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FISHERIES ENFORCEMENT ISSUES

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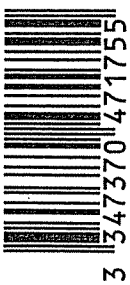
FOREWORD

The OECD Committee for Fisheries hosted a Workshop on Enforcement, 21-22 September 1993. Enforcement officers, government officials, researchers and fisheries managers addressed problems related to enforcement of fisheries management rules. The papers in this document were presented at this Workshop and are published under the authority of the Secretary-General of the OECD.

FISHERIES ENFORCEMENT ISSUES

As many fish stocks face over-exploitation and fishermen suffer from low incomes, enforcing fisheries legislation and observing the rules of the game become more and more important. During a two day Workshop on Fisheries Enforcement hosted by the OECD, enforcement experts discussed a range of practical, economic, and legal issues they face in everyday enforcement work.

This publication is a collection of papers presented at that workshop. It addresses practical issues in fisheries enforcement and provides an account of OECD countries' experience.



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BLUEPRINT FOR A SATELLITE-BASED SYSTEM FOR THE MONITORING OF FISHING ACTIVITIES

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INTRODUCTION

In June 1993, the Council of the European Communities made the commitment to decide before 1 January 1996, to what extent and when a continuous position monitoring system, either land or satellite based and using satellite communications for data transmission, shall be installed for Community fishing vessels. This paper sketches a possible way in which such a satellite-based surveillance system could operate.

The system described is a distributed system, which would give maximum flexibility to each Member State to develop a national system tailored specifically to its own needs, and to integrate the system with its existing monitoring facilities and operations. The successful operation of each national system implies the necessary co-operation between Member States in exchanging position reports of vessels located in waters under each other's jurisdiction.

The description is based on the experience gained by certain Member States, on studies that have been carried out by consultancy companies on behalf of the Commission of the European Communities (CEC) and, in particular, on the experience of the CEC with different technologies on board of its chartered Fishery Patrol Vessel Ernst Häckel operating in the North-west Atlantic.

OUTLINE OF A POSSIBLE SYSTEM

A possible system could be limited to vessels having certain characteristics e.g. all vessels above a certain length. Each Member State would operate through a Fisheries Monitoring Centre (FMC), which at any time must be able to determine the position of its fishing vessels included in the system. Each Member State can set up its own FMC, or alternatively, set up a common FMC with other Member States.

The system would provide world-wide coverage to allow each participating Member State to monitor the activities of all its flag vessels wherever they may be fishing, as well as vessels of other Member States fishing in waters under its jurisdiction.

The system would fulfil three main functions:

-- Data retrieval: Each fishing vessel included in the system would be equipped with a device which would systematically allow the FMC of the vessel's flag state to determine its position, speed and course.

-- Data management: The data received at FMCs would be analysed in conjunction with vessels details and fishing regulations.

-- Data distribution: In a distributed system, Member States will have to exchange certain categories of data available in their national systems.

The three main functions are described in the next point.

MAIN FUNCTIONS

Data retrieval

Each fishing vessel included in the system would be equipped with a device ("blue box") which would systematically allow the determination of its position, speed and course. At least three available satellite based services could be used to implement the data retrieval function : Argos, EutelTracs and Inmarsat-C.

Argos is a French owned service which allows for the positions of mobile terminals to be determined and which was used in an experiment conducted by the Scottish Fisheries Protection Agency. Argos is also used to manage the days-at-sea allocation of a part of the Dutch flat-fish fleet.

EutelTracs is a combined position-determination and messaging service operated by Eutelsat.

As an option, and in certain circumstances, position-determination systems such as DECCA, GPS (Global Positioning System), LORAN-C, etc. could be used in conjunction with Argos and EutelTracs.

The *Inmarsat-C* mobile communication service on the contrary has at present no incorporated position-determination component and must therefore be combined with a navigation instrument such as *GPS*. This combination of services is already being tested by the Portuguese fishing authorities in the MONICAP system and by the Irish authorities in the LIR-MAR experience.

Each vessel included in the MONICAP system has an integrated GPS and Inmarsat-C position reporting terminal in a tamper-proof casing. The GPS component continuously determines the position of the vessel. It also calculates other parameters to be used in the assessment of whether the vessel appears to be fishing, namely speed, course and distance travelled in a given time interval. The terminal automatically transmits position reports at intervals specified by the Portuguese FMC. Alternately, position data can be requested at any time by the FMC and will be transmitted (the so-called "polling" feature).

Whatever system is chosen, for the monitoring system to be effective, it must have an adequate built-in level of protection against tampering. Procedures would need to be devised for validating position data received by the FMC and for dealing with cases of reports not being received when expected. Positions could for example be logged automatically on board fishing vessels.

Data management

The data received at FMCs would be analysed in conjunction with vessel details and fishing regulations to identify suspected infringements of regulations. Details of the suspected infringements would be forwarded to national authorities responsible for enforcing the regulations. Statistical reports on fishing effort in different geographical areas would also be produced.

It would be possible to develop the system in such a way that the FMCs would be able to accept position reports from terminals of more than one type (e.g. some vessels using GPS/Inmarsat-C, some using Euteltracs, and some using Argos and new services yet to be introduced). The CEC has been carrying out several successful experiments with different technologies on board of its chartered inspection vessel Ernst Häckel operating in the North-west Atlantic Ocean. A software prototype has been developed capable of handling data reports originating from these different satellite systems.

For the systems to be effective, all relevant vessels would be obliged to carry the required on-board equipment.

Data distribution

The main category of data which would need to be distributed between the various FMCs involved in the system is position reports. The data from each vessel would be directed to the FMC of its Flag State. If the vessel's position is in the waters under the jurisdiction of another Member State, the Flag State FMC would re-transmit the position data to the relevant Coastal State FMC. By this procedure each Member State would receive position information relating to all vessels included in the system and located in waters under its jurisdiction, and to all of its own vessels wherever they are fishing.

A key requirement of the arrangements to be established for the dissemination of information about vessel movements is that strict confidentiality would have to be ensured.

The requirements for distribution of data between the FMCs could readily be met by existing terrestrial communication services. The two main types of data communication service which would be used for the data distribution are public switched networks and dedicated private leased circuits.

RELATIONSHIP WITH TRADITIONAL MONITORING METHODS

The system outlined would improve the process of monitoring fishing activities, by making it more efficient. It could not, however, totally replace the existing methods of monitoring, but would provide a complementary facility, for the following main reasons:

-- The system would be capable of identifying suspected infringements of only certain types of regulations, namely those which absolutely prohibit fishing by vessels of specific flags, size or power categories, using particular fishing methods, in specified

areas at specified times. The system could not, for example, identify infringements of regulations concerning fishing for particular species (although it could provide useful indications in some circumstances) or the use of particular mesh sizes.

-- The system could not provide conclusive proof of illegal fishing. If a vessel is found to be in an area in which it is not allowed to fish, an assessment could be made of whether or not it is actually fishing, based on an algorithm involving factors such as changes in the vessel's speed and course. Such an algorithm would identify vessel manoeuvres highly likely to be the result of fishing activity, but which could also be explained by other circumstances, e.g., engine failure.

-- It is unlikely at this stage that all vessels fishing in EC waters would be included in the system.

-- Vessels deliberately involved in illegal fishing (e.g. unlicensed vessels) would either not carry a positioning device or use all means to tamper with it. Illegal fishing can still be detected by existing monitoring methods and should be deterred by appropriate penalties.

The proposed automatic system would essentially be a complement to the existing monitoring function, without affecting the inspection function. At present the verification of log-book data, particularly in relation to areas where skippers claim to have fished, is at best somewhat haphazard, relying as it does on a given vessel having been sighted at a particular instant in time by a patrol vessel or aircraft, and subsequent cross-checking of information. Not only would continuous automatic tracking provide a reliable data base against which to check the accuracy of skippers' declarations for complete fishing voyages, thereby neutralising the tendency for mis-reporting, but it would also allow much closer management of fisheries where provisions are made for the transfer of a proportion of catches to ICES divisions other than those from the stock area from which the catches actually originate. Such flexibility currently includes the western mackerel stock (divisions IV & VI) and herring in the North Sea & Eastern English Channel (divisions IVc & VIId). Potentially, automatic monitoring could, in these circumstances, allow for more efficient utilisation of quotas by offering greater flexibility within what is often claimed to be a too rigid quota system.

COST ESTIMATES

The following table shows the total 5-year costs of the whole monitoring system for the Community, assuming the following two extreme cases :

The combination of low cost options :

-- basic position reporting terminals (i.e. without data entry units and printers);
-- no interactive monitoring facilities at FMCs;
-- shared software development.

The combination of expensive options :

-- enhanced position reporting terminals (with data entry units and printers);
-- with interactive monitoring facilities at FMCs;
-- bespoke software development.

The corresponding total 5-year costs are estimated as follows (in million ECU):

	10 000 vessels	20 000 vessels	30 000 vessels
1. Low cost options	85	164	242
2. Expensive options	121	219	318

The data processing costs would vary from one Member State to another, because of differences in fleet sizes, local hardware prices, etc.

The question of who would bear the costs of the proposed system is outside the scope of this paper.

VALUE OF THE SYSTEM

There is little doubt that the system would lead to more efficient monitoring of compliance with fishing regulations. As discussed earlier, however, the system would not be capable of improving monitoring to the extent that existing arrangements could be dispensed with altogether.

Control represents a cost for the Community, whatever technology is used. Modern technologies cannot be isolated and therefore the link with the expenditure for conventional fisheries control should be made. It appears clearly that, even after the introduction of satellite technology, the predominant cost factors will remain existing personnel cost and the cost of marine and aerial surveillance. Benefits from satellite technology will be achieved trough the synergy with the conventional control means, by reducing the number of un-registered landings of black fish in small unmanned ports and by offering valuable information for the logbook verification process. The critical success factor will be the realisation of this synergy, in particular the improvement of the aerial and marine surveillance. The perceived value would, in any case, probably vary from one Member State to another.

Another perceived benefit is the possibility offered to allow more efficient management of fishing inputs. The availability of more sophisticated monitoring methods will allow that restrictions on fishing are put in place only where really necessary. Further scope for improving management is provided by the ability to collect more comprehensive statistics on fishing activity.

Additionally the use of satellite systems and the exploitation of their communication possibilities in real time would offer scope for much better co-ordination and greater transparency between the appropriate authorities.

Furthermore, at least one of the commercially available systems (GPS/Inmarsat) meets the safety requirements at sea (IMO rules) and others can still seek IMO type-approval. Implementation of the proposed satellite monitoring would simultaneously mean that a part of the fishing fleet is brought into compliance with the Global Maritime Distress and Safety System (GMDSS), introduced from 1 February 1992. A significant number of fishing vessels would become easily traceable by the search and rescue authorities. It is expected that search and rescue costs would therefore drop.

Another possible spin-off of the system could be improved market transparency through the improved communication possibilities.

ALTERNATIVE SOLUTION

The United Kingdom is currently exploring a parallel solution without the satellite communication component, i.e. with a GPS satellite navigation system on board fishing vessels but without real-time reporting to a control centre. An automatic position recorder on board the vessel can register the GPS-based position at half-hourly intervals throughout each trip. The automatic position recorders are substantially cheaper and do also provide valuable information, albeit retrospectively, for the purpose of verifying the days at sea and the catch areas declared in the logbooks. This could be a valid approach in situations where real-time information is not very useful. The collection of diskettes to establish data bases will however require a high level of logistical organisation.

The solution explored by the United Kingdom could however also converge with the one outlined above by adding the real-time communication component.

PILOT PROJECTS

In order to assess the technologies to be used and the vessels to be included in a satellite based monitoring system, the Member States in co-operation with the CEC will carry out pilot projects in 1994/1995. To this end, Member States shall ensure that a continuous position monitoring system is installed for certain categories of Community vessels. Detailed rules for the implementation of pilot projects shall be decided in the near feature. The pilot projects could be conceived along the following lines :

Exploitation of unique features offered

In seeking to identify suitable pilot projects with the aim of demonstrating the advantages envisaged, it seems important to consider projects where optimum use may be made of the unique features offered by the use of satellite-based systems. Without doubt the most significant of these is the ability to determine with confidence the positions and tracks of fishing vessels either in real time or, as in the experiment being evaluated by the United Kingdom with Automatic Position Recorders, retrospectively. This information could be most effectively used to demonstrate its value as a management tool, in particular to allow more efficient management of fishing inputs in situations where fishing effort is limited by geographical extent or subject to limitations on fishing time or days at sea. Pilot projects covering such fisheries could additionally permit Member States to build in incentives to promote acceptance of new technology by fishermen, such as by allowing bonus fishing time to vessels volunteering to participate in pilot trials.

Synergy with conventional means

The CEC has repeatedly stressed that the envisaged role of satellite-based technology is seen as being complementary to, rather than as a replacement of classical surveillance means. Pilot projects should allow scope for the advantages of this synergy to fully demonstrate the increased efficiency which would accrue to the utilisation of traditional surveillance resources. Suitable cases should be considered so that armed with real-time information on fishing vessel movements, the authorities on shore would be alerted to the possibilities of landings at unauthorised or unmanned ports, and control authorities would be in an informed position to enable optimum use of marine and aerial surveillance units.

Monitoring fishing activity by Community vessels outside Community waters

The possibility of allowing Member States to follow the activities of their fleets fishing outside Community waters, through the application of satellite technology, is an option which should not be overlooked in identifying possible pilot projects. The monitoring of the whereabouts of vessels operating in distant waters, either in real time, or with a delay as in the case of automatic position recording devices, will be facilitated with the use of the technology being considered.

In assessing the results of the pilot projects, the Council of the European Communities and the CEC will evaluate not only matters of practicability and technical feasibility but also the cost-effectiveness.