SECTION VI

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Report of the STACTIC Working Group Meeting on Pilot Satellite Project 24-26 October 1995 Brussels, Belgium

Report of the STACTIC Working Group Meeting on Pilot Satellite Project

(FC Doc. 95/24)

24-26 October 1995
Brussels, Belgium

1. Opening of the Meeting

The Chairman of the Fisheries Commission (Mr. H. Koster, EU) called the meeting to order at 1030 hrs on 24 October 1995. He stated that unfortunately the STACTIC Chairman (Mr. D. Bevan, Canada) was unable to attend this meeting.

Delegates were present from the following Contracting Parties: Canada, Denmark (in respect of the Faroes and Greenland), Estonia, European Union, Iceland, Japan, Latvia and Norway. Also, representatives of ARGOS, EUTELSAT and INMARSAT were present at the meeting. (Annex 1)

Since according to the NAFO practice an *ad hoc* Working Group elects its own Chairman, it was suggested to Contracting Parties to propose a Chairman. The Canadian delegate proposed Mr. H. Koster (EU) to chair this meeting. No other suggestions being available, it was agreed to follow this proposal.

2. Appointment of Rapporteur

Mr. M. Nedergaard (EU) was appointed Rapporteur.

3. Adoption of Agenda

The provisional agenda was adopted without modifications. (Annex 2)

4. Presentation by system providers on satellite tracking system which can be used in the NAFO Regulatory Area

Representatives of ARGOS, EUTELSAT and INMARSAT were present at the meeting.

Each system provider made an extensive presentation on its satellite tracking system and the capabilities to track fishing vessels particular in the NAFO Regulatory Area. Since not all Contracting Parties were present at the meeting, the Chairman requested these system providers to circulate in writing their presentations to all Contracting Parties.

The delegates reviewed these presentations in detail, with emphasis on the following features:

ARGOS

By using polar-orbiting satellites, global coverage is provided. At present, 2-3 NOAA satellites are used and it is expected that a fourth satellite will enter into service in 1996.

The number of position reports increases with the latitude. At 50° typically 20 reports are obtained. In the NAFO area- normally 20-24 fixes/day. If the GPS module in the ARGOS fails, the land station will still be able to determine the vessel position.

EUTELSAT

Does not provide global coverage - only regional. However, the coverage will be expanded by moving the stationary satellites (East/West). Provides real time communication and guarantee of privacy. Positions are determined by the land station.

INMARSAT-C

Provides in best cases coverage from approx. 80°N to 80°S. The Inmarsat-C system will develop into smaller units and offer higher data-transmission speed. If the integrated GPS system fails in the Satcom-C terminal no position will be reported, unless an external GPS navigator is connected. Hardware prices and communication costs may also decrease.

The Chairman thanked the service providers for attending the meeting and their constructive and open contribution to the discussions on this point of the agenda.

5. Cost estimation

The system providers presented the following price estimates:

INMARSAT

1.	On board equipment (single unit)	5000 US $
	More than 100 units (excl. message terminal)	3000 US $
2.	Transmissions	
	Data-report "single" (position only)	0.05 US $
	Data-report (incl. course and speed)	0.07-0.09 US $
3.	LES-station data report fee (depends on location)	0.04-0.06 US $
	Subject to competition between the LES in the areas.	
4.	Base station	
	PC + software	20,000 US $

In addition national telecommunication authorities will add their own service charge, which can be quite considerable. This can, however, often be negotiated (National RTT and Fisheries Enforcement Service).

- Vessel "polling" will add 5 to 7 cents to the message price (typical 15-20%) Group polling 2.00 $
- Data message which include catch data, if within the size of 1KB cost approx. 0.90-1.10 $
- Fleet net messages (2-256 vessels) 2.00-2.65 $

2/3 of the service providers do not charge subscription fee.

EUTELSAT

As a primary service provider for the purpose of the NAFO pilot project:

1. Ship borne equipment
   One unit/part (incl. installation) — 5000-6000 ECU

2. Land based station
   (PC + software + adaptation) — 10,000 ECU

3. Service
   No land lines (public telephone lines) a pure Euteltrac communication via Eutelsat satellites.

Fixed terminal	5,000 ECU
Communication - Position-reports	3,000 ECU/mobile terminal/24 months

   One position/hour (typically 15-20 msg/day) as standard, which can be increased to "fast" position report.

   For a "European" vessel/Contracting Party the communication configuration will be with two networks. (N-America and Europe). For a Canadian vessel only one network is needed.

4. Training (2 days) base station — 5000 ECU
   Training for shipborne equipment — 200 ECU

(1 ECU approx. 1.32 US $ (Oct 1995))

ARGOS

1.	On board equipment Beacon (transmitter) and a "Psion"-terminal	2000-2500 US $
2.	Software "Elsa"-software and certain maps	4000 US $
3.	Service charges for the NAFO Pilot Project Lump sum	2500 $/year/boat

13-14 fixes/day incl. catch data position, course speed activity catch data using a standard design.

No local charges automatic communication by X.25 to the flag state and NAFO Secretariat.

6. Reports by delegates of Contracting Parties on national programmes on satellite tracking

All delegations at the meeting reported on their experience with fishing vessel tracking systems. The reports of Norway, Iceland, Japan, Canada and the EU are attached (Annexes 3 to 7 respectively).

Although Greenland, Estonia and Latvia had experience with satellite position and communication systems, they had no experience with an automatic tracking system. These Contracting Parties considered the NAFO pilot project as a useful means with a view to obtain experience in this field.

The Chairman summarized on the reports that whilst in the framework of the NAFO pilot project some Contracting Parties hoped to obtain some experience with satellite tracking of fishing vessels for enforcement purposes, others used already satellite tracking or carried out extensive testing. Therefore, he hesitated to draw conclusions which could preclude at this stage Contracting Parties from testing to the full extent any system considered appropriate.

7. Consideration of criteria which can be used by different systems

The meeting discussed to some extent criteria which should be met by satellite tracking systems. In the pilot phase it was, however, not considered opportune to fix specific criteria. None of the systems should be excluded beforehand, since it is likely that their performance will advance if tested in the NAFO Regulatory Area. It was identified that Contracting Parties may endeavour to test satellite tracking systems allowing an accuracy of the position of fishing vessels by 500 meters with 99% certainty and allowing 24 position reports on 24 hours.

8. Compatibility between different systems when used within the NAFO Scheme of Joint International Inspection and Surveillance (hardware-software)

Although the systems as such are not compatible, the information obtained by the different satellite systems can be made compatible. The system providers are able to provide the information in a form modulated to the customer. In most cases each system provider will supply its own software. As a provisional solution software has been developed which can process simultaneously information from ARGOS, EUTELSAT and INMARSAT.

The representative of INMARSAT stated that the compatibility question can be resolved when fishing nations agree on a common format in which the information should be supplied. He considered that such question should be resolved in the FAO rather than in the NAFO.

The representatives of Denmark (on behalf of Greenland) and Norway noted that in NEAFC standardization work is underway. The EU mentioned similar attempts in other parts of the world (USA, Australia).

The representatives of the Contracting Parties present at the meeting considered the format for exchange of satellite tracking information as well as the exchange protocol as issues to be reflected on during the pilot phase. Some standardization such as the use of UTC (Universal time count) and WGS 84 (World Grid System, raster longitude latitude) was considered a possibility for being able to use exchanged information. All Contracting Parties would examine in the framework of the procedures and rules applicable within Contracting Parties which standards could be usefully applied.

It was agreed that when transmitting information obtained by satellite tracking, Contracting Parties will identify the standard used.

As an example of an exchange format, a model developed within the EU by Denmark, including an extension developed by Spain, was circulated in the meeting (Annex 8).

As regards the NAFO Secretariat, the Chairman concluded that no provision was made by NAFO for investment in soft and hardware. With the experience obtained in the framework of the NAFO pilot project consideration should be given to this question. In conformity with the decision taken by the Fisheries Commission, each Contracting Party shall provide the NAFO Secretariat 'with information in the form as pointed out in the NAFO Conservation and Enforcement rules and as it can be received (fax, telex, etc.).

9. Consideration of the most acceptable system or systems to be used in the NAFO Regulatory Area

It was obvious from the presentation by the above system providers that several systems seem available. It was not considered opportune during the pilot phase to close the door for any system.

10. Recommendations/Report to the Fisheries Commission

A first draft of the report has been discussed in the meeting. The Chairman suggested that a provisional report of the meeting would be transmitted to the participants by Dr. Chepel with a request for observations. Dr. Chepel would finalize the report in the light of these observations.

The following recommendations to the Fisheries Commission were agreed:

- As regards standardization of information and protocols for exchanging information

- it is suggested that the results of the work underway in NEAFC on this issue be circulated by the NAFO Secretariat to all NAFO Contracting Parties.

- the Fisheries Commission will reflect on the liaison between NAFO and NEAFC regarding further standardization work.

- In accordance with the NAFO Pilot Project for Observers and Satellite Tracking

- Contracting Parties be encouraged to test to the full extent several systems of satellite tracking

- Contracting Parties be encouraged to make the results of their testing available to other Contracting Parties

- Consideration be given to question of the installation of the necessary communication and data processing equipment in the NAFO Secretariat comparable with the equipment used by Contracting Parties.

11. Other business

No points were raised under this agenda item.

12. Adjournment

The Chairman thanked the participants for attending the meeting and their contributions. The meeting was adjourned at 1200 hrs on 26 October 1995.

Annex 1. List of Participants

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Annex 2. Agenda

1. Opening of the Meeting by the Chairman, Mr. H. Koster (EU)
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Presentation by system providers on satellite tracking systems which can be used in the NAFO Regulatory Area
5. Estimates of costs of the system for Contracting Parties
6. Reports by delegates of Contracting Parties on national programmes on satellite tracking
7. Consideration of criteria which can be used by different systems
8. Compatibility between different systems when used within the NAFO Scheme of Joint International Inspection and Surveillance (hardware-software)
9. Consideration of the most acceptable system or systems to be used in the NAFO Regulatory Area
10. Recommendations/Report to the Fisheries Commission
11. Other business
12. Adjournment

Annex 3. Report by the Delegate of Norway

Norwegian National Satellite Tracking Activities

Norway has not yet adopted satellite tracking as part of any national fishing regulation. Norwegian fisheries authorities have, however, carried out a number of tests to learn about the possible use of the various satellite systems for tracking and data reporting purposes.

The first of these trials was to some extent triggered by the use of satellite tracking in the North Pacific fishing regulations from 1990 onwards.

From April until July 1991 the Norwegian Directorate of Fisheries therefore sought permission from the Institute of Marine Research to keep ARGOS Mar-90 transmitters on board three of their research vessels, in order to ascertain possible achievements by the use of this system in our latitudes. During the trial period the vessels carried out their ordinary surveys.

The ARGOS system showed capabilities of tracking vessels at sea, even in difficult fjord surroundings. An average of 15 locations a day was obtained, with a maximum of 25 at high latitudes. This was based on a two-satellite operation, which was the ARGOS standard at the time.

In 1993 the ARGOS Mar-90 system was therefore also selected as the platform for carrying out tests trying to establish whether tracking by satellite could give indications as to the actual fishing activity of a vessel. A total of 6 transmitters were installed on board three types of fishing vessels: 2 trawlers, 2 purse-seiners and 2 long-liners. This was done in close cooperation with the fishermen. At the end of the trial, the satellite trackings were compared with the logbooks from the respective vessels. Overall, a rather good correlation was found between fishing behaviour as indicated by the trackings, compared to actual fishing activity. A report in Norwegian has been written to summarize these results.

In the autumn of 1993 the Directorate of Fisheries carried out further tests both with ARGOS and INMARSAT-C equipment on a total of 5 vessels, to check the feasibility of using small bit-mapped messages, 256 bits long, to transmit by satellite reports on catch and fishing activity as required by the Norwegian Quota Control System. These tests were as such successful, although they did identify a number of potential problems. A special PC grogram - MONRAP - which has later been improved, was developed for the tests.

From 1990 onwards Norwegian research has been applied to develop INMARSAT-C as a suitable platform for maritime communication in northern waters. A main consideration has been its use on board fishing vessels. With conventional antenna systems, good mobile coverage with geostationary satellite systems can generally not be guaranteed unless the satellite is visible at least 5° above the horizon. Unfortunately, this is still well south of the Svalbard Islands.

During the first part of the domestic INMARSAT-C trials in 1990-91, a two-antenna system was developed which could even give an amount of coverage with the satellite slightly (0.6°) below the horizon. Three fishing vessels and two research vessels participated in these trials. The two-antenna system is now commercially available. With such a system communication is possible to some extent even at about 81°N.

During 1992-93 the INMARSAT-C trials were extended, and equipment installed on board a total of 13 Coast Guard vessels, 4 research vessels and 10 conventional fishing vessels.

In 1993, in cooperation with the Coast Guard, the Directorate of Fisheries developed a transaction driven system - MONUT - whereby the Coast Guard vessels can access the Norwegian Quota Control System from sea by means of INMARSAT-C; to obtain data on overall fishing activity, or data related to specific fishing vessels. The Coast Guard can also upload their own inspection data into the central data base by satellite. This system is now utilized by all the 13 Coast Guard vessels.

From January 1994 the Directorate of Fisheries carried out tests of the EUTELTRACS system on board the research vessel "Johan Hjort". An English language report on the first three months of this test has been written. The report shows that within the area of coverage, the positioning accuracy of the EUTELTRACS system in the Barents Sea area was quite good. The trial was later extended to provide data from the vessel for an additional 12 months.

The "Johan Hjort" trials, among others, show that careful attention to details such as the placing of the antenna is important, if one shall achieve uninterrupted tracking of platforms by means of geostationary satellite systems in their areas of marginal coverage.

At the same time, the "Johan Hjort" also carried an ARGOS Mar-90 transmitter. A report has been written which indicates a certain loss of accuracy for the traditional ARGOS positioning algorithm when the platform is moving at cruising speeds. Be aware that the new ARGOS-GI platform with GPS positioning is now being offered as the standard ARGOS system.

Of current Norwegian activities concerning satellite tracking, a trial of polled tracking of INMARSAT-C platforms using the 4 Norwegian marine research vessels is worth mentioning. Since mid-95 these vessels have been tracked automatically, based on 15-minute interval polling. The results so far have been very satisfactory. This system - MONPOL - can also handle data from e.g. ARGOS and EUTELTRACS, although this will then be scheduled, and not polled, positioning.

The - MONPOL - data programs show how the Norwegian Directorate of Fisheries may organize their activities in connection with the NAFO Satellite Tracking Pilot Project.

At present the Norwegian Ministry of Fisheries is studying plans for an eventual large scale national pilot test, using satellite technology on board fishing vessels. Tracking is one of the elements of such a test. As the recommendations from this study are not scheduled until mid-November, however, a possible decision to proceed with larger scale national trials is still some time off.

Annex 4. Report by the Delegate of Iceland

Chairman, Ladies and Gentlemen.

My name is Gylfi Geirsson and I am a Lieutenant Commander in the Icelandic Coast Guard. I would like to take this opportunity to give you a brief overview of the situation in Iceland concerning remote tracking of fishing vessels.

Iceland has had a duty position reporting system in force for the fishing vessels for nearly 30 years. This is a manual system, intended solely for safety purposes. For the last few years there have been plans and preparations for an automated system, working either via VHF repeaters or via satellites, or a combination of both, but still solely for safety purposes.

The Icelandic Coast Guard has though been running a position reporting system for many years, intended for fishery control for foreign vessels which have been licensed to fish in Icelandic waters. That is to say boats from Faroes, Norway and Belgium.

In June this year a committee on behalf of the Ministry for Fisheries started investigating the possibility of a remote tracking of the fishing vessels activity. This is formed on the ground of a new fishing law, which gives the smallest fishing boats the possibility to choose between fixed days allowed for fishing and with coda restrictions on cod, or choose the days themselves and then without coda restrictions on cod but considerably less days for fishing. In the latter case the boats will be subject to remote monitoring of their movements. The system would then automatically count their days at sea. This system will according to the new fishery law be ready no later than 1 February 1996.

Since it was not thought to be realistic that a fully automated system would be ready before that date, an alternate manual but nevertheless a computerized system will be used in the meantime.

Early in the process it was decided that the system used must be fully compatible with the future automatic position reporting system. The committee has studied several systems and different means of communication, including VHF, Inmarsat C, ARGOS and Euteltrack. A pilot project will start with some or all those equipment on board 30-40 vessels in the next few months.

Since it was obvious, even for the smallest boats that the line of sight VHF coverage is not sufficient, and there could exist shadow areas in the Inmarsat C system inside fjords because of the low horizon of the satellites in our latitude, a study of the satellite coverage was undertaken.

The Icelandic Coast Guard on behalf of the Ministry for Fisheries, launched a survey program, where all fjords in Iceland where a possible shadow could exist were surveyed. The survey was done with a small rubber dinghy, equipped with two Standard C satcoms, two computers and a GPS receiver. The satcom antennas were only about 2 meters above sea level. One satcom was logged into Atlantic Area East, and the other to Atlantic Area West.

A special software was made to constantly log the information from the satcoms and to display the signal strength to the operator in the boat, showing a figure from Zero to Five. For the ease of the operation the figures were made to completely fill the screen and turned to red if the signal was below 2. Additionally an indication of the ocean area East or West was displayed.

The survey was in brief conducted in such a way that the rubber dinghy sailed the south side of the fjords, as close to the coast as possible, following the shoreline until both satcoms showed signal strength Zero. Then a 90° turn was made from the shoreline, sailing slowly until either one showed full signal again. Then the shoreline was approached again with an angle of 45°.

The result is very promising and as you can see on the slides the shadow areas are very limited, and in many cases where there was no signal from one satellite, there was full signal from the other.

To compare this with the result from our Coast Guard vessels which are also equipped with Standard C and have the satcom antennas installed about 18 meters above sea level, we have simply not found a black area around Iceland, even in the narrowest fjords with the highest mountains and sailing as close to the coast as possible.

The Icelandic Coast Guard has some experience in automatic position reporting, since all Coast Guard vessels and our F-27 patrol aircraft have been using the Inmarsat Standard C for that purpose for some years.

The Coast Guard has great interest in remote tracking of the fishing fleet, since it can greatly improve the surveillance and make it more economic, especially the airborne surveillance.

Therefore a system working on either VHF or system such as ARGOS, where the transmission of position report and identification could be intercepted from an aircraft, is of interest. If this is intergraded with the radar information and displayed on a plotter aboard the aircraft, the airborne surveillance could be conducted from much higher altitudes than today, giving considerable greater radar coverage. Given those circumstances the aircraft would only have to descend down to those radar echoes which are not remotely identified, for visual identification.

Of course this can also been done with use of other systems, where the position reports are transmitted to the aircraft in flight and also be memorizing the radar signature from each vessel, or by giving a polling command rom the aircraft, but this will in my view never give the same degree of accuracy as when received directly from the fishing vessel.

The committee in Iceland on remote monitoring of fishing vessels has not finished its work and no decision has been taken about which system will be used to track the Icelandic fishing fleet.

We intend to observer closely all activity in this field, with that in view that the system to be used in Iceland, should be fully compatible with other such systems.

This concludes my briefing, thank-you.

Annex 5. Report by the Delegate of Japan

Summary Report on the Satellite Program in Japan

In resource management, it is essential to grasp accurately the information concerning operation such as operating position and catch amount of fishing vessels. It is desirable to obtain that information on a real-time basis to a maximum practicable extent.

Japan, as a responsible fishing nation, considers it crucial to obtain data such as operating position of fishing vessels and catch amount on a real-time basis, with a view to ensure transparency of fishing activities. Based on this recognition, Japan launched development of real-time position and catch reporting system using satellites.

1. Background

(1) In the 1980s, submission of records of NNSS (Nav. Navigation Satellite System) was required by the Government of Japan, in order to determine the operating position of trawling vessels operating in the Bering high Sea. But there were major issues surrounding this requirement, that is, the vessel position could not be grasped on a real-time basis.

(2) Later, through consultations with the United States and Canada, monitoring was launched to determine the vessel position on a real time basis by installing the ARGOS vessel tracking system on 215 squid driftnet fishing vessels in the North Pacific in 1990.

Fishing vessels operating on the high seas of the Bering Sea were also obliged to carry the ARGOS system onboard.

(3) ARGOS system does not have any problem in obtaining information on vessel position, but it cannot transmit large amount of information on catch amount. We have studied what type of system is most appropriate for installation on fishing vessels from the viewpoint of implementing better resource management.

As a considerable some points, discussions were made on a method in which the communication function of INMARSAT A and ARGOS.

(4) Each system has its own features, and it is necessary to consider the following conditions in determining which system is to be adopted.

- that the equipment should not cause excessive financial burden on fisherman as regards the instalment cost and system usage fee
- that the confidentiality of the contents of the communications be preserved
- that there should be no risk of vessel position data to be falsified
- the size of equipment should fit the size of the fishing vessels
- if possible, the equipment can be maneuvered within the certification of the fishing vessels crew (radio operator) now on board
- the equipment can be used for other communication purposes as far as possible
- that it has durability against vibrations of the vessels and causes little or no troubles

2. INMARSAT A

(1) After considering the above conditions, Japan decided to adopt the system combining GPS and INMARSAT for the position and catch report system in the future based on the recognition that (a) in INMARSAT, there is no limit to the amount of information when catch volume and other data are transmitted, (b) the number of fishing vessels which the INMARSAT as communication means, is expected to increase (c) relatively large scale fishing vessels are already using INMARSAT A system as communication means, and GPS/INMARSAT combined system is considered to be acceptable to fisherman, and (d) the maintenance cost of this system after the whole system went into operation will be small. Against this background, development of prototype of the equipment to be installed onboard fishing vessels was initiated.

(2) Japan selected relatively large-scale longline tuna fishing vessels as the first target, and developed prototype of personal computer incorporating GPS using INMARSAT A system which a bulk of these fishing vessels have already installed. The equipment was installed onboard some tuna longline fishing vessels operating in the Atlantic from 1992, in which data were transmitted on a experiment basis. The test confirmed the possibility of real time availability of position information.

3. ARGOS

Transponders have been installed on distant-water trawling vessels operating in the North Pacific and information on the Operation position of the vessels has been collected through the ARGOS System. About 50 fishing vessels now have transponders onboard in this region. ARGOS System does not have any problems in transmitting position data.

The information on fishing vessels position is a satellite-based system as in the following procedures: Transponders on board the fishing vessels transmit the position data in electronic wave of certain frequency, which i perceived by the NOAA satellite. Then fishing position is calculated at the processing center of ARGOS, and the data are transmitted to the Japan Fisheries Information Service Center.

4. Status of the present system development

Now the GPS-INMARSAT A system and ARGOS are workable without problems concerning this system. Besides this system, INMARSAT C system including a catch report is now being developed. INMARSAT C unit is very small compared with INMARSAT A. So it can be fitted to smaller vessels. However, there are some problems; the number of Japanese fishing vessels installing INMARSAT C system is still very small because it allows only key-board-based communications and contains neither telephone nor facsimile function.

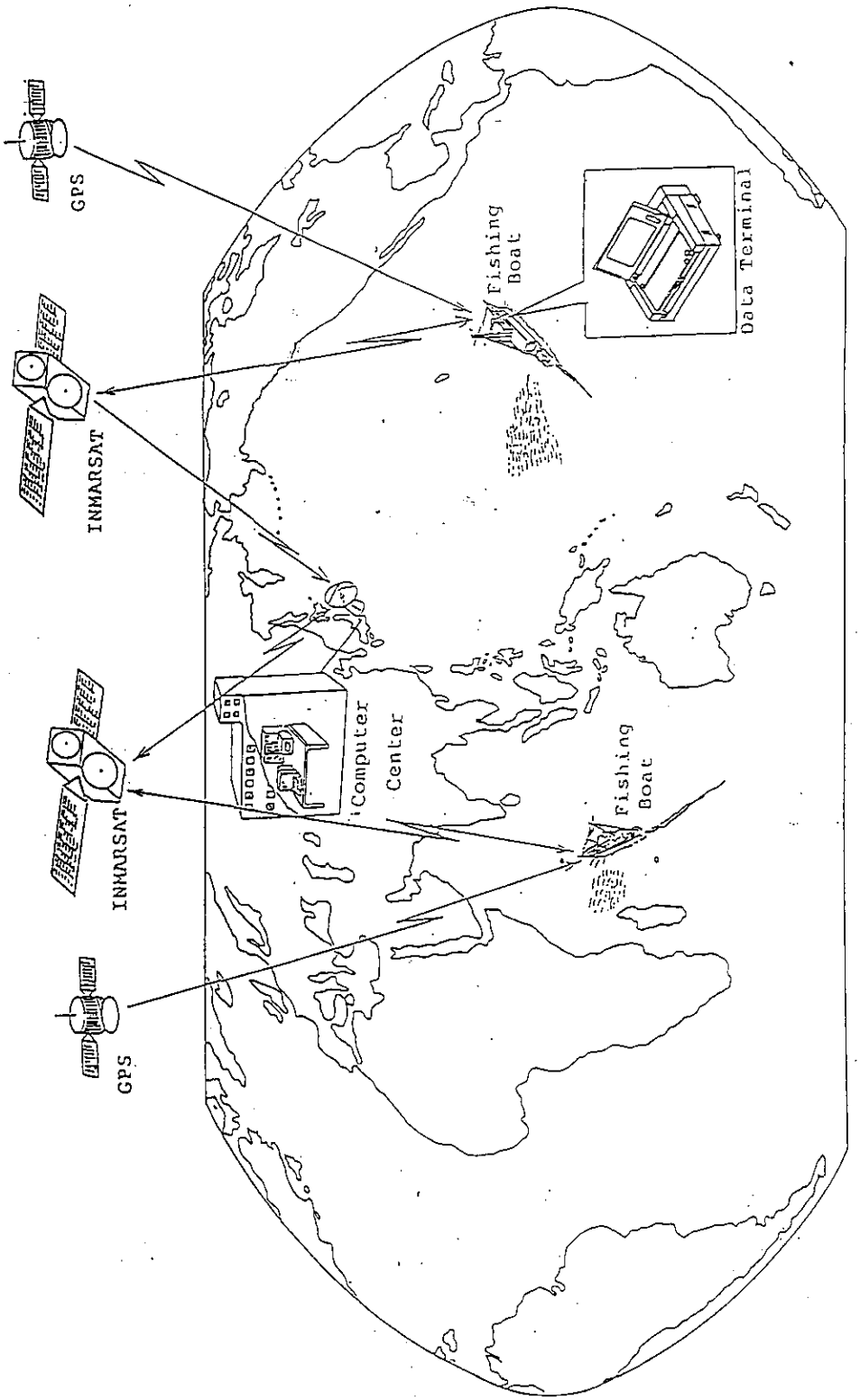
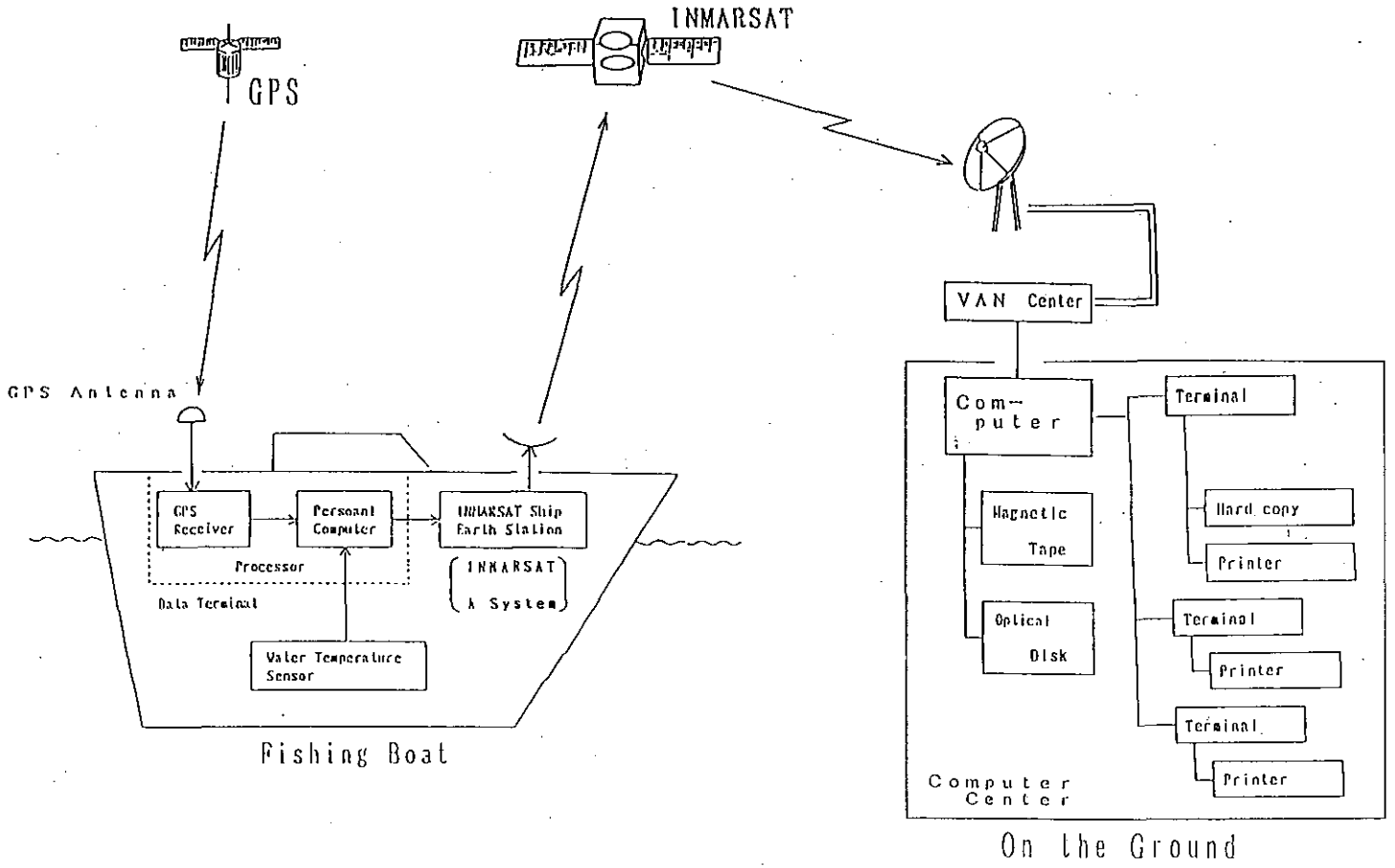
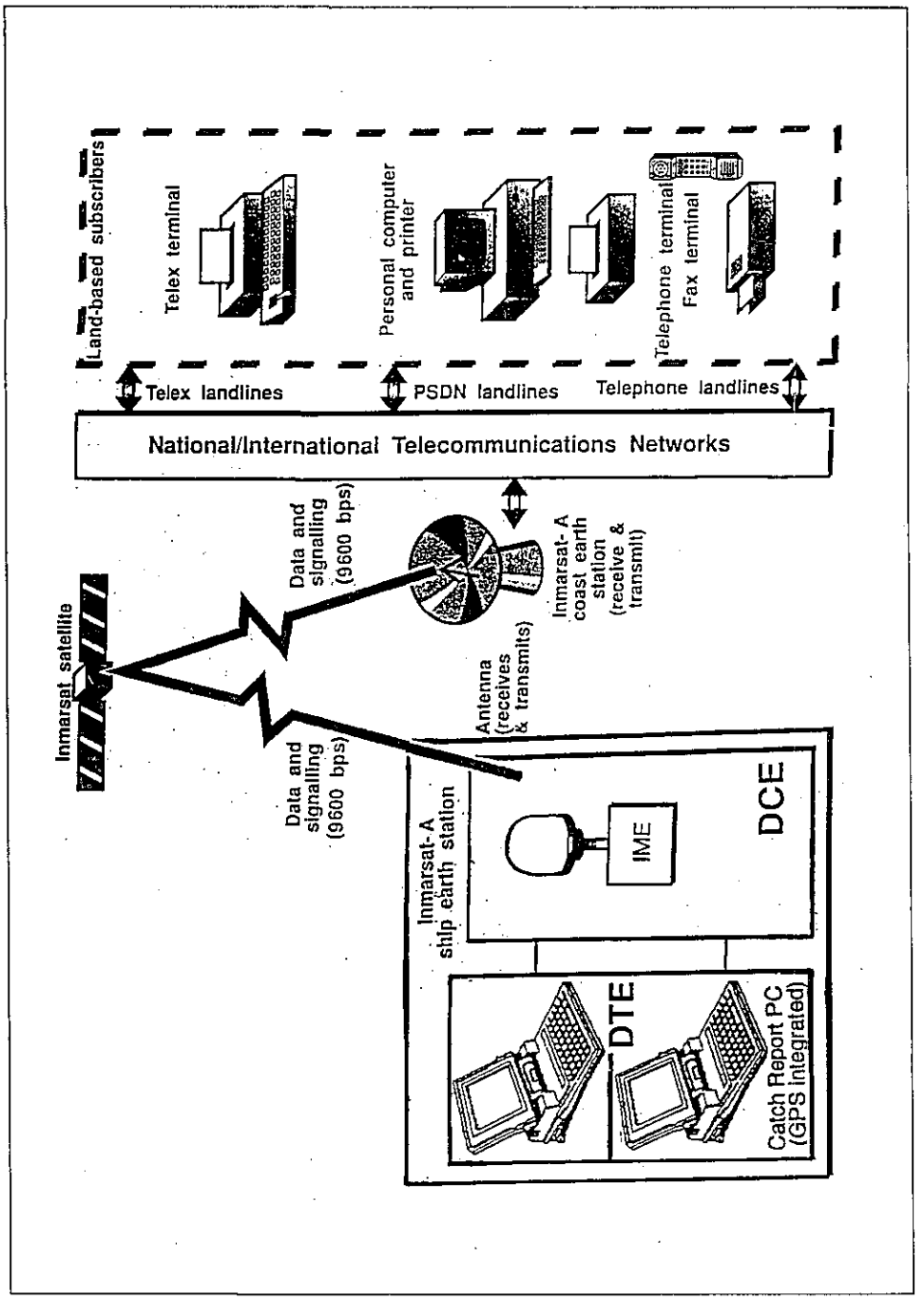
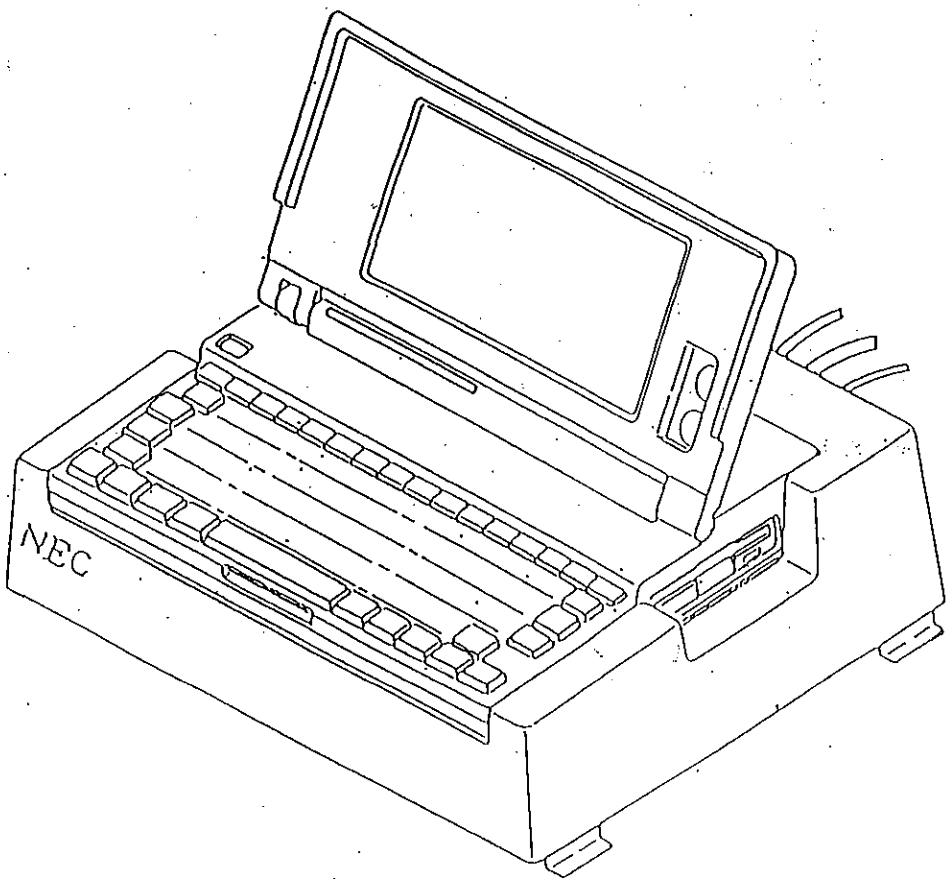


Figure System Outline

Figure System Diagram




Land-based subscribers
Telex terminal
Personal computer and printer
Telephone terminal
Fax terminal
Telex landlines
PSDN landlines
Telephone landlines
National/International Telecommunications Networks
Inmarsat satellite
Data and signalling (9600 bps)
Inmarsat-A coast earth station (receive & transmit)
Antenna (receives & transmits)
Data and signalling (9600 bps)
Inmarsat-A ship earth station
IME
DCE
DTE
Catch Report PC (GPS integrated)



Dimensions/Weight

Height: 118mm
Width : 380mm
Depth : 320mm
Weight: 5kg

Figure . Data Terminal

漁獲成績報告書・入力画面 (5/7)

1993/04/21 10:45
S 35° 00.000'
E160° 00.000'
2次元測位中

入 力 項 目

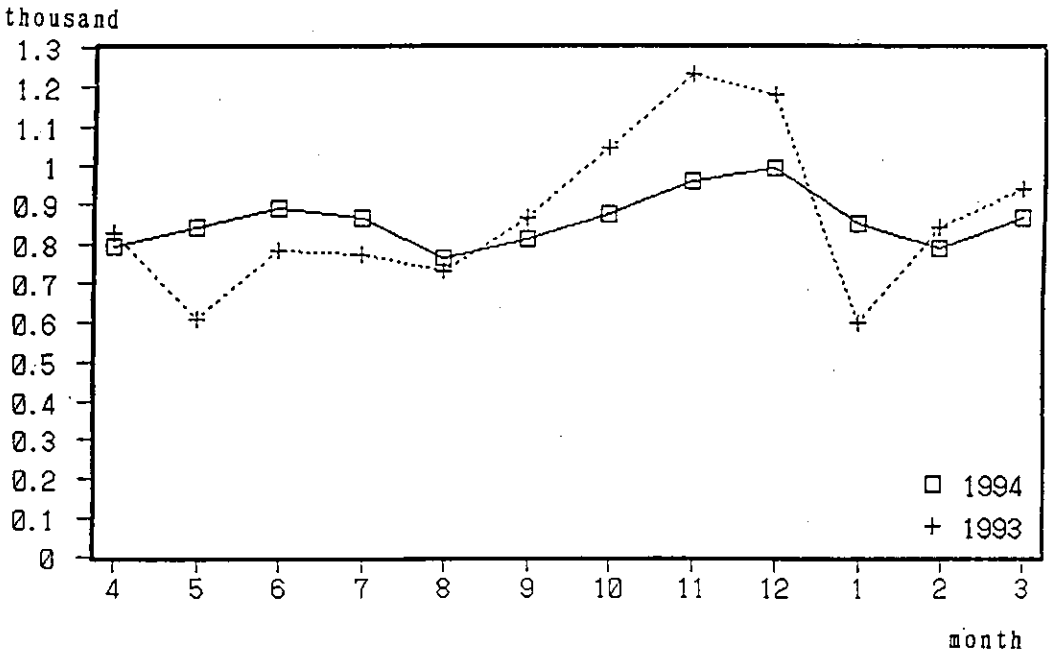
14. 漁 獲 物		尾 数	重 量 [kg]
(1) マグロ類	クロマグロ	[■]	[ ]
(2)	ミナミマグロ	[ ]	[ ]
(3)	ビンナガ	[ ]	[ ]
(4)	メバチ	[ ]	[ ]
(5)	キハダ	[ ]	[ ]

(1) マグロ類 クロマグロ……尾数 ■

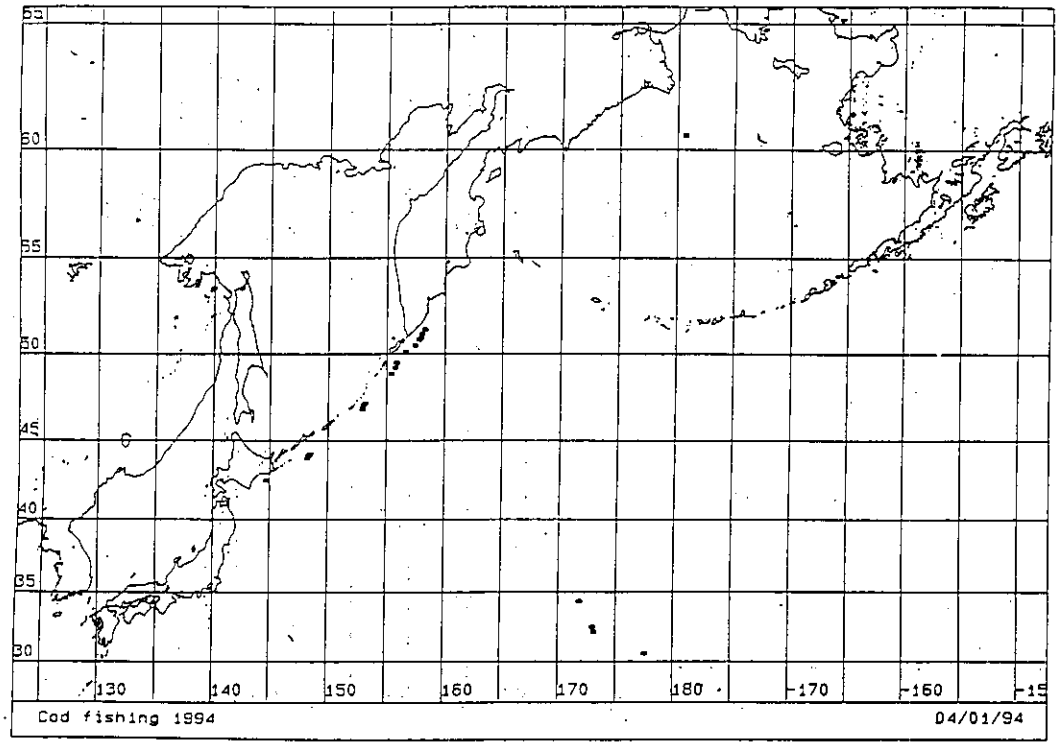
f・1 中止 | f・2 — | f・3 — | f・4 — | f・5 前頁 | f・6 次頁 | f・7 — | f・8 — | f・9 — | f・10 終了

Table Kinds of fish caught No. 1

month	1994	number/day	1993	number/day
4	794	26.47	828	27.60
5	846	27.29	610	19.68
6	894	29.80	787	26.23
7	867	27.97	778	25.10
8	766	24.71	735	23.71
9	817	27.23	868	28.93
10	877	28.29	1,045	33.71
11	958	31.93	1,234	41.13
12	993	32.03	1,179	38.03
1	854	27.55	602	19.42
2	792	28.29	842	30.07
3	868	28.00	940	30.32
total	10,326	28.29	10,448	28.62



Data received number in 1993, 1994



Position Report ;ARGOS(Trawling Vessels)

Annex 6. Report by the Delegate of Canada

- The Government of Canada has mandated the Department of Fisheries and Oceans with the responsibility for the conservation, protection and management of the fisheries resource.

- Department of Fisheries and Oceans also has responsibility for ocean sciences and hydrography as well as a large number of small craft harbours.

- Within the Department, the Conservation and Protection sector has responsibility for surveillance and enforcement.

- Canada has numerous fishery restrictions to monitor within its 200-mile economic zone as well as in international waters.

- There are about 20-25,000 registered commercial fishing vessels on Canada's Atlantic coast. The vast majority of the vessels are small boats; about 4,000 are over 10 meters in length of which only about 200 have capability to fish in the NAFO Regulatory Area (NRA).

- Over recent years, the Department of Fisheries and Oceans has undergone a number of budget cuts as the Government of Canada attempts to deal with fiscal responsibilities.

- Budget reductions have meant that we have had to investigate all methods to improve the efficiency and effectiveness of our enforcement programs.

- Canada has been interested in the potential of satellite vessel monitoring since the early 1980s. It has been believed that such systems may hold potential to improve our surveillance and enforcement capability.

- We originally investigated the idea of developing our own system but, determined this would be very expensive. A decision was made to wait for private industry to develop the technology.

- Canada continued to monitor technology improvements and in recent years, it has reached the point where operational systems are available "off the shelf".

- Canada uses a mix of fishery enforcement tools including: extensive aircraft patrols; patrol vessels; on-board fishery observers; Fishery Officer boardings/inspection; onshore dockside monitoring of landings.

- It is our belief that satellite monitoring will not replace conventional enforcement methods; however, they may be made more efficient and effective. This could help compensate for shrinking resource levels.

- Cost savings may be realized through more efficient deployment of enforcement platforms, e.g., aircraft and vessel patrols. For example, satellite monitoring may identify problem areas to be checked on a priority basis.

- Depending on the sophistication of the system employed, certain offences may be more easily detected e.g., area restrictions, fishing time restrictions, misreporting of catch, misreporting of area fished.

- However, satellite monitoring will have very little effectiveness in detecting other very serious offences occurring at sea including: dumping/discarding; highgrading; illegal gear (liners, small mesh); taking of prohibited species; taking fish below legal size limits; etc.

- It is recognized that the potential benefits from satellite monitoring will largely depend on well thought out, effective data management. This is a key factor, otherwise, data will not be very useful. Data management must package and present the data to convert it to useable information.

- Canada has not made a commitment to satellite monitoring on an operational basis for domestic fisheries. It is felt that further information, experience and testing is required before a decision can be taken.

- Potential benefits must be clearly defined and quantified. At this point, it is not clear whether satellite monitoring will provide sufficient benefits to warrant implementation on an operational basis.

- Canada has limited "hands on" experience with such systems; however, we are satisfied that the technology works and is not a limitation.

- We were recently involved in a small pilot test program to evaluate satellite monitoring on Canada's Atlantic coast and the NRA. This program helped demonstrate and confirm that these systems do in fact work.

- As well, the pilot program helped define specific requirements which we feel will be required for satellite monitoring.

- Canada has not decided on any particular system as we wish to keep options open. However, at this time, we feel it would be most beneficial to investigate systems providing a broad range of features. This would likely prove more attractive and beneficial to private industry thereby increasing acceptance.

- We look forward to the NAFO pilot satellite project. We feel this will be a valuable opportunity to increase our experience and knowledge of what the systems offer in terms of enforcement capability. This will undoubtedly help to further evaluate how the systems can be integrated with our other programs.

- At this point, our experience and understanding of satellite monitoring has indicated that the following important requirements should be adopted by Canada for the NAFO Pilot:

    - the system should be a complete "turnkey" service from a qualified service provider;
    - the system must have continuous and redundant satellite coverage in all NAFO areas;
    - the position accuracy should be equal or greater than that of GPS;

- there must be two-way data communications fully addressable to one or multiple destinations;
- the system must be capable of segregating official and private/commercial data;
- security and integrity of data must be assured;
- the system must have integrated GPS;
- environmental operating conditions must be proven and ensured;
- telex, e-mail and facsimile gateways for ship-to-shore and shore-to-ship traffic.

Various other requirements have also been identified.

- Should Canada proceed with satellite monitoring on an operational basis at some future time, we feel that there will be a need for strong regulatory measures to ensure the systems are kept operational.

- In summary, Canada intends to take advantage of every opportunity new technology offers; however, we must ensure there are demonstrated benefits before moving ahead.

- It is hoped that new techniques and technology can help increase enforcement effectiveness and reduce costs in the future.

Annex 7. Report by the Delegate of the European Union

EU PROGRAMMES ON SATELLITE MONITORING

INTRODUCTION

The European Community

The European Community comprises 15 Member States (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom of Great Britain and Northern Ireland). There are 11 official languages in the Community.

Only two Member States, Luxembourg and Austria, do not have a fishing fleet.
The Community is managed by a number of common institutions of which the most important are:

- a democratically elected Parliament
- a Council representing the Member States and composed of government ministers
- a Commission which has the power to initiate, and to ensure compliance with, Community legislation (executive body)
- a Court of Justice which ensures that Community law is observed.

The Community is a member of the United Nations Food and Agriculture Organisation (FAO). The Community participates as a contracting party in the work of various international fisheries organisations: NAFO, NEAFC, NASCO, CCAMLR, IBSFC, ... In addition it is an observer at ICCAT, ICES, IWC, OECD, ...

The Common Fisheries Policy (CFP)

The CFP is one of the Community's integrated common policies, and involves a significant transfer of authority from the Member States to the Community.

The CFP is a typical case of European integration and concerns all aspects of Community activities from external relations, including fisheries agreements with third countries, to regional policy.

The main areas of the CFP are:

- marketing and trade measures
- structural policies
- conservation of fish stocks.

Conservation policy relating to EU fishing areas and resources

The EC's conservation policy has been designed to provide the maximum protection for stocks and is based on scientific information provided by **STECF**, the Community's Scientific, Technical and Economic Committee for Fisheries, by **ICES**, the International Council for the Exploration of the Sea, by the **NAFO** Scientific Council, ...

The main instruments of the EC's conservation policy are:

- the technical measures for the protection of juvenile fish,
- the exploitation rates.

The technical measures cover essentially the mesh size of fishing nets and the minimum size of fish landed. They also include limits on different fishing seasons, areas where certain types of fishing are banned and restrictions on fishing gear.

The exploitation rates are based on the concept of TACs, total allowable catches. On the basis of scientific advice, the European Commission presents proposals for TACs for the various stocks. The final decision on the level of catches that can be made for the following year is taken by the Council of Ministers (Fisheries Council) each December. TACs are divided into national quotas according to agreed allocation keys. When a TAC or a quota has been exhausted, the fishery must be closed, a policy endorsed by the European Court of Justice.

The Council has recently adopted a Regulation on the management of the fishing effort relating to certain Community fishing areas and resources. This Regulation establishes, with effect from 1 January 1996, the criteria and procedures for the introduction of a system for the management of fishing effort in certain ICES divisions.

Conservation measures apply in management units (NEAFC regions, ICES divisions, etc.) across the Exclusive Economic Zones of the individual Member States as well as in management units in international waters (NAFO Regulatory Area, CCAMLR, ...).

Monitoring, control and surveillance of fishing activities

Fishing activities must be monitored to ensure that the CFP is respected.

Notwithstanding that the rules are adopted at Community level, the main responsibility for ensuring that the rules are applied lies with the competent authorities of the Member States. Each Member state must police its own waters and control the landings on its territory.

It should be taken into account that the MCS resources (manpower, patrol vessels, aircraft, ...), as well as the legal means and the sanctions, differ from one Member State to another and that this may entail differences in the way fishing activities are monitored and in the way infringements are prosecuted. Sanctions, decided by national Court, may range from fines, confiscation of gear and catch, or even of the fishing vessel, to temporary suspension or permanent withdrawal of fishing licences.

The organization of the MCS services differs indeed from one Member State to another. Some have inspection services dedicated specifically to fisheries activities whilst others call on several different government departments which also perform functions other than fisheries surveillance.

The Community is helping the Member States by providing financial aid to strengthen their control measures. Under this scheme, Member States have mainly applied for a financial contribution to the purchase of fisheries protection vessels and aircraft. The Commission has prepared a proposal to make it possible, as from 1996 onwards, to provide financial aid for community-wide data communication networks for fisheries control as well as for the training and exchange of officials involved in enforcement.

The European Commission has its own team of fisheries inspectors, which increased from 7 in 1983 to 22 today. Their task is to inspect the national MCS services, but not the fishermen themselves. They are "the eyes and the ears" of the European Commission.

In 1993, a decision was taken to extend fisheries control to the port-harvest sector in order to allow for cross-checks between the details entered into the logbooks by the fishermen on the one hand and the landing declarations and the various sales notes issued on the other hand. To that end the information will have to be entered on computerised data bases.

The European Union is indeed in favour of the use of modern technologies for MCS tasks. This is further illustrated by its interest in the potential of satellite monitoring.

EU PROGRAMMES FOR SATELLITE MONITORING

EU Pilot projects for satellite monitoring (1994-1995)

Member States are at present carrying out pilot projects for satellite monitoring, involving up to 350 vessels throughout the Community. Argos, Euteltracs and Inmarsat are being used to track their movements. Several Member States are testing more than one of these systems. The United Kingdom is the only Member state that conducts also a trial with automatic position recorders (APR). The pilot projects are funded with ECU 10 million from the Community budget. The results of the exercise will provide the input for a future Council Regulation on the application of satellite monitoring.

The way in which the pilot projects are set up is also an illustration of the co-operation between Member States.

Each Member State operates through a Fisheries Monitoring Centre (FMC), which must be able to determine the position of its fishing vessels included in the pilot project, wherever they operate. The data from each vessel are always 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 will re-transmit the position data to the relevant **Coastal State** FMC. By this procedure each Member State receives position information relating to all vessels included in the pilots and located in waters under its jurisdiction.

Member states have started to exchange position reports among themselves on a test basis, although the implementation of the procedures took more time than expected. The competent authorities are using the data exchange format proposed by Denmark as well as the X.25 as data exchange protocol. The data exchange between Member states is a very important part of the pilot projects. A failure to exchange data between flag states and coastal states on a regular basis could undermine the credibility of the decentralised system architecture preferred by most Member states.

The pilot projects are coordinated by the European Commission. The Commission regularly organises meetings of the **Expert Group Fisheries Control** with the responsible officials from the Member states in order to monitor the progress of the projects. The Commission is also keeping up-to-date common information such as the list of contact persons, the list of participating vessels and the data communication addresses. Finally, the Commission is administering the Community financial contribution (approval of project proposals, payment of advances and reimbursement of expenditure incurred by the Member states).

NAFO Pilot Project for Satellite Tracking (1996-1997)

During the 17th Annual Meeting, in September 1995, NAFO Contracting Parties agreed to implement during the period from 01 January 1996 to 31 December 1997 a Pilot Project to provide for satellite tracking devices on 35% of their respective vessels fishing in the Regulatory Area.

As a Contracting Party, the European Community participates in this pilot project.

DG XIV trials (since 1992)

The Directorate General for Fisheries (DG XIV) of the European Commission has also been conducting its proper trials since 1992. DG XIV is using its inspection vessel operating in the NAFO Regulatory Area for this purpose. During 1992-1993 several systems have been tested on board the ERNST HAËCKEL: Argos, Euteltracs, Monicap and a GPS/Inmarsat terminal (Capsat from Thrane&Thrane). Monitoring software was installed at DG XIV's offices in Brussels, Belgium. During 1994, the KOMMANDOR AMALIE was equipped with Argos and GPS-Argos. The Prodat system was tested as well. During 1995, the tests with GPS-ARGOS continue. Further trials will be conducted as necessary.

* * *

For more information on satellite monitoring in the European Community please contact:

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Field name	Field code	Number of characters	Remarks	Mandatory/Optional
Start record	SR			Mandatory
From	FR	3	DNK,DEU,....	Mandatory
Addressee	AD	3	DNK,DEU,....	Optional
Internal fleet register no.	IR	12		Mandatory
External identification no.	XR	12		Mandatory
Vessel name	NA	34		Optional
Flag state	FS	3	DNK,DEU,....(see note 1)	Optional
Time (UTC)	TI	6	HHMMSS	Mandatory
Date	DA	6	YYMMDD	Mandatory
Latitude	LA	6	eg: 56124N = 56°12,4N	Mandatory
Longitude	LO	7	eg: 012346E = 012°34,6E	Mandatory
Speed	SP	3	eg: 105 = 10,5 knots	Optional
Course	CO	3	000 - 359	Optional
End record	ER			Mandatory
Trailer Start	TS	Max. 80 char.		Optional
Trailer end	TE			Mandatory if TS is used

NOTE. If flag state is omitted, then it is assumed that the code in the FROM field is the flag state.

Examples:

ex. no. 1:

//SR//FR/DNK//AD/DEU//IR/DNK000004962//XR/FN112//NA/ANJA//FS/DNK//TI/235959//DA/930314//LA/563412N//LO/0123512E//SP/08//CO/345//ER//
//SR//FR/DNK//AD/DEU//IR/DNK000014847//XR/HG214//NA/ASTORIA//FS/DNK//TI/235959//DA/930314//LA/561234N//LO/0113412E//SP/10//CO/180//ER//
//TS/THIS IS AN ADMINISTRATIVE COMMENT, EG. TRANSMISSION DELAYED DUE TO SYSTEM ERROR//TE//

ex. no. 2:

//SR//FR/DNK//IR/DNK000001234//XR/FN112//TI/123423//DA/930412//LA/56124N//LO/012346E//ER//

ex. no. 3:

//SR//LA/56123N//FR/DNK//LO/012345E//TI/123456//IR/DNK000001234//DA/931225//XR/FN112//ER//

Characters are only to be sent in uppercase

character-set is ISO 6 (ASCII US-ENGLISH)

danish Æ Ø Å is translaged into [\ ]

Spanish extension of the Danish format

Field name	Field code	Number of characters	Remarks	Mandatory/Optional
Start record	SR			Mandatory
From	FR	3	DNK,DEU,....	Mandatory
Addressee	AD	3	DNK,DEU,....	Optional
Internal fleet register no.	IR	12		Mandatory
External identification no.	XR	12		Mandatory
Vessel name	NA	34		Optional
Flag state	FS	3	DNK,DEU,....	Optional
Time (UTC)	TI	6	HHMMSS	Mandatory
Date	DA	6	YYMMDD	Mandatory
Type of message	TM	Max. 20 char.	(see note 1)	Optional
Activity	AC	Max. 6 char.	(see note 2)	Optional
Latitude	LA	6	eg: 56124N = 56°12,4N	Mandatory
Longitude	LO	7	eg: 012346E = 012°34,6E	Mandatory
Speed	SP	3	eg: 105 = 10,5 knots	Optional
Course	CO	3	000 - 359	Optional
End record	ER			Mandatory
Trailer Start	TS	Max. 80 char.		Optional
Trailer end	TE			Mandatory if TS is used

Note 1. CONTENTS OF THE FIELD "TYPE OF MESSAGE"

	COMMENTS
ROUTINE	(Routine position message).
ENTRY EEZ	
EXIT EEZ	
START FISHING	(The START FISHING button has been pushed).
END FISHING	(The END FISHING button has been pushed).
ENTRY (name of the port)	Ex.: ENTRY ULLAPOOL.
EXIT (name of the port)	Ex.: EXIT CORK.
MOVE (name of ICES subdivision)	Ex.: MOVE 8C.

Note 2. CONTENTS OF THE FIELD "ACTIVITY"

ACTIVE
PASIVE
PORT

EXAMPLES

//SR//FR/ESP//IR/ESP000014962//XR/VI-3-1862//TI/182300//DA/950212//TM/ROUTINE//AC/PASIVE//LA/56124N//LO/012346//ER//

//SR//FR/ESP//IR/ESP000000573//XR/CO-2-2341//TI/202330//DA/950331//TM/START FISHING//AC/ACTIVE//LA/46353N//LO/008237W//ER//

//SR//FR/ESP//IR/ESP000014962//XR/VI-3-1862//TI/033025//DA/950520//TM/MOVE 7J//AC/ACTIVE//LA/51342N//LO/011351W//ER//