ENVIRONMENTAL ATLAS

OF THE

SOUTHERN GULF OF ST. LAWRENCE

SECTION I

CABOT STRAIT

MARINE ENVIRONMENT BRANCH

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

MARCH 1979

This environmental atlas of the Southern Gulf of St. Lawrence has been prepared by B. E. McGuire for the Marine Environment Branch of the Environmental Protection Service, Atlantic Region. The main purpose of the atlas is to provide a document which can be used in planning for and responding to oil spills in the Southern Gulf of St. Lawrence. Biological, oceanographic, meteorological and socio-economic data have been compiled from existing sources for the coastal zone of the Southern Gulf. However, some emphasis has been placed on those areas considered vulnerable to oil spills. Dr. F. C. Duerden and Mr. R. J. Percy were scientific advisors for the project. This study was completed under DSS Contract No. OSC78-00010.

Each section of the atlas contains two base maps and six transparent acrylic overlays. These overlays may be used individually or in any combination.

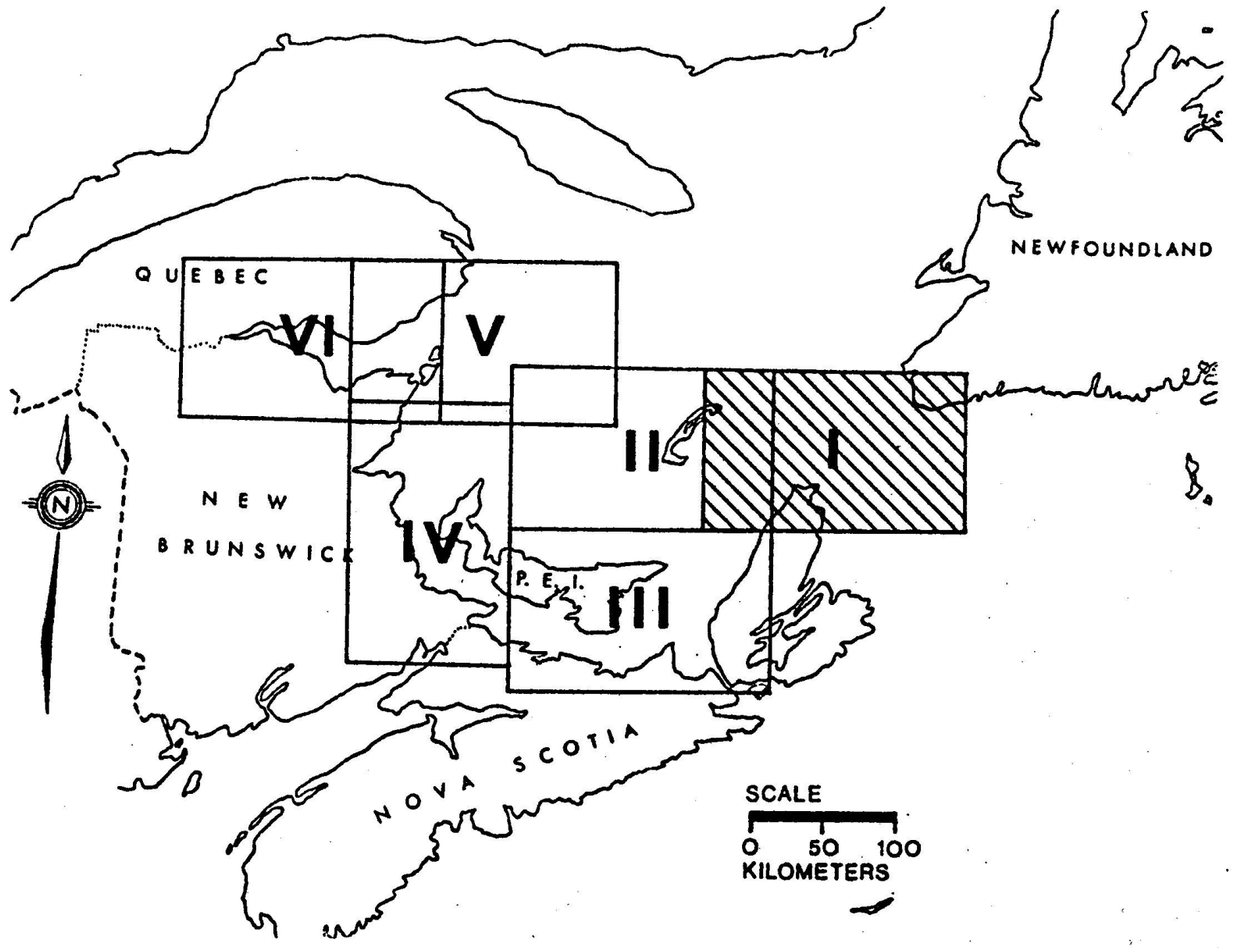
An appendix contains wind and visibility data, by month, presented in a series of 12 tables. The information is for three coastal stations: Chatham, N.B.; Summerside, P.E.I.; and Sydney, N.S. In addition, tables listing tidal ranges, fish processing plants, lobster pounds, and fisheries protection officers are provided. A list of references utilized has also been included, however, personal communications and personal observations could not be cited.

The author expresses his appreciation for the cooperation provided by the following groups without whose assistance this report could not have been prepared: Atlantic Oceanographic Laboratory, Atmospheric Environment Service, Canadian Wildlife Service, Fisheries and Marine Service, Maritime Resource Management Service, New Brunswick Department of Environment, Nova Scotia Department of Environment, Parks Canada, Prince Edward Island Department of Environment and the Prince Edward Island Land Use Service Centre.

The Southern Gulf of St. Lawrence has been subdivided into six sections:

I Cabot Strait
II Magdalen Islands
III Northern Nova Scotia and Eastern Prince Edward Island
IV Western Prince Edward Island and Eastern New Brunswick
V Northeastern New Brunswick and Gaspé
VI Chaleur Bay

These are indicated by the sketch map below (the shaded portion shows the area covered in this section).



The Gulf of St. Lawrence is one of the most important coastal regions of North America, providing a source of income and recreation for large numbers of people throughout the Atlantic Provinces and Quebec. In recent years the Gulf's significance as an oil transportation route and a site for petroleum exploration have intensified. The potential risk of oil spills has, therefore, become a major concern. This Atlas compiles existing physical and biological baseline information for the southern Gulf of St. Lawrence region.

The Gulf of St. Lawrence encompasses an area of approximately 250,000 km^2 and is joined to the Atlantic Ocean through Cabot Strait and the Strait of Belle Isle. The total freshwater discharge into the Gulf has been estimated to be a mean annual value of 13.44×10^3 m^3/s (Trites 1972). It has also been determined that the outgoing flow from the Gulf is primarily confined to the upper 50 meters of water while most of the flow into the Gulf is below 50 meters.

There are two main bathymetric features of the Gulf: the Laurentian Channel is a deep trench (maximum depth - 500 m) extending from the Continental Shelf to the Saguenay Fiord in the St. Lawrence Estuary, the Magdalen Shallows is a shelf (50 - 75 m in depth) extending southwest from the Laurentian Channel to the coasts of Nova Scotia, Prince Edward Island, New Brunswick and southeastern Gaspé.

The topography of the region is dominated by areas of low relief, numerous sand beaches, and low unresistant cliffs. The present study provides a shoreline classification for all areas of the southern Gulf except Gaspé. Tidal ranges are low, less than two meters. The coastal environment is wave dominated, however, sea ice limits wave action for up to four months each year (Owens 1976).

The climate is generally described as humid temperate with a mean summer temperature of 16°C and a mean winter temperature of -5°C. The prevailing winds blow from the southwest in summer and the northwest in winter. Between December and April, northerly gale force winds can be expected in the region for 10 to 15 percent of the time.

The Gulf of St. Lawrence is considered to be a complex estuary; its physical oceanographic features are the result of a large number of variables - such as precipitation, fresh water discharge, wind, topography, heat transfer, tides, and tidal currents (Trites and Walton 1975).

Surface water circulation within the southern Gulf is generally counterclockwise, average speeds ranging from 4 to 10 km per day. Maximum velocities in Cabot Strait can, however, reach 29 km per day. Tidal currents seldom exceed one km per hour except in the Northumberland and Cabot Straits; here velocities approach two km per hour. Sea surface temperature ranges from 1°C in winter to 18° in summer.

Sea ice begins to form in December and gradually extends to include the entire southern Gulf. An area west of Newfoundland remains ice free due to the influence of surface water from Cabot Strait. During February and March, sea ice from the central Gulf advances seaward through Cabot Strait. Heavy ice concentrations remain in the southern Gulf until April when a rapid breakup occurs.

The surface waters of the Gulf contain high levels of phytoplankton from mid-April to mid-June, primarily in the Gaspe current system and the northern part of the Magdalen Shelf. Zooplankton are widely distributed throughout the Gulf; highest concentrations are found during May and September. Average zooplankton levels on the Magdalen Shelf are about three times those found in most of the deep water areas.

Irish moss is the principal seaweed harvested in the region. The plants are abundant just below the low-water mark. The most productive areas are found on the north and west coasts of Prince Edward Island.

Numerous inshore and commercial fish species use southern Gulf waters as both a nursery and feeding area. The major spawning grounds for herring, cod and American plaice are located on the Magdalen Shelf. Over 25 fish species are caught commercially in the Gulf; however, roughly 85 percent of the total landings are comprised of herring, redfish and cod.

Atlantic herring spawn in the southern Gulf mainly in waters near the Magdalen Islands and Chaleur Bay during spring and fall. Following spring spawning, the adults disperse into feeding schools over the Magdalen Shelf. Fall spawning takes place in August and September. After fall spawning, the adults migrate eastward during October and November. The stock then divides into two populations near the Magdalen Islands; one population proceeds to overwintering areas in the fiords of southwestern Newfoundland, the other migrates to the edge of the Laurentian Channel, near Cape Breton Island.

Redfish inhabit the deep waters of the Gulf - principally in the Laurentian Channel. Mating takes place in late summer and live young are produced during spring in water depths ranging from 200 m to 400 m. Redfish larvae remain in the upper 100 m of the water column until they reach a length of 45-50 mm; at this time they move to the bottom.

Cod stocks are widely distributed throughout the southern Gulf. Cod migrate to inshore feeding areas from May to September. Spawning takes place on the Magdalen Shelf from March to June. In the fall, adult cod move eastward along the Magdalen Shelf and overwinter on the southern edge of the Laurentian Channel off Cape Breton Island.

Lobsters are the most important species caught commercially (based on landed values). They are harvested to a depth of about 20 m in most coastal waters except western Newfoundland. The fishing season extends from May to late June in most areas except western Northumberland Strait; here the season lasts from August to October. Lobsters breed in summer. The pelagic larvae molt four times after hatching, lasting three to six weeks, then settle to a benthic existence.

Atlantic salmon migrate through southern Gulf waters to their spawning rivers during May, although spawning does not take place until October and November. Salmon support a significant sport fishery in the region during summer. In this Atlas, salmon rivers are classified as major if they support a sport fishery greater than 500 kg and minor if they support a sport fishery of less than 500 kg.

THE MAJOR SHELLFISH SPECIES HARVESTED IN THE REGION ARE SCALLOPS, OYSTERS, BAR CLAMS, SOFT-SHELL CLAMS, AND QUAHOGS. ALL THESE SPECIES SPAWN DURING SUMMER; THEIR LARVAE ARE PELAGIC FOR A PERIOD OF TWO - THREE WEEKS BEFORE SETTLING TO THE BOTTOM. THE MOST IMPORTANT GROWING AREAS ARE LOCATED ON THE NORTH SHORE OF PRINCE EDWARD ISLAND AND THE NORTHEASTERN COAST OF NEW BRUNSWICK.

WATERFOWL - PRIMARILY CANADA GEESE, BLACK DUCKS, EIDERS, AND SCOTERS MIGRATE THROUGH THE REGION IN SPRING (NORTHWARD) AND FALL (SOUTHWARD). MAJOR STOP-OVER AREAS ARE LOCATED IN ESTUARIES ON THE NORTH AND SOUTH COASTS OF PRINCE EDWARD ISLAND AND SOUTHEASTERN NEW BRUNSWICK. THE NORTHUMBERLAND STRAIT IS THE SITE OF A NUMBER OF EXCELLENT BREEDING AREAS - MAINLY EIDERS AND BLACK DUCKS.

A LARGE NUMBER OF SHOREBIRDS - PRIMARILY SANDPIPERS AND PLOVERS, ALSO MIGRATE THROUGH THE REGION USING THE SAME STAGING AREAS AS WATERFOWL.

A NUMBER OF SEABIRD COLONIES ARE LOCATED IN THE COASTAL AREAS OF THE SOUTHERN GULF. SPECIES PRESENT DURING THE BREEDING SEASON INCLUDE GREAT CORMORANTS, DOUBLE CRESTED CORMORANTS, GREAT BLUE HERONS, RAZOR-BILLED AUKS, ATLANTIC PUFFINS, BLACK GUILLEMOTS, LEACH'S STORM PETREL, BLACK-LEGGED KITTIWAKES, COMMON TERNS IN ADDITION TO GREAT BLACK-BACKED AND HERRING GULLS. SEABIRDS ARE GENERALLY FOUND AT THEIR NESTING SITES FROM APRIL TO OCTOBER.

FEW BIRDS OVERWINTER IN THE SOUTHERN GULF DUE TO SEVERE ICE CONDITIONS THROUGHOUT THE REGION.

HARP SEALS AND TO A LESSER DEGREE, HOODED SEALS MIGRATE SOUTHWARD THROUGH THE STRAIT OF BELLE ISLE DURING JANUARY AND FEBRUARY. WHELPING AND BREEDING TAKES PLACE NEAR THE MAGDALEN ISLANDS. PUPS ARE USUALLY BORN IN THE FIRST TWO WEEKS OF MARCH AND BREEDING FOLLOWS IN APRIL. NORTHWARD MIGRATION GENERALLY OCCURS IN MAY. HARP SEALS ARE ECONOMICALLY IMPORTANT AS A LARGE NUMBER OF PUPS ARE HARVESTED IN THE SOUTHERN GULF EACH YEAR.

GREY SEALS AND HARBOUR SEALS ARE PRESENT IN SCATTERED HERDS IN MOST COASTAL WATERS DURING THE SUMMER AND FALL. IN JANUARY, ICE IN NORTHUMBERLAND STRAIT (NEAR ST. GEORGES BAY) PROVIDES A BREEDING SITE FOR LARGE NUMBERS OF GREY SEALS.

61°

60°

59°

EAST I.

MAGDALEN ISLANDS

47°30′

NEWFOUNDLAND

Shoal Pt.

C. Ray

Channel-Port aux Basques

47°30′

CABOT STRAIT

Ferry to North Sydney, N.S.

St. Paul Island

47°

47°

C. St. Lawrence

C. North

Bay St. Lawrence

Dingwall

Red Cape

C. Egmont

Neil's Harbour

CAPE BRETON HIGHLANDS

CAPE BRETON ISLAND NATIONAL PARK

61°

Enragée Pt.

Cheticamp

Ingonish

C. Smokey

60°

59°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Rocky Shore
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

EAST I.

MAGDALEN ISLANDS

47°30'

61°

60°

59°

NEWFOUNDLAND

Shoal Pt.

C. Ray

Channel-Port aux Basques

47°30'

CABOT STRAIT

St. Paul Island

Ferry: North Sydney, N.S.

Snow Crabs

Redfish & Witch Flounder Concentrations

Summer Concentrations: Grey Seals

47°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Rocky Shore
- Intertidal Mud/Sand
- Salt Marsh/Bog

47°

C. St. Lawrence

C. North

Bay St. Lawrence

Dingwall

Red Cape

C. Egmont

Neil's Harbour

CAPE BRETON HIGHLANDS

CAPE BRETON ISLAND NATIONAL PARK

Ingonish

61°

Enragée Pt.

Cheticamp

C. Smokey

60°

59°

SCALE 1:500,000

0 5 10

KILOMETERS

61°

60°

59°

NEWFOUNDLAND

Shoal Pt.

Ray

Channel-Port aux Basques

47°30′

EAST I.

MAGDALEN ISLANDS

Ragged Islands

47°30′

CABOT STRAIT

St. Paul Island

Ferry to North Sydney, N.S.

Migration Routes - Spring & Fall :

Ducks & Geese

Shorebirds

Migratory Bird Stop-over Zone

Seabird Colony

47°

C.St.Lawrence

C.North

Bay St. Lawrence

Dingwall

Red Cape

C.Egmont

Neil's Harbour

CAPE BRETON HIGHLANDS

CAPE BRETON ISLAND

NATIONAL PARK

Ingonish

Enragée Pt.

Cheticamp

C.Smokey

61°

60°

59°

47°

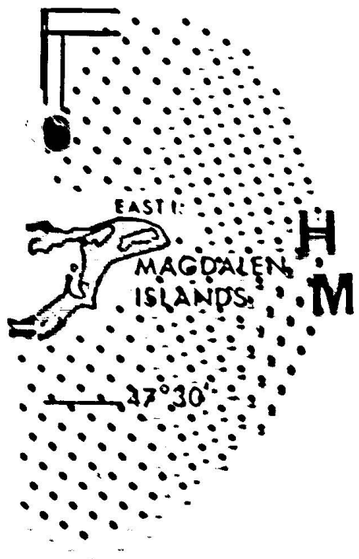
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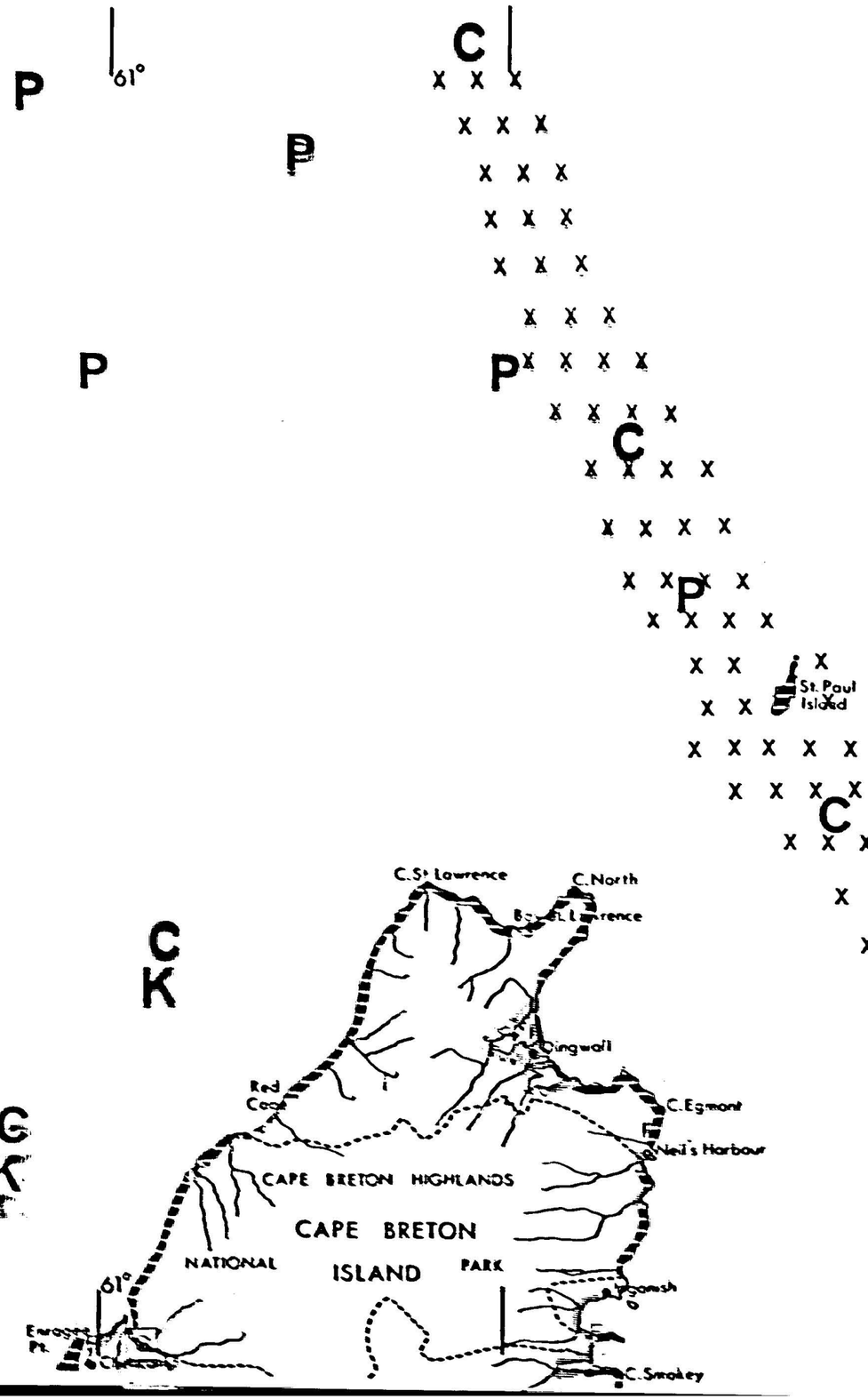
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Rocky Shore
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10 KILOMETERS

1:10





Salmon Spawning River S

Fish Processing Plant F

47°

Register here

Mean Sea Ice Concentration - Winter:

10/10

≥7/10

>4/10

<1/10

61°

60°

59°

47°30'

47°

EAST MAGDALEN ISLANDS

NEWFOUNDLAND

Shoal Pt.

C. Ray

Channel-Port aux Basques

CABOT STRAIT

Ferry to North Sydney, N.S.

St. Paul Island

C. St. Lawrence

C. North

Bay St. Lawrence

Dingwall

Red Cape

C. Egmont

Neil's Harbour

CAPE BRETON HIGHLANDS

CAPE BRETON ISLAND NATIONAL PARK

Ingonish

Enragee Pt.

Cheticamp

C. Smokey

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Rocky Shore
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10 KILOMETERS

61°

60°

59°

EAST I.

MAGDALEN ISLANDS

8°

47°30′

9°

12°

St. Paul Island

CABOT STRAIT

11°

Shoal Pt.

NEWFOUNDLAND

C. Ray

Channel-Port aux Basques

47°30′

47°

13°

3°

C. St. Lawrence

C. North

Bay St. Lawrence

Dingwall

Red Cape

C. Egmont

Neil's Harbour

CAPE BRETON HIGHLANDS

CAPE BRETON ISLAND NATIONAL PARK

Ingonish

Enragée Pt.

Cheticamp

C. Smokey

61°

60°

Ferry to North Sydney, N.S.

47°

Mean Sea Surface Temperature °C

Spring

Summer

Fall

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Rocky Shore
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

59°

1-5

61°

60°

59°

EAST I.

MAGDALEN ISLANDS

47°30′

NEWFOUNDLAND

Shoal Pt.

C. Ray

Channel-Port aux Basques

47°30′

CABOT STRAIT

Ferry to North Sydney, N.S.

St. Paul Island

47°

C.St.Lawrence

C.North

Bay St. Lawrence

Dingwall

Exploratory Drilling Site

Red Cape

C.Egmont

Neil's Harbour

CAPE BRETON HIGHLANDS

CAPE BRETON HIGHLANDS NATIONAL PARK

CAPE BRETON ISLAND

Primary Surface Current

Ingonish

Enragée Pt.

Cheticamp

C.Smokey

47°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Rocky Shore
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

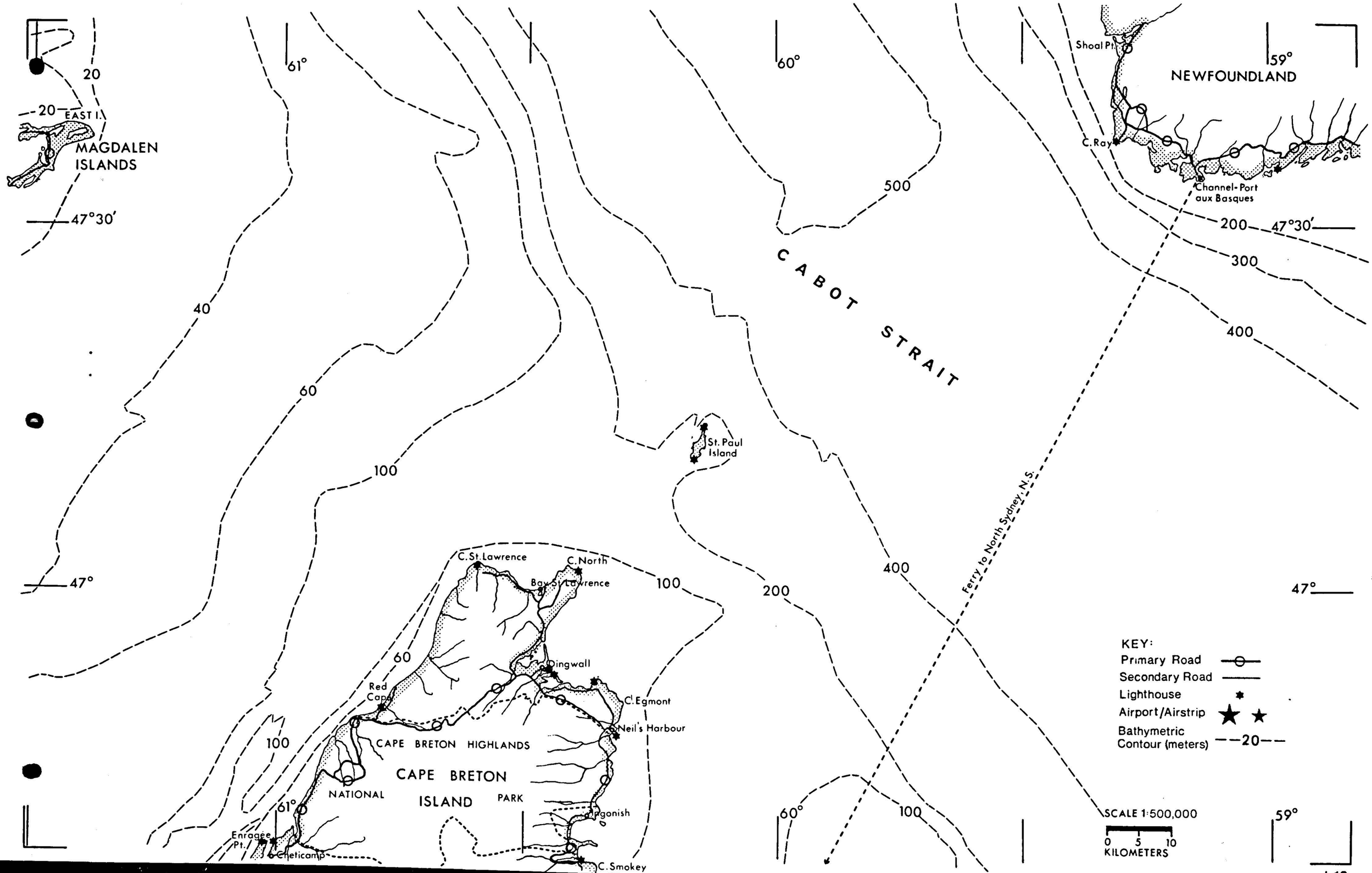
0 5 10 KILOMETERS

61°

60°

59°

I-11


20
20
EAST I.
MAGDALEN ISLANDS
47°30'
61°
60°
59°
NEWFOUNDLAND
Shoal Pt.
C. Ray
Channel-Port aux Basques
40
60
100
200
300
400
500
CABOT STRAIT
St. Paul Island
Ferry to North Sydney, N.S.
47°
C. St. Lawrence
C. North
Bay St. Lawrence
Pingwall
Red Cape
C. Egmont
Neil's Harbour
CAPE BRETON HIGHLANDS
CAPE BRETON ISLAND
NATIONAL PARK
Pgonish
Enragee Pt.
Chéticamp
C. Smokey
KEY:
Primary Road
Secondary Road
Lighthouse
Airport/Airstrip
Bathymetric Contour (meters)
SCALE 1:500,000
0 5 10
KILOMETERS

ENVIRONMENTAL ATLAS

OF THE

SOUTHERN GULF OF ST. LAWRENCE

SECTION II

MAGDALEN ISLANDS

MARINE ENVIRONMENT BRANCH

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

MARCH 1979

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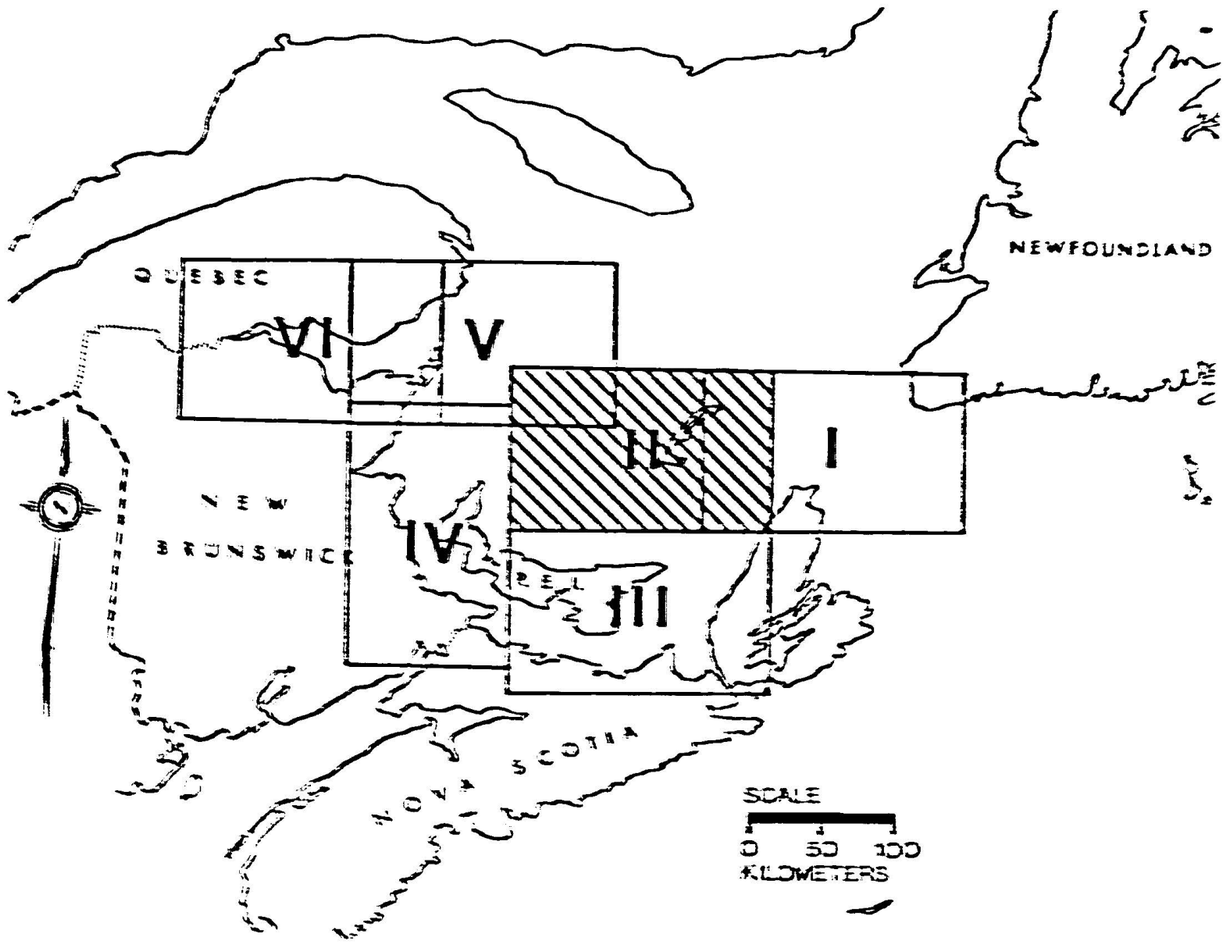
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IV	Western Prince Edward Island and Eastern New Brunswick
V	Northeastern New Brunswick and Gaspé
VI	Chaleur Bay

These are indicated by the sketch map below (the shaded portion shows the area covered in this section).



63°

62°

BRION I

61°

47°30′

47°30′

EAST I

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

Havre-aux-Maisons

Cap-aux-Meules

GRINDSTONE I.

Etang-du-Nord

ENTRY I

Deadman I

Havre Aubert

AMHERST I

Ferry

47°

47°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

63°

62°

61°

SCALE 1:500,000

0 5 10

KILOMETERS

63°

62°

BRION I

61°

47°30'

47°30'

7°

13°

12°

3°

8°

14°

5°

16°

9°

13°

47°

47°

EAST I

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

GRINDSTONE I.

Etang-du-Nord

Cap-aux-Meules

Deadman I

Havre-Aubert

AMHERST I

ENTRY I

Fatty

Sea Surface Temperature (°C)

Spring

Summer

Fall

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

SCALE 1:500,000

0 5 10

KILOMETERS

63°

62°

61°

1193

Mean Sea
Ice Concentration.
Winter:

10/10

>7/10

>4/10

63°

62°

61°

47°30'

47°

BRION I.

EASTI

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

GRINDSTONE I.

Etang-du-Nord

Cap aux Meules

Havre Aubert

ENTRY I.

Deadman I.

AMHERST I.

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

SCALE 1:500,000

0 5 10

KILOMETERS

63°

62°

BRION I

61°

47°30′

47°30′

EAST I

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

Havre-aux-Maisons

GRINDSTONE I.

Etang-du-Nord

Cap-aux-Meules

ENTRY I

Deadman I

Havre Aubert

AMHERST I

47°

47°

Ferry

Primary Surface Current

Exploratory Drilling Site

63°

62°

61°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

SCALE 1:500,000

0 5 10

KILOMETERS

1/1/95

63°

62°

61°

47°30′

47°

BRION I

EAST I

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

GRINDSTONE I.

Etang-du-Nord

Havre-aux-Maisons

Cap-aux-Meules

ENTRY I

Havre Aubert

AMHERST I

Deadman I

Whelping Area-Harp & Hooded Seals-March

Scallop Bed

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

SCALE 1:500,000

0 5 10

KILOMETERS

63°

62°

BRION I

61°

47°30′

47°30′

EAST I

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

Havre-aux-Maisons

Cap-aux-Meules

GRINDSTONE I.

Etang-du-Nord

ENTRY I.

Havre-Aubert

Deadman I

AMHERST I

Ferry

47°

- Commercial Fisheries:
  - Cod
  - Herring
  - Mackerel
  - American Plaice
- Major Herring Spawning Area (Spring & Fall)

Note: Lobsters are harvested in most coastal waters to a depth of 40 m.

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

SCALE 1:500,000

0 5 10

KILOMETERS

63°

62°

61°

11:0

63°

62°

BRION I

61°

47°30′

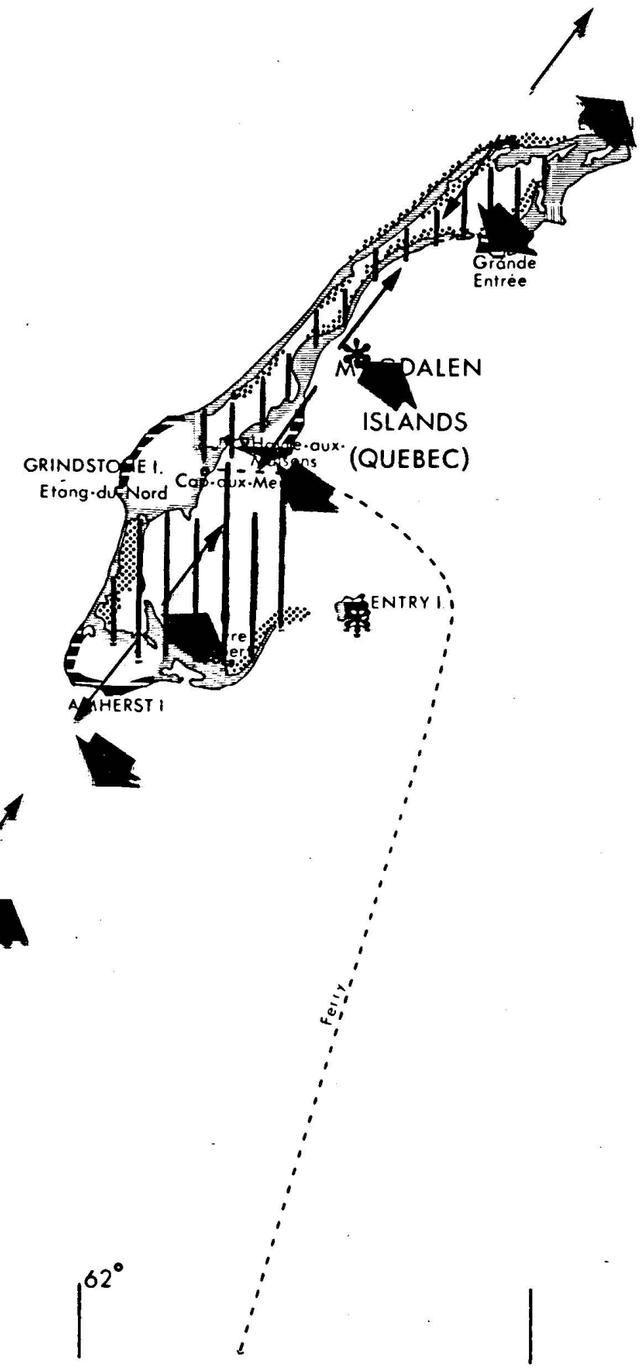
Migration Routes · Spring & Fall:

Ducks & Geese

Shorebirds

Seabird Colony

Migratory Bird Stop-over Zone



47°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Intertidal Mud/Sand

SCALE 1:500,000

0 5 10

KILOMETERS

11:8

63°

62°

61°

47°30'

47°

80

60

40

20

BRION I.

EAST I.

Grande Entrée

MAGDALEN ISLANDS (QUEBEC)

Havre-aux-Maisons

GRINDSTONE I.

Etang-du-Nord

Cap-aux-Meules

ENTRY I

Deadman I

Havre-Aubert

AMHERST I.

Ferry

KEY

Primary Road

Secondary Road

Lighthouse

Airport/Airstrip

Bathymetric Contour (meters)

SCALE 1:500,000

0 5 10

KILOMETERS

11-10

ENVIRONMENTAL ATLAS

OF THE

SOUTHERN GULF OF ST. LAWRENCE

SECTION III

NORTHERN NOVA SCOTIA &
EASTERN PRINCE EDWARD ISLAND

MARINE ENVIRONMENT BRANCH

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

MARCH 1979

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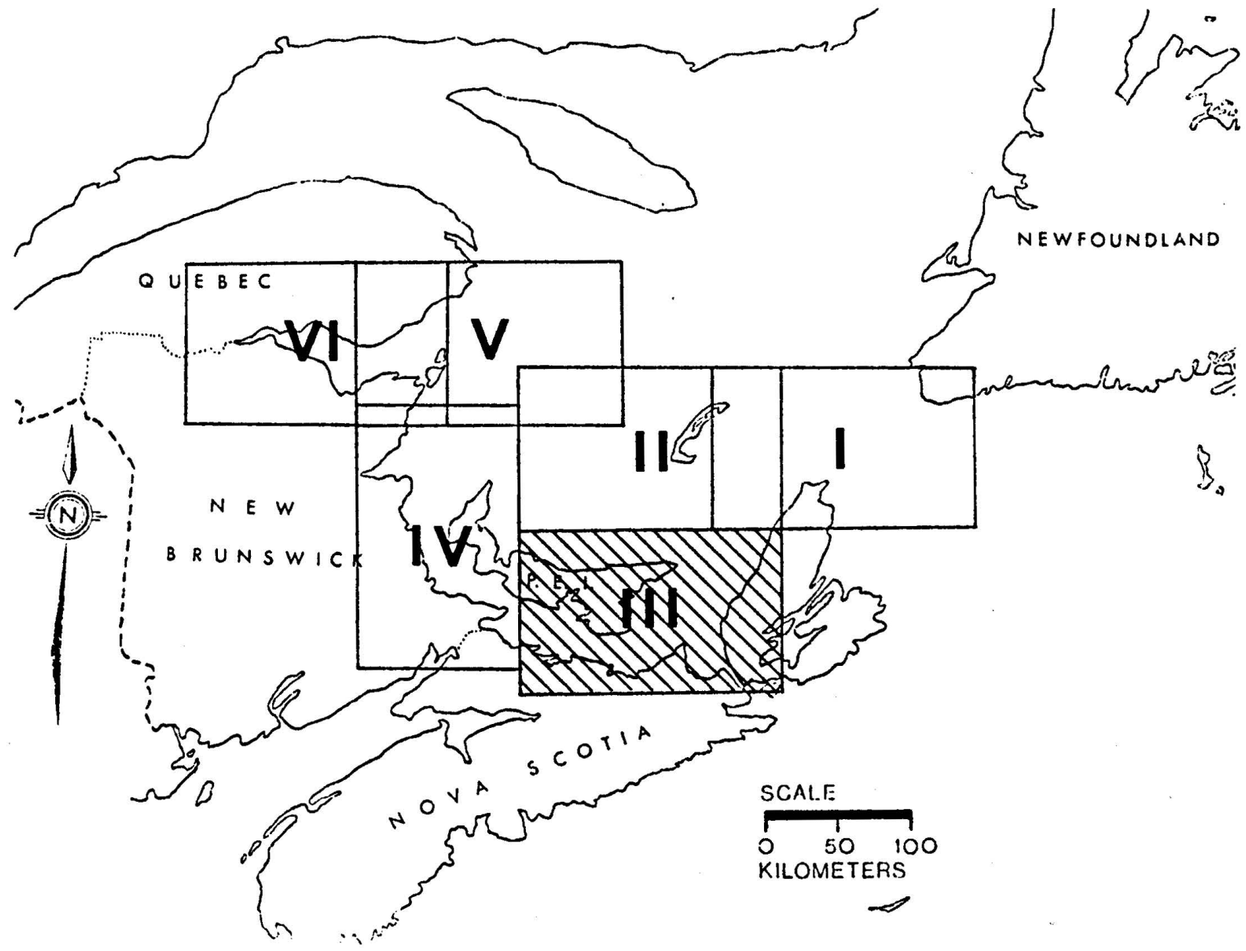
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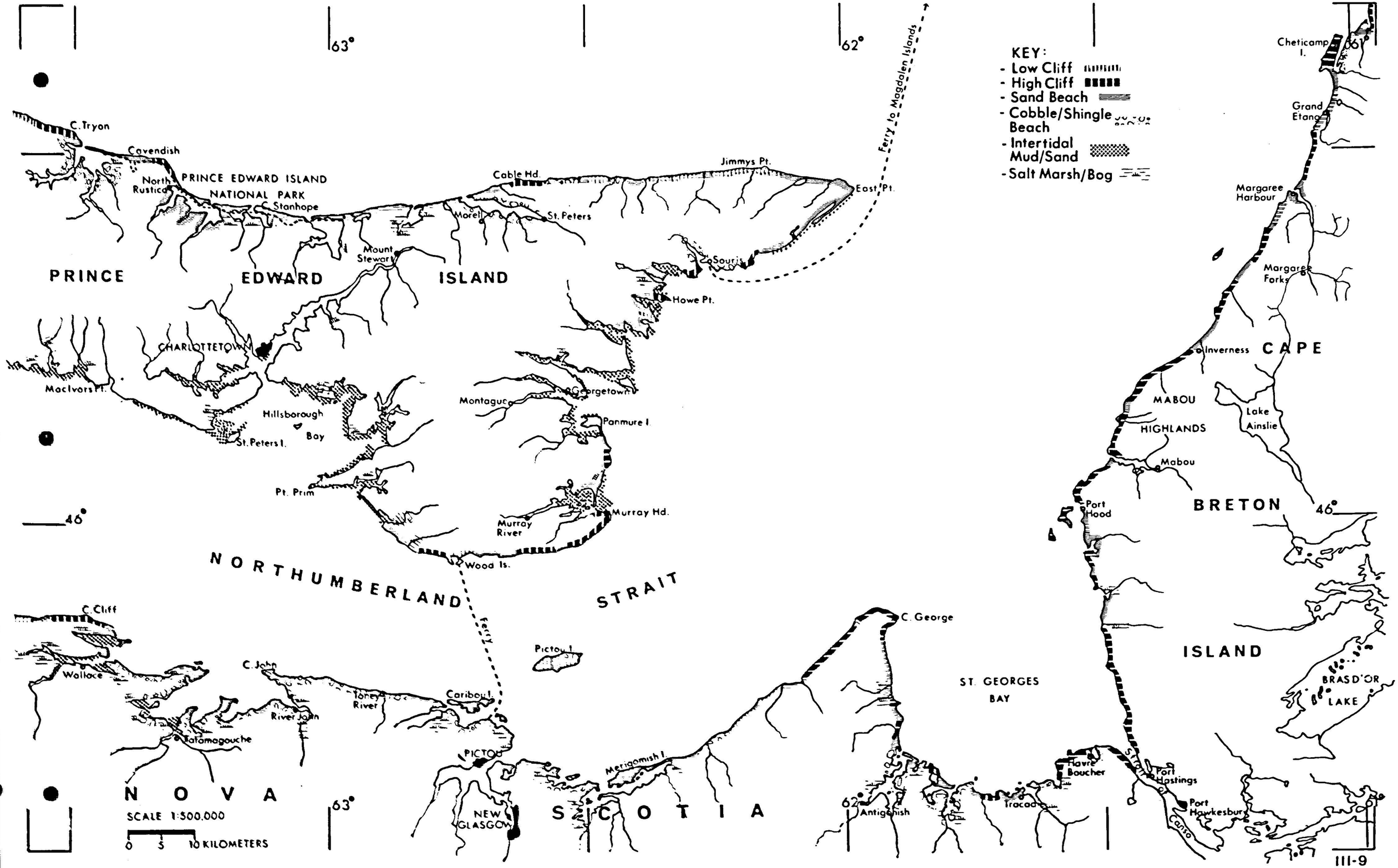
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II Magdalen Islands
III Northern Nova Scotia and Eastern Prince Edward Island
IV Western Prince Edward Island and Eastern New Brunswick
V Northeastern New Brunswick and Gaspé
VI Chaleur Bay

These are indicated by the sketch map below (the shaded portion shows the area covered in this section).




63°
62°
61°
46°
KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog
C. Tryon
Cavendish
North Rustico
PRINCE EDWARD ISLAND NATIONAL PARK
C. Stanhope
Cable Hd.
Jimmys Pt.
East Pt.
Ferry to Magdalen Islands
Morell
St. Peters
Mount Stewart
PRINCE EDWARD ISLAND
Souris
Howe Pt.
CHARLOTTETOWN
MacIvors Pt.
Hillsborough Bay
St. Peters I.
Montague
Georgetown
Panmure I.
Pt. Prim
Murray River
Murray Hd.
Wood Is.
NORTHUMBERLAND STRAIT
Ferry
C. Cliff
Wallace
C. John
Toney River
Caribou I.
River John
Tatamagouche
Pictou I.
PICTOU
NEW GLASGOW
NOVA SCOTIA
Merigomish I.
C. George
ST. GEORGES BAY
Antigonish
Tracadie
Havre Boucher
Port Hastings
Port Hawkesbury
Strait of Canso
Cheticamp I.
Grand Etang
Margaree Harbour
Margaree Forks
Inverness
CAPE BRETON ISLAND
MABOU HIGHLANDS
Lake Ainslie
Mabou
Port Hood
BRASD'OR LAKE
SCALE 1:500,000
0 5 10 KILOMETERS

63°

62°

C. Tryon

Cavendish

North Rustico

PRINCE EDWARD ISLAND NATIONAL PARK

C. Stanhope

Cable Hd.

Jimmys Pt.

East Pt.

Ferry to Magdalen Islands

Primary Surface Current

Morell

St. Peters

Mount Stewart

PRINCE EDWARD ISLAND

Souris

Howe Pt.

CHARLOTTETOWN

Exploratory Drilling Site

MacIvors Pt.

Hillsborough Bay

St. Peters I.

Pt. Prim

Montague

Georgetown

Panmure I.

Murray River

Murray Hd.

Wood Is.

46°

NORTHUMBERLAND STRAIT

C. Cliff

Wallace

C. John

Toney River

River John

Tatamagouche

Caribou I.

Pictou I.

Ferry

PICTOU

NEW GLASGOW

Merigomish I.

NOVA SCOTIA

C. George

ST. GEORGES BAY

Antigonish

Tracadie

Havre Boucher

Strait of Canso

Port Hastings

Port Hawkesbury

BRETON ISLAND

BRAS D'OR LAKE

Port Hood

Mabou

HIGHLANDS

MABOU

Lake Ainslie

Inverness

CAPE

Margaree Forks

Margaree Harbour

Grand Etang

Cheticamp I.

66°

63°

62°

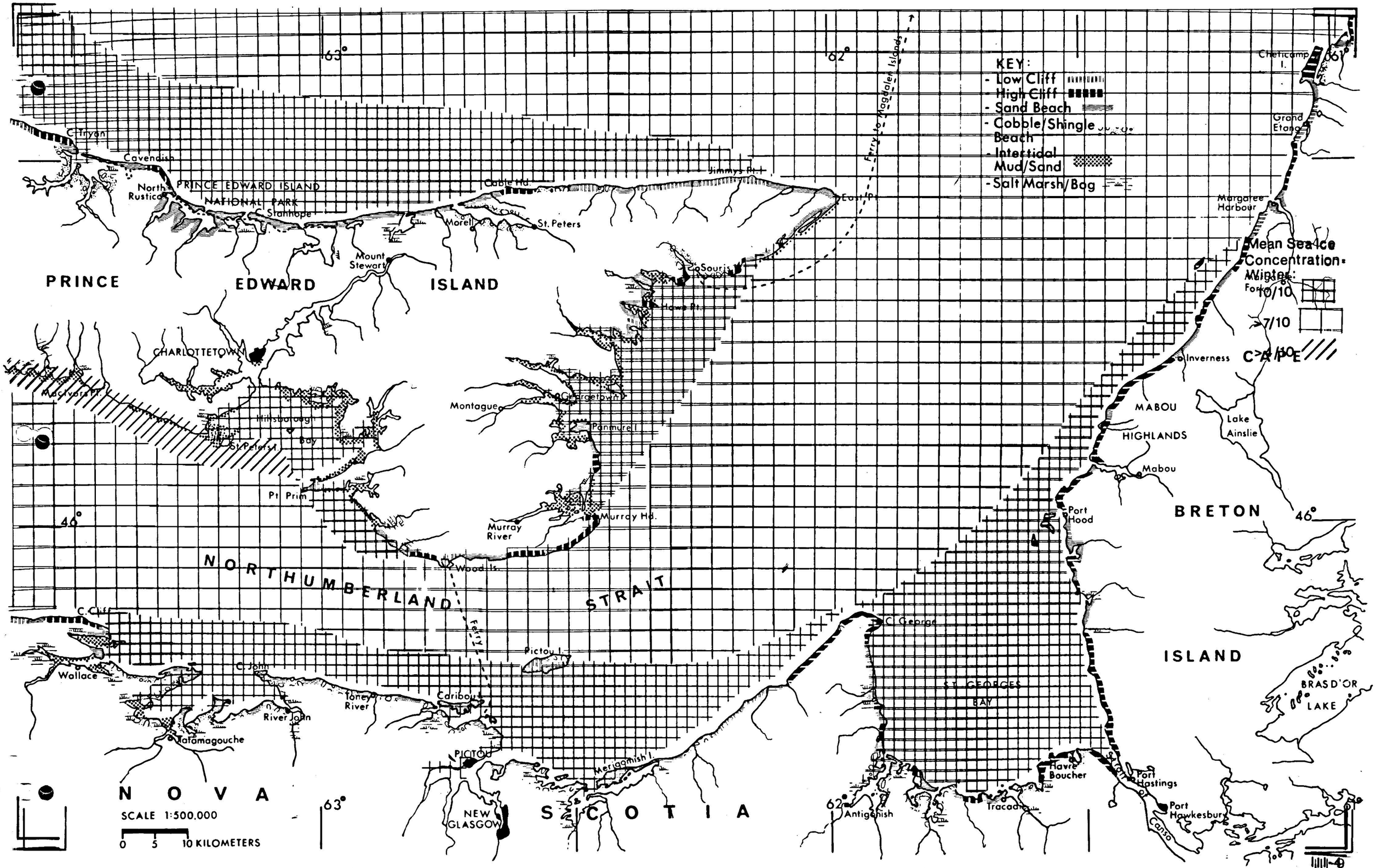
46°

SCALE 1:500,000

0 5 10 KILOMETERS

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog


KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bag
Mean Sea Ice Concentration - Winter:
10/10
7/10
C>A/10
PRINCE EDWARD ISLAND
NATIONAL PARK
NORTHUMBERLAND STRAIT
NOVA SCOTIA
CAPE BRETON ISLAND
ST. GEORGES BAY
BRAS D'OR LAKE
MABOU HIGHLANDS
Ferry to Magdalen Islands
Ferry
C. Tryon
Cavendish
North Rustico
C. Stanhope
Cable Hd.
Jimmys Pt.
East Pt.
Morell
St. Peters
Mount Stewart
Souris
Howe Pt.
CHARLOTTETOWN
MacIvors Pt.
Hillsborough Bay
St. Peters I.
Pt. Prim
Montague
Georgetown
Panmure I.
Murray River
Murray Hd.
Wood Is.
Pictou I.
C. Cliff
Wallace
C. John
Toney River
Caribou
River John
Tatamagouche
PICTOU
Merigomish I.
NEW GLASGOW
C. George
Antigonish
Havre Boucher
Tracadie
Port Hastings
Port Hawkesbury
Canso
Port Hood
Mabou
Inverness
Margaree Harbour
Margaree Forks
Grand Etang
Cheticamp I.
Lake Ainslie
SCALE 1:500,000
0 5 10 KILOMETERS
63°
62°
61°
46°

Mean Sea Surface Temperature (°C)
Summer
Fall
Spring

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

63°
62°
61°
46°
16°
5°
9°
14
3°
10°
18
7
6°
8°
9°

C. Tryon
Cavendish
North Rustico
PRINCE EDWARD ISLAND NATIONAL PARK
C. Stanhope
Cable Hd.
Jimmys Pt.
East Pt.
Ferry to Magdalen Islands
Morell
St. Peters
Mount Stewart
Souris
PRINCE EDWARD ISLAND
Howe Pt.
CHARLOTTETOWN
MacIvors Pt.
Hillsborough Bay
St. Peters I.
Pt. Prim
Montague
Georgetown
Panmure I.
Murray River
Murray Hd.
Wood Is.
NORTHUMBERLAND STRAIT
Ferry
C. John
Wallace
Toney River
Caribou I.
River John
Tatamagouche
Pictou I.
PICTOU
Merigomish I.
NEW GLASGOW
C. George
ST. GEORGES BAY
Antigonish
Tracadie
Havre Boucher
Port Hastings
Port Hawkesbury
Strait of Canso
Cheticamp I.
Grand Etang
Margaree Harbour
Margaree Forks
Inverness
CAPE BRETON ISLAND
MABOU HIGHLANDS
Lake Ainslie
Mabou
Port Hood
BRASD'OR LAKE

NOVA SCOTIA

SCALE 1:500,000
0 5 10 KILOMETERS

111-3

Note: Lobster are harvested in most coastal waters to a depth of 40m.

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

PRINCE EDWARD ISLAND NATIONAL PARK

PRINCE EDWARD ISLAND

NORTHUMBERLAND STRAIT

NOVA SCOTIA

CAPE BRETON ISLAND

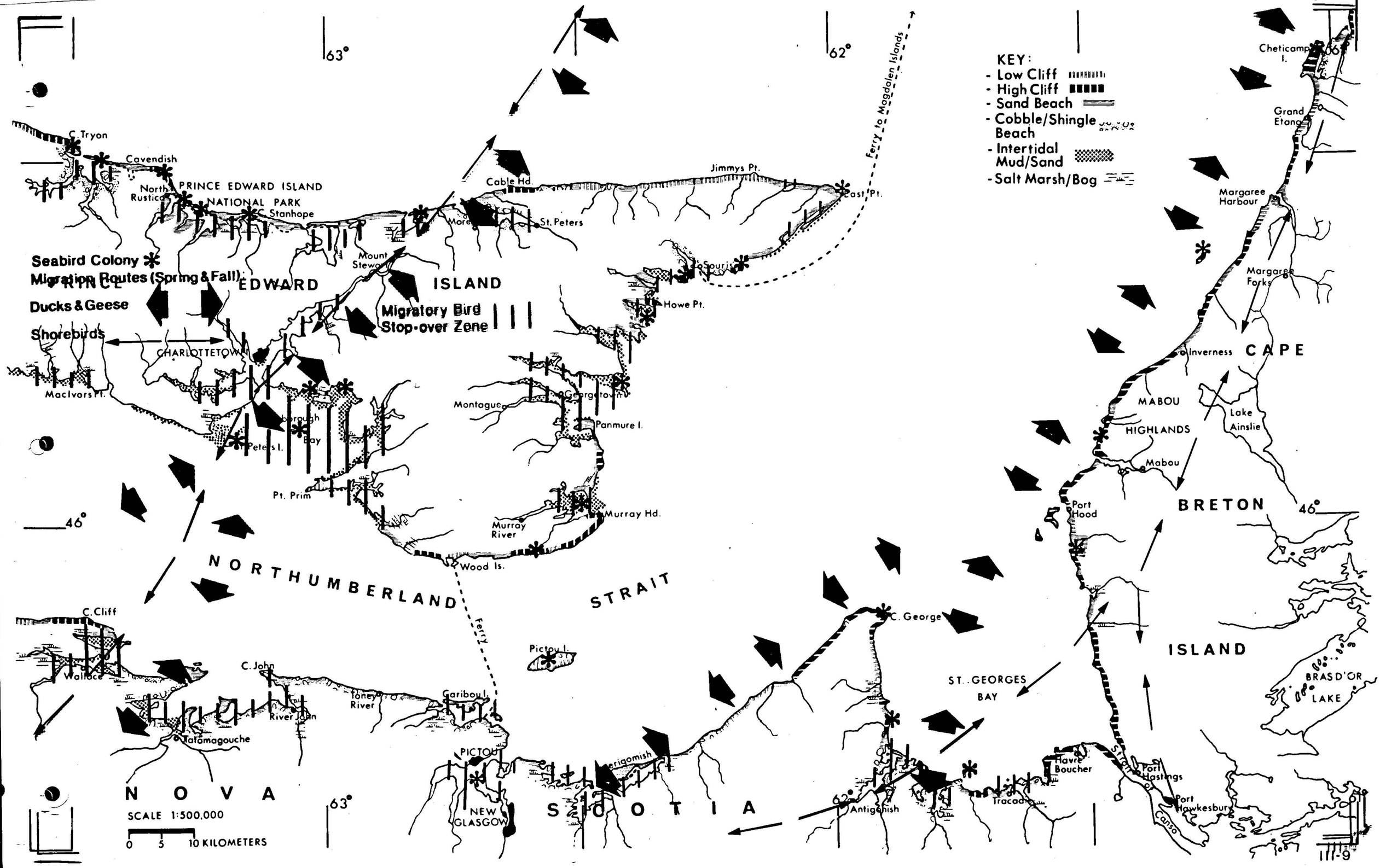
C. Tryon
Cavendish
North Rustico
Stanhope
Cable Hd
Timms Pt.
East Pt.
St. Peters
Mount Stewart
Souris
Howe Pt.
CHARLOTTETOWN
MacIvors Pt.
Hillsborough Bay
St. Peters I.
Montague
Georgetown
Panmure I.
Shellfish Growing Area
Seaweed Harvesting Area
Pt. Prim
Murray River
Murray Hd.
Wood Is.
Ferry to Magdalen Islands
C. Cliff
Wallace
C. John
Tatamagouche
River John
Tatamagouche
Caribou I.
PICTOU
NEW GLASGOW
Pictou I.
Merigomish I.
C. George
ST. GEORGES BAY
Antigonish
Tracadie
Havre Boucher
Port Hastings
Port Hawkesbury
Strait of Canso
Cheticamp I.
Grand Etang
Margaree Harbour
Margaree Forks
Inverness
Fish Processing Plant
MABOU
Lobster Pound
HIGHLANDS
Dalle Ainslie
Mabou
Port Hood
BRAS D'OR LAKE

Commercial Fisheries:
- Cod
- Hake
- Winter Flounder
- Herring
- Mackerel
- American Plaice
- Tuna
- Queen Crabs

Salmon Spawning River (Spring):
- Major
- Minor

SCALE 1:500,000
0 5 10 KILOMETERS

63°
62°
61°
46°


63°
62°
46°
KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog
Seabird Colony
Migration Routes (Spring & Fall):
Ducks & Geese
Shorebirds
Migratory Bird Stop-over Zone
Ferry to Magdalen Islands
Ferry
PRINCE EDWARD ISLAND NATIONAL PARK
PRINCE EDWARD ISLAND
NORTHUMBERLAND STRAIT
NOVA SCOTIA
CAPE BRETON ISLAND
C. Tryon
Cavendish
North Rustico
C. Stanhope
Cable Hd.
Jimmys Pt.
East Pt.
St. Peters
Mount Stewart
Souris
Howe Pt.
CHARLOTTETOWN
MacIvors Pt.
Montague
Georgetown
Panmure I.
Pt. Prim
Murray River
Murray Hd.
Wood Is.
C. Cliff
Wallace
C. John
River John
Toney River
Caribou I.
Tatamagouche
Pictou I.
PICTOU
NEW GLASGOW
Merigomish
C. George
ST. GEORGES BAY
Antigonish
Havre Boucher
Tracadie
Port Hastings
Port Hawkesbury
Strait of Canso
Cheticamp I.
Grand Etang
Margaree Harbour
Margaree Forks
Inverness
MABOU HIGHLANDS
Mabou
Lake Ainslie
Port Hood
BRASD'OR LAKE
SCALE 1:500,000
0 5 10 KILOMETERS

63°

62°

61°

46°

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

Ferry to Magdalen Islands

C. Tryon

Cavendish

North Rustico

PRINCE EDWARD ISLAND NATIONAL PARK

C. Stanhope

Cable Hd.

Jimmys Pt.

East Pt.

Morell

St. Peters

Mount Stewart

PRINCE EDWARD ISLAND

Souris

Howe Pt.

CHARLOTTETOWN

MacIvors Pt.

Hillsborough Bay

St. Peters I.

Montague

Georgetown

Panmure I.

Pt. Prim

Murray River

Murray Hd.

Wood Is.

NORTHUMBERLAND STRAIT

Ferry

C. Cliff

Wallace

C. John

Toney River

Caribou I.

River John

Tatamagouche

Pictou I.

PICTOU

Merigomish I.

NEW GLASGOW

NOVA SCOTIA

SCALE 1:500,000

0 5 10 KILOMETERS

Whelping Area Grey Seals (Winter)

C. George

ST. GEORGE'S BAY

Havre Boucher

Antigonish

Tracadie

Cheticamp I.

Grand Etang

Margaree Harbour

Margaree Forks

Inverness

CAPE BRETON ISLAND

MABOU HIGHLANDS

Mabou

Lake Ainslie

Port Hood

BRAS D'OR LAKE

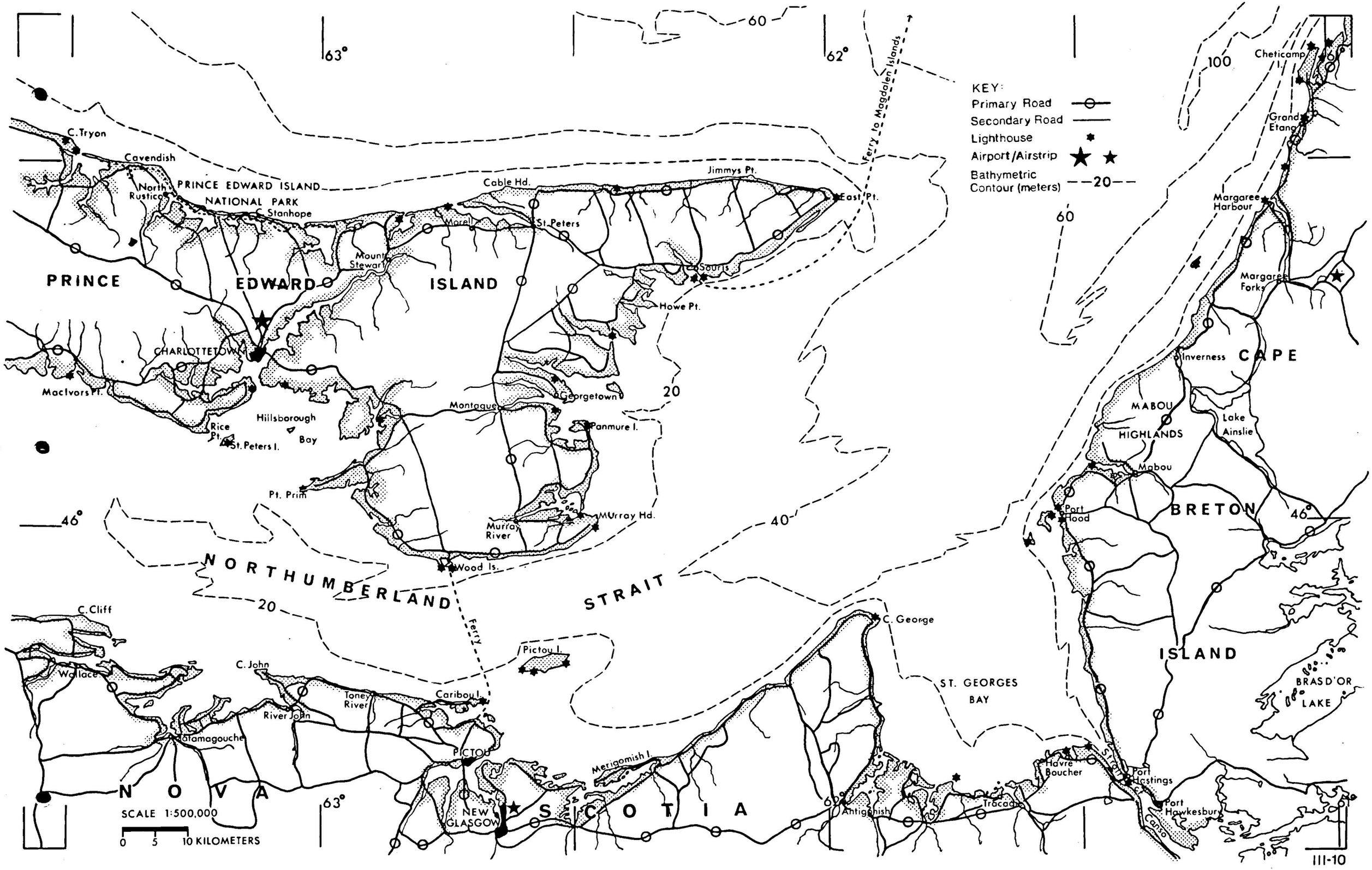
Gaspereaux
Eels
Smelts
Scallop Bed

Strait of Canso

Port Hastings

Port Hawkesbury

111:8


63°
60
62°
Ferry to Magdalen Islands
KEY:
Primary Road
Secondary Road
Lighthouse
Airport/Airstrip
Bathymetric Contour (meters) --20--
C. Tryon
Cavendish
North Rustico
PRINCE EDWARD ISLAND NATIONAL PARK
C. Stanhope
Cable Hd.
Jimmys Pt.
East Pt.
Morell
St. Peters
Mount Stewart
PRINCE EDWARD ISLAND
Souris
Howe Pt.
CHARLOTTETOWN
MacIvors Pt.
Montague
Georgetown
20
Panmure I.
Hillsborough Bay
Rice Pt.
St. Peters I.
Pt. Prim
Murray River
MUrray Hd.
Wood Is.
46°
40
NORTHUMBERLAND STRAIT
20
Ferry
C. Cliff
Wallace
C. John
Toney River
Caribou I.
River John
Tatamagouche
Pictou I.
PICTOU
NEW GLASGOW
Merigomish I.
C. George
ST. GEORGES BAY
Antigonish
Tracadie
Havre Boucher
Strait
Port Hastings
Port Hawkesbury
Canso
NOVA SCOTIA
63°
60
SCALE 1:500,000
0 5 10 KILOMETERS
100
Cheticamp
Grand Etang
Margaree Harbour
Margaree Forks
Inverness
CAPE BRETON ISLAND
MABOU HIGHLANDS
Lake Ainslie
Mabou
Port Hood
BRASD'OR LAKE
46°

ENVIRONMENTAL ATLAS

OF THE

SOUTHERN GULF OF ST. LAWRENCE

SECTION IV

WESTERN PRINCE EDWARD ISLAND

& EASTERN NEW BRUNSWICK

MARINE ENVIRONMENT BRANCH

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

MARCH 1979

This environmental atlas of the Southern Gulf of St. Lawrence has been prepared by B. E. McGuire for the Marine Environment Branch of the Environmental Protection Service, Atlantic Region. The main purpose of the atlas is to provide a document which can be used in planning for and responding to oil spills in the Southern Gulf of St. Lawrence. Biological, oceanographic, meteorological and socio-economic data have been compiled from existing sources for the coastal zone of the Southern Gulf. However, some emphasis has been placed on those areas considered vulnerable to oil spills. Dr. F. C. Duerden and Mr. R. J. Percy were scientific advisors for the project. This study was completed under DSS Contract No. DSC78-00010.

Each section of the atlas contains two base maps and six transparent acrylic overlays. These overlays may be used individually or in any combination.

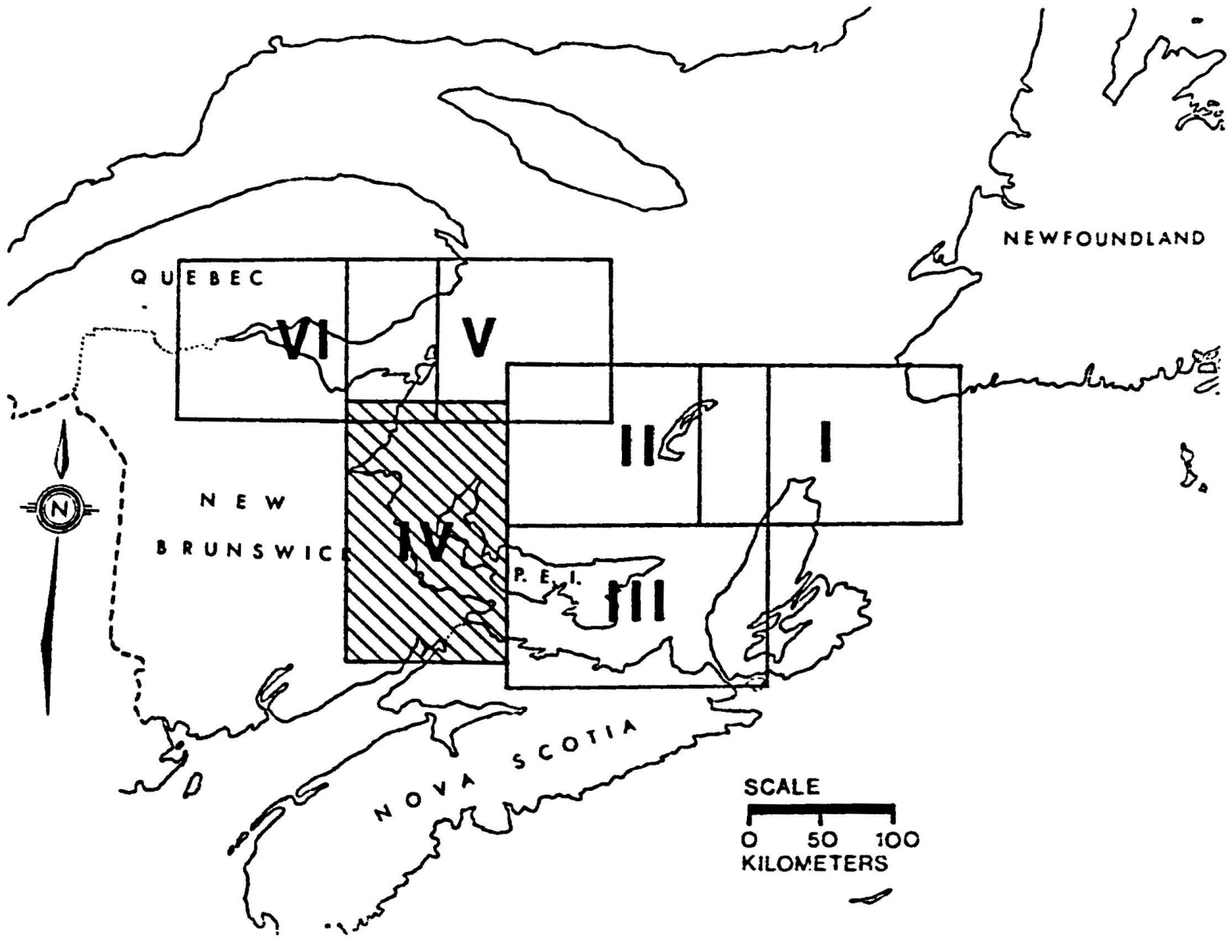
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II Magdalen Islands
III Northern Nova Scotia and Eastern Prince Edward Island
IV Western Prince Edward Island and Eastern New Brunswick
V Northeastern New Brunswick and Gaspé
VI Chaleur Bay

These are indicated by the sketch map below (the shaded portion shows the area covered in this section).



65°

64°

47°

47°

46°

46°

65°

64°

Tracadie

Tabusintac

Neguac Beach

Portage I.

MIRAMICHI BAY

Fox I.

Pt. Escuminac

Baie-Ste-Anne

Pt. Sapin

KOUCHIBOUGUAC NATIONAL PARK

Richibucto

Buctouche Bar

Buctouche

NEW BRUNSWICK

Renouard Pt

Cocagne

Shediac

Cap-Pelé

MONCTON

NORTHUMBERLAND STRAIT

North Cape

Tignish

Miminegash

C. Kildare

PRINCE EDWARD ISLAND

Alberton

O'Leary

West Pt.

Hog I.

Profits Pt.

MALPEQUE BAY

Summerside

C. Egmont

Seacow Hd.

Borden

Ferry

C. Tormentine

Port Elgin

BAIE VERTE

Tidnish

Heather Beach

Pugwash

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10 KILOMETERS

65°
64°
47°
46°
Tracadie
Tabusintac
Neguac Beach
Portage I.
MIRAMICHI BAY
Fox I.
Pt. Escuminac
Baie-Ste-Anne
Pt. Sapin
KOUCHIBOUGUAC NATIONAL PARK
Richibucto
Buctouche Bar
Buctouche
NEW BRUNSWICK
Renouard Pt
Cocagne
MONCTON
Shediac
Cap-Pelé
NORTHUMBERLAND STRAIT
North Cape
Tignish
Miminegash
C. Kildare
PRINCE EDWARD ISLAND
Alberton
O'Leary
West Pt.
Hog I.
Profits Pt.
MALPEQUE BAY
C. Egmont
Summerside
Seacow Hd.
Borden
Ferry
C. Tormentine
Port Elgin
BAIE VERTE
Tidnish
Heather Beach
Pugwash
14°
7°
5°
16°
6°
8°
8°
7°
18°
8°
9°
Sea Surface Temperature (°C)
Spring
Summer
Fall
KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog
SCALE 1:500,000
0 5 10
KILOMETERS
IV-9
IV-3

65°

64°

Tracadie

Tabusintac

Pokemouche

Caraquet

CARAQUET BAY

Miscou

Pt. Escuminac

Baie-Ste-Anne

47°

North Cape

47°

Tignish

Pt. Sapin

KOUCHIBOUGUAC

NATIONAL

PARK

Miminegash

C. Kildare

PRINCE

Alberton

NORTHUMBERLAND

O'Leary

EDWARD

Richibucto

West P.

Tignish

MAI PEQUE

ISLAND

Buctouche Bar

Buctouche

STRAIT

BAY

NEW

BRUNSWICK

Summerside

C. Egmont

Renoush Pt.

Cocagne

Beaconsfield

Borden

Shediac

Cap-Pele

Tormentine

Port Elgin

BAIE VERTE

46°

Tidnish

MONCTON

Mean Concentration of Sea Ice - Winter :

KEY :

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

10/10

>7/10

>4/10

46°

65°

SCALE 1:500,000

0 5 10

KILOMETERS

64°

Heather Beach

Pugwash

IV49

65°

64°

47°

47°

Tracadie

Tabusintac

Neguac Beach

Portage I.

MIRAMICHI BAY

Fox I.

Pt. Escuminac

Baie-Ste-Anne

Pt. Sapin

KOUCHIBOUGUAC NATIONAL PARK

Richibucto

NORTHUMBERLAND STRAIT

Primary Surface Current

Buctouche Bar

Buctouche

NEW BRUNSWICK

Renouard Pt

Cocagne

Shediac

Cap-Pele

MONCTON

North Cape

Tignish

Miminegash

C. Kildare

PRINCE EDWARD ISLAND

Alberton

O'Leary

West Pt.

Hog I.

Profits Pt.

MALPEQUE BAY

C. Egmont

Summerside

Seacow Hd

Borden

Ferry

C. Tormentine

Port Elgin

BAIE VERTE

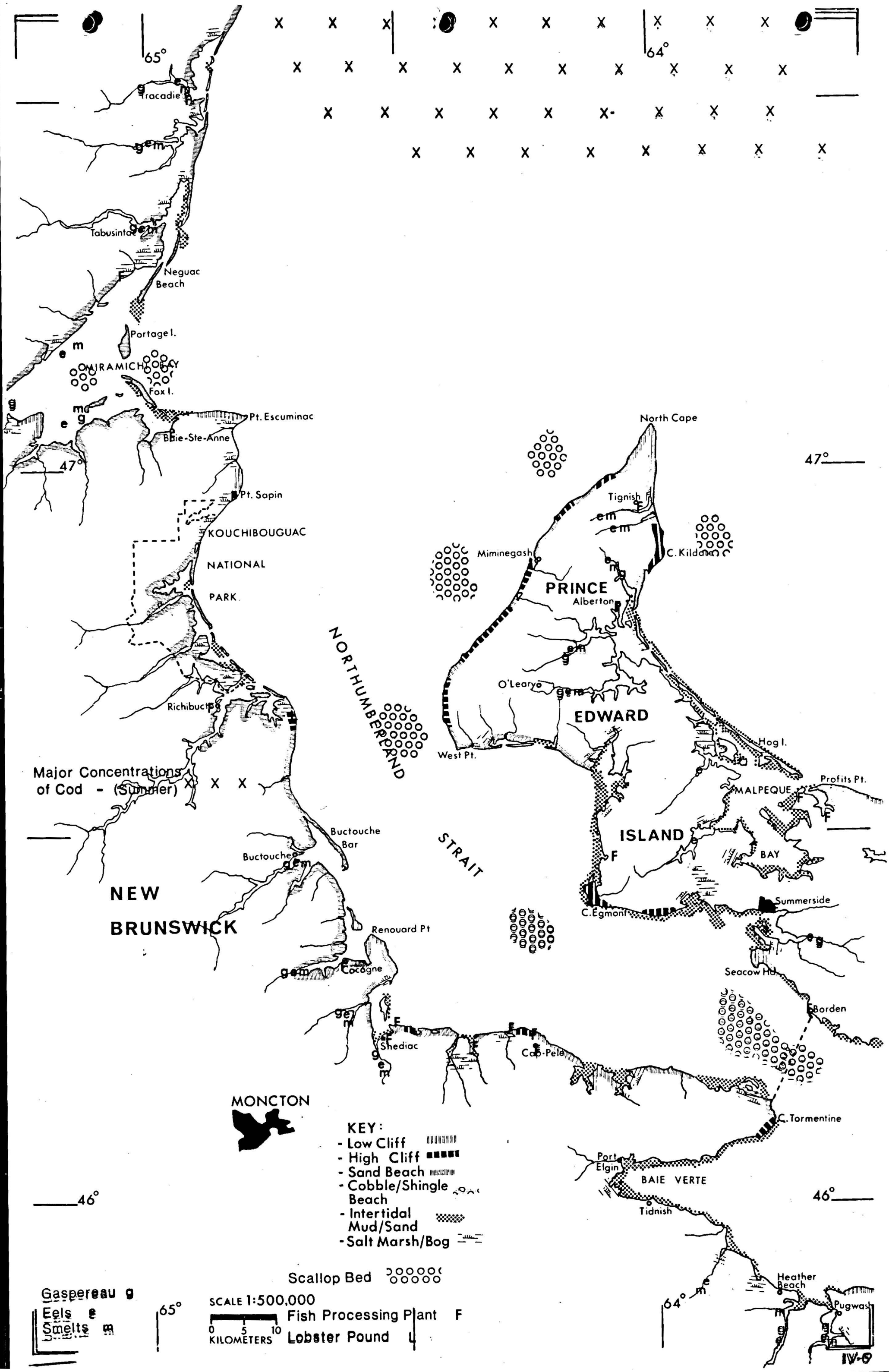
Tidnish

Heather Beach

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

46°

46°


65°
64°
47°
46°
Tracadie
Tabusintac
Neguac Beach
Portage I.
MIRAMICHI BAY
Fox I.
Pt. Escuminac
Baie-Ste-Anne
Pt. Sapin
KOUCHIBOUGUAC
NATIONAL
PARK
Richibucto
Buctouche Bar
Buctouche
NEW
BRUNSWICK
Renouard Pt
Cocagne
Shediac
Cap-Pele
MONCTON
Major Concentrations of Cod - (Summer) X X X
NORTHUMBERLAND
STRAIT
North Cape
Tignish
Miminegash
C. Kildare
PRINCE
Alberton
O'Leary
EDWARD
West Pt.
Hog I.
Profits Pt.
MALPEQUE
ISLAND
BAY
C. Egmont
Summerside
Seacow Hd.
Borden
C. Tormentine
Port Elgin
BAIE VERTE
Tidnish
Heather Beach
Pugwash
KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog
Scallop Bed
Gaspereau g
Eels e
Smelts m
SCALE 1:500,000
0 5 10
KILOMETERS
Fish Processing Plant F
Lobster Pound L
IV-6

65°

64°

47°

46°

Tracadie

Tabusintac

Neguac Beach

Portage I.

MIRAMICHI BAY

Fox I.

Pt. Escuminac

Baie-Ste-Anne

Pt. Sapin

KOUCHIBOUGUAC NATIONAL PARK

Richibucto

Buctouche Bar

Buctouche

NEW BRUNSWICK

Renouard Pt

Cocagne

Shediac

Cap-Pelé

MONCTON

NORTHUMBERLAND STRAIT

North Cape

Tignish

Miminegash

C. Kildare

PRINCE EDWARD ISLAND

Alberton

O'Leary

West Pt.

Hog I.

Profits Pt.

MALPEQUE BAY

C. Egmont

Summerside

Seacow Hd

Borden

Ferry

C. Tormentine

Port Elgin

BAIE VERTE

Tidnish

Heather Beach

Shellfish Growing Area

Seaweed Harvesting Area

Note: Lobsters are harvested in most coastal waters to a depth of 40m.

Commercial Fishing:

Cod
Hake
Herring
Mackerel
Tuna
Rock Crab

C K H M T R

Salmon Spawning River - Major S
Minor s

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

65°

64°

47°

47°

46°

Tracadie

Tabusintac

Negouac Beach

Portage

AMCHI BAY

Fox I.

Pt. Escuminac

Baie-Ste-Anne

Pt. Sapin

OUCHIBOUGUAC

NAL

PARK

Richibucto

NORTHUMBERLAND

STRAIT

Buctouche Bar

Buctouche

NEW

BRUNSWICK

Seabird Colony *

Migration Routes - (Spring & Fall):

Ducks & Geese

Shorebirds

Migratory Bird Stop-over Zone

Renouard Pt

Cocagne

Shediac

MONCTON

North Cape

Tignish

Miminegash

C. Kildare

PRINCE

Alberton

O'Leary

EDWARD

West Pt.

Hog I.

Profits Pt.

MALPEQUE

ISLAND

BAY

C. Egmont

Summerside

Seacow Hd.

Borden

Ferry

Cap-Pelé

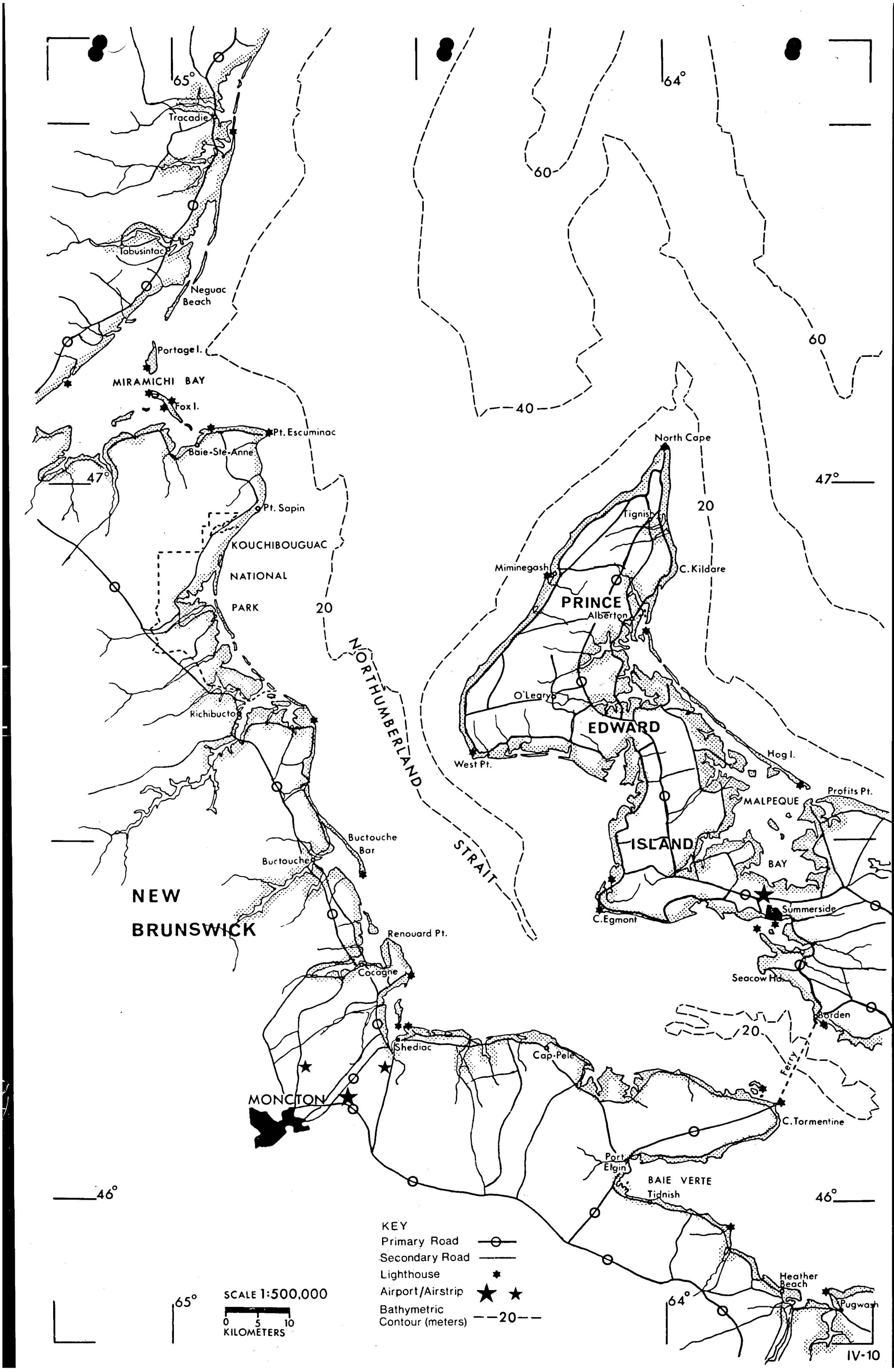
C. Tormentine

Port Elgin

BAIE VERTE

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle


65°
64°
47°
46°
Tracadie
Tabusintac
Neguac Beach
Portage I.
MIRAMICHI BAY
Fox I.
Pt. Escuminac
Baie-Ste-Anne
Pt. Sapin
KOUCHIBOUGUAC NATIONAL PARK
Richibucto
Buctouche Bar
Buctouche
NEW BRUNSWICK
Renouard Pt.
Cocagne
Shediac
MONCTON
Cap-Pele
NORTHUMBERLAND STRAIT
60
40
20
North Cape
Tignish
Miminegash
C. Kildare
PRINCE
Alberton
O'Leary
EDWARD
West Pt.
Hog I.
Profits Pt.
MALPEQUE
ISLAND
BAY
Summerside
C. Egmont
Seacow Hd.
Borden
Ferry
C. Tormentine
Port Elgin
BAIE VERTE
Tidnish
Heather Beach
Pugwash
KEY
Primary Road
Secondary Road
Lighthouse
Airport/Airstrip
Bathymetric Contour (meters)
SCALE 1:500,000
0 5 10
KILOMETERS

ENVIRONMENTAL ATLAS

OF THE

SOUTHERN GULF OF ST. LAWRENCE

SECTION V

NORTHEASTERN NEW BRUNSWICK

& GASPÉ

MARINE ENVIRONMENT BRANCH

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

MARCH 1979

THIS ENVIRONMENTAL ATLAS OF THE SOUTHERN GULF OF ST. LAWRENCE HAS BEEN PREPARED BY B. E. MCGUIRE FOR THE MARINE ENVIRONMENT BRANCH OF THE ENVIRONMENTAL PROTECTION SERVICE, ATLANTIC REGION. THE MAIN PURPOSE OF THE ATLAS IS TO PROVIDE A DOCUMENT WHICH CAN BE USED IN PLANNING FOR AND RESPONDING TO OIL SPILLS IN THE SOUTHERN GULF OF ST. LAWRENCE. BIOLOGICAL, OCEANOGRAPHIC, METEOROLOGICAL AND SOCIO-ECONOMIC DATA HAVE BEEN COMPILED FROM EXISTING SOURCES FOR THE COASTAL ZONE OF THE SOUTHERN GULF. HOWEVER, SOME EMPHASIS HAS BEEN PLACED ON THOSE AREAS CONSIDERED VULNERABLE TO OIL SPILLS. DR. F. C. DUERDEN AND MR. R. J. PERCY WERE SCIENTIFIC ADVISORS FOR THE PROJECT. THIS STUDY WAS COMPLETED UNDER DSS CONTRACT No. OSC78-00010.

EACH SECTION OF THE ATLAS CONTAINS TWO BASE MAPS AND SIX TRANSPARENT ACRYLIC OVERLAYS. THESE OVERLAYS MAY BE USED INDIVIDUALLY OR IN ANY COMBINATION.

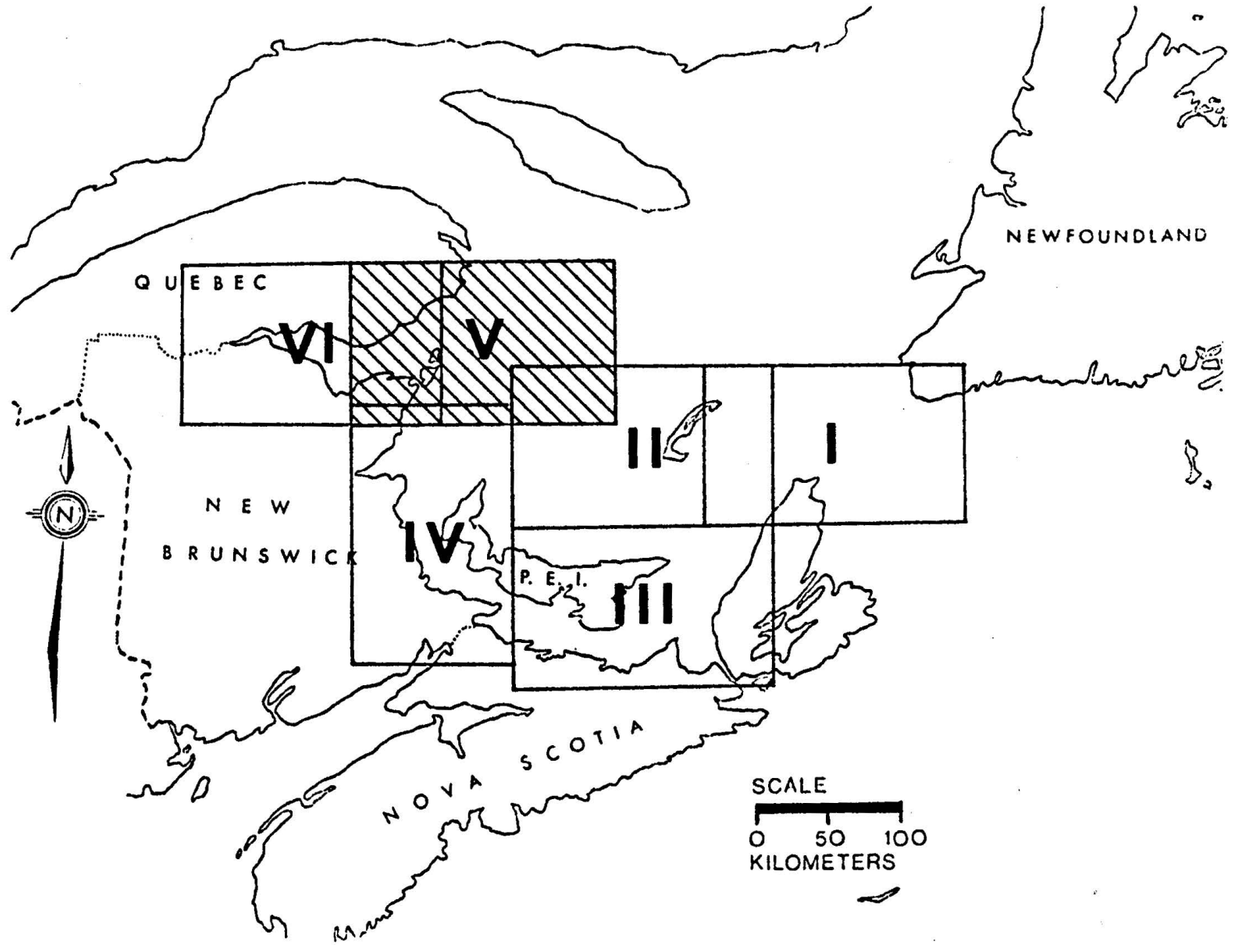
AN APPENDIX CONTAINS WIND AND VISIBILITY DATA, BY MONTH, PRESENTED IN A SERIES OF 12 TABLES. THE INFORMATION IS FOR THREE COASTAL STATIONS: CHATHAM, N.B.; SUMMERSIDE, P.E.I.; AND SYDNEY, N.S. IN ADDITION, TABLES LISTING TIDAL RANGES, FISH PROCESSING PLANTS, LOBSTER POUNDS, AND FISHERIES PROTECTION OFFICERS ARE PROVIDED. A LIST OF REFERENCES UTILIZED HAS ALSO BEEN INCLUDED, HOWEVER, PERSONAL COMMUNICATIONS AND PERSONAL OBSERVATIONS COULD NOT BE CITED.

THE AUTHOR EXPRESSES HIS APPRECIATION FOR THE COOPERATION PROVIDED BY THE FOLLOWING GROUPS WITHOUT WHOSE ASSISTANCE THIS REPORT COULD NOT HAVE BEEN PREPARED: ATLANTIC OCEANOGRAPHIC LABORATORY, ATMOSPHERIC ENVIRONMENT SERVICE, CANADIAN WILDLIFE SERVICE, FISHERIES AND MARINE SERVICE, MARITIME RESOURCE MANAGEMENT SERVICE, NEW BRUNSWICK DEPARTMENT OF ENVIRONMENT, NOVA SCOTIA DEPARTMENT OF ENVIRONMENT, PARKS CANADA, PRINCE EDWARD ISLAND DEPARTMENT OF ENVIRONMENT AND THE PRINCE EDWARD ISLAND LAND USE SERVICE CENTRE.

THE SOUTHERN GULF OF ST. LAWRENCE HAS BEEN SUBDIVIDED INTO SIX SECTIONS:

I CABOT STRAIT
II MAGDALEN ISLANDS
III NORTHERN NOVA SCOTIA AND EASTERN PRINCE EDWARD ISLAND
IV WESTERN PRINCE EDWARD ISLAND AND EASTERN NEW BRUNSWICK
V NORTHEASTERN NEW BRUNSWICK AND GASPE´
VI CHALEUR BAY

THESE ARE INDICATED BY THE SKETCH MAP BELOW (THE SHADED PORTION SHOWS THE AREA COVERED IN THIS SECTION).



48°30'

65°

64°

63°

48°30'

Percé

Bonaventure I.

Cap d'Espoir

QUEBEC

Chandler

Gascons

Pt. Ouest

Paspébiac

48°

48°

BAIE DES CHALEURS

MISCOU I.

Miscou Centre

Sandy Pt.

ILE LAMEQUE

Lameque

Grand Anse

Maisonette

Caraquet

Shippegan

NEW BRUNSWICK

47°30'

Tracadie

65°

64°

63°

47°30'

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

48°30′
65°
64°
63°
48°30′
48°
47°30′
47°30′
65°
64°
63°

QUEBEC

NEW BRUNSWICK

BAIE DES CHALEURS

Percé
Bonaventure I.
Cap d'Espoir
Chandler
Gascons
Pt. Ouest
Paspébiac
MISCOU I.
Miscou Centre
Sandy Pt.
ILE LAMEQUE
Lameque
Shippegan
Grand Anse
Maisonette
Caraquet
Tracadie

5°
5°
13°
3°
14°
16°
5°
14°
7°

Mean Sea Surface Temperature (°C)

Spring
Summer
Fall

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000
0 5 10
KILOMETERS

48°30'

Mean Sea Ice Concentration (Winter):

65° 10/10 >4/10

≥7/10

QUEBEC

Perce

Bonaventure

64°

63°

48°30'

Cap d'Espoir

Chandler

Gascons

Pt. Ouest

Paspebiac

48°

BAIE DES CHALEURS

MISCOU I.

Miscou Centre

Sandy Pt.

ILE LAMEQUE

Lameque

Grand Anse

Maisonette

Caraquet

Shippegan

NEW BRUNSWICK

47°30'

Tracadie

65°

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

48°

64°

63°

47°30'

SCALE 1:500,000

0 5 10

KILOMETERS

V-4

48°30′

65°

64°

63°

48°

47°30′

QUEBEC

Percé

Bonaventure I.

Cap d'Espoir

Chandler

Gascons

Pt. Ouest

Paspébiac

BAIE DES CHALEURS

MISCOU I.

Miscou Centre

Sandy Pt.

ILE LAMEQUE

Lameque

Shippegan

Grand Anse

Maisonette

Caraquet

NEW BRUNSWICK

Tracadie

Primary Surface Current

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10 KILOMETERS

V-5

48°30'

65°

64°

63°

48°30'

48°

47°30'

QUEBEC

NEW BRUNSWICK

Percé

Bonaventure I.

Cap d'Espoir

Chandler

Gascons

Pt. Ouest

Paspébiac

BAIE DES CHALEURS

MISCOU I.

Miscou Centre

Sandy Pt.

ILE LAMEQUE

Lameque

Maisonette

Grand Anse

Caraquet

Shippegan

Tracadie

Gaspereaux g

Eels e

Smelts m

Snow Crabs ■

Scallop Bed

KEY:

- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

V-9

V-6

48°30′ 65° 64° 63° 48°30′

QUEBEC

Percé
Bonaventure I.
Cap d'Espoir
Chandler
Major Herring Spawning Area
Gascons
Shellfish Growing Area
Pt. Ouest
Paspébiac
48°

BAIE DES CHALEURS

MISCOU I.
Miscou Centre
Sandy Pt.
ILE LAMEQUE
Lameque
Grand Anse
Maisonnette
Caraquet
Shippegan

NEW BRUNSWICK

Tracadie
47°30′
65°
64°

Commercial Fisheries:

- Cod
- Hake
- Herring
- Mackerel
- American Plaice

F Fish Processing Plant

Lobsters are harvested in most coastal waters to a depth of 40m.

KEY:
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

Major Concentrations of Cod - Summer

48°
47°30′
63°

SCALE 1:500,000
0 5 10
KILOMETERS

V-9

48°30′

65°

64°

63°

48°30′

Percé

Bonaventure I.

Cap d'Espoir

QUEBEC

Chandler

Migratory Bird Stop-over Zone

Gascons

Pt. Ouest

Paspébiac

48°

BAIE DES CHALEURS

MISCOU I.

Miscou Centre

Sandy Pt.

ILE LAMEQUE

Lameque

Grand Anse

Maisonette

Caraquet

Shippegan

Migration Routes (Spring & Fall):

Ducks & Geese

Shorebirds

NEW BRUNSWICK

Seabird Colony

Tracadie

47°30′

65°

64°

63°

48°

47°30′

KEY:

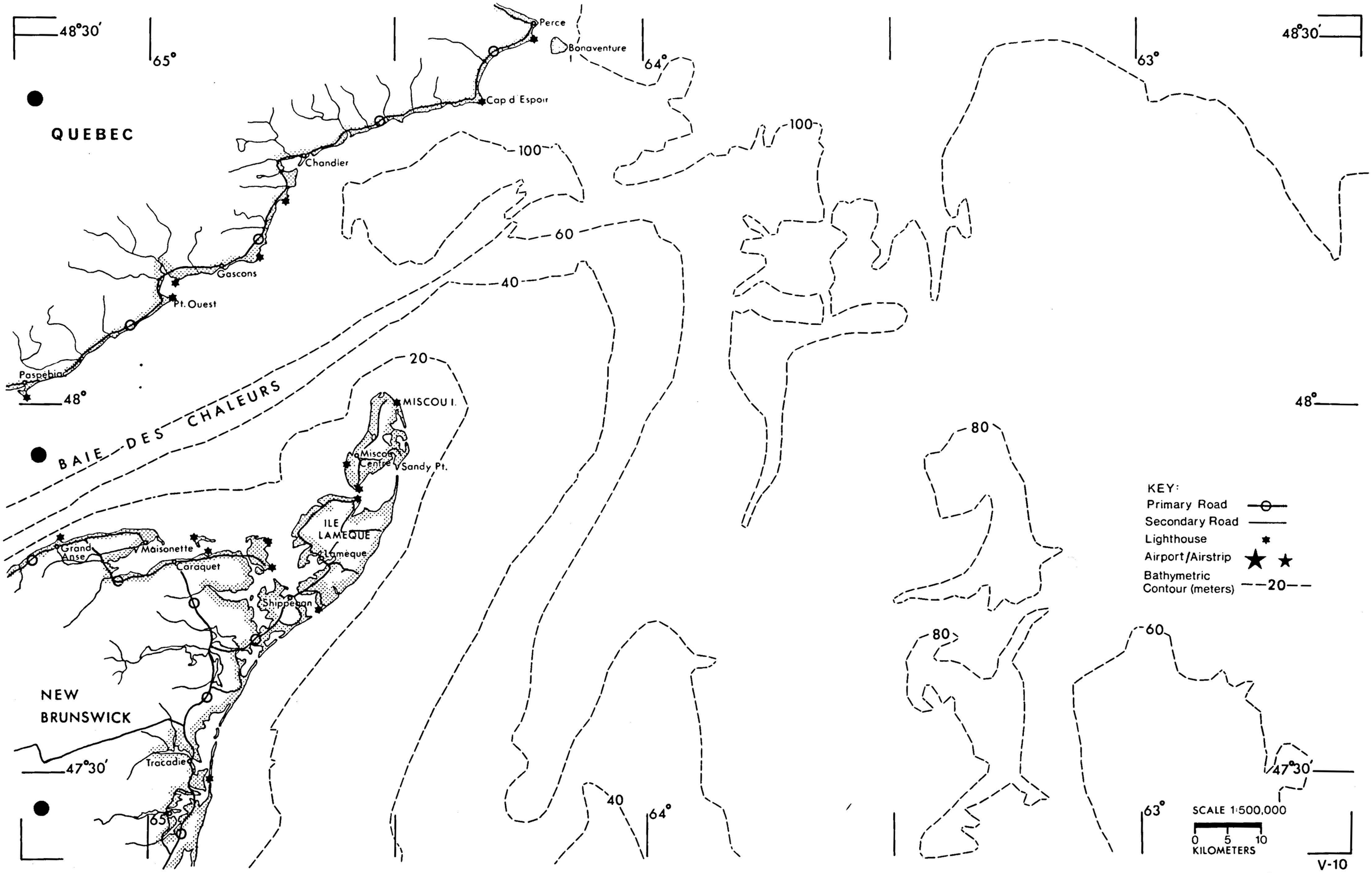
- Low Cliff
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

V-8


48°30'
65°
64°
63°
48°30'
QUEBEC
Perce
Bonaventure
Cap d'Espoir
Chandler
Gascons
Pt. Ouest
Paspebiac
48°
100
60
40
20
BAIE DES CHALEURS
MISCOU I.
Miscou Centre
Sandy Pt.
ILE LAMEQUE
Lameque
Grand Anse
Maisonette
Caraquet
Shippegan
NEW BRUNSWICK
Tracadie
47°30'
65°
40
64°
80
60
63°
47°30'
48°
KEY:
Primary Road
Secondary Road
Lighthouse
Airport/Airstrip
Bathymetric Contour (meters) --20--
SCALE 1:500,000
0 5 10
KILOMETERS

ENVIRONMENTAL ATLAS

OF THE

SOUTHERN GULF OF ST. LAWRENCE

SECTION VI

CHALEUR BAY

MARINE ENVIRONMENT BRANCH

ENVIRONMENTAL PROTECTION SERVICE

ATLANTIC REGION

MARCH 1979

This environmental atlas of the Southern Gulf of St. Lawrence has been prepared by B. E. McGuire for the Marine Environment Branch of the Environmental Protection Service, Atlantic Region. The main purpose of the atlas is to provide a document which can be used in planning for and responding to oil spills in the Southern Gulf of St. Lawrence. Biological, oceanographic, meteorological and socio-economic data have been compiled from existing sources for the coastal zone of the Southern Gulf. However, some emphasis has been placed on those areas considered vulnerable to oil spills. Dr. F. C. Duerden and Mr. R. J. Percy were scientific advisors for the project. This study was completed under DSS Contract No. OSC78-00010.

Each section of the atlas contains two base maps and six transparent acrylic overlays. These overlays may be used individually or in any combination.

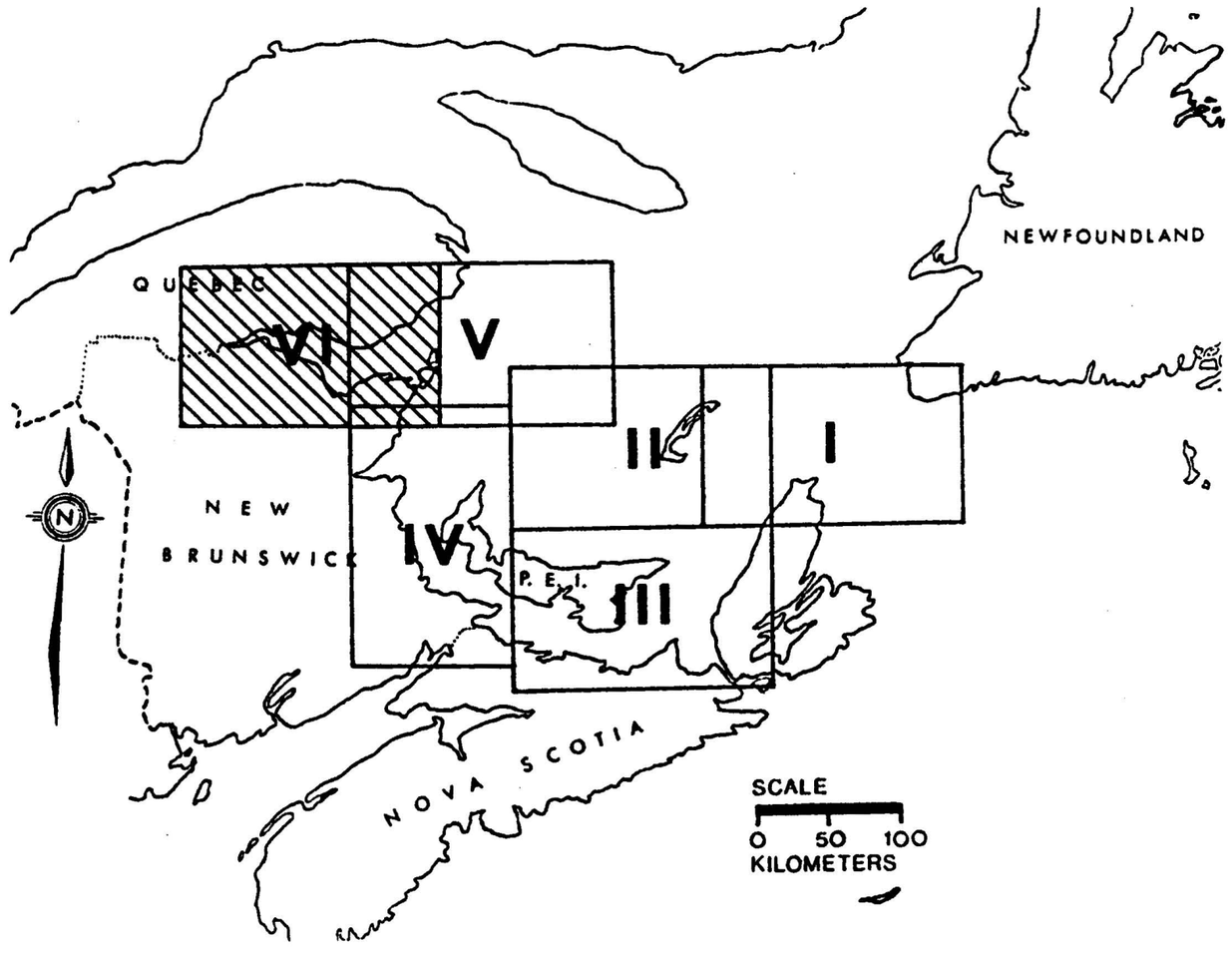
An appendix contains wind and visibility data, by month, presented in a series of 12 tables. The information is for three coastal stations: Chatham, N.B.; Summerside, P.E.I.; and Sydney, N.S. In addition, tables listing tidal ranges, fish processing plants, lobster pounds, and fisheries protection officers are provided. A list of references utilized has also been included, however, personal communications and personal observations could not be cited.

The author expresses his appreciation for the cooperation provided by the following groups without whose assistance this report could not have been prepared: Atlantic Oceanographic Laboratory, Atmospheric Environment Service, Canadian Wildlife Service, Fisheries and Marine Service, Maritime Resource Management Service, New Brunswick Department of Environment, Nova Scotia Department of Environment, Parks Canada, Prince Edward Island Department of Environment and the Prince Edward Island Land Use Service Centre.

The Southern Gulf of St. Lawrence has been subdivided into six sections:

I Cabot Strait
II Magdalen Islands
III Northern Nova Scotia and Eastern Prince Edward Island
IV Western Prince Edward Island and Eastern New Brunswick
V Northeastern New Brunswick and Gaspé
VI Chaleur Bay

These are indicated by the sketch map below (the shaded portion shows the area covered in this section).



67°

66°

65°

QUEBEC

Chandler

Gascons

Pt. Ouest

New Richmond

Carlton

Caplan

Bonaventure

Paspébiac

48°

DALHOUSIE

MATAPEDIA

CAMPBELTON

Charlo

Heron I.

BAIE DES CHALEURS

Jacquet River

Petite Rocher

Nigadoo

Salmon Beach

BATHURST

48°

MISCOU I.

Miscou Centre

ILE LAMEQUE

Lameque

Grand Anse

Maisonette

Caraquet

Shippegan

Tracadie

Neguac Beach

NEW BRUNSWICK

47°30′

47°30′

KEY:

- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

67°

66°

65°

VI-9

67°

66°

65°

48°

47°30'

QUEBEC

NEW BRUNSWICK

BAIE DES CHALEURS

9°

16°

7°

14°

5°

MATAPEDIA

CAMPBELTON

DALHOUSIE

Charlo

Heron I.

Carlton

New Richmond

Caplan

Bonaventure

Paspébiac

Gascons

Pt Ouest

Chandler

Jacquet River

Petite Rocher

Nigadoo

Salmon Beach

BATHURST

Grand Anse

Maisonette

Caraquet

ILE LAMEQUE

Lameque

Shippegan

MISCOU I.

Miscou Centre

Tracadie

Neguac Beach

KEY:

- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

Mean Sea Surface Temperature (°C):

Spring

Summer

Fall

VII-98

67°

66°

65°

QUEBEC

Chandler

Gascons

Pt. Ouest

New Richmond

Carlton

Caplan

Bonaventure

Paspébiac

DALHOUSIE

Charlo

Heron I.

48°

MATAPEDIA

CAMPBELLTON

B A I E D E S C H A L E U R S

Jacquet River

MISCOU I.

Miscou Centre

ILE LAMEQUE

Lameque

Petite Rocher

Grand Anse

Maisonnette

Caraquet

Shippegan

Nigadoo

Salmon Beach

BATHURST

Tracadie

47°30'

Negouac Beach

NEW BRUNSWICK

Mean Ice Concentration (Winter):

10/10

>7/10

>4/10

KEY:

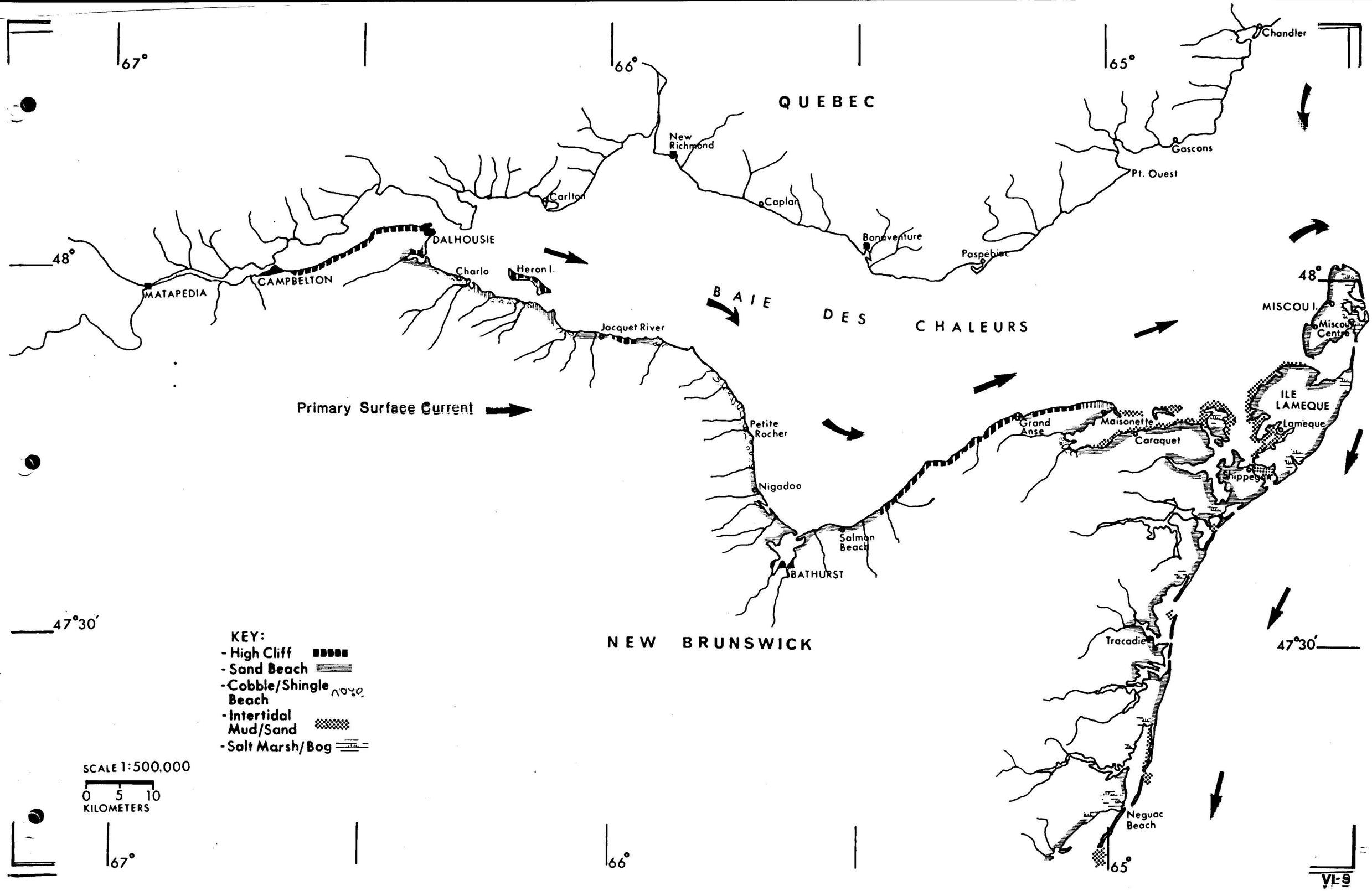
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

VI:9


67°
66°
65°
48°
47°30'
QUEBEC
NEW BRUNSWICK
BAIE DES CHALEURS
Chandler
New Richmond
Gascons
Pt. Ouest
Carlton
Caplan
Bonaventure
Paspébiac
DALHOUSIE
MATAPEDIA
CAMPBELTON
Charlo
Heron I.
Jacquet River
Petite Rocher
Nigadoo
Salmon Beach
BATHURST
MISCOU I.
Miscou Centre
ILE LAMEQUE
Lameque
Grand Anse
Maisonette
Caraquet
Shippegan
Tracadie
Neguac Beach
Primary Surface Current
KEY:
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog
SCALE 1:500,000
0 5 10
KILOMETERS

67°

66°

65°

48°

47°30′

QUEBEC

NEW BRUNSWICK

BAIE DES CHALEURS

Chandler

Gascons

Pt. Ouest

New Richmond

Carlton

Caplan

Bonaventure

Paspébiac

DALHOUSIE

MATAPEDIA

CAMPBELTON

Charlo

Heron I.

Jacquet River

Salmon Spawning River

Petite Rocher

Nigadoo

Salmon Beach

BATHURST

Miscou I.

Miscou Centre

ILE LAMEQUE

Lameque

Grand Anse

Maisonette

Caraquet

Shippegan

Tracadie

Neguac Beach

Snow Crabs

Gaspereaux g

Eels e

Smelts m

Scallop Bed

KEY:

- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

SCALE 1:500,000

0 5 10

KILOMETERS

67°

66°

65°

QUEBEC

Chandler

New Richmond

Gascons

Pt. Ouest

Carlton

Caplan

Bonaventure

Paspébiac

DALHOUSIE

48°

Charlo

Heron I.

MATAPEDIA

CAMPBELTON

Shellfish Growing Area ▲ ▲ ▲

Jacquet River

B A I E D E S C H A L E U R S

Commercial Fisheries:

Cod C

Herring H

Mackerel M

Tuna T

Major Herring Spawning Area

Petite Rocher

Nigadoo

Salmon Beach

BATHURST

NEW BRUNSWICK

MISCOU I.

Miscou Centre

ILE LAMEQUE

Lameque

Grand Anse

Maisonette

Caraquet

Shippegan

Tracadie

Neguac Beach

47°30'

KEY:

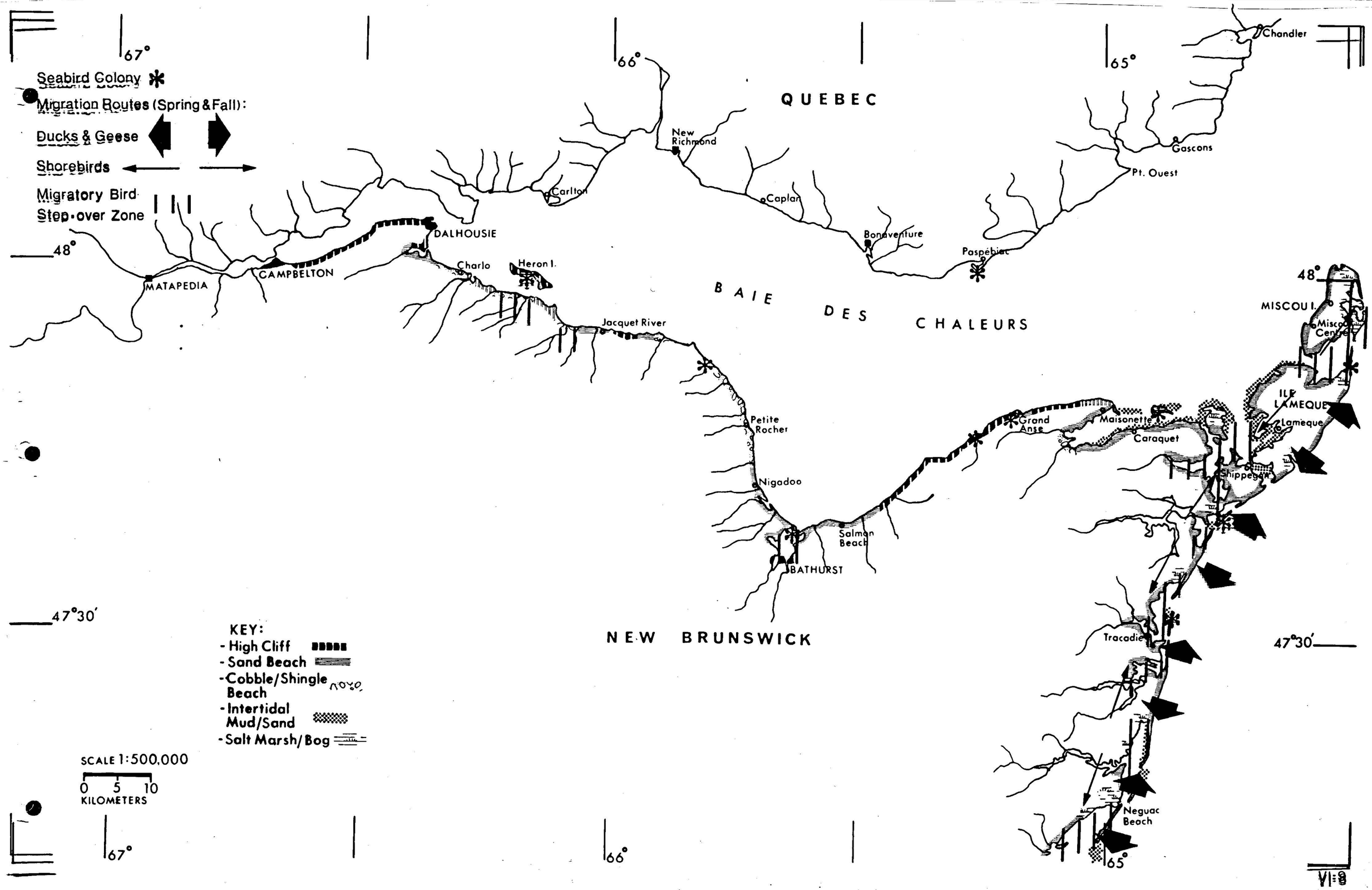
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog

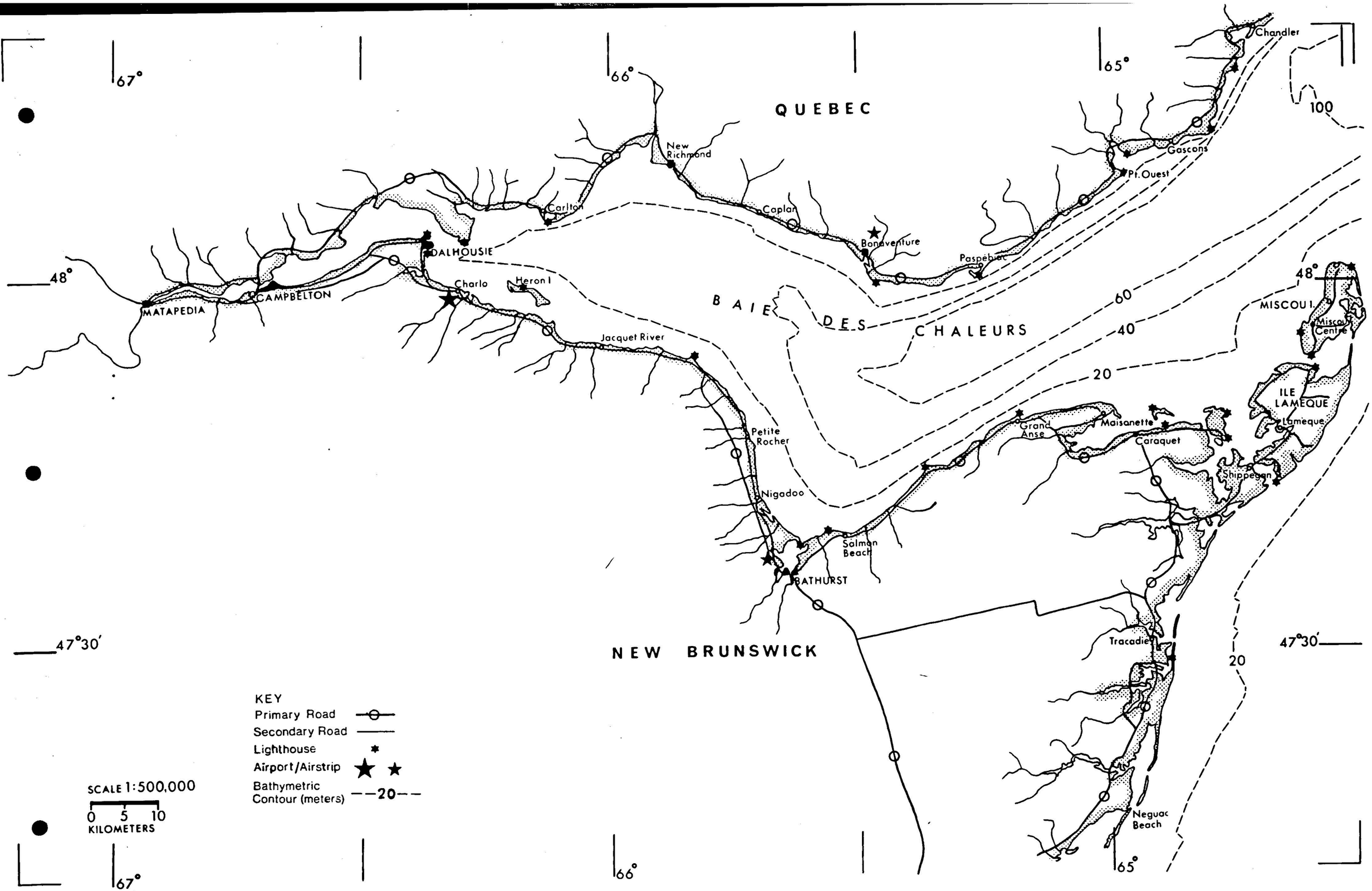
Fish Processing Plant E

SCALE 1:500,000

0 5 10

KILOMETERS


67°
66°
65°
48°
47°30'
Seabird Colony
Migration Routes (Spring & Fall):
Ducks & Geese
Shorebirds
Migratory Bird Stop-over Zone
QUEBEC
Chandler
New Richmond
Gascons
Pt. Ouest
Carlton
Caplan
Bonaventure
Paspébiac
DALHOUSIE
Charlo
Heron I.
MATAPEDIA
CAMPBELTON
BAIE DES CHALEURS
Jacquet River
MISCOU I.
Miscou Centre
ILE LAMEQUE
Lameque
Grand Anse
Maisonette
Caraquet
Shippegan
Petite Rocher
Nigadoo
Salmon Beach
BATHURST
NEW BRUNSWICK
Tracadie
Neguac Beach
KEY:
- High Cliff
- Sand Beach
- Cobble/Shingle Beach
- Intertidal Mud/Sand
- Salt Marsh/Bog
SCALE 1:500,000
0 5 10
KILOMETERS


67°
66°
65°
QUEBEC
Chandler
100
Gascons
Pt. Ouest
New Richmond
Carlton
Caplan
Bonaventure
Paspebiac
DALHOUSIE
48°
Charlo
Heron I
MATAPEDIA
CAMPBELLTON
Jacquet River
B A I E
D E S
C H A L E U R S
60
40
20
MISCOU I.
Miscou Centre
ILE LAMEQUE
Lameque
Maisanette
Grand Anse
Caraquet
Shippegan
Petite Rocher
Nigadoo
Salmon Beach
BATHURST
NEW BRUNSWICK
Tracadie
Neguac Beach
47°30'
KEY
Primary Road
Secondary Road
Lighthouse
Airport/Airstrip
Bathymetric Contour (meters) --20--
SCALE 1:500,000
0 5 10
KILOMETERS

APPENDIX

MONTHLY WIND DATA FOR THE SOUTHERN GULF OF ST. LAWRENCE

A. Chatham, N.B. Period 1955-72

Average Wind Speed (KM/HR)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	16.4	15.5	16.8	16.1	13.5	13.5	11.9	12.9	13.4	14.8	15.0	16.0	14.7
NNE	18.7	19.8	20.2	17.9	14.0	15.2	13.5	14.5	14.0	15.3	17.2	17.2	16.4
NE	19.8	19.7	19.0	18.1	15.6	15.6	13.7	14.5	14.4	15.0	16.4	18.2	16.6
ENE	18.2	16.9	19.7	17.2	16.8	15.8	13.7	15.0	14.4	14.8	17.9	17.4	16.4
E	13.1	15.0	15.2	13.5	13.4	12.6	11.1	10.3	11.9	11.9	12.6	15.6	13.1
ESE	13.9	13.9	14.0	12.9	13.4	13.5	11.1	11.4	11.4	11.6	13.2	18.5	13.2
SE	13.4	11.3	12.2	12.9	13.2	12.2	11.3	11.1	13.2	12.6	12.7	15.6	12.7
SSE	13.5	14.8	13.4	14.2	14.5	13.7	13.2	11.1	13.9	16.1	15.6	15.2	14.2
S	13.4	15.6	17.1	17.2	16.6	16.4	15.3	13.9	14.7	15.6	15.6	13.7	15.5
SSW	15.2	16.4	18.1	19.2	19.7	20.2	17.9	15.8	17.6	16.8	16.8	16.6	17.6
SW	15.2	17.1	16.9	17.1	17.7	17.6	15.6	15.2	16.3	16.4	15.5	16.1	16.4
WSW	16.6	18.1	18.7	16.4	17.4	16.4	15.5	14.4	15.0	15.8	16.1	16.8	16.4
W	18.2	17.4	18.1	16.8	16.4	15.2	14.5	14.8	14.7	16.1	15.8	17.2	16.3
WNW	19.0	19.7	20.8	19.5	18.5	18.7	16.8	16.8	16.9	19.5	19.3	19.2	18.7
NW	18.2	17.7	18.2	17.1	17.9	16.6	15.3	15.3	15.8	17.1	17.1	17.1	16.9
NNW	16.9	16.3	17.4	16.0	17.1	15.5	13.5	14.7	15.0	14.7	14.8	15.0	15.6
All Directions	15.8	16.1	16.8	15.8	15.3	15.2	13.9	13.5	14.2	14.8	14.8	15.3	15.2

A. Chatham, N.B. Period 1955-72

Percentage Frequency

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	5	4	6	5	5	4	3	3	4	5	5	6	5
NNE	4	4	6	6	4	4	2	2	3	4	5	4	4
NE	6	8	9	11	9	8	5	4	4	4	6	3	6
ENE	4	5	7	7	7	6	4	3	3	3	3	2	5
E	2	3	4	4	4	5	3	3	3	2	2	1	3
ESE	1	1	1	1	2	2	1	1	1	1	1	1	1
SE	1	1	1	2	2	2	2	2	2	2	2	1	2
SSE	1	1	1	2	2	2	2	2	1	2	2	1	1
S	3	4	3	5	6	6	9	7	7	6	6	4	6
SSW	5	4	4	6	8	13	14	14	11	9	7	6	8
SW	10	10	6	9	11	15	18	17	16	15	11	12	13
WSW	14	14	9	8	9	9	10	11	12	12	12	14	11
W	13	11	10	8	8	6	8	10	9	10	11	13	10
WNW	10	10	10	7	6	4	5	5	6	7	8	10	7
NW	8	7	9	7	6	4	4	5	6	6	6	8	6
NNW	6	4	6	5	4	3	2	3	4	5	5	5	4
Calm	7	9	8	7	7	7	8	8	8	7	8	9	8

MONTHLY WIND DATA FOR THE SOUTHERN GULF OF ST. LAWRENCE

B. Summerside, P.E.I. Period 1955-72

Average Wind Speed (KM/HR)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	30.6	28.2	31.0	27.4	27.3	26.3	21.3	23.1	26.0	28.5	28.4	28.9	27.3
NNE	33.7	28.7	20.2	28.2	25.2	26.4	21.4	23.7	26.1	29.5	33.5	30.8	28.1
NE	28.1	26.8	24.2	22.4	20.6	21.6	20.0	19.5	23.2	23.1	28.7	29.0	23.9
ENE	26.0	25.8	22.6	21.0	20.3	19.0	19.5	20.5	20.3	23.5	24.2	27.2	22.6
E	23.4	20.8	18.5	15.8	16.3	14.5	14.2	16.0	14.5	17.1	17.1	22.7	17.6
ESE	22.7	24.5	23.9	19.5	17.1	15.6	13.9	15.0	16.4	18.2	19.0	24.2	19.2
SE	23.1	25.3	22.1	22.4	20.0	18.4	18.9	17.6	19.5	21.8	24.8	25.8	21.6
SE	24.0	24.5	23.5	23.1	22.7	20.6	20.0	19.2	19.8	23.5	26.3	26.1	22.7
S	21.9	20.6	21.8	21.3	21.0	20.6	19.7	20.0	20.5	22.9	23.2	24.2	21.4
SSW	23.5	22.9	23.1	23.4	25.0	26.0	23.2	23.5	25.3	25.0	26.4	22.4	24.2
SW	20.5	21.9	24.5	22.1	25.2	25.6	23.5	22.9	23.7	23.5	22.9	25.0	23.4
WSW	25.5	28.5	28.4	23.7	25.3	22.2	20.8	22.2	23.7	26.6	25.2	28.5	25.0
W	29.7	27.7	27.9	24.2	24.7	21.6	19.8	21.6	22.6	26.8	26.9	27.9	25.2
WNW	29.5	28.5	30.8	27.1	26.0	24.2	20.5	20.5	22.7	25.8	26.1	27.6	25.8
NW	25.6	26.9	26.1	25.0	24.8	22.9	20.2	19.3	21.9	23.2	23.9	23.4	23.5
NNW	27.3	26.8	29.7	26.9	26.0	22.6	19.3	19.8	22.4	25.0	23.5	25.3	24.5
All Directions	25.8	24.7	25.2	23.1	22.1	21.9	19.8	20.3	21.6	23.9	24.2	25.3	23.2

B. Summerside, P.E.I. Period 1955-72

Percentage Frequency

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	7	5	10	9	6	4	2	3	4	5	4	5	5
NNE	5	6	9	12	9	7	4	4	5	5	5	4	6
NE	3	4	7	8	6	7	4	4	4	4	5	3	5
ENE	3	4	5	5	4	3	3	2	3	3	3	3	3
E	3	3	4	3	4	3	2	2	3	3	3	3	3
ESE	2	3	3	2	3	2	2	2	2	2	3	2	2
SE	4	3	3	4	3	3	2	2	3	3	5	3	3
SSE	4	6	4	7	8	7	6	4	5	6	7	4	6
S	4	5	5	8	11	11	13	10	7	7	6	5	8
SSW	4	5	5	8	13	20	23	20	15	9	5	4	11
SW	5	5	4	5	8	13	14	14	12	10	6	5	8
WSW	10	10	7	5	4	5	6	8	8	10	8	10	8
W	17	14	9	6	5	4	5	8	8	11	12	17	10
WNW	12	10	9	5	4	2	4	5	7	8	11	13	8
NW	8	7	6	5	3	2	2	4	6	6	8	9	5
NNW	5	4	5	4	3	2	2	3	3	4	4	5	4
Calm	4	6	5	4	6	5	6	5	5	4	5	5	5

MONTHLY WIND DATA FOR THE SOUTHERN GULF OF ST. LAWRENCE

C. Sydney, N.S. Period 1955-72

Average Wind Speed (KM/HR)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	26.4	24.5	25.2	24.2	22.6	20.8	18.7	19.2	20.8	24.8	27.9	24.4	23.2
NNE	23.2	21.1	22.2	19.8	18.7	18.2	15.8	16.8	19.2	22.7	23.4	22.7	20.3
NE	21.8	21.8	21.4	18.7	17.4	16.0	15.0	16.1	14.8	20.0	21.6	20.5	18.9
ENE	27.7	25.8	24.7	21.9	16.3	17.6	14.8	19.3	16.9	19.2	22.2	22.2	21.0
E	26.6	26.9	25.8	22.1	18.2	17.1	15.8	17.6	16.1	18.7	24.2	24.2	21.2
ESE	31.1	32.1	30.6	24.0	21.6	18.9	16.8	19.7	20.5	21.8	28.7	28.7	24.0
SE	28.4	29.7	27.3	23.8	19.8	20.5	16.8	17.6	18.7	23.7	23.7	28.4	23.2
SSE	26.6	26.6	27.4	23.4	21.9	18.9	20.2	19.5	21.1	24.5	27.6	26.4	23.7
S	23.1	23.1	23.9	24.0	24.2	22.9	21.3	21.0	21.8	22.4	26.0	24.2	23.1
SSW	23.5	23.7	24.2	26.1	23.5	24.5	22.6	21.9	23.2	22.4	22.7	21.8	23.5
Sw	20.3	20.6	21.2	22.9	22.6	22.9	20.3	19.8	19.8	20.6	20.4	22.1	21.1
WSW	23.5	23.4	24.8	21.9	22.4	19.5	19.0	18.7	19.0	21.0	24.0	25.5	21.9
W	26.8	26.3	25.5	23.7	22.9	19.7	20.6	20.0	20.0	21.9	23.4	26.0	23.1
WNW	27.1	27.7	28.2	24.7	23.4	21.0	21.0	21.3	22.2	23.5	24.8	26.3	24.4
NW	27.4	27.3	25.5	25.8	23.1	20.0	19.8	19.8	22.2	24.5	25.6	26.3	24.0
NNW	30.8	29.9	28.2	28.2	26.0	21.9	18.9	21.2	23.2	26.9	28.5	27.4	26.0
All Directions	25.2	24.8	24.8	23.4	22.1	20.6	19.5	19.5	20.0	22.2	24.0	24.5	22.6

C. Sydney, N.S. Period 1955-72

Percentage Frequency

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
N	5	7	12	11	11	8	5	4	6	6	6	6	7
NNE	3	4	5	5	4	4	3	2	3	3	3	3	4
NE	3	3	5	4	4	4	3	2	3	3	3	3	3
ENE	3	2	3	3	2	2	2	2	2	2	3	2	2
E	4	3	4	4	4	3	4	3	3	2	5	3	4
ESE	2	3	3	2	3	2	2	2	2	2	2	2	2
SE	3	4	3	3	4	4	4	3	3	4	4	4	4
SSE	3	2	2	3	3	4	3	3	3	4	5	3	3
S	6	7	6	8	11	11	14	13	9	9	9	7	9
SSW	6	7	7	8	12	16	19	15	11	10	8	7	11
SW	11	10	9	10	12	18	18	22	18	15	11	12	14
WSW	10	9	7	6	5	6	6	9	9	9	9	12	8
W	16	16	11	9	6	5	7	8	10	11	11	13	10
WNW	9	8	7	6	4	3	3	4	6	6	8	8	6
NW	9	7	7	7	7	4	3	4	6	7	7	8	6
NNW	6	6	8	9	6	4	2	2	4	6	5	6	5
Calm	1	2	1	2	2	2	2	2	2	1	1	1	2

VISIBILITY - SOUTHERN GULF OF ST. LAWRENCE

A. Chatham, N.B. Period 1953-72

Percentage Frequency

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
<1KM	2.1	2.4	2.8	2.0	1.1	1.6	1.3	0.9	1.6	1.9	2.9	2.8	2.0
<5KM	19.8	19.0	19.8	17.1	15.5	15.0	13.2	11.8	13.5	14.6	21.3	19.2	16.6

B. Summerside, P.E.I. Period 1953-72

Percentage Frequency

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
<1KM	3.1	3.7	4.1	3.1	1.5	1.2	0.7	0.5	0.9	1.2	2.1	2.8	2.1
<5KM	23.5	19.0	22.5	20.4	15.6	15.1	12.1	10.4	10.5	12.1	17.2	19.7	16.5

C. Sydney, N.S. Period 1953-72

Percentage Frequency

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
<1KM	3.6	4.5	4.9	5.6	6.2	6.2	5.3	2.2	2.2	2.3	3.4	2.8	4.1
<5KM	25.3	24.2	27.0	26.6	27.5	27.9	27.2	19.7	16.7	18.2	24.8	21.6	23.9

TIDAL RANGES - SOUTHERN GULF OF ST. LAWRENCE

NOVA SCOTIA	MEAN TIDE (M.)	LARGE TIDE (M)
Bay St. Lawrence	0.8	1.2
Margaree	0.7	1.1
Port Hood	0.9	1.3
Antigonish Harbour	1.0	1.6
Pictou	1.2	2.0
Cape Cliff	1.7	2.6
NEW BRUNSWICK		
Cape Tormentine	1.3	2.0
Shediac Bay	0.8	1.6
Pt. Sapin	0.9	1.4
Portage I.	1.1	1.6
Lower Neguac	1.0	1.6
Shippegan	1.5	2.1
Bathurst	1.6	2.3
Dalhousie	2.0	3.0
PRINCE EDWARD ISLAND		
Souris	1.1	1.7
Charlottetown	1.8	2.9
Borden	1.6	2.5
Summerside	1.5	2.2
Miminegash	0.8	1.2
Malpeque	0.8	1.1
North Lake	0.7	1.1
QUEBEC		
Grande Rivière	1.0	1.4
Gaspé	1.2	1.7
Grindstone I. (Magdalen I.)	0.7	1.0

FEDERAL FISHERIES PROTECTION OFFICERS

SOUTHERN GULF OF ST. LAWRENCE

NOVA SCOTIA

	LOCATION	OFFICE TELEPHONE
R. W. Watts, FO	Margaree Forks	248-2322
J. G. Doucette, FO	Ingonish Beach	285-2408
W. B. Marcott, FO	Port Hood	787-3227
T. Kiely, FS	Antigonish	863-1142
E. C. Pushie, FO	Antigonish	863-1142
J. R. Webber, FO	Antigonish	863-1142
R. S. Stewart, FS	Pictou	485-4477
A. MacIsaac, FO	Pictou	485-5413
G. R. Brittain, FO	Pictou	485-4477
F. M. Hiltz, FO	Wallace	257-2400

NEW BRUNSWICK

C. R. Lavoie, DPO	Moncton	858-2004
G. Veinotte, FO	Moncton	858-2004
A. J. Frigault, FS	Shediac	532-4407
M. L. Sirois, FO	Shediac	532-4407
R. L. Butler, FO	Albert	882-2070
B.C.J. Keating, FO	Port Elgin	538-2331
R. LeBlanc, FO	Buctouche	743-2274
E. Robichaud, FO	Richibucto	523-4435
J.N.A. Comeau, FS	Richibucto	523-4435
J. Y. Mallet, FO	Richibucto	523-4435
R. H. Theriault, FO	Baie St. Anne	228-4263
J. G. Blanchard, FO	Tabusintac	779-4442
J. H. Robichaud, FO	Neguac	776-3307
P. B. Duggan, FO	Chatham	773-3268
J. F. Comeau, FO	Tracadie	395-2788
M. T. Mazerolle, FS	Shippegan	336-8712
A. J. McMahon, FO	Shippegan	336-8712
W. F. Savoie, FO	Shippegan	336-8712
R. M. Breault, FO	Lameque	344-2253
J. M. Comeau, A/DPO	Caraquet	272-3038
R. J. Duguay, FO	Caraquet	727-3038
J.M.A. Doucet, FO	Bathurst	546-2305
D. P. Brown, FO	Dalhousie	684-2202

PRINCE EDWARD ISLAND

	LOCATION	OFFICE TELEPHONE
H. H. Scarth, DPO	Charlottetown	892-5346
S. L. McQuaid, FO	Charlottetown	892-5346
D. F. Bryan, FO	Charlottetown	892-5346
D. I. Rix, FS	Montague	838-2422
E. F. MacDonald, FO	Montague	838-2422
D. G. Sheidow, FO	Montague	838-2422
G. R. Arsenault, FO	Souris	687-2019
S. M. Matheson, FO	Morell	961-2251
N. E. McLeod, FS	Summerside	436-2813
C. L. Heckbert, FO	Summerside	436-2813
J. R. St. John, FO	Summerside	436-2813
D. M. Blackadar, FO	Alberton	853-2297
J. D. Baglole, FO	Tignish	882-2155

NOVA SCOTIA

Name of Fish Processor	Mailing Address	Telephone Number	Months of Normal Operation	Products Handled
1. Victoria Co-op Fisheries Ltd.	Neils Harbour Victoria Co.	336-2541	May-Dec	fresh groundfish; mackerel, salmon, live lobsters, live and cooked crabs
2. Dingwall Fish Company	Dingwall Victoria Co.	383-2052	May-Dec	fresh groundfish; mackerel, salmon, live lobsters
3. Cheticamp Fishermen's Co-operative, Ltd.	Cheticamp Inverness Co.	224-2290	May-Dec	fresh and frozen groundfish; mackerel, herring, smelts, eels, salmon, crabs, lobsters
4. E. P. Melanson, Ltd.	Cheticamp Inverness Co.	224-2424	May-Dec	fresh groundfish; mackerel, herring, smelts, eels, salmon, alewives, lobsters
5. National Sea Products, Ltd.	Cheticamp Inverness Co.	224-2444	May-Dec	fresh groundfish; mackerel herring, smelts, salmon, lobsters
6. Grand Etang Fishermen's Co-operative, Ltd.	Grand Etang Inverness Co.	224-2616	May-Dec	fresh and salted groundfish; herring, mackerel, salmon, eels, alewives, lobsters
7. E. P. Melanson	R. R. # 1, Pictou Pictou Co.	485-5247	Apr-Dec	lobsters, scallops
8. National Sea Products, Ltd. (Pictou Div.)	P. O. Box 550, Pictou, Pictou Co. (plant at Caribou)	485-4343	12	live, frozen and canned lobsters; hake, herring, mackerel, smelts, scallops, oysters, eels
9. Marine Colloids, Ltd.	Toney River Pictou Co.	485-4651	Jul-Nov	Irish moss
10. H. F. Russel Sea Foods, Ltd.	Pictou or Lismore Pictou Co. (plant at Lismore)	485-6417 and Merigomish 34	May-Nov	fresh hake; salmon, herring, scallops, live lobsters
11. George W. Reed	Black Point Pictou Co.	752-8691	May-Aug	live and cooked lobsters fresh clams
12. J. Campbell MacKay	Pictou Landing Pictou Co.	752-8871	Apr-Dec	cooked lobsters
13. St. Georges Co-op.	Ballantynes Cove Antigonish Co.	863-4931	May-Nov	fresh and salted groundfish; herring, alewives, lobsters, bait
14. Kennedy Fisheries, Ltd.	Aulds Cove Guysborough Co.	747-2431	May-Jun	live lobsters
15. Douglas Mills	Port Howe Cumberland Co.	447-2381	May-Jul	pickled alewives
16. Wallace Fisheries, Ltd.	Wallace Cumberland Co.	257-2920	May-Jun	lobsters
17. Steward Bennett	Wallace Cumberland Co.	257-2932	May-Nov	oysters, clams
18. Earl Chase	Port Howe Cumberland Co.	243-2408	Apr-Dec	live and cooked lobsters; smelts, clams, mackerel, oysters, eels
19. George Allen	Wallace Cumberland Co.	257-2219	May-Nov	live lobsters, oysters, clams

PRINCE EDWARD ISLAND

Name of Fish Processor	Mailing Address	Telephone Number	Months of Normal Operation	Products Handled
1. Tignish Fisheries Co-op Association, Ltd.	Tignish Prince Co.	882-2050	May-Nov	fresh, frozen and canned lobsters; chicken haddie; salted groundfish; salted mackerel; tuna, bait
2. Jerry Buote	Tignish Prince Co.	882-2088	May-Nov	lobsters; salted cod and hake; salted mackerel, herring bait, tuna
3. Alberton Fisheries, Ltd.	Alberton Prince Co.	853-2848	May-Dec	lobsters, mackerel, eels, smelts, tomcod
4. Div. of Georgetown Seafoods, Ltd. (H.B. Nickerson & Sons, Ltd)	Alberton Prince Co.	853-2680	May-Dec	lobsters, mackerel, eels, tomcod, tuna
5. Deagle Fisheries	Miminegash Prince Co.	882-2759	May-Dec	lobsters, flounders, salted cod and hake
6. Division of Tignish Fisheries Co-op Assn., Ltd.	Skinners Pond Prince Co.	882-2428	May-Oct	lobsters; round cod and hake (trucked to parent plant at Tignish)
7. P.E.I. Marine Plants Co-op	Tignish Prince Co.	882-3363	May-Dec	Irish moss
8. Genu Products Canada, Ltd.	Miminegash Prince Co.	882-2990	May-Dec	Irish moss
9. Marine Colloids, Ltd.	Miminegash Prince Co.	882-2965	May-Dec	Irish moss
10. Acadian Fishermen's Co-op Assn., Ltd.	Abrams Village Prince Co.	854-2675	12	cod, hake, tuna, smelts, flounder, clams, scallops, herring, mackerel, crab, silver sides
11. Polar Quick Freezing Co., Ltd.	Summerside Prince Co.	436-2912	12	mackerel, smelts, eels, tomcod, lobsters, oysters, scallops, tuna
12. National Sea Products, Ltd.	Summerside Prince Co.	436-9258	12	mackerel, smelts, eels, herring, tomcod, flounder, cod, hake, scallops, clams quahaugs
13. Fred L. Arsenault	Summerside Prince Co.	436-3435	May-Dec	lobsters, oysters, clams
14. Island Sea Foods, Ltd.	Borden Prince Co.	855-2828	May-Dec	mackerel, smelts, lobsters scallops, oysters
15. Malpeque Fishermen's Co-op Assn. Ltd.	Malpeque Prince Co.	836-5119	12	cod, hake, flounder, tomcod, mackerel, eels, smelts, herring, tuna, lobsters, clams
16. North Shore Packing Co. Ltd.	Darnley Prince Co.	836-5133	Apr-Dec	fresh and salted groundfish; eels, mackerel, tomcod, smelts, tuna, canned lobsters, clams, oysters
17. Burleigh Bros.	Ellerslie Prince Co.	Tyne Valley 80-2	May-Dec	oysters
18. L. Beaton	St. Eleanors Prince Co.	436-5111	Aug-Dec	oysters
19. Smith Bros.	Freeland (Ellerslie) Prince Co.	Tyne Valley 68-2	May-Dec	oysters
20. Inverness Co-op	Enmore (Ellerslie) Prince Co.	Tyne Valley 58-4	May-Dec	oysters, quahaugs
21. Lennox Island Co-op	Lennox Island (Ellerslie) Prince Co.	Tyne Valley 22-6	May-Dec	oysters
22. Freeland Co-op	Ellerslie Prince Co.	Tyne Valley 78-5	May-Dec	oysters

Name of Fish Processor	Mailing Address	Telephone Number	Months of Normal Operation	Products Handled
23. French River Canning Co.	French River Queens Co.	New London 39	May-Nov	fresh and canned lobsters; lobster paste, canned mackerel, salted cod and hake, chicken haddie, clams
24. North Rustico Fishermen's Co-op Association, Ltd.	North Rustico Queens Co.	963-2252	May-Nov	fresh lobsters, pickled mackerel; salted cod and hake .
25. Tidewater Seafoods, Ltd.	Victoria Queens Co.	Crapaud 139	May-Nov	fresh lobsters, clams, quahaugs, clam chowder
26. Alfred G. Watts & Son	Little York Queens Co.	672-2230	May-Nov	fresh and salted groundfish
27. Georgetown Seafoods, Ltd. (H. B. Nickerson & Sons, Ltd.)	Georgetown Kings Co.	Georgetown 123 & 125	12	fresh and frozen groundfish; eels, smelts, mackerel, scallops, tomcod, caplin, tuna
28. Georgetown Packers, Ltd.	Georgetown Kings Co.	Georgetown 40	May-Aug	live and canned lobsters
29. Wendell Graham, Ltd.	R.R. #4 Montague (Gaspereaux) Kings Co.	962-2776 -2777	May-Nov	live, frozen and canned lobsters; scallops, crabs, cod and hake
30. Tidewater Seafoods, Ltd.	Murray Harbour Kings Co.	962-2701	May-Dec	live, canned and frozen lobsters; frozen groundfish; mackerel, herring, quahaugs, clams
31. Keeping & Mac Kay, Ltd.	Beach Point Kings Co.	962-2257	May-Dec	live, canned and frozen lobsters; frozen groundfish; scallops, clams
32. Beach Point Fishermens Coop Assn. Ltd.	Beach Point Kings Co.	962-2757	May-Jun	live and canned lobsters
33. Usen Fisheries, Ltd.	P. O. Box 658 Souris Kings Co.	687-2059	Apr-Jan	fresh and frozen groundfish; fish meal and oil
34. P. E. I. Seaweeds Ltd.	North Lake Kings Co.	South Lake 46	Apr-Jan	mixed Irish moss
35. P. E. I. Seaweeds Ltd.	Naufrage Kings Co.	687-2567	Apr-Jan	mixed Irish moss
36. Donovan Enterprises, Ltd.	Naufrage Kings Co.	687-2576	May-Oct	fresh and salted groundfish; lobsters, tuna
37. Lawrence Trenholm	Morell Kings Co.	Morell 165	Apr-Feb	fresh and salted groundfish; lobsters, smelts, eels, tomcod, tuna
38. National Sea Products, Ltd.	Morell Kings Co.	Morell 64	Apr-Feb	fresh and salted groundfish; smelts, eels; live and canned lobsters
39. United Maritime Fishermen (North Lake)	P. O. Box 430 Souris Kings Co	South Lake 3-21	May-Dec	fresh and frozen groundfish; fresh and frozen lobsters; silversides, smelts
40. Souris Seafoods, Ltd. (Division of Babineau Fisheries, Ltd.)	P. O. Box 130 Souris Kings Co.	687-2935	May-Oct	fresh and frozen lobsters and mackerel; frozen groundfish; scallops
41. Babineau Fisheries, Ltd.	Morell Queens Co.	Morell 107	May-Oct	fresh and frozen lobsters; canned hake; frozen scallops, lobster paste, frozen crab

NEW BRUNSWICK

Name of Fish Processor	Mailing Address	Telephone Number	Months of Normal Operation	Products Handled
1. W. S. Loggie Co., Ltd.	Petit Rocher Gloucester	783-2228	12	cod, mackerel, herring, smelts, tomcod, scallops
2. Blue Cove Packing Co., Ltd.	Blue Cove Gloucester Co.	732-2839	May-Nov	marinated herring
3. Theodore Landry	Blue Cove Gloucester Co.	732-2117	May-Oct	marinated herring; oysters, lobsters
4. Les Produits Belle Baie Ltée.	Caraquet Gloucester Co.	727-2647	May-Nov	fresh and frozen groundfish; crab, shrimp
5. Marché du Poisson du Quai	Caraquet Gloucester Co.	727-5270	May-Feb	fresh groundfish; oysters, lobsters, clams, tuna
6. Carapec, Ltée.	Caraquet Gloucester Co.	727-3405	Apr-Dec	fresh and frozen groundfish; marinated herring, meal and oil
7. Anglo B. C. Packing Co., Ltd.	Lr. Caraquet Gloucester Co.	727-5465	May-Nov	herring meal and oil
8. Seapro, Ltd.	Middle Caraquet Gloucester Co.	727-3087	May-Oct	marinated herring
9. Bay Chaleur Packers, Ltd.	Lr. Caraquet Gloucester Co.	727-2619	May-Oct	fresh and canned crab
10. Lawrence Landry	Grand Anse Gloucester Co.	732-2954	May-Nov	fresh groundfish; oysters, lobsters
11. Alfred Blanchard	Caraquet Gloucester Co.	727-3188	May-Jun	live lobsters
12. Maisonette Seafoods, Ltée.	Maisonette Gloucester Co.	727-2596	May-Nov	marinated herring
13. Jable Enterprises, Ltd.	Lr. Caraquet Gloucester Co.	727-2727	May-Nov	marinated herring
14. La Coopérative des Ostréiculteurs Acadiennes Ltée.	Maisonette Gloucester Co.	727-3824	Sep-Nov	oysters
15. Connor Bros., Ltd.	Lr. Caraquet Gloucester Co.	727-2269	May-Nov	marinated herring
16. L'Association Co-operative des Pecheurs de l'Isle Ltée.	Lameque Gloucester Co.	344-8591	Apr-Nov	fresh and frozen groundfish; smelts, herring, mackerel, lobsters, crabs
17. United Maritime Fishermen	Lameque Gloucester Co.	344-8606	Apr-Nov	fish meal and oil
18. Henri Savoie	Pigeon Hill Gloucester Co.	344-2366	Apr-Oct	lobsters, herring, mackerel, hake
19. Paul Emile Savoie	Ste. Marie Sur Mer Gloucester Co.	344-8666	Apr-Nov	herring, mackerel, cod, hake
20. Gerard Blanchard	Pigeon Hill Gloucester Co.	344-2513	Apr-Nov	cod, hake, herring, mackerel
21. Les Produits de Mer (M.O. Duguay, Ltd.)	Ste. Marie Sur Mur Gloucester Co.	344-2301	Apr-Nov	salted and marinated herring; salted cod
22. National Sea Products, Ltd. (Shippegan Div.)	P. O. Box 130 Shippegan Gloucester Co.	336-2360	Apr-Dec	fresh and frozen groundfish; crab, shrimp, fish meal and oil
23. Connor Bros., Ltd	Shippegan Gloucester Co.	336-2245	Apr-Dec	fresh and frozen groundfish; crab, shrimp, canned herring, meal and oil
24. Gully Fish & Food, Ltd.	Shippegan Gloucester Co.	336-2278	May-Nov	fresh and frozen crab, lobsters

25. Associated Fisheries of Canada Ltd	Shippegan Gloucester Co.	336-2211	May-Nov	fresh and frozen crab, lobsters, mackerel
26. W. S. Loggie Ltd	Shippegan Gloucester Co.	336-2213	May-Dec	fresh and frozen crab, lobsters, fresh and salted cod
27. Gauthier Bros Ltd.	Shippegan Gloucester Co.	336-2653	May-Dec	marinated herring, smelts
28. Val Comeau Cold Storage Ltd	Val Comeau Gloucester Co.	395-3491	May-Oct	salted groundfish; eels, frozen and canned mackerel; canned clams; smelts
29. McGraw Fresh and Frozen Fish, Ltd.	Tracadie Gloucester Co.	395-4162	May-Feb	fresh and salted groundfish; mackerel, eels, smelts, lobsters, scallops
30. Albert & Sons Fisheries, Ltd..	Neguac Northumberland Co.	776-8233	May-Dec	salted alewives; salted and vinegar cured herring
31. Neguac Shellfish Company, Ltd.	Lr. Neguac Northumberland Co.	776-8772	Jan-Nov	cod, flounders, tomcod, mackerel, eels, smelts, herring, alewives, salmon, bass, lobsters, scallops
32. Emery Savoie	Loger Neguac Northumberland Co.	776-3236	Jan-Oct	smelts, tomcod, oysters, clams, quahaugs, lobsters
33. New Brunswick Fish Market	Wishart's Point Northumberland Co.	779-9804	May-Oct	cod, mackerel, eels, clams
34. Baie Ste. Anne Co-op	Baie Ste. Anne Northumberland Co	228-4444	12	fresh, frozen and salted groundfish; smelts, tomcod, fresh and salted herring; mackerel, oysters lobsters, bait
35. W. S. Loggie Co., Ltd.	Hardwicke Northumberland Co.	228-4213	May-Nov	fresh and salted cod; herring, mackerel, lobsters
36. National Sea Products, Ltd.	Escuminac Northumberland Co.	228-4212	May-Nov	herring, mackerel, lobsters oysters.
37. Ade Theriault	Baie Ste. Anne Northumberland Co.	228-4421	May-Nov	bloaters
38. Marine Colloids, Ltd.	R.R. #1 Kouchibouguac Kent Co.	876-3751	May-Nov	Irish moss
39. Genu Products Canada, Ltd.	R.R. #1 Kouchibouguac Kent Co.	876-3652	May-Nov	Irish moss
40. Point Sapin Co-op	R.R. #1 Kouchibouguac Kent Co.	876-3302	May-Nov	fresh groundfish; mackerel, herring, gaspereaux, lobsters
41. United Maritime Fishermen, Ltd.	Cape Lumiere Kent Co.	523-4351	May-Jan	fresh, frozen and canned lobsters; rock and snow crab, mackerel, eels, smelts, chicken haddie, scallops
42. Richibucto Village Fishermen's Co-op	Richibucto Village Kent Co.	523-4520	12	fresh and salted cod; chicken haddie; fresh, frozen and canned lobsters; snow crab, alewives
43. B.A. Richard	Cote-Ste. Anne Kent Co.	743-6198	Jun-Oct	fresh, frozen and canned lobsters; rock crab, chicken haddie
44. Antoine Mazerolle (fish buying station)	Richibucto Kent Co.	523-4268	12	fresh groundfish; smelts, eels, mackerel, lobsters, scallops, clams, quahaugs
45. Stafford Foods, Ltd.	Richibucto Kent Co	523-4303	12	frozen round eels
46. E.P. Melanson, Ltd.	Cocagne Kent Co.	532-4434	12	fresh and frozen smelts; fresh, frozen, and canned lobsters; eels, mackerel, scallops, clams, shrimp
47. Mills Seafoods, Ltd.	Buctouche Kent Co.	743-2444	May-Dec	clams, quahaugs, oysters
48. Shediac Lobster Shop, Ltd.	Shediac Westmorland Co.	532-4302	May-Oct	snow crab, lobsters, clams

49. National Sea Products, Ltd. (Shediac Div.)	Shediac Westmorland Co.	532-4431	May-Jan	fresh, cooked and canned lobsters; frozen, salted and canned herring; chicken haddie; canned and frozen mackerel; scallops, eels, smelts, oysters, blueberries
50. Edmond Gagnon, Ltd.	R.R. #1 Robichaud Westmorland Co.	532-3827	May-Nov	canned crabs
51. Landry & Landry (1975), Ltd.	R.R. #1 Robichaud Westmorland Co.	577-2542 -4452	May-Nov	lobsters, scallops, crabs
52. Cape Bald Packers, Ltd.	Cape Bald Westmorland Co.	577-2527	May-Oct	fresh, frozen and canned lobsters; canned mackerel, canned crab, cod roe, lobster paste, scallops
53. Adrice P. Cormier	R.R. #1 Cape Bald Westmorland Co.	577-2511	May-Nov	herring, mackerel, alewives, scallops, flounders
54. Hector C. Cormier	R.R. #1 Cape Bald Westmorland Co.	577-4261	Apr-Oct	bloaters, lobsters
55. Norbert Cormier	R.R. #1 Cape Bald Westmorland Co.	577-4537	May-Aug	bloaters
56. Edgar Cormier (Westmorland Fisheries)	R.R. #1 Cape Bald Westmorland Co.	577-2726	Apr-Dec	mackerel, herring, alewives, crabs, lobsters
57. Ferdinand Cormier	R.R. #1 Cape Bald Westmorland Co.	577-2609	May-Aug	bloaters
58. Ferdinand Gaudet	R.R. #1 Cape Bald Westmorland Co.	577-4493	May-Oct	salted alewives, bloaters
59. Robert A. Cormier	R.R. #1 Cape Bald Westmorland Co.	577-4450	May-Aug	bloaters
60. Eugene Landry	Lr. Cape Bald Westmorland Co.	577-2629	May-Aug	bloaters
61. Clement Sandell	R.R. #1 Cape Bald Westmorland Co.	577-2862	12	bloaters; pickled herring mackerel and alewives
62. Norman Brine	R.R. #1 Cape Bald Westmorland Co.	577-4652	May-Aug	bloaters
63. Thaddy LeBlanc	R.R. #1 Cape Bald Westmorland Co.	577-2779	May-Aug	bloaters
64. Oscar Ouelette	R.R. #1 Cape Bald Westmorland Co.	577-4691	May-Oct	bloaters; pickled mackerel and alewives
65. Emile Jacob	R.R. #1 Cape Bald Westmorland Co.	577-2828	Apr-Jan	bloaters, pickled alewive
66. Lawrence & Philip Jacob	R.R. #1 Cape Bald Westmorland Co.	577-2295	May-Aug	bloaters
67. Adolf Jacob	R.R. #1 Lr. Cape Bald Westmorland Co.	577-2270	May-Aug	bloaters
68. Philip Ouelette	R.R. #1 Lr. Cape Bald Westmorland Co.	577-2560	Apr-Nov	bloaters, pickled alewives and herring
69. Mile LeBlanc & Sons, Ltd.	R.R. #1 Cape Bald Westmorland Co.	577-2753	12	bloaters; pickled herring, alewives and mackerel
70. Achille Boudreau	R.R. #1 Lr. Cape Bald Westmorland Co.	577-4479	May-Aug	bloaters
71. Alvin Boudreau	R.R. #1 Cape Bald Westmorland Co.	577-2462	May-Aug	bloaters

72. Arthur Leger	R.R. #1 Cape Bald Westmorland Co.	577-2872	May-Aug	bloaters	84. James Brine	Port Elgin Westmorland Co.	538-7579	12	bloaters; pickled alewives, herring, mackerel
73. Adrice Leger	R.R. #1 Cape Bald Westmorland Co.	577-2623	Apr-Dec	bloaters, pickled alewives	85. National Sea Products, Ltd.	Cape Tormentine Westmorland Co.	538-2921	Apr-Nov	fresh and salted groundfish, lobsters
74. Willie W. LeBlanc	R.R. #1 Cape Bald Westmorland Co.	577-2846	Apr-Nov	bloaters					
75. Donald A. LeBlanc	R.R. #1 Lr. Cape Bald Westmorland Co.	577-2844	May-Oct	bloaters					
76. Alverie & Azor LeBlanc	R.R. #1 Cape Bald Westmorland Co.	577-4509	May-Oct	bloaters					
77. Albert & Leo Richard	R.R. #1 Cape Bald Westmorland Co.	577-2885	May-Oct	bloaters					
78. Norbert & Alphee LeBlanc	R.R. #1 Cape Bald Westmorland Co.	577-4408	May-Oct	bloaters					
79. Cormier & LeBlanc (1968), Ltd.	Lr. Cape Bald Westmorland Co.	577-2206	May-Nov	fresh and frozen lobsters, crabs and scallops					
80. Leo LeBlanc	R.R. #1 Cape Bald Westmorland Co.	577-2706	May-Oct	bloaters					
81. Royal Donnelle	R.R. #1 Cape Bald Westmorland Co.	577-2918	May-Oct	bloaters					
82. Roger Dorion & Adolphe Duguay	R.R. #1 Westmorland Co.	577-4214	May-Oct	bloaters					
83. Romouald Jacob	R.R. #1 Cape Bald Westmorland Co.	--	May-Oct	bloaters					

Bibliography

Ahrens, M. and E. Schofield 1978. Results of a survey of fishermen on the question of Miramichi dredging. Fisheries and Oceans Canada. Unpublished report.

Airphoto Analysis Associates Consultants Ltd. 1975. Beach resources - Eastern New Brunswick. Toronto, Ontario. 215 p.

Allen, K.R. and J.K. Lindsay 1967. Commercial catches of Atlantic salmon in the Maritime area 1949-1965. Fish. Res. Board Can. Tech. Rep. No. 29, 143 p.

Anonymous 1954. Atlas of Sea Surface Currents - North Atlantic Ocean. U.S. Naval Hydrographic Office. Washington, D.C.

Anonymous 1968. Oceanographic Atlas of the North Atlantic Ocean - Section III. Pub. No. 700 U.S. Naval Oceanographic Office, Washington, D.C.

Anonymous 1974. U.S. Navy Marine Climatic Atlas of the World Vol. I - North Atlantic. NAVAIR-50-IC-528, Washington, D.C.

Anonymous 1975. Summary of Synoptic Meteorological Observations- Vol. II Area 9 - Gulf of St. Lawrence. U.S. Naval Weather Service Command, Washington, D.C.

Banks, R.E. 1966. The cold layer in the Gulf of St. Lawrence. J. Geophys. Res. 71: 1603-1610.

Bellrose, F.C. 1976. Ducks, Geese and Swans of North America. Stockpole Books; Harrisburg, Penn. 2nd ed. 543 p.

Black, W.A. 1958-62. Gulf of St. Lawrence ice surveys. 1958-1962. Dept. of Mines and Tech. Surveys Geogr. Branch. Geogr. Papers No. 12, 14, 19, 23, 25, 36, Ottawa, Ontario.

Blackford, B.L. 1965. Some oceanographic observations in the southeastern Gulf of St. Lawrence - Summer 1964. Fish. Res. Board Can. Mans. Rept. No. 185.

Blackford, B.L. 1967. Some oceanographic observations in the southern Gulf of St. Lawrence - Summer 1965. Fish. Res. Board Can. Tech. Rep. No. 26, 34 p.

Bourne, N. 1964. Scallops and the offshore fishery of the Maritimes. Fish. Res. Board Can. Bull. No. 145, 60 p.

Bourne, N. and A. McIver 1962. Gulf of St. Lawrence scallop explorations - 1961. Fish. Res. Board Can. Biol. Stat. St. Andrews, Circ. Gen. Ser. 35, 4 p.

Brown, R.G.B. and D.N. Nettleship et. al. 1975. Atlas of Eastern Canadian Seabirds. Can. Wildl. Serv. Ottawa. 220 p

Bryant, E.A. and S.B. McCann 1972. A note on wind and wave conditions in the southern Gulf of St. Lawrence. Maritime Sediments Vol. 8(3): 101-103.

Bryant, E.A. and S.B. McCann 1973. Long and short term changes in the barrier islands of Kouchibouguac Bay, southern Gulf of St. Lawrence. Can. J. Earth Sci. Vol. 10: 1582-1590.

Bumpus, D.F. and L.M. Lauzier 1965. Surface circulation of the Continental Shelf of North America. Ser. Atlas of the Mar. Envir. Folio No. 7. Am. Geogr. Soc.

Caddy, J.F. and R.A. Chandler 1976. Historical statistics of landings of inshore species in the Maritime Provinces 1947-1973. Fish. & Mar. Serv. Tech. Rep. No. 639, 240 p.

Can. Dept. of Energy, Mines & Resources 1977. Can. Topographic Maps 1:500,000 No. 11SW, 11NW, 21NE, 21SE, 22SE, 11NE. Surveys and Mapping Branch, Ottawa, Ont.

Can. Dept. of Environment 1974. Land Capability Maps for Recreation and Wildlife - Waterfowl. Lands Directorate, Ottawa, Ont.

Can. Dept. of Environment 1975. Can. Nautical Charts No. 4022, 4023, 4024, 811A, 811G. Can. Hydrographic Service, Ottawa, Ont.

Can. Dept. of Environment 1975. Canadian Normals, Vol. 3 Wind 1955-1972. Atmospheric Environment Service, Downsview, Ont.

Can. Dept. of Environment 1976. Sensitivity Mapping - The Maritime Provinces. Environmental Protection Service - Atlantic Region, Sect. 2-4.

Can. Dept. of Environment 1977. Sailing Directions - Gulf and River St. Lawrence 3rd ed. Can. Hydrographic Service, Ottawa, Ont., 515 p.

Dawson, W.B. 1913. The currents in the Gulf of St. Lawrence. Can. Dept. Naval Service, Ottawa, Ont.

Dickie, L.M. and J.C. Medcof 1963. Causes of mass mortalities of scallop (Placopecten magellanicus) in the southwestern Gulf of St. Lawrence. J. Fish. Res. Board Can. 20(2): 451-482.

Dickie, L.M. and C.D. MacInnes 1958. Gulf of St. Lawrence scallop explorations 1957. Fish. Res. Board Can. MS Rept. No. 650, 62 p.

Eales, J.G. 1968. The eel fishery of eastern Canada. Fish. Res. Board Can. Bull. No. 166, 79 p.

El-Sabh, M.I. 1975. Transport and currents in the Gulf of St. Lawrence. Bed. Inst. Oceanog. Rept. Series BI-R-75-9.

Paleoheimo, J.E. and A.C. Kohler 1968. Analysis of the southern Gulf of St. Lawrence cod population. J. Fish. Res. Board Can. 25: 555-578.

Ploeg, J. 1971. Wave climate study, Great Lakes and Gulf of St. Lawrence, July 1972. Bedford Inst. Oceanog. Rept. Series BI-R-75-20.

Powles, P.M. 1958. Studies of reproduction and feeding of Atlantic cod (Gadus callarias) in the southwestern Gulf of St. Lawrence. J. Fish. Res. Board Can. 15: 1383-1402.

Powles, P.M. 1965. Life history and ecology of American plaice (Hippoglassoides platessoides) in the Magdalen Shallows. J. Fish. Res. Board Can. 22: 565-598.

Prest, V.K. 1962. Geology of the Tignish map - area, Prince Edward Island. Geol. Surv. Can. Paper 61-28, 15 p.

Prest, V.K. 1973. Surficial deposits of Prince Edward Island. Geol. Surv. Can. Map 1366A.

Prince Edward Island Land Use Service Centre 1977. Offshore Islands Study, Provincial Planning Division, Charlottetown, P.E.I. Reports and Maps.

Reid, S.J. 1975. Density structure in the Gulf of St. Lawrence, July 1972. Bedford Inst. Oceanog. Report Series BI-R-75-20.

Reinson, G.E. 1976. Channel and shoal morphology in the entrance to the Miramichi Estuary, N.B. Geol. Surv. Can. Paper 76-1C: 33-35.

Sandeman, E.J. 1973. The redfish of the Gulf of St. Lawrence, biological considerations in past, present and future. Fish. & Mar. Serv. St. John's Biol. Station Circ. No. 20, 19 p.

Scarratt, D.J. 1964. Abundance and distribution of lobster larvae (Homarus americanus) in the Northumberland Strait. J. Fish. Res. Board Can. 21(4): 661-680.

Sargeant, D.E. 1965. Migrations of harp seals (Pogohilus groenlandicus) in the Northwest Atlantic. J. Fish. Res. Board Can. 22: 433-464.

Sergeant, D.E. 1976. History and present status of populations of harp and hooded seals. Biol. Conserv 10: 95-118.

Sergeant, D.E., A.W. Mansfield and B. Beck 1970. Inshore records of cetacea for eastern Canada 1949-68. J. Fish. Res. Board Can. 27: 1903-1915.

Simpson, W. 1973. Gulf of St. Lawrence water uses and related activities. Environment Canada Lands Directorate, Geogr. Paper No. 53, 22 p.

Srivastava, S. 1971. Fish of the Gulf of St. Lawrence - an unabridged bibliography. Fish. Res. Board Can. Tech. Rep. No. 261, 141 p.

Steven, D.M. 1974. Primary and secondary production in the Gulf of St. Lawrence. Mar. Sci. Centre Rep. No. 26 McGill Univ., Montreal, Que.

Sunby, B. 1974. Distribution and transport of suspended particulate matter in the Gulf of St. Lawrence. Can. J. Earth Sci. 11: 1517-1533.

Sutcliffe, W.H. 1972. Correlations between seasonal river discharge and local landings of American lobster (Homarus americanus) and Atlantic halibut (Hippoglassus hippoglassus) in the Gulf of St. Lawrence. J. Fish. Res. Board Can. 30: 856-859.

Taylor, G.B. 1975. Oceanographic observations in the Gulf of St. Lawrence from 25 Oct. to 16 Nov. 1970. Bedford Inst. Oceanog. Data Series BI-D-75-7.

Trites, R.W. 1970. The Gulf as a physical oceanographic system. In 2nd Gulf of St. Lawrence Workshop. Bedford Inst. Oceanog., Dartmouth, N.S.

Trites, R.W. and A. Walton 1975. A Canadian Coastal Sea - the Gulf of St. Lawrence. Bedford Inst. Oceanog. Report Series BI-R-75-15.

Turner, G.E. 1975. Timing and migrations of Atlantic salmon (Salmo salar) within the Miramichi River system, New Brunswick. ICES-CM 1975/M24 Anadromous and Catadromous Fish Committee.

Wilder, D.G. 1974. The lobster fishery of the southern Gulf of St. Lawrence. Fish. Res. Board Can. Atl. Biol. Station Circ. Gen. Ser. 24, 16 p.

Winters, G.H. and V. M. Hodder 1973. Analyses of the southern Gulf of St. Lawrence herring stock and implications concerning its future management ICNAF Res. Doc. 73/68.

Lauzier, L.M., R.W. Trites and H.B. Hachey 1957. Some features of the surface layer of the Gulf of St. Lawrence. Bull. Fish. Res. Board Can. III: 195-212.

Lauzier, L.M. and J. Hull 1969. Coastal station data temperatures along the Canadian Atlantic Coast 1921-1969. Fish. Res. Board Can. Tech. Rep. No. 150, 25 p.

Lauzier, L.M. et Marcotte A. 1965. Comparison du climate marin de Grande Rivière (Baie des Chaleurs) avec celui d'autres stations de la côte Atlantique. J. Fish. Res. Board Can. 22: 1321-1334.

Legendre, L. and W.D. Watt 1970. The distribution of primary production relative to a cyclonic gyre in Baie des Chaleurs. Mar. Biol. 7: 167-170.

Leim, A.H. 1957. Summary of results under the Atlantic Herring Investigations Committee. Bull. Fish. Res. Board Can. No. 111: 1-16.

Leim, W.H. and W.B. Scott 1966. Fishes of the Atlantic Coast of Canada. Fish. Res. Board Can. Bull. 155, 485 p.

Loring, D.H. and D.J.G. Nota 1973. Morphology and sediments of the Gulf of St. Lawrence. Fish. Res. Board Can. Bull. No. 182, 147 p.

MacGregor, D.G. 1956. Currents and transport in Cabot Strait. J. Fish. Res. Board Can. 13: 435-448.

MacLaren Atlantic Ltd. 1978. Miramichi Channel Study - supplementary report - First Draft, Halifax, N.S.

Mansfield, A.W. and B. Beck 1977. The grey seal in Eastern Canada. Fish. & Mar. Serv. Tech. Rep. No. 704, 80 p.

Maritime Resource Management Service 1975. Strait of Canso natural environment inventory - commissioned by the Canada - Nova Scotia Strait of Canso Environment Committee. Reports and Maps.

Matheson, K.M. 1967. The meteorological effect on ice in the Gulf of St.-Lawrence. McGill Univ. Mar. Sci. Centre. M.S. Rep. No. 3, 110 p.

McCann, S.B. 1972. Reconnaissance survey of Hog Island, P.E.I. Maritime Sediments Vol. 8: 107-113.

McKenzie, R.A. 1964. Smelt life history and fishery in the Miramichi River. Fish. Res. Board Can. Bull. 144, 77 p.

Messieh, S.N. 1975a. Maturation and spawning of Atlantic herring (Clupea harengus harengus) in the southern Gulf of St. Lawrence. J. Fish. Res. Board Can. 32: 66-68.

Messieh, S.N. 1975b. Delineating spring and autumn herring populations in the southern Gulf of St. Lawrence by discriminent function analysis. J. Fish. Res. Board Can. 32: 471-477.

Messieh, S.N. and S.N. Tilbo 1971. Discreteness of Atlantic herring (Clupea harengus harengus) populations in spring and autumn fisheries in the southern Gulf of St. Lawrence. J. Fish. Res. Board Can. 28: 1009-1014.

Messieh, S.N. and A.C. Kohler 1972. Distribution, relative abundance and growth of larval herring (Clupea harengus harengus) in the southern Gulf of St. Lawrence. Fish. Res. Board Can. Tech. Rep. No. 318, 31 p.

Montreal Engineering Co. Ltd. 1974. Assessment of environmental impact. Prince Edward Island - Mainland power interconnection Parts I-IV, Halifax, N.S.

Montreal Engineering Co. Ltd. 1976. Compendium for fisheries resource information for the Miramichi Estuary Parts 1-5, Halifax, N.S.

Murty, T.S. and J.D. Taylor 1970. A numerical calculation of the wind-driven circulation in the Gulf of St. Lawrence J. Oceanog. Soc. Japan 26: 203-204.

Neu, H.J.A. 1973. Freshwater regulation in the St. Lawrence system In Bedford Inst. of Oceanog. Biennial Review 1971/72.

Owens, E.H. 1974. A framework for the definition of coastal environments in the southern Gulf of St. Lawrence In Offshore Geology of Eastern Canada (B.R. Pelletier, ed.). Geol. Surv. Can. Paper 74-30 Vol. 1: 47-76.

Owens, E.H. 1977. Coastal environments of Canada. The impact and cleanup of oil spills. Environment Canada, Environmental Protection Service, Ottawa. Economic & Tech. Review Rept. EPS-3-EC-77-13, 413 p.

Owens, E.H. and J.R. Harper 1972. The coastal geomorphology of the southern Gulf of St. Lawrence: a reconnaissance. Maritime Sediments 8(2): 61-64.

Owens, E.H. and A.J. Bowen 1977. Coastal environments of the Maritime Provinces. Maritime Sediments 13(1): 1-31.

Farquharson, W.I. 1958. Causeway investigation Northumberland Strait - report on tidal survey 1958. Dept. of Mines & Tech. Surveys. Ottawa, Ont., 137 p.

Farquharson, W.I. 1970. Tides, tidal streams, and currents in the Gulf of St. Lawrence. 2nd ed. Atl. Oceanog. Lab. Dartmouth, N.S. Unpublished Manuscript, 145 p.

Fisher, H.D. 1952. Harp Seals of the North Atlantic. Fish. Res. Board Can. Gen. Ser. No. 20, St. Andrews, N.B., 4 p.

Fisheries and Marine Service 1977. Fisheries sensitivities relative to proposed offshore oil and gas exploration and development - Preliminary Evaluation. Unpublished Rept. Biological Station, St. Andrews, N.B.

Foote, T.R. 1973. Winter 1972. Oceanographic data of Cabot Strait and Gulf of St. Lawrence. Bedford Inst. Oceanog. Data Series BI-D-73-5.

Forrester, W.D. 1970. Geostrophic approximation in the St. Lawrence Estuary. Tellus 22: 53-65.

Forrester, W.D. 1974. Internal tides in the St. Lawrence Estuary. J. Mar. Res. 32: 55-66.

Forward, C.N. 1960. Shorelines of Northumberland Strait. Geogr. Bull. No. 14: 100-105.

Gates, A.D. 1975. The tourism and outdoor recreation climate of the Maritime Provinces. Atmospheric Environment Service, Meteorological Applications Branch, Toronto, Ontario., 133 p.

Godfrey, W.E. 1966. The Birds of Canada. Nat. Mus. of Can. Bull. No. 203, 628 p.

Hachey, H.B. 1961. Oceanography and Canadian Atlantic Waters. Fish. Res. Board Can. Bull. 134, 120 p.

Hassan, E.M. (coord.) 1971. Proceedings of 2nd Gulf of St. Lawrence Workshop. Bed. Inst. Oceanog., Dartmouth, N.S.

Hayes, M.V. et. al. 1973. Investigations of form and processes in the coastal zone. In Coastal Geomorphology, D.R. Coates, ed.; Proc. 3rd Annual Geomorphology Symposia Series Sept. 1972. Binghampton, N.Y.

Hodder, V.M. and L.S. Parsons 1971. Comparison of certain biological characteristics of herring from Magdalen Islands and southwestern Newfoundland. Int. Com. N.W. Atl. Fish Res. Bull. 8: 59-65.

Hodder, V.M. and G.H. Winters 1972. Distribution and size of larval herring and capelin, southern Gulf of St. Lawrence and southwestern Newfoundland. Nov. 1969 and 1970. Fish. Res. Bd. Can. Tech. Rep. No. 315, 25 p.

Ingram, R.G. 1973. Winter surface currents around Cape Breton Island. J. Fish. Res. Board Can. 30(1): 121-123.

Jean, I. 1964. Seasonal distribution of cod (Gadus morhuor) along the Canadian Atlantic coast in relation to water temperature. J. Fish. Res. Board Can. 22: 66-68.

Jorden, F. 1973. The St. Lawrence system run-off estimate 1960-1970. Bed. Inst. Oceanog. Data Series BI-D-73-10.

Keyte, R. and R.W. Trites 1971. Circulation patterns in the Gulf of St. Lawrence June 1968 - Sept. 1969. Fish. Res. Board Can. Tech. Rep. No. 271.

Kohler, A.C. 1968. Fish stocks of the Nova Scotia banks and Gulf of St. Lawrence. Fish. Res. Board Can. Tech. Rep. 80, 25 p.

Krank, K. 1971. Surficial geology of Northumberland Strait. Geol. Surv. Can. Paper 71-53, 10 p.

Krauel, D.P. 1975. The physical oceanography of the Miramichi River Estuary. Sept. -Oct. 1973. Fish & Mar. Serv. Tech. Rep. No. 571.

Lauzier, L.M. 1957a. St. Lawrence spring run-off and summer salinities in the Magdalen Shallows. Bull. Fish. Res. Board Can. 111: 193-194.

Lauzier, L.M. 1957b. Variations of temperature and salinity in shallow waters of the southwestern Gulf of St. Lawrence. Bull. Fish. Res. Board Can. 111: 251-268.

Lauzier, L.M. 1965. Drift bottle observations in Northumberland Strait, Gulf of St. Lawrence. J. Fish. Res. Board Can. 22(2): 353-368.

Lauzier, L.M. 1967a. Recent trends in temperature variations in ICNAF Subarea 4. Int. Comm. Northwest Atl. Fish. Redbook - 1967 Part IV: 24-32.

Lauzier, L.M. 1967b. Bottom residual drift on the Continental Shelf area of the Canadian Atlantic Coast. J. Fish. Res. Board Can. 24: 1845-1858.

Lauzier, L.M. and R.W. Trites 1958. The deep waters in the Laurentian Channel. J. Fish. Res. Board Can. 15: 1247-1257.