Republic of Liberia

National Fisheries and Aquaculture Authority

RESEARCH AND STATISTICS ANNUAL TECHNICAL REPORT 2025

Table of Content

Foreword 7
Preface 8
Acknowledgements 9
Acronyms and Abbreviations 11
1. Executive Summary 13
2. Introduction 15
2.1. Background and Rationale 15
2.2. Objectives of the Report 17
2.4 Limitations 20
2.5 Structure of the Report 22
3. Fishery Statistics 24
3.1 Overview of Existing Data Collection Programs, Applications and Data Sources 24
3.2 General Overview of existing Fishing Fleet and Efforts 25
3.3 Marine Capture Fishery Production by Subsectors 26
3.4 Time Series Production Analysis of Artisanal and Industrial Marine Trawlers (2018-2025) 30
3.5 Imports and Export 31
3.6 Analysis of Fish Trade Dynamics: Import and Export Trends (2014–2025) 33
3.7 Analysis of Fish Trade Dynamics: Domestic Production vs. Import Reliance (2018-2025) 35
3.8 Aquaculture and Inland Fishery Production 37
4 Fisheries Resource Biology and Ecology 38
4.7 Fisheries Resource Abundance and Standing Biomass 38
4.8 Resource Exploitation Status and Biological Reference Points (BRPs) 41
4.9 Resource Biology and Ecological Indicators 47
5 Fisheries Resource Socio-Economics 52
5.7 Economic Value of Fishery Production 52
5.8 Fisheries Role in Food Security and Nutrition 53
5.9 Contribution to the National Economy 54
6 Fisheries Quality Assurance and Compliance Update 55
6.7 Routine Quarterly Inspection of Cold Storage Facilities 55
6.8 Highlights of the Nationwide Assessment of Cold Storage Establishments 57
7. Summary of Activities Achieved (2025) 66
7.1 Fisheries Statistics 66
7.2 Fisheries Biology and Ecology 67
7.3 Fisheries Socio-Economics 67
7.4 Fisheries Quality Assurance 68
7.5 Institutional and Capacity Development 68
7.6 Summary of Key Performance Indicators 69
8. Conclusion and Recommendations 70

8.1 Conclusion 70
8.2 Recommendations 71
9. Appendices and Annexes 74
Appendix 1: Species specific Biomass Estimates for Major Pelagic and Demersal Fisheries Resources from the Liberian Shelf by Surveys 74
Appendix 2: Combined marine industrial and artisanal fisheries production (Kg) times series for the top 66 species landed from 2018-2024 78

List of Tables

Foreword 7
Preface 8
Acknowledgements 9
Acronyms and Abbreviations 11
1. Executive Summary 13
2. Introduction 15
2.1. Background and Rationale 15
2.2. Objectives of the Report 17
2.4 Limitations 20
2.4.1 Data Gaps and Coverage Issues 20
2.4.2 Methodological Constraints 20
2.4.3 Temporal Limitations 21
2.4.4 Capacity and Resource Constraints 21
2.4.5 Reporting and Disclosure Limitations 22
2.5 Structure of the Report 22
3. Fishery Statistics 24
3.1 Overview of Existing Data Collection Programs, Applications and Data Sources 24
3.2 General Overview of existing Fishing Fleet and Efforts 25
3.3 Marine Capture Fishery Production by Subsectors 26
3.3.1 Marine Artisanal Fisheries 26
3.3.2 Tuna Fisheries 27
3.3.3 Coastal Industrial Fisheries 28
3.3.4 Deepwater Shrimp Fishery 28
Species composition: 28
Management implication: 29
3.3.5 Comparative Analysis and Strategic Implications 29
Strategic observations: 29
3.3.6 Conclusion on Production by Subsector: 30
3.4 Time Series Production Analysis of Artisanal and Industrial Marine Trawlers (2018-2025) 30
3.5 Imports and Export 31

3.5.1 Imports 31
3.5.2 Exports 32
3.6 Analysis of Fish Trade Dynamics: Import and Export Trends (2014–2025) 33
3.6.1 Overview 33
3.6.3 Export Trends 34
3.6.4 Strategic Implications 34
3.7 Analysis of Fish Trade Dynamics: Domestic Production vs. Import Reliance (2018-2025) 35
3.7.1 Comparative Analysis of Production and Consumption 35
3.7.2 Import Dependency and Self-Sufficiency Ratio 36
3.7.3 Economic Implications of Import Dependency 36
3.7.4 Resource Management Perspectives 36
3.7.5 Conclusion and Strategic Outlook 37
3.8 Aquaculture and Inland Fishery Production 37
4 Fisheries Resource Biology and Ecology 38
4.7 Fisheries Resource Abundance and Standing Biomass 38
4.1.1 Overview of Surveys Conducted (2019–2024) 38
4.1.2 Summary of Survey Estimates 39
4.1.3 Comparative Analysis of Survey Results 39
4.1 Total Biomass Estimates 39
4.2 Pelagic Resources 40
4.3 Demersal Resources 40
4.1.4 Species-Level Biomass Comparison 41
4.8 Resource Exploitation Status and Biological Reference Points (BRPs) 41
4.2.1 Stock status categories 42
4.2.2 Management Reference Points (MRPs) 42
4.2.3 Assessments Results 43
4.2.4 Management Advice 45
Management Recommendations by Status 46
Cross-Cutting Actions 46
4.2.6 Recommended Research 46
4.9 Resource Biology and Ecological Indicators 47
4.3.1 Sardinella aurita 47
4.3.2 Shrimp Species Length Analysis 49
5 Fisheries Resource Socio-Economics 52
5.7 Economic Value of Fishery Production 52
5.8 Fisheries Role in Food Security and Nutrition 53
5.9 Contribution to the National Economy 54
6 Fisheries Quality Assurance and Compliance Update 55
6.7 Routine Quarterly Inspection of Cold Storage Facilities 55
6.1.1 Overview of Cold storage facilities inspected 56

6.8 Highlights of the Nationwide Assessment of Cold Storage Establishments....57
6.2.1 Overview of Key Findings....57
Distribution of Cold Storage facilities across Liberia....57
National Cold Storage Database....58
Types of Cold Storage Infrastructures across the country....58
Ownership Type....60
Administrative Structure of Cold Storage Facilities....61
Primary Energy Source....63
Temperature Logging and Monitoring System....63
General Hygiene Status....64
Fish Handling Practices and Traceability Records....65
Sources of Fish Product in Storage....66
7. Summary of Activities Achieved (2025)....66
7.1 Fisheries Statistics....66
7.2 Fisheries Biology and Ecology....67
7.3 Fisheries Socio-Economics....67
7.4 Fisheries Quality Assurance....68
7.5 Institutional and Capacity Development....68
7.6 Summary of Key Performance Indicators....69
8. Conclusion and Recommendations....70
8.1 Conclusion....70
8.2 Recommendations....71
A. For Overexploited Stocks (Immediate Actions)....71
B. For Fully and Not-Fully Exploited Stocks (Precautionary Actions)....71
C. Cross-Cutting Management Actions....71
D. Research Priorities for 2026....72
E. Institutional and Policy Actions....72
9. Appendices and Annexes....74
Appendix 1: Species specific Biomass Estimates for Major Pelagic and Demersal Fisheries Resources from the Liberian Shelf by Surveys....74
Appendix 2: Combined marine industrial and artisanal fisheries production (Kg) times series for the top 66 species landed from 2018-2024....78

List of Figures

Foreword....7
Preface....8
Acknowledgements....9
Acronyms and Abbreviations....11

1. Executive Summary 13
2. Introduction 15
2.1. Background and Rationale 15
2.2. Objectives of the Report 17
2.4 Limitations 20
2.4.1 Data Gaps and Coverage Issues 20
2.4.2 Methodological Constraints 20
2.4.3 Temporal Limitations 21
2.4.4 Capacity and Resource Constraints 21
2.4.5 Reporting and Disclosure Limitations 22
2.5 Structure of the Report 22
3. Fishery Statistics 24
3.1 Overview of Existing Data Collection Programs, Applications and Data Sources 24
3.2 General Overview of existing Fishing Fleet and Efforts 25
3.3 Marine Capture Fishery Production by Subsectors 26
3.3.1 Marine Artisanal Fisheries 26
3.3.2 Tuna Fisheries 27
3.3.3 Coastal Industrial Fisheries 28
3.3.4 Deepwater Shrimp Fishery 28
Species composition: 28
Management implication: 29
3.3.5 Comparative Analysis and Strategic Implications 29
Strategic observations: 29
3.3.6 Conclusion on Production by Subsector: 30
3.4 Time Series Production Analysis of Artisanal and Industrial Marine Trawlers (2018-2025) 30
3.5 Imports and Export 31
3.5.1 Imports 31
3.5.2 Exports 32
3.6 Analysis of Fish Trade Dynamics: Import and Export Trends (2014–2025) 33
3.6.1 Overview 33
3.6.3 Export Trends 34
3.6.4 Strategic Implications 34
3.7 Analysis of Fish Trade Dynamics: Domestic Production vs. Import Reliance (2018-2025) 35
3.7.1 Comparative Analysis of Production and Consumption 35
3.7.2 Import Dependency and Self-Sufficiency Ratio 36
3.7.3 Economic Implications of Import Dependency 36
3.7.4 Resource Management Perspectives 36
3.7.5 Conclusion and Strategic Outlook 37
3.8 Aquaculture and Inland Fishery Production 37
4 Fisheries Resource Biology and Ecology 38

4.7 Fisheries Resource Abundance and Standing Biomass 38
4.1.1 Overview of Surveys Conducted (2019–2024) 38
4.1.2 Summary of Survey Estimates 39
4.1.3 Comparative Analysis of Survey Results 40
4.1 Total Biomass Estimates 40
4.2 Pelagic Resources 40
4.3 Demersal Resources 41
4.1.4 Species-Level Biomass Comparison 41
4.8 Resource Exploitation Status and Biological Reference Points (BRPs) 42
4.2.1 Stock status categories 43
4.2.2 Management Reference Points (MRPs) 43
4.2.3 Assessments Results 44
4.2.4 Management Advice 46
Management Recommendations by Status 46
Cross-Cutting Actions 46
4.2.6 Recommended Research 47
4.9 Resource Biology and Ecological Indicators 47
4.3.1 Sardinella aurita 47
4.3.2 Shrimp Species Length Analysis 50
5 Fisheries Resource Socio-Economics 53
5.7 Economic Value of Fishery Production 53
5.8 Fisheries Role in Food Security and Nutrition 54
5.9 Contribution to the National Economy 55
6 Fisheries Quality Assurance and Compliance Update 56
6.7 Routine Quarterly Inspection of Cold Storage Facilities 56
6.1.1 Overview of Cold storage facilities inspected 57
6.8 Highlights of the Nationwide Assessment of Cold Storage Establishments 58
6.2.1 Overview of Key Findings 58
Distribution of Cold Storage facilities across Liberia 58
National Cold Storage Database 59
Types of Cold Storage Infrastructures across the country 59
Ownership Type 61
Administrative Structure of Cold Storage Facilities 62
Primary Energy Source 64
Temperature Logging and Monitoring System 64
General Hygiene Status 65
Fish Handling Practices and Traceability Records 66
Sources of Fish Product in Storage 67
7. Summary of Activities Achieved (2025) 67
7.1 Fisheries Statistics 67

7.2 Fisheries Biology and Ecology 68
7.3 Fisheries Socio-Economics 68
7.4 Fisheries Quality Assurance 69
7.5 Institutional and Capacity Development 69
7.6 Summary of Key Performance Indicators 70
8. Conclusion and Recommendations 71
8.1 Conclusion 71
8.2 Recommendations 72
A. For Overexploited Stocks (Immediate Actions) 72
B. For Fully and Not-Fully Exploited Stocks (Precautionary Actions) 72
C. Cross-Cutting Management Actions 72
D. Research Priorities for 2026 73
E. Institutional and Policy Actions 73
9. Appendices and Annexes 75
Appendix 1: Species specific Biomass Estimates for Major Pelagic and Demersal Fisheries Resources from the Liberian Shelf by Surveys 75
Appendix 2: Combined marine industrial and artisanal fisheries production (Kg) times series for the top 66 species landed from 2018-2024 79

FOREWORD

From the Director General

It is with profound professional satisfaction that I present the Department of Research & Statistics Annual Technical Report for 2025. This document is not merely a compilation of data; it is the scientific voice of the National Fisheries and Aquaculture Authority (NaFAA), offering an evidence-based diagnosis of the health, productivity, and challenges facing Liberia's marine and inland fisheries.

The year 2025 marked a significant maturation of our scientific and statistical capabilities. For the first time, we have been able to integrate data from advanced fisheries-independent surveys (including the 2024 EAF-Nansen and INRH/Moroccan surveys) with our enhanced fisheries-dependent monitoring and analysis systems to produce a more coherent picture of our resources. The findings, particularly those concerning stock status, are sobering revealing that five of eight key commercial stocks are overexploited. Yet, they are also empowering, providing the clear scientific justification for management interventions that we have long needed.

This report reflects the dedication of our four specialized units: Biological Research, Socio-Economic Research, Statistics, and Quality Assurance. Together, they have advanced our mandate to generate policy-

relevant knowledge. I commend the Director, Associate Directors, Managers, and the entire field staff whose daily work, often under difficult conditions, turns raw data into actionable science.

As we move forward, this report will serve as our baseline. It is now incumbent upon policymakers, development partners, and industry stakeholders to heed its conclusions. The science is clear; the path to sustainability requires immediate, collective action.

J. Cyrus Saygbe, Sr.
Director General
National Fisheries and Aquaculture Authority (NaFAA)

PREFACE

We are pleased to introduce the biological components of this 2025 Annual Technical Report. The Department of Research and Statistics role has been to ensure that our assessments of fish stocks, ecosystem indicators, and resource biology meet rigorous scientific standards and directly inform Liberia's management decisions.

The past year has been transformative for biological research at NaFAA. We have moved from a period of chronic data-limitation to one where we can apply sophisticated assessment models, specifically Catch-Maximum Sustainable Yield (CMSY) and Bayesian Schaefer Model (BSM) methods to evaluate the status of our key pelagic and demersal resources. The comparative analysis of the 2019–2024 survey data (EAF-Nansen, CRODT, and INRH) presented in this report represents the most comprehensive synthesis of biomass estimates compiled for the Liberian shelf.

The stark contrast between the high biomass estimates from the 2024 EAF-Nansen survey (2.4 million tons) and the lower estimates from other surveys highlights both the abundance potential of our waters and the critical need for standardized, periodic surveys. However, our stock assessments tell a more concerning story: 63% of the assessed species are overexploited, including key demersal stocks like croakers (*Pseudotolithus spp.*) and snappers (*Lutjanus spp.*).

We invite you to examine the biological indicators within, particularly the shrimp length-frequency analysis showing healthy spawning stocks and the maturity studies on *Sardinella aurita*. These are the building blocks of a modern, science-based fishery management system. The challenge now is to match our growing scientific capacity with decisive regulatory action.

ACKNOWLEDGEMENTS

The Department of Research & Statistics extends its deepest gratitude to all individuals and institutions whose contributions made this 2025 Annual Technical Report possible.

First, we thank the Director General of NaFAA and the senior management team for their sustained investment in research capacity, including the procurement of field equipment, support for survey participation, and prioritization of scientific training.

We acknowledge with appreciation our international partners:

- **The EAF-Nansen Programme (FAO/Norway)** for conducting the 2019 and 2024 transboundary survey aboard the R/V Dr. Fridtjof Nansen and for capacity building in stock assessment.
- **The Moroccan Institute for Fisheries and Marine Research (INRH)** for the 2024 survey using R/V Al Hassan Al Marakchi and for the detailed biological analysis of pelagic species.
- **The Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean (ATLAFCO)** for supporting the 2024 INRH resource survey on the Liberian continental shelf.
- **The Senegalese Research Institute (CRODT)** for the 2023 survey that, despite challenges, provided critical baseline demersal data.
- **The World Bank for funding the Liberia Sustainable Management of Fisheries Project (LSMFP)** that supported the CRODT 2023 stock assessment.

We are profoundly grateful to the **Fisheries Enumerators, Fisheries Observers, Data Field Coordinators, and Quality Control Technicians**, the backbone of our data collection system who work tirelessly in the nine coastal counties and at sea, often in remote landing sites, to ensure that no catch goes unrecorded.

Special recognition is due to the leadership of our technical units:

- **Mr. Nasi T. Broh, Associate Director for Statistics**, receives our sincere commendation for his exceptional leadership in developing the Aquaculture Farmers Database (533 farms registered across Bong, Nimba, and Lofa counties) and the national Cold Storage Facility Database (255 facilities with full geospatial metadata). His oversight of the time-series production analysis, trade dynamics assessment, and per capita consumption trends has fundamentally strengthened Liberia's fisheries statistical baseline.
- **Mr. Sonkarley Karnue, Associate Director for the Quality Assurance Unit**, is gratefully acknowledged for his diligent coordination of the nationwide cold storage enumeration and inspection exercise (December 2025), as well as the routine quarterly inspections of 149 fish establishments. Under his leadership, the Unit documented critical compliance gaps in temperature monitoring (0%) and traceability (20%), providing the evidence base for urgent regulatory reforms. His team's work has significantly advanced food safety oversight along the entire fish value chain.
- **Mr. Austin Saye Wehye**, **Director, Department of Research & Statistics**, led the stock assessments for eight key species using CMSY/BSM methods, while **Mr. Roosevelt S. Daniels, Associate Director for Biological Research** assisted and led the synthesis of four major resource

surveys (2019–2024), and the shrimp length-frequency analyses. His scientific rigor has produced the most comprehensive biological assessment of Liberia's fisheries resources to date.

Finally, we thank the fishing communities, industrial vessel operators, and fish traders who voluntarily provide their catch and trade data. Your cooperation is the foundation of evidence-based management.

• ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
BRP	Biological Reference Point
BSM	Bayesian Schaefer Model
CECAF	Fishery Committee for the Eastern Central Atlantic
CL	Carapace Length
CMSY	Catch-based Maximum Sustainable Yield
CPUE	Catch Per Unit Effort
CRODT	Centre de Recherches Océanographiques de Dakar-Thiaroye (Senegal)
DRS	Department of Research and Statistics
EAF	Ecosystem Approach to Fisheries
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization
F_{MSY}	Fishing mortality at Maximum Sustainable Yield
GDP	Gross Domestic Product
GIS	Geographic Information System
GPS	Global Positioning System

HCR	Harvest Control Rule
ICCAT	International Commission for the Conservation of Atlantic Tunas
INRH	Institut National de Recherche Halieutique (Morocco)
LEC	Liberia Electricity Corporation
LIFSSP	Liberia Integrated Fisheries Sector Strengthening Project
LSMFP	Liberia Sustainable Management of Fisheries Project
MCL	Median Carapace Length
MCS	Monitoring, Control, and Surveillance
MSY	Maximum Sustainable Yield
MT	Metric Tons
NaFAA	National Fisheries and Aquaculture Authority
SSB	Spawning Stock Biomass
TAC	Total Allowable Catch
USD	United States Dollar
VMS	Vessel Monitoring System
WB	World Bank

1. EXECUTIVE SUMMARY

In 2025, the Department of Research and Statistics consolidated Liberia's transition toward a data-driven fisheries governance framework. Total fisheries production reached **40,772 MT**, valued at approximately **USD 34.5 million**, with **marine artisanal fisheries contributing 69%** of total landings. Despite this substantial production, per capita fish consumption remained below the global average at **10.4 kg/person/year**, signaling persistent distribution, post-harvest, and access challenges.

Key Statistical Achievements:

- A centralized aquaculture database was established, registering **533 farms** across Bong, Nimba, and Lofa counties, with tilapia as the dominant species and male farmers accounting for 70% of ownership.
- A nationwide cold storage enumeration recorded **255 facilities**, with 90% operating as branches of major foreign-owned enterprises, highlighting market concentration and the need for strengthened local participation.
- Total fish imports reached **22,456 MT (USD 9.66 million)**, with an average annual import dependency ratio of **43.9%**, reflecting continued reliance on external supply to meet national demand.

Biological Research Highlights:

Four major resource surveys (2019–2024) were synthesized, revealing wide variability in biomass estimates from 74,116 MT (2019) to 2.4 million MT (2024 EAF-Nansen), attributed to differences in survey design, acoustic methodologies, spatial coverage, and seasonal timing.

Critically, **stock assessments for eight key commercial species** using CMSY/BSM methods showed:

- **63% (5 species) overexploited**: including *Pseudotolithus spp.* (croakers), *Lutjanus spp.* (snappers), *Galeoides decadactylus* (butternose), *Cynoglossus spp.* (solefish), and *Alectis alexandrinus* (big poor-joe).
- **25% (2 species) fully exploited**: *Sardinella spp.* (bony) and *Caranx spp.* (cavalley).
- **12% (1 species) not fully exploited**: *Ilisha africana* (gbapleh).

The relative fishing mortality (F/FMSY) for overexploited stocks ranged from 1.73 (*Lutjanus spp.*) to 11.9 (*Cynoglossus spp.*), indicating fishing pressure far beyond sustainable limits. Positive biological indicators were observed for shrimp stocks, with median carapace lengths (MCL) exceeding lengths at first maturity (CL50), indicating a healthy spawning stock biomass and no evidence of recruitment overfishing.

Quality Assurance Outcomes: Routine quarterly inspections of 149 fish establishments revealed major compliance gaps: **0% of facilities displayed temperature logbooks**, and only **20% maintained traceability records**. The nationwide cold storage assessment (255 facilities) further identified that while 90% of facilities had acceptable hygiene, the lack of daily temperature logging and weak traceability pose significant food safety risks.

Trade and Economic Analysis: Analysis of trade dynamics (2018–2025) revealed a structural deficit: domestic production meets only **56%** of national fish demand, with an average annual import requirement of approximately **20,000 MT**. This represents both a vulnerability to global market fluctuations and an untapped opportunity for aquaculture expansion.

Conclusion:

Liberia's fisheries resources are under significant pressure, with overexploitation evident across multiple demersal stocks. However, improved survey data, new databases (aquaculture and cold storage), and strengthened analytical capacity now provide the tools for corrective action. The Department recommends immediate reductions in fishing mortality for overexploited stocks (30–50%), mandatory temperature logging and traceability for cold storage facilities, and prioritized investment in aquaculture to address the 20,000 MT annual import deficit.

2. INTRODUCTION

2.1. Background and Rationale

Liberia's fisheries sector is a cornerstone of national food security, livelihoods, and economic development. With an Exclusive Economic Zone (EEZ) of approximately 246,000 kmZ and a coastline stretching 590 km, the country's marine and inland waters support diverse fish resources that directly engage over 40,000 fisherfolks and provide primary protein for an estimated 80% of the population. The sector also contributes significantly to government revenue through industrial fishing licenses and facilitates regional trade in fish products.

Despite this strategic importance, Liberia's fisheries resources have historically been managed with limited scientific information. Data collection systems were fragmented, stock assessments were rare, and management decisions often relied on precautionary principles rather than empirical evidence. This information deficit has left the sector vulnerable to overfishing, habitat degradation, and the emerging impacts of climate change.

Recognizing this gap, the National Fisheries and Aquaculture Authority (NaFAA), through its Department of Research and Statistics, has since 2020 embarked on a systematic effort to strengthen Liberia's fisheries science and statistical infrastructure. This effort has been supported by international partnerships including the EAF-Nansen Programme (FAO/Norway), the Moroccan Institute for Fisheries and Marine Research (INRH), and the Senegalese Research Institute (CRODT) as well as domestic investments in data collection, quality assurance, and human capacity development.

Rationale for the 2025 Annual Technical Report

The present report is anchored in the recognition that evidence-based fisheries governance requires regular, transparent, and comprehensive reporting on the state of the nation's aquatic resources. Without such reporting, policymakers operate in a vacuum, management measures lack scientific justification, and the risk of resource collapse escalates.

Several compelling factors necessitated the production of this 2025 report:

1. **Availability of New Scientific Data:** The completion of four major fisheries resource surveys between 2019 and 2024 (two national, two regional) has generated a wealth of biomass, biological, and ecological data that must be synthesized and made accessible to decision-makers.

2. **Evidence of Overexploitation:** Preliminary analyses from the Department's stock assessment unit indicated that several key commercial species (e.g., croakers, snappers, grunters) may be experiencing fishing mortality beyond sustainable limits. A rigorous, documented assessment was urgently required.
3. **Structural Changes in the Fisheries Sector:** The expansion of the non-motorized Kru fleet, stagnation of motorized Fanti vessels, fluctuations in industrial tuna effort, and the absence of a national frame survey since 2020 have altered fishing pressure dynamics. These changes demand an updated statistical baseline.
4. **Emerging Food Security Concerns:** Per capita fish consumption declined sharply after 2020 (from ~10.6 kg to 7.55 kg in 2021) and has only slowly recovered to 10.4 kg in 2025. Understanding the drivers of this trend—whether supply, distribution, or economic—requires integrated analysis of production, trade, and consumption data.
5. **Regulatory and Reporting Obligations:** As a cooperating member of the International Commission for the Conservation of Atlantic Tunas (ICCAT) and a signatory to various regional fisheries instruments, Liberia is obligated to produce regular scientific and statistical reports. This document fulfills part of that commitment.
6. **Need for a Baseline against Which to Measure Progress:** The World Bank (WB) supported Liberia Sustainable Management of Fisheries Project (LSMFP), and the Liberia Integrated Fisheries Sector Strengthening Project (LIFSSP) and other initiatives are investing in fisheries management. A comprehensive 2025 report provides the baseline against which future interventions can be evaluated.

Thus, this report is not merely an institutional exercise. It is a strategic instrument designed to inform policy, guide management, attract investment, and promote the sustainable utilization of Liberia's fisheries and aquaculture resources.

2.2. Objectives of the Report

The overall goal of the 2025 Annual Technical Report is to provide a comprehensive, evidence-based update on the status, trends, and performance of Liberia's fisheries and aquaculture sector, with a focus on informing management and policy decisions.

Specific Objectives

The report is structured to achieve the following specific objectives:

Objective 1: To Update National Fisheries Statistics

- Present 2025 production figures by subsector (marine artisanal, industrial trawl, tuna, and aquaculture).
- Analyze time-series trends (2018–2025) for artisanal and industrial fisheries.
- Document import and export volumes and values for fish and fishery products.
- Estimate per capita fish consumption and track changes over the reporting period.

Objective 2: To Assess the Biological Status of Key Fish Stocks

- Synthesize biomass estimates from the four major resource surveys conducted between 2019 and 2024.
- Evaluate the exploitation status of eight commercially important pelagic and demersal species using data-limited assessment methods (CMSY/BSM).
- Compute Biological Reference Points (BRPs) including MSY, F_{MSY}, B_{MSY}, and $F_{0.1}$.
- Provide management advice based on stock status categories (not-fully exploited, fully exploited, overexploited).

Objective 3: To Characterize Resource Biology and Ecological Indicators

- Analyze length-frequency distributions for key shrimp species and estimate median carapace length (MCL) relative to length at first maturity (CL_{50}) and maximum length (CL_{max}).
- Examine sex ratio, maturity stages, and reproductive potential for *Sardinella aurita*.
- Map spatial distribution patterns for key pelagic species.

Objective 4: To Analyze Fisheries Socio-Economics

- Estimate the monetary value of total fisheries production (2025).

- Calculate fisheries contribution to GDP and household livelihoods. (to be expanded in future reports).
- Identify social indicators relevant to fishing communities (to be expanded in future reports).

Objective 5: To Evaluate Quality Assurance and Compliance

- Document findings from routine quarterly inspections of cold storage facilities.
- Present results of the nationwide cold storage assessment (December 2025), including facility distribution, ownership structure, energy sources, hygiene status, and traceability practices.
- Identify gaps in temperature monitoring, record-keeping, and food safety compliance.

Objective 6: To Establish Baseline Databases for Future Monitoring

- Document the newly developed Aquaculture Farmers Database (533 farms registered in three counties).
- Present the national Cold Storage Facility Database (255 facilities with GPS coordinates and operational metadata).
- Provide recommendations for database expansion and maintenance.

Objective 7: To Formulate Evidence-Based Recommendations

- Translate assessment findings into specific, actionable management recommendations.
- Prioritize research activities for the 2026 reporting cycle.
- Identify institutional and policy reforms needed to strengthen fisheries governance.

2.3 Scope and Coverage

The scope of this report encompasses all fisheries and aquaculture activities under the mandate of NaFAA, as defined by the National Fisheries and Aquaculture Act and associated regulations.

Geographic Coverage

- **Marine Waters:** Liberia's EEZ (≈246,000 km²), including coastal waters from the shoreline to the 200-nautical mile limit. Specific attention is given to nearshore areas (≤20 km) that are the primary operational zone for artisanal canoe fisheries.
- **Coastal Counties:** Data collection covers landing sites, cold storage facilities, and fish trade nodes across all nine coastal counties: Grand Cape Mount, Bomi, Montserrado, Margibi, Grand Bassa, Rivercess, Sinoe, Grand Kru, and Maryland.

- **Inland Counties:** For aquaculture, the report covers Bong, Nimba, and Lofa counties (where the new database was piloted), with plans for expansion to Margibi and Montserrado in subsequent reports.

Temporal Coverage

- **Primary Focus:** Calendar year 2025 (January 1 – December 31, 2025).
- **Time-series Analysis:** Where trend analysis is presented (e.g., production, consumption, fleet dynamics), data from 2018 to 2025 are included to contextualize recent changes.
- **Survey Data:** Fisheries resource surveys conducted between 2019 and 2024 are synthesized to provide biomass and biological context.

Thematic Coverage

The report addresses the following thematic areas, aligned with the Department's mandate:

Theme	Specific Content
Fisheries Statistics	Production by subsector; artisanal vs. industrial trends; imports/exports; per capita consumption; fleet composition (2014–2025).
Resource Biology & Ecology	Biomass estimates from surveys; stock status assessments (8 species); biological reference points; length-frequency analysis; shrimp biology; pelagic species biology.
Socio-Economics	Monetary value of production; fisheries GDP contribution; unsold production analysis; livelihood indicators.
Quality Assurance	Cold storage facility inspections; hygiene and sanitation; temperature monitoring; traceability; source of fish products.
Aquaculture & Inland Fisheries	Farmer database development; species composition; gender and regional disparities; production estimates.

Exclusions

While the report is comprehensive, the following areas are explicitly excluded or partially treated due to data limitations:

- Detailed climate change impact modeling (qualitative treatment only).
- Full economic valuation of ecosystem services provided by fisheries.

- In-depth analysis of post-harvest loss quantification (preliminary only).
- Tuna stock assessments (ICCAT-specific reporting handled separately, though referenced).
- Recreational fisheries (data not systematically collected in 2025).

2.4 Limitations

While the Department has made substantial progress in data collection and analysis, the 2025 report is subject to several limitations that readers should consider when interpreting findings.

2.4.1 Data Gaps and Coverage Issues

Table 1: Associated Limitations of current Report

Limitation	Impact	Mitigation or Future Action
No national frame survey since 2020	Fleet size, number of fishers, and landing site counts are outdated, potentially biasing effort estimates and production extrapolations.	Plan a frame survey for Q3 2026; prioritize funding and logistics.
Aquaculture database limited to 3 counties (Bong, Nimba, Lofa)	Production and farmer numbers for Margibi, Montserrado, and other inland counties are unknown, leading to underestimation of sector contribution.	Expand enumeration to remaining counties in 2026.
Inland fisheries not systematically covered	Riverine and lake fisheries (e.g., Lake Piso) are poorly quantified, missing a potentially significant source of food and livelihood.	Design and pilot inland fisheries survey methodology in 2026.
Tuna observer coverage below target (<5% of trips)	Bycatch, discards, and catch composition for tuna fisheries have high uncertainty.	Recruit and train additional observers; target 10% coverage by 2027.
Cold storage data: 12 facilities closed/unavailable at time of inspection	Operational status and compliance for these facilities remain unknown, potentially biasing compliance statistics upward.	Follow-up inspection within 3 months; enforce registration requirements.

2.4.2 Methodological Constraints

Biomass Estimate Variability Across Surveys

The four resource surveys synthesized in this report (2019–2024) produced widely divergent biomass estimates (74,116 – 2,397,200 tons). This creates interpretational challenges for management:

- **Root Causes:** Differences in acoustic calibration, spatial coverage, stock modeling approach, seasonal timing (fish migration), and survey objectives (regional vs. national).
- **Department Position:** While the 2024 EAF-Nansen survey provides the most robust estimate due to expanded coverage and modern methodologies, the Department cannot definitively assert a single "correct" biomass value.
- **Recommended Path:** Establish a recurring biennial survey schedule using consistent methodology (collaboration with EAF-Nansen or other partners) to build a comparable time-series.

Data-Limited Assessment Uncertainties

The CMSY/BSM methods used for the 8-species assessment are powerful for data-limited contexts but carry inherent uncertainties:

- **Input Data Quality:** CPUE standardization is imperfect due to changes in fishing power, gear efficiency, and spatial effort allocation over the 10-year time-series.
- **Prior Sensitivity:** Results are sensitive to priors for intrinsic growth rate (r) and carrying capacity (k); while literature-based priors were used, they may not reflect local stock-specific dynamics.
- **Single-Species Focus:** The assessments do not account for species interactions, environmental variability, or ecosystem effects.

Mitigation: The Department presents results with confidence intervals (where available), applies multiple priors to test robustness, and explicitly states that management advice should adopt precautionary buffers to account for uncertainty.

2.4.3 Temporal Limitations

- **Time-Series Inconsistencies:** Some variables (e.g., fleet composition data from 2014–2025) rely on different data sources across years, with potential breaks in series.
- **Lag in Trade Data:** Import/export data from relevant sources may have reporting lags of 1–2 months; final annual figures remain subject to minor revision.
- **Survey Non-Annual Nature:** Biomass estimates are not available annually; the 2025 report relies on surveys from 2019, 2023, and 2024, meaning some assessments reflect conditions 1–6 years before the reporting period.

2.4.4 Capacity and Resource Constraints

- **Human Resources:** The Department operates with very few competent technicians, who are not fully incentivized with research funding and logistics. This limits the number of stock assessments, research publications, and advanced modeling that can be completed annually.

- **Equipment Limitations:** Some landing sites lack reliable weighing scales, mobile gadgets, and internet connectivity for real-time data upload.
- **Laboratory Capacity:** The Fishery Competent Laboratory requires upgrades to conduct microbiological and chemical contaminant testing at the volume needed for robust quality assurance.

2.4.5 Reporting and Disclosure Limitations

- **Confidentiality:** Some industrial vessel-level data (e.g., individual company catch and effort) are aggregated to prevent disclosure of commercially sensitive information.
- **Non-Response:** A small number of cold storage facilities (n=12) and fish establishments refused inspection or were locked at the time of visit; these are noted in the report but excluded from compliance calculations.

2.5 Structure of the Report

The 2025 Annual Technical Report is organized into nine (9) main sections, designed to guide the reader from broad context to specific findings and actionable recommendations (**Table 2**).

Table 2: Outline of Report Structure

Section	Title	Content Summary
1	Executive Summary	Condensed overview of key findings, stock status, production figures, quality assurance outcomes, and priority recommendations (1-2 pages).
2	Introduction	Background, rationale, objectives, scope, methodology, limitations, and report structure (the present section).
3	Fisheries Statistics	Production by subsector (artisanal, industrial trawl, tuna); fleet trends (2014–2025); time-series analysis (2018–2025); import/export volumes and values; and per capita fish consumption.
4	Fisheries Resource Biology and Ecology	Biomass estimates from four major surveys (2019–2024); stock assessment results for 8 key species (CMSY/BSM); biological reference points; shrimp biology (length-frequency, MCL vs. CL50); *Sardinella aurita* biology (spatial distribution, length, sex ratio, maturity).
5	Fisheries Resource Socio-Economic	Monetary value of production (2025, monthly); quantity sold vs. unsold; fisheries' contribution to GDP (preliminary); social indicators (livelihoods, fishing community demographics).

6	Fisheries Quality Assurance and Compliance	Routine quarterly inspections (149 facilities); nationwide cold storage assessment (255 facilities)—distribution, ownership, energy sources, temperature logging, hygiene, fish handling, traceability, and sources of fish.
7	Summary of Activities Achieved (2025)	Consolidated list of key deliverables (surveys, databases, inspections, assessments, publications).
8	Conclusion and Recommendations	Synthesis of findings; specific management recommendations by stock status; research priorities for 2026; institutional and policy actions.
9	Appendices and Annexes	Appendix 1: Species-specific biomass estimates (pelagic and demersal) by survey; Appendix 2: Time-series production (2018-2025) for top 66 species; Annexes: Survey reports, data collection forms, inspection checklists, etc.

Navigational Aids

- **Tables and Figures:** Each table and figure is numbered sequentially based on first mention and referenced in the text.
- **Acronyms and Abbreviations:** Provided before Section 1 for quick reference.
- **Foreword and Preface:** Contextual statements from the Department Director and Associate Director for Biological Research.
- **Acknowledgements:** Recognition of partners, staff, and communities.

3. FISHERY STATISTICS

Liberia's fisheries sector in 2025 showed steady growth, with total catches from both artisanal and industrial fleets contributing significantly to food security and the economy. The National Fisheries and Aquaculture Authority (NaFAA) reported stronger institutional reforms, improved monitoring, and progress toward sustainable management.

Liberia's fisheries sector is a major contributor to employment, food security, and economic growth, directly engaging over 40,000 fisherfolks and providing the primary source of protein for about 80% of the population. Artisanal fisheries remain central to coastal livelihoods and local food supply, while industrial fisheries are becoming increasingly important for exports and government revenue, particularly through licensing.

Catch and effort trends show generally stable artisanal catches, despite seasonal fluctuations, and substantial industrial landings, with CPUE monitoring used to assess stock status. Key species in industrial fisheries include shrimps, crabs, hake, and pelagic species.

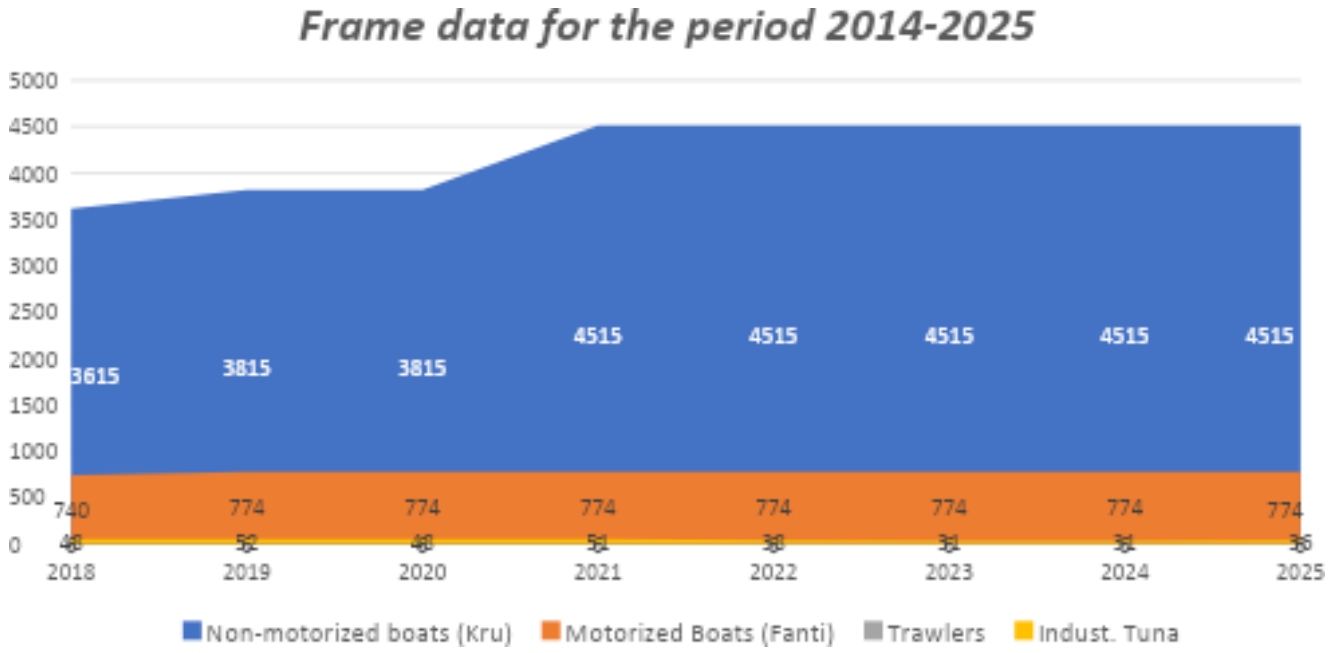
3.1 Overview of Existing Data Collection Programs, Applications and Data Sources

Liberia's fisheries statistics are managed primarily by the National Fisheries and Aquaculture Authority (NaFAA), which oversees catch and effort monitoring, licensing, and research. Current data collection programs combine artisanal landing surveys, industrial logbooks, nationwide frame surveys, and structural databases, but gaps remain in inland fisheries, aquaculture, and harmonization across systems.

Liberia's fisheries data systems comprise multiple, complementary data collection programs supporting management, compliance, and food security analysis. Catch and effort monitoring is conducted through daily artisanal landing records and industrial vessel logbooks, enabling CPUE estimation and fishery-dependent stock assessment. A digital licensing and vessel registry, integrated with MCS systems, provides baseline information for fleet capacity, compliance monitoring, and revenue tracking.

3.2 General Overview of existing Fishing Fleet and Efforts

Figure 1 depicts vessel trends in Liberia's fishing sector that carry significant implications for sustainable fisheries management, particularly the rapid expansion of the non-motorized Kru fleet alongside the relatively stable yet constrained Fanti fleet. This divergence underscores the need for a deeper understanding of the socioeconomic factors shaping artisanal fisheries, including access to resources, capital limitations, and market demand. The stagnation of motorized vessels and the decline in industrial tuna fleets likely reflect broader policy, economic, and infrastructural constraints. Notably, persistent challenges in sourcing raw materials for Fanti boat construction since 2011 have restricted fleet expansion, revealing a critical structural bottleneck within the sector.



These challenges are further compounded by the absence of a national frame survey since 2020, which has resulted in substantial data gaps, outdated fleet estimates, and weakened evidence-based decision-making. This shortfall undermines Liberia's capacity to accurately estimate artisanal fish production, monitor changes in fleet size and composition, and design effective policies to support sustainable fisheries development.

Collectively, these constraints may be increasing pressure on the non-motorized fleet to meet domestic fish demand, thereby intensifying fishing effort in nearshore waters. This dynamic highlights a complex interaction between artisanal and industrial fisheries, where limited industrial capacity may inadvertently drive greater exploitation by the least capitalized artisanal fishers. The observed fluctuations in industrial tuna vessel numbers—peaking 52 vessels in 2019 before declining sharply by 31 in 2023—may further

reflect shifts in international fishing agreements, market conditions, or stock availability, with indirect consequences for coastal fishing pressure.

Within this context, the resilience and sustainability of small-scale fisheries are particularly critical, given their central role in livelihoods and national food security, as well as their high vulnerability to climate change, economic shocks, and market volatility. The high participation of young men with limited formal education, combined with perceived weaknesses in integrating local knowledge and coordinating institutional responses to climate adaptation, points to underlying social and governance vulnerabilities within fishing communities.

Addressing these challenges requires inclusive governance approaches, notably the institutionalization of fisheries data collection and management within NaFAA, alongside the strengthening of community-based management and co-management systems. Together, these measures are essential for effectively regulating artisanal fishing effort, ensuring equitable benefit sharing, and securing the long-term sustainability of Liberia's diverse fisheries resources.

3.3 Marine Capture Fishery Production by Subsectors

Liberia's marine capture fishery production in 2025 totaled **40,891.33 metric tons (MT)**, representing a marginal increase from the preliminary estimate of 40,772 MT reported earlier in this document following the inclusion of previously unreported deepwater shrimp landings. The sector continues to be overwhelmingly dominated by small-scale artisanal fisheries, which are central to coastal livelihoods, domestic food supply, and employment generation. **Table 1 below** presents the final disaggregated production figures by subsector for the 2025 calendar year.

Table 3: Marine Capture Fishery Production by Subsectors 2025

Subsector	Production (MT)	Share (%)
Marine Artisanal Fisheries	28,309.79	**69.23%**
Tuna Fisheries	7,166.70	**17.53%**
Coastal Industrial Fisheries	5,295.81	**12.95%**
Deepwater Shrimp Fishery	119.03	**0.29%**
Total	**40,891.33**	**100%**

3.3.1 Marine Artisanal Fisheries

The artisanal sub-sector remains the undisputed cornerstone of Liberia's fisheries sector, contributing **28,309.79 MT (69.23%)**—nearly seven out of every ten kilograms of fish produced nationally **(Table 3).** This sub-sector comprises 4,299 small-scale, predominantly non-motorized Kru canoes and a smaller but significant 1,349 motorized Fanti vessels operating primarily within Liberia's nearshore waters (typically ≤20 km from the coastline).

Key characteristics of the artisanal fishery in 2025:

- **Gear diversity:** Artisanal fishers employ a range of gears including handlines, gillnets, cast nets, and beach seines, with targeting strategies varying by season and target species.
- **Species composition:** The artisanal catch is multispecies, dominated by *Sardinella maderensis* (flat bonny), *Sphyraena guachancho* (guachanche barracuda), *Pseudotolithus spp.* (croakers), and *Chloroscombrus chrysurus* (Atlantic bumper).
- **Employment:** The sub-sector directly engages over 40,000 fishers, fish processors, and traders, with indirect employment along the value chain reaching over 100,000 people (**Table 4**).

Table 4: Socioeconomic indicators from 2020 Artisanal Frame Survey (NaFAA 2020)

Indicator	Number
Fishermen	15,709
Dependents of Fish traders	78,453
Fisherwomen (traders/processors)	12,907
Total	107,069

The dominance of the artisanal sub-sector (69.23%) underscores its irreplaceable role in national food security. Unlike industrial tuna and coastal trawl fisheries, which are largely export-oriented or supply urban processed fish markets, artisanal landings flow directly into local communities, providing affordable animal protein to approximately 80% of Liberia's population. However, this high reliance also creates vulnerability: any decline in artisanal productivity due to overfishing, habitat degradation, or climate impacts would have immediate and severe consequences for household nutrition, particularly in rural coastal areas.

3.3.2 Tuna Fisheries

Tuna fisheries contributed **7,166.70 MT (17.53%)** in 2025, representing the second-largest subsector by volume. This sub-sector comprises foreign-flagged and Liberian-licensed industrial tuna vessels (predominantly purse seiners and longliners) operating in offshore waters beyond the continental shelf.

Key observations:

- The tuna fleet targets primarily skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), and bigeye (*Thunnus obesus*) tunas, with landings directed toward export markets and, to a lesser extent, local processing.
- Vessel numbers have fluctuated over the past decade, peaking at 52 vessels in 2019 before declining to approximately 31 vessels in 2023 and stabilizing in 2024–2025. These fluctuations reflect international fishing agreements, market conditions (particularly European and Asian demand), and stock availability.

- Tuna fisheries contribute significantly to government revenue through licensing fees and access agreements, though their direct contribution to domestic food security is limited compared to the artisanal sub-sector.

3.3.3 Coastal Industrial Fisheries

Coastal industrial bottom trawlers accounted for **5,295.81 MT** (12.95% of total production). These vessels target demersal fish species—including croakers (*Pseudotolithus spp.*), grunters (*Pomadasys spp.*), and threadfins (*Galeoides decadactylus*)—as well as bycatch species of varying commercial value.

Management concerns:

- The coastal industrial trawl fishery operates in the same inshore waters (typically 20–50 m depth) as the artisanal canoe fishery, leading to direct competition and gear conflict. Industrial trawlers are often perceived by artisanal fishers as depleting nearshore stocks that sustain small-scale livelihoods.
- Stock assessments presented in **Section 4** of this report indicate that several demersal species targeted by this fleet—including *Pseudotolithus spp.* (croakers) and *Galeoides decadactylus* (butternose)—are overexploited, with fishing mortality exceeding F_{MSY} by factors of 3.6 and 8.3, respectively.
- The relatively small production share (12.95%) contrasts with the disproportionate fishing pressure exerted by this sub-sector on overexploited demersal stocks. This suggests that well-guided effort management in the coastal industrial fleet, combined with gear modifications (e.g., increased mesh size), may yield significant conservation benefits with minimal impact on total national production.

3.3.4 Deepwater Shrimp Fishery

The 2025 reporting cycle introduces, for the first time, a discrete account of the **deepwater shrimp fishery**, which contributed **119.03 MT** (0.29% of total production). While modest in volume, this sub-sector is of notable scientific and economic interest.

Species composition:

The deepwater shrimp catch comprises three primary species (**Table 5**):

Table 5: Key Shrimp species targeted by the Deepwater Shrimp Fishery

Species	Common Name	Biological Significance
Farfantepenaeus notialis	Southern pink shrimp	Shallow-water component
Aristaeopsis edwardsiana	Scarlet shrimp	Deepwater (>300 m)
Aristeus varidens	Stripedred shrimp	Deepwater (>200 m)

Management implication:

The deepwater shrimp fishery is currently operating within biologically sustainable limits. However, given its small scale and the high commercial value of deepwater shrimp (particularly scarlet shrimp), careful monitoring is required to prevent effort creep. The Department recommends maintaining current effort levels while establishing a dedicated data collection protocol for this sub-sector, including species-specific catch reporting and routine length-frequency sampling.

3.3.5 Comparative Analysis and Strategic Implications

Figure 2 illustrates the percentage contribution of each subsector to total marine capture production in 2025.

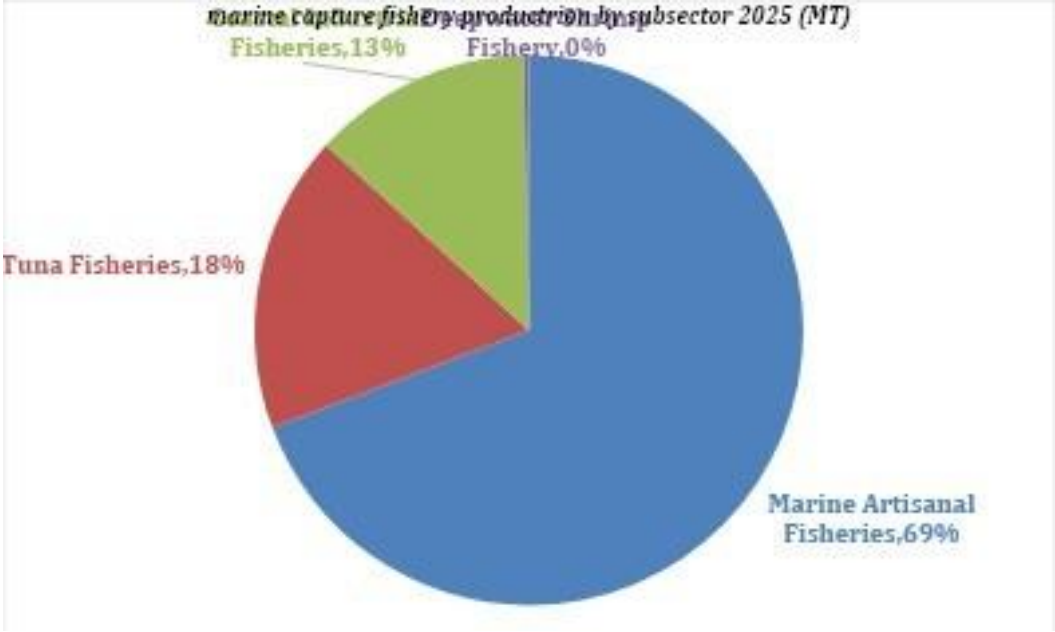


Figure 2: Percentage of Marine Fishery Production by Subsector (2025)

Strategic observations:

Table 6: Strategic observations on the overall marine fishery production 2025

Observation	Implication	Recommended Action
Artisanal fisheries dominate (69%) but exert pressure on nearshore overexploited stocks.	High dependence creates both food security benefits and ecological risk.	Implement co-management with artisanal fishers; promote selective gears; establish spatially managed areas.
Coastal industrial fisheries contribute only 13% but target overexploited demersal stocks.	Low production share but high conservation impact.	Consider guided effort control or seasonal closures; increase mesh size to 60 mm.
Deepwater shrimp fishery is	Opportunity for sustainable	Maintain current effort; establish

biologically healthy but small (0.3%).	expansion, but risk of effort creep.	dedicated monitoring.
Tuna fisheries (18%) contribute significantly to revenue but not to domestic food security.	Revenue-generation potential balanced against limited nutritional contribution.	Ensure access agreements include provisions for local landing or processing.

3.3.6 Conclusion on Production by Subsector:

Liberia's marine capture fishery in 2025 remains fundamentally an artisanal fishery, with nearly 70% of all landings originating from small-scale canoes. This pattern highlights the importance of prioritizing artisanal fisheries in national food security and poverty reduction strategies, while ensuring effective governance of industrial and tuna fleets to prevent overfishing and resource conflict.

The inclusion of the deepwater shrimp fishery (119 MT) in this year's report, though small in volume, is an important step toward comprehensive sectoral reporting. The favorable biological status of shrimp stocks provides a rare positive note in an otherwise concerning assessment of Liberia's demersal resources.

Strategic actions arising from this analysis include:

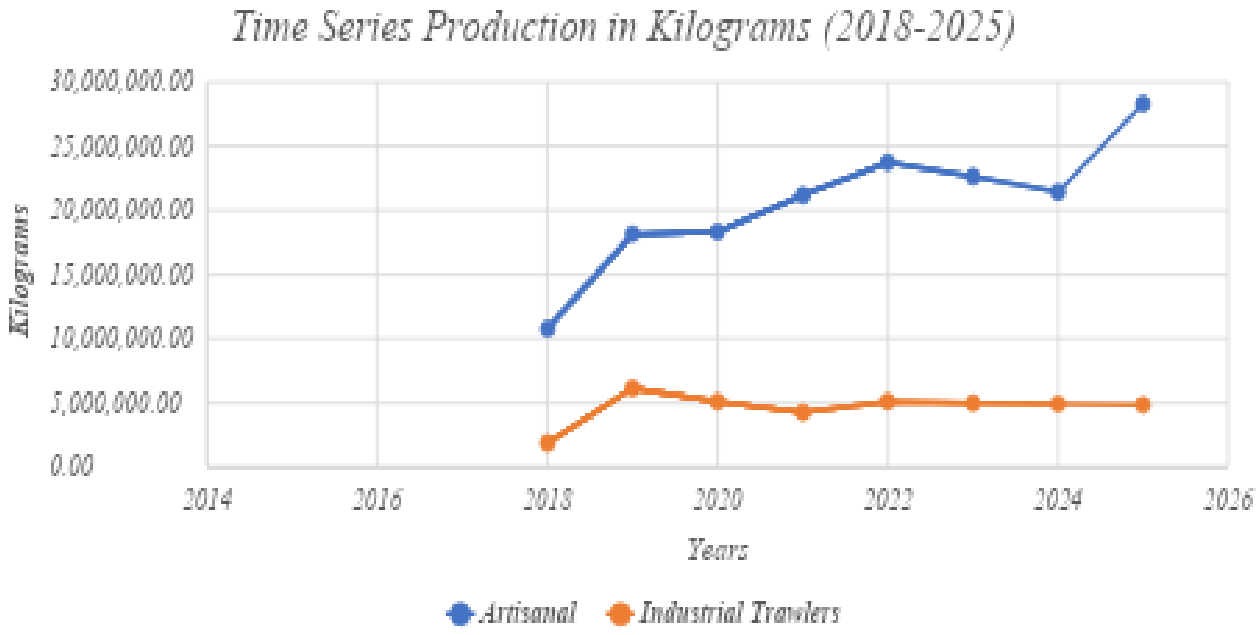
1. **Strengthening artisanal fisheries** through improved post-harvest infrastructure, training in selective fishing gears, and formal recognition of co-management arrangements.
2. **Reforming coastal industrial fisheries** by reducing fishing mortality on overexploited demersal stocks, including mesh size increases and potential vessel day limits.
3. **Enhancing tuna fisheries governance** to maximize revenue while ensuring compliance with ICCAT conservation measures.
4. **Developing aquaculture** (as discussed in Section 3.7) to address the 20,000 MT annual import deficit without placing additional pressure on wild marine stocks.

3.4 Time Series Production Analysis of Artisanal and Industrial Marine Trawlers (2018-2025)

Figure 3 illustrates time-series production data for Liberia’s marine artisanal and industrial trawl fisheries from 2018 to 2025, highlighting clear differences in catch volumes and sectoral trends. Throughout the period, artisanal fisheries consistently recorded substantially higher production than industrial trawlers. For example, in 2018 artisanal landings reached 10,769,000 kg, far exceeding the 1,880,552.54 kg recorded by industrial trawlers, a pattern that persists across most years in the dataset. Cumulatively, artisanal production totaled 164,562,805.80 kg over the period, compared with 37,360,588.54 kg from the industrial sector, underscoring the dominant contribution of artisanal fisheries to Liberia’s marine fish supply.

This dominance is particularly significant given Liberia’s extensive coastline of approximately 590 km and an Exclusive Economic Zone of about 246,000 kmZ, which support rich demersal and pelagic resources critical for national food security and employment. The marked disparity between sectors reflects

differences in operational scale, regulatory arrangements, and target species. Artisanal fisheries are typically characterized by small vessels, diverse fishing gears, and a focus on nearshore resources, whereas industrial trawlers operate larger vessels targeting offshore stocks. Year-to-year trends further show that artisanal production increased notably between 2018 and 2022, indicating a period of growth and intensified activity within the small-scale fisheries sector.



3.5 Imports and Export

3.5.1 Imports

The total imported tonnage for the year reached 22,456.51, valued at approximately $9.66 million, indicating a substantial reliance on foreign sources for fish consumption, which aligns with previous observations regarding the performance of the Liberian fishing industry (**Table 7**).

Table 7: 2025 Annual Fish importation

Months	Qty Imported in Tons	Value of imports (USD)
Jan	322.5	245623.62
Feb	417.796	226922.21
Mar	355.068	266096.25
Apr	1584.42	975650.13
May	3004.353	1278159.08
Jun	3173.125	1805148.72
Jul	1003.221	743585.262
Aug	29.7	12150
Sept	5103.03	1782192.88

Oct	*4558.14*	*1261838.44*
Nov	*2115.81*	*638072.59*
Dec	*789.35*	*427308.61*
Grand Total	***22,456.51***	***$9,662,747.79***

The analysis also reveals significant fluctuations in both tonnage and monetary value, with distinct peaks and troughs throughout the year (**Figure 4**). Specifically, the data indicates a pronounced surge in imports during May, June, and September, which collectively account for over 50% of the total annual tonnage and value, pointing to potential seasonal dependencies or strategic import scheduling. For instance, the peak in September, with 5,103.03 tons valued at $1,782,192.88, significantly contrasts with the low in August, which recorded only 29.7 tons at $12,150, highlighting extreme variability in monthly import patterns.

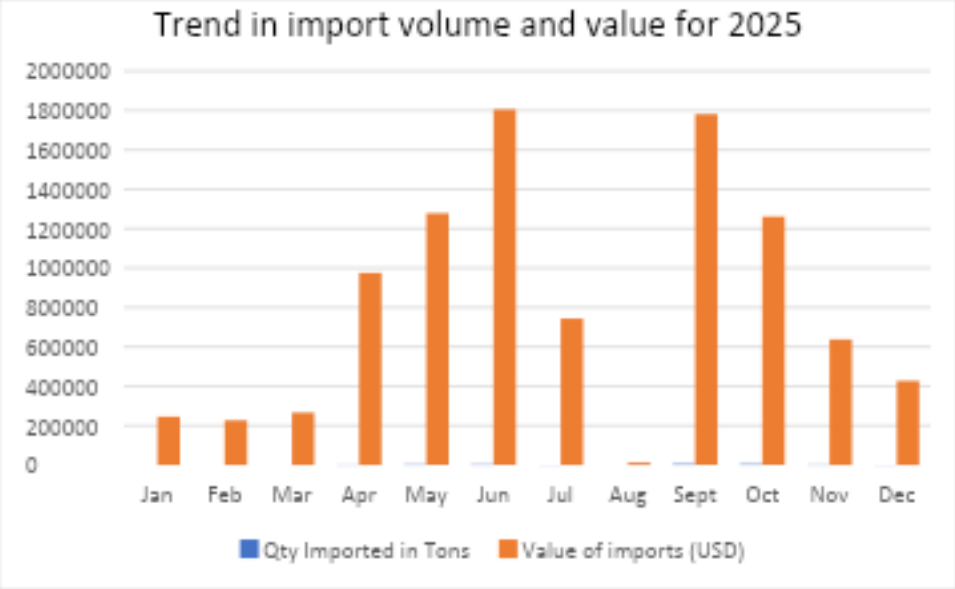


Figure 4: Volume and value of fish import in 2025

This sharp contrast may either suggest substantial shifts in market demand, disruptions in global supply chains, or strategic adjustments in procurement to optimize cost or meet specific consumption needs. These oscillations underscore the necessity for robust fisheries management and policy frameworks to mitigate potential economic shocks and ensure food security. Furthermore, these fluctuations may indicate a reliance on imports to buffer periods of low domestic yield, potentially impacting the livelihoods of local small-scale fishing communities that support millions of people in Liberia.

3.5.2 Exports

In terms of fish export during 2025, July accounts for 108 MT, representing 87.5% of total recorded exports, which suggests a single large shipment or multiple entries associated with one transaction. This concentration may reflect seasonal harvesting patterns, fulfillment of contractual obligations, or alignment with specific export windows. Only two export dates are recorded, indicating either very limited export activity or gaps in data coverage, which constrains analysis of monthly or quarterly trends. The January

export volume of 15.5 MT may reflect off-season trade, clearance of residual stocks, or early-year demand from regional markets.

3.6 Analysis of Fish Trade Dynamics: Import and Export Trends (2014–2025)

3.6.1 Overview

Liberia's fish trade balance has exhibited significant volatility over the past twelve years, characterized by a marked structural reliance on imports to meet domestic demand and extremely low export volumes. **Figure 5** shows the trend in fish imports and exports from 2014 to 2025.

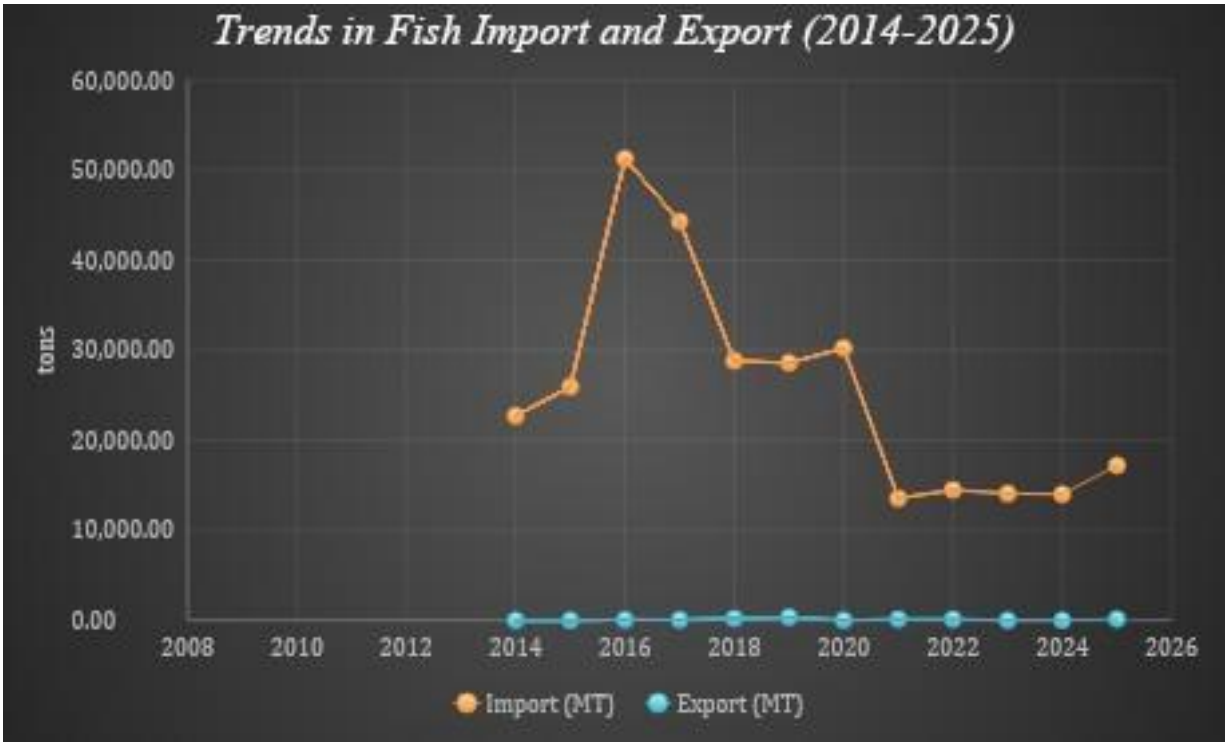


Figure 5: Trends in fish import and export 2014-2025

3.6.2 Import Trends

Annual fish imports averaged **25,426.48 MT** over the 2014–2025 period, with notable interannual variability (**Figure 5**). A dramatic peak occurred in 2016 (**51,267.74 MT**), likely reflecting post-Ebola supply chain disruptions and stockpiling behavior. Imports subsequently declined and stabilized between **13,500–14,500 MT** from 2021 to 2024, before rising again to **17,200 MT** in 2025.

This recent increase (17,200 MT in 2025, up from 14,000 MT in 2024) represents a **22.9% year-on-year increase**, suggesting either a rebound in consumer demand, a shortfall in domestic production relative to

population growth, or strategic importation to buffer against anticipated market fluctuations. Despite the post-2021 stabilization at lower levels than the 2016–2017 peak, imports remain substantial and persistent.

3.6.3 Export Trends

In contrast to imports, Liberia's fish exports are negligible in volume, averaging only **94.25 MT annually** over the same period (**Figure 5**). Exports peaked in 2019 (**324.83 MT**) and 2018 (**187.5 MT**), then collapsed to near-zero levels (1–6 MT) between 2020 and 2024, before recovering modestly to **123.5 MT** in 2025.

The extremely low export volumes indicate that Liberia's fisheries sector is overwhelmingly oriented toward domestic consumption rather than regional or international trade. This stands in contrast to many West African nations (e.g., Senegal, Mauritania) where significant export industries exist. The 2025 export volume (123.5 MT) remains only 0.7% of the import volume (17,200 MT), underscoring a profound and persistent trade deficit.

3.6.4 Strategic Implications

Table 8: Import-export indicators

Indicator	Value	Implication
Average annual import	25,426.48 MT	Continuous foreign exchange outflow
Average annual export	94.25 MT	Negligible contribution to trade balance
Import: Export ratio (2025)	139:1	Extreme trade deficit in fish products
Domestic production (2025)	40,891 MT	Production exceeds imports but still insufficient to meet demand

The persistent import reliance—equivalent to approximately 56% of domestic production—suggests that Liberia's fish consumption exceeds domestic supply capacity (**Table 8**). This structural deficit can only be addressed through: (i) sustainable expansion of domestic capture fisheries (constrained by overexploited stocks), (ii) aquaculture intensification to close the gap, or (iii) continued import dependence with associated economic vulnerabilities.

3.7 Analysis of Fish Trade Dynamics: Domestic Production vs. Import Reliance (2018-2025)

3.7.1 Comparative Analysis of Production and Consumption

A comparative analysis of domestic production, import and consumption trends over the past eight years reveals a consistent gap between the nation's appetite for fish and its capacity to harvest them from local waters (**Figure 6**).

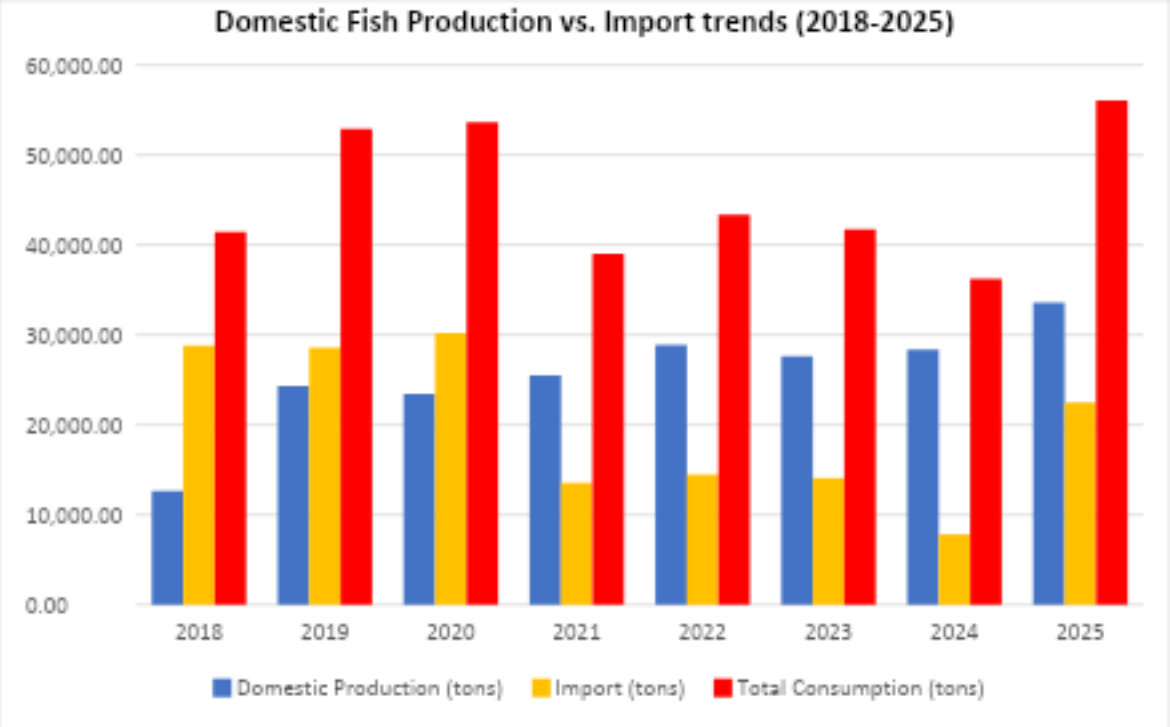


Figure 6: Comparison of domestic fish production, import and consumption trends

Table 9: Summary of Key production, import and consumption Indicators (2018-2025)

Indicator	Average Annual Quantity (tons)
Domestic Production	25,549.55
Imports	19,999.85
Total Apparent Supply	45,549.40
Consumption	45,549.39

- **Total Market Demand:** The average annual consumption stands at **45,549.39 tons**, establishing a clear baseline for the total market requirement.
- **Domestic Output:** Local production yields an average of **25,549.55 tons** per year.

- **Production Sufficiency:** Currently, domestic fisheries meet approximately **56%** of the total annual demand (Table 9).

3.7.2 Import Dependency and Self-Sufficiency Ratio

In considering the economic implications of these key indicators, two metrics are critical:

- **Import Dependency Ratio (Imports / Total Supply) =19,999.85/45,549.40≈43.9%**
- **Self-Sufficiency Ratio (Production / Consumption) =25,549.55/45,549.39≈56.1%**

Interpretation: Nearly 44% of all fish consumed domestically comes from foreign sources. While this is not extreme by global standards (many small island nations exceed 70% import dependency), it is **moderately high** for a country with any domestic fishing capacity. More importantly, domestic production meets only slightly more than half of national demand (56%), leaving the population highly exposed to international market fluctuations.

3.7.3 Economic Implications of Import Dependency

With an average of **19,999.85 tons** imported annually, the sector exhibits a significant reliance on external markets to bridge the **44%** supply deficit.

- **Foreign Exchange Pressure:** Constant high-volume imports necessitate a continuous outflow of foreign currency, which can impact the national balance of payments.
- **Price Volatility:** Heavy reliance on imports makes the domestic market vulnerable to global supply chain disruptions and international price fluctuations, potentially affecting the affordability of protein for the general population.
- **Opportunity Cost:** The 20,000-ton deficit represents an untapped economic opportunity for local fishers and aquaculture developers. If even a fraction of this import volume were shifted to domestic production, it would stimulate local job creation and value-chain development.

3.7.4 Resource Management Perspectives

The stagnant gap between production and consumption suggests two primary management pathways:

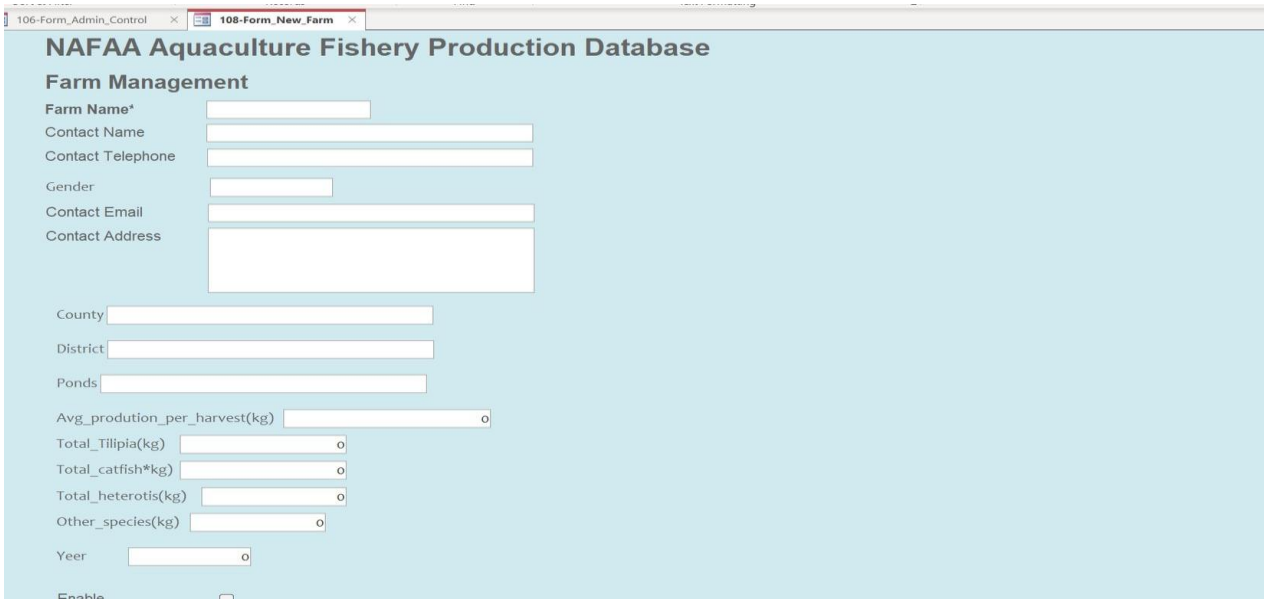
Strategy	Management Focus	Expected Outcome
Capture Fisheries Optimization	Implementing sustainable yield limits and reducing Illegal, Unreported, and Unregulated (IUU) fishing.	Stabilization of wild stocks to maintain current production levels.
Aquaculture Expansion	Investing in inland pond culture and mariculture to target the 19,999.85-ton deficit.	Reduced import reliance without over-exploiting marine ecosystems.

3.7.5 Conclusion and Strategic Outlook

A critical look at the trends in data from 2018-2025 underscores a "structural deficit" in the fisheries sector. While domestic production is substantial, it remains insufficient to meet the dietary needs of the population. To move toward self-sufficiency, the technical recommendation is to prioritize **aquaculture intensification**. This approach targets the average annual import requirement of roughly **20,000 tons** without placing additional pressure on wild marine stocks, which are likely already near or at Maximum Sustainable Yield (MSY).

3.8 Aquaculture and Inland Fishery Production

Liberia's aquaculture sector is constrained by the lack of a centralized database, limiting effective policy formulation, resource allocation, and sustainable development (**Figure 7**).



During the course of the year, a centralized database was initiated which registered **533 aquaculture farms** from Bong, Nimba, and Lofa counties, respectively. Findings reveal strong regional and gender disparities. Nimba County hosts the largest number of farms and the highest production (**Figures 8**), while male farmers dominate ownership (70%), pond management, and total output (about 72% of production). Tilapia is the most widely farmed species across all counties.

The report recommends expanding database coverage to Margibi and Montserrado counties, completing data collection in remaining districts, and equipping data collectors with tablets and weighing scales. Overall, the assessment demonstrates that a centralized aquaculture database is essential for transforming Liberia's aquaculture sector into a data-driven system that enhances productivity, resilience, food security, and long-term sustainability.

4 FISHERIES RESOURCE BIOLOGY AND ECOLOGY

4.7 Fisheries Resource Abundance and Standing Biomass

Between 2019 and 2024, the National Fisheries & Aquaculture Authority (NaFAA), in collaboration with regional and international partners, conducted four major fisheries resource surveys in Liberian territorial waters. These surveys were designed to assess the status of pelagic and demersal fish stocks to inform evidence-based fisheries management and policy formulation. This update provides a comparative analysis of the most recent survey results, drawing on finalized reports and preliminary data from the 2024 EAF-Nansen survey.

4.1.1 Overview of Surveys Conducted (2019–2024)

The two regional surveys include the 2019 and 2024 Transboundary Ecosystem and fisheries resource surveys conducted under the EAF-NANSEN Program using the R/V Dr. Fridtjof Nansen, respectively. The two national surveys include the 2023 ecosystem and demersal resource survey conducted by the Senegalese research institute CRODT using R/V Dr. Lassana Conteh, and the 2024 Marine ecosystem and fisheries resource survey conducted by the Moroccan Institute for Fisheries and Marine Research (INRH) using the R/V AL HASSAN AL MARAKCHI, respectively. A broad summary of the various surveys, including the durations, scope and current status, is presented in **Table 10** below.

Table 10: Summary of most recent fisheries resource surveys conducted in the Liberian in waters

Survey	Duration	Scope	Status
2019 EAF NANSEN Survey	August 26 to September 2, 2019 (8 days)	Regional	Completed
2023 CRODT/Senegalese Survey	August 14-25, 2023 (13 Days)	National	Completed
2024 AL HASSAN AL MARAKCHI/Moroccan Survey	January 26 to February 09, 2024 (14 Days)	National	Completed
2024 EAF NANSEN Survey	April 20- May 1, 2024 (12 Days)	Regional	Completed

4.1.2 Summary of Survey Estimates

A synthesis of biomass estimates from the four surveys is presented in **Table 11**. Notable variation exists across surveys due to differences in survey design, spatial coverage, timing, and technical execution.

Table 11: Summary of Results from recent Marine Fisheries Resource Assessments conducted in the Liberian waters

Survey	Report Status	Total Biomass Estimate (tons)	Total Pelagic Estimate (tons)	Total Demersal Estimate (tons)
2019 EAF-Nansen Survey	Final report referenced	74,116	18,400	55,716
2023 CRODT/Senegalese Survey	Final report referenced	22,700	3,158	19,542
2024 INRH/Moroccan Survey	Final report referenced	348,503	94,000	254,503

2024 EAF-Nansen Survey	Draft report referenced	2,397,200	125,200	2,272,000

4.1.3 Comparative Analysis of Survey Results

4.1 Total Biomass Estimates

The 2024 EAF-Nansen survey reported a total biomass estimate of **2.4 million tons**, a marked increase from the 2024 Moroccan estimate of **348,503 tons** and the 2019 Nansen estimate of **74,116 tons** (**Table 11**). These differences may be attributed to:

- Expanded spatial coverage and improved acoustic methodologies in 2024;
- Seasonal variability in fish distribution and abundance;
- Differences in survey objectives (e.g., regional vs. national scopes).

4.2 Pelagic Resources

Pelagic biomass estimates ranged from **3,158 tons** (2023 CRODT) to **125,200 tons** (2024 EAF-Nansen). The 2024 Moroccan survey estimated **94,000 tons** of pelagic biomass, while the 2019 Nansen survey reported **18,400 tons** (**Table 11**).

Key pelagic species such as *Sardinella aurita* (round sardinella) and *Trachurus trecae* (horse mackerel) showed significant increases in 2024 estimates, reflecting both improved detection and potential population recovery or migration patterns **(Figure 9).** The detailed species disaggregated biomass estimates for the more than 16 pelagic species assessed from all recent surveys is found in Appendix 1.

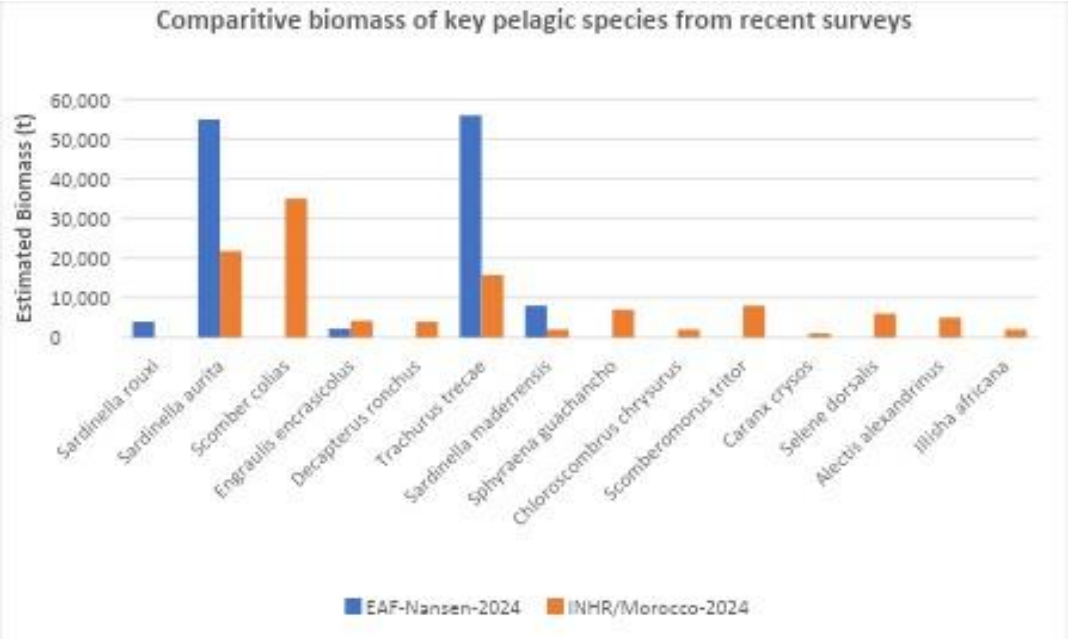


Figure 9: Comparative biomass estimates of key pelagic resources from recent surveys

4.3 Demersal Resources

Demersal biomass estimates exhibited even greater variation, from **19,542 tons** (2023 CRODT) to **2.27 million tons** (2024 EAF-Nansen). The 2024 Moroccan survey estimated **254,503 tons**, while the 2019 Nansen survey estimated **55,716 tons** (**Table 11**).

The low 2023 estimate is attributed to a **technical force majeure** that limited station coverage to only 42% (18 of 43 planned stations), resulting in under-sampling of key demersal habitats.

4.1.4 Species-Level Biomass Comparison

A disaggregated analysis of key demersal species is shown in **Figure 10**. The data reveal substantial inter-survey variability, particularly for commercially important stocks. Between the INHR/Morocco-2024 EAF-Nansen-2019 surveys, *Dentex angolensis* (Angolan dentex) accounted for one of the most abundant demersal stocks with biomass estimate upwards of 20,000 tons. This is followed by *Brachydeuterus auritus* (Bigeye grunt) and *Pomadasys species* (Grunters) with biomass estimates upwards of 15,000 tons (**Figure 10).** The detailed species disaggregated biomass estimates for the more than 35 demersal species assessed from all recent surveys is found in Appendix 1.

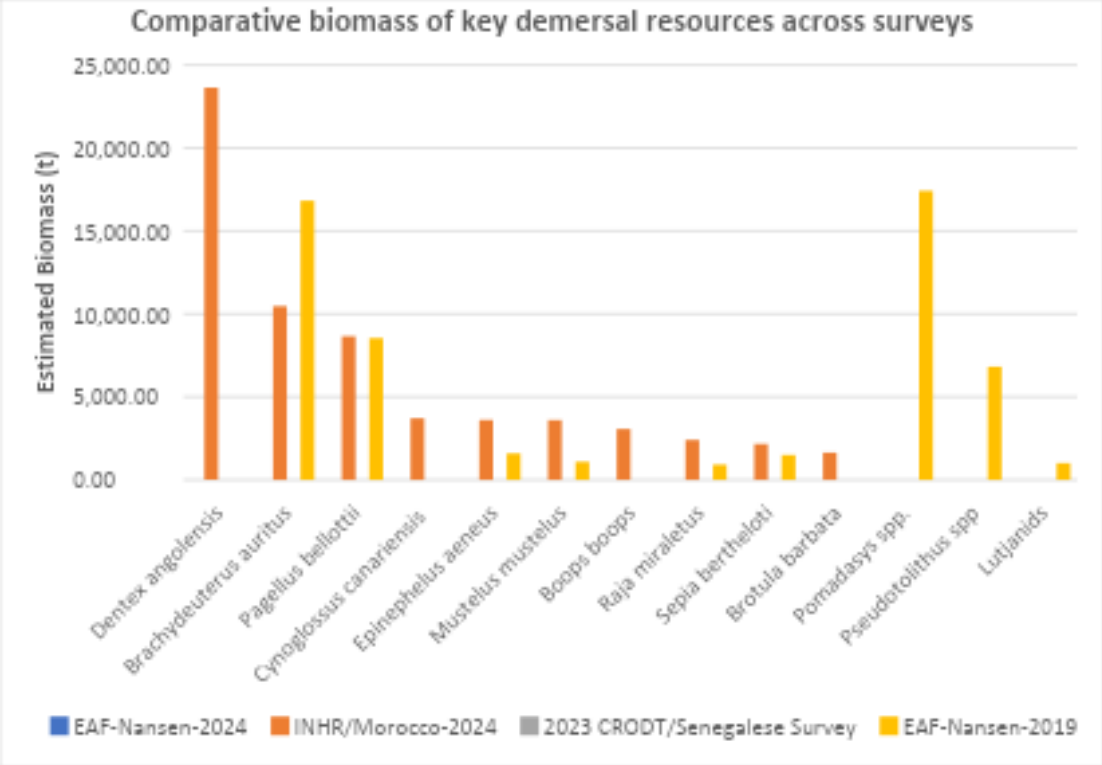


Figure 10: Comparative biomass estimates of key demersal resources from recent surveys

4.8 Resource Exploitation Status and Biological Reference Points (BRPs)

The combined coastal marine industrial and artisanal fisheries is a multispecies and multi-gear fishery that targets almost 130 species. Appendix 2 contains the combined marine industrial and artisanal fisheries production for the top 66 species landed from 2018-2024. Analysis shows that *Sardinella maderensis* (Flat bonny) accounted for the highest species landed during this period with a total production of 47,152,830.10 Kg corresponding to 27.94%.

Despite the multiple number of species that have continued to be harvested by the marine industrial and artisanal fisheries over the years, the scientific exploitation status of these stocks has remained largely unknown. As a result, resource management over the years has largely depended on precautionary measures such as observed landings and catch trends. This situation can be attributed to limited and fragmented time series data and scientific capacity. However, with the marked improvements in the data collection regime and scientific capability at NaFAA lately, the Department of Research and Statistics is now poised to ensure a robust stock evaluation routine going forward.

Most recently, the Department of Research and Statistics conducted stock evaluations for eight (8) commercially viable pelagic and demersal species that are indicative of the marine capture fisheries. The species assessed are: *Pseudotolithus spp, Cynoglossus spp, Galeoides decadactylus, Lutjanus spp, Alectis alexandrinus, Sardinella spp, Caranx spp,* and *Ilisha africana.*

These species were assessed using data-limited assessment methods such as the Catch-Maximum Sustainable Yield (CMSY) and Bayesian Schaefer Model (BSM) approaches, integrating catch data and relative abundance (CPUE) information collected from 2015 to 2024 (Froese et al. 2016). These analyses provided estimates of stock status, productivity, maximum sustainable yield (MSY), and exploitation rates, forming the scientific basis for management recommendations to ensure sustainable utilization of these key demersal and small-medium pelagic resources.

4.2.1 Stock status categories

We utilized the three categories of assessment adopted by CECAF Scientific Working Groups as follows:

- **Not fully exploited:** The stock is in good condition, and fishing pressure can be increased without affecting sustainability. All increases must be seen in the context of the general environmental situation.
- **Fully exploited:** The fishery operates within the limits of sustainability. Current fishing pressure seems sustainable and can be maintained.
- **Overexploited:** The fishery is in an undesired state in terms of biomass or/and fishing mortality. Fishing pressure should be reduced to allow the stock to grow.

4.2.2 Management Reference Points (MRPs)

For management advice, consistent with CECAF Scientific Working Groups, we have also adopted the following Biological Reference Points (BRPs):

- **Target reference points:** $B_{cur}/B_{0.1}$ and $F_{cur}/F_{0.1}$
- **Limit reference points:** B_{cur}/B_{MSY} and F_{cur}/F_{MSY}

Where:

- **$F_{0.1}$** - The fishing mortality rate at which the slope of the yield-per-recruit curve is only one-tenth the slope of the curve at its origin or 90 percent of F_{MSY}.
- **F_{MSY}** - Value of F (and of other characteristics of the stock) where the long-term total yield is maximum.

- F_{Max} - Consider the long-term yield per recruit, Y/R, as a function of F, for a certain exploitation pattern. F_{Max} is the point of the curve, Y/R against F, where Y/R is maximum.
- **$B_{0.1}$**– is the value of Biomass corresponding to $F_{0.1}$
- **B_{MSY}**– is the value of Biomass corresponding to F_{MSY}.

4.2.3 Assessments Results

The 8 species assessed comprised 4 pelagic and 4 demersal species, respectively (**Tables 12 and 13**). **Figure 11** shows the percent distribution of the 8 species assessed. One small pelagic stock, *Ilisha Africana* (Gbapleh), was assessed as **not fully exploited** (12%; n=1), another small pelagic stock, *Sardinella spp.* (Bony), and a medium pelagic stock, *Caranx spp.* (Cavalley), were assessed as **fully exploited** (25%; n=2), while one medium pelagic stock, *Alectis alexandrinus* (Big Poor-joe), and 4 demersal stocks, *Galeoides decadactylus* (Butternose), *Pseudotolithus spp.* (Croakers), *Cynoglossus spp.* (Solefish) and *Lutjanus spp.* (Snappers), were assessed as **overexploited** (63%; n=5), respectively (**Figure 11; Tables 12 and 13**). The details of the data, methodology, and results of the 8 species assessed can be found in the Semi-industrial Fisheries Management Plan of Liberia on the NaFAA website.

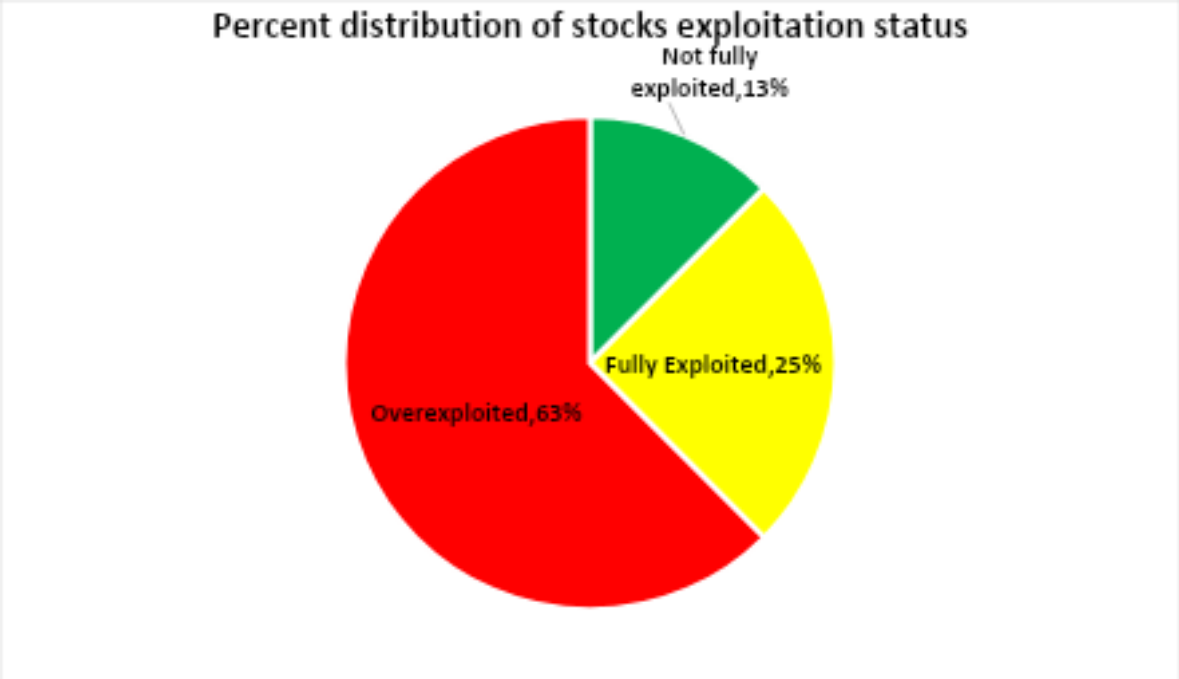


Figure 11: percent distribution of the 8 species assessed

Table 12: Pelagic Stocks Status (based on BSM analysis)

Stock	Ecology	Intrinsi	Carryin	MSY	Current	Relative	Relative	Stock Status

		c growth rate (r)	g capacity (k) (mt)	(mt)	Biomass (B_{2024}) (mt)	fishing mortality (F/F_{MSY})	Biomass (B/B_{MSY})	
Sardinella spp. (Bony) 	Small pelagic	0.49	68,500	8,400	29,600	0.965	0.865	**Fully exploited**
Ilisha Africana(Gbapleh) 	Small pelagic	1.08	4,490	1,210	699	0.411	1.4	**Not-fully exploited**
Alectis alexandrinus (Big Poor-joe) 	Medium pelagic	0.411	3,260	335	1,180	2.82	0.726	**Overexploited**
Caranx spp. (Cavalley) 	Medium pelagic	0.561	1,270	178	444	0.975	0.698	**Fully exploited**

Table 13: Demersal Stocks Status (based on BSM analysis)

Stock	Ecology	Intrinsic growth rate (r)	Carrying capacity (k) (mt)	MSY (mt)	Current Biomass (B_{2024}) (mt)	Relative fishing mortality (F/F_{MSY})	Relative Biomass (B/B_{MSY})	Stock Status
Galeoides decadactylus (Butternose) 	Shallow-water demersal	0.473	3,990	472	438	8.26	0.219	**Overexploited**
Pseudotolithus spp. (Croakers) 	Shallow-water demersal	0.31	14,300	1,110	4,780	3.59	0.67	**Overexploited**
Cynoglossus spp. (Solefish) 	Shallow-water demersal	0.137	1,940	67	382	11.9	395	**Overexploited**

Lutjanus spp. (Snappers) 	Deep-water demersal	0.384	9,060	871	4370	1.73	0.965	**Overexploited**

4.2.4 Management Advice

A total of eight commercially important stocks were assessed using the Biomass Dynamic Model (BSM). Results indicate a concerning status: the majority (63%; n=5) are overexploited, while only one stock remains not fully exploited (**Table 14**).

Table 14: Results for Management (based on BSM analysis) for all stocks assessed

Stock Status	Number of Stocks	Required Management Action
Fully exploited	**2**	Maintain current fishing pressure; introduce precautionary buffers.
Not-fully exploited	**1**	Allow limited, controlled increases under strict harvest rules.
Overexploited	**5**	Reduce fishing pressure immediately to allow rebuilding.

Management Recommendations by Status

- **Overexploited (5 stocks):**
  Reduce fishing mortality by 30–50% within 6 months. Implement emergency measures (e.g., shortened seasons, spawning closures, larger mesh sizes). Establish recovery plans with clear biomass targets and timelines (3–5 years). Strengthen monitoring (VMS, observers) and compliance.

- **Fully exploited (2 stocks):**
  Maintain current effort and catch levels. Introduce precautionary triggers (e.g., 10–15% biomass decline automatically reduces TAC by 10%). Increase assessment frequency to semi-annual to detect early signs of overfishing.

- **Not fully exploited (1 stock):**
  Allow modest TAC increases (max 10–15% per year) only after adopting pre-agreed harvest control rules (HCRs). Avoid overcapitalization by allocating access rights. Continuously monitor environmental conditions and recruitment.

Cross-Cutting Actions

- Apply ecosystem-based management to account for predator-prey and bycatch interactions.

- Integrate climate indicators (e.g., temperature, productivity shifts) into stock forecasts.
- Maintain transparent stakeholder engagement and annual stock reassessments.

4.2.5 Conclusion

With five stocks overexploited, immediate reductions in fishing pressure are critical. Fully exploited stocks must be safeguarded, and the single underexploited stock developed cautiously. Without prompt action, the fishery risks stock collapses, economic losses, and long-term recovery costs.

Priority Recommendation for the Coming Year:
Reduce fishing mortality on overexploited stocks by 30–50% within six months, supported by enhanced monitoring and annual progress reviews.

4.2.6 Recommended Research

- Conduct recruitment studies to inform a possible "**open and closed season"** regime to allow stocks to recover/recruit.
- Conduct size limits/Gear selectivity studies to inform **revised/updated mesh-size regulations.**
- Conduct habitat studies to identify/map and **protect critical habitats** (especially spawning areas)

4.9 Resource Biology and Ecological Indicators

The 2024 Moroccan Research Institute (INRH) resource survey in the Liberian EEZ conducted a fishery independent study on the detailed biology and ecology of key pelagic species, while NaFAA Research and Statistics Department conducted a fisheries dependent length-based analysis to assess the biology of shrimp resources. The detailed reports of the resource survey and the shrimp fishery analysis can be sourced on NaFAA website,

4.3.1 Sardinella aurita

Round sardinella, *Sardinella aurita*, presents a discontinuous pattern in the study area, with significant concentrations detected between Buchanan and the eastern maritime border of Liberia. High concentrations are particularly located between Buchanan and Greenville cities. Round sardinella was almost absent in the north-western part of the country (**Figure 12**).

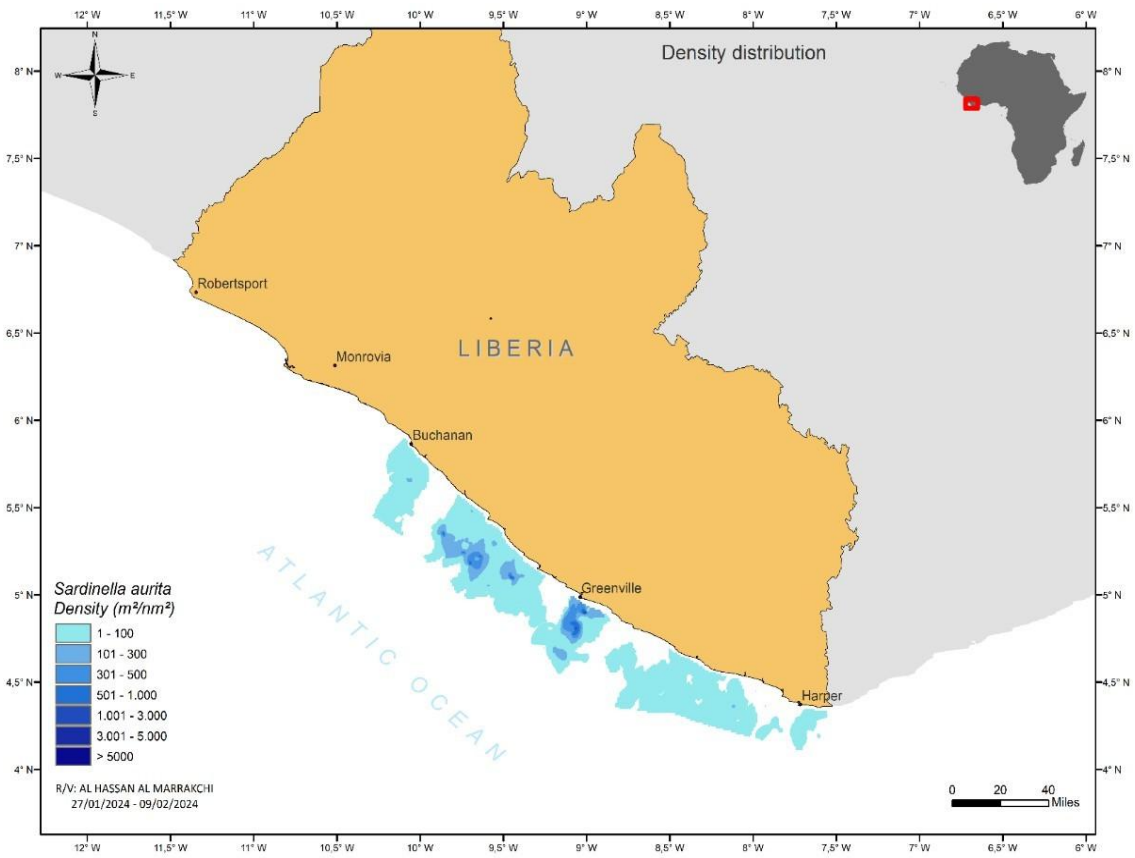


Figure 12: Spatial distribution of sardinella aurita.

The lengths distribution for Sardinella aurita are ranging between 11 cm and 25 cm. But are characterized by a modal structure with a peak at 14 cm (**Figure 13**).

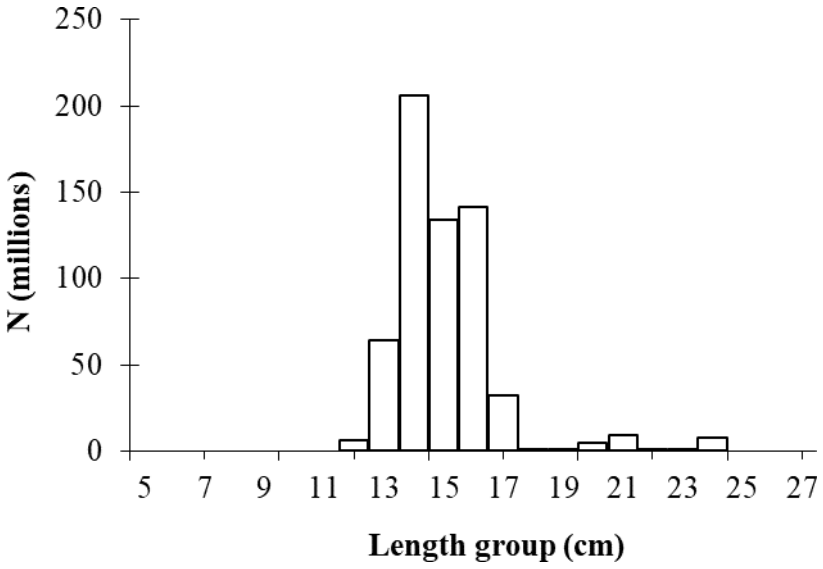


Figure 13: Lengths distribution of Sardinella aurita.

The sex ratio of *Sardinella aurita* tends more towards females which constitute 60% of the total population (**Figure 14**). The majority of individuals analyzed are mature, i.e. more than 80% of the population at mature stages. On a maturity scale of "1" to "5", the dominant stage is stage 5. All of these biological indicators suggest that the population has a very good and high reproductive potential.

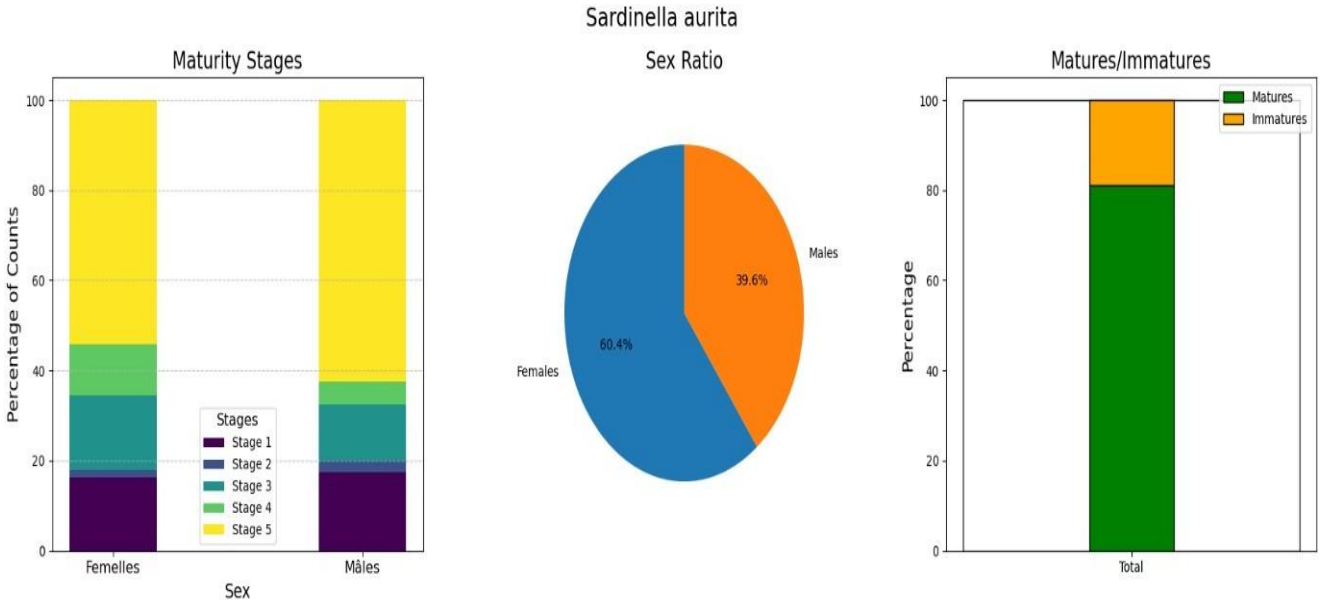


Figure 14: sex ratio and maturity trends of Sardinella aurita

4.3.2 Shrimp Species Length Analysis

A comparative analysis of the **median carapace lengths (MCL)** of the three shrimp species reported to their respective **lengths at first biological maturity (*CL_{50}*)** and **maximum carapace lengths (*CL_{max}*)** shows that the MCLs of the shrimp populations are significantly higher than the CL_{50} and sits closer to the CL_{max}, indicating an overall positive—biological "snapshot" of the stock's health (**Table 15**). Scientifically, this relationship is a primary indicator used to determine if a population is being overexploited or if management measures are working. Since the median length is above *CL_{50}*, it means that more than half of the shrimps captured have had the opportunity to spawn at least once. This means that the shrimp populations are currently in a biologically **"Safety Buffer":** This indicates a healthy **Spawning Stock Biomass (SSB)** for the three shrimp stocks (**Table 15; Figures 15, 16 and 17**)**.** When a population is overfished, the median size usually drops below CL_{50} (a condition called **recruitment overfishing**), meaning most shrimp are caught before they can reproduce. However, in the context of the Liberian shrimp fishery, analysis currently shows that median sizes are way above CL_{50}, clearly suggestive of stocks with high reproductive capacity that are being fished within biologically sustainable limits, and "recruitment overfishing" is not occurring (**Table 16**).

Table 15: Shrimps carapace length (CL) comparison table

Species	Sex	Length at First Maturity (CL_{50})	Maximum Carapace Length (CL_{max})	Median Carapace Length (MCL)
Southern Pink Shrimp	Female	~31 mm	~57 mm	39 mm
	Male	~24 mm	~41 mm	
Scarlet Shrimp	Female	46–54 mm	~105 mm	67.5 mm
	Male	34–40 mm	~65 mm	
Striped Red Shrimp	Female	24–27 mm	~66 mm	46.5 mm
	Male	18–20 mm	~39 mm	

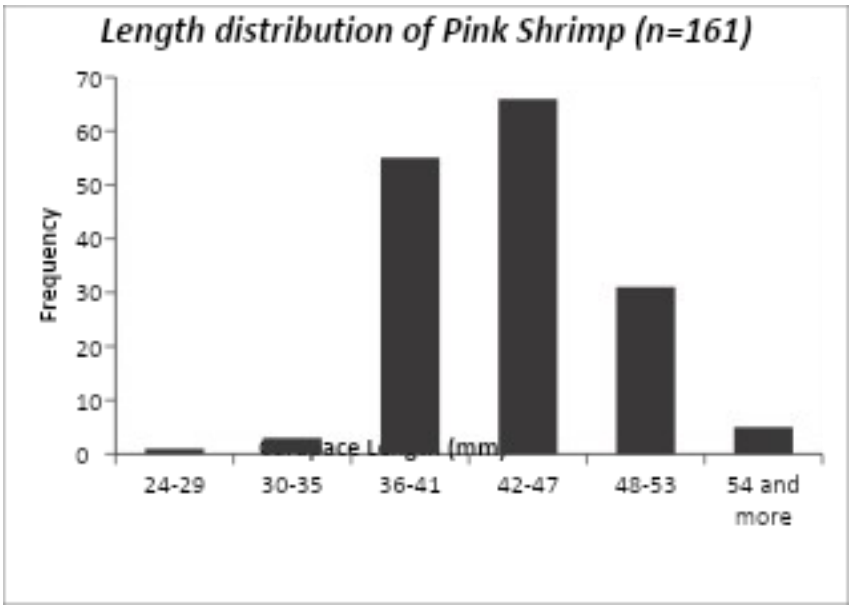


Figure 15: Length frequency distribution of Southern pink Shrimp stock with MCL=39mm

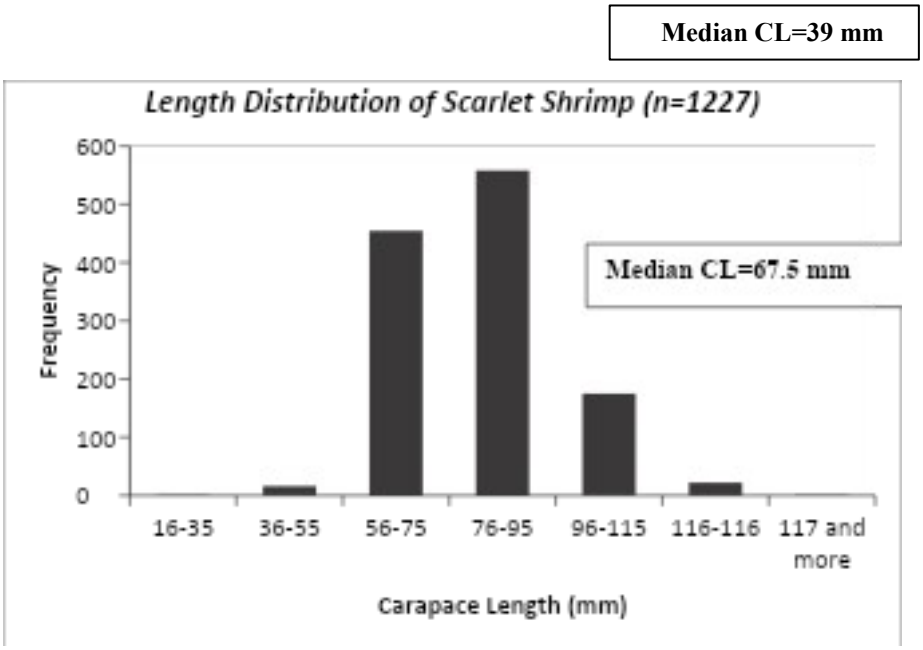


Figure 16: Length frequency distribution of Scarlet Shrimp stock with MCL=67.5mm

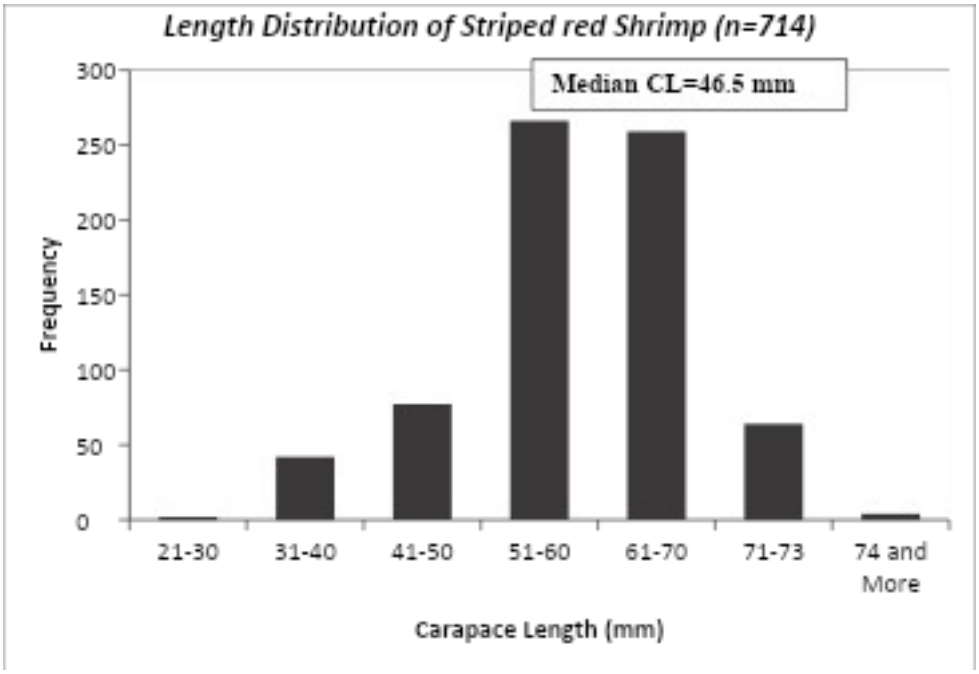


Figure 17: Length frequency distribution of Striped red Shrimp stock with MCL=46.5mm

Table 16: Summary Table for Management

Metric Relationship	**Biological Status**	**Management Implication**
$MCL > CL_{50}$	High reproductive capacity.	Stock is likely sustainable; "recruitment overfishing" is not occurring.
$MCL \approx CL_{max}$	Low exploitation of adults.	Potential for high-quality, large-sized harvest; population is resilient.
$MCL < CL_{50}$	Population "juvenescence."	**Warning:** The stock is being harvested before it can replenish itself.

5 FISHERIES RESOURCE SOCIO-ECONOMICS

5.7 Economic Value of Fishery Production

Liberia's 2025 marine fishery production totaled approximately 40,772 tons, generating about USD 34.5 million in revenue (**Table 17**). Production showed clear seasonal variation, peaking in August (4,041.15 tons) and reaching its lowest level in July (2,198.93 tons), reflecting changes in fishing conditions, weather, and stock availability.

Around 16% of total production (6,661.6 tons) remained unsold, indicating market and post-harvest constraints. An exception occurred in December, when all production was sold, though total value was comparatively lower, likely due to price fluctuations or species composition. Revenue trends broadly followed production patterns, with August recording the highest revenue (USD 3.73 million) and June the lowest (USD 2.12 million), while average monthly revenue stood at about USD 2.88 million.

Strategically, fisheries remain vital for food security, supplying a major share of national protein needs. The observed seasonal peaks highlight opportunities for improved storage, processing, and export planning, while reducing post-harvest losses requires expanded cold-chain infrastructure, diversified markets, and stronger regional trade linkages.

Table 17: 2025 Monetary Value fish of production

MONTH	QUANTITY PRODUCED (tons)	QUANTITY SOLD(tons)	VALUE(USD)
Jan	3,716.16	3,047.25	3,428,722.80
Feb	3,604.19	2,955.44	3,004,441.00
Mar	2,746.29	2,251.96	2,453,459.80
Apr	3,981.16	3,264.55	3,063,010.80
May	3,682.60	3,019.73	2,739,294.00
Jun	2,737.12	2,244.44	2,115,806.20
Jul	2,198.93	1,803.12	2,027,410.69
Aug	4,041.15	3,313.74	3,725,942.14
Sep	3,840.83	3,149.48	3,541,242.49
Oct	3,174.97	2,603.48	2,927,322.34
Nov	3,285.27	2,693.92	3,029,018.94
Dec	3,763.64	3,763.64	2,475,791.28
Total	**40,772.31**	**34,110.75**	**34,531,462.49**

5.8 Fisheries Role in Food Security and Nutrition

Fish is a cornerstone of food security and nutrition in Liberia, serving as a primary source of animal protein for much of the population.

- High reliance on fish in both urban and rural diets
- Affordable compared to other protein sources
- Rich in essential micronutrients (omega-3 fatty acids, vitamins, minerals)

Liberia's fish production is largely driven by marine artisanal canoe fisheries, which account for 70.2% of total output, followed by tuna vessels (17.8%) and industrial trawlers (12%). Despite this substantial production, per capita fish consumption declined sharply after 2020, falling from about 10.6 kg/year to 7.55 kg in 2021, likely due to COVID-19 disruptions and supply-chain constraints (**Figure 18**). Although consumption has gradually increased to 10.4 kg by 2025, the average intake of 9.24 kg/year remains well below the global average, pointing to potential nutritional gaps.

The disconnect between high artisanal production and low consumption highlights constraints in cold-chain infrastructure, distribution, and post-harvest handling, as well as the concentration of fish supply in urban or export markets. Industrial and tuna fisheries appear to contribute less directly to rural diets. These trends emphasize the need to strengthen local access to fish for food security, invest in storage and market infrastructure, promote aquaculture to supplement marine supply, and better integrate fisheries data into national food security and nutrition policies (**Table 18**).

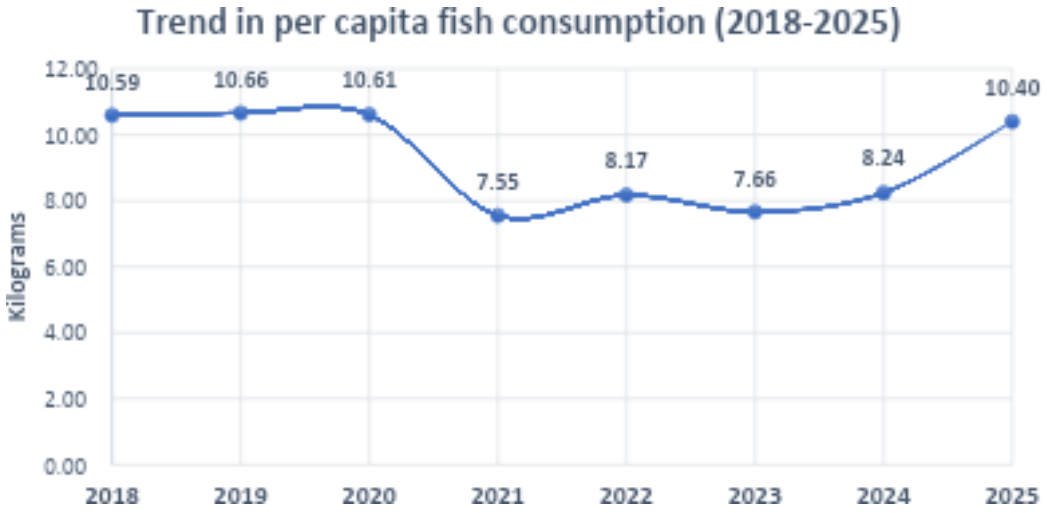


Figure 18: Trend in per capital fish consumption (2018-2025)

Table 18: Key Food Security Indicators

Indicator	Value	Source (Year)
Per capita fish consumption (kg/year)	10.40	NaFAA (2025)
Fish contribution to animal protein (%)	65	FAO (2016)
Average Fish import (MT/year)	25,426.48	NaFAA (2025)

5.9 Contribution to the National Economy

The fisheries and aquaculture sector contributes significantly to Liberia's economy through:

- Employment generation
- Income for rural and coastal households
- Foreign exchange earnings from exports
- Contribution to Gross Domestic Product (GDP) (**Figure 19; Table 19**)

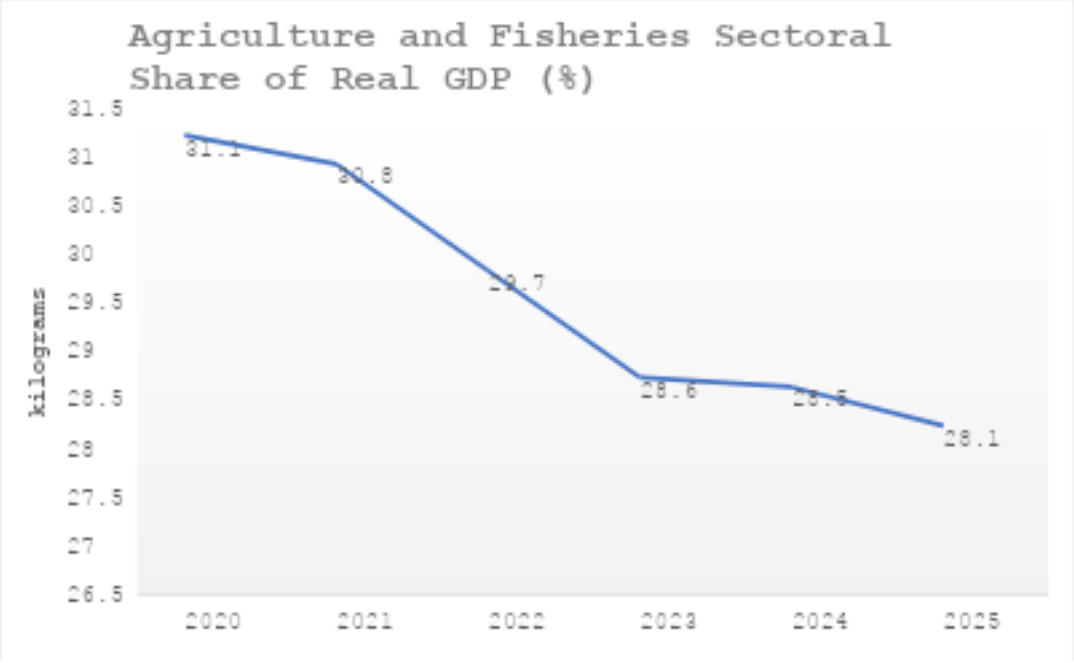


Figure 19: Contribution of fisheries to GDP (2020-2025) (Source: CBL, 2025)

Table 19: Key Economic Indicators

Indicator	Value	Source (Year)
Contribution to GDP (Agriculture & Fisheries) (%)	28.1	CBL (2025)
Export value (USD)	104,596.40	NaFAA (2025)
Total production (MT)	40,772.30	NaFAA (2025)
Value of production (USD)	34,531,462.49	NaFAA (2025)

6 FISHERIES QUALITY ASSURANCE AND COMPLIANCE UPDATE

6.7 Routine Quarterly Inspection of Cold Storage Facilities

In keeping with its mandate of ensuring compliance with quality standards and best practices for fish and fisheries products, the Quality Assurance unit conducts routine quarterly inspections of fish and fisheries establishments. The key findings of the first quarter inspection of cold storage facilities in 2025 are presented below.

6.1.1 Overview of Cold storage facilities inspected

The inspection found that cold storage operations in Liberia exist in 2 categories: companies that import and distribute or retail fish in several sub-branches and single cold storage facilities that operate independently under sole proprietorship. The inspection covered a total of 149 fish establishments, segmented into 15 fish importing companies, 1 fishing company, and 133 distribution centers or retail outlets (**Table 20)**.

Table 20: List of fish Establishments inspected during the 1st Quarter Inspection & Enumeration Exercise

No1	Establishment	Head Office	Number of Branches	Total Facility
1	Africa No1	1	5	6
2	Banjak Frozen Food	1	14	15
3	Caroline Frozen Food	1	10	11
4	Cheaitou Brothers	1	13	14
5	Dalian Hailian	1	2	3
6	Diamond Food Liberia Inc	1	3	4
7	Fresh Frozen Food	1	33	34
8	National Frozen Food	1	5	6
9	Ossaco Corporation	1	1	2
10	United Commodities Inc.	1	9	10
11	West Africa Enterprise	1	11	12
12	T R H	1	8	9
13	Scodi Liberia Inc.	0	3	3
14	Royal Frozen Food	1	0	1
15	Unity Frozen Food	1	3	3
16	HH Frozen Food	1	0	1
17	Intercontinental Fishing Company	1	0	1
18.	Joyce Frozen Food	0	4	4
19.	Gbarnga Frozen Supply	0	1	1
20.	7 Star Frozen Food	0	1	1
21.	Manigbeh & Son	0	1	1
22.	Marche Business Center	0	1	1
23.	Quality Frozen Food	0	1	1

24.	Golden Frozen Food	0	3	3
25.	Island Frozen Food	0	1	1
	Total	16	133	149

6.7 Highlights of the Nationwide Assessment of Cold Storage Establishments

In December 2025, the Quality Assurance Unit within the Department of Research and Statistics of NaFAA conducted a nationwide cold storage inspection and enumeration exercise to inform regulation, revenue generation, investment planning, and risk-based inspection systems.

6.2.1 Overview of Key Findings

The nationwide cold storage inspection and enumeration presented critical sectorial baseline data related to the distribution, ownership, operational status, technical capacity, and compliance of cold storage facilities across Liberia, highlighting critical patterns, gaps, and risks that have implications for food safety, regulatory oversight, and the efficiency of the fish cold chain.

Distribution of Cold Storage facilities across Liberia

The survey found that Cold storage facilities are highly concentrated in Montserrado (60%; n=153), followed by Nimba (35), Margibi (22), and Bong (17). Most other counties have fewer than 10 facilities, including Grand Bassa (9), Grand Gedeh (4), Sinoe (4), Maryland (3), Lofa (3), River Gee (2), Bomi (2), Gbarpolu (1), and Grand Kru (1). This uneven county distribution shows a centralized cold storage system, with many counties dependent on secondary distribution from major hubs (**Figure 20**).

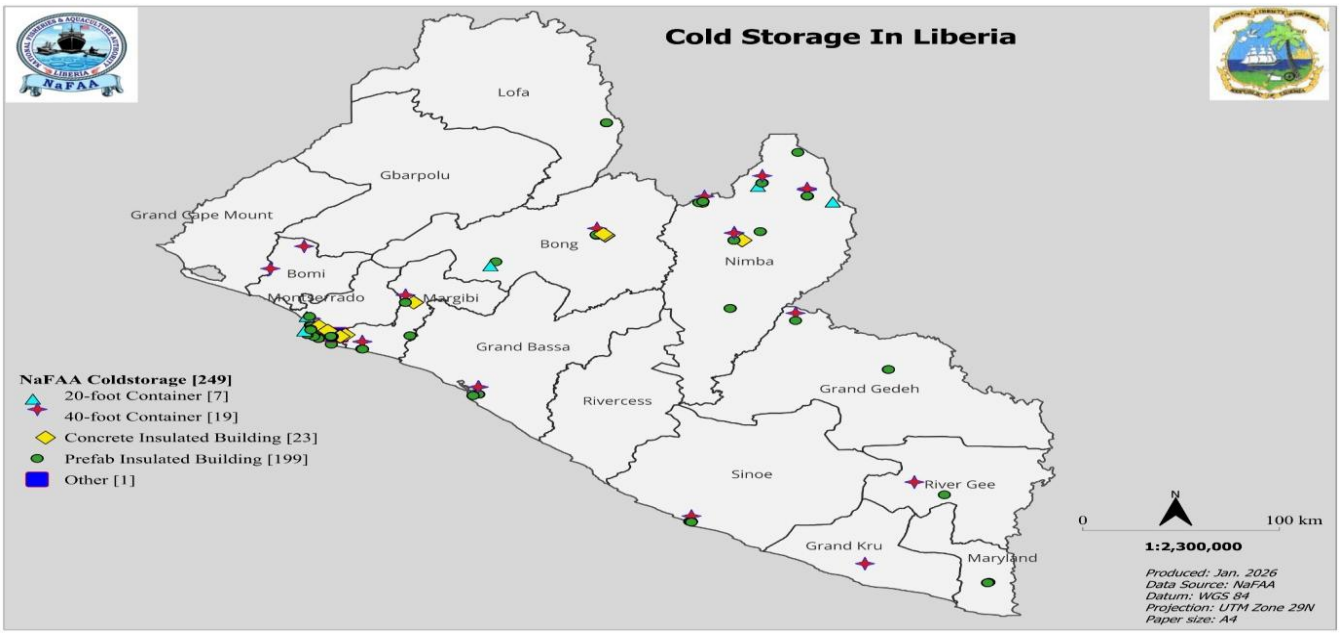


Figure 20: Map showing Fish Cold Storage Facilities across Liberia

National Cold Storage Database

The survey facilitated the development of a national cold storage facility database, capturing key administrative, technical, and geospatial information for each facility, including location, facility type, ownership, management contacts, and GPS coordinates (**Table 21**). The database supports mapping, registration, inspection planning, traceability, and food safety oversight, and provides a foundation for regulatory enforcement and evidence-based decision-making across the cold chain.

Table 21: Summary Description of the Cold Storage Database

Database Element	Description
Total Facilities Recorded	249 cold storage facilities nationwide
Geographic Coverage	Facilities are mapped across multiple counties and communities
Facility Types Captured	Prefab insulated buildings, concrete insulated buildings, 20-ft and 40-ft container units
Geospatial Data	GPS coordinates (latitude and longitude) recorded for all facilities
Ownership Information	Owner name and nationality (Liberian and foreign) documented
Management Details	Facility manager names and contact phone numbers captured
Administrative Use	Supports registration, billing, inspection planning, and enforcement
Analytical Use	Enables mapping, spatial analysis, traceability assessment, and food safety oversight

Types of Cold Storage Infrastructures across the country

The nationwide cold storage enumeration identified a total of 255 cold storage facilities (**Table 22**), with prefabricated insulated buildings accounting for 80% of all installations **(Figure 21).** Cold storage infrastructures are **highly concentrated in major commercial counties**, particularly **Montserrado**, which alone hosts about **59% of all facilities**, followed by **Nimba**, **Margibi**, and **Bong (Figure 22)**.

Table 22: Distribution of Cold Storage Facilities by structure across the Country

County	20-foot Container	40-foot Container	Concrete Insulated Building	Prefab Insulated Building	Grand Total
Bomi		2			2
Bong	1	1	4	11	17
Gbarpolu				1	1
Grand Bassa		2		7	9
Grand Gedeh		1		3	4
Grand Kru		1			1
Lofa				3	3
Margibi	1	3	2	16	22

Maryland				3	3
Montserrado	2	1	17	132	153
Nimba	3	6	2	24	35
River Gee		1		1	2
Sinoe		1		3	4
Grand Total	**7**	**19**	**23**	**199**	**255**

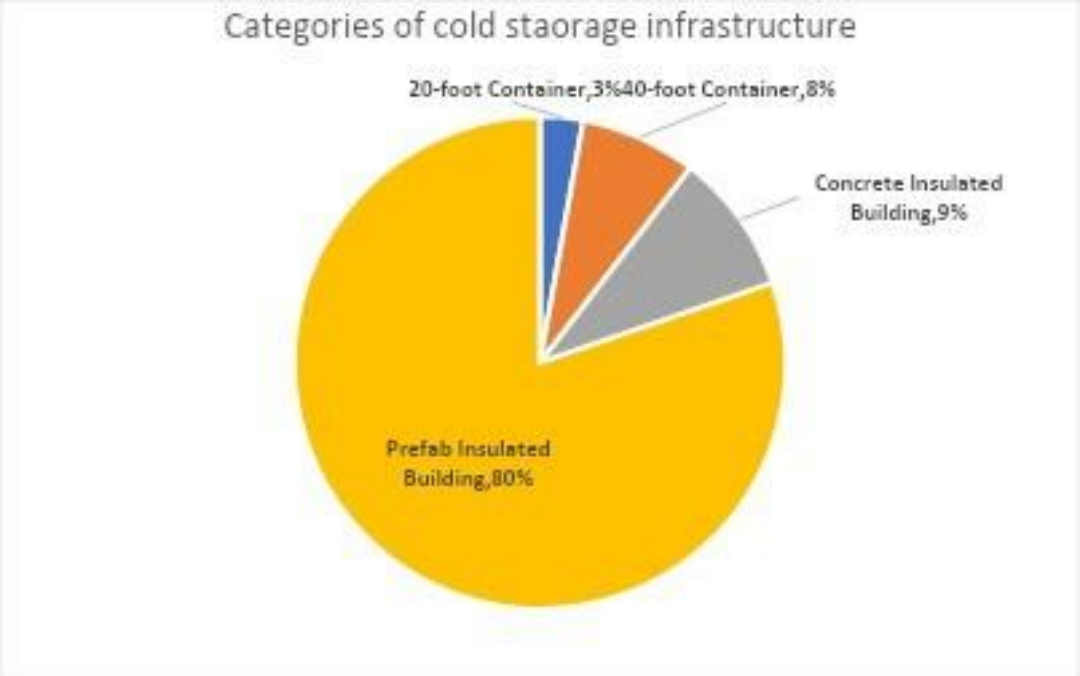


Figure 21: Percent distribution of types of cold storage facilities

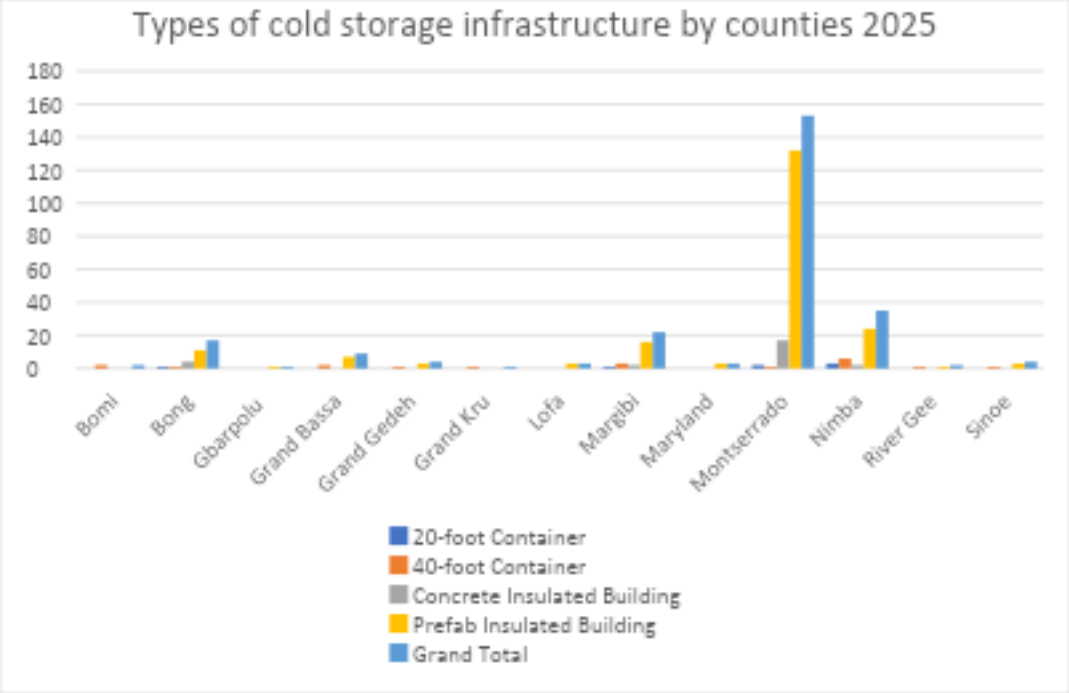


Figure 22: Types of cold storage facilities by county

In contrast, several counties have only one to three facilities, indicating reliance on secondary distribution from urban hubs. While this centralized structure supports the availability of imported frozen fish in major markets, it also increases the risk of cold chain breaks, temperature abuse, and quality deterioration during inter-county distribution, with implications for food safety, equitable **access, and regulatory oversight** across the country.

Ownership Type

The ownership analysis shows that **cold storage facilities are predominantly foreign-owned**, with foreign operators accounting for the majority of the cold stores enumerated and only a small share under Liberian ownership (**Figure 23**). This indicates that the imported fish cold chain is largely driven by **foreign investment**, highlighting the need for policies and incentives to **strengthen local ownership and participation** in the sector.

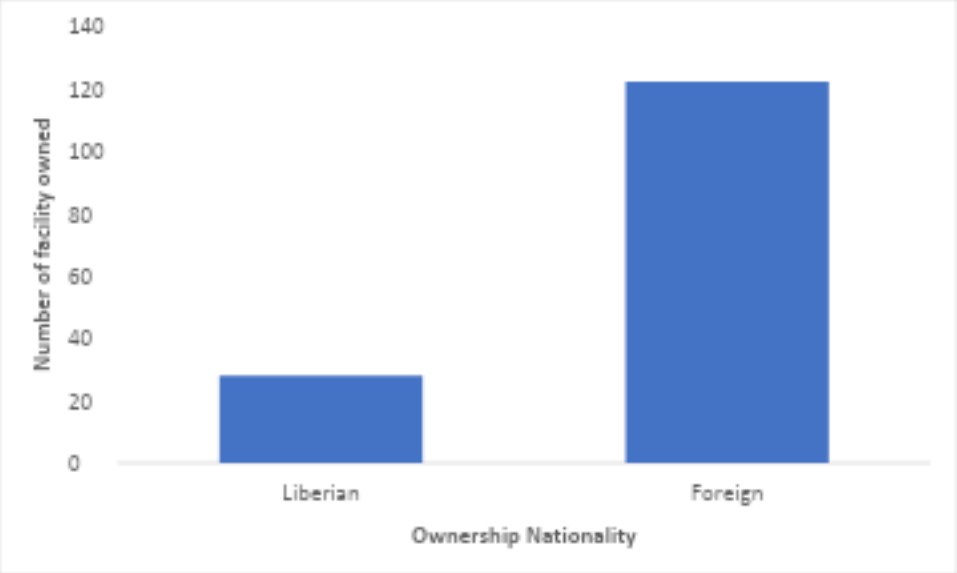


Figure 23: Cold Storage Ownership Distribution

Administrative Structure of Cold Storage Facilities

The analysis shows that Liberia's cold storage sector is **highly centralized**, with **228 of 255 facilities (90%) operating as branches** and only **27 as head offices (Table 23)**. A few large operators dominate the market—particularly Fresh Frozen Food, UCI Fresh & Frozen Food, Africa No-1 Enterprise, and West Africa Enterprise—supporting wide distribution of imported fish but also highlighting **market concentration and the need for strong regulatory and competition oversight**.

Table 23: Distribution of Cold Storage Facilities by Ownership

No	Facility Name	Head Office	Branches	Total Facility
1	Africa Frozen Food	-	1	1
2	Africa No-1 Enterprise	1	18	19
3	Aminata Freezing	-	1	1
4	B. D. Frozen Food Inc.	-	1	1
5	Banjak Frozen Food	1	15	16
6	Blue Marlin Frozen Center	1	1	2
7	Branded Tech	-	1	1
8	Bushrod Marine Products-LLC	1	-	1
	Blueline Frozen Food	1	-	1
9	Caroline Frozen Food	1	13	14
10	Chaeitou Bro Branch	1	16	17
11	Crystal Frozen Food	-	3	3

12	D' Cold Storage	-	1	1
13	Dalian Hailan Branch	1	2	3
14	Diamond Food Lib	1	4	5
15	Franky Frozen Food	1	-	1
16	Fresh Frozen Food	1	53	54
17	Fresh Frozen Island	-	1	1
18	Gbarnga Frozen Food	-	1	1
19	God Gift Frozen Food	-	1	1
20	Golden Frozen Food	-	1	1
21	Scodi Head Office	1	3	4
22	HH Frozen Food Head Office	1	2	3
23	Joyce Frozen Food	1	6	7
24	Kenneh Frozen Food	-	1	1
25	Leon Company -Ossaco Corporation	1	-	1
26	Lewis Enterprise	1	-	1
27	Lala Frozen Food	1	-	1
28	Linas Cold Storage	-	1	1
29	Mamie Singba Tarpeh Cold Storage	-	1	1
30	Manigba and Son	-	1	1
31	Marche Business Center	1	3	4
32	Maryland Business company	1	1	2
33	National Frozen Food	1	9	10
34	None Money No Friend Frozen Food	-	1	1
35	Ossaco Corporation	1	2	3
36	Plowein Trading Center	**-**	**1**	**1**
37	Quality Corporation	-	1	1
38	Reem Frozen Food	1	-	1
39	Roy Frozen Food Branch 2	-	1	1
40	S D Frozen Food	-	1	1
41	Sea Trade Center	1	-	1
42	Solo BLHS Business Center	-	1	1
43	Standard General Supply	-	1	1
44	TRH Corp	1	10	11
45	Tuasan Frozen Food Center	-	1	1
46	UCI Fresh & Frozen Food	1	26	27
47	Unity Frozen Food	1	2	3

48	Warehouse for Franky and Joyce Br 3	-	1	1
49	West Africa Enterprise Head Office	1	17	18
	Total	**27**	**228**	**255**

Primary Energy Source

The findings show that 200 facilities use a public grid (LEC) with a backup generator, while 35 use only a generator **(Figure 24).** Only one facility uses solar, while the power source of 12 facilities remains undefined due to closure or non-operational status. The analysis shows that most cold storage facilities rely on LEC power supplemented by generators, underscoring the need for backup electricity to maintain cold chain operations. Dependence on generators increases operating costs and fuel risks, underscoring the need to promote more reliable, **renewable energy solutions** to strengthen sector resilience.

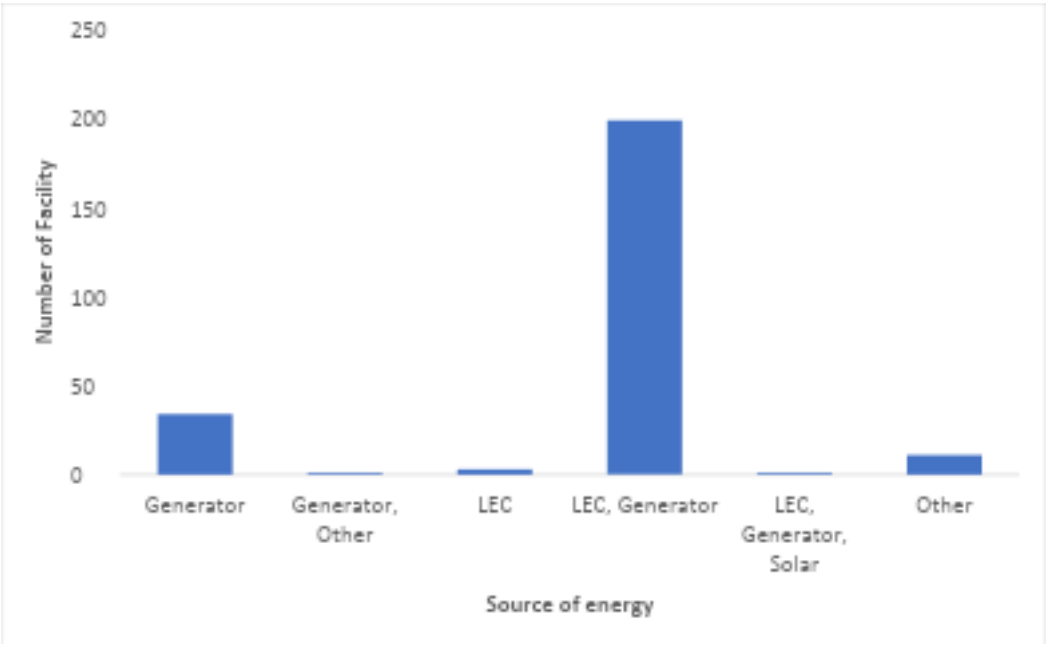
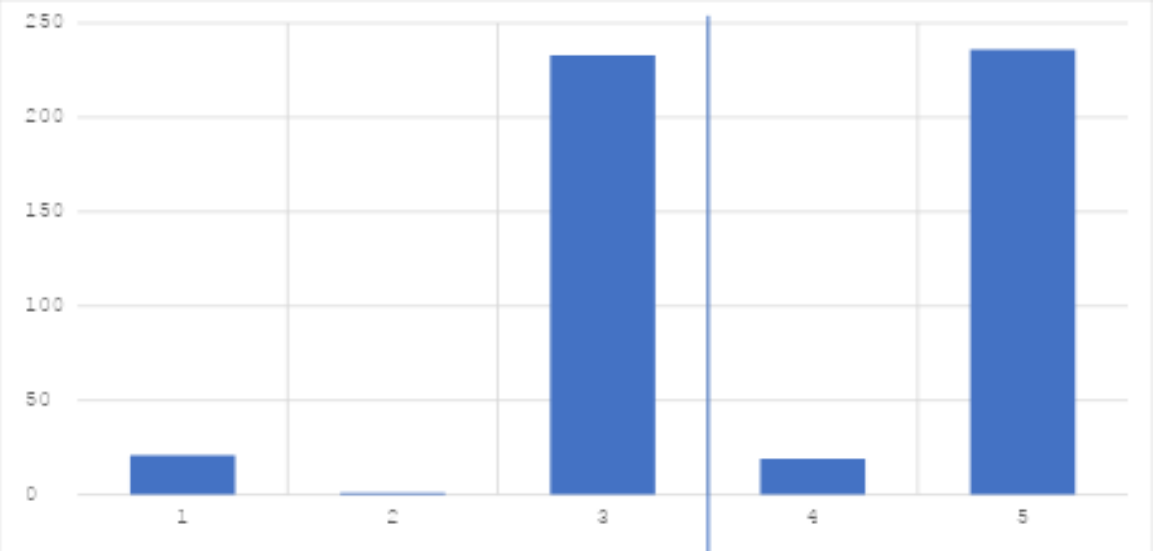


Figure 24: Sources of Electricity in Cold Storage Facilities

Temperature Logging and Monitoring System

The findings from the evaluation of the cold storage temperature monitoring system reveal a key compliance gap (**Figure 25**). Only the head offices of multi-branch facilities maintain temperature records. Although **most facilities have temperature monitoring systems**, **daily temperature logging is rarely done**. However, temperature reading is reportedly submitted to head offices every morning. Those that do not record temperatures at all are facilities considered closed or under renovation. This gap between system

availability and actual use underscores the need for **mandatory daily logging and stronger inspection enforcement** to ensure cold chain integrity and food safety.



General Hygiene Status

The hygiene assessment indicates that approximately 225 facilities (about 90%) were rated acceptable, while around 8 facilities (3%) were rated good, and about 5 facilities (2%) were rated poor **(Figure 26).** Importantly, approximately 12 facilities (5%) rated very poor were closed at the time of inspection, limiting immediate food safety risks but signaling serious infrastructure and sanitation deficiencies. These findings highlight the need for corrective actions and verification before reopening, alongside continued monitoring to sustain acceptable hygiene standards across operational facilities.

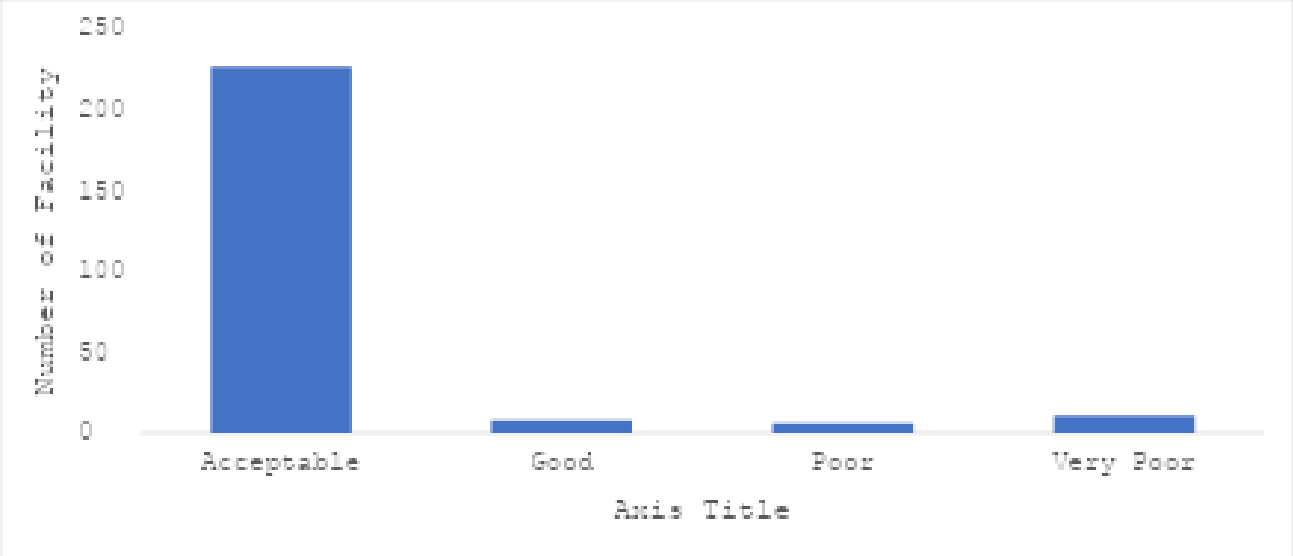


Figure 26: Hygiene Conditions in Cold Storage Facilities

Fish Handling Practices and Traceability Records

The assessment indicates that about 235 facilities (≈94%) have acceptable fish handling practices (clean storage areas, proper arrangement of fish, separation from non-food items), while only ~5 (≈2%) meet good hygienic standards and ~10 (≈4%) are poor, posing food safety risks (Figure 20). Traceability remains weak, with ~200 facilities (≈80%) lacking records and only ~50 (≈20%) maintaining documentation, limiting effective food safety control, recall capacity, and regulatory oversight and highlighting the need for mandatory traceability and enforcement (**Figure 27**).

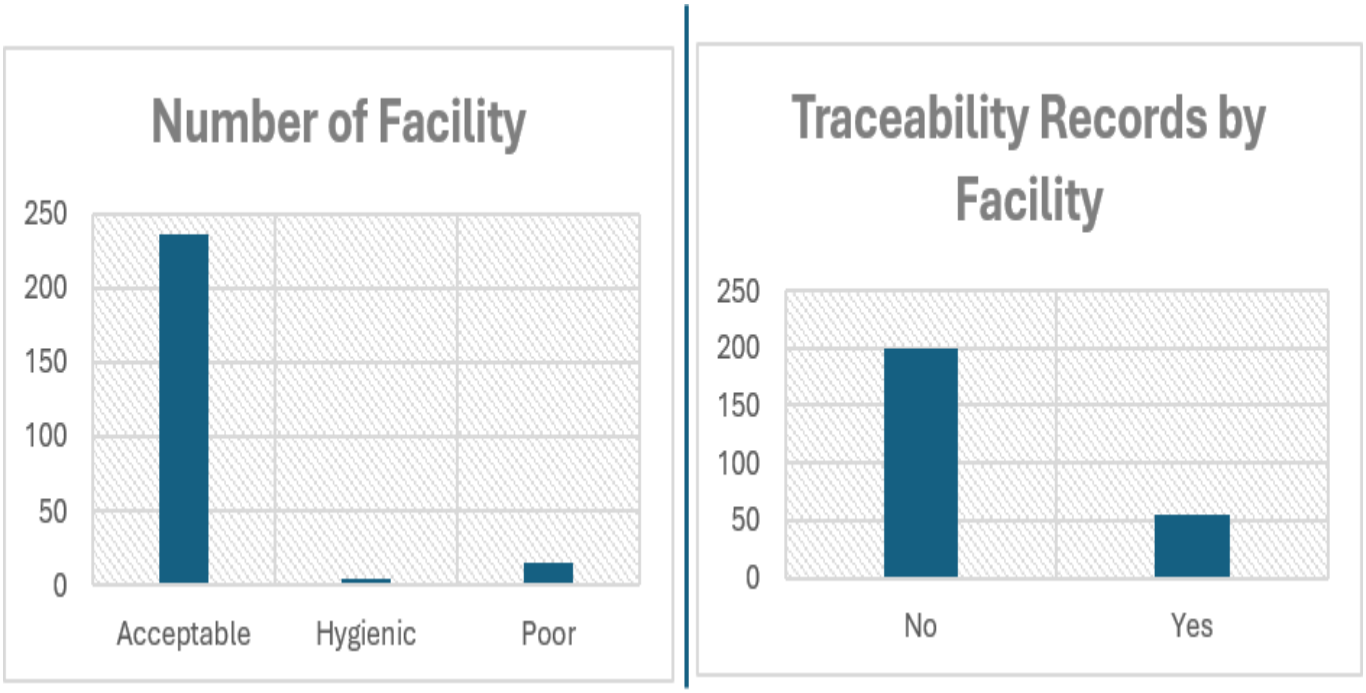


Figure 27: Fish Handling Practices and Traceability Records

Sources of Fish Product in Storage

The analysis shows that local (industrial) fish products dominate storage, used by about 140 facilities (56%), followed by imported fish, used by about 90 facilities (36%). Only a small number of stores (6%) import and sell both local and imported products, indicating that cold storages mainly support local industrial and imported fish supply chains (**Figure 28**).

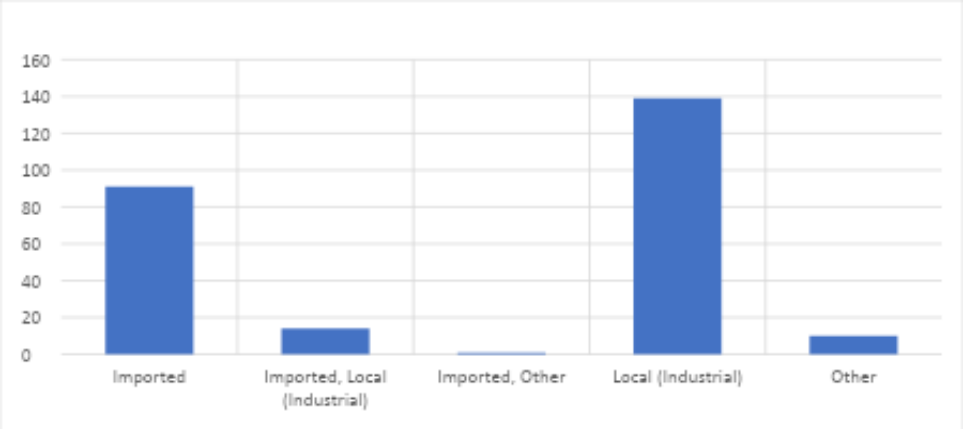


Figure 28: Sources of Fish Product in Cold Storage Facilities

7. SUMMARY OF ACTIVITIES ACHIEVED (2025)

The Department of Research and Statistics (DRS) accomplished the following key deliverables during the 2025 reporting cycle, organized by functional unit:

7.1 Fisheries Statistics

Activity	Description	Status
Aquaculture Farmers Database	Developed and populated a centralized database registering 533 aquaculture farms across Bong, Nimba, and Lofa counties, capturing GPS coordinates, ownership (gender-disaggregated), pond characteristics, species cultured, and production volumes.	Completed
Nationwide Cold Storage Enumeration	Conducted a complete census of 255 cold storage facilities across 13 counties, capturing facility type, ownership structure, energy sources, temperature monitoring, hygiene status, and traceability practices. Database includes GPS coordinates for spatial mapping.	Completed
Time-Series Production Update	Compiled and analyzed artisanal and industrial fisheries production data (2018–2025), documenting cumulative artisanal production of	Completed

	164,562,805.80 kg and industrial production of 37,360,588.54 kg over the period.	
Import/Export Trade Monitoring	Consolidated monthly import and export data for 2025, documenting total imports of 22,456.51 MT (USD 9.66 million) and exports of 123.5 MT.	Completed
Trade Dynamics Analysis	Produced a comparative analysis of domestic production vs. import reliance (2018–2025), calculating import dependency ratio (43.9%) and self-sufficiency ratio (56.1%).	Completed

7.2 Fisheries Biology and Ecology

Activity	Description	Status
Resource Survey Synthesis	Synthesized biomass estimates from four major surveys (2019 EAF-Nansen, 2023 CRODT, 2024 INRH/Moroccan, 2024 EAF-Nansen), documenting total biomass estimates ranging from 74,116 MT to 2,397,200 MT.	Completed
Stock Assessment (8 Species)	Conducted data-limited stock assessments using CMSY/BSM methods for 8 commercially important pelagic and demersal species, computing MSY, F_{MSY}, B_{MSY}, and stock status categories.	Completed
Shrimp Biology Analysis	Performed length-frequency analysis for three shrimp species (Southern pink, Scarlet, Striped red), comparing median carapace length (MCL) to length at first maturity (CL_{50}) and maximum length (CLmax).	Completed
Sardinella aurita Biology	Analyzed spatial distribution, length-frequency, sex ratio (60% female), and maturity status (>80% mature) from 2024 INRH survey data.	Completed
Biological Reference Points (BRPs)	Established target (Bcur/$B_{0.1}$, Fcur/$F_{0.1}$) and limit (Bcur/B_{MSY}, Fcur/F_{MSY}) reference points aligned with CECAF Scientific Working Group standards.	Completed

7.3 Fisheries Socio-Economics

Activity	Description	Status
Monetary Value of	Estimated 2025 fisheries production value at USD 34,531,462.49, with monthly revenue	Completed

Production	ranging from USD 2.12 million (June) to USD 3.73 million (August).	
Per Capita Consumption Trend	Calculated per capita fish consumption trend (2018–2025), documenting decline from 10.6 kg (2018) to 7.55 kg (2021) and recovery to 10.4 kg (2025).	Completed
Fisheries GDP Contribution	Documented fisheries contribution to agriculture and fisheries GDP at 28.1% (Central Bank of Liberia, 2025).	Completed
Unsold Production Analysis	Identified that approximately 16% of total production (6,661.6 tons) remained unsold, indicating market and post-harvest constraints.	Completed

7.4 Fisheries Quality Assurance

Activity	Description	Status
First Quarter Cold Storage Inspection	Inspected 149 fish establishments (15 importing companies, 1 fishing company, 133 distribution centers), evaluating temperature control, hygiene, and sanitation.	Completed
Nationwide Cold Storage Assessment (December 2025)	Enumeration and inspection of 255 cold storage facilities across Liberia, documenting facility types (80% prefab insulated buildings), ownership (predominantly foreign), energy sources (200 LEC + generator, 35 generator-only), and compliance gaps (0% temperature logging, 20% traceability).	Completed
Cold Storage Database Development	Created a geospatially-enabled database with GPS coordinates, administrative metadata, and compliance scores for all 255 facilities.	Completed
Hygiene and Sanitation Grading	Evaluated and graded facilities on hygiene (0–22 scale), identifying top performers (Diamond Food Lib, Cheaitou Bro, Dalian Hailian) and those requiring improvement (Fresh Frozen Food, National Frozen Food, UCI).	Completed

7.5 Institutional and Capacity Development

Activity	Description	Status
Staff Training	Provided on-the-job training for enumerators, data field coordinators, and quality control	Ongoing

	technicians in data collection protocols and inspection procedures.	
International Collaboration	Participated in the 2024 EAF-Nansen Survey (regional) and maintained partnerships with INRH (Morocco), CRODT (Senegal), FAO, and World Bank (LSMFP/LIFSSP).	Ongoing
Data Management Systems	Strengthened electronic logbook systems for industrial vessels and mobile data collection platforms for artisanal enumerators.	Ongoing
Reporting	Produced this Annual Technical Report (2025) and contributed to ICCAT and other regional reporting obligations.	Completed

7.6 Summary of Key Performance Indicators

Indicator	2025 Achievement	Target (2026)
Aquaculture farms registered	533	1,000+ (expand to all 15 counties)
Cold storage facilities enumerated	255	300 (including previously closed facilities)
Fish establishments inspected	149	200 (quarterly)
Stock assessments completed	8 species	12 species
Resource surveys participated in	2 (INRH, EAF-Nansen)	2 (biennial schedule)
Fisheries production (MT)	40,772	42,000 (with aquaculture expansion)
Per capita consumption (kg/year)	10.4	11.5

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

The 2025 technical reporting cycle has yielded a dual narrative: **progress in scientific capacity** alongside **alarming trends in resource status**.

On the side of progress:
The Department has successfully operationalized modern data collection systems, including electronic platforms for aquaculture (533 farms registered) and cold storage (255 facilities with GPS coordinates). Participation in high-quality international research surveys (EAF-Nansen 2024, INRH 2024) has generated the most comprehensive biomass and biological data ever compiled for the Liberian shelf. The development of a national cold storage database and aquaculture farmers registry represents a foundational shift toward transparent, geospatially-enabled management. For the first time, stock assessments using CMSY/BSM methods have been applied to eight key commercial species, providing an empirical basis for management advice.

On the side of concern:
The biological evidence is unequivocal. The majority of Liberia's commercially important demersal and medium-pelagic stocks are **overexploited (63% of assessed species)**. The relative fishing mortality (F/F_{MSY}) for species such as *Cynoglossus spp.* (11.9) and *Galeoides decadactylus* (8.26) indicates fishing pressure far beyond sustainable limits—in the case of solefish, nearly **12 times** the level that would produce maximum sustainable yield. Without immediate intervention, these stocks face recruitment overfishing, economic decline, and prolonged recovery timelines spanning 5–10 years.

The trade analysis reveals a structural deficit: domestic production meets only **56% of national fish demand**, requiring an average annual import of **20,000 MT** (import dependency ratio of 44%). This represents both a vulnerability to global price shocks and a significant opportunity for aquaculture expansion.

The quality assurance findings are equally concerning: while most cold storage facilities maintain acceptable hygiene, the complete absence of daily temperature logging (0% compliance) and weak traceability (only 20% maintain records) pose serious food safety risks. The cold storage sector remains highly centralized (90% branches of foreign-owned enterprises), with limited Liberian participation.

The overarching conclusion is clear: Liberia has reached a critical inflection point. The science is now robust enough to guide management. Failure to act on the recommendations below will undermine food security, livelihoods, and the long-term sustainability of the fisheries sector.

8.2 Recommendations

A. For Overexploited Stocks (Immediate Actions)

#	Recommendation	Responsible Body	Timeline
1	**Reduce fishing mortality by 30–50%** within six months for *Pseudotolithus spp.*, *Lutjanus spp.*, *Galeoides decadactylus*, *Cynoglossus spp.*, and *Alectis alexandrinus*.	NaFAA Management	Within 6 months
2	Implement **emergency management measures**: spawning area closures (seasonal or permanent), minimum mesh size increase to 60 mm for demersal trawls, and vessel day limits for industrial and semi-industrial fleets.	NaFAA with MCS Unit	Within 3 months
3	Establish **formal recovery plans** with clear biomass targets and 3–5 year timelines, reviewed annually by the Department of Research & Statistics.	Department of Research & Statistics	By Q2 2026

B. For Fully and Not-Fully Exploited Stocks (Precautionary Actions)

#	Recommendation	Responsible Body	Timeline
4	Maintain current effort levels for *Sardinella spp.* and *Caranx spp.*, introducing **precautionary buffers** (e.g., 10–15% biomass decline triggers automatic effort reduction).	NaFAA Management	Immediate
5	Allow controlled, limited increases for *Ilisha africana* (maximum 10–15% per year) only under pre-agreed Harvest Control Rules (HCRs) and with continuous monitoring.	Department of Research & Statistics	Ongoing

C. Cross-Cutting Management Actions

#	Recommendation	Responsible Body	Timeline
6	**Mandate daily temperature logging** and traceability records for all cold storage facilities, enforced through unannounced quarterly inspections. Non-compliance to attract sanctions including fines or temporary closure.	Quality Assurance Unit	By Q1 2026
7	Conduct a **national frame survey** to update fleet estimates, number of fishers, and landing site counts (no comprehensive survey since 2020).	Department of Research & Statistics	By Q3 2026

8	Expand the **aquaculture database** to all 15 coastal and inland counties, equipping enumerators with tablets and weighing scales. Target registration of 1,000+ farms by the end of 2026.	Statistics Unit	By Q4 2026
9	Address the **20,000 MT annual import deficit** through targeted aquaculture investment, prioritizing tilapia and catfish production in Bong, Nimba, Lofa, Margibi, and Montserrado counties.	NaFAA Management with Development Partners	2026–2028

D. Research Priorities for 2026

#	Recommendation	Expected Output	Timeline
10	Conduct **recruitment studies** for overexploited demersal stocks (*Pseudotolithus spp.*, *Lutjanus spp.*) to inform open/closed season regimes.	Seasonal closure recommendations	By Q3 2026
11	Perform **gear selectivity studies** to validate and update mesh size regulations, particularly for industrial trawls targeting demersal species.	Revised mesh size regulations	By Q4 2026
12	Map **critical habitats** (particularly spawning aggregation sites) using the 2024 survey data and local ecological knowledge, with outputs in GIS format.	Spatial management zones	By Q4 2026
13	Establish a **semi-annual stock assessment routine** for all 8 key species, transitioning from data-limited (CMSY/BSM) to full analytical assessments where data permit.	Regular stock status updates	Starting Q3 2026
14	Complete **species-level biomass disaggregation** for the 2024 EAF-Nansen survey data (over 35 demersal and 16 pelagic species) and publish as a reference document.	Species-specific biomass reference	By Q3 2026

E. Institutional and Policy Actions

#	Recommendation	Responsible Body	Timeline
15	Integrate **climate indicators** (sea surface temperature, primary productivity, upwelling intensity) into routine stock forecasts and survey analyses.	Biological Research Unit	By Q4 2026
16	Strengthen **stakeholder engagement** through annual science-management workshops to translate assessment results into regulatory action, with participation from fisherfolk associations, processors, and importers.	Department of Research & Statistics	Annually (Q1)
17	Allocate dedicated budget lines for **observer coverage** (target 100% of industrial trawl and 10% of tuna	NaFAA Management	Fiscal Year 2026–2027

	vessel trips) to improve catch, bycatch, and discards data quality.		
18	Operationalize the **Semi-industrial Fisheries Management Plan** for Liberia, incorporating the stock assessment results and Biological Reference Points documented in this report.	NaFAA Management	By Q2 2026
19	Establish a **recurring biennial survey schedule** with consistent methodology (collaboration with EAF-Nansen or alternative partners) to build a comparable time-series of biomass estimates.	Department of Research & Statistics with Partners	Starting 2026

The time for precautionary talk has passed. The evidence demands decisive, science-based management. The Department of Research & Statistics stands ready to provide the scientific support necessary for Liberia to transition from resource exploitation to resource stewardship.

9. APPENDICES AND ANNEXES

APPENDIX 1: SPECIES SPECIFIC BIOMASS ESTIMATES FOR MAJOR PELAGIC AND DEMERSAL FISHERIES RESOURCES FROM THE LIBERIAN SHELF BY SURVEYS

Pelagic Resources		EAF-Nansen-2024	INHR/ Morocco-2024	2023 CRODT/Senegalese Survey	EAF-Nansen-2019
Species	**Common Name**	**Estimated Biomass (t)**	**Estimated Biomass (t)**	**Estimated Biomass (t)**	**Estimated Biomass (t)**
Sardinella rouxi	Yellowtail Sardinella	4,000	-		
Sardinella aurita	Round bonny	55,000	21,794	24	5,600
Scomber colias	Scomber mackerels		35,000		
Engraulis encrasicolus	Anchovy	2,200	4,223		
Decapterus ronchus	Scads		4,000		
Trachurus trecae	Horse mackerel	56,000	15,739		12,600
Sardinella maderrensis	Flat bonny	8,000	2,000	6	200
Sphyraena guachancho	Guachanche barracuda		7,000		
Chloroscombrus chrysurus	Atlantic bumper		2,000		
Scomberomorus	West African				

tritor	Spanish mackerel		8,000		
Caranx crysos	Blue runner		1,000		
Selene dorsalis	African moonfish		6,000		
Alectis alexandrinus	Alexandria pompano		5,000		
IIlisha africana	West African ilisha		2,000	1,599	
Drepane africana	African sicklefish			1,529	
Others	All other pelagic species				
Sub-total		**125,200.00**	**113,757**	**3,158**	**18,400**

Demersal Resources		EAF-Nansen-2024	INHR/ Morocco-2024	2023 CRODT/Senegalese Survey	EAF-Nansen-2019
Dentex angolensis	Angolan dentex	250,000	23,632.78	686	
Squalus megalops	Shortnose spurdog shark		12,308.25		
Brachydeuterus auritus	Bigeye grunt	1,752,000	10,469.01	1,442	16,827

Pagellus bellottii	Red pandora	270,000	8,654.64	84	8,544
Dentex congoensis	Congo dentex		8,426.98		
Squatina oculata	Smoothback angelshark		8,266.99		
Pentheroscion mbizi	Blackmouth croaker		6,165.59		
Saurida brasiliensis	Brazilian lizardfish		4,123.07		
Scorpaena stephanica	Spotted-fin rockfish		4,051.41		
Pseudupeneus prayensis	West African goatfish		3,763.75		
Cynoglossus canariensis	Canary tonguesole		3,711.48	512	
Epinephelus aeneus	White grouper		3,608.64	662	1,591
Mustelus mustelus	Smooth-hound shark		3,600.43	38	1,090
Umbrina canariensis	Canary drum		3,523.38		
Raja parva	African Brown Skate		3,277.13		
Boops boops	Seabream		3,067.72	164	
Priacanthus arenatus	Atlantic bigeye		2,983.43		

Dentex canariensis	Canary dentex		2,545.90		
Illex coindetii	Broadtail shortfin squid		2,414.56		
Raja miraletus	Brown ray		2,406.49	443	917
Etmopterus polli	African lanternshark		2,182.69		
Uranoscopus albesca	Longspine stargazer		2,175.63		
Sepia bertheloti	African cuttlefish		2,162.39	167	1,497
Dactylopterus volitans	Flying gurnard		1,681.11		
Brotula barbata	Bearded brotula		1,642.82	1,611	
Branchiostegus semifasciatus	Zebra tilefish		1,537.19		
Sphyraena guachancho	Guachanche barracuda		1,239.19		
Merluccius polli	Benguela hake		1,111.07		
Ariomma bondi	Silver-rag driftfish		1,005.61	7	
Pomadasys spp.	Grunters			682	17,420

Pseudotolithus spp	West African croakers			4,145	6,822
Galeoides decadactylus	Lesser African threadfin			378	
Pandalid spp.	Shrimps			118	
Pteroscion peli	Boe drum			624	
Lutjanids	Snappers				1,008
Others	All other demersal species		99,006.95	7,779	
Sub-total		**2,272,000**	**234,746**	**19,542**	**55,716**
Grand Total		**2,397,200.00**	**3 48,502.94**	**22,699.68**	**7 4,116.00**

APPENDIX 2: COMBINED MARINE INDUSTRIAL AND ARTISANAL FISHERIES PRODUCTION (KG) TIMES SERIES FOR THE TOP 66 SPECIES LANDED FROM 2018-2024

Species	2018	2019	2020	2021	2022	2023	2024	Grand Total (Kg)	Percent
Sardinella maderensis	45800	9557312	4718455	10842180	8129120	8559689	5300274	47,152,830.10	**27.94%**
Sphyraena guachancho	4585880	814200	1302570	823818.8	1453396	2955356	2094318	14,029,538.80	**8.31%**
Sardinella aurita	63078	462092.2	3799360	842079.8	2079376	1551196	2233698	11,030,880.00	**6.54%**
Pseudotolithus typus	453632	1150223	1047160	794966.3	2126888	2270532	1780478	9,623,878.90	**5.70%**
Pagrus caeruleostictus	688392.5	1344880	1667605	562556.7	848956	691586	45234	5,849,209.80	**3.47%**
Chloroscombrus chrysurus	165925	474925.4	890145	1090799	1186260	1129647	767318	5,705,019.10	**3.38%**
Osteichthyes	440487.5	1053279	995715	697399.7	1097812	722334	591760	5,598,786.80	**3.32%**
Ilisha africana	323540	360364.8	471450	530002.8	2220576	612281	708950	5,227,164.60	**3.10%**

Brachydeuterus auritus	152925	830842.8	464405	733863.1	1427968	765651	464724	4,840,378.90	**2.87%**
Lutjanus goreensis	507100	1385645	1127105	379953	207296	188015	662340	4,457,454.40	**2.64%**
Galeoides decadactylus	779376	652692.6	683415	533283.8	457531	374388	582630	4,063,316.40	**2.41%**
Pseudotolithus senegalensis	199300	217528.6	350595	279420.3	599360	820508	863478	3,330,189.90	**1.97%**
Alectis ciliaris	45952.5	264436.8	255655	1023076	234004	686352	500158	3,009,634.20	**1.78%**
Euthynnus alletteratus	85600	131684.4	429590	819712.8	505504	428637	538440	2,939,168.20	**1.74%**
Sphyraena barracuda	610401.5	231420.4	216545	125640.9	435296	743132	509250	2,871,685.80	**1.70%**
Scomberomorus tritor	6096	76989.2	219525	252265	503544	502924	866888	2,428,231.20	**1.44%**
Cynoglossus senegalensis	113721	298709.6	218025	135226.6	446708	391960	399562	2,003,912.20	**1.19%**
Lutjanus fulgens	1600	362392.4	399735	97169.4	124256	120466	828786	1,934,404.80	**1.15%**
Hemiramphus brasiliensis	351000	114203.2	336560	442856.7	205408	348657	90846	1,889,530.90	**1.12%**
Ariidae	290	109772.4	121725	95837.4	296748	222524	930438	1,777,334.80	**1.05%**
Exocoetidae	5703	383062.6	118090	554236.9	50156	107911	536214	1,755,373.50	**1.04%**
Jurrel	8100	180360	273660	396260	343500	250120	290740	1,742,740.00	**1.03%**
Scorpaena angolensis	88835	196653	169578	765209	122350	140694	103852	1,587,171.00	**0.94%**
Dentex maroccanus		9042	85575	5261.4	90144	77159	1236756	1,503,937.40	**0.89%**
Pseudotolithus elongatus	845100	41017.8	42455	12720.6	156800	94829	65982	1,258,904.40	**0.75%**
Dasyatis margarita	62126	70804	93645	142123.7	231784	301857	253134	1,155,473.70	**0.68%**
Pentanemus quinquarius	21284	89488.4	145460	34398.9	213600	237088	297402	1,038,721.30	**0.62%**
Caranx hippos	127200	156426.6	14105	156809.7	374240	131905	62496	1,023,182.30	**0.61%**
Brotula barbata	77628	257503	149620	43341.9	78732	219100	163736	989,660.90	**0.59%**
Alectis alexandrinus		60225.2	283395	146619.9	222368	71021	104748	888,377.10	**0.53%**
Pseudupeneus prayensis	12738	128241.2	156365	136800	153860	90855	182900	861,759.20	**0.51%**
Atlantic bigeye	4950		149340	353760	178280	70320	97100	853,750.00	**0.51%**
Drepane africana	840	73491	138210	48769.7	163060	146306	130488	701,164.70	**0.42%**
Ophichthidae	3584	38677.8	81260	33133.5	139784	115628	259002	671,069.30	**0.40%**
Lion Fish	58724	230960	178160	48760	37240	37140	52410	643,394.00	**0.38%**
Ethmalosa fimbriata	10	318251	36960	78554.7	151616	31248	26586	643,225.70	**0.38%**
Atlantic Big Eye		643080						643,080.00	**0.38%**
Pomadasys jubelini	19962	19226.8	45450	362400.4	93648	63511	13986	618,184.20	**0.37%**
Katsuwonus pelamis	76300	30359.2	41580	11255.4	78144	224626	149352	611,616.60	**0.36%**
Sepiidae, Sepiolidae	60229	58120	94333	49056.7	104134	73055	114906	553,833.70	**0.33%**
Prionace glauca	4500	3644.2	229740	29770.2	3776	4185	207984	483,599.40	**0.29%**
Sarda sarda	431600	54.8	13860	66.6	0	27125	5340	478,046.40	**0.28%**
Thinnus alalunga	367500	77925.6	19530	6260.4	1152	1736	1386	475,490.00	**0.28%**
Loose Fish	112230.04	319580	8040					439,850.04	**0.26%**
Myliobatidae		34606.2	39445	169497	110176	12338	53844	419,906.20	**0.25%**
Rhinobatos spp		33756.8	120015	22544.1	75264	99510	44268	395,357.90	**0.23%**
Istiophorus albicans	30100	36743.4	44450	126773.1	37888	18259	69384	363,597.50	**0.22%**
Trichiurus lepturus	8250	65228	51615	15807.6	122468	74537	22134	360,039.60	**0.21%**
Engraulis encrasicolus		305016.8	70	3063.6	28512	10788	12474	359,924.40	**0.21%**
Octopodidae	28460.5	74940	47778	68719	62300	36348	38324	356,869.50	**0.21%**

Caranx bartholomaei		15344	19530	63536.4	74912	97278	60354	330,954.40	**0.20%**
Makaira indica		11343.6	153230	36163.8	26752	46469	32298	306,256.40	**0.18%**
Tylosurus crocodilus		10028.4	3955	43556.4	20768	103602	121506	303,415.80	**0.18%**
Panulirus spp	840	6384.2	22855	18248.4	30216	84504	80934	243,981.60	**0.14%**
Zipper Fish	5970	3760	260	13500	56540	24260	128410	232,700.00	**0.14%**
Stromateus fiatola	240	14248	420	12820.5	153216	18259	4704	203,907.50	**0.12%**
Auxis thazard	3200	4274.4	111510	50949	4444	31	84	174,492.40	**0.10%**
Portunus validus	4502	3534.6	14210	18881.1	19864	11165	85848	158,004.70	**0.09%**
Rachycentron canadum		16686.6	22855	10323	34496	26319	45864	156,543.60	**0.09%**
Pteroscion peli	290	26742.4	31510	21711.6	22144	9548	44016	155,962.00	**0.09%**
Carcharhinus altimus	17200	12741	31255	44122.5	11776	6820	31836	155,750.50	**0.09%**
Bitter Fish					68340	32160	51000	151,500.00	**0.09%**
Carcharhinus falciformis	85000	7644.6	4725		1280	3534	48006	150,189.60	**0.09%**
Pampano		85060	50700	6200	200	1140	2440	145,740.00	**0.09%**
Penaeidae	15949	19236	11165	5016	29460	27560	34532	142,918.00	**0.08%**