1. INTRODUCTION

Iceland’s geographical location, nature and topography have meant that, from its earliest days, the nation has been dependent to a considerable extent upon gathering and utilizing the riches of the sea (Figure 1). The relative shortage of fertile and suitable land for agriculture meant that Icelanders had to rely on marine resources for valuable export commodities, and this became the foundation for an economic renaissance and development in Icelandic society during the nineteenth and twentieth centuries. Around 1800, Iceland was one of Europe’s poorest countries, but by 2000 it had become one of the world’s wealthiest nations, largely thanks to fishing and abundant resources in Icelandic waters. Hence, the history of fishing and seafaring forms a central part of Iceland’s culture and heritage.¹

Figure 1: Map of Iceland and the North Atlantic Ocean

The financial crisis in 2008 nearly resulted in the Icelandic economy going bankrupt and the situation continues to be serious at present (2011), but there is a belief among fishers that it will again be the fisheries that will save the economy. Iceland has always been fiercely independent but after the collapse of its banks, and in the face of a global recession, Iceland has applied for European Union (EU) membership. However, fisheries is expected to be a major stumbling block in the negotiations. Icelandic fishers are unlikely to relinquish control of their fishing grounds without a fight. Public

¹ Jón Þ. Þó, University of Akureyri (www.fisheries.is).
opinion is split and the question of EU membership will eventually have to be settled by a referendum.2

**Box 1: The Cod Wars**

For centuries, foreign fishing vessels operated off the shores of Iceland. This caused no problems as long as these vessels were small and rather primitive fishing gear was used, but with the advent of steamships and trawlers at the beginning of the twentieth century, overfishing became a serious threat. Catches were almost doubling every decade in the early 1990s (see figure). On becoming independent in 1918, Iceland started to establish its own coast guard operations (formally on 1 July 1926) and attempted to control this foreign activity. The first vessel, *Thor*, was acquired in 1922 and had a displacement of 200 tonnes. It was equipped with a 47 mm cannon in 1924 because captains of foreign trawlers were unwilling to take orders from an unarmed patrol vessel.

**Catches by foreign vessels in Icelandic waters since the 1900s**

![Catches by foreign vessels in Icelandic waters since the 1900s](source)

*Source: Ministry of Fisheries and Agriculture ([www.fisheries.is](http://www.fisheries.is)).*

The fishing grounds off Iceland were given a much-needed respite during the two World Wars, but when peace was restored after the Second World War, foreign fishing began on an even greater scale than before, using larger vessels and increasingly sophisticated equipment (see figures below). To counter this, Iceland extended its fishing zone to four nautical miles in 1952 from a baseline drawn across the outermost points of promontories and islands, thereby protecting large bays from this threat. The fishing zone was subsequently extended to 12 miles in 1958, 50 miles in 1972 and 200 miles in 1975, increasing its area from 25 000 km² before 1952 to 758 000 km² in 1975.

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The Icelandic Coast Guard (ICG) was put to the test on many occasions during these successive extensions of the fishing zone. Strong protests were made by a number of nations, and one of them, the United Kingdom, sent warships to Iceland’s fishing grounds in 1958, 1972 and 1975. This made it difficult for the ICG to enforce its fisheries zones and, in the attempts to do so, ICG vessels were frequently involved in hazardous manoeuvres and collisions with both trawlers and frigates. Nonetheless, the “Cod Wars” eventually came to an end with no loss of life.

This fierce independence, particularly in fisheries-related matters, is associated with the arduous campaign that lasted three-quarters of a century to win full jurisdiction over Icelandic fishing grounds. Iceland championed the international cause of coastal States to manage fisheries within their waters and prevent overfishing. Important milestones on that path were the extension of Iceland’s economic zone to 12 miles in 1958 (being the first such initiative in the North Atlantic) and further to 50 miles in 1972. The 200 mile Exclusive Economic Zone (EEZ) was fully effective from May 1976. All the extensions of its fishing zone were opposed by distant-water fishing nations operating in the waters off Iceland, and these events are still referred to as the “Cod Wars” (Box 1). However, this was only one of many disputes between coastal States and fishing States, which was one of the issues to be resolved in the process leading up to the adoption of the United Nations Convention on the Law of the Sea (UNCLOS) (1982).3

Iceland accounts for a surprising 1.8 percent of global catches (FAO global catch statistics, 2005), which is comparable with much larger countries. Annual catches by Icelandic vessels exceeded 2 million tonnes in the late 1990s and early 2000s, falling to about 1.4 million tonnes in 2007.4 Figure 2 shows that a large part of the variability observed in catches is due to the size of capelin catches and other pelagic resources (i.e. blue whiting and Atlanto-Scandian herring).5

**Figure 2: Catches by Icelandic vessels in the period 1905–2007, showing when Iceland extended its fisheries zone**

Source: Ministry of Fisheries and Agriculture.

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4 The statistics provided in the text are given in “Icelandic Fisheries in Figures: 2008”, published by the Ministry of Fisheries and Agriculture, Iceland (www.fisheries.is).
5 Fishing and fish processing contributed about 7 percent of Iceland’s gross domestic product in 2007.
In 2007, the Icelandic fishing fleet totalled 1,642 vessels, including 84 trawlers. This is a relatively small size for a fleet when considering total catches, which shows how efficient Icelandic fisheries are. This efficiency has been achieved by innovation in management, fishing and fish processing through equipment design and product development. A technological development in recent years has been the increasing size of pelagic trawls and, with increasing engine power, the ability to catch pelagic fish at greater depths than previously possible (see figure in Box 2).

Not all of Iceland’s catches are taken inside the Icelandic EEZ. Iceland participates in a framework of fisheries agreements in the North Atlantic, which typically gives reciprocal access to each other’s fishing grounds. This involves Iceland, Faroe Islands, Greenland, Norway, the Russian Federation and the EU, as well as fishing activity in international waters under the management of regional fisheries management organizations (RFMOs, see Box 2). About 15 percent of catches by Icelandic vessels are taken outside the Icelandic EEZ.

Box 2: Icelandic fisheries relations in the North Atlantic

Icelandic vessels operate over a wide area in the North Atlantic outside their own exclusive economic zone (EEZ). This includes: fishing for cod in the Barents Sea; capelin in the Jan Mayen area and off east Greenland; mackerel and herring in Faroese and international waters; and redfish and northern shrimp in international waters. When fishing for stocks in the EEZ of another country, this is done in the context of bilateral fishing agreements. Many of these fish stocks (i.e. Atlanto-Scandian herring, blue whiting, mackerel and capelin) are straddling stocks that are managed through coastal State agreements, and their implementation by the North East Atlantic Fisheries Commission (NEAFC) in its regulatory area.

There is also an Icelandic fishery for shrimp in the Flemish Cap, which is managed by the Northwest Atlantic Fisheries Organization (NAFO). In some cases, such as redfish and Greenland halibut, there is still a need for agreement on allocation between fishing nations in order to secure their sustainable harvest.

**Brimnes RE, one of the most modern trawlers operating in Icelandic fisheries, capable of hauling three trawls simultaneously**

6 The number of fishers is estimated to be about 5,000 by the Directorate of Fisheries. On average, an Icelandic fisher catches 210 tonnes of fish per year (www.fisheries.is).
Considering Iceland’s strategic location as well as its role and responsibilities in the North Atlantic, the requirement for effective vessel monitoring both in national and international waters is evident in order to carry out fisheries control and enforcement as well as other functions related to safety at sea and security.

For many years, FAO has been assisting national fisheries administrations in addressing the issues they confront in managing and developing fisheries. This includes fisheries monitoring, control and surveillance (MCS) at the policy, planning and operational levels. Vessel monitoring systems (VMSs) are considered to be a powerful tool as part of implementing effective MCS, and it is estimated that there are now 80 countries that have introduced VMSs to monitor fishing vessel activity. The 2006 Expert Consultation on the use of VMSs came to a number of findings and recommendations that have direct relevance to this study (FAO, 2007).

Although a VMS is a valuable tool, it should form part of a system complementing and strengthening other existing and traditional MCS mechanisms (e.g. landings control, inspections, air and sea surveillance, and data analysis). Thus, a VMS is not a panacea for all MCS challenges nor is it capable of eliminating illegal fishing by itself. Good examples of VMS use show that it can increase the efficiency of MCS operations and make traditional means of surveillance more cost-effective. The 2006 Expert Consultation noted that some fisheries management authorities, including some of those responsible for MCS, were under the mistaken impression that a VMS would eliminate the need for other MCS tools. This is clearly a misconception, and it is also important to point out that a satellite-based VMS may not be a well-suited control mechanism in all fisheries. This has to be evaluated on a case-by-case basis.

Many developing countries are facing problems in implementing a VMS, and it is important to realize that an MCS framework should be in place prior to moving to implementation of a VMS because the efficiency of the VMS would be greatly enhanced. Other alternatives to satellite-based systems should be considered, depending on the characteristics of the fishery. FAO has contributed by providing guidelines, updates on technical aspects and advice at the regional and national levels through a number of initiatives (Flewwelling, 1995; FAO, 1998, 2007; Flewwelling, et al., 2002; Kelleher, 2002; FAO/FishCode, 2005).

The Icelandic case illustrates that integrating various functions, such as vessel monitoring for the purposes of safety at sea, security, customs, immigration as well as fisheries control and enforcement, is a particularly effective solution. It can be applied depending on national structures and priorities in each country. It is important to use complementary data (e.g. fishing licence data) together with VMS information so that its full potential can be realized. An effective VMS does not only gather and store data, it also analyses data in conjunction with other sources in order to assess the activity of a specific vessel or group of vessels.

This study also provides a historical background on how the responsible structure for Iceland’s VMS evolved over time, leading up to the creation of an integrated system serving many different purposes. The system was set up for safety reasons primarily, but various aspects of fisheries MCS are highlighted. In this way, it is hoped to inform an audience of both specialists and non-specialists on the possible benefits of introducing or making use of a VMS in a broader context of maritime MCS.
2. HISTORICAL PERSPECTIVE

Icelandic Coast Guard

The ICG was formally established in 1926 and has a long history of search and rescue (SAR) missions. In the mid-1950s, the ICG opened its own operations centre, which was mainly for coordination and communication purposes, but fisheries monitoring was included later. In 1987, this centre was staffed at all times, as maritime SAR missions became increasingly more important. Consequently, the Ministry of Justice issued a regulation making the ICG responsible for maritime SAR. Next, the ICG started its air operations using fixed-wing aircraft in 1955, followed a decade later by helicopter operations, which now form an essential component of SAR. The permanent functioning of the centre soon showed its advantage, as SAR operations by helicopters could be initiated rapidly and, consequently, many lives have been saved.

Box 3: Vessel monitoring system

The basic function of a vessel monitoring system (VMS) is to provide reports on the location of a vessel at regular intervals, its movements as well as its speed and course. It can thus provide information on whether a fishing vessel is in an area where fishing activities are not allowed or specific measures are in force, which can then be followed up by physical inspections (at sea or on land) to check whether all is in order.

A VMS does not replace other means of monitoring, control and surveillance (MCS) such as patrol vessels, aircraft or land-based inspections, but it makes them more effective by providing the authorities with the location of vessels suspected of having committed infringements, thus enabling inspectors to carry out targeted checks at sea or on land (see accompanying figure). Even when suspected infringements are not immediately detected, irregularities can still be spotted later in the course of cross-checking data.

For a VMS to function, electronic devices (transceivers or transmitters) are installed on board fishing vessels. These devices automatically send data to a satellite system (e.g. every one or two hours), which transmits them to a land-based station, which, in turn, sends them to the appropriate fisheries monitoring centre. The result is that any member State of participating regional fisheries management organizations (RFMOs) can observe the activity of its own vessels in all waters and the activities of vessels from other member States in its own waters. The information received is then cross-checked against a range of other data.

The accompanying figure presents a VMS that is satellite-based, and there are a number of options in terms of satellite communication systems such as Inmarsat, Argos or Euteltracs, which are all different systems but can serve the same purpose as illustrated. Galileo is a global navigation satellite system being set up by the European Union (EU), which is still not operational but is expected to introduce new functions and capabilities in relation to a VMS. Some characteristics of the Galileo system can be used to ensure the integrity of retransmitted position, course and speed data (i.e. making this system more tamperproof) (Gallagher, 2005).
Illustration of a fisheries MCS system

Source: European Commission.

It is important to point out that there are alternatives to satellite-based systems such as those mentioned above. These include land-based systems such as very high frequency (VHF) systems, which are also being used in Iceland for vessel monitoring. Another alternative is the use of mobile communication systems, land-based or satellite-based. These alternatives may provide much cheaper services but are usually associated with some limitations, e.g. range of VHF and mobile telephones.

The ICG started to track its own patrol units via the Inmarsat C system in 1992 and acquired a computerized tracking system (VMS) in 1996 (Box 3). Tracking of fishing vessels for fisheries control purposes started soon afterwards based on requirements of the Northwest Atlantic Fisheries Organization (NAFO) and, later, the North East Atlantic Fisheries Commission (NEAFC). At this time, tracking Icelandic fishing vessels for safety purposes was done by the Life Saving Association on behalf of the Ministry of Transport and Communications. There were thus two independent tracking systems operating in Iceland with the associated complications and costs. Furthermore, the Life Saving Association was responsible for SAR in the area close to the coast, but the ICG had overall responsibility. This situation created all kinds of complications and was finally resolved in 2006 when the Ministry of Justice issued a regulation on the Maritime Traffic Service (MTS) (Reg. No. 672/2006), combining these functions and establishing that the ICG had overall leadership concerning SAR.

Icelandic Life Saving Association

The Life Saving Association has a long history of assistance to seafarers dating back to the early 1920s, when a number of catastrophic incidents occurred (i.e. foreign trawlers grounded). The Life Saving Association was based on voluntary work and formed numerous rescue teams all around the coast. Their history involves hundreds of lives saved, with many of these rescues taking place under adverse conditions. When mandatory vessel reporting for safety purposes was established in the late 1960s (Box 4), the daily operation was entrusted to the Life Saving Association, which operated a centre for this purpose at its headquarters in Reykjavik. This centre also functioned as the Rescue Coordination Centre.
These responsibilities have now been placed under the ICG following the structural reform in 2006. Subsequently, the Life Saving Association has merged with other voluntary rescue organizations in Iceland, which now operate under the name Slysavarnafélagið Landsbjörg, or in English, the Icelandic Association for Search and Rescue (ICE-SAR). Although overall responsibility has been placed with the ICG, the ICE-SAR continues to play an essential role in SAR.

Box 4: The Stígandi incident

In August 1967, the Icelandic fishing boat Stígandi, with a crew of 12, was out fishing for herring together with other boats in the area between the islands of Jan Mayen and Spitsbergen in the North Atlantic. The normal procedure was that the boats either landed their catch to herring tankers operating in the area or sailed to port in Iceland. Because of the distance involved, the trip to port could take several days. At the time, there was no system for regular reporting of vessel position and it could take days to discover that a boat was missing.

The fishing boat Stígandi

When the Stígandi did not return to port, the owner started an investigation to find out if it had landed to either of the two herring tankers operating in the area. When it became clear that there had been no transshipment, all vessels in the area were asked if they had any information regarding the Stígandi. There had not been any information on the whereabouts of the Stígandi for the previous five days and, as a consequence, a search operation was started.

As this was a large area, the search operation was expected to take several days. The boats in the area were lined up for visual search, and aircraft searched the area, starting from the north of Iceland and moving northeast towards the fishing area. Late in the evening of the first search day, one of the boats reported the sighting of a rubber dinghy and, shortly after, all the Stígandi crew, who were onboard, safe and sound. They had been in the dinghy for five days with no means of communication, as their boat had gone down very quickly and they had been unable to take the emergency radio set with them.

A unanimous decision was then taken by skippers in general to report their position at least daily to the herring tankers, which kept track of the reports and investigated immediately if there was a missing vessel report.¹

The incident stimulated debate among fishers, the authorities and the Life Saving Association on the need for a system to enhance the safety of fishers, leading to the establishment of mandatory vessel tracking in 1968.

¹ The author was a radio operator on one of the herring tankers and, therefore, involved in the search as well as receiving and keeping track of the position reports from the boats from the first day of the voluntary reporting system.
Coastal radio operation

Iceland Telecom operated the coastal radio station system in Iceland from 1930 to 2004. Coastal radio stations formed an important part of SAR services, as they were the recipients of all distress calls, and the system functioned for a long time as part of the Maritime Rescue Coordination Centre (MRCC). During the period of mandatory vessel reporting in Iceland, most position reports came via the coastal radio stations located in various places around the coast of Iceland.

When the terrestrial automatic tracking system was established, the technical branch of Iceland Telecom was responsible for the setup and maintenance of the necessary very high frequency (VHF) repeater stations around the coast. In the late 1990s, the vessel tracking system for safety purposes was moved into the main communication centre of Iceland Telecom in Reykjavik and the employees of the Life Saving Association worked there side-by-side with the radio operators of Iceland Telecom.

Iceland Telecom has now been privatized and no longer operates or services the coastal radio station system or the vessel tracking system by VHF, which were both integrated into the MTS under the optimal responsibility of the ICG in 2006.
3. THE INTEGRATED SYSTEM

In this section, the integrated system is introduced. This system combines some of the operational functions of various institutions and organizations into a single location – the ICG Operations Centre/MTS to achieve more effective operations, to enhance safety and security and to simplify procedures for fisheries and maritime activity by establishing a single point of contact (SPOC).

Operations Centre and objectives

The ICG carries out its operational tasks in the ICG Operations Centre. These tasks include:

- operating the VMSs for safety, security and surveillance purposes in the Icelandic EEZ;
- providing the MTS (including the Global Maritime Distress and Safety System [GMDSS] and SAR capacity) and functioning as the SPOC for all maritime-related notifications (e.g. Schengen, port calls, transit notifications);
- monitoring and surveillance of fishing activity.

It is important to point out that the various VMSs operated by the ICG are primarily for safety purposes. Apart from satellite-based systems, this includes monitoring of coastal activity through a dedicated land-based VHF system with a network of repeater stations around the coast and the Automatic Identification System (AIS), which has a range (30–60 nautical miles) similar to that of the VHF system. The requirements for fisheries monitoring and surveillance have increased over time, including international agreements to enhance cooperation and improve the coverage of high seas.

The MTS consists of a monitoring, control and information system for maritime traffic with a view to enhancing safety and efficiency, improving the response of authorities to incidents, accidents or potentially dangerous situations at sea, and contributing to better prevention and detection of pollution by ships.

However, there are other agencies and/or functions that are present at the same location as the ICG Operations Centre (also called the National Rescue Centre or the Joint Rescue Coordination Centre [JRCC] depending on the context). This includes the Capital District Fire and Rescue Service, the ICE-SAR, Emergency Alert 112, the Police National Communication Centre, the Police Vehicle Control and Maintenance Centre and the Civil Protection Department of the National Commissioner of the Police. Representatives from medical emergency, the Red Cross, the Road Department, Air Traffic Control, etc. may be called in depending on the situation. There is a clear advantage in having all these emergency response functions together in the same location, as it facilitates effective cooperation.

For civil protection operations, such as in the case of strong earthquakes or other natural disasters, the police maintain operational control, but maritime incidents come under ICG control. However, there may be a need for close cooperation between the various authorities depending on the nature and scale of the event.

Supporting units

In order to support operations in the field, the ICG uses two 70 m patrol vessels (Figure 3), three helicopters, one fixed-wing aircraft and a new multipurpose vessel (length 94 m) (Figure 4), which is also equipped for hydro graphical surveys. Technical details are given in Annex I.

The Aviation Department of the ICG is located at Reykjavik Airport, where pilots, aviation mechanics and other personnel of the department are based. At Faxagarður quay in Reykjavik harbour, ICG personnel also staff a security post that is responsible for security of ICG patrol vessels when moored. They also carry out other tasks in support of the patrol vessels.
Figure 3: The Icelandic Coast Guard patrol vessel Ægir

Figure 4: The new Icelandic Coast Guard multipurpose vessel Þór (Thor) being launched at the Asmar shipyard in Chile

Institutional setup

There are several agencies and organizations involved, directly or indirectly, in the functioning of the ICG Operations Centre. In terms of maritime related matters, this involves the ICG, the Icelandic Maritime Administration (IMA) and the Directorate of Fisheries.

The ICG is a law enforcement agency under the Ministry of Justice with the general tasks of providing security as well as SAR services at sea. It is also responsible for carrying out Iceland’s obligations in the context of international conventions and bilateral agreements in the context of maritime affairs.

The Directorate of Fisheries, under the Ministry of Fisheries and Agriculture, takes care of the day-to-day administration of fisheries, which includes implementing legislation on fisheries management, collecting and publishing data on fishing activity, issuing permits to vessels and allocating catch
quotas (i.e. Iceland has a system of individual transferable quotas), as well as inspections of catches, gear and handling methods. It should be noted that weighing of catches at ports is mandatory for all vessels, Icelandic and foreign.

The IMA, under the Ministry of Transport, Communications and Local Government, is responsible for various tasks in maritime administration, such as operation of lighthouses and navigational systems, vessel registration and supervision of ship surveys, staffing and certification. The IMA is also responsible for establishing the MTS in Iceland, but the daily operation of the MTS is entrusted to the ICG according to a special service agreement.

In many of the tasks carried out through the ICG Operations Centre, the ICG cooperates with the Directorate of Fisheries and the IMA, as well as the Directorate of Customs (under the Ministry of Finance) for matters concerning imports and exports.

Other institutions and organizations

The communications centre of the National Commissioner of Police is at the same location as the ICG Operations Centre. Police operations in Iceland are coordinated and monitored from here, and the JRCC, managed by the police, is also located here. The JRCC is activated in the case of large operations, requiring the expertise and capacity of various agencies, such as in civil protection operations.

Emergency Alert 112 is the national service for answering all emergency calls and coordinating various response units (e.g. police, fire, ambulance) on land. This service is at the same location as those described above, thus forming part of the JRCC. In the context of the MTS, Emergency Alert 112 has the responsibility for routing emergency calls that are received via the telephone system to the ICG at the same centre.

Emergency Alert 112 is also responsible for the financing and functioning of technical systems of the MTS, including the GMDSS communication systems as well as the terrestrial VHF tracking system for the mandatory tracking of vessels for safety purposes. However, it is the ICG that is responsible for operating the MTS under a service agreement with the IMA. In addition, Emergency Alert 12 operates the Terrestrial Trunked Radio (TETRA) emergency communication system with numerous transmitter stations around the coast and inland.

The ICE-SAR is an association of voluntary rescue teams in Iceland, of which there are about 100, located throughout Iceland (Figure 5). These are highly trained and specialized teams for SAR operations on land and at sea. The ICE-SAR forms part of the agreement between the IMA, Emergency Alert 112 and the ICG concerning the operations of the MTS. During maritime emergency operations, ICE-SAR units and boats (14 all-weather lifeboats) can be activated and directed from the centre.

Legal aspects and international obligations

According to Law Act No. 52 of 2006, the ICG is responsible for a wide range of maritime protection and security duties, which include:

1. Providing security and safety at sea in accordance with Iceland’s international obligations, agreements with other States and the provisions of law.

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7 The Terrestrial Trunked Radio (TETRA) is a specialist professional mobile radio, designed specifically for use by government agencies, emergency services, transport services and the military. It works in a very similar way to the Global System for Mobile Communication (GSM) (mobile phone standard technology), but handsets have a longer range and there is more bandwidth allocated for data.
2. Law enforcement at sea, including fisheries patrol, and assistance to law enforcement ashore in co-operation with the National and regional commissioners of police.

3. Search and rescue services to mariners and ships and other means of transport at sea.

4. Search and rescue services to aircraft.

5. Search and rescue services on land.

6. Urgent ambulance services in co-operation with other rescue organisations.

7. Assistance to civil protection authorities.

8. Assistance in case of failure of ordinary communications, such as by reason of ice floe, layers of snow, violent weather or natural disasters.

9. Ocean patrol in accordance with the Act on the Maritime Security Act and other acts of law on similar matters.

10. Notification of, and disposal of, flotsam, mines, bombs or other sources of hazards to navigation, in addition to bomb disposal on land.

11. Hydrographic survey, charting, issue of notices to mariners, preparation of tide tables, sailing directions and other publications relating to navigation.

12. Reception of notifications from ships as provided for in the Act on Foreigners, and control of jurisdictional boundaries at sea.

According to Regulation No. 672/2006 on the MTS, issued by the Minister for Transport and Communications, a maritime SAR coordination centre for Icelandic waters shall be established in accordance with the International Convention on Maritime Search and Rescue. This regulation states that the ICG shall administer the expert management of the MTS according to a service agreement, is responsible for the central administration of SAR coordination from the MTS and thus provides it with the role of MRCC for rescue units in Iceland in accordance with the International Convention on Maritime Search and Rescue.

Considering that the primary objective of the MRCC is for safety purposes, it should be noted that there are reporting requirements for all Icelandic vessels. According to Article 29 of the same Regulation No. 672/2006, Icelandic ships shall report their departure from and arrival into port and their position through the automatic ship reporting system as follows:

- ships of 24 m in length and over shall report at one-hour intervals;
- ships of less than 24 m in length that may navigate outside the service area of the automatic ship reporting system on the VHF channel shall report at one-hour intervals;
- ships of less than 24 metres in length that navigate within the service area of the automatic ship reporting system on the VHF channel shall report at 15-minute intervals;
- passenger ships engaged in commercial operations shall report at 15-minute intervals.

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8 Facilitated by the International Maritime Organization (IMO), of which Iceland has been a member since 1960 (www.imo.org).
Icelandic Coast Guard ships and ships engaged in non-commercial operations are exempted from these provisions.

Also specified in Act No. 52 of 2006 is that the ICG may conclude service agreements on matters concerning fisheries patrol (or surveillance). Further details on applicable maritime-related legislation are available, including vessel safety requirements, maritime security, foreign fishing vessels, anti-pollution measures and investigation of accidents.9

**International obligations**

In the international context, Iceland is a party to the UNCLOS as well as the United Nations (UN) Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (the Fish Stocks Agreement).

Iceland participates actively in regional cooperation regarding the sustainable utilization of marine resources and is a member of various regional fisheries organizations in whose areas it has fisheries interests. This cooperation is carried out within organizations such as the NEAFC (Figure 5), the NAFO, the International Commission for the Conservation of Atlantic Tunas (ICCAT), the North Atlantic Salmon Conservation Organization (NASCO), and the North Atlantic Marine Mammal Commission (NAMMCO). Iceland is also expected to become a contracting party of the South East Atlantic Fisheries Organization (SEAFO).

**Figure 5: Regulatory area of the NEAFC (in orange), which covers the most important fisheries by Icelandic vessels in international waters**

Source: NEAFC [www.neafc.org](http://www.neafc.org)

9 Refer to the ICG Web site (www.lhg.is).
Representing Iceland, the IMA participates in a wide range of international collaborative efforts (Box 5) such as in the context of the International Maritime Organization (IMO), the International Association of Lighthouse Authorities and the Permanent International Association of Navigation Congresses, as well as relevant EEA\textsuperscript{10}/EU meetings. The IMA is responsible for implementation of the Paris Memorandum of Understanding on Port State Control and foreign relations in respect of it. Furthermore, it participates in consultation meetings with counterpart organizations in other Nordic countries.

**Area coverage**

In terms of area coverage, it is important to make a distinction between the Icelandic EEZ and the much larger SAR area, the latter being under the responsibility of the ICG for SAR operations as agreed with the IMO (SAR Convention).

**Box 5: International maritime obligations**

Together with 168 other countries, Iceland is a member of the International Maritime Organization (IMO). The IMO was created with the main task of developing and maintaining a regulatory framework for shipping and its remit includes safety, environmental concerns, legal matters, technical cooperation, maritime security and the efficiency of shipping. This international cooperation has resulted in a comprehensive body of international conventions supported by numerous recommendations governing every facet of shipping. The International Convention for the Safety of Life at Sea (SOLAS), International Convention for the Prevention of Pollution from Ships (MARPOL) and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) are considered to be the cornerstone treaties of this international regulatory framework. Iceland has ratified 36 of these IMO conventions, amendments or protocols (as of November 2009).

In 1988, the IMO amended the SOLAS, requiring ships to fit Global Maritime Distress and Safety System (GMDSS) equipment. The GMDSS was developed to provide the communication support needed to implement the search and rescue (SAR) system, which is based on a combination of satellite and terrestrial radio services, changing international distress communications from being primarily ship-to-ship to ship-to-shore (rescue coordination centre). It consists of an internationally agreed-upon set of safety procedures, types of equipment and communication protocols used to increase safety and make it easier to rescue distressed ships, boats and aircraft. The system is intended to perform the following functions: automatic alerting (including position determination of the unit in distress using satellite emergency position-indicating radio beacons [EPIRBs]), SAR coordination, locating (homing), maritime safety information broadcasts (Navigational Telex [NAVTEX]), general communications, and bridge-to-bridge communications. Recreational vessels or vessels with a gross register tonnage (GRT) of less than 300 GRT do not need to comply with GMDSS radio carriage requirements, but are increasingly using digital selective calling (DSC) VHF radios.

Another requirement in the context of the SOLAS is the installation of the Automatic Identification System (AIS; see accompanying figure) on board ships of more than 300 GRT and all passenger ships regardless of size. The AIS is a short-range coastal tracking system used on ships and by vessel traffic services (whose requirements are also specified in the SOLAS). Vessel information such as unique identification, position, course and speed can thus be displayed on a screen, which allows maritime authorities to track and monitor vessel movements.

Ships outside AIS radio range can be tracked with the Long Range Identification and Tracking (LRIT) system, which is a complementary system being put in place by the IMO under the SOLAS. The LRIT

\textsuperscript{10} The European Economic Area (EEA) was established on 1 January 1994, allowing European Free Trade Association (EFTA) countries to participate in the European single market without joining the European Union (i.e. implies harmonization in terms of legislation over a wide range of sectors). Contracting parties are Iceland, Liechtenstein and Norway (but not Switzerland, which rejected the EEA Agreement).
system is currently in the phase of implementation, which will require ships (i.e. larger than 300 GRT and all passenger ships as well as oil rigs) to report their position automatically to their flag administration at least four times a day. Other contracting governments may request information about vessels in which they have a legitimate interest under the regulation.

How the Automatic Identifications System (AIS) works

The size of the Icelandic EEZ is about 754 000 km², extending to the full 200 nautical miles to the south and southwest, where it abuts the large area of high seas in the central North Atlantic, and to the northeast, where it abuts an enclave of high seas in the Norwegian Sea sometimes referred to as the “banana hole”. Elsewhere, the EEZ extends to the EEZs/fishing zones of Faroe Islands, the Norwegian island of Jan Mayen and Greenland (Figure 7).

Figure 6: Map of the Icelandic Exclusive Economic Zone
The ICG Operations Centre functions as the SPOC for vessels operating inside the EEZ as well as vessels heading for ports in Iceland and for vessels transiting the Icelandic EEZ. In relation to fisheries, the centre also keeps track of Icelandic vessels operating in the regulatory areas of the NEAFC and NAFO as well as vessels operating in the EEZs of other countries such as Faroe Islands, Greenland, Norway and the Russian Federation. The centre also tracks foreign fishing vessels operating in Icelandic waters under fishing agreements, including Norwegian, Faroese, Russian and Greenlandic vessels.

The ICG is also responsible for SAR operations as described below, as agreed in the context of the IMO. This is a vast area of about 1.9 million km², extending from 0 degrees longitude westward to the Greenland coast (Figure 7). The area to the south of Iceland that is referred to as “Clyde” is more or less covered by Iceland; with examples of ambulance flights by helicopters into that area. Faroe Islands has claimed responsibility for the part of the area that is inside its EEZ, but this is still to be approved by the IMO.

**Figure 7: The search and rescue (SAR) area under the responsibility of the ICG**

4. IMPLEMENTATION

The ICG is responsible for operations in one of the toughest marine areas in the world, the North Atlantic Ocean. A series of depressions cross the waters around Iceland on the way from North America to Europe, bringing heavy storms during a large part of the year as well as dangerous ice flows during the winter. The difficulties of mounting operations for missing ships or aircraft in such a vast area, and under possibly dangerous conditions, are obvious. Maintaining permanent alert status in a centre that is staffed 24 hours a day, every day of the year, is important. As mentioned above, the ICG Operations Centre joins together previously separate functions that are essential for the ICG to carry out its responsibilities. The following sections describe the implementation of these functions in Iceland as well as operational and technical aspects.