

Edition No. 55, Spring 1997
Édition No. 55, Printemps 1996

ISSN 0711-5628

Lighthouse

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION
REVUE DE L'ASSOCIATION CANADIENNE D'HYDROGRAPHIE

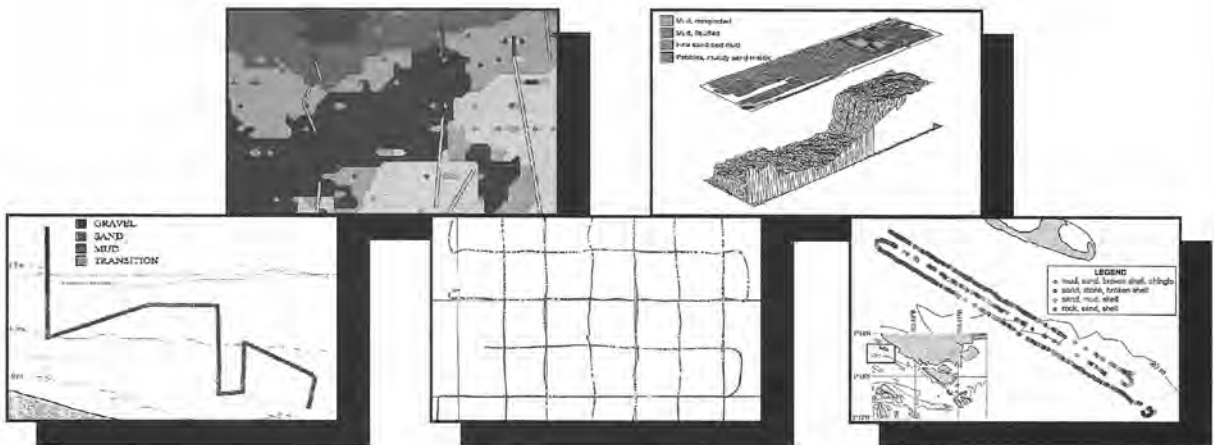




Seabed Classification

MAPPING THE SEABED

with your echo sounder



- generating maps worldwide
 - unique digital approach
- repeatable, accurate results in real-time
 - convenient ASCII data format



Quester Tangent Corporation
9865 West Saanich Road, Sidney, B.C. Canada V8L 5Y8
Tel: (250) 656-6677 Fax: (250) 655-4696
E-Mail: sales@questercorp.com
Web: <http://www.questercorp.com>

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION
REVUE DE L'ASSOCIATION CANADIENNE D'HYDROGRAPHIE

CHA Executive/Exécutif de l'ACH

National President/Président national K. McMillan
Treasurer/Trésorier B. Power

Vice Presidents/Vice-présidents

Newfoundland Branch F. Hall
Section du Québec B. Labrecque
Ottawa Branch J. Box
Central Branch T. Herron
Prairie Schooner Branch B. Calderbank
Captain Vancouver Branch G. Pugach
Pacific Branch R. Hare

Lighthouse - Editorial Staff/Équipe de rédaction

Editor/Rédactrice en chef T. Herron
Associate Editor/Rédactrice associée P. Travaglini
Assistant Editors/Rédacteurs adjoints D. Monahan
F. Oliff / J. Weller

Feature Editor/Rédacteur des chroniques P. Knight
Advertising Manager/Directeur de la publicité D. Pugh
Financial Manager/Directeur des finances R. Sandilands
Printing/Impression C. Gorski
Subscriptions/Abonnement and/et Distribution J. Weller
R. Robitaille

Translation/Traduction Section du Québec
Word Processing/Traitement de textes L. Smith

* Every edition also receives much assistance from the Central Branch Lighthouse Committee and other CHA volunteers.

* Chaque édition est réalisée grâce à la collaboration du comité Lighthouse de la section Centrale et d'autres volontaires de l'ACH.

LIGHTHOUSE is published twice yearly by the Canadian Hydrographic Association and is distributed free to its members. A membership application form can be found on page 5 of this issue. Yearly subscription rates for non-members are \$20 for Canadian residents, and \$25 for non-residents. Please make cheque or money order payable in Canadian funds to the Canadian Hydrographic Association.

La revue LIGHTHOUSE est publiée deux fois par année par l'Association canadienne d'hydrographie et distribuée gratuitement à ses membres. Une formule d'adhésion se trouve en page 5 de cette édition. Les tarifs annuels d'abonnement pour les non-membres sont de 20\$ au Canada et de 25\$ hors Canada, payable par chèque ou mandat-poste en devises canadiennes à l'ordre de l'Association canadienne d'hydrographie.

All Lighthouse correspondence should be sent to:

Adressez toute correspondance au:

Editor, Lighthouse
Canadian Hydrographic Association
867 Lakeshore Road
P.O. Box 5050
Burlington, Ontario
CANADA L7R 4A6

Telephone/Téléphone: (905) 336-4812

Fax/Télécopieur: (905) 336-8916

e-mail: Lighthouse@bur.dfo.ca

Advertising Rates/Tarifs publicitaires

For a rate card and mechanical specifications see the rate card printed on page 51 of this issue.

Pour les tarifs et les spécifications publicitaires, se référer à la page 52 de cette édition.

Back issues of Lighthouse/Éditions antérieures de Lighthouse

Back issues of Lighthouse, Editions 24 through 54 are available at a price of \$10 per copy. Please write to the Editor.

Les éditions 24 à 54 de la revue Lighthouse sont disponibles au coût de 10\$ par copie en écrivant au rédacteur en chef.

Contents/Contenu

	Page
Thirty Years of Turmoil, Stress and Achievement <i>T. McCulloch</i>	7
Harmonic Analysis and Tidal Predictions <i>W.R. Crawford</i>	12
Hydrographic Surveying At The University Of Otago, New Zealand <i>C. Spencer and N. Sutherland</i>	21

Regular Features/Chroniques

Letters to the Editor / Lettres au rédactrice en chef	2
Message from the National President / Mot du Président national	3
Lighthouse Abstracts / Résumés pour Lighthouse	4
Index of Advertisers / Index des annonceurs	5
Association of Canada Land Surveyors / Association des Terres du Canada	6
IFS / FIG	27
Ends of the Earth / Au bout du monde	28
CHA Academic Award / Bourse d'étude de l'ACH	30
Lighthouse Puzzler / Casse-tête du Lighthouse	33
Sustaining Members / Membres de soutien	34
News from Industry / Nouvelles de l'industrie	37
CHA News / Nouvelles de l'ACH	45
Directors' Meeting / Réunion des directeurs de l'ACH	49

Views expressed in articles appearing in this publication are those of the authors and not necessarily those of the Canadian Hydrographic Association.

Les opinions exprimées dans les articles de cette revue ne sont pas nécessairement celles de l'Association canadienne d'hydrographie.

Closing dates for articles / Date de tombée des articles

Spring Issue	February 1/1er février	Édition du printemps
Fall Issue	September 1/1er septembre	Édition de l'automne

Letters To The Editor

Dear Editor:

A year ago I was involved in a field start-up on the East coast of India. I had been there several months and the mirage of coconut treed coastline on the horizon beckoned daily, but no respite from the six month construction schedule. About this time the trappings of the real world faded (John Halsall my good China friend will attest to this phenomena). I started to cancel memberships and subscriptions in protest that urban folk had timely access to and the luxury of enjoying such privileges.

The first to go was TIME and MTS. That left the Hydro Society or CHA. I must confess in a moment of poor judgment I chose the latter and with heavy heart wrote an eloquent letter as to why the relevance of the esteemed association had wanned for me; I would move on without it.

Months passed, the monsoon approached and the off-shore construction was completed and commissioned on schedule.

Eight months later back in Australia I kept receiving all the periodicals etc. that go with the above organizations. TIME was overjoyed to hear from me and signed me up for a new periodical that would further burden my credit card, but allow me to purchase a very fancy watch

rated to 300m water depth, (handy in the shower I thought). MTS keeps coming – I'll get around to re-joining sometime. There is a question of ethics there somewhere?

That left the CHA. The memories of long executive meetings in the BIO thrashing out agendas to inspire CHA membership on the East coast remained. The many hours spent with Charlie & Galo over questionnaires "How to improve the CHA". I seem to remember "free beer at social events" was warmly received. Cancelling on the CHA had not been a good decision.

Several days back I received a call from the production supervisor (who I know well now) on site Suri-Yanam, India. He had been promoted to Production Manager Madras. All was going well and by the way, there was a letter from me to a Canadian Association dated March, 1996. It had been buried in paperwork, should he send it on?

Now if I can only figure out how to stop getting TIME.

Yours sincerely,

Peter Barr

Editor's Note:

We welcome Peter back as an International Member.

K **KNUDSEN**
ENGINEERING LIMITED

Precision Survey Solutions
Digital Acoustic Products
for the Marine Industry

10 INDUSTRIAL ROAD
PERTH, ONTARIO
CANADA K7H 3P2

TEL (613) 267 - 1165
Fax (613) 267 - 7085
EMAIL: <http://knudsenengineering.com>




Message from the National President Mot du Président national




Ken McMillan

The Canadian Hydrographic Association enters its 31st year in 1997. During this period the changes to hydrography, particularly in the instrumentation have been dramatic. The days of the single beam sounder now appear to be over, as multibeam systems abound. With the increased complexity, the average hydrographer now needs to understand computers, electronics, surveying and cartography while maintaining a professional regard for the practice of hydrography. In emerging and developing countries, the demand for older single beam echo sounders and other hydrographic surveying equipment will increase. Not every country gets a World Bank loan! To this end, the CHA is investigating the possibility of distribution of surplus equipment from Canadian industry to meet the needs of others less fortunate. The first distribution of surplus equipment was recently completed by the CHA. Equipment from the Canadian Hydrographic Service, Central and Arctic Region, was sent to the Centre for Hydrographic Studies at the University of Malaysia. I am sure that the students of the current IHO/FIG Category B course now underway will benefit from this donation. Further donations are welcome.





Editor's Note / Note de la redactrice



Terese Herron



The Canadian Hydrographic Association (CHA) is celebrating thirty years since its formation. Tom McCulloch, one of the founding fathers, presents us with an insight into the formation and early years of the CHA. Many of those who founded the CHA are now retiring, and what began as a small association has grown into seven branches across the country and includes international membership. The CHA has had many accomplishments over the years and for an Association of its size has been extremely active.

Central Branch Member Roger Robitaille retired last March. For several years Roger has been the postmaster of both Central Branch and Lighthouse. He is responsible for the interesting postage you see on the envelopes. The Lighthouse production team wishes Roger all the best in his retirement from the CHS. Roger will continue to assist with Lighthouse for the near future.

Also leaving us is Peter Knight, one of our feature editors. Peter has accepted a position at the University of Otago in New Zealand. From this location Peter will continue to bring us the Ends of the Earth column. We wish Peter and his family all the best in their new location.

Now that the summer field season is upon us, I would like to wish those field bound, gentle breezes, sunny skies and calm waters. As I write this aboard the CCGS Griffon we are experiencing strong winds, sunny skies and rough waters.

As in the past I am searching out papers to publish in Lighthouse. If you are writing a paper that might be of interest to our readers please forward a copy to the editor for review.



Thirty Years of Turmoil, Stress and Achievement

by
T. McCulloch

The Canadian Hydrographic Association (CHA) is this year celebrating its 30th anniversary. The CHA was formed in 1967 to address many challenging training issues; these were largely a result of the many technological advancements made during the 1960's.

A training plan was discussed by many of the senior CHS employees as early as 1963. It was not until late 1966 when many of them were pronounced unqualified for the newly-created position of Assistant Regional Hydrographer that they were galvanized into action.

Official recognition of the CHA took place at the 1967 Hydrographic Conference, at which Mike Eaton was elected President.

A newsletter was started in 1968, but it was not until Issue 12, in 1975, that it became known as Lighthouse.

The CHA has become part of the establishment through co-hosting of national hydrographic conferences, the Student Awards Program and the Central and Arctic Region's Heritage Launch project. Endeavours such as these have raised the public's awareness of the Canadian Hydrographic Association and it's important place in the national fabric.

Happy 30th birthday to you CHA - may you have many more!

Page 7

Harmonic Analysis and Tidal Predictions

by
W. R. Crawford

Tidal constants have traditionally been calculated from an analysis of a one-year record of sea level heights. This paper describes a method to determine average tidal constants based on many years of observations. This method also identifies any drift in either amplitude or phase of the tidal constants, any irregularities in the nodal modulation, and tidal constituents whose amplitudes are too small to be of use for tidal predictions.

Page 12

Trente ans de bouleversement, de tension et d'accomplissement

par
T. McCulloch

L'Association canadienne d'hydrographie (ACH) célèbre ses trente ans cette année. L'ACH a été fondé en 1967 pour répondre aux nombreux défis reliés à la formation résultant des nombreux progrès technologiques faits durant les années 1960.

Un plan de formation était discuté par plusieurs des employés d'expérience du SHC depuis 1963. Ce n'est qu'à la fin de 1966, lorsque plusieurs d'entre eux ne se sont pas qualifiés pour le poste nouvellement créé d'Assistant hydrographe régional, qu'ils ont coordonné leurs actions.

La formation officielle de l'ACH a eu lieu à la Conférence hydrographique de 1967 avec l'élection de Mike Eaton comme président.

Un bulletin de nouvelles débuta en 1968, mais ce n'est qu'à partir du numéro 12, en 1975, qu'il devenait connu sous le nom de Lighthouse.

L'ACH est devenu un incontournable dans l'organisation en partenariat de conférences hydrographiques nationales, par le programme des bourses aux étudiants et par le projet Heritage Launch de la section Centrale et Arctique. De telles réalisations ont éveillé la perception du public à l'Association canadienne d'hydrographie et à son importance au niveau national.

Joyeux 30e anniversaire ACH - puissiez-vous en avoir plusieurs autres!

Page 7

Analyse harmonique et prédictions de marées

par
W. R. Crawford

Les constantes de marée ont été traditionnellement calculées par l'analyse d'un enregistrement d'un an de niveaux d'eau. Cet article décrit une méthode pour déterminer les constantes moyennes de marée basées sur plusieurs années d'observations. Cette méthode identifie aussi les dérives d'amplitude et de phase des constantes de marées, les irrégularités des modulations nodales ainsi que les amplitudes des constantes de marées trop petites pour être utilisées dans les prédictions de marées.

Page 12

Hydrographic Surveying at the University of Otago, New Zealand

by

C. Spencer and N. Sutherland

In an effort to stay abreast of the many technological changes in the hydrographic industry, the University of Otago at Dunedin is offering New Zealand's only university level survey degree program. The survey program at the University of Otago offers the only hydrographic survey courses available in the country. The traditional providers of hydrographic information for the country are facing new challenges both in terms of competition and restricted government involvement. The University of Otago's surveying department stands poised to respond to the challenges facing the hydrographic profession as it enters the next millennium.

Page 21

Programme d'hydrographie à l'Université d'Otago, Nouvelle-Zélande

par

C. Spencer et N. Sutherland

Dans un effort de demeurer à jour face aux nombreux changements technologiques dans l'industrie hydrographique, l'Université d'Otago à Dunedin est la seule université de la Nouvelle-Zélande à offrir un baccalauréat en arpentage. La faculté d'arpentage de l'Université d'Otago offre le seul cours en hydrographie disponible au pays. Les fournisseurs traditionnels de l'information hydrographique pour le pays font face à de nombreux défis en terme de compétition et de l'implication restreinte du gouvernement. La faculté de l'Université d'Otago est prête à relever les défis auxquels doit faire face la profession hydrographique à l'aube du prochain millénaire.

Page 21

Index of Advertisers / Index des annonceurs

Quester Tangent Corporation	inside front cover
Knudsen Engineering Ltd.	2
McQuest Marine Sciences Ltd.	19
The Hydrographic Society	20
Kongsberg Simrad	25
International Hydrographic Bureau	26
Seatex Inc.	35
Aerodat Inc.	38
McQuest Marine Sciences Ltd.	43
Nautical Data International Inc.	inside back cover
1998 Canadian Hydrographic Conference	outside back cover



**Application for Membership
Formule d'adhésion**



I hereby make application for membership in the Canadian Hydrographic Association and if accepted agree to abide by the constitution and by-laws of the association.

Je désire devenir membre de l'Association canadienne d'hydrographie en tant que et si ma demande est acceptée je m'engage à respecter la constitution et les règlements de cette association.

Member / membre
\$30.00

(for most branches/pour la plupart des sections)

Sustaining Member / membre de soutien
\$150.00

International Member / membre international
\$30.00

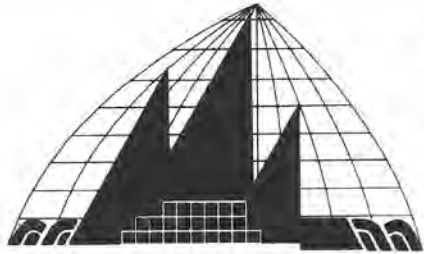
Name/Nom _____

Address / Adresse _____

Telephone / Téléphone _____ (Home / Résidence) _____ (Business / Bureau)

Employed by / Employeur _____ Present Position / Post Occupé _____

Citizenship / Citoyenneté _____ Date _____



Association of Canada Lands Surveyors / Association des Arpenteurs des Terres du Canada

by/par

J. S. Simpson, CLS/a.f, OLS, Executive Director/Directeur exécutif

Those Hydrographers who are still members of the Association of Canada Lands Surveyors know that we are still patiently waiting for the passing of the Act of Parliament that will make us a self-regulating Association. Perhaps the word 'passing' in this sense is somewhat misleading, as it implies that the Act has actually reached the halls of Parliament. This is definitely not the situation, since it has not yet even been submitted for first reading. It will soon be the second anniversary of the date that we were supposed to have been up and running as an Association - April 1, 1995. It is revealing just how unrealistic this date was when we realize that the Department of Justice did not actually begin work on the document to be submitted to Parliament until October 1995. However, even that activity has now gone on for a year and a half, with ever receding target dates for submission. The latest word we have received is that it will not be submitted during the present Parliamentary session, primarily because of the impending federal election. The reasoning is that it makes no sense to introduce the bill at this time because if there is an election, the order paper is cleared and all bills have to be reintroduced during the new session.

In the meantime, the number of Canada Lands Surveyors continues to grow year by year and the surveying of Canada Lands continues at a high level of activity. Since in the first place it was the federal government that invited the ACLS to become self-regulating, to give the Association the authority to properly regulate the activities of all the new Canada Lands Surveyors carrying out a much increased level of work, the ACLS Board of Directors is hoping that all CLS's are adhering to the ACLS Code of Ethics. The last thing the ACLS would want is that when self-regulation does occur, we are greeted with a rash of complaints resulting from several years of unregulated surveying activities!

Meanwhile, the ACLS continues to prepare for the day of self-regulating, whenever it might occur. A program for Continuing Professional Development for ACLS members is in the final stages of development and the Budget and Fees Committee has prepared a draft of a post self-regulating dues structure which will be presented to the members at the Annual General Meeting in Ottawa on May 30.

Les hydrographes encore membres de l'Association des arpenteurs des terres du Canada savent que nous attendons encore que le Parlement vote la loi qui nous donnera une Association auto-réglementée. Peut-être que le mot "vote" peut porter à confusion puisqu'il implique que la loi devrait être sur le parquet du Parlement. Ce n'est pas le cas, puisqu'elle n'a pas été soumise à la première lecture. Cela fera bientôt deux ans que nous sommes supposés être constitués et fonctionner en tant qu'Association (1^{er} avril 1995). Ceci révèle combien cette date était irréaliste quand nous réalisons que le ministère de la Justice n'a pas encore commencé à travailler sur le document à être soumis au Parlement en octobre 1995. Bien que le dossier soit en traitement depuis un an et demi, la date de soumission est toujours retardée. La dernière information que nous ayons reçue est qu'elle ne sera pas soumise durant la présente session parlementaire, principalement à cause de l'imminence des élections fédérales. La raison est qu'il n'est pas opportun de présenter la loi avant une élection parce que le feuillet est annulé et que toutes les lois doivent être représentées à la session suivante.

Pendant ce temps, le nombre d'arpenteurs fédéraux continue d'augmenter année après année, le besoin en arpentage des terres du Canada continue d'être une activité en forte demande. Puisqu'en premier lieu c'était le gouvernement fédéral qui a invité l'AATC à devenir auto-réglementé pour donner à l'Association l'autorité de réglementer adéquatement les activités de tous les nouveaux arpenteurs fédéraux réalisant des travaux de plus en plus exigeants, le Conseil d'administration de l'AATC espère que tous les a.f. adhèrent au code d'éthique de l'AATC. La dernière chose que l'AATC voudrait, quand arrivera le jour de l'auto-réglementation, c'est d'être inondé par un lot de plaintes résultant de plusieurs années d'arpentage non-réglementé.

Entre-temps, l'AATC continue à se préparer pour le jour de l'auto-réglementation, quand il arrivera enfin. Un programme de formation professionnelle continue pour les membres de l'AATC est au stage final de développement et le Comité du budget et des cotisations a préparé l'ébauche d'une grille de tarifs post auto-réglementation qui sera présentée aux membres à l'assemblée générale annuelle à Ottawa le 30 mai.

Thirty Years Of Turmoil, Stress And Achievement

T. McCulloch

PART I : THE BIRTH OF THE CHA

(then, the Canadian Hydrographers' Association, now the Canadian Hydrographic Association)

Today, society and its government are in much upheaval, with reductions in program funding and in the staff to manage these programs. The effect is traumatic, often career threatening, and sometimes leads to job termination. A worrying, perplexing time! You probably think those lucky old-timers back at the time of formation of the CHA never faced such problems.

And you would be correct to some extent, but we did face great upheaval in society and uncertainty of direction to meet new challenges, and a feeling that we (the young whippersnappers in the CHS) were not prepared to tackle the problems of the future—particularly in relation to training for deployment of the first wave of new technology and techniques that came upon us. But also in determining proper standards for our profession—and in relating that profession to its fast growing counterparts in oceanography—physical, geological and geophysical. Additionally, there were the problems associated with the mushrooming exploitation of the ocean's hydrocarbon resources and the international move to develop a *Law of the Sea Convention* that would be recognized and adhered to by all maritime nations. All of the foregoing would impact eventually on the conduct of the hydrographic profession—and we were ill prepared.

To establish a starting point for this presentation, I have reviewed my own personal memories (fighting Alzheimer's all the way!) and picked 1963 as a suitable beginning. Other "old-timers" may start elsewhere but let them develop their own reflections at another time.

The 1960's

The formation of the Marine Sciences Branch and the inclusion of the CHS within it, and the establishment of the Bedford Institute of Oceanography in Dartmouth, N.S. began the process of national change in the hydrographic mission. The impact of that process of change on the Pacific Coast was practically non-existent. There was little transfer of technology to disturb an orderly, meticulous and conscientious profession concerned largely with accuracy and productivity in publishing nautical charts and supporting compilation of data.

However, in December of 1963 at the Dominion Hydrographer's 3rd Annual Conference in Ottawa, Dr. W. Cameron, MSB Director, stated that hydrographers' charting tasks should be extended to describe other parameters of the sea bottom. He suggested that hydrographers might eventually move into the problem of describing the sea itself as it varies from place to place and time to time. The concept was challenged in private by many, particularly on the Pacific Coast, but change was underway which would require a drastic rethink of our mission and the training and education standards that would be required to successfully tackle that mission. However, CHS on the Pacific Coast lacked day-to-day contact with the oceanographic professions that were becoming common in the east. We slumbered on and were ill-prepared for what was to come.

Senior Survey Officers Course

In the winter of 1964/65, four members of CHS took part in what was to be the last Senior Survey Officers Course run by the Survey and Mapping Branch of Energy, Mines and Resources. The four chosen to attend were Larry Murdoch, Barrie MacDonald, Mike Eaton and myself. [The selection of this group may have been a contributing factor to the demise of the course!] We were exposed to lots of survey and mapping technologies and other useful information, but what whetted my interest [and I would surmise Mike Eaton's, also] was the one-week tour of survey and mapping establishments in Washington, particularly those involved in hydrographic and oceanographic research and developments in technology and technique. This was followed by exposure to the formulation of the Computing Devices of Canada study of future CHS technical requirements as commissioned by the Dominion Hydrographer. The contrast between the exciting new developments apparently underway in hydrography elsewhere and the seemingly glacial approach to change on the Pacific Coast left me with the feeling that we were not ready for the future. Decca 6F and Tellurometer were not enough!

The Massacre

In the following winter of 1965/66, an event took place that caused much personal anguish at the time but probably helped propel the CHS into facing the facts of its situation. Eight senior CHS members—DeGrasse, Corkum, Eaton, Blandford, Kerr, Wills, Sandilands and myself, were interviewed by Bill Cameron (Director, Marine Sciences Branch), Clarence Cross (Advi-

son to Cameron), Norman Gray (Dominion Hydrographer) and others. All of us were pronounced unqualified to occupy the newly established position of Assistant Regional Hydrographer in Atlantic, Central and Pacific Regions. What a slap in the face, not just personally but also for the entire CHS. Here, the eight most senior and experienced field officers in the CHS were told that they were not capable of rising to senior managerial status! It was a body blow and took some time to heal. The principal message appeared to be that we all lacked the training and education to meet Bill Cameron's exacting standards. There was blood on the floor of that boardroom!

In 1965, and again in 1966, a number of senior hydrographers met informally from time to time to discuss the urgent need to approach CHS management about hydrographic education and training. These included Eaton, Kerr, Lelievre, Rogers, Anderson and myself. It led to CHS support and encouragement for the "massacred" eight and others to take a number of university courses—mostly in mathematics, physics and geology. This was appreciated but did not answer any of the long-term concerns regarding training and education.

BCR (Bureau of Classification Revision) Exercise

If all of the foregoing weren't bad enough, adding to concerns about the "uneducated hydrographers", a BCR exercise was underway to classify each and every surveyor as either a Survey Officer or a Survey Technician. The slogan "*too many Chiefs, too few Indians*" was being touted. According to this approach, the *Indians* would be the button-pushers: it was believed that many would be required to support the new technology, a wrong perception as it turned out. People frantically wrote, rewrote and rewrote again their BCR documents to ensure that they became a Chief, or at least a high-ranking Indian. What games we play—and all of this brought about by the Glassco Commission of the Civil Service which actually proposed "*Let the Manager Manage*" but saw its work perverted by the interpretation put upon its findings by the bureaucrats of the Treasury Board and the Civil Service Commission.

To the "massacred" and others in the CHS, the BCR exercise and the need for additional education and training appeared to complement each other, but it also made the objective more difficult to achieve.

Official Recognition of the CHA

The informal meetings of 1966 led to an agreement and an undertaking that CHS management would probably react positively to education and training proposals if they were supported by evidence of general support and agreement among hydrographic surveyors. (Having a friend at court in the CHS management helped. Mike Bolton was a strong supporter as long as we did not go the "union" route.)

In September 1966, Mike Eaton prepared a discussion paper entitled *Education for Hydrographers*, which was circulated nationally among interested hydrographers. In the paper he expressed his own views on aims, knowledge required, attitudes affecting education, methods to achieve the goals of enhanced training and education, and a suggested program for Marine Sciences Branch to adopt. All good stuff—with lots of in-house training proposed—but it would require a strong management commitment.

Meetings were held in all Regions and support developed for an announcement of the formation of an Association to promote training and education. This would be at the CHS Conference, scheduled for March 1967 in Dartmouth, Nova Scotia. I presented a paper entitled *The Educated Hydrographer* at the 1967 Hydrographic Conference which incorporated my Pacific Coast views with some of the work previously outlined by Mike Eaton. It was well received by both rank and file, and by CHS management. It led to a meeting with CHS management to determine a suitable course of action. As suggested in my paper, a committee of two persons—Nick Cleary, Education Officer, Survey and Mapping Branch, and myself—were detailed to conduct a study and prepare a CHA brief on future training and education requirements for CHS.

Mike Eaton was elected the first President of the CHA at the 1967 Hydrographic Conference, and was so recognized by CHS management. A well-deserved honour in recognition of his uphill struggle to persuade hydrographers of the new need to further develop their training and experience.

CHA Education Brief

The Brief was completed in late May 1967 and forwarded to CHS management for review and, hopefully, action. The following steps were proposed:

1. Upgrading or refresher courses in physics and mathematics for existing staff.
2. A Junior Hydrographers' Technical Course as a natural progression from the basic entry course on hydrography given to recruits. Exam to be set by CHA and CHS Training Officer. Course subjects would include Survey General, Sounding, Projection, Radio Aids, Navigation and Seamanship, Tides and Tide Theory, and Cartography. Three years of field service would be a prerequisite.
3. Refresher courses in-house or at university in Physics Theory, Light, Heat, Electronics, Magnetism and Mathematics, for those with the appropriate educational background.
4. Main Hydrographic Course for hydrographers with H.I.C. potential on Projection, Radio Aids (principles, errors, calibration etc.), Photogrammetry, Applied Electronics, Astronomy and Computers. Five years of field service would be a prerequisite. Exams to be set by the CHA.

5. Senior Hydrographer Course (Specialization): Geophysics, Geology, Principles of Analysis and Prediction of Tides, Physical Oceanography, etc. Exams to be set by the CHA and institution.

I quote: "The foregoing proposal by the CHA on education and training is a proposal to deal with an emergency situation, as it exists today (1967) and is intended to stimulate the interest of both hydrographers and management in an education and training program geared to career development and offering enhanced prestige to professional hydrographers."

Note: The Brief was developed while I worked up "Richardson" for her forthcoming Arctic voyage, which was to prove more exciting than most.

Response of Dominion Hydrographer

In September 1967, the CHA received the CHS response to our brief which was in the main, encouraging. However, it was suggested that our approach be modified into three steps: Junior, Intermediate and Senior. It outlined a number of suggestions which could assist in complementing the CHA proposals, e.g. tuition costs, study time, assignment of in-house lectures and an emphasis on the use of the rotational year for a major part of the staff educational program.

A meeting of CHA representatives and CHS management was suggested for early October, seeking consensus and clarification on the following points: 1) recognition of other formal training, 2) details of syllabi, 3) standards of courses including examinations, 4) prerequisites to enter the various steps, and 5) PSC regulation governing tuition fees, etc.

At the October meeting, a compromise was reached. The entry level and the CHA-proposed Junior Hydrographic level (in-house) would be amalgamated, becoming Step 1; the CHA Step 4 course (in-house) would become the Step 2 course or Advanced Hydrographic Course, amalgamating our Steps 3 and 4; the CHA Step 5 (University Level) would require further study before acceptance. The readiness of CHA to conduct its own exams was discussed and left in abeyance for the immediate months ahead. The first Step 2 Course would be given during the summer of 1968. In response to CHS management questioning, CHA representatives assured them that CHA was neither a union nor a social club, but a professional association.

Events Following

At the February 1968 Hydrographic Conference in Ottawa, I was elected CHA's second President and almost simultaneously it was announced that I would be the next Regional Hydrographer of Central Region. Now I began to understand what was meant by possible "conflict of interest"! I reluctantly stepped down as CHA President in May of 1968, but continued to be involved in the education and training issue—a CHA member but on

the CHS management team. That enabled my support for the CHA Step 5, which now became CHS-sponsored financial assistance to approved hydrographers working toward a university degree in a hydrographic-related program. The first Step 2 took place in-house in the winter of 1968/69. All appeared to be going forward as planned.

PART II : THE ESTABLISHMENT OF THE CHA

In 1968, the CHA could congratulate itself on persuading CHS management to adopt a three-tier approach to training and education:

1. Entry level / Junior Hydrographer — Prerequisite: three-year college diploma in surveying and mapping or equivalent.
2. Intermediate level / HIC Potential — Prerequisite: three to five years field experience
3. Senior level / University level hydrography program — Prerequisite: both step 1 and 2 above.

The Step 3 University Degree program was pushed vigorously by the new Dominion Hydrographer, Art Collin. Several hydrographers who had been taking university courses at their own pace and expense suddenly found themselves supported fully on programmes leading to a degree, and a number of other potential candidates were identified. This was a tremendous development for the future of CHS, but simultaneously it exposed a weakness in the strength of CHA and its ability to continue a partnership with CHS management in the new approach to training and education. The problem was the self-imposed task of setting CHA standards of examination at the Step 1 and Step 2 levels. It had been difficult enough to contemplate how this task would be tackled prior to the announcement of Step 3, but with Step 3 in place, all the people who could best design and monitor a CHA examination system were lost to us, together with those of high potential for Step 3, who no longer saw CHA as the path to righteousness.

At one point it had looked as if CHA was subverting CHS, but now the shoe was on the other foot. A revitalized CHS scarcely needed CHA. What therefore was CHA's role to be?

The Blasted Constitution and Bylaws

The role of CHA was debated at length in every region. In Central and Pacific Regions, the education and training theme was still in the forefront, but Atlantic region did not seem to have much enthusiasm. HQ obviously was content to be a social club. The one thing all could agree upon was the need for a meaningful constitution and bylaws that reflected the aims and objectives of the Association, the conditions of membership, fees, powers and duties of officers, etc. There ensued a protracted struggle that almost destroyed the CHA. Eventually it was determined that the furthering of the knowledge and professional development of CHA members could

go hand in hand with advancing the development of hydrography and associated activities in Canada. A grandfather clause did not appease the disgruntled!

Newsletters

Attempts were made to publish a national CHA newsletter, starting in 1968. The first edition was a rather amateurish affair [I was the editor and publisher] with blurbs about products and a scattering of news about hydrographic events. However, by the third edition (1970), edited by Bob Golding, a more interesting pattern was developing. This edition was published just prior to the Canadian Hydrographic Conference scheduled for the spring of 1970 in Ottawa. It included a marvellous drawing of a hydrographer bellowing the word "FIX!" on the cover. It also contained some useful comments on the matters concerning members, some rather funny recollections of the massive deployment of hydrographic resources off Tadoussac in 1969. Naturally, also the infamous episodes of the offer to the Dominion Hydrographer to purchase a battleship to round off the fleet, and the hoisting of the Hotel Tadoussac Chef's desk to the jack of the hotel flagstaff—all good clean fun! Additionally, there was a copy of the syllabus for the 1970 Step 2 Course and the article on GEBCO by Al Smith. Finally, the following poetry, which is a classic illustration of the fear and cynicism that the Step 2 Course engendered in some CHS staff members:

*In Sid's halls of learning we gathered
Eight others and myself
We dusted off our thinking caps
And moved them from the shelf.*

*For six strained weeks we sat around
With learning our objective
But management's taken Hydrography II
In quite another perspective.*

*They're putting up their stumbling blocks
As fast as we can jump them
But never fear the CHA
Will find a way to stump them.*

*The CHA's behind us boys
Never fear of that
Until we fail Step II that is.
I think I smell a rat.*

*Eights and sevens and fours we sit
And put up with the system
Why can't Doc Colin see what's wrong
In all his wisdom.*

*In Sid's halls of learning we gathered
And wrote the eight exams
Eight others and myself
Are past giving a damn.*

*But what about the others
Who do it all next year
What about the others
Who have so much to fear?*

Although editions of the newsletter continued for some years, it almost expired in 1971 for lack of copy.

Magazines

By Edition 12 in 1975, we had graduated to publishing *Lighthouse*, now the official journal of the CHA. Earl Brown was the National President and Adam Kerr was the enthusiastic editor, with Sandy Sandilands and Mike Eaton as associate editors. The journal was the first of a new series and contained a number of very interesting articles. The introduction and the editorial strongly underlined the need for input—"Unless you, all of you get writing and provide material, this journal will expire once again, like a codfish in the bottom of a dory." Articles like *SATNAV* by Mike Eaton, *The Asia Tragedy* by Mike Casey, *James Cook — Master Surveyor* by George MacDonald, *CSS Pandora II* by Sandy Sandilands and *An Antarctic Survey — Twenty Years Ago* by Adam Kerr—all made for an interesting publication.

Conferences and Publications

In 1977, *Lighthouse* graduated to publishing a special edition of the proceedings of the 16th Annual Canadian Hydrographers' Conference held in Burlington, Ontario, hosted jointly by the CHS and CHA. After ten years CHA had become part of the *establishment*. The conference was graced by the attendance of several heads of other national hydrographic offices, e.g. Rear Admiral David Haslam, UK, Rear Admiral Robert Munson, US National Ocean Survey, etc. Papers were presented on many subjects including the following: *Internationalizing of Hydrography the NE London Polytechnic*, by Allan Ingham; *Reliable Navigation through System Integration*, by D. Wells and S. Grant; *The Chlorine Car Caper* by Tony O'Connor—just to name a few. The conference was well attended, with participants from Canada, USA and Europe, and had many exhibitors. It was a financial success. The keynote address on surveying related to the exploitation of hydrocarbons in the North Sea was delivered by Rear Admiral D. W. Haslam, Hydrographer of the Royal Navy. The Fickle Finger of Fate Award was passed on to Mike Bolton from Adam Kerr at the culmination of the conference. Willie Rapatz was CHA National President at the time of this event (the 16th Annual Canadian Hydrographic Conference but the first co-hosted by the CHA.)

Many other CHA-CHS jointly hosted annual conferences followed, with special *Lighthouse* editions devoted to the conference proceedings. CHA was on a roll—in 1979 we were a co-sponsor of the First International Hydrographic Technical Conference in Ottawa, together with the CHS, FIG and CIS. This conference attracted presenters and attendees from around the globe. It was an outstanding success—in no small measure due to the part played by many individual members of CHA.

In the eighties, CHA moved into a controlling position re: the planning and implementation structure of Canadian Hydrographic Conferences with, of course, con-

tinuing vital support from CHS. This move took place as the National Ocean Survey of the US and Canada developed a biannual approach to hydrographic conferences: Canada taking the odd years and the US the even years (i.e. we hosted in 1983, 1985, 1987 and 1989; the US in 1984, 1986, and 1988). They attracted much attention jointly around the world. In 1989, CHA Vancouver Branch hosted a fine conference "Discovery 89" which was internationally attended and definitely a prime example of what CHA could do almost entirely on its own—if CHS management stopped playing the role of "father knows best". We owe much to the skill and integrity of the late Gordon Murray.

As you are all aware, the 1989 conference approach ran into internal CHS/CHA politics, and conferences have lagged somewhat as successful vehicles of information transfer even with CHS back in the driver's seat. A teleconference approach was not an outstanding success. However, in 1996 CHS hosted a very good hydrographic conference in Dartmouth, Nova Scotia which did attract large numbers of attendees. So perhaps the pendulum has started to swing back and the 1998 conference planned for Victoria will see CHA back making a strong contribution.

The CHA bylaws were amended in 1988 to change the name of the Association to the *Canadian Hydrographic Association*, to better reflect the role that nautical cartographers play in the delivery of the end product—the nautical chart!

The regular editions of the *Lighthouse* have continued to provide an important link and informative tool, not only in Canada but also internationally. We can be very proud of its influence everywhere in the hydrographic world. Long may it continue.

Additionally, the CHA is involved in hydrographic development assistance programs overseas and has established a Student Awards Program, funded largely through management fees for administering these development

programs. A great deal of credit is due to Barry Lusk, who was CHA National President from 1987 to 1990.

Another CHA initiative is the Heritage Launch Project in Central Region, which has really promoted the profession of hydrographic surveying and charting among the ship and boat enthusiasts of the Great Lakes.

Finally, our luncheon meetings and seminars continue to underline our aims and objectives. I quote:

The Canadian Hydrographic Association is a non-profit, scientific and technical group of about 500 members with the objectives of:

- *advancing the development of hydrography, marine cartography and associated activities in Canada;*
- *furthering the knowledge and professional development of its members;*
- *enhancing and demonstrating the public need for hydrography;*
- *assisting in the development of hydrographic sciences in the developing countries.*

The CHA is the only national hydrographic organization in Canada. It embraces the disciplines of:

- *hydrographic surveying;*
- *marine cartography;*
- *marine geodesy;*
- *offshore exploration;*
- *tidal and tidal current studies.*

The Canadian Hydrographic Association is formally affiliated with the Canadian Institute of Geomatics. It is informally associated with the Hydrographic Society.

This does outline our purpose but perhaps should be rewritten with fire in the belly and descriptive rhetoric that challenges the imagination!

To all those who have worked hard to make the CHA an organization to be proud of—Many Happy 30th Birthday Returns.

About the Author / À propos de l'auteur

Mr. T.D.W. McCulloch is an Hydrographic Consultant with McCulloch Hydrographic Consulting and is the project manager for the CHA/CIDA Malaysia Hydrographic Training Project. He is a founding member of the Canadian Hydrographic Association and is a Life Member with Central Branch, CHA. He is also a member of the Canadian Institute of Geomatics, the Hydrographic Society, and the Company of Master Mariners of Canada. Mr. McCulloch has expertise in hydrographic surveying and in the direction and management of hydrographic/oceanographic organizations within the government of Canada.

For more information please contact:

Mr. T.D.W. McCulloch
McCulloch Hydrographic Consulting
2035 Paul's Terrace
Victoria, B.C.
V8N 2Z4
tel: (250) 721-3541

Harmonic Analysis and Tidal Predictions

W. R. Crawford

*"Something old
Something new
Something borrowed
Something blue"*

A 1990's approach to tidal predictions might be described by the wedding jingle listed above. Tidal predictions, at least those using quantitative methods, are several hundred years old, yet here I describe a new twist to improve the technique. Tidal analysis fits a field of study between astronomy and turbulence, borrowing something from each. The end result of all my studies is a simple upgrade to our data base of tidal constants in Canadian waters, known within the Hydrographic Service as the Blue Book, upon which we base all tidal predictions.

In this paper I will describe the basic procedure of tidal analysis, and then show how we evaluate any changes in the tides over many years at an individual gauge.

Background

Since the 1960's, all tidal analyses and predictions have relied upon numerical techniques and computers. The original Canadian software was written under the direction of Gabriel Godin of the Canadian Hydrographic Service (Godin, 1972), and revised and documented by Gabriel Godin and Michael Foreman of the Institute of Ocean Sciences (Foreman, 1977). It has been applied for use on various computers by the former Tides and Currents Section, Pacific Region of the Canadian Hydrographic Service. This computer program, together with a companion program to analyze and predict tidal currents, is now in use around the world, and is known informally as the Foreman tidal software. These programs are optimized to operate on at least one year of observations, and are not normally applied to more than several years of data.

Within these programs are stored the astronomical amplitudes and phases of up to 146 main constituents, which are then compared with the computed amplitudes and phases in the tidal record as determined by this software. Astronomical amplitudes and phases are constants over the globe, but the computed values are unique to any one port or harbour. For example, at Point Atkinson, our principal tide gauge on the Strait of Georgia in British Columbia, the amplitude of M_2 , the principal lunar semi-diurnal tide, is 0.918 metres, and its phase lag is 159.1 degrees, while at Victoria only 80 km away these values

are 0.370 metres and 85.8 degrees. Although amplitudes are absolute values, the phase lags must be determined relative to a given time zone. Within the Canadian Hydrographic Service, all tide gauges keep local standard time, even in summer, and all analyses and predictions are in local standard time. So the phase lag of 159.1 degrees for M_2 is relative to Pacific Standard Time. For scientific applications, or global tidal comparisons, phase lags are relative to UTC (Universal Co-ordinated Time.)

Although we can analyze for 146 possible constituents, there are not actually 146 tides. There are just two, the solar and the lunar tide, whose daily, or semi-diurnal constituents are denoted M_2 and S_2 . All other tides are actually mathematical functions invented to represent changes in the S_2 or M_2 tide over periods of days, months or years. For example, due to the tilt of the earth's axis, one of the two high tides on a given day is higher than the other. To represent this inequality, daily (or diurnal) cosine functions are invented, and the largest of these functions, or constituents, is denoted K_1 , with a period of approximately one day. The lunar orbit is tilted at 5 degrees to the ecliptic, so in addition to K_1 , there are smaller diurnal tides O_1 , and P_1 , to account for the lunar and solar inclinations separately.

Since the moon's orbit is elliptical, the semi-diurnal lunar tide varies in amplitude over a lunar month, and the semi-diurnal N_2 tide takes care of much of this perturbation, while the constituent T_2 performs this role for the solar tide. Others account for the slow migration of the lunar node, solar perigee, and other orbital changes. The repeat period of each of these phenomena is known to very high precision, allowing us to predict the tides far into the future with a single year of observations.

For a one-year analysis we normally use the largest 68 of these constituents, of which 45 are of astronomical origin as described above, and the remaining 23 are due to frictional effects in coastal waters, and are labeled shallow water tides.

The two points where the lunar orbit cuts the ecliptic are called the nodes; the ascending node is the one where the moon passes from the south side of the ecliptic to the north side. It takes 18.6 years for the ascending node to complete one revolution of the earth. The point of the moon's orbit which is closest to the earth is called the perigee, and the line drawn between this point and the

earth, called the line of apsides, also rotates slowly, with a period of 8.85 years. Each of these causes slow changes in the main tidal constants, which are imbedded in the tidal analysis and prediction programs and compensated for without input from the human operators. To give an example, the analysis program assumes that each constituent, for example K_1 , has constant amplitude over the duration of the one-year record. In fact, the amplitude of K_1 varies by $\pm 14\%$ over the 18.6-year and 8.85-year cycles, and M_2 by $\pm 5\%$. The analysis program computes the astronomical forcing amplitude at the central day of the record to be analyzed, and compares this to the actual amplitude of the tidal record for this period. The prediction program computes the astronomical amplitude of each constituent for the period to be predicted, and uses this to adjust the predicted tides. Similar corrections are made to the phases. For the *Canadian Tide and Current Tables*, this adjustment is updated every month.

The variation of amplitude and phase over the 18.6-year cycle is referred to as the **nodal modulation**. In the documentation for the analysis and prediction programs, it is denoted the **satellite modulation**, to include the 8.85-year cycle of lunar perigee, and various solar perturbations. However, in modern tidal analysis the terms are interchangeable and refer to the full satellite modulation.

Application to many years of data

With many years of observations, one can investigate several features of the tides:

- How can we use these measurements to improve our predictions?
- Do the tidal constants at a port change over a period of time? Tides can change over a period of years as a harbour silts up or an entrance to a harbour is constricted or dredged.
- Are we predicting the satellite modulation correctly? These programs assume that this modulation follows the astronomical cycle. Is this reasonable?
- Can we identify periods where the gauges or their stilling wells operated poorly?

The use of multiple years of data for these four purposes will be described in the remainder of this paper. I begin with up to twenty sets of harmonic constants, each computed from one of twenty consecutive years of hourly tidal heights at a port using the standard tidal analysis program. These constants are input to a spreadsheet in which are computed average amplitude and phase, and standard deviations of amplitude over the twenty years. As well, graphs of the amplitude and phase deviations for 21 constituents are presented to allow a user to identify any trend or cyclical variation in the amplitudes or phases, and to identify years where the quality of measurement is poor. The standard error of the average amplitude is computed and may be used as an accept/reject criterion for inclusion of tidal constituents in subsequent predictions.

This spreadsheet, which runs in Microsoft Excel version 5.0 on a personal computer, operates on output of the Foreman harmonic analysis routine. Twenty years of data are input, one year at a time, to the harmonic analysis routine. The output, consisting of amplitudes and phases of 68 constituents for each of 20 years, is loaded to the spreadsheet. A sequence of 20 years was originally selected because it is close to the nodal cycle of 18.6 years, and the calculations and graphics could fit onto the personal computer I was assigned. This program has since been adapted to accept up to 37 years of data and 92 constituents, and will also handle years with missing data. The spreadsheet computes the following statistics for each constituent, although phase information for Z_0 is not computed since it is unnecessary.

Vector average amplitude A and phase θ of each constituent over the 20 years.

The amplitude and phase for each year are converted to x and y components, which are averaged separately then combined to form the average amplitude and phase.

Standard error S of the vector amplitude over 18 years.

The average and individual amplitudes and phases are converted to x and y components. The standard deviation of each component is computed, then the RMS value of these average deviations is computed. The *sample* standard deviation s , rather than the *population* standard deviation is computed. Finally, the standard error $S = \sigma/20^{1/2}$ of the sample mean is computed and printed.

Ratio r formed by dividing the standard error S by the mean A .

This ratio may be used to determine an accept/reject criterion for using a selected constituent in tidal prediction programs.

Deviations of individual amplitudes ΔA_i and phases $\Delta \theta_i$ from the 20-year averages.

Largest positive and negative deviations of individual amplitudes $\Delta A_{i(ma)}$, $\Delta A_{i(mi)}$ and phases $\Delta \theta_{i(ma)}$, $\Delta \theta_{i(mi)}$ from the 20-year averages.

Once computed, the spreadsheet plots annual deviations of amplitude ΔA_i and phase $\Delta \theta_i$ for the 68 constituents. Scales of these plots are automatically selected such that the largest plotted deviation will be at the full range. Table 1 presents the summary statistics for Point Atkinson, British Columbia (in the Strait of Georgia at $49^\circ 20'N$, $123^\circ 15'W$). Plotted deviations of amplitude and phase are presented in Figure 1.

Table 1 Statistics of selected tidal constituents at Point Atkinson, British Columbia

	Average amplitude (mm)	Average Phase (PST) deg	Standard deviation (mm)	Error ratio	Maximum negative amplitude dev (mm)	Maximum positive amplitude dev (mm)	Maximum negative phase dev (deg)	Maximum positive phase dev (mm)
Zo	3086.1		32.2	0	-55.3	72.3	0	0
Sa	45.8	338.99	43.4	0.24	-24.7	48.5	-137	98
Ssa	19.8	216.44	33.4	0.42	-15	41.3	-180	78
MSm	5	283.24	22.6	1.13	-0.4	30.1	-124	174
Mm	13	171.04	30.1	0.58	-6.7	56.9	-161	177
MSf	2.9	51.33	25.1	2.15	7	42.8	-179	140
Mf	24.9	124.62	19.5	0.2	-14.6	42.8	-61	37
Q1	77.7	149.83	3.9	0.01	-5	6.2	-5	4
Rho1	15.3	142.4	5.2	0.08	-7.4	9.2	-20	14
O1	475.8	151.82	6.3	0	-7.9	5.2	-1	1
NO1	41	174.99	19.7	0.12	-17.4	47.5	-27	41
K1	862.2	165.91	8.8	0	-14.3	7.4	0	0
J1	49.5	197.19	7.6	0.04	-10.3	8.9	-8	10
SO1	30.3	279.25	4	0.03	-6.7	3.1	-10	11
2N2	21.5	109.5	7.9	0.09	-7.6	14	-21	28
H1	3.5	290.89	5.4	0.39	-2.4	6.6	-111	89
M2	919.1	159.14	9.4	0	-17.3	9	0	0
L2	27.7	186.8	5.3	0.05	-4.8	8.4	-13	21
S2	232.3	179.48	3.8	0	-3.2	4.5	0	2
K2	62.2	178.85	3.2	0.01	-3	2.8	-5	5
MK3	7.7	197.45	6.7	0.22	-5.2	18.7	-80	25
M4	8.1	172.06	5	0.16	-3.4	13	-46	33
M6	9.2	67.51	1.1	0.03	-1.9	0.8	-5	17

Figure 1a.

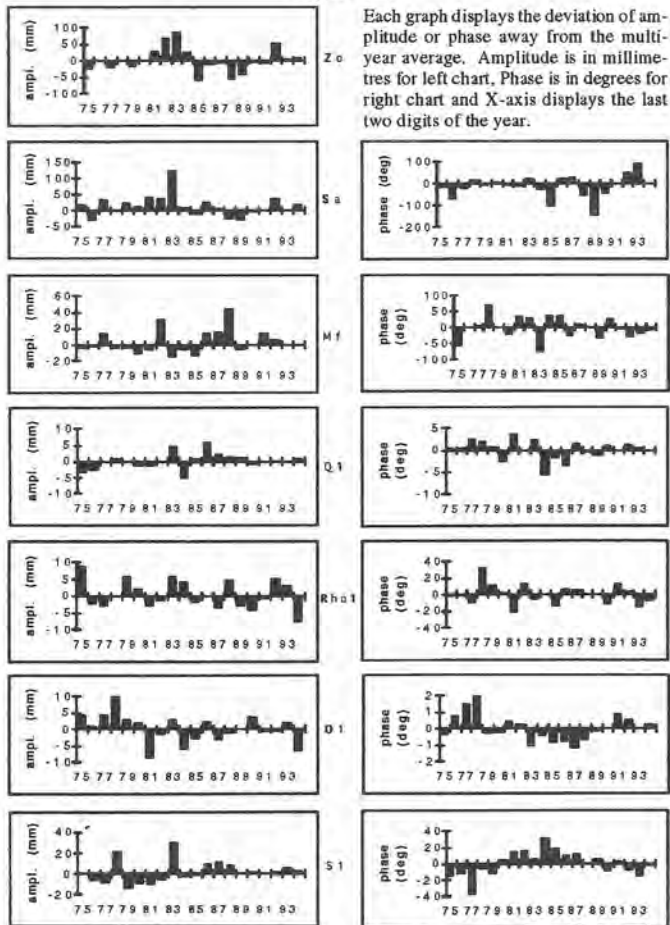
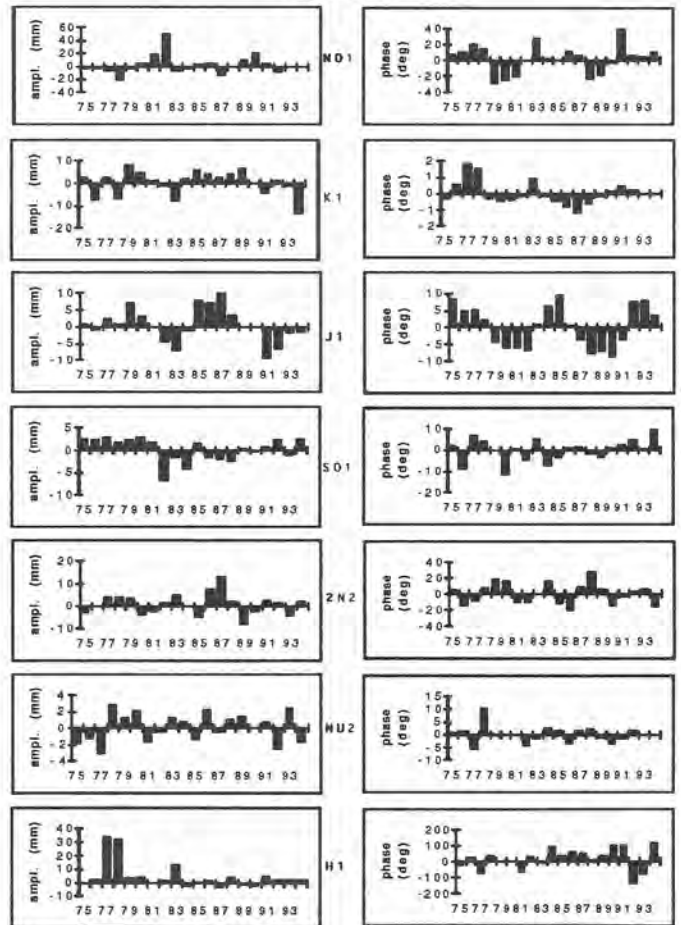


Figure 1b.



Interpretation

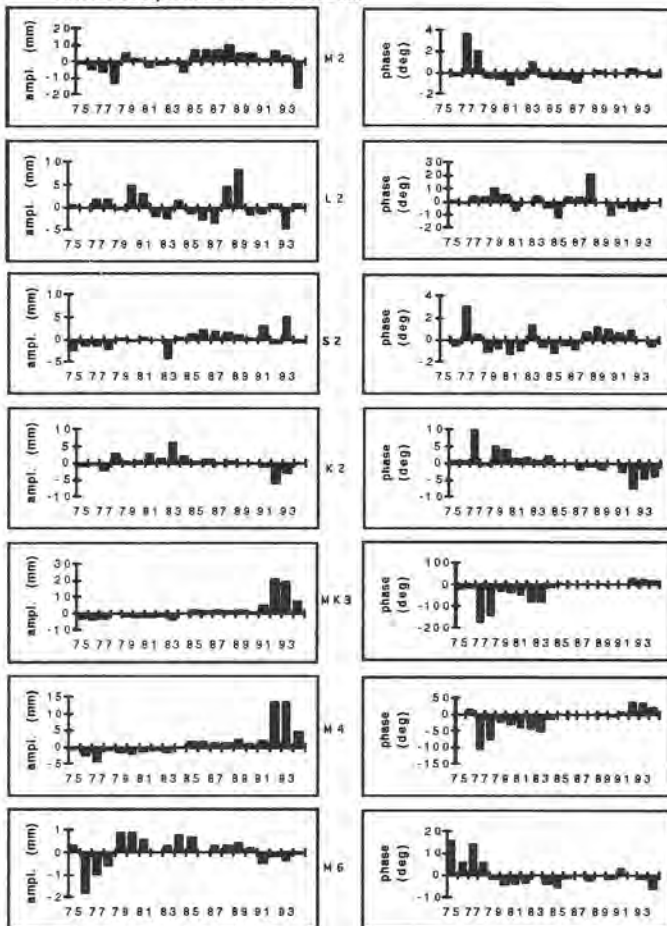
I have used this spreadsheet to investigate the following features.

1 Trends and anomalies.

The plotted values will immediately show a long term trend in amplitude and phase of constituents and in amplitude of Z_0 , the annual average sea level. In 1982-83 El Niño raised sea levels all through British Columbia waters. This rise was centred in December 1982 and January 1983, at a time of year when local sea levels are normally high. The highest recorded sea levels at several gauges hit in late December 1982. Consequently, the Z_0 and S_a constituents both display large amplitudes in 1983, and to a lesser extent in 1982, as indicated in Figure 1. The 1992 El Niño also increased sea level, as revealed in these Z_0 and S_a constituents.

One may wish to know whether to use a constituent set based on 20 years of measurements, or to use a more recent year's constituents. The choice depends on the inter-annual stability of the constituents. Most British Columbia ports are in deep channels with little silting, such that frequent dredging is not required, and the tidal constants are stable over many years. None of the British Columbia stations examined revealed a significant trend over the 20 years.

Figure 1a,1b and 1c. Plots of the deviations of amplitude and phase of 21 selected tidal constituents for the port of Point Atkinson, British Columbia.



This spreadsheet as presently set up cannot determine seasonal changes in a constituent. For example, the semi-diurnal constituents at Victoria, British Columbia, display a small summer-winter shift in amplitude and phase (Foreman *et al.*, 1995). To some extent the shift of M_2 will be accounted for by the inclusion of neighboring constituents H_1 and H_2 in predictions, and their amplitude indicates the magnitude of such changes. However, other semi-diurnal constituents do not all have such close neighbours to account for their seasonal variation.

2 Quality control of observations of hourly heights.

One often finds ears with incomplete records, or poor quality data. Should these years be used for subsequent predictions of tidal heights? If not, then what is an acceptable degree of missing data for tidal analyses? The analysis program outputs a numerical value called a matrix condition, which indicates the degree to which noise in the record upsets the analysis. A value of one indicates little or no effect, while a zero shows an analysis significantly corrupted by noise. Table 2 reveals that at Point Atkinson, B.C., the years 1978 and 1983 were each missing a significant period of observations, to the degree that the matrix condition dropped to a value less than 0.1. Such a low value normally indicates that at least one pair of constituents is poorly resolved by the analysis. Figure 1 indicates that the constituents H_1 , M_2 , and several others revealed irregularities in 1977, while M_f , S_1 , NO_1 , K_1 , H_1 , S_2 , and K_2 all displayed unusual amplitudes or phases in 1983. Rather than look to determine which pairs of constituents are causing the problem, it would be appropriate here to remove these years from the spreadsheet calculation of average values and of confidence limits for the constituents.

Several constituents in Figure 1 reveal unusual deviations for the years 1977 and 1992, although these years have full sets of observations. Records for 1978 show that the stilling well for this gauge had silted up, and it was cleared July 1978, creating a shift in constituents. Based on the anomalies seen here it is likely that the stilling well silted up in 1977 and remained so until 1978. The gauge attendant's records for 1992 indicate that the stilling well had silted up in the spring, and it was cleared in July, this time creating a shift in the high frequency constituents. The attendants have reported that the stilling well for this gauge can silt up in about two years. It appears that the cleaning did not keep up with the silting in 1978 and 1992. Although constituents S_2 , MK_3 and M_4 have unusual amplitudes in 1993, other constituents seem normal in this year, and the gauge should have been operating well. There is a possibility that the clean-out of the stilling well in 1992 changed the characteristics of flow around the well, in which case 1993 may represent true conditions better than most other years. Given these irregularities, I have eliminated data from the years 1977, 1978, 1983 and 1992 before computing statistics in Table 1. However, these plots show that silting and flow at the stilling well may influence the tidal constants.

year	number of observations	matrix condition	year	number of observations	matrix condition
1975	8675	0.808	1985	8759	0.818
1976	8783	0.821	1986	8707	0.808
1977	8759	0.818	1987	8759	0.818
1978	7301	0.068	1988	8783	0.821
1979	8759	0.818	1989	8759	0.818
1980	8783	0.821	1990	8759	0.818
1981	8759	0.818	1991	8759	0.818
1982	8759	0.818	1992	8783	0.821
1983	6433	0.001	1993	8759	0.818
1984	8612	0.785	1994	8759	0.818

Table 2. Details of input data to annual harmonic analyses for Point Atkinson, British Columbia. The matrix condition is a diagnostic output from the Foreman, 1977, tidal analysis program.

3 Reliability of constituents.

The process described here allows one to determine the degree of confidence one has in each constituent, based on the year-to-year variations in amplitude and phase.

The first step is to compute the absolute value of the vector difference between the amplitude and phase of the mean and individual annual estimates of a constituent. The standard deviation of all these individual differences is σ . Given a series of n normally distributed estimates of a value A_i , the standard error of the mean is $S = \sigma/n^{1/2}$, where s is the sample standard deviation of the estimates of A_i . Therefore, our confidence in computing the true value of an amplitude increases as the square root of the number of estimates.

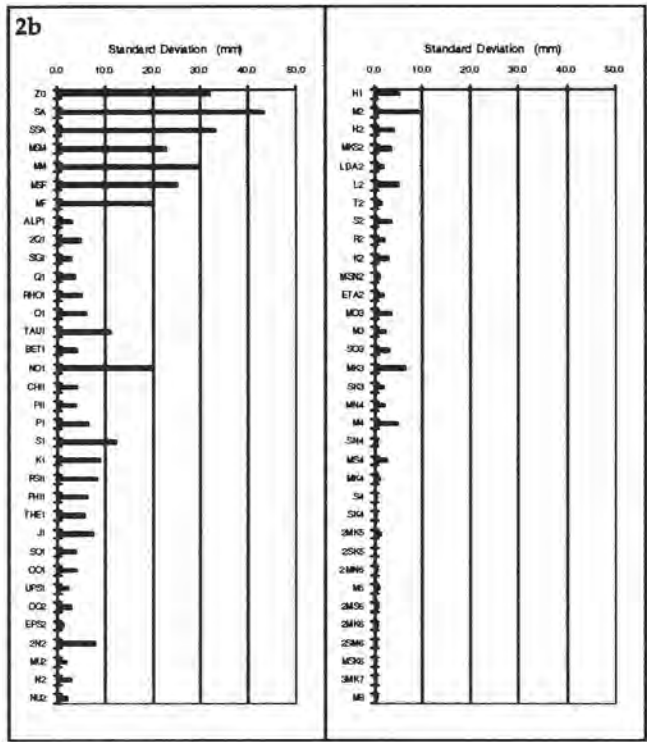
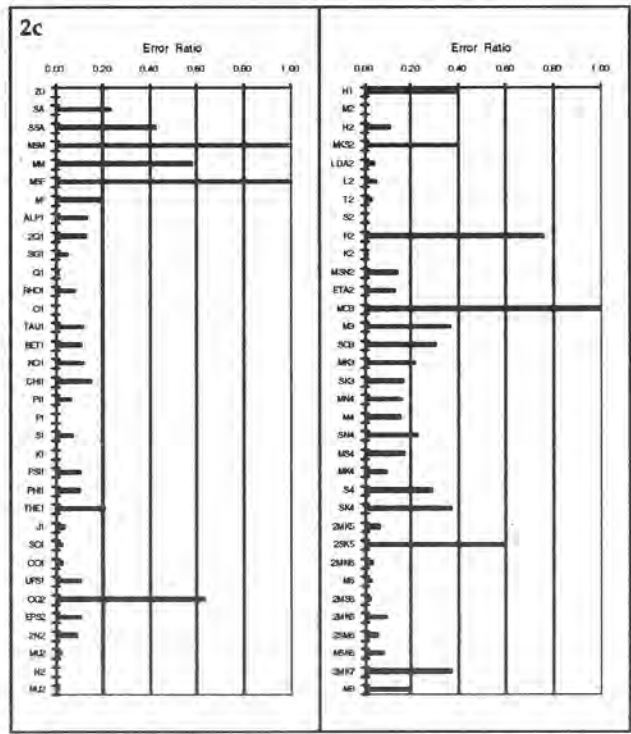
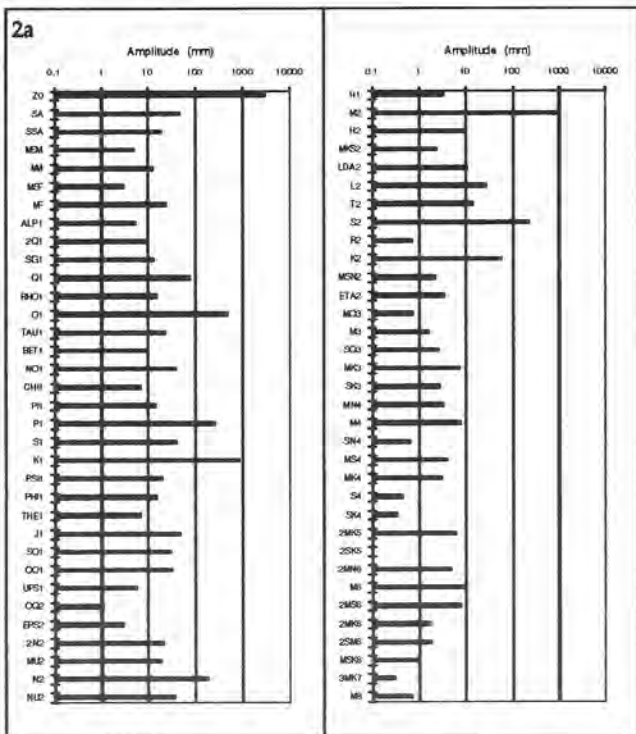


Figure 2a Amplitude of tidal constituents at Point Atkinson, B.C., based on 16 years of observations between 1975 and 1994.

Figure 2b Standard deviation of the amplitude of tidal constituents at Point Atkinson, B.C., based on 16 years of observations between 1975 and 1994.

Figure 2c Error ratio $r=S/A$ of tidal constituents at Point Atkinson, B.C., based on 16 years of observations between 1975 and 1994.



There should be some accept/reject criterion based on the error ratio of $r=S/A$, which is listed in column 5 of Table 1. Certainly, if r is much smaller than one the constituent should be used for tidal predictions, while a value of r much larger than one should preclude it from a prediction scheme. I selected a criterion that there should be 95% confidence that the use of an individual constituent will improve the prediction, and described in the Crawford (1995) paper how to use Student's t to compute a cut-off value of r . For twenty years of data, r should be less than 0.48 for a constituent to be included in predictions. For ten years, the cut-off is $r = 0.45$

Values of the amplitude A , standard deviation σ , and the error ratio $r=S/A$ for the port of Point Atkinson, British Columbia are presented in Figures 2a to 2c. Amplitudes and phase lags for the years 1977, 1978, 1983 and 1992 were removed, after considering the anomalies in these years noted earlier. When 16 years of data are available, the error ratio $r=S/A=0.47$ is the cut-off criterion for 95% confidence.

Amplitudes of 68 constituents are plotted in Figure 2a, and show a typical pattern for the west coast of Canada; the tide is mixed diurnal and semi-diurnal, and a few constituents dominate the plot. Standard deviations of the amplitudes presented in Figure 2b reveal a general decrease toward higher frequencies. Largest errors are in the long-period bands, (fortnight MSf, Mf, month MSm, Mm, semi-annual Ssa, annual Sa, and annual average Zo) due to El Niño and wind and air pressure influences, which have more energy at these periods than do the tides. Errors in all these long-period bands are greater than found in either K_1 or M_2 . Crawford (1982) noted that the long period constituents could be resolved better if the portion of the sea level record coherent with air pressure changes were removed from the time series. The lesson here is simple; one should be careful when including long-period constituents in predictions.

Finally, Figure 2c plots the values of the error ratio $r=S/A$. Three of the long period constituents (Mm, MSm and Mf) fall outside the $r > 0.47$ 95% confidence test. OQ_2 and R_2 are the only astronomical constituents in the semi-diurnal band to fail the test. Among shallow water constituents, two higher frequency ones have error ratios above the threshold: MO_3 and $2SK_5$.

4 Satellite modulation.

The standard set of 68 constituents has inter-annual variations denoted earlier as satellite modulation. These variations are not determined at individual ports; the astronomical values are used instead. However, there can be a problem if shallow water and astronomical constituents have the same frequency and different satellite modulation. If frictional effects at a port are significant and the analysis program has assumed that the modulation is solely due to the astronomical potential, the

Astronomical	Shallow water
MSm	I2-M2 b1-O1
Mm	N2-M2 O1-Q1
MSf	S2-M2 O1-P1
Mf	K2-M2 K1-O1
Q1	NK1
O1	MK1
Tau1 (t1)	MP1
NO1	NO1
P1	SK1
K1	MO1
J1	MQ1
SO1	SO1

Astronomical	Shallow water
OQ2	OQ2
e2	MNS2
2N2	O2
m2	2MS2
N2	KQ2
g2	OP2
M2	KO2
L2	2MN2
S2	KP2
K2	K2
MO3	MO3
M3	NK3

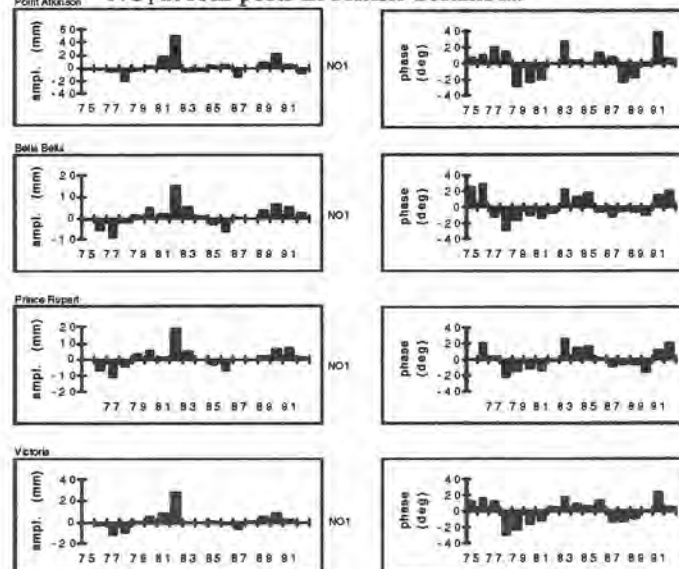
Table 3 Shallow water constituents that may mask astronomical constituents. The long period constituents are listed by Crawford (1982), others are from Foreman (1977) based on notes by Godin (personal communication).

resulting harmonics will vary in a cyclical manner from year to year. (Pairs of shallow water and astronomical constituents at the same frequency are listed in Table 3.)

In addition to the complications noted above, there may be modulations due to third order tides. Several, such as Q_1 , NO_1 , J_1 , $2N_2$, N_2 , and L_2 , have third order satellites whose amplitude and phase are normally difficult to predict (Godin, 1986).

These two effects are revealed in Figure 1 as inter-annual variations in amplitude and phase, with regular (although small) variation observed in NO_1 , L_2 and J_1 at Point Atkinson. Each of these constituents can be modulated by both of the mechanisms noted above. Although this spreadsheet is a tool to identify these variations, it provides no simple cures. If such variability is large, one should re-define the constituent as a shallow water tide, or use a full satellite analysis such as described by Foreman and Neufeld (1991) or Franco (1995).

Figure 3. Plots of the deviation of amplitude and phase of NO_1 at four ports in British Columbia.



The largest deviation of any of the diurnals and semi-diurnals is found in 1982 in the NO₁ constituent. Amplitudes of this constituent are high in 1982 along the British Columbia coast, as shown in the graphs of amplitude and phase in Figure 3 for four of these ports. This unusual behavior is likely linked to a quirk in the satellite modulation of its astronomical potential in 1982. NO₁ is an unusual constituent, in that its satellite modulation can be large in amplitude, and although the modulation is dominated by M₁, which differs in frequency by one cycle in 4.4 years, there is also a third order satellite whose behavior may be erratic. Calculations of the theoretical satellite modulation using the standard analysis software revealed that the amplitude of the astronomical potential of this constituent at the latitude of Point Atkinson in October 1982 was only 44% of its nominal value, and its average value throughout the year was 54% of its nominal value.

However, it is likely that at Point Atkinson the satellites of NO₁ do not follow the astronomical behavior. The analysis of thirty-eight years of tidal data at Victoria, British Columbia by Foreman and Neufeld (1991) revealed that the third-order satellite of NO₁ differs significantly from the expected behavior. The actual satellite amplitudes and phases determined by this thirty-eight year analysis show that the amplitude of NO₁ reduced to 64% of its nominal value in November 1982 (M. Foreman, personal communication). The difference of 20% between these ratios of satellite modulation could explain the anomalous amplitudes at Victoria in 1982 and other British Columbia ports such as Point Atkinson.

Application

Is there an improvement in predictions with this new set of constituents? To examine this, I prepared two sets of tidal predictions (actually hindcasts, since they are of past events). One is based on this new set of constituents, and the other is based on our present set used for predictions and was derived from an analysis of a one-year record. I have examined residual hourly heights (observed minus predicted) using these two sets. Over the 1974 to 1993 period, these residuals were smaller for the new set for 19 out of 20 years.

A comparison on a month-by-month basis for this 20-year period is listed in Table 4. Both the absolute and the relative improvements are greatest between May and August. Much of the non-tidal sea level fluctuations is due to wind forcing, which is much stronger in winter and would explain why the relative improvement is much better in summer.

Month	Number of hours	RMS Difference Observed - Old (metres)	RMS Difference Observed - New (metres)	Absolute Improvement (metres)	Relative Improvement (%)
Jan	14058	0.1942	0.1836	0.011	5.4
Feb	12867	0.2034	0.2001	0.003	1.6
Mar	13986	0.166	0.1599	0.006	3.7
Apr	13675	0.1345	0.1256	0.009	6.6
May	14103	0.1183	0.1003	0.018	15.2
Jun	12982	0.1168	0.098	0.019	16.1
Jul	12670	0.1048	0.0784	0.026	25.2
Aug	13362	0.1037	0.0852	0.019	17.8
Sep	14681	0.1099	0.0983	0.012	10.6
Oct	14455	0.142	0.1371	0.005	3.5
Nov	14405	0.1918	0.1829	0.009	4.7
Dec	14860	0.2041	0.1893	0.015	7.3

Table 4. Comparison of hourly water level predictions using present tidal constituents, and new tidal constituents.

Conclusion

A procedure is developed to use multiple years of harmonic analyses to improve tidal prediction accuracy at a port where many years of observations are available. This technique enables one to readily determine:

- whether a tidal constituent should be included in subsequent tidal predictions at the port;
- if a particular year of data is of poor quality for tidal analysis;
- if an inter-annual trend in amplitude and phase is present in any constituent;
- if shallow water tides are co-existing with main tidal constituents;
- a master set of tidal constants for a particular port.

Acknowledgments

The tidal analyses were processed by A. Ma of the Canadian Hydrographic Service. A portion of this paper was originally published in the *International Hydrographic Review* in 1995.

References

1. Crawford, W.R., Analysis of fortnightly and monthly tides, *International Hydrographic Review*, LIX: 131-141, 1982.
2. Crawford, W.R., A technique for quality control and selection of tidal harmonic constituents, *International Hydrographic Review*, LXXII: 135-150, 1995.
3. Foreman, M.G.G., Manual for tidal heights analysis and prediction, *Pacific Marine Science Report 77-10*, Institute of Ocean Sciences, Patricia Bay, Sidney, B.C. 97pp, 1977, revised November 1992.
4. Foreman, M.G.G. and E.T. Neufeld, Harmonic analysis of long time series, *International Hydrographic Review*, LXVIII: 85-108, 1991.


5. Foreman, M.G.G., R.A. Walters, R.F. Henry, C.P. Keller and A. Dolling, A tidal model for eastern Juan de Fuca Strait and the southern Strait of Georgia, *Journal of Geophysical Research*, 100, C1, 721-740, 1995.
6. Franco, A.S., Rapid tidal analyses from a 33/4 Julian years span up to a nodal cycle span, with a PC, *International Hydrographic Review*, LXXII: 59-67, 1995.
7. Godin, G., *The Analysis of Tides*, University of Toronto Press, 264pp, 1972.
8. Godin, G., The use of nodal corrections in the calculations of harmonic constants, *International Hydrographic Review*, LXIII: 143-162, 1986.

About the Author / À propos de l'auteur

Dr. William Crawford is a research scientist, and Head of the Hydrodynamics Applications Section in the Canadian Hydrographic Service, Pacific Region. During his 20 years in CHS at the Institute of Ocean Sciences he has been involved with tides and currents research, coastal oceanographic studies and oil spill predictions. He served as oceanographic editor of ATMOSPHERE-OCEAN, the research journal of the Canadian Meteorological and Oceanographic Society, from 1989 to 1992, and has published about 50 scientific papers.

For more information please contact:

William R. Crawford
 Canadian Hydrographic Service
 Fisheries and Oceans Canada
 Institute of Ocean Sciences
 9860 West Saanich Road
 P.O. Box 6000
 Sidney, BC
 V8L 4B2
 Canada
 Telephone: (250) 363-6369
 Fax: (250) 363-6323
 email: craw@ios.bc.ca



McQuest Marine
 489 Enfield Road
 Burlington, Ontario
 CANADA L7T 2X5

Tel.: (905) 639-0931
 FAX: (905) 639-0934

M C Q U E S T
 MARINE SCIENCES LIMITED

Hydrographic, Geophysical and Environmental
 Surveys and Consulting Services



representing and serving the world hydrographic
surveying community with individual and
corporate members in sixty countries

The Hydrographic Society

UNIVERSITY OF EAST LONDON · LONGBRIDGE ROAD · DAGENHAM
ESSEX RM8 2AS · ENGLAND · TELEPHONE: 081 597 1946 · FAX: 081 590 9730

AUSTRALASIAN

PO Box 1447
North Sydney
NSW 2059
Tel: + 61 2 925 4800
Fax: + 61 2 925 4835

BENELUX

RWS — Dir Noordzee
Postbus 5807, 2280HV
Rijswijk (ZH), The Netherlands
Tel: 703 366600
Fax: 703 90 06 91

DENMARK

Sokortafdelingen
Rentemestervej 8
DK 2400 Copenhagen NV
Tel: + 45 35 87 50 89
Fax: + 45 35 87 50 57

UK

c/o UEL
Longbridge Road
Dagenham Essex RM8 2AS
Tel: 081 597 1946
Fax: 081 590 9730

USA

PO Box 732
Rockville
Maryland 20848-0732
Tel: 301 460 4768
Fax: 301 460 4768

Hydrographic Surveying at the University of Otago, New Zealand

C. Spencer and N. Sutherland

The University of Otago (the world's most southern university) offers the only degree in Surveying and the only courses in Hydrographic Surveying at a tertiary level in New Zealand. Although the primary focus of the Department is on providing professional surveyors for New Zealand, recent changes to the industry infrastructure and resultant curriculum have opened the courses to a wide range of students.

Hydrographic Surveying in New Zealand is in a state of reformation as the traditional providers move into a market-driven environment, competing with other organizations for charting and consultative programs. In July 1996, New Zealand made a commitment to the international community, formalizing the delimitation process of our continental shelf and the control of the fourth largest Exclusive Economic Zone (EEZ) in the world. This commitment has been met by the University of Otago through initiatives in research and training within the Earth and

Ocean Sciences. By signing the UN Convention on Law of the Sea (UNCLOS III), and with our buoyant economy and major bureaucratic transformations, New Zealand and the University of Otago are facing a much changing world at our end of the earth.

New Zealand - A Maritime Nation

New Zealand is well known as a little South Pacific country (pop. 3.8 million) with a sporting prowess, big on

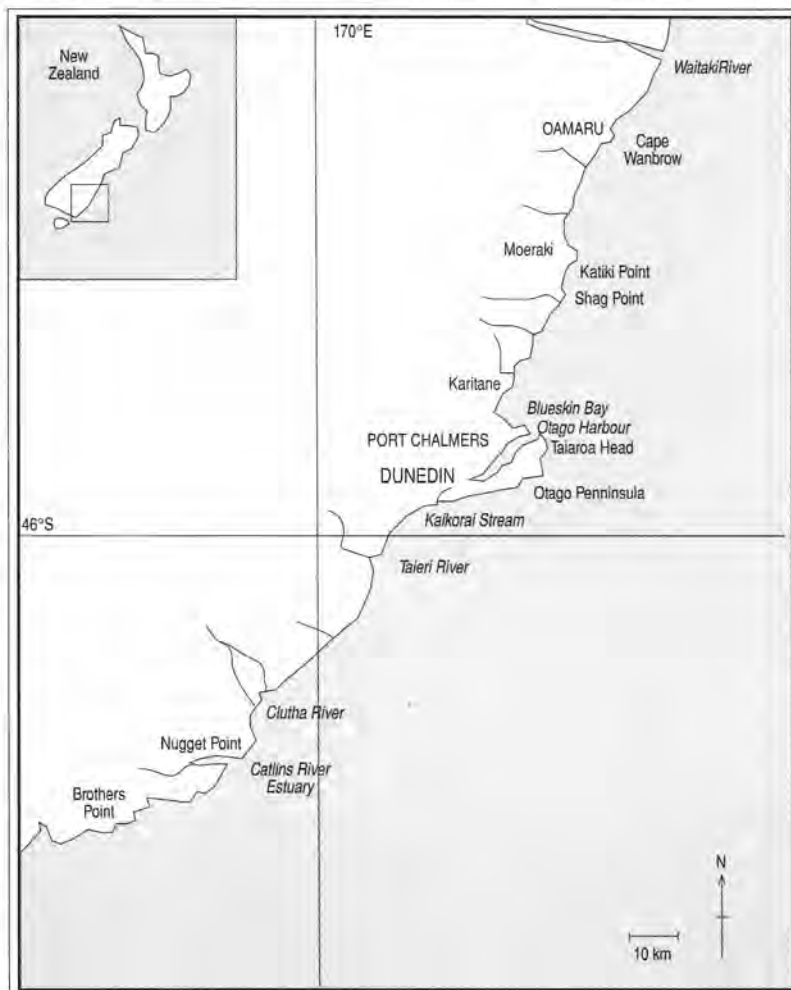
sheep and timber. Over the years New Zealanders have stood alongside Canadians on the battlefields of Europe and in the international arena on agricultural, environmental and resource management issues.

Recent economic changes—national and international—have improved communication networks. We are 'coming-of-age' in moving away from our traditional alliances in Europe. The exploration of opportunities within Asia and the Pacific, have resulted in increasing ties with our friends in Canada. Collaboration between the Departments of Surveying at Otago, the University of Calgary, and the University of New Brunswick are being encouraged.

Although founded on maritime exploration and exploitation, New Zealanders collectively are only just coming to terms with the fact that we are a maritime nation. The past century's preoccupation with mutton, trees and wars in other countries, has distracted us from the overwhelming proximity to our maritime resources; the

post-European tradition in New Zealand has seen the ocean as little more than a transport and recreation facility.

This article is offered as brief overview of what the University of Otago's Department of Surveying is doing to meet the challenges offered by recent initiatives and our role as a provider of education in New Zealand: The Maritime Nation.



Hydrographic Surveying in New Zealand—A change of tack

From July 1996, New Zealand made an international commitment by ratifying the United Nations Convention on Law of the Sea (UNCLOSIII). Delimitation of our extensive continental shelf and the responsibility for the fourth largest EEZ in the world (20-times the size of our land area) have initiated radical bureaucratic change in how hydrographers are going to do business in New Zealand.

The former Department of Survey and Land Information (DOSLI) has been restructured forming a core organization Land Information New Zealand (LINZ) with a directive, amongst other things, to manage a seamless terrestrial/marine cadastre, topographic and hydrographic services, and an EEZ data base. LINZ will not be conducting actual hydrographic survey and processing work, but will act as the State Client and repository for resultant survey data. From this data LINZ will develop a range of products (e.g. charts, DTM and cadastral information) for on-selling. It is envisaged that the majority of the services required shall be contracted out to suitable organizations in a competitive regime. LINZ will supervise those contracts and set in motion measures for quality control and assurance throughout the process.

Such traditional providers of hydrographic surveys as the Hydrographic Office of the Royal New Zealand Navy (RNZN) and the National Institute of Water and Atmosphere (NIWA) after a short transitional period are going to have to compete on a commercial basis with other hydrographic/surveying organizations for charting work. It would seem though, that these organizations will still remain at the centre and continue to be an integral part of the new hydrographic industry in New Zealand. At present we are in a transitory stage, where policy, terms of reference and the registration of provider interest are just beginning to evolve out of the restructuring—exciting and changing times!

The University of Otago is located in Dunedin, known as the 'Edinburgh-of-the-South', and is near the southeast tip of New Zealand. Founded in 1869, when the predominantly Scottish settlement of Dunedin was only twenty years old, the University of Otago is New Zealand's oldest.



Dunedin—the University City

Since its inception, the University has maintained a strong association with the City (pop. 117,000) and forms an integral part of both the city's identity and livelihood. In fact, education is the city's primary industry, with both the Polytechnic and College of Education also located in the North Dunedin area. The pseudo-gothic stone University Registry buildings sit alongside picturesque professorial houses and wooden Edwardian villas on the banks of Leith Stream which flows through and under the Campus, offering a sample of the rich architectural culture of the city.

The proximity of the three tertiary institutions to the main areas of student housing and extensive leisure facilities ensures a vibrant student life and a perception that Otago offers a lifestyle as well as an education. The national reputation for the experience of living in a student city is matched by Otago's international academic reputation and enables the student roll (at present about 15,000) to continue to grow despite the University being some distance from the main population centres.

The Department of Surveying was formed in 1963 and is the sole provider of a surveying degree course in New Zealand. After spending the first 30 years in a renovated bakery, we have recently moved to new and spacious facilities in what was previously a maternity hospital. The majority of the 200 undergraduates are enrolled in the 4-year BSurv programme, while the remainder will either complete a 3-year BSc within the Department or are taking just one or two papers as part of another degree. Enrollments for the BSurv are limited to 50 per year. At the postgraduate level, there are 15 students currently enrolled for 1-year diploma courses, MSurv and PhD degrees. The 13 academic staff come from a variety of backgrounds in industry, government and education, and the majority have qualifications from outside New Zealand.

We are fortunate that Otago has a very wide range of departments and degree courses. This not only gives our students a broad choice of electives within their BSurv, but also means that within the campus, both staff and students have access to facilities and specialists in many of the academic fields related to surveying. We can also utilize the Hocken Library, which houses a unique collection of the country's historical documents, art, charts and maps. New Zealand's spectacular and varied landscape provides ample natural laboratories: the university's Marine Science research vessels (including the 15 metre R.V. Munida, based from the University's research facility, the Portobello Marine Laboratory) gives us access to the 40 kilometre long Otago Harbour, and the Pacific at our doorstep, while just three hours away are the Southern Alps, one of the most actively deforming regions of the earth.

New Zealand's surveying curriculum

For many years the primary aim and function of the Department was to produce graduates suitable for entry into the New Zealand surveying profession. The new curriculum introduced in 1994 retains the broad mandatory core which has equipped our graduates well both nationally and internationally, but now allows both choices from the whole of the University calendar and also specialization within the Department—Hydrographic Surveying (the most popular elective with 85 enrollments for 1996), Remote Sensing, GIS, Engineering Surveying, Photogrammetry and Cartography. Although these options were also part of the previous curriculum, we are now able to cover each to an appropriate depth and can respond more readily to changing technology and market requirements.

In common with tertiary institutions world-wide, educational ground rules are undergoing change—the search for quality assurance, the requirement from students for a flexible degree (or combination of degrees), and the deregulation of the professions. We faced our first departmental review under the new order in 1996. Hydrographic surveying received strong encouragement in its on-going teaching and research development with a mid to long-term mandate to seek accreditation from the International Hydrographic Office/Fédération Internationale de Géomètres (IHO/FIG), Category A.

Based on our strengths in Information Science, resource Management and the Marine and Earth Sciences, IHO/FIG accreditation is offered as a logical step forward. The development of research in areas such as our EEZ cadastre, native title issues, and multibeam sonar processing has already been initiated, with a number of programs being worked upon with a strong Canadian representation.



University of Otago

Research and collaborative associations

The Department has recently implemented two strategic moves to strengthen its research activities—the definition of specific research areas and the furthering of collaborative alliances. The strategic directions for research were identified by considering the aims of funding agencies and the views of survey practitioners in New Zealand (Hannah, et al 1995). Six themes to guide our future efforts were proposed: hydrographic surveying; resource management; land/maritime tenure and cadastral issues; specific applications of technology; issues of marketing; management and public policy; and collaborative multi-disciplinary science research.

Collaborative research is perceived as the desirable approach by funding agencies and we are well placed to meet that requirement. Within the University, strong associations exist with the Departments of Geography, Marine Science (who share our building), Information Science, Management and Geology.

Outside the University, we maintain strong links with both the profession (who provide guidance on curriculum matters) and with the central government LINZ, the Institute of Geological and Nuclear Sciences (IGNS); Terralink (containing the cartographic section of the former DOSLD); and RNZN. We anticipate that our research links with all of these bodies, and with a variety of others, will strengthen in scope and geographical extent in the coming years. It is our aim not only to continue to see our graduate surveyors noted worldwide for their professional skills, but also to see our post-graduates noted for excellence in their research. We face the future with confidence and optimism.

References

1. Hannah, J., The Otago Vision: Teaching and Research Excellence in Geomatics, *Aust. Surv. Education Supplement*, June 1995, p.40-46,1995.
2. Hannah J., Hoogsteden, C. and Ballantyne B., Future Direction for Research Within the New Zealand Surveying Industry, *Internal Report*, Department of Surveying, University of Otago, 1995.
3. Spencer, C.A., A change of tack: progress in the development of the Hydrographic surveying Industry in New Zealand, Notes for presentation to the University of Otago and as a discussion paper to the New Zealand Institute of Surveyors, 1996.
4. Spencer C.A., Ballantyne B., New Zealand's EEZ mandate: Fishing-tips and Resource Management Opportunities for the Hydrographic Surveyor, An oral paper submitted to the 37th Australian Surveyors Congress *Beyond the Telescope.*, Perth, Western Australia.
5. Sutherland N.C., Surveying at Otago—New Zealand's Oldest University, *Surveying World*, Vol.4/1, 1995.

About the Authors / À propos des auteurs



Chris Spencer is the course coordinator and principal lecturer in Hydrographic Surveying in the Departments of Surveying and Marine Science, University of Otago. Chris completed a B.Sc (Surveying/Geology) at Otago in 1993 and is currently undertaking a PGDip. Sci.. His research interests include the integration of real-time mapping and navigation systems with oceanographic monitoring, environmental monitoring, the UN Convention on Law of the Sea, issues pertaining to New Zealand's EEZ, and the feasibility of acquiring IHO/FIG accreditation for the Hydrographic Surveying module at Otago. Prior to entering university, Chris worked in not only various fields of the surveying industry around the world, but also in boat building, fishing, geology, and in law enforcement. [Editor's Note: Since the writing of this article Chris has accepted a hydrographic assignment with Western Geophysical.]

Neil Sutherland, a native of Dunedin, obtained his BSc from the University of Otago in 1972. For a number of years he worked for the Department of Lands and Survey specializing in geodesy, deformation projects and astronomy. During this time he spent a further two periods at the University of Otago in postgraduate studies. He began teaching in the Department of Surveying in 1988. His professional and research interests include GIS/LIS, geodesy, measurement and information systems.



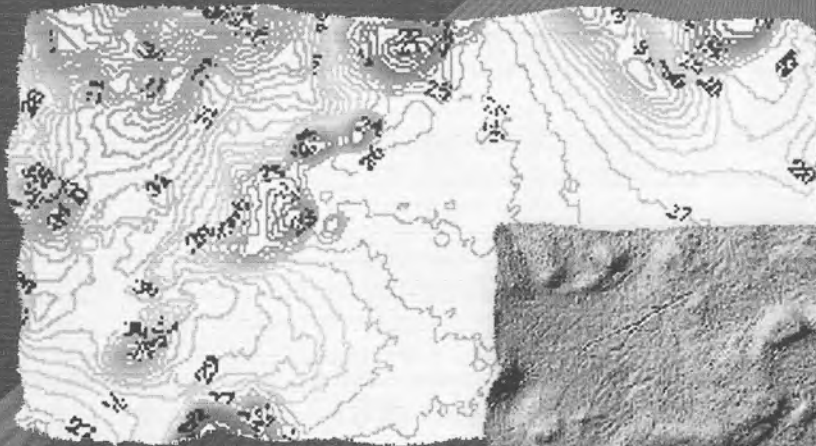
For more information please contact:

Chris Spencer or Neil Sutherland
 Department of Surveying, University of Otago
 PO Box 56, Dunedin, New Zealand.
 Telephone: 64 3 479-7585; Fax: 64 3 479 7586
 Home page: <http://spheroid.otago.ac.nz:808/surveying.html>

Portable Multibeam Systems For Shallow Water and ROV Survey

EM 3000 Series

- Powerful hydrographic mapper
- Full swath accuracy to latest IHO standards
- 300 kHz, 600 m depth range and 1500 m transducer depth rating
- Swath width 4-10 times water depth
- 100% sea floor coverage at high survey speed
- 1.5° x 1.5° footprint
- Real time raybending/refraction correction
- Both phase and amplitude bottom detection



Contour map - EM 3000 built in software.

*Survey in Halifax Harbor courtesy
Canadian Hydrographic Service (CHS)*



*Shaded depth presentation to reveal more details on seafloor
(possibly anchor tracks shown above) - EM 3000 built in software.*

SM 2000 Series

- Multibeam imaging
- Profiling - obstacle avoidance
- 200 kHz, 200 m range and 500 m transducer depth rating
- PC-based topside for real time data presentation
- Adaptive telemetry for optic fiber or coax



KONGSBERG
SIMRAD

Norway:
Kongsberg Simrad AS
Phone: + 47 33 03 40 00
Fax: + 47 33 04 44 24

USA:
Kongsberg Simrad Inc.
Phone: + 1 619 471 2223
Fax: + 1 619 471 1121

Canada:
Kongsberg Simrad Mesotech Ltd.
Phone: + 1 902 468 2268
Fax: + 1 902 468 2217

UK:
Kongsberg Simrad Ltd.
Phone: + 44 1224 226 500
Fax: + 44 1224 226 501

Singapore:
Kongsberg Simrad Pte. Ltd.
Phone: + 65 774 4667
Fax: + 65 774 5673

INTERNATIONAL HYDROGRAPHIC BUREAU

**publishes twice a year, in March and September,
an English and a French edition of**

◆ THE INTERNATIONAL HYDROGRAPHIC REVIEW ◆

This publication contains articles of topical interest on hydrography, oceanography, cartography, navigation, photogrammetry, geodesy and allied subjects, radio aids, automation, new instruments and techniques. The September issue is also devoted to specific topics.

Approx. 165 pages, 18 x 27 cm; numerous illustrations
Original articles for publication are welcome

The Bureau also publishes monthly the

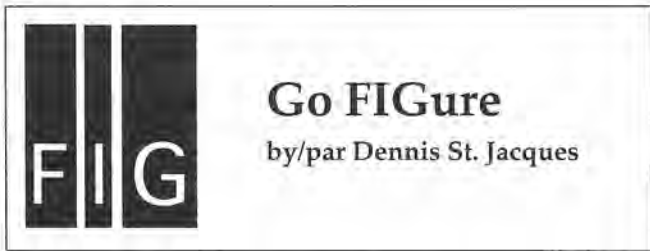
◆ INTERNATIONAL HYDROGRAPHIC BULLETIN ◆

which contains topical news, reports the work undertaken by the I.H. Bureau and the world hydrographic community, covers recent developments in hydrographic instrumentation and training programmes, describes new survey vessels, etc. Charts and publications issued by Hydrographic Offices are listed each month, and there is a comprehensive monthly bibliography on hydrography and related subjects.

The Catalogue of the IHO can be obtained gratis by writing to the

INTERNATIONAL HYDROGRAPHIC BUREAU
B.P. 445
4, quai Antoine Ier
MC 98011 MONACO CEDEX
Teleph: +377 93.10.81.00
Telefax: +377 93.10.81.40
Telex: 479164 MC - INHORG
e-mail (INTERNET): ihb@unice.fr
INTERNET WEB Home page: <<http://www.iho.shom.fr>>
<<http://www.ohi.shom.fr>>

The 1997 Permanent Committee Meeting for FIG will be held in Singapore during the week of May 11-16. In association with the Permanent Committee Meeting, there will be a Symposium of technical papers addressing the theme of "New Thrusts for Surveyors". There will be one session devoted to technical papers on Hydrographic topics. The following is an outline of the program for the Session:



1. Multibeam Swath Sounding Systems. Mike Crutchlow, Canadian Hydrographic Service.
2. Hydrographic Education in Australia. Mark Judd, University of Melbourne (not confirmed).
3. FIG/IHO Advisory Committee. Razali Bin Ahmad, Bangunan Shell, Malaysia
4. Technical Coordinating Committee. Rear Admiral G. Angrisano, Director, International Hydrographic Bureau.
5. Hydrographic Activities in the Port of Hong Kong. Nick Emerson, Port of Hong Kong.
6. Hydrography in the Port of Singapore. Wilson Chua, Port of Singapore.

In addition, the Port of Singapore will provide a technical tour of their facilities to interested symposium delegates.

Dr. David Wells, the Chairman of Working Group 419a on systematic errors in multibeam systems, reports that the paper he presented at the XX Congress in Melbourne, Australia, has generated a significant amount of interest in the hydrographic community. He has capitalized on this interest to develop an informal network of researchers and practitioners in the field of Multibeam Sounding Systems. This network of interested parties takes advantage of Ad Hoc gatherings to further the work of the working group. One such occasion was the multibeam training course that the University of New Brunswick (UNB) provided for Racal Ltd. in the United Kingdom. One of the issues that has received recent attention is the systematic errors introduced by long-period vertical movements in excess of 200 seconds. Present motion-sensing technology has difficulty compensating for this motion and the hydrographic community is looking at kinematic GPS for a possible solution. Dr. Wells plans to continue this informal dialogue on an opportunity basis and will present a report of the findings of this group at the next FIG Congress in Brighton.

Working Group 420c is investigating the criteria for determining the quantity of data to be retained and managed in multibeam sounding systems. To assist in the study, the Chairman, Mike Crutchlow, has distributed a questionnaire to national delegates and is in the process of reviewing the results of the questionnaire.

Lastly, I would like to remind all of you that the XXI Congress of FIG will be held in Brighton, United Kingdom from July 19-26, 1998.

L'assemblée générale 1997 du Comité permanent de la FIG se tiendra à Singapore du 11 au 16 mai. Parallèlement à l'assemblée du Comité permanent, se tiendra un symposium d'articles techniques sous le thème de "Nouvel

essor pour les arpenteurs". Il y aura une session dévolue aux articles techniques sur des sujets hydrographiques. Voici les grandes lignes du programme de la session:

1. Les systèmes de sondage multifaisceaux Swath. Mike Cruthlow, Service hydrographique du Canada.
2. Le programme hydrographique en Australie. Mark Judd, Université de Melbourne (non confirmé).
3. Le Comité conseil FIG/OHI. Razali Bin Ahmad, Bangunan Shell, Malaisie.
4. Le Comité de coordination technique. Contre-amiral G. Angrisano, Directeur, Bureau hydrographique international.
5. Les activités hydrographiques au Port de Hong Kong. Nick Emerson, Port de Hong Kong.
6. L'hydrographie au Port de Singapore. Wilson Chua, Port de Singapore.

De plus, le Port de Singapore offrira aux délégués intéressés une visite technique de leurs installations.

Le Dr David Wells, président du WG419a sur les erreurs systématiques des systèmes multifaisceaux, rapporte que l'article qu'il a présenté au XXe congrès à Melbourne, Australie, a suscité beaucoup d'intérêt dans la communauté hydrographique. Il a tiré partie de cet intérêt pour développer un réseau informel de chercheurs et de praticiens dans le domaine des systèmes de sondage multifaisceaux. Ce réseau de gens intéressés tire avantage de rassemblements ad hoc pour approfondir l'étude du groupe de travail. Une de ces occasions était le cours de formation multifaisceaux que l'UNB a donné à RACAL Ltd. au Royaume-Uni. Les erreurs systématiques introduites par des mouvements verticaux de longues périodes excédant les 200 secondes sont un des enjeux qui ont retenu l'attention récemment. La technologie actuelle de mesure du mouvement compare difficilement ce déplacement et la communauté hydrographique regarde la possibilité du GPS cinématique comme solution. Dr Wells se propose de continuer ce dialogue informel sur une base opportune et présentera un rapport de ces conclusions à ce groupe de travail au prochain congrès de la FIG à Brighton.

Le groupe de travail 420c examine le critère déterminant la quantité de données à être retenue et gérée par les systèmes de sondage multifaisceaux. Pour aider à l'étude, le président, Mike Crutchlow, a distribué un questionnaire aux délégués nationaux et il est en cours de revue des résultats du questionnaire.

Finalement, je voudrais rappeler à vous tous que le XXIe congrès de la FIG se tiendra à Brighton, Royaume-Uni, du 19 au 26 juillet 1998.

Ends of the Earth / Au bout du monde En Route to Calabar

by/par Anthony Knott

The Ends of the Earth feature describes the activities of hydrographers and those practising related disciplines.
We encourage readers everywhere to send accounts of their own work.

I am an ex Royal Navy Hydrographic Survey Officer and as such am fairly used to working in unusual places and in countries of dubious political nature under sometimes arduous conditions. But nothing could have prepared me for my recent survey experience in Nigeria, surveying the Warri, Bonny and Calabar Rivers.

First the logistics: We ran out of food, oil and fuel for the ship; we were set adrift in the river by bandits who stole our mooring ropes; all the life saving equipment was stolen twice; and we had to weld ourselves inside the ship at night to protect ourselves and our survey gear.



MV Marine Endeavour

I was due to join the *MV Marine Endeavour* at Calabar and commence the survey operations there. The survey began very slowly and seemed to run from one major fiasco to another. I can only liken it to a Harrison Ford adventure movie, needless to say I am very happy to be back in Canada. In this article I will explain only the journey to Calabar before the survey even started.

I left London on a British Airways jet for Lagos via Accra in Ghana. The plane was three hours delayed due to loading problems, possibly something to do with all the refrigerators, TV sets and washing machines that passengers insisted on taking as hand baggage! We arrived in Accra after six hours in the air. All the passengers disembarked and I was left in an empty plane wondering what was wrong with going to Lagos. It transpired that the majority of passengers

thought we had arrived in Lagos. Convincing half the plane's passengers that Accra was not Lagos resulted in another five hours delay.

We landed in Lagos eight hours late and consequently the company representative was not present. Lagos airport is not a good place to be at 0200am with no one to meet you. I was approached by an individual from the drug enforcement agency and a short while later arrested by 4 armed police, locked up in a cell and accused of being an international drug smuggler. Needless to say my first impressions of Nigeria were not good and I was really quite frightened. I was interrogated at length by various "officers" and eventually released about 4 hours later having paid the appropriate "on the spot fine" for international drug smuggling, this fee included some cash and my bottle of duty free.

Having been released and informed that the returning flight to London had departed I was back at square one. After another few hours the company representative appeared and I was led to a very old vehicle and whisked away to god-knows-where in Lagos. After various road block stoppages by police and immigration we made it to Lagos and the company apartment.

The next day, after the driver said his prayers, we departed on what, by Nigerian standards, was a routine journey. I counted two dead bodies on the road and decided it was better to try to sleep despite the bumpy dirt road and extreme heat. We drove to a place called Warri (in my opinion it should be called worry).

I arrived in Warri to find the ship beached on a river bank a short wade from the shore. Apparently a beached ship requires no berthing charges! The ship was a rust bucket and would probably qualify for the most unsafe ship on the high seas, all safety equipment having been stolen or sold. At this stage I was confronted by the Captain who was highly inebriated and supported by someone he referred to as his woman. That night we sailed for Calabar.

The crew consisted of the Captain, myself and another surveyor, and a Nigerian crew of 12. I was detailed the

middle watch since none of the crew were qualified to drive ships and I had my ticket. At about 0200am the port engine broke down with a massive vibration that woke the Captain. We were then rammed by a Nigerian fishing trawler and had nets tangled around our tow. At the time we were towing a nine metre survey launch which was to be used for the survey operations. It is at times like this when the expression 'worse things happen at sea' springs to mind; one has to adopt



Survey Launch tangled in nets

a very casual attitude just to keep sane. By UK standards we were in a bit of muddle, the Captain's comment at this time was simply, "Welcome to Nigeria."

We waited until daylight and began the task of untangling ourselves and hoping that the starboard engine would not pack up. Incidentally, the closest reliable coast guard station was Falmouth in the UK and I had the distress frequencies clearly memorized. This little fiasco over and having refused the offer of an entire cargo of fish as compensation from the fishing trawler, we proceeded on our way to Calabar. I went below decks to my cabin to get some sleep and hopefully forget about my situation for at least a little while. At this stage I was confronted by a large rat in my cabin on which I vented all my anger. An hour later having convinced one of the crew that it is not healthy to eat rats, I went to bed. If that member of the crew had

been the cook I think I would have gone completely insane.

Calabar River is a large tributary of the River Niger and the city of Calabar is some way upriver. With no reliable chart and no pilot, the Captain and I struggled slowly up the river in the hope of finding a reasonable berth where the ship would not be impounded or the crew arrested. Nigeria was virtually at war with neighbouring Cameroon and Calabar is very close to the border. We were informed by the company HQ in Lagos on the radio (our only means of communication with the outside world) that this would not be a problem since they usually stopped fighting in the vicinity of expatriots. What a comforting thought. It was in Calabar that the survey started. I was there for 3 months and I never wish to return.

About the Author / À propos de l'auteur



Mr. Anthony Knott was born in Tanzania and educated in England. In 1989 he joined the Royal Navy and qualified to become a hydrographic surveyor. He subsequently became a Lieutenant serving in many parts of the world, primarily involved in Gravity base stations for a global net in South America and the United States.

Mr. Knott has since left the Royal Navy and works as a freelance Hydrographic Surveyor, latterly using Unix based multibeam swath technology for which he trained in Holland. He studied for his post Graduate qualifications at Plymouth University in Devon England and is hoping to find some interesting survey work in Canada.

Mr. Knott is currently living in Winnipeg with his wife Shelly and one month old son Alexander.

For more information please contact:

Mr. Anthony Knott

802 Grosvenor Avenue,

Winnipeg, Manitoba,

R3M 0N2

tel: (204) 474 1901

Internet address: sbesel@hydro.mb.ca



THE CANADIAN HYDROGRAPHIC ASSOCIATION AWARD FOR DESERVING STUDENTS

LA BOURSE ASSOCIATION CANADIENNE D'HYDROGRAPHIE POUR LES ÉTUDIANTS MÉRITANTS

Rules for eligibility:

1. The applicant must be a full time student registered in an accredited survey science program (the program must have Geographic Information System, Cartographic, Land or Hydrographic Survey components) in a university or technological college anywhere in Canada. The Administrator of the Award program will determine the eligibility of the program.
2. The award will be available only to students who are in their second year of study in the degree or diploma program that conforms to the basic subject topic. The applicant will be required to submit a transcript of his/her first year marks at the time of application. The marks must indicate an upper level standing in the class and an average 70% in the subjects taken.
3. The award will be presented to an applicant who can demonstrate a bona fide financial need, coupled with an above average academic performance as stated above.
4. The value of the award is \$2,000.
5. The Applicant will be required to write a short paragraph explaining his/her financial need in a clear, concise, manner on the application form.
6. The applicant must submit one letter of reference from an official of the university or college at which the applicant spent the previous year. This letter of reference must include the address and phone number of the official.
7. The award applications will be submitted to the Administrator of Canadian Hydrographic Association Award Program by the end of June to the following address:

Barry M. Lusk, Manager
Canadian Hydrographic Association Award Program
4719 Amblewood Dr.
Victoria, BC
V8Y 2S2
Phone: (250) 658-1836
8. Each year, in July, an individual, who meets the qualifications and deadline will be chosen from the list of applications received. The award will be given to the successful applicant during the first week of August so that he/she may reasonably plan their next financial school year.
9. The successful applicant will be issued with a special Canadian Hydrographic Association certificate, duly framed, at the time the award is made. A duplicate certificate will be hung in the CHA offices.
10. The successful applicant's letter of appreciation will be published in our next issue of our professional journal "Lighthouse".
11. An individual student may receive the award once only.

Critères d'admissibilité:

1. Le candidat doit être un étudiant inscrit à temps complet dans une université ou un collège canadien à un programme de sciences qui inclut les systèmes d'information géoréférencée, les levés hydrographiques ou terrestres. L'administrateur de la bourse déterminera l'éligibilité du programme d'études.
2. La bourse s'adresse aux étudiants qui seront à leur deuxième année d'étude respectant les sujets de base. Le candidat doit soumettre une copie de son relevé de notes de sa première année avec sa demande. Les notes doivent être supérieures à la moyenne et avoir une moyenne de 70 % dans les sujets suivis.
3. La bourse est remise au candidat qui, de bonne foi, démontre des besoins financiers et qui respecte les performances académiques exigées ci-haut.
4. La valeur de la bourse est de 2000 \$.
5. Le candidat doit écrire un court texte, clair et concis, décrivant ses besoins financiers sur le formulaire de la demande.
6. Le candidat doit soumettre une lettre de référence d'un officiel de l'université ou du collège où il a suivi son cours. Cette lettre de référence doit inclure l'adresse et le numéro de téléphone de l'officiel.
7. Les demandes doivent être soumises à l'administrateur de la bourse Association canadienne d'hydrographie pour la fin du mois de juin à l'adresse suivante:

Barry M. Lusk, Administrateur
Bourse Association canadienne d'hydrographie
4719 Amblewood Dr.
Victoria (Colombie-Britannique)
V8Y 2S2
Téléphone: (250) 658-1836
8. Le récipiendaire est déterminé en juillet parmi les demandes reçues qui rencontrent les exigences et les délais. La bourse est remise durant la première semaine d'août afin de permettre au récipiendaire de planifier financièrement son année scolaire.
9. Le récipiendaire reçoit un certificat encadré de l'Association canadienne d'hydrographie dont un duplicata est suspendu à leur bureau.
10. Une lettre d'appréciation du récipiendaire est publiée dans l'édition suivante de notre revue professionnelle "Lighthouse".
11. L'étudiant récipiendaire peut recevoir la bourse qu'une seule fois.

Book Review / Critique de livres

Sir John Franklin's Journals and Correspondence: The First Arctic Land Expedition 1819-22

F. Oliff

In 1996 The Champlain Society published the journal of Sir John Franklin's first Arctic Land Expedition 1819-22. This journal, edited by Richard C. Davis, differs from the narrative Franklin had published in 1823; the narrative was composed in the weeks and months following the termination of the journey, whereas the journal was kept daily when possible, or at least weekly.

An important part of the journal, covering the period on the sea and the walk back up the Hood River, is missing—due to Franklin having lost his journal in Belanger's Rapids, and had to be replaced with notes from Back's and Richardson's journals. Back's and Richardson's viewpoints should provide a truer, more objective account of the conditions facing the men together with Franklin's abysmal reactions, but this is not the case.

The introduction, 109 pages in length, is probably all one really needs to read if he or she already has some knowledge of the expedition and its outcome. Richard Davis does not spare the British Admiralty or John Franklin any blame for the disappointing results.

The expedition, which resulted in the deaths of 11 of the 20 men who started the trip on the Coppermine River, was plagued from its beginning in the boardrooms of the British Admiralty. The Admiralty wanted to keep its naval officers gainfully employed following the 1812 war with France. The quest for a Northwest Passage was renewed with vigour at that time and the fact that the Navy had no experience in mounting land expeditions was never considered a serious matter. This is the first cause of failure for the expedition. Dependence on the Hudson's Bay Company (HBC) and the North West Company (NWC) who were engaged in a bitter rivalry for the dwindling Canadian fur stocks was a fatal blunder. Due to the lack of foresight on Franklin's and the Admiralty's



parts, the expedition's success or failure lay squarely on the shoulders of the HBC and NWC. This is a second factor for failure.

The Navy ought to have put off the expedition for another year; the lack of preparation resulted in Franklin not having enough supplies and led in turn to the deaths of his men from starvation and murder. Some of the men resorted to eating their shoes and there were also reports of cannibalism. One of the native hunters murdered midshipman Robert Hood, and was executed by John Richardson. The men who did survive did so by eating tripe de roche (lichen).

A third reason for the failure of Franklin's first Arctic land expedition lay in the arrogance and

ethnocentricity prevalent in the British command in the 1800's. The British sense of superiority in the face of the harsh Canadian conditions, and Franklin's refusal to deal with the natives he employed, were contributing factors in the deaths of his men. It is interesting to note that not all British naval leaders who engaged in overland expeditions have treated the natives, on whom their survival depended, so poorly (refer to John Ross, John Richardson, Samuel Hearne and John Rae).

John Franklin was knighted while many of his contemporaries were not. Certainly his contribution to the mapping of Canada's Arctic is worthy of merit, but a knighthood? History allows one to view the facts objectively, and had Franklin's leadership been questioned, as it should have been following this expedition, perhaps he would never have commanded the ill-fated expedition of 1845-47 in which 137 men perished.

*Sir John Franklin's Journals and Correspondence:
The First Arctic Land Expedition 1819-22 The Champlain
Society, Toronto, 1995. Richard C. Davis (editor)*



Canadian Hydrographic Association Association canadienne d'hydrographie



The Canadian Hydrographic Association (CHA) is a non-profit, scientific and technical group of about 500 members with the objectives of:

- advancing the development of hydrography, marine cartography and associated activities in Canada;
- furthering the knowledge and professional development of its members;
- enhancing and demonstrating the public need for hydrography;
- assisting in the development of hydrographic sciences in developing countries.

It is the only national hydrographic organization in Canada. It embraces the disciplines of:

- hydrographic surveying;
- marine cartography;
- marine geodesy;
- offshore exploration;
- tidal and tidal current studies.

The Canadian Hydrographic Association is formally affiliated with the Canadian Institute of Geomatics. It is informally associated with the Hydrographic Society.

What the CHA Can Do For You

- advance your knowledge of hydrography, cartography and associated disciplines, and keep you abreast of the latest development in these disciplines;
- enable you to develop and maintain contacts with others involved with hydrography, nationally and internationally.

These benefits are provided through the publication of LIGHTHOUSE (one of only three journals in the world devoted exclusively to hydrography), through the sponsorship of seminars, colloquiums, training programs, national conferences, and branch and national meetings.

Lighthouse

The journal of the Canadian Hydrographic Association, LIGHTHOUSE, is published twice yearly and distributed free to its members. Timely scientific, technical and non-technical papers and articles appear in the journal, with authors from national and international academia, industry and government. Present circulation of LIGHTHOUSE is approximately 700.

Membership

Membership is open to all hydrographers, those working in associated disciplines, and those interested in hydrography and marine cartography.

Branch & Regional Activities

The Canadian Hydrographic Association has seven (7) branches located across Canada. National headquarters is located in Ottawa.

For further information write to:

National President
Canadian Hydrographic Association
P.O. Box 5378, Station F
Ottawa, Ontario
Canada
K2C 3J1

L'Association canadienne d'hydrographie (ACH) est un organisme sans but lucratif réunissant un groupe scientifique et technique de plus de 500 membres ayant des objectifs communs, comme:

- faire progresser le développement de l'hydrographie, de la cartographie marine et de leurs sphères d'activités au Canada
- permettre les échanges d'idées et le développement professionnel de ses membres
- rehausser et démontrer l'importance de l'hydrographie auprès de public
- assister au développement des sciences de l'hydrographie dans les pays en voie de développement

Au Canada, l'Association est la seule organisation hydrographique qui embrasse les disciplines suivantes:

- levé hydrographique
- cartographie marine
- géodésie marine
- exploration extra-côtière
- étude des marées et courants

L'Association canadienne d'hydrographie est affiliée à l'Association canadienne des sciences géomatiques, et non-officiellement liée à la Hydrographic Society.

Ce qu'elle peut faire pour vous

L'ACH vous offre des avantages tels que:

- parfaire vos connaissances de l'hydrographie, de la cartographies et des disciplines connexes, tout en vous tenant au courant des nouvelles techniques et des derniers développements réalisés dans ces domaines;
- établir et maintenir des contacts avec ceux qui oeuvrent en hydrographie, au niveau national et international.

Ces avantages sont transmis par l'entremise de LIGHTHOUSE (une des trois revues au monde traitant exclusivement d'hydrographie) et par la tenue de séminaires, de colloques, de programmes de formation et d'assemblées régionales et nationales.

Lighthouse

La revue de l'Association canadienne d'hydrographie, LIGHTHOUSE, est publiée deux fois l'an et distribuée gratuitement aux membres. Des articles scientifiques, techniques et non techniques, provenant du milieu de l'industrie ou du gouvernement autant national qu'international, apparaissent dans cette revue. Le tirage actuel de la revue est d'environ 700 copies.

Comment devenir membre

Le statut de membre est offert aux hydrographes et à tout ceux oeuvrant ou ayant un intérêt dans des disciplines associées à hydrographie ou à la cartographie marine.

Sections et activités régionales

L'Association canadienne d'hydrographie possède sept (7) sections à travers le Canada. L'administration central se trouve à Ottawa.

Pour plus d'informations, s'adresser au:

Président national
Association canadienne d'hydrographie
C.P. 5378, station F
Ottawa, Ontario
Canada
K2C 3J1



Lighthouse Puzzler

Casse-tête du Lighthouse

by/par Beth Weller



Lighthouse Puzzler # 16

Prizes were given to the four winning rinks at a recent CHA Bonspiel.

From these clues, can you figure out who skipped the four teams, the order they finished and their prizes?
(The fourth place prize was dinner for four at "Emma's Back Porch".)

The clues:

1. First place rink was not Jacqueline's or Power's or the team that won the set of glasses.
2. Mr. Johnston's rink did not come second or win the curling shoe bags.
3. Andrew's rink came third.
4. Helen Miles' rink did not win the dinner for four.
5. Gorski's rink did not win the dinner or the watches.

	Jacqueline	Andrew	Helen	John	Dinner for four	Sets of glasses	Wrist watches	Curling shoe bags	First place	Second place	Third place	Fourth place
Power												
Johnston												
Miles												
Gorski												
First place												
Second place												
Third place												
Fourth place												
Dinner for four												
Sets of glasses												
Wrist watches												
Curling shoe bags												

Solution to Fall Puzzler (#15)

All four people are mentioned in Clue 2. Warrender took the binder and hot chocolate (Clue 6) so must be Paola. The student, with the textbook, does not like rum or coffee (Clue 1) so must be the tea drinker, leaving Halsall to be the one with the logic puzzle book.

Neither Brian nor Koudys is the student (Clue 5) so Brian must be Halsall, meaning Koudys is the one with *Arabian Nights*. Jennifer, with the Irish coffee, is not the student (Clues 1 and 4) so must be Koudys.

Filling in the blanks, Keith Biggar is the student and Brian Halsall has the rum toddy.



Sustaining Members Membres de soutien



Sustaining membership allows companies closely linked with the hydrographic field to become more involved with the activities of the CHA and to maintain closer contact with users of their products. Through LIGHTHOUSE these Sustaining Members are also able to reach a world-wide hydrographic audience. The benefits of Sustaining Membership include:

- a certificate suitable for framing;
- three copies of each issue of Lighthouse;
- copies of the local Branch newsletters, where available;
- an invitation to participate in CHA seminars;
- an annual listing in Lighthouse;
- an annual 250 word description in Lighthouse; and
- discounted advertising rates in Lighthouse.

Annual dues for CHA Sustaining Membership are \$150.00 (Canadian).
Current Sustaining Members are listed below.

Aanderaa Instruments Ltd.

100 - 4243 Glanford Avenue
Victoria, British Columbia
Canada V8Z 4B9 Fax: (250) 479-6588
contact: Gail Gabel
(affiliation - CHA Pacific Branch)

Garde côtière canadienne

104 rue Dalhousie, Suite 311
Québec, Québec
Canada G1K 4B8 Téléc: (418) 648-4236
contact: Claude Duval
(affiliation - ACH Section du Québec)

l'Institut maritime du Québec

53 St-Germain Ouest
Rimouski, Québec
Canada G5L 4B4 Téléc: (418) 724-0606
contact: Claude Jean
(affiliation - ACH Section du Québec)

NovAtel Communications Ltd.

6732 8th Street N. E.
Calgary, Alberta
Canada T2E 8M4 Fax: (403) 295-0230
contact: Art Silver
(affiliation - CHA Central Branch)

Quester Tangent Corporation

9865 West Saanich Road
Sidney, British Columbia
Canada V8L 3S3 Fax: (250) 655-4696
contact: John Watt
(affiliation - CHA Pacific Branch)

Seatex Inc.

1111 Third Avenue
Suite 2500
Seattle, Washington
U.S.A. 98101 - 3263 Fax: (201) 295-1424
contact: Karl Wm. Kieninger
(affiliation - CHA Central Branch)

Simrad Mesotech Systems Ltd.

202 Brownlow Avenue
Dartmouth, Nova Scotia
Canada B3B 1T5 Fax: (902) 468-2217
contact: John Gillis
(affiliation - CHA Central Branch)

terra surveys ltd.

1962 Mills Road,
Sidney, British Columbia
Canada V8L 3S1 Fax: (250) 656-4604
contact: Rick Quinn
(affiliation - CHA Pacific Branch)

NovAtel Today

Headquartered in Calgary, Alberta, Canada, NovAtel Inc. is a publicly traded company on the Nasdaq National Market under the symbol "NGPSF". NovAtel designs, markets and supports a broad range of products which determine precise geographic locations using the Global Positioning System ("GPS"). NovAtel's advanced GPS technology provides accuracy to the sub-centimetre level while showing a high degree of integrity in dynamic environments. The Company's products are used principally for applications where users require higher performance, accuracy and reliability. This includes applications in high-end markets such as surveying, geographic information systems, agriculture, aviation, marine and mining and machine control.

In 1992, NovAtel successfully developed and patented Narrow Correlator™ technology which would establish the Company's reputation in the GPS industry. This unique correlation technique delivers one meter or better positioning accuracy utilizing L1, C/A code tracking. Narrow Correlator™ successfully challenged the notion that high precision was possible only with P-code tracking or dual frequency receivers. The Company has

continued its technological advancements with the introduction of breakthrough technologies which model and eliminate multipath distortions — Multipath Estimation Technology ("MET™") and Multipath Estimating Delay Lock Loop ("MEDLL™").

Today, NovAtel is strengthening its leadership in the high-end GPS markets by continuing to introduce products that address industry needs and by maintaining responsive and flexible customer support. Some of the Company's recent product innovations include:

- RT-20™ — 20 centimetre RTK system developed for demanding GPS applications such as dredging, autonomous RPV and ground vehicles, seismic survey and topographic mapping
- GISMO™ — GPS/GIS package that combines fast and accurate GPS technology, powerful data collection tools and innovative software developed for utilities, municipalities, environmental and natural resources applications
- Outrider™ — GPS Survey system used to collect GPS data for post-processing or real-time kinematic available with RT-2™ option which provides rapid, real-time 2 centimetre accuracy
- MiLLennium™ — dual frequency receiver designed to sustain the most demanding surveying, differential reference station and navigation applications
- WAAS Receiver — differential system receiver for the Wide Area Augmentation System used in en route precision approach guidance for the both commercial and non-commercial aircraft.

Seatex Inc.

Seatex is a worldwide supplier of quality marine motion sensors and navigation equipment. Seatex designs and manufactures advanced products for the following applications: GPS based satellite positioning, motion sensing and specified instrumentation solutions.

The North American headquarters is located in Seattle, Washington, providing 24 hour sales, engineering and customer support. All motion sensor products can be upgraded by the customer to a higher performance level at no additional engineering cost. This allows our customers to purchase what they need today, knowing that they have the flexibility to upgrade for future applications. Seatex products interface with all major OEM manufacturers equipment worldwide.

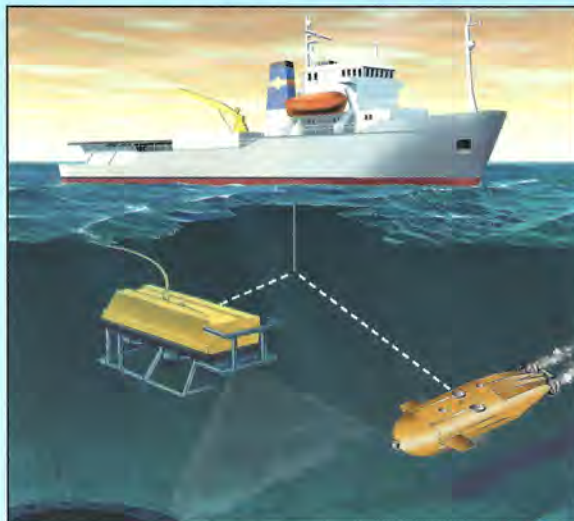
In Canada, our products may be purchased through our Canadian agent located in Charlottetown, Prince Edward Island, (922-566-9285).

For product and company information visit the Seatex Home Page:

<http://www.seatex.no>, or call our offices at (206)583-8358. Our goal is to provide our customers with leading edge technology. At Seatex this means highest quality, state-of-the-art solutions at the best price in the world.

Seapath® 200

Optimize Your
Acoustic Positioning Systems



Benefits

- Seapath provides accurate true heading and attitude required by the latest technology within Ultra Short Base-Line acoustic positioning
- Acoustic positioning benefits from Seapath in applications such as; High resolution mapping, ROV and tow-fish tracking, cable/pipe laying, dredging, and other DP operations

Features

- True heading anywhere on Earth
- One product replaces three instruments (gyro compass, GPS receiver, motion sensor)
- No scheduled maintenance or re-calibration
- Costs reduced by upgrading from MRU product line
- Robust against GPS drop-outs
- Real-time data at 100 Hz update rate

Components



Seatex MRU-5, GPS Antenna Beam, Processing Unit

Seatex

Leading Edge in Marine Motion Sensors

Main Office: Seatex AS, Pirsenteret, N-7005 Trondheim, Norway. Phone: +47- 73 54 55 00 Fax: +47- 73 51 50 20
E-mail: firmapost@seatex.no Homepage: <http://www.seatex.no>
UK: Seatex Ltd., Aberdeen. Phone: +44 - 1224 744625 Fax: +44 - 1224 744625
E-mail: pme@seatex.demon.co.uk
North America: Seatex Inc., Seattle. Phone: +1 - 206 583 8358 Fax: +1 - 206 583 8356
E-mail: mailbox@seatexinc.com



International Members of the Canadian Hydrographic Association



Membership in the Canadian Hydrographic Association is open to anyone interested in maintaining a link with hydrography in Canada. People who live or work in other countries or who are not conveniently located to existing CHA branches can become international members with the same rights and privileges as other members.

As authorized under the CHA bylaws, the national president has arranged for Central Branch to continue administering the International section of the CHA membership. Under this arrangement we endeavour to ensure that all international members receive the same level of service. International members may also join the branch of their choice.

International Membership is \$30.00 (Canadian) per year, or the equivalent in Sterling or US currency. This includes a personal membership certificate suitable for framing along with annual update seals, as well as copies of our journal *Lighthouse* each spring and fall.

Each international member also receives the Central Branch Newsletter. This helps our far-flung members keep in touch between issues of our journal and also offers a forum for members to share views and concerns.

Commander Larry Robbins of the Royal New Zealand Navy is our international correspondent for the Newsletter and writes a regular column with items of interest to international members. Drop snippets of news to him at: 42 Knights Road, Rothesay Bay, Auckland 1310, New

Zealand, Tel: (+64) 9 478 4782, Fax: (+64) 9 478 4785 and e-mail: larry@robbins.gen.nz. All scraps are very welcome! And if you have special news or views you are most welcome to write something longer for the newsletter or *Lighthouse*. Letters to the Editors are also welcome.

International Members of the Canadian Hydrographic Association

Reha Metin Alkan	Turkey
Peter Barr	Australia
Ing. F. Bianchetti	Italia
Giuseppe Biscontin geom	Italia
Gary S. Chisholm	New Zealand
Ir Eka Djunarsjah	Indonesia
Nick Emerson	Hong Kong
Luis Leal de Faria	Portugal
Randall J. Franchuk	U.S.A.
Ronald Furness	Australia
G.H. Goldsteen	Australia
Instituto Hidrographico	Espana
Chih Ping Hu	Taiwan
Adam J. Kerr	Monaco
Karl Wm. Kieninger	U.S.A.
Charles David Meador	U.S.A.
Capt. K. Millen	United Kingdom
Rumlan Bin Mukhtar	Malaysia
Rear Admiral Steve Ritchie (Ret'd)	Scotland
Cdr. Larry Robbins	New Zealand
Paul Sanson	France
Paul Stern	United Kingdom
Jack L. Wallace	U.S.A.



Hints To Authors



Lighthouse publishes material covering all aspects of hydrography. Authors submitting manuscripts should bear the following points in mind:

1. A typewritten, double-spaced copy (including tables, legends for figures and a list of references) on A4 size paper should be submitted.
2. It is possible to submit papers on 3.5" floppy discs formatted for either PC or Mac. Ascii and Microsoft Word files are among those accepted.
3. Papers should be in either French or English and will be published without translation.
4. Illustrations should be sent flat and should be prepared with due consideration to probable reductions to page or column width. Specifically, map and plan material should possess a scale bar rather than a representative fraction to allow for such reduction.

News From Industry

Nouvelles de l'industrie

• **Klein Associates Inc.** •
Salem, New Hampshire USA

A digital, simultaneous dual frequency Klein System 2000 was recently deployed and successfully completed shallow water detection trials operating against various type stealth sea mines including the French MANTA and the Swedish ROCKAN bottom mines in a recently conducted shallow water detection trial. The Klein System 2000 is a fully digital, simultaneous dual frequency side scan sonar which simultaneously illuminates targets with 140 kHz and 395 kHz frequencies and displays the returns of both frequencies on high resolution color video or very high resolution thermal paper.

Klein Associates Inc. has been a specialist in the design and manufacture of side scan sonar equipment since 1968. High resolution side scan sonar images are now available for access on a sonar web site: <http://www.kleinsonar.com>

• **Racal Survey Limited** •
New Malden, Surrey, UK

Pictured beside the Gannet A platform, the "Sedco 704" semi-submersible rig is the first to have been positioned in the North Sea using GLONASS satellites. The trial was performed by Racal Survey on behalf of Shell Expro.

Racal has acquired **Pelagos Corporation**, a survey company based in San Diego, California, USA. Pelagos is a key provider of survey services and navigation software products to the offshore telecommunications industry. Racal has also acquired **Geodia**, a leading French geotechnical services company based in Paris, France. Geodia offers unique technology in the tasks of performing site surveys and investigations prior to the installation of offshore structures and pipelines.

Visit Racal on the www at <http://www.racal.com>

• **Chelsea Instruments Ltd.** •
West Molesey, Surrey, UK

Chelsea Instruments has formed an alliance with **Marine Acoustics Ltd.** Finchampstead, Berkshire, UK who specialise in the design and development of acoustic systems and transducers. A new range of oceanographic products are being jointly developed and will be marketed through the existing Chelsea network of representatives.

• **SeaBeam Instruments Inc.** •
East Walpole, MA, USA

The India Naval Hydrographic Office (INHO) has awarded SeaBeam Instruments a contract for one deep water multi-beam survey system, two shallow water multibeam systems and a multibeam operator training simulator.

SeaBeam Instruments Inc. accepted responsibility on January 1, 1997 for the marketing and support of Allied Signal ELAC Nautik's multibeam sonar systems throughout North America.



• **NRCan Government of Canada** •
Ottawa, ON

Lloyd Axworthy, Minister of Foreign Affairs, announced on April 16, 1997, on behalf of Anne McLellan, Minister of Natural Resources Canada (NRCan), and Don Boudria, Minister for International Cooperation and Minister Responsible for la Francophonie, that digital mapping technology has been transferred to the Federal Service of Geodesy and Cartography of Russia (Roskartografia). Canada is contributing \$1.7 million to this project as part of the Canadian International Development Agency (CIDA) technical cooperation program in Russia.

• **NovAtel Calgary** •
AB, Canada

NovAtel Inc. a leading Global Positioning System manufacturer, has signed an agreement with Norman Wade Company Limited, a leading supplier of survey equipment with 18 locations across Canada. Effective immediately, Norman Wade will distribute NovAtel's line of GPS products including GISMO™ for GIS applications and the newly introduced Outrider™ for survey and precise applications. First deliveries of GISMO and Outrider are scheduled for March 1997. NovAtel has signed an agreement with Nikon Inc. to distribute its GPS products in the U.S. and Latin America.

• **The Hydrographic Society** •
Polytechnic of East London, Longbridge Road,
Dagenham, Essex RM8 2AS, UK

Pat Sanders, founder and president of Coastal Oceanographics Inc. of Middlefield, Connecticut, has been elected President of The Hydrographic Society of America, one of five national branches of the Hydrographic Society. He succeeds Capt. Tom Richards, NOAA.

The Hydrographic Society of America is based at P.O. Box 732 Rockville, Maryland 20848-0732

• **Institut maritime du Québec** •
Rimouski, PQ, Canada

Le 24 janvier dernier, le Centre international pour le développement de l'inforoute en français (CIDIF) avisait l'institut maritime du Québec que sa vitrine électronique sur le WWW avait été jugée de grande qualité et que cela lui valait une mention dans *Le Détour*, une vitrine web par laquelle on peut accéder aux différentes vitrines francophones retenues par le CIDIF. Et c'est avec fierté que l'institute arborera dorénavant dans sa page d'accueil sur le WWW le logotype officiel du *Détour*, un privilège réservé aux organismes dont la vitrine est retenue par le CIDIF. Soulignons que des organismes aussi prestigieux que le Cirque du Soleil, le Réseau des sports (RDS), la Place des Arts jouissent du même privilège. On accède au site de l'Institut maritime du Québec à l'adresse suivante : <http://www.imq.qc.ca>


• **STN ATLAS ELEKTRONIK** •

STN ATLAS Elektronik has received an order from the UK Royal Navy's Hydrographic Office for a portable Fansweep 20 shallow water multibeam swath sounding system. The 200kHz system also includes proprietary Atlas Hydromap on and off-line processing facilities for real-time acquisition, processing, display, and management of hydrographic data via HPworkstation.

New Book

Voyages Into Eternity an autobiography by Ian Alexander Miller describes a varied career that took him worldwide. Merchant Ship-Master, Harbour Master, Hydrographer, Oceanographer, involved with a range of fields such as optimum ship Routing, geophysical surveys, offshore oil exploration, and marine sciences research and development. Ian Miller finally retired with his wife Jane to live in Ottawa, Canada.

For further information please contact Mark Leonard, The Pentland Press Ltd., 1 Hutton Close, South Church, Bishop Auckland, County Durham, DL14 6XB, England.



World Leader in Airborne Geophysics

HIGH RESOLUTION AIRBORNE GEOPHYSICS
HELICOPTER ELECTROMAGNETICS FOR
AIRBORNE BATHYMETRY AND SEA ICE MEASUREMENT
HIGH SENSITIVITY MAGNETICS - ELECTRONIC NAVIGATION
LASER PROFILING - CUSTOM DATA PROCESSING
COLOUR MAPPING AND PLOTTING

AERODAT INC. 6300 Northwest Dr., Mississauga, Ont., Can. L4V 1J7
Tel: (905) 671-2446 Fax: (905) 671-8160 Email: scott@aerodat.com



Canadian Hydrographic Service Service Hydrographique du Canada



Central And Arctic Region

Retirement



Roger continues to be an active member of the Canadian Hydrographic Association where his efforts are usually focused on the distribution of *Lighthouse* journal and the Central Branch Newsletter. Roger was known throughout the region as a picture framer and stamp collector. Many people in the region have pictures framed by Roger gracing their walls and many have taken advantage of Roger to purchase a stamp which he always seemed to have on hand in abundance. A sign on the blackboard above Roger's old desk in Carto Unit 1 highlights the loss represented by his retirement. The Post Office is closed.

Left: Dominion Hydrographer Steve MacPhee presents Roger Robitaille a plaque with the CHS crest.

Below: Roger (and his silent partner) on field survey.

Roger Robitaille retired from the CHS Central Region on March 31, 1997. Roger joined the CHS in 1970 and spent the first seventeen years of his career in field surveys. In 1988 Roger accepted a rotational assignment in cartography. Roger stayed in the cartographic section becoming one of the region's first multidisciplinary hydrographers. A landmark for Roger was the publication in 1996 of his Chart 1435 Cardinal to/à Whaleback Shoal. This complicated, four compartment chart of a heavily traveled portion of the St. Lawrence River displays Roger's considerable cartographic achievement.



Surveying and Charting Update

Surveys for 1997

Arctic. A winter survey of Rae Strait and Rasmussen Basin, operating out of Gjoa Haven, was completed in April. This survey used airborne electromagnetic and spot sounding techniques to extend the shipping corridor along the southern shore of Prince William Island.

Other summer Arctic survey activities include: Allen Bay near Resolute, Kojesse Inlet near Iqaluit and Deception Bay in Hudson Strait.

Hudson Bay. In partnership with the Government of the Northwest Territories, we will be conducting multi-beam swath sounding surveys of Chesterfield Narrows and the approaches and harbours at the communities of Chesterfield Inlet, Whale Cove and Arviat. These surveys are part of a multi-year program to survey and chart resupply routes for most of the communities on the western coast of Hudson Bay.

Great Lakes. We are planning three surveys in the Great Lakes in 1997. The first is a survey of the Eastern part of

Georgian Bay between Giants Tomb Island and Parry Sound in support of recreational boating in the area and will operate from the CCGS Griffon. The second survey is located at Ogden Point on the north shore of Lake Ontario. The approaches and docking area of the St. Lawrence Cement Wharf will be surveyed using multibeam technology and the data will be incorporated into existing charts. The third survey is of the Mission River in the Port of Thunder Bay. Natural processes have led to sediment infilling which require resurvey to determine new values for the shipping channel and wharf faces.

New Products for the 1997 Navigation Season

Lake Ontario - *Chart 2044 - Port Dalhousie*. This New Harbour Chart is now available from chart dealers. The existing inset of Port Dalhousie on chart 2070 is now cancelled.

Lake Erie - *Chart 2110 - Long Point Bay*. This New Edition incorporating many shoreline changes will be available this Spring.

Lake Huron/Georgian Bay - *Chart 2206 - McGregor Bay* in the North Channel. This New Chart will be printed on both sides and in compartments to give the mariner the option of cutting the chart into a smaller format. The chart will also be printed on waterproof paper.

Arctic - *Chart 7740 - M'Clintock Channel, Larsen Sound and Franklin Strait*. This New Edition incorporates a wealth of survey data and is now available.

New Products Available in 1997

Work is underway on the following Charts which should be available later in 1997:

Lake Huron/Georgian Bay - *Chart 2225 - Approaches to Parry Sound* on Georgian Bay. This chart will be converted to metres and to the 1983 North American Datum (NAD83) for compatibility with the Global Positioning System.

CEN 306 - Sailing Directions, Georgian Bay. This new booklet-style Sailing Directions will cover all of Georgian Bay (Tobermory to Killarney) and will cancel the existing Georgian Bay Small Craft Guide.

Lake Superior - *Chart 2300 - Lake Superior*. This chart will incorporate new survey data and be converted to metres and the 1983 North American Datum (NAD83) for compatibility with the Global Positioning System.

Arctic - *New Charts 5628 - Rankin Inlet, 5629 - Marble Island to Rankin Inlet and 5630 - Cape Lones to Chesterfield Inlet* will be completed to incorporate recent new surveys in the Rankin Inlet area.

New Editions of Arctic Charts 7502 - *Gulf of Boothia and Committee Bay* and 7552 - *Bellot Strait and Approaches* will incorporate a wealth of survey data.

Raster Charts

CHS continues to expand its coverage of raster chart files. The release of six CD's to cover the area of Great Lakes, Trent-Severn Waterway, Rideau Waterway, Ottawa River and Lake Nipissing is targeted for the 1997 navigation season. These CD's will contain a number of raster chart files (ranging from 30-70 individual charts), but single raster charts are also available on floppy disk. CHS has obtained the training, hardware and software to edit these raster chart files to keep them up-to-date for NTM's.

Reprints

In addition, the following charts are scheduled to be corrected for any Notice to Mariners and released as Reprints in 1997:

1436	St. Lawrence River - Whaleback Shoal to Summerland Group
1437	St. Lawrence River - Summerland Group to Grindstone Island
1439	St. Lawrence River - Carleton Island to Charity Shoal
1554	Ottawa River - Rapides-des-Joachims to Lac La Cave
2000	Lake Ontario - General Chart of Lake Ontario
2111	Lake Ontario - Belleville Harbour
2058	Lake Ontario - Cobourg to Oshawa
2069	Lake Ontario - Bay of Quinte - Picton to Presqu'île Bay
2123	Lake Erie - Pelee Passage to the Detroit River
2294	North Channel - Little Current and Approaches
2298	Lake Huron - Cove Island to Duck Islands
2309	Lake Superior - Cape Gargantua to Otter Head

On The Horizon

St. Lawrence River

Work will continue on the St. Lawrence River new metric charting program. *New Chart 1433 - St. Regis to Croil Island* and *New Chart 1432 - Lac Saint-Francois* will be available for the 1998 navigation season.

Lake Ontario

A New Edition of *Chart 2085 - Toronto Harbour* will be produced to include the latest source data.

A New Edition of *Chart 2061 - Scotch Bonnet Island to Cobourg* will be produced to include new survey data.

Lake Erie

Chart 2181 - Harbours in Lake Erie, will be updated to include the latest survey data and will be changed to metres and NAD83 horizontal datum.

Georgian Bay

New Chart 2283 - Nottawasaga Bay in Georgian Bay is of Nottawasaga Bay from Cape Croker to Giants Tomb Island. The central portion of this chart until now, has only been portrayed on Chart 2201 - the General Chart of Georgian Bay.

Field surveys this summer will result in future charting actions for *Chart 2239 - Port Severn to Hope Island*, *Chart 2202 - Port Severn to Parry Sound* and *Chart 2289 - Giants Tomb Island to Lone Rock*.

Lake Superior

Survey work in Thunder Bay on Lake Superior is scheduled for 1997 and this information will be incorporated into a New Edition of *Chart 2314 - Port of Thunder Bay*.

New Production Method

A number of advances have been made toward a streamlined process for the printing of paper charts from digital files. The efforts have been focused on the cost efficiencies with better management of the printing of digital files. This cost efficiency relies on improved processes for the output of digital chart files.

CHS worked with NRCan staff at the Geomatics Canada office in Ottawa to develop a routine whereby a full-colour, A0-size, digital, postscript, chart-file could be sent from a CHS regional site to Geomatics Canada for colour separation, digital screen application, digital colour proofing, digital generation of printing negatives, registration and final lithographic printing. This was a successful effort and work will continue to perfect and document the process.

Electronic Charts

The primary focus of the ENC program in 1997 is on production of S-57 ENC's. These S-57 ENC's are designed to meet the International Hydrographic Organizations S-57 Edition 3 Standard and to support an International Maritime Organization compliant ECDIS. Production has begun at the Beauharnois Canal on the St. Lawrence River and will progress west to Thunder Bay. Priority of production will be determined by commercial shipping routes and client consultation.

Additional software to aid in the Quality Control process of Electronic Charts has been obtained from SevenC's, of Hamburg, Germany. This SevenC's ENC Designer V3.0 software and the appropriate S-57 training was delivered in February, 1997.

Water Levels

Water levels on all of the Great Lakes are considerably above average. If wet conditions should persist over the next several months, levels on Lakes Superior, Huron and St. Clair could approach previous record high levels by this summer, and Lake Erie's level could exceed the previous record high. While it is unlikely that Lake Ontario's level will reach it's record high, it will probably continue to be significantly above average. The risk of serious flood and erosion damage, particularly during storms, is very high along the shores of all the Great Lakes.

Pacific Region

Chart Production

Work over the past several months has centred on the production of eight New Editions of print-on-demand (POD) charts of the Canadian Arctic. These charts are all in digital form, incorporating the latest Arctic field data and can be used for ENC production. Four are at colour proof stage and all eight will be ready for the navigation season.

A New Chart of Roberts Bank, Chart 3492, is also in production and will include the new Vancouver Port Corporation facilities and the previously uncharted Canoe Passage approach to the Fraser River. The approaches to the facilities and the dredged turning basin were surveyed using the new EM3000 multibeam (see Hydrographic Surveys). These data are the first EM3000 multibeam data to be incorporated in a Canadian chart. POD copies of this New Chart will be exhibited at the XVth International Hydrographic Conference in Monaco, April 14-25, 1997.

A New Edition of the Fraser River Chart 3490, incorporating this year's surveys from Public Works and Government Services Canada (PWGSC) is under construction and is expected to be ready for the navigation season in May. Twelve New Editions of the Mackenzie River chart series were also produced in the past several months. Other work includes the ongoing maintenance of stock, through Reprints and New Editions.

Several cartographers are now trained in S-57 production. S-57 production is also being contracted out, with ENCs from Juan de Fuca Strait to Vancouver Harbour being produced by Offshore Systems Limited (OSL) of Vancouver, and ENCs in the Prince Rupert area being produced by Devel-Tech of Saskatoon. Work is continuing in-house on the ENCs for Department of National Defence. CARIS ASCII files are sent to Ottawa for conversion under contract into DIGEST format.

Client Liaison and Support

Institute Electronics (IE) has been busy with a variety of jobs: bathymetry (including single beam, bottom classification and swath), tides and currents activities, and informatics support. A Knudsen sounder was loaned to the Esquimalt DND group to evaluate a Quester Tangent bottom classification system. IE is evaluating new Knudsen sounder software. EM3000 support has been provided, but the Sun workstation has experienced continuous hardware problems. There has been support for the SAIL datalogging system on the ships, and to implement a local area network (LAN) on the Tully and Laurier. The group is also preparing to install an OSL ECDIS on the Tully, which was purchased by Coast Guard as part of their "standard fit."

The mechanical unit is manufacturing sensor and sampling systems for the ROV. This was made necessary by the unfortunate loss at sea last summer of the predecessor ROV.

The Sonar Systems group has just returned from the February herring fishery, where an evaluation was carried out on the following systems: the in-house 200 kHz single beam sounder, which digitizes the whole water column to separate midwater herring from the sea floor; a swath system from Kongsberg-Simrad-Mesotech, which accomplishes much the same task; and the EM3000 which, because of the 300 kHz operating frequency and the depth of the herring, was less successful.

Sales and Distribution has been responding to sales orders. As revenue targets are becoming ever more important to CHS, client relations with dealers and end users also become important. The group has spent much time working with a contractor to implement a new monitoring program. Supported by the private sector, it will provide much-needed strategic information.

Josef Cherniawsky and Bill Crawford published the paper "Comparison between weather buoy and Comprehensive Ocean-Atmosphere Data Set wind data for the west coast of Canada" in the August 1996 issue of *Journal of Geophysical Research* (Vol. 101, C8, 18,377-18,389.) They are presently preparing for publication a manuscript describing the response to wind forcing of surface currents in all waters surrounding the Queen Charlotte Islands, and extending south to Brooks Peninsula, based on five years of drifter measurements and the wind stress field measured by the weather buoys. As part of this study Bill has re-examined all CTD and bottle data of temperature and salinity measured in these waters, to prepare ocean climatology for this region and has developed baroclinic diagnostic models of seasonal currents in these waters, and barotropic models of wind-driven currents. Bill Crawford also submitted an article to *Lighthouse* (this issue) on tidal analyses and predictions.

For Globec, efforts have been placed into preparing historical times series of coastal winds along the British Columbia, Washington and Alaska State coasts, and to collaborations with Roger Street and Brad Bass of AES, Downsview, and Manon Faucher of AES, Vancouver. The funding was applied to assist Manon Faucher on a two-year program to prepare the optimal historical time series of coastal winds over the past 40 years. So far a 30-year time series of "Bakun" winds at all of the British Columbia coastal weather buoys has been acquired. Manon will compare these Bakun winds with weather buoy winds for the years 1991 to present that all these

buoys have been operating, to determine the suitability of Bakun winds to this project. She will also examine the NCEP/NCAR 40-year reanalysis winds, using statistical analysis to determine a suitable coastal wind stress field based on these model-generated winds, by comparing them with the shorter time series of winds measured at our weather buoys. This latter project is her primary focus.

Peter Chandler has almost finished his statistical analysis of the new tidal constituents for selected west coast ports. The Korean Post Doc, Dr. Sok Kuh Kang, will be at IOS for the next 12 months. He will use TOPEX data to improve our regional tidal models.

Geomatics Engineering

Work in Geomatics Engineering continues in support of Hydrographic Surveys and Chart Production requirements. 121 digital files were submitted to the division for checking and submission to the Hydrographic Data Centre (HDC) in 1996. Several older digital files were updated to current format and content specifications. New data received from hydrographic surveys, in the form of digital field sheets and digital chart revisory overlays, was also checked for format and content and submitted to HDC. Work in HDC continues on CHSDIR. An inventory of sources not incorporated in current ENC releases is being created under contract.

74 BC provincial government Terrain Resources Information Management (TRIM) files were acquired, in support of field sheet and chart construction and quality control, at no cost through an information sharing agreement. 24 historic field sheets were digitized under contract to Devel-Tech and Terra Surveys Ltd., in support of the production of the New Chart scheme for the north and central coast of BC, and as part of a continuing program to convert our hard-copy source data into digital form. Seven digital survey files of this year's surveys of the Fraser River were received from PWGSC (see Chart Production).

The Tide and Current Table Production software is mostly operational, with some further bug fixes required, and the documentation is about 70% complete. 1998 reference port predictions have been produced using this software. Preliminary software porting tests have been done from HP-UX to the DEC Alpha platform. Work is ongoing on the vertical control and tidal database under HIN, with the standardization on the Tide and Current Format (TCF) for tidal constituent exchange. Several people in Geomatics Engineering have had CARIS, Oracle and Windows NT training and can now provide additional system support for the other departments.

Hydrographic Surveys

Over the past few months, most of the field surveyors have been involved with checking and submitting last season's work. In an effort to incorporate 1996 field data in POD charts (see Chart Production) prior to the next navigation season, Arctic field sheets have taken precedence over west coast surveys conducted in Esperanza Inlet.

Our first EM3000 multibeam survey was conducted at the new Vancouver Port Corporation facilities at Roberts Bank. This survey has been completed and is a source for a new chart to be released imminently. A number of multibeam projects are scheduled for the 97 season. The first, already completed, is to map and portray the artificial reefs constructed at the foot of Bevan Avenue in Sidney. This survey is part of a larger project that will involve a great number of players examining many scientific aspects of these reefs. For more information, view the web page at the URL <http://www.nwis.bc.ca/pages/sidneypier>.

During June, the multibeam equipped Launch *Puffin* will survey portions of Juan Perez Sound in the QCI. This joint project with AGC, Parks Canada and the BC Government aims at tying together archeological and geological investigations and the 9000 year old Haida oral history which infers a sea level some 150 metres lower than present. The CHS will provide a geographical framework for this project as well as gather information for charting. Later in the summer the *Puffin* will be in Vancouver Harbour and Nanaimo.

The barge *Pender* will work on the central BC coast near Milbanke Sound. This survey is a continuation of previous Barge work conducted in the early to mid 1990s. The survey will commence in early May with the CCG towing the *Pender* from IOS and finish near the Labour Day weekend.

Once again, Arctic surveys will be undertaken from the CCGS *Nahidik*. This year the work will focus on the sparsely sounded Bathurst Inlet and Melville Sound. This work in support of the active mining activity in the vicinity will begin in late July in Cambridge Bay and finish in mid September.

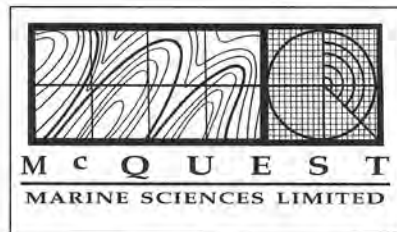
A new waterlevel gauging system is being prototyped and tested at Pat Bay prior to being deployed in the remaining PWLN stations. Improvements in accuracy and a reduction in data gaps is anticipated. The Tsunami gauges are to be outfitted with MSAT communication equipment this year.

HYDRO

Hydrographic Surveying Software.

Designed to bring the power and convenience of today's modern personal computer to the hydrographic surveying industry.

HYDRO, a general purpose system incorporating navigation and post processing options such as intelligent editing, sounding selection, automated contouring and volumes. The total solution for hydrographic surveying.



McQuest Marine
489 Enfield Road
Burlington, Ontario
CANADA L7T 2X5

Tel.: (905) 639-0931
FAX: (905) 639-0934

Hydrographic, Geophysical and Environmental
Surveys and Consulting Services



**THE GERALD E. WADE
ESSAY AWARD
COMPETITION**

**GERALD E. WADE
(1922 - 1986)**



Gerald E. Wade, a valued member of the Canadian Hydrographic Association, was born in Fredericton, New Brunswick where he received his early education. He volunteered for Service duty at 17 and served with the Canadian Forces for 5 years in the Mediterranean and Western European theatres of war. When his tour of duty had ended, Gerry attended Mount Allison University and earned his Engineering Certificate in 1949. He then went on to obtain a B.Sc. from Carleton University, a Dominion Land Surveyors license and two Provincial Survey Licenses in Nova Scotia and Prince Edward Island.

Gerry's life work was in the field of surveying, initially with the Topographic Survey Branch of the Department of Mines and Resources and then with the Canadian Hydrographic Service from 1951 to 1977. Gerry was an effective, hard-working Hydrographer-In-Charge of many survey operations coast to coast in Canada.

Subsequent to Gerry's retirement from the Canadian Hydrographic Service in 1977, he was instrumental in establishing the Hydrographic Surveying programs at Humber College of Applied Arts and Technology, Rexdale, Ontario and the University of Toronto, Erindale Campus, Mississauga, Ontario. He was one of the founding members, who first conceived the idea of the Canadian Hydrographic Association, and he worked hard nurturing it, both as its National President in 1977 and as a strong supporter of its basic aims. Gerry was also very supportive of young people and their activities. It is for these reasons, in conjunction with the high esteem that the members of the Canadian Hydrographic Association held of him, that we wish to perpetuate the memory of this fine man through the establishment of this essay competition.

OBJECTIVE:

to encourage students to expand their research, further their interests and improve their writing skills.

OPEN TO:

students enrolled in Survey, Geography, Marine Navigation, Cartography programs at any Canadian colleges or universities.

ESSAY THEME:

should relate the disciplines of marine navigation, cartography, geography, hydrography or land survey sciences and can be either technical or non-technical, or human interest oriented.

ESSAY FORMAT:

should be 1500 to 2500 words in length and must be submitted typed, preferably double spaced. Essays may also be submitted on disc if created in WordPerfect or Microsoft Word.

JUDGING:

a committee of judges will be formed by the Central Branch Executive of the Canadian Hydrographic Association for evaluating the essays and granting the awards. The two best essays will share the \$400.00 award as two prizes of \$200.00 each. All prizes will be awarded at the discretion of the judges and their decisions are final and binding on all the entrants.

PUBLICATION:

Lighthouse, the journal of the Canadian Hydrographic Association is published twice yearly with an international circulation of 700 copies. On author's approval, essays submitted to this competition will be directed to the Editor of the CHA journal Lighthouse for possible publication.

CORRESPONDENCE:

all correspondence with respect to this essay competition should be directed to the:

Canadian Hydrographic Association
Wade Essay Award
867 Lakeshore Road, PO. Box 5050
Burlington, Ontario L7R 4A6

CLOSING DATE: May 29 of each year.



CHA News Nouvelles de l'ACH



Pacific Branch

The CHA Pacific Region started its new year with a new executive. Fairly new that is, many decided to carry on with a second term and were elected by acclamation. Rob Hare accepted the nomination for the position of Vice-President. The new executive are Rob Hare, Mike Woods, Bodo De Lange Boom, Willi Rapatz, Brian Watt, Dave Gartley, Doug Cartwright and Alan Schofield. Past Vice President is Alex Raymond.

A number of executive meetings have been held recently. Notable is the planning of CHA's involvement in the Canadian Hydrographic Conference (CHC'98) to be held in the spring of 1998 in Victoria, BC. Pacific Region CHA intends to hold workshops and a social prior to the conference. Some ideas tossed around were GPS and Multibeam workshops. The Victoria Maritime Museum could be the location of our social. Information can be found in the CHC'98 link on CHS Pacific Region's Web Page.

Jim Galloway gave an illustrated talk at the Glen Meadows Golf and Country Club in December. Sixty five members listened to Jim's talk on "Stock Assessment using Hydrographic Tools".

A CHA brown bag seminar was held January 20. Andre Godin from Laurentian Region CHS gave a talk on "The Calibration of Shallow Water Multibeam Echo-Sounding Systems".

Tom McCulloch kept us spellbound with a very informative talk on the "Thirty Years of the CHA" at a luncheon seminar in late January.

Doug Cartwright is trying to put together a GPS seminar later in March.

The CHA/Quester Tangent H2O Bonspiel was held on Sunday, February 20 at the Victoria Curling Club. Our old venue at the Glen Meadows Golf and Country Club was destroyed by the weight of almost three feet of snow that fell late December.

As space was limited, 40 curlers quickly signed up. The scoring rules were changed this year to rolling a dice after each end to decide which "rules" were to be used to tally the score. The best die to roll was a three — Count all the rocks out of play. Of course this led to some rather high scores, but a fun time was had by all. This new format allowed everyone (novice to expert) a chance at winning a game or two.

Dave Paton won the popular "Turkey Shoot" with his rock closest to the mark.

Anticipation of a visit from the NOAA ship Raineer to the Institute of Ocean Sciences on March 11 had our executive frantically seeking a social event, but late word was the visit had been cancelled.

One of our sustaining members, Terra Surveys have been quite busy with many activities. Work has taken members to some exotic locations. Jim Vosburgh, Harry Olynyk and Peter Onyschtschuk to the Barbados, Dean Johnson in the Arabian Gulf, and Rick Quinn to the Philippines, India and Malaysia.



Prairie Schooner Branch

The Prairie Schooner Branch members have been carrying on as reported in the Fall 1995 Edition.

Andrew Brebner has become a consultant in Yellowknife. He has continued to be involved in mineral claims, subdivisions and a GPS control project in the Territories.

John Brigden has been working overseas in Cameroon, Gabon, Trinidad and the Gulf of Mexico.

Bruce Calderbank has been working in Canada and overseas in Angola and the North Sea.

Elizabeth Cannon and Gerard Lachapelle have continued to lecture and conduct geomatic research at the University of Calgary. Elizabeth is now the President of ION for 1996/1997. Gerard continues as the Department Head of Geomatics Engineering. Elizabeth and Gerard are the co-convenors for the KIS97 conference.

Mike Chorney has continued to work in the Netherlands supervising ocean bottom and land seismic surveys.

Alex Hittel has continued to work in Canada and overseas.

Hal James has continued to manage his company's Edmonton office and has been involved in extensive native land claims in the Territories.

David Thomson has continued to manage his company's Calgary office, which provides survey services in Canada, Burma and Thailand.

Central Branch

The first General Meeting of 1997 was held at the home of Brian and Anna Power in Burlington. Ted Cowan, DFO economist at the Bayfield Institute, spoke about his role in establishing the moratorium on Atlantic Canada's cod fishing industry. This was followed by the usual pizza (no anchovies!) and beer.

March's General Meeting was held at Terese Herron's residence in Waterdown. Vic Cairns of Fisheries and Oceans Canada, Fish Habitat Studies presented us with an informative slide show outlining the progress and achievements of their involvement in the Hamilton Harbour Remedial Action Plan. The revival of the shoreline and aquatic ecosystems in Cootes Paradise and Hamilton Harbour have considerably improved fish stocks, water clarity and quality in these waters. This has also given rise to more revisory survey items to chart the newly constructed artificial islands and shoals.

The 26th Annual H₂O Bonspiel was hosted at the Dundas Granite Curling Club on Sunday, February 16, 1997. Forty-eight curlers took part and as with all sports there were winners and non-winners! The winning team was skipped by Rick Sandilands, viced by Andrew Leyzack, Jeff Lesic-second and Chris Johnston-lead. Congratulations to the second place team, skipped by Brad Tinney, Chris Vogel-vice, Tim Pascoe-second and Greg Thiel-lead. This photo shows some of the exciting action.



Our most gracious thanks to our sponsors:

Canadian Hydrographic Association, Central Branch
Offshore Systems Ltd., Vancouver, BC
Canadian Hydrographic Service, Central & Arctic Region
Kongsberg Simrad Ltd., Dartmouth, NS
Telecom Computer Products, Burlington, Ont.
Universal Systems Ltd., Fredericton, NB
McQuest Marine Sciences, Burlington, Ont.
GeoNet, Central Bedeque, PEI
RC Marine Electronics Ltd., Dartmouth, NS
Earl Brown, Burlington, Ont.
Terese Herron, Waterdown, Ont.

Without you we could not have held such a wonderful event (26 years running!).



Bonspiel organizers Jacqueline Miles and Brian Power with the winning team: Rick Sandilands, Andrew Leyzack, Chris Johnston and Jeff Lesic.

A hearty welcome aboard! to new in-house members Daniel Brousseau, Mike Marsden, Paul Read, Al Shepherd, Dave Willis, Jim Weedon, Glen Toldi, Laura Sandilands and Carol Robinson and international student members Paul Stern and Rhea Metin Alkan.



Section du Québec

Le 18 janvier 1997, la Section du Québec tenait son assemblée générale annuelle des membres à Rimouski. Aucun Conseil d'administration n'a été élu, Bernard Labrecque assumera encore cette année le poste de vice-président. Suivant l'assemblée générale, Jean-Marie Gervais du Service hydrographique du Canada (SHC) a fait une présentation avec diapositives sur sa participation à la création d'un bureau hydrographique civil égyptien. Le SHC avait été demandé par la firme SNC-Lavallin pour réaliser la partie hydrographique de ce projet subventionné par l'ACDI. Cette présentation nous a permis de voir les difficultés rencontrées dans un pays où le contrôle militaire est important.

La parution 1997 de notre publicité en commun a connu un vif succès auprès des dépositaires autorisés de cartes et publications marines. Cette publicité permet de faire connaître la Section du Québec au public par la parution d'une publicité dans cinq revues d'importance. Il appuie aussi nos efforts à combler un poste permanent à notre magasin de cartes.

La Section du Québec a réussi à conclure des ententes avec le Centre marin des Blanchons, Voile abordable et plusieurs autres sociétés pour la réalisation et la vente de l'édition 1997 de son Carnet de bord. Voile abordable a intégré une page d'information sur l'Association sur son site Internet, l'adresse est "<http://www.voileabo.qc.ca/>

fhome.htm". La Section a l'intention de construire sur cet embryon pour mieux faire connaître l'Association et les services qu'elle offre.

Nous avons participé au Salon nautique & plein-air de Québec qui s'est tenu du 4 au 6 avril aux Galeries de la Capitale. Le lancement officiel du nouvel "Atlas des

courants de marée, Estuaire du Saint-Laurent du cap de Bon-Désir à Trois-Rivières" par le SHC a permis à la Section du Québec de récupérer une partie de cet engouement par la vente de l'atlas et par l'explication de l'hydrographie et de la marée aux visiteurs. La prochaine activité de la Section est sa participation à l'Expo-Nature de Rimouski à la fin avril.

2.00 \$

Carnet de bord 1997



Association
canadienne
d'hydrographie
Section du Québec



1997 Directors Directeurs de 1997



National President

Ken McMillan
489 Enfield Road
Burlington, ON
L7T 2X5

Bus: (905) 639 - 0931
Fax: (905) 639 - 0934

National Secretary/Treasurer

Brian Power
867 Lakeshore Rd.
Burlington, ON
L7R 4A6

Bus: (905) 336 - 4836
Fax: (905) 336 - 8916

Newfoundland Branch

Frank Hall
Director, CHA
Cabot College
Ridge Road Campus
St. John's, NF
A1C 5P7

Bus: (709) 758 - 7039
Fax: (709) 758 - 7126

Quebec Branch

Bernard Labrecque
Director, CHA
53 St. Germain Ouest
Rimouski, PQ
G5L 4B4

Bus: (418) 775 - 0600
Fax: (418) 775 - 0654

Ottawa Branch

Joel Box
Director, CHA
615 Booth St.
Ottawa, ON
K1A 0E6

Bus: (613) 995 - 4516
Fax: (613) 996 - 9053

Central Branch

Terese Herron
Director, CHA
867 Lakeshore Rd.
Burlington, ON
L7R 4A6

Bus: (905) 336 - 4832/4846
Fax: (905) 336 - 8916

Prairie Schooner Branch

Bruce Calderbank
Director, CHA
74 Gamelea Place
Calgary, AB
T3E 4K2

Bus: (403) 246 - 1265
Fax: (403) 246 - 3333

Captain Vancouver Branch

George Pugach
Director, CHA
5760 Cranley Dr.
West Vancouver, BC
V7W 1S8

Bus/Fax: (604) 921 - 9802

Pacific Branch

Rob Hare
Director, CHA
PO Box 6000
9860 West Sannich Road
Sidney, BC
V8L 4B2

Bus: (250) 363 - 6595
Fax: (250) 363 - 6323

Editor, Lighthouse

Terese Herron
Editor, Lighthouse
867 Lakeshore Rd.
Burlington, ON
L7R 4A6
e-mail: lighthouse@bur.dfo.ca

Bus: (905) 336 - 4832/4846
Fax: (905) 336 - 8916

CHA Academic Awards Program

Barry Lusk
Manager, Academic Awards
4719 Amblerwood Dr.
Victoria, BC
V8Y 2S2

Ph: (604) 658 - 1836



1996 Directors' Meeting Réunion des directeurs de l'ACH



Conference Call February 12, 1997 MINUTES:

Directors present: (12)

Ken McMillan	National President
Brian Power	Secretary/Treasurer
Dave Pugh	Past National President
Terese Herron	Central Branch
Frank Hall	Newfoundland Branch
Iona Monahan	Ottawa Branch
Joel Box	Ottawa Branch
Sheila Acheson	Ottawa Branch
Alex Raymond	Pacific Branch
Rob Hare	Pacific Branch
Barry Lusk	Manager Student Award
Paul Sawyer	Captain Vancouver Branch

Meeting convened at 12:00 EST by teleconferencing. The National President, Ken McMillan, called the meeting to order. Ken relayed regrets from Bruce Calderbank (Prairie Schooner) and Bernard Labrecque (Quebec).

1. Agenda

All directors had received a copy of the agenda by fax except Frank Hall, whose copy was faxed to an old number.

2. Minutes of the 1995 Director's Meeting.

Minutes received and accepted as read, action items discussed.

3. Outstanding Items.

Report on outstanding action items.

A) From 1993 Directors meeting:

3.3a. CHS/CIG Journal Exchange

We are sending CIG copies of Lighthouse and Terese is in contact with Susan Pugh regarding issues of Geomatica.

3.3c. Membership Lists

Terese Herron requires this membership list as well for publication in Lighthouse

Action : Directors

Rob Hare is working on a digital data base and will be circulating a letter to the branches letting them know what is required in the data base.

Action : Rob Hare 97/98

3.14. Insurance Coverage

Indemnification for Directors is not required as long as dual signatures are held and the bank balance is small.

Planned activities for the coming year are to be submitted to the National President by February 15th of each year.

Action : Directors

9. CHA Award

Discussion deferred to new business on the agenda.

B) From 1994 Directors Meeting:

14.3 Position of Past National President

Sean Hinds will put forward his motion that the immediate past president should act in an informal capacity as a non-voting advisor to the board of directors for a period of one year following the close of his or her term of office, for the purposes of continuity of office, at the 1996 AGM.

Action: Sean Hinds/Terese Herron

C) From 1995 Directors Meeting:

11 Memberships

The branches are dealing with student rates and are acquiring new student members.

13 Correspondence

Action was taken by Dave Pugh.

4. Presidents Report for 1996 - Summary:

- Trip to Malaysia on CIDA training project.
- Attended the Hydro '96 Conference in Holland and acted as a session chair person.
- Tended to CIG Council meetings as Hydrographic representative in Ottawa and Toronto.
- Spoke with Julian Goodyear regarding resurrecting the Atlantic Branch. Julian reported back that there was no interest in the region.
- President was contacted by UNB for CHA membership and reports that Central Branch will be looking after UNB membership.
- Attended Hydrographic Society's Annual General Meeting.

5. Treasurer's Report

A financial statement for 1995 was not available at the time of this directors meeting. Brian Power will contact Ray Chapeskie to get the 1995 financial report. The auditors for 1995 are Sheila Acheson and Jake Kean as appointed at the annual general meeting.

Action: Brian Power

Financial records and past financial statements require forwarding from Ottawa to Burlington.

Action: Brian Power/Ray Chapeskie

6. Vice President's Reports:

Newfoundland Branch: Frank Hall reported that the branch was not very active with only two meetings taking place. Frank will forward a written report and financial statement.

Ottawa Branch: Joel Box reported 53 members in their branch, activities in their branch consisted of lunch time presentations and a workshop on web site development. Joel Box to forward written report.

Quebec Branch: Report not available at this time. Membership stands at 36 with 2 Sustaining members.

Central Branch: Terese reported the branch held 6 evening meetings followed by seminars, the H2O Bonspiel and the annual Summer BBQ. Membership stands at 63 plus 23 International and 2 Sustaining.

Prairie Schooner Branch and Captain Vancouver: The branches have been dormant.

Pacific Branch: Rob Hare reported that the 1996 membership was at 76 of which one third is comprised of members from outside the CHS. Rob is to forward more details.

At this time Barry Lusk inquired about conference profits generated in the past - had they been forwarded to the National President? A discussion followed and directors were asked to look into this and report to the National.

Action : Directors

7. Communication

The National President wanted to know if there was interest by all the directors in establishing an Internet e-mail account. The cost would be approximately \$29-30 per month. The directors felt that there was no need for one since the branches all have access to E-Mail already.

The National President received a letter from a student awards manager concerning lower interest rates that will be available at the time of the GIC renewal. See discussion under new business.

The National President received a letter from CIG requesting our MOU to be renewed.

Action : Ken McMillan

8. New Business

Student Awards: Barry expressed concern about maintaining the correct level of funding for the student awards. The GIC is due to mature this year and will have to be reinvested at a much lower interest rate. Discussion followed regarding ways to handle this short fall. Barry to contact National to request further funding for the awards program.

Action: Barry Lusk

Paul Sawyer suggested that recipients of the student award should provide more background information about themselves and an article. This information and the article to be published in Lighthouse. Barry will look after making sure recipient writes more than 3 lines.

Action: Barry Lusk

The rules for the student awards as set out in the poster are the official rules. The rules appearing in Lighthouse will be amended to agree with the poster and bilingualized.

Action: Terese Herron

New bilingual posters to be printed.

Action: Barry Lusk

Lighthouse: Terese reported that the Fall edition of Lighthouse would be mailed out third week of March and the Spring '97 edition would be ready for the printer this May. Terese is still looking for branch news for the Spring edition.

Action : Directors

Terese reported that Lighthouse had enough funds to print the next issue of Lighthouse and a financial statement will be presented at the AGM.

CHS book by George Macdonald

Dave Pugh reported that the government is looking to have George's book published by this summer in both official languages. Dave indicated that the CHA could play a role in marketing and selling the book. Dave suggested that since the manuscript was in a digital format, inventories could be kept low, allowing us to provide a print on demand approach.

Paul Sawyer voiced a concern regarding profits for the sale of the book and the fact that the CHA was a none profit organization. It was agreed that this would not be a problem if the monies were put towards supporting the student awards program and Lighthouse.

Action: Ken McMillan/Dave Pugh

CHA Certificates: Terese reported that the current supply of membership certificates had run out and she was looking into ordering a new supply. Terese suggested a digital copy of the certificate be created and circulated to the branches for final approval.

Action: Terese Herron

In the past the CHA official seal was produced on different materials in colours of gold and red. All agreed that the gold seal should be the official seal.

Annual General Meeting: The date for the 1997 AGM is set for April 15th at 12:00 noon EDST. The meeting will be conducted by teleconferencing.

Proxy form and agenda to be sent out to all the branches.

Action: Ken McMillan/Brian Power

1998 Director's Meeting: The 1998 Director's meeting is to be held March 9th in Victoria, to coincide with the CHS conference being held the week of March 10-12.

Adjournment

Motion to adjourn. (14:16)

Rob Hare/Terese Herron -carried



Spring 1997

Lighthouse

Journal of the Canadian Hydrographic Association
Revue de l'Association canadienne d'hydrographie

LIGHTHOUSE originally began as an internal newsletter of the Canadian Hydrographers' Association (CHA) in the winter of 1969. It was conceived as a means of stimulating discussion between the branches of CHA. Over the years, **LIGHTHOUSE** has become Canada's national hydrographic journal. It still remains faithful to

the original goal of providing a mix of technical, historical and social information of interest to those associated with hydrography in Canada. But its circulation has expanded to include over 700 individuals, companies and hydrographic organizations in Canada and around the world.

1997 Advertising Rates

POSITIONING

The acceptance and positioning of advertising material is under the sole jurisdiction of the publisher. However, requests for a specified position will be considered if the position premium of \$25 has been included in the insertion order.

MECHANICAL REQUIREMENTS

Advertising material must be supplied by the closing dates as camera-ready copy or film negatives (Colour ads must be film negatives). Copy preparation, including colour, bleed and photos will be charged at the printer's cost plus 10%. Proofs should be furnished with all ads.

Single-page inserts will be charged at a full page body rate. Material must be supplied by the client. Page size must conform to the single page insert trim size (below).

PUBLICATION SIZE

	(Width	x	Length)
Publication Trim Size:	8.5"	x	11.0"
Live Copy Area:	7"	x	10"
Bleed Size:	8.75"	x	11.25"
Single Page Insert Trim Size:	8.25"	x	10.75"

Standard Ad Sizes:

Full Page:	7"	x	10"
1/2 Page:	6.875"	x	4.75"
or:	3.375"	x	9.75"

CLOSING DATES

LIGHTHOUSE is published twice yearly in Spring and Fall. The closing dates are **March 15th** and **October 15th** respectively.

PRINTING

Offset screened at 133 lines per inch.

RATES

All rates are quoted in Canadian Funds. Sustaining members receive a 10% discount.

	B & W	Colour	
		Spot*	Four
Outside Back Cover	NA	NA	\$1025
Inside Cover	\$300	\$400	\$825
Body, Full Page	\$275	\$375	\$675
Half Page	\$200	\$300	\$675
Single-page Insert	\$275	\$375	\$675
Professional Card	\$125	\$225	NA

*Spot Colour (Orange, Red or Blue)

RATE PROTECTION

Advertisers will be protected at their contract rates for the term of their contracts up to one year. Cancellations are not accepted after closing date.

All advertising material should be directed to:

Mr. D. Pugh, Advertising Manager
LIGHTHOUSE ADVERTISING
615 Booth St.,
Ottawa, Ontario
CANADA K1A 0E6

Telephone: (613) 943-1366
Fax: (613) 996-9053
e-mail: lighthouse@bur.dfo.ca



Lighthouse

Revue de l'Association canadienne d'hydrographie
Journal of the Canadian Hydrographic Association

Originellement à l'hiver 1969, **LIGHTHOUSE** était le journal de l'Association canadienne des hydrographes (ACH). Il représentait un moyen pour stimuler les discussions entre les Sections de l'ACH. De par les années, **LIGHTHOUSE** est devenue la revue hydrographique nationale du Canada. Elle reste fidèle à

son but original de fournir une source d'information technique, historique et sociale à ceux qui s'intéressent à l'hydrographie au Canada. Son tirage a augmenté pour inclure au-delà de 700 membres, compagnies et organisations hydrographiques au Canada et dans le monde entier.

Tarifs publicitaires 1997

EMPLACEMENTS

L'approbation et l'emplacement de l'annonce sont à la discrétion de l'éditeur. Cependant, toute demande d'emplacement spécifique sera considérée si une prime de 25 \$ est ajoutée à la demande de parution.

EXIGENCES MÉCANIQUES

L'annonce publicitaire doit être un prêt à photographier ou sur film négatif (les couleurs supplémentaires doivent être sur film négatif) et être fournie aux dates de tombée. La préparation de copie couleur, à fond perdu et de photos, sera chargée au tarif de l'imprimeur plus 10 %. Les épreuves devraient être fournies avec tous les suppléments.

Les insertions d'une page seront chargées au tarif d'une pleine page. Le matériel devra être fourni par le client.

DIMENSIONS DE LA PUBLICITÉ

	(Hauteur)	(Largeur)
Dimension de la revue:	8.5" x	11.0"
Encart libre:	7.0" x	10.0"
Publicité à fond perdu:	8.75" x	11.25"
Insertion d'une page:	8.25" x	10.75"

Grandeurs standards des suppléments:

Pleine page:	7.0" x	10.0"
Demie-page:	6.875" x	4.75"
ou:	3.375" x	9.75"

DATE DE TOMBÉE

LIGHTHOUSE est publiée deux fois par année, au printemps et à l'automne. Les dates de tombée sont le **15 mars** et le **15 octobre** respectivement.

IMPRESSION

Internégatif tramé à 133 lignes au pouce.

TARIFS

Tous les tarifs sont en devises canadiennes. Les membres de soutien ont droit à un rabais de 10 %.

	N & B	Couleur	
		Une*	Quatre
Couverture arrière	SO	SO	1025 \$
Couverture intérieure	300 \$	400 \$	825 \$
Pleine page	275 \$	375 \$	675 \$
Demie-page	200 \$	300 \$	675 \$
Insertion d'une page	275 \$	375 \$	675 \$
Carte d'affaire	125 \$	225 \$	SO \$

*Une couleur (orange, rouge ou bleu)

Les tarifs sont assurés aux termes des contrats publicitaires jusqu'à concurrence d'un an. Les annulations ne sont pas acceptées après la date de tombée.

Tout le matériel publicitaire doit être acheminé à:

Monsieur D. Pugh, Directeur de la publicité
LIGHTHOUSE ADVERTISING
615 Booth St.,
Ottawa, Ontario
CANADA K1A 0E6

Téléphone: (613) 943-1366
Télécopieur: (613) 996-9053
e-mail: lighthouse@bur.dfo.ca

digital ocean[®]



**Official Distributor of
Certified Electronic
Chart Data for the
Canadian Hydrographic Service**

**Distributeur officiel pour
les données de Cartes
Électroniques Certifiées pour le
Service Hydrographique du Canada.**

**Assisting Hydrographic Offices
to Build Electronic Chart
Infrastructure**

**Assister les Bureaux Hydrographiques
dans le but de développer l'infrastructure
de Cartes Électroniques**

• Electronic Chart Production

**S-57 Edition 3 ENC
Raster Chart
VPF Products**

• Production de Cartes Électroniques

**CEN S-57 Édition 3
Cartes Matricielles
Produits PPFV**

**• Distribution of Electronic
Charts and Updates**

**• Distribution de Cartes Électronique
et Mises à Jour**

**• Technology Transfer
and Training**

**Production Tools
Process Development
and Application**

**• Transferts de Technologie
et Formation**

**Outils de Production
Développement de Processus
et Application**

**• New Product Development
Digital Sailing Directions
Electronic Docking Charts
Multibeam Data Products**

**• Développement des Nouveaux Produits
Instructions Nautiques Numériques
Cartes Électroniques d'accostages
Produits en données multi-faisceaux**

Nautical Data International, Inc.

PO Box 127

St John's, Newfoundland

Canada, A1C 5H5

Toll Free: 800-563-0634

Telephone: 709-576-0634

Facsimile: 709-576-0636

Internet: www.ndi.nf.ca

Electronic Mail: info@ndi.nf.ca

Nautical Data International, Inc.

CP 127

St John's, Terra-Neuve

Canada, A1C 5H5

800-563-0634 :Sans frais

709-576-0634 :Téléphone

709-576-0636 :Télécopieur

www.ndi.nf.ca :Internet

info@ndi.nf.ca :Courrier électronique

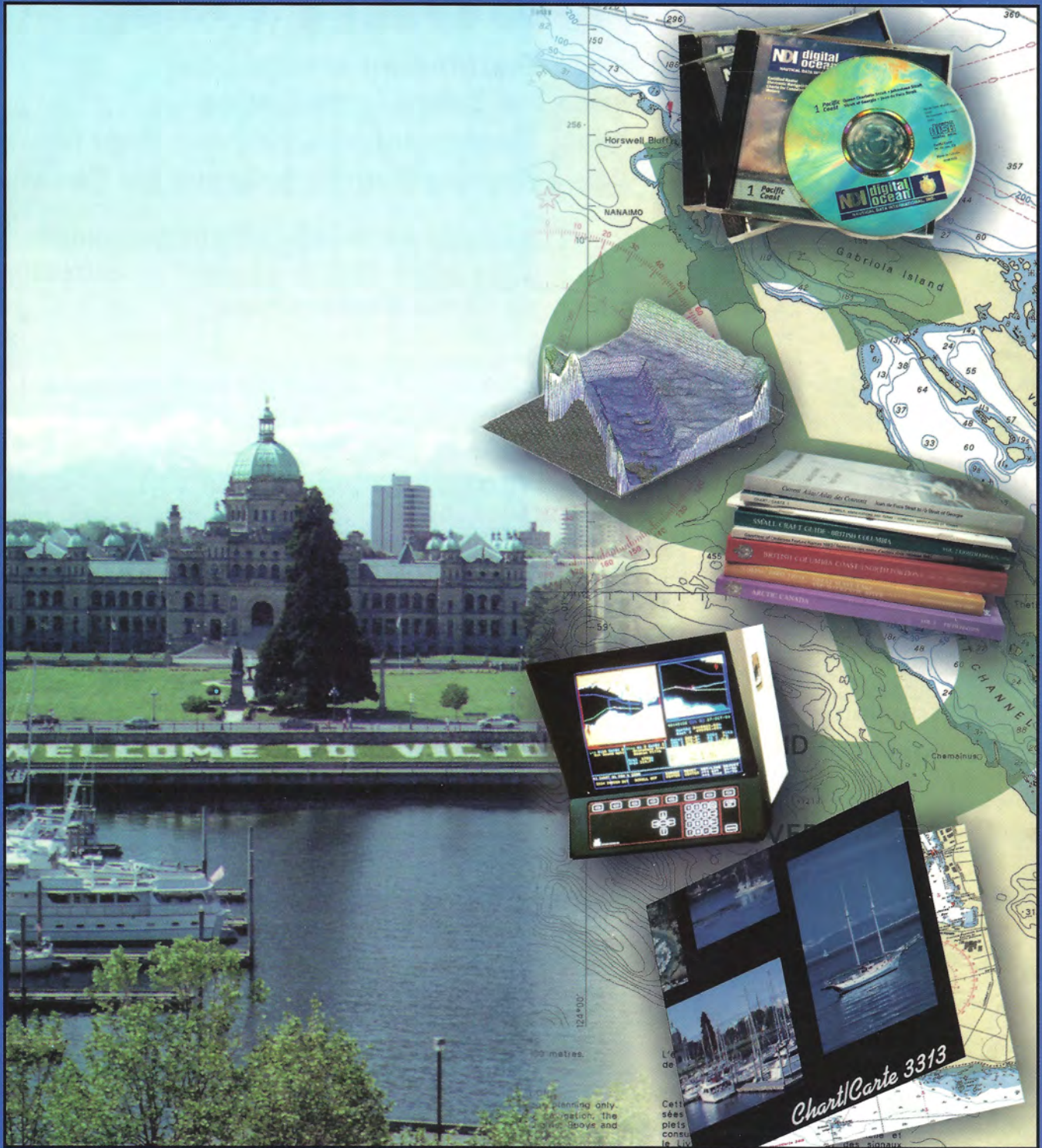
1998 Canadian Hydrographic Conference

Turning Data into Dollars

WWW: <http://www.ios.bc.ca/chc98/>

March 10-12, 1998

Victoria, B.C., Canada



CANADIAN
INSTITUTE
OF
GEOMATICS



ASSOCIATION
CANADIENNE
DES SCIENCES
GEOMATIQUES

