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ENVIRONMENT CANADA  
ENVIRONMENTAL PROTECTION SERVICE  
PACIFIC REGION

SHELLFISH GROWING WATER CONTROL PROGRAM  
ANNUAL REVIEW 1980 - 1981  
Okeover Inlet and Surrounding Area, Desolation  
Sound, Quadra Island, Cortes Island, Redonda  
Island, Texada Island, Lund Harbour and Scuttle  
Bay to Powell River

81-2

Regional Program Report No. 81 - 2

by

Bruce H. Kay

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## ABSTRACT

Between April 1, 1980 and March 31, 1981 the Environmental Protection Service conducted bacteriological surveys of bivalve molluscan shellfish growing waters in the following areas: Okeover Inlet, Lancelot Inlet, Malaspina Inlet, Theodosia Inlet, Lund, Scuttle Bay to Powell River, Gillies Bay (Texada Island), portions of Desolation Sound, Quadra Island, Cortes Island and West Redonda Island. The surveys were conducted to classify the shellfish growing waters as to their acceptability for the purpose of shellfish harvesting. Sanitary surveys were conducted concurrent with the bacteriological studies to identify and evaluate the sources of fecal pollution to the marine waters.

The data collected indicated numerous areas were contaminated with fecal pollution beyond acceptable federal water quality standards. The sources of contamination to the study areas were varied and included agricultural runoff, overboard discharges of raw sewage from pleasure vessels, discharges from sewage treatment systems and non-point sewage sources.

As a result of these surveys, 13 new closures and 5 closure amendments were added to the Pacific Shellfish Regulations Schedule I (Contaminated Areas).

## RÉSUMÉ

Entre le 1er avril 1980 et le 31 mars 1981, le service de la protection de l'environnement a effectué des études bactériologiques des eaux où croissent des mollusques bivalves dans les zones suivantes: Okeover Inlet, Lancelot Inlet, Malaspina Inlet, Theodosia Inlet, Lund, Scuttle Bay à Powell River, Gillies Bay (île Texada), certaines parties du détroit Desolation, l'île Quadra, l'île Cortes et l'île Redonda. Ces études ont eu pour objet de classer les eaux où croissent les mollusques, selon qu'elles sont ou non propres à leur pêche. Des études sanitaires ont été effectuées en même temps que les études bactériologiques pour identifier et évaluer les formes de pollution des eaux de la mer par des matières fécales.

Les résultats obtenus par les analyses montrent que de nombreuses zones sont contaminées par une pollution d'origine fécale au-delà des normes de qualité de l'eau fixées par les organismes fédéraux. Les sources de contamination des zones étudiées sont variées: elles comprennent les eaux de ruissellement, le déversement de matières fécales à partir des bateaux de plaisance, le produit des systèmes de traitement des eaux d'égout et la pollution provenant de sources impossibles à localiser.

À la suite de ces analyses, 13 nouvelles zones interdites et 5 modificatifs concernant des zones interdites ont été ajoutés aux Règlements relatifs à la pêche des mollusques, partie 1 (zones contaminées).

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LIST OF ABBREVIATIONS

|                     |                                  |
|---------------------|----------------------------------|
| EPS                 | Environmental Protection Service |
| FC                  | Fecal Coliform                   |
| FS                  | Fecal Streptococci               |
| G                   | "greater than"                   |
| L                   | "less than"                      |
| m                   | metres                           |
| ml                  | millilitres                      |
| m <sup>3</sup> /sec | cubic metres per second          |
| MF                  | Membrane Filtration              |
| MPN                 | Most Probable Number             |
| ppt                 | Parts per thousand               |
| STP                 | Sewage Treatment Plant           |
| $\bar{x}$           | arithmetic mean                  |

## CONCLUSIONS

1. Bivalve molluscan shellfish at the head of Okeover Inlet (portion of oyster lease L.6454) are subject to fecal contamination from a stream entering at this location, although the contamination would be restricted to those shellfish in close proximity to the stream bed, particularly at low tide. The source(s) of contamination was not identified; however, fecal coliform levels in the growing water were elevated following a period of heavy rain indicating contaminated runoff to be the probable cause.
2. Process water discharged by the Sliammon Seafoods Plant did not have a measurable affect on marine water quality in the nearshore areas or by the sink float. However, the process water was intermittently contaminated with low levels of fecal coliforms and the poor location of the outfall pipe could result in occasional receiving water contamination in the vicinity of the sink float. Consideration should be given to extending the outfall or relocating the sink float if the float is to be used.
3. Bivalve molluscan shellfish at the head of Trevenen Bay (oyster lease L.2855) may be subject to contamination from goats having access to the beach area. Although marine water quality results were acceptable, high fecal levels were observed in a sample of oysters taken from this location. Access to the beach area by farm animals should not be permitted.
4. The growing waters at the head of Thors Cove (oyster lease L.2313) were contaminated with fecal pollution to the extent that consumption of bivalve molluscan shellfish harvested from this area may pose a health hazard. The source of contamination was not ascertained.

5. The growing waters at the head of Theodosia Inlet (oyster lease L.7116 and L.7107) were contaminated with fecal pollution to the extent that consumption of bivalve molluscan shellfish harvested from this area may pose a health hazard. The Theodosia River and other freshwater inputs at the head of the inlet are implicated as the source of contamination.
6. The waters in Lund Harbour were generally of acceptable bacteriological quality for shellfish harvesting, except in the immediate vicinity of the government wharf. However, the numerous wharves in the area, the heavy boating traffic and the existence of direct and treated sewage discharges to the nearshore zone preclude this area from shellfish harvesting.
7. The intertidal zone from, but not including Scuttle Bay, southeast to Gibson's Beach (north of Powell River) is contaminated with fecal pollution to the extent that consumption of bivalve molluscan shellfish harvested from this area may pose a health hazard. The discharge of sewage from the Sliammon Indian Reservation sewage treatment plant is the probable source of contamination. (The Scuttle Bay area 15-1 closure remains in effect due to local sources.)
8. The discharge of chlorinated sewage effluent from the Wildwood Heights sewage lagoon did not result in measurable contamination of the receiving waters. Localized pollution may occur near the mouth of the unnamed creek receiving the effluent due to upstream contamination.
9. The intertidal zone at the head of Gillies Bay, Texada Island, is subject to fecal pollution entering the bay via Cranby Creek. This creek receives effluent from a sewage lagoon and is also contaminated by general drainage from the surrounding community. During high rainfall, the impact of Cranby Creek and numerous

other stormwater discharges can contaminate the intertidal zone at the head of the bay to the extent that consumption of bivalve molluscan shellfish from this area may pose a health hazard.

- 10 Numerous summer anchorage areas were subject to intermittent fecal contamination due to overboard discharges of raw sewage from pleasure vessels. Not all of the anchorage areas surveyed exceeded shellfish growing water quality standards, primarily due to difficulties in the detection of boating wastes. However the data collected was sufficient to indicate that consumption of bivalve molluscan shellfish harvested from anchorage areas may pose a health hazard during the boating season. The areas of specific concern are Prideaux Haven, Tenedos Bay, Grace Harbour, Allies Island (commercial oyster lease L.3901 and L.297), Roscoe Bay, Squirrel Cove, Cortes Bay, Hanson Bay, Von Donop Inlet, and Drew Harbour.
- 11 The waters at the head of Refuge Cove, West Redonda Island, are subject to fecal contamination to the extent that consumption of bivalve molluscan shellfish harvested from this area may pose a health hazard. The sources of contamination include raw discharges from dwellings along the shore and discharges from boats moored at the marina. The present shellfish closure in this area is adequate to safeguard the shellfish consumer. The commercial oyster lease (L.3569) located in the outer portion of Refuge Cove was not subject to fecal pollution from the identified sources.
- 12 The waters along the east coast of Cortes Island, from the Squirrel Cove dock to Mary Point including commercial oyster lease L.1512, met the approved shellfish growing water standard.
- 13 The waters of Gorge Harbour, Cortes Island, including commercial oyster leases L.473, L.461, L.295, L.457 and L.1571, met the approved shellfish growing water standard. Portions of the

harbour in the vicinity of the Gorgeview Marina may be subject to intermittent contamination resulting from overboard discharges of raw sewage. The existing shellfish closure is considered adequate to protect the shellfish consumer.

- 14 The waters of Whaletown Bay, Cortes Island including the commercial oyster lease (L.458) located near the head of the bay met the approved shellfish growing water standard.
- 15 The waters of Coulter Bay, Carrington Bay and Quartz Bay on Cortes Island, and Evans Bay and Burdwood Bay on Read Island met the approved shellfish growing water standard.

## SCHEDULE I CLOSURES

As a result of the studies described herein, the following amendments to Schedule I (Contaminated Areas) of the Pacific Shellfish Regulations have been instituted.

1. Contaminated Area 13-2 is amended as follows: Area 13-2. The waters and tidal foreshore of Manson's Landing, Cortes Island, Area 13, lying within 900 metres of the government dock, excluding Manson Lagoon, except that shellfish may be taken from September 15 to April 30 each year.
2. Contaminated Area 13-3 is revoked as it is already under a general Schedule I wharf closure (Item 1, Schedule I).
3. Contaminated Area 13-6 is revoked and replaced with the following: Area 13-6. The waters and tidal foreshore of Drew Harbour, Quardra Island, Area 13, lying inside a line drawn from the northernmost tip of Rebecca Spit across the entrance of Drew Harbour to its western headland, except that shellfish may be taken from September 15 to April 30 each year.
4. Area 13-7 is amended as follows: Area 13-7. That portion of the tidal foreshore of Gorge Harbour, Cortes Island, Area 13, lying 300 metres west of the Gorgeview Marina wharf and 300 metres east of the government wharf, except that shellfish may be taken from September 15 to April 30 each year, outside of the standard wharf closure boundaries.
5. Area 16-6 is amended as follows: The tidal foreshore of Gillies Bay, Texada Island, Area 16, lying within an 800 m radius of the mouth of Cranby Creek entering at the head of Gillies Bay.

The following additions to Schedule I of the Pacific Shellfish Regulations have been instituted.

1. Area 15-3. The intertidal zone at the head of Theodosia Inlet, Area 15, lying inside a line drawn from the Percy Logging Company dock on the south side of the Inlet, to the small peninsula directly across on the north side of the inlet.
2. Area 15-4. The intertidal zone at the head of Thors Cove, Lancelot Inlet, Area 15.
3. Area 15-5. The intertidal zone lying within a 200 m radius of the unnamed creek entering at the head of Okeover Inlet, Area 15.
4. Area 15-6. The waters and tidal foreshore of Lund Harbour, Area 15, lying inside a line drawn from the peninsula at the northern end of the harbour entrance to the point of land at the southern entrance to the government wharf.
5. Area 15-7. The waters and tidal foreshore of the area known as Prideaux Haven, including Melanie Cove and Laura Cove, Area 15, bounded on the west by a line drawn to the narrowest point between Eveleigh Island and the mainland coast and on the north by a line drawn from Lucy Point on Eveleigh Island to the westernmost tip of Scobell Island and thence from the easternmost tip of Scobell Island to Copplestone Point, except that shellfish may be taken from September 15 to April 30 each year.
6. Area 15-8. The waters and tidal foreshore of Tenedos Bay, Area 15, lying inside a line drawn from the eastern tip of Bold Head northeast to the southern headland of the easternmost bay of Tenedos Bay, except that shellfish may be taken from September 15 to April 30 each year.



7. Area 15-9. The intertidal zone lying between Allies Island and West Redonda Island, Area 15, except that shellfish may be taken from September 15 to April 30 each year.
8. Area 15-10. The waters and tidal foreshore of Roscoe Bay, West Redonda Island, Area 15, except that shellfish may be taken from September 15 to April 30 each year.
9. Area 15-11. The waters and tidal foreshore of Squirrel Cove, Cortes Island, Area 15, except that shellfish may be taken from September 15 to April 30 each year.
10. Area 15-12. The waters and tidal foreshore of Cortes Bay, Cortes Island, Area 15, lying inside a line drawn at the entrance to the bay, except that shellfish may be taken from September 15 to April 30 each year.
11. Area 15-13. The waters and tidal foreshore of Von Donop Inlet, Cortes Island, Area 15, except that shellfish may be taken from September 15 to April 30 each year.
12. Area 15-14. The waters and tidal foreshore of Refuge Cove, West Redonda Island, Area 15, lying inside a line drawn across the head of the cove, from a point on the north foreshore 400 metres from the centre of the bulk oil storage tank situated near the head of the cove, to a point on the south foreshore 275 metres from the centre of the bulk oil storage tank. (Note: This closure, formerly Area 13-6, was altered to conform with Area designations.)
13. Area 15-15. The waters and tidal foreshore of Grace Harbour, Area 15, lying inside a line drawn from Moss Point to Scott Point, except that shellfish may be taken from September 15 to April 30 each year.

With respect to amendments 13-2, 13-6 and 13-7, and additions 15-7, 15-8, 15-9, 15-10, 15-11, 15-12, 15-13, 15-14 and 15-15, the major cause of the observed or potential sewage contamination was the overboard discharge of raw sewage from pleasure vessels. It is recognized that the contamination of shellfish beds in anchorage area is intermittent and depends upon numerous factors such as:

- (i) the number of boats present and their proximity to shellfish beds.
- (ii) the volume of water movement in the anchorage area.
- (iii) the sewage treatment/disposal systems utilized by each vessel.

Therefore at any given time these areas may or may not meet shellfish growing water standards during the summer. Further, during those periods when the water is free of detectable sewage pollution, shellfish tissue may remain contaminated. Therefore the aforementioned restrictions on shellfish harvesting have been imposed during the heavy boating season from May 1 to September 14 each year.

The shellfish closures are shown in Figures 1 and 2.

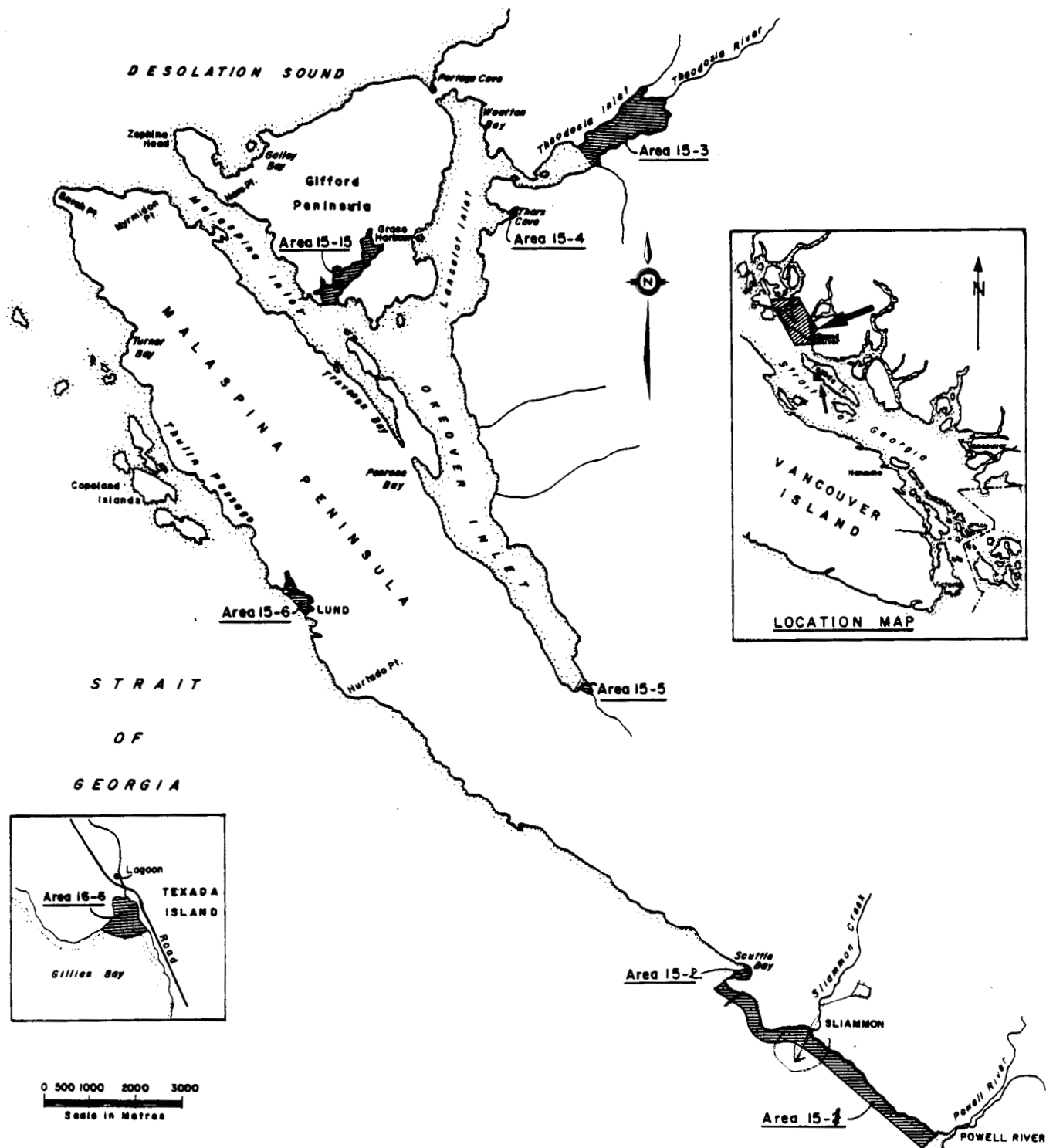
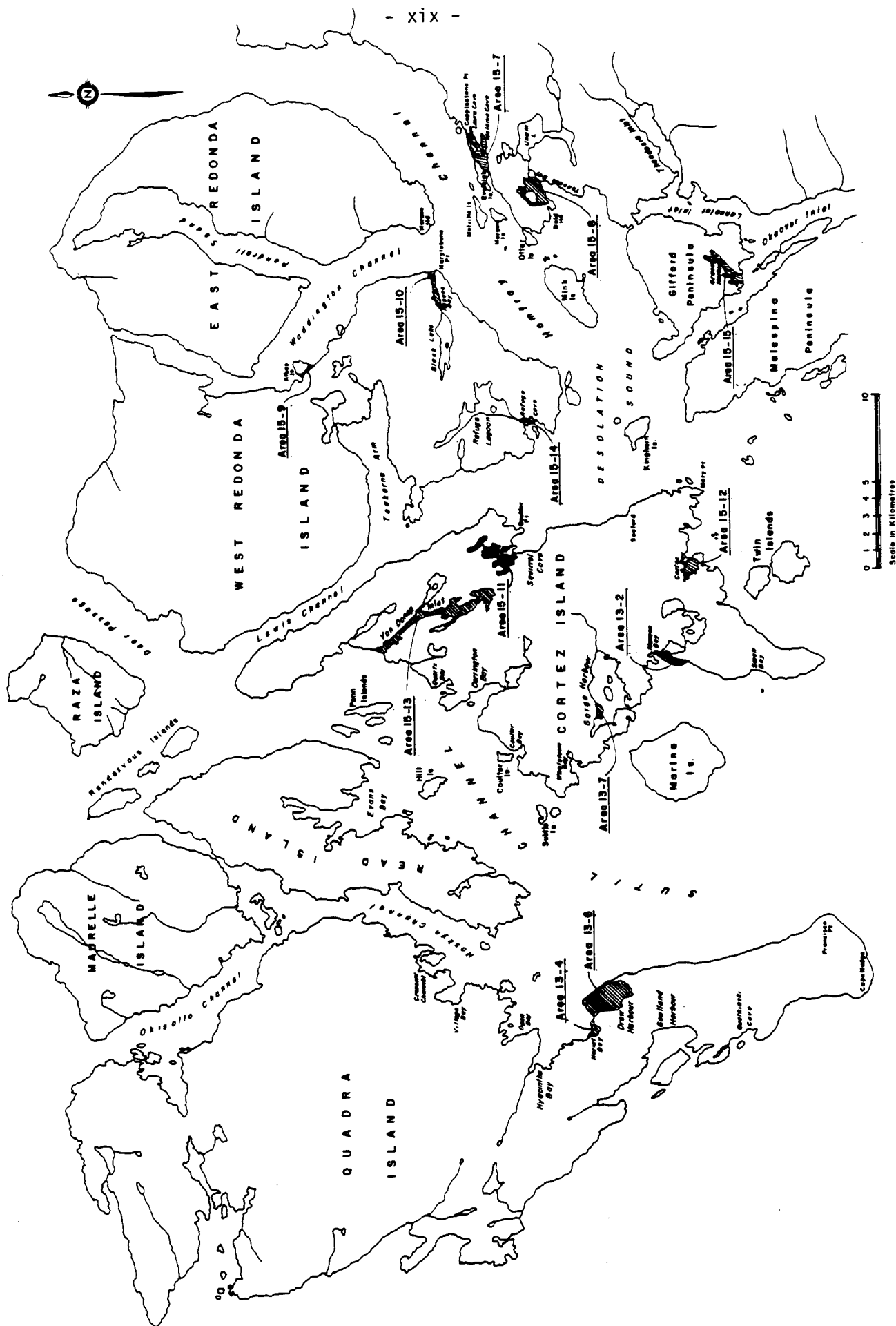


FIGURE 1 SCHEDULE 1 CLOSURES IN STUDY AREA I



**FIGURE 2 SCHEDULE 1 CLOSURES IN STUDY AREA II**

## 1 INTRODUCTION

Under the requirements of the Canadian Shellfish Safety Program the Environmental Protection Service regularly conducts water quality surveys to assess the bacteriological quality of shellfish harvesting areas. During the 1980-1981 program year (April 1, 1980 to March 31, 1981) three such surveys were conducted by EPS in the following areas:

- (a) Area I: Okeover Inlet, Malaspina Inlet, Lancelot Inlet, Theodosia Inlet, Lund Harbour, Scuttle Bay to Powell River and Gillies Bay, Texada Island.
- (b) Area II: Desolation Sound, West Redonda Island, Cortes Island and Quadra Island.
- (c) Area III: Jervis Inlet, Nelson Island, Churchill Bay and Halfmoon Bay.

Data from the first two surveys is presented in this report, while data for the third survey will be presented in a future report pending additional data gathering in August 1981. The location of survey areas I and II is shown in Figure 3.

Previous shellfish surveys for the study areas had been carried out by EPS in 1973(1) and 1975(2) when selected areas of Quadra, Cortes and West Redonda Islands and the mainland coast north of Powell River were sampled. However, no growing water surveys had been conducted in the Desolation Sound, Okeover Inlet, Lund Harbour or Gillies Bay areas. In addition, changes in sewage treatment and disposal practices had occurred in the previously surveyed areas. Consequently, shellfish surveys were planned in these areas during the 1980-1981 program year with the following objectives:

1. Assess the shellfish growing water quality of previously unsurveyed commercial oyster leases.

2. Assess the impact on water quality of the Sliammon Seafoods Plant process effluent. Federal Fish Inspection reports had indicated contamination of unknown origin was rendering sink float oysters in the vicinity of the effluent discharge unfit for consumption.
3. Assess the impact of a sewage treatment plant discharge, residential raw sewage discharges and overboard raw sewage discharges on the water quality in and around Lund Harbour
4. Re-assess shellfish growing water quality between Scuttle Bay and Powell River. Since the 1975 EPS survey, the outfall serving the Sliammon Indian Reservation STP had been lengthened and chlorination facilities had been added to the Wildwood Heights sewage lagoon.
5. Assess the impact of a sewage lagoon discharge on the water quality of Gillies Bay, Texada Island. High bacteria levels in shellfish tissue samples taken from Gillies Bay had been obtained by the Fish Inspection Branch. The area was subsequently closed to shellfish harvesting pending a sanitary and bacteriological investigation.
6. Assess the impact of overboard discharges of raw sewage from pleasure vessels in major anchorage areas within the Desolation Sound and Quadra, Cortes, W. Redonda Islands areas. Unexplained fecal contamination of shellfish samples harvested from these areas had been recorded by the Fish Inspection Branch.
7. Assess the adequacy of other Schedule I shellfish closures in the study areas.

Bacteriological and sanitary surveys of Area I were conducted in May and November of 1980, and Area II surveys were conducted in July 1980 by staff of the Environmental Protection Service.

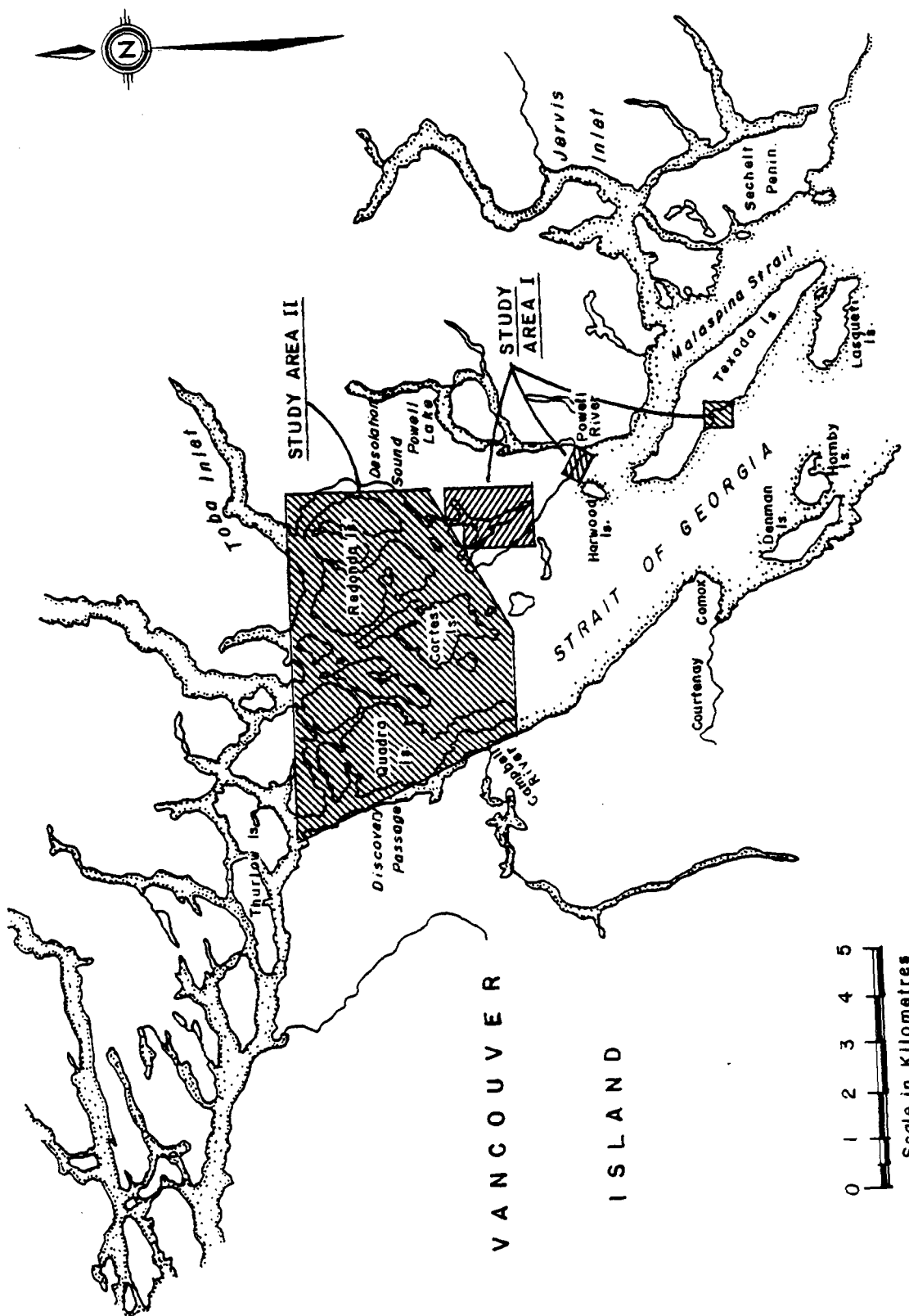


FIGURE 3 LOCATION MAP OF STUDY AREAS

## 2           SAMPLE STATION LOCATIONS

Marine sample stations were located over commercial oyster leases or in commercially harvested clam and oyster areas. These areas were identified by the provincial Marine Resources Branch and the federal Department of Fisheries and Oceans. Sample stations were also located in shellfish areas subject to fecal contamination from vessel discharges, sewage effluents and other sources of fecal contamination.

Freshwater and effluent sample stations were established on all major inputs to the marine sampling areas.

The location of commercial oyster leases in the study areas are shown in Figures 4 and 5 and sample station locations are shown in Appendix I (Area I) and Appendix III (Area II). Detailed descriptions of the marine and freshwater sample stations are presented in Appendix II, Tables 1 and 2 (Area I) and Appendix IV, Tables 1 and 2 (Area II).



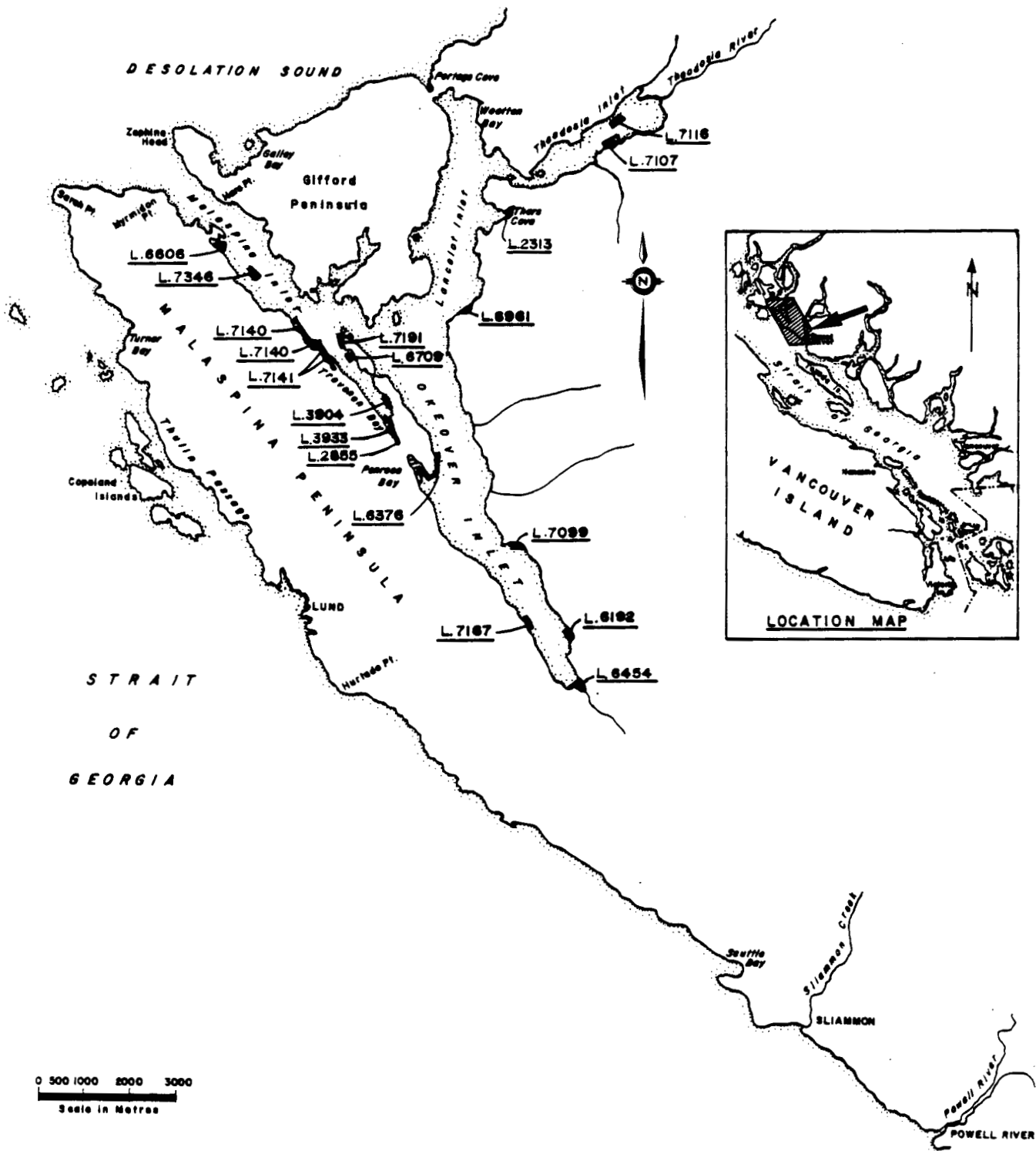


FIGURE 4 LOCATION OF REGISTERED OYSTER LEASES IN STUDY AREA I

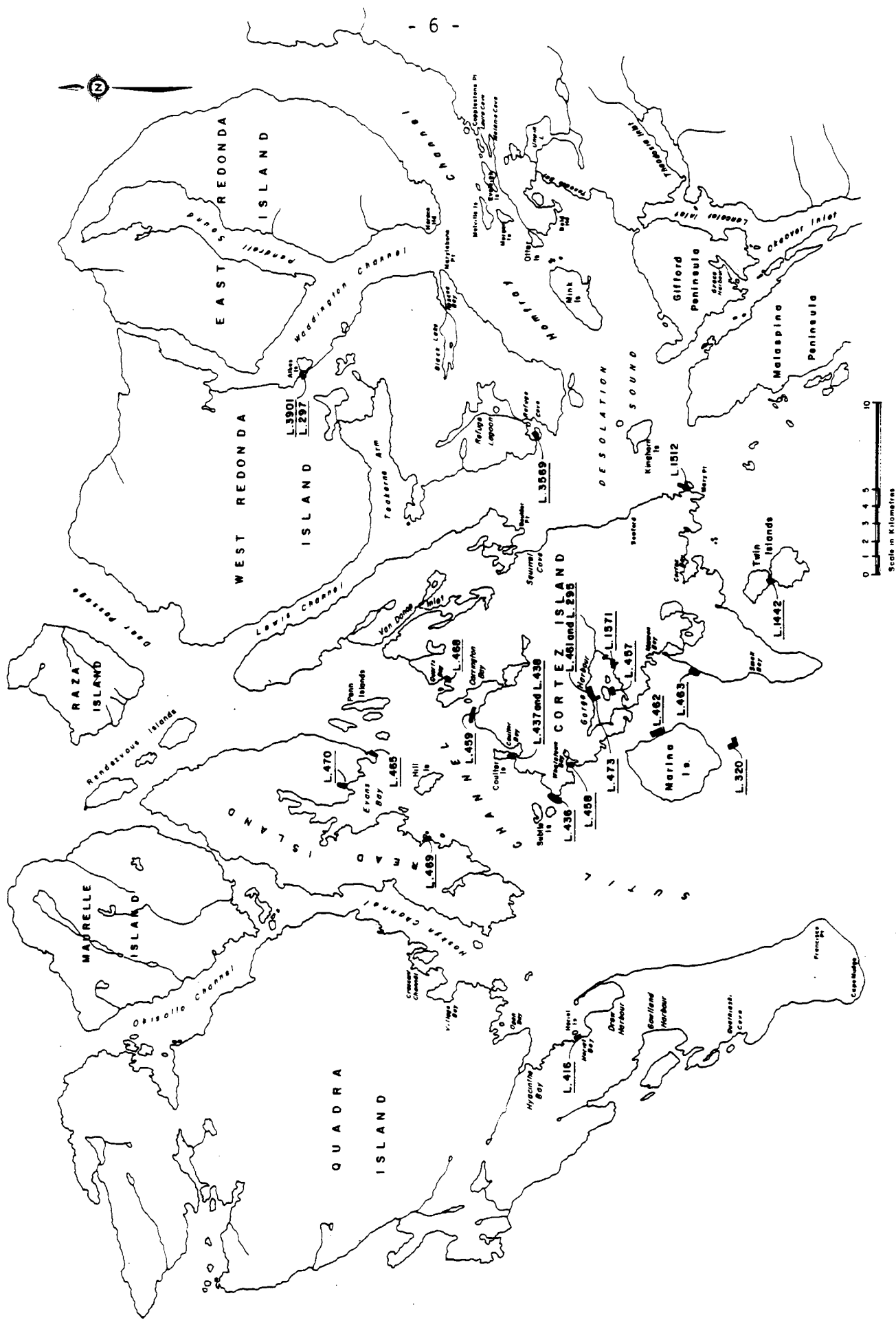


FIGURE 5 LOCATION OF REGISTERED OYSTER LEASES IN STUDY AREA II

### 3 FIELD PROCEDURES AND METHODS

#### 3.1 Bacteriological Sampling and Analyses

All marine water samples for bacteriological analyses were collected in sterile wide-mouth glass bottles, approximately 15-30 cm below the water surface. The water depth at collection points over shellfish beds did not exceed 1.5 m. Samples were stored in coolers at temperatures not exceeding 10°C until processed. All analyses were conducted on site in the EPS mobile microbiology laboratory, generally within five hours of collection.

The fecal coliform MPN per 100 ml was determined using the multiple tube fermentation technique (three decimal dilutions of five tubes each) as described in Part 908C of the 14th edition of Standard Methods for the Examination of Water and Wastewater (3). The culture medium used was the A-1 medium as described by Andrews and Presnell (4) and further evaluated by Kay (5). A-1 medium was supplied by Gibco Diagnostics.

All freshwater samples were collected in sterile wide mouth glass bottles and were tested for fecal coliform and fecal streptococci using the membrane filtration method described in Part 909 of the 14th edition of Standard Methods. Media used were mFC and KF streptococcus Agar obtained from Difco laboratories, Detroit, for the fecal coliform and fecal streptococci tests respectively. The membrane filters used were Millipore HC, obtained from Millipore Limited, Mississauga, Ontario.

Biochemical confirmation of fecal coliform isolates obtained from both the MPN and MF procedures was performed on a percentage of all samples collected. These results are presented in Appendix V.

### 3.2 Physical Testing Equipment and Analysis

Salinity measurements were made on all marine samples using an American Optical Refractometer (Catalogue No. 10413) which has a resolution to the nearest 0.5 ppt. Salinity data is summarized in Appendix II, Table 7 and Appendix IV, Table 7. Tide and rainfall data are found in Appendix I, Figures 4, 5 and 6 for Area I and Appendix III, Figures 3 and 4 for Area II respectively.

#### 4 RESULTS AND DISCUSSIONS

Canadian bivalve molluscan shellfish growing waters are classified according to the following bacteriological criterion:

In order that an area be considered bacteriologically safe for the harvesting of shellfish, the fecal coliform median MPN of the water must not exceed 14 per 100 ml, and not more than 10% of the samples ordinarily exceed an MPN of 43 per 100 ml, in those portions of the area most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions.\*

Shellfish growing areas can also be closed on the basis of known or potential pollution sources which may or may not be reflected in the bacteriological water quality results. In this regard, all major freshwater and effluent inputs to the study areas were sampled and both fecal coliform and fecal streptococci measurements were performed on these samples. The fecal coliform:fecal streptococci ratio (FC:FS) of each input was calculated where both mean values exceeded 100/100 ml in an attempt to determine the origin of fecal contamination observed. Geldreich and Kenner (6) have reported higher FS than FC levels in all warm-blooded animal feces except for humans. The FC:FS ratio in humans was 4.4 whereas in other warm-blooded animals the ratio was less than 0.7. Care must be taken in the interpretation of FC:FS data and in this report it is presented as supporting data for sanitary investigations. The calculated FC:FS ratios are presented in Table 5 of Appendix II.

Shellfish closures imposed on the basis of these factors resulted in 58.8 km of coastline or 1136.1 hectares of shellfish growing areas being classified as unacceptable in the two survey areas. The rationale behind the imposition of these closures is presented in subsequent sections of the text. For ease of discussion, results for the two survey areas (Area I and Area II) are presented separately.

\*This report expresses the 10 per cent limit in terms of a 90 percentile which must not exceed 43/100 ml.

#### 4.1 Area I

A total of 532 samples were collected from 87 marine sample stations in Area I. Unacceptable fecal coliform levels were found at sample stations located in Thors Cove, Theodosia Inlet, Lund Harbour, Scuttle Bay to Powell River and Gillies Bay. Summarized and daily bacteriological results for marine sample stations are presented in Tables 3 and 4 of Appendix II. Freshwater and effluent sample results are presented in Tables 5 and 6 of Appendix II.

Study Area I was sampled from May 21 to June 5 and from November 17-25, 1980 to assess the shellfish growing water quality under various rainfall conditions. Between May 19 and June 6 1980, 43.7 mm of rainfall were recorded for the study area, while 51.8 mm was recorded between November 17 and 25. The rainfall data tabulated below indicates total rainfall observed during May was 32% greater than the 40 year mean

| <u>Month</u> | <u>1980 Total (mm)</u> | <u>Historical mean (mm)</u> |
|--------------|------------------------|-----------------------------|
| May          | 63.7                   | 48 (43 years)               |
| June         | 84.3                   | 85.5 (45 years)             |
| November     | 265.3                  | 138.7 (40 years)            |

(Information obtained from Atmospheric Environment Service,  
Environment Canada)

and rainfall recorded during November was 91% greater than the 40 year mean. The water quality data collected is therefore presumed to reflect conditions that would occur under pollution-causing conditions i.e. increased runoff containing fecal material. The observed rainfall effects are discussed separately in the following sections.

##### 4.1.1 Okeover Inlet (Marine Sample Stations 1-21)

Marine sample stations 1-21 were sampled between May 20 and June 6, 1980 and stations 1, 2, 3, 6, 7, 8 and 9 were resampled between November 17 and 21, 1980. The latter sampling was conducted to assess the impact of the Sliammon Seafoods process effluent on the surrounding

marine water quality and to re-assess the water quality at the head of Okeover Inlet during a high rainfall period. Data for both the May and November sampling are included in the calculation of the median and 90 percentile levels for sample stations 1, 2, 3, 6, 7, 8 and 9.

All marine sample stations in Okeover Inlet met the shellfish growing water standard, although stations 1, 2, and 3 demonstrated variable water quality, particularly during the November sampling. Elevated fecal coliform values were recorded at these stations on November 21 and the stream entering at the head of the inlet (S2) was implicated as the source of contamination. The mean fecal coliform value for S2 was 73/100 ml, and results did not vary greatly between the May and November sampling. However increased flows in S2 during high rainfall periods intermittently contaminated the immediate shellfish growing waters (L.6454) located at the mouth of the creek.

Localized contamination of the foreshore may also occur at the mouth of stream S5 ( $\bar{x}$  FC = 71/100 ml) and slight contamination was noted at Station 11, presumably due to this source. Seepage from the septic tank - absorption field systems serving the 2 or 3 houses adjacent to the stream may be the source.

Sample stations 19 and 20 in Penrose Bay are subject to intermittent contamination apparently resulting from rain-induced runoff. Both these stations had high fecal coliform levels on May 27, coincident with a heavy rainfall and ebb tide.

Marine sample stations 6-9 were located in the vicinity of the Sliammon Seafoods processing plant and all met the approved shellfish growing water standard during both the May and November sampling periods indicating process effluent from the plant was not influencing the water quality.

During November, in-plant samples were taken of the raw water supply, treated water supply, the final process effluent (E01) and the bubbler wash water at the Sliammon Seafoods Plant. The mean fecal coliform level of the discharged effluent was 16/100 ml; however,

levels of 100/100 ml and 40/100 ml were observed, suggesting that the process water may become contaminated on occasion. Fecal streptococci levels were high in E01 ( $\bar{x}$  FS = 877/100 ml) although these levels are of doubtful sanitary significance. Only oysters were being processed during the study.

Both the raw and treated water supplies were negative for fecal coliforms and a single sample of the morning washdown taken on November 20 was also negative. The bubbler wash water had low fecal coliform levels ( $\bar{x}$  FC = 110/100 ml) and slightly higher fecal streptococci levels ( $\bar{x}$  FS = 52/100 ml).

#### 4.1.2 Malaspina Inlet (Marine Stations 22-31)

All marine stations in Malaspina Inlet were of acceptable shellfish growing water quality, although shellfish at the head of Trevenen Bay (L.2855) may be subject to intermittent contamination from goats having access to the beach. Shellstock samples collected at this location exhibited fecal coliform levels of 1700/100g and 80/100g on two separate occasions indicating a potential pollution problem.

Two sample stations were located at the head of Grace Harbour and an additional 2 stations were sampled during August 1980. This data is discussed in section 4.2.4.

#### 4.1.3 Lancelot Inlet (Marine Stations 32-35)

Samples taken in Thors Cove (Stations 34 and 35) did not meet the approved growing water standard. The source of contamination of these station was not ascertained and did not appear to be correlated with rainfall or tidal conditions. A small creek entering the cove was sampled once, giving a fecal coliform result of 1/100 ml.



4.1.4 Theodosia Inlet (Marine Stations 36-42)

Samples (40, 41, 42) in the intertidal zone at the head of Theodosia Inlet did not meet the approved shellfish growing water standard. Contamination was believed to originate from the Theodosia River and other streams at the head of the Inlet where fecal coliform levels ranging up to 27/100 ml were recorded. Other marine sample stations (37-39) located approximately 200 m west of stations 40-42 were of acceptable quality suggesting the river exerts a limited influence on water quality at the head of the inlet. Notwithstanding this, salinity values at all stations (37-42) were very similar indicating bacterial levels decrease due to factors other than dilution as one moves further from the estuary. Contamination at these stations was noted during the ebb and low slack periods of the tide, but not on the flood, further implicating fresh water inputs at the head of the Inlet. A farm located approximately 600 meters up the Theodosia river from high water, on the north side of the valley, has several head of cattle and some horses which apparently have access to the streams. The farm is the only known uplands habitation in the vicinity. Samples taken at the mouth of two creeks flowing through the Percy Logging Company camp (S9, S10) had mean FC levels of 11/100 ml and 13/100 ml indicating acceptable performance of the septic tank-absorption field system, and verifying that these inputs were not the cause of high counts at marine stations 40, 41 and 42. Two commercial oyster leases are located at the head of Theodosia Inlet (L.7116 and L.7107).

4.1.5 Lund Harbour (Marine stations 43-54)

Marine sample stations in Lund Harbour were all of acceptable growing water quality with the exception of station 51, located inside the government wharf breakwater. Contamination at this stations was due to a contaminated creek (S11 which had a mean FC of 206/100 ml) entering the east end of the bay, at least four direct discharges from houses located

on the beach, and moored boat discharges. The effluent discharged from a package treatment plant and ocean outfall serving the Breakwater Inn and several residences did not appear to influence water quality at the sampling stations.

#### 4.1.6 Scuttle Bay to Powell River (Marine stations 55-71)

Two sample stations (55, 56) in Scuttle Bay were of acceptable water quality for shellfish harvesting and did not appear to be influenced by contamination affecting other sample stations south of Scuttle Bay. These stations were located outside of the existing Area 15-1 closure which was not sampled during this survey. Marine Stations 57, 61, 64, 65 and 66 all exceeded the approved shellfish growing water standard.

The two major potential sources of bacteriological contamination to this area were Sliammon Creek and the sewage treatment plant discharge from the Sliammon Indian Reservation. During this survey the Sliammon Creek (S12, S13) was not significantly contaminated with fecal coliforms and it would appear the STP was the sole cause of contamination observed in this area. Samples of the final effluent (E02) yielded a mean FC count of  $3.5 \times 10^6/100 \text{ ml}$ .

Bacteriological data for marine stations 57-71 was grouped according to tide conditions at the time of collection and the results are presented below:

|                   | <u>Flood</u> | <u>Ebb</u> | <u>High Slack</u> | <u>Low Slack</u> |
|-------------------|--------------|------------|-------------------|------------------|
| Median MPN/100 ml | 15           | 22.5       | 11                | 2                |
| 90 pct MPN/100 ml | 46           | 33         | 47.5              | 5                |
| No. of Results    | 24           | 24         | 15                | 15               |

This data shows that unacceptable contamination of this area occurs on all tidal stages with the exception of low slack. This is consistent with the STP being the major source of contamination. Effluent from this source would move towards shore and in a NW direction on the flood tide and away from shore in a SE direction on the ebb tide. Sample stations located NW of the outfall exhibited poorer water quality than those located SE of the outfall as shown in the table on the following page.

|             | NW |      |      | outfall |      |      | SE |      |      |     |    |
|-------------|----|------|------|---------|------|------|----|------|------|-----|----|
| Station No. | 59 | 60   | 61   | 62      | 63   | 64   | 65 | 66   | 67   | 68  | 69 |
| Median:     | 13 | 10.5 | 26   | 12.5    | 14   | 19.5 | 17 | 2.5  | 7    | 7.5 | 4  |
| 90 pct:     | 18 | 27   | 39.4 | 33.5    | 20.6 | 47.2 | 23 | 59.8 | 32.2 | 21  | 22 |

Sewage effluent (E03) discharged from the Wildwood Heights sewage lagoon did not affect water quality during the survey as fecal coliform values were reduced to less than 10/100 ml due to chlorination of the effluent. The creek (S15) to which the lagoon effluent discharged was contaminated ( $\times$  FC = 836/100 ml) from other upstream sources and exerted a limited effect on water quality near its point of discharge (Station 70). The mean FC of the creek immediately upstream (S14) of the sewage lagoon discharge was 873/100 ml which is comparable to the mean FC of 730/100 ml observed during surveys conducted by EPS in 1975 (S7). The FC:FS ratios at this station were all less than one indicating, but not confirming, animals as the pollution source. Some small farms east of Highway 101 are the likely source.

Sampling conducted in this area during this study indicated water quality from Scuttle Bay to Powell River was generally better than that observed during the previous November 1975 study. The apparent improvement in water quality may be due to several factors, including:

- 1) the extension of the Sliammon STP outfall by 128 m to a depth of 12 m
- 2) chlorination of the Wildwood Heights lagoon effluent
- 3) decreased precipitation during the 1980 survey - 43.7 mm as compared with 279.5 mm. This would significantly reduce the impact of Sliammon Creek and the unnamed creek (S15) on water quality in the vicinity.

#### 4.1.7 Gillies Bay (Marine stations 72-87)

All marine stations in Gillies Bay met the approved shellfish growing water standard except station 74 located near the head of the bay. Sampling was conducted at all stations during June and November 1980. The major source of contamination to the head of Gillies Bay was Cranby Creek (S19;  $\bar{x}$  FC = 358/100 ml) which receives effluent from a sewage treatment

lagoon servicing some of the homes in Gillies Bay. The lagoon effluent (E04) quality varied from a mean FC of 5075/100 ml during June to a mean FC of  $1.5 \times 10^5$ /100 ml during November. This higher FC value combined with an increase in flows for Cranby Creek resulted in poorer marine water quality at stations 72, 73 and 74 during the November sampling period. Fecal contamination was also introduced into Cranby Creek by a tributary stream (S16;  $\bar{x}$  FC = 490/100 ml) which drains a residential area served by septic tank/tile field disposal system. The fecal coliform levels in this creek were higher in June than November, and upstream samples (S17;  $\bar{x}$  FC = 58/100 ml) collected in November had similar FC densities to downstream samples. It was therefore difficult to determine the sources of contamination to this stream.

During the June survey, the sewage lagoon had no appreciable discharge and the anticipated rain-induced increase in discharge rate during November was not observed, although there was some flow. Considerable septic seepage was noted in the vicinity of the lagoon discharge point suggesting that a portion of the effluent may be lost into the ground.

Numerous other drainage ditches around Gillies Bay were sampled during November (S20-S28) and some exhibited high fecal coliform levels. However, due to the extremely low flow of these discharges, their impact on the receiving environment was difficult to measure. The cause of contamination to these drainage ditches was most probably seepage from septic tank absorption fields. Time did not permit an investigation to determine the sources of fecal pollution to the storm drains and FC:FS ratios were generally inconclusive. The effect of these drainage inputs on the bacteriological quality of shellfish in Gillies Bay would be more pronounced during low tide, when undiluted drainage would flow across the beach areas. Thus the measurement of overlying water quality in this instance may not necessarily reflect the actual pollution effects. Contamination of shellfish tissue from the intertidal area at the head of Gillies Bay has previously been recorded by the Fish Inspection Branch, Department of Fisheries and Oceans.

#### 4.2 Area II

In total, 597 samples were collected from 97 marine sample stations in Area II. All samples were collected between July 7 and August 1, 1980. Unacceptable fecal coliform levels were found at 15 sample stations in Prideaux Haven, Tenedos Bay, Allies Island, Roscoe Bay, Refuge Cove, Squirrel Cove, Cortes Bay and Manson Bay. However, evidence of fecal pollution was difficult to detect in all areas since the sole source of sewage contamination to most areas surveyed was the overboard discharge of raw sewage from pleasure vessels.

The assessment of shellfish growing water quality in anchorage areas requires several considerations to be taken into account. These include:

- 1) Boats are sources of fresh fecal pollution.
- 2) The unpredictable aspects of boat pollution, which include:
  - (i) variable population
  - (ii) mobility
  - (iii) intermittent pollution contribution
  - (iv) varying modes of sewage handling ranging from no treatment to holding tanks
  - (v) treatment devices with varying efficiencies
  - (vi) varying hydrographic and flushing features of different anchorage areas
  - (vii) the epidemiological background of a transitory population contributing fresh fecal pollution is not well defined
- 3) The approved growing water bacteriological standard does not necessarily apply because:
  - (i) unpredictable aspects of boat pollution mentioned above
  - (ii) the pathogen to coliform ratio is different in fresh fecal material than in municipal sewage from which the bacteriological standard was derived
  - (iii) usual sampling techniques do not apply

These considerations led to the development of a policy statement by the Shellfish Sanitation Branch of the U.S. Food and Drug Administration. This policy statement says, in part, that "no bacteriological criteria

have been established to evaluate boat discharges because of highly variable indicator to pathogen ratios, freshness of fecal material, lack of dispersion of fecal material in water column, lack of sensitivity for present water sampling methods to detect such random occurrences and poor epidemiological evidence on which to establish guidelines." Therefore the U.S. FDA believed it necessary to close waters around marinas, boatyards and mooring areas, the extent and time of these closures depending on local conditions.

The bacteriological data collected during this study reinforces the difficulties encountered in measuring sewage discharges from boats. Vessel counts were taken daily at each anchorage area (Table 1) however there was no correlation between the number or density of boats and observed fecal coliform levels in the water. Limited bacteriological analysis of shellfish tissues indicated significant fecal contamination of the tissue was occurring, despite acceptable fecal coliform levels in the overlying waters in some areas.

Therefore, the results presented in subsequent sections should be interpreted with caution, bearing in mind these considerations. In addition to the bacteriological sampling conducted in these anchorage areas, pleasure vessels were randomly surveyed to determine the types of sewage disposal systems on board. The survey will be the subject of a future report and will not be discussed in detail here. However, the majority of vessels of Canadian registry interviewed did not have any means of treating or holding their sewage. American vessels are required by law to have U.S. Coast Guard approved treatment or holding systems.

Rainfall during the study period (July 1 - August 1, 1980) totaled 21.3 mm which is less than the 19 year average of 39.6 mm tabulated by the Atmospheric Environment Service. Therefore the water quality results reflect conditions that would be expected to occur in the absence of significant rainfall and presumably are indicative of sources of pollution that occur independent of rainfall. Summarized and daily bacteriological data for marine sample stations is presented in Tables 3 and 4 of Appendix IV. Freshwater bacteriological results are found in Tables 5 and 6 of Appendix IV.

#### 4.2.1 Tenedos Bay and Prideaux Haven (Marine stations 1-14)

Both Tenedos Bay and Prideaux Haven are major recreational anchorage areas and form part of the Desolation Sound Marine Park. Daily boat counts for these two areas ranged from 15-116 at the time marine samples were collected.

Sample stations 3 and 8 in Prideaux Haven exceeded the shellfish standard and fecal coliform levels in this anchorage were generally elevated at all stations. Shellstock samples collected at marine stations 4, 5 and 6 yielded fecal coliform results of 330, 1700 and 330 per 100g of tissue, respectively. These values exceed the approved market standard of 230 fecal coliforms/100g for shellfish and indicate the oysters are subject to significant fecal contamination. The only identified pollution source in the area was the discharge of sewage from anchored boats. A small stream (S2) entering at the eastern end of Laura Cove was not implicated as a source of contamination (mean FC/ 100 ml = 2).

Two sample stations in Tenedos Bay (stations 9 and 14) exceeded the approved growing water standard and some of the other stations were subject to intermittent fecal contamination. Again, anchored boats were the only identified sources of contamination. A small stream (S1) draining Unwin Lake had a mean fecal coliform count of 12/100 ml. No shellstock samples were collected in Tenedos Bay.

#### 4.2.2 Grace Harbour (Marine stations 15-18)

Marine water quality in Grace Harbour was acceptable for the purpose of shellfish harvesting despite the presence of anchored boats. The majority of boats were generally anchored in proximity to stations 15 and 16, where fecal coliform levels ranged from less than 2 to 13 per 100 ml. Samples collected at these stations during May 1980 (Section 4.1.2) had fecal coliform levels ranging from less than 2 to 23 per 100 ml in the absence of anchored boats. No shellstock samples were collected at this location.

TABLE 1 DAILY BOAT COUNTS IN MAJOR ANCHORAGE LOCATIONS

| Date   | Prideaux<br>Harbour | Tenedos<br>Bay | Grace<br>Harbour | Allies<br>Island | Roscoe<br>Bay | Squirrel<br>Cove | Cortes<br>Bay | Gorge<br>Harbour | Manson's<br>Landing | Von Donop<br>Inlet | Drew<br>Harbour |
|--------|---------------------|----------------|------------------|------------------|---------------|------------------|---------------|------------------|---------------------|--------------------|-----------------|
| 1980   |                     |                |                  |                  |               |                  |               |                  |                     |                    |                 |
| July 9 |                     |                |                  |                  |               | 11               |               |                  |                     |                    |                 |
| 11     | 45                  | 15             | 13               | 5                |               | 29               | 27            |                  |                     |                    |                 |
| 14     | 33                  | 22             | 15               | 6                | 13            | 30               | 42            |                  |                     |                    |                 |
| 15     | 47                  | 28             | 25               | 8                | 16            | 9                | 39            |                  |                     |                    |                 |
| 16     | 33                  | 34             | 14               | 3                | 10            | 41               | 23            |                  |                     |                    |                 |
| 17     |                     |                |                  |                  |               |                  |               | 27               | 16                  | 13                 | 15              |
| 18     |                     |                |                  |                  |               |                  |               | 26               | 15                  | 15                 | 19              |
| 21     |                     |                |                  |                  |               |                  |               | 31               | 15                  | 18                 | 4               |
| 23     |                     |                |                  |                  |               |                  |               | 30               | 17                  | 24                 | 7               |
| 24     |                     |                |                  |                  |               |                  |               | 23               | 16                  | 27                 | 8               |
| 25     |                     |                |                  |                  |               |                  |               | 26               | 12                  | 13                 | 12              |
| 26     | 116                 |                |                  |                  |               | 32               | 19            | 17               |                     |                    |                 |
| 27     | 102                 | 70             | 15               |                  |               | 58               |               |                  |                     |                    |                 |



4.2.3 Allies Island (Marine stations 19, 20)

Samples were collected at Allies Island due to the proximity of a commercial oyster lease (L.3901, L.297) to an anchorage area. Station 20 did not meet the shellfish growing water standard and shellstock samples collected from the lease yielded a fecal coliform MPN of 1700/100g indicating significant pollution of the lease was occurring. Boat counts ranged from 3 - 8 at this location and no other pollution inputs were identified.

4.2.4 Roscoe Bay (Marine stations 21, 22)

Station 22 exceeded the growing water standard due to a single high fecal MPN value of 1600/100 ml. Station 21 was not contaminated and the stream draining Black Lake (S3) was not implicated in the contamination at station 22 ( $\bar{x}$  FC/100 ml = 5.5). Boat counts at this location ranged from 10 - 16 and were the only identified sources of bacteriological contamination. The occurrence of a single high fecal coliform count at this location is indicative of the unpredictable results expected for intermittent discharges such as those from boats.

4.2.5 Refuge Cove (Marine stations 23-29)

Stations 23, 24 and 25, located at the head of Refuge Cove, exceeded the shellfish growing water standard. This area was subject to fecal contamination from the following sources:

- (i) raw sewage discharges from buildings along the foreshore; and
- (ii) discharges from boats moored at the marinas.

The poor water quality in this portion of Refuge Cove has been noted in a previous survey conducted by EPS in 1973 (1). A Schedule I contaminated area closure (13-6) was invoked as a result of this survey and there appears to have been little improvement in water quality to date. Samples taken outside the Schedule I closure at stations 26 - 29 met the approved shellfish growing water standard. Stations 27, 28 and 29 were located at a raft oyster culture lease located in Refuge Cove.

4.2.6 Squirrel Cove (Marine stations 30-36)

Stations 30 - 36 were located in the major anchorage area of Squirrel Cove. Shellfish growing water quality was not met at stations 31, 33 and 36 and intermittent low-level fecal contamination was noted at stations 30 and 32. The source of contamination at stations 31 and 33 was identified as discharges from anchored boats since no other source was noted. A stream (S5) draining a lagoon at this location did not contribute to the bacteriological pollution. Boat counts in Squirrel Cove ranged from 9 to 58 during the course of the survey.

The source of the contamination at station 36 was not identified, although landwash may have been the cause since some rain was noted on July 15 by field staff although none was recorded at the Cortes Island Forestry Station. Fecal coliform levels on other days were low at this station. Shellstock samples (oysters) taken at stations 30 and 33 yielded fecal coliform levels of 1300/100 g and 330/100 g indicating shellfish harvested from this area would not meet market standards due to unacceptable bacteriological contamination.

Stations 37 - 40 were established outside the major anchorage to assess water quality fronting the Indian Reservation and Squirrel Cove government dock areas. All stations in this area met the growing water standard, although elevated fecal coliform levels were noted at stations 37 - 39 on July 12, coincident with rainfall observed by field staff. Previous samples taken by EPS in 1973 (1) also indicated water quality offshore of the Indian Reservation was acceptable for shellfish harvesting. (Sewage generated on the reserve is reportedly collected by a single collection system and treated by a septic tank with subsequent ground disposal. A stream (S6) entering approximately 100 m north of the government dock was slightly contaminated ( $\bar{x}$  FC = 68.5/100 ml) although this area is presently under a general Schedule I wharf closure.

4.2.7 Squirrel Cove to Mary Point (Marine stations 37-44)

Stations 41 to 44 were located along this section of coastline to assess growing water quality. All stations met the approved standard although elevated fecal coliform levels were recorded at stations 41 and 43 on July 15, presumably resulting from landwash effects. No sources of sewage contamination were noted onshore or from boats. An oyster lease (L.1512) located at station 44 was well removed from any potential sources of bacteriological pollution.

4.2.8 Cortes Bay (Marine stations 45-47)

Sample stations 45, 46 and 47 were established to assess water quality in Cortes Bay and of these stations, 45 and 46 both exceeded the approved growing water standard.

Boat discharges were again implicated as the source of fecal contamination, as no onshore sources were identified during the sanitary survey. The boat counts presented in Table 1 range from 19 to 42 and include anchored vessels and vessels docked at both the government wharf and private marina. No contamination was noted at station 47, with the exception of a single high count on July 15. An oyster shellstock sample collected at station 47 yielded a fecal coliform result of 40/100 g.

4.2.9 Sutil Point to Manson Bay, including Twin Islands (Marine stations 48-53)

Stations 48 to 53 were established in these areas to assess growing water quality. A registered oyster lease located between the Twin Islands (L.1442) was not sampled due to the absence of significant pollution sources.

No contamination was noted at Smelt Bay and it would appear the septic tanks and absorption fields serving these houses are operating adequately.

Station 51 in Manson Bay exceeded the growing water standard at the median level. The source of contamination at this location was not identified although the cause was either land based or related to boat discharges. Boat counts shown in Table 1 include both anchored vessels and vessels docked at the government wharf. Drainage from Manson's Lagoon entering the bay at station 50 was not contaminated, thereby discounting this source as the cause of the high coliform values.

Samples collected in both Manson Bay and Manson's Lagoon during the 1973 EPS survey (1) met the shellfish growing water standard and no sewage disposal problems were noted at that time.

#### 4.2.10 Gorge Harbour (Marine stations 54-62)

Stations 54 to 62 in Gorge Harbour met the approved shellfish growing water standard. The major potential sources of contamination to the harbour included:

- (i) sewage discharges from anchored or moored boats; and
- (ii) contaminated streams entering at S7 and S8.

The former potential source was not evident in the water quality results from the major anchorages despite the number of boats present (Table 1). These major anchorage areas were in the vicinity of stations 54 - 56 and 59 and 60, and included the wharf and gas floats at the Gorgeview Marina. Previous sampling by EPS in 1973 in the vicinity of the marina indicated contamination of the growing water was occurring as a result of:

- (i) boat discharges;
- (ii) a contaminated stream entering at the marina; and
- (iii) possible absorption field seepage.

During the 1973 study the mean fecal coliform value for the creek (S7) was 79/100 ml as compared with 81/100 ml during the present study suggesting there has been little change in this area during the past 7 years. The data collected during the 1973 study resulted in the imposition of of Schedule I contaminated area closure 13-7 and that closure

remains in effect at present. A registered oyster lease (L.473) located west of the marina (station 57) remains outside the closure and was unaffected by the boating activity and fecal contamination in S7.

A registered oyster lease (L.457) located along the south shore of Tan Island was not sampled due to the absence of significant sources of contamination.

A third oyster lease (L.1571), located at the eastern end of Gorge Harbour (station 61), was of acceptable growing water quality. A stream entering the harbour at the far eastern end (S8) was not significantly contaminated ( $\bar{x}$  FC = 26/100 ml) and did not affect water quality at nearby marine station 62.

#### 4.2.11 Whaletown Bay (Marine stations 63-65)

Three stations (63, 64, 65) were established at Whaletown Bay to assess water quality at a registered oyster lease (L.458) located near the government dock. Although some fecal contamination was observed in Stations 63 and 64, they did not exceed the approved growing water standard. Sources of contamination to Whaletown Bay include discharges from moored boats at the government wharf and discharges from ferry vessels travelling between Whaletown Bay and Heriot Bay (Quadra Island).

#### 4.2.12 Coulter Bay (Marine stations 66-69)

Marine stations 66 - 69 exhibited excellent water quality during the survey and no sources of contamination were noted that would adversely affect the oyster leases located between Coulter Island and Cortes Island (L.437, L.438). A small stream (S9) entering Coulter Bay did not cause any water quality deterioration ( $\bar{x}$  FC = 18.5/ 100 ml).

4.2.13 Carrington Bay and Quartz Bay (Marine stations 70-73)

These areas were not used for recreational boat anchorage during the survey and no other potential pollution sources were observed. Water quality at all marine stations (70 - 74) was excellent including those stations in the vicinity of the oyster lease (L.468) in Quartz Bay (stations 73 and 74). The small stream (S10) entering at the head of Quartz Bay had no effect on water quality ( $\bar{x}$  FC = less than 1/100 ml).

4.2.14 Von Donop Inlet (Marine stations 75-79)

Five sample stations (75 - 79) were established in Von Donop Inlet to assess the impact of boat anchorage on water quality. Boat counts, which varied from 13 to 27 during the survey, did not correlate with water quality; that is, water quality did not vary according to the number of boats present. Low level fecal contamination was noted in stations 75, 76 and 77, however shellfish growing water standards were not exceeded. Shellstock samples collected previously from this area and analyzed by the Fish Inspection Branch have shown occasional fecal contamination.

4.2.15 Read Island (Marine stations 82-87)

Marine stations 82 - 87 were established in Evans Bay, including Bird Cove, and at a registered oyster lease in Burdwood Bay. No bacteriological contamination was observed at any of these stations, nor were there any sources of fecal pollution identified.

4.2.16 Quadra Island (Marine stations 88-97)

Marine stations on Quadra Island were concentrated in the Drew Harbour area to assess the effects of boat discharges on the recreational

shellfish harvesting beaches of Rebecca Spit and the commercial oyster lease located at Heriot Island.

Water quality at all stations (88 - 97) in this area was good, and there was no apparent impact of boat discharges on the receiving waters despite the utilization of Drew Harbour for anchorage (Table 1). Other potential sources at Heriot Bay include sewage discharges from the ferry and from moored boats at both the private and government wharfs.

Three freshwater inputs to this area were sampled on one occasion and the results are presented below:

| <u>Location</u>                                    | <u>Fecal Coliform/<br/>100 ml</u> | <u>Fecal Streptococci/<br/>100 ml</u> |
|--|-----------------------------------|---------------------------------------|
| unnamed creek entering<br>200 W of government dock | 98                                | 85                                    |
| unnamed creek entering at<br>head of Hyacinth Bay  | 7                                 | 33                                    |
| Drew Creek   | 23                                | 69                                    |

These inputs were not considered to be of sufficient flow to impact significantly on the receiving waters.

Samples collected in Heriot Bay and Drew Harbour during 1973 indicate water quality has not changed significantly during the past 7 years although greater utilization of the harbour as an anchorage area was noted.

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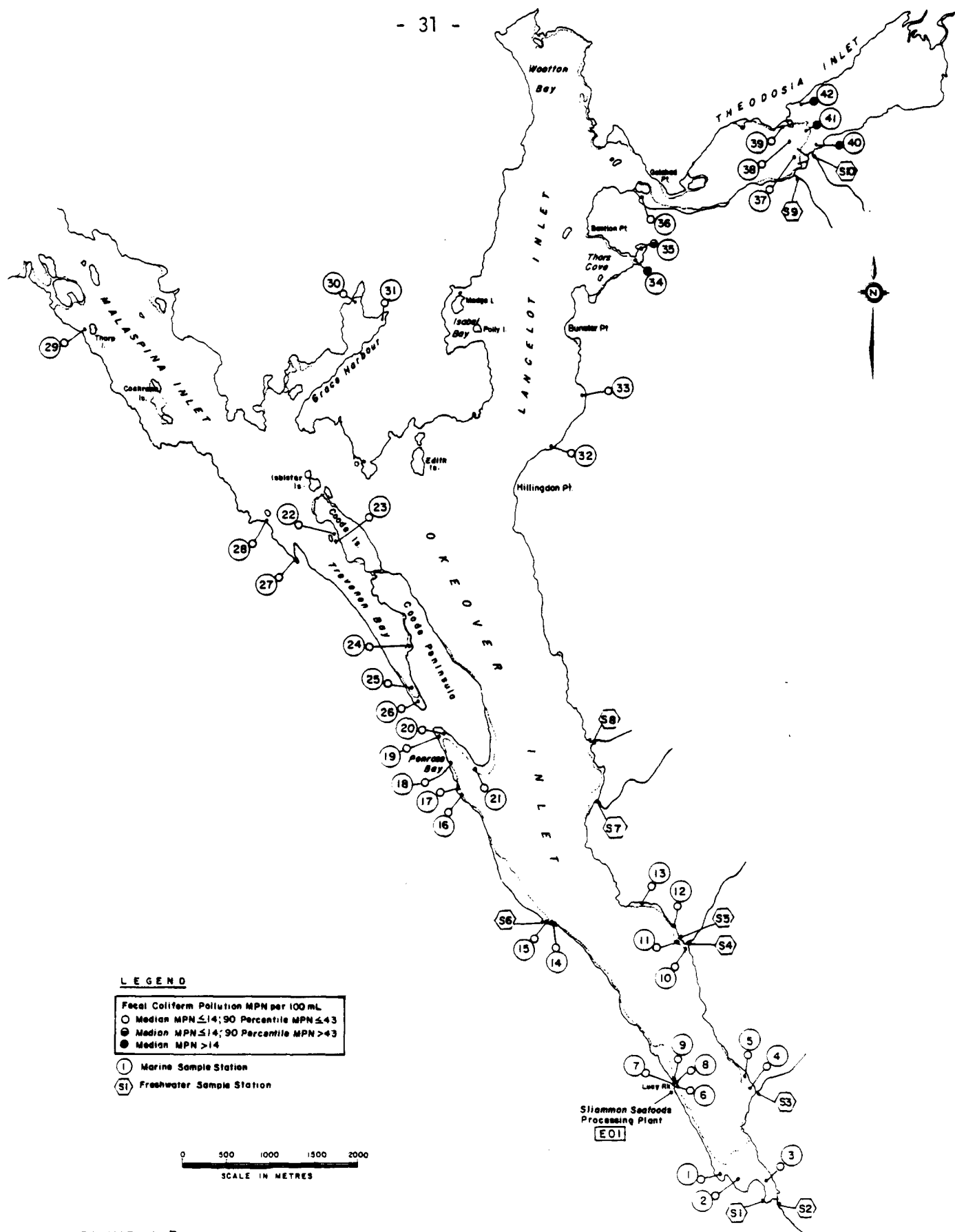


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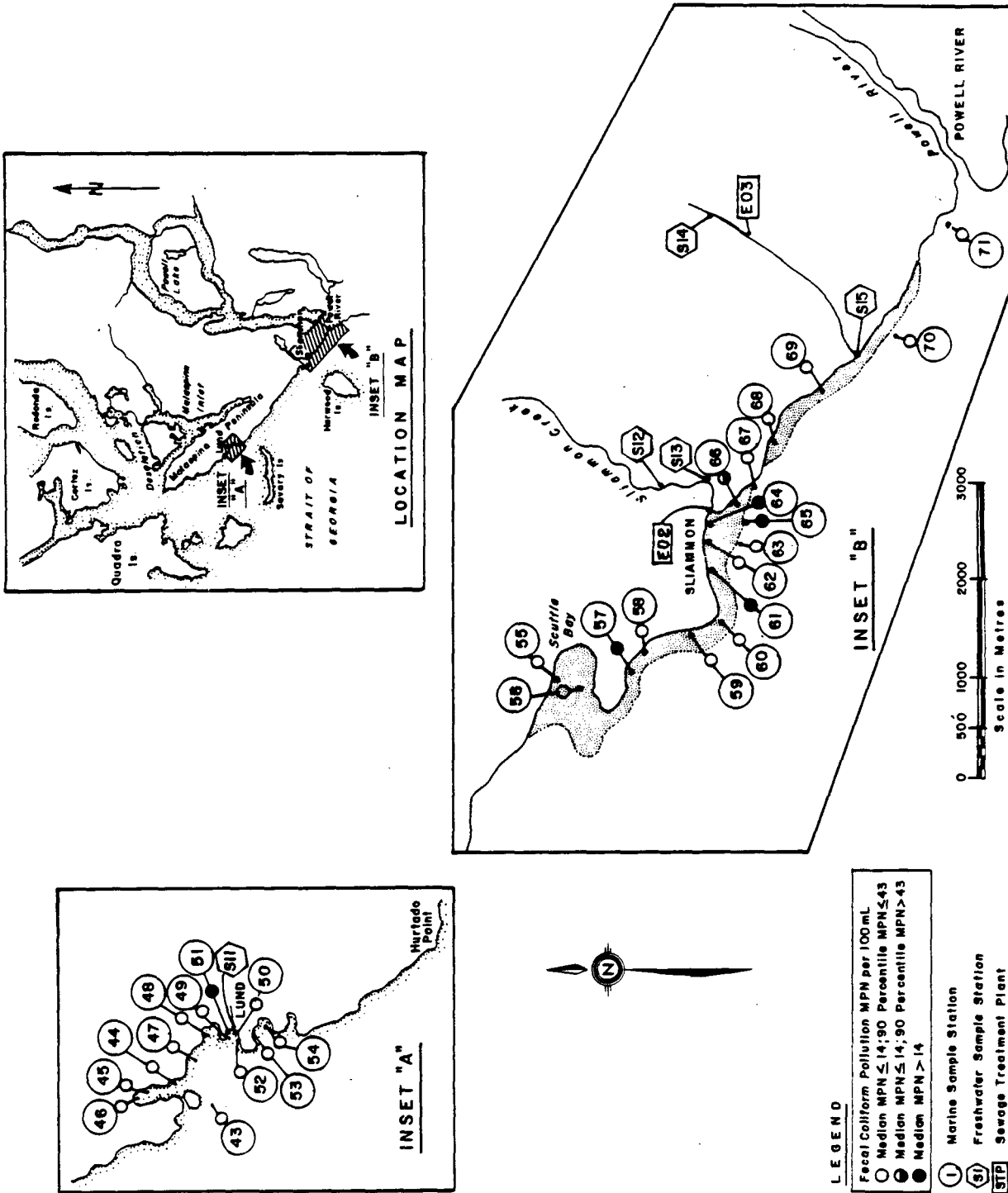
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APPENDIX I

AREA I FIGURES



APPENDIX I  
FIGURE I MARINE AND FRESHWATER SAMPLE STATION LOCATIONS -  
OKEOVER INLET, MALASPINA INLET, LANCELOT INLET  
AND THEODOSIA INLET

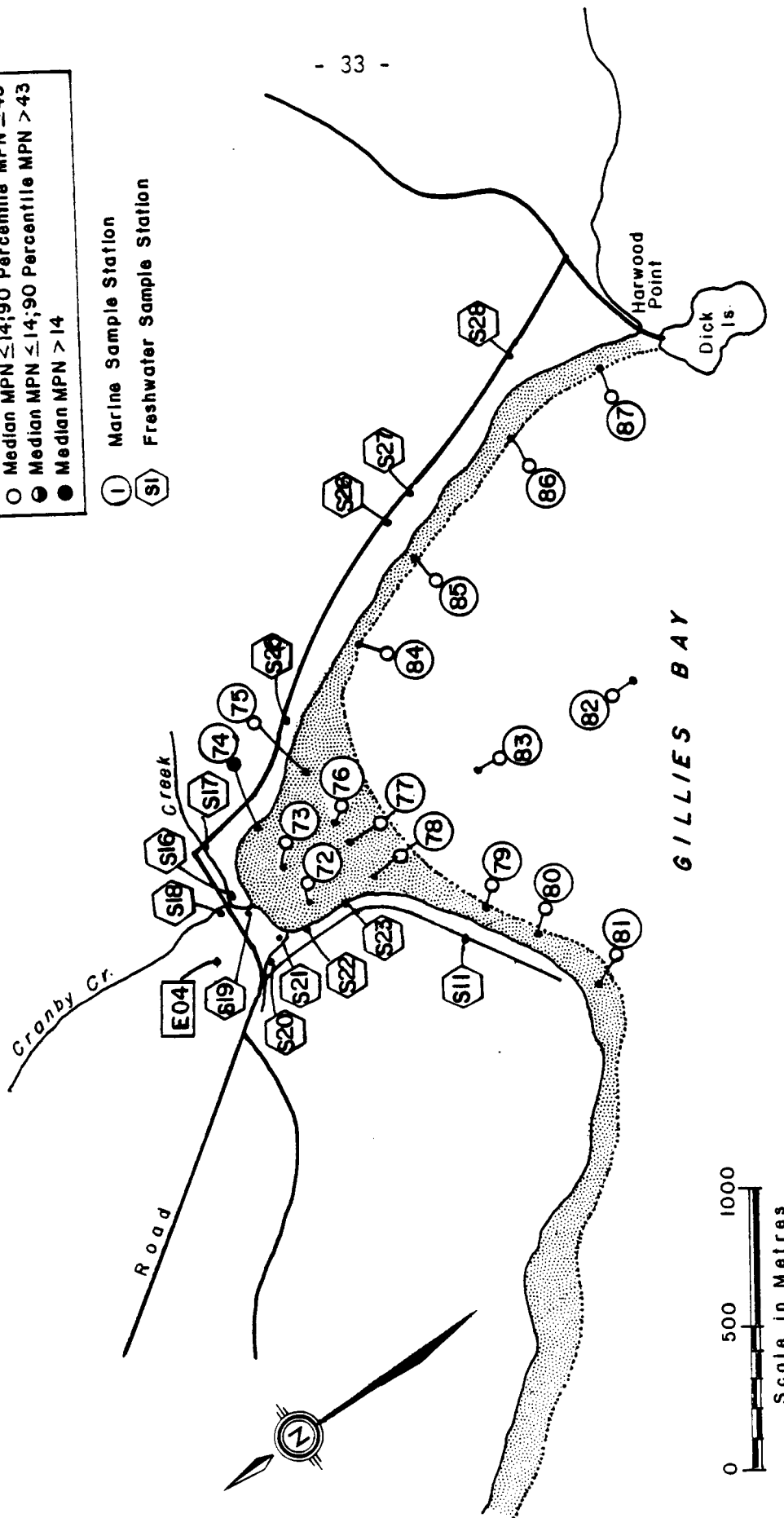


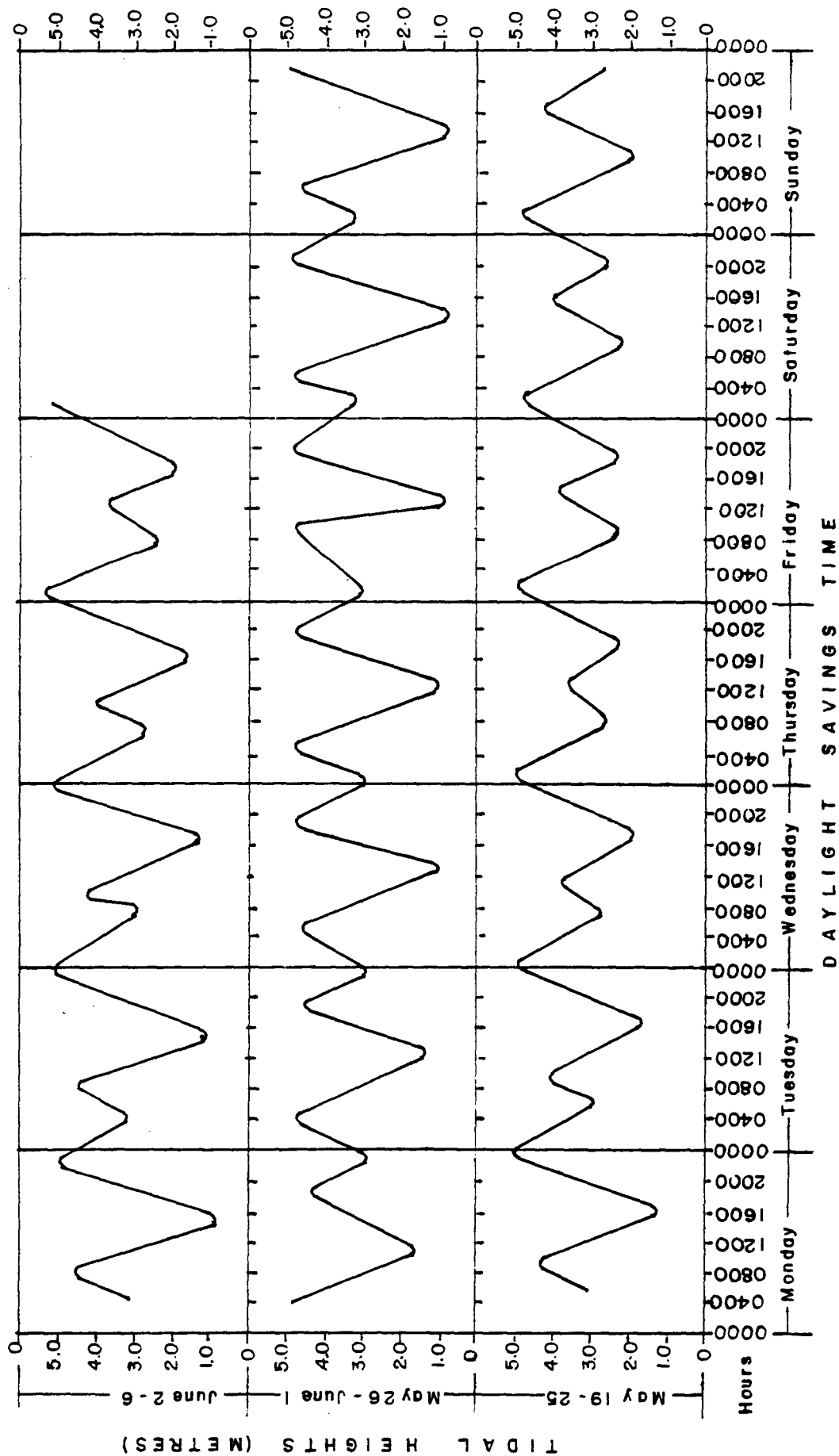
APPENDIX 1  
FIGURE 2 MARINE AND FRESHWATER SAMPLE STATION LOCATIONS -  
LUND HARBOUR AND SCUTTLE BAY TO POWELL RIVER

# LEGEND

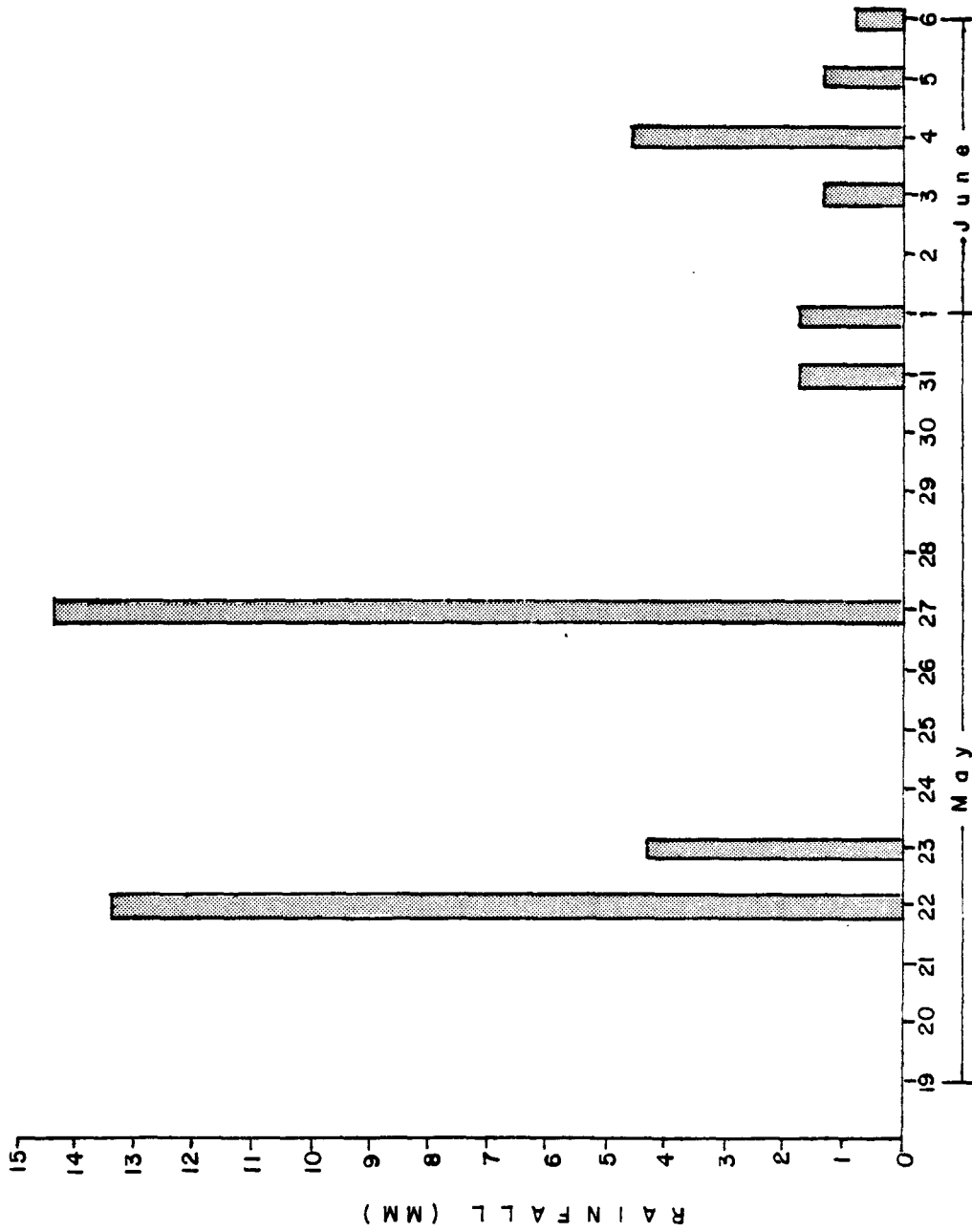
Fecal Coliform Pollution MPN per 100 mL  
 ○ Median MPN ≤ 14; 90 Percentile MPN ≤ 43  
 ● Median MPN ≤ 14; 90 Percentile MPN > 43  
 ● Median MPN > 14

① Marine Sample Station  
 S1 Freshwater Sample Station

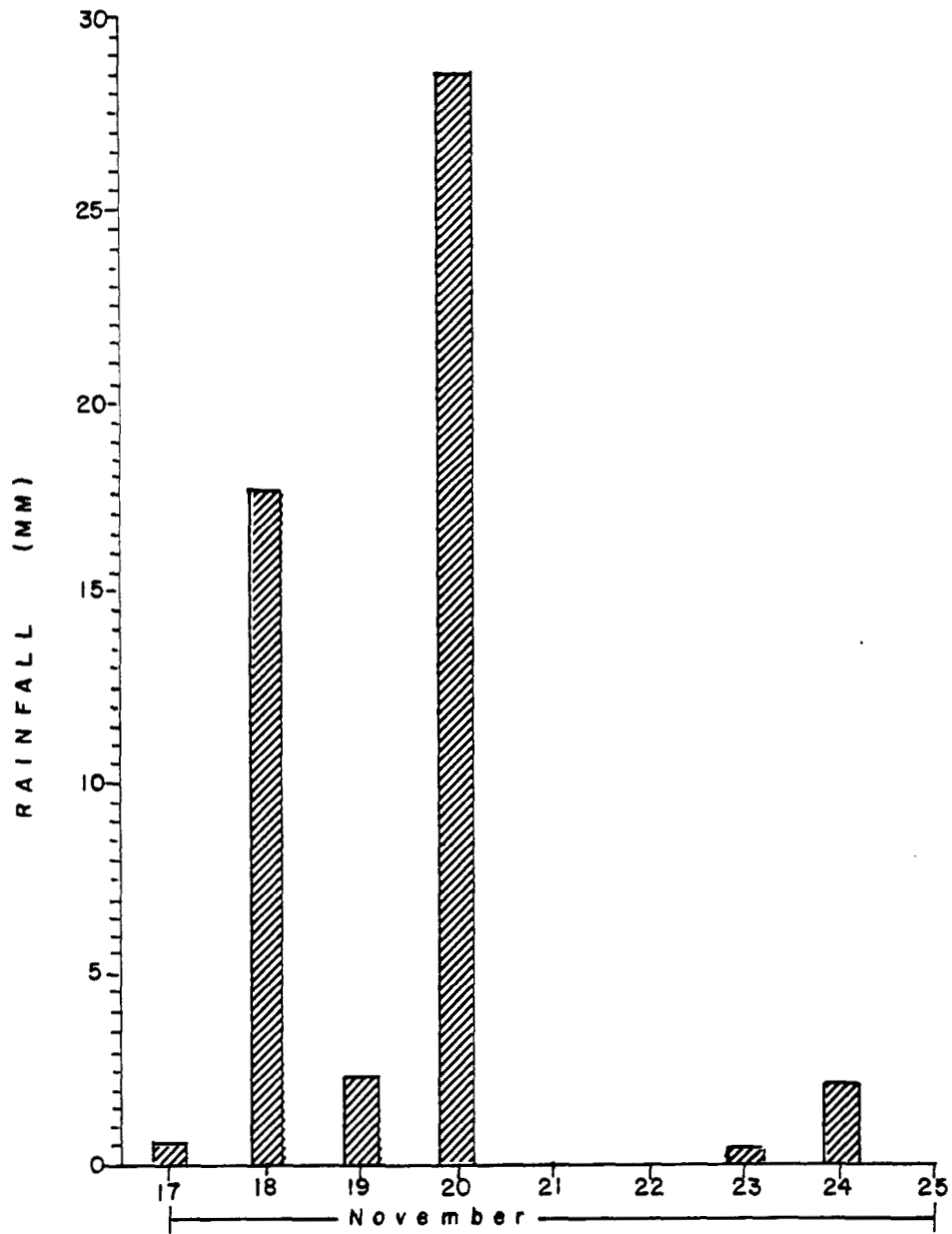




APPENDIX I  
FIGURE 4 TIDAL HEIGHT GRAPH - OKEOVER INLET - May 19 to June 6, 1980



APPENDIX I  
FIGURE 5 RAINFALL DATA - CORTES ISLAND FORESTRY STATION -  
May 19 to June 6, 1980



APPENDIX I

FIGURE 6 RAINFALL DATA - POWELL RIVER  
November 17 - 25, 1980



APPENDIX II

AREA I. TABLES

APPENDIX II, Table 1: MARINE SAMPLE STATION COORDINATES (Area 1)

| Sample Station | Latitude (North) | Longitude (West) | Area          |
|----------------|------------------|------------------|---------------|
| 1              | 49° 57.96'       | 124° 40.91'      | Okeover Inlet |
| 2              | 49° 57.87'       | 124° 40.70'      | "             |
| 3              | 49° 57.97'       | 124° 40.58'      | "             |
| 4              | 49° 58.47'       | 124° 40.63'      | "             |
| 5              | 49° 58.52'       | 124° 40.64'      | "             |
| 6              | 49° 58.46'       | 124° 41.35'      | "             |
| 7              | 49° 58.48'       | 124° 41.32'      | "             |
| 8              | 49° 58.49'       | 124° 41.36'      | "             |
| 9              | 49° 58.52'       | 124° 41.38'      | "             |
| 10             | 49° 59.35'       | 124° 41.30'      | "             |
| 11             | 49° 59.37'       | 124° 41.39'      | "             |
| 12             | 49° 59.43'       | 124° 41.41'      | "             |
| 13             | 49° 59.59'       | 124° 41.72'      | "             |
| 14             | 49° 59.47'       | 124° 42.57'      | "             |
| 15             | 49° 59.48'       | 124° 42.64'      | "             |
| 16             | 50° 00.27'       | 124° 45.51'      | Penrose Bay   |
| 17             | 50° 00.32'       | 124° 43.52'      | "             |
| 18             | 50° 00.46'       | 124° 43.60'      | "             |
| 19             | 50° 00.62'       | 124° 43.74'      | "             |
| 20             | 50° 00.64'       | 124° 43.69'      | "             |
| 21             | 50° 00.44'       | 124° 43.36'      | "             |
| 22             | 50° 01.85'       | 124° 44.80'      | Coode Island  |
| 23             | 50° 01.84'       | 124° 44.78'      | "             |
| 24             | 50° 01.18'       | 124° 44.04'      | Trevenen Bay  |
| 25             | 50° 00.90'       | 124° 43.98'      | "             |
| 26             | 50° 00.85'       | 124° 43.93'      | "             |
| 27             | 50° 01.74'       | 124° 45.17'      | "             |
| 28             | 50° 01.95'       | 124° 45.44'      | "             |
| 29             | 50° 03.09'       | 124° 47.23'      | Thorpe Island |

APPENDIX II, Table 1: MARINE SAMPLE STATION COORDINATES (Area 1)

| Sample Station | Latitude (North) | Longitude (West) | Area            |
|----------------|------------------|------------------|-----------------|
| 30             | 50° 03.30'       | 124° 44.64'      | Grace Harbour   |
| 31             | 50° 03.20'       | 124° 44.36'      | "               |
| 32             | 50° 02.44'       | 124° 42.66'      | Lancelot Inlet  |
| 33             | 50° 02.75'       | 124° 42.40'      | "               |
| 34             | 50° 03.60'       | 124° 41.94'      | Thors Cove      |
| 35             | 50° 03.65'       | 124° 41.86'      | "               |
| 36             | 50° 03.97'       | 124° 41.85'      | Theodesia Inlet |
| 37             | 50° 04.20'       | 124° 40.49'      | "               |
| 38             | 50° 04.30'       | 124° 40.55'      | "               |
| 39             | 50° 04.38'       | 124° 40.62'      | "               |
| 40             | 50° 04.36'       | 124° 40.20'      | "               |
| 41             | 50° 04.44'       | 124° 40.30'      | "               |
| 42             | 50° 04.58'       | 124° 40.37'      | "               |
| 43             | 49° 58.95'       | 124° 46.16'      | Lund Harbour    |
| 44             | 49° 59.09'       | 124° 46.02'      | "               |
| 45             | 49° 59.14'       | 124° 46.04'      | "               |
| 46             | 49° 59.25'       | 124° 46.05'      | "               |
| 47             | 49° 59.00'       | 124° 45.85'      | "               |
| 48             | 49° 58.95'       | 124° 45.64'      | "               |
| 49             |                  |                  | "               |
| 50             |                  |                  | "               |
| 51             |                  |                  | "               |
| 52             |                  |                  | "               |
| 53             | 49° 58.57'       | 124° 45.56'      | "               |
| 54             | 49° 58.49'       | 124° 45.57'      | "               |
| 55             | 49° 54.50'       | 124° 37.58'      | Scuttle Bay     |
| 56             | 49° 54.35'       | 124° 37.70'      | "               |
| 57             | 49° 54.13'       | 124° 37.53'      | Slammon I. R.   |
| 58             | 49° 54.00'       | 124° 37.30'      | "               |

APPENDIX II, Table 1: MARINE SAMPLE STATION COORDINATES (Area 1)

| Sample Station | Latitude (North) | Longitude (West) | Area           |
|----------------|------------------|------------------|----------------|
| 59             | 49° 53.80'       | 124° 37.18'      | Sliammon I. R. |
| 60             | 49° 53.70'       | 124° 37.10'      | "              |
| 61             | 49° 53.70'       | 124° 36.72'      | "              |
| 62             | 49° 53.71'       | 124° 36.50'      | "              |
| 63             | 49° 53.53'       | 124° 36.54'      | "              |
| 64             | 49° 53.71'       | 124° 36.40'      | "              |
| 65             | 49° 53.50'       | 124° 36.40'      | "              |
| 66             | 49° 53.63'       | 124° 36.20'      | "              |
| 67             | 49° 53.48'       | 124° 36.03'      | "              |
| 68             | 49° 53.39'       | 124° 35.70'      | "              |
| 69             | 49° 53.20'       | 124° 35.30'      | Gibson's Beach |
| 70             | 49° 52.81'       | 124° 34.97'      | Powell River   |
| 71             | 49° 52.48'       | 124° 34.12'      | "              |
| 72             | 49° 40.68'       | 123° 28.82'      | Gillies Bay    |
| 73             | 49° 40.70'       | 123° 28.80'      | "              |
| 74             | 49° 40.68'       | 123° 28.60'      | "              |
| 75             | 49° 40.57'       | 123° 28.53'      | "              |
| 76             | 49° 40.57'       | 123° 28.62'      | "              |
| 77             | 49° 40.57'       | 123° 28.83'      | "              |
| 78             | 49° 40.57'       | 123° 28.95'      | "              |
| 79             | 49° 40.40'       | 123° 29.15'      | "              |
| 80             | 49° 40.33'       | 123° 29.40'      | "              |
| 81             | 49° 40.24'       | 123° 29.70'      | "              |
| 82             | 49° 39.67'       | 123° 29.05'      | "              |
| 83             | 49° 39.94'       | 123° 28.85'      | "              |
| 84             | 49° 40.42'       | 123° 28.38'      | "              |
| 85             | 49° 40.16'       | 123° 28.20'      | "              |
| 86             | 49° 39.62'       | 123° 28.00'      | "              |
| 87             | 49° 39.30'       | 123° 28.00'      | "              |

APPENDIX II Table 2: FRESHWATER AND EFFLUENT SAMPLE STATION LOCATIONS  
(Area I)

| STATION NO. | LOCATION DESCRIPTION   | RECEIVING WATER  |
|-------------|--|------------------|
| S1          | unnamed stream entering at SW corner of Okeover Inlet                              | Okeover Inlet    |
| S2          | unnamed stream entering at head of Okeover Inlet                                   | Okeover Inlet    |
| S3          | unnamed stream entering at oyster lease L.6192                                     | Okeover Inlet    |
| S4          | unnamed stream approx. 50m south of shell pile on east side of Okeover Inlet       | Okeover Inlet    |
| S5          | unnamed stream at shell pile on east side of Okeover Inlet                         | Okeover Inlet    |
| S6          | unnamed creek entering north of Government Dock                                    | Okeover Inlet    |
| S7          | unnamed creek entering on the east side of Okeover Inlet, accross from Penrose Bay | Okeover Inlet    |
| S8          | unnamed creek entering approximately 750m north of S7                              | Okeover Inlet    |
| S9          | unnamed creek at Percy Logging Camp  | Theodosia Inlet  |
| S10         | unnamed creek approximately 400m east of S9  | Theodosia Inlet  |
| S11         | unnamed creek entering Lund Harbour at Government Dock                             | Lund Harbour     |
| S12         | Sliammon Creek at Highway bridge   | Malaspina Strait |
| S13         | Sliammon Creek near mouth  | Malaspina Strait |
| S14         | unnamed creek upstream of Wildwood Heights sewage lagoon discharge                 | Malaspina Strait |
| S15         | mouth of S14, downstream from lagoon discharge                                     | Malaspina Strait |
| S16         | small creek entering Cranby Creek adjacent to road                                 | Gillies Bay      |
| S17         | creek adjacent to Arnold's Store at south side of road (S6 upstream)               | Gillies Bay      |

continued...

APPENDIX II Table 2: FRESHWATER AND EFFLUENT SAMPLE STATION LOCATIONS  
(Area I)

| STATION<br>NO. | LOCATION DESCRIPTION   | RECEIVING WATER |
|----------------|--|-----------------|
| S18            | Cranby Creek entering at head of bay at road                   | Gillies Bay     |
| S19            | Cranby Creek at mouth next to Gillies Bay Inn                  | Gillies Bay     |
| S20            | ditch accross from bank (S21 upstream)                         | Gillies Bay     |
| S21            | ditch adjacent to laundromat at wooden bridge                  | Gillies Bay     |
| S22            | ditch at foot of Oak Street                                    | Gillies Bay     |
| S23            | ditch discharge at foot of Ash                                 | Gillies Bay     |
| S24            | culvert discharge on Sanderson Road 50m east of Dogwood Avenue | Gillies Bay     |
| S25            | culvert outlet 30m west of abandoned house                     | Gillies Bay     |
| S26            | culvert outlet 25m east of 50 km/h sign                        | Gillies Bay     |
| S27            | culvert outlet 100m west of 50 km/h sign                       | Gillies Bay     |
| S28            | culvert (north side) 50m before "Retreat Motel" sign           | Gillies Bay     |

APPENDIX II Table 3: SUMMARY OF FECAL COLIFORM MPN DATA FOR MARINE  
SAMPLE STATIONS (Area I)

| STATION | NO. OF SAMPLES | MPN RANGE | MEDIAN | 90 PERCENTILE |
|---------|----------------|-----------|--------|---------------|
| 1       | 10             | L2 - 350  | L2     | 5             |
| 2       | 10             | L2 - 540  | L2     | 2             |
| 3       | 10             | L2 - 540  | 2      | 33            |
| 4       | 6              | L2 - 13   | 5.5    | 11.8          |
| 5       | 6              | L2 - 33   | L2     | 14.4          |
| 6       | 11             | L2 - 11   | L2     | 8.3           |
| 7       | 11             | L2 - 13   | L2     | 6.5           |
| 8       | 11             | L2 - 2    | L2     | 2             |
| 9       | 11             | L2 - 5    | L2     | 2             |
| 10      | 6              | L2 - 4    | L2     | 2.8           |
| 11      | 6              | L2 - 14   | 2      | 8.6           |
| 12      | 6              | L2 - 2    | L2     | 2             |
| 13      | 6              | L2 - L2   | L2     | L2            |
| 14      | 6              | L2 - 2    | L2     | 2             |
| 15      | 6              | L2 - 2    | L2     | 2             |
| 16      | 6              | L2 - 5    | L2     | 3.2           |
| 17      | 6              | L2 - 2    | L2     | L2            |
| 18      | 6              | L2 - 2    | L2     | L2            |
| 19      | 7              | L2 - 79   | 5      | 27.2          |
| 20      | 6              | L2 - 49   | 2      | 29.8          |
| 21      | 6              | L2 - 5    | L2     | 4.4           |
| 22      | 6              | L2 - 2    | L2     | L2            |
| 23      | 6              | L2 - 5    | L2     | 2             |
| 24      | 6              | L2 - 49   | L2     | 20.8          |
| 25      | 6              | L2 - 2    | L2     | L2            |
| 26      | 6              | L2 - 2    | L2     | L2            |
| 27      | 6              | L2 - 23   | L2     | 11.6          |
| 28      | 6              | L2 - L2   | L2     | L2            |
| 29      | 6              | L2 - L2   | L2     | L2            |
| 30      | 6              | L2 - 23   | L2     | 13.4          |
| 31      | 6              | L2 - 21   | L2     | 8.4           |

continued...

APPENDIX II Table 3: MPN BACTERIOLOGICAL RESULTS FOR MARINE STATIONS

| STATION | NO. OF SAMPLES | MPN RANGE | MEDIAN | 90 PERCENTILE |
|---------|----------------|-----------|--------|---------------|
| 32      | 6              | L2        | L2     | L2            |
| 33      | 6              | L2 - L2   | L2     | L2            |
| 34      | 5              | L2 - 350  | 49     | 214.5         |
| 35      | 5              | L2 - 540  | 13     | 335           |
| 36      | 5              | 2 - 5     | 2      | 3.2           |
| 37      | 5              | 2 - 17    | 9      | 14            |
| 38      | 5              | 2 - 17    | 7      | 12            |
| 39      | 5              | 2 - 23    | 5      | 17            |
| 40      | 6              | 4 - 33    | 22.5   | 27            |
| 41      | 6              | 5 - 49    | 23     | 39.4          |
| 42      | 5              | 7 - 70    | 17     | 47.8          |
| 43      | 3              | L2 - L2   | L2     | L2            |
| 44      | 4              | L2 - 17   | 3.5    | 13            |
| 45      | 4              | 2 - 5     | 2      | 3.8           |
| 46      | 4              | L2 - 4    | L2     | 3.2           |
| 47      | 4              | L2 - 17   | 2.5    | 11.4          |
| 48      | 4              | L2 - 13   | 6.5    | 11            |
| 49      | 3              | 5 - 49    | 13     | 38.2          |
| 50      | 3              | 5 - 8     | 8      | 8             |
| 51      | 3              | 2 - 170   | 130    | 158           |
| 52      | 3              | L2 - 5    | 2      | 4.1           |
| 53      | 4              | L2 - 5    | L2     | 3.8           |
| 54      | 4              | L2 - 2    | L2     | L2            |
| 55      | 6              | L2 - 5    | L2     | 4.4           |
| 56      | 6              | L2 - 11   | 5      | 9.2           |
| 57      | 5              | L2 - 46   | 17     | 39.5          |
| 58      | 6              | L2 - 23   | 6.5    | 23            |
| 59      | 5              | L2 - 23   | 13     | 18            |
| 60      | 6              | L2 - 33   | 10.5   | 27            |
| 61      | 6              | L2 - 49   | 26     | 39.4          |
| 62      | 6              | L2 - 49   | 12.5   | 33.4          |

continued...



APPENDIX II Table 3: MPN BACTERIOLOGICAL RESULTS FOR MARINE STATIONS

| STATION | NO. OF SAMPLES | MPN RANGE | MEDIAN | 90 PERCENTILE |
|---------|----------------|-----------|--------|---------------|
| 63      | 4              | L2 - 23   | 14     | 20.6          |
| 64      | 6              | L2 - 49   | 19.5   | 47.2          |
| 65      | 4              | L2 - 23   | 17     | 23            |
| 66      | 6              | L2 - 130  | 2.5    | 59.8          |
| 67      | 6              | 5 - 46    | 7      | 32.2          |
| 68      | 6              | L2 - 33   | 7.5    | 21            |
| 69      | 5              | L2 - 23   | 4      | 22.5          |
| 70      | 4              | 5 - 33    | 13.5   | 28.6          |
| 71      | 3              | L2 - 49   | 2      | 34.9          |
| 72      | 8              | 2 - 49    | 9.5    | 30.6          |
| 73      | 8              | L2 - 79   | 5      | 33.4          |
| 74      | 8              | 2 - 79    | 15     | 71.8          |
| 75      | 8              | L2 - 79   | 6      | 26.2          |
| 76      | 8              | L2 - 9    | 3      | 6.6           |
| 77      | 4              | L2 - 5    | 2      | 3.8           |
| 78      | 8              | L2 - 49   | L2     | 16.2          |
| 79      | 8              | L2 - 26   | 2      | 10.8          |
| 80      | 7              | L2 - 13   | 2      | 10.2          |
| 81      | 7              | L2 - 2    | L2     | L2            |
| 82      | 7              | L2        | L2     | L2            |
| 83      | 8              | L2        | L2     | L2            |
| 84      | 8              | L2 - 5    | L2     | 3             |
| 85      | 8              | L2 - 2    | L2     | L2            |
| 86      | 8              | L2 - 4    | L2     | 2.4           |
| 87      | 8              | L2 - 17   | L2     | 9.8           |

APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 1              | May 21     | 1310 | L2        | 4              | May 21     | 1320 | L2        |
|                | 22         | 0995 | L2        |                | 22         | 0955 | L2        |
|                | 23         | 0910 | L2        |                | 23         | 0925 | 13        |
|                | 26         | 0915 | 2         |                | 26         | 0925 | 11        |
|                | 27         | 0905 | 5         |                | 27         | 0915 | 11        |
|                | 28         | 0905 | L2        |                | 28         | 0910 | L2        |
|                | Nov. 18    | 1040 | L2        |                |            |      |           |
|                | 19         | 0830 | 2         |                |            |      |           |
|                | 20         | 0940 | L2        |                |            |      |           |
|                | 21         | 0905 | 350       |                |            |      |           |
| 2              | May 21     | 1310 | L2        | 5              | May 21     | 1320 | L2        |
|                | 22         | 0950 | L2        |                | 22         | 0955 | 2         |
|                | 23         | 0915 | 2         |                | 23         | 0925 | L2        |
|                | 26         | 0920 | 2         |                | 26         | 0925 | 2         |
|                | 27         | 0910 | L2        |                | 27         | 0915 | 33        |
|                | 28         | 0910 | L2        |                | 28         | 0915 | L2        |
|                | Nov. 18    | 0140 | L2        |                |            |      |           |
|                | 19         | 0830 | L2        |                |            |      |           |
|                | 20         | 0945 | L2        |                |            |      |           |
|                | 21         | 0900 | 540       |                |            |      |           |
| 3              | May 21     | 1315 | L2        | 6              | May 21     | 1325 | L2        |
|                | 22         | 0950 | 2         |                | 22         | 1000 | L2        |
|                | 23         | 0920 | 2         |                | 23         | 0930 | L2        |
|                | 26         | 0925 | 8         |                | 26         | 0925 | L2        |
|                | 27         | 0910 | 2         |                | 27         | 0920 | 2         |
|                | 28         | 0910 | L2        |                | 28         | 0920 | L2        |
|                | Nov. 18    | 1040 | 2         |                | Nov. 17    | 1500 | 11        |
|                | 19         | 0830 | 5         |                | 18         | 0930 | 2         |
|                | 20         | 0950 | 23        |                | 19         | 0900 | 9         |
|                | 21         | 0910 | 540       |                | 20         | 0915 | 2         |
|                |            |      |           |                | 21         | 0935 | L2        |

continued...

APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |         | FC        |  | Sample Station | Collection |         | FC        |
|----------------|------------|---------|-----------|--|----------------|------------|---------|-----------|
|                | Date       | Time    | MPN/100ml |  |                | Date       | Time    | MPN/100ml |
| 7              | May        | 21 1325 | L2        |  | 10             | May        | 22 1010 | 2         |
|                |            | 22 1000 | L2        |  |                |            | 23 0935 | L2        |
|                |            | 23 0930 | 2         |  |                |            | 26 0935 | 4         |
|                |            | 26 0930 | 13        |  |                |            | 27 0925 | L2        |
|                |            | 27 0920 | L2        |  |                |            | 28 0925 | L2        |
|                |            | 28 0920 | L2        |  |                |            | 29 1105 | L2        |
|                | Nov.       | 17 1500 | L2        |  |                |            |         |           |
|                |            | 18 0930 | L2        |  |                |            |         |           |
|                |            | 19 0905 | 7         |  |                |            |         |           |
|                |            | 20 0915 | L2        |  |                |            |         |           |
|                |            | 21 0935 | 2         |  |                |            |         |           |
| 8              | May        | 22 1005 | L2        |  | 11             | May        | 22 1015 | 14        |
|                |            | 23 0930 | L2        |  |                |            | 23 0940 | L2        |
|                |            | 26 0930 | 2         |  |                |            | 26 0945 | 5         |
|                |            | 27 0920 | L2        |  |                |            | 27 0930 | 2         |
|                |            | 28 0920 | 2         |  |                |            | 28 0925 | L2        |
|                |            | 29 1110 | L2        |  |                |            | 29 1105 | 2         |
|                | Nov.       | 17 1505 | L2        |  |                |            |         |           |
|                |            | 18 0930 | L2        |  |                |            |         |           |
|                |            | 19 0905 | 2         |  |                |            |         |           |
|                |            | 20 0920 | L2        |  |                |            |         |           |
|                |            | 21 0940 | 2         |  |                |            |         |           |
| 9              | May        | 22 1005 | L2        |  | 12             | May        | 21 1340 | L2        |
|                |            | 23 0930 | 5         |  |                |            | 22 1020 | L2        |
|                |            | 26 0930 | L2        |  |                |            | 23 0945 | 2         |
|                |            | 27 0925 | L2        |  |                |            | 26 0940 | 13        |
|                |            | 28 0920 | L2        |  |                |            | 27 0930 | L2        |
|                |            | 29 1110 | L2        |  |                |            | 28 0930 | L2        |
|                | Nov.       | 17 1510 | L2        |  |                |            |         |           |
|                |            | 18 0930 | L2        |  |                |            |         |           |
|                |            | 19 0910 | 8         |  |                |            |         |           |
|                |            | 20 0920 | L2        |  |                |            |         |           |
|                |            | 21 0940 | 2         |  |                |            |         |           |

continued...

APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 13             | May 21     | 1340 | L2        |  | 17             | May 21     | 1345 | L2        |
|                | 22         | 1020 | L2        |  |                | 22         | 1030 | L2        |
|                | 23         | 0945 | L2        |  |                | 23         | 1000 | L2        |
|                | 26         | 0940 | L2        |  |                | 26         | 0950 | L2        |
|                | 27         | 0930 | L2        |  |                | 27         | 0940 | L2        |
|                | 28         | 0930 | L2        |  |                | 28         | 0940 | 2         |
| 14             | May 22     | 1020 | L2        |  | 18             | May 21     | 1350 | L2        |
|                | 23         | 0950 | L2        |  |                | 22         | 1050 | L2        |
|                | 26         | 0945 | L2        |  |                | 23         | 1000 | L2        |
|                | 27         | 0935 | L2        |  |                | 26         | 0950 | L2        |
|                | 28         | 0935 | L2        |  |                | 27         | 0940 | 2         |
|                | 29         | 1100 | 2         |  |                | 28         | 0945 | L2        |
| 15             | May 22     | 1025 | L2        |  | 19             | May 21     | 1350 | L2        |
|                | 23         | 0950 | L2        |  |                | 22         | 1035 | 2         |
|                | 26         | 0945 | L2        |  |                | 23         | 1005 | 5         |
|                | 27         | 0935 | 2         |  |                | 26         | 0955 | 5         |
|                | 28         | 0935 | L2        |  |                | 27         | 0945 | 79        |
|                | 29         | 1100 | 2         |  |                | 28         | 0945 | 2         |
| 16             | May 21     | 1345 | 5         |  | 20             | May 21     | 1350 | 2         |
|                | 22         | 1030 | L2        |  |                | 22         | 1035 | L2        |
|                | 23         | 1000 | L2        |  |                | 23         | 1005 | L2        |
|                | 26         | 0950 | L2        |  |                | 26         | 0955 | 2         |
|                | 27         | 0940 | 2         |  |                | 27         | 0945 | 49        |
|                | 28         | 0940 | L2        |  |                | 28         | 0950 | 17        |

continued...

APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 21             | May 21     | 1400 | L2        |  | 25             | May 21     | 1425 | L2        |
|                | 22         | 1040 | L2        |  |                | 22         | 1105 | L2        |
|                | 23         | 1010 | L2        |  |                | 23         | 1025 | L2        |
|                | 26         | 0955 | L2        |  |                | 26         | 1015 | L2        |
|                | 27         | 0945 | 5         |  |                | 27         | 1005 | 2         |
|                | 28         | 1010 | 4         |  |                | 28         | 1045 | L2        |
| 22             | May 22     | 1050 | L2        |  | 26             | May 21     | 1425 | L2        |
|                | 23         | 1020 | L2        |  |                | 22         | 1100 | L2        |
|                | 26         | 1005 | L2        |  |                | 23         | 1030 | L2        |
|                | 27         | 0955 | 2         |  |                | 26         | 1015 | 2         |
|                | 28         | 1020 | 2         |  |                | 27         | 1000 | 2         |
|                | 29         | 1040 | L2        |  |                | 28         | 1030 | L2        |
| 23             | May 22     | 1050 | L2        |  | 27             | May 21     | 1435 | L2        |
|                | 23         | 1035 | L2        |  |                | 22         | 1110 | L2        |
|                | 26         | 1005 | L2        |  |                | 23         | 1040 | 4         |
|                | 27         | 0955 | L2        |  |                | 26         | --   | L2        |
|                | 28         | 1020 | 2         |  |                | 27         | 1010 | 23        |
|                | 29         | 1040 | L2        |  |                | 28         | 1045 | L2        |
| 24             | May 22     | 1055 | 2         |  | 28             | May 22     | 1125 | L2        |
|                | 23         | 1035 | L2        |  |                | 23         | 1040 | L2        |
|                | 26         | 1010 | L2        |  |                | 26         | 1025 | L2        |
|                | 27         | 1000 | 49        |  |                | 27         | 1010 | L2        |
|                | 28         | 1025 | L2        |  |                | 28         | 1050 | L2        |
|                | 29         | 1035 | L2        |  |                | 29         | 1030 | L2        |

continued...

APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 29             | May 21     | 1450 | L2        |  | 33             | May 22     | 1210 | L2        |
|                | 22         | 1130 | L2        |  |                | 23         | 1125 | L2        |
|                | 23         | 1055 | L2        |  |                | 26         | 1050 | L2        |
|                | 26         | 1030 | L2        |  |                | 27         | 1030 | L2        |
|                | 27         | 1015 | L2        |  |                | 28         | 1120 | L2        |
|                | 28         | 1055 | L2        |  |                | 29         | 1010 | L2        |
| 30             | May 22     | 1150 | 7         |  | 34             | May 23     | 1130 | L2        |
|                | 23         | 1105 | L2        |  |                | 26         | 1030 | 49        |
|                | 26         | 1055 | L2        |  |                | 27         | 1035 | 350       |
|                | 27         | 1020 | 23        |  |                | 28         | 1130 | 2         |
|                | 28         | 1100 | 2         |  |                | 29         | 1000 | 79        |
|                | 29         | 1025 | L2        |  |                |            |      |           |
| 31             | May 22     | 1145 | L2        |  | 35             | May 23     | 1130 | L2        |
|                | 23         | 1110 | L2        |  |                | 26         | 1050 | 540       |
|                | 26         | 1035 | L2        |  |                | 27         | 1035 | 13        |
|                | 27         | 1020 | 21        |  |                | 28         | 1130 | 5         |
|                | 28         | 1150 | L2        |  |                | 29         | 1000 | 13        |
|                | 29         | 1020 | L2        |  |                |            |      |           |
| 32             | May 22     | 1205 | L2        |  | 36             | May 22     | 1220 | 7         |
|                | 23         | 1120 | L2        |  |                | 23         | 1135 | 2         |
|                | 26         | 1045 | L2        |  |                | 26         | 1055 | 2         |
|                | 27         | 1030 | L2        |  |                | 27         | 1040 | 2         |
|                | 28         | 1110 | L2        |  |                | 28         | 1135 | 5         |
|                | 29         | 1010 | L2        |  |                | 29         | 0955 | 2         |

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APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 37             | May 23     | 1145 | 2         |  | 41             | May 21     | 1545 | 13        |
|                | 26         | 1105 | 17        |  |                | 22         | 1230 | 33        |
|                | 27         | 1045 | 11        |  |                | 23         | 1150 | 13        |
|                | 28         | 1140 | 9         |  |                | 26         | 1110 | 33        |
|                | 29         | 0945 | 2         |  |                | 27         | 1055 | 49        |
|                |            |      |           |  |                | 28         | 1150 | 5         |
| 38             | May 23     | 1145 | 7         |  | 42             | May 21     | 1545 | 33        |
|                | 26         | 1105 | 17        |  |                | 22         | 1235 | 110       |
|                | 27         | 1050 | 7         |  |                | 23         | 1150 | 7         |
|                | 28         | 1140 | 2         |  |                | 26         | 1110 | 13        |
|                | 29         | 0950 | 5         |  |                | 27         | 1100 | 70        |
|                |            |      |           |  |                | 28         | 1150 | 17        |
| 39             | May 23     | 1145 | 5         |  | 43             | May 29     | 1350 | L2        |
|                | 26         | 1105 | 23        |  |                | 30         | 0930 | L2        |
|                | 27         | 1050 | 2         |  |                | June 05    | 0920 | L2        |
|                | 28         | 1140 | 11        |  |                |            |      |           |
|                | 29         | 0950 | 5         |  |                |            |      |           |
| 40             | May 21     | 1540 | 33        |  | 44             | May 29     | 1355 | L2        |
|                | 22         | 1230 | 4         |  |                | 30         | 0940 | L2        |
|                | 23         | 1150 | 5         |  |                | June 04    | 0925 | 17        |
|                | 26         | 1110 | 23        |  |                | 05         | 0920 | 7         |
|                | 27         | 1050 | 22        |  |                |            |      |           |
|                | 28         | 1150 | 23        |  |                |            |      |           |

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APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |   | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|---|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |   |                | Date       | Time | MPN/100ml |
| 45             | May 29     | 1355 | 2         | ' | 50             | May 29     | 1410 | 8         |
|                | 30         | 0940 | 17        | ' |                | 30         | 0950 | 8         |
|                | June 04    | 0925 | 11        | ' |                | June 05    | 0930 | 5         |
|                | 05         | 0915 | 5         | ' |                |            |      |           |
| 46             | May 29     | 1350 | L2        | ' | 51             | May 29     | 1410 | 130       |
|                | 30         | 0940 | L2        | ' |                | 30         | 0955 | 170       |
|                | June 04    | 0925 | 4         | ' |                | June 05    | 0930 | 2         |
|                | 05         | 0915 | 2         | ' |                |            |      |           |
| 47             | May 29     | 1400 | 3         | ' | 52             | May 29     | 1420 | 2         |
|                | 30         | 0945 | L2        | ' |                | 30         | 1015 | L2        |
|                | June 04    | 0920 | 2         | ' |                | June 05    | 0905 | 5         |
|                | 05         | 0925 | 17        | ' |                |            |      |           |
| 48             | May 29     | 1405 | L2        | ' | 53             | May 29     | 1430 | L2        |
|                | 30         | 0950 | 8         | ' |                | 30         | 1015 | L2        |
|                | June 04    | 0915 | 13        | ' |                | June 04    | 0910 | 5         |
|                | 05         | 0925 | 5         | ' |                | 05         | 0905 | 2         |
| 49             | May 29     | 1405 | 49        | ' | 54             | May 29     | 1430 | 2         |
|                | 30         | 0950 | 13        | ' |                | 30         | 1020 | L2        |
|                | June 05    | 0930 | 5         | ' |                | June 04    | 0910 | L2        |
|                |            |      |           | ' |                | 05         | 0900 | L2        |

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APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 55             | May 29     | 1440 | L2        |  | 59             | May 30     | 1050 | L2        |
|                | 30         | 1040 | L2        |  |                | June 03    | 1240 | 5         |
|                | June 03    | 1135 | 4         |  |                | (am) 04    | 0530 | 13        |
|                | (am) 04    | 0845 | L2        |  |                | (pm) 04    | 1430 | 13        |
|                | (pm) 04    | 1445 | 5         |  |                | 05         | 0830 | 23        |
|                | 05         | 0840 | L2        |  |                |            |      |           |
| 56             | May 29     | 1445 | 5         |  | 60             | May 29     | 1455 | L2        |
|                | 30         | 1040 | 11        |  |                | 30         | 1055 | 2         |
|                | June 03    | 1150 | 5         |  |                | June 03    | 1300 | 8         |
|                | (am) 04    | 0840 | 5         |  |                | (am) 04    | 0825 | 33        |
|                | (pm) 04    | 1445 | 8         |  |                | (pm) 04    | 1425 | 13        |
|                | 05         | 0840 | L2        |  |                | 05         | 0825 | 23        |
| 57             | May 30     | 1045 | L2        |  | 61             | May 29     | 1500 | 21        |
|                | June 03    | 1220 | 17        |  |                | 30         | 1100 | L2        |
|                | (am) 04    | 0840 | 46        |  |                | June 03    | 1305 | 33        |
|                | (pm) 04    | 1440 | 33        |  |                | (am) 04    | 0820 | 49        |
|                | 05         | 0835 | L2        |  |                | (pm) 04    | 1420 | 17        |
|                |            |      |           |  |                | 05         | 0825 | 31        |
| 58             | May 29     | 1450 | L2        |  | 62             | May 29     | 1500 | L2        |
|                | 30         | 1050 | L2        |  |                | 30         | 1100 | L2        |
|                | June 03    | 1230 | 23        |  |                | June 03    | 1310 | 8         |
|                | (am) 04    | 0845 | 23        |  |                | (am) 04    | 0815 | 49        |
|                | (pm) 04    | 1430 | 13        |  |                | (pm) 04    | 1420 | 23        |
|                | 05         | 0830 | L2        |  |                | 05         | 0820 | 17        |

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APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection   |      | FC        |  | Sample Station | Collection   |      | FC        |
|----------------|--------------|------|-----------|--|----------------|--------------|------|-----------|
|                | Date         | Time | MPN/100ml |  |                | Date         | Time | MPN/100ml |
| 63             | May 30       | 1105 | L2        |  | 67             | May 29       | 1510 | 5         |
|                | June (am) 04 | 0815 | 11        |  |                | 30           | 1115 | 5         |
|                | (pm) 04      | 1415 | 23        |  |                | June 03      | 1345 | 7         |
|                | 05           | 0820 | 17        |  |                | (am) 04      | 0800 | 7         |
|                |              |      |           |  |                | (pm) 04      | 1405 | 23        |
|                |              |      |           |  |                | 05           | 0810 | 46        |
| 64             | May 29       | 1505 | L2        |  | 68             | May 29       | 1520 | L2        |
|                | 30           | 1110 | 8         |  |                | 30           | 1120 | L2        |
|                | June 03      | 1320 | 31        |  |                | June 03      | 1355 | 7         |
|                | (am) 04      | 0810 | L2        |  |                | (am) 04      | 0755 | 8         |
|                | (pm) 04      | 1410 | 49        |  |                | (pm) 04      | 1405 | 33        |
|                | 05           | 0815 | 46        |  |                | 05           | 0805 | 13        |
| 65             | May 30       | 1105 | L2        |  | 69             | May 29       | 1530 | L2        |
|                | June (am) 04 | 0810 | 23        |  |                | 30           | 1125 | L2        |
|                | (pm) 04      | 1415 | 23        |  |                | June (am) 04 | 0750 | 4         |
|                | 05           | 0815 | 11        |  |                | (pm) 04      | 1400 | 22        |
|                |              |      |           |  |                | 05           | 0800 | 23        |
| 66             | May 29       | 1510 | L2        |  | 70             | May 30       | 1130 | 5         |
|                | 30           | 1110 | L2        |  |                | June (am) 04 | 0745 | 2         |
|                | June 03      | 1335 | 5         |  |                | (pm) 04      | 1355 | 33        |
|                | (am) 04      | 0805 | L2        |  |                | 05           | 0800 | 22        |
|                | (pm) 04      | 1410 | 13        |  |                |              |      |           |
|                | 05           | 0810 | 130       |  |                |              |      |           |

continued...

APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection   |      | FC        | Sample Station | Collection |      | FC        |
|----------------|--------------|------|-----------|----------------|------------|------|-----------|
|                | Date         | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 71             | May 30       | 1130 | 2         | 74             | June 02    | 1030 | 5         |
|                | June (am) 04 | 0740 | L2        |                | 03         | 1015 | 13        |
|                | 05           | 0755 | 49        |                | 04         | 1025 | 2         |
|                |              |      |           |                | 05         | 1020 | 2         |
|                |              |      |           |                | Nov. 18    | 1030 | 79        |
|                |              |      |           |                | 19         | 1020 | 17        |
|                |              |      |           |                | 20         | 1010 | 33        |
|                |              |      |           |                | 21         | 1100 | 70        |
| 72             | June 02      | 1020 | 8         | 75             | June 02    | 1030 | 79        |
|                | 03           | 1015 | 11        |                | 03         | 1005 | 5         |
|                | 04           | 1030 | 17        |                | 04         | 1020 | L2        |
|                | 05           | 1025 | 2         |                | 05         | 1015 | 11        |
|                | Nov. 18      | 1040 | 8         |                | Nov. 18    | 1040 | 7         |
|                | 19           | 1025 | 8         |                | 19         | 1025 | L2        |
|                | 20           | 1130 | 49        |                | 20         | 1020 | 13        |
|                | 21           | 1115 | 26        |                | 21         | 1130 | 5         |
| 73             | June 02      | 1020 | 5         | 76             | June 02    | 1035 | 5         |
|                | 03           | 1015 | 2         |                | 03         | 1010 | 2         |
|                | 04           | 1025 | 5         |                | 04         | 1040 | L2        |
|                | 05           | 1025 | L2        |                | 05         | 1015 | 4         |
|                | Nov. 18      | 1035 | 2         |                | Nov. 18    | 1045 | L2        |
|                | 19           | 1020 | 22        |                | 19         | 1030 | L2        |
|                | 20           | 1015 | 7         |                | 20         | 1025 | 6         |
|                | 21           | 1110 | 79        |                | 21         | 1135 | 9         |

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APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 77             | June 02    | 1035 | 2         |  | 80             | June 02    | 1045 | 2         |
|                | 03         | 1010 | L2        |  |                | 03         | 1030 | 2         |
|                | 04         | 1035 | 2         |  |                | 04         | 1050 | 13        |
|                | 05         | 1015 | 5         |  |                | 05         | 1035 | L2        |
|                |            |      |           |  |                | Nov. 18    | 1105 | L2        |
|                |            |      |           |  |                | 19         | 1045 | 9         |
|                |            |      |           |  |                | 21         | 1145 | L2        |
| 78             | June 02    | 1040 | L2        |  | 81             | June 02    | 1045 | L2        |
|                | 03         | 1015 | L2        |  |                | 03         | 1030 | L2        |
|                | 04         | 1035 | L2        |  |                | 04         | 1055 | L2        |
|                | 05         | 1020 | 8         |  |                | 05         | 1040 | 2         |
|                | Nov. 18    | 1050 | 5         |  |                | Nov. 18    | 1105 | L2        |
|                | 19         | 1035 | 49        |  |                | 19         | 1050 | L2        |
|                | 20         | 1030 | 2         |  |                | 21         | 1150 | L2        |
|                | 21         | 1135 | 2         |  |                |            |      |           |
| 79             | June 02    | 1040 | 4         |  | 82             | June 02    | 1105 | L2        |
|                | 03         | 1025 | L2        |  |                | 03         | --   | --        |
|                | 04         | 1045 | 2         |  |                | 04         | 1100 | L2        |
|                | 05         | 1030 | 7         |  |                | 05         | 1050 | L2        |
|                | Nov. 18    | 1100 | 26        |  |                | Nov. 18    | 1115 | L2        |
|                | 19         | 1040 | 2         |  |                | 19         | 1055 | L2        |
|                | 20         | 1040 | L2        |  |                | 20         | 1045 | L2        |
|                | 21         | 1145 | 2         |  |                | 21         | 1155 | L2        |

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APPENDIX II Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area I)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 83             | June 02    | 1100 | L2        |  | 86             | June 02    | 1120 | L2        |
|                | 03         | 1035 | L2        |  |                | 03         | 1000 | L2        |
|                | 04         | 1040 | L2        |  |                | 04         | 1010 | 2         |
|                | 05         | 1045 | L2        |  |                | 05         | 1005 | 2         |
|                | Nov. 18    | 1120 | L2        |  |                | Nov. 18    | 1140 | L2        |
|                | 19         | 1055 | L2        |  |                | 19         | 1020 | L2        |
|                | 20         | 1045 | 2         |  |                | 20         | 1100 | L2        |
|                | 21         | 1200 | L2        |  |                | 21         | 1235 | 4         |
| 84             | June 02    | 1125 | L2        |  | 87             | June 02    | 1110 | L2        |
|                | 03         | 1005 | L2        |  |                | 03         | 0950 | L2        |
|                | 04         | 1020 | 5         |  |                | 04         | 1000 | L2        |
|                | 05         | 1010 | L2        |  |                | 05         | 1000 | L2        |
|                | Nov. 18    | 1025 | 2         |  |                | Nov. 18    | 1145 | L2        |
|                | 19         | 1100 | L2        |  |                | 19         | 1120 | 17        |
|                | 20         | 1050 | 2         |  |                | 20         | 1100 | L2        |
|                | 21         | 1205 | 17        |  |                | 21         | 1250 | 8         |
| 85             | June 02    | 1120 | L2        |  | 85             | June 02    | 1120 | L2        |
|                | 03         | 1000 | L2        |  |                | 03         | 1000 | L2        |
|                | 04         | 1015 | L2        |  |                | 04         | 1015 | L2        |
|                | 05         | 1010 | L2        |  |                | 05         | 1010 | L2        |
|                | Nov. 18    | 1130 | L2        |  |                | Nov. 18    | 1130 | L2        |
|                | 19         | 1110 | L2        |  |                | 19         | 1110 | L2        |
|                | 20         | 1055 | L2        |  |                | 20         | 1055 | L2        |
|                | 21         | 1215 | 2         |  |                | 21         | 1215 | 2         |

APPENDIX II      TABLE 5  
SUMMARY OF BACTERIOLOGICAL RESULTS FOR FRESHWATER SAMPLE STATIONS

| Sample<br>Station | Fecal Coliform MF/100 ml |          |      | Fecal Streptococci MF/100 ml |          |      | FC:FS<br>Ratio |
|-------------------|--------------------------|----------|------|------------------------------|----------|------|----------------|
|                   | No. of Samples           | Range    | Mean | No. of Samples               | Range    | Mean |                |
| S1                | 2                        | L10-1110 | 555  | 2                            | L10-650  | ~325 | 1.7            |
| S2                | 9                        | 3-160    | 73   | 9                            | 13-73    | 36   | --             |
| S3                | 8                        | 0-14     | 4    | 8                            | 0-21     | 7    | --             |
| S4                | 5                        | 0-4      | 1    | 5                            | 3-19     | 8    | --             |
| S5                | 5                        | 8-230    | 71   | 5                            | 3-11     | 7    | --             |
| S6                | 5                        | 0-22     | 10   | 5                            | 15-45    | 29   | --             |
| S7                | 4                        | 0-22     | 8    | 4                            | 8-22     | 13   | --             |
| S8                | 3                        | 0-2      | 1    | 4                            | 4-29     | 15   | --             |
| S9                | 4                        | 0-28     | 11   | 4                            | 8-41     | 20   | --             |
| S10               | 4                        | 0-37     | 13   | 4                            | 5-20     | 12   | --             |
| S11               | 6                        | 26-730   | 206  | 6                            | 13-200   | 63   | --             |
| S12               | 5                        | 6-37     | 19   | 5                            | 8-31     | 16   | --             |
| S13               | 4                        | 13-79    | 36   | 4                            | 15-71    | 36   | --             |
| S14               | 3                        | 130-2300 | 873  | 3                            | 130-2400 | 920  | 0.9            |
| S15               | 3                        | 90-230   | 836  | 3                            | 20-2100  | 747  | 1.1            |
| S16               | 8                        | 28-1285  | 490  | 8                            | 8-930    | 308  | 1.6            |

continued...

## SUMMARY OF BACTERIOLOGICAL RESULTS FOR FRESHWATER SAMPLE STATIONS

| Sample Station    | Fecal Coliform MF/100 ml |                           |                     | Fecal Streptococci MF/100 ml |                           |                     | FC:FS Ratio |
|-------------------|--------------------------|---------------------------|---------------------|------------------------------|---------------------------|---------------------|-------------|
|                   | No. of Samples           | Range                     | Mean                | No. of Samples               | Range                     | Mean                |             |
| S17               | 4                        | 34-100                    | 58                  | 4                            | 11-270                    | 89                  | --          |
| S18               | 8                        | 20-510                    | 245                 | 8                            | 8-1500                    | 300                 | 0.8         |
| S19               | 8                        | 81-900                    | 358                 | 8                            | 19-560                    | 169                 | 2.1         |
| S20               | 3                        | 6-71                      | 29                  | 3                            | 32-57                     | 42                  | --          |
| S21               | 4                        | 2-58                      | 27                  | 4                            | 12-80                     | 42                  | --          |
| S22               | 3                        | 660-2200                  | 1210                | 3                            | 220-660                   | 370                 | 3.3         |
| S23               | 3                        | 2500-6900                 | 4233                | 3                            | 880-4400                  | 2360                | 1.8         |
| S24               | 3                        | 22-87                     | 48                  | 3                            | 23-72                     | 51                  | --          |
| S25               | 3                        | 90-140                    | 110                 | 2                            | 280-1300                  | 790                 | 0.14        |
| S26               | 4                        | 130-1690                  | 690                 | 3                            | 10-170                    | 113                 | 6.1         |
| S27               | 4                        | 29-63                     | 48                  | 4                            | 12-150                    | 58                  | --          |
| S28               | 4                        | 340-1200                  | 683                 | 4                            | 70-730                    | 330                 | 2.1         |
| Effluent Samples: |                          |                           |                     |                              |                           |                     |             |
| E01               | 10                       | 0-100                     | 16                  | 10                           | 72-2480                   | 877                 | --          |
| E02               | 4                        | 18000-5.7x10 <sup>6</sup> | 3.5x10 <sup>6</sup> | 4                            | 68000-2.2x10 <sup>5</sup> | 1.5x10 <sup>5</sup> | 23          |
| E03               | 3                        | 110-10                    | 3                   | 3                            | 110-40                    | 30                  | --          |
| E04               | 8                        | 1000-1.9x10 <sup>5</sup>  | 7.5x10 <sup>4</sup> | 8                            | 280-2900                  | 1.3x10 <sup>3</sup> | 57.6        |

APPENDIX II TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION | DATE    | FC/100 ml | FS/100 ml |
|---------|---------|-----------|-----------|
| S1      | May 22  | 1110      | 650       |
|         | 23      | L10       | L10       |
| S2      | May 22  | 76        | 73        |
|         | 23      | 32        | 14        |
|         | 26      | 35        | 13        |
|         | 27      | 160       | 69        |
|         | 28      | 3         | 24        |
|         | Nov. 18 | 66        | 50        |
|         | 19      | 61        | 20        |
|         | 20      | 100       | 34        |
|         | 21      | 120       | 26        |
|         |         |           |           |
| S3      | May 22  | 8         | 10        |
|         | 23      | 1         | 7         |
|         | 26      | 1         | 5         |
|         | 27      | 14        | 21        |
|         | 28      | 0         | 8         |
|         | Nov. 18 | 0         | 0         |
|         | 20      | 6         | 1         |
|         | 21      | 3         | 1         |
| S4      | May 22  | 4         | 10        |
|         | 23      | 0         | 19        |
|         | 26      | 1         | 3         |
|         | 27      | 2         | 4         |
|         | 28      | 0         | 4         |

continued...



APPENDIX II: TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION | DATE   | FC/100 ml | FS/100 ml |
|---------|--------|-----------|-----------|
| S5      | May 22 | 230       | 11        |
|         | 23     | 13        | 4         |
|         | 26     | 52        | 6         |
|         | 27     | 24        | 11        |
|         | 28     | 8         | 3         |
| S6      | May 22 | 18        | 28        |
|         | 23     | 4         | 15        |
|         | 26     | 4         | 36        |
|         | 27     | 22        | 45        |
|         | 28     | 0         | 23        |
| S7      | May 23 | 5         | 8         |
|         | 26     | 4         | 11        |
|         | 27     | 22        | 22        |
|         | 28     | 0         | 9         |
| S8      | May 26 | 1         | 12        |
|         | 27     | 2         | 29        |
|         | 28     | 0         | 4         |
| S9      | May 23 | 3         | 8         |
|         | 26     | 12        | 17        |
|         | 27     | 28        | 41        |
|         | 28     | 0         | 12        |

continued...

APPENDIX II: TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION | DATE    | FC/100 ml | FS/100 ml |
|---------|---------|-----------|-----------|
| S10     | May 23  | 1         | 5         |
|         | 26      | 12        | 7         |
|         | 27      | 37        | 20        |
|         | 28      | 0         | 15        |
| S11     | May 27  | 54        | 130       |
|         | 29      | 26        | 13        |
|         | 30      | 170       | 200       |
|         | June 02 | 730       | 72        |
|         | 03      | 180       | 44        |
|         | 04      | 74        | 48        |
| S12     | May 29  | 18        | 18        |
|         | 30      | 14        | 31        |
|         | June 02 | 6         | 8         |
|         | 03      | 21        | 11        |
|         | 04      | 37        | 10        |
| S13     | May 30  | 23        | 71        |
|         | June 02 | 13        | 22        |
|         | 03      | 28        | 15        |
|         | 04      | 79        | 35        |
| S14     | May 27  | 2300      | 2400      |
|         | June 03 | 130       | 130       |
|         | 04      | 190       | 230       |

continued...

APPENDIX II: TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION | DATE    | FC/100 ml | FS/100 ml |
|---------|---------|-----------|-----------|
| S15     | May 27  | 2300      | 2100      |
|         | June 03 | 90        | 20        |
|         | 04      | 119       | 103       |
| S16     | June 02 | 620       | 173       |
|         | 03      | 1285      | 930       |
|         | 04      | 1015      | 890       |
|         | 05      | 340       | 120       |
|         | Nov. 18 | 100       | 20        |
|         | 19      | 41        | 8         |
|         | 20      | 28        | 13        |
|         | 21      | G80       | G80       |
| S17     | Nov. 18 | 100       | 20        |
|         | 19      | 40        | 11        |
|         | 20      | 34        | 270       |
|         | 21      | G80       | 54        |
| S18     | June 02 | 20        | 8         |
|         | 03      | 90        | 220       |
|         | 04      | 320       | 430       |
|         | 05      | 181       | 1500      |
|         | Nov. 18 | 360       | 110       |
|         | 19      | 190       | 50        |
|         | 20      | 290       | 10        |
|         | 21      | 510       | 70        |

continued...

APPENDIX II: TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION | DATE    | FC/100 ml | FS/100 ml |
|---------|---------|-----------|-----------|
| S19     | June 02 | 460       | 123       |
|         | 03      | 390       | 280       |
|         | 04      | 900       | 560       |
|         | 05      | 370       | 170       |
|         | Nov. 18 | 170       | 150       |
|         | 19      | 160       | 19        |
|         | 20      | 81        | 19        |
|         | 21      | 330       | 30        |
| S20     | Nov. 19 | 6         | 32        |
|         | 20      | 11        | 57        |
|         | 21      | 71        | 38        |
| S21     | Nov. 18 | 30        | 80        |
|         | 19      | 19        | 22        |
|         | 20      | 2         | 12        |
|         | 21      | 58        | 55        |
| S22     | Nov. 19 | 770       | 230       |
|         | 20      | 660       | 220       |
|         | 21      | 2200      | 660       |
| S23     | Nov. 19 | 3300      | 880       |
|         | 20      | 2500      | 1800      |
|         | 21      | 6400      | 4400      |

continued...

APPENDIX II: TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION | DATE    | FC/100 ml | FS/100 ml |
|---------|---------|-----------|-----------|
| S24     | Nov. 19 | 35        | 23        |
|         | 20      | 22        | 72        |
|         | 21      | 87        | 57        |
| S25     | Nov. 18 | 100       | 1300      |
|         | 19      | --        | --        |
|         | 20      | 90        | --        |
|         | 21      | 140       | 280       |
| S26     | Nov. 18 | 1690      | 170       |
|         | 19      | 130       | 160       |
|         | 20      | 690       | --        |
|         | 21      | 250       | 10        |
| S27     | Nov. 18 | 60        | 150       |
|         | 19      | 63        | 20        |
|         | 20      | 29        | 49        |
|         | 21      | 39        | 12        |
| S28     | Nov. 18 | 1200      | 730       |
|         | 19      | 560       | 70        |
|         | 20      | 340       | 200       |
|         | 21      | 630       | 320       |

continued...

APPENDIX II: TABLE 6

DAILY BACTERIOLOGICAL RESULTS FOR FRESHWATER  
AND EFFLUENT SAMPLE STATIONS (AREA 1)

| STATION           | DATE    | FC/100 ml         | FS/100 ml         |
|-------------------|---------|-------------------|-------------------|
| <u>Effluents:</u> |         |                   |                   |
| E01               | May 23  | 0                 | 1410              |
|                   | 26      | 0                 | 360               |
|                   | 27      | 1                 | 80                |
|                   | 28      | 0                 | 72                |
|                   | Nov. 17 | 100               | 1300              |
|                   | 18      | L10               | 780               |
|                   | 19      | 40                | 1250              |
|                   | 20      | L10               | 2480              |
|                   | 21      | L10               | 150               |
|                   |         |                   |                   |
| E02               | May 30  | G8000             | G8000             |
|                   | June 02 | $5.7 \times 10^6$ | $2.2 \times 10^5$ |
|                   | 03      | $2.9 \times 10^6$ | $1.2 \times 10^5$ |
|                   | 04      | $1.8 \times 10^6$ | $1.1 \times 10^5$ |
| E03               | May 30  | 10                | 40                |
|                   | June 03 | L10               | 20                |
|                   | 04      | L10               | L10               |
| E04               | June 02 | 8100              | 300               |
|                   | 03      | 7100              | 800               |
|                   | 04      | 4100              | 280               |
|                   | 05      | 1000              | 300               |
|                   | Nov. 18 | $1.2 \times 10^5$ | 2900              |
|                   | 19      | $1.9 \times 10^5$ | L1000             |
|                   | 20      | $1.8 \times 10^5$ | 2800              |
|                   | 21      | $9.4 \times 10^4$ | 1600              |

APPENDIX II, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS (AREA 1)

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 1              | 5              | 18-28          | 25                  |
| 2              | 4              | 26.5-28        | 27.5                |
| 3              | 4              | 25-28          | 27                  |
| 4              | 4              | 26-27          | 26.5                |
| 5              | 4              | 25.5-27        | 26                  |
| 6              | 5              | 18-27          | 25                  |
| 7              | 4              | 26-28          | 27                  |
| 8              | 3              | 27.5-28        | 27.5                |
| 9              | 3              | 27-28          | 27.5                |
| 10             | 3              | 26-27.5        | 26.5                |
| 11             | 3              | 25-27          | 26                  |
| 12             | 4              | 26-28          | 27                  |
| 13             | 4              | 26-28          | 27                  |
| 14             | 3              | 27-27.5        | 27.5                |
| 15             | 3              | 27-28          | 27.5                |
| 16             | 4              | 26.5-28        | 27                  |
| 17             | 4              | 27-28          | 27.5                |
| 18             | 4              | 26.5-28        | 27                  |
| 19             | 4              | 26.5-28        | 27                  |
| 20             | 4              | 26-28          | 27                  |
| 21             | 4              | 27-28          | 27.5                |
| 22             | 3              | 26.5-27        | 26.5                |
| 23             | 3              | 27             | 27                  |
| 24             | 3              | 26.5-27        | 27                  |
| 25             | 4              | 26-27.5        | 26.5                |
| 26             | 4              | 26.5-28        | 27                  |

continued...

APPENDIX II, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS (AREA 1)

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 27             | 4              | 26-26.5        | 26                  |
| 28             | 3              | 26-27.5        | 27                  |
| 29             | 5              | 15-28          | 24                  |
| 30             | 3              | 25-27          | 25.5                |
| 31             | 3              | 25-28          | 26.5                |
| 32             | 3              | 26-27          | 26.5                |
| 33             | 3              | 26-27          | 26.5                |
| 34             | 2              | 25-28          | 26.5                |
| 35             | 2              | 25-28          | 26.5                |
| 36             | 4              | 13-24          | 17.5                |
| 37             | 3              | 6-12           | 8.5                 |
| 38             | 3              | 6-15           | 9.5                 |
| 39             | 3              | 6-14           | 9.5                 |
| 40             | 5              | 4-17           | 10                  |
| 41             | 5              | 5-12           | 9                   |
| 42             | 5              | 6-14           | 10.5                |
| 43             | 1              | 28             | 28                  |
| 44             | 3              | 26.5-28        | 27.5                |
| 45             | 3              | 27-28          | 27.5                |
| 46             | 3              | 27-28          | 27.5                |
| 47             | 3              | 28             | 28                  |
| 48             | 3              | 26.5-28        | 27.5                |
| 49             | 2              | 26.5-28        | 27                  |
| 50             | 2              | 28             | 28                  |
| 51             | 2              | 24-26          | 25                  |
| 52             | 2              | 26.5-28        | 27                  |
| 53             | 3              | 16-28          | 24                  |

continued...



APPENDIX II, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS (AREA 1)

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 54             | 3              | 26-28          | 27                  |
| 55             | 4              | 25-28          | 26.5                |
| 56             | 4              | 24-28          | 26.5                |
| 57             | 3              | 26.5-27.5      | 27                  |
| 58             | 4              | 26-27          | 26.5                |
| 59             | 3              | 26.5-27        | 27                  |
| 60             | 4              | 24-27          | 26                  |
| 61             | 4              | 24-26.5        | 25.5                |
| 62             | 4              | 20-26.5        | 24.5                |
| 63             | 2              | 22-26.5        | 24                  |
| 64             | 4              | 3-24           | 17.5                |
| 65             | 2              | 23.5-26.5      | 25                  |
| 66             | 4              | 23.5-26.5      | 25.5                |
| 67             | 4              | 23-27          | 25                  |
| 68             | 4              | 24-27          | 25.5                |
| 69             | 3              | 24-26.5        | 25.5                |
| 70             | 2              | 25             | 25                  |
| 71             | 2              | 22.5-25        | 24                  |
| 72             | 4              | 25-28          | 26.5                |
| 73             | 4              | 26-28          | 26.5                |
| 74             | 4              | 26-28          | 27                  |
| 75             | 4              | 26-28          | 27                  |
| 76             | 4              | 26.5-28        | 27                  |
| 77             | 4              | 26.5-28        | 27                  |
| 78             | 4              | 27-28          | 27.5                |
| 79             | 4              | 26.5-28        | 27                  |

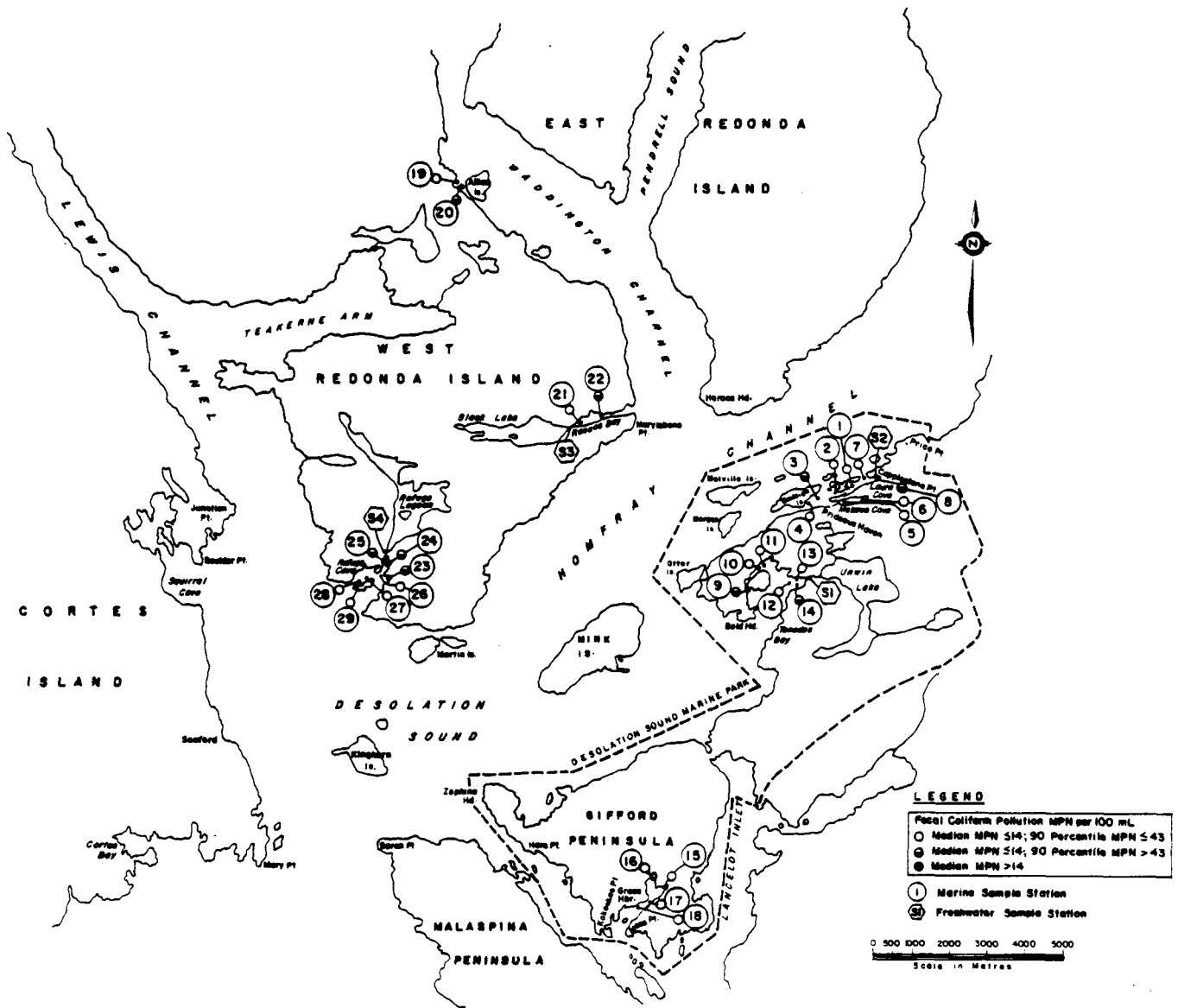
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APPENDIX II, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS (AREA 1)

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 80             | 4              | 26-28          | 27                  |
| 81             | 4              | 26-28          | 27                  |
| 82             | 4              | 26-28          | 27.5                |
| 83             | 2              | 26-28          | 27                  |
| 84             | 4              | 27-28          | 28                  |
| 85             | 4              | 26.5-28        | 27.5                |
| 86             | 4              | 26-28          | 27.5                |
| 87             | 4              | 26.5-28        | 27.5                |

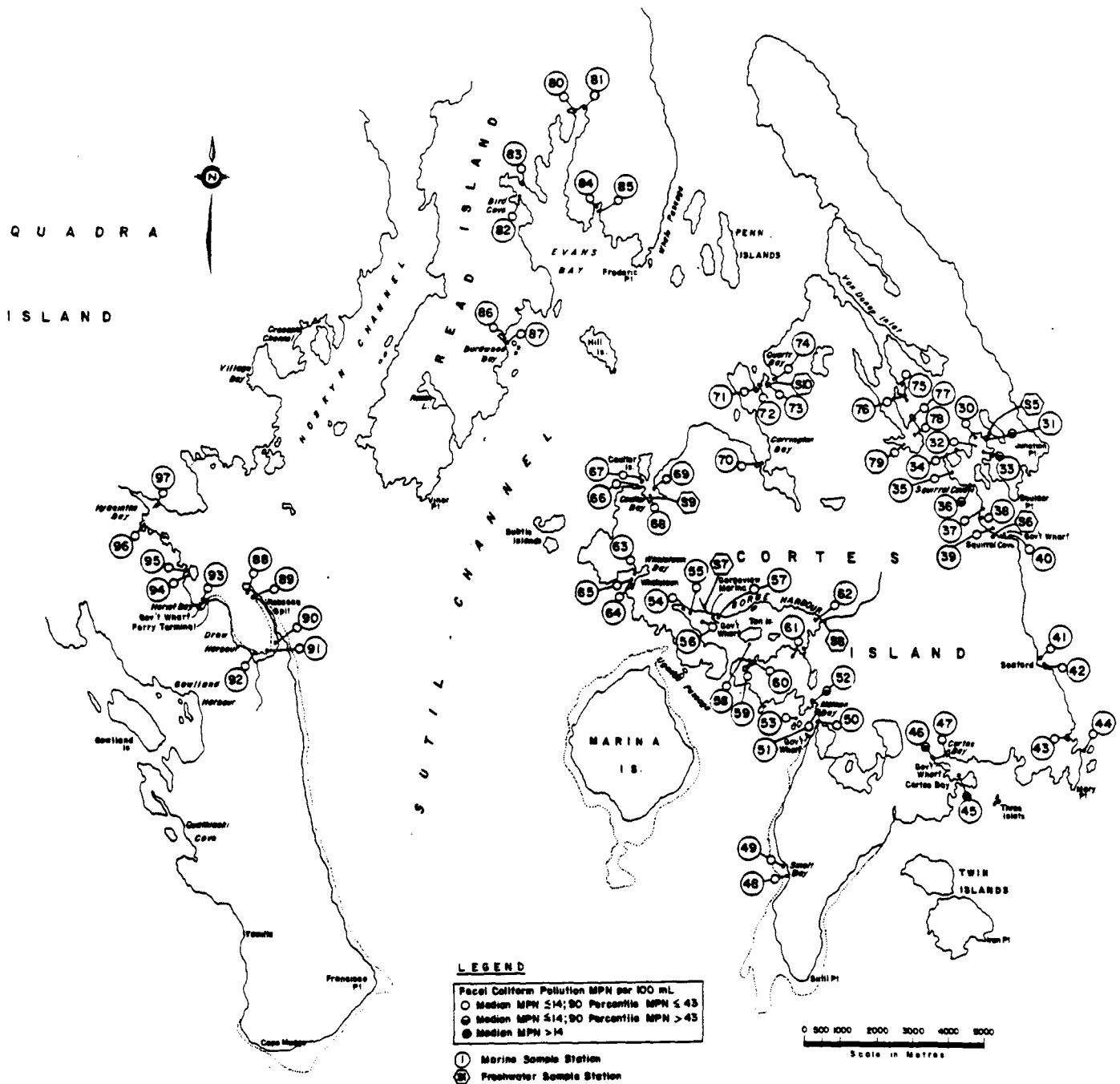
APPENDIX III

AREA II FIGURES



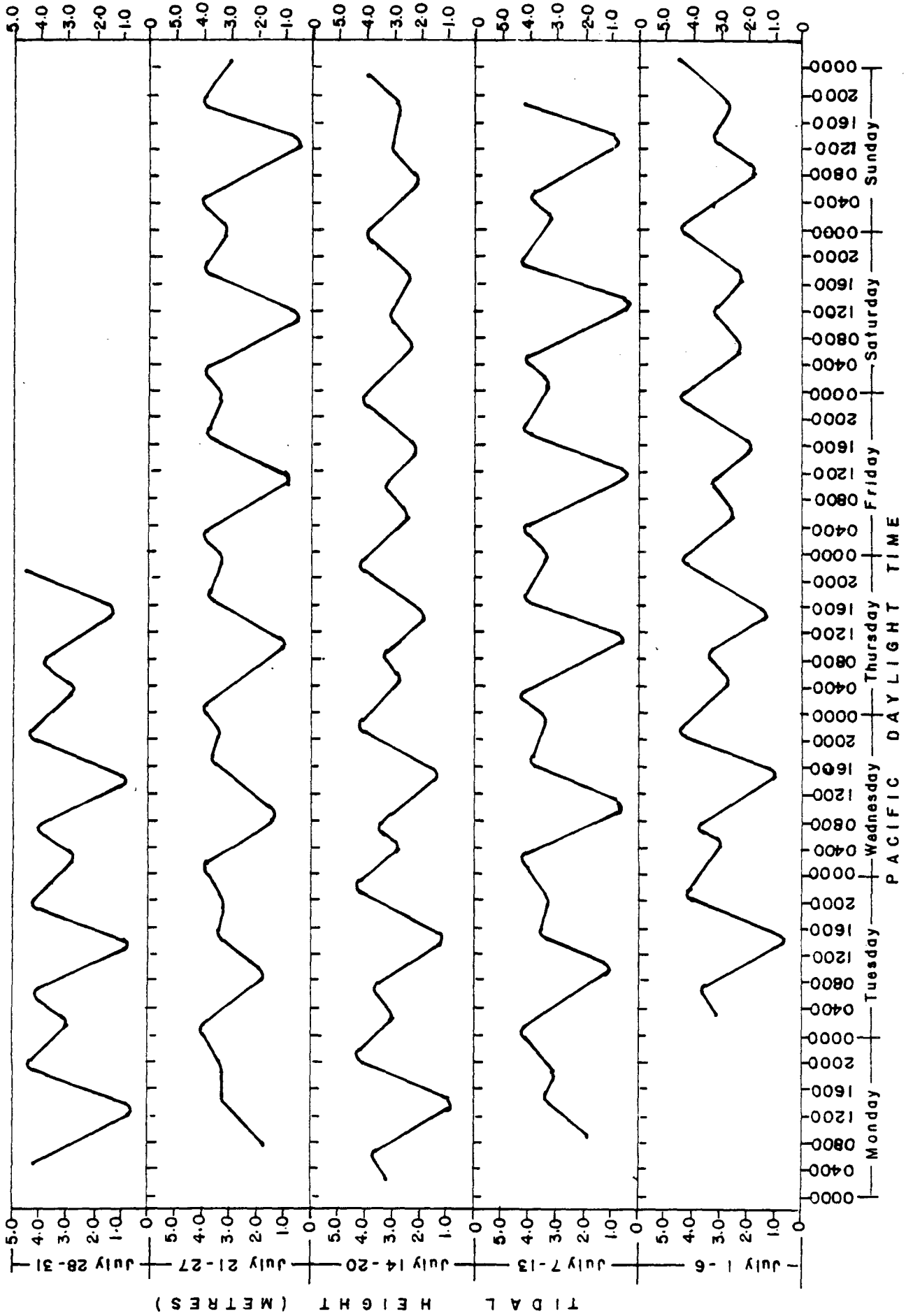
### APPENDIX III

FIGURE 1 MARINE AND FRESHWATER SAMPLE STATION LOCATIONS - PRIDEAUX HAVEN, TENEDOS BAY, GRACE HARBOUR AND WEST REDONDA ISLAND

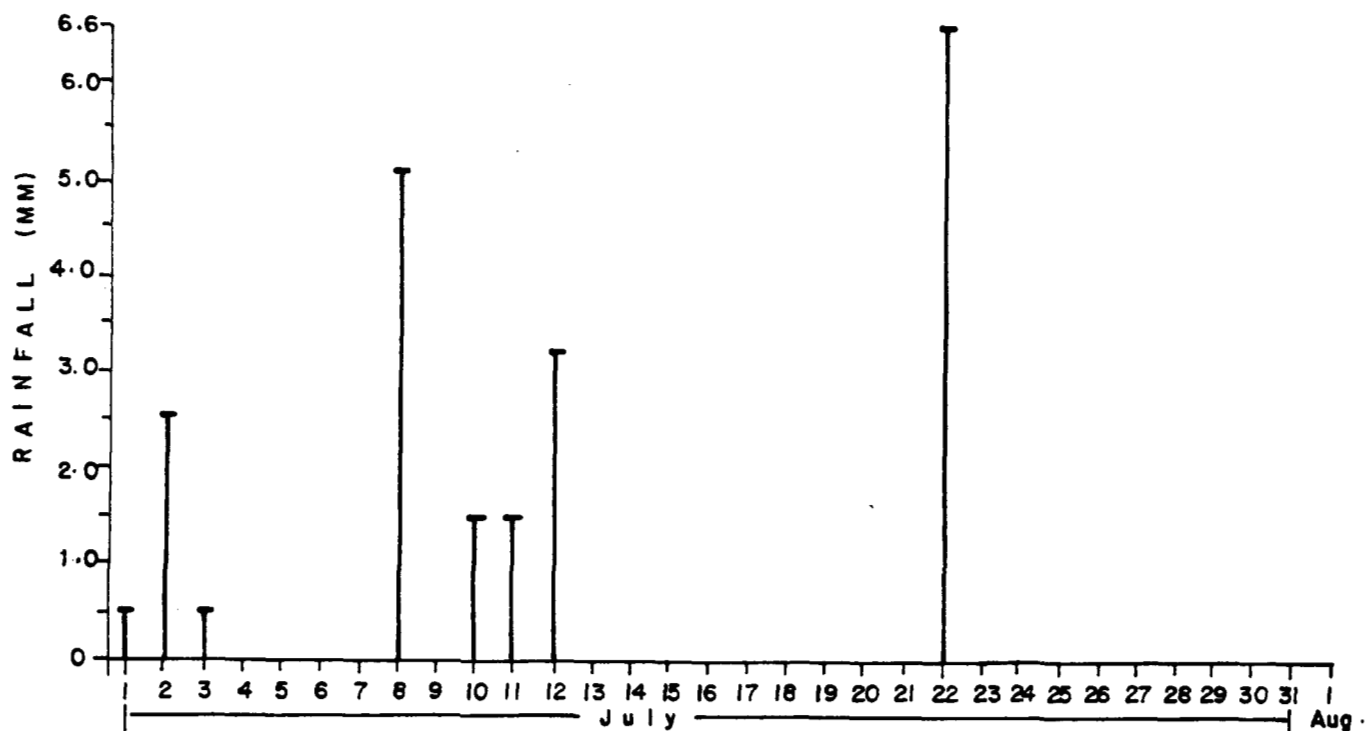


### APPENDIX III

**FIGURE 2 MARINE AND FRESHWATER SAMPLE STATION LOCATIONS - CORTES, READ AND QUADRA ISLANDS**



APPENDIX III  
FIGURE 3 TIDAL HEIGHT GRAPH - CAMPBELL RIVER, July 1 - 31, 1980



APPENDIX III  
FIGURE 4

RAINFALL DATA - CAMPBELL RIVER -  
July 1 - August 1, 1980

APPENDIX IV

AREA II TABLES



APPENDIX IV, Table 1: MARINE SAMPLE STATION COORDINATES (Area II)

| Sample Station | Latitude (North) | Longitude (West) | Area           |
|----------------|------------------|------------------|----------------|
| 1              | 50°08.70'        | 124°40.30'       | Prideaux Haven |
| 2              | 50°08.60'        | 124°41.20'       | "              |
| 3              | 50°08.55'        | 124°41.05'       | "              |
| 4              | 50°08.45'        | 124°41.35'       | "              |
| 5              | 50°08.55'        | 124°40.60'       | Melanie Cove   |
| 6              | 50°08.55'        | 124°40.20'       | "              |
| 7              | 50°08.80'        | 124°40.00'       | Laura Cove     |
| 8              | 50°08.80'        | 124°39.90'       | "              |
| 9              | 50°07.35'        | 124°42.60'       | Tenedos Bay    |
| 10             | 50°07.50'        | 124°42.45'       | "              |
| 11             | 50°07.55'        | 124°42.35'       | "              |
| 12             | 50°07.35'        | 124°41.75'       | "              |
| 13             | 50°07.40'        | 124°41.50'       | "              |
| 14             | 50°07.35'        | 124°41.50'       | "              |
| 15             | 50°03.15'        | 124°44.40'       | Grace Harbour  |
| 16             | 50°03.25'        | 124°44.60'       | "              |
| 17             | 50°02.95'        | 124°44.65'       | "              |
| 18             | 50°02.90'        | 124°44.95'       | "              |
| 19             | 50°12.80'        | 124°48.90'       | Allies Island  |
| 20             | 50°12.70'        | 124°48.75'       | "              |
| 21             | 50°09.50'        | 124°46.25'       | Roscoe Bay     |
| 22             | 50°09.65'        | 124°45.70'       | "              |
| 23             | 50°07.45'        | 124°50.35'       | Refuge Cove    |
| 24             | 50°07.60'        | 124°50.30'       | "              |
| 25             | 50°07.70'        | 124°50.40'       | "              |
| 26             | 50°07.45'        | 124°50.40'       | "              |
| 27             | 50°07.40'        | 124°50.75'       | "              |
| 28             | 50°07.35'        | 124°50.90'       | "              |
| 29             | 50°07.30'        | 124°50.90'       | "              |

continued...

APPENDIX IV, Table 1: MARINE SAMPLE STATION COORDINATES (Area II)

| Sample Station | Latitude (North) | Longitude (West) | Area              |
|----------------|------------------|------------------|-------------------|
| 30             | 50°08.60'        | 124°55.20'       | Squirrel Cove     |
| 31             | 50°08.55'        | 124°55.00'       | "                 |
| 32             | 50°08.45'        | 124°55.30'       | "                 |
| 33             | 50°08.35'        | 124°54.95'       | "                 |
| 34             | 50°08.35'        | 124°55.65'       | "                 |
| 35             | 50°07.90'        | 124°55.60'       | "                 |
| 36             | 50°07.80'        | 124°55.20'       | "                 |
| 37             | 50°07.50'        | 124°55.10'       | "                 |
| 38             | 50°07.40'        | 124°55.10'       | "                 |
| 39             | 50°07.15'        | 124°54.75'       | "                 |
| 40             | 50°07.10'        | 124°54.70'       | "                 |
| 41             | 50°05.35'        | 124°53.80'       | Seaford           |
| 42             | 50°05.25'        | 124°53.75'       | "                 |
| 43             | 50°04.20'        | 124°53.15'       | South Eastern Tip |
| 44             | 50°04.00'        | 124°52.80'       | of Cortes Island  |
| 45             | 50°03.40'        | 124°55.70'       | Cortes Bay        |
| 46             | 50°03.80'        | 124°56.20'       | "                 |
| 47             | 50°03.90'        | 124°55.90'       | "                 |
| 48             | 50°02.05'        | 124°59.50'       | Smelt Bay         |
| 49             | 50°02.20'        | 124°59.50'       | "                 |
| 50             | 50°04.35'        | 124°58.90'       | Manson Bay        |
| 51             | 50°04.55'        | 124°58.90'       | "                 |
| 52             | 50°04.60'        | 124°59.00'       | "                 |
| 53             | 50°04.40'        | 124°59.25'       | "                 |
| 54             | 50°06.10'        | 125°01.95'       | Gorge Harbour     |
| 55             | 50°06.50'        | 125°01.70'       | "                 |
| 56             | 50°05.90'        | 125°01.40'       | "                 |
| 57             | 50°05.90'        | 125°00.90'       | "                 |
| 58             | 50°05.60'        | 125°00.30'       | "                 |

continued...

APPENDIX IV, Table 1: MARINE SAMPLE STATION COORDINATES (Area II)

| Sample Station | Latitude (North) | Longitude (West) | Area            |
|----------------|------------------|------------------|-----------------|
| 59             | 50°05.25'        | 125°00.45'       | Gorge Harbour   |
| 60             | 50°05.25'        | 125°00.30'       | "               |
| 61             | 50°05.50'        | 124°59.20'       | "               |
| 62             | 50°05.95'        | 124°58.80'       | "               |
| 63             | 50°06.55'        | 125°02.85'       | Whaletown Bay   |
| 64             | 50°06.40'        | 125°03.00'       | "               |
| 65             | 50°06.45'        | 125°02.90'       | "               |
| 66             | 50°07.85'        | 125°02.70'       | Coulter Bay     |
| 67             | 50°07.95'        | 125°02.70'       | "               |
| 68             | 50°07.70'        | 125°02.55'       | "               |
| 69             | 50°07.75'        | 125°02.45'       | "               |
| 70             | 50°08.10'        | 125°00.00'       | Carrington Bay  |
| 71             | 50°09.25'        | 125°00.15'       | Quartz Bay      |
| 72             | 50°09.35'        | 124°59.90'       | "               |
| 73             | 50°09.35'        | 124°59.85'       | "               |
| 74             | 50°09.40'        | 124°59.75'       | "               |
| 75             | 50°09.35'        | 124°56.90'       | Von Donop Inlet |
| 76             | 50°09.20'        | 124°56.90'       | "               |
| 77             | 50°08.80'        | 124°56.70'       | "               |
| 78             | 50°08.60'        | 124°56.65'       | "               |
| 79             | 50°08.45'        | 124°56.80'       | "               |
| 80             | 50°13.25'        | 125°04.20'       | North Arm Evans |
| 81             | 50°13.30'        | 125°04.05'       | Bay             |
| 82             | 50°12.05'        | 125°05.50'       | Bird Cove       |
| 83             | 50°12.15'        | 125°05.40'       | "               |
| 84             | 50°11.90'        | 125°03.75'       | Evans Bay       |
| 85             | 50°11.85'        | 125°03.70'       | "               |
| 86             | 50°10.05'        | 125°05.80'       | Burdwood Bay    |
| 87             | 50°09.95'        | 125°05.80'       | "               |

continued...

APPENDIX IV, Table 1: MARINE SAMPLE STATION COORDINATES (Area II)

| Sample Station | Latitude (North) | Longitude (West) | Area          |
|----------------|------------------|------------------|---------------|
| 88             | 50°06.35'        | 125°11.50'       | Drew Harbour  |
| 89             | 50°06.25'        | 125°11.45'       | "             |
| 90             | 50°05.60'        | 125°10.95'       | "             |
| 91             | 50°05.45'        | 125°11.15'       | "             |
| 92             | 50°05.40'        | 125°11.45'       | "             |
| 93             | 50°06.20'        | 125°12.60'       | Heriot Bay    |
| 94             | 50°06.60'        | 125°12.90'       | "             |
| 95             | 50°06.80'        | 125°12.90'       | "             |
| 96             | 50°07.30'        | 125°13.90'       | Hyacinthe Bay |
| 97             | 50°07.55'        | 125°13.70'       | "             |

APPENDIX IV Table 2: FRESHWATER SAMPLE STATION DESCRIPTIONS  
(Area II)

| STATION NO.                    | DESCRIPTION  | RECEIVING WATER               |
|--------------------------------|--|-------------------------------|
| S1                             | stream drainign Unwin Lake   | Tenedos Bay                   |
| S2                             | stream entering east end of Laura Cove                                 | Laura Cove,<br>Prideaux Haven |
| S3                             | stream draining Black Lake   | Roscoe Bay                    |
| S4                             | stream draining Refuge Lagoon  | Refuge Cove                   |
| S5                             | stream draining Lagoon, Squirrel Cove                                  | Squirrel Cove                 |
| S6                             | stream entering near gov't wharf,<br>Squirrel Cove                     | Squirrel Cove                 |
| S7                             | stream entering at Gorge View Marina                                   | Gorge Harbour                 |
| S8                             | stream entering at east end of Gorge<br>Harbour                        | Gorge Harbour                 |
| S9                             | stream entering at marine station #68                                  | Coulter Bay                   |
| S10                            | stream entering at marine station #74                                  | Quartz Bay                    |
| <u>Miscellaneous stations:</u> |  |                               |
| HB1                            | unnamed creek entering 200m west of<br>gov't wharf                     | Heriot Bay                    |
| HB2                            | unnamed creek at main gravel road<br>entering at head of Hyacinthe Bay | Hyacinthe Bay                 |
| HB3                            | Drew Creek - culvert exit at main road                                 | Drew Harbour                  |
| S7U                            | S7 upstream of Gorge View Marina at<br>main road                       | Gorge Harbour                 |
| S8U                            | S8 upstream at road  | Gorge Harbour                 |

APPENDIX IV, Table 3: SUMMARY OF FECAL COLIFORM MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Station | No. of<br>Samples | MPN<br>Range | MPN per 100 ml<br>Median<br>90 PCT | Station | No. of<br>Samples | MPN<br>Range | MPN per 100 ml<br>Median<br>90 PCT |
|---------|-------------------|--------------|------------------------------------|---------|-------------------|--------------|------------------------------------|
| 1       | 8                 | L2-23        | 3                                  | 26      | 6                 | L2-79        | L2 34.6                            |
| 2       | 8                 | L2-7         | 2                                  | 27      | 6                 | L2-11        | L2 4.4                             |
| 3       | 7                 | L2-920       | L2                                 | 28      | 6                 | L2-11        | L2 4.4                             |
| 4       | 8                 | L2-33        | 2                                  | 29      | 6                 | L2-17        | L2 6.8                             |
| 5       | 9                 | L2-49        | 2                                  | 30      | 8                 | L2-33        | 3 20.2                             |
| 6       | 8                 | L2-11        | 2                                  | 31      | 8                 | L2-920       | 2 920                              |
| 7       | 7                 | L2-33        | 2                                  | 32      | 8                 | L2-23        | 2 8.6                              |
| 8       | 8                 | L2-79        | 5                                  | 33      | 7                 | L2-350       | 2 139.3                            |
| 9       | 6                 | L2-79        | L2                                 | 34      | 6                 | L2-2         | L2 2                               |
| 10      | 5                 | L2-33        | 2                                  | 35      | 6                 | L2-2         | 2 2                                |
| 11      | 5                 | L2-33        | 2                                  | 36      | 6                 | L2-130       | 3.5 58.6                           |
| 12      | 7                 | L2-2         | L2                                 | 37      | 7                 | L2-49        | 2 30.8                             |
| 13      | 7                 | L2-7         | L2                                 | 38      | 7                 | L2-70        | 2 25.2                             |
| 14      | 7                 | L2-240       | L2                                 | 39      | 7                 | L2-49        | L2 19.6                            |
| 15      | 6                 | L2-13        | L2                                 | 40      | 6                 | L2-4         | L2 2.8                             |
| 16      | 7                 | L2-11        | 2                                  | 41      | 6                 | L2-94        | L2 40.6                            |
| 17      | 6                 | L2-8         | 3.5                                | 42      | 6                 | L2-5         | 2 3.2                              |
| 18      | 6                 | L2-2         | 2                                  | 43      | 6                 | L2-49        | 2 22.6                             |
| 19      | 6                 | L2-49        | L2                                 | 44      | 6                 | L2-5         | L2 3.2                             |
| 20      | 6                 | L2-49        | 3                                  | 45      | 6                 | L2-110       | 22 91.4                            |
| 21      | 5                 | L2-5         | 2                                  | 46      | 6                 | L2-110       | 10.5 63.8                          |
| 22      | 5                 | L2-1600      | L2                                 | 47      | 6                 | L2-79        | 2.5 39.4                           |
| 23      | 6                 | L2-1600      | 12.5                               | 48      | 6                 | L2-49        | 5 39.4                             |
| 24      | 6                 | L2-1600      | 2                                  | 49      | 6                 | L2-13        | L2 10                              |
| 25      | 6                 | L2-540       | 4.5                                | 50      | 6                 | L2-8         | L2 5.6                             |

L = less than

(Continued)

APPENDIX IV, Table 3: SUMMARY OF FECAL COLIFORM MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Station | No. of<br>Samples | MPN<br>Range | MPN<br>Median | MPN per 100 ml<br>90 PCT | Station | No. of<br>Samples | MPN<br>Range | MPN<br>Median | MPN per 100 ml<br>90 PCT |
|---------|-------------------|--------------|---------------|--------------------------|---------|-------------------|--------------|---------------|--------------------------|
| 51      | 6                 | 5-130        | 20.5          | 71.3                     | 75      | 5                 | L2-13        | 2             | 7.5                      |
| 52      | 6                 | L2-33        | 6             | 18                       | 76      | 5                 | L2-23        | L2            | 17                       |
| 53      | 6                 | L2-8         | 6             | 8                        | 77      | 6                 | L2-11        | L2            | 7.4                      |
| 54      | 6                 | L2-4         | L2            | 2.8                      | 78      | 6                 | L2-5         | L2            | 3.2                      |
| 55      | 6                 | L2-14        | 2             | 12.8                     | 79      | 6                 | L2-8         | 3.5           | 8                        |
| 56      | 7                 | L2-5         | L2            | 2.9                      | 80      | 6                 | L2-2         | L2            | L2                       |
| 57      | 5                 | L2-2         | L2            | 2                        | 81      | 6                 | L2-2         | L2            | L2                       |
| 58      | 5                 | L2-L2        | L2            | L2                       | 82      | 6                 | L2-L2        | L2            | L2                       |
| 59      | 6                 | L2-5         | 2             | 5                        | 83      | 6                 | L2-L2        | L2            | L2                       |
| 60      | 6                 | L2-49        | 2             | 22                       | 84      | 5                 | L2-L2        | L2            | L2                       |
| 61      | 6                 | L2-2         | L2            | L2                       | 85      | 5                 | L2-2         | L2            | L2                       |
| 62      | 6                 | L2-8         | L2            | 6.2                      | 86      | 6                 | L2-5         | L2            | 2                        |
| 63      | 6                 | L2-13        | 9.5           | 13                       | 87      | 3                 | L2-2         | L2            | L2                       |
| 64      | 6                 | L2-33        | 2             | 17.4                     | 88      | 6                 | L2-2         | L2            | L2                       |
| 65      | 6                 | L2-5         | L2            | 3.2                      | 89      | 6                 | L2-13        | L2            | 8.2                      |
| 66      | 6                 | L2-L2        | L2            | L2                       | 90      | 6                 | L2-2         | L2            | L2                       |
| 67      | 5                 | L2-L2        | L2            | L2                       | 91      | 6                 | L2-11        | L2            | 7.4                      |
| 68      | 6                 | L2-2         | L2            | L2                       | 92      | 6                 | L2-5         | L2            | 2                        |
| 69      | 6                 | L2-2         | L2            | 2                        | 93      | 6                 | L2-2         | L2            | L2                       |
| 70      | 6                 | L2-L2        | L2            | L2                       | 94      | 7                 | L2-14        | L2            | 4.2                      |
| 71      | 6                 | L2-8         | L2            | 3.2                      | 95      | 5                 | L2-17        | L2            | 8.5                      |
| 72      | 6                 | L2-23        | L2            | 12.2                     | 96      | 5                 | L2-L2        | L2            | L2                       |
| 73      | 6                 | L2-17        | L2            | 6.8                      | 97      | 6                 | L2-13        | L2            | 7.6                      |
| 74      | 6                 | L2-7         | L2            | 5.2                      |         |                   |              |               |                          |

L = less than

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 1              | July 08    | --   | 4         | 5              | July 08    | --   | 13        |
|                | 09         | --   | 2         |                | 09         | --   | L2        |
|                | 11         | 1150 | 23        |                | 11         | 1135 | 23        |
|                | 14         | 1010 | 11        |                | 14         | 0955 | L2        |
|                | 15         | 1105 | 7         |                | 15         | 1050 | L2        |
|                | 16         | 1105 | L2        |                | 16         | 1105 | L2        |
|                | 26         | 1255 | L2        |                | 26         | 1045 | 5         |
|                | 27         | --   | 2         |                | 27         | --   | 2         |
|                |            |      |           |                | 29         | --   | 49        |
| 2              | July 08    | --   | L2        | 6              | July 08    | --   | 11        |
|                | 09         | --   | L2        |                | 09         | --   | L2        |
|                | 11         | 1155 | 7         |                | 11         | 1135 | 2         |
|                | 14         | 1010 | 2         |                | 14         | 1000 | L2        |
|                | 15         | 1100 | 2         |                | 15         | 1050 | 2         |
|                | 16         | 1125 | L2        |                | 16         | 1055 | 2         |
|                | 26         | 1100 | 2         |                | 26         | 1040 | 8         |
|                | 27         | --   | 2         |                | 27         | --   | 11        |
| 3              | July 09    | --   | L2        | 7              | July 09    | --   | L2        |
|                | 11         | 1125 | 920       |                | 11         | 1210 | L2        |
|                | 14         | 0950 | L2        |                | 14         | 1020 | 17        |
|                | 15         | 1040 | L2        |                | 15         | 1125 | 2         |
|                | 16         | --   | L2        |                | 16         | --   | L2        |
|                | 26         | 1030 | 11        |                | 26         | 1115 | 11        |
|                | 27         | --   | 17        |                | 27         | --   | 33        |
| 4              | July 09    | --   | 2         | 8              | July 08    | --   | 8         |
|                | 11         | 1130 | L2        |                | 09         | --   | 2         |
|                | 14         | 0950 | L2        |                | 11         | 1210 | 2         |
|                | 15         | 1040 | 5         |                | 14         | 1025 | L2        |
|                | 16         | --   | L2        |                | 15         | 1120 | 79        |
|                | 26         | 1025 | 5         |                | 16         | 1140 | L2        |
|                | 27         | --   | 33        |                | 26         | 1110 | 49        |
|                | 29         | --   | 2         |                | 27         | --   | 79        |

continued...



APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        |   | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|---|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |   |                | Date       | Time | MPN/100ml |
| 9              | July 08    | --   | L2        | : | 13             | July 08    | --   | L2        |
|                | 09         | --   | L2        |   |                | 09         | --   | 2         |
|                | 11         | 1100 | L2        |   |                | 11         | 1040 | 2         |
|                | 14         | --   | --        |   |                | 14         | 0915 | L2        |
|                | 15         | 1015 | 49        |   |                | 15         | 0955 | 7         |
|                | 16         | --   | 2         |   |                | 16         | --   | L2        |
|                | 27         | --   | 79        |   |                | 27         | --   | L2        |
| 10             | July 11    | 1050 | 2         | : | 14             | July 08    | --   | L2        |
|                | 14         | 0925 | 33        |   |                | 09         | --   | 2         |
|                | 15         | 1010 | 23        |   |                | 11         | 1040 | L2        |
|                | 16         | --   | L2        |   |                | 14         | 0910 | 8         |
|                | 27         | --   | 2         |   |                | 15         | 0955 | 2         |
|                |            |      |           |   |                | 16         | --   | 5         |
|                |            |      |           |   |                | 27         | --   | 240       |
| 11             | July 11    | 1050 | L2        | : | 15             | July 08    | --   | L2        |
|                | 14         | 0925 | 11        |   |                | 09         | --   | L2        |
|                | 15         | 1010 | 2         |   |                | 11         | 1000 | 8         |
|                | 16         | --   | L2        |   |                | 14         | 0830 | L2        |
|                | 27         | --   | 33        |   |                | 15         | 0910 | 13        |
|                |            |      |           |   |                | 16         | --   | 2         |
| 12             | July 08    | --   | 2         | : | 16             | July 08    | --   | L2        |
|                | 09         | --   | L2        |   |                | 09         | --   | 2         |
|                | 11         | 1045 | L2        |   |                | 11         | 1005 | 5         |
|                | 14         | 0920 | L2        |   |                | 14         | 0835 | 8         |
|                | 15         | 1000 | L2        |   |                | 15         | 0920 | 11        |
|                | 16         | --   | L2        |   |                | 16         | --   | L2        |
|                | 27         | --   | L2        |   |                | 27         | --   | 2         |

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APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 17             | July 08    | --   | L2        | 21             | July 08    | --   | 5         |
|                | 09         | --   | 8         |                | 09         | --   | 2         |
|                | 11         | 1010 | 8         |                | 14         | 1010 | 2         |
|                | 14         | 0840 | 5         |                | 15         | 1110 | L2        |
|                | 15         | 0920 | 2         |                | 16         | 1115 | 5         |
|                | 16         | --   | L2        |                |            |      |           |
| 18             | July 08    | --   | L2        | 22             | July 08    | --   | L2        |
|                | 09         | --   | L2        |                | 09         | --   | L2        |
|                | 11         | 1010 | 2         |                | 14         | 1015 | 1600      |
|                | 14         | 0845 | 2         |                | 15         | --   | 4         |
|                | 15         | 0925 | 2         |                | 16         | 1120 | L2        |
|                | 16         | --   | 2         |                |            |      |           |
| 19             | July 08    | --   | L2        | 23             | July 08    | --   | 2         |
|                | 09         | --   | L2        |                | 09         | 1055 | 2         |
|                | 11         | 1140 | L2        |                | 11         | 1230 | 280       |
|                | 14         | 1035 | L2        |                | 14         | 1140 | L2        |
|                | 15         | 1045 | 49        |                | 15         | --   | 1600      |
|                | 16         | 1055 | L2        |                | 16         | 1200 | 23        |
| 20             | July 08    | --   | 49        | 24             | July 08    | --   | 2         |
|                | 09         | --   | 2         |                | 09         | 1045 | L2        |
|                | 11         | 1140 | 4         |                | 11         | 1220 | 2         |
|                | 14         | 1040 | 2         |                | 14         | 1135 | L2        |
|                | 15         | 1045 | 49        |                | 15         | 1150 | 1600      |
|                | 16         | 1050 | L2        |                | 16         | 1150 | 5         |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 25             | July 08    | --   | 4         | 29             | July 08    | --   | L2        |
|                | 09         | 1045 | 2         |                | 09         | 1030 | L2        |
|                | 11         | 1220 | L2        |                | 11         | 1210 | 17        |
|                | 14         | 1135 | 17        |                | 14         | 1125 | L2        |
|                | 15         | 1155 | 540       |                | 15         | 1140 | L2        |
|                | 16         | --   | 5         |                | 16         | 1140 | L2        |
| 26             | July 08    | --   | L2        | 30             | July 08    | --   | L2        |
|                | 09         | 1040 | 5         |                | 09         | 1145 | L2        |
|                | 11         | 1215 | L2        |                | 11         | 1040 | 17        |
|                | 14         | 1130 | L2        |                | 14         | 0930 | 33        |
|                | 15         | 1145 | 79        |                | 15         | 0955 | 8         |
|                | 16         | 1150 | L2        |                | 16         | --   | 2         |
| 27             | July 08    | --   | L2        |                | 26         | 1230 | 2         |
|                | 09         | 1040 | L2        |                | 27         | --   | 4         |
|                | 11         | 1210 | L2        | 31             | July 08    | --   | L2        |
|                | 14         | 1125 | L2        |                | 09         | 1135 | 2         |
|                | 15         | 1140 | 11        |                | 11         | 1040 | 920       |
|                | 16         | 1145 | L2        |                | 14         | 0935 | 2         |
| 28             | July 08    | --   | L2        |                | 15         | 0950 | 920       |
|                | 09         | 1035 | L2        |                | 16         | 1000 | L2        |
|                | 11         | 1210 | L2        |                | 26         | 1230 | 2         |
|                | 14         | 1125 | L2        |                | 27         | --   | 33        |
|                | 15         | 1140 | 11        | 32             | July 08    | --   | L2        |
|                | 16         | 1145 | L2        |                | 09         | 1150 | L2        |
| 29             | July 08    | --   | L2        |                | 11         | 1035 | 2         |
|                | 09         | 1035 | L2        |                | 14         | 0930 | 2         |
|                | 11         | 1210 | L2        |                | 15         | 0945 | 5         |
|                | 14         | 1125 | L2        |                | 16         | 0955 | L2        |
|                | 15         | 1140 | 11        |                | 26         | 1150 | 2         |
|                | 16         | 1145 | L2        |                | 27         | --   | 23        |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 33             | July 09    | 1130 | L2        |  | 37             | July 08    | --   | L2        |
|                | 11         | 1045 | 7         |  |                | 09         | 1200 | 2         |
|                | 14         | 0940 | 2         |  |                | 11         | 1020 | 23        |
|                | 15         | 0955 | 49        |  |                | 14         | 0910 | L2        |
|                | 16         | 1010 | 350       |  |                | 15         | 0925 | 49        |
|                | 26         | 1235 | L2        |  |                | 16         | 0935 | L2        |
|                | 27         | --   | L2        |  |                | 30         | 0950 | 2         |
| 34             | July 09    | 1155 | L2        |  | 38             | July 08    | --   | 2         |
|                | 11         | 1030 | L2        |  |                | 09         | 1210 | L2        |
|                | 14         | 0925 | 2         |  |                | 11         | 1020 | 2         |
|                | 15         | 0935 | L2        |  |                | 14         | 0910 | 6         |
|                | 16         | 0950 | L2        |  |                | 15         | 0925 | 70        |
|                | 30         | 1010 | L2        |  |                | 16         | 0935 | L2        |
|                |            |      |           |  |                | 30         | 0950 | L2        |
| 35             | July 09    | 1200 | 2         |  | 39             | July 08    | --   | L2        |
|                | 11         | 1025 | 2         |  |                | 09         | 1210 | L2        |
|                | 14         | 0920 | L2        |  |                | 11         | 1015 | 7         |
|                | 15         | 0930 | 2         |  |                | 14         | 0905 | L2        |
|                | 16         | 0945 | 2         |  |                | 15         | 0920 | 49        |
|                | 30         | 1000 | L2        |  |                | 16         | 0930 | 2         |
|                |            |      |           |  |                | 30         | 0945 | L2        |
| 36             | July 09    | 1200 | L2        |  | 40             | July 08    | --   | L2        |
|                | 11         | 1020 | 11        |  |                | 09         | 1215 | L2        |
|                | 14         | 0915 | 5         |  |                | 11         | 1015 | 2         |
|                | 15         | 0930 | 130       |  |                | 14         | 0905 | 4         |
|                | 16         | 0940 | 2         |  |                | 15         | 0920 | L2        |
|                | 30         | 1000 | L2        |  |                | 16         | 0930 | 2         |
|                |            |      |           |  |                |            |      |           |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 41             | July 09    | 1245 | L2        |  | 45             | July 09    | 1310 | 8         |
|                | 11         | 1005 | L2        |  |                | 11         | 0930 | 79        |
|                | 14         | 0855 | L2        |  |                | 14         | 0835 | 21        |
|                | 15         | 0910 | 94        |  |                | 15         | 0845 | 110       |
|                | 16         | 0920 | 5         |  |                | 16         | 0900 | 23        |
|                | 30         | 0940 | L2        |  |                | 26         | 1310 | L2        |
| 42             | July 09    | 1245 | 2         |  | 46             | July 09    | 1320 | L2        |
|                | 11         | 1005 | 2         |  |                | 11         | 0940 | 33        |
|                | 14         | 0855 | L2        |  |                | 14         | 0810 | 13        |
|                | 15         | 0910 | L2        |  |                | 15         | 0835 | 110       |
|                | 16         | 0920 | 2         |  |                | 16         | 0815 | 8         |
|                | 30         | 0940 | 5         |  |                | 26         | 1305 | L2        |
| 43             | July 09    | 1250 | L2        |  | 47             | July 09    | 1325 | L2        |
|                | 11         | 0955 | 2         |  |                | 11         | 0945 | 13        |
|                | 14         | 0845 | 2         |  |                | 14         | 0800 | 5         |
|                | 15         | 0905 | 49        |  |                | 15         | 0835 | 79        |
|                | 16         | 0915 | L2        |  |                | 16         | 0855 | L2        |
|                | 30         | 0930 | 5         |  |                | 26         | 1305 | L2        |
| 44             | July 09    | 1255 | L2        |  | 48             | July 17    | 0755 | 33        |
|                | 11         | 0955 | 5         |  |                | 18         | --   | 49        |
|                | 14         | 0845 | L2        |  |                | 21         | --   | 5         |
|                | 15         | 0900 | L2        |  |                | 23         | 0800 | 5         |
|                | 16         | 0910 | 2         |  |                | 24         | 0735 | L2        |
|                | 30         | 0925 | 2         |  |                | 25         | 0750 | L2        |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 49             | July 17    | 0755 | 13        | 53             | July 17    | 0825 | 5         |
|                | 18         | --   | 8         |                | 18         | 0845 | 7         |
|                | 21         | --   | L2        |                | 21         | --   | 8         |
|                | 23         | 0800 | L2        |                | 23         | 0820 | 8         |
|                | 24         | 0740 | 2         |                | 24         | 0755 | 5         |
|                | 25         | 0755 | L2        |                | 25         | 0815 | L2        |
| 50             | July 17    | 0810 | L2        | 54             | July 17    | 0840 | 4         |
|                | 18         | 0835 | 8         |                | 18         | 0900 | L2        |
|                | 21         | --   | 4         |                | 21         | --   | 2         |
|                | 23         | 0810 | L2        |                | 23         | 0845 | 2         |
|                | 24         | 0750 | L2        |                | 24         | 0830 | L2        |
|                | 25         | 0835 | L2        |                | 25         | 0905 | L2        |
| 51             | July 17    | 0815 | 11        | 55             | July 17    | 0930 | 2         |
|                | 18         | 0835 | 130       |                | 18         | 0905 | L2        |
|                | 21         | --   | 27        |                | 21         | --   | 2         |
|                | 23         | 0815 | 14        |                | 23         | 0840 | 14        |
|                | 24         | 0755 | 5         |                | 24         | 0825 | 2         |
|                | 25         | 0810 | 33        |                | 25         | 0905 | 12        |
| 52             | July 17    | 0820 | L2        | 56             | July 17    | 0935 | 2         |
|                | 18         | 0845 | 2         |                | 18         | 0905 | L2        |
|                | 21         | --   | 8         |                | 21         | --   | L2        |
|                | 23         | 0815 | 33        |                | 23         | 0840 | L2        |
|                | 24         | 0755 | 5         |                | 24         | 0825 | L2        |
|                | 25         | 0810 | 7         |                | 25         | 0900 | 5         |
|                |            |      |           |                | 26         | 1430 | L2        |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        |   | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|---|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |   |                | Date       | Time | MPN/100ml |
| 57             | July 18    | 0910 | L2        | : | 61             | July 17    | 0955 | L2        |
|                | 21         | --   | 2         |   |                | 18         | 0930 | L2        |
|                | 23         | 0845 | 2         |   |                | 21         | --   | L2        |
|                | 24         | 0825 | L2        |   |                | 23         | 0855 | 2         |
|                | 25         | 0855 | L2        |   |                | 24         | 0810 | L2        |
|                |            |      |           |   |                | 25         | 0840 | L2        |
| 58             | July 18    | 0915 | L2        | : | 62             | July 17    | 1000 | 5         |
|                | 21         | --   | L2        |   |                | 18         | 0935 | L2        |
|                | 23         | 0850 | L2        |   |                | 21         | --   | L2        |
|                | 24         | 0800 | L2        |   |                | 23         | 0900 | 2         |
|                | 25         | 0830 | L2        |   |                | 24         | 0810 | 8         |
|                |            |      |           |   |                | 25         | 0850 | L2        |
| 59             | July 17    | 0945 | 4         | : | 63             | July 17    | 1030 | 8         |
|                | 18         | 0920 | L2        |   |                | 18         | 1000 | L2        |
|                | 21         | --   | 5         |   |                | 21         | --   | 13        |
|                | 23         | 0850 | 5         |   |                | 23         | 0920 | 11        |
|                | 24         | 0800 | L2        |   |                | 24         | 0910 | L2        |
|                | 25         | 0825 | L2        |   |                | 25         | 0920 | 13        |
| 60             | July 17    | 0945 | 49        | : | 64             | July 17    | 1035 | L2        |
|                | 18         | 0920 | L2        |   |                | 18         | 0950 | L2        |
|                | 21         | --   | 4         |   |                | 21         | --   | 2         |
|                | 23         | 0850 | 2         |   |                | 23         | 0920 | 33        |
|                | 24         | 0805 | L2        |   |                | 24         | 0905 | 2         |
|                | 25         | 0830 | 2         |   |                | 25         | 0925 | 7         |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |                | Date       | Time | MPN/100ml |
| 65             | July 17    | 1035 | L2        | 69             | July 17    | 1105 | L2        |
|                | 18         | 0950 | L2        |                | 18         | 1015 | L2        |
|                | 21         | --   | 2         |                | 21         | --   | L2        |
|                | 23         | 0920 | 5         |                | 23         | 0935 | 2         |
|                | 24         | 0905 | L2        |                | 24         | 0925 | L2        |
|                | 25         | 0920 | L2        |                | 25         | 0940 | 2         |
| 66             | July 17    | 1055 | L2        | 70             | July 17    | 1120 | L2        |
|                | 18         | 1010 | L2        |                | 18         | 1045 | L2        |
|                | 21         | --   | L2        |                | 21         | --   | L2        |
|                | 23         | 0950 | L2        |                | 23         | 1000 | L2        |
|                | 24         | 0920 | L2        |                | 24         | 0945 | L2        |
|                | 25         | 0935 | L2        |                | 25         | 0950 | L2        |
| 67             | July 18    | 1015 | L2        | 71             | July 17    | 1135 | L2        |
|                | 21         | --   | L2        |                | 18         | 1045 | L2        |
|                | 23         | 0950 | L2        |                | 21         | --   | L2        |
|                | 24         | 0920 | L2        |                | 23         | 1010 | 8         |
|                | 25         | 0935 | L2        |                | 24         | 0955 | L2        |
| 68             | July 17    | 1055 | L2        | 72             | July 17    | 1140 | L2        |
|                | 18         | 1020 | L2        |                | 18         | 1100 | L2        |
|                | 21         | --   | L2        |                | 21         | --   | L2        |
|                | 23         | 0935 | 2         |                | 23         | 1015 | 23        |
|                | 24         | 0935 | L2        |                | 24         | 0955 | 5         |
|                | 25         | 0940 | L2        |                | 25         | 1005 | L2        |

continued...



APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample<br>Station | Collection |      | FC<br>MPN/100ml |    | Sample<br>Station | Collection |      | FC<br>MPN/100ml |    |
|-------------------|------------|------|-----------------|----|-------------------|------------|------|-----------------|----|
|                   | Date       | Time |                 |    |                   | Date       | Time |                 |    |
| 73                | July       | 17   | 1145            | L2 | 77                | July       | 17   | 1215            | L2 |
|                   |            | 18   | 1100            | L2 |                   |            | 18   | 1130            | 5  |
|                   |            | 21   | --              | L2 |                   |            | 21   | --              | L2 |
|                   |            | 23   | 1015            | 17 |                   |            | 23   | 1035            | L2 |
|                   |            | 24   | 0955            | L2 |                   |            | 24   | 1015            | 11 |
|                   |            | 25   | 1005            | L2 |                   |            | 25   | 1020            | L2 |
| 74                | July       | 17   | 1145            | L2 | 78                | July       | 17   | 1215            | 5  |
|                   |            | 18   | 1105            | L2 |                   |            | 18   | 1125            | 2  |
|                   |            | 21   | --              | L2 |                   |            | 21   | --              | L2 |
|                   |            | 23   | 1015            | 7  |                   |            | 23   | 1040            | L2 |
|                   |            | 24   | 1005            | 4  |                   |            | 24   | 1020            | L2 |
|                   |            | 25   | 1000            | L2 |                   |            | 25   | 1025            | 2  |
| 75                | July       | 18   | 1135            | L2 | 79                | July       | 17   | 1220            | L2 |
|                   |            | 21   | --              | L2 |                   |            | 18   | 1125            | 8  |
|                   |            | 23   | 1045            | 13 |                   |            | 21   | --              | 8  |
|                   |            | 24   | 1035            | 2  |                   |            | 23   | 1040            | 5  |
|                   |            | 25   | 1040            | 2  |                   |            | 24   | 1025            | L2 |
| 76                | July       | 18   | 1135            | L2 | 80                | July       | 17   | 1250            | L2 |
|                   |            | 21   | --              | 23 |                   |            | 18   | 1240            | L2 |
|                   |            | 23   | 1045            | L2 |                   |            | 21   | --              | 2  |
|                   |            | 24   | 1030            | 11 |                   |            | 23   | 1125            | L2 |
|                   |            | 25   | 1035            | L2 |                   |            | 24   | 1025            | L2 |
|                   |            |      |                 |    |                   | 25         | 1110 | L2              |    |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample<br>Station | Collection |      | FC<br>MPN/100ml |    | Sample<br>Station | Collection |      | FC<br>MPN/100ml |    |
|-------------------|------------|------|-----------------|----|-------------------|------------|------|-----------------|----|
|                   | Date       | Time |                 |    |                   | Date       | Time |                 |    |
| 81                | July       | 17   | 1250            | L2 | 85                | July       | 18   | 1225            | L2 |
|                   |            | 18   | 1240            | L2 |                   |            | 21   | --              | L2 |
|                   |            | 21   | --              | L2 |                   |            | 23   | 1110            | 2  |
|                   |            | 23   | 1125            | L2 |                   |            | 24   | 1130            | L2 |
|                   |            | 24   | 1145            | L2 |                   |            | 25   | 1100            | L2 |
|                   |            | 25   | 1110            | 2  |                   |            |      |                 |    |
| 82                | July       | 17   | 1310            | L2 | 86                | July       | 18   | 1310            | L2 |
|                   |            | 18   | 1250            | L2 |                   |            | 21   | --              | L2 |
|                   |            | 21   | --              | L2 |                   |            | 23   | 1140            | L2 |
|                   |            | 23   | 1130            | L2 |                   |            | 24   | 1200            | L2 |
|                   |            | 24   | 1150            | L2 |                   |            | 25   | 1135            | 5  |
|                   |            | 25   | 1125            | L2 |                   |            | 30   | 1145            | L2 |
| 83                | July       | 17   | 1310            | L2 | 87                | July       | 18   | 1310            | L2 |
|                   |            | 18   | 1250            | L2 |                   |            | 21   | --              | L2 |
|                   |            | 21   | --              | L2 |                   |            | 23   | --              | -- |
|                   |            | 23   | 1130            | L2 |                   |            | 24   | --              | -- |
|                   |            | 24   | 1150            | L2 |                   |            | 25   | --              | -- |
|                   |            | 25   | 1125            | L2 |                   |            | 30   | 1120            | 2  |
| 84                | July       | 18   | 1225            | L2 | 88                | July       | 17   | 1515            | L2 |
|                   |            | 21   | --              | L2 |                   |            | 18   | 0805            | L2 |
|                   |            | 23   | 1105            | L2 |                   |            | 21   | --              | L2 |
|                   |            | 24   | 1130            | L2 |                   |            | 23   | 1245            | L2 |
|                   |            | 25   | 1055            | L2 |                   |            | 24   | 1240            | 2  |
|                   |            |      |                 |    |                   | 25         | 1250 | L2              |    |

continued...

APPENDIX IV Table 4: DAILY BACTERIOLOGICAL MPN DATA FOR MARINE SAMPLE STATIONS (Area II)

| Sample Station | Collection |      | FC        |  | Sample Station | Collection |      | FC        |
|----------------|------------|------|-----------|--|----------------|------------|------|-----------|
|                | Date       | Time | MPN/100ml |  |                | Date       | Time | MPN/100ml |
| 89             | July 17    | 1510 | L2        |  | 93             | July 17    | 1440 | L2        |
|                | 18         | 0810 | L2        |  |                | 18         | 0830 | 2         |
|                | 21         | --   | 13        |  |                | 21         | --   | L2        |
|                | 23         | 1245 | 2         |  |                | 23         | 1220 | L2        |
|                | 24         | 1240 | L2        |  |                | 24         | 1230 | L2        |
|                | 25         | 1245 | 5         |  |                | 25         | 1215 | L2        |
| 90             | July 17    | 1505 | L2        |  | 94             | July 17    | 1450 | L2        |
|                | 18         | 0815 | 2         |  |                | 18         | 0830 | L2        |
|                | 21         | --   | L2        |  |                | 21         | --   | L2        |
|                | 23         | 1240 | L2        |  |                | 23         | 1215 | L2        |
|                | 24         | 1240 | L2        |  |                | 24         | 1225 | L2        |
|                | 25         | 1245 | L2        |  |                | 25         | 1210 | L2        |
| 91             | July 17    | 1500 | L2        |  | 95             | July 18    | 0835 | L2        |
|                | 18         | 0820 | 5         |  |                | 23         | 1215 | L2        |
|                | 21         | --   | L2        |  |                | 24         | 1225 | L2        |
|                | 23         | 1240 | L2        |  |                | 25         | 1210 | L2        |
|                | 24         | 1235 | L2        |  |                | 30         | 1145 | 17        |
|                | 25         | 1240 | 11        |  | 96             | July 17    | 1530 | L2        |
| 92             | July 17    | 1500 | L2        |  |                | 18         | 0840 | L2        |
|                | 18         | 0820 | L2        |  |                | 21         | --   | L2        |
|                | 21         | --   | L2        |  |                | 23         | 1200 | L2        |
|                | 23         | 1235 | L2        |  |                | 25         | 1200 | L2        |
|                | 24         | 1235 | 5         |  | 97             | July 17    | 1525 | L2        |
|                | 25         | 1240 | L2        |  |                | 18         | 0840 | 4         |
| 93             | July 17    | 1510 | L2        |  |                | 21         | --   | 13        |
|                | 18         | 0810 | L2        |  |                | 23         | 1205 | L2        |
|                | 21         | --   | 13        |  |                | 24         | 1220 | L2        |
|                | 23         | 1245 | 2         |  |                | 25         | 1200 | L2        |
|                | 24         | 1240 | L2        |  |                |            |      |           |
|                | 25         | 1245 | 5         |  |                |            |      |           |

APPENDIX IV, Table 5: SUMMARY OF BACTERIOLOGICAL RESULTS FOR FRESHWATER  
SAMPLE STATIONS (Area II)

| Sample<br>Station | No.of<br>Samples | MF Count per 100 ml |         |          |         |
|-------------------|------------------|---------------------|---------|----------|---------|
|                   |                  | FC Range            | FC Mean | FS Range | FS Mean |
| S1                | 2                | 3-17                | 10      | -        | 4*      |
| S2                | 2                | L2-2                | 2       | -        | 10*     |
| S3                | 2                | 4-7                 | 5.5     | -        | 19*     |
| S4                | 2                | 1-L2                | 1       | -        | 1*      |
| S5                | 2                | 0-2                 | 1       | -        | 3*      |
| S6                | 2                | 63-70               | 68.5    | -        | 60*     |
| S7                | 4                | 55-104              | 81.3    | 84-350   | 218.5   |
| S8                | 4                | 16-35               | 26.3    | 26-44    | 32      |
| S9                | 3                | 8-19                | 18.5    | 14-310   | 122.3   |
| S10               | 2                | 0-1                 | L1      | 1-4      | 2.5     |

\* only one sample collected

APPENDIX IV TABLE 6  
DAILY BACTERIOLOGICAL MF DATA FOR FRESHWATER  
SAMPLE STATIONS (Area II)

| STATION | DATE    | FC/100 ml | FS/100 ml |
|---------|---------|-----------|-----------|
| S1      | July 09 | 17*       | --        |
|         | 11      | 3         | 4         |
| S2      | July 09 | L2*       | --        |
|         | 11      | 2         | 10        |
| S3      | July 09 | 7*        | --        |
|         | 11      | 4         | 19        |
| S4      | July 09 | L2*       | --        |
|         | 11      | 1         | 1         |
| S5      | July 09 | L2*       | --        |
|         | 11      | 0         | 3         |
| S6      | July 09 | 63*       | --        |
|         | 11      | 70        | 66        |
| S7      | July 17 | 55        | 180       |
|         | 21      | 104       | 260       |
|         | 23      | 84        | 350       |
|         | 24      | 82        | 84        |
| S8      | July 17 | 35        | 26        |
|         | 21      | 29        | 30        |
|         | 23      | 16        | 44        |
|         | 24      | 25        | 28        |
| S9      | July 17 | 19        | 310       |
|         | 23      | 10        | 43        |
|         | 24      | 8         | 14        |
| S10     | July 17 | 1         | 1         |
|         | 23      | 0         | 4         |

\*MPN Results

APPENDIX IV, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 1              | 4              | 16-23          | 19                  |
| 2              | 4              | 16-22          | 19                  |
| 3              | 3              | 16-22          | 20                  |
| 4              | 3              | 17-22          | 20                  |
| 5              | 4              | 16-20          | 19                  |
| 6              | 4              | 16.5-22        | 19                  |
| 7              | 3              | 15.5-21        | 19                  |
| 8              | 4              | 16-20          | 18                  |
| 9              | 3              | 20-22          | 21                  |
| 10             | 3              | 23-24          | 23.5                |
| 11             | 2              | 23             | 23                  |
| 12             | 4              | 17.5-22        | 21                  |
| 13             | 4              | 18-22          | 20                  |
| 14             | 4              | 12-22          | 17                  |
| 15             | 4              | 24-26          | 25                  |
| 16             | 4              | 25-25.5        | 25                  |
| 17             | 4              | 24.5-25        | 25                  |
| 18             | 4              | 25-25.5        | 25                  |
| 19             | 4              | 13.5-18        | 16                  |
| 20             | 4              | 13.5-18        | 16                  |
| 21             | 3              | 16-21.5        | 19                  |
| 22             | 3              | 16-20          | 18                  |
| 23             | 4              | 22-23.5        | 23                  |
| 24             | 4              | 14-19.5        | 17                  |
| 25             | 4              | 14-21          | 17                  |
| 26             | 4              | 21-23          | 22                  |

continued...

APPENDIX IV, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 27             | 4              | 22-24          | 23                  |
| 28             | 4              | 22-24          | 23                  |
| 29             | 4              | 23-24          | 24                  |
| 30             | 4              | 22-24          | 23                  |
| 31             | 4              | 22-24          | 23                  |
| 32             | 3              | 22-24          | 23                  |
| 33             | 3              | 22-24          | 23                  |
| 34             | 3              | 23-24          | 23                  |
| 35             | 3              | 23-24          | 23                  |
| 36             | 3              | 21.5-23.5      | 23                  |
| 37             | 4              | 22-24          | 23                  |
| 38             | 4              | 22.5-24        | 24                  |
| 39             | 4              | 22.5-24        | 23                  |
| 40             | 4              | 22-24          | 23                  |
| 41             | 3              | 23-24          | 24                  |
| 42             | 3              | 23.5-24        | 24                  |
| 43             | 3              | 24-24.5        | 24                  |
| 44             | 3              | 24-25          | 24                  |
| 45             | 3              | 23-25          | 24                  |
| 46             | 3              | 24             | 24                  |
| 47             | 3              | 23-24          | 24                  |
| 48             | 4              | 24-25.5        | 25                  |
| 49             | 4              | 24-24.5        | 24                  |
| 50             | 4              | 23.5-24.5      | 24                  |
| 51             | 4              | 22.5-25        | 24                  |
| 52             | 4              | 23.5-24.5      | 24                  |

continued...

APPENDIX IV, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 53             | 4              | 24-25          | 24.5                |
| 54             | 4              | 25-25.5        | 25                  |
| 55             | 4              | 24.5-26        | 26                  |
| 56             | 4              | 25-25.5        | 25                  |
| 57             | 3              | 25-26          | 25.5                |
| 58             | 3              | 26             | 26                  |
| 59             | 4              | 25-26          | 26                  |
| 60             | 4              | 25-25.5        | 25                  |
| 61             | 4              | 25-25.5        | 25                  |
| 62             | 4              | 23-25          | 24                  |
| 63             | 4              | 25             | 25                  |
| 64             | 4              | 25             | 25                  |
| 65             | 4              | 25             | 25                  |
| 66             | 4              | 20-24          | 22.5                |
| 67             | 3              | 20-22.5        | 22                  |
| 68             | 4              | 19.5-24        | 22                  |
| 69             | 4              | 19-24.5        | 22                  |
| 70             | 4              | 20-23.5        | 22                  |
| 71             | 4              | 20.5-24        | 22                  |
| 72             | 4              | 18-22.5        | 21                  |
| 73             | 4              | 17-23          | 20.5                |
| 74             | 4              | 17.5-23        | 21                  |
| 75             | 3              | 22-23          | 22.5                |
| 76             | 3              | 22-24          | 23                  |
| 77             | 4              | 22-23          | 22.5                |
| 78             | 4              | 22             | 22                  |

continued...



APPENDIX IV, Table 7: SUMMARY OF SALINITY DATA FOR MARINE STATIONS

| SAMPLE STATION | NO. OF SAMPLES | SALINITY RANGE | MEAN SALINITY (ppt) |
|----------------|----------------|----------------|---------------------|
| 79             | 4              | 20-22          | 21                  |
| 80             | 4              | 22-25          | 23.5                |
| 81             | 4              | 22.5-24.5      | 23.5                |
| 82             | 4              | 22-26          | 24.5                |
| 83             | 4              | 22-26          | 24.5                |
| 84             | 3              | 22-24          | 23.5                |
| 85             | 2              | 24             | 24                  |
| 86             | 3              | 21-24          | 22.5                |
| 87             | 3              | 22-24          | 23                  |
| 88             | 4              | 23-25.5        | 24                  |
| 89             | 4              | 23-25          | 24.5                |
| 90             | 4              | 23-25          | 24.5                |
| 91             | 4              | 23-25          | 24.5                |
| 92             | 4              | 23-25.5        | 24.5                |
| 93             | 4              | 22-25          | 24                  |
| 94             | 4              | 22-25          | 24                  |
| 95             | 2              | 22-23.5        | 23                  |
| 96             | 4              | 22-25          | 23.5                |
| 97             | 4              | 6-24.5         | 19.5                |

continued...

APPENDIX V

BIOCHEMICAL CONFIRMATION RESULTS

## 1 INTRODUCTION

The accuracy of the MPN test procedure in recovering fecal coliforms, specifically Escherichia coli from the marine environment is routinely tested as part of the microbiology laboratory quality control procedure.

During shellfish surveys, a minimum of 10% of all positive (growth + gas) A-1 media tubes are subjected to biochemical identification to determine the existence of E. coli in the sample. Positive tubes are generally picked randomly unless anomolous results are observed at individual sample stations.

## 2 MATERIALS AND METHODS

Inocula from positive A-1 tubes are streaked on Levine's EMB agar to obtain isolated colonies. After 24 hours incubation on Levine's EMB, typical coliform colonies are picked for further biochemical identification. If no typical coliform colonies are present, atypical colonies are selected for biochemical screening.

All isolates are subjected to the following series of biochemical screening tests: indole, methyl red, Voges-Proskauer, citrate (collectively known as IMViC) growth at 44.5°C (lactose), motility, oxidase and ornithine decarboxylase. The procedures followed were those described in Part 908 of the Environmental Protection Service Laboratory Manual (1).

## 3 RESULTS AND DISCUSSIONS

A total of 156 isolates from study area I were biochemically screened and of these 141 (90.4%) were identified as Escherichia coli. The remainder of the isolates were not further identified to the species

level. In study area II, 221 isolates were screened and of these 172 (77.8%) were identified as Eschericia coli.

The poor recovery (77.8%) of E. coli from area II isolates was further investigated to determine whether alterations in closure areas would result if MPN values were computed on the basis of biochemical data. This computation did not generate data that would require changes in closure area boundaries.

The biochemical types obtained from the Area I and II isolates are grouped according to their reactions in the following table:

| BIOCHEMICAL TEST |    |    |   |            |    |       | Percentage    |
|------------------|----|----|---|------------|----|-------|---------------|
| I                | MR | VP | C | EC(44.5°C) | OX | Orn.D |               |
| <u>Area I:</u>   |    |    |   |            |    |       |               |
| +                | +  | -  | - | +          | -  | +/-   | 90.4(141/156) |
| +                | +  | -  | + | +          | -  | +     | 4.5(7/156)    |
| -                | -  | -  | + | -          | -  | +     | 1.3(2/156)    |
| +                | -  | -  | + | +          | -  | +     | 3.2(5/156)    |
| +                | -  | -  | + | +          | -  | -     | 0.6(1/156)    |
| <u>Area II:</u>  |    |    |   |            |    |       |               |
| +                | +  | -  | - | +          | -  | +/-   | 77.4(172/221) |
| +                | +  | -  | + | +          | -  | +     | 6.3(14/221)   |
| +                | -  | +  | + | +          | -  | +     | 4.9(11/221)   |
| -                | -  | +  | + | +          | -  | +     | 4.0(9/221)    |
| -                | -  | +  | + | +          | -  | -     | 0.9(2/221)    |
| Other            |    |    |   |            |    |       | 6.5(13/221)   |

I = indole

C = citrate

MR = methyl red

EC = lactose fermentation @44.5°C

VP = Voges Proskauer

OX = oxidase

Orn.D = ornithine decarboxilase

REFERENCES

- 1        Laboratory Manual - Environmental Protection Service, Fisheries  
         and Marine Service (Pacific Region) January 1979.