

STATE OF ACOUSTICS IN NOVA SCOTIA

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SUMMARY

The current level of activity in acoustics research in the province of Nova Scotia is briefly reviewed, including a discussion of per capita concentration of professional membership. This paper is an adaptation of an invited talk presented to the 1996 Annual General Meeting of the Institute of Acoustics of Atlantic Canada, held at the Bedford Institute of Oceanography, 1996/05/31

SOMMAIRE

Le degré d'activité dans le métier de la recherche en acoustique en Nouvelle Ecosse est brièvement revue, comprenant une discussion du concentration par capita des membres des associations professionnelles. Ceci est une révision d'une présentation faite à la Réunion Générale Annuelle de l'Institut d'Acoustiques Atlantique Canadienne, qui a eu lieu à l'Institut d'Océanographie de Bedford, 1996/05/31.

INTRODUCTION

At one of the regular meetings of the Board of Directors of the Institute of Acoustics of Atlantic Canada in the spring of 1995, the suggestion arose to have ten-minute presentations of the "State of Acoustics" in each of the four Atlantic provinces at the up-coming Annual General Meeting. Although the topic is impossibly too broad to be able to do it any kind of justice within the time allotted, the author felt it would be an interesting and fun assignment, and agreed to present for Nova Scotia. The following paper is an adaptation of the prepared text of the presentation.

PROFESSIONAL MEMBERSHIP

In an attempt to gauge the state of acoustics in Nova Scotia, the membership of professional associations may be the most obvious place to start. Acoustics is something people do, so one should consider *who* is doing it. Although there are many acoustics practitioners who are not members of a professional association, those who *are* form the most visible subgroup. There are four associations that will be con-

sidered in this context; although doing so is not intended to suggest that these four, or these four alone, are the definitive *professional* associations of acousticians; it is simply a label of convenience for the purpose at hand.

Acoustical Society of America (ASA). With a history dating to 1928, the ASA is recognised as the leading association for professional acousticians, attracting a membership of about 7000 from all parts of the world.[1] Its peer-reviewed Journal (JASA) is the premiere publication for acoustics research. The 1995 membership directory lists **23 members** in Nova Scotia, which at **25 per million** population, is a significant concentration, compared to 295 members in all of Canada (10 pM), and 5360 in the US (20 pM).

It is interesting to note that per capita ASA membership in Nova Scotia compares favourably with such states as California (24 pM) and Pennsylvania (22 pM), while remaining at about one third the concentration of the best-represented states, Massachusetts and Connecticut (each 71 pM). These concentrations are depicted graphically in Figure 1. Already we see that Nova Scotia has an identifiable place in the North American acoustics community.

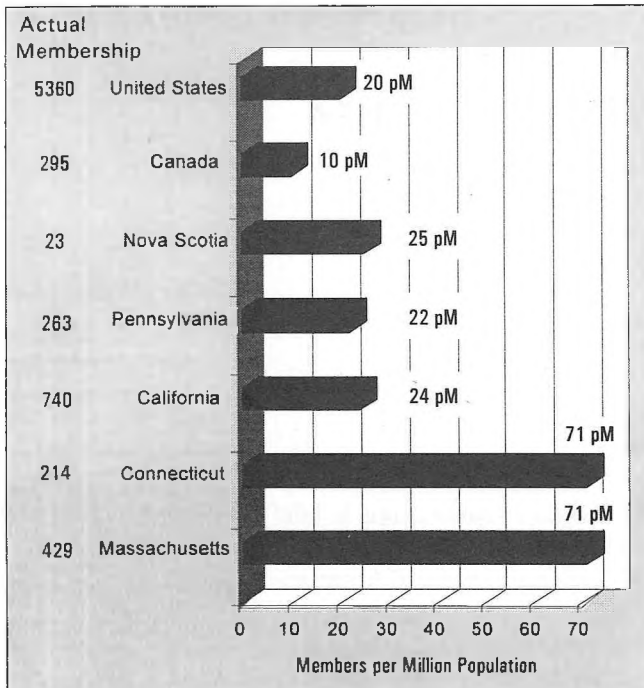


Figure 1. Comparison of 1995 ASA membership concentration between Nova Scotia and several other areas.

Canadian Acoustical Association (CAA). CAA is the professional, interdisciplinary organisation that fosters communication among people working in all areas of acoustics in Canada. It is an umbrella organisation through which general issues in education, employment and research can be addressed at a national level. It publishes the journal *Canadian Acoustics*. [2] In 1995, the CAA had 313 Canadian

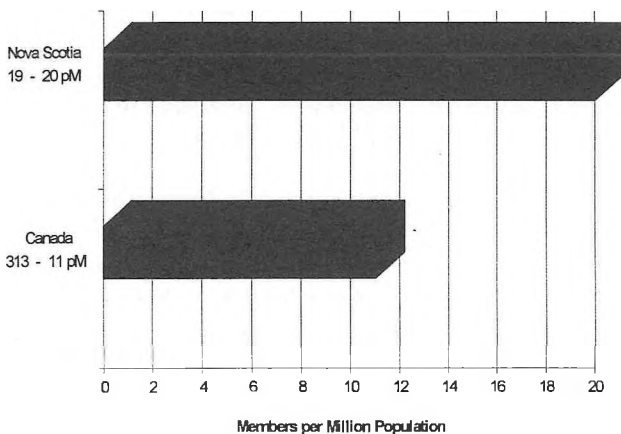


Figure 2. Comparison of 1995 CAA membership concentration between Nova Scotia and all of Canada.

members (11 pM); of which 19 were also Nova Scotian (20 pM). [3] This presents a consistent picture (Figure 2) with the data on ASA membership; and indeed, there is a very high membership overlap between the two organisations in Canada.

Halifax Chapter of the Canadian Acoustical Association (HC-CAA). With a membership of about 30, the local chapter deserves individual treatment from the CAA in general; not only because it is separately incorporated and carries out a set of programs that are supplemental to the services of the CAA, but also because its very existence highlights the strength of the acoustics community in Halifax Metro, and by extension, Nova Scotia. To the author's knowledge, it is the CAA's only presently-active local chapter. It presents a running series of seminars and site visits, actively promotes the introduction of acoustics to school children, and facilitates informal gatherings of its members.

Institute of Acoustics of Atlantic Canada (IAAC). A public meeting was held in Halifax in May 1990 to discuss a proposal to create a professional acoustics association in the region. [4] This eventually led to the IAAC's formal inauguration in May 1992. While serving all four Atlantic provinces as a nucleus for cooperation and exchange among acoustics practitioners, the IAAC has enjoyed strong support from its Nova Scotian members.

For 1995/96 the membership roll lists 18 members (12 individual and 6 corporate memberships), Nova Scotia accounts for 11 of these (61%, 7 individual and 4 corporate). One might be tempted to surmise from this figure that Nova Scotians are *over-represented* in the IAAC membership, perhaps by virtue of its location here. However, evidence presented in the following section suggests that this is not the case.

OTHER PRACTITIONERS

The **Atlantic Canada Acoustics Inventory (ACAI)** was completed by Guptill Consulting Services in 1992, at the initiative of the IAAC (with sponsorship from the Federal and Provincial governments). [5] From a total of 735 entries, it lists 231 for Atlantic Canada, which report some professional, commercial, or institutional involvement in acoustics; of these, 161 were based in Nova Scotia. [6] Seen in the light of this 70% figure, the IAAC membership appears to *under-represent* the Nova Scotian presence, if anything.

Figure 3 shows a comparison between the number of Nova Scotian registrations in each of the groups discussed above, and the number of Atlantic Canadians in the same group. The consistency in the relative size of the Nova Scotian co-

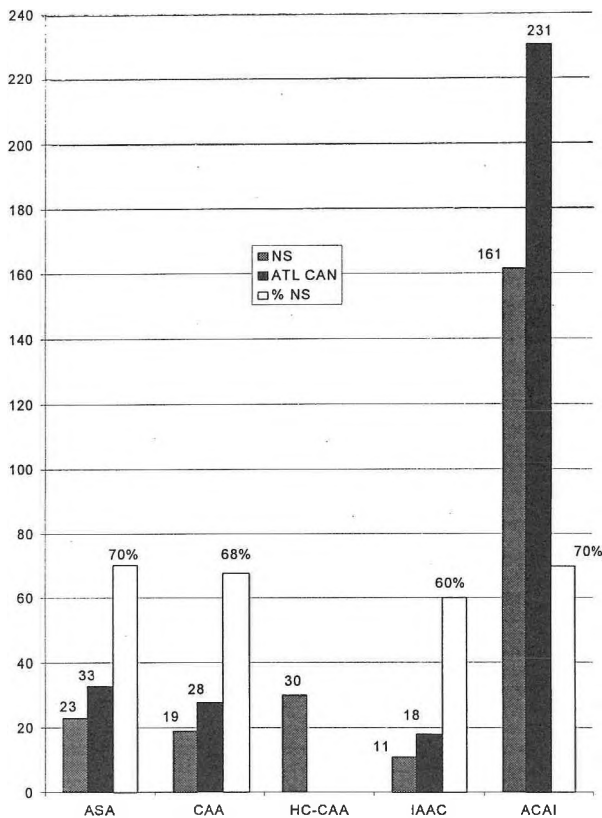


Figure 3. Comparison of 1995 association membership between Nova Scotia and all of Atlantic Canada.

hort in each of the four multi-provincial groups is remarkable.

In reality, we have only touched upon the most visible tip of the iceberg in this quick round-up of acoustical Nova Scotians. We know that the music and broadcast industries, in their many facets, could also be brought under this umbrella, as could voice-communications, navigation aids, medical ultra-sound, etc. The numbers of these practitioners of applied acoustics would certainly dwarf those of the R&D effort that we have already presented.

AREAS OF INTEREST

As one might expect, given Nova Scotia's intimate and enduring relationship with the sea, the lion's share of the professional activity in acoustics is centred around underwater acoustics; whether in support of military applications, fish finding and assessment, or sub-bottom geological investigation. Of the 23 ASA members, for example, 20 listed underwater acoustics among their top three areas of interest. Other areas of R&D cover practically the entire spectrum,

including animal bioacoustics, architectural acoustics, speech communication, noise and vibration, music, etc.

PRINCIPAL CENTRES

The bulk of the acoustics R&D in Nova Scotia is concentrated, as one might expect, in a number of major institutions. The acoustics involvement in each centre is briefly surveyed below.

The Defence Research Establishment Atlantic (DREA). DREA has been active in underwater acoustic research and development for over fifty years. This R&D effort has included research into the ocean environment, development of acoustic sources, receivers, and equipment to process and display acoustic data, and development of military sonar systems.[7]

The Bedford Institute of Oceanography (BIO). The BIO program in acoustics is mainly involved in the use of underwater acoustics to study various ocean and fresh water parameters. Since the first patent was granted in 1907 for an underwater acoustics device to measure water depths, acoustic methods to obtain oceanographic measurements have become increasingly important in areas including bathymetric surveys, the measurement of ocean currents, geophysical research, the assessment of ocean biomass, the migratory patterns of fish, and even to climate prediction.[8]

Dalhousie University (DAL). Currently, more than 20 of Dalhousie's faculty members are engaged in teaching and/or research on a full- or part-time basis in acoustics fields. They can be found in the School of Human Communication Disorders, and in the Departments of Psychology, Oceanography, Biology, and Medicine, as well as in a number of other disciplines related to Neuroscience. The University thus has considerable strength in several areas that are pertinent to the study of acoustics.[9]

PRIVATE COMPANIES

It is difficult to gauge the number of Nova Scotian companies that derive significant revenues from the study and application of acoustics; the ACAI records 52, which should be considered as a lower-bound. To mention just one example, I could acknowledge my own employer, Seimac Limited, which provided support for this investigation. Based in Dartmouth, NS, with a staff of about 40, Seimac has been involved in ocean-related R&D for about 17 years. There are currently about six people employed here whose work generally relates to underwater acoustics a good part of the time.

CONCLUSION

In conclusion, I believe it is fair to say, that by virtue of the revenues generated, acoustics is important to Nova Scotia; and by virtue of the valuable contributions of its practitioners, Nova Scotia is important to acoustics.

- [1] *Membership Directory and Handbook 1995*, Acoustical Society of America, Woodbury, NY, 1995.
- [2] The Canadian Acoustical Association, *membership brochure*, 1993.
- [3] *Membership Directory 1995*, Canadian Acoustics, Vol. 23, No. 4, p55-67, 1995/12
- [4] Cliff Tyner, IAAC Chairman, *private communication*, 1994/03/17.
- [5] Technology Transfer & Industrial Innovation (TTII, joint Federal/Provincial) funding: 68%, Defence Research Establishment Atlantic (Federal) funding: 32%. Jerry O'Neill, TTII, *private communication*, 1991/12/23.
- [6] Fred Guptill, *Atlantic Canada Acoustics Inventory*, Guptill Consulting Services, 1992/03.
- [7] R.F. Brown, Chief, DREA, *private communication*, 1992/01/22
- [8] Stephen B. MacPhee, Regional Science Director, DFO, and D.I. Ross, Director, AGC, EM&R; Bedford Institute of Oceanography, *private communication*, 1992/01.
- [9] Dennis Stairs, Vice-President (Academic & Research), Dalhousie University, *private communication*, 1992/02.

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Prix de l'ACA à la mémoire de Raymond Héту

L'assemblée des directeurs de l'Association canadienne d'Acoustique et le comité du Prix Raymond Héту ont décidé d'établir un nouveau prix, à la mémoire de Raymond Héту, qui serait financé en tout ou en partie par des dons des membres de l'ACA. A leur demande, j'invite donc les membres à faire parvenir leurs dons pour ce prix. Des fonds substantiels ont déjà été promis. S. v. p. me faire parvenir vos chèques libellés au nom de l'Association canadienne d'Acoustique et y inscrire, Re: Prix Raymond Héту. Un reçu d'impôt sera émis.

CAA Prize in Memory of Raymond Héту

The Board of Directors of the Canadian Acoustical Association, and the Raymond Héту Prize Committee, have decided to establish a new prize in memory of Raymond Héту which would be financed all or in part by donations from the members of the CAA. At their request, I invite you to make donations towards this prize. Substantial funds have already been promised. Please send cheques made out to the Canadian Acoustical Association and marked, Re: Raymond Héту Prize to me. A tax receipt will be issued.

Murray Hodgson - Président, Comité du Prix Raymond Héту / Chair, Raymond Héту Prize Committee