Report on the Marine Weather/Sea-State Services Requirements

A Review by the West Coast Federal Government

Departments of Environment, Transport, and Fisheries & Oceans

A review of this Marine Weather Services Requirements Report has been conducted by an inter-Departmental Committee of operational managers, from three federal government departments - namely; Environment Canada, Transport Canada, and Fisheries and Oceans.

This federal committee was extremely pleased with the interest and participation of the marine community in the study. Clearly, the Report confirms the high level of personal interest in government services related to safety and security of mariners at sea. It also confirms that recent actions to improve marine weather/sea-state services on the West Coast are taking the proper direction.

The Report not only recommends improvements to the technical and scientific service programs but also reaffirms the need for continued development of cooperative programs between the federal services and the marine community using those services.

Part I of the Report lists 10 conclusions and recommendations reached as a result of the Study. The federal government Review Committee agrees with these recommendations almost in their entirety and will be developing action plans, as necessary, to implement them. Following is a specific list of actions planned or already being undertaken.

Summary of Requirements

1. Recommendation - revise issue times of forecasts to match users' operational needs.

   ACTION: Environment Canada (AES) will consult with various groups, the Canadian Coast Guard (CCG) and Department of Fisheries & Oceans in developing revisions to issue times.

2. Recommendation - minimize delays in the transmission of weather information and improve area coverage of weather broadcasts.

   ACTION: AES and the CCG have initiated actions to improve the efficiency of weather broadcasts. The forecast areas will also be reviewed for possible sub-Divisions of the current marine areas.

3. Recommendation - there is a need for more frequent local reports and these reports need to be more representative of open-waters conditions.

   ACTION: A number of activities and plans have already been implemented to address this recommendation - including 'special' observations from lightstations and vessels at sea, continuing installations of round-the-clock reporting from automatic weather stations and coastal and offshore buoys. These actions will continue in order to develop a comprehensive data gathering network.

4. Recommendation - more moored buoys, particularly offshore.

   ACTION: Additional moored buoys are being installed over the next 3 to 4 years in both the offshore and coastal areas.

5. Recommendation - requirement for marine weather and sea-state reports is greater in some localities than in others.

   ACTION: Action is already underway. AES in consultation with CCG and DFO, is examining the total data requirements including specific areas where hazardous weather/sea-state conditions present problems.

6. Recommendation - minimize the downtime of automatic report stations.

   ACTION: AES, with the support of CCG as required, has placed a high priority to effect repairs and maintenance, at key localities, as quickly as is logistically possible.

7. Recommendation - upper air observations required over the northeast Pacific, such as ASAP.

   ACTION: A three ship ASAP program has been established to ensure continued provision of these data.

8. Recommendation - marine require more information about marine weather services and government agencies require continuous feedback on users' needs.

ACTION: The Committee views this as a very important recommendation in enhancing cooperation and information exchange between users and providers of information. A number of steps have been taken, including:

- increased consultation with user groups.
- publication of new marine weather services brochures.
- development of marine weather audio-visuals is underway.
- a hazardous weather manual is nearing completion.
- the Mariner Reporting Program (MAREP) has been implemented and will be expanded.

Further activities to increase cooperative efforts will be examined.

9. Recommendation - broadcast of weather information other than by voice.

ACTION: The need for graphical information is relatively small, however implementation over the next 5 years of new technology such as NAVTEX (by the CCG) will provide hard-copy information as required.

10. Recommendation - feasibility for using coastal radar to monitor sea-state should be investigated.

ACTION: The AES and CCG will investigate the possibility of using the information from a coastal radar site to obtain sea-state information.

REPORT OF WORKING GROUP ON USER REQUIREMENTS FOR WEST COAST WEATHER INFORMATION SERVICES

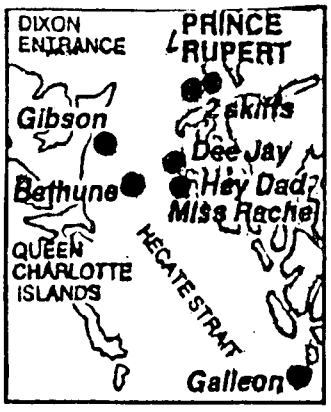
September 1986

P.L.J. Morin, Chairman
J.F. Gosse
R.F. Henry
M.A. Montgomery

VANCOUVER, B.C. The Sun FRIDAY, APRIL 20, 1965

FOUR SINK AS STORM RIPS COAST

Two missing fishboats found



STORM-STRICKEN AREA

Search and rescue aircraft today located two missing fishboats — the last of at least 11 fishing vessels battered by a Pacific storm that raged through the Queen Charlotte Islands-Prince Rupert area Thursday.

There was no word on the condition of the vessels — the Galleon and Pacific Traveller — or the two crewmen aboard each. They had been sought by rescue vessels and aircraft for 14 hours before being located about 9 a.m. today.

Search and rescue could say only: "Aircraft are investigating."

Four boats sank at the height of the storm Thursday. During the day 18 men were plucked by helicopters from the sea or the decks of their sinking vessels.

The storm gave those at sea no respite today — the area was under a storm warning, meaning winds in excess of 45 knots. It was only slightly better than Thursday when search crews faced 10 metre waves and 65-knot winds.

Four halibut fishing boats sank just after their crews were rescued, and another four vessels were escorted or towed to safety.

Coast guard spokesman Wally Manz said the rescue effort was severely hampered by the weather.

NORTH ISLAND GAZETTE

40¢

WEDNESDAY, APRIL 18, 1984

NINETEENTH YEAR NUMBER 37

Search continues for windstorm victims

BULL HARBOUR - An intensive search was still going on yesterday as the Gazette was going to press to find three people who were on board the 65 foot trawler 'Cape Blanco' which sank Sunday 20 nautical miles northwest of Cape Scott.

Missing and presumed drowned are skipper Carl Bruce, his son Gavin Bruce and crew member Ivor Lauten. All three are from the Vancouver area. The 'Cape Blanco' was registered to the company GJ Dobrulla in Ladner.

Two search and rescue helicopters, a Buffalo aircraft and the Coast Guard vessel 'Camsell' are believed to be continuing the search today.

A rescue co-ordination centre spokesman from Victoria told the Gazette that the fishing vessel 'Pacific Eagle', which had been travelling with the 'Cape Blanco', reported the two boats had just gone through a squall at about 1 pm.

A few moments later a distress signal came in from the 'Cape Blanco' with a voice yelling, "We're rolling, we're rolling!"

The Buffalo aircraft was then immediately diverted to the scene from another incident in the same general area and arrived within 15 minutes after the report. The 'Camsell' and two helicopters were also tasked.

Debris and an oil slick have been found in the area, but the vessel itself and occupants have not been sighted.

The RCC spokesman said enough debris has been found to positively identify it as remnants of the 'Cape Blanco'. (RG)

Windstorm deadly

BELLA BELLA - Three bodies were recovered, one person survived after two boats capsized over and sank near here Sunday afternoon.

Police are blaming a freak windstorm which hit the area causing storm force winds and heavy seas for about a three hour period.

The wind started at about noon in this area, according to an RCMP spokesman. He said distress signals were received from the boats earlier, but "during 125 mile an hour winds there's not much we can do."

The lone survivor was picked up by a volunteer vessel, the 'Go-Getter', in an area four miles south of Namu. The survivor was part of a two-man crew on a 35 foot fish boat.

A rescue helicopter later spotted the other body floating in the water. By the time the Go-Getter was able to get there, the person was dead.

The second vessel, reportedly a 28 foot sailboat, sank with two people aboard about four miles north of Egg Island in the Rivers Inlet area. The two bodies were recovered after a search and rescue operation conducted by the Victoria Rescue Co-ordination Centre.

An RCC spokesman said the two people were found floating in their survival suits. They died probably more as a result of the weather rather than hypothermia, he added.

Both vessels were of United States origin.

It is believed all occupants of the two ill-fated boats were Americans.

By press time the names of the deceased and of the survivor were still being withheld pending notification of next of kin. (BG)

Weather pattern weird

PORT HARDY - A deep low pressure centre raced northward Sunday along the west coast of Vancouver Island producing gale to storm force winds over North Island waters.

At the height of the disturbance, winds along the west and central coasts were reported to have reached 110 kilometres per hour with stronger gusts.

Locally, at the airport weather office, gusts to 66 kilometres per hour were recorded.

"Part of the problem was its speed," said weatherman Roy Koch.

The unusual squall caused three boats off the north end of the island to sink. Three people are reported dead. Three other people are missing and presumed drowned.

The squall also caused extensive power outages throughout the North Island area and also caused minor property damage.

Other than this incident, the weather pattern for the seven-day period from April 9th to the 15th was a bit warmer and wetter than normal.

VANCOUVER, B.C. The Sun WEEKEND

SATURDAY OCTOBER 13, 1984 50 CENTS

Sea scoured in hunt for four

By GORDON HAMILTON

Winds gusting up to 28 knots and eight foot seas were reported today in the area off northern Vancouver Island where four fishermen were last seen clinging to their overturned boats Friday as a storm swept them north along the island's rugged west coast.

A Canadian Forces Labrador helicopter and a Buffalo aircraft were in the air this morning in an attempt to locate the men and a coast guard cutter was heading toward the search area.

A 50 metre fisheries department vessel was conducting a coastline search and carried a crew prepared to conduct a ground search.

The four men may have been washed ashore because of strong tides and winds, according to a rescue centre spokesman.

Capt. Robert Barr said an eight to 16 kilometre tidal drift may have carried the men to shore.

Rescue attempts Friday were frustrated by the violent storm that battered the outer coast and Georgia Strait, swamping eight vessels, drowning at least one man and scattering the Pacific salmon fleet.

"When the cloud lifted enough the Aurora long range patrol aircraft could see them being swept along with their boats," a rescue centre spokesman said.

Two of the men were about 3.5 kilometres from shore and the other two were closer in.

"They waved at the plane," said Capt. Don Blair of the Victoria Rescue Co-ordination Centre.

The four fishermen were last reported off Kains Island near Winter Harbor, on northwest Vancouver Island. The men, wearing survival suits, clung to two fishing vessels that swamped when struck by winds up to 120 kilometres per hour.

A Labrador helicopter from Canadian

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GLOSSARY OF ACRONYMS

AES	-	Atmospheric Environment Service, Environment Canada
ARS	-	automatic reporting station
ASAP	-	automated shipboard aerological program
CCG	-	Canadian Coast Guard, Transport Canada
CMB	-	continuous marine broadcast (VHF)
DFO	-	Department of Fisheries and Oceans
DND	-	Department of National Defence
EPS	-	Environmental Protection Service, Environment Canada
FSS	-	flight service station (airport weather briefing office)
MAREP	-	marine weather reporting program
MF	-	medium frequency
PIREP	-	aviation pilot weather report
PWC	-	Pacific Weather Centre (AES)
RCMP	-	Royal Canadian Mounted Police
SEAS	-	shipboard aerological acquisition system
SSB	-	single sideband broadcast (MF)
VFR	-	visual flight rules
VHF	-	very high frequency
VTS	-	vessel traffic system

ACKNOWLEDGEMENTS

The Working Group members would like to thank the following persons: Mr. Gary Wells (Chairman); Dr. J.F. Garrett, Captain B.G. Irving and Mr. R. Bryant, members of the MARIT task force, for their individual and collective support during this investigation; Christine Lechelt and Jess Rai for their help in the preparation and processing of the questionnaires and for general secretarial assistance; Todd Warnes for organizing the data-base and programs to handle the questionnaire returns; Irene Sipila and Billie Mathias for editing and typing this report; Rosalie Rutka and Coralie Wallace for preparing the diagrams; the numerous private individuals and CCG, AES and DFO personnel in many locations on the coast, who facilitated the investigation in many ways; and finally, all the west coast mariners on whose contributions, in the questionnaires, at meetings with the Working Group and in letters, this report is based.

PART I

EXECUTIVE SUMMARY

This report examines the requirements of mariners for weather information on the west coast of Canada, as established through enquiries made in early 1986 as part of the government response to the LeBlond report on the storm of October 11-12, 1984. The views of over 700 mariners, predominantly commercial fishermen, were obtained through mailed questionnaires and public meetings. Other user groups consulted were: towing vessel operators; recreational boaters; masters of ferries and patrol vessels; and coastal aviators.

After a general introduction in Part II, the main user groups are introduced in Part III; the operations of the commercial fishing industry are also reviewed. Part IV describes the main components of the present weather information services. Part V presents the contents of the questionnaires distributed to mariners, together with their tabulated replies and comments. Part VI details the conclusions reached by the Working Group concerning possible improvements to the marine weather services. These are substantiated by cross-references to the questionnaire results in Part V and comments from mariners who attended the public meetings.

The principal conclusions are summarized below. Numbers in square brackets indicate the relevant detailed conclusions in Part VI on which the summary conclusions are based.

SUMMARY OF REQUIREMENTS

1. There is a requirement for altering the issue times and contents of marine weather forecasts and reports in order to match users' operational needs more effectively. [A1, A2, A3, A4, A5, B10, B12, C2, D7, D9, D10]

2. There is a requirement to minimize delays in the preparation of marine weather information and its transmission to mariners, and to improve the sound quality and area coverage of marine weather broadcasts. [D1, D2, D3, D7, D8]

SUMMARY OF REQUIREMENTS continued

3. Mariners require more frequent local marine weather reports, on a round-the-clock basis, and these reports need to be more representative of over-water conditions. [B5, B6]

4. More moored buoys equipped to report hourly meteorological and sea state conditions are required in west coast waters; in particular, the number of offshore buoys should be increased. [B7, B8, B9]

5. Mariners concur that the requirement for local marine weather and sea state reports is greater in some localities than others; the areas with highest priority are Langara Island, Cape Mudge, Cape Caution and Estevan Point. [B1]

6. There is a requirement to minimize the down-time of automatic reporting stations. [B11]

7. Mariners' needs for accurate marine forecasts require that more upper atmosphere observations, such as those provided by the Automated Shipboard Aerological Program (ASAP) should be collected over the northeast Pacific. [A7]

8. Mariners require more information on all aspects of the marine weather services, and the government agencies involved require continuous feedback on users' needs. [E3, F1, F2, F3]

9. There is an increasing requirement to broadcast marine information other than by voice broadcasts; certain types of information can be handled more satisfactorily in graphical form. [C1]

10. In view of mariners' stated requirements for sea state information, the feasibility of installing multi-purpose radar to monitor sea state and swell, in addition to vessel traffic, should be investigated. [B13]

PART II

INTRODUCTION

There is a long history of loss of lives and vessels on the west coast of Canada, and there is considerable public and official concern that these losses continue despite improvements in vessel design, life-saving equipment and rescue services. Though weather information services have also been improved steadily, many of the losses have been weather-related. Even today, severe storms can arrive on the west coast with little warning, due to the paucity of surface and upper atmosphere data over the NE Pacific. In other cases, known storms reach the coast sooner than forecast or intensify more than present meteorological science would predict.

The condensed accounts of three recent incidents, shown in Table II-1, show that the commercial fishing fleet continues to suffer serious losses. In fact, recent trends in the industry appear to be aggravating the vulnerability of fishermen to severe weather. The main factors here are shortened fisheries openings due to stock depletion and increasing economic necessity to continue fishing during an opening, almost irrespective of weather.

THE LEBLOND INVESTIGATION

After the loss of life in the October 11-12, 1984 storm (see Table II-1), public concern led the Minister of the Environment to set up an independent investigation, under the chairmanship of Dr. Paul H. LeBlond, into the various circumstances contributing to the loss of life and vessels. Some of the recommendations in the LeBlond Report* are shown in Table II-2.

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* Final Report of the Investigation on the Storm of October 11-12, 1984 on the West Coast of Vancouver Island, P.H. LeBlond (draft)

TABLE II-1: Summary of Three Recent Severe Storms

(1) April 15, 1984, - 3 lives, 2 fishing vessels lost

A cold front moving northward at 50 knots, upon crossing northern Vancouver Island, brought winds of 80-100 knots to areas off northern Vancouver Island and the north coast. Prior to this, the storm produced winds of only 15 knots as it passed buoys moored off the Washington and Oregon coasts. Satellite imagery showed no change in the front's intensity as it moved north.

Upon the first reports of hurricane-force winds, warnings were immediately issued.

Marine Casualty Investigation Reports on "Cape Blanco", "Thelma", Transport Canada (unpublished).

(2) October 11-12, 1984, - 5 lives, 6 fishing vessels lost

This storm struck the coast sooner than forecast, during a salmon fishery off the west coast of Vancouver Island. The weak remains of a tropical storm transformed explosively into a strong mid-latitude low pressure system in the last day of its approach towards the B.C. coast. The storm was forecast much too late to influence the movements of fishermen, and the wind speeds in it were seriously underestimated. Swell running ahead of the storm contributed to the disaster (see Draft Report of LeBlond Investigation).

Marine Casualty Investigation Reports on "Miss Robin", "Silver Titan", "Lady Val II", "Scallywag", "Invercan" and "Hurricane I", Transport Canada (unpublished). See also "Anatomy of a Tragedy", Pacific Yachting, March 1985.

(3) April 25, 1985, - 5 lives, 6 fishing vessels lost

A cold front, forecast to give gales, moved in to the B.C. coast earlier than expected and proved much more intense than satellite imagery and conventional data sources indicated. Winds of 85-90 knots and seas up to 15 m were encountered during search and rescue operations necessitated among the halibut vessels affected in Dixon Entrance and Hecate Strait.

Some delay occurred in issuing an upgraded storm warning forecast, as Coast Guard radio operators were already too busy handling distress traffic to broadcast the warning.

Marine Casualty Investigation Report No. 385, Transport Canada.

TABLE II-2: Extracts from Draft Report of LeBlond Investigation

1) "We recommend very strongly that marine forecasting be assigned as a specific and individual responsibility in coastal weather centres (such as PWC)."
2) "A wave forecasting service should be introduced gradually; development under way along these lines at AES should be refined in the light of the best available methods and put on an operational footing as soon as possible."
3) "It is important that the federal agencies responsible for marine weather services and safety gain the confidence and collaboration of the users of the information and services which they provide. This collaboration could be furthered by the establishment of MAREP type programs, by the coordination of the activities of all participants in marine activities and by periodic non-confrontational reviews of the performance of government services."
4) "Measures should be taken to obtain regular, including night time reports by:
   a) offering some form of incentive to radio operators to transmit weather information at night, and
   b) by furthering the development and utilization of automatic or semi-automatic data collection platform to be put on commerical and government vessels."
5) "We recommend that the Automated Shipboard Aerological Program (ASAP) be continued and deployed on an operational basis."
6) "We urge the Department of the Environment not to forget, in its program to automate coastal weather stations, that mariners depend heavily on reports of actual weather conditions received from these stations."
7) "The drifting buoys deployed by AES would be even more useful if they could report winds."
8) "The NOAA buoys are invaluable in forecasting Pacific storms. Environment Canada should collaborate with NOAA in planning for continued maintenance and possible future deployments of these buoys."
9) "As the Atmospheric Environment Service improves its internal communications network and the selectivity of its means of disseminating information, it is important that the Coast Guard keep up with developments."
10) "There appears to exist no standard consultation between Environment Canada and Fisheries and Oceans in deciding whether a fishery opening would be advisable from a safety point of view. Special arrangements have been worked out for the herring fishery and could be broadened to cover all fishery openings."
11) "The installation of weather radar at one or two locations on the west coast of Vancouver Island has been suggested as means of detecting approaching squall lines and severe convection clouds. It is recommended that renewed consideration be given to this kind of system, with direct long distance input of the information to the Pacific Weather Centre."
12) "Research on the physics of rapid deepening of process of storms of the type seen on October 11-12, 1984 be encouraged, either by direct commission, or via the AES subvention program to universities or in collaboration with other interested parties, such as the NOAA Pacific Marine Environmental Laboratory in Seattle."

MARIT TASK FORCE: WORKING GROUP ON USER REQUIREMENTS

Following the LeBlond investigation, a regional interdepartmental marine task force (MARIT) was set up, with representatives from Environment Canada, Transport Canada and the Department of Fisheries and Oceans, to coordinate improvements in marine weather services. The present report is the product of a Working Group set up by MARIT to investigate the requirements of the various user groups with respect to marine weather (including sea state) forecasting and reporting*. Questions examined by the Working Group included the following:

(a) the content and quality of marine forecasts and reports;
(b) the adequacy and timeliness of these products;
(c) the efficiency with which weather information is disseminated;
(d) requirements for new services and products.

The Working Group was chaired by P.L.J. Morin, Supervising Meteorologist, Pacific Weather Centre (PWC). The other members were Captain J.F. Gosse, master of the DFO patrol vessel "James Sinclair", Dr. R.F. Henry, Research Scientist, Ocean Physics Division, Institute of Ocean Sciences (DFO) and Captain M.A. Montgomery, master of the Coast Guard patrol vessel "George E. Darby".

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* A clear distinction should be borne in mind between a forecast, which is an informed prediction of future events, and a report, which relates actual observed conditions.

MODUS OPERANDI OF WORKING GROUP ON USER REQUIREMENTS

Two principal means were adopted by the Working Group for obtaining a broad sample of user requirements. A questionnaire was drawn up and mailed to 1,000 commercial fishermen selected at random from the DFO list of licenced commercial fishing vessels. In addition, 15 public meetings were held in B.C. coastal communities,* at which participants were invited to fill in the questionnaire and then contribute their views verbally to the Working Group and ask questions. Slightly modified versions of the questionnaire were prepared for towing operators and recreational boaters. The questionnaires were also found to be quite suitable for coastal aviators and other miscellaneous users who attended the meetings.

The contents and the replies to the questionnaires are given in detail in Part V of this report. Altogether 719 completed questionnaires were received. Many respondents added numerous written comments to the questionnaires, and some subsequently wrote letters to the Working Group. Much of this material is included in this report.

Private meetings were held with representatives of various sections of the fishing industry, such as the Pacific Trollers Association, the Native Brotherhood, the United Fishermen and Allied Workers' Union, and with towing company managers at Rivtow and Seaspan International. The Working Group also visited the Pacific Weather Centre (PWC), Weatheradio Canada at Victoria, Port Hardy Flight Service Station, the Rescue Coordination Centre at DND, Esquimalt, Canadian Coast Guard (CCG) radio and vessel traffic management centres at Prince Rupert, Tofino and Vancouver, the CCG radio station at Sooke, the CCG rescue base at Parksville, and lightstations at Bonilla Island, Egg Island, Cape Scott, Pine Island, Ballenas Island and Sheringham Point.

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* Meetings were held at Bella Coola, Bella Bella, Skidegate, Masset, Prince Rupert, Port McNeill, Campbell River, Tofino, Powell River, Port Alberni, Nanaimo, Victoria, Sidney and Vancouver.

Obviously, considerable emphasis was given throughout this enquiry to the needs of commercial fishermen, the user group which has suffered the most frequent and severe losses in recent decades. Of the other user groups, the only one substantially under-sampled is recreational boaters. To cover this very diverse group would require a much longer time than was available to the Working Group. Such a survey could probably be carried out with reasonable efficiency through the good offices of magazines catering to the yachting, powerboating and sportsfishing fraternities. The results of a brief survey of this group carried out at the 1986 Vancouver Boat Show are shown in Appendix II-1.

PREVIOUS STUDIES

The conclusions of an interdepartmental study group which met with representatives of the Canadian west coast fishing industry in 1980* differed in several respects from the findings of the present survey. For instance, the study group found "no strong support for a wave forecast service", contrary to the questionnaire results given here in Part VI, though the study group recognized that the fishermens' attitude at the time could reflect lack of awareness of possible benefits. Another interesting difference is that, in 1980, there was no call for revision of the weather forecast areas, whereas the present Working Group found this much in demand. The probable explanation lies, almost paradoxically, in improvements made in the marine weather service since 1980. For instance, installation of automatic reporting stations at Solander and Sartine Islands on the northwest coast of Vancouver Island has led marine forecasters to issue more frequent gale and storm warnings for the whole West Coast Vancouver Island forecast area. This is annoying to fishermen on the southwest coast, who often find lighter winds prevailing there, and, consequently, now see a need to treat the northwest and southwest coasts of Vancouver Island as separate forecast areas.

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* "Ocean Information Services: Study Group Report to Ad Hoc Inter-departmental Committee to Discuss the Requirements and Availability of Ocean Information Services." Canadian Special Publication of Fisheries and Aquatic Sciences, No. 53, Dept. of Fisheries and Oceans, Ottawa, 1980.

The results of two recent studies[1],[2] of the weather information needs of west coast U.S. fishermen are in close accord with those of the present survey. The recommendations are not strictly comparable in all cases to those given later in this report, in view of the organizational differences in the U.S. and Canadian weather services.

COMMENTS ON THE MAIN BODY OF THE REPORT, PARTS III TO VI

Part III consists of an introduction to the main user groups served by the weather information services on the west coast. A fairly detailed description of the fishing industry is presented, since without this, it is impossible to appreciate the importance of various types of weather information to the most frequent victims of west coast storms, commercial fishermen.

Part IV outlines the roles of the federal government agencies involved in the provision of weather information. The main burden is carried by PWC and by CCG radio and lightstations. The importance of communications in weather information services becomes obvious by this stage of the report.

Part V describes the distribution and contents of a questionnaire on weather information requirements which was distributed widely among west coast mariners, particularly commercial fishermen, in the early part of 1986. The results of the survey are summarized in tabular form, with many illuminating comments from users appended.

Part VI presents the conclusions drawn by the Working Group from responses to the questionnaire (see Part V) and discussions with users. Some relevant comments noted down at the public meetings or excerpted from users' letters are included.

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1 "An Assessment of the Northwest Ocean Service Center from the Perspective of its Present and Potential Users." Natural Resources Consultants, Seattle, Wash., March 1984.

2 "The Utility of National Weather Service Marine Weather Products in the U.S. West Coast Commercial Fishing Industry", National Ocean Service Planning Staff and Office of Ocean Services, April, 1985.

In effect, Part V and the comments included in Part VI state the "raw" requirements of the users. In drawing up the recommendations in Part VI, the Working Group members have used their combined expertise to translate the users' requirements into practicable changes in the existing services. Some of the recommendations involve no increase in funding, and two or three of these have already been implemented; some involve substantial costs, while a few require certain technical advances, and these will obviously take appreciable time to implement.

PART III

USERS OF WEST COAST MARINE WEATHER INFORMATION

INTRODUCTION

This portion of the report describes the main groups of users dependent on marine weather information for conducting their operations safely and efficiently. The three largest distinct groups are commercial fishermen, recreational boaters (including sports fishermen) and towboat/ barge operators. Coastal aviators form another small but important group dependent on marine weather. Another class of miscellaneous users having common weather information needs, consisting of ferries, CCG, DFO and RCMP patrol vessels, will be dubbed "official users" for convenient reference in this report.

Each of these user groups is discussed below, but commercial fishermen are given particular attention, as, for a number of reasons, they are the most vulnerable to severe weather. A brief review of the west coast industry is presented, to help in understanding the scope of fishermens' needs for weather and sea state information. Unless otherwise noted, statistics shown for the various fisheries are for 1984, the most recent year for which figures are available.[1]

COMMERCIAL FISHERMEN

Many fishermen have lost their lives in west coast waters, particularly during the severe spring and fall storms experienced at the beginning and end of the major fisheries season. Economic pressures and the nature of the west coast fisheries oblige fishermen to fish in all but the most severe weather.

While some fishing goes on year-round, there is a slack period in the winter months, November to February, the peak months being July and August. In 1984, DFO recorded commercial fishing activity exceeding

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1 "British Columbia Catch Statistics, 1984." Fisheries Management, Dept. of Fisheries and Oceans.

280,000 fishing days in B.C. waters. Figure III-1 shows the areas with the largest concentration of fishing days in that year. However, there are fishermen at sea at practically all seasons along most of the coast.

The majority of fishing vessels are 30 to 60 feet in length and have a maximum speed of about 11 kts when fully laden. Some also carry heavy gear on deck. Consequently, they are vulnerable to dangerous sea and weather conditions not only when fishing but during the long transits between fishing grounds and between fishing ground and port.

The West Coast Fishing Industry

The west coast commercial fishing fleet is a major user of weather services. The fishery is very diverse, covering many different areas of the coast, during different seasons, with varying sized vessels, some of which use more than one type of fishing gear (see Fig. III-2) depending on species being fished. Since it can take several hours to deploy or recover some fishing gear, weather forecasts are a very important factor in deciding fishermen whether to begin or continue fishing. Further, because fishing boats have to make long transits between harbours and fishing grounds, sometimes with heavy catches aboard, accurate weather information is often critical to their safety.

Salmon fishing, which constitutes the most important fishing activity (see Fig. III-3), involves three types of gear: troll, gillnet and seine. The number of vessels in the salmon fishing fleet is approximately 4,491 in total, with 551 seiners, 1,972 combination vessels (allowed to troll and gillnet at different times), 999 trollers and 969 gillnetters.[1] The average size of seiners is 60 to 70 feet overall, while trollers and gillnetters range in length from 30 to 40 feet. Figure III-4 shows the proportion of salmon caught using the three types of gear.

Gillnetters and seiners operate, for the most part, in protected or semi-protected waters, although many hours and even days of travelling in open waters may be needed to get to a salmon opening. While many gear-use restrictions apply, the major operational areas include the Strait of

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1 Numbers at November 30, 1984, furnished by DFO Licence Division. For the various types of licences, see table following Question 7 in Part V of this report.)

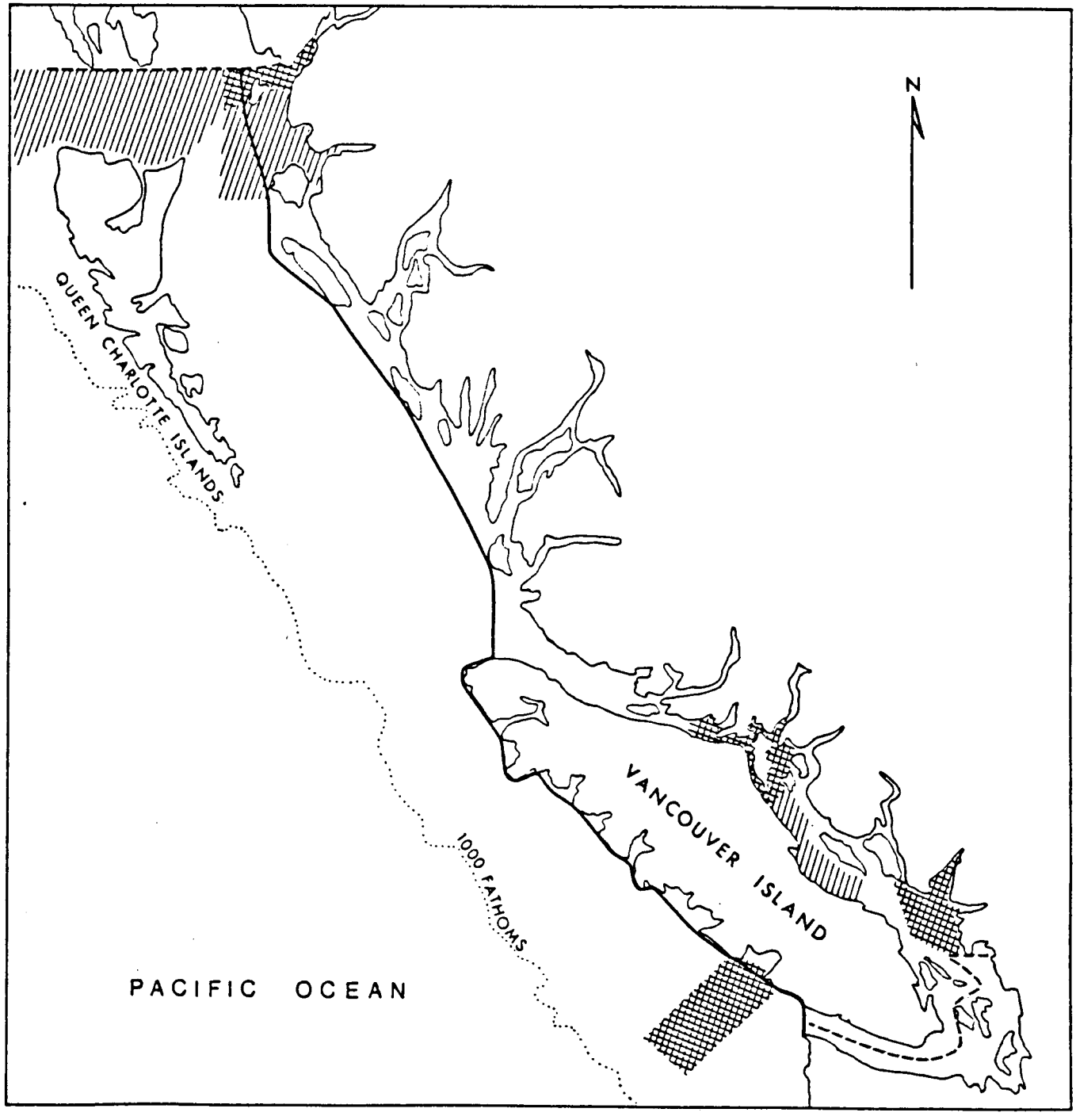

Figure III-1: The heavily hatched areas indicate the regions having the highest density of fishing-days; while the lightly hatched areas indicate secondary areas with a lower density of fishing-days.* The unhatched areas should not be interpreted as having no fishing. The hatched areas accounted for about 55% of the 1984 fishing-days.

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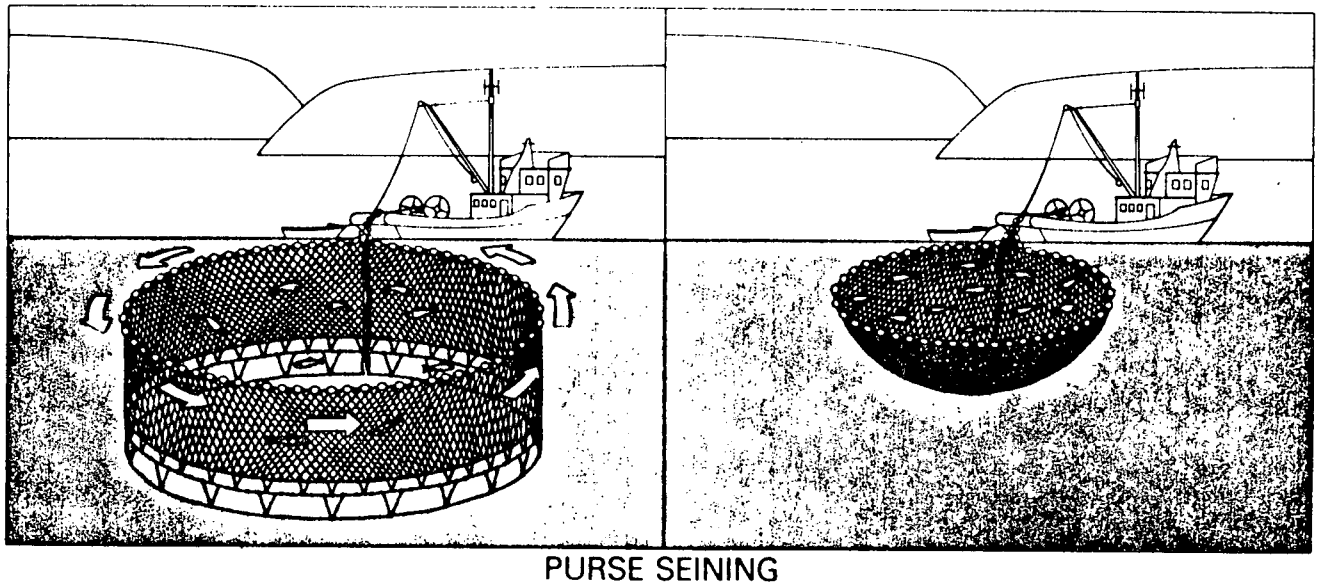
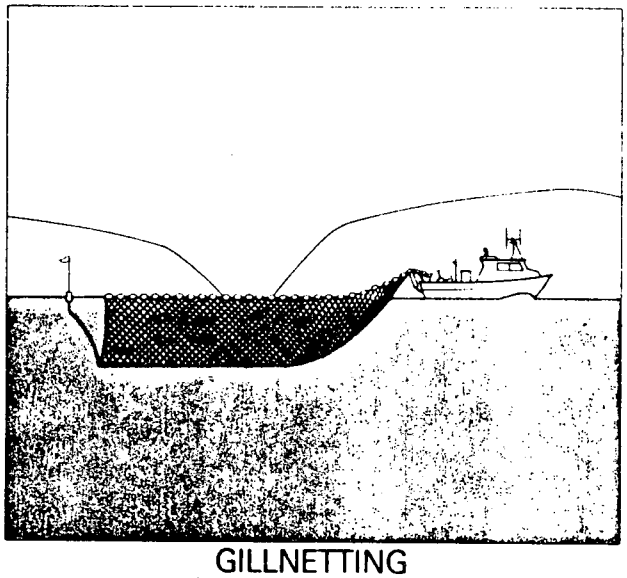
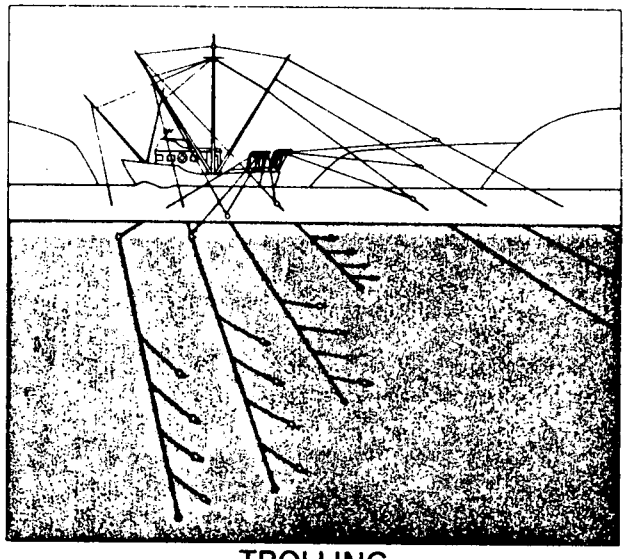
*Based on 1984 fishery statistics



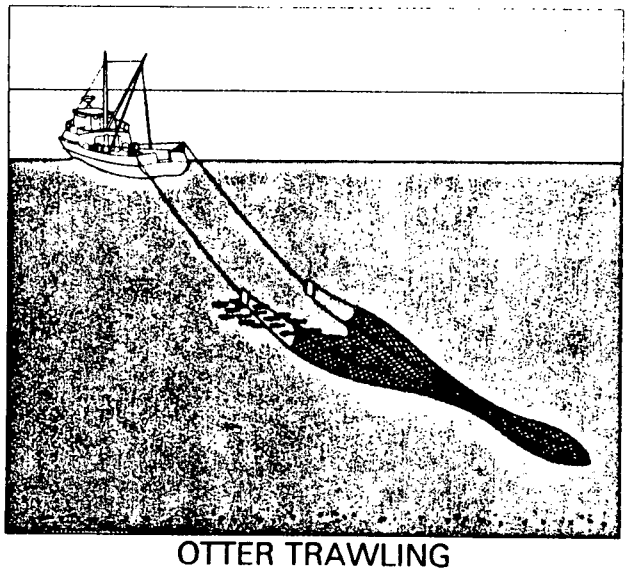
PURSE SEINING



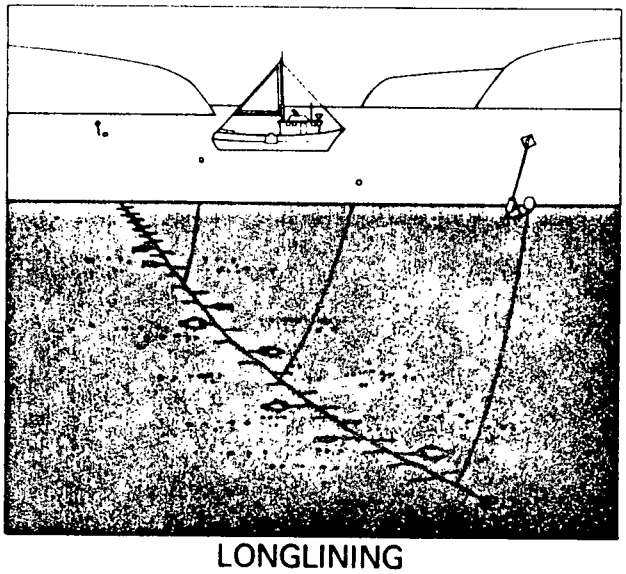
GILLNETTING



TROLLING



OTTER TRAWLING



LONGLINING

Figure III-2: Methods of Fishing from "Sailing Directions" - British Columbia Coast. Vol. 1, 1984. Department of Fisheries and Oceans.

Figure III-3: The total landed dollar value* (processing not included) of the B.C. fishery and that portion attributable to the salmon fishery during the last eleven years. The bar graph to the right indicates the portion contributed by the various species to the total 1985 fishery.

Based on the Department of Fisheries and Oceans "B.C. Catch Statistics, 1984" and provisional figures for 1985.

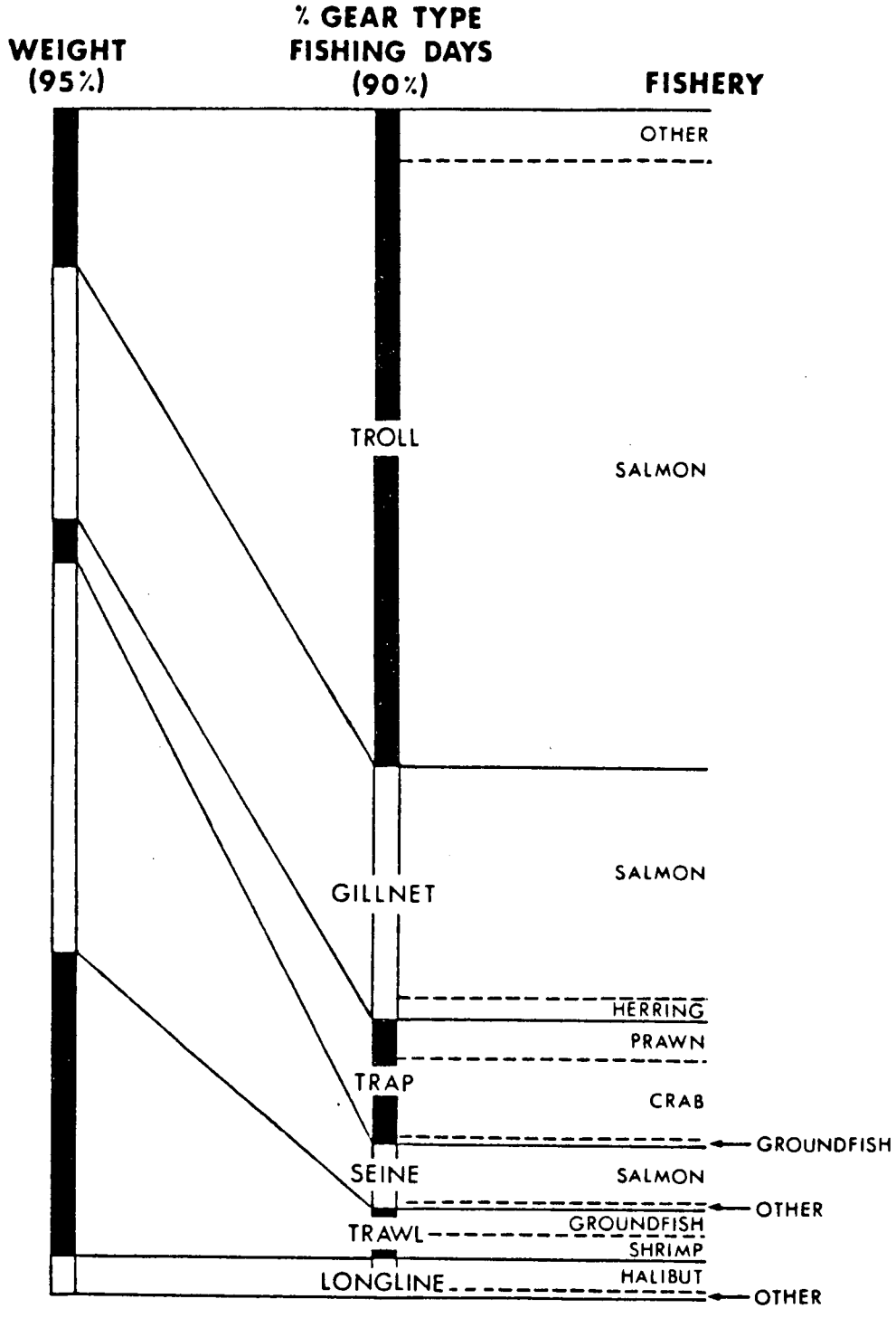


Figure III-4: The central bar represents the percentage of fishing days in which certain types of fish gear are used. The main species caught by each type of gear is indicated on the right. The left bar indicates the weight caught by the various types of gear. The central bar represents 90% of the fishing days and the left represents 95% of the fishery weight.

Georgia, Juan de Fuca Strait, inlets on the west coast of Vancouver Island, inlets on the Queen Charlotte Islands and along the northern mainland coast. Figures III-5 and III-6 outline, in bold line, the portion of B.C. waters to which trolling, seining and gillnetting are confined.

Gillnetters and seiners start fishing close to the middle of June on the north coast of B.C. around the Nass and Skeena River areas, and progress south during the season to the late fall fishery openings on the west coast of Vancouver Island and the Strait of Georgia openings in October. Some of the net fleet based around the Fraser River and the Strait of Georgia travel to the north coast for openings and some of the north coast net fleet fish the late fall fishery on the west coast of Vancouver Island and the Gulf of Georgia. The seasonal distribution of the various fisheries is shown in Figure III-7. The seasonal distribution of the salmon fishery by area is shown in Figure III-8.

For trollers, salmon fishing begins on the west coast of Vancouver Island, Queen Charlotte Sound, west coast Queen Charlotte Islands, Dixon Entrance and Hecate Strait about the middle of April and continues to the end of October. The salmon troll fishery takes place 25 to 100 nautical miles from shore. A troller working 25 nautical miles offshore can take anywhere from three hours to eight hours to find shelter in severe weather, depending on the location, size of vessel and sea conditions. The troll fleet, having a relatively long fishing season, is more likely to experience the very sudden and severe storms which can occur in early spring and late fall.

About 25 trollers[1] participate also in the tuna fishery, which can take them up to 300 nautical miles offshore. Sea surface temperatures, particularly the position of thermal fronts, are of importance to tuna fishermen.

The herring fleet consists of seiners and gillnetters, the gillnets being placed near the shore from open punts of 25 to 40 feet in length. Seiners operate in the same manner for herring as for salmon, except that a different size net is used. When stocks allow, herring fishing begins in the south in the middle of February and works north, with the fishery ending on the north mainland coast around the first part of April. (In

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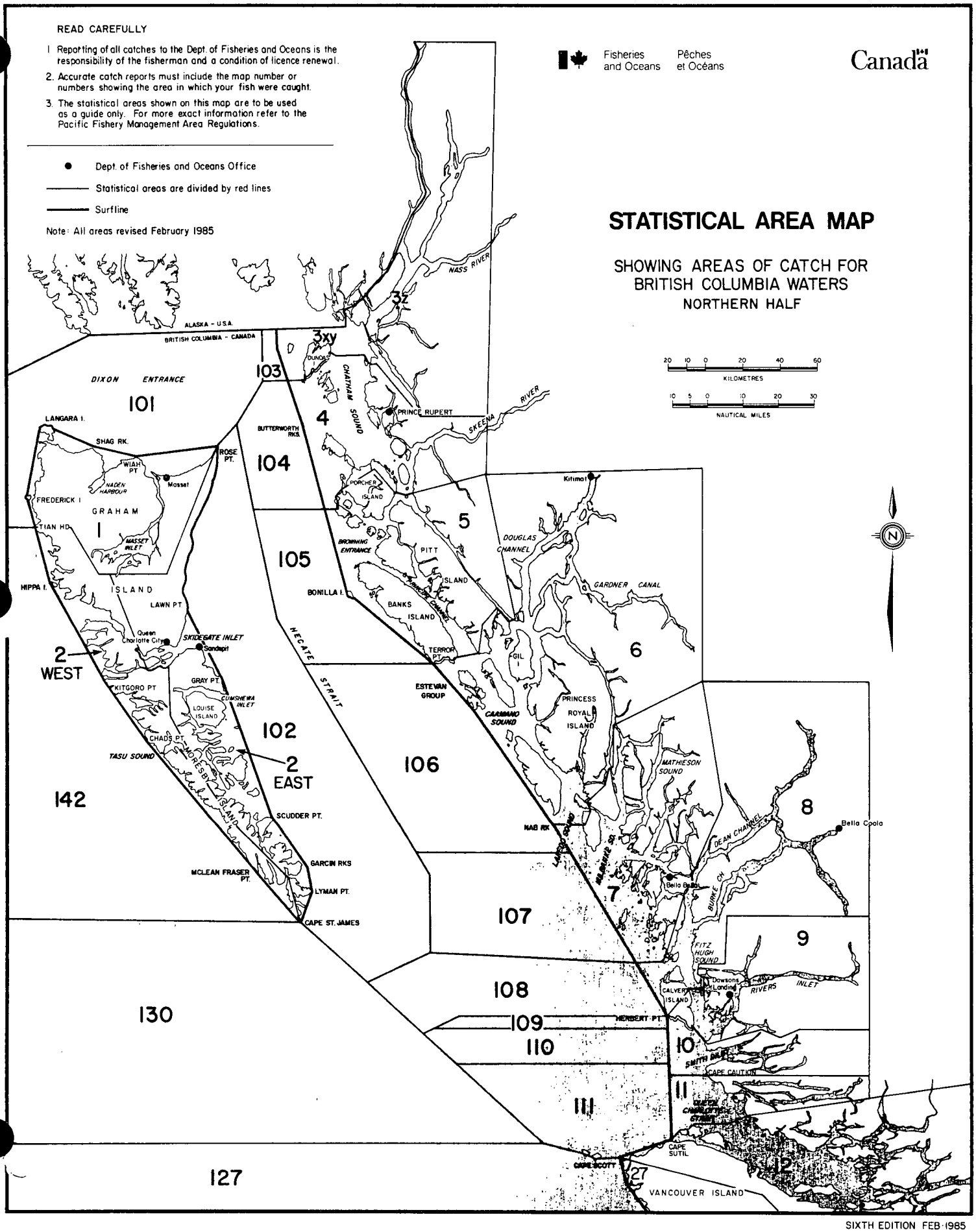
1 According to DFO estimates; tuna fishing does not require a licence from DFO.


READ CAREFULLY
1. Reporting of all catches to the Dept. of Fisheries and Oceans is the responsibility of the fisherman and a condition of licence renewal.
2. Accurate catch reports must include the map number or numbers showing the area in which your fish were caught.
3. The statistical areas shown on this map are to be used as a guide only. For more exact information refer to the Pacific Fishery Management Area Regulations.
Dept. of Fisheries and Oceans Office
Statistical areas are divided by red lines
Surfline
Note: All areas revised February 1985
Fisheries and Oceans
Pêches et Océans
Canada
STATISTICAL AREA MAP
SHOWING AREAS OF CATCH FOR BRITISH COLUMBIA WATERS
NORTHERN HALF
KILOMETRES
NAUTICAL MILES
ALASKA - U.S.A.
BRITISH COLUMBIA - CANADA
NASS RIVER
DIXON ENTRANCE
LANGARA I.
SHAG RK.
WIAH PT.
ROSE PT.
Masset
NADEN HARBOUR
FREDERICK I.
GRAHAM ISLAND
TIAN HD.
MASSET INLET
HIPPA I.
LAWN PT.
Queen Charlotte City
SKIDEGATE INLET
Sandspit
KITGORO PT.
GRAY PT.
CUMSHEWA INLET
LOUISE ISLAND
CHAOS PT.
TASU SOUND
MORESBY ISLAND
SCUDDER PT.
GARCIN RKS.
MCLEAN FRASER PT.
LYMAN PT.
CAPE ST. JAMES
BUTTERWORTH RKS.
DUNDAS I.
CHATHAM SOUND
PRINCE RUPERT
SKEENA RIVER
PORCHER ISLAND
BROWNING ENTRANCE
PITT ISLAND
BONILLA I.
BANKS ISLAND
HECATE STRAIT
TERROR PT.
ESTEVAN GROUP
Kitimat
DOUGLAS CHANNEL
GARDNER CANAL
GIL I.
PRINCESS ROYAL ISLAND
CAMANO SOUND
MATHIESON SOUND
NAB RK.
LAREDO SOUND
MILBANKE SD.
DEAN CHANNEL
Bella Coola
Bella Bella
BURKE CH.
FITZ HUGH SOUND
Dawsons Landing
RIVERS INLET
CALVERT ISLAND
HERBERT PT.
SMITH INLET
CAPE CAUTION
CAPE SUTIL
CAPE SCOTT
VANCOUVER ISLAND
103
101
4
104
105
5
6
2 WEST
102
2 EAST
106
142
130
107
108
109
110
111
127
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27
SIXTH EDITION FEB 1985

Figure III-5

AD CAREFULLY

1. Reporting of all catches to the Dept. of Fisheries and Oceans is the responsibility of the fisherman and a condition of licence renewal.
2. Accurate catch reports must include the map number or numbers showing the area in which your fish were caught.
3. The statistical areas shown on this map are to be used as a guide only. For more exact information refer to the Pacific Fishery Management Area Regulations.

● Dept of Fisheries and Oceans Office

——— Statistical areas are divided by red lines

——— Surfline

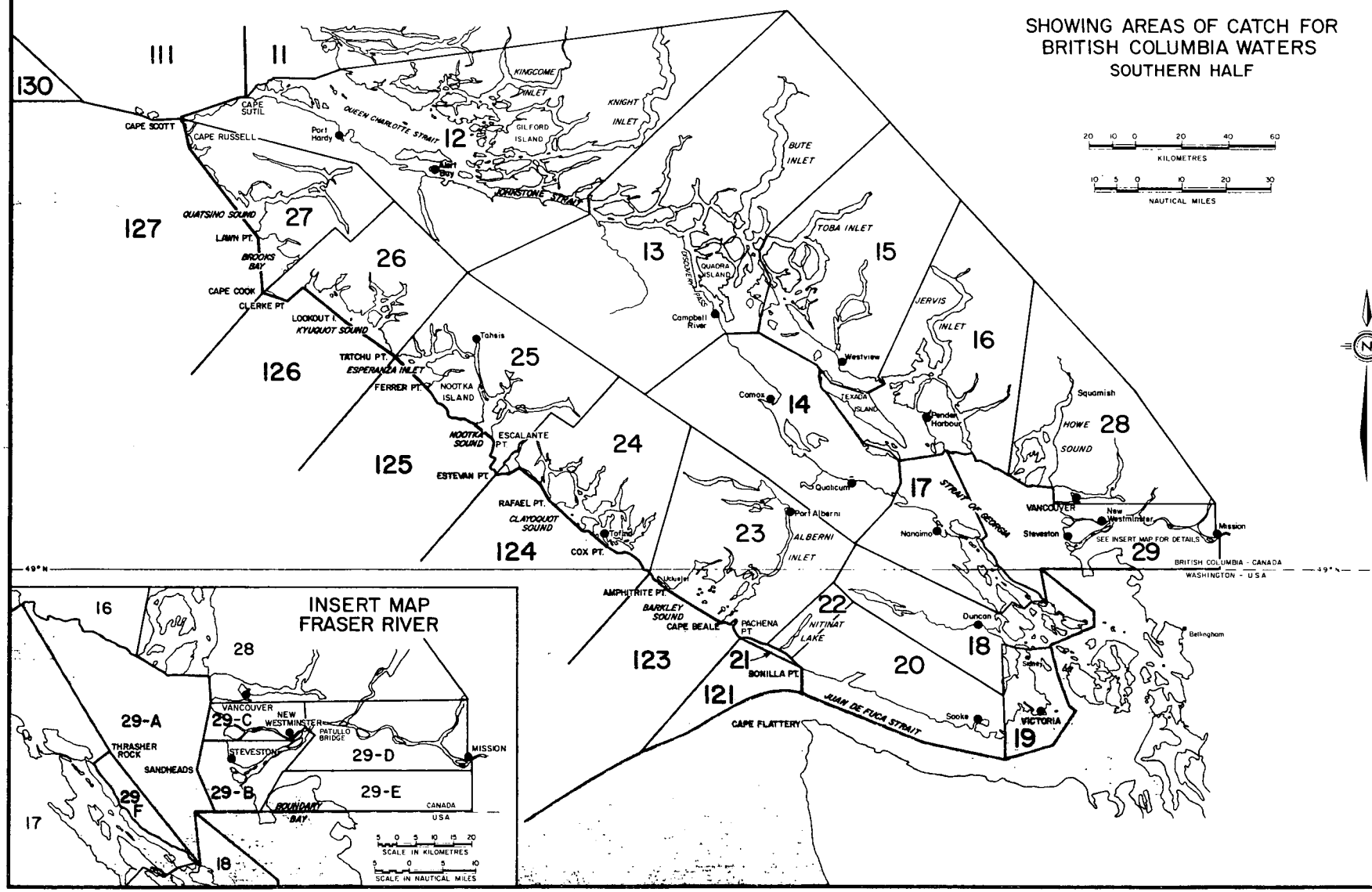
Note: All areas revised February 1985

Fisheries and Oceans / Pêches et Océans

Canada

STATISTICAL AREA MAP

SHOWING AREAS OF CATCH FOR BRITISH COLUMBIA WATERS SOUTHERN HALF



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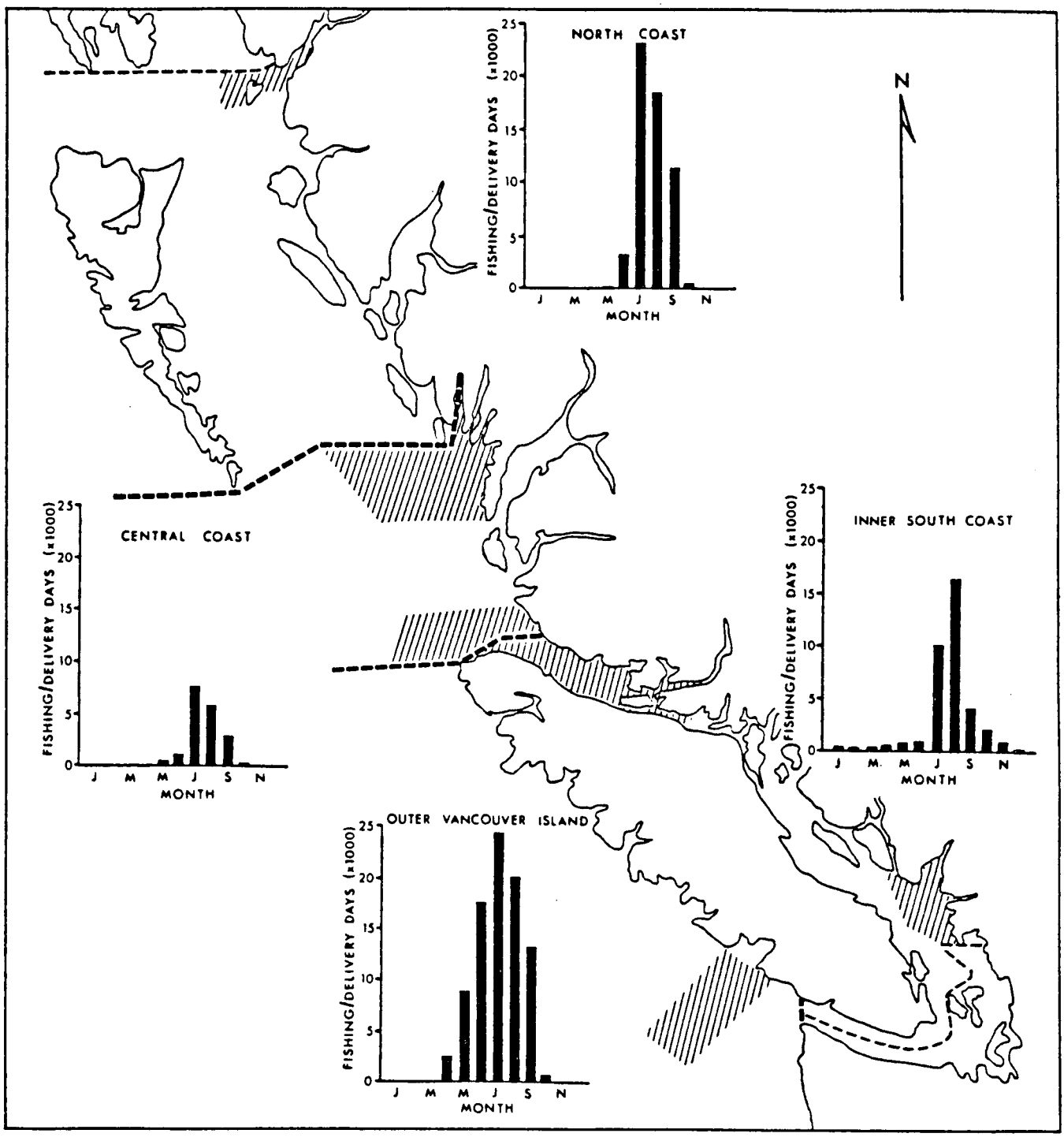

Figure III-8: The bar graphs indicate the seasonal trend of fishing-days dedicated to salmon fishing in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days.

1986, herring stocks allowed fishing only on the north coast.) Herring fishing is much more volatile than salmon due to the fact that the herring approach the coast to spawn in certain areas, over a period of one to seven days, whereas salmon runs start gradually and build to a peak, lasting a few days to a week, and then taper off. During the herring season, net fishermen are exposed to the unpredictable weather of late winter and early spring; salmon net fishing is mostly in the summer, with some fall fishing. Figure III-9 shows the spatial and temporal distribution of the herring fishery. Examination of Figure III-7 illustrates the lucrative nature of the herring fishery. The financial return per fishing-day can be much higher than that achieved during the salmon fishery.

Bottom- or mid-water trawling for groundfish is carried out on a year-round basis, though with very few landings in January. The principal species caught by bottom-trawling are sole, rockfish, perch and cod. In mid-water trawling, pollock is a major catch. According to official figures, there are about 141 vessels (draggers) licenced to bottom fish. Most of these vessels may participate in other fisheries during the year, such as pack herring, pack salmon or work in a co-operative fishing arrangement in which hake is caught and delivered to foreign vessels. In 1984, the delivered value of hake caught was over $4.5 million. Most draggers are from 70 to 110 feet long and are able, as a general rule, to take more severe weather than the salmon fleet. Figure III-10 depicts the spatial and temporal distribution of trawl fishing. In contrast with the peak periods of herring, salmon and halibut, the trawl fishery is more evenly distributed through the year.

There are over 400 licenced vessels in the halibut fleet, but very few fish halibut only. Most of these vessels also fish for salmon or work in the "Special Fisheries" under a "Z" licence. Halibut fishing is regulated by the joint U.S./Canada International Halibut Commission, which controls areas, quotas and fishing times. Halibut openings start toward the end of April and run to the middle of August with four 15-day openings. Fishing is done with baited hooks and made fast to an anchored main line stretched along the bottom. If at all possible, a halibut fisherman will attempt to recover his gear before severe weather sets in; this operation can sometimes take up to 12 hours. Not only is the loss of gear a consideration, but lost gear will continue to fish until the bait is exhausted, thus depleting the stock.

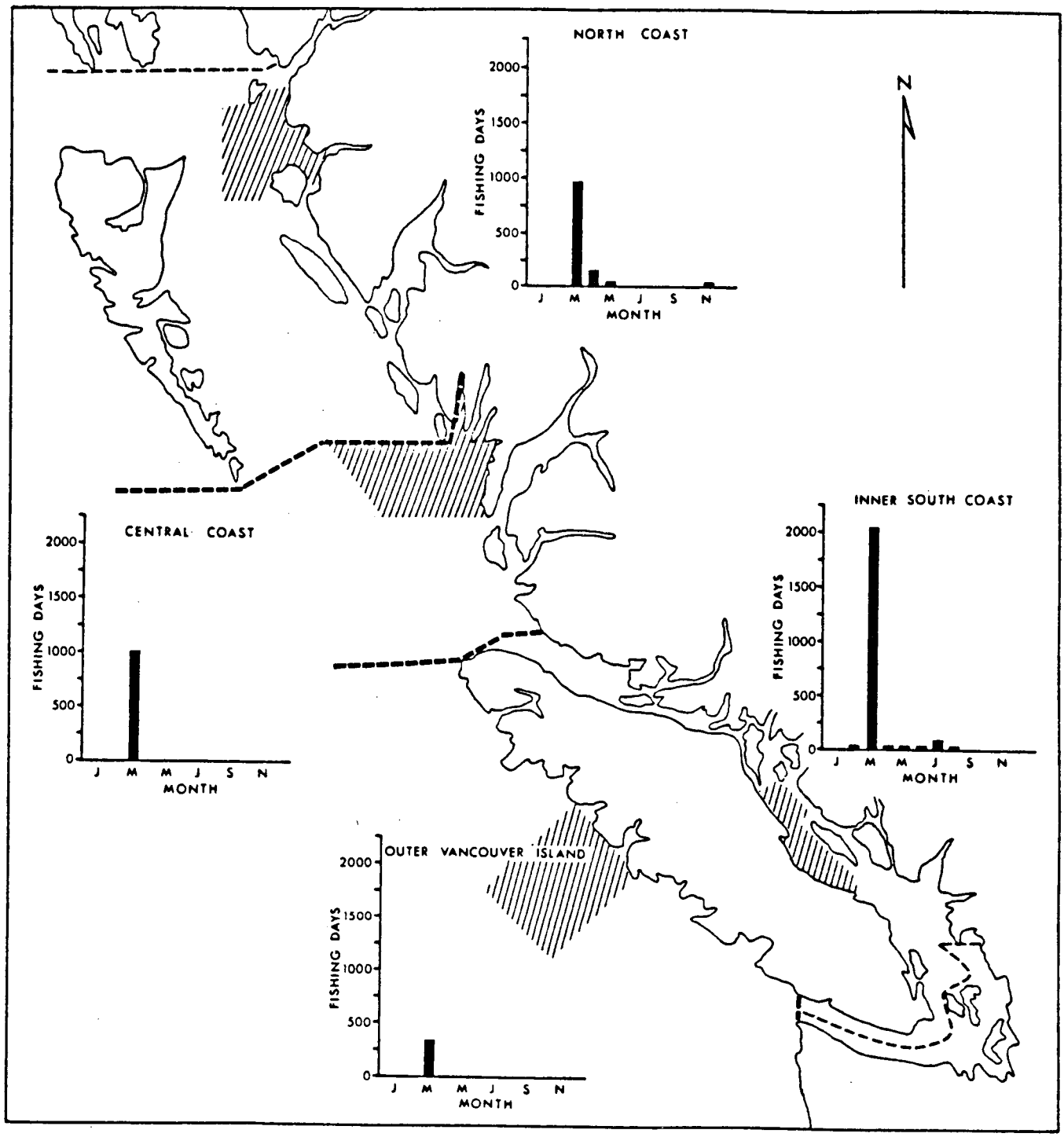

Figure III-9: The bar graphs indicate the seasonal distribution of fishing-days dedicated to herring fishing in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days.

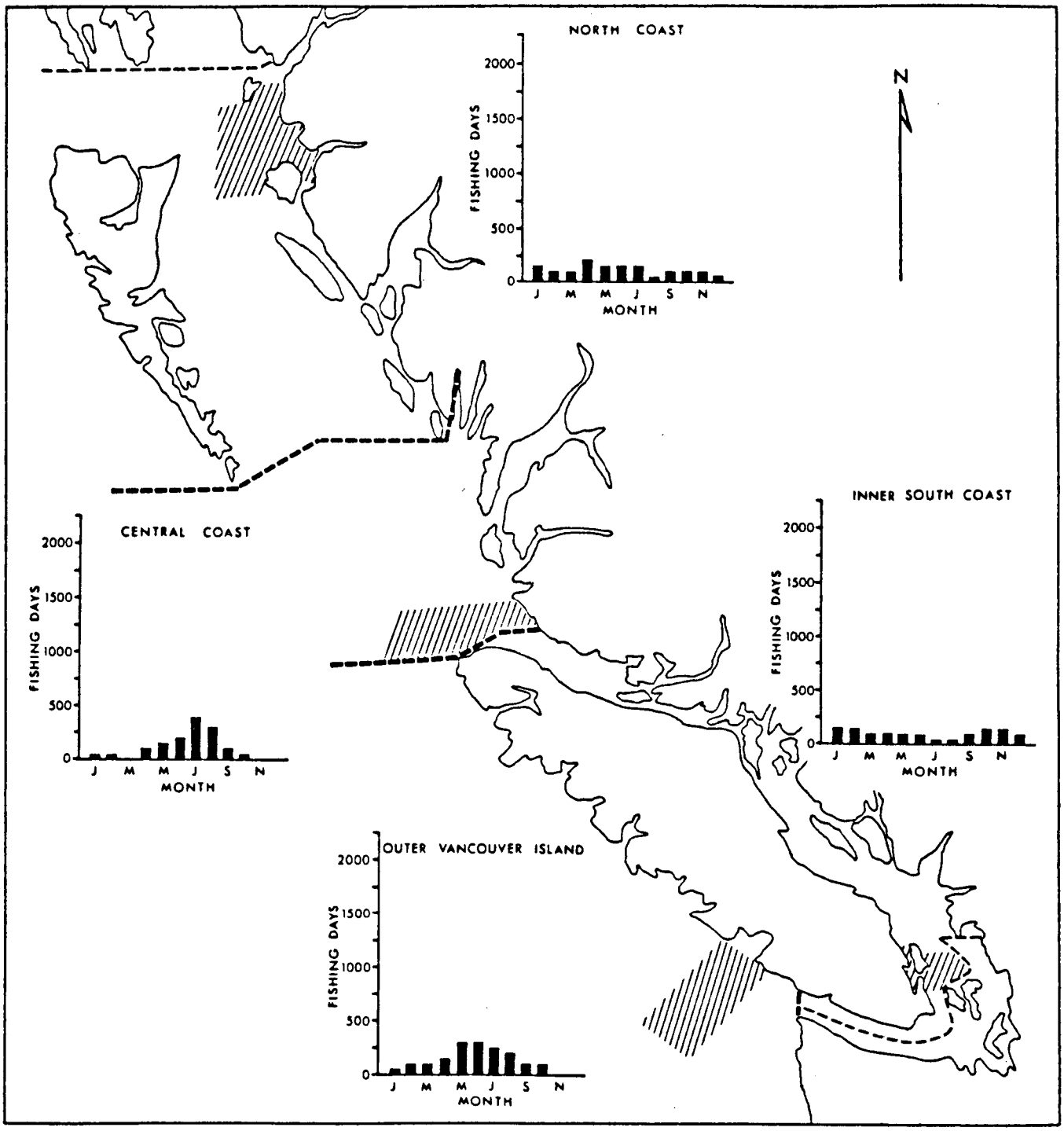

Figure III-10: The bar graphs indicate the seasonal distribution of fishing-days dedicated to bottom trawling in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days devoted to bottom trawling. This figure does not include mid-water trawling. Almost all trawling fishing-days are dedicated to fishing for cod, sole, rock fish, perch and other groundfish.

Figure III-11 indicates the spatial and temporal distribution of longline fishing-days, of which, in 1984, 90% were devoted to halibut fishing.

Another important fishery is sable fish or black cod, in which trapping is the principal method used. This fishery takes place near the edge of the continental shelf off the Queen Charlotte Islands and Vancouver Island. Figure III-12 displays the spatial and temporal distribution of sable fishing days.

Most of the remaining fishermen work under a "Z" licence--a special fisheries licence which permits the harvesting of sea urchins, squids, prawns, oysters, sea cucumbers, etc. Although this year-round fishery is generally conducted in or near sheltered waters, weather is still in important factor. Figure III-13 shows the distribution of prawn trapping and shrimp trawling days. Like the shrimp fishery, most prawn fishing is done close to the mainland and inside some mainland inlets. Figure III-14 shows that crab fishing is similarly concentrated near the mainland and in the Strait of Georgia. A particular hazard to boats engaged in these fisheries is the occurrence of freezing spray during periods of cold outflow winds from the interior of B.C.

On the west coast, there are over 7,000 commercial licenced fishing vessels, many carrying more than one licence (e.g., Salmon "A," Herring "H"), trying to make a living from harvesting the sea. These vessels are affected by marine weather and ocean conditions. Fishing is one of the few areas in our society where the small independent businessman can make a living, but to make a return on his investment, he is often forced to take weather-related risks as fishery openings and/or stock quotas decrease. The fishermen are under increased pressure to catch more fish in less time. As a consequence, marine weather information will become more important in terms of short-term tactical planning than in influencing fishermens' decisions on when or where to go fishing. Fishermen may use marine weather information to decide when to leave the fishing grounds to unload, but weather advisories and warnings may not necessarily force the fishermen to stay in port or leave the grounds.

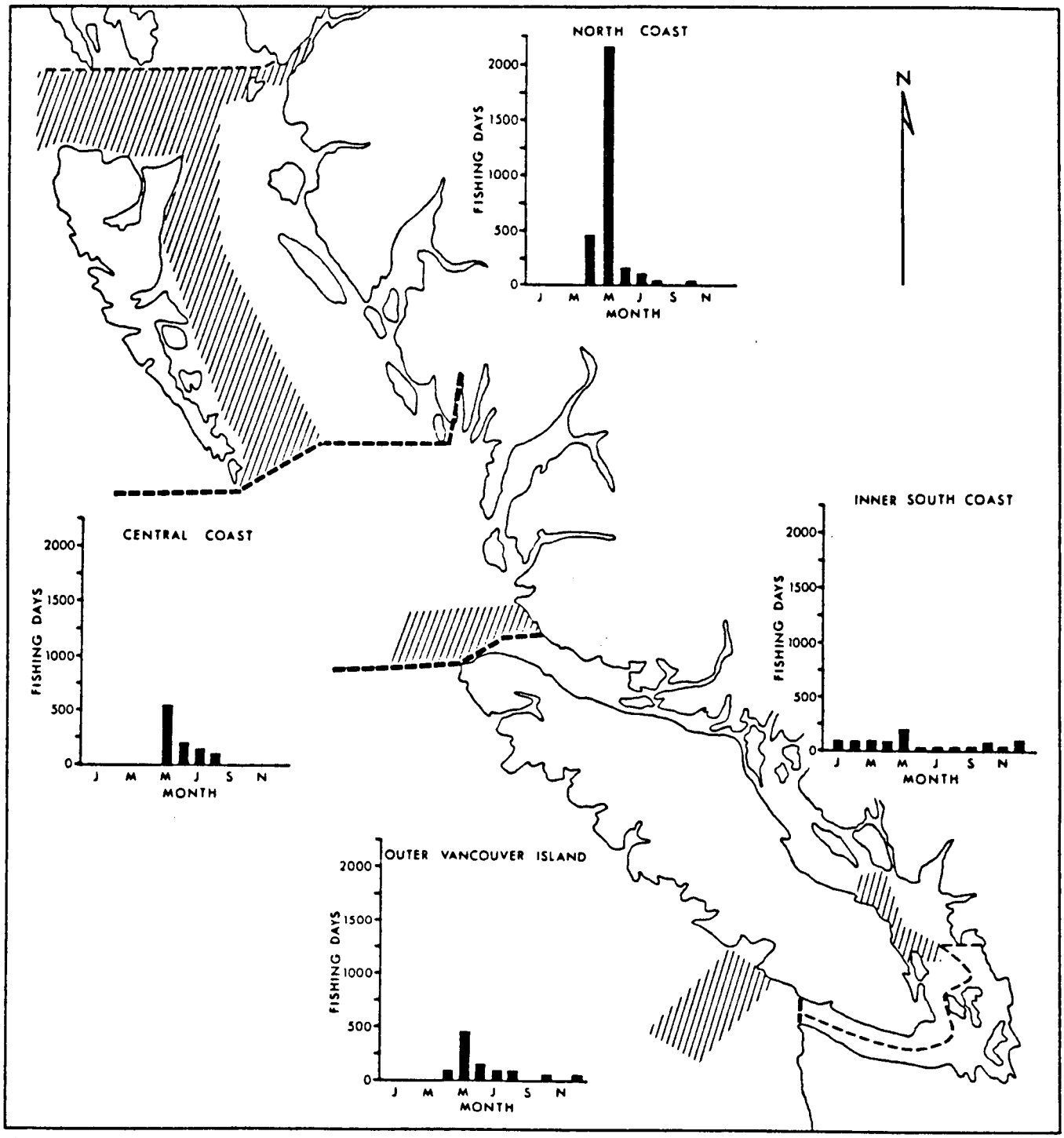

Figure III-11: The bar graphs indicate the seasonal distribution of fishing-days dedicated to longline fishing in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days. About 90% of the longline fishing-days are devoted to halibut fishing.

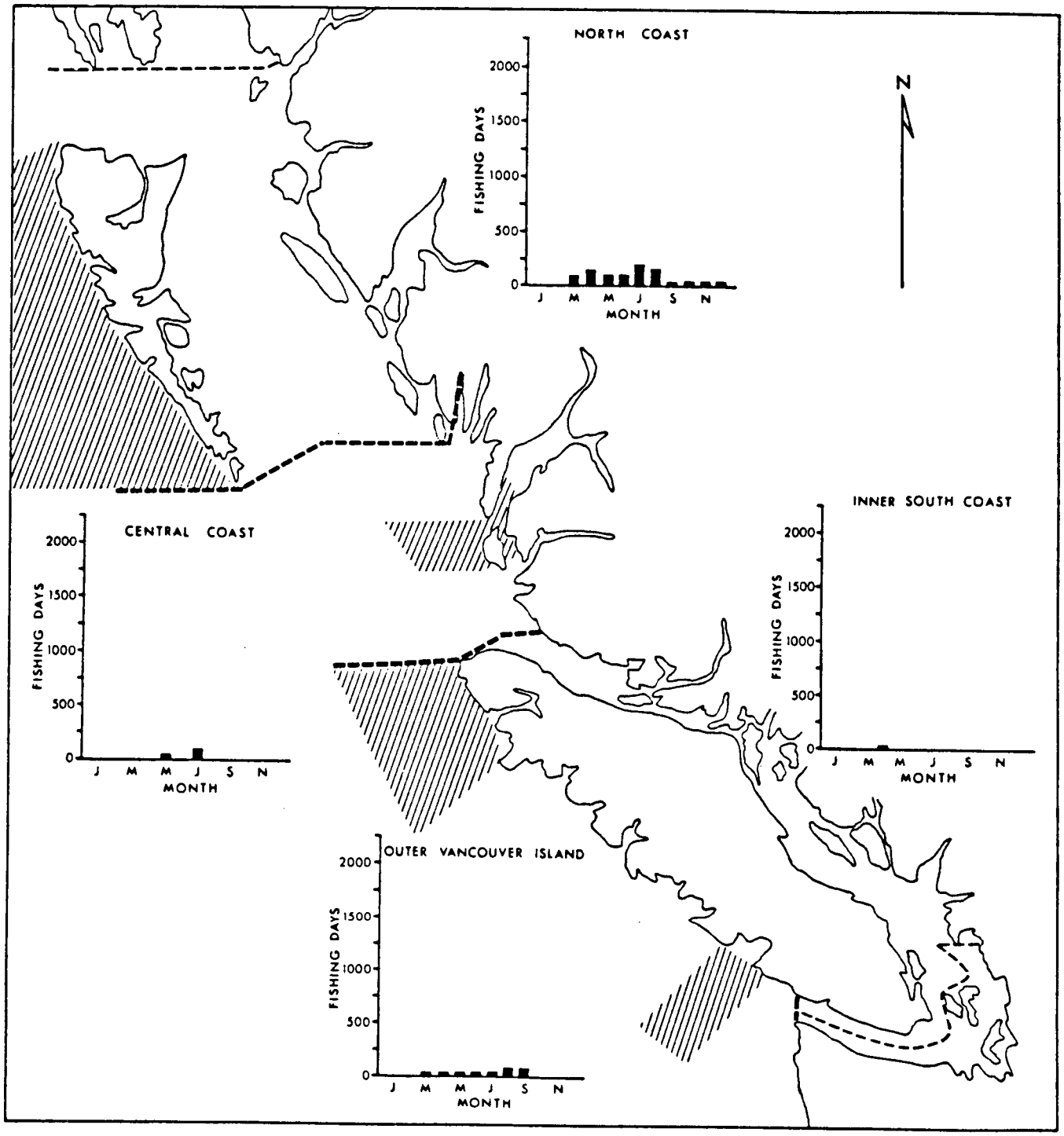

Figure III-12: The bar graphs indicate the seasonal distribution of fishing-days dedicated to sable fishing in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days. Over 90% of the sable fish are caught by the use of traps.

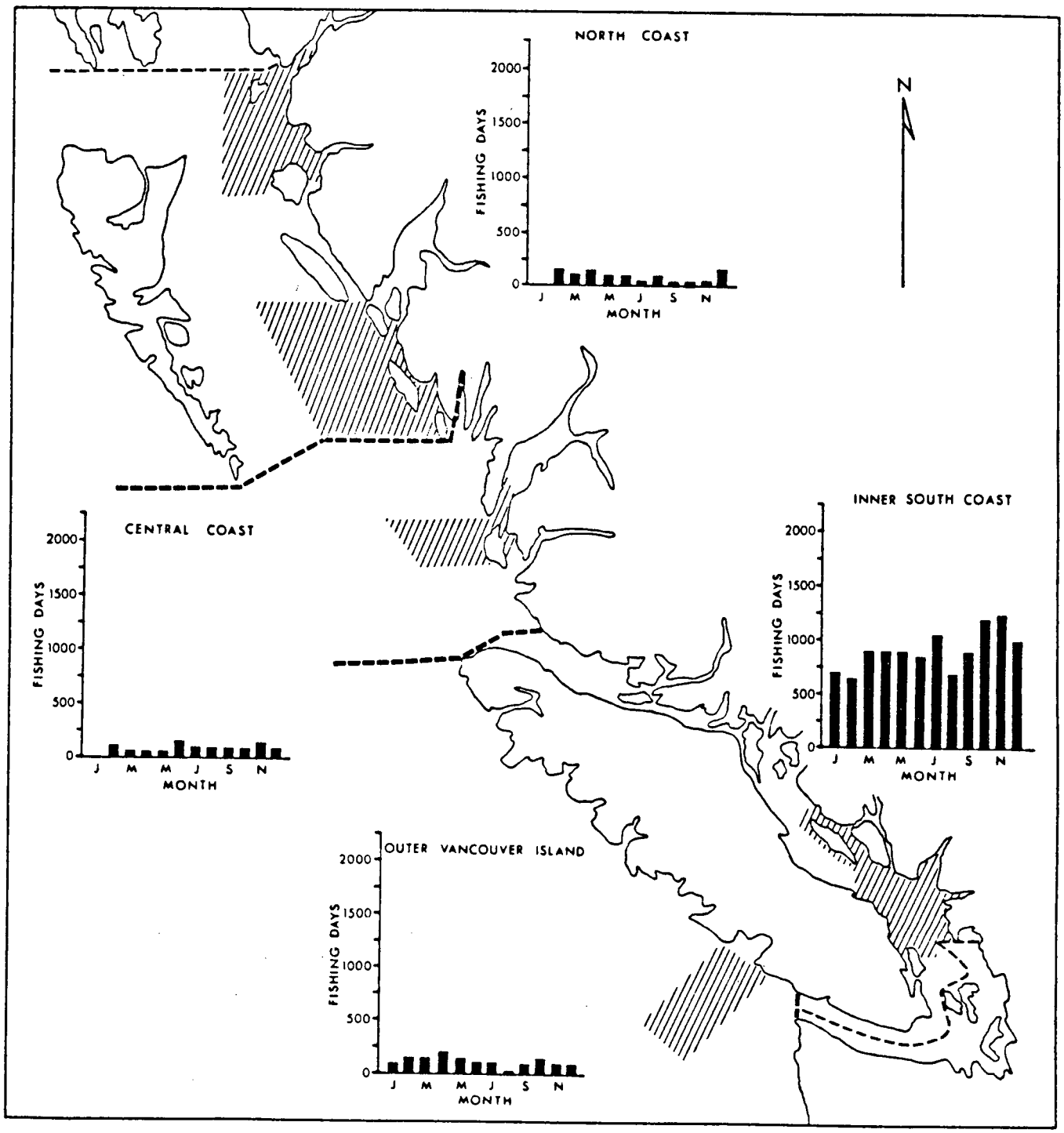

Figure III-13: The bar graphs indicate the seasonal distribution of fishing-days dedicated to prawn and shrimp fishing in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days.

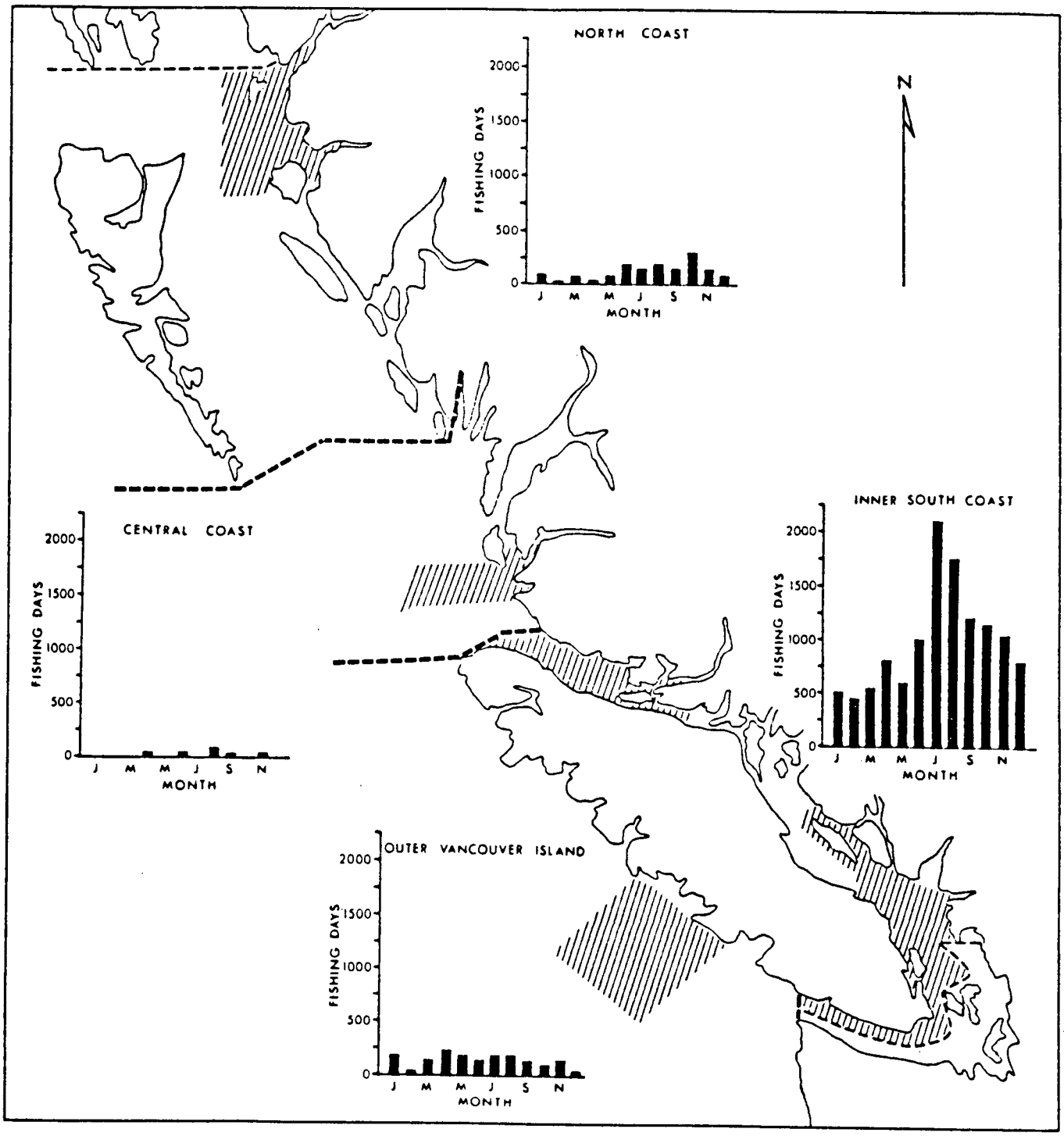

Figure III-14: The bar graphs indicate the seasonal trend of fishing-days dedicated to crab trapping in four coastal regions. The shaded areas within the four coastal regions represent areas having the highest density of fishing-days.

Utility of present weather information services to the fishing industry

The foregoing analysis of fisheries by area and season, combined with input from fishermen, reveals some inadequacies in present services, in particular, a degree of mismatching between marine forecast areas and fishing areas.

The marine forecast for the west coast of Vancouver Island is held in bad repute by fishermen and examination of Figure III-1 soon reveals why this is so. The heaviest concentration of fishing in that region occurs near La Perouse Bank off Barkley Sound and, in 1984, it accounted for almost 20% of the fishing days. Climatologically, the strongest winds are well north of that region and occur over the northwest portion of Vancouver Island. In response to frequent gale and storm wind reports in that region and particularly since the installation of automatic reporting stations at Sartine and Solander Islands, the marine forecasters issue gale and storm warnings for the north portion of the marine forecast region. As a result, the marine forecast for all of west coast Vancouver Island is flagged to indicate a gale or storm status situation. In actuality, the gales or storms are slower in reaching or may fail to materialize in the La Perouse Bank area.

Similarly, much of the fishing on the north coast is done in the inshore areas where, generally speaking, the winds are weaker than offshore. Frequently, however, all north coast waters are flagged as being under a gale or storm status, when in reality, the strongest winds may be well off the mainland coast. At other times, there are situations where strong outflow winds or strong inflow winds warrant warnings only for the mainland inlets, but the associated marine areas are flagged with either a gale or storm warning.

Another region requiring attention is the area near Desolation Sound. The rough orography coupled with the merging of Johnstone Strait, Strait of Georgia and some mainland inlets results in a wind pattern that is poorly represented by either the Strait of Georgia or Johnstone Strait marine forecasts. There is a large amount of marine traffic through this area comprising fishermen travelling to and from the south coast, towboat and

barge operators, and recreational boaters. Many mariners remarked that Johnstone Strait winds, while having the same direction as those in Queen Charlotte Strait, are frequently much stronger, and hence, these two regions should be treated as two separate forecast regions. Similarly, the Gulf Island region, whose wind and sea state differs markedly from the more open regions of the Strait of Georgia, is poorly represented.

While it is difficult to justify the issue of specialized forecasts that cater to specific areas during certain fisheries, there is ample support for re-designing the marine areas to better serve the various sectors of the marine community.

TOWING OPERATORS

Due to the large forestry industry in B.C. and the need for transporting goods to and from communities on the mainland, Vancouver Island, Queen Charlotte Islands and between Puget Sound and Alaska, there is a heavy volume of towboat and barge traffic along the B.C. coast. Estimates place the tonnage handled as equivalent to that passing through the St. Lawrence Seaway.

A fairly accurate count of this traffic is available from the three CCG VTS centres located at Prince Rupert, Tofino and Vancouver. Approximately 85% of the towboat/barge traffic occurs in the Strait of Georgia/Puget Sound/Juan de Fuca Strait area with the remainder confined to the west coast of Vancouver Island and the north coast. There is some lessening of traffic during the holiday period in December and January, and again, during the drier summer months due to forest closures. Figure III-15 shows the distribution of towboat/barge operations in 1984.

The most weather-sensitive aspect in this marine sector are log tows. Damage and loss of log tows begins when wind speeds exceed the 12- to 15-kt range and when seas approach two to three feet. In addition, tows must pay particular attention to tidal currents in such locations as Porlier Pass, Dodd Narrows, Seymour Narrows, Skookumchuk Narrows and the build-up of swell in the more open areas such as the Strait of Georgia and along the west coast of Vancouver Island.

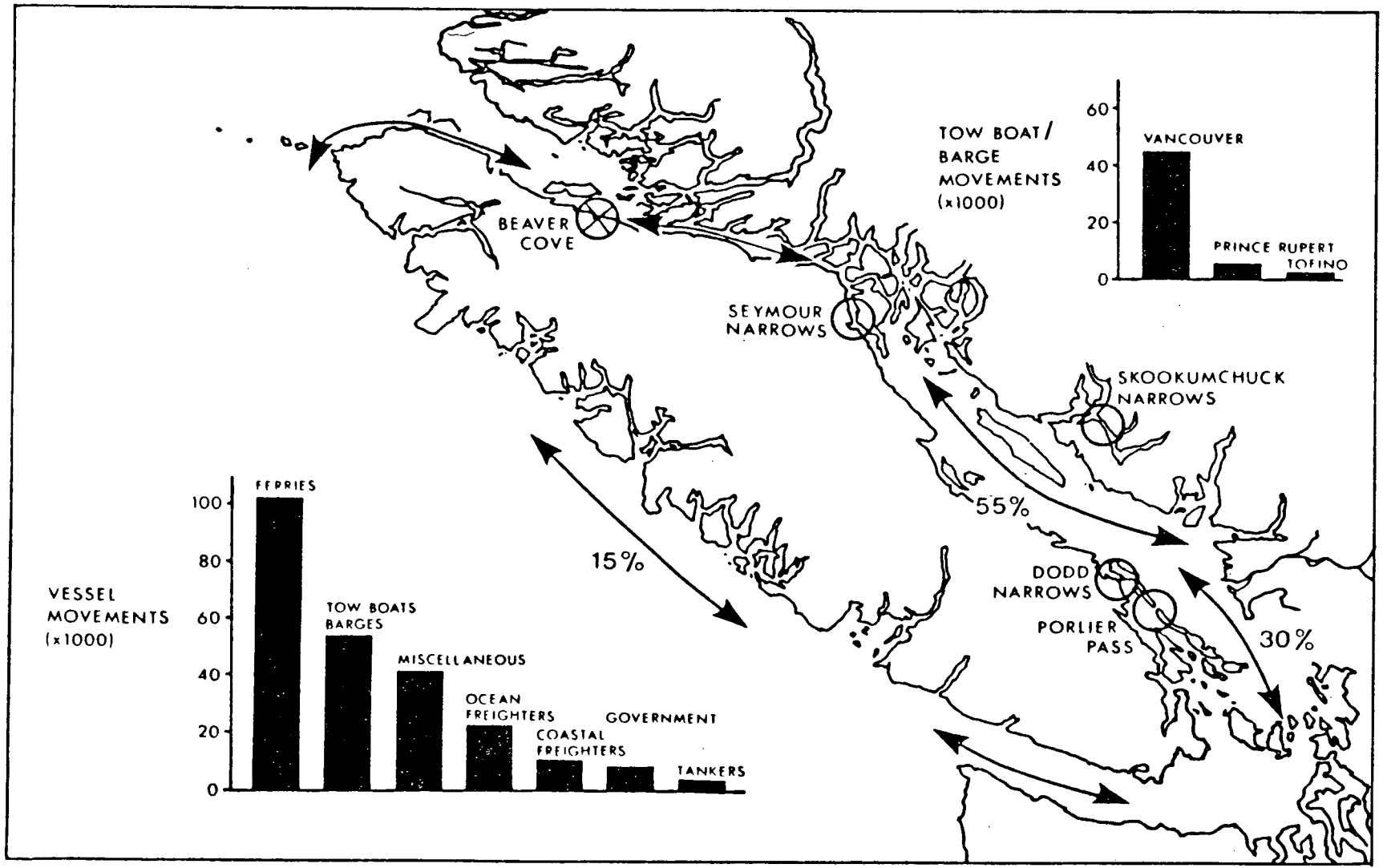

Figure III-15: The arrows and the accompanying percentage approximate the traffic pattern of the towboat/barge movements for the south coast region of B.C. The bar diagram at the top right-hand corner illustrates the regional distribution of towboat/barge movements as recorded by VTS. The bar diagram to the left summarizes the 1984 vessel movements as recorded by VTS. Fishing vessel movements are not included as only the larger ones register their movements.

RECREATIONAL BOATERS

Due to the unstructured nature of this group, an accurate estimate of the number of recreational boaters is not possible. Estimates[1] place the number of recreational vessels at 200,000. During the 1984-85 sports fishing year, over 300,000 tidal sports fishing licences were issued, and one must assume that a large fraction of the recreational boating community consists of sportsfishermen.

The economic activity generated by various segments of the recreational boat community is placed at $0.5 billion dollars, and it is estimated that $200 million dollars of this total is generated by the sportsfishermen. Figure III-16 shows the distribution of sportsfishing days through the year for the Strait of Georgia and the Strait of Juan de Fuca. About 90% of sportsfishing occurs in the Strait of Georgia, as might be expected, given the distribution of the general population in coastal British Columbia.

AVIATION USERS

One small but important user group very sensitive to marine weather information is the coastal aviation sector. This group includes a number of small commercial regional airlines[2], company aircraft, government aircraft including CCG helicopters and, of course, a large number of private planes travelling up and down the west coast including pilots travelling from the western United States to Alaska. Using figures compiled at the various coastal airports there were in excess of 40,000 coastal VFR flights in 1985.

In contrast to the B.C. interior, where the aviation sector is supplied with hourly weather reports specially designed for the aviator, only a few lightstation reports are available to coastal aviators, and these are issued only every three hours between 4:00 a.m. and 10:00 p.m.

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[1]These estimates were compiled from DFO statistics, Statistics Canada, Allied Boating of Canada and Marine Trades Association.

[2]The Working Group received comments from Vancouver Island Helicopters, Wilderness, Trans Provincial, Terrace Air, North Coast Air, Waglisla and Pacific Rim Airlines.

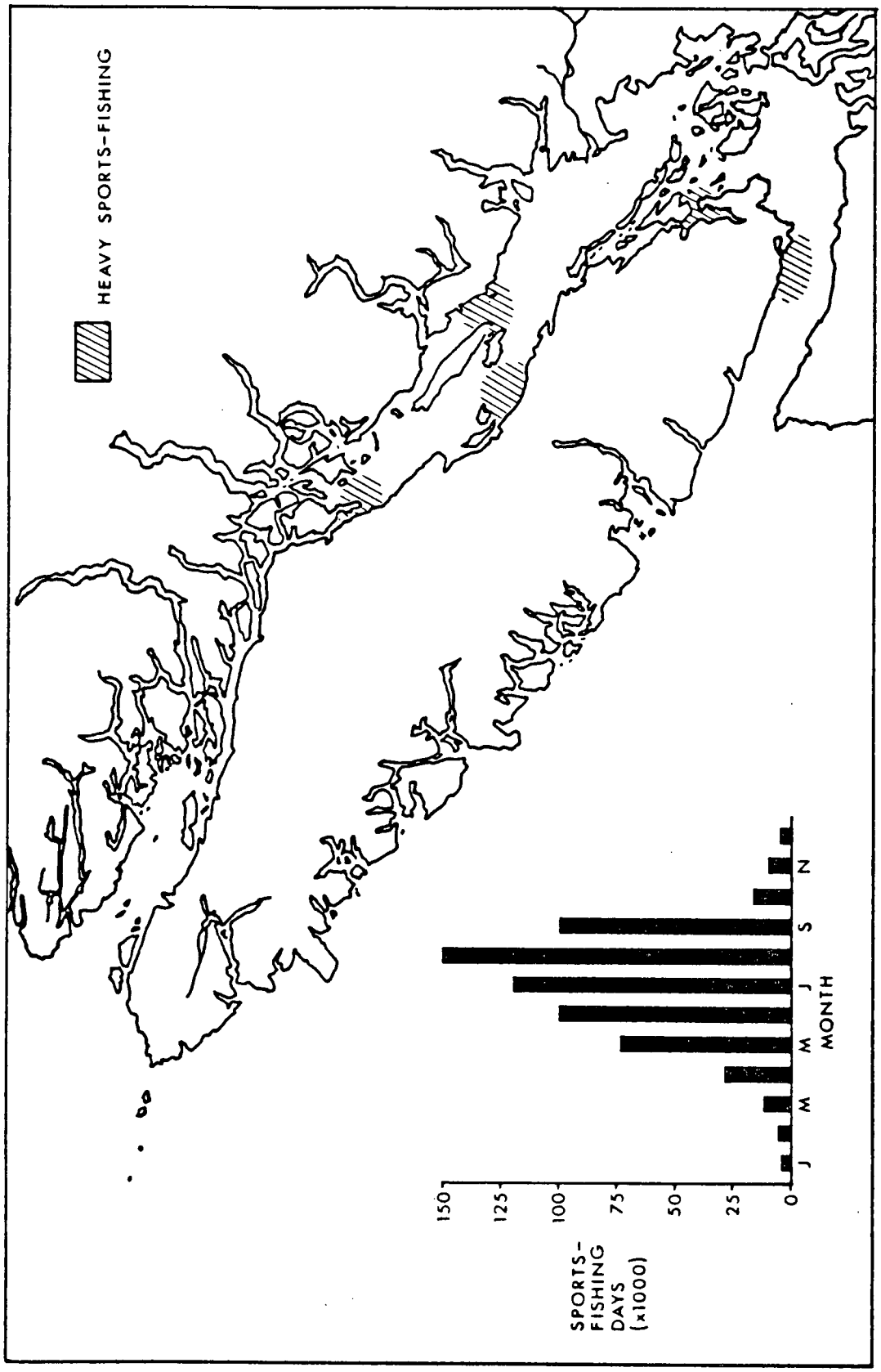

Figure III-16: The bar graph indicates the annual distribution of sportsfishing days. The hatched areas in the map indicate regions having the highest density of fishing days. About 90% of the sportsfishing is done on the inner south coast.

These reports, when received, are highly valued. Frequently, aviation activity is curtailed until the receipt of these reports.

In addition, federal government communication regulations do not permit or allow communication between lightstation operators and pilots who desire to receive or communicate weather information.

The three-hour time gap between lighthouse reports and the rapidly-varying nature of west coast weather have an adverse impact on aviation activity and safety. More frequent reports and a means for coastal aviators to communicate with designated lightstations would go a long way to improving the present inadequate level of service.

OFFICIAL USERS

Under this heading, it is convenient to group a variety of mariners who regularly cover a large part of the B.C. coast throughout the year, such as CCG, DFO, RCMP patrol vessels and B.C. Ferry Corporation vessels. PWC marine forecasters have considerable confidence in the reliability of the regular weather and sea state reports contributed by these vessels.

All the users in this group also make constant use of the marine weather service as well as contributing to it. The safety of the larger ferries is seldom affected by weather, but even the largest CCG and DFO vessels are often at risk when obliged to remain at sea during storm-related search and rescue incidents. Weather forecasts, refined with local reports, are of considerable importance to masters of rescue vessels faced with a choice of actions. Decisions on the feasible uses of helicopters during rescue operations also depend on marine weather information.

CCG and DFO weather-related activities are discussed further in Part IV of this report.

PART IV

GOVERNMENT MARINE WEATHER SERVICES

Several federal government departments are involved in provision of weather information to mariners. The Pacific Weather Centre (PWC), part of the Atmospheric Environment Service (AES), Environment Canada, is responsible for producing marine forecasts and warnings. Most of the marine weather observations used by AES in marine forecasting are collected through the Canadian Coast Guard (CCG), Transport Canada, radio facilities. Broadcasting weather forecasts and reports is also carried out by CCG radio. The Department of Fisheries and Oceans (DFO) carries out wave measurement studies in support of wave forecasting research. DFO also controls fishery openings; the decisions made are based largely on stock considerations, but sometimes inadvertently affect the safety of fishing vessels, though less so than the following comment by a fisherman states:

> "Due to unfair allocation practices of the D.F.O., (cutbacks in Seasons and openings, the use of "banana zones") such as were used in Georgia St. against the Gulf Trollers forcing small boats very far out into open water, fishermen have been forced into taking many more chances than they normally would. The D.F.O. is guilty of the murder of these people as surely as if they had held a gun to their heads & pulled the trigger! Some fishermen such as Gulf Trollers must try to fish every day no matter what the forecast, just to try to qualify for Unemployment Insurance."

The following sections give a more detailed overview of the weather-related activities of AES, CCG and DFO. In particular, the inter-relationship of AES and CCG is described; the accompanying diagram (see Fig. IV-1) illustrates how complicated just one aspect of this relationship, communications, has become. In view of the facts that some of the communication difficulties affecting the weather services stem from Department of Communication regulations and that DFO is becoming more involved in wave forecasting studies, there is a case to be made for

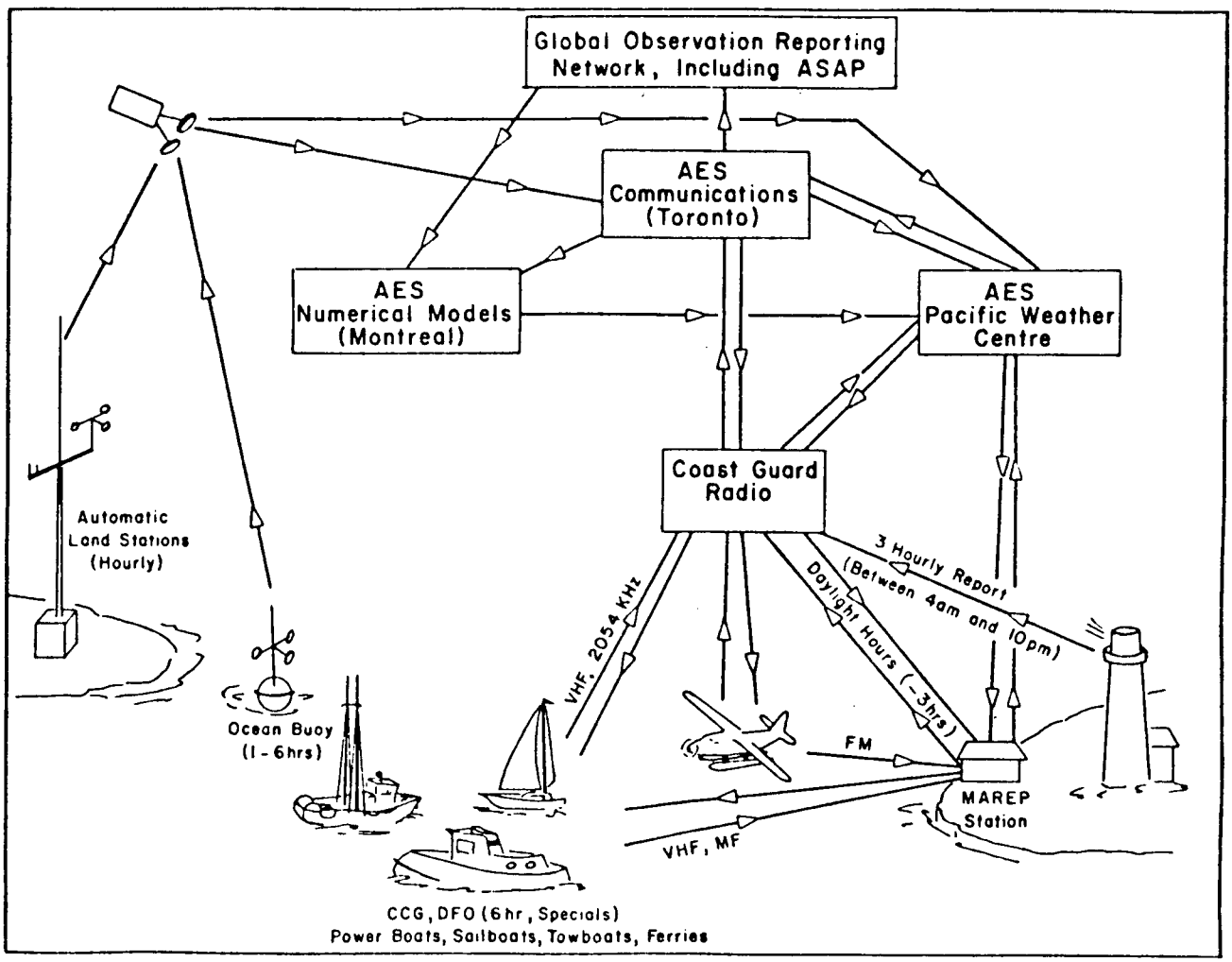

Figure IV-1: Schematic of West Coast Weather Communications

instituting a standing interdepartmental committee to coordinate provision of weather services on the west coast.

For convenience, a description of the AES service "Weatheradio Canada" is given after the account of CCG radio services.

ROLE OF THE ATMOSPHERIC ENVIRONMENT SERVICE IN MARINE WEATHER SERVICES

One of the primary responsibilities of the PWC is to issue marine weather forecasts every six hours (beginning at 4:30 a.m. PST) for inshore areas on the B.C. coast and for waters up to 200 nautical miles offshore (see Fig. IV-2). In addition, warnings of storm- or gale-force winds are issued whenever necessary (see Table IV-1). Since October 1985, PWC has also issued sea state forecasts for offshore areas. To complement these forecasting activities, PWC, in conjunction with CCG, collects and broadcasts reports of current weather conditions observed at many coastal locations and at sea. The main purpose of these forecasts, warnings and reports is to keep mariners informed of current and anticipated weather, so that they can conduct their operations in a safe and efficient manner.

TABLE IV-1: Marine Wind Warning Criteria

Type of Warning	Predicted Wind Speed	Seasonal Use
Small Craft Warning	21 to 33 knots	April to October for Georgia, Juan de Fuca, Johnstone and Queen Charlotte Straits
Gale Warning	34 to 47 knots	All year
Storm Warning	greater than 48 knots	All year

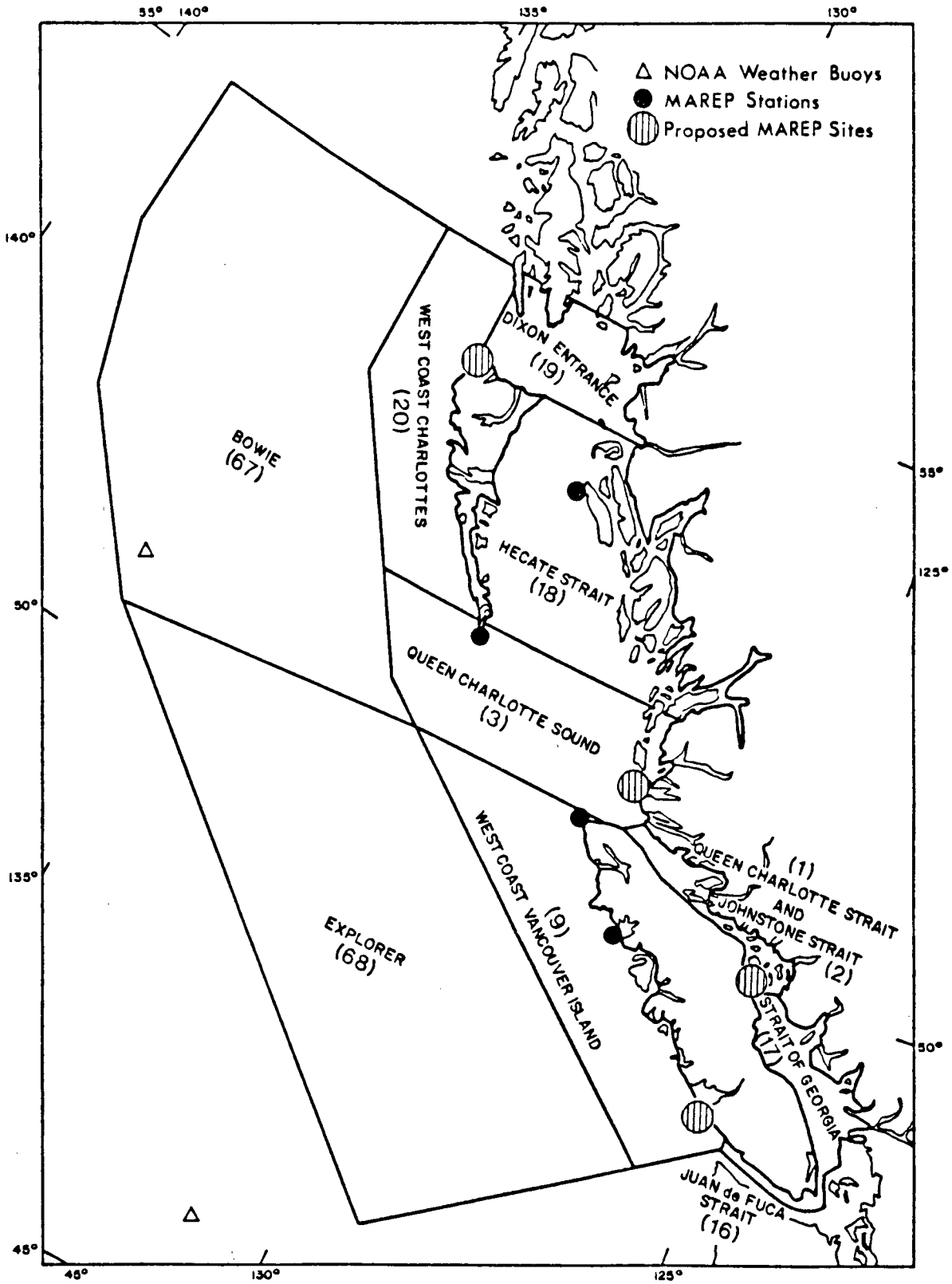

Figure IV-2: Current forecast areas for which marine forecasts are issued by the Pacific Weather Centre. The locations of present and future MAREP sites are also shown.

Marine Forecasting

Forecasts and warnings are based on a large variety of meteorological data which are transmitted at frequent intervals to PWC from a wide network of observing stations. Drawing on training and experience, and with some guidance from numerical models, the duty forecasters interpret the available data and issue forecasts (at 0430, 1030, 1630, 2230 hrs. PST) that reflect the most likely sequence of weather events.

Even with the help of satellite imagery and numerical atmospheric models, the information available to the marine forecaster is inferior to that normally available for land areas, and this is particularly so on the west coast of a continent, where both surface and upper atmosphere data are extremely sparse in the offshore (i.e., "upwind") direction.

The numerical models assimilate recent meteorological observations over the whole northern hemisphere and offer objective predictions of the manner in which the current weather pattern will evolve. However, over oceanic areas, present day models omit many medium-scale features which are essential for accurate local forecasting. Many of these details (for example, the locations of fronts) are evident in satellite pictures of the eastern Pacific and western North America which are received half-hourly by PWC. By superposing this satellite information on the large-scale flow pattern indicated by the models, the meteorologist can predict the probably development and movement of the smaller-scale features, and also assess the local effects of the latter on the overall flow pattern. Observations of wind, temperature and pressure provided by deep sea buoys and ships also help in locating fronts, surface lows and other features, although the overall accuracy is still not comparable with that normally reached over the continent, where a relatively dense network of surface and upper atmosphere observations is available.

The mountainous and heavily indented coast of B.C. introduces a high degree of local complexity into the atmospheric flow pattern on scales smaller than numerical models and satellite imagery can resolve. Here the meteorologist must also call on weather reports from lightstations, coastal aviation and shipping to develop a detailed picture of current conditions. Then, combining this knowledge with information on the large-scale flow pattern and with experience of the steering effects of local orography on similar past weather patterns, the meteorologist can forecast how the

current situation may develop. Particular difficulty is still encountered in determining whether a front, a low-pressure centre or a high-pressure ridge will intensify on its approach to the coast, since the data available is essentially sparse in time and space and contains significant measurement errors. For example, wind reports from lightstations and automatic reporting stations are often unrepresentative of conditions over nearby open water because of orographic shielding of anemometers.

The whole forecasting procedure, from collection of observations through numerical model runs, etc. to drawing up the issued forecast, is so labour- and time-intensive that it is not practicable to issue more than four forecasts per day. However, the duty meteorologist continuously monitors incoming satellite imagery and all data reported between forecasts, and issues storm and gale warnings whenever necessary, thus updating the regular forecasts so far as severe weather is concerned.

Conventional Sources of Local Meteorological Observations

AES collects observations of wind speed and direction, surface pressure, temperature and other parameters at hourly intervals from land stations in B.C. This and similar data received from adjacent parts of the U.S. is relevant to marine weather forecasting.

39 manned CCG lightstations along the B.C. coast (see Figs. IV-3, IV-4) send in marine weather reports every three hours between 4:00 a.m. and 10:00 p.m. PST. Government ships and some other vessels also send in weather reports, usually at about six-hour intervals. As a result of an interim recommendation from this committee, some pilots flying daily over Hecate Strait and other exposed waters now radio in marine weather reports.

In addition, AES maintains 12 Automatic Reporting Stations (ARS), which radio in hourly values of pressure, temperature, and wind speed and direction (see Fig. IV-5). The number of ocean vessel reports available to the marine forecast desk at PWC may vary from zero at 0400 hrs. to over 100 at 1600 hrs. Appendix IV-1 lists examples of various types of weather reports.

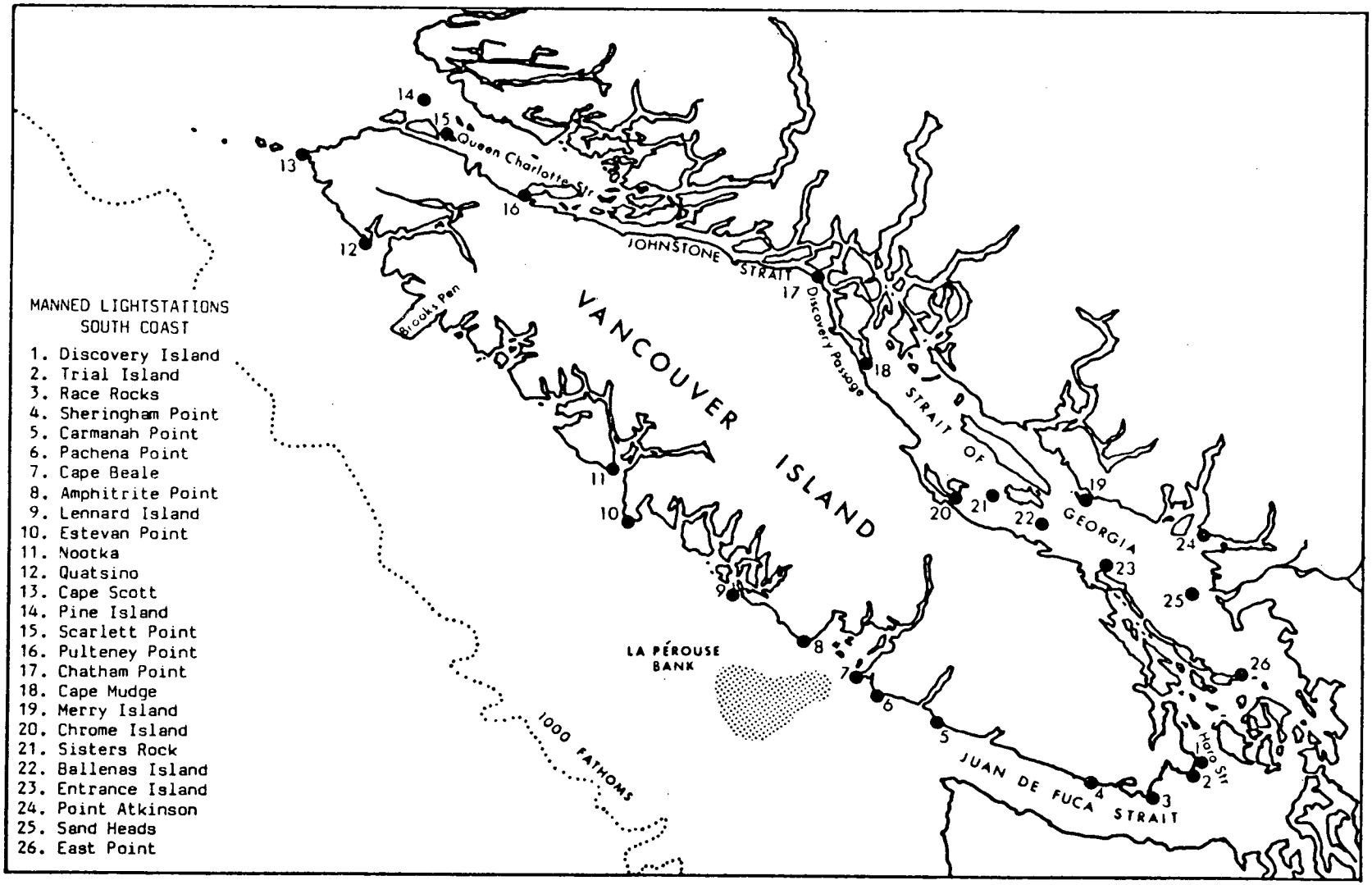

Figure IV-3: Location of manned lightstations on the south coast of British Columbia providing visual weather and sea state observations every three hours between 4:00 a.m. and 10:00 p.m. PST.

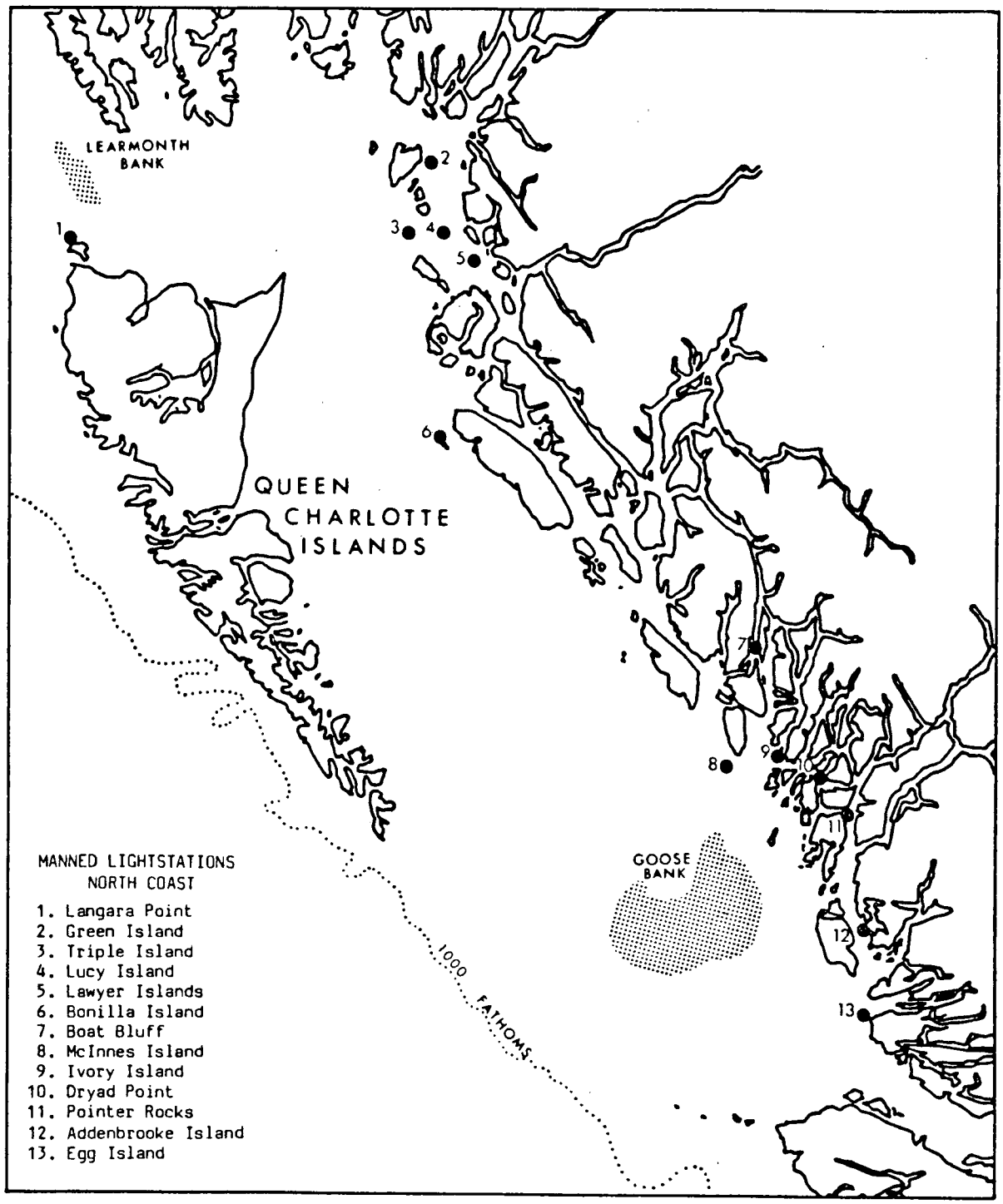

Figure IV-4: Locations of manned lightstations on the north coast of British Columbia providing visual weather and sea state observations every three hours between 4:00 a.m. and 10:00 p.m. PST.

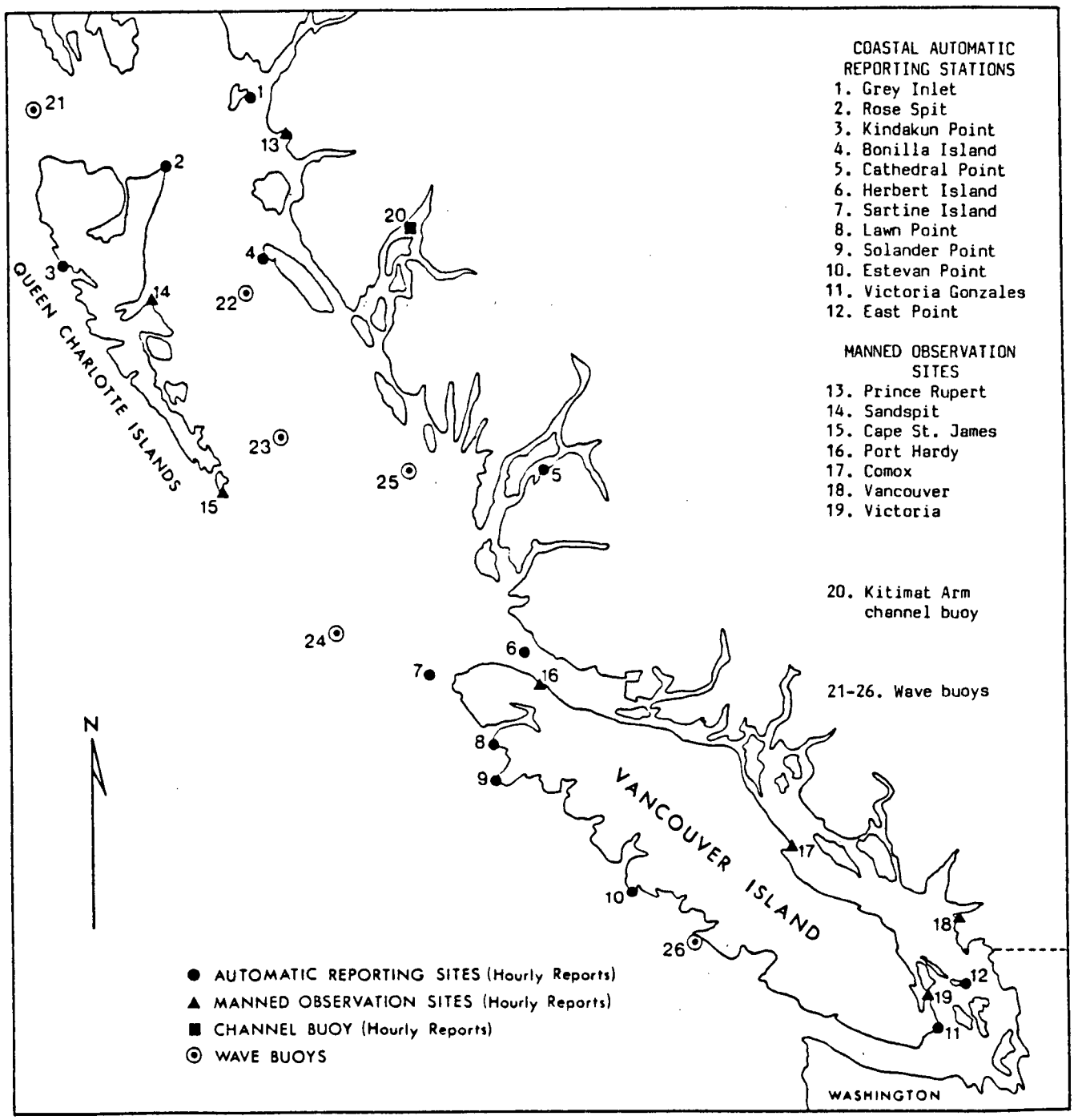

Figure IV-5: Automatic and manned sites which provide hourly reports between 10:00 p.m. and 4:00 a.m. Only sites numbered 13 to 19 provide visual observations of cloud conditions, visibility and weather.

Supplementary Sources of Local Meteorological Observations

Local weather reports are used directly by mariners as well as by forecasters. Many fishermen, for example, consider local reports and forecasts to be of roughly equal importance. With its own and mariners' needs in mind, AES has recently taken steps to increase the number of local reports and to improve their dissemination to mariners by instituting the MAREP (marine reporting) program. So far three lightstations, Bonilla, Cape St. James and Cape Scott (see Fig. IV-2), have been equipped as MAREP stations, with VHF transceivers to receive marine weather reports from any vessel willing to report on observed conditions, and to transmit a summary of recently-received reports to any vessel requesting information. A fourth MAREP station has been opened very recently at Kyoquot; in this case, the operation is contracted out to an individual.

In view of the density of shipping on the west coast (see Table IV-2), the MAREP program has potential for greatly increasing the effectiveness of marine weather reporting. Judging from the growing popularity of a similar system in the U.S., the cooperation of the marine community in making a success of the MAREP program can be counted on. An informal weather-reporting system is operated during the summer months on ham radio frequencies by the west coast sailing fraternity.

The Automated Shipboard Aerological Program (ASAP), instituted four years ago, provides some upper atmosphere observations which generally give the meteorologist a somewhat better idea of the wind and temperature fields aloft than did the former weathership program. Under the ASAP program, three freighters, which are engaged continuously on three-week round trips across the Pacific, release radio-sonde balloons at 12-hour intervals. It is planned to extend the program to include five such ships. By this means, as many as three radio-sonde observations yielding essential upper atmosphere information over the northeast Pacific are sometimes available, where otherwise there would be none.

For over 10 years, with occasional interruptions, two NOAA buoys anchored over Bowie and Explorer Seamounts (see Fig. IV-2) have contributed valuable hourly reports giving pressure, temperature, wind strength and direction, dew point, etc. as well as some wave information. It is anticipated that these buoys will soon be augmented by three Canadian buoys giving somewhat better coverage.

TABLE IV-2: Summary of Navigation Movements in B.C. Coastal Waterways† 1984

TYPE OF VESSEL	VANCOUVER ZONE	TOFINO ZONE	PRINCE RUPERT ZONE	TOTAL
FREIGHTERS	12,527	9,123	1,488	23,138
TANKERS	1,658	1,542	614	3,814
PASSENGER/CRUISE	903	0	295	1,198
COASTAL	8,980	1,187	518	10,685
TUGS	45,073	2,731	5,760	53,564
FISHING	N/A	52,256	N/A	52,256*
GOVERNMENT	5,090	734	2,927	8,751
MISCELLANEOUS	40,211	1,043	695	41,949
FERRY	98,772	0	2,825	101,597
TOTAL	213,214	68,616	15,122	296,952

† obtained from VTS (western)
* VTS figures for fishing vessels include only those greater than 20 metres

In 1983, there were 337 marine casualties on the west coast, of which 253 were fishing vessels. 20% of the marine casualties were directly attributed to environmental causes.

In 1984, there were 313 marine casualties on the west coast, of which 226 were fishing vessels. 14% of the marine casualties were directly attributed to weather-related causes.

The percentage of marine casualties directly attributable to weather-related causes, averaged over 1983 and 1984, was 17%.

Sea State Observations and Forecasts

Since October 1985, PWC has issued sea state forecasts for offshore waters. It is hoped to extend these eventually to inshore waters, when the effects of shallow water and coastal currents on wind waves are better understood. More accurate forecasts of winds over coastal waters are also required so that local wave generation effects can be taken into account.

At present, sea state measurements are obtained every hour from the anchored buoys at Bowie and Explorer Seamounts, and every three hours, between 4:00 a.m. and 10:00 p.m., from two of the six wave buoys in inshore waters (see Fig. IV-5). Some ocean-going vessels report on sea state conditions offshore, while most inshore weather reports (from lightstations, ferries, planes, etc.) include visual estimates of wave height. Given a fair number of sea state observations over the area in question, plus information on prevailing and forecast winds, the marine forecaster can forecast sea state for a few hours ahead by empirical means.

Since vessel traffic may be infrequent, and reliable visual estimates cannot be made, it often happens that very little information on sea state is available at night. To fill this gap, the forecaster can make use of numerical wave models which compute sea state from the surface wind field. The extent to which this method can be used to forecast future sea state depends heavily on the accuracy with which the surface winds can be forecast. Clearly, in view of the difficulties currently experienced in forecasting surface winds over the northeast Pacific, accurate sea state forecasting will be hard to achieve for some years to come.

Swell, which will be taken to mean long wind waves with periods from 5 to 30 seconds, is an important factor for fishing and towing operations on the B.C. coast. It is difficult to forecast accurately, since it may be generated far out at sea by distant storms and suffer little attenuation before reaching the coast. Visual reports usually include estimates of predominant swell wave length and direction, and given even a few reports from offshore, it is often possible to form some estimate of the height and direction of swell propagating into exposed nearshore waters. However, the effects of local winds and currents on swell are not fully understood.

It should be noted too that due to the long SE-NW fetches in the Strait of Georgia and Hecate Strait, southeast winds can generate substantial swell, which can interact with the strong tidal currents

occurring at the northern ends of both these water bodies to produce dangerous opposed seas.

It did not prove possible during the present enquiry to do an adequate study of the sea state monitoring capability of the CCG radar stations. It is known that at certain ranges, the S-band radar at Tofino shows swell period and direction quite clearly. An investigation of the extent to which wind wave and swell amplitude can be measured by radar certainly seems justified, since just a few well-sited radars could cover most of the nearshore and inshore waters of the west coast.

ROLE OF THE CANADIAN COAST GUARD IN MARINE WEATHER SERVICES

The CCG is an important user of weather information, both in the course of routine duties such as servicing floating or fixed navigation aids with ships and helicopters, and in the demanding circumstances of search and rescue incidents. Accurate forecasts and up-to-date weather reports are essential in all these operations. However, we shall concentrate here on the CCG's role in providing and forwarding weather observations and in broadcasting forecasts and reports.

Observations

The CCG currently operates 39 manned lightstations on the west coast. One of the primary duties for most of these stations is to take observations of local weather and sea state at three-hour intervals and report this information to CCG radio stations for transmission by landline to AES. Another service supplied by many stations is an update of their own local conditions and those experienced by vessels in their area, if these are at variance with official reports or forecasts.

In addition to these duties, the lightstations respond to numerous requests for local weather and sea conditions from mariners and aviators. This service is supplied through the goodwill of individual lightkeepers. Personnel in residence at the CCG lightstations at Bonilla Island, Cape St. James and Cape Scott man the official MAREP marine reporting stations instituted recently with AES funding.

It may be noted that the CCG maintains 18 automated lightstations, fog alarms and radio beacons, 148 lighted navigation buoys and 950 lighted beacons on the west coast, many of which could be fitted with automatic equipment capable of reporting sea condition, visibility and/or wind conditions. Many of these buoys and unmanned stations are in exposed areas and represent an established platform, which is already being maintained. The remote automated sites have helicopter pads as part of the installation.

The six major CCG vessels which operate on the west coast also regularly provide weather observations to AES via the CCG radio stations.

Collection of Weather Reports

The CCG operates seven marine radio stations, which are radio-linked to remote transceiver sites as shown in Figure IV-6. These stations gather weather observations for re-broadcasting to their own localities and for forwarding to AES. The observations come from lightstations, automatic reporting stations, government and private vessels, CCG helicopters and designated bases.

The CCG also maintains and operates a vessel traffic system (VTS) with bases in Vancouver, Prince Rupert and Tofino. These stations' primary task is control of traffic movements. Secondary tasks include assistance in search and rescue, supply of a backup communications system, when required, and collecting weather observations from transiting vessels entering or exiting the Canadian Control Zone, in particular when inbound from or outbound to the open sea. If, in the opinion of the operator, these reports are significant, they are passed on to AES.

The VTS radar system permits 24-hour surveillance of the Strait of Georgia, Gulf Islands, Juan de Fuca Strait and the west coast of Vancouver Island. Although the present equipment is not designed for such purposes, radar has potential for surveillance of sea state and location of weather fronts over wide areas in a highly cost-effective manner. The S-band radar installed at Tofino already permits some monitoring of swell direction and wavelength near the coast.

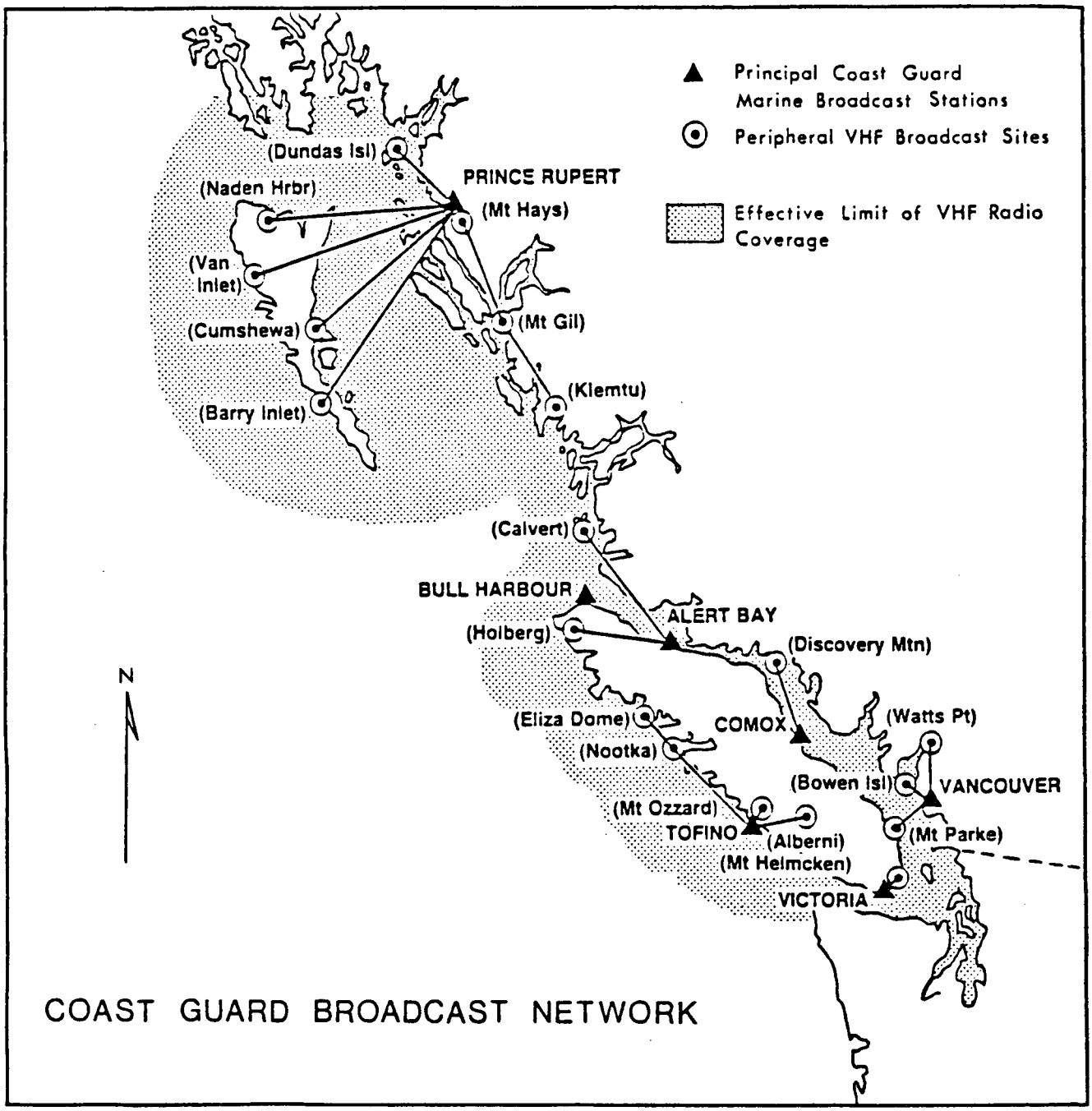

Figure IV-6 Present location of the main Canadian Coast Guard Radio Stations and their peripheral VHT radio sites. The shaded area represents the coverage achieved by the VHF continuous marine broadcast. (Adapted from "Radio Aids to Marine Navigation (Pacific)," Vol. 31, No. 1-WE, April 1, 1986, Canadian Coast Guard).

Broadcasting of Weather Forecasts and Reports by CCG Radio

This section deals with the MF and VHF facilities currently operated by the CCG for the primary purpose of transmitting weather forecasts and reports.[1]

Weather information, plus some notices to shipping, are broadcast at three-hour intervals from Prince Rupert, Bull Harbour, Tofino and Victoria. All four stations broadcast on 2054 kHz, but on a staggered time schedule, to avoid interference. The range of these marine MF broadcasts is such that mariners almost anywhere on the coast can hear each station in turn. This is useful not only to mariners in transit, but to others trying to judge the progress of weather systems.

In addition to receiving weather information on the scheduled broadcasts above, mariners can hear essentially the same information on the continuous marine broadcast (CMB) service on various VHF channels. The main station and peripheral sites (relay stations) involved in these broadcasts are shown in Table IV-3.

The contents of the scheduled and continuous broadcasts consist generally of the following, in the order shown:

(a) synopsis and weather forecasts for neighbouring inshore and offshore areas;
(b) local weather reports;
(c) notices to shipping;
(d) traffic list.

In addition, storm and gale warnings may be added whenever required.

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1 The information given here is extracted from "Radio Aids to Marine Navigation (Pacific)", Vol. 31, No. 1-WE, April 1, 1986, Canadian Coast Guard.

The time taken to broadcast all these items, in turn, is between 20 and 30 minutes. Consequently, information is repeated between two and three times per hour on CMB stations. The interval between scheduled broadcasts on 2054 kHz is governed by the need for each of the stations involved to have time, in turn, to broadcast the information listed above.

Synopses and weather forecasts for scheduled and continuous broadcasts are sent to the main CCG radio stations at six-hour intervals from the PWC by landline.

Weather reports (reported observations) collected from the area adjoining any given radio station are incorporated directly into the broadcasts, but reports from other areas are received, via Toronto, through a high-speed communications link. The present traffic on this link is such that weather reports (often referred to as lighthouse reports), which have relatively low priority, occasionally are delayed for several hours.

The continuous marine broadcasts are usually prepared by taping the three-hour scheduled broadcasts. Gale or storm warnings can be added to the taped message when issued, but making any change to the existing message requires re-recording from that point on the tape onwards. When other CCG communications needs have priority, particularly during search and rescue incidents, updating of weather broadcasts sometimes has to be delayed or suspended for some hours because of this cumbersome taping procedure, despite the best efforts of the radio operators.

Since the tapes are re-used many hundreds of times, there is a very noticeable deterioration in recording quality as a tape ages. Without any doubt, the recording equipment being used for the continuous marine broadcasts is obsolete, ill-matched to the needs now placed on the system and basically incapable of coping with any increased demand.

At present, the combined effects of delays in transmission of messages and procedural delays in incorporating messages into the broadcasts often causes a lag of several hours between the time an observation is taken and its reception on radio by the mariner.

TABLE IV-3: West Coast Marine Weather Broadcasts
The information in this table is extracted from "Radio Aids to Marine Navigation (Pacific)," Vol. 31, No. 1-WE, April 1, 1986, Canadian Coast Guard.

	SCHEDULED		CONTINUOUS*			
CCG RADIO STATION	SCHEDULED BROADCAST FREQUENCY	MARINE FORECASTS LOCAL WEATHERS	MARINE FORECASTS LOCAL WEATHERS		CMB TRANSMITTER SITE	BROADCAST CONTENT
		(ALL TIMES PST)	CHANNEL	FREQUENCY		
ALERT BAY			WX1	162.55 MHz	(Alert Bay)	(a) Areas 1,2,3,9, 17,68.
			WX2	162.40 MHz	(Calvert)	(b)(c)(d)
			21B	161.65 MHz	(Holberg)	
BULL HARBOUR	2054 kHz	0450,0750,1050, 1350,1650,1950, 2250				(a) Areas 1,2,3,9, 18,20,67,68. (b)(c)(d)
COMOX			21B	161.65 MHz	(Discovery Mtn)	(a) Areas 12,16,17. (b)(c)(d)
			WX1	162.55 MHz	(Cape Lazo)	
PRINCE RUPERT	2054 kHz	0505,0805,1105, 1405 1705,2005,2305	21B	161.65 MHz	(Mt. Hays)	(a) Areas 3,18,19, 20, 67.
			21B	161.65 MHz	(Cumshewa)	(b)(c)(d)
			WX1	162.55 MHz	(Klemtu)	Continuous broadcast
			WX1	162.55 MHz	(Van Inlet)	Info available by telephone
			WX2	162.40 MHz	(Barry Inlet)	(604) 624-9009
			WX2	162.40 MHz	(Dundas Island)	
			WX2	162.40 MHz	(Naden Harbour)	
			WX2	162.40 MHz	(Mt. Gil)	
TOFINO	2054 kHz	0440,0740,1040, 1340 1640,1940,2240	21B	161.65 MHz	(Mt. Ozzard)	(a) Areas 1,3,9,16, 68.
			WX1	162.55 MHz	(Eliza Dome)	(b)(c)(d)
			WX2	162.40 MHz	(Alberni)	
			WX2	162.40 MHz	(Nootka)	
VANCOUVER			21B	161.65 MHz	(Mt. Parke)	(a) Areas 16,17.
			WX3	163.475MHz	(Bowen Island)	(b)(c) Continuous broadcast Info available by telephone (604) 270-7411
VICTORIA	2054 kHz	0520,0820,1120, 1420,1720,2020, 2320	WX3	162.475MHz	(Mt. Helmcken)	(a) Areas 9,16,17, 18. (b)(c)(d)

TABLE IV-3: West Coast Marine Radiotelephone Services continued

* Local weathers are updated at three-hourly intervals during the period 0400-2200 PST.

(a) synopsis and forecast;
(b) local weather reports;
(c) Notices to Shipping;
(d) traffic list.

List of forecast areas (see Fig. IV-2):
1-Queen Charlotte Strait;
2-Johnstone Strait;
3-Queen Charlotte Sound;
9-West Coast Vancouver Island;
16-Juan de Fuca Strait;
17-Strait of Georgia;
18-Hecate Strait;
19-Dixon Entrance;
20-West Coast Queen Charlottes;
67-Bowie;
68-Explorer.

CCG Radio Stations providing scheduled broadcasts (Bull Harbour, Prince Rupert, Tofino, and Victoria) broadcast this information simultaneously on 2054 kHz and appropriate CMB channels (except Bull Harbour) after announcement on 2182 kHz and channel 16. CCG Radio Stations providing continuous broadcast service only (Alert Bay, Comox, Vancouver) broadcast this information in full on appropriate CMB channels after an announcement on channel 16.

WEATHERADIO CANADA

AES runs a continuous VHF weather broadcast from the Victoria Airport Weather Office, providing marine and general weather information to the reception area shown in Figure IV-7.

The message-handling requirements of this service are practically identical to those for the CCG continuous marine broadcasts. The broadcast is composed of a sequence of independent messages, and for maximum effectiveness, the recording system must have capability for convenient replacement of individual messages as soon as updates are received.

Since late 1985, the Weatheradio broadcast has been handled using a solid-state random access audio recording system built by Interalia Associates Ltd. of Calgary, which permits independent updating at arbitrary times of up to 24 messages. Even individual words may be replaced. The sequence of messages in the continuous broadcast can also be changed easily at any time. An important practical benefit is that the operator's workload is spread more evenly. The total length of broadcast possible with the present design of equipment is 30 minutes. The system has many convenient aids for the operator, and both management and operators report considerable satisfaction with this equipment.

Part of a report on a survey of Weatheradio users carried out in 1983 is included here as Appendix IV-3. Among other points, it illustrates the conflicting requirements of a wide user population. Tone alerts were not widely used at the time of this survey. Since the Interalia System can generate six different tone alert signals and tone alert receivers are now available very cheaply, there should be considerable potential for popularizing this aspect of the service.

WEATHERADIO CANADA

CONTINUOUS WEATHER INFORMATION

Via VHF-FM Radio Vancouver and Victoria Areas

Frequency 162.40 MHz. Call sign CFA240

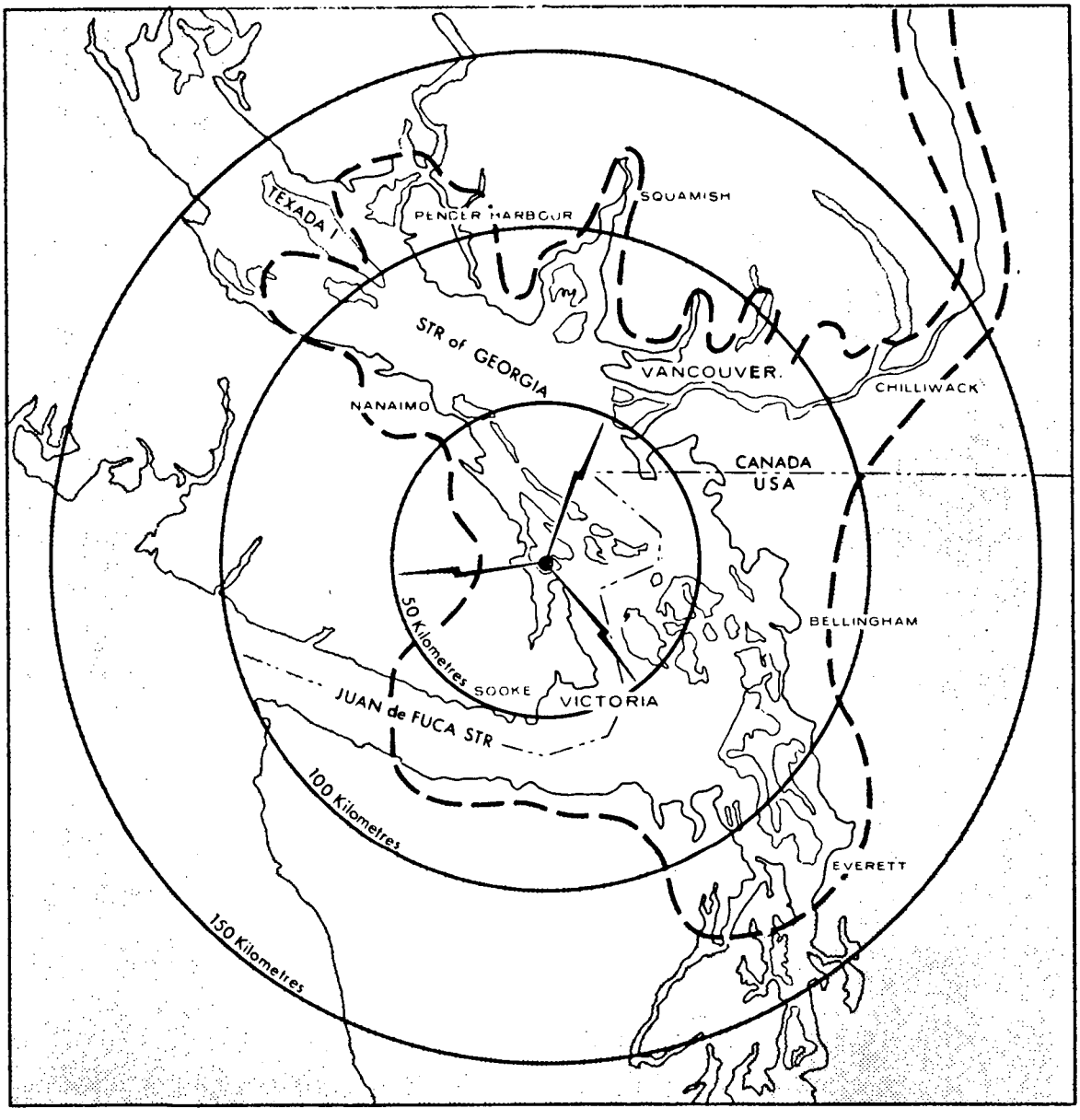

Figure IV-7: Light area inside dashed line indicates dependable reception. Transmitter site - 602 metre level of southern Saltspring Is. (from "Small Craft Guide", Vol. II, 1986, DFO).

ROLE OF THE DEPARTMENT OF FISHERIES AND OCEANS IN WEATHER SERVICES

Management of Fisheries

The DFO Ship Division has 26 patrol vessels composed of 10 two-man vessels, 8 three-man vessels, 4 four-man vessels, 2 six-man vessels, as well as two headquarter vessels, the "James Sinclair" with a crew of 11 and the "Tanu" with a crew of 18. Both headquarter vessels are mainly involved in the management of the offshore and foreign fishing fleet. Weather, in the management of the offshore fisheries, determines whether vessels can be boarded at sea either in our troll fleet or whether observers or DFO officers can be placed safely on board a foreign fishing vessel.

The management of any domestic inshore salmon fishery on the west coast consists of setting fishing times according to geographical area, expected size of projected salmon return and the amount of vessels harvesting the particular run. A DFO patrol vessel will monitor openings for the amount of salmon delivered to packers and collectors in order to determine whether a fishery will extend for 24 hours or close on the announced closing time.

During an inshore salmon fishery, particularly in the fall, a DFO patrol vessel master, in the event of a gale warning in the most recent weather forecast, might tape the forecast and read it on the VHF channel used by fishermen just before a salmon opening, to make sure most of the fishing fleet is aware of the possibility of adverse weather during fishing times. It is becoming the practice, when briefings from PWC indicate the possibility of gale-strength winds during a fishery, for a DFO officer, in consultation with the DFO patrol vessel masters in the area, to announce to the fishing fleet that the fishery will be extended if the targeted amount of catch is not reached. This is done in the hope that smaller vessels will not try to stay fishing in weather that is beyond the capabilities of the vessels and crews.

The more than 1500 fishing vessels involved in the Roe Herring fishery, from the middle of February to its close in the first or second week in April, are often subjected to the last of the winter storms and the unsettled conditions of early spring. Herring fishing is a very volatile fishery with openings lasting from less than 30 minutes to up to 24 hours for seines and from one to about three days for gillnets. Although the

herring fishery is carried out in sheltered waters when the herring are ready to spawn, regardless of the weather, the fishery must go on to have a suitable product for market. After the herring have been caught it is imperative that the product get to the processing plant as soon as possible whether in the hold of a seiner or packer. Accurate forecasts and up-to-date reports are essential throughout the fishery.

Foreign countries fish inside Canada's 200-mile territorial waters in specific areas outside the 12-mile limit for specified types of bottom fish. Hake fishing is carried out by Canadian catcher boats with the product being transferred to the foreign processing vessel anywhere from 8 nm to 20 nm offshore. Weather seldom interferes with this fishery due to the size of vessel and the method of transferring the catch in the net from the catcher vessel to the processing vessel.

Oceanographic Programs

DFO carries out physical, chemical and biological oceanographic studies from the Institute of Ocean Sciences in Sidney and the Pacific Biological Station in Nanaimo. The only DFO program connected with west coast weather services is the operation of six wave buoys, whose locations are shown in Figure IV-5. At present, three hourly reports are received from two of the five northernmost buoys between 4:00 a.m. and 10:00 p.m. via nearby lightstations. It is planned to install communications equipment in the summer of 1986 to permit on-line monitoring of sea state at the Tofino buoy.

PART V

QUESTIONNAIRE ON MARINE WEATHER SERVICES: DISTRIBUTION, QUESTIONS, RETURNS AND COMMENTS

DISTRIBUTION

This part of the report deals with the questionnaires which were distributed from February to April 1986 to masters of various types of vessels operating on the west coast. Questions 7 through 9 (see below) differed according to type of vessel -- fishing boat, towboat or recreational vessel. The remaining questions were common to all the questionnaires, including some given to aviators and to a miscellaneous group, who for convenience here are referred to as "official"; this group includes masters of CCG, DFO and RCMP vessels, ferry captains, pilots, etc.

Fishing vessel questionnaires were distributed in two different ways. 1,000 questionnaires were mailed out; recipients were chosen by taking every sixth name on the DFO List of Licenced Fishing Vessels as at 20 January 1986. Since the list is arranged alphabetically by owner's name within each licence class, this constituted a random sampling, so far as fishing licence, gear, size of boat, etc. were concerned. 334 replies were received to this mailing. A further 164 fishing vessel questionnaires were filled in at 15 public meetings held in coastal communities; the total number of fishing vessel questionnaires included in the tabulations below is therefore 498.

About 450 towing vessel questionnaires were distributed to masters through towing companies and at the public meetings. A total of 57 completed questionnaires were received, including nine returned by masters of American towing vessels who use Canadian weather services while en route to Alaska.

About 450 questionnaires were distributed to recreational boaters at public meetings and through yacht clubs. A total of 126 completed questionnaires were received.

Eventually, two further classes of respondents were identified at the public meetings. These are as follows:

a) coastal aviators;

b) "official" (i.e., ferry captains, pilots, captains of CCG, DFO and RCMP vessels).

These groups were also asked to fill in questionnaires, omitting questions 7 through 9 which where irrelevant.

The coverage attained with the questionnaires can be judged from the summary in Table V-1.

TABLE V-1: Coverage Obtained with Questionnaires

Description	Fishing Vessels	Towing Vessels	Recreational Vessels	Coastal Aviators	Official
Number Distributed	1500	450	450	10	50*
Number Returned	498	57	126	10	28
Approximate Size of Population	7100	300*	40,000*	150*	100*

*indicates rough estimates

The answers to the 719 questionnaires completed were entered into a computer database to facilitate subsequent tabulations and cross-comparisons. This data will be retained on diskette.

The questions are grouped as follows:

		Questions
A.	Identification	1-2
B.	Operational Habits	3-9
C.	Information Sources and Communications	10-14
D.	Assessment of Present Services	15-34
E.	New or Improved Services Required	35-48
F.	User Participation	49-50
G.	User Education	51-55

QUESTIONS, RETURNS AND COMMENTS

This section deals with the content of the questionnaire and the returns received, on a question-by-question basis. The text of each question is stated first in bold type. Immediately following are the tabulated returns, by user group or in total where relevant. These are followed, in some cases, by an explanatory NOTE to assist or caution in the interpretation of the question and replies. Next are given selected COMMENTS from the returned questionnaires. Since these comments were not specifically solicited, but volunteered by the respondents, they must be accorded a fair amount of weight. Some comments written on the questionnaires, but not obviously related to specific questions, have been included in Part VI.

In some of the tables below, where shortage of space dictated, the five user groups are occasionally identified by initial letter as follows:

F - fishing

T - towing

R - recreational

O - official

A - aviation

The same abbreviations are used to indicate which type of user made the comments quoted.

A. Identification

1. **Name or Company?**

2. **Home Port?**

NOTE: Although many respondents answered these warm-up questions, the replies are not given in this report. For the majority of users, home port does not bear any relation to area or mode of operation. All answers to the questionnaires have been stored in a database and remain available for further use.

B. Operational Habits

3. **Size of vessel?**

	≤ 20 ft.	21-30 ft.	31-40 ft.	41-60 ft.	61-89 ft.	≥ 90 ft.	No Ans.
Fishing	11	28	257	145	40	8	9
Towing	1	0	7	2	26	15	6
Recreational	9	59	42	8	2	1	5
Official	0	2	1	5	7	10	3

NOTE: Vessels 90 ft. or more in length (including all tows) are considered major traffic and are expected to report to VTS.

4. **Number of years experience?**

	≤ 10	11-20	21-30	31-40	≥ 40	No Ans.	Total
Fishing	89	155	116	71	40	27	498
Towing	10	16	16	9	1	5	57
Recreational	39	35	32	11	5	4	126
Official	5	5	8	2	1	7	28
Aviation	2	2	0	0	0	6	10

5. **Areas worked over a 12-month period? (check any that apply)**

	F	T	R	O	A
1. **Juan de Fuca Strait**	146	41	72	4	4
2. **Strait of Georgia**	233	52	105	15	6
3. **Johnstone/Queen Charlotte Straits**	269	48	42	9	7
4. **Queen Charlotte Sound**	285	29	21	8	6
5. **Hecate Strait**	239	23	12	10	5
6. **Dixon Entrance**	223	25	10	10	4
7. **West Coast Vancouver Island**	317	22	41	10	7
8. **West Coast Charlottes**	177	10	3	4	3
No Answer	17	0	0	0	1
Number in group	498	57	126	28	10

Inshore - any of (1) - (3)	337	57	114	19	9
Offshore - any of (4) - (8)	449	57	57	19	8

NOTE: The last two rows in this table show the results of subsequently grouping the above eight areas into two broader areas:

Inshore - areas worked include one or more of areas 1 through 3
Offshore - areas worked include one or more of areas 4 through 8.

6. **During which time periods do you primarily operate during the year? (check any that apply)**

Period	Fishing	Towing	Recreational	Official	Aviation
Jan-Feb	73	51	69	25	10
Mar-Apr	291	56	111	28	10
May-Jun	385	56	125	28	10
Jul-Aug	489	55	124	28	10
Sep-Oct	446	57	124	28	10
Nov-Dec	130	53	81	25	10
No Ans.	2	0	0	0	0
No. in Group	498	57	126	28	10

7R. (Recreational vessels only)

Vessel Type?

Power	**Sail**	No Answer
58	66	2

7F. (Fishing Vessels only)

What limited licence tabs do you hold? (check any that apply)

Licence Tab	Returns from Random mailing (i)		Returns at Meetings (ii)		Total (i) + (ii)
A - Salmon	290	(291)	144	(143)	434
B - native (10 year)	1	(1)	0	(0)	1
N - native	2	(2)	1	(1)	3
C - general; cod crabs etc.	52	(50)	23	(25)	75
E - abalone	2	(1)	0	(1)	2
G - geoduck and horseclam	4	(5)	3	(2)	7
H - roe herring	91	(85)	35	(41)	126
J - herring roe on kelp	1	(3)	3	(1)	4
K - sablefish	7	(7)	3	(3)	10
L - halibut	60	(58)	27	(29)	87
S - shrimp trawl	18	(17)	7	(8)	25
T - groundfish trawl	10	(14)	11	(7)	21
D - packing	10	(9)	3	(4)	13
Z - special fisheries	69	(60)	20	(29)	89
- tuna	3	(5)	4	(2)	7
No Answer	0		0		0

NOTE:

a) Numbers above in parentheses indicate the expected number of replies in each category when the total found for each licence class is split into two categories, random mailing and meeting returns, in the same ratio (334/164) as the number of mailed questionnaires returned (334) to the number handed in at meetings (164). Similarly calculated expected figures are shown for Question 9F. Differences between actual and expected numbers appear too small to be significant, and it can be concluded that the two samples obtained from the fishing community, that is those reached by the random mailing and those attending the public meetings, are essentially similar. Consequently, apart from here and Question 9F, no distinction is made elsewhere in this report between fishermen who responded to mailed questionnaires and those who filled in questionnaires at meetings.

b) No licence tab is required for tuna fishing offshore. Some respondents volunteered the information that they fished for tuna.

8. (Recreational Vessels only)

Check One:

Commercial?	**Sport?**	No Answer
8	118	0

9T. (Towing Vessels only)

Type of towing:

Barge	**Logcraft**	**Salvage**	**Other**
43	21	9	9

DISCUSSION:

Of the nine entries under "Other", four were logships, one was ship berthing and the remaining four were unspecified.

9F. (Fishing Vessels only)

Type of Fishing (check any that apply)

Type of Gear	Returns from random mailing (i)		Returns at meetings (ii)		Total (i)+(ii)
Troll	221	(228)	119	(112)	340
Gillnet	168	(162)	73	(79)	241
Seine	36	(40)	23	(19)	59
Dragger	25	(27)	15	(13)	40
Longline	71	(71)	35	(35)	106
Other:					
Trawl	4	(3)	1	(2)	5
Trap	37	(40)	23	(20)	60
Handline	21	(20)	9	(10)	30
No Answer	19	(14)	2	(7)	21
Combination Troll and gillnet	119	(119)	59	(59)	178

NOTE:

a) Expected numbers are shown in parentheses - for definition see Question 7F, Note a). Again, the random mailing and meeting returns show essentially similar results.

b) The numbers of combination boats were found by counting returns where both troll and gillnet were checked.

C. Information Sources and Communications

10. **Which of the following pieces of electronic equipment do you currently have onboard your vessel?**

Equipment	Fishing	Towing	Rec'l	Official	Aviation
CB Receiver	438	10	52	17	0
VHF Receiver	334	35	53	16	5
VHF Transceiver	438	54	96	26	9
SSB Receiver	156	27	10	10	4
SSB Transceiver	170	45	6	15	7
AM/FM Radio	367	50	93	19	2
Television	187	38	22	9	N/A
Radar	144	52	16	26	2
Loran-C	318	24	19	16	5
Sat-Nav	2	3	6	1	0
Facsimile Recorder	49	4	1	2	N/A
Echo Sounder	437	51	91	25	N/A
Sonar	50	1	1	5	N/A
Computer	7	5	3	1	0
No Answer	4	0	3	0	0
Total in group	498	57	126	28	10

DISCUSSION:

Several respondents commented that they carry equipment not included in the above list, e.g., radio direction finders, colour echo sounders, ham radio. Most mariners seem willing to consider purchasing almost any electronic equipment which demonstrably contributes to their safety or the efficiency of their operations. In discussions, several fishermen and recreational boaters, who currently do not own one, expressed interest in purchasing a facsimile recorder in view of the decrease in price of this equipment.

11. **What are your three principal sources of weather information?**

Source	Fishing	Towing	Rec'l	Official	Aviation
Local Radio & television	148	17	94	17	5
Other Mariners	327	38	34	8	1
Local CCG radio, i.e., Alert Bay, Tofino, etc.	356	48	67	22	6
CMB	410	47	114	26	6
Facsimile	6	3	1	2	0
Weatheradio Canada	28	7	31	1	2
Direct radio contact with light stations	50	6	4	7	1
Number in group	498	57	126	28	10

DISCUSSION:

Five respondents noted that direct contact with AES, e.g., phoning local weather officers is one of their principal means of obtaining weather information.

12. **Do you rely on any non-radio weather aids?**

Barometer	623
Cloud type or appearance	586
Rings around sun or moon	315
Bird behaviour	250
Appearance of sea surface	511
Other	

DISCUSSION:

Numbers in this table are out of the total 719 returned questionnaires, there being little point in breaking replies down according to class of vessel.

It was clear from comments that most respondents understood "barometer" to include barograph, as was intended.

Answers volunteered by respondents under "Other" included:

Observed wind and trends	24
Colour of sunset or sunrise	9
Experience, instinct	8
Swell	5
Phase of moon; tide	4
Mirages	4
Air clarity, visibility	4
Sea temperature and trends	3
Season	3
Arthritis	3
Morning dew	2.

13. **Would you favour having a radio channel dedicated to marine weather?**

	Yes	**No**	No Ans.	Total
Fishing	391	40	67	498
Towing	50	2	5	57
Recreational	110	7	9	126
Official	25	0	3	28
Aviation	10	0	0	10
Total	586	49	84	719

NOTE: The intention here was to find out if a weather channel with no extraneous information such as "Notices to Shipping" is required. Not all respondents understood the question in this sense; some took it simply as a check on the usefulness of the present scheduled and continuous marine broadcasts, which include "Notices to Shipping" and some other non-weather information.

COMMENTS:

F ... Keep the weather reports for weather reports. Cut out some of the extras such as tides, military and some buoy moving 20 ft. somewhere.
... Forecasts and local weather on 2054 Hz SSB are the most useful.
... Yes. 2054 kHz SSB.
A ... Yes, something like Holberg [CMB, Alert Bay peripheral]
T ... Get ship notices off weather channels and make forecast and reports very brief and concise.
R ... Yes, weather 1 & 2 [ie., CMB] good enough.
... If CMB was dedicated to weather only, that would be first class.

14. **Is the present tidal current information in the Tide Tables sufficient for your needs?**

	Yes	No	No Ans.	Total
Fishing	443	39	16	498
Towing	50	5	2	57
Recreational	116	6	4	126
Official	25	1	2	28
Total	634	51	24	709

COMMENTS:

F ... No. More intermediate points appreciated.
... More current stations would be of use.
... Tide change times would be useful.
T ... Yes, but Quatsino Narrows cumbersome.
... But, American current tables for North Pacific are far superior to ours.
O ... Instructions regarding the use of tide-tables should be re-worked to make it more comprehensible [CCG].
R ... No. Would like slack times shown.
... Would like times of high tide, low tide, slack tide e.g., at Alert Bay.
... Yes. Please improve explanation as to how to use Part B of Tidal Atlas.
... Would like more localized tables such as for Stubbs Island. Where can we get these? For the narrows at Seymour Inlet, etc.?
A ... Increase these [BC Pilot].

D. Assessment of Present Services

15. **Are local lighthouse weather reports important to you?**

	Very Important	**Important**	**Not Important**	No Ans.	Total
Fishing	327	149	5	17	498
Towing	46	9	2	0	57
Recreational	63	52	8	3	126
Official	18	7	3	0	28
Aviation	9	1	0	0	10
Total	463	218	18	20	719

COMMENTS:

F ... Important, but unfortunately do not always indicate offshore weather.
... Cape Mudge is wrong 90%. Not their fault. Too far up from Cape.
R ... Forecast by area more important.
T ... Especially for small pleasure craft. However, the frequency should be increased from April to October.

16. **Are local visual weather reports more or less important to you than weather forecasts?**

	More Important	**Less Important**	No Ans.	Total
Fishing	274	165	59	498
Towing	37	14	6	57
Recreational	78	44	4	126
Official	16	11	1	28
Aviation	7	3	0	10
Total	412	237	70	719

COMMENTS:

F ... Equal importance [**9 times**].*
... Both necessary. Locals let us know systems advancing.

---

* i.e. this comment was made by nine different users.

COMMENTS: continued

F ... [more important] on west coast Charlottes.
... [more important] when can talk to local lighthouse.
... The most important factor to my operation is accurate local weather conditions updated on the hour or sooner if conditions warrant it.
T ... [more important] inside waters.
... Equal importance [**4 times**].
A ... Equal importance.
R ... Equal importance [**2 times**].

17. **How important are marine forecasts to your safety?**

	Very Important	**Important**	**Not At All?**	No Ans.	Total
Fishing	361	124	5	8	498
Towing	46	10	1	0	57
Recreational	77	48	1	0	126
Official	20	7	1	0	28
Aviation	6	4	0	0	10
Total	510	193	8	8	719

18. **Do you find Small Craft Warnings (winds in range 20 to 34 kts*) useful to you?**

	Yes	**No**	No Ans.	Total
Fishing	421	61	16	498
Towing	47	7	3	57
Recreational	112	12	2	126
Official	24	3	1	28
Aviation	8	1	1	10
Total	612	84	23	719

COMMENTS:

F ... As important as gale warnings [80 ft. boat].

---

* This should have stated "20 to 33 kts."

19. **Do you feel that a Marine Gale/Storm Warning is required each time gales or storms are expected?**

	Yes	No	No Ans.	Total
Fishing	454	16	28	498
Towing	57	0	0	57
Recreational	114	6	6	126
Official	28	0	0	28
Aviation	8	0	2	10
Total	661	22	36	719

COMMENTS:

F ... Gale and storm warnings should also be broadcast on channel 78A VHF.*
... VHF channel 78A is monitored by 80 to 90% of the Salmon Fleet, while 16 is not.*
... Should be on all channels.
... Yes, with a possibility factor, e.g., 50% chance.
... Rather have wind speed.

*Working Group response: We do not endorse the use of channel 78A, as this would undermine the role of the internationally-regulated distress and calling frequency, channel 16.

20. **Are warnings of the possibility of freezing spray important?**

	Yes	No	No Ans.	Total
Fishing	233	223	42	498
Towing	38	16	3	57
Recreational	39	83	4	126
Official	14	13	1	28
Aviation	8	0	2	10
Total	332	335	52	719

Fishing Nov-April	175	128	28	331

COMMENTS:

F ... In early spring herring season.
... Yes very important!!!

DISCUSSION:

The final row in the above table shows returns from only those fishermen who indicated, in Question 6, that they fish at least some of the winter months, November to April. Compared to the overall sample of fishermen shown in the first row, there is a higher level of interest in freezing spray warnings. Presumably, if the survey could be limited to fishermen who fish in winter on the north coast, an even higher percentage would be interested.

21. **If a previous forecast of gale or storm force winds fails to occur, do you tend to ignore subsequent warnings for gales or storms?**

	Yes	No	No Ans.	Total
Fishing	96	364	38	498
Towing	4	50	3	57
Recreational	25	95	6	126
Official	3	25	0	28
Aviation	1	9	0	10
Total	129	543	47	719

COMMENTS:

F ... Almost in past year because so many warnings.
... No. Quite often, gale will arrive behind schedule.
... Will fish close to shore after one wrong, further out after two wrong.
... Tend to play it safe.
... Generally, I would continue fishing during gales to 40 kts. Definitely NOT in storms.
R ... No. There is always [a gale warning] somewhere and [it is] sometimes late.

22. **Are marine weather warnings usually issued soon enough to allow you to take any necessary action?**

	Usually	Sometimes	Seldom	No Ans.	Total
Fishing	215	240	31	12	498
Towing	22	32	1	2	57
Recreational	68	51	4	3	126
Official	20	8	0	0	28
Aviation	6	4	0	0	10
Total	331	335	36	17	719

COMMENTS:

F ... Not often enough and not updated as frequently as necessary.
... Want forecast and wind speeds at 0300.
... Accuracy lacking.
... Seldom. Unable to pick up weather channel in Bella Coola.
... Not in case of severe winds of 50-100 kts.
R ... Usually overstated, lack credibility.

23. **What is the minimum number of hours of advance notification you require of the expected onset of a gale (winds greater than 34 kts)?**

	Fishing	Towing	Recreational	Official	Aviation
6 hours	143	17	54	6	5
12 hours	212	24	46	10	4
18 hours	25	3	3	1	0
24 hours	81	9	21	6	0
36 hours	8	1	0	0	0
48 hours	8	1	0	1	0
No Answer	21	2	2	4	1
No. in group	498	57	126	28	10

COMMENTS:

F ... 18 hours the very minimum.
... 6 hours, the more advanced the better.
T ... 12 hours inside waters; 24 hours outside waters.
... 6 hours, the more time the better to prepare towing gear, etc.

DISCUSSION:

It is clear from respondents' comments and crossings out and corrections on the questionnaries that some misread or misunderstood this question and checked

DISCUSSION: continued

"6 hours" when in fact they required longer warning. After supplementary enquiries at the public meetings, the concensus of opinion in the Working Group was that few users are satisfied with only 6 hours' warning; most find 12 to 24 hours acceptable, possibly wishing for more, but distrusting too much the probable accuracy of longer warnings to consider them worthwhile.

24. **Do you consider the present marine forecast weather service to be**

	Good?	**Fair?**	**Poor?**	No Ans.	Total
Fishing	100	321	67	10	498
Towing	15	32	8	2	57
Recreational	26	89	10	1	126
Official	14	13	1	0	28
Aviation	2	8	0	0	10
Total	157	463	86	13	719

COMMENTS:

F ... Poor 1982, 1983, 1984, fair in 1985.
... Not upgraded soon enough.
... Good and improving.
... Fair and improving.
... Too often forecast sounds as though a NE x SW is given in attempt to be half right. I have heard a forecast and outlook using day before tape.
... Want 5:10 am weather forecast broadcast at 4:00 am instead.

25. **Along with the marine forecast a weather synopsis is issued. Do you feel the synopsis as issued is useful?**

	Yes	**No**	No Ans.	Total
Fishing	454	13	31	498
Towing	53	3	1	57
Recreational	114	7	5	126
Official	26	0	2	28
Aviation	10	0	0	10
Total	657	23	39	719

COMMENTS:

F ... Yes, but recording should be updated immediately, not the following day.
R ... Not complete enough.

26. **Is inclusion in a synopsis of technical information, such as positions of high and low pressure centres and fronts, of use to you?**

	Yes	**No**	No Ans.	Total
Fishing	379	75	44	498
Towing	51	5	1	57
Recreational	99	20	7	126
Official	23	4	1	28
Aviation	8	1	1	10
Total	560	105	54	719

COMMENTS:

F ... Not lat. and longs. [**10 times**].
... Give in nautical miles from point [of land].
... Yes, if over 50 nautical miles offshore.
... Speed, direction of centre very important.
... Direction of movement [required].
R ... Not lats. and longs.

27. **Do you find that the forecast wind speeds over open water are usually**

	Over-Estimated?	**Accurate?**	**Under-Estimated?**	No Ans.	Total
Fishing	79	142	202	106	719
Towing	5	27	16	9	57
Recreational	56	31	22	17	126
Official	5	13	7	3	28
Aviation	2	4	2	2	10
Total	147	217	249	106	719

COMMENTS:

F ... Inaccurate [**5 times**].
... 1/3 over-estimated, 1/3 accurate, 1/3 under-estimated [**3 times**].

COMMENTS: continued

F ... Over-estimated in 1985.
... Over-estimated west coast Charlottes, under-estimated west coast Vancouver Island.
... Usually not current or accurate.
T ... Two weeks right on, next 2 weeks right off - light winds forecast scares me.

28. **Do you find that the wind direction over open water is usually forecast**

	Very Accurately?	**Well?**	**Poorly?**	No Ans.	Total
Fishing	67	343	59	29	498
Towing	8	40	5	4	57
Recreational	7	91	19	9	126
Official	4	21	2	1	28
Aviation	3	6	0	1	10
Total	89	501	85	44	719

COMMENTS:

F ... Poorly on west coast Charlottes.

29. **Is the forecast sky condition (i.e., whether it will be cloudy, sunny, etc.) of any use to you or your operation?**

	Yes	**No**	No Ans.	Total
Fishing	271	199	28	498
Towing	33	23	1	57
Recreational	101	23	2	126
Official	17	11	0	28
Aviation	8	1	1	10
Total	430	257	32	719

30. **Is the forecast of precipitation useful to you or your operation?**

	Yes	No	No Ans.	Total
Fishing	272	187	39	498
Towing	34	19	4	57
Recreational	98	26	2	126
Official	20	8	0	28
Aviation	10	0	0	10
Total	434	240	45	719

COMMENTS:

F ... Snow only.

31. **Do you feel that visibilities are generally forecast**

	Well?	Poorly?	No Ans.	Total
Fishing	407	48	43	498
Towing	46	8	3	57
Recreational	107	10	9	126
Official	25	1	2	28
Aviation	8	2	0	10
Total	593	69	57	719

32. **Is the forecast of visibilities useful to you or your operation?**

	Yes	No	No Ans.	Total
Fishing	416	58	24	498
Towing	49	7	1	57
Recreational	109	14	3	126
Official	25	3	0	28
Aviation	10	0	0	10
Total	609	82	28	719

33. **Do you find wind reports from the Automatic Reporting Stations of use to you? (e.g., Solander Is., Cathedral Pt., Herbert Is.)?**

	Yes	No	No Ans.	Total
Fishing	395	51	52	498
Towing	41	7	9	57
Recreational	37	58	31	126
Official	14	11	3	28
Aviation	10	0	0	10
Total	497	127	95	719

COMMENTS:

F ... Rose Spit is most accurate, west coast Charlottes [Kindakun] very inaccurate.
... Move Kindakun ARS to Hippa Island.
... Should be ARS on Spring Island Lookout [**2 times**].
... Yes, some ARS not accurate, [regarding wind] e.g., Kindakun Point.
... We need a system of weather reporting buoys offshore.
... Yes, but very poor reliability.
... Rose Spit too often "not available".
... Need one on Spring Island [Kyoquot].
... Solander Island very good.
... Too close inshore to indicate offshore weather.
A ... Yes, but require them hourly.
R ... No, often in error.

COMMENTS: continued

T ... None inside. Would be useful.
... Never used these.
... Not enough of these.
... Should be one on Mitlenatch Island [southeast of Cape Mudge].

34. **For your operation, is the information on sea state given in local weather reports**

	Important?	Unimportant?	No Ans.	Total
Fishing	441	38	19	498
Towing	54	2	1	57
Recreational	115	8	3	126
Official	26	2	0	28
Aviation	3	6	1	10
Total	639	56	24	719

COMMENTS:

T ... Very important.

E. New or Improved Services Required

35. **Do you require updated local weather reports during the night?**

	Yes	No	No Ans.	Total
Fishing	397	76	25	498
Towing	54	2	1	57
Recreational	46	75	5	126
Official	18	9	1	28
Aviation	2	8	0	10
Total	517	170	32	719

COMMENTS:

F ... [Need reports] available at approximately 4:30 am.
... Yes, 4:00 am.

COMMENTS: continued

F ... Yes, for travel to fishing grounds.
... Yes, when strong winds forecast.
... 11:00 pm, 5:00 am, 11:00 am, 5:00 pm.
... One more would be enough.
... We travel a lot at night crossing Queen Charlotte Sound, and at 0300 we are still getting weather from 2000 the night before, and it will be blowing like hell half-way across.
R ... Yes, if there was a standard time for a weather update -- 2000 hours -- it would be a big help.
T ... For small craft, an early report i.e., 0600 would be good during the summer period.

36. **Would you like local weather reports to be more rapidly updated?**

	Yes	**No**	No Ans.	Total
Fishing	448	25	25	498
Towing	55	1	1	57
Recreational	117	8	1	126
Official	25	1	2	28
Aviation	10	0	0	10
Total	655	35	29	719

COMMENTS:

F ... Yes, at night.
... Yes, every two hours.
... Every hour.
... And more frequent.
... Faster updates would be very helpful.
... Four hours, but one hour when gales forecast.
... Yes, would like update every two hours.
A ... Yes, especially during morning hours.
T ... Very much so.
R ... More frequent lighthouse observations and "special" reports when there are significant changes would be very helpful. For example, when leaving the Gulf Islands to head to Steveston, the weather report for Sandheads is usually several hours old. Why not hourly reports as in aviation? Why not transmit weather reports from other vessels similarily to the "Pirep" system used in aviation? My biggest complaint would be on the frequency of weather observations. Thank you.

37. **Would you find it useful if we attached a probability of occurrence when gale- or storm-force winds are forecast - e.g., "there is a 75% probability that gale-force winds will develop in Hecate Strait after midnight?**

	Yes	No	No Ans.	Total
Fishing	440	26	32	498
Towing	45	10	2	57
Recreational	106	11	9	126
Official	25	2	1	28
Aviation	8	1	1	10
Total	624	50	45	719

COMMENTS:

F ... No. People will take chances if forecast is 50% probability of gale-force winds.
... No. I gamble already.
... No. This creates gambling and taking risks.
... Good idea.
... Yes, definitely [**2 times**].
... Now that <u>is</u> a very good idea.
... Great idea!!!
... Very useful.
... Very good suggestion.
... Would be very helpful.

T ... No. Don't vacillate.
... Yes. Very.
... Very good idea...this would be much more realistic.

38. **Do you have a need for a 3- to 5-day marine outlook?**

	Yes	No	No Ans.	Total
Fishing	393	75	30	498
Towing	45	12	0	57
Recreational	91	32	3	126
Official	22	5	1	28
Aviation	7	3	0	10
Total	558	127	34	719

NOTE:

Present practice is to issue 2-day marine outlook.

COMMENTS:

R ... Would like them to give probabilities.

39. **Which of the following information regarding local sea state would you like to have? (check any that apply)**

	F	T	R	O	A
Wave height	433	52	117	26	4
Wave direction	293	40	82	21	0
Distance between crests	91	13	43	11	0
No answer	41	3	3	1	6
No. in group	498	57	126	28	10

NOTE:

"Distance between crests" was used in the question in case some users were unfamiliar with the concept of wave period. Several respondents noted that they would prefer information on wave period.

40. **Would water depth or wave/swell reports be of use to you at the following locations? (check any that apply)**

Masset	154
Naden	114
Lawn Point Bar	168
Nahwitti	213
Nitinat	117
Cape Mudge	254
Steveston	135
Brooks Peninsula	201
Other	

NOTE:

Most respondents appeared to interpret "Steveston" to include Sandheads, as was intended.

DISCUSSION:

Under the heading "Other", the following locations were suggested by two or more respondents:

Estevan Point	14	Active Pass	3
Rose Spit	14	Amphitrite Point	3
Cape Scott	12	Bonilla Island	3
Cape St. James	10	Cape Caution	3
Carmanah Point	8	Strait of Georgia	3
Langara Island	6	Hecate Strait	3
Cape Calvert	5	Marble Island	3
West Coast Charlottes	5	Pine Island	3
Triple Island	5	Queen Charlotte Sound	3
Cape Lazo	4	Sandheads	3
La Perouse Bank	4	Scott Channel	3
Triangle Island	4	Sisters Island	3

41. **Please list up to three locations where wave and/or swell conditions are of importance to your operations.**

Location	Times cited	Waves	Swell
Estevan Point	56	35	35
Rose Spit	54	31	27
Queen Charlotte Sound	46	32	25
Hecate Strait	45	29	27
Cape Mudge	43	20	20
Cape Scott	42	26	25
Brooks Peninsula (incl. Solander Island)	39	22	21
Cape Calvert	38	29	30
Strait of Georgia	37	26	18
Cape St. James	36	22	21
Sandheads (Steveston)	32	19	20
West Coast Charlottes	29	21	21
Dixon Entrance	27	19	19
Egg Island	27	19	19
Langara Island	21	11	12
Pine Island	21	15	17
Milbanke Sound	20	10	11
Juan de Fuca Strait	19	12	9
Bonilla Island	19	1	0
Nahwitti Bar	18	14	12
West Coast Vancouver Island	17	11	10
Johnstone Strait	16	12	7
La Perouse Bank	15	12	12
McInnes Island	14	10	11
Lawn Point	12	6	4
Nitinat	12	8	6
Sisters Island	11	9	5
Race Rocks	11	8	7
Merry Island	11	7	5
Triple Island	11	7	4
Queen Charlotte Strait	9	7	6
Trial Island	9	7	3
Chatham Point	9	5	2
Triangle Island	8	8	7
Tofino	8	7	6
Discovery Passage	8	6	5
Cape Lazo	8	6	2
Scott Channel	8	5	2
Haro Strait	8	5	2
Cape Caution	8	4	4
Marble Island	7	7	7
Masset Inlet	7	6	5
Esperanza Inlet	7	5	4
Amphitrite Point	7	3	4
Frederick Islands	6	4	4
Lennard Island	5	5	4
Entrance Island	5	5	3
Swiftsure Bank	5	4	4
Porlier Pass	5	4	3

Location	Times cited	Waves	Swell
Ucluelet	5	4	2
Rennell Sound	5	3	3
Work Channel	5	3	3
Pachena Point	5	3	2
Barkley Sound	5	2	2

NOTE:

Only those locations cited five or more times are included above.

42. **Some weather buoys are to be placed in coastal channels in the future. Check the three channels most important to you.**

Douglas Channel	96	**Dean Channel**	91
Burke Channel	89	**Rivers Inlet**	154
Kingcome Inlet	38	**Stewart Channel** *	38
Knight Inlet	85	**Howe Sound**	102
Other			

NOTE:

*The mis-spelling Stewart, in place of Stuart, was not noticed before the questionnaires were printed. According to respondents' home ports and areas worked, "Stewart Channel" was apparently taken to mean: a) the approaches to Stewart in Portland Inlet; b) the waters in the vicinity of Stuart Island; or c) Stuart Channel (from Sansum Narrows to Ladysmith).

DISCUSSION:

The following table lists other locations proposed by three or more respondents.

Johnstone Strait	12
Strait of Georgia	9
Portland Inlet	8
Amphitrite Point	7
Barkley Sound	5
Hecate Strait	5
Juan de Fuca Strait	5
Skidegate	5
Ballenas Island	4
Malaspina Strait	4
Milbanke Sound	4
Bute Inlet	3
Goletas Channel	3
Masset Inlet	3
Principe Channel	3
Queen Charlotte Sound	3

43. **Would forecasts of dangerous wave conditions, such as cross swell and opposed sea, be of importance to you?**

	Yes	No	No Ans.	Total
Fishing	403	62	33	498
Towing	47	8	2	57
Recreational	102	21	3	126
Official	20	7	1	28
Aviation	2	7	1	10
Total	574	105	40	719

COMMENTS:

F ... Yes, at certain outside locations.
... Yes, especially at tidal confluences, e.g., Cape Mudge, Masterman Island and Pine Island etc.
... No, with tide book you can tell this yourself.
... Tide table and local wind observation and wave height allows calculated guess.
... Direction of (tidal) current also important especially at Cape Cook.
... Sea is frequently confused at Ogden Channel.

44. **Would offshore swell and sea state reports be of use to you?**

	Yes	No	No Ans.	Total
Fishing	359	101	38	498
Towing	38	14	5	57
Recreational	54	65	7	126
Official	12	14	2	28
Aviation	1	7	2	10
Total	464	201	54	719

COMMENTS:

F ... Yes, so long as locations are not in lats. and longs.

45. **Would a Tidal Current Atlas for northern B.C. waters (similar to a "Current Atlas for Juan de Fuca Strait to Strait of Georgia") be of use to you?**

	Yes	No	No Ans.	Total
Fishing	298	129	71	498
Towing	37	16	4	57
Recreational	43	74	9	126
Official	15	11	2	28
Total	393	230	86	709

COMMENTS:

F ... For all B.C. fast-water locations Scott Channel, Pine Island, Rose Spit.
... I would like to see Atlas extended to northern waters.
... Tidal Atlas most useful [Nanaimo].
... Tidal current is important for avoidance of drifting over international boundary in Strait of Georgia while fishing.
... Longliners, prawn netters need to know currents, so as to pass on safe side of anchored buoys.
... Fish bite at slack tide.
... Tuna and salmon fishing best at full moon.
... Tidal current atlas would be useful on north coast, also for Discovery Pass to Pine Island.

DISCUSSION:

When a copy of the south coast Current Atlas was passed around at the public meetings, it was clear that even many south coast mariners, especially fishermen, have not seen it before. Recreational boaters were more familiar with the Atlas, but their responses possibly reflect the fact that few of them sail north of Queen Charlotte Strait. The "towing" replies above represent the views of a user group apparently familiar with the existing Atlas, who navigate the entire coast in all seasons.

46. **Are sea surface temperatures important to your operation?**

	Yes	No	No Ans.	Total
Fishing	260	194	44	498
Towing	8	46	3	57
Recreational	16	107	3	126
Official	6	20	2	28
Aviation	2	7	1	10
Total	292	374	53	719

COMMENTS:

F ... In Fahrenheit.
... Extremely important in summer.
T ... Only if someone falls in.

47. **Would information on positions of plankton concentrations be of use to you?**

	Yes	No	No Ans.	Total
Fishing	257	197	44	498
Towing	2	53	2	57
Recreational	16	106	4	126
Official	4	23	1	28
Aviation	0	8	2	10
Total	279	387	53	719

COMMENTS:

F ... Yes, extremely important.
... Have been waiting patiently for this information.

48. **Would information on the positions of ocean thermal fronts be of use to you?**

	Yes	No	No Ans.	Total
Fishing	279	159	60	498
Towing	20	32	5	57
Recreational	26	91	9	126
Official	5	22	1	28
Aviation	4	5	1	10
Total	334	309	76	719

COMMENTS:

F ... Maybe once/day at 10:00 am -- all non-forecast information and notices could be updated, but regular forecasts need to be brief.
... Have been waiting patiently for this.

F. User Participation

49. **Would you, under any circumstances, advise the nearest Coast Guard Radio Station of worsening weather conditions (e.g., wind increase of 20 kts in one hour)?**

	Yes	No	No Ans.	Total
Fishing	397	51	50	498
Towing	51	1	5	57
Recreational	100	17	9	126
Official	25	2	1	28
Aviation	7	2	1	10
Total	580	73	66	719

COMMENTS:

F ... Have done [2 **times**].
... Not if it pinpoints my position; anonymously, yes.
... Haven't thought of it, but a good idea [25 years experience].
T ... I have reported worsening weather conditions in Hecate Strait. No notification was broadcast on weather channels.

50. **Would you take time to fill out a "postage paid" post card whenever a major discrepancy occurs between forecast and actual weather?**

	Yes	No	No Ans.	Total
Fishing	377	67	54	498
Towing	43	8	6	57
Recreational	106	12	8	126
Official	23	3	2	28
Aviation	9	0	1	10
Total	558	90	71	719

COMMENTS:

F ... No, but toll-free phone okay.
O ... I use the phone [RCMP].

G. User Education

51. **Winds blow around a low pressure centre**

	Clockwise?	Counter-Clockwise?	No Ans.	Total
Fishing	64	242	192	498
Towing	5	36	16	57
Recreational	24	80	22	126
Official	7	20	1	28
Aviation	0	10	0	10
Total	100	388	231	719

NOTE:

This and the following question were intended as a very brief probe into the state of users' weather knowledge.

52. **Are forecast winds made with reference to True North or Magnetic North?**

	True North	Magnetic North	No Ans.	Total
Fishing	159	218	121	498
Towing	36	9	12	57
Recreational	89	15	22	126
Official	23	2	3	28
Aviation	4	5	1	10
Total	311	249	159	719

53. **Do you make any distinction between the terms mist or fog?**

	Yes	No	No Ans.	Total
Fishing	373	99	26	498
Towing	48	9	0	57
Recreational	91	33	2	126
Official	24	4	0	28
Aviation	6	4	0	10
Total	542	149	28	719

54. **Would you attend an annual one-day refresher course on marine weather?**

	Yes	No	No Ans.	Total
Fishing	319	113	66	498
Towing	43	11	3	57
Recreational	104	16	6	126
Official	21	6	1	28
Aviation	7	2	1	10
Total	494	148	77	719

COMMENTS:

F ... Yes, if free, in local area.
... Brochure--attach to tide tables.
... Important not to change terminology.

55. **Would a brochure explaining terminology used in weather forecasts be of any value?**

	Yes	No	No Ans.	Total
Fishing	379	81	38	498
Towing	45	11	1	57
Recreational	105	16	5	126
Official	21	5	2	28
Aviation	6	4	0	10
Total	556	117	46	719

COMMENTS:

F ... Tell us what a **Kilopasto** [sic] is, as compared to our barometer reading (i.e., is it high or low).
... Keep terminology simple.
... Yes, very much so.
... No, please use plain English as our friends on American side do.
T ... Yes, Just so everyone uses same terms.
R ... Yes. Especially new metric terminology.

PART VI

CONCLUSIONS

This section addresses a number of issues which, for convenience, are grouped under the following headings:

A. Requirements for Marine Weather and Sea-State Forecasts
B. Requirements for Marine Weather and Sea-State Reports
C. New Products Required
D. Efficient Dissemination of Forecasts and Reports
E. Continuing Assessment of Services
F. User Education

The requirements described here are drawn directly from users' replies to the questionnaires, and comments volunteered at the public meetings. A selection of these have been given verbatim, here and in Part V. Sometimes users seem to have conflicting needs, but such cases often simply reflect differences in operational practices.

The conclusions drawn here generally follow from the users' stated requirements but in some instances, obvious to the reader, the working group has also drawn on its knowledge of the internal working of the government services involved to suggest steps by which user requirements could be met.

In the following pages, bold type is used to highlight that part of the text containing the essence of each of the working group's conclusions.

A. REQUIREMENTS FOR MARINE WEATHER/SEA STATE FORECASTS

Preamble

Mariners clearly depend heavily on the present marine weather forecasts, (see Question 17 in Part V) though they show a realistic appreciation of the inherent inaccuracies. Most complaints are concerned with issue times and prompt dissemination rather than with the general content of forecasts. At the public meetings, it was noticeable how readily questioners grasped the scientific and technical reasons for current limitations in forecast accuracy.

Forecast wind speed and direction are undoubtedly the most important information for all classes of mariners. The responses to Questions 18 and 19 in Part V clearly illustrate strong support for the present wind warning program. Even in areas where forecast winds are currently often inaccurate, mariners use the issued wind information together with other forecast and reported data to form their own corrected wind forecasts.

Conclusions

A1) At present, forecasts are issued at 0430, 1030, 1630, 2230 PST. The time of issue of the early morning and late afternoon forecasts are particularly important to fishermen planning to go to sea or return to port. Fishermen generally leave harbour by first light and consequently need a forecast earlier than 0430 PST. Taking into consideration also how sunrise and sunset vary with latitude, the conclusion is that **fishermen's operational needs would be better matched if forecasts were issued at the following times (PST):**

in summer: 2.30 a.m., 10.00 a.m., 5.00 p.m., 10.00 p.m.
in winter: 3.30 a.m., 10.00 a.m., 4.00 p.m., 9.00 p.m.

For usefulness of forecast contents, see answers to Questions 17-20, 24-31 in Part V. Answers to Question 22 indicate that more timely warning of gales and storms is required. The need for changes in forecast times was not addressed specifically in the questionnaire,

A1) continued

but is brought out clearly in the following remarks made at the public meetings:

... issue times okay [Victoria]
... need [forecast] before 4:30 a.m. [Nanaimo]
... early morning forecasts one to two hours late [Port Alberni]
... need forecasts at least by 3:30 a.m. to be of use [Powell River]
... four daily forecasts should be one hour earlier [Powell River]
... issue times in summer should be two hours earlier [Masset]
... forecast is an hour later (local time) in summer. This is a nuisance in morning for setting out and at night for anchoring. Forecasts not early enough in summer but this requirement varies with latitude. Note also that day is much shorter in north in winter. Still fishing past 11 p.m. in summer, often travel in dark. [Masset]
... should be updated every three hours along with local reports [Skidegate]
... forecasts often do not reflect local conditions [Tofino]
... need forecasts before 4:00 a.m. [Campbell River]
... issue times okay [Port McNeill]
... need earlier issue of forecasts [Vancouver]
... just before daybreak and dusk before setting anchor [Vancouver]
... forecasts need to be received before 4:00 a.m. [Vancouver]

A2) The dissatisfaction with over-frequent issuance of gale/storm warnings evident from the answers to Questions 19, 21, 22 in Part V and the following remarks at public meetings:

... marine forecasts overdo gales and storms since Oct. 12, 1984 storm [Victoria]
... too much crying wolf lately [Victoria]
... continuous gale warnings discourage use of forecasts [Nanaimo]

A2) continued

... between March 12 to April 3, 1985 (there were) periods of continuous gale warnings but only four or five good blows,

is caused to a large extent by the wide variation in conditions possible within each existing forecasting area. For instance, since the west coast of Vancouver Island is a single forecast area at present (Fig. IV-2) a gale warning must be issued for the whole area even though the forecaster may expect only part of the coast to be affected. Also, much of the west coast fishery takes place in the larger inlets; current forecasting techniques apply better to more open water and do not allow adequately for heavy influence of topography on the wind. Mariners would obviously be better served by making warnings more area-specific. **It must be concluded that some subdivision of existing forecast areas is desirable.** Possible areas which could be designated separately are:

i) the easternmost portion of Dixon Entrance including Chatham Sound, Portland Inlet and their approach channels;
ii) the east coast of Hecate Strait from Triple Island to Laredo Sound;
iii) the central coast from Laredo Sound to Cape Caution;
iv) the northwest coast of Vancouver Island from Bajo Reef to Triangle Island;
v) the coast of Vancouver Island from Bajo Reef to the entrance of Juan de Fuca Strait;
vi) Queen Charlotte Strait;
vii) Johnstone Strait, consisting of the present Johnstone Strait area as far south as Chatham Point;
viii) the remainder of the present Johnstone Strait area;
ix) southern Strait of Georgia up to a line from Gower Point to Departure Bay;
x) the remainder of Strait of Georgia excluding the Gulf Islands;
xi) Haro Strait including the Gulf Islands lying west of the line from Saturna Island to Gabriola Island to Departure Bay.

A2) continued

The suggested areas are shown in Figures VI-1, VI-2 for comparison with Figure IV-1. Opinion at public meetings was almost unanimously in favour of smaller forecast areas:

... could use smaller forecast areas [Victoria]
... west coast Vancouver Island should be split into two areas at approximately Bajo Reef [Victoria]
... mariners don't mind if forecasters use terms like "Eastern/Western sections" [Powell River]
... keep north coast regions separated [Powell River]
... smaller regions will complicate things [Powell River]
... small craft warning should be more localized in time and space [Campbell River]
... Hecate Strait should have a separate inshore region [Powell River]
use the term "inland waters" like Washington State does [Prince Rupert]
... have an inshore Dixon Entrance forecast region [Masset]
... need to separate Johnstone/Queen Charlotte Strait due to strong summertime inflow [Tofino]
... would like smaller forecast regions in the public and marine forecasts [Tofino]
... define and use the term "inshore waters" [Masset]
... Hecate Strait needs two separate regions - inshore and offshore to handle wind forecasts [Campbell River]
... forecast areas too large - Hecate, west coast Vancouver Island could be separated [Port McNeill]

A3) Mariners must be able to visualize the positions of storm centres, etc., mentioned in the forecasts without having to refer to a chart. **One of the most frequently volunteered preferences (see Qn. 26, Comments) was reversion from the present use of latitudes and longitudes to the previous practice of stating positions of significant weather features in nautical miles and true bearing**

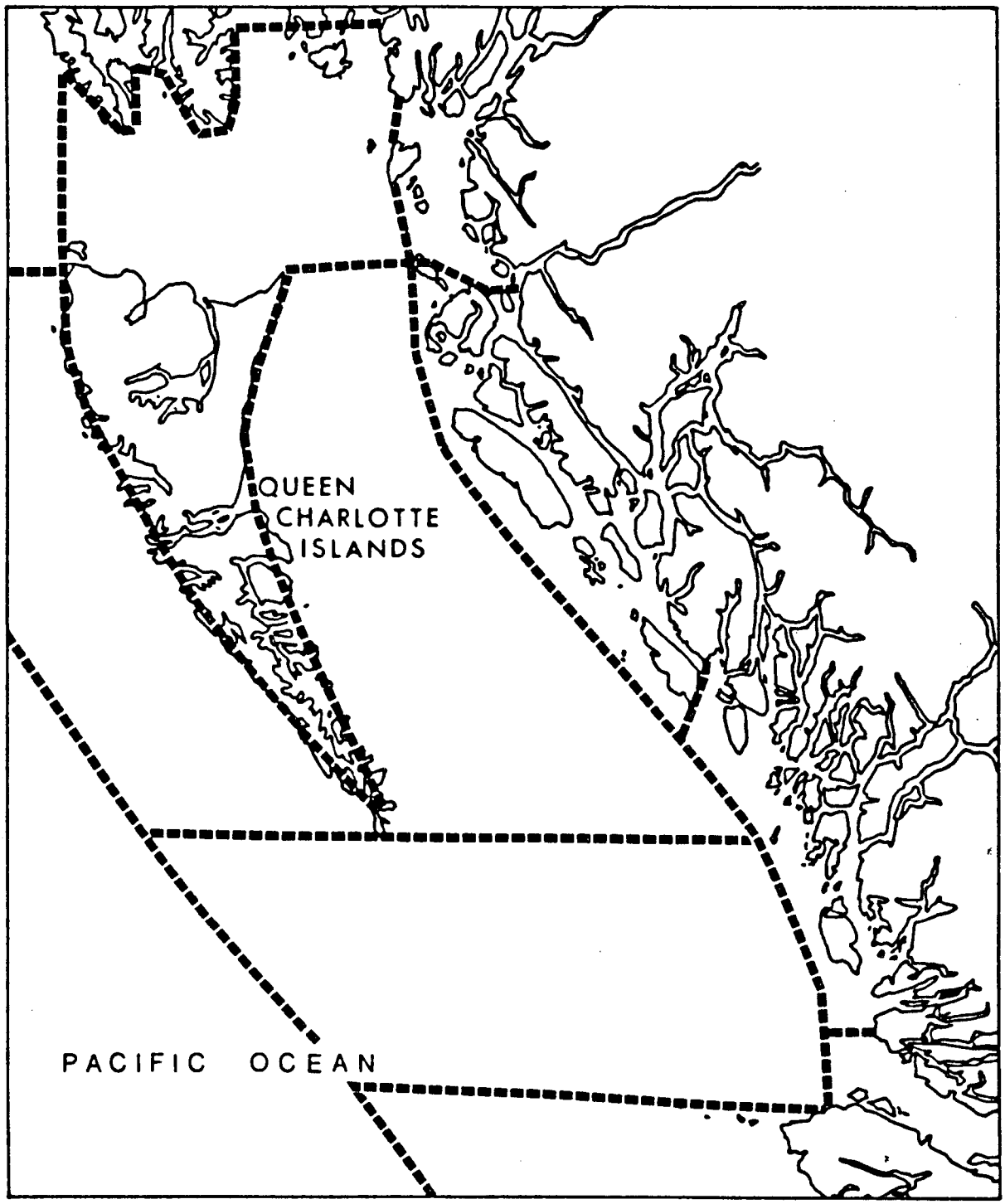

Figure VI-1: Recommended weather forecast areas.

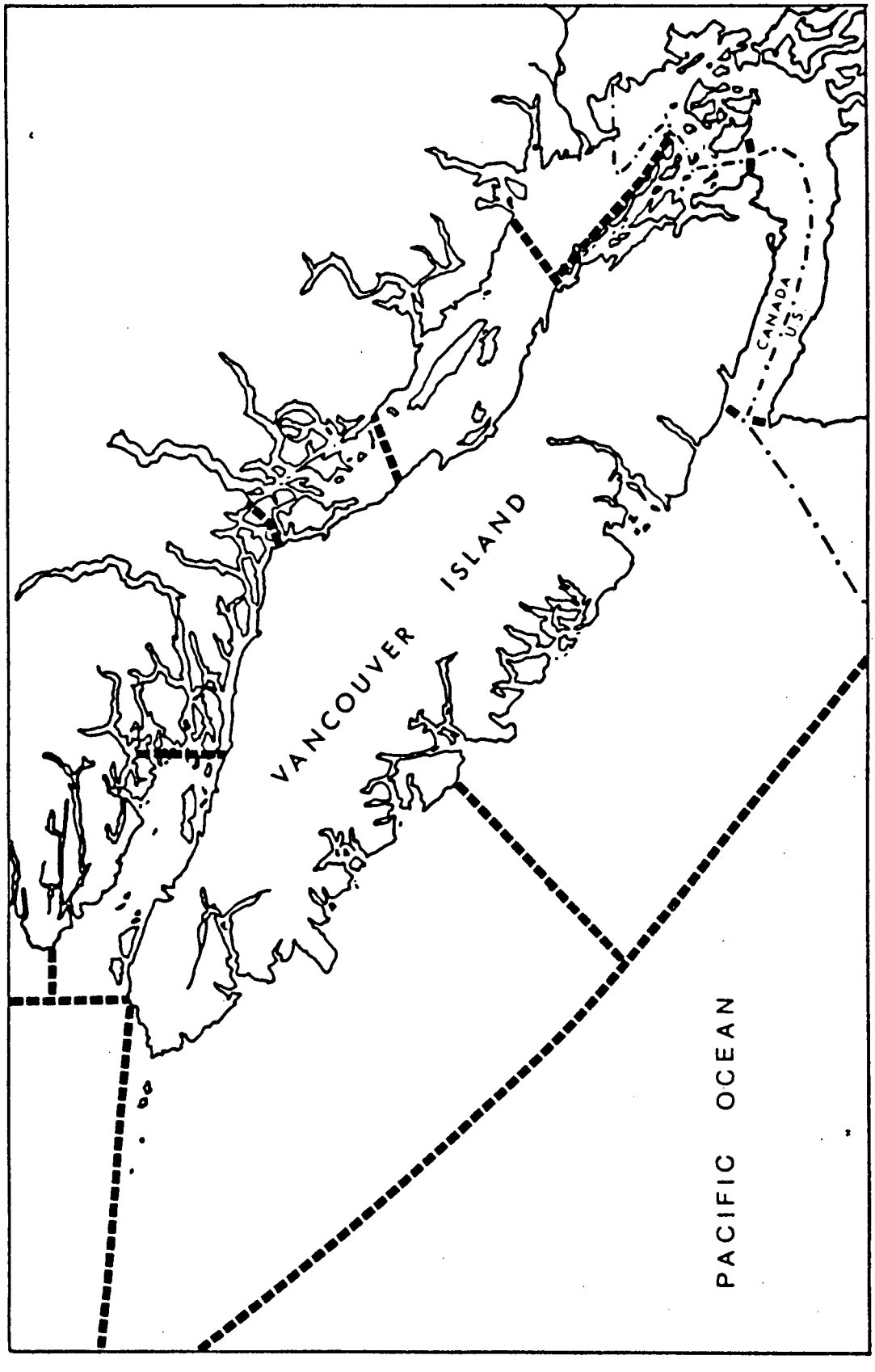

Figure VI-2: Recommended weather forecast areas.

A3) continued

relative to selected coastal landmarks. The following remarks made at meetings confirm this conclusion:

... prefer place names instead of lats and longs [Victoria]
... do not use lats and longs [Prince Rupert]
... use common reference points, not lats and longs [Masset]
... prefer place names to the use of lats and longs [Port McNeill]
... do not use lats and longs for position references [Bella Bella]

Latitudes and longitudes are preferable only when referring to features 1000 miles or more from shore.

A4) Interviews with dispatch managers at Rivtow and Seaspan revealed that 15 kts is a critical value of wind speed for log tow operations. **The usefulness of forecast and reported winds to the towing industry would be enhanced if winds between 10 and 20 kts were classified in 5 kt intervals i.e. "10 to 15 kts" or "15 to 20 kts."**

A5) At present, all winds over 48 kts are classified as "storm force" (Table IV-1). It was clear from discussions at the public meetings that having a further class of severe wind warning would be valuable. AES quite properly objects to issuing a "hurricane warning" when hurricanes as such do not occur outside the tropics, but as the need to warn mariners of extreme conditions is pre-eminent, **it is suggested that a "hurricane-force wind warning" (or other acceptably worded message) should be issued when winds in excess of 64 kts are anticipated.**

The remaining four topics in this section concern reinforcements to existing government programs which could lead to better satisfaction of user requirements.

A6) Acquisition of additional wind and pressure observations over the open coastal waters would be of considerable assistance in marine forecasting. **The large number of towboat/barge and ferry movements taking place year-round in B. C. coastal waters suggests that AES**

A6) continued

should consider fitting some of these vessels with Shipboard Environmental Acquisition System (SEAS) units to give regular wind and pressure reports.

A7) Meteorologists agree unanimously that more upper air measurements over the north Pacific are a fundamental necessity if west coast marine forecasts are to become more reliable. The few observations currently available give a very sparse picture compared to the dense network of observations used over the continents. One of the few current sources of upper air measurements is the ASAP program operated by AES. Semi-automated radiosonde launchers have been installed on three car-carriers continuously engaged on 19-day round trips from Japan to Canada. **Until sufficient upper air measurements can be obtained by satellite or other form of remote sensing, installation of ASAP units on more ocean-going ships is highly desirable (see also LeBlond recommendation, Table II-2, Item 5).**

A8) The questionnaire results (Qns. 34, 39-41, 43-44) indicated that all classes of west coast mariners have need of wave and swell forecasts. Though this contradicted the findings of an interdepartmental study in 1980,[1] further inquiry left no doubt about this conclusion. Comments made at public meetings included:

... could use swell forecast on west coast especially for recreational purposes [Victoria]
... am only affected by sea state in severe conditions [Port Alberni]
... Comox bar forecast needed [Powell River]
... wave height important near Lawyer for recreational people or possibly wave height buoy near Holland or Green Top [Prince Rupert]

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1 Study Group Report to the Ad Hoc Interdepartmental Committee to Discuss the Requirements and Availability of Ocean Information Services, Canadian Special Publication of Fisheries and Aquatic Sciencs 53, Ocean Information Services, Department of Fisheries and Oceans, Ottawa, 1980.

A8) continued

... broadcast sea states very useful [Prince Rupert]
... U.S. sea state forecasts are pretty good [CCG, Prince Rupert]
... infer sea states from the wind reports [Masset]
... need forecast swells as these sweep up crab traps in Dixon Entrance [Masset]
... need to know about sea state conditions near Francisco Pt. and rip tide in Seymour Narrows [Campbell River]
... need sea states at Cape Mudge, Cape Caution [Port McNeill]
... need significant changes in sea state due to the dispersive aspect of sea [EPS, Vancouver]
... Our problem as sailors and power boaters in Strait of Georgia particularly, has been encountering adverse sea-state conditions because conditions have worsened considerably since the last forecast.
... need reports for 20- to 30-mile zone where [fishing] fleet is [Port Alberni]
... need night-time sea state for seiners travelling at night [Port McNeill]

At present, wave forecasts are issued only for offshore waters; in order to extend this service to coastal and inshore waters, it will clearly be necessary to provide the marine forecaster with more detailed surface wind forecasts, means of assimilating an increasing number of sea-state observations and methods of wave forecasting suitable for coastal waters. **In view of the limited time available to prepare each forecast, it would seem advisable to initiate procurement of appropriate hardware and software to facilitate the task of extending sea state forecasts to coastal and inshore waters.**

A9) Answers to Qn. 20 indicate that regular warning of icing conditions would be useful to many mariners, as do the following comments noted at public meetings:

... usually know if icing will occur from weather conditions [Victoria]
... encountered icing while prawning in Bella Coola and near Rivers Inlet
... need icing forecasts as have observed some icing on fishing vessels

A9) continued)

during the Halibut season [Nanaimo]

... like freezing spray forecasts - some encountered west side of Texada [Powell River]

... freezing spray warning should be in forecast if expected [Masset]

... during Qualicum run, encountered freezing spray '85 [Masset]

... like to hear of potential for freezing spray [Port McNeill]

... freezing spray forecasts well accepted and boats stay in port [Bella Coola]

The present limited knowledge of icing and lack of marine icing reports makes issuance of potential icing warnings difficult. Therefore, in view of the dangers icing can pose to vessels, **PWC should conduct additional research to support a permanent capability for warning mariners of the possibility of icing.**

B. REQUIREMENTS FOR MARINE WEATHER AND SEA-STATE REPORTS

Preamble

Reports on present weather and sea-state are at least as important to mariners as forecasts (see Qn. 16, Part V). The value of reports from nearby points is obvious, but in addition, reports from more distant points along the coast permit users to check the forecasts by monitoring the progress and development of weather systems.

Since reports concern present conditions, prompt transmission is even more important than in the case of forecasts and most complaints concern delays in transmission. However, users also complain about poor siting of manned and automatic coastal reporting sites (see Qn. 33) and of poor coverage in some areas. At the public meetings, considerable interest was expressed in the recently-instituted MAREP program, which broadcasts solicited and unsolicited reports from the mariners themselves. While it will never be possible to note every significant change in local wind and sea state on our complex coast, the present reporting network, with some improvement in procedures and equipment and with extension of the MAREP program, could provide a satisfactory weather-reporting service. This

could be supplemented on an opportunistic basis with environmental data being collected by firms or agencies and with visual reports from coastal aviators.

Conclusions

B1) The following comments noted at public meetings convey the demand for weather reports and level of interest in the MAREP program:

... good site would be McInnes [Powell River]
... Langara good site for MAREP as some 250 vessels to west and north during fishing season [Masset]
... can solicit reports from deep-sea vessels and tugboats [Masset]
... make more use of offshore shipping for MAREP [Masset]
... stronger push should be made to get ships to report in [Tofino]
... need communication link between marine and aviation [Tofino]
... civil aircraft can't communicate with lighthouses at present [Prince Rupert]
... about airline-lighthouse link, I think it's fantastic [Prince Rupert]
... there is a need for local weather centres [Tofino]
... lightstations should have their own working channel to exchange information [Campbell River]
... solicited reports have a great potential for solving problems [Campbell River]
... recreational boaters contact station before proceeding around the Cape; little contact with aviation people or towboat operators; big need for local weather in region during May to October [Cape Scott lightstation]
... also need some local reports for open stretch between Cape Caution to Clark Pt. (Calvert Is.) [Bella Bella]
... Egg and Pine Is. good sites for MAREP [Bella Coola]
... frequent requests for weather; log is kept [Ballenas Is. lightstation]
... need weather station at Bella Bella and more local reports to serve a 90-mile radius about Bella Bella [Bella Bella]
... Scarlett Pt., Egg Is. report good [Nanaimo]
... need more local in Prince Rupert region [Nanaimo]

B1) continued

... trollers concerned of losing lighthouse reports [Nanaimo]
... frequent request for local weather [CCG, Parksville]
... need local reports from an area 50 miles north of Cape Scott, 10 miles west of Addenbrooke [Bella Bella]
... I use Alaskan MAREP reports [Vancouver]
... some recreational traffic solicit weather [Pine Is. lightstation]
... need local reports in area Pine Is., Egg Is. and Cape Caution [Pine Is. lightstation]
... information passed on to some local towboat companies [Egg Is. lightstation]

The MAREP service has been in operation since late 1985 at Bonilla Island lightstation and new stations have recently come into service at Cape St. James, Cape Scott and Kyoquot (Fig. IV-2). The success of similar services in the U.S. suggests that **it would be worth proceeding without delay to install further MAREP stations.** Consideration of the comments quoted above and answers to Qns. 40, 41, 43 suggest that **Langara Island, Cape Caution, Cape Mudge and Estevan Point should be considered for the next MAREP installations.**

B2) Coastal aviation pilots who attended the public meetings stated that for lack of equivalent information through regular aviation weather channels, they make frequent use of lightstation reports before committing themselves to coastal flights, which are usually carried out under VFR regulations. Pilots can also assess these factors quite accurately in their own locality, but Department of Communication regulations prohibit fixed installation of radio equipment which would allow pilots to pass reports to and receive observations directly from lightstations. Negotiation with DOT might remove this obstacle and so make available reports from areas poorly covered at present. The MARINE PIREPS program proposed earlier by this working group, in which fishing company aircraft crossing Hecate Strait during the 1986 fishing season were asked to report weather conditions through aviation weather offices was not successful, due to hurried

B2) continued

implementation and cumbersome routing of messages. With adequate planning, **the MARINE PIREPS program could certainly contribute valuable weather reports, particularly if it is expanded to include all commercial coastal aviators.**

B3) Fishermen from the Queen Charlottes stated that they find it useful to listen to offshore weather reports transmitted to Seattle on 4419 kHz by U.S. oil tankers en route between Alaska and Puget Sound. This is a potential source of reports from an area currently under-reported, especially during night hours. These reports would also aid PWC forecasters. **Reports from tankers and other high seas vessels entering or leaving the offshore waters could be solicited by CCG VTS.**

B4) Gales and storms are of particular importance to mariners (Qn. 17) but the answers to Qns. 21 and 22 indicate that there are shortcomings in the present gale and storm warning system. The forecasters are obliged to issue an appropriate warning for an area whenever a gale or storm is expected anywhere in that area within the next 24 hours, which, in the opinion of many mariners, leads to over-frequent warnings of gales or storms which do not affect their own vicinities. **The reliability of gales and storm warnings could be improved by appending a message to weather broadcasts soliciting marine weather reports from vessels in areas that have or show the potential for a storm.** Other measures which should improve the gale and storm warning service are given in (A1) and (C2).

B5) Most mariners would like to see substantial improvements in the weather reporting service. The answers and comments to Qns. 33, 35, 36 show the principal improvements required i.e. better placed observations, more frequent lightstation reports, reports during night hours, and, most important of all, less delay in getting up-to-date reports on the air. These requirements are fully borne out by the following comments made at public meetings:

B5) continued

... reports every two hours adequate if put quickly on CMB [Port Alberni]
... need report every two hours including night and within 20 minutes [Powell River]
... if locals were updated more often, marine forecasts and warnings would be picked up because people would listen more often [Powell River]
... need observations between Kyuquot and Esperanza and Estevan and Tatchu [Port Alberni]
... need more lighthouse weather [FSS, Prince Rupert]
... fixed wing and helicopter operations in channels depends almost 100% on lighthouse reports - would like prompt, hourly reports [CCG, Prince Rupert]
... all coast guard flight operations must rely on only three aviation reports - YZT, YPR, YZP (refer to B5.14)
... need more locals between the hours 15, 16, 17, 18 z like from Ethelda Bay [Prince Rupert]
... would like frequent reports in the morning and evening [Prince Rupert]
... lighthouse reports aren't frequent enough to develop good weather trends [Prince Rupert]
... need hourly weather reports [Prince Rupert]
... people want more local weather and less from outside regions; only three minutes out of ten refer to Charlottes area [Skidegate]
... Cape St. James, Bonilla reports most important for crossing strait [Skidegate]
... I get all the local weather reports before I set out - in both directions, from Langara round to Triple Is. [Skidegate fisherman]
... would like report in Port Alberni Canal and at mouth of Canal [Tofino]
... more local reports needed [Tofino]
... marine information has too large a time gap between regular reports [Port McNeill]
... could use lighthouse reports earlier during early morning summer hours [Vancouver]
... need reports every one to two hours to ensure safe travel in local waters and to the Queen Charlotte Islands which is a four- to five-hour trip [Bella Bella]

B5) continued

... need local observations every hour [aviator, Bella Bella]
... require more local reports during the fishing season April to September [Bella Bella]
... reports adequate if updated rapidly every three hours [Vancouver]
[reports] adequate if updated promptly every three hours [Skidegate]
... need local 3:00 a.m. to 3:30 a.m. [Masset]

On the basis of discussions with lightkeepers at six stations and comments from mariners, the working group concluded that selected lightstations could provide reports every two hours round the clock and that the remainder could report every two hours during working hours. A partial alternative which would keep lightstation workloads manageable would be to telemeter wind, pressure and temperature hourly.

Extension of the MAREP program (see B1 above) should ensure better area-coverage. More prompt broadcast of reports is discussed in (D2) and (D3) below.

B6) Mariners and lightkeepers alike agree that winds reported by some lightstations and automatic reporting stations are very frequently unrepresentative of over-water winds nearby. The following are some relevant comments taken at meetings:

... Bull Harbour has lousy wind observation [Powell River]
... Bull Harbour has bad anemometer site; offshore wind different than inshore wind [Tofino]
... if Bull Harbour SW 20, then gales 35-40 SW [Nanaimo]
... Kains Is. is very little use [Port Alberni]
... Cape Mudge gives an underrepresentative wind report - need something at Francisco Pt. or Mitlenatch Is. [Powell River]
... Langara local report not representative; wind strengths poor [Skidegate]
... wind sensor needs better placement [Cape Scott lightstation keeper]

B6) continued

... Kindakun ARS needs to be moved further to NW [Skidegate]
... need observation at Francisco Pt. as Mudge is protected [Campbell River]
... McInnes wind report not representative [Bella Bella]
... would like lightstations to include peak gusts [Campbell River]
... Point Atkinson weather reports have little value for Howe Sound. Further, Point Atkinson's reports are usually inaccurate, i.e., wind speed, wave height [see also Appendix VI-1].

For users' comments on automatic reporting station measurements, see Qn. 33.

On visiting some lightstations, members of the working group could see that anemometers were very effectively sheltered by the topography, at least in some directions. **To ensure that lightstation wind reports are representative of nearby over-water winds, it appears that more than one anemometer is required at certain lightstations to avoid errors due to the shielding effect of topography.** Calibration of anemometer measurements against nearby over-water measurements could also improve the accuracy of wind reports from lightstations. These conclusions may well hold for some automatic reporting stations also.

B7) As noted under (A8) and Qn. 34 many mariners require sea-state and swell information. Wave measurement buoys are expensive to install and maintain and for this reason, it is incumbent on all parties involved to obtain maximum benefit from the few wave buoys in place at any given time. Oceanographic purposes are often served by recording wave measurements for recovery later, whereas sea-state forecasting and reporting requires real-time reporting of wave data. **Consequently, AES and DFO should enlist the cooperation of government agencies and private firms installing wave measurement buoys to ensure the availability of this information in real-time for use by the PWC marine forecasters and the marine community.**

B8) Fishermen in particular require several hours advance warning of severe storms, in order both to recover gear and have time to reach

B8) continued

shelter. Results of Qn. 23 indicate mariners require 6 to 12 hours of lead time to ensure safe return to port.

The offshore meteorological and wave-height reports from the two NOAA buoys at Bowie and Explorer seamounts are invaluable to marine forecasters trying to judge the development of storms and even directly to mariners in nearshore waters, as the following comment shows:

... winds at Bowie seamount are accurate; I use this at North Island, even inside [Masset]

It must be concluded that Canada should augment the present system of offshore buoys in order to obtain more reliable advance warnings of severe winds. Directional wave measurement instrumentation would be a useful addition (see Qn. 43). Several buoys 250 to 300 miles offshore are necessary in view of the speed and directions with which storms can approach the coast. **It would also be extremely helpful to all classes of mariner if buoys equipped with meteorological and directional wave measuring instruments could be installed at the following critical exposed locations: off Brooks Peninsula, at Learmonth Bank in Dixon Entrance, in the middle of Hecate Strait and midway between Cape Scott and Cape St. James, (see Qns. 40, 41).**

B9) From the comments on Qn. 33, it can be concluded that mariners would like to see many more automatic reporting stations installed to cover gaps in the present reporting network. The following are a selection from the numerous comments on this theme noted at public meetings:

... there is a need for wind sensors on "J" buoys A, B, & near Discovery, Nahwitti Bar [EPS, Vancouver]

... require an auto station in the Goslings [Victoria]

... auto stations required at Lookout Is. and Bajo Reef Buoy or Eliza Dome [Victoria]

... there is a big gap between Solander and Estevan [Port Alberni]

B9) continued

... need local observations for China Creek; present weather from airport inadequate - large amount of traffic in canal [Port Alberni]

... need automatic report near Goslings [Powell River]

... possible automatic site King Horn in Desolation; Gosling Is. would be another good site [Powell River]

... Mitlenatch often has worse conditions than Cape Mudge [Powell River]

... Holland Rock possible site; Green Top Is. also; big difference between Lucy and Triple Is. [Prince Rupert]

... Digby Is. wind too low and does not adequately correlate with difficulties encountered in entering harbour [Prince Rupert]

... long-standing request [by letter] for reports (no action by government) vicinity Oona River, Kitkatla, Hartley Bay area [Prince Rupert]

... Ogden, Grenville - Watson Rock suggested [Prince Rupert]

... need anemometer sensor for Robson Bight-Kelsey Bay area to detect strong afternoon inflows in Johnstone Strait [Campbell River]

... need conditions off Wilby Shoals [Campbell River]

... need buoy in Bute Channel to indicate outflow/inflow conditions [Campbell River]

... need observation between Chrome and Mudge [Campbell River]

... sea state very confused at junction of Ogden Channel and Granville - winds from several directions meet [Campbell River]

... need a sensor to pick up strong southwesterlies that develop at times in Johnstone/Queen Charlotte Strait [Port McNeill]

... need local report vicinity Goslings [Bella Bella]

... An automatic wind station at Gower Pt. would be good. The distance from Merry Is. to Pt. Atkinson is too great. I have seen calm winds at Merry, light winds at Atkinson and bad wind and sea conditions at Gower. This is a heavy traffic area and deserves better coverage. Merry reports are good but not regular and sometimes never. Hood Pt. and Halibut Banks are a must. Grief Pt. also unreliable.

The requirement for more local wind observations could be met by installing equipment on existing buoys and beacon sites. Use of

B9) continued

existing facilities should minimize costs of installation, power, access and maintenance.

B10) Many mariners formally or self trained in single observer forecasting would welcome receiving frequent local reports and a selection of reports from points all along the coast, as indicated by the following comments:

... need broader spectrum of lighthouse reports on CMR to help verify forecasts [Campbell River]
... use [local reports] for forecasting and determining gradients
... more emphasis should be placed on single observer forecasting [Victoria]
... would like barometer reading and tendency in local report; dew point would be useful too [Port Alberni]
[Vancouver]

AES could meet the needs of single observer forecasting by providing bulletins for broadcast by CCG Radio of all available local reports and selected reports from coastal airports, MAREP sources, and U.S. reporting stations. The north coast CMB-VHF and scheduled broadcasts on 2054 kHz should include selected south coast marine reports and vice-versa, to assist the mariner in single observer forecasting. The broadcasts from Alert Bay and Bull Harbour should include these same selected out-of-area-reports.

B11) Mariners exaggerate the lengths of time for which automatic reporting stations are off the air due to breakdowns. For instance, the following statements made at public meetings,

... Lawn Point was off 60% of the time during last fishing season [Port Alberni]
... Rose Spit is often down for a week [Masset]

B11) continued

can be disproved from the maintenance records, but on the other hand, an apparently acceptable "down-time of 1% per year" may represent a failure lasting in excess of three days, possibly in the height of fishing season. **Clearly, continuing efforts must be made to keep downtime to a minimum and to aim at steady improvement in reliability.**

B12) The answers to Qn. 55 among others and the following comments at meetings:

... need local sea states in feet and metres [Victoria]
... use feet instead of terms like "choppy, low SW swell" [Powell River]
... use either all feet or metres, need uniformity in all sea state terminology [Powell River]
... sea state should be in feet, not metres [Masset]
... sometimes speeds are mentioned in kph [Vancouver]

indicate that mariners require consistent choice of units in forecasts and reports. They show a natural preference for familiar units and in at least one case there are good technical reasons for preferring imperial to metric units. When experiencing poor radio reception among considerable shipboard and wind noise, it is easier to make out quantities stated in integer units. Consequently, it makes good practical sense to give wave heights in feet rather than metres, thus avoiding the need to use fractions of a metre. The difference between 1 m and 2 m is of course too great for useful wave description. **West coast mariners clearly prefer to have all speeds in knots, wave heights in feet, visibilities in nautical miles and pressures in millibars.** Most seem to be accepting the use of degrees Celsius for temperatures. Many express dislike of purely qualitative terms such as "moderate winds" and prefer receiving qualitative estimates such as "winds of 12 to 19 kts" whenever possible.

B13) As noted earlier in the report, the working group did not have time to investigate the use of radar for monitoring sea state and swell. Apart from coast guard personnel familiar with the present VTS radar, none of the mariners interviewed seemed to know of the potential for using radar in this way. Nevertheless it is clear that **AES, DFO and CGG should conduct a joint study of the feasibility of using multi-purpose coastal radar stations to monitor sea-state and swell in addition to performing present roles.**

C. NEW PRODUCTS REQUIRED

Preamble

This section deals with a few changes to the forecasting and reporting services which will require development effort on the part of various agencies. They address expressed and anticipated requirements of the marine community.

Conclusions

C1) Due to the increasing amount of useful information that marine scientists have at their disposal, it is possible to produce products for mariners that should further improve the safety and efficiency of their operations. While voice broadcasts of weather information will continue to be required, it is appropriate now to consider supplementary means of communicating to mariners the growing volume of useful marine information.

The responses to Qns. 46-48 in Part V show that there is already some demand for non-meteorological information, for instance, plankton distribution. This type of information can be distributed most efficiently in graphical form by radiofax broadcast, and several mariners pointed out to the working group that the decreasing cost of radiofax receivers would make it worthwhile to install such equipment if only more information were broadcast by radiofax. Comments gathered included:

C1) continued

... FAX now in cost range of small operators as receivers now available for $600 Canadian [recreational boater, Victoria]
... would like to see Canadian weather charts extended farther west so a much clearer picture of incoming disturbances or centres can be seen by the observer [Victoria]
... no access to weather maps [recreational boater, Prince Rupert]
... would find it useful to have a weather port with access to maps, pics, etc.; want weather by FAX re-broadcast on local TV; also want to use a personal computer to dial into AES [aviator, Skidegate]
... [need] offshore weather charts miniature for [storm] tracking

Of course, radiofax is an efficient means of broadcasting meteorological and sea-state information also, such as satellite imagery or graphical depictions of weather systems most useful to offshore mariners.

It seems advisable for the government departments involved to consider instituting more radiofax broadcasts of meteorological and oceanographic data. Requirements of some mariners for hard copies of forecasts and reports could also be satisfied by this means. Even mariners without radiofax equipment could benefit from this service when putting to sea if radiofax receivers were installed at their home ports.

At present, DND transmit by radiofax large-scale isobaric analyses and and prognoses four times daily. See state analyses and prognoses are also transmitted twice daily. It is suggested that PWC should aim over the next few years to institute, possibly by radiofax, transmission of the following information (suggested frequencies in parentheses):

i) Enhanced satellite imagery of the northeast Pacific, outlining significant features and their direction and rate of movement (eight times daily).

C1) continued

ii) Detailed isobaric and wind analyses of the northeast Pacific (four times daily).

iii) Text of the forecasts and selected marine reports (four times daily).

iv) Sea state analyses and prognoses for B.C. coastal waters (every 12 hours).

v) Isobaric and sea state prognostic charts for 12, 24 and 36 hours for the northeast Pacific (every 12 hours).

vi) Sea surface temperature charts of B.C. coastal waters (twice weekly).

vii) Satellite images of chlorophyll (zooplankton) concentration (twice weekly).

Provision of each of these items will of course be dependent on the technical feasibility of obtaining the information and of processing it in the available time.

C2) Answers received to Qn. 37, Part V showed a surprising readiness to have probabilities of occurrence stated with gale- or storm-force winds. Comments at meetings confirmed this attitude, eg.

... the use of probabilities makes the forecast more realistic [Victoria

... probabilities of gales or storms would be a good idea [Campbell River]

Adoption of this practice will however require development of new skills on the part of forecasters, and not least in wording of the consequent warnings so as to avoid ambiguity. **The conclusion of the working group is that issuing of probabilities of occurrence for gale and storm-force winds is well worth attempting.** Initially, it should be tried in a few restricted areas. Feedback from mariners would be essential in evaluation of this innovation.

C3) Answers to Qn. 38 indicate a clear requirement by all classes of mariners for introduction of a three- to five-day marine outlook. The feasibility of doing so is dependent on general progress in meteorology, including developments in numerical modelling, and even more on increased upper-air measurements over the Pacific. **The working group concludes that in view of mariners' willingness to accept use of probabilities in forecasts, issuance of a three- to five-day marine outlook could be tried in the near future on an experimental basis.**

D. EFFICIENT DISSEMINATION OF MARINE WEATHER INFORMATION

Preamble

Prompt notification of predicted and observed changes in weather are essential to all mariners. Users' dissatisfactions with the present weather broadcasting services centre on slow updating of weather reports, poor reception in certain areas, and low sound quality. For example:

... most important improvement would be to get new forcasts and reports on CMB tapes within 30 minutes [Masset]

... local reports always late when weather is bad [Bella Coola]

... lighthouse reports often too old [Tofino]

... lighthouse reports frequently late [Powell River]

... Lawn Pt. to Solander information gets updated, but data often three hours late [Campbell River].

... Quality of tapes at Rupert and other stations are terrible. You are listening to sometimes three forecasts, one on top of the other (doesn't anybody ever re-listen to your tapes, i.e., for accuracy and mistakes or clarity?) They are static scratchy and generally not audible. It's a bloody waste of time and money when the whole conclusion of your efforts are not able to be heard. Sometimes in the middle of the nite, they come on with a gale warning then they don't update the tape until the next morning. In my opinion there is far too much time between tape changes of local weathers especially through the nite.

... dead spot at the bottom of Solander; VHF has dead spot south of Brooks Peninsula [Port McNeill]

... no CMB reception possible at the upper end of Dean Channel, Bella Coola village [Bella Coola]

... large blind spot for CMB on west coast of Charlottes; north of Skincuttle Inlet on east coast of Charlottes has very poor CMB reception [Port Alberni]

Another shortcoming, which occurs only infrequently but then at critical times, is curtailment or interruption of CCG weather broadcasts during search and rescue incidents. The first priority of the CCG radio stations is to support CCG rescue operations, and at such times, normal broadcasting of weather information to other mariners may be delayed or suspended. In view of the fact that severe weather can sometimes develop in a surprisingly short time in any of the west coast marine regions, it is essential that issuing and updating of weather warnings should retain a high priority. While it would be acceptable to abbreviate the weather broadcasts to some extent during SAR incidents, means of maintaining uninterrupted weather broadcasts must be devised.

Since very few users were familiar with the complex communications arrangements used in support of the weather broadcasts (see Figure IV-1), few technical recommendations were put forward by users in this case, though their comments convey their dissatisfaction with the end-product vividly enough. The suggestions below are a result of the working group's review of the present system in light of the users' rquirements and relevant technical facts.

Conclusions

D1) The LeBlond report noted that some of the delay in forwarding weather information at the time of the October 11-12, 1984 storm was caused by breakdown of a computer in Toronto. This highlights the fact that the present communications network used for weather information is far from ideal. Not only is the routing of messages too complicated, but there is other traffic with higher priority, and parts of the system

D1) continued

now have so little spare capacity that long delays are now common, e.g.

... new forecast goes out at 5:15 a.m., but old lighthouse data still on it - slow by up to two hours [Masset]
... aviation operations frequently delayed due to late receipt of local weather reports [Bella Coola]
... local observations often one and one-half to two hours late [Port McNeill]

The working group concludes that overall simplification of the dissemination system is highly desirable. In particular, PWC should be the main centre for collecting and disseminating marine information and forecasts generated on the west coast. Subject to technical feasibility, broadcast of marine forecasts and warnings from their centre of origin, i.e. PWC, should also be considered.

D2) A number of complaints concerning broadcast quality and delays in transmission can be traced to the obsolescent tape equipment in use at CCG Radio. For instance,

... Channel 21B has noisy background [Campbell River]
... Holberg and Calvert radios are hard to hear due to noise on tapes [Port McNeill]
... local reports are put on CMB promptly, but some delay in summer when operator busy [Cape Scott lightstation]
... vast difference in broadcast quality between aviation and marine [Skidegate]
... When a special storm warning or gale warning is broadcast by Coast Guard Radio Stations you are initially advised on CH16VHF to shift to W1 or W2 for information. The tape recorded weather is stopped and the special broadcast is transmitted, then the tape is started again. Several times with Alert Bay and Prince Rupert CCG radio stations, the resumed taped broadcast on W1 and W2 are not updated to contain the

D2) continued

new information provided in the special broadcast. For people required to be on deck working their vessels out of earshot of the radio when the special broadcast comes through they rely on the erroneous taped broadcast. This can deny the person several hours of running time in which to escape approaching adverse weather. Your attention to this matter would be appreciated by myself and other mariners I have discussed this with, and could lessen the chances of fatal encounters with weather. [towboat, Vancouver]

As noted in Part IV, Weatheradio Canada (AES) has had very satisfactory performance from Interalia solid-state recording equipment installed some months ago to handle needs almost identical to those of the CMB Service. **It must be concluded that Interalia or equivalent equipment should be acquired as soon as possible for all CCG marine broadcast stations,** otherwise users' frequently-stated requirements for overall delays of no more than 30 minutes in broadcasts of weather reports cannot be met. Also it may be noted that some of the improvements in weather broadcasts suggested below will be much easier to implement if this modern recording eequipment is acquired.

D3) To ensure that marine weather forecasts and warnings are received in a timely fashion, PWC should adopt procedures and install equipment which can reduce the time delays occurring at present in the preparation and transmission of weather information.

D4) Mariners find variation in terminology and phrasing very confusing under the trying circumstances in which they work. For instance:

... forecast synopsis often not smooth [Prince Rupert]
... wording of forecasts is very variable, depending on forecaster; some very intelligible, some almost unreadable [Campbell River]
... tape quality lousy; people bored; use own abbreviations [Powell River]
... synopsis often not smooth for reading [Prince Rupert]
... forecasts syntax and semantics poor [Vancouver]

D4) continued

To increase intelligibility of broadcast weather information, forecasters should use concise standard terminology with no idiosyncratic abbreviations. Simple phraseology and straightforward sentence structure help to produce easily-pronounceable, easily-understood text.

D5) Many mariners commented how easy it is to miss important parts of radio broadcasts under shipboard working conditions (see, for instance, the comment from a Vancouver-based towboat captain quoted in D2) above). **CCG Radio could improve the effectiveness of marine weather warnings by issuing "tone alert" signals prior to broadcast of each warning, using different tone signals for different categories of message.** Some shipboard radios already have tone alert capacity; separate tone alert devices can be bought quite cheaply.

D6) Numerous comments were received by the working group in writing and verbally about the difficulty of understanding particular radio operators' voices. Complaints concerned unfamiliar accents, poor pronunciation, lack of familiarity with marine terminology and less tangible factors such as "boring" or "depressing" voice quality. In view of the fact that some voices can be heard much more clearly than others on radio in noisy environments, **quality of voice and manner of delivery should obviously be accorded high importance in selection of marine broadcasters.** Seemingly minor irritating factors become important when a listener has to maintain some degree of attention for many hours at a time; ability to suggest some empathy with the listener can clearly increase the effectiveness of a radio operator very considerably.

D7) Mariners report good reception of the 2054 kHz scheduled weather broadcasts almost everywhere on the coast, but the present three- hour interval between these broadcasts (see Table IV-3) hampers their use as a fully satisfactory alternative to the CMB-VHR broadcasts in areas where the latter are unavailable. **There is a need for more frequent**

D7) continued

scheduled broadcasts; the working group concluded that it should be possible for the four stations involved to make hourly 15-minute broadcasts on a staggered schedule.

D8) CCG Radio has steadily improved CMB-VHF coverage on the west coast, but there are still some areas where reception is poor. A list of problem areas mentioned to the working group at public meetings is given in Appendix VI-3. **CCG should obviously continue its efforts to identify and eliminate existing dead spots and interference.**

D9) For safety reasons, an alternative to the MF scheduled broadcasts is needed beyond the range of the coastal CMB-VHF broadcasts (see Fig. IV-6). **This requirement could be satisfied by broadcasting marine forecasts and warnings and selected weather reports by radio telex at least four times per day.**

D10) The comments on Qn. 13, Part V indicate that repetition of "Notices to Shipping" on every CMB cycle is unnecessary and on receiving firm confirmation of this at the public meetings, **the working group concluded that it should be adequate to broadcast "Notices to Shipping" no more than four times per day.**

E. CONTINUING ASSESSMENT OF SERVICES

Preamble

In order to judge the adequacy of the marine weather service, it is necessary to monitor its performance on a continuing basis. Many mariners obviously feel that their comments on the service, from the user's viewpoint, receive insufficient attention from government agencies, e.g.

... It's about time some of the front line people go out and see the users. [troller, Vancouver]

... boats around for 5000 years, aviation 100 years, yet marine weather takes a back seat [Skidegate]

... Glad to see this questionnaire and the chance to provide feedback -- keep up the good work.

... Thank you for your concern regarding questionnaire.

The answers to Qns. 49 and 50 indicate that most users are very willing to cooperate with AES and CCG to improve the weather service, but it is clear that many consider that meeting members of the working group is the first substantial opportunity that they have had to provide some input. Throughout the present enquiry, it was evident that users had given considerable thought to the problems they pointed out and and many constructive suggestions. Consider for instance the following variety of miscellaneous suggestions from users:

... We can tell if the weather is going to be good or bad depending on the reception of VHF. We shouldn't have to rely on this.

... would like a public briefing office similar to J. Paschold's [Vancouver Airport] which is much superior to what we get at Powell River

... channel 16 is cluttered up in Strait of Georgia by pleasure boaters making casual calls

... use Tidal Atlas but have trouble telling arrow size; would like Tidal Atlas in form of transparent chart overlays [CCG, Powell River]

... Extreme Rip Tide reports appended to lighthouse reports are not broadcast on the coast guard marine broadcast [Campbell River]

... I do not blame the CCG, weathermen, etc. for the state of the weather. When the lines are untied, the Master must accept responsibility for himself, his crew, and his vessel. However, I urge you to call the weather as you see it and not to put senseless warnings out just to protect yourselves from idiots and politicians.

... people need to be told to phone CCG radio for marine information: many phone FSS which is primarily an aviation function [FSS, Prince Rupert]

... need a toll-free weather recorder phone for the large number of small boaters [Campbell River]

... have set times/frequency when coast guard radio does roll call of marine observations so mariners can listen in rather than wait for CMB [recreational boater not aware of scheduled broadcasts, Tofino]

Assessment of the marine weather service should obviously include regular consultation with the marine community.

Conclusions

E1) **To monitor the effectiveness of the dissemination system, AES should periodically keep a log of times of issue of all weather messages and warnings and CCG should keep logs of receipt and broadcast times of same over agreed periods of time.** Analysis of these records would help to pinpoint sources of delay.

E2) **To check the overall accuracy of the forecast service, AES should verify marine forecasts and warnings, on a six-hour basis, analyses being made both by marine area and weather regime.**

E3) **The government agencies involved in the marine weather service should jointly institute regular enquiry into users assessment of the service.** It would be most effective to have several levels of assessment, for instance

a) regular feedback (e.g. by pre-paid postcard, see Qn. 50) from users on anomalies between forecast and observed weather

b) periodic (at least annual) public meetings in coastal communities to solicit the views of mariners who do participate in (a) above

c) in-depth reviews, similar to the present enquiry, at about three-year intervals to examine present service and new requirements in the light of technical developments and changes in industry operations.

F. USER EDUCATION

Preamble

In order to ensure that the marine weather service products are properly understood and used to maximum advantage, efforts must be made to ensure that users are fully familiar with existing services. The answers to Qns. 51, 52 and 55 show that some users need more information on basic terminology used in weather broadcasts.

To ensure that people entering the marine industry become familiar with the marine weather services, particularly those, such as MAREP, requiring active participation by users, efficient means must be found for communicating educational material to the marine public. The positive response to Qns. 54 and 55 shows that mariners are keen to obtain more information about the weather service and its products.

Conclusions

F1) **PWC, in cooperation with CCG and DFO should publish a comprehensive user's guide to weather-related government services for the marine community, including information on services available, interpretation of forecasts and a glossary of terms used.**

F2) **PWC, in cooperation with CCG and DFO, should issue information bulletins, as necessary, to inform mariners of significant changes in marine weather services.** Several means of distributing these bulletins will be required, in order to reach all sectors of the marine community. It should be noted that it is important to consult users, and, at the very least, to notify them, before dropping any existing service (see Appendix VI-4).

F3) **The various governmental agencies such as DFO, CCG and PWC should hold joint annual public meetings in coastal communities to obtain feedback from and to inform the marine public on current and proposed marine services.** It should be noted such meetings would also play a useful

educational role for the government personnel participating. In addition, DFO officials responsible for fishery openings should become familiar with marine forecast operations through familiarization visits at the PWC.

F4) In order to reach members of the marine community unable to attend the public meetings proposed above, **consideration should be given to use of the Knowledge Channel,** which is available to most north coast communities on one of the standard VHF channels (2 to 13).

PART VII

APPENDICES

APPENDIX II-1: Vancouver Boat Show -- 1986 Survey

Questionnaire developed by T. Gigliotti and handed out to some attendees by D. Brown and A. Webster of AES.
Approximately 85% of the respondents are recreational boaters.

1. Do you check the latest marine weather forecast before setting out in your boat?

Always:	79%
Occasionally:	15%
Never:	6%

Respondents: 181

2. How do you get the latest marine forecast?

Cablevision:	12%
Phone tape:	11%
AM-FM radio:	16%
Weather office:	17%
Weatheradio:	39%
TV:	5%

Respondents: 178

3. Are you able to keep aware of weather developments once you are in the water?

Yes:	79%
No:	21%

Respondents: 178

4. At what wind speed do you feel it unsafe for you to go out into open waters?

15 knots:	19%
20 knots:	34%
30 knots:	30%
40 knots:	16%

Respondents: 178

5. What is your impression of the general quality of the current Marine Weather Services Program?

Excellent:	21%
Good:	33%
Adequate:	35%
Poor:	11%

Respondents: 175

6. Which factors in a marine weather forecast do you consider to be the most important for boating purposes. Please list in order of importance starting with 1, 2, 3 etc.

Factor	(High) Priority Level					(Low)
	1	2	3	4	5	6
Sky condition	9%	6%	8%	21%	18%	38%
Precipitation	1%	6%	7%	16%	49%	19%
Visibility	17%	17%	40%	18%	4%	5%
Wind speed	51%	22%	11%	8%	4%	3%
Wind direction	9%	36%	14%	16%	15%	9%
Thunderstorms	12%	12%	19%	21%	11%	26%

7. Would you like to see the "Small Craft Warning" Program, now in effect from about May 1st to November 1st annually, extended to a year-round Program?

Yes: 82%
No: 18%

Respondents: 171

8. Do you have the latest information pamphlet covering the West Coast Marine Weather Program?

Yes: 36%
No: 64%

Respondents: 171

9. Have you ever considered the purchase of a reasonably-priced radio receiver, which would allow you to pick up the latest weather information from "Weatheradio Canada" 24 hours a day?

Yes: 75%
No: 25%

Respondents: 171

10. Would you be in favor of a programmed basic weather training course on Cablevision in the local area?

Yes: 84%
No: 16%

Respondents: 171

APPENDIX IV-1: Examples of Lightstation Observations, MAREP Reports and U.S. MAREP and Coastal Reports.

B.C. LIGHTSTATION REPORTS

```
16 BULL HARBOUR OVC 15 S3 1FT CHP 1014.9F=
16 PINE ISL OVC 15 SE18 4FT MOD MOD W OCNL RW -
15 WLP SA 1525 AUTO4    140/04/03/1415/-1     6004 68MM=
16 SCARLEET PT OVC 15 SE10 1FT CHP LO-MOD NW
15 YZT SA 1500 6 SCT 20 SCT E28 BKN 100 OVC 10 151/3/2/1604/997/
16 PULTENEY PT OVC 15 SESE RPLD
   HADDINT last 2718Z
16 ALERT BAY CLDY 12RW -- CLM SMTH 1015.2S
   WXM*     none decoded/none recent
15 CHATHAM CLDY 15 SE2 RPLD SHWRS DSTNT E
```

MAREP REPORTS

```
03 HALIBUT BANK PT CLDY 15 SW12 CHP 1013 STDY TEMP 8 (AIR)=
14 QUEEN OF COQUITLAM HOOD POINT PC 10 E5 RPLD BARO 3009RS AT 6C
15 MID CHANNEL PC 12 SE15 MOD CHOP 1 FT SE SWL
```

ALASKAN MAREPS

```
03 57.7N 155.5W /NW65 / / / / / /CARIE LYN
03 55.9N 158.5W CY15 /NW25 /3 / / /42 /30.12/HERCULES
03 55.6N 157.5W C6 /NW25 /3 NW8 / /35 /1019/MANNA
03 59.6N 143.5W CY15 SW10 /1 /SE12 / /48 /996 /S. FOSS
03 57.1N 156.4W CY10 NW50 / / / /37 /30.17/N. DAWN
03 59.2N 151.7W W30 / / / / /45 /29.82/A. PACKER
03 57.1N 138.0W CY10 /E10 / / / /44 /29.50/STORMY SEA
03 58.1N 152.0W C12 /W25 /3 /ENE 5 /5.6/6.4 /1010 /M. FREEMAN
```

U.S. COASTAL REPORTS

```
SXUS8 KSEA 281457
ID   UXVSB     /WIND/WAVE/AIR/PRESS INS REMARKS STATION NAME
8S7             /    /    /   /         NO RPT  NEAH BAY
NIX PC10        /E08 /    /   /30.14             PACIFIC BEACH NF
96S             /SE05/    /   /                  NEW DUNGENESS
S38             /CALM/    /   /                  BURROWS ISLAND
53S             /S06 /    /   /                  POINT WILSON
S19             /    /    /   /         NO RPT  FRIDAY HRB ARPT
```

APPENDIX IV-2: Victoria/Vancouver Weatheradio Survey

Background

1. Weatheradio service was inaugurated in Canada on January 24th, 1977 when broadcasts began emanating from the Pacific Weather Centre (PWC) then located at the Vancouver Airport. A UHF link brought the signal over to Mount Tuam on Saltspring Island where the output was, and still is transmitted from the 602 metre level on a frequency of 162.4 megahertz. When the PWC moved from the airport to nearby Airport Square it became technically difficult to continue the operation from Vancouver. At that time the studio equipment was moved to the Victoria WO3 where the service has continued since June 29th, 1979. Although a brief survey was conducted during the early stages of the operation from Vancouver to establish the radiation pattern, no user survey on broadcast content had been conducted until now.

2. From May 16th until July 4th, 1983 a message was carried on the Weatheradio inviting listeners to call either the Victoria WO3 or the Vancouver WO4 with comments or suggestions for improving the service. Callers were asked a series of questions to determine their locality, the type of receiver used, the quality of reception (other than cable TV), the information normally obtained from the broadcast, and the purpose for which the information was required.

The Survey

3. A total of 323 questionnaires were completed, 91 from listeners in Victoria and 232 from Vancouver. The response was gratifying, and since it probably represents only a small percentage of the total listening audience (perhaps 10%), the service appears to be widely used and appreciated. Indeed most callers made positive comments about the service and statements such as "good as is" and "excellent service" appeared many times.

4. We were surprised to learn from Vancouver callers that the Weatheradio broadcast is being carried by Vancouver cable TV on channel 14, which is their weather page. Victoria cable TV had agreed to carry the signal at our request because high terraine between the transmitter and the city makes it difficult to obtain clear radio reception in downtown Victoria. The Vancouver cable company apparently followed suit of its own accord.

5. Judging by the responses, cable TV is by far the most important method of broadcast reception. 64% of all callers received their information from cable TV, but more so in Vancouver (71%) than in Victoria (47%). The fact that the audio and video signals are from different sources poses problems and several callers commented that since the two components are not synchronized, it is confusing at times.

6. Special weather radio receivers are not a popular item, only 13% of the callers indicated that they owned one. They appear to be more popular in Victoria however, as 27% of the callers admitted ownership as compared to only 7% for Vancouver. This is probably due to a higher percentage of boaters in Victoria, which would also explain 21% receiving the signal on marine radios in Victoria as compared to only 17% in Vancouver.

APPENDIX IV-2: Victoria/Vancouver Weatheradio Survey - continued

7. The tone alert, although a good selling feature for Weatheradio, does not appear to be widely used. Of the callers obtaining the broadcast from other than cable TV, only 7% had radios with a tone alert feature and only 3% indicated that they used the facility.

8. Quality of radio reception received high marks generally, with 81% rating reception as good, 20% fair and only 4% as poor. The difference in signal rating between Victoria and Vancouver was small with 85% of Victoria users rating the signal good compared with 78% in Vancouver.

9. Public forecasts are the most widely used portion of the broadcast with 72% of the callers indicating that they listen for that type of information, 61% use the marine forecasts, and the use of lighthouse reports was close behind at 46%. Least important are the cross Canada summaries, but a sizeable 35% indicated that they are interested in that information as well. Victoria preferences for marine information were slightly higher at 73% for marine forecasts and 64% for lighthouse reports as compared to 56% and 39% respectively for Vancouver. Again, this is probably due to the larger per capita boating community in Victoria.

User Comments

10. Some of the comments and suggestions were quite interesting. Of the 323 respondents, 176 or 55% made a positive comment about the service. Other comments in order of response frequency are as follows:

More frequent up-dating of lighthouse reports (19)

Remove signal from cable TV (7)

Slow down the reading of lighthouse reports (5)

Carry mountain forecasts longer into season change (4)

Interference (noise, taxi splash-over, background voices etc.) on signal (3)

Signal modulation too low (2)

Appeal too broad, make more technical (2)

Publicize the service more (2)

Too thorough (1)

More detail on cross Canada summary (1)

Broadcast marine information less frequently (1)

Use female voices for better clarity (1)

Provide phone number for public weather information (1)

APPENDIX IV-2: Victoria/Vancouver Weatheradio Survey - continued

Suggested Additions

11. Callers were asked what they would like to see broadcast in addition to what was now carried. Suggested additions in order of request frequency are as follows:

Tide information (18)

5 day outlook (15)

West Coast marine forecast and lighthouse reports (6)

European and international reports (6)

Aviation summary (5)

Winds in public forecasts (4)

Sunrise & sunset information (4)

Wave height information (3)

Swell forecasts (3)

Resort weather information (3)

Barometric pressure (3)

North Coast marine forecasts & lighthouse reports (2)

Oregon public forecasts (2)

Humidity information (2)

More detailed forecasts for Alberta (1)

Recommended Deletions

12. Respondents were also asked what they would like to see deleted from the current broadcast. Suggestions were as follows:

Cross Canada summary (26)

Non local B.C. information (1)

Marine forecasts and lighthouse reports (1)

APPENDIX IV-2: Victoria/Vancouver Weatheradio Survey - continued

Conclusions

13. One gratifying conclusion which was very evident from the survey is that the service is widely used and is much appreciated.

14. A second conclusion is that the cross Canada summary, although used, is not as important as some of the other elements of the broadcast and several callers complained about having to listen to a long disertation about weather in other parts of Canada when all they really wanted were the latest lighthouse reports.

15. Additions such as the 5 day outlook and the general aviation summary (TWB Summary) could be included without difficulty, but one would have to weigh the time penalty in the broadcast cycle against the percentage of users requiring that information.

16. West and North Coast marine forecasts and lighthouse reports could be added also but with a significant penalty in broadcast cycle time. The small number of requests for this information coupled with the fact that the broadcast pattern does not extend into these areas would indicate a low priority for the addition of this information.

17. Wave and swell forecasts are not available for broadcast at the present time, but the need can easily be demonstrated. On the other hand tide information is available from many sources including annual tables, daily news papers and local information offices. Carrying tide information on the broadcast would be both redundant and time consuming for the broadcast cycle because of the number of points for which data would have to be provided.

18. Requests for barometric pressure, humidity, sunrise & sunset times, resort weather, detailed Alberta forecasts and Oregon public forecasts, all have too little support to receive a very high priority. Sunrise and sunset times could be included as part of an avaition summary if desired.

Broadcast Changes

19. Two changes have been made to the broadcast since the survey ended. One was a request from NOAA in June to include lighthouse reports from the San Juan Islands, which was deferred until the survey was complete. The second was as a result of the comments from the survey which indicated that although the cross Canada summary was used, it was a source of frustration to those listening for a specific piece of information such as the forecast high temperature or the lighthouse winds. The cross Canada summary has now been set to play only every third broadcast cycle, which seems to be about the best compromise.

Other Changes Contemplated

20. Additional changes will be subject to Regional Headquarters approval, but two that we would recommend and which could be accommodated fairly easily are:

The addition of the 5 day outlook for southern B.C.

General aviation summary (TWB Summary) with the addition of sunrise & sunset times.

APPENDIX VI-1: Letter in "Pacific Yachting", January 1986 Concerning Anemometer Siting.

Atkinson reports questioned

I am writing to protest the inaccuracy and subsequent danger emanating from the given weather reports at Point Atkinson Light Station.

Since this is the nearest reporting station to Vancouver, naturally it is the one most mariners rely on when checking weather conditions before embarking on or continuing a trip on the waters around Vancouver. Also, the majority of mariners traverse the waters around Point Atkinson to reach their favorite cruising areas around Howe Sound and back again.

In my many years of boating I have often heard from friends that the weather reports from Point Atkinson do not relate to actual sea conditions around there but this has been shrugged off by an explanation such as time lapse between getting the report and putting it on tape. The case I experienced cannot be written off using this excuse, as on the night of October 6, 1985, I had cause to come around Point Atkinson to return to my home port at Fisherman's Cove. The weather report on Channel 21 for Point Atkinson for 2000 hours gave winds at 7 knots with a one-foot chop. I had the misfortune to be at Point Atkinson at 2005 hours on the night in question and, in actual fact, there was a 4-5ft sea running with winds approximately 35-40 knots. In fact, the wind was picking up the grit and sand off Seal Rocks and blowing it past my search light just inside the Howe Sound side of Point Atkinson. It was all I could do to stand on the bridge of my 34ft trawler with waves constantly breaking over the bow. It is frightening to think what may have happened had I been in a smaller vessel with no choice but to carry on around into Howe Sound.

At 2100 hrs. I had my vessel finally secured at Thunderbird Marina where I again listened carefully to Channel 21, and still the report for Point Atkinson at 2000 hrs. was given as a 7-knot wind with a one-foot chop. I then contacted Vancouver Radio and asked them to confirm this report, which they did, and questioned how it was arrived at. I was told the lighthouse-keeper phoned his report in for 2000 hrs. and the readings were taken "from the machines." I then informed Vancouver Radio of the actual sea conditions at that time and was told my complaint was the second one that evening since a previous complaint had been received from a deep-sea vessel earlier. Subsequently a notice was added on Channel 21 reflecting true sea conditions.

The following morning I contacted the Operations Supervisor of Vancouver Radio and asked him once more how the readings were taken at Point Atkinson. I was told they were taken from the machines which were on the leeward side of Point Atkinson and were sheltered by the trees and the headland. I informed them that since the wind in that location had to be blowing 15-20 knots which resulted in power outage in West Vancouver, that the machines were either inaccurate or hidden down a hole.

I also checked with B.C. Ferries in Horseshoe Bay to find the wind speeds they had experienced on the Sunday night and was told the last reading at 1905 hours was winds of Force 5 on the Beaufort Scale. Other mariners I have checked with reported winds of 18-20 mph at that time and increasing.

In conclusion, the point I must make is that the methods of weather reporting from Point Atkinson, whether by machine or in person, have to be changed before disaster strikes. Certainly before Expo when numerous visiting vessels will be in the Howe Sound and Vancouver area and unsuspecting crews must rely on our weather reporting, be it accurate or otherwise, to ensure the safety of their vessels and passengers.

W. Paterson, Skipper,
Coast Guard Auxiliary Vessel
Highland Dancer
c.c. Rt. Hon. Mazankowski,
Minister of Transport
Chuck Cook, M.P.
Jack Davis, M.P.

APPENDIX VI-2: UFAWU Fact Sheet on Lighthouses

FACT Ever since the first lightkeeper took up his duties at Fisgard in 1859, not a single life has been lost, nor a single vessel wrecked due to a lightkeeper's negligence. The system has been fail-safe for 120 years.

FACT The lighthouse automation program was intended to deny overtime to lightkeepers who still keep watch 12 hours a day, all year long.

FACT Cost benefits were calculated upon deliberately distorted figures based upon doubling the number of keepers on the Coast to avoid paying overtime. Lightkeepers have never asked for overtime, and have dissented from their union when the demand was made on their behalf.

FACT The U.S. Coast Guard rejected the Sperry Rand Videograph as the control mechanism in their lighthouse automation program. The Videograph has been installed on 246 lighthouses for this purpose at a cost of $1.5 million.

FACT The Event Data Recorder, designed to monitor faults and performance on unmanned lightstations was removed from service in June, 1979 "due to continuing problems".

FACT In five years from 1976 to 1980, nine man years of technician time was required to service lightstations where keepers were ordered not to make repairs.

FACT In four years, automation equipment failed 2,091 times, shutting stations down for 221 days from Race Rocks to Cape Scott.

FACT From 1979 to 1982 there were 872 incidents of lightkeepers' assistance to mariners in the Victoria District alone, many of which might have resulted in death or injury if these stations had been "manned" by Videographs.

FACT Paul LeBlond, U.B.C. oceanographer who headed a commission investigating loss of life due to inadequate weather reporting of the West Coast in 1984, described lightkeepers "as the only monitors of sea states and weather conditions on the West Coast of Vancouver Island". "It's fine to talk of automation," he allowed, "but there should be some method of reporting on weather conditions. The lightkeepers are the only source of information on local weather conditions available to mariners. Their contribution is invaluable."

FACT If men leave the lights, other men will die.

STANDING COMMITTEE ON NAVIGATIONAL AIDS AND SAFETY

April 16, 1986 UNITED FISHERMEN AND ALLIED WORKERS' UNION

APPENDIX VI-3: Areas Experiencing Poor Reception of VHF Weather Broadcasts.

The following is a list of some areas experiencing poor reception or interference. These locations were either given to the committee at public meetings or submitted with the returned questionnaires. Continued upgrading of the peripheral broadcast sites may have already rectified some of these problems.

Location	Nature of Problem
Bella Bella to Seaforth Channel	Poor reception
Bella Coola, Dean and Burke Channel	Dead area
Naden Harbour	Echo effect
Parksville	Dead area
Grenville Channel	Dead area
East end of Gardner Canal	Dead area
South of Brooks Peninsula	Dead area
Bonilla Island area	Dead area
West coast Charlottes	Dead area
Skincuttle Inlet northwards	Dead area
Comox to Cape Mudge	Radio broadcast interference from Neah Bay, Wash.

APPENDIX VI-4: Letter Concerning an Unannounced Change in Service.

Box 351
Tofino, B.C.
V0R 2Z0

May 5, 1986
Tofino, B.C.

[To Working Group]

Re: The recent dropping of the excellent San Francisco High Seas Weather from the Tofino Coast Guard Radio (VHF CH 21 BRAVO) broadcast

I, and many people I know have always used this information to formulate our own forecasts -- so as to have a clear picture of what is happening out at sea for days ahead. If more mariners did this -- there would be a lot fewer incidents of boats being caught by sudden (?) storms along the west coast.

Perhaps, some Safety Notice in a leaflet form could help to inform mariners of the value of this data -- and how to use it. This information is far too valuable to drop altogether -- maybe if it were run with the Notices to Shipping 3 times a day it would be more fair to all mariners concerned.

Thank you

R.A. Jones