



Emerging Trends in Electronic Monitoring Across East Asia

*Synthesis from stakeholder convenings at the
2025 Our Ocean Conference in Busan, South Korea*

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*Authored by Ocean Outcomes with contributions by Qingdao Marine
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Introduction and Background

East Asia plays a critical role in global fisheries. China, Japan, South Korea, and Taiwan are among the world's top fishing economies in terms of harvest volume and vessel numbers.¹ They serve as a home base for distant-water fleets that fish on the high seas and supply important seafood commodities such as tuna and squid to Asian, North American, and European seafood markets. These economies are not only seafood powerhouses—they also shape the global direction of fisheries governance, technology, and innovation.

Electronic monitoring (EM)—a suite of cameras, sensors, and Global Positioning System (GPS) technologies installed on fishing vessels to track fishing activities — is gaining traction across the region.² Governments, fishing companies, and Non-Governmental Organizations (NGOs) are investing in EM to improve transparency, ensure compliance with domestic and international rules, address illegal, unreported, and unregulated (IUU) fishing concerns, and meet growing market demands for traceable, sustainable seafood. EM holds promise as a scalable fisheries management tool that enhances supply chain transparency—especially in distant-water and high-seas fleets, where human observers are costly or infeasible.

One area where this traction is particularly visible is in global tuna fisheries, where East Asian fleets play a large role. In 2024, The Nature Conservancy introduced the Tuna Transparency Pledge, an initiative designed to unite retailers, suppliers, and governments in achieving 100% on-the-water monitoring coverage by 2027. This objective applies to all industrial tuna fishing vessels within signatory supply chains and is facilitated through either EM or human observers.³ Major signatories such as Walmart, Albertsons, Thai Union, and several Pacific Island governments have amplified momentum around EM adoption, underscoring market and governance expectations for greater transparency.

While NGOs are calling for international pledges, regulatory momentum is also accelerating. All five of the major Regional Fisheries Management Organizations (RFMOs) have now adopted minimum EM standards for tuna fisheries, with the most recent to do so in February 2025.⁴ Formal requirements such as these are setting a global baseline for EM use and will be especially significant for the East Asian fleets, which play a prominent role in RFMO-managed tuna fisheries.

Despite this growing interest, EM adoption is not uniform globally, and uptake in many regions has been slow. Jurisdictions across East Asia are pursuing EM through their own blend of pilot programs, policy experiments, and market incentives shaped by differing legal systems, economic priorities, and technical capacities.

To address these systemic gaps, Ocean Outcomes (O2) and Environmental Defense Fund (EDF) convened a regional workshop in Busan, South Korea, in April 2025, adjacent to the Our Ocean Conference. The workshop aimed to facilitate cross-border learning on electronic

¹Throughout this report we use the term Taiwan, which is recognized and referred to in certain international forums including Regional Fishery Management Organizations as “Chinese Taipei.”

²The Pew Charitable Trusts. (2019). [Electronic Monitoring: A Key Solution for Global Fisheries](#).

³The Nature Conservancy. (2024). [Tuna transparency pledge](#).

⁴World Wildlife Fund. (2025). [Groundbreaking move aims to safeguard crew welfare and promote sustainability in Tuna Fisheries](#).

monitoring among experts, fishery managers, and NGO representatives from the four jurisdictions. This report synthesizes the resulting developments and stakeholder perspectives, providing an analysis of the current EM landscape and the advancement of monitoring technology across these major fishing economies.

EM Landscape: Administrative Progress and Implementation Challenges

South Korea: Building EM Capacity in Response to Global Expectations

Strategic EM Developments

South Korea's EM initiatives were initially catalyzed by international scrutiny, following a 2013 European Union (EU) "yellow card" regarding IUU fishing risks.⁵ Since the first EM pilot launch in 2020, the government has supported annual trials focused on AI tools for detecting fishing activity and species identification. In 2025, the Ministry of Oceans and Fisheries announced a KRW 18.2 billion (approximately USD 12.6 million) fund to support wider deployment of AI-enabled EM systems, scheduled to begin in 2026.⁶

The tuna sector views EM as a strategic tool for maintaining market access, particularly for meeting sustainability requirements from international buyers. With an active distant-water tuna fishing fleet of approximately 110 vessels, South Korea has prioritized high-standard monitoring to safeguard its global operations. Roughly 70% of the longline tuna production is already Marine Stewardship Council (MSC) certified, and EM serves as a strategic mechanism to satisfy emerging RFMO requirements, enabling fleets to qualify for additional catch quotas by increasing monitoring coverage beyond the 5% baseline.⁷

Beyond distant-water fleets, South Korea is exploring EM to improve data in domestic fisheries and reinforce its total allowable catch (TAC) system and harvest control rules. Active trials are evaluating AI capabilities for fish counting, species identification, and movement tracking, both onboard vessels and at unloading facilities.

Stakeholder Observations and Challenges

While EM offers significant transformative potential, ongoing discussions continue regarding whether its scope should be expanded to address critical issues such as waste, bycatch of endangered species, and labor rights. Workshop participants observed that while substantial resources are being directed toward proprietary EM technology, the efficiency of these investments warrants evaluation against established international systems to avoid technical duplication.

⁵EU IUU Fishing Coalition. (2015). EU Regulation to combat illegal fishing, Third country carding process. http://www.iuuwatch.eu/wp-content/uploads/2015/06/Case-Study2.FINAL_.EN_.pdf

⁶Mi-Na, L. (2025). *AI-powered deep-sea fishing vessel monitoring project launched...Starlink gains momentum*. Nate. <https://news.nate.com/view/20250330n10993> engagement with civil society to ensure that

⁷Haas, B., Azmi, K., & Davis, R. (2024). Pacific tuna update: 20th meeting of the Western and Central Pacific Fisheries Commission. *Marine Policy*, 168, 106320. https://doi.org/developing_new_hardware_and_software/10.1016/j.marpol.2024.106320

These discussions also highlighted the need for a clearer technical trajectory for the sector. Specifically, the implementation process would benefit from a formal regulatory roadmap and enhanced civil society engagement to ensure transparency objectives are fully realized. Ultimately, the transition from experimental trials to a systematized governance framework remains a primary challenge; overcoming this will require decisive policy leadership and broader stakeholder consultation to establish EM as a core pillar of fisheries management within the government.

Japan: Advancing EM Through Reform and Market Alignment

Strategic EM Developments

The Japanese government is increasingly exploring EM for high-seas operations, with these solutions also serving as potential components of the monitoring, control, and surveillance (MCS) measures required for recently introduced domestic fishery management reforms. Between 2021 and 2022, official trials were launched to test EM systems developed overseas, with pilot findings subsequently submitted to IOTC.

Similar to South Korea, Japan's EM trajectory has been shaped by emerging RFMO requirements and access conditions for Pacific Island States. However, following the underperformance of foreign vendor trials, Japan shifted course in 2023 toward domestic investment in developing its own EM system, an approach that is usually cost- and time-intensive. The domestically developed system is expected to reach operational readiness by 2027. In the interim, the Fisheries Agency of Japan (FAJ) continues to evaluate select foreign vendor solutions in parallel, signalling openness to non-domestic options provided concerns around data sensitivity and per-vessel installation and annual maintenance costs can be adequately addressed. EDF-Japan has been actively engaged in supporting and facilitating Japan's EM development.

Currently, there is no official deployment figure. However, accounting for vessels involved in ongoing foreign vendor trials and those supporting the domestic development programme, an estimated 20-30 vessels are currently equipped with EM systems.

Although in a developmental phase, EM is viewed as an essential tool for securing access to high-value, sustainability-conscious markets and for demonstrating responsible fishing practices. It is also becoming a requirement for access to specific exclusive economic zones (EEZs), such as Palau's. To support these goals, Japan engages in international dialogues with the United States, China, and various RFMOs to promote EM adoption and deter illegal, unreported, and unregulated (IUU) fishing. Furthermore, Japan is increasingly integrated into global knowledge-sharing platforms, including EM4Fish, Seafood and Fisheries Emerging Technology (SAFET), and the International Fisheries Observer and Monitoring Conference (IFOMC), which provide frameworks for aligning domestic efforts with international best practices.

Stakeholder Observations and Challenges

In parallel with these developments, early trials have identified several technical and institutional challenges. These include equipment instability on vessels, difficulties with data

transmission, and a lack of trained shore-based reviewers with adequate access to software. Existing systems have also struggled to capture specific biological data, such as fish weight or sex, and the high deployment cost relative to traditional observer programs remains a significant barrier.

Market demand for EM remains relatively low, driven primarily by eco-labeling requirements and external regulations rather than domestic legislative mandates. Continued scalability is further hindered by concerns about data privacy, unclear policies on the use of footage, and the absence of standardized data and hardware frameworks across the fleet.

Looking ahead, the EM strategy in Japan is maturing as administrative support and private-sector innovation move pilots toward broader implementation. As AI, data analytics, and satellite connectivity become more accessible, EM is expected to expand beyond compliance to multifunctional applications, including monitoring vessel safety and labor conditions at sea.

China: Scaling EM Through Strategic Policy and Innovation

Strategic EM Developments

China has demonstrated measurable progress in the application of EM across its distant-water fleet, guided by a strategic framework that emphasizes sustainable fisheries, improved traceability, and adherence to international conservation commitments. The 14th Five-Year Plan for Fishery Development (2021–2025), which calls for “comprehensive monitoring that includes vessel tracking, electronic fishing logbooks, video surveillance, and transshipment oversight,”⁸ serves as a primary driver. This policy framework also promotes corporate accountability by linking compliance performance with national evaluations of fishing enterprises. Companies that voluntarily adopt EM systems are eligible for incentives, including bonus points in compliance scoring systems and access to specific financial support.

These significant financial incentives have facilitated this expansion, including government programs offering vessel upgrade subsidies. For example, in Shenzhen, subsidies of up to 3 million RMB are available to support onboard equipment upgrades (exceeding USD 415,000) for safety improvements and the installation of new monitoring systems. On the water, adoption is steadily increasing: by late 2023, over 100 Chinese tuna fishing vessels have been equipped with EM systems.⁹ These installations are utilized to enhance crew safety, maintain operational records, and verify compliance with both international and domestic regulations.

Technological innovation remains central to this expansion. The Chinese government utilizes the BeiDou Navigation Satellite System for precise tracking, and the 2024 release of the Integrated Smart Terminal System—developed by the East China Sea Fisheries Research Institute in collaboration with Hikvision and Beyondsoft—has introduced AI-enabled

⁸Ministry of Agriculture and Rural Affairs of China. (2022). [Opinions on Promoting the High-Quality Development of Distant-Water Fisheries during the 14th Five-Year Plan Period](#).

⁹The State Council Information Office of the People's Republic of China. (2023). [The White Paper of China's Distant-Water Fisheries Development](#).

monitoring tools. These systems are designed for low power consumption and reliable data transmission, even under conditions of limited connectivity. Some industry participants, such as the Pingtairong Ocean Fishery Group, have equipped portions of their fleets with 24/7 video monitoring and are sharing data with academic partners for research and validation purposes.

Stakeholder Observations and Challenges

While significant progress has been made, the transition toward large-scale implementation is constrained by several technical and economic hurdles. Workshop participants identified high installation and maintenance costs, limited data-processing capacity, and persistent concerns regarding privacy and data confidentiality as primary obstacles. Technical challenges also include maintaining video quality under adverse weather conditions, which remains a developmental priority for the region. These barriers are particularly pronounced for smaller operators, whose financial and technical constraints necessitate more robust policy frameworks and enhanced cooperation between governments, industry, and research institutions. Long-term success will likely depend on refining comprehensive EM guidelines, expanding training programs, and fostering the cross-sector collaboration required to ensure that monitoring technology delivers both accountability and sustainability across all fleet segments.

Scalability also depends heavily on the alignment of policy frameworks with private sector commitments to improve labor conditions at sea. Without standardized regulatory enforcement or consistent buyer demand, vessel operators often lack the commercial incentive to invest in the necessary monitoring and connectivity infrastructure, such as onboard Wi-Fi. Incorporating EM into labor standards, certification schemes, and trade policies could provide the necessary impetus for wider adoption across the region. Furthermore, effective implementation requires collaboration between governments and industry stakeholders to establish standardized protocols for labor monitoring, connectivity provision, and grievance reporting. Integrating these social responsibility components into EM programs ensures that the technology addresses both environmental sustainability and ethical labor practices comprehensively.

Taiwan: Advancing EM Through Collaborative Efforts

Strategic EM Developments

In Taiwan, EM is transitioning from a technical option into an operational necessity. This shift is primarily driven by market expectations regarding sustainability and the increasing focus on labor rights monitoring within the global seafood supply chain. The government has begun integrating EM trials into broader fisheries reform, employing a science-based, collaborative approach to evaluate the feasibility and cost-effectiveness of these systems within commercial operations.

Within Taiwan's total fleet of 855 distant-water tuna longline vessels,¹⁰ current implementation data indicate that approximately 50 are equipped with Electronic Monitoring

¹⁰Overseas Fisheries Development Council. (n.d.). Distant-water tuna longline fleet statistics. <https://www.ofdc.org.tw:8181/app/display.xhtml?id=6>

(EM). This figure includes 30 vessels with active EM initiatives¹¹ and 20 participating in pilot projects led by the government, universities, and non-governmental organizations.

These pilots are designed not only to collect baseline data but also to develop technical standards that align with international best practices while addressing the unique operational characteristics of the local fleet. Stakeholder engagement remains a core component of this development, with regular workshops and consultations ensuring that emerging policies are informed by the perspectives of fishers, regulators, and researchers.

For the 2025 fiscal year, the government established the "*Subsidy Guidelines for Installing Electronic Observer Systems*"¹² to lower short-term financial barriers. This program provides a subsidy of up to NTD 150,000 per vessel for 10 sets of EM systems, specifically targeting tuna longline operations. To qualify, systems must meet rigorous technical specifications, including high-definition night-vision capabilities and the capacity to store video data for at least one year.

Stakeholder Observations and Challenges

Taiwan's EM program has successfully engaged early adopters; however, participants noted that long-term adoption is constrained by dependence on discretionary subsidies and the absence of clear, formal regulations.

The lack of a clear legal framework or comprehensive policy guidance can leave the industry hesitant to invest in systems that may not satisfy future compliance requirements. Technical capacity also remains a challenge, characterized by a limited pool of trained technicians and limited familiarity with EM hardware among some vessel operators.

Furthermore, the high cost of installation and maintenance remains a persistent concern for many stakeholders. To move beyond isolated pilot projects, Taiwan must formalize a cohesive strategy supported by clear policy guidance and scalable financing. By building on the current foundation of inclusive planning and local capacity, it is possible to transition EM from a series of trials to a fully integrated pillar of responsible fisheries management.

Shared Foundations for Regional Collaboration

While governance systems across East Asia vary in their integration of EM into formal compliance mandates, shared commonalities across the region suggest a strong foundation for learning and knowledge sharing. These commonalities range from market-driven motivations and pilot-based implementation to shared technological frontiers. Recognizing these points of alignment is essential for developing the policies, technical standards, and capacity-building efforts required to catalyze the uptake of EM across the region.

¹¹International Seafood Sustainability Foundation. (n.d.). Vessels in Other sustainability initiatives (VOSI) tool. <https://www.iss-foundation.org/vessel-and-company-commitments/vessels-in-other-sustainability-initiatives-vosi/vosi-tool/>

¹² Executive Yuan Gazette Online. (2025, July 8). Operation directions of subsidies for the installation of electronic monitoring system in fishing vessels in 2025. National Development Council. https://gazette.nat.gov.tw/egFront/e_detail.do?metaid=158530

Market-driven Transparency and Requirements

A primary driver of EM adoption is the need to meet expectations in international markets, particularly in the European Union and the United States. These markets increasingly demand high levels of transparency, traceability, and verified sustainability. Compliance with the Marine Stewardship Council (MSC) standards and commitments to initiatives such as the Tuna Transparency Pledge have elevated EM from a niche technology to a core requirement for maintaining market access. Consequently, governments are beginning to align their monitoring capabilities to meet expectations for the global seafood supply chain.

Incremental Adoption Through Public Financing

EM is generally being introduced via pilot projects rather than immediate policy mandates. These technical trials, primarily conducted on longline and purse-seine vessels in commercial tuna fisheries, enable governments to assess feasibility before establishing statutory requirements. To lower the adoption threshold, authorities in each government are using public financing models. These include full or partial subsidies to offset the costs of hardware installation and maintenance, reflecting a shared administrative commitment to modernizing fisheries oversight while managing the financial burden on vessel operators. NGOs and philanthropy are also playing a role in supporting pilot projects alongside government funding.

Technical Innovation and Observer Coverage Gaps

There is a general consensus among stakeholders that traditional human-observer programs face limitations, including high operational costs, safety concerns, and coverage gaps. EM is considered a promising approach to enhance monitoring density. To this end, governments are prioritizing technological innovation, specifically exploring AI-driven systems for species identification, fishing event detection, and satellite communication integration. The shift from physical hard-drive retrieval to satellite-based data transmission represents a shared technical frontier aimed at improving the timeliness and efficiency of data review.

Scalability of Labor Standards and Connectivity

Scaling EM across the region requires robust policy frameworks and industry commitments to improve labor conditions at sea. Without regulatory enforcement or clear buyer demand, vessel operators lack the commercial incentive to invest in the necessary EM and Wi-Fi infrastructure. Incorporating EM into labor standards, certification schemes, and trade policies could serve as a primary driver for wider adoption. Furthermore, cooperation between governments and industry stakeholders is essential to establish standardized protocols for labor monitoring, Wi-Fi provision, and grievance reporting. Integrating these social responsibility components into EM programs ensures that the technology addresses both environmental sustainability and ethical labor practices.

Conclusion and Recommendations

EM is emerging as an essential component of sustainable, ethical, and transparent fisheries management, particularly for industrial distant-water tuna fleets. Across the four East Asian jurisdictions that host the largest distant-water tuna fleets in the world, EM systems are being tested to meet international market demands, comply with regional management measures, and address gaps in traditional observer coverage. While moving at different paces, they face comparable structural hurdles, including regulatory ambiguity, high implementation

costs, and fragmented technical innovation. Moving from isolated pilots to fully integrated systems will require strategic planning, legal clarity, and sustainable financing. Progress can be accelerated through enhanced communication and knowledge sharing between governments, seafood industry actors, and international management bodies.

Establishing a resilient EM framework across East Asian jurisdictions is essential for strengthening fisheries governance and ensuring the long-term sustainability and transparency of the region's seafood production. In an increasingly competitive global marketplace, these advancements have become a strategic imperative. Addressing this need requires targeted action in the following areas:

1. Strengthen Policy and Legal Frameworks

Establishing regulatory certainty is a prerequisite for the long-term success of EM programs. Jurisdictions should prioritize developing governing frameworks that clearly define management objectives and establish protocols for data storage, analysis, and sharing. Aligning jurisdictional strategies with international data and performance standards will ensure that EM systems remain relevant to global markets and regional management requirements. By providing a clear statutory basis for EM, authorities can create the stability necessary to encourage private sector investment.

2. Prioritize Transparency and Inclusive Governance

The design and development of EM programs should involve active engagement with industry stakeholders, fishers, and civil society. Building trust and legitimacy requires a shared understanding of the objectives and processes behind monitoring technologies. Inclusive governance models can help address concerns regarding data privacy and ensure that EM solutions are practical and context-appropriate. Regular consultations between regulators and those on the front lines of implementation are essential for fostering alignment and long-term cooperation.

3. Design EM Programs with Data Infrastructures in Mind

The implementation of EM generates substantial volumes of new electronic data that must be managed efficiently by administrative bodies. It is critical to develop scalable data infrastructures that balance management goals with data security and cost-efficiency. These systems should be designed with interoperability in mind to enable the seamless exchange of information across platforms and jurisdictions. A robust data architecture will provide the foundation for evidence-based decision-making and enhance the overall effectiveness of fisheries oversight.

4. Leverage AI Development for Regional Scale

To avoid duplication of effort and reduce operational costs, jurisdictions should examine opportunities to collaborate to develop AI-driven tools for video review. Sharing or co-developing open-sourced algorithms and video datasets can accelerate innovation and support the professional growth of EM reviewers. By pooling technical expertise at the regional level, stakeholders can reduce financial barriers to entry and ensure that AI tools can meet the diverse technical needs of fisheries.

5. Strengthen Coordination and Capacity Building

Establishing regular forums for exchanges between fishery management bodies, technical providers, and seafood industry actors is necessary to drive regional convergence. These platforms allow for the sharing of best practices, motivations for EM adoption, and the harmonization of monitoring targets. Coordination should also include dialogues between seafood buyers and producers to align expectations regarding EM coverage and verification mechanisms. Sustained investment in training programs will ensure that technicians and operators have the skills required to maintain and utilize EM systems effectively.

6. Unlock Financing and Incentives

Sustainable financing remains a significant challenge to EM scalability. Stakeholders should explore diverse financing models as well as innovative incentive structures that support adoption across a wide range of vessel operators. At the same time, incentivizing EM service providers to improve hardware and software will facilitate greater efficiency and lower long-term costs. By leveling the playing field for technology vendors, jurisdictions can foster a competitive environment that drives innovation and ensures that EM becomes a cost-effective pillar of responsible fisheries management.

By acting on these recommendations, stakeholders in the region can accelerate EM adoption, strengthen fisheries governance, and position themselves as a global leader in sustainable and transparent seafood production.

Ocean Outcomes and our partners are actively working to support regional stakeholders in addressing shared challenges and in adopting locally appropriate EM programs and technologies. Through collaboration and strategic investment, the transition from experimental trials to integrated systems will ensure that EM serves as a foundational tool for the future of transparent and ethical fisheries.

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