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# REVIEW OF MARITIME PATROL REQUIREMENTS

SURFACE SURVEILLANCE SUPPLEMENT

### Ministry of Fisheries







MARITIME PATROL SUPPLEMENT

### AIM

## Identify and detail the Ministry of Fisheries' maritime patrol requirements.

### **OBJECTIVES**

- Supplement the main maritime patrol review, dated 1 Nov 2000, by determining the Ministry of Fisheries' specific needs in relation to surface surveillance.
- Determine the range of capabilities necessary to provide appropriate surface surveillance cover.

#### AUTHORS

The National Compliance Unit (Operations) prepared this report.

#### DATE

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#### SECURITY

This document has been reclassified due to the removal of sensitive information.



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This document follows the recent *Review of Maritime Patrol Requirements*, and is intended as a supplement to the original review. Rather than focusing on aerial surveillance, this review explores the same questions but in the context of surface patrols.

### **Surface Patrol History**

Surface patrols, conducted by vessels at sea, are an important element in the layered approach to surveillance currently employed by the Ministry of Fisheries. Surface patrols contribute to the pool of information regarding the activities of those operating within New Zealand's fisheries waters. They must be used in conjunction with a number of other information-gathering tools, such as aerial surveillance, the vessel monitoring system (VMS), catch-effort declarations, and other forms of onshore documentation. In particular, these patrols possess the ability to collect information directly from vessels of interest, to verify existing information on their location and activities, and to demonstrate the Ministry's capability to enforce fisheries laws.

Surface patrols have been used specifically for fisheries protection in New Zealand since 1946 when two harbour defence motor launches were assigned to this task. By the late 1960s, six vessels were used for fisheries patrolling, with many other vessels supplementing this effort over those years.

In 1977 New Zealand declared a 12 nautical mile (nm) territorial sea and a 200 nm exclusive economic zone (EEZ) which covers an area of 1.3 million square nm, the fourth largest in the world. In 1982 the United Nations Convention on the Law of the Sea (UNCLOS) enshrined the concept of an EEZ into international law, and New Zealand has not only the sovereign right to harvest the living maritime resources within its EEZ but also the responsibility to manage and police it.

The extensive parameters of New Zealand's EEZ include an extreme range of sea conditions from the temperate sub-tropical waters surrounding the Kermadec Islands to the "roaring forties" of the sub-Antarctic islands south of Stewart Island. The outer limit of the EEZ is over 400 nm from the two main islands of New Zealand.

This vast new area of jurisdiction meant a dramatic change in the characteristics of the vessels required to patrol it; vessels required greater endurance and improved ocean-going ability in order to cope with these varied and extreme conditions.

#### **Naval Support**

At the time New Zealand declared its EEZ, the Royal New Zealand Navy (RNZN) was allocated the task of performing the majority of surface patrols inside the zone, with the Royal New Zealand Air Force (RNZAF) providing aerial surveillance support. The RNZN had four 33 metre patrol craft dedicated to fisheries protection. In practice, however, only one vessel was usually at sea at any given time due to various mechanical and technical limitations, and crew-leave requirements. These vessels were inadequate to conduct effective patrols beyond the territorial sea. A single frigate, the HMNZS Taranaki, was allocated the dual-role of training sailors and patrolling New Zealand's deepwater fisheries. Three other frigates also contributed thirty per cent of their allocated sea days to resource protection duties. It was, however, relatively easy for fishing vessels to monitor the movements of the fisheries-dedicated frigate, potentially jeopardising the patrol's effectiveness<sup>1</sup>.

In the mid 1980s the quota management system (QMS) was implemented and fisheries enforcement became more shore-based and focused on verifying landed catch and associated documentation.

In the early 1990s the satellite-based VMS was introduced, and this enabled the RNZAF aerial surveillance patrols to be conducted in a far more effective manner in the deepwater fisheries. During this period the RNZN became much less involved in fisheries patrolling, yet remained the only provider of deepwater surface patrols.

In recent years the focus of enforcement in the deepwater fisheries has shifted from dealing with infringements of closed areas (now deterred largely by VMS and aerial surveillance) to that of more complex quota fraud involving the mis-reporting of catch and the dumping of quota species. Surface surveillance has an increasing role in the investigations of offences.

As a result of an inter-departmental agreement in 1990 between the New Zealand Defence Force (NZDF) and the then Ministry of Agriculture and Fisheries (MAF), the RNZN provides MFish with forecasts of naval vessel activity. This information enables MFish to seek the use of naval craft for fisheries patrolling but only if an appropriate vessel is operating within a particular area of interest at a desired time.

An example of a fisheries patrol based on such a request occurred in November 1998. The frigate HMNZS Te Kaha boarded and inspected a number of fishing vessels, and sighted many others during a voyage to the sub-Antarctic islands while on Department of Conservation (DoC) duties. The frigate's presence was noted with interest among the fishing fleet, and feedback from MFish observers onboard some of the fishing vessels attested to the success of the operation. While the RNZN has demonstrated its willingness and ability to accommodate this type of request, surface patrols such as this are all too infrequent.

While extensive and detailed planning is involved in scheduling the activities of RNZN vessels, fisheries-related tasks are not usually considered, nor is MFish involved on a regular basis prior to these plans being finalised. The tight schedules of maintenance, training and exercises have meant that fisheries patrols are not a high priority for the RNZN. As a result there have been no dedicated fisheries-focused, programmed surface patrols within New Zealand waters in recent years. This issue needs to be urgently addressed, and this review presents an excellent opportunity to seek the assistance of the RNZN to develop planned fisheries patrols. Improvement in the communication between MFish and the RNZN is part of the solution to this problem.

The RNZN does respond to specific operational requests by MFish, and Operation HEAVE is a good example of this. In 1989 a joint-agency operation was conducted, involving fishery officers, the frigate HMNZS Wellington, and a RNZAF Orion. The Orion was used to locate and identify a fleet of commercial fishing vessels, while the frigate was used to board and inspect a number of 'vessels of interest.' A helicopter aboard HMNZS Wellington was used to provide surveillance coverage of the remaining fleet, noting the activities of these vessels. The operation was considered

<sup>&</sup>lt;sup>1</sup> A Long Term Plan for the Surveillance and Policing of the New Zealand Exclusive Economic Zone - Interdepartmental Working Party Report, c1980.

a success in terms of demonstrating New Zealand's ability to patrol the most inhospitable waters of its EEZ.

The rapid-response capability of surface patrols has yet to be tested, but this certainly needs to be retained in case, for example, a vessels flees the New Zealand EEZ with an observer aboard, or a foreign intruder needs apprehension. The capability to respond is in itself a major deterrent to this kind of offending.

#### **MFish Vessels**

At present, MFish's own surface patrol capability is very small. Throughout the 11 district offices, a fleet comprising of 13 small craft is currently in use. The recent sale of the vessel 'Taranui' has further depleted the limited patrolling capacity, but a 7.3 metre replacement craft is being built and is expected to be available by April 2001. A 15 metre craft, the 'Takapu,' which has radar and other sophisticated electronic equipment, is shared among a number of North Island district offices. All other surface patrol vessels held by MFish are trailer-borne, small inflatable craft, most under 6 meters in length, and suitable only for conducting inshore surface patrols.

While some of these craft possess the endurance to reach the outer limits of the territorial sea, they rely on favourable weather conditions, and the safety of crew is a common and significant concern. The Nelson office has occasionally employed their craft as a valuable mode of transportation, gaining access to remote locations where roads are non-existent. In general, these craft have been effective only close to shore, and in fair weather.

Some districts, such as Napier and New Plymouth, have no allocated vessels, and have to borrow, albeit on an ad-hoc basis, from those districts possessing vessels. Some offices share patrol craft which are used primarily to regulate customary fisheries. Some district offices have even chartered commercial fishing vessels or employed vessels owned by the DoC as a means of conducting their surface patrols. There is a distinct lack of appropriate vessels available to the MFish district offices around New Zealand.

#### Summary

Dedicated surface surveillance patrols are an essential element of fisheries enforcement, yet the capacity of MFish to conduct its own surface patrols is very limited, and is generally restricted to patrolling inshore areas, and is dependent upon favourable weather conditions. Although the RNZN remain the main provider of surface patrols, especially of the deepwater fisheries, and possess frigates which provide a powerful deterrent to foreign intruders, there is currently no comprehensive programmed surface patrolling regime dedicated to New Zealand's fisheries.



See Appendix 2 Country Reports for an outline on the approaches taken by Australia, Canadia, Ireland and the United Kingdom, regarding the surface surveillance within their respective jurisdictions.

By way of summary, Figure 1 shows a breakdown of surface surveillance capabilities and effort levels.

Country	Agency responsible	Patrol fleet composition	No. of vessels	Number of sea days allocated to EEZ surveillance tasks per annum
Australia	Coastwatch	Bay Class	8	900 <sup>1</sup>
	RAN	Fremantle Class	15	1868 <sup>2</sup>
Canada	Coast Guard	Offshore MT Cutter Intermediate Task Cutter Small MT Cutter	4 6 14	Unknown
	Navy	Kingston Class	12	138
England &Wales	Royal Navy	Island Class Castle Class	5 2	1081 <sup>3</sup>
Ireland, Republic of	Naval Service	Deirdre Class Roisin Class Eithne Class Orla Class	4 1 1 2	10594
New Zealand	Royal New Zealand Navy	ANZAC Class Frigate Leander Class Frigate Inshore Patrol Craft	2 1 4	See note <sup>5</sup>
Scotland	Scottish Fisheries Protection Agency	Sulisker Class Island Class	3	1168 <sup>3</sup>
		Fast Patrol Launch	2	668 Figure 1.

Notes on table

The blue text indicates vessels utilised in or capable of offshore patrol duties. Those in red are strictly inshore vessels designed for use in sheltered waters.

<sup>1</sup> This is the actual number of days spent on patrol in 1999. Current planning will see this increased to 1200 days in 2000.

<sup>2</sup> The RAN allocate 1800 days per annum to civilian tasks. This figure indicates additional patrol work above the budgeted figure for 1999.

<sup>3</sup> This is the combined total for both classes of vessel.

<sup>4</sup> This figure represents the total number of days allocated solely to fishery protection work and represents 93 per cent of the total output for the Naval Service.

<sup>5</sup> No days are specifically allocated for civilian EEZ patrols but resources sometimes available on request.



#### SURVEILLANCE TASKS

There are two broad categories of surface surveillance tasks – programmed and response patrols – similar to aerial surveillance. Both these categories break down into sub-categories and are discussed in turn below. Included in the various fisheries tasks are those relating to law enforcement, including the exercise of statutory powers, such as the powers to stop, board, search and seize evidence, the seizure of vessels and the arrest of persons under certain circumstances. The exercise of these powers will at times require the use of force, against both New Zealand and foreign nationals.

It is possible that a patrol will move from one category of task to another, or include a number of sub-categories of tasks. For example, while a vessel is on patrol it may be called upon to respond to a developing situation, or when planning the patrol a number of different tasks may be achieved by the same voyage. The significant enforcement responsibilities associated with surface fisheries patrol, and the use of vessels to effect the stopping, boarding, search and seizure of vessels requires the patrol vessel to be recognisable as a government vessel. With the inherent need for a boarding capability, an appropriate number of the patrol vessel's crew will also need to be able to exercise the authority of the State.

#### **Programmed Patrols**

- 1. *General or routine* these occur where there is no prior concern about a specific offence or offences and the patrol is designed to cover a specified area or portion of the fishing fleet. While the patrol may be general in nature it is still very much targeted, in that careful consideration will be given to the best place to send the patrol and it will still have a specific objective. For example, a general patrol may be dispatched to cover the Chatham Rise orange roughy fleet and any other vessels it encounters.
- 2. *Area protection* these are concerned with the patrol of specific areas of interest, such as closed areas or particularly high-risk fishing grounds. Sending a patrol vessel into a particular area has the advantage over other forms of surveillance, in that it gives a physical presence over an extended time period. France has used this type of patrol to interdict illegal fishing activity around the remote Kerguelen and Crozet Islands.
- 3. *Deterrence* these are specialised variations of the general patrol which take place in situations where, although there is no evidence of specific offending, there is a requirement for a patrol for primarily deterrence value. An example of this occurred in Operation HEAVE in 1990. A frigate was sent to the sub-Antarctic areas of the EEZ in response to intelligence indicating that the Russian fleet working in the area considered themselves beyond New Zealand's ability to enforce its jurisdiction.

#### **Response Patrols**

- 1. *Offence detection* in a situation where reliable intelligence indicates that an offence has been or is being committed, surface surveillance may be required, especially where there is a need for a boarding rather than just evidence gathering. This may involve the target vessel being approached as covertly as possible.
- 2. *Hot pursuit* these relate to situations where a vessel has been involved in an offence and then attempts to flee New Zealand's jurisdiction. This may involve pursuit beyond the EEZ in accordance with UNCLOS rules on hot pursuit. As long as continuous contact is maintained from within the EEZ, the vessel may be pursued and apprehended on the high seas. A surface response is essential in these cases. An aircraft may maintain contact for the purposes of hot pursuit but a patrol vessel is required to actually stop (potentially involving the use of force) and board the offender. It is also possible that the patrol vessel may be required to tow the offender back to port.
- 3. High seas these patrols arise from New Zealand's international obligations as a member of regional arrangements and as a flag State, and have been codified into domestic law through the soon to be implemented provisions in Part VI A of the Fisheries Act 1996. It is envisaged that in situations where a New Zealand flagged vessel, operating under a high seas fishing permit, infringes and refuses to comply with lawful directives, New Zealand may have to send a patrol vessel to enforce the law. While this is likely to be a rare occurrence, the capacity to respond over very long distances will need to be available as an ultimate deterrent.
- 4. Operational support these patrols are similar to the first category of response patrols, except that the response does not need to be immediate, thereby allowing a higher degree of planning. A surface patrol capability greatly assists in the area of boarding vessels in order to seize vital evidence and/or the vessel itself. In recent years, fisheries officers have employed a variety of vessels to get this job done. A good example of this is Operation HAWKE in 1999. The Fu Yuan No 4 fished illegally within New Zealand's territorial sea and an operation was mounted to seize the vessel. When the Fu Yuan No.4 temporarily moved to another location there were no vessels capable of taking the boarding party to it, and the success of the entire operation was jeopardised. The Fu Yuan eventually returned to its original position and a local coastguard vessel was used to transport fisheries officers to it.

#### **Evidential Levels**

Surface patrols have some advantages over other forms of surveillance because they can obtain evidence directly from the vessel, and seize that evidence if applicable. Some forms of offending can only be detected if the vessel is boarded during its fishing operations (e.g. use of incorrect fishing gear or mis-reporting of catch, etc).

The three identified levels of evidence reporting standards are the same as those set out on page 24 of the main report.

#### SURVEILLANCE AREAS

The areas identified and prioritised, as targets for surveillance patrols, remain essentially the same (see pages 24-26 of the main report).

In determining the level of effort required (see page 10), the nature of some fisheries shifts the focus from aerial to surface surveillance. Appendix 1 is based on the list of priority fisheries contained in the main report, but includes five new areas and dispenses with three others that are irrelevant for surface surveillance purposes. The descriptions of some of the other fisheries have undergone minor changes to reflect the shift in focus.

#### SURVEILLANCE RANGES

To maintain a consistent approach, the same range bands will be used in considering surface surveillance requirements as were used to consider aerial surveillance in the main report. These range bands are set out in the following table:

<b>Description:</b> Short	<b>Range:</b> From the beach to the outer boundary of the Territorial Sea (TS).	<b>Coverage:</b> All inshore fisheries and 1 per cent of the deepwater fisheries. Also includes land-based surveillance (e.g. transportation).
Medium	From the boundary of the TS to 90 nm from major airfields.	This covers all inshore fisheries and 60 per cent of deepwater fisheries.
Long	From 90 nm to 300 nm from major airfields	This covers 92 per cent of deepwater fisheries and some extra territorial fisheries.
Extreme	300 nm +	This includes 100 per cent of deepwater fisheries and all extra territorial fisheries.

These ranges are illustrated in Figure 2.

The fact that some of these ranges are derived from the distance from major airfields is not problematic, as these airfields are generally collocated with major ports. In many cases, the issue of range has more to do with distance from land than the distance from port. For example, a four day patrol within the territorial sea is of much less concern than a two day patrol directly out towards the EEZ boundary, where the vessel will be susceptible to the harsher conditions that occur in the more exposed reaches of the open sea.

## **Proposed Ranges for Fisheries Surveillance**



Figure 2.

#### SURVEILLANCE TIMES

The seasonal variations identified in the main report, particularly in Appendix 5, remain the same.

The total effort necessary to meet MFish's surface surveillance requirements is 617 sea days. This figure was derived from an analysis of MFish's priority fisheries as identified in the section headed "Analysis of Fisheries" and is attached as Appendix 1.

As identified in the section on the background of surface surveillance, there has been little concerted surveillance effort in many of New Zealand's major fisheries. This means that there is little historical data available to assist in the calculation of MFish's surveillance requirements. Efforts were made to mitigate the correspondingly large speculative element, but the figure should be viewed as a general estimate until an expanded surface surveillance effort yields more direct data.

Figure 3 shows a breakdown of the overall surveillance requirements into the identified range bands.



The percentage breakdown by range is as follows: short 54.2 per cent, medium 25.1 per cent, long 15 per cent and extreme 4.9 per cent.

#### SURVEILLANCE SYSTEMS

In the main report, it was identified that the particular capabilities of an aerial surveillance platform are largely secondary to the electronic systems onboard. In the case of surface surveillance, the balance shifts back toward the platform and its inherent abilities when operating in the field. This is a by-product of the more 'hands on' approach taken by surface patrols (for example, boardings) and the need to work in a variety of weather conditions.

The type of vessel suited to conducting surveillance in New Zealand waters largely depends on the particular tasks it will be expected to do and the location within the EEZ that these tasks will be performed. While a vessel may be specifically designed to perform particular roles, it can also be employed to complete multi-task assignments. Obviously, the more specialised the vessel, the less flexible it becomes when considering other tasks.

An EEZ resource-protection vessel would need to be flexible enough to allow it not only to patrol close to shore but also to have the ability to steam quickly to the outer edge of the EEZ and operate in New Zealand's sub-Antarctic waters. The vessel will therefore require high speed (in both pursuit and transit modes), superior sea-keeping attributes (which implies a large vessel), good endurance at sea and the capability to tow other vessels. Other important requirements will be additional space on the vessel for specialists (fisheries officers etc.), a secure communications suite, a dedicated surveillance radar, gear retrieval systems, and a suitable weapons system.

An auxiliary boat is an essential addition for conducting boardings and increasing the vessel's patrol capabilities in the inshore fisheries. Another option that deserves special consideration is the capability to operate a helicopter off the vessel. This adds another dimension to a vessel's capabilities at sea, in that it allows the benefits of both aerial and surface platforms to be combined. The helicopter allows the vessel to expand its surveillance efforts, just as the vessel greatly extends the endurance and range of the helicopter. This option will have implications in both initial and ongoing costs, as well as influencing the size of the vessel required.

See Appendix 4 for a more detailed assessment of the likely operational capabilities of a patrol vessel.



The analysis within this supplementary report shows strong similarities with both aerial and surface fisheries surveillance, particularly in the shortfall of available resources.

#### **Range Analysis**

An analysis of MFish's surface surveillance requirements over the range bands set out in the report demonstrates that:

#### While a long-range capability is still essential, an additional shorterrange capability could patrol the majority of our fisheries.

The need for long range and extreme range patrols remains high and looks likely to increase as the new high seas fishing legislation is implemented. These patrols are likely to be few in number but would be disproportionately high in priority. A dedicated fisheries patrol vessel capable of working at these longer ranges would be prohibitively expensive to purchase and operate. There appears to be no current practical alternative to the use of RNZN frigates to fulfil these roles. This assumes that the RNZN is able and willing to take on the task of providing occasional long range fisheries patrols and retains a capacity to respond to cases of EEZ intrusion, hot pursuit and high seas incidents.

An analysis of MFish's needs reveals that 80 per cent of the surface surveillance requirements fall within the short and medium range bands. A patrol vessel or vessels with the capability of operating out to 90 nm and in high sea states would appear to be the most effective means of delivering the identified surveillance requirements. Since inshore work requires a much smaller type of vessel, this patrol vessel would need to either carry a tender vessel or operate in conjunction with smaller craft.

#### **Gap Analysis**

As identified in the section entitled "Surface Surveillance Background", current patrolling efforts in the deepwater are so sporadic and uncoordinated that it is not possible to develop any meaningful figures for the extent of the current effort. It is safe to say, however, that very few (likely to be less than 1%) of MFish's programmed deepwater surface surveillance requirements are currently being met.

In the inshore fisheries there is some effort exerted by MFish district offices, however, these efforts are variable and the effort level depends to a significant degree on the availability of suitable vessels and favourable weather conditions. Only 17.7 per cent of MFish's inshore surveillance requirements are currently being met.

This analysis leads to the conclusion that:

There is a substantial gap between the programmed surface surveillance sea days required by MFish and those that it is currently receiving from MFish's own inshore patrol vessels, the RNZN and ad hoc charter vessels.

With 17.7 per cent of the inshore fisheries (which constitute approximately 20 per cent of the overall fishery) being covered, and assuming 1 per cent of the deepwater fisheries are covered, then only 5 per cent of MFish's total programmed surface surveillance requirements are being met.

The situation regarding response patrols fares better than that of programmed patrols, due to the need for fewer sea days. As the number of response patrols varies widely from year to year it is difficult to quantify the requirement and any gap in meeting it. However, the RNZN has always shown a willingness to respond where it is in their ability. There have been no major incidents in which a response has not been mounted, however in some cases aerial surveillance was used instead of surface surveillance, which has limited further options. It is fair to say, however, that New Zealand still remains untested in an extreme range response situation.



### **Table Deleted**

Total sea days (unmodified) = 1134Modified for multi-tasking (divided by 2) = 567

NB. The multi-tasking factor used in the analysis of aerial surveillance requirements was 3, reflecting the higher speed and larger overall coverage provided by an aircraft.

The Ministry of Fisheries uses small inshore craft to perform a variety of patrols in respect to the recreational and customary fisheries. As these requirements are adequately provided for within the Ministry's current capability, they are not included in this report. The above figures only reflect programmed patrols and further sea days need to be added to reflect time spent on response patrols. This is a difficult figure to estimate, as there will be large fluctuations from year to year.

Estimated response sea days = 50

#### MFish's total requirement for surface surveillance in sea days = 617



#### AUSTRALIA

As one of the world's major maritime nations, Australia has a nautical jurisdiction extending from the tropical climes of the north, down to the frigid southern oceans located in the Antarctic region. Within this area, Australian authorities must monitor and control a range of activities, such as fishing, the illegal importation of narcotics and weapons, and the burgeoning activity of illegal immigration by sea. This requires a considerable maritime surveillance effort, which is managed by Coastwatch.

Coastwatch is a branch of the Australian Customs Service that was established for the purpose of 'centralising' the management of Australia's maritime surveillance resources. The branch essentially receives requests from the various federal agencies and then co-ordinates a response with the appropriate service providers. Coastwatch uses both the Defence Force and their own fleet of vessels in order to fulfil the requirements for surface surveillance of the EEZ.

The Royal Australian Navy (RAN) currently operates 15 Fremantle Class Patrol Boats (FCPBs) to support the Civil Surveillance Program run by Coastwatch. The principle role of the FCPBs is to provide a surface response capability, which is primarily targeted at fishing vessels operating illegally within the EEZ. This generally involves locating, boarding and, if required, arresting vessels at sea, and then delivering them into the custody of the Australian Fisheries Management Authority (AFMA). In the past few years, the FCPBs have increasingly been tasked to respond to Suspected Illegal Entry Vessels (SIEVs) attempting to enter Australia from the north.

Commencing service in 1980, the Royal Australian Navy's FCPBs contribute 1800 sea days per annum to the Civil Surveillance Program, equating to about 120 sea days per vessel per year, depending on maintenance and other taskings. Given the advancing age of these vessels, consideration is being given toward their replacement in the future by Offshore Patrol Vessels (OPV) capable of embarking a helicopter.



The 42 metre Fremantle Class Patrol Boat, HMAS Warrnambool, exercising with a RAN Sea King helicopter. Armed with a 40mm Bofors GP gun and capable of 30 knots, this class of vessel gives Australia an effective offshore surveillance platform.

The Australian Customs Service National Marine Fleet fulfil similar roles to those performed by the RAN patrol boat fleet. Formerly operating six small Minister-class vessels, Customs is currently in the process of receiving eight new Bay-class patrol boats through a \$58m (AUD) modernisation program funded by the Federal Government. These 38.2 metre vessels will greatly extend the capabilities of the Customs fleet by providing a fast surface response asset, with a useful endurance, and a true offshore patrol capacity. It is envisaged that the Bay-class vessels will add a further 1200 sea days to the Civil Surveillance Program managed by Coastwatch.



Australian Customs Service Bay class vessel.

In addition to the capabilities mentioned above, AFMA has, from time to time, chartered commercial fishing vessels to execute fisheries patrols. In particular, AFMA chartered the trawler, Austral Leader, for a patrol around Australia's sub-Antarctic territories. However, this option is generally seen as less than an ideal situation, due to the limitations of this type of vessel with respect to EEZ patrolling.

#### CANADA

The Department of Fisheries and Oceans (DFO) is the government agency responsible for managing Canada's fisheries resources. In order to accomplish this task, the DFO relies heavily on the ability of other organisations to provide it with the necessary surveillance resources, both in terms of in the air and on the water. The surface component of the maritime surveillance of the Canadian EEZ is carried out by two organisations.

The Canadian Armed Forces, in particular the navy, have available considerable assets that could perform various surveillance tasks within the Canadian EEZ. However, the navy's combat vessels, such as the Destroyers and the Frigates, are seldom used in fishery protection duties or other civilian tasks as they are not particularly suited to this kind of role. Instead, the navy utilise a new class of vessel known as the Kingston Class Maritime Coastal Defence Vessels (MCDVs).



**The HMCS Kingston undergoing sea trials.** The Kingston class vessels are 55.3 metres, have a top speed of 15 knots, and the ability to operate well beyond Canadian waters. The normal duration of a patrol is 18 days at sea, and the main armament is a 40mm Bofors GP gun.

12 Kingston-class vessels were delivered to the Navy throughout the 1990s, with the fleet being split evenly between the Pacific and Atlantic coasts. The primary mission of this Kingston-class fleet is coastal surveillance and patrol. This involves a wide variety of duties, including general naval operations and exercises, search and rescue, and support to other government departments in the areas of law enforcement, resource protection and environmental monitoring. These vessels are the primary offshore patrol platform employed to monitor and protect Canada's fisheries resources.

These vessels were produced, utilising commercial design and construction standards, rather than the more rigid (and expensive) military equivalents. Even though these vessels are not frontline warships, and therefore do not need the same level of defensive attributes, some military standards were employed for reasons of stability, flood-control zones, doors, turning/stopping distances, and ammunition spaces.

Supplementing the Navy's EEZ patrolling effort, the Canadian Coast Guard have the platforms available to police the 200nm boundary. The predominant tasks of the Coast Guard include assisting with general navigational safety in Canadian waters, search and rescue missions, and environmental protection (pollution control). The role of fisheries protection is more of a secondary concern for the Coast Guard, though the Coast Guard possesses extensive surface resources that are available to support the efforts of the DFO. As with many other organisations, the Coast Guard often 'multi-task' their sea patrols, supporting a number of other agencies in a cost-effective manner.



**The Intermediate Multi Task Patrol Cutter CCGS John Jacobson.** The 50 metre Cutter has a crew of 14, and can stay at sea for up to 28 days.

The Coast Guard's extensive fleet enables it to perform various tasks within Canadian waters. These vessels range in size from large ocean-going Icebreakers to small launch-type vessels that operate close to shore.



**The CCGC Chilco Post and Comox Post patrolling inshore waters**. The Coast Guard fleet consists of many different types of craft, allowing the service to cater for various needs. The 20 metre 'Post' vessels can operate at sea for up to 10 days. They are tasked with patrolling sheltered inshore waters.

#### **UNITED KINGDOM**

As detailed in the main report, the responsibility for managing fisheries resources in United Kingdom waters is divided between a number of agencies. The main division is between Scotland and the other nations within the United Kingdom, with Scotland taking the responsibility for managing and policing its own EEZ.

#### **England and Wales**

The Ministry of Agriculture, Fisheries and Food (MAFF) Sea Fisheries Inspectorate, is the body responsible for the protection of resources in England and Wales. MAFF employs the Royal Navy for control at sea, and has available 10 patrol vessels, including five Island-class and two Castleclass offshore patrol vessels of the Royal Navy Fishery Protection Squadron (RNFPS). The Royal Navy service is provided to MAFF on a contract-type basis.

The two principle tasks of the RNFPS are the patrolling of British fishing grounds on behalf of the MAFF, and the protection of the North Sea Oil and Gas fields from terrorist threats.

Ordered in 1975, the Island-class ships were built specifically for conducting offshore patrols. These vessels were built to commercial standards and resembled fishing trawlers in both design and appearance. As a result of the commercial design, they were built with spacious living conditions. They have, however, proven to be very unstable in rough seas. This, along with their small size, slow speed and lack of a flight deck, has generated much criticism, and has led to the development of a Mark II Patrol Vessel, the Castle Class.



The 59.5 metre Island Class patrol vessel HMS Orkney (P299). The vessel is armed with a 20mm BMARC gun and has a top speed of 16.5 knots.

Officially designated 'Offshore Patrol Vessels Mark II,' the design of the Castle class incorporated significant improvements over the Island class; they were larger, had a flight deck for a helicopter, and were generally a superior sea boat than the Island class. The two vessels in this class were commissioned in the early 1980s.



**HMS Dumbarton Castle (P265).** Far more capable than the Island class vessels, only two of the proposed six vessels were constructed. These vessels are equipped with surface search radar, further enhancing the patrol capabilities.

The Royal Navy vessels are MAFF's sole offshore surveillance assets, providing almost 1100 sea days per annum, at a cost of approximately 6 million pounds.

#### Scotland

For the last three years, the Scottish Fisheries Protection Agency (SFPA) has undertaken all enforcement and inspection activities within Scottish territory, including those at sea. This has placed Scotland in a unique position within the European Union, in that they have all their enforcement resources operating under the one command. This 'co-ordinated organisation approach' allows the agency to use aerial, marine and shore resources together to meet its objectives.



**FPV Sulisker of the Scottish Fisheries Protection Agency.** The SFPA also operates a single Island Class vessel, the FPV Westra, and two inshore patrol vessels.

The SFPA has four offshore patrol vessels, three 65-metre Sulisker-class vessels, and an Islandclass patrol boat. The Sulisker vessels were launched during the 1980s, and are deployed in threeweek cycles throughout the two hundred-mile British fisheries limits under Scottish jurisdiction, making maximum use of the vessel's 21-day endurance. In order to patrol inshore waters, the SFPA has two fast patrol launches, which confine their activities to the territorial sea surrounding Scotland.

This capability is necessary to help fill the gap left by the withdrawal of the Royal Navy vessels from Scottish fishery protection work. The Chief Executive of the SFPA, in comments to a Government committee, regretted that the agency had to dispense with the services of the Royal Navy in Scotland simply because they could no longer afford to fund the contract. As a result, they have had to increase the priority of their onshore inspections.

#### **REPUBLIC OF IRELAND**

The responsibility for conducting maritime surface surveillance within the Irish EEZ lies with the Naval Service, a branch of the Irish Defence Force. In spite of the fact that the Defence Force's primary role is the protection of the state, the main role for the Naval Service is fishery protection. As an indication of this commitment in 1999, 93 per cent of the Naval Services output, in terms of sea days, was dedicated to fishery protection duties. This contrasts many other countries, where the navy's primary role traditionally has been the protection of national sovereignty, and resource protection is usually seen only as a secondary priority to be performed during peacetime.

This situation arose as the result of the Anglo-Irish Treaty that formed the Irish State in 1922. The Treaty did not allow the newly formed state to establish a navy, but only a civilian-based fishery protection service. Ireland eventually gained a naval arm, incorporating the fishery protection service. The national importance of the fishery resources is reflected in the quality of the Service's fleet and its equipment.

Through its extensive experience, the Naval Service has developed its fleet to fulfil the requirements of fishery protection duties. The initial decade following the establishment of the Irish EEZ saw the Service experiment with different types of vessels, such as minesweepers and fishing vessels. Certain sectors of the fishing industry believed that the best option would be to use large fishing vessels with small crews. At the time, large numbers of fishing vessels were being displaced from some European fishing grounds, so this was seen as an economic use of existing resources. The Naval Service chartered one such vessel to conduct EEZ patrols, but the experiment was deemed a failure, and the concept of using redundant fishing vessels as patrol vessels was abandoned.



**L. E. Eithne with SA 365f Dauphin 2 helicopter embarked**. The largest vessel in the Irish fleet, the Eithne can range over 7000 miles and reach speeds of over 20 knots. The vessel is equipped with search radar and a 57mm Bofors gun.

This, and similar experiences, led the Service to acquire purpose built vessels for both offshore and inshore patrol duties. The current fleet consists of an 81-metre Helicopter Patrol Vessel (HPV), four Deirdre-class offshore vessels, and two Orla-class inshore patrol vessels. The Deirdre-class offshore patrol vessels were the first vessels originally designed for EEZ patrols in Irish waters, and have proven to be very effective. However, since these vessels are in their third decade of operations, the Naval Service has commenced its acquisition of the new Roison-class vessels.



The Deirdre class vessel L. E. Aoife. The 65-metre Aoife was designed and built in the 1970s specifically for patrolling Irish fishery waters. Armed with a 40mm Bofors gun and two 20mm canons, the vessel is a very stable platform at sea and is capable of 17 knots.



**L. E. Roisin undergoing sea trials.** The latest patrol vessel for the Naval Service builds on the experience gained from operating the Service's first generation of purpose built craft the Deirdre class. Commissioned in December 1999 the 79-metre vessel is capable of 23 knots and has an endurance of 6000 miles at 15 knots.

The Service operates closely with the Air Corps Maritime Patrol Squadron, providing Ireland a highly effective, combined patrol force. Aircraft and vessels are often tasked to simultaneously cover the same areas. In these cases, the aircraft functions as the long range 'eyes' and 'ears,' while

the vessel provides the means of enforcement. The significant investment in communications and information technology infrastructures has contributed to the success of these patrols.

The Naval Service established the Naval Supervisory Centre (NSC) as a national recording centre for sea fisheries. The NSC supervises and co-ordinates all matters concerning fisheries that are within the Naval Service's area of responsibility. In addition, it briefs Naval Command on the current activities, trends and developments occurring in sea fisheries.

To assist the NSC with their task of fishery protection, the Naval Service has developed a number of software packages, such as the fishery database, the fisheries legislation expert system, and the naval service geographical information system. These information systems are maintained by the staff at NSC, and the information is available, via satellite communications and in real time, to the vessels and aircraft engaged in EEZ patrols.



**L. E. Orla inshore patrol vessel.** Only marginally smaller than the Deirdre class the two vessels in this class do not have the sea-keeping abilities of the former. Designed for inshore work, the Orla class vessels are tasked with coastal patrol duties where their 25 knots top speed can be used to advantage.

## APPENDIX 3 – SEA STATES

BEAUFORT WIND SCALE - A scale classifying wind strength in terms of observable effects at sea.
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BEAUFORT FORCE	WIND SPEED IN MPH	SEA STATE (AND SEA-STATE RATING)	EFFECTS AT SEA
0	Under 1	Calm: (1)	Sea like mirror
1	1-3	Light air: (1)	Ripples with appearance of fish scales, no foam crests.
2	4-7	Light breeze: (2)	Small wavelets, crests of glassy appearance not breaking.
3	8-12	Gentle breeze: (2)	Large wavelets, crests begin to break scattered whitecaps
4	13-18	Moderate breeze: (3)	Small waves, becoming longer, numerous whitecaps.
5	19-24	Fresh breeze: (4)	Moderate waves, becoming longer, many whitecaps, some spray
6	25-31	Strong breeze: (5)	Larger waves forming whitecaps everywhere, more spray.
7	32-38	Moderate gale: (6)	Sea heaps up, white foam from breaking waves begins to be blown in streaks.
8	39-46	Fresh gale: (7)	Moderately high waves of greater length, foam is blown in well mad streaks.
9	47-54	Strong gale: (8)	High waves, sea begins to rolls, dense streaks of foam, spray may reduce visibility.
10	55-63	Whole gale: (8)	Very high waves with overhanging crests, sea takes white appearance, visibility reduced.
11	64-72	Storm: (9)	Exceptionally high waves, sea covered with white foam patches.
12	73 or greater	Hurricane force: (9)	Air filled with foam, sea completely white with driving spray, visibility reduced.



The subject of surface surveillance platforms and their equipment is varied and complex, and the authors do not espouse to be experts in such matters. Therefore, the following section qualifies as the basis for further, more expert, analysis.

In the main report, much was stated about the importance of the electronic sensors and systems carried onboard the surveillance platform. Indeed, it was postulated that the capabilities of the platform itself were somewhat secondary to its 'eyes' and 'ears'. In the case of surface surveillance, the balance shifts back toward the platform and its inherent abilities when operating in the field.

This shift is due to the particular requirements defined for surface surveillance assets, which in comparison to aerial surveillance platforms are rather more overt in nature. For a suitably equipped aircraft, it is possible to remain concealed from an offending vessel and still monitor its activities. For a vessel, on the other hand, this task is more difficult, unless the vessel is equipped with a helicopter and suitable sensors. Vessels deployed for fishery protection work may engage in covert surveillance for a portion of a patrol, but more often than not, they will be required to board and conduct inspections at sea.

However, a patrol craft is more appropriately tasked in a rapid-response role as it possesses the ability to apprehend a fishing vessel, whereas an aircraft can monitor the activities of a vessel, report these to the appropriate sources, and disable the vessel if required. In other words, one of the most important distinctions between aerial surveillance and surface patrols is that while the former has excellent stealth capability, the latter can actually enforce the law at sea and provide a very visible deterrent to any would-be transgressors.

#### A dedicated vessel for the role

The type of vessel suited to conducting surveillance in New Zealand waters largely depends on the particular tasks it will be expected to do, and the location within the EEZ that these tasks will be performed. Vessel designers can often tailor a vessel (both the hull and the actual equipment fit) to meet the customer's requirements, and as long as these are defined clearly from the outset the vessel will fulfil its mission.

While a vessel may be specifically designed to perform particular roles, it can also be employed to complete multi-task assignments. Obviously, the more specialised the vessel, the less flexible it becomes when considering other tasks. Conversely, requiring a vessel to fulfil a multitude of functions will require a degree of compromise with respect to the primary mission. This 'compromise' needs to be managed in such a way as to provide an effective platform.

From its inception, EEZ surveillance around the world has predominantly been the domain of naval vessels with few exceptions. For the most part, this is likely to have been seen as a cost-effective use of a nation's naval force during peacetime. A number of nations are beginning to seriously examine the implications of using these types of vessels in this role.

The use of warships for civilian EEZ tasks is, in many cases, an uneconomic use of resources. Whether a particular navy is operating frigates, corvettes or similar vessels, its ships will have a fairly high level of weaponry, a relatively high-speed propulsion plant, and a crew trained in operating the sophisticated combat and related systems necessary in conflict. It is expensive to acquire and maintain such a complex capability, and to have it unleashed on civilian tasks within the EEZ is often seen as 'overkill'.

Another option used by some nations has been the periodic employment of commercial fishing vessels on EEZ patrols. In the majority of cases this option has proved inadequate, as the vessels were simply not up to the task. These types of vessels are often too slow<sup>1</sup> and do not have any surveillance equipment, such as search radar and helicopter capability.

Over the past decade there has been a gradual shift away from using these other types of vessels for EEZ work with a view to designing vessels specifically for the role. In some quarters they are now defined as 'EEZ Management Vessels'.

The patrol boats (including those operated by navies) are built to commercial standards, dispensing with the need for comprehensive defence mechanisms and complex design features geared toward improving a vessel's combat survivability, which is clearly not needed for this class of vessel. Indeed, desired features of these patrol vessels, such as a clear deck area, crew facilities, simplicity and support independence, clearly contrast military design standards, where primary considerations are generally speed, radar and acoustic signatures, arcs of fire, and the ability to withstand shock. This change in standards significantly reduces the cost of a platform, and provides a vessel that is just as capable as a combat vessel, yet far more readily available for EEZ resource protection work.

#### Vessel attributes

An EEZ resource-protection vessel would need to be flexible enough to allow it not only to patrol close to shore but also to have the ability to steam quickly to the outer edge of the EEZ and operate in New Zealand's sub-Antarctic waters. The vessel must have superior sea-keeping attributes, allowing it to operate in sea states of at least 4 or 5 (see Appendix 3 for definition), without detriment to the crew and without hampering normal duties. Such requirements would likely have implications for the size of the proposed vessel; the vessel would probably be at least 30 or 40 metres in length.

A good loiter capability is equally as important for the purposes of either shadowing a suspect vessel or maintaining surveillance on a specific activity or area of concern. The potential to loiter implies that the vessel will need to have sufficient endurance at sea. A minimum endurance of ten days could be seen as adequate but this will depend on other factors, such as the number of vessels in the patrol fleet, their distribution around the country, and the distances to their areas of operation. Obviously, if the fleet were small and based in one port, the vessel's endurance would have to be significantly greater in order to deal with longer transit times.

A rigid hull inflatable boat (RHIB) or a launch-type vessel will be an essential component of a patrol vessel to allow the vessel to conduct boardings at sea. This will also increase the degree of flexibility the vessel has when conducting short-range operations. A suitable auxiliary boat embarked onboard the patrol boat would allow, for example, fishery officers to conduct patrols close to and onshore in remote areas, while the patrol boat continues with surveillance further offshore. The patrol boat would act like a 'mother ship' with the RHIB or launch returning to the vessel at the end of each day. This would dramatically increase EEZ surveillance coverage.

<sup>&</sup>lt;sup>1</sup> Most fishing vessels can only make 10 to 12 knots whilst other vessels operating in the New Zealand EEZ such as fish carriers have maximum speeds of over 20 knots.

In considering such a scenario the speed of the patrol boat becomes an important factor. A faster vessel will reduce transit times and allow the vessel to cover a greater area during a patrol. The vessel will need to have a sufficient speed to allow it to overtake any fleeing vessel, and to indicate to the offending vessel that it must halt. The extra speed will also allow the patrol vessel to take action quickly, avoiding an escalating situation involving 'hot pursuit' on the high seas. As a guideline the vessel would, at the very minimum, require a top speed of 20 to 25 knots (although 30 knots and above would be preferable).

The manner in which the vessel is employed will have implications on crew numbers and the accommodation available onboard. For example, additional fishery officers performing special inshore surveillance work would require the necessary facilities to cater for the extra personnel. Similarly, tasks performed for other agencies may also need additional space on the vessel for people and supplies (e.g. disaster relief). The complexity of the vessel will also impact on the size of the crew needed, and would further influence the size of vessel deemed appropriate.

#### Communications

Overseas experience has demonstrated the effectiveness of operating aircraft and vessels in a coordinated approach to fishery protection patrols. Therefore, a crucial consideration for any proposed patrol vessel is the communications suite. The vessel will need to have the ability to communicate with a shore base and patrol aircraft while on duty, in addition to the obvious need to communicate with other vessels at sea. As well as this 'open' means of communication, the vessel will also need access to secure communication facilities, both in voice and data forms.

As a minimum, the vessel will have HF, VHF, UHF and satellite communication equipment, as well as a data-link allowing the transfer of information between the patrol assets and the shore base.

#### **Electronic sensors**

Most foreign patrol boats employed on EEZ patrol tasks lack dedicated surveillance radar, tending to be fitted only with limited navigation radar. This limits the vessel with respect to its ability to conduct covert surveillance when not supported by either its own helicopter or a shore-based patrol aircraft. The offshore patrol vessel must therefore have suitable search radar fitted to enhance its surveillance capability and allow for efficient use of the time spent at sea. In addition to radar, the vessel must also have an electronic suite that will allow it to locate and identify vessels in all conditions.

#### Maritime helicopter

This leads to an issue of whether the EEZ resource protection vessel should be equipped with helicopter capability. Earlier vessels engaged in this role were often not equipped with such a capability but the use of a helicopter on a small patrol vessel has been an increasing trend over the past two decades.

The helicopter adds a whole new dimension to a vessel's capabilities at sea. A modern multipurpose maritime helicopter is often equipped with similar sensors (though may be not as comprehensive) to the fixed-wing maritime patrol aircraft and hence much of what was stated in the main report applies here with the exception of airborne endurance. The shore-based patrol aircraft has more time on station and can cover more area than a helicopter but the combination of a helicopter and a patrol vessel has the advantage of a sustained presence in an area and the ability to carry out inspection and enforcement operations. The helicopter, in effect, extends the 'eyes' and 'ears' of the vessel, conducting both overt and covert forms of surveillance beyond the horizon. The helicopter can also be used to transport boarding parties to vessels, thus avoiding the need to have the resource-protection vessel decrease speed in order to disembark a RHIB. In general, the utility and surveillance functions of the helicopter, combined with the attributes of a patrol vessel, make this combination a formidable resource protection tool.

A further consideration, then, is whether the vessel will have full support facilities for a helicopter (i.e. a hangar) or simply a flight deck with refuelling capabilities. This will also have implications on the size of the vessel.

#### Weapons

A resource protection vessel will need to have a weapon of sufficient calibre for use in situations, for example, where an illegal vessel is attempting to flee New Zealand's maritime jurisdiction. Not only does the visual appearance of a weapon onboard a vessel indicate to any would-be transgressors the seriousness with which New Zealand manages its EEZ but it also allows the patrol vessel to take the necessary action when required. Such a weapon is more appropriate for patrol vessels operating offshore where the likelihood of engaging in 'hot pursuit' is far greater.

#### Other equipment and capabilities

In terms of other equipment, the vessel will need to have winches capable of retrieving different types of fishing gear, such as rock lobster pots and various types of nets. The ship will also need deck space to handle any gear brought onboard and provision made for its stowage.

If the patrol vessel arrests another ship at sea it may be forced to disable it in order to prevent it escaping custody. There is also the possibility that the crew of the illegal vessel may attempt to sabotage their ship to avoid going back to port. In any case, the patrol vessel will need to be capable of towing disabled vessels back to port.

A final consideration, but one of the most important factors for any vessel, is the crewing aspect. A vessel is only as good as those who operate it, so a high standard of training and experience will be required. This places responsibility on the Ministry of Fisheries to provide the crew with the appropriate level of training in order to enable them to carry out their duties. In addition to the standard training in seamanship and vessel handling, the crew will have to be proficient in aspects such as fishery officer powers, obligations under the Bill of Rights and international law.