

## Research for PECH Committee – Workshop on electronic technologies for fisheries - Part I: Transmitted positional data systems

### KEY FINDINGS

- The use of the current **vessel monitoring system (VMS)** for fisheries control and scientific advice for fisheries management is being replaced on some occasions by the **automatic information system (AIS)** due to data access problems and excessive time laps between transmissions.
- Although **AIS provides more information** due to its higher frequency of emissions, it does not have the same reception coverage and the same legal coverage. The application of AIS is required for **maritime safety** reasons and not for fishing control.
- Newly developed **electronic technologies (ETs)** for merging positional data with satellite images provide excellent data for both fisheries **monitoring & control** and fisheries **research**. However, these data are not always available due to the low number of daily images taken of a specific area or to the high price of such data fusion services.



### Background

This study examines the existing ETs based on the collection of **positional data** as well as the respective **transmission systems**, which are both applicable for purposes of **fisheries control** and **research**. It also reviews **space-based** ETs providing very **high resolution images**, and assesses the potential of data fusion techniques, through merging positional data and satellite image data.

The present document is the executive summary of the study for Workshop on electronic technologies for fisheries - Part I: Transmitted positional data systems. The full study, which is available in English can be downloaded at: <https://bit.ly/3lgWJ09>

Finally, strengths, weaknesses, opportunities and threats (**SWOT**) of the different ETs were scrutinised with a view to achieve an improved **monitoring of fishing activities** in the fields of fisheries control and research.

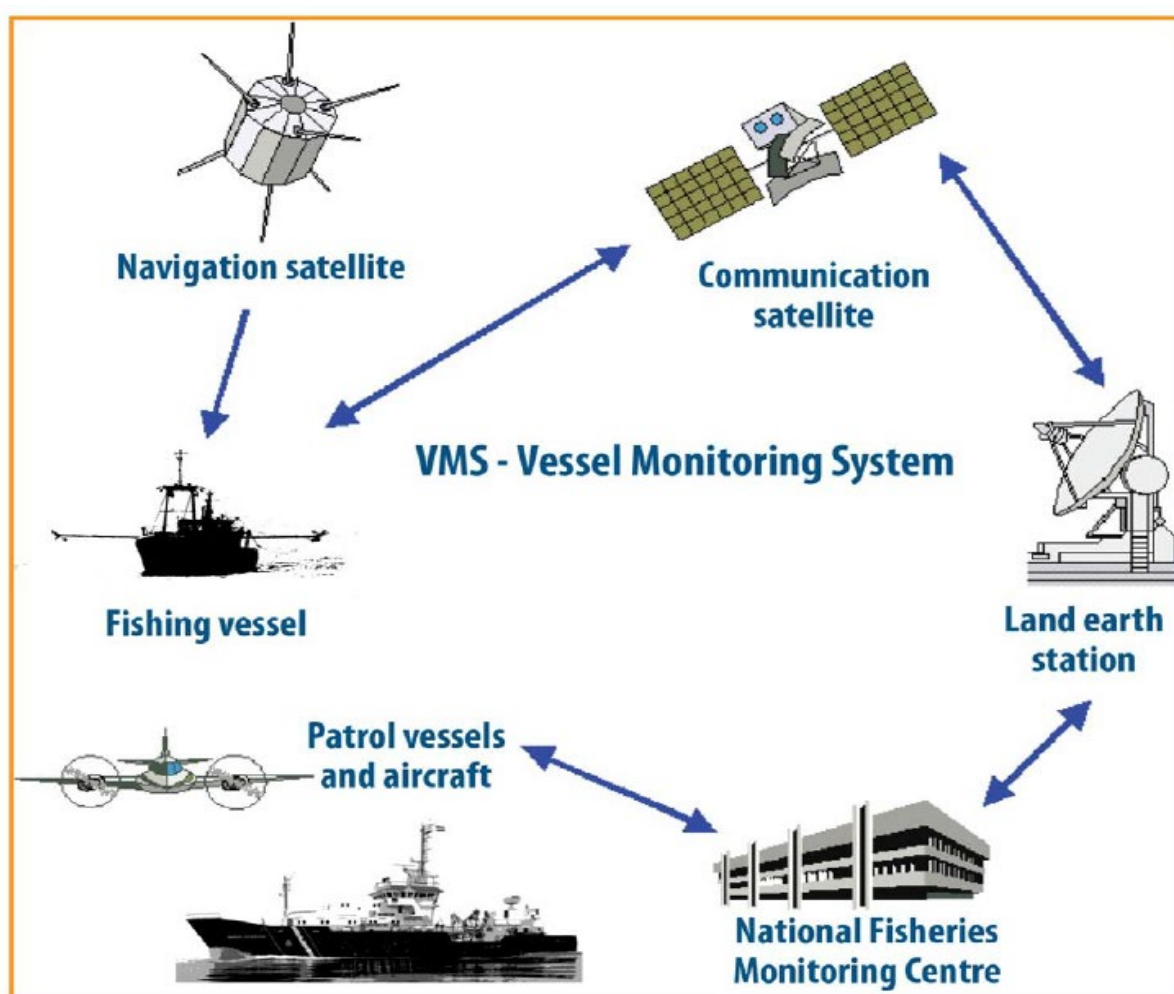
### Transmitted positioning systems currently available

Currently, **four global positional data systems exist**, which are owned by the United States, the European Union, Russia and China. They all use the same **receivers** as those installed in any common cellular phone, and indicate the **position of a vessel**. The data can be easily ascertained with very high accuracy.

A second type of spaceborne sensors used for fisheries control are the **very high resolution sensors**. This technology is based on the inspection of the **visual spectrum** or on **synthetic aperture radars** using microwave. Both systems can achieve **high-resolution images** of fishing vessels and are currently used for fisheries **control** and **research**.

In the European Union, the compilation of satellite images for **fisheries control** is done by the **Copernicus** Maritime Surveillance Service. It is also used by the European Fisheries Control Agency (**EFCA**) in collaboration with the European Maritime Security Agency (**EMSA**).

**Figure: Data flow of the EU VMS system**



Source: [Special report No. 8/2017](#) - European Court of Auditors (ECA), 2017, p. 24

## Applications for transmitted positioning systems

**Positional data** are used primarily to **study fishing effort and effects** of fishing on marine habitats, but also to support marine spatial planning activities. Regarding **fisheries control**, it is imperative to know the **vessel's position** to understand **if, where** and **what** it is fishing and **whether** it is fishing in the areas for which it is **licensed**.

Two of these applications currently exist and are used in fisheries **control and research**: the **vessel monitoring system** (VMS), which was introduced in 1997 for fisheries position control, and the **automatic identification system** (AIS), which was introduced in 2002 for maritime navigation security. As a result, still today **VMS** is predominantly used for **control** purposes, while **AIS** is more frequently used by **fisheries researchers** due to its higher emission frequency and accessibility.

This report also presents **newly developed satellite imaging systems** and their use in connection with positional data. These systems are currently being used for fisheries control aiming to detect inter alia catch **transshipment** or the **position of boats** that have **turned off** their **VMS and/or AIS**.

## Analysis of the different options

VMS and AIS are both **mature technologies** whose **accuracy has improved** over time from the first only prevailing global positional data system to the current multisystem scenario.

**VMS** has a more **robust transmission technology** using satellite communications, which make it very difficult to lose data. Nevertheless, long time-laps between the emissions of data create caveats for control and fisheries research.

**AIS** is more precise, as it has a **higher transmission frequency** due to its purpose of preventing collisions at sea. However, it transmitting to land receivers proves often to be difficult. In fisheries AIS data are used for ex-post analysis due to being a secondary use of generated data.

Very **high resolution satellite images** provide very valuable information, which is even more useful when combined with **positional data**. However, its main weakness are the longer time-laps between images taken of the same ocean sector.

All the data sources present concerns and problems regarding current data privacy and personal privacy rules, which need to be addressed.

## Policy recommendations

Many of the newly developed satellite-driven electronic technologies based on positional data are being used with great success. However, they cannot fully substitute traditional VMS yet, since the spatio-temporal coverage of the fishing grounds is not sufficient and still depends on meteorological conditions.

Based on the present analysis the following policy recommendations can be given:

- **Extent the obligation to use tracking devices** in commercial fishing vessels to the maximum possible consensus.
- **Increase the accuracy of VMS positional data** so it can be of a similar magnitude as the actual data provided by current GNSS systems (20 metres). The enforced precision indication of 500 metres was intended for the GPS capabilities of the late 20th century and not for current GNSS systems like Galileo which enable accuracies of 20 metres at 99% confidence with free receivers such as those used in mobile phones.
- **Reduce the VMS emission time** of both data types to ten minutes (instant transmission) and one minute (stored data or delayed transmission), respectively. As our review of scientific literature suggests, this could be achieved and would be ideal, both for fisheries

research and control. Nowadays cheaper means of transmission, as well as technologies capable of storing and transmitting huge volumes of data exist. In this way sufficient spatio-temporal resolution to apply automated algorithms for detecting fishing activities could be achieved.

- Take the necessary actions to **grant access to the generated data** to control bodies and scientific advisors for fisheries management while preserving the personal privacy of fishers.
- **Follow-up on** the work started recently, by **combining VMS, AIS and VHR/SAR images** as complementary to the VMS data.

## Further information

This executive summary is available in the following languages: English, French, German, Italian and Spanish. The study, which is available in English, and the summaries can be downloaded at: <https://bit.ly/3lgWJ09>

More information on Policy Department research for PECH:

<https://research4committees.blog/pech/>



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