

Not to be cited without
permission of the authors¹

DFO Atlantic Fisheries
Research Document 95/ 127

Ne pas citer sans
autorisation des auteurs¹

MPO Pêches de l'Atlantique
Document de recherche 95/ 127

**Potential Impacts of Use of Acoustic Deterrent Devices (ADDs)
on Marine Mammals in the Quoddy Region based on a study conducted in British
Columbia Waters**

Michael B. Strong
Edward A. Trippel
Donald S. Clark
John D. Neilson
Blythe D. Chang

Department of Fisheries and Oceans
Biological Station
St. Andrews, New Brunswick
EOG 2X0

¹This series documents the scientific basis for the evaluation of fisheries resources in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

Research documents are produced in the official language in which they are provided to the secretariat.

¹La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

Abstract

Electronic acoustic deterrent devices (ADDs) are currently used to ward off seals from salmonid aquaculture sites in the Quoddy Region of the Bay of Fundy. The impact of the use of these devices on the distribution of a number of non-target species including the harbour porpoise (*Phocoena phocoena*) was determined by Olesiuk et al. (1995) in a study in British Columbia waters. Assuming that a similar range of influence exists for these devices in Fundy waters, the potential impact from ubiquitous use of ADDs at existing salmon cage locations in the Quoddy area on harbour porpoise distribution is assessed. Recommendations to restrict the use of ADDs during the seasonal visitation of cetaceans are made.

Résumé

Des dispositifs électroniques et acoustiques de dissuasion sont actuellement utilisés pour éloigner les phoques des sites de salmoniculture de la région de Quoddy, dans la baie de Fundy. Olesiuk et al. (1995) ont déterminé les effets de ces dispositifs sur des espèces non ciblées, y compris sur le marsouin commun (*Phocoena phocoena*), dans une étude réalisée dans les eaux de la Colombie-Britannique. En tenant pour acquis que les influences dans la baie de Fundy sont du même ordre, on analyse ici les effets possibles de l'utilisation généralisée de ces dispositifs près des cages à saumon de la région de Quoddy sur la distribution du marsouin commun. On recommande d'en restreindre l'utilisation à la période de visite saisonnière des cétacés.

Introduction

A high proportion (40-60%) of salmon aquaculture sites in the upper Bay of Fundy are using electronic acoustic deterrent devices (ADDs) to ward off seals¹. Such devices are used primarily during winter months (December through April). The acoustic pulse produced by those in use locally is concentrated at 10KHz at an intensity of approximately 200dB. This is a frequency at which harbour seals (*Phoca vitulina*) and harbour porpoises (*Phocoena phocoena*) are very sensitive (Olesiuk et al. 1995). Local retailers indicate that these devices keep seals out of an area of approximately 300 m radius.

The use of powerful underwater acoustic emitters may have effects on non-target populations of marine mammals. The impact of ADDs on harbour porpoises has recently been investigated by Olesiuk et al. (1995) at a British Columbia site. The purpose of this paper is to extend the findings of a report by Olesiuk et al. (1995) to the Quoddy region of New Brunswick where salmon aquaculture co-occurs with important seasonal populations of marine mammals, particularly harbour porpoises.

Methods

Analyses were performed under the premise that all existing sites operated with ADDs. Thus, impacts described here are those expected with an extreme scenario of usage of current ADDs. The frequency and intensity of sound produced by the ADD used in the study conducted by Olesiuk et al. was similar to those which are in use locally. Thus, in assessing the potential impact of ADDs on availability of habitat to harbour porpoises, and in restricting their access to narrow passages, we have plotted areas surrounding local aquaculture sites which correspond to those used in Olesiuk et al.'s study. Their study indicated that harbour porpoise are excluded from a 400 m radius, and that their occurrence is greatly reduced within 2.5 km.

Ambient noise levels are higher in the Passamaquoddy area than the 60 dB reported in the British Columbia study due to the tidal amplitude. However, at a range of 2500 m the signal intensity would still be 129 dB for a source level of 200 dB. Using a detection threshold of 28 dB in excess of background noise (Olesiuk et al. 1995), this would still be audible to a harbour porpoise at any realistic level of background noise.

Details for both the 400 m and 2.5 km scenario are presented for five areas: Inner Quoddy, Outer Quoddy, Head Harbour, Lime Kiln and Grand Manan (Fig. 1).

Results and Discussion

There are 73 aquaculture sites in the Quoddy Region (Fig. 1) Many currently employ ADDs during the winter to prevent seals from causing mortalities among caged salmon. Seals cause mortalities when fish are bitten through cage netting, and when fish become lethally stressed due to harassment, especially during periods of extremely low water temperature. Seals also destroy netting allowing salmon to escape.

1. This is an approximation based on discussions with contacts within the salmon growing industry.

Under the 400 m scenario (Figs. 2-6), two passages among the Quoddy Islands are "blocked" to the passage of harbour porpoise (Pendleton Island Passage, Indian Island Passage). Due to the high concentration of aquaculture sites, the Lime Kiln area is potentially highly impacted by the use of ADDs. The Grand Manan area is not seriously affected by the use of ADDs due to the lower density of sites in this area compared to the Quoddy Islands.

Under the 2500 m scenario, entry into Passamaquoddy Bay by harbour porpoises could be seriously limited (Figs. 7-11). All four entry passages into Passamaquoddy Bay would be seriously affected (Pendleton Island, Little L'Etete, Big L'Etete Passages (Fig. 8), and Western Passage (Fig. 9); Head Harbour Passage (Fig. 9) would also be affected). It should be noted that the circular areas on the maps will be influenced by land masses and this was not accounted for during figure preparation. Some of the passages at the south end of Grand Manan Island would also be restricted (Fig. 11).

Although sound production by larger cetaceans is of a low frequency, there are indications that for some species, sound production can be in the frequency range produced by the ADDs (J. Lien, Memorial University, pers. comm.). Thus, there appears to be the potential for impact on other locally occurring cetaceans, such as the fin whale (*Balaenoptera physalus*), minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), right whale (*Eubalaena glacialis*), and white-sided dolphin (*Lagenorhynchus acutus*).

Preliminary Recommendations:

- p Acoustic deterrent devices should not be employed at salmon cage sites that are near areas, or during periods when harbour porpoise and other cetaceans are common. This measure would limit the use of ADDs at some sites adjacent to areas of high cetacean activity from May until November. The impact of such a measure on industry would likely be minimal, as the need for ADD's usage is greatest in the winter period when seal attacks are most frequent. However, further experimentation in the Bay of Fundy should be conducted to confirm these results.

Literature Cited

- Olesiuk, P.F., Nichol, L.M., Sowden, P.J., and J.K.B. Ford. 1995. Effects of sounds generated by an acoustic deterrent device on the abundance and distribution of harbour porpoise (*Phocoena phocoena*) in Retreat Passage, British Columbia. Unpublished manuscript.

Salmonid Aquaculture Sites

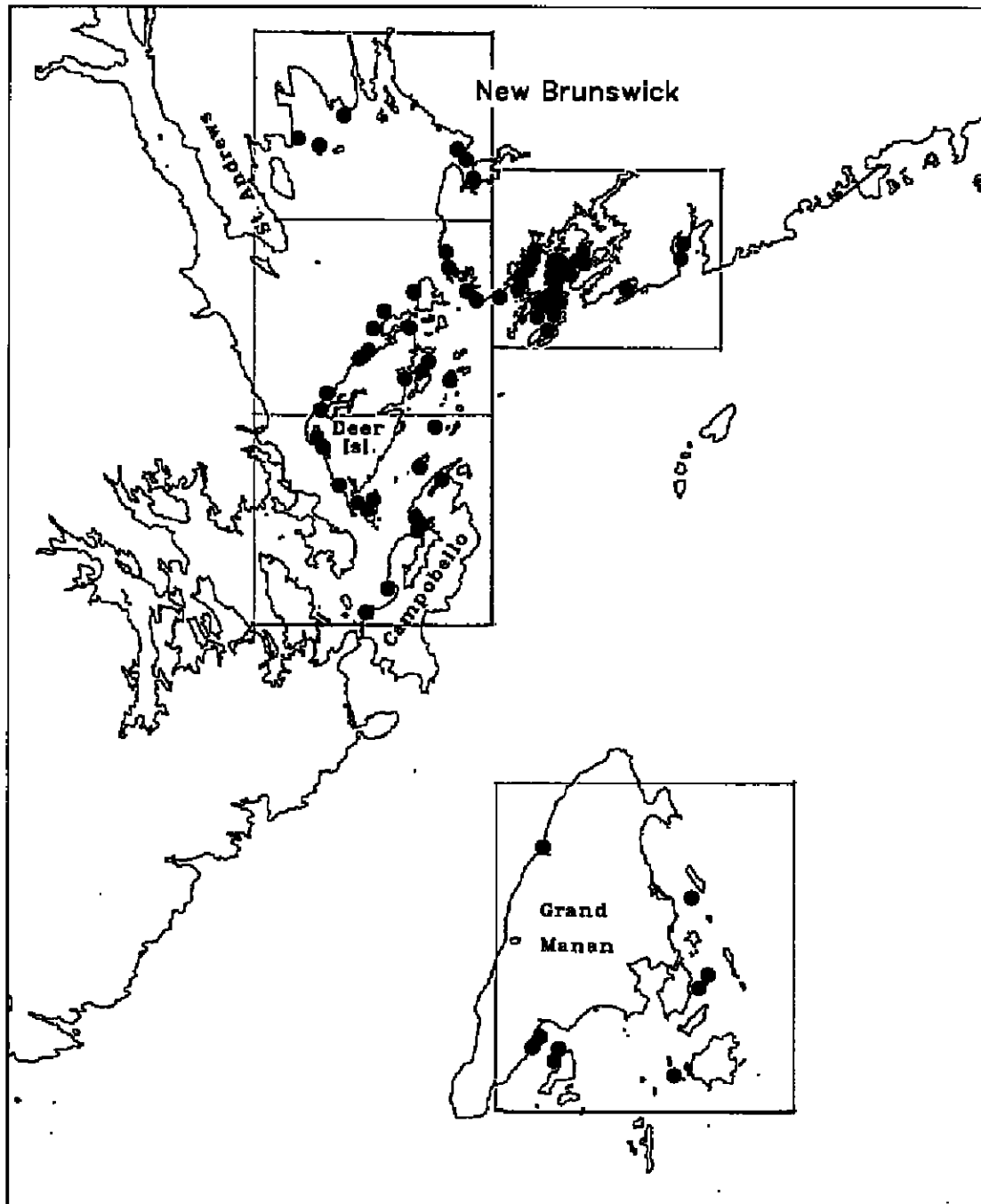


Fig. 1. Salmonid Aquaculture Sites in the Quoddy Region.

Fig. 2. Areas encompassed within a 400-m radius of sites in inner Passamaquoddy Bay.

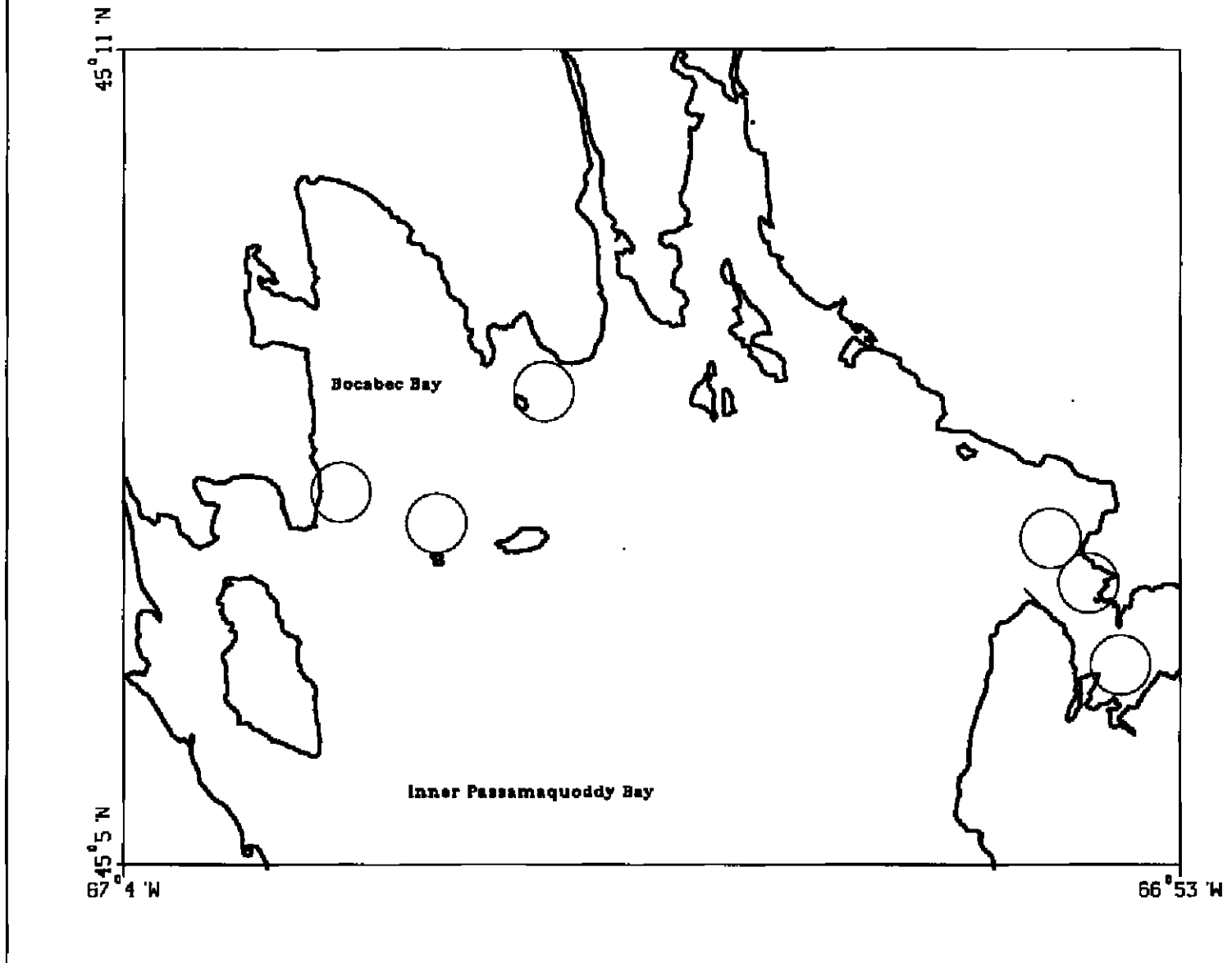


Fig. 3. Areas encompassed within a 400-m radius of sites in outer Passamaquoddy Bay.

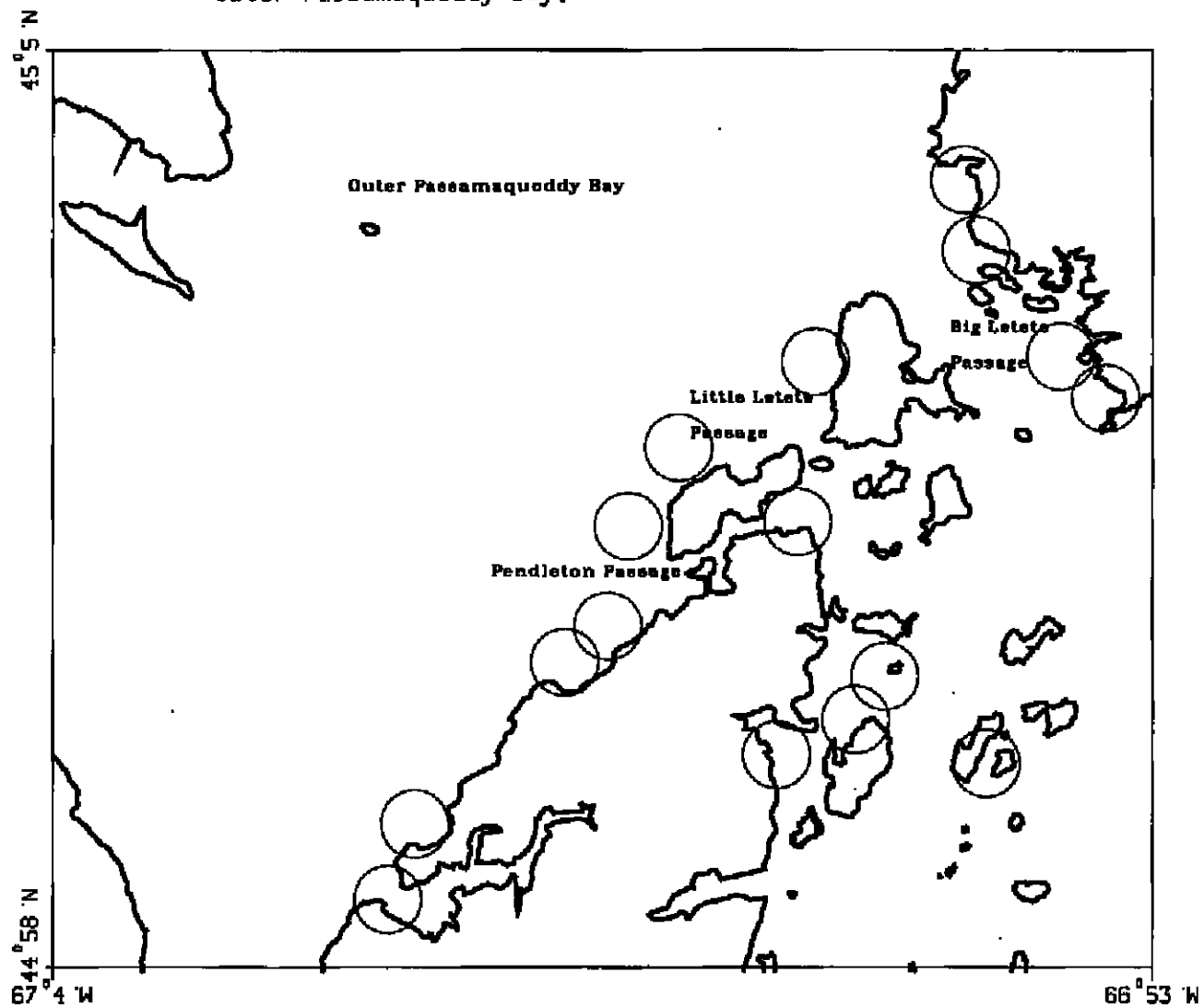


Fig. 4. Areas encompassed within a 400-m radius of sites in the Head Harbour and Western Passage Region.

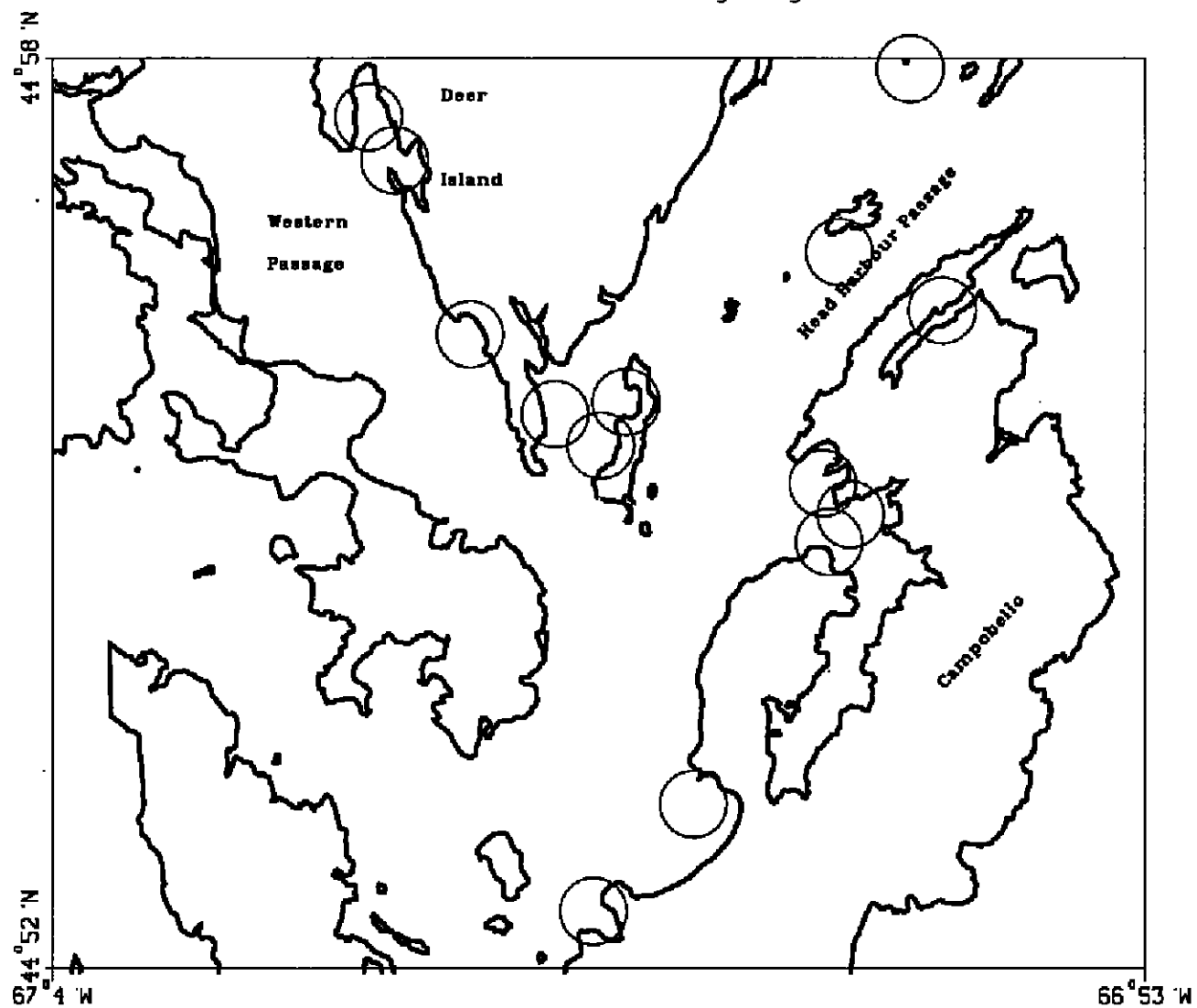


Fig. 5. Areas encompassed within a 400-m radius of sites in the Lime Kiln Bay Region.

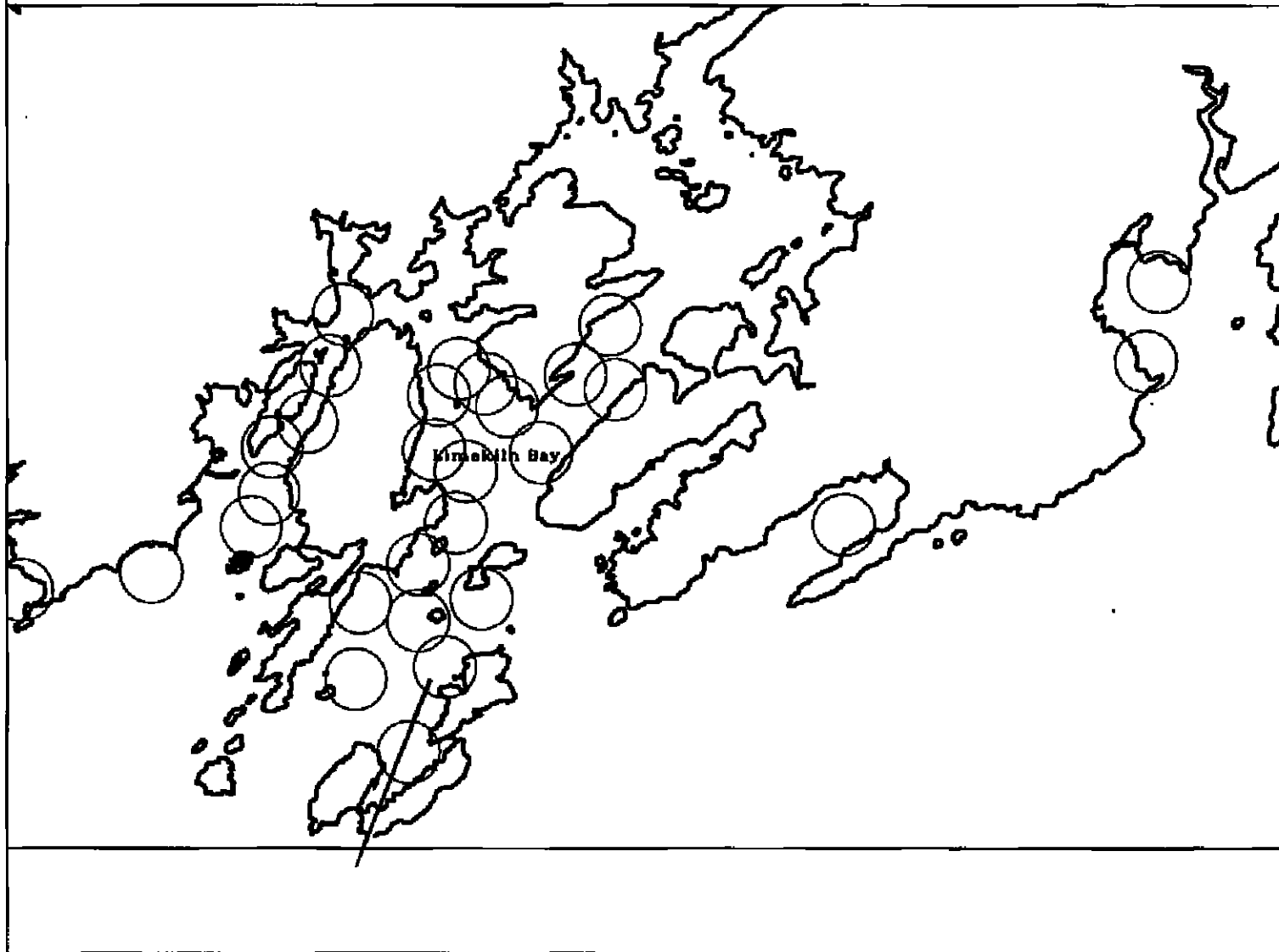


Fig. 6. Areas encompassed within a 400-m radius of sites located near Grand Manan.

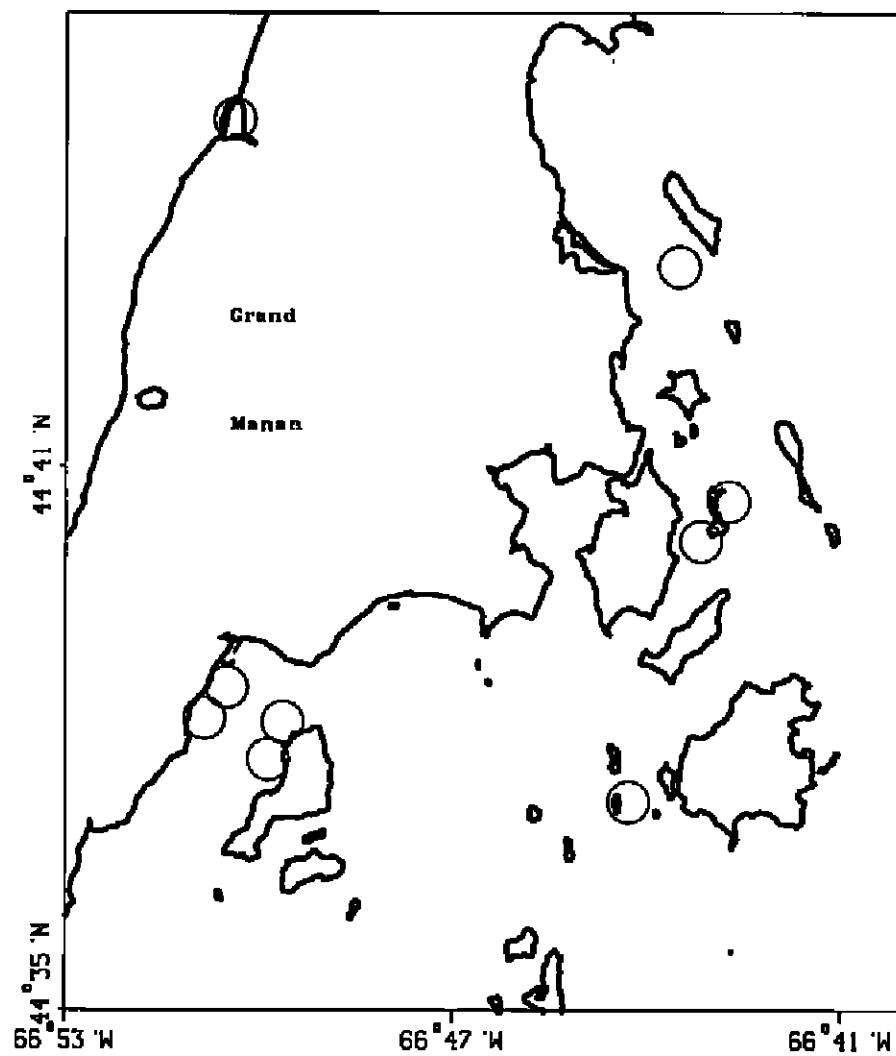


Fig. 7. Areas encompassed within a 2500-m radius of sites in inner Passamaquoddy Bay.

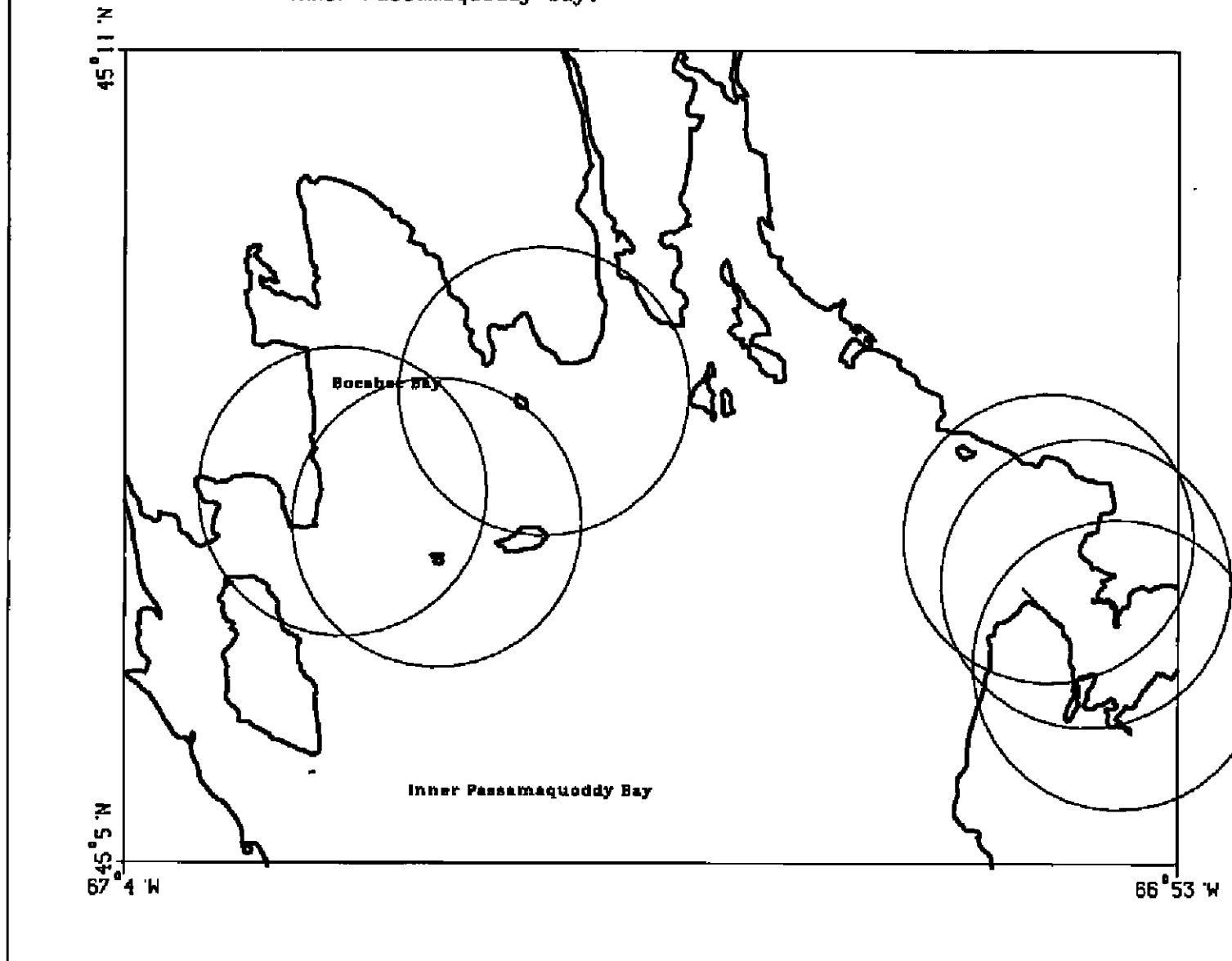


Fig. 8. Areas encompassed within a 2500-m radius of sites in outer Passamaquoddy Bay, L'Etete Passage and the Deer Island Archipelago.

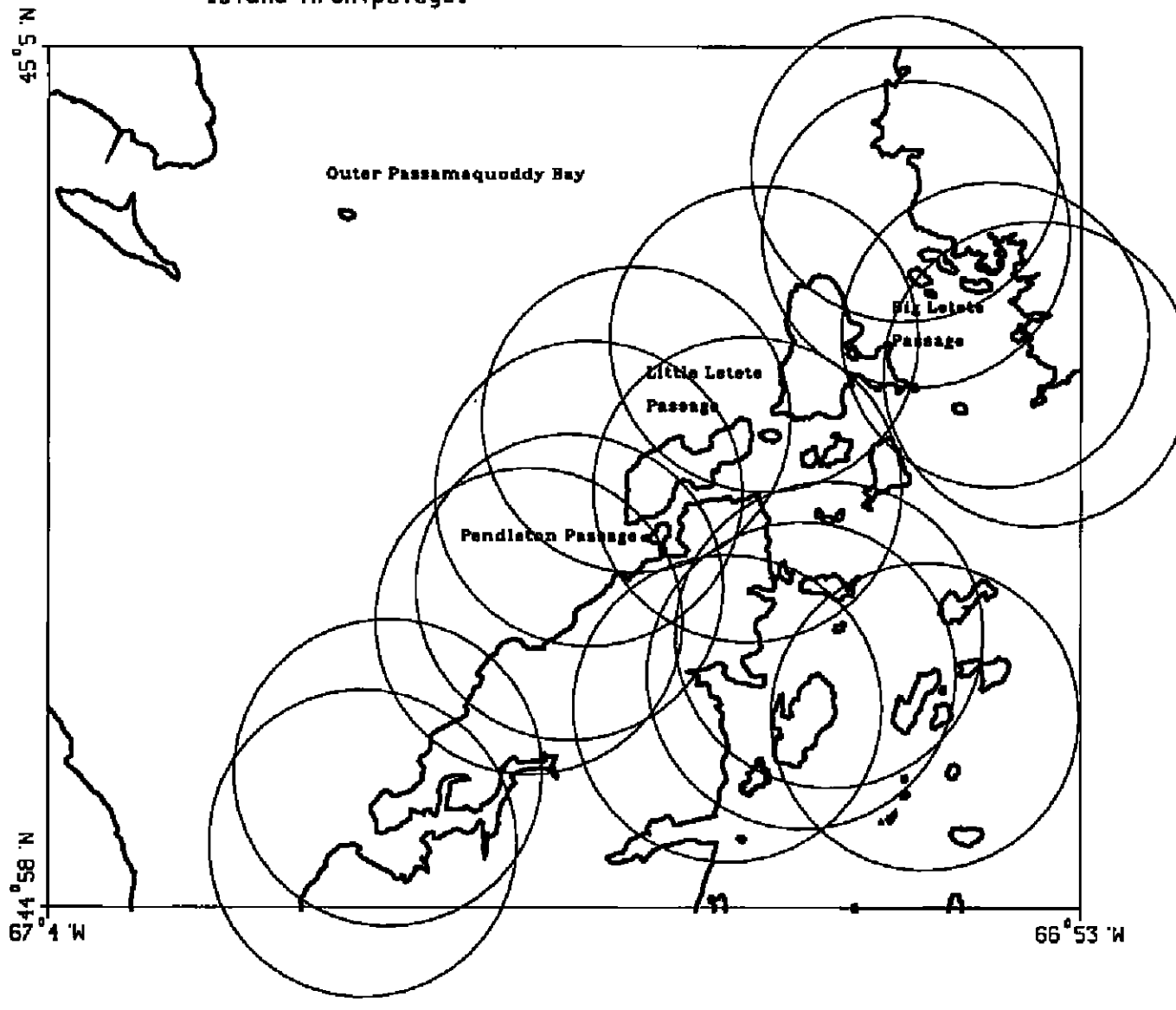


Fig. 9. Areas encompassed within a 2500-m radius of sites in the Head Harbour and Western Passage Region.

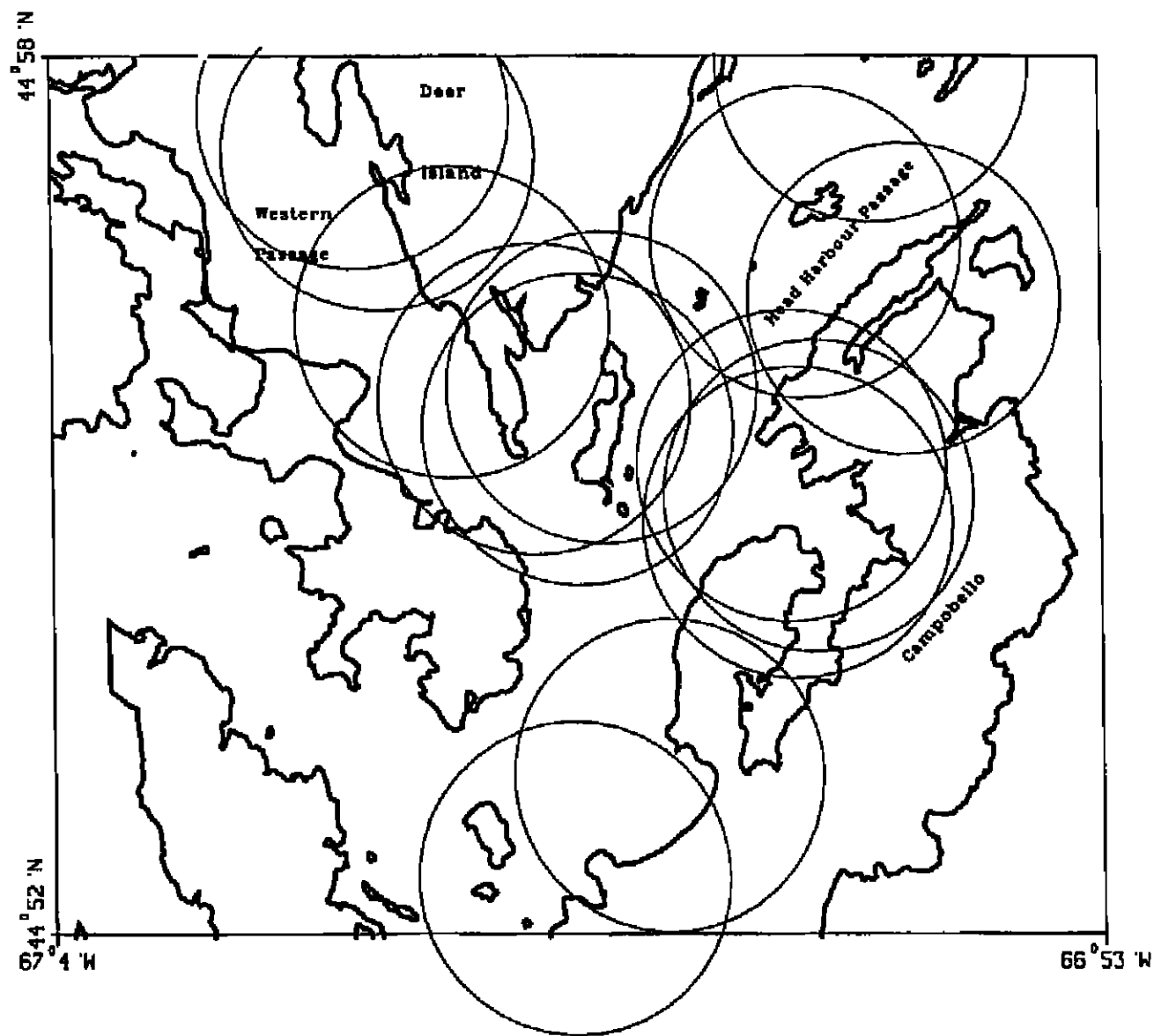


Fig. 10. Areas encompassed within a 2500-m radius of sites in the Lime Kiln Bay Region.

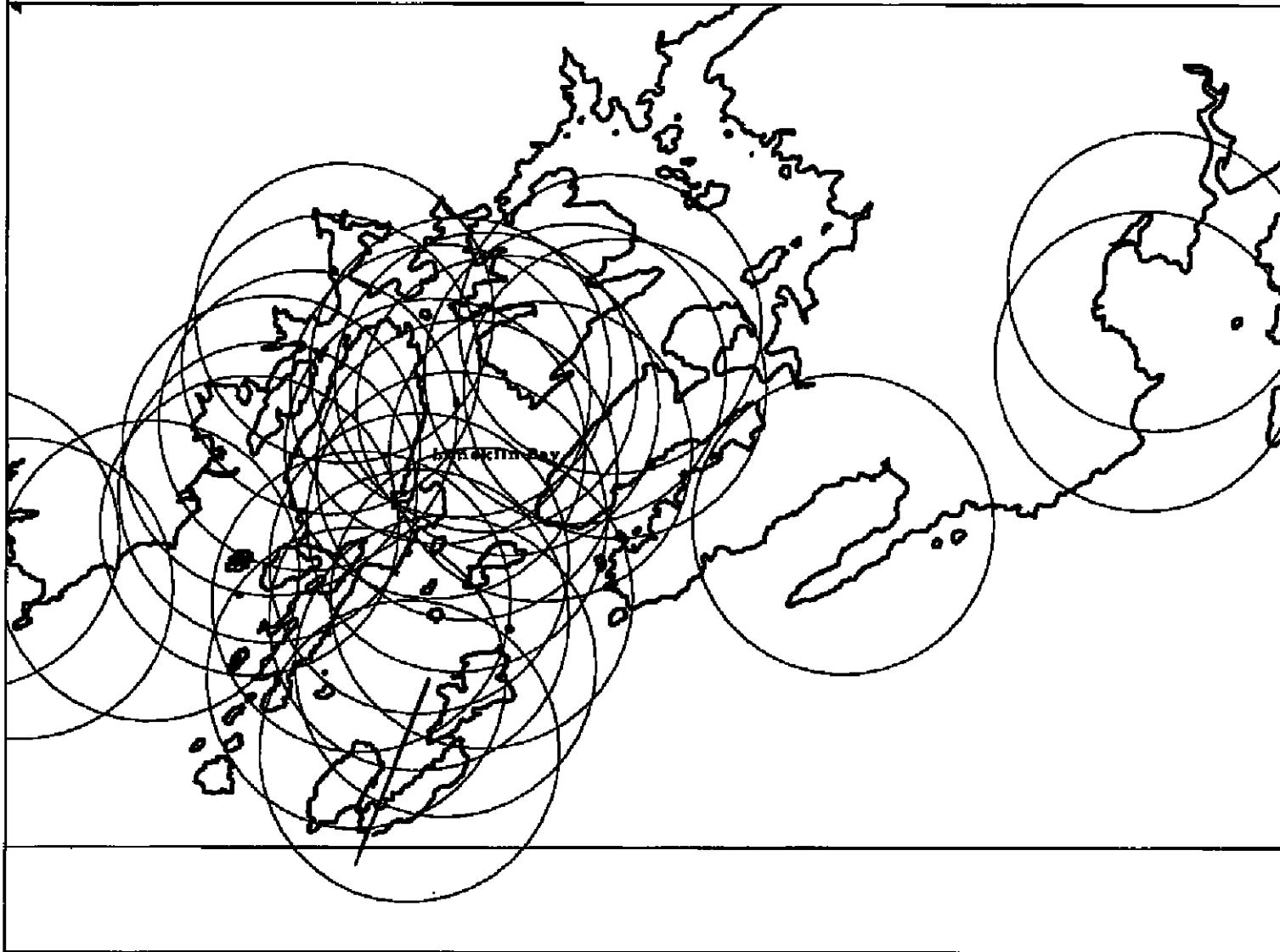


Fig. 11. Areas encompassed within a 2500-m radius of sites located near Grand Manan.

