REVIEW DIRECTORATE

DIRECTION GÉNÉRALE
DE L'EXAMEN

REPORT ON THE REVIEW OF SHORT RANGE MARINE AIDS TO NAVIGATION
PROJECT 65156
FEBRUARY 2001

Fisheries and Oceans Canada
Pêches et Océans Canada
Canada

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

The Marine Aids Program is a component of the Marine Navigation Services (MNS) business line. The Aids to Navigation Program (ANP) encompasses assisting mariners to navigate safely and efficiently by[1]:

- establishing national standards for aids to navigation;
- providing and operating of 'public' aids to navigation systems;
- providing guidelines and assistance for the establishment of 'private' aids to navigation;
- monitoring aids services; and
- providing safety information.

The scope of the review included an examination of the following:

- Action taken in response to observations and recommendations included in the 1993 audit report on Short-Range Aids to Navigation.
- Planning and coordination of the Short-Range Aids to Navigation Program including the interface with Fleet and Technical Services and other departmental organizations.
- The establishment of Short-Range Aids to Navigation priorities.
- Information systems - the number of systems involved, their interfaces and potential duplication or lack of information.
- Aids Modernization - Background of the program, resources, including the use of funds for their intended purpose, and expected results.
- Client satisfaction.
- The process by which the Short-Range Aids to Navigation Program is funded and resource expenditures accounted for, including the coordination with the Fleet and Technical Services organizations.
- Service Standards/Performance Measurement.
- The process by which short-range navigational aids are divested to the private sector, including the interface with Small Craft Harbours.

The review was divided into three major phases: Planning, Conducting and Reporting. The Planning phase included examining key documentation and conducting interviews in Headquarters (HQ). A field visit was also undertaken to the Pacific Region. Through this process the Review Team identified items to be examined during the detailed review field visits.

The Conduct Phase involved interviews and examination of relevant documentation in Headquarters and Regional Offices as well as selected Canadian Coast Guard Bases in Newfoundland, Maritimes, Laurentian and Central and Arctic.

The Reporting Phase involved conducting the analysis and reporting of the findings. This report provides this analysis.

[1] *Business Plan 1999/2000 – 2001-2002*, Marine Navigation Services, Canadian Coast Guard, PC Docs #48438.

The focus of the review was on short-range aids to navigation, however, the impact of long-range aids to navigation on the overall program was considered.

Marine Aids to Navigation has undertaken significant initiatives over the past few years to improve the program. These initiatives have included:

- introduction of the Marine Aids Modernization program;
- development and populating the Aids Program Information System (SIPA);
- refinement and implementation of Levels of Service;
- revitalization of lightstations; and,
- refinement and improvement of the program planning and delivery structures.

These initiatives have been introduced in a time of financial reduction and constraints. To fulfil these initiatives, the program has been moving towards a more business-like approach for its program delivery. It is with this perspective that this review should be viewed. The observations and recommendations are focused on promoting a more business-like approach to assist the program in its continuous improvement efforts.

SUMMARY OF FINDINGS AND CONCLUSIONS

Planning and Reporting Structure - MNS has established a well structured national business plan and process. An examination of major projects shows that the estimation processes vary, with some estimates being very detailed and others having no real base. There are no mechanisms in place to capture the information on historical costs associated with aids and therefore no basis to identify real cost and performance changes. The lack of this information makes it difficult to estimate future costs and properly plan. Once the plans are determined, there is very little reporting against planned activities. None of the reporting addresses key outcome information or the effectiveness of the program or resource utilization.

Interface - The major interface points with the Aids Program are with Operations and Technical Services. On a yearly basis, these three groups go through a planning process. While the day-to-day planning process is quite extensive, there is no assessment of the impact on the Program of not obtaining the vessel days requested or not meeting the agreed-to service requirements. While there is a scheduling with Operations and Technical Services for the routine maintenance program, there is also a need for planning for response to outages or other issues related to marine aids. A need exists to establish a framework with Operations and Technical Services to determine how best to respond to these needs.

Marine Aids Modernization - The monitoring and assessment of MAM is undertaken yearly. While this provides a status assessment and description of factors affecting the status of each initiative, it does not provide an analysis of the impact of some of the factors on the overall MAM Project and the overall program. In monitoring and reporting on the progress of the MAM project, the following questions should be answered:

- What is the impact of the shortfalls in terms of costs/savings on the project and the overall program?
- What is the impact on other groups (e.g., Operations, Technical Services and the Canadian Hydrographic Service)?
- How is this shortfall being addressed?

Performance - While performance measures, indicators and results have been identified in some regions, critical performance data seems to be missing from the monitoring of the program. SIPA is on-line in all the regions. SIPA captures information on outages (i.e., how long the aid is not in service); however, there is very little information on the performance of short-range aids (i.e., how well are the aids performing) to assist in the planning process. There is no information on cycle times, quality (durability and reliability), costs and delivery.

Levels of Service - The Marine Aids Operational Directive 2.2500 predetermines the response time for each potential discrepancy with each aid, based on importance of the aid, which is also predetermined through a needs analysis. While the regions are doing well and the incident rates have not increased, it is unclear whether the Program is operating safely. The trend is clearly showing that reliability for the floating lighted aids is decreasing. It is important for the Program to assess this situation and ensure the appropriate mechanisms are put in place to continue to ensure safe navigation for mariners.

Information Systems - SIPA is a database used for tracking the information related to the operation and maintenance of aids to navigation and it is the primary source of information for the Marine Aids Program. While SIPA is on line in all the regions, it does not seem to be populated consistently. Data capture is not integrated with other departmental financial and operational systems to its full extent to eliminate double entry and multiple sets of books. The identification of assets also appears to vary by system thereby rendering transferability of information between systems impossible.

Asset Management - An important part of asset management is understanding the causal factors of equipment failure. This, in turn, affects the acquisition, maintenance, operations and training components of the program. Current process does not provide for a systematic review of equipment failure. There is also no inventory holding strategies to determine quantities to be maintained.

Budgeting and Associated Decision Making - MNS holds well under 50% of the monies spent on Navigation Aids. This means that decision-making, to a large extent, is in the control of the service providers. Budgeting is also very fragmented. This makes it difficult to rationalize the decision-making and maintain accountability. There is currently no way of completing a variance analysis or true assessment of the budget's appropriateness to meet on-going program requirements.

A Management Action Plan (MAP) addressing the recommendations in this report is provided in **Section 4.0**. In addition to the MAP, more detailed steps have been identified by the CCG to assist in implementing the recommendations.

2.0 INTRODUCTION

2.1 BACKGROUND

The Marine Aids Program is a component of the Marine Navigation Services (MNS) business line. It represents a significant portion of the planned net spending of MNS. The focus of the review was on short-range aids to navigation, however, the impact of long-range aids to navigation on the overall program was considered. Any information gathered on long range aids to navigation will be maintained on file and used in a future review of long-range aids to navigation.

The Minister of Fisheries and Oceans, through various legislation including the *British North America Act, Canada Shipping Act* and the *Oceans Act,* is mandated, though not obligated, to provide aids to navigation in Canadian waters in order to facilitate safe and expeditious movement of marine traffic.

The International Maritime Organization's (IMO) Convention for Safety of Life at Sea (SOLAS), chapter 5, Regulation 14, to which Canada is a signatory, states:

> "*The contracting governments undertake to arrange for the establishment and maintenance of such aids to navigation as, in their opinion, the volume of traffic justifies and the degree of risk requires, and to arrange for information relating to these aids to be made available to all concerned*".

The Aids to Navigation Program (ANP) encompasses assisting mariners to navigate safely and efficiently by[2]:

- establishing national standards for aids to navigation
- providing and operating of 'public' aids to navigation systems
- providing guidelines and assistance for the establishment of 'private' aids to navigation
- monitoring aids services
- providing safety information.

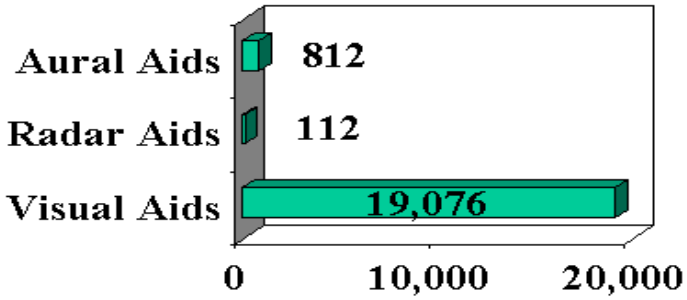
The ANP includes two main categories of Aids:

- Short Range Aids to Navigation (SRAN) system which include:

[2] *Business Plan 1999/2000 – 2001-2002*, Marine Navigation Services, Canadian Coast Guard, PC Docs #48438.

- Visual aids: lighthouses marking prominent land features, buoys marking hazards, junctions, fairways, etc., ranges marking centrelines of channels, daybeacons marking channels for daytime use;

National Inventory Summary



- Radar aids: radar reflectors to enhance detection of visual aids to navigation and important land features under reduced visibility conditions; radar beacons (RACONs) sending a distinctive response to ships radar to identify an important visual aids or land feature; and,

- Aural aids: fog horns warning danger and/or providing general direction; bell and whistle buoys warning of hazards and/or also providing general direction.

- Long Range Aids to Navigation (LRAN) system which include:

  - Radio beacons: beacons that provide a means of homing in on major points of land, major harbours or ports of refuge;

  - Loran-C: hyperbolic radio navigation system that is used to identify vessel position on the East Coast, on the West Coast and on the Great Lakes, for use with Loran-C receivers and specialized nautical charts; and,

  - DGPS Satellite Positioning System: the Global Positioning System (GPS) is a satellite navigation system developed by the United-States Department of Defence. It was declared as having initial capability in December 1993. A Differential GPS (DGPS) is another service provided by ANP to link mariners to GPS through Coast Guard DGPS beacons that enhances the accuracy of GPS.

The scope of this review is on the first category of aids (i.e., short-range aids).

Resources

Costing information is now generated through Departmental Activity Costing System (DACS). The feeder into this system for MNS purposes is Fleet Activity Information System (FAIS) and ABACUS. The table below provides the costs for the short-range aids as identified by DACS. Please note that the figures represent the costs of the program and not the budget or actual expenditures.[3]

Region	Ship Costs ($)	Aircraft Costs ($)	Direct and Shared Costs ($)	Total ($)
Newfoundland	6,607,048	965,993	14,569,451	22,142,492
Maritimes	11,764,492	743,567	12,856,184	25,364,243
Laurentian	12,508,564	617,354	8,893,438	22,019,356
Central & Arctic	14,789,722	41,091	10,648,135	25,478,947
Pacific	5,617,999	1,608,963	14,790,897	22,017,859
Total	**51,287,825**	**3,976,968**	**61,758,105**	**117,022,897**

The most significant cost line object for the Program is personnel. It is important to understand that most of the costs of the short-range aids to navigation occur outside the Program's organization. The biggest cost sources are Operations/Fleet and Technical Services.

The following table provides the distribution of aids by type and region in 1998/99.[4]

Region	Type of Aid		Total
	Floating Aid	Fixed Aid	
Newfoundland	696	774	1,472
Maritimes	5,326	911	6,239
Laurentian	1,605	601	2,271
Central & Arctic	5,303	2,447	7,471
Pacific	579	1,428	1,907
Total	**13,509**	**6,161**	**19,360**

2.2 OBJECTIVES AND SCOPE

Objectives

The objectives of the review were to determine whether:

- The Program was meeting the needs of mariners in a cost efficient and effective manner.
- The Short-Range Aids Program was supported by adequate planning, monitoring and communications mechanisms.
- Short-Range Aids to Navigation were commissioned, placed and maintained in a cost-effective manner and in support of national and regional priorities and goals.
- Short-Range Aids to Navigation research and development projects originated from technical innovations or operational needs, and are properly managed.

[3] *Cost Base by DACS Activity*, Fiscal Year 1998/99.
[4] *Marine Aids Modernization, Phase II Capital Report*, Marine Aids to Navigation Program, December, 1999.

- User consultation mechanisms were sufficient to exchange information and advise on the delivery of Program services.

Scope

The scope of the review included an examination of the following:

- Action taken in response to observations and recommendations included in the 1993 audit report on Short-Range Aids to Navigation.
- Planning and coordination of the Short-Range Aids to Navigation Program including the interface with Fleet and Technical Services and other departmental organizations.
- The establishment of Short-Range Aids to Navigation priorities.
- Information systems - the number of systems involved, their interfaces and potential duplication or lack of information.
- Aids Modernization - Background of the program, resources, including the use of funds for their intended purpose, and expected results. This review should be considered preliminary since the full impact of the Aids Modernization Program will not be known for several years.
- Client satisfaction.
- The process by which the Short-Range Aids to Navigation Program is funded and resource expenditures accounted for, including the coordination with the Fleet and Technical Services organizations.
- Service Standards/Performance Measurement.
- The process by which short-range navigational aids are divested to the private sector, including the interface with Small Craft Harbours.

This final report was approved by the Departmental Review Committee in February 2001.

2.3 METHODOLOGY

The review was divided into three major phases: Planning, Conducting and Reporting.

The Planning phase included examining key documentation and conducting interviews in Headquarters (HQ).

A field visit was also undertaken to the Pacific Region. Through this process the Review Team identified items to be examined during the detailed review field visits.

The Conduct Phase involved interviews and examination of relevant documentation in Headquarters and Regional Offices as well as selected Canadian Coast Guard Bases in Newfoundland, Maritimes, Laurentian and Central and Arctic.

The Reporting Phase involved conducting the analysis and reporting of the findings. This report provides this analysis.

3.0 OBSERVATIONS AND RECOMMENDATIONS

Marine Aids to Navigation has undertaken significant initiatives over the past few years to improve the program. These initiatives have included:

- introduction of the Marine Aids Modernization program;
- development and populating Aids Program Information System (SIPA);
- refinement and implementation of Levels of Service;
- revitalization of lightstations; and,
- refinement and improvement of the program planning and delivery structures.

These initiatives have been introduced in a time of financial reduction and constraints. To fulfil these initiatives, the program has been moving towards a more business-like approach for their program delivery. It is with this perspective that this review should be viewed. The observations and recommendations are focused on promoting a more business-like approach to assist the program in its continuous improvement efforts.

The observations and recommendations relate to the following areas:

- planning and reporting structure;
- interface;
- marine aids modernization;
- performance;
- levels of service;
- information systems;
- asset management; and,
- budgeting and associated decision-making.

The following section of this report describes the overall findings, best practices, where applicable, and recommendations.

3.1 PLANNING AND REPORTING STRUCTURE

Planning of the program is based on ensuring short-range aids to navigation are operational to assist mariners. MNS has established a well structured national business plan and process. The plan is adjusted each year outlining the key strategies and objectives as well as major initiatives and their timeframes. The plans have improved significantly since the previous audit and have therefore implemented the recommendations on clear deliverables and timeframes.[5] However, the plans have some weaknesses. They do not always clearly articulate who is going to do what, which weakens the plans in terms of accountability. Another weakness is the lack of linkage of resources to activities and outcomes. In reviewing the 1998/99 Business Plan, the resource linkages for reduction targets by region, Research and Development (R&D) and major and minor capital were clear, but they were unclear for the remaining areas such as, major initiatives (non-capital) and operating areas. This leads to the final area of weakness, the performance indicators, which is discussed in detail in **Section 3.4, Performance**.

[5] *Short-Range Aids to Navigation, Internal Audit Report*, Canadian Coast Guard, March 17, 1993, p.12.

On a regional basis the business plans are less developed. There is little to no information on what is going to be done, who is accountable, when the work is going to be done, resources and what is going to be achieved. They are not linked to the national business plan. The exception is the Laurentian, where their business planning process is more comprehensive. Their business plan describes the program's objectives, regional objectives, activities and expected results. For each of the expected results, performance measures have been identified. The region is currently in the process of defining the tools/systems to capture the data so they can report on the defined performance measures. Without improvements to the planning documents, variance analyses are not possible and accountabilities cannot be fully maintained.

In examining the major projects, we observed that the cost estimation processes vary with some estimates being very detailed and others having no real base. For example, in estimating the costs for the environmental remediation program there appears to be very detailed site analysis to support the type and extent of work to be done. This, in turn, allows for a more detailed and realistic estimation process. On the other hand the lightstation revitalization project did not define the extent of work required thereby rendering the estimate unreliable. The variance appears not to be caused by materiality or time but rather reflects the individual approaches of officers.

MNS has relied on costing systems such as BIM/MACS in the past and currently DACS, however, the review team found that information on historical costs associated with aids was lacking and therefore no basis to identify real cost and performance changes. The lack of this information makes it difficult to estimate future costs and to properly plan.

Once the plans are determined, there is very little reporting against planned activities. For example the 1998/99 Business Plan identified several key initiatives yet there was no formalized reporting of what was actually achieved. Much of the reporting tends to identify major initiatives in a technical manner but not necessarily progress against planned outcomes. There is a six-month national peer review meeting held with the regions. While this is an excellent initiative, it does not provide the variance reporting necessary to maintain accountability. It also misses out on feedback necessary to do proper planning and take the necessary corrective actions. None of the reporting addresses key outcome information or the effectiveness of the program or resource utilization.

Recommendations:

It is recommended that:

3.1.1 the Director, Navigational Systems distribute the annual business plan to regions for their input and consideration in developing the regional plans.

3.1.2 the Director, Navigational Systems and the Regional Superintendents, Aids to Navigation, review the Laurentian business plan process for its applicability as a basis for developing an appropriate business plan.

3.1.3 The Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, establish a reporting structure between HQ and the regions that

reports progress to planned and anticipated performance. The performance indicators and measures form a large part of this reporting structure.

3.1.4 The Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, put in place an accountability framework in the business plan as well as projects/initiatives undertaken by the Program.

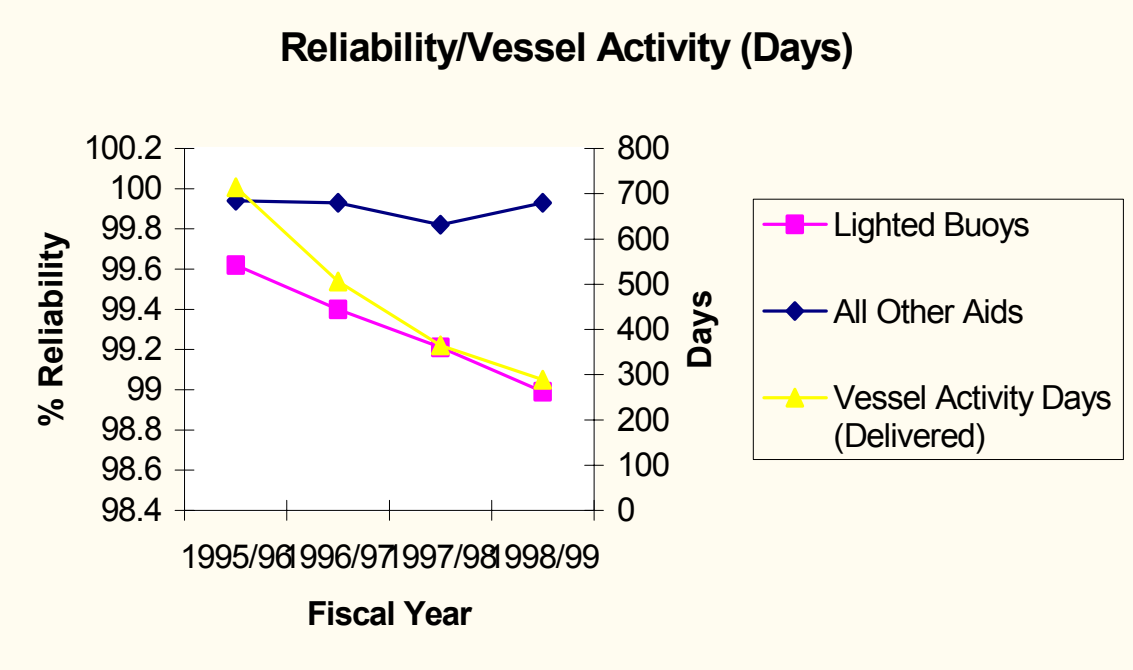
3.2 INTERFACE

The major interface points with the Aids Program are with Operations (fleet) and Technical Services. Both these groups have a direct and major influence on whether the Program is able to meet its objectives. These three groups have been working together for many years, therefore have a detailed understanding of each other's activities, environment and operations. A change to any of these groups has the potential of having an impact on the other two. For example, when there was a budget reduction to Fleet (i.e., less vessel time available), this had a direct impact on the Aids Program and Technical Services' ability of attaining their program objectives.

On a yearly basis, these three groups go through a planning process. This process is similar in all regions. For Operations (fleet), planning is an annual scheduling process whereby a request from the Aids Program is made for fleet services, in the form of ship days. The request actually specifies the type of vessel for specific periods and locations. Operations, upon reviewing the requirements of all users, prepare a schedule and discuss this schedule with each of their users. In all regions, the requested activity level is much higher than the planned activity level. For example, in the Maritimes, they requested 430 ships days and were planned for 298 days, while in the Pacific they required 520-550 ship days and only received 298 days.[6]

[6] Based on interviews with Superintendents of Marine Aids to Navigation in the Maritimes and Pacific Regions.

While the day-to-day planning process is quite extensive, there is no assessment of the impact on the Program of not obtaining the days requested. For example, in the Pacific Region, as depicted below, the vessel time provided to the MNS program has been decreasing over the years while the aids reliability has only decreased for floating lighted buoys. The reliability for



other aids (i.e., floating unlit, fixed lighted, fixed unlit) has remained somewhat constant.

As the chart depicts, while vessel activity associated with MNS has decreased by over 50% in the last four years, the reliability of aids has not suffered significantly. The aids most affected are the floating lighted aids. However, as the following table depicts, the number of accidents has not increased[7].

Causal factors assigned to vessels involved in shipping accidents	**1988**	**1992**	**1997**
Canadian Flag:			
# accident: assigned factor	821	700	365
# accidents attributable to aids to navigation	18	13	11
Foreign Flag			
# accidents: assigned factor	155	149	65
# accidents attributable to aids to navigation	0	5	1

The majority of accidents are attributable to human error and unsafe environmental/ vessel conditions. Although national accident rates are declining, the statistics show that more accidents on the east and west coasts involve fishing vessels than other types, and that cargo/oil-bul-ore-tanker vessels are involved in more inland water accidents. As per the shipping accidents reported by Transportation Safety Board of Canada (TSB), by region in 1998, the Laurentian, Maritimes and Central and Arctic regions have reduced shipping

7 *Transportation Safety Board of Canada (TSB) Statistics Internet Site*, Tables 5a and b.

accidents by more than half in the past decade. Accidents have also declined significantly in the other two regions.

For Technical Services, the planning process is much less detailed to non-existent. The schedule of trips is given to them and they plan/organize their resources to respond to this plan provided by the Aids Program/Operations. While many initiatives were undertaken to reduce the level of effort required by Technical Services (i.e., five-year buoy), these have yet to produce the extent of benefits expected. This observation is discussed in more detail in **Section 3.3, Marine Aids Modernization**.

While there is a scheduling with Operations and Technical Services for the routine maintenance program, there is also a need for planning for response to outages or other issues related to marine aids. For example, in a recent review, the Maritimes experienced discrepancies of 13.5% of their fixed/floating aids.[8] The current planning process does not incorporate any contingency planning considerations for outages, which means that an already fully deployed fleet must respond to this. In essence, this means that outages are responded to based on short-term priorities and availability of vessels.

As the statistics indicate, this often is translated into longer periods of time between the time of the discrepancy and the time of repair. A need exists to establish a framework with Operations and Technical Services to determine how best to respond to needs and discrepancies to meet the standards (e.g., Service Level Agreement (SLA)). This framework should focus on the objectives (i.e. what needs to be done) of the Program versus how it should be done. Although in the short-run this may cause some confusion and a change in culture, it will be a significant gain in the future.

There is also little readily available information on the planned versus actual activities undertaken. Although this information exists in various documents and forms, it is not easily accessible and identifiable. This, in turn, makes it difficult to analyze the impacts of not meeting planned aids activities.

The Maritimes has a detailed day-to-day planning and analysis of variances process. They maintain a spreadsheet, which shows the planned activities and actual activities, thereby showing the difference between planned and accomplished. While this provides a better picture of the planned vs. actual, it does not provide the analysis of the impact of this shortfall on the program. This type of analysis could not be found in any of the regions.

As described above, a SLA would provide the tool to assist in managing the program's interface with other groups.
Typical service level agreements include:

- specific expected outcomes;
- indicators from which the outcomes would be measured;
- data sources of where the information will come from; and,
- consequences and impacts of not meeting expected outcomes.

[8] *CCG Maritimes Regional – Operational Performance*, Maritimes Region, 1998.

The impacts on the program are very important to measure. These may drive some of decision-making related to the day-to-day activities as well as approved projects/initiative and long-term planning.

Recommendations:

It is recommended that:

3.2.1 the Director General, Marine Programs, develop Service Level Agreements with Operations and Technical Services.

3.2.2 the Director General, Marine Programs, establish a mechanism to monitor these service providers as set out in the service level agreement.

3.3 MARINE AIDS MODERNIZATION

The Marine Aids Modernization (MAM) project was initiated in response to the program review and it is a very complex project due to the diversity of the actions planned by the various CCG regions to rationalize and modernize the present aids systems to achieve program review goals. Those goals called for the achievement of program review target saving of $2.1M in 1997/98, $10.1M in 1998/99 and accumulating to over $10M annually by the year 2000/01 when fully implemented.[9]

The magnitude and complexity of the task is such that the present resources in each region are reported as not adequate to undertake the work. The Operations and Maintenance (O&M) budget does not have any resources that can be deployed for this task. Even though capital budgets were delegated to the regions to assist in this initiative, funds required seem to have been under estimated. Following is a national cost summary overview ($000) for Phase I and II:

Element	Phase I	Phase II			Total	Total
	97/98	98/99	99/00	00/01	Phase II	Project
Project Management	440	404	205	166	775	1,215
Communication	120	240	243	245	728	848
Consultation	140	203	206	208	617	848
Real Property Assessment	120	122	122	41	285	405
Site Dismantling	707	635	247	124	1,006	1,713
Equipment and Installation	1,496	955	470	760	1,885	3,381
Contingency	453	382	226	186	794	1,247
Total	**3,477**	**2,942**	**1,719**	**1,730**	**6,090**	**9,657**

Modernization of aids will result in significant O&M savings and reductions of the Short-Range Aids (SRA) capital assets base. It was estimated that short-range aids to navigation were to be reduced from about 20,000 in 1997/98 to about 16,000 by the end of 2000/01. This reduction of about 4,000 SRAs represents the bulk of savings estimated for this project. Also,

[9] *Effective Project Approval, Marine Aids Modernization – Phase II*, Canadian Coast Guard, Fisheries and Oceans Canada, PC Docs #36860, 1997

this reduces the CCG asset base by some $15M. In addition, there are inventory savings associated with the divestiture of real property support short-range aids. The introduction of new technology, solorization and more efficient buoy paint will also contribute to the estimated savings. Real property and infrastructure at most lightstations will no longer be required as a result of downsizing or decommissioning lights and foghorns. The targeted savings for the MAM project are summarized below. The 1997/98 savings of $2,159M have already been implemented as reductions.

	1997/98	1998/99	1999/00	2000/01
Non-fleet	2,159	4,529	7,129	9,960
Fleet	-	5,617	8,617	10,117
Total	2,159	10,146	15,746	20,077

Aids Modernization is the Aids to Navigation Program's major initiative required to achieve the CCG objectives and allow the CCG to meet its financial objectives. Aids Modernization consists of:

- adjusting Levels of Service (LOS) to user's needs for safer navigation in accordance with CCG's policies and standards;
- taking full advantage of new technology to improve navigation and reduce costs;
- eliminating surplus equipment and/or services; and,
- improving information technology to enhance communication with clients and reduce costs of data gathering.

Specifically, the MAM is a complex project, which links all aspects of the marine aids services and involves, but is not limited to, the following initiatives:

- conventional aids – the review of requirements for conventional aids (and associated policies);
- DGPS – the implementation of a Canadian DGPS service;
- electronic charts – the development and implementation of electronic charts and associated information displays;
- navigational equipment – the regulatory development and field implementation of new navigational equipment;
- information and training for users and industry – the modification/adaptation of official information to mariners; the development of training packages, communication and marketing plans;
- more effective aids to navigation – the ongoing implementation and development of more effective aids to navigation, including lighstation standardization project and 5-year maintenance free buoy;
- solarization of seasonal buoys;
- environment;
- research and development; and
- other initiatives – the implementation of other initiatives at national and regional levels and the discontinuance of LORAN-C.

The project management structure is critical to the delivery of the modernization project. A Project Charter was signed and agreed to in February 1997, by the Coast Guard Commissioner, the Director General, MNS, the Director General, Technical and Operational Services Directorate (TOSD) and the Regional Directors regarding their respective responsibilities and working relationships for the duration of the Project.

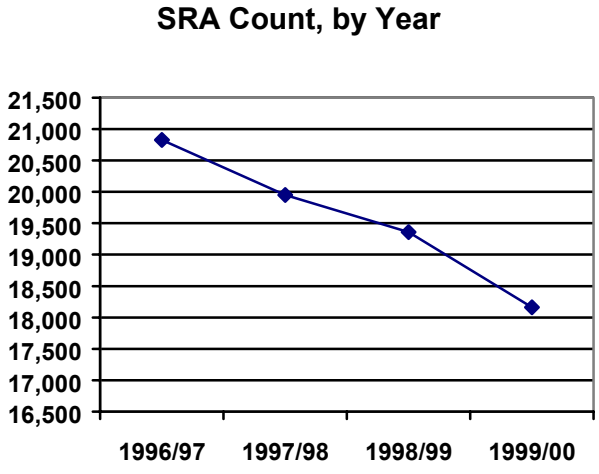
The monitoring and assessment of MAM is undertaken year over year. A recent capital report provided the status of the main initiatives of the MAM project.[10] The report identified several areas, which should have an impact on the attainment of the overall project objectives, for example:

- The Government's decision to keep 51 lightstations staffed.
- The options of divestitures and disposal of sites or systems no longer supported by the policy or level of service review have been delayed by the consultative process and Native Land Claim issues, local heritage issues, environmental concerns (mercury, mould, other heavy metals), maintenance and upgrades.
- The savings forecast for the 5-year buoy project was based on the assumption that the buoys would remain on station for 5 years without servicing or maintenance. This is proving to be difficult in many locations, as the moorings need to be replaced after 2 to 3 years. In some regions, ships visit the buoys yearly to verify their position and remove marine growth and fouling.
- DGPS, although delayed, is expected to begin the process of phasing in full operational service by the spring of 1999. A further delay in C&A due to a requirement to replace antenna towers. Since the completion of its work in the regions, the review team has been advised that DGPS is now fully operational.

While these provide the status and a description of factors affecting the status of each initiative, it does not provide an analysis of the impact of some of the factors on the overall MAM Project.

The reduction of SRA is also not being met based on the following chart.

As mentioned earlier, it was estimated that short-range aids to navigation would be reduced from about 20,000 in 1997/98 to about 16,000 by the end of 2000/01. Currently, the total short-range aids target for 2000/01 is 18,194. Given this, it is clear that the MAM Project reductions cannot be achieved; however, no analysis has been made to describe the impact of these shortfalls.



[10] *Marine Aids Modernization Phase II, Capital Report*, Marine Aids to Navigation Program, December 31, 1999.

In monitoring and reporting on the progress of the MAM project, the following questions should be answered:

- What is the impact of the shortfalls in terms of costs/savings to the project and overall program?
- What is the impact on other groups (e.g., Operations, Technical Services and the Canadian Hydrographic Service)?
- How is this shortfall being addressed?

There is a need to have the appropriate processes/information systems in place to enable the collection of the data required to determine whether expected savings/benefits are being achieved. This shortfall is consistent with the observations and recommendations in the 1993 Audit of Short-Range Aids to Navigation.[11] Some of the cost reductions have been based on assumptions of savings/benefit of the MAM project. It is essential that the Program know if these savings/benefits are being achieved. Some of the essential components of project planning, monitoring and reporting include:

- project plan describing objectives, roles and responsibilities, timeframe, costs, expected benefits and reporting requirements;
- selection criteria to accept/reject project proposal and set priorities;
- monitoring and reporting requirements for projects/initiatives (i.e., who project team reports to, how frequently and what they report on).

This project reporting structure will allow for the assessment of impacts on the organization where objectives are not being met. As mentioned earlier, these are critical to the long-term planning of the Program.

Recommendation:

It is recommended that:

3.3.1 the Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, put in place mechanisms to improve the planning, coordination and implementation as well as the monitoring and reporting of projects.

3.4 PERFORMANCE

The 1998/99 to 2000/01 Business Plan sets out the following:

> *"To establish Performance Indicators and Outcome Indicators that make sense to HQ and the Regions, in order to monitor the Program effectiveness the Aids Modernization Plan and overall results of the Marine Aids program for the industry and Canadian public."*

[11] *Short-Range Aids to Navigation, Internal Audit Report*, Canadian Coast Guard, March 17, 1993, p. 31 and 33.

The indicators will be used to monitor the Aids Program, Aids Modernization, and the Business Plan. The results of the monitoring process will be distributed twice per year for the regions to comment.

The 1999/2000 – 2001/2002 Business Plan indicated the type of performance indicators that could be used in MNS to measure program-specific outputs. They identified that further work would be done in this area during the planning period to develop an improved national performance measurement system that focuses on key outcome as well as output measures, and ties into the CCG performance measurement framework currently under development.

Indicators	Performance Measures	Outputs	Outcomes (results)
▸ Number of Safety incidents related to Marine Aids/Area	▸ Report from Transport Safety Board	▸ Incident increase/decrease	▸ Safety of navigation
▸ Cost/Aids/ National ▸ Cost/Aids/ Regional ▸ Cost of Loran C ▸ Cost of DGPS	▸ BIM/MACS=Cost ▸ SIPA=Number of Aids	▸ Cost increase/decrease for Marine Aids Service	▸ Efficiency of the system
▸ Public satisfaction	▸ Reaction of user groups at CMAC (national and regional) ▸ Number of negative ministerial correspondence	▸ Degree of client support	▸ Safety, efficiency and effectiveness of Marine Aids System & facilitate access to Canadian Waterways
▸ Number and duration of delays because of poor visibility in major commercial waterways	▸ Report from MCTS	▸ Performance compare to availability standard ▸ Trend	▸ Effectiveness of Marine Aids System & facilitate access to Canadian Waterways
▸ Reliability	▸ SIPA	▸ Performance compare to published standard for reliability ▸ Cost increase/decrease	▸ Safety, efficiency and effectiveness & facilitate access to Canadian Waterways
▸ Cost/Risk index/Area	▸ Level of Safety tool	▸ Increase/decrease cost of Marine Aids	▸ Safety, effectiveness and efficiency of the system & facilitate access to Canadian Waterways
▸ Cost/Number of Aids/Area	▸ Level of Safety tool	▸ Cost increase/decrease	▸ Efficiency of the system
▸ Number of intervention/5yr buoys	▸ SIPA	▸ Cost reduction	▸ Efficiency
▸ Number of outages/5yr buoys	▸ SIPA	▸ Trend in reliability	▸ Efficiency and effectiveness & facilitate access to

Indicators	Performance Measures	Outputs	Outcomes (results)
			Canadian Waterways

While performance measures, indicators and results have been identified, critical performance data are missing to monitor achievements of the program as was identified during the 1993 Audit of Short-Range Aids to Navigation[12]. While SIPA is on-line in all the regions, capturing information on outages (i.e., how long the aid is not in service), there is very little information on the performance of short-range aids (i.e., how well are the aids performing) to assist in the planning process. There is no information on cycle times, quality (durability and reliability), costs and delivery. The Laurentian Region has defined some of their performance measures but are in the process of establishing their reporting and monitoring systems. Their performance measures are to be in-line with those set out by HQ.

Recommendations:

It is recommended that:

3.4.1 The Director, Navigational Systems propose the performance indicators identified in the 1999/00-2001/02 Business Plan to the regions and within CCG Headquarters. There may be some regional adjustments required. Since the Laurentian Region has already defined many of these, these could be used as the starting point.

3.4.2 Once the performance measures are agreed to, the data sources should be identified and the appropriateness of the information collected should be confirmed. These performance measures and data sources should then form part of the business planning process and on-going monitoring of the Program.

3.4.3 The Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, determine the appropriate reporting against performance measures. This should be done regionally and then compiled at the national level.

3.5 LEVELS OF SERVICE

The Canadian Coast Guard, on October 15, 1990, approved a level of quality for the marine aids service, specifying overall performance targets for operational reliability of 99%. The International Association of Lighthouse Authorities (IALA) advise that the reliability for various categories of aids should be:

- landfall and leading lights, at least 99.8%;
- other fixed lights or large navigation buoys, at least 99%; and,
- other lighted buoys, at least 97% (other unlighted aids such as daybeacons and unlit spars are not specified).

[12] *Short-Range Aids to Navigation, Internal Audit Report*, Canadian Coast Guard, March 17, 1993, p.20.

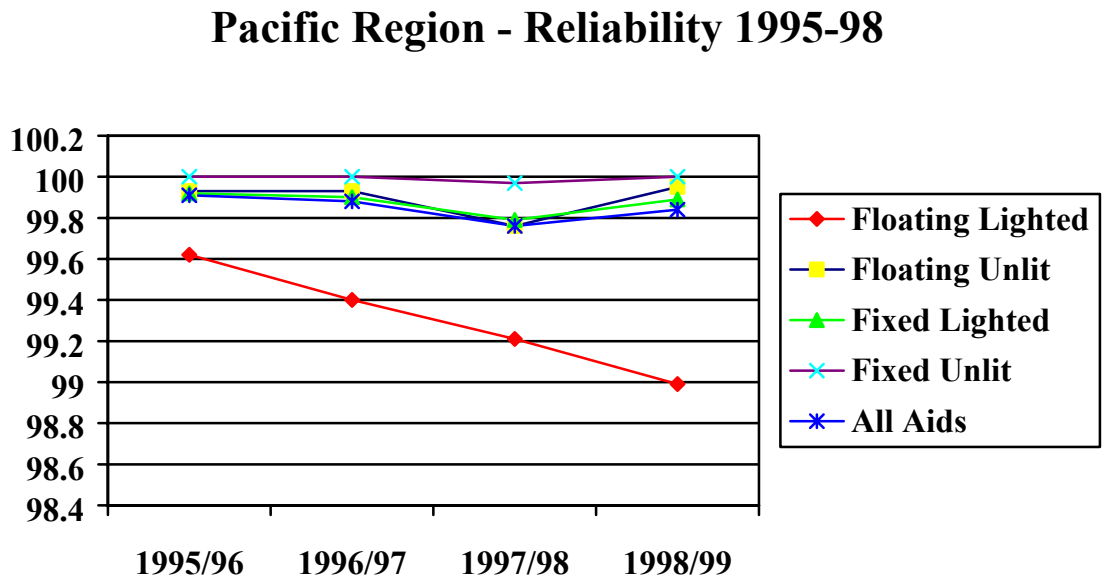
The Marine Aids Operational Directive 2.2500 takes a slightly different approach than the IALA recommendations in that it predetermines the response time for each potential discrepancy with each aid, based on importance of the aid which is also predetermined through a needs analysis. The aids are identified as per the following categories:

- Threat rating 1 – 99.8% and response time of 24 hours;
- Threat rating 2 – 99% and a response time of 72 hours;
- Threat rating 3 – 97% and a response time of 336 hours; and,
- if an individual aid should fall to 95% then attempts are made to improve its reliability by modernizing its equipment, installing monitoring equipment or considering alternative system design.

While the availability standard is a good risk-based approach of setting priorities, it is currently not being used across the regions. Priorities are determined by day-to-day activities. For example, if there is an outage in an area where a vessel is present, then the outage will be taken care of. However, if an outage were identified in an area where there is no vessel coverage at the time, the outage would be scheduled for when there would be vessel coverage. While the threat rating is identified in SIPA, the rating is not communicated to Operations at the time of the outage.

Interviewees also identified that if the performance target cannot be met for a particular outage, the aid is identified as being discontinued in SIPA. By following this practice, the reliability statistics are being distorted.

Currently, regions are experiencing some difficulty in achieving the reliability standard set out in Directive 2.2500, as shown below for the Pacific Region:



While the regions are doing well and the incident rates have not increased, it is unclear whether the Program is operating safely. The trend is clearly showing that reliability for the floating

lighted aids is decreasing. It is important for the Program to assess this situation and ensure the appropriate mechanisms are put in place to continue to ensure safe navigation for mariners.

There is also an availability standard set out in the Marine Aids Operational Directive 2.2200, *Design of Short-Range Marine Aids Systems*. This administrative directive specifies the principles and procedures for the selection and location of the types and mix of aids to be included in the short-range aids systems established under Directive 2.2100, *Provision of Short-Range Marine Aids Systems*.

The IMO Convention for SOLAS, Chapter 5, Regulation 14, to which Canada is a signatory, states:

> *"The contracting governments undertake to arrange for the establishment and maintenance of such aids to navigation as, in their opinion, the volume of traffic justifies and the degree of risk requires, and to arrange this information relating to these aids to be made available to all concerned."*

Design availability is the percent of time during the worst month of the navigation season (i.e., the month when visibility is most frequently restricted) that, given local waterway and weather patterns and conditions, the operator of specific categories of vessels should be able to use (i.e., see, hear, etc.) the short-range marine aids system to assist in navigating through the area, assuming that the aids are functioning properly. The design availability for all three vessel categories (i.e., certified commercial, uncertified commercial and pleasure craft) is 75%. This design availability was reduced from 85% to 75% in the fall of 1996 based on an analysis of past incidents such as groundings, collisions or near-misses.

As mentioned previously and depicted in the table below, the number of incidents has not increased since the inception of the lowered design availability:

Causal factors assigned to vessels involved in shipping accidents	**1988**	**1992**	**1997**
Canadian Flag:			
# accident: assigned factor	821	700	365
# accidents attributable to aids to navigation	18	13	11
Foreign Flag			
# accidents: assigned factor	155	149	65
# accidents attributable to aids to navigation	0	5	1

As part of the reduced design availability, a national review of service levels was undertaken through a pre-determined LOS assessment process. The LOS assessment process forms part of the cyclical review of all aids, which is consistent with a recommendation made in the 1993 Audit of Short-Range Aids to Navigation.[13] This process is quite extensive and is completed consistently across all regions. There is also an annual peer review involving all regions to review the progress of the regions as well as raise any issues with some of the assessments or the process.

[13] S*hort-Range Aids to Navigation, Internal Audit Report*, Canadian Coast Guard, March 17, 1993, p.17.

The Key LOS Assessment Steps Chart provides the major steps involved in the LOS assessment. Consultations form a large part of this process. Before recommendations are made in the LOS assessment, consultations are undertaken with mariners, pilots, and other stakeholders.

Key LOS Assessment Steps

1. Determination of area of review by LOS Officer
2. Complete site inventory and technical data (form 73-0117)
3. Collect information (form 73-0116) including historical data from lightstations and airports
4. Determine users (usually defined by least capable users, i.e., outer by smaller vessels and inner by larger vessels)
5. Complete site data sheet (form 73-0115)
6. Use charts and draw the tracks (form 73-0118)
7. Determine preliminary threat rating (form 73-0118)
8. Complete composite threats/needs matrix – outer approaches/open water
   - inner (form 73-0120)
   - outer (form 73-0119)
9. Operational analysis – using charts for visibility and perception
10. Develop options and make recommendation (including feasibility, advantages/disadvantages, benefits and occasionally costs)
11. Superintendent, MNS makes final decision

The status of the LOS assessments varies across the regions. It is unclear what the national status is for the LOS. The SIPA database is not up-to-date and could not provide an accurate representation of the LOS status.

The LOS assessment process was put into place to assist in the removal of redundant aids as defined through the assessment. While many aids were identified as redundant, factors (e.g., stakeholder buy-in and influences, etc.) have come into play which have made the attainment of the reduction in aids inconsistent across the regions. For example, in one region, it was recommended that twenty-nine aids be discontinued; however, they remained in service.

Following the directive of reducing the design availability from 85% to 75%, an R&D Project Justification was approved by Headquarters for the Laurentian Region to undertake a study based on risk. The concept of the study was based on consultations with industry (e.g., commercial, pilots, etc.) and developing a tool to assess the following elements: vessel characteristics, navigable waterway, weather conditions, as well as, experience of pilots and captains and human factors.

This study will provide an additional tool to determine the level of marking required to navigate safely. This tool is complimentary to the LOS Assessment process, and identifies the risk element not clearly specified in the current assessment methodology.

Recommendations:

It is recommended that:

3.5.1 the Director, Navigational Systems, determine the risk of their reliability and availability performance results.

3.5.2 the Director, Navigational Systems, determine whether it can "afford" the current standards of reliability and availability given its current resource base and fleet availability.

3.6 INFORMATION SYSTEMS

Historically, statistics consisted of reliability reports compiled by regions and sent to HQ. In the last few years, the goal was to move toward unit based and comparative statistics. The SIPA is a database used for tracking the information related to the operation and maintenance of aids to navigation and it is the primary source of information for the Marine Aids Program. As of November 1998, the SIPA database included data for approximately 18,800 active aids and all their components. SIPA and Impromptu are used daily by all 5 regions and NCR including CCG and Canadian Hydrographic Service (CHS). This is consistent with the recommendation from the previous audit to review existing systems and implement the appropriate information systems.[14]

While SIPA is on line in all the regions, it does not seem to be populated consistently. For example, a March 2000 SIPA printout of the aids module identified that 27 aids were added in the Newfoundland Region during 1995-1999[15]. Our interviews in the Newfoundland Region confirmed that they have added 162 aids in 1997/98, 150 aids in 1998/99, 118 aids in 1999/2000 and anticipate another 170 aids in 2000/01.[16]

Data capture may not be integrated to its full extent to eliminate double entry and multiple sets of books. DFO' Management Reporting System (MRS) and SIPA capture asset information with the potential of Maintenance Information Management System (MIMS) also capturing similar information.

MRS is the budgetary and expenditure system for the Department. MIMS is the departmental system to track maintenance activities and costs by asset.

The identification of assets appears to vary by system thereby rendering transferability between systems impossible. Integration between MRS and SIPA is one-way. MRS can be downloaded in SIPA and MIMS but not vice versa.

[14] *Short-Range Aids to Navigation, Internal Audit Report*, Canadian Coast Guard, March 17, 1993, p.14.
[15] *New Aids Established*, SIPA print-out, March 9, 2000.
[16] *Interview with, and e-mail from, Program Manager, Aids to Navigation*, December 1999 and March 2000.

Recommendation:

It is recommended that:

3.6.1 The Director, Navigational Systems ensure that all regions update SIPA to enable the decision-making to be based on sound baseline data. There should be on-going monitoring of the status of the progress made in updating of the data in SIPA.

3.7 ASSET MANAGEMENT

An important component of the ANP is assets and how well the assets are managed. In recognition of this, ANP has focused a significant portion of the MAM to improve asset management. In examining asset management across the country a number of observations were made, namely:

- Asset holdings should be based on an assessment of asset cost, rotation, replacement, repair time and cost, and ease of access to acquiring new assets. These considerations indicate how much stock needs to be held and what the minimum and maximum ordering quantities should be, given ordering quantity discounts from manufacturers. All these factors combine to give the Economic Order Quantities (EOQ). None of the regions have established EOQs by asset category nor has the background assessment been done to calculate the EOQs.

- Assets are managed on a region by region basis and, in some cases, a base by base basis. While there is much merit to this approach there is little use of a central asset management distribution and purchasing capability. While there are national standing offers for acquisition of assets, regions do not have to use the standing offers. This reduces the full benefits of national procurements and creates situations where regions may not be making economical purchases.

An important part of asset management is understanding the causal factors of equipment failure. This, in turn, affects the acquisition, maintenance, operations and training components of the program. There presently is no systematic review of equipment failure. The analyses are based on the understanding of personnel and their views of equipment failure. While this input is critical to understanding equipment failure it does not provide a complete and adequate basis to make a comprehensive assessment.

For example, in a study conducted by one region, they indicated that the aids with discrepancies were revisited for more repair work. The cause of half of the second visits was unclear. As they identified, this required a more detailed assessment. It is important to understand the "why" since it will influence the course of action/decision. For example if the same components are defective, it may be a faulty part from the manufacturer, poor training, special/environmental conditions or a combination of these. A need exists to understand the cause so the correct training, procurement or maintenance, etc. can be provided to resolve the situation.

SIPA is intended to assist in providing an understanding in this area. As of yet, it is not fully populated, therefore does not allow this type of analysis (refer to **Section 3.6, Information Systems** for findings on SIPA).

Recommendation:

It is recommended that:

3.7.1 the Director, Navigational Systems and the Regional Superintendents, Aids to Navigation, in consultation with their counterparts in Technical Services develop an assets management system that:

- ensures regions use national standing offers unless there is a clear and documented justification;
- establishes an EOQ standard for each asset category;
- ensures SIPA is populated and used as basis to assess causes of repeat discrepancies of the same aid; and,
- develops a mechanism to share information amongst regions on holdings so that they can be optimally used.

This recommendation is consistent with recommendations made in the previous audit on asset management.[17]

3.8 BUDGETING AND ASSOCIATED DECISION MAKING

MNS holds well under 50% of the monies spent on Navigation Aids. This means that decision-making, to a large extent, is in the control of the service providers. This is also true of the asset management. Generally, the physical assets of the Aids Program (e.g., buoys, fixed aids, electronic equipment, etc.) rest with the Technical Services. While this serves various corporate requirements (e.g., multi-tasking, economies on procurement, etc.) it can have negative implications to the Program.

This has meant that ANP does not have discretion or choice over how monies are actually spent on their behalf. For example, the decision to use a larger vessel than necessary for a particular assignment may be based on corporate reasons and the Program has to incur the cost. The Program does have input and can negotiate with the service branches but they do not have choices in the end of moving monies if there is a better alternative. This lack of choice may lead to inappropriate decision making where decisions are made that serve other than the Program's purposes. Business decision models usually place resources in the hands of, or at least discretion on how the funds are used with, the accountable organization.

While this has been a topic of much discussion in CCG it still has to be resolved so that the programs can exercise choice and have influence. The model presently used by the Science and Conservation and Protection programs of having control over their respective budgets may have application to MNS.

[17] *Short-Range Aids to Navigation, Internal Audit Report*, Canadian Coast Guard, March 17, 1993, p. 20-21 and 27.

Budgeting is also very fragmented. Monies are held in several different RCM budgets with the largest outside of MNS being held by Operations and Technical Services. This makes it difficult to rationalize the decision-making and maintain accountability. For example, sometimes assets are procured by MNS and in other cases by Technical Services. It is unclear when an asset should be procured by a given RCM and, in a number of cases, it appears to be the one who has money in their budget. This makes it difficult to determine who is responsible for the long-term asset investment decisions and short-term purchasing decisions. For example, is MNS responsible for determining the long-term investment strategy as it relates to each asset category and are they funded to implement this strategy? Currently, it is unclear who is responsible and it is not clear who has the budget to implement this strategy.

The multiple budget holders also made it impossible to follow an audit trail for the program. There is no clear budget as to how much should be spent on the maintenance of MNS assets for any fiscal year. Therefore there is no way of completing a variance analysis or true assessment of the budget's appropriateness to meet on-going program requirements. A business-like approach would establish budgets with clear accountabilities and variance reporting against those accountabilities. That does not presently exist.

Recommendations:

It is recommended that:

3.8.1 the Director General, Marine Programs review the present budget allocation process to determine whether there is merit to creating a separate and clear budget for MNS as it relates to Operations and Technical services. The intent is to allow MNS discretion as to how the monies would be best invested to meet program objectives.

3.8.2 the Director General, Marine Programs establish a budget mechanism that clearly identifies the budgets for procuring and maintaining navigation aids assets.

4.0 MANAGEMENT ACTION PLAN

The following table provides the recommendations, management action plan, officer of primary interest and initial target date.

Recommendations	Management Action Plan	Officer of Primary Interest	Initial Target Date
3.1.1 The Director, Navigational Systems distribute the annual business plan to regions for their input and consideration in developing regional plans.	**Note:** The essence of the recommendations in this section (3.1.1 to 3.1.4) is acceptable to Marine Programs. However, alterations have had to be made, with respect to the delivery of the results in consideration of CCG Headquarters Renewal. The distribution of annual business plans to the Regions for their input and consideration on developing regional plans is part of the process agreed to within the Department however, this will not be the responsibility of the Director, Navigational Systems. Therefore, the present departmental process actually addresses this recommendation. Further, this recommendation should also recognize that the regional plans be shared with HQ for their input and consideration.	In collaboration with the DG of Integrated Business Management, The Director of Planning and Performance Measurement, Marine Program, will make sure to follow the departmental Process.	End of 2001

3.1.2 The Director, Navigational Systems and the Regional Superintendents, Aids to Navigation, review the Laurentian business plan process for its applicability as a basis to develop an appropriate business plan.	The focus over the next years will be the development of the Business Performance Management (BPM) process however, we should be able to review this with a view to incorporate the Laurentian Region planning process. The BPM process is in essence the procedure that Laurentian Region is using. The BPM provides the links between objectives, activities and results using performance measures as a management tool.	The Director of Planning and Performance Measurement, Marine Program	End of 2001
3.1.3 The Director Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, establish a reporting structure between HQ and the regions that reports progress to plan and anticipated performance. The performance indicators and measures form a large part of this reporting structure.	Annual Reporting against planned delivery of results is a critical component of the BPM process. The Marine Programs Business plan will be operationalised in the regions with the performance measurement system being the monitoring of the delivery to the business plan.	The Director of Planning and Performance Measurement, Marine Program and Manager Performance Measurement, Marine Programs	End of 2003
3.1.4 The Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, put in place an accountability framework in the business plan as well as projects/initiatives undertaken by the Program.	The Management Model limits the accountability between the Regional Superintendents and the Director Navigation Systems. An accountability framework is already in place between HQ and the Regions through the BPM process initiated recently in the department.	Completed	

	However, for specific and important initiatives like Aids Modernization Phase III (a project initiated by the CCG Management Board in November 2000), there is the flexibility to develop accords between the DG Marine Programs and the Regional Directors.	DG Marine Program with the Regional Directors of CCG for the accord of the Marine Aids Modernization Phase III	April 2001
3.2.1 The Director General, Marine Services, develop a SLA with Operations and Technical Services.	It is proposed to develop a national framework agreement with ITS and with Fleet Services in consultations with the Regional Offices. Following the national framework, Regional Agreements should be implemented dealing with specific needs and providing more details in terms of expectations.	OPI for the development of the national framework – Director, Navigation Systems OPI for the regional agreements are the Regional Directors of Programs	National Framework – Sept. 2001 Regional Agreements – April 2002

3.2.2 The Director General, Marine Programs establish a mechanism to monitor these service providers as set out in the service level agreement.	As part of the agreement mentioned above, there would be a performance monitoring of the service provided by the two organizations. Performance Indicators will be defined with the collaboration of the Performance Measurement Management Team in Marine Programs. Following are items that are to be defined in the national framework: Buoy commissioning for Seasonal Buoys & Annual Buoys; Buoy decommissioning for Seasonal Buoys & Annual Buoys; Floating and Fixed Aids Checking, verification and Inspection (Position & Characteristics); Floating and Fixed Aids Correction of Discrepancy and Servicing; Monitoring of operation, Performance Monitoring (Availability & Reliability); Service Reports through SIPA/SIPA Mobile/MIMS; Type of work to be performed by CCG or Contractors; and	Director, Navigation Systems in cooperation with the Manager, Performance Measurements	April 2002

	Costs associated with the service provided.		
3.3.1 The Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, put in place mechanisms to improve the planning, coordination and implementation as well as the monitoring and reporting of projects.	The Department is requiring the linkage between Strategic Direction, Business Planning and Performance Measurement. Marine Programs will be following the Departments direction for this issue. We have identified communication as a key but we also have to have a system that responds to the intent of the Management Model. We will therefore have a performance measurement system to respond to this need.	The Director of Planning and Performance Measurement, Marine Program, and the Manager of Performance Measurements will put in place the mechanisms.	April 2002
3.4.1 The Director, Navigational Systems propose the performance indicators defined in the 1999/00-2001/02 Business Plan be distributed to the regions and within CCG Headquarters. There may be some regional	Work has already commenced on the development of a Marine Programs National Performance Measurement System with involvement of the Marine Programs Specialist Divisions, and Regions. As part of the first	Manager, Performance Measurement	December 2001

adjustments required. Since the Laurentian Region has already defined many of these, these could be used as the starting point.	phase of development, the division is completing an inventory of measures and indicators related to Marine Programs. All of the proposed measures (including those proposed in the 1999/00-2001/2002 Business Plan as well as those proposed by Laurentian) will be reviewed at the upcoming Marine Programs National Meeting where both HQ and regional representatives will be working together to finalize performance indictors related to their program.		

3.4.2 Once the performance measures are agreed to, the data sources should be identified and the appropriateness of the information collected should be confirmed. These performance measures and data sources should then form part of the business planning process and on-going monitoring of the Program.	The division is also completing an inventory of information systems (including SIPA) and data sources relevant to Marine Programs performance measurement. Both the inventory of measures and indicators and of data sources/ information systems are linked, so that when an indicator will be agreed upon, the source (if existing) will be known. We will link this information to the business planning process and on-going monitoring. The inventory will include information on links to all of the information systems (including SIPA) and data sources proposed measures (including those proposed in the 1999/00-2001/2002 Business Plan as well as those proposed by Laurentian) will be reviewed at the Marine Programs National Meeting where both HQ and regional representatives will be working together to ensuring regional involvement in the appropriate reporting against PM.	Manager, Performance Measurement	December 2001

3.4.3 The Director, Navigational Systems, in consultation with the Regional Superintendents, Aids to Navigation, determine the appropriate reporting against performance measures. This should be done regionally and then compiled at the national level.	Once implemented the Marine Programs Performance Measurement System will ensure consistent and timely performance reporting.	Manager, Performance Measurement	End of 2003
3.5.1 The Director, Navigational Systems, determines the risk of their reliability and availability performance results.	The Risk Management and Decision Support Division has already developed a draft framework for The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). Once revised and accepted by IALA, this framework will provide a comprehensive risk management process for the provision of aids to navigation services. The Risk Management and Decision Support Division will undertake a detailed risk analysis of the reliability and availability of all short-range aids across Canada. This will involve extensive participation by the Regions to gather, format and analyze current data. This will result in detailed reports on both the	In the short term: The Manager, Aids to Navigation and the Aids Superintendents will identify where major problems exists and propose measures and implementation schedules to ensure safe navigation. In a longer term: The Manager, Risk Management, Marine Programs will develop a risk analysis of the reliability and availability of all aids to navigation in Canada.	June 2001 End of 2002

	reliability and availability of short-range aids.		
3.5.2 The Director, Navigational Systems, determine whether it can "afford" the current standards of reliability and availability given its current resource base and fleet availability.	The Risk Management Framework will be used to assess the risk and determine various risk control options. The options proposed may relate directly to the affordability of aids to navigation services. If it is demonstrated that it is not possible to provide affordable Aids to Navigation systems without lowering the levels of service standards, then appropriate guidelines will be developed to identify an affordable level of service with associated risks.	Manager, Aids to Navigation and the Manager, Risk Analysis	End of 2003
3.6.1 The Director, Navigational Systems, ensure that all regions update SIPA to enable the decision-making to be based on sound baseline data. There should be on-going monitoring of the status of the progress made in updating of the data in SIPA	The Aids Program Information System (SIPA) phase 2 has been in production on a national basis since October 1997 and is being upgraded on a yearly basis in order to meet the user's needs. As of January 2000, there were approximately 18,900 active aids in SIPA. There is also SIPA Mobile that is a sister application of SIPA. It's purpose is to provide technicians and fleet officers with a means to take SIPA data to remote sites and	Manager, Aids to Navigation And the Regional Superintends, Aids to Navigation	June 2001

	prepare service reports. SIPA Mobile is in production since June 2000. At the moment, the verification of the data is performed on an on-going basis by the Regional Aids to Navigation Offices. In the past, Headquarters provided funding on a regular basis to regional offices in order to "clean and verify" the data in SIPA. During the spring of 2000, a "clean and verify" exercise was made in all the Regions. Reports showed that the Regions are quite confident that the SIPA info has greatly improved, therefore, much more reliable. A great effort has been made to verify all tombstone data and to input the service reports provided by Fleet and Technical Services. In addition to this project, a detailed report about the quality of information will be prepared by the SIPA Team in Headquarters based on Regional direct input.		

3.7.1 The Director, Navigational Systems, and Regional Superintendents, Aids to Navigation, in consultation with their counterparts in Technical Services develop a proper assets management system that: • ensures regions use national standing offers unless there is a clear and documented justification; • establishes an EOQ standard for each asset category; • ensures SIPA is populated and used as basis to assess causes of repeat discrepancies of the same aid; and, • develops a mechanism to share information amongst regions on holdings so that they can be optimally used.	Following the implementation of HQ Renewal, the ITS Strategy Project was created to develop and implement a national strategy for life cycle management and technical business management of all the Canadian Coast Guard. The Life Cycle Materiel Management (LCMM) Process to be implemented within the Coast Guard Technical Community is based upon Coast Guard best practices and accepted LCMM principles. Furthermore the process will be based upon the value (both financial and operational) of the asset. The LCMM methodology will comprise clearly stated policies, standards and procedures. A key component of the LCMM methodology will be the introduction of Integrated Logistic Support with the associated notion of a supply chain. This will address the process by which CCG obtain and manage spare parts.	Director of ITS Strategy	Implementation Proposal of the strategy in March 2001. Introduction of the component parts of the strategy over the next 3-4 years.
3.8.1 The Director General, Marine Programs review the present budget allocation process to determine whether there is	The new DFO business planning framework being implemented is addressing the concerns expressed in this	DG, Marine Programs	April 2002

merit to creating a separate and clear budget for MNS as it relates to Operations and Technical services. The intent is to allow MNS discretion as to how the monies would be best invested to meet program objectives.	section 8 of this report. The process will permit to rationalize the decision making process, maintain accountability, identify appropriate level of service standards and budgets.		
3.8.2 The Director General, Marine Programs establish a budget mechanism that clearly identifies the budgets for procuring and maintaining navigation aids assets.	As described in section 3.2.1, the SLA to be negotiated with Fleet and ITS will define the roles and responsibilities of ITS and Fleet concerning the activities performed for the Aids Program. The aids program will then become accountable for the service provided and through reporting structures such as performance measurement, the SLA can be adjusted to increase the efficiency of the service provided.	DG, Marine Programs	April 2002

APPENDIX A – GLOSSARY OF TERMS/ACRONYMS

GLOSSARY OF TERMS/ACRONYMS

ABACUS	
ANP	Aids to Navigation Program
BUOY Manager	Portable buoy position tool
CCG	Canadian Coast Guard
CHSDIR	Canadian Hydrographic Service Directory
DACS	Departmental Activity Costing System
DGPS	Differential Global Position System
EOQ	Economic Order Quantities
FAIS	Fleet Activity Information System
FMRS	Financial Management Resource System
GPS	Global Positioning System
HQ	Headquarters
IALA	International Association of Lighthouse Authorities
IMO	International Maritime Organization's
LOS	Levels of Service
LRAN	Long Range Aids to Navigation
MAM	Marine Aids Modernization
MARS	The Material Assets Recording System (MARS) is a distributed online database system designed to provide users with permanent, visible, audible, and up-to-date records of material in use (i.e., departmental assets) for accounting, control, and management purposes.
MIMS	Maintenance Information Management System
MNS	Marine Navigation Services

NAVAID	The Navigational Aids Information Database (NAVAID) contains information concerning each aid to navigation whether it is fixed or floating, lighted or unlit. It contains Aid Revision Service and Discrepancy histories on all aids. Information on Contractors and Work program as well as Equipment Inventories is also maintained.
NOTMAR	Notice to Mariners
O&M	Operations and Maintenance
ORCA	Oceans Risk and Criteria Analysis
R&D	Research and Development
SOLAS	Safety of Life at Sea
SRAN	Short Range Aids to Navigation is a costing model to provide users with a relatively simple method of immediately accessing costing information: ▸ powerful tool for providing highly detailed costing information on user-defined scenarios ▸ create new-scenario-select from a multitude of variables, including aid location, geographic area, aid type, service activity and other criteria ▸ reports generated that illustrate financial implications of the scenario ▸ changes to the scenario can be made instantaneously ▸ user is able to access reports and compare the financial implications of the changes that were made
SIPA	The Aids Program Information System is a database used for tracking the information related to the operation and maintenance of aids to navigation and it is the primary source of information for the Marine Aids Program.
SIPA Mobile	Sister application of SIPA. Its purpose is to provide CCG ships with means to take SIPA data to remote sites, update the database, and prepare service reports.
SLA	Service Level Agreement
SRA	Short-Range Aids
TOSD	Technical and Operational Services Directorate
TSB	Transportation and Safety Board of Canada