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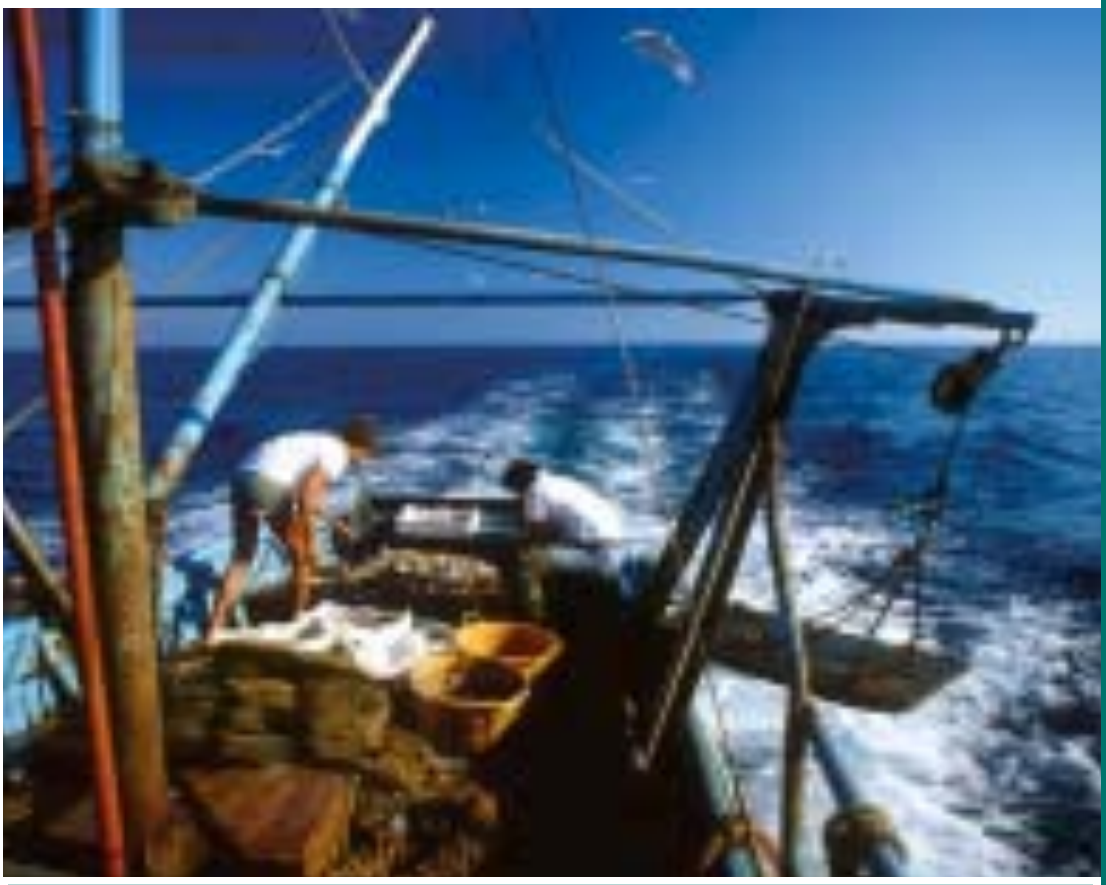
Guidelines for developing an at-sea fishery observer programme



Preparation of this document

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Abstract

These Guidelines are intended to help those involved in managing fisheries to understand the range of objectives that an observer programme can meet and how these contribute towards the management of a fishery. The importance of scientific, compliance and information outputs are considered in relation to the requirements for developing and implementing management plans. The Guidelines promote the use of observers as agents capable of contributing to many monitoring, sampling and compliance activities required in modern integrated fisheries management. The different inputs, requirements and outputs of at-sea fishery observer programmes are presented focusing on what they are, how they relate to the objectives of a programme and different options on how to develop them. The Guidelines conclude with a design and maintenance strategy for an observer programme.

Keywords: fisheries management; capture fisheries; MCS

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List of Abbreviations

CCRF	FAO Code of Conduct for Responsible Fisheries
COFI	Committee on Fisheries
CPUE	Catch Per Unit Effort
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of the United Nations
FMA	Fisheries Management Authority
UNFSA	Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management
HF	High Frequency
IMO	International Maritime Organization
IPOA	International Plan of Action
IT	Information Technology
IUU	Illegal, Unregulated and Unreported
MCS	Monitoring, Control and Surveillance
STCW-95	International Convention on Standards of Training, Certification and Watchkeeping
STCW-F	International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel
SWOT	Strength, weakness, opportunity and threat analysis
TAC	Total Allowable Catch
TAE	Total Allowable Effort
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
VHF	Very High Frequency
VMS	Vessel Monitoring System
VPA	Virtual Population Analysis

INTRODUCTION

The uses of at-sea information

Information on the ways in which fishing vessels are operating when at sea is becoming increasingly important for a number of reasons. Data on what fish are caught, and how, when and where can inform a wide variety of tasks that face fishery management authorities. Such data provide input to the assessment of the state of fish stocks and the ecosystem of which they are a part. They offer insights into the ways in which fishers are operating within the frameworks of conservation and management measures through which fishery managers attempt to ensure sustainability. In addition, at-sea information is used by fishing companies to vary their fishing strategies in response to both conservation and management measures and their markets.

Many fish stocks are being exploited at close to their maximum sustainable yield (MSY); many are over-exploited and in need of controls that will allow their recovery. Some are under-utilized or are the target of newly developing fisheries. Whatever the state of fish stocks there are pressures from all sides to ensure that fishery activities are sustainable. This means strong controls if a recovery programme is required and cautious approaches if there is still some scope for more catches. The precautionary approach, as advocated by the Code of Conduct for Responsible Fisheries and accepted for its scientific sense, means that the risks of overstepping the maximum allowable catch (for both developing and recovering fisheries) should be minimised. Risks need to be estimated based on all the factors that are believed to contribute to them. These factors may include the amount and location of the catch, or the time that fish are caught (both seasonally and during their life-cycle), or the extent of the side effects of fishing such as the destruction of other non-target species or habitat, among many others.

There are thus two underlying reasons why at-sea fishery information is important. The first concerns fishery science, and the second compliance. In terms of the former, such information provides individual vessel data on what, how, when and where fish are caught, which can then be used together with information from other vessels for the assessment of stocks (including temporal and spatial 'mapping') and the prediction of their responses to exploitation in the future. In terms of compliance, within the general context of fisheries monitoring, surveillance and control (MCS) systems, at-sea fishery information provides individual vessel data that can be used to check whether fishing is being conducted according to fishery management control rules — imposed to try to ensure sustainability. Some control rules require the aggregation of data from all vessels on their catches or the amount of fishing effort over time so that fishing stops when the total allowable catch (TAC) or total allowable effort (TAE) of a fleet is reached. Other control rules may apply to individual fishing operations, such as limits to the location or timing of the catch or to the size of the fish caught. Conservation and management measures are often a mixture of many of these (and other) control rules, applying to individual vessels or the fishery as a whole.

Types of at-sea information

At-sea information can be obtained in several ways. The traditional method is the use of logbooks, kept on board the vessel and completed by the fishing master. The detailed data they deliver then become a part of the information required for both fishery science and compliance activities. Direct communication is also an important method. Radio or telephone reporting directly to fishery management authorities or through fishing company offices can provide similar, though usually not as detailed, information on fishing.

The problem with these forms of at-sea fishing information is that they entirely rely on the accuracy and honesty of the person reporting, usually the fishing master. In circumstances where the control rules are difficult to comply with, such as the avoidance of by-catch or size limits, or where it is disadvantageous to comply, such as the avoidance of catch limits, seasons or fishing areas, relying on honest reporting in logbooks or from communications is risky. Under-reporting from these forms of at-sea information is notorious and the subject of continuous problems between the fishing sector and management in almost all fisheries. Nevertheless, both forms are still important in the array of information available for fishery science and compliance, and hence management. In the case of communications, the advent of satellite communications and the development of vessel monitoring systems have enabled at least some independent verification of the location and timing of fishing activities, but reporting of the actual catch remains subject to the accuracy and honesty of the fishing master.

In addition to the honesty issue is the problem of attention to detail. Fishery science often needs information that is just not feasible for fishing crews to collect or record. Such details as species composition (say, for each haul), or size frequencies, or the state of reproduction or stomach contents, are often highly important to the scientific methods used to assess fish stocks. In some circumstances, such detail may also be important to compliance, such as limits to species by-catch, fish size or reproductive condition.

Thus, in terms of verification of fishing activities and attention to detail there is only one method that can assure independence, accuracy and

appropriate data coverage — namely, the use of at-sea observers. Of course, other systems can be put in place to contribute to these requirements. Crosschecking of logbooks can be undertaken by inspectors at ports against landings, but usually only the aggregate information from a whole fishing trip. Vessel monitoring systems, surveillance and at-sea inspections can verify locations and timings of fishing activities. And at-sea inspections can check aggregate catch on board against logsheet totals. But observers on board vessels are the only independent people who can verify fishing activities on a daily or individual fishing operation basis.

The deployment and role of observers

Obviously, not all fishing vessels can carry observers all the time. The vessel may be too small for an additional member to be carried for an extended period. The cost of carrying observers is often attributable directly to the vessel or fishing company, and will reduce profitability, relatively more so in smaller vessels than larger ones.

Furthermore, the need to carry an observer may not be continuous from the point of view of the fishery management authority (FMA) or fishery science. Just as land-based statistical programmes develop sampling strategies, which define the ways to raise sample data to figures that represent the 'true' picture, observers may be used as samplers by attendance on board vessels according to a sampling strategy devised by the FMA.

Even while on board, the scope and extent of data recorded by observers will always be subject to a sampling strategy, since they cannot record every detail of every fish caught. The ways in which the data are to be sampled will be subject to statistical strategies devised mostly for the purpose of scientific assessment, and to a lesser extent compliance. Nevertheless, any data that an observer records can be used for both purposes, as appropriate.

Some authorities may attempt to provide 100% observer coverage, hence a complete census of some aspects of fishing activities. However, if the sampling strategy (placing an observer on a particular fishing vessel for a particular period) is sufficient to provide confidence that the data obtained are representative (i.e. without statistical sampling bias), then a lower level of observer coverage is as good as full coverage. Lower coverage means less cost, both to fishery authorities in their management of an observer programme and to fishing vessels while observers are on board. However, in terms of compliance observation, which is increasingly becoming a major role for observers, higher levels of coverage may be necessary than might be required for scientific observation.

Traditionally, observers are only meant to observe, record and report and, as such, have an indirect 'information only' role in compliance control. But the increased capability of observers to report directly, on almost a real time basis with fishery authorities via modern communications, means that they now offer a primary information source for compliance control while yet not empowered to take any direct action.

This 'advanced' role of observers may cause further resentment and resistance to their activities, often in a situation where difficulties must be handled directly by the observer while on board a fishing vessel. It is therefore extremely important to deploy observers that are trained in all aspects of the role, and are capable of acting with tact and with a full understanding of their position and the legal authority to undertake their work. Equally, it is important for fishing masters to be aware of their responsibilities to observers, including awareness of the deployment strategy under which observers are operating.

Decision-making on at-sea deployment of observers and their work programmes

Most of what follows starts with the understanding that an observer programme has been decided upon, and then goes on to outline the legal, financial, training, sampling, output, design and implementation issues that stem from the decision. The intention of such a review is to complement and to some extent update previous manuals and reports on observer programme operations. These earlier documents remain authoritative guides and should be consulted as rich sources of technical and administrative information on observer programmes, whether at general, regional or national levels.[1]

These Guidelines do not attempt to describe the full range of decisions that may be taken prior to and during the development of an at-sea fishery observer programme. Nevertheless, it is important to recognize key factors and influences on the overall decision-making process. These factors may occur at many levels within the framework of a fisheries management authority, including, most importantly, the policy level. The following summarises the types of decision-making at five levels; policy, management, science, MCS/compliance and observer operations.

Policy level

The establishment or extension of an observer programme would normally be made at the policy level (usually Ministerial or regional Commission), based on advice that:

[1] See for example FAO (1996a), Farman (1987), McElderry *et al.* (1999), Nolan (1999), and van Helvoort (1986).

- direct measurements of some biological variables are required for the scientific methods used for stock assessment;
- compliance with conservation and management measures is poor, including other forms of reporting such as logbooks or communications; and
- a new fishery or a new fishery agreement requires primary data in order to establish baseline information, check compliance and deter infringement.

Management level

Management would prepare and organise the legal, institutional and financial frameworks under which an observer programme will operate, based on the policy decision. These are outlined in Chapters 2 and 3. Management would seek scientific and compliance advice on the extent and level of coverage that satisfy their requirements, both in terms of numbers of observer days and the sampling strategies that will determine observer work programmes. Based on this assessment of observer requirements, management would institute (or contract) employment and training, scheduling of deployment, and equipment, communication and information management requirements, either directly or at the observer operations level.

Science level

Decision-making on the level of observer coverage and the design of sampling methodologies and strategies is a complex task and is only briefly outlined in Chapter 4. Essentially, such decisions depend on the scientific methods and approaches that are being used to assess stocks (and, where necessary, the environment). Assessments would need to be made of: the biological (and environmental) variables appropriate to the scientific methods; the methods used for their measurement; and the stratification, sampling and sub-sampling approaches required to ensure data are representative and free from bias. No observer programme should be developed before obtaining at least some of these assessments because it is only on the basis of such assessments that the personnel, work programme and training requirements for observers can be estimated. Fishery scientists would normally continuously process and evaluate observer data in relation to their scientific methods, and then suggest changes to sampling if this reveals that inadequate samples are being taken or if sampling is more than is required for the development of the appropriate parameters.

MCS/compliance level

In similar fashion to scientific evaluation of observer data collection requirements, compliance services would evaluate and re-evaluate the information they need observers to collect, including prioritization of the conservation and management measures that observers can usefully and confidently report on.

Observer operations level

At the operational level of observer programme management the decisions and requirements of its 'clients' - policy, management, science and compliance - are put into practice through the training and deployment of observers on board fishing vessels. Observer managers would continually assess the capacity of the programme to undertake decisions and deliver requirements, including assessing the opportunities offered by improved skills and capabilities or the constraints imposed by personnel and financial difficulties.

Clearly, observer programmes need to be flexible and adaptable in meeting their responsibilities and tasks. Feedback between all levels within the decision-making hierarchy is fundamental to developing an at-sea fishery observer programme. Table 1 summarises the decisions and activities taken at different levels, and the reasons for taking them.

Table 1 Decision-making in the development of an at-sea fishery observer programme

Decision level	Decision/activity	Reasons for decision/activity
Policy	Establish an Observer Programme	Feedback on poor compliance or scientific needs
	Extend an Observer Programme	Scientific data requirements New fishery/ new fishing agreement
Management	Establish legal, institutional and financial framework	Policy decision
	Assess/reassess observer requirements	Feedback on science/compliance requirements
	Design/redesign Observer Programme	
	▪ Personnel and training	Insufficient observers/new task and training requirement
	▪ Deployment and communications	Scheduling and equipment according to coverage required
	▪ Information management	New/amended data processing requirement
Science	Evaluate scientific data needs and sampling strategy	What data types, how and when to be collected (stratification and sampling)
	Process data and adjust sampling strategy	Data fitted to scientific method reveals inadequate or excessive sampling
MCS/Compliance	Evaluate compliance needs and observation strategy	What data types/fishing activity records required, including prioritization
	Process data and adjust observation strategy	Information reveals inadequate observations or changed priorities
Observer Operations	Alter Observer Programme activities	New requirements for deployment, scientific or compliance data
	Inform science and compliance of opportunities and constraints	Personnel and financial changes