

This fact sheet is one in a series outlining key elements for regional fisheries management organizations to consider as they develop electronic monitoring programs. More information is available at pewtrusts.org/ElectronicMonitoring.



Data Collection, Transmission, and Storage

Robust standards help ensure accurate, consistent monitoring

Overview

After determining an electronic monitoring (EM) program's objectives and structure, fishery managers will need to decide how to collect, transmit, and store the resulting data. Different combinations of monitoring technology can be used to meet a program's needs and make the best use of available resources. (See Figure 1.) An effective EM program will include robust standards that ensure uniform data collection and review practices across member nations and fleets.

Data collection standards

Technology standards should be aligned with a program's objectives to ensure that all vessels are accurately and consistently recording the required data and that information is shared, reviewed, and audited in a uniform way. Working with vendors early on can provide much-needed flexibility to meet the standards and to allow for the use of new technologies when they become available. Regional fisheries management organizations (RFMOs) should also periodically review minimum standards and adopt innovations.

Figure 1

Minimum Hardware Components for an Electronic Monitoring System Typically Include:

- Digital cameras:** Cameras that record and store digital images. *Consider the minimum resolution, frame rate, low-light capabilities, etc.*
- Sensors:** Devices that detect an object's movement. *For example, a drum-rotation sensor to trigger video recording or tag fishing activity.*
- GPS:** A satellite-based navigation system to determine a vessel's exact location.
- Hard drives:** High-capacity, self-contained data storage devices.
- Control box:** A collection of instruments and physical interfaces that allow operators to control a piece of equipment and monitor its performance.
- Satellite modem:** A device used to establish data transfers to report a system's status.
- Video monitor:** A device with a screen to display a system's status and camera views. *These are usually located in the wheelhouse.*

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Video retrieval and transmission

Once data is collected by EM systems on-board vessels, it will need to be transferred for review and analysis. Three options exist to transfer the data to the appropriate agency, and they vary widely in cost, reliability, and turnaround time. (See Table 1). RFMOs can lower the cost of video retrieval and transmission by requiring videos to be in a standardized format.

Figure 2 provides an example of how the data-retrieval methods fit in the EM data pathway.

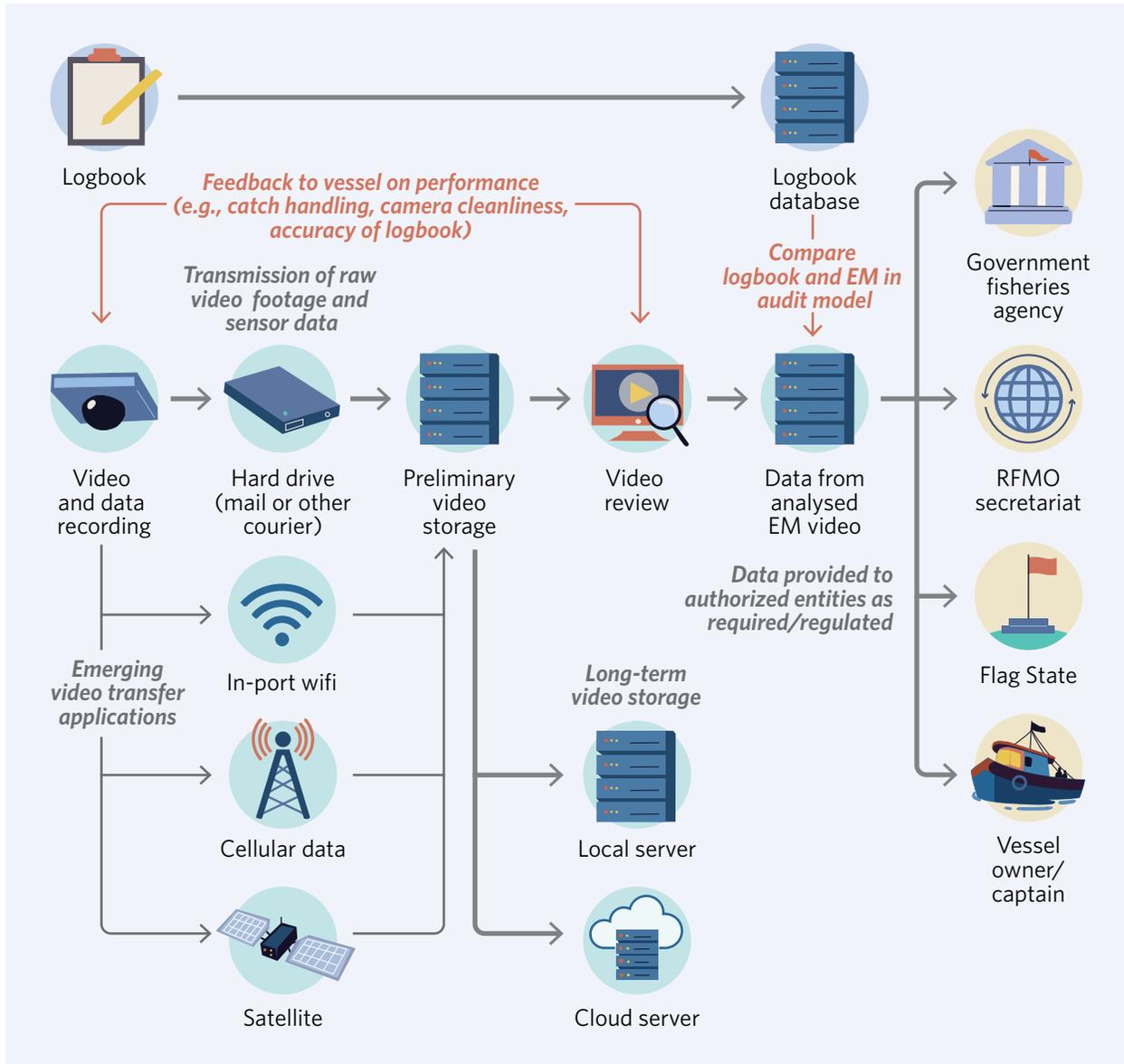
Table 1

Operational Video Retrieval Methods

Hard drive exchange	Hard drive exchange is the most popular approach and best-suited for fisheries operating for long periods across vast distances. Several options exist: <ul style="list-style-type: none">▪ Mailing companies are used by vessel operators to send hard drives to fisheries managers.▪ Couriers periodically exchange used hard drives for new ones. To ensure a reliable chain of custody, fisheries managers could consider data encryption.▪ Collector stations at major ports with trained staff are used to transmit videos to the appropriate centralized review office.
Wi-Fi transmission	Wi-Fi transmission, including via mobile data networks, is possible when vessels are in range of shore. This is the cheapest system, but it requires network connectivity in all ports of entry.
Satellite	Satellite transmission is the most-expensive option. However, it could become more cost-effective with the use of emerging technologies such as sensors or artificial intelligence. This would allow the most near-real-time transmission of data.

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Figure 2
EM System Data Flows



Source: M. Michelin, N.M. Sarto, and R. Gillett, "Roadmap for Electronic Monitoring in RFMOs," CEA Consulting (2020), <https://www.ceacon consulting.com/casestudies/the-pew-charitable-trusts>

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Data storage

RFMOs should create standards for where, how, and how long video footage will be stored after it has been reviewed. Storage decisions should be based on the EM program's goals and the personnel who will need to access monitoring records, at what frequency, and for what purpose. The storage system's design will also depend on whether the EM program is national or RFMO-wide and if fishing companies will receive copies of the EM records for their own use.

Depending on the program’s objectives and standards, footage can range from video of an entire fishing trip to video stills from key fishing events (e.g., transshipment). Once footage is reviewed, it may be deleted or stored, indefinitely or for a finite period. Figure 3 lists some guiding questions and data storage considerations for EM program designers.

Figure 3

Storage Decision Considerations and Examples



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Conclusion

Setting standards for data collection, retrieval, and storage gives a clear direction for the life cycle of footage and ensures that systems will be inter-operable and monitoring more transparent. These considerations help ensure that RFMOs have the data to support improvements in the management of important fisheries and thus to ensure their long-term sustainability.

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