COMPREHENSIVE SUMMARY REPORT-CMFRI

1. Establishment of Landing Monitoring System for Target Species

1.1 Recruitment and Training of Enumerators

To ensure systematic and reliable monitoring of marine fish landings, a cadre of skilled enumerators was established through the Indian Council of Agricultural Research (ICAR), New Delhi. Recruitment was conducted via a national-level entrance examination, followed by interviews. Successful candidates were appointed as Technicians and deputed to ICAR institutes, including CMFRI centres.

The recruited staff underwent rigorous training at ICAR–CMFRI, with modules designed to standardize monitoring procedures. The training curriculum included:

- **Marine Fish Taxonomy** – Identification of commercially important species commonly landed along the Indian coastline.
- **Landing Centre Characteristics** – Understanding craft and gear operations at major and minor fish landing centres.
- **Sampling Methodologies** – Stratified Random Sampling (SRS) techniques for unbiased, representative data collection.
- **Digital Data Entry** – Hands-on training with GPS-enabled tablets for online, real-time recording and transmission of fish landing data.

This structured process has developed a technically proficient workforce capable of generating high-quality and standardized landing statistics for India's marine fisheries.

1.2 Development of Data Sheets and Standardized Protocols

The **Stratified Random Sampling (SRS) Method**, developed and validated by CMFRI, serves as the national standard for marine fish landing monitoring in India. Key features include:

1. **Stratification of Coastline** – Division of the Indian coastline into strata based on maritime states and fishing regions.

2. **Selection of Sampling Centres** – Identification of representative landing centres considering fishing intensity, species diversity, and regional significance.
3. **Randomization of Sampling Days** – Allocation of observation days using random number generation to avoid temporal bias.
4. **Catch and Effort Data Collection** – Recording species-wise catch, craft and gear characteristics, and fishing effort.
5. **Digital Data Entry** – GPS-enabled tablets linked to the centralized CMFRI server in Kochi, enabling real-time processing and retrieval.
6. **Data Expansion and Estimation** – Raising factors applied to scale sample observations to centre-level, district-level, state-level, and national estimates.

Through this system, CMFRI generates official species-wise, district-wise, and national marine fish production statistics, which form the cornerstone of India's fishery management and policy formulation *(Ref:CMFRI Report September 2025)*

1.3 Pilot Implementation and Expansion

The system was first piloted at selected landing centres along the Karnataka coast, progressively expanded to cover both major and minor centres. Since 2017, manual data collection has been completely replaced with digital operations using web-based applications and GPS-enabled tablets.

Currently, the system is fully operational and produces robust, statistically reliable quarterly and annual estimates of marine fish landings, thereby providing India with dependable fishery statistics at multiple spatial scales.

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2. Biological Sampling of Key Target Species

2.1 Objectives

The biological sampling program was designed to generate **biological reference points** essential for fish stock assessment and management. Priority was given to commercially important small pelagic species, including:

- **Indian oil sardine (Sardinella longiceps)**
- **Indian mackerel (Rastrelliger kanagurta)**
- **Scads (Decapterus spp.)**
- **Bullet tuna and little tuna (Auxis spp. / Euthynnus affinis)**
- **Other Sardinella species**

2.2 Sampling Process

Biological sampling was carried out in-situ at landing centres in **Mangalore and Malpe** between **January and August 2025**, targeting purse seines, ring seines, and trawlers.

For each specimen, the following parameters were systematically recorded:

- Total length and body weight
- Sex and sex ratio (M:F)
- Maturity stages (immature, matured, gravid, and spent)

Representative findings include:

- **Sardinella longiceps**: Length 119–187 mm (mean 146 mm); sex ratio 1:1.2; 47.3% matured and 45.2% spent, indicating active spawning activity.
- **Rastrelliger kanagurta**: Length 101–268 mm (mean 205 mm); sex ratio 1:1.3; 65% spent stage, suggesting peak spawning during the sampling period *(Ref:CMFRI Report September 2025)*

2.3 Seasonal Variations and Species Composition

Species composition varied notably across different fishing gears:

- **Purse Seines**: Dominated by *Sardinella longiceps* (31.1%) and *Rastrelliger kanagurta* (23.1%), with additional contributions from *Trichiurus lepturus* (10.9%), *Thryssa spp.* (8.8%), and others.
- **Ring Seines**: Higher proportions of *Sardinella longiceps* (35.8%) and *Metapenaeus dobsoni* (29.6%), along with a diverse mix of lesser sardines and miscellaneous pelagics.
- **Trawlers**: More diverse assemblage, dominated by *Nemipterus japonicus* (24.4%), *Epinephelus diacanthus* (14.3%), *Sardinella gibbosa* (13.9%), *Thryssa spp.* (13.0%), *(Ref:CMFRI Report September 2025)*

These observations highlight seasonal and gear-based variations in catch composition, providing critical insights for stock structure analysis and spawning season identification.

2.4 Status of Outputs

- **Biological Sampling Database**: Complete, with raw and tabulated datasets compiled.
- **Annual Summary Reports**: Compilation is ongoing; consolidated reporting is expected in the forthcoming assessment cycle.

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3. Conclusion

The establishment of a **Landing Monitoring System** and a **Biological Sampling Program** marks a significant advancement in fisheries research and monitoring along the Karnataka coast.

- The **Landing Monitoring System** is fully operational, supported by trained enumerators, standardized SRS methodology, and digital reporting tools, ensuring robust and timely estimates of marine fish production.
- The **Biological Sampling Program** has generated extensive datasets on size structure, maturity, and spawning dynamics of key small pelagic species. While annual consolidated reports are under preparation, the available data already provide a strong foundation for stock assessment and management.