NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD

Agenda Item 5.3(b)
For decision

Council

CNL(97)23

Surveillance of Fishing for Salmon in International Waters

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Surveillance of Fishing for Salmon in International Waters

1. Following the Special Meeting of the Council on Fishing for Salmon in International Waters in 1992, the Secretary was asked to call a meeting of the Coastguard/Fishery Protection authorities in the North-East Atlantic to review the options for improvements in surveillance through improved international cooperation. This meeting was held in 1993 and a number of recommendations were formulated at the meeting, including a proposal for a specific salmon-related surveillance project, and these were subsequently endorsed by the Council. It was also agreed that a second meeting be held to review the results of this project and other relevant developments. The Council asked the Secretary to report back on this meeting. In accordance with this decision, a second meeting of Coastguards/Fishery Protection authorities was held on 20 March 1997 and the report of the meeting is attached (Annex 1).

2. At this meeting reports were received on the results of the salmon fishery surveillance carried out in 1995/96. There has been a major change in the area, since the last meeting, because of the enormous growth in fishing for pelagic species such as herring and mackerel. The catches in this fishery are extremely large. If only a minute percentage of the catch was post-smolts, the salmon losses could be highly significant. The meeting also recognised that there are large periods of the year when there is no surveillance, corresponding with the period when salmon fishing is known to have occurred in the past, and the area covered by surveillance is not complete.

3. In view of the limitations in the surveillance, NASCO had approached the UK Defence Evaluation and Research Agency (DERA), who are now taking on commissioned work, to assess the usefulness of radar satellite imagery to the problem of surveillance of fishing for salmon in international waters. Since the directed salmon fishery takes place over very large geographical areas and at times of the year when there may be 24 hours of darkness and heavy cloud, radar may offer a practical approach to improving the surveillance cover. While satellite systems are now beginning to be used for detection of illegal dumping at sea and oil slick detection, and early results suggest a high level of vessel detection success (>90%), the vessels used for fishing for salmon in international waters are small and sea conditions may be extreme. DERA felt there was a need to conduct a pilot project to assess the utility of the technology to this particular situation. A brief summary of the DERA proposal is attached as Annex 2.

4. If the experiment, which might cost about £10,000, were successful it would clarify whether this system could be used to alert us to the presence of vessels in international waters. The Council is asked to decide whether it wishes to commission the experiment, to await the result of Norwegian evaluations which may take place over the next two years, but which are unlikely to look specifically at the utility of satellites in relation to surveillance of fishing for salmon in international waters, or to take other action.

Secretary
Edinburgh
14 April 1997

ANNEX 1

Report of the Second International Meeting on Surveillance of Fishing for Salmon in International Waters Fishmongers Hall, London, 20 March 1997

1. Chairman's Introduction and Welcome

1.1 The Chairman, Dr Malcolm Windsor, opened the meeting and welcomed the delegates to London. He referred to the progress that had been made at the first meeting in 1993 in reviewing the sources of available information and in developing recommendations for strengthening the surveillance. NASCO welcomed the cooperation with the coastguard/fishery protection authorities since successful diplomatic actions depended on reliable surveillance information. While there was evidence that NASCO's actions have resulted in a reduction in the problem, to the extent that the last sighting was of a single vessel in February 1994, the Atlantic salmon resource is small and at present abundance is low. Even one vessel could undermine the strict conservation measures that have been introduced nationally and internationally.

1.2 A list of participants is given in Appendix 1. Apologies were received from the Icelandic Coastguard representative, Captain Helgi Hallvardsson, who was unable to attend the meeting because of unforeseen circumstances. The agenda for the meeting is contained in Appendix 2.

2. Overview of the Problem and NASCO's Actions

2.1 A background paper was presented which described the problem of fishing for salmon in international waters since it was first reported to NASCO in 1989/90, and which reviewed the existing sources of information and summarised the recommendations from the first meeting.

2.2 All of the reported sightings of fishing activity have been by airborne surveillance flights by the Norwegian and Icelandic coastguards. In addition, valuable information has been obtained from inspection of vessels at sea and during port calls when more detailed information including details of catches has been obtained. Salmon fishing activity has been observed between approximately 66°30'N - 72°20'N and 6°30'E - 5° 40'W. All of the sightings were in the months January - June although it is known that fishing has also occurred in the period October - December. No sightings have been obtained since February 1994 but the need for vigilance has been stressed since there appears to be a market for wild salmon on the continent with buyers prepared to pay a premium price. It was recognised that there are considerable periods of the year, coinciding with the period of the fishery, when there are no surveillance flights and that the fishery could be conducted over very large geographical areas making detection during surveillance flights difficult. It was also recognised that patrol ships do not usually operate in international waters but concentrate on the main fishing areas within EEZ's which may not coincide with the routes to and from international waters. There

have been no changes to the sources of information available to assess the scale of the problem since the first meeting.

2.3 In the light of the limitations in the existing surveillance information, and as it had been agreed that many of the sightings had been obtained by chance, a number of measures were agreed at the first meeting to improve the surveillance operation.

3. Reports by the Parties on the Salmon Fishery Surveillance Project

3.1 At the 1993 meeting it had been agreed that a cooperative salmon fishery surveillance project should be undertaken in order to better assess the scale of the problem. It was anticipated that the primary source of information would be the Icelandic and Norwegian coastguards' airborne surveys. This project had originally been scheduled for 1994/1995 but because of other commitments, which were not anticipated, it was not possible for all coastguard authorities to contribute fully to this project. Following consultations it had been agreed that the project be re-scheduled for 1995/96 (week 45 in November 1995, week 6 in February 1996 and week 18 in April/May 1996). It was recognised that the exact timing of the surveys would be dependent on the weather. The surveys would attempt to cover the entire area of international waters.

3.2 In accordance with the project plan three flights over international waters had been undertaken by the Icelandic coastguard on the agreed dates and additional surveillance flights had been conducted on 7/5/96, 16/5/96 and 12/8/96. While there had been no evidence of directed salmon fishing in international waters, vessels fishing for capelin and herring had been located in the area. The Norwegian coastguard had made 21 flights over the area of international waters during 1996. The number of flights had been increased in response to the heavy fishing activity for pelagic species in the area. In addition to the airborne surveillance, a Norwegian coastguard ship had patrolled the international waters close to the Norwegian EEZ. No new information was available from the Faroe Islands or from Scotland.

3.3 Concern was expressed about the possible by-catch of salmon in fisheries for pelagic species such as mackerel, herring and capelin. Evidence presented to NASCO in 1992 indicated that by-catches of salmon in a pelagic trawl fishery for mackerel and horse mackerel in international waters close to the Norwegian EEZ were as high as 0.3 tonnes in a single haul. Furthermore, one of NASCO's Grand Prize winners in the Tag Return Incentive Scheme had been a tag return from a herring processing plant. The catches of Atlanto Scandian herring and of capelin (the latter being fished for mainly within the Icelandic EEZ and the Jan Mayen fishery zone) are now very large (thought to be in excess of 1 million tonnes for each species) while the catch of mackerel is thought to be of the order of 100,000-200,000 tonnes. It was thought that post-smolts could go undetected in large hauls particularly if the fish was ultimately destined for industrial purposes. While most of the herring landed is now used for human consumption, capelin is used for industrial purposes. Given the scale of the fishery and the recent evidence that post-smolts tend to form shoals from particular rivers, even a small number of salmon per haul could be damaging to the stocks. Experience from scientific research fishing for Atlantic salmon using surface trawls indicated that to be successful the gear must be fished right on the surface. This research also indicated that when fished at night the nets caught large quantities of

mackerel but no salmon. It was thought that most of the catch of herring and mackerel in international waters was taken using purse-seine nets during the summer months (May - September) and that these might result in a by-catch of salmon. It was recognised that more information was needed on this issue. While the pelagic fisheries are probably not the cause of the low abundance of salmon stocks their expansion at the present time could have implications for the recovery of salmon stocks if there is a significant by-catch problem.

3.4 It was recognised that the situation had changed since the last meeting of the Group in 1993. There is now a large-scale pelagic fishery in international waters involving many vessels. While this might result in improved surveillance of the area, there is concern about the by-catch of salmon in the fishery. It was agreed that more information was needed on this fishery and in this respect NASCO had requested ICES to evaluate the potential by-catch of post-smolts in pelagic fisheries. It was also recommended that the question of by-catch of salmon should be taken up with fishermen's organizations and processing plants in an attempt to obtain more detailed information on the scale of the problem. The need for continued vigilance in relation to directed fishing for salmon in international waters was recognised.

4. Use of Information from Military Sources

4.1 At the 1993 meeting the Norwegian coastguard, which is linked to the military, agreed to explore the possibilities of obtaining surveillance information from NATO AWACS aircraft which have extremely advanced radar systems capable of covering large areas.

4.2 AWACS would be capable of detecting the presence of vessels and could probably provide information on size and speed of vessels. The information could be made available in real time to the coastguard authority. While AWACS information would not be able to provide the detailed information required for diplomatic action it could serve as a warning of the presence of vessels in the area which the coastguards could then investigate using more traditional surveillance methods. It was agreed that AWACS planes might therefore provide useful information in support of the coastguards' airborne surveillance operations although this information would probably only be available on an occasional basis.

5. Use of Information from Ports

5.1 At the 1993 meeting the importance of good information from ports had been stressed and the Icelandic and Norwegian coastguards had agreed to see if their port records were held in such a way as to allow searching for certain vessel names and call signs. It had also been agreed that an effort should be made to inform port authorities, even in small ports, of the problem. Following the 1993 meeting a note concerning the problem of fishing for salmon in international waters had been agreed by correspondence and following translation this had been distributed to coastguard/fishery protection authorities for dissemination to the relevant port authorities in each country.

5.2 The Norwegian coastguard reported on the coastal surveillance system in operation in Norwegian inner coastal waters. Under this system all foreign vessels must report to

the naval authorities 24 hours in advance of their arrival. This information is computerised and it is possible to search the stored information by vessel name. Vessels sailing through Norwegian inner territorial waters, other than during innocent passage, are also required to register with the authorities. It was agreed that this system might provide valuable information on the activities of vessels known to have fished for salmon in international waters in the past. However, the salmon vessels travelling from or returning to the Baltic from international waters would not have needed to register unless they were within inner waters.

6. Use of Information from Satellites

6.1 At the 1993 meeting it had been agreed that advances in satellite technology might have a significant impact on the surveillance problem and that these should be kept under close review. Satellites using synthetic aperture radar are able to detect vessels during hours of darkness and through cloud cover although fine resolution would be needed to enable vessels of 30m in length to be detected. The salmon fishing takes place during winter months when there may be 24 hours darkness and in areas prone to heavy cloud cover so radar is the only available technology likely to work.

6.2 In 1995 a new Canadian commercial satellite, RADARSAT, was launched and this and the European Space Agency's ERS1 and ERS2 satellites have synthetic aperture radar on board. Both are beginning to be used for vessel detection in connection with illegal dumping at sea, oil slick detection and other applications. Preliminary verification or 'truthing' of satellite information with coastguard information from the English Channel suggests that 90% of the vessels identified by the coastal radar were detected by the satellite radar system.

6.3 In view of the advances in satellite based radar systems for vessel detection NASCO had approached the Defence Evaluation Research Agency (DERA) of the UK Ministry of Defence regarding the application of satellite surveillance in detecting vessels in international waters. Such a system, if capable of detecting small vessels at reasonable cost, could serve as a first warning of the presence of vessels in the area thereby reducing the need for frequent airborne surveys. In the event that a vessel was detected the coastguard authorities could be alerted so that the detailed information needed for diplomatic purposes could be obtained. DERA had responded with a proposal to undertake a short pilot investigation into the use of RADARSAT radar imagery for surveillance of the area concerned. This satellite has a number of advantages over the ERS systems which mean that it is likely to be more cost effective in large-scale surveillance. The proposal involved three phases as follows:

i) an archive search of RADARSAT data to see if coincident imagery exists for past airborne surveillance flights. On the basis of this information the decision would be taken as to whether or not real time data should be acquired.

ii) liaise through NASCO with coastguard authorities to plan a number of coincident RADARSAT scenes over the target areas.

iii) carry out ship detection techniques on the RADARSAT imagery obtained either from archive or from planned acquisitions.

6.4 The view was expressed by the Scottish delegates that satellite reconnaissance might be a rather expensive means of obtaining sighting information which would still need to be validated. They would favour efforts to obtain information from the home ports of vessels known to have been involved in fishing for salmon in international waters. While satellite information is expensive it has the advantage of covering the whole area and could be used to reduce the number of airborne surveillance operations. The Norwegian coastguard indicated that they intended to proceed with an evaluation of satellite surveillance of ships. Radar satellite detection would be a method of focussing inspection flights into areas where there had been a sighting of a vessel or vessels by the satellite. The utility of such systems in detection of salmon fishing vessels in international waters should be re-examined at the next meeting of NASCO and the coastguard/fishery protection agencies.

6.5 The possible use of transponders in relation to fishing for salmon in international waters was discussed. Within EU waters fishing vessels greater than 24m in length fishing for certain species in certain areas will be required to have a transponder fitted from 1998. These transponders allow a vessel to be located accurately by satellite. It was recognised that vessels fishing for salmon in international waters are unlikely to have a transponder fitted but if it was a requirement of the flag state concerned the transponder could easily be deactivated so as to avoid detection. The attention of the group was also drawn to the Global Marine Distress Safety System under which vessels are required to notify their position. While the group recognised that not all countries may be party to this system, and there were doubts as to whether the information could be used in relation to the problem of fishing for salmon in international waters, it was agreed that more information should be obtained on the system from the International Maritime Organization.

7. General Publicity and Communication of Information

7.1 At the 1993 meeting it was agreed that efforts should be made to improve local awareness of the problem of fishing for salmon in international waters A press release had been agreed by correspondence following the meeting and after translation this had been sent to the coastguard/fishery protection authorities for distribution to the press and radio networks in each country. It had also been agreed that NASCO should serve as the centre for exchange of information and guidelines were agreed by correspondence which were circulated to all coastguard/fishery protection authorities.

7.2 It was agreed that no further measures were necessary to increase general publicity and communication of information at the present time. However, where a coastguard/fishery protection authority believes that there is a need to bring the issue to the attention of the general public in future the existing press release could, after any necessary amendment, be re-issued.

8. Options for Improvements in Longer-term Surveillance through Cooperation

8.1 No other recommendations for improved surveillance were developed.

9. Any Other Business

9.1 There was no other business but it was agreed that it was important to continue to exchange information and review surveillance options in the light of developments in technology. It was agreed that there should be a further meeting of the group, when further developments justified it, probably in 2 to 3 years time.

Appendix 1

List of Participants

Commodore Klepsvik	Inspector, Norwegian Coastguard, HQ Defence Command, Oslo Mil/Husby, N-0016 Oslo 1, Norway
Mr Martin Kruse	Vaktar Og Bjargingartanastan, Faroese Inspection and Rescue Service, Torshavn FR 100, Faroe Islands
Mr Arni Isaksson	Directorate of Freshwater Fisheries, Vagnhofdi 7, 112 Reykjavik, Iceland
Mr David Dunkley	Inspector of Salmon Fisheries, SOAEFD, Pentland House, 47 Robb's Loan, Edinburgh, EH14 1TY
Mr Paul du Vivier	Scottish Fisheries Protection Agency, Pentland House, 47 Robb's Loan, Edinburg, EH14 1TY
Dr Malcolm Windsor	NASCO, 11 Rutland Square, Edinburgh, EH1 2AS
Dr Peter Hutchinson	NASCO, 11 Rutland Square, Edinburgh, EH1 2AS

Appendix 2

International Meeting On Surveillance

Of Fishing For Salmon In International Waters

AGENDA

1. Chairman's Introduction and Welcome
2. Overview of the Problem and NASCO's Actions
3. Reports by the Parties on the Salmon Fishery Surveillance Project
4. Use of Information from Military Sources
5. Use of Information from Ports
6. Use of Information from Satellites
7. General Publicity and Communication of Information
8. Options for Improvements in Longer-term Surveillance through Cooperation
9. Any Other Business

1 Management Summary

1.1 Introduction

The Defence Research Agency (DERA) is pleased to respond to the invitation from NASCO to submit a proposal to undertake a short investigation into the use of RADARSAT satellite radar imagery for the surveillance of small fishing vessels operating in the North Atlantic Salmon Fisheries.

1.2 Requirement

For long periods of the year there is no routine surveillance of the North Atlantic Salmon fishing grounds carried out by the more traditional techniques of aircraft surveillance. This is typically due to a number of factors such as lack of day light flying hours, inclement weather conditions and cost of aircraft surveillance operations.

Improved methods of routine long term surveillance over these areas are required to provide reliable and cost effective fisheries policing information.

The DERA proposal describes a short programme of work to assess the use of RADARSAT Synthetic Aperture Radar (SAR) imagery for the detection of small fishing vessels operating in the North Atlantic Salmon fisheries.

1.3 Deliverables

The deliverables on completion of the contract will be:

1. 2 RADARSAT images in electronic format on Exabyte tape media as purchased by NASCO within this project.
2. Hardcopy imagery from all RADARSAT images assessed
3. Final report

1.4 DERA Capability (Expertise)

The Command and Information Systems (CIS) Sector of DERA is fully certified to operate under BS EN ISO 9001. The DERA proposal is supplied with the commitment to conduct the work to a high quality standard, on time, and to cost. This will be ensured by employing an experienced project team. The project team will be formed from experienced staff of the Space Department, part of CIS Sector

1.5 Price and validity

The firm fixed price element for all of the work described in this proposal is £10,040 excluding value added tax. Travel & Subsistence will be charged as a Limit of Liability up to £1500.

This offer is valid until 31st May 1997.

Further details are included in the commercial proposal, in Section 5.

1.6 Company Furnished Items

To assist in the availability of coincident satellite passes a further RADARSAT ScanSAR image will be procured for this programme as a DERA funded item.

RADARSAT International have been approached by DERA and have agreed to provide several other scenes for use in support of this project.

Hardcopy of all the imagery will be provided where appropriate and will funded by DERA.

1.7 Contact Points

Bid Manager.....	Rob Freeman	Tel: 01252 392288	Fax :01252 396310
Contracts Manager	Richard Hill	Tel: 01684 896363	Fax: 01684 896310
Project Manager	Peter Bird	Tel: 01252 393425	Fax: 01252 396310