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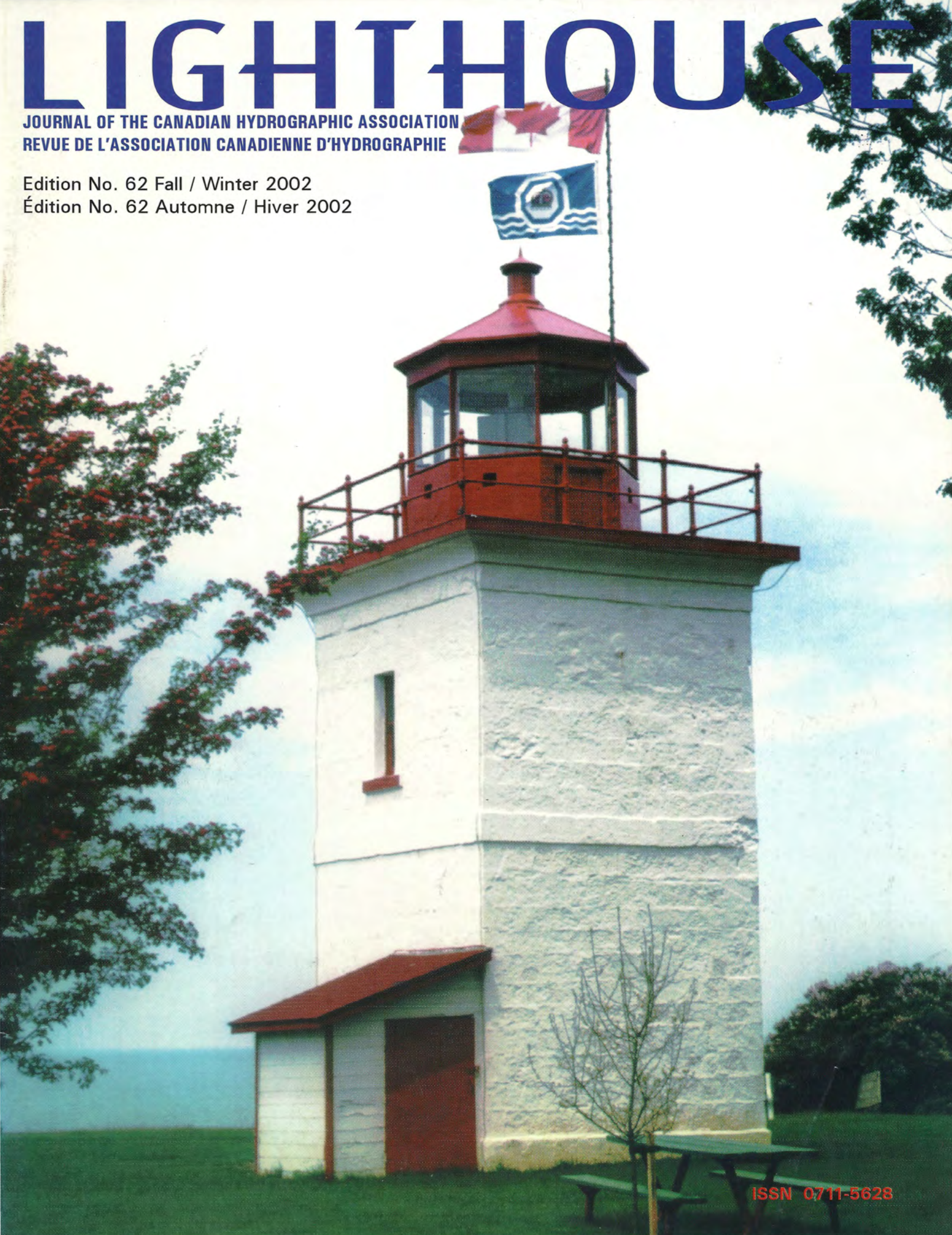

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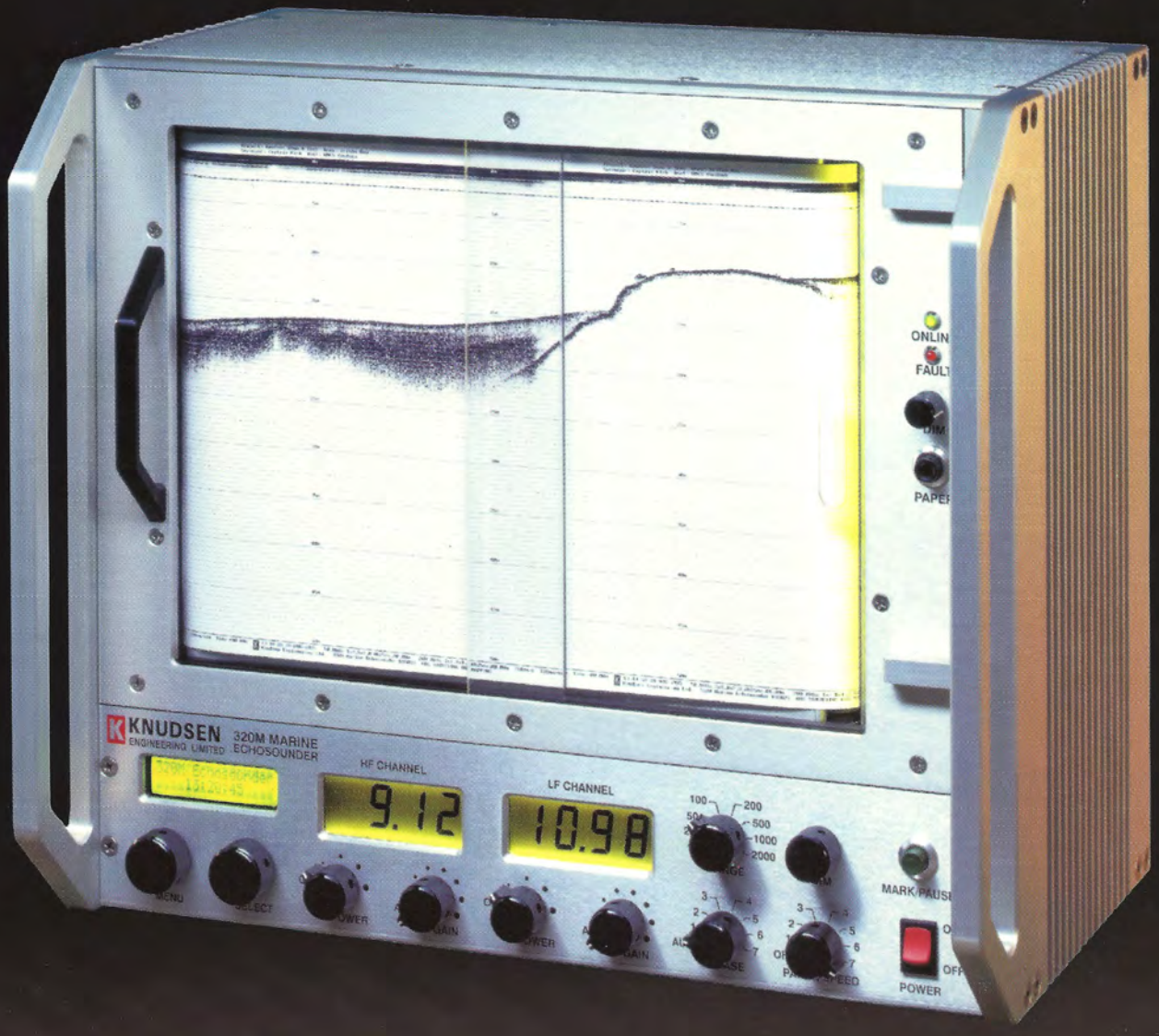

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Cover

Photo courtesy of Gordon Strathdee

THE GODERICH LIGHTHOUSE
Eastern Shore of Lake Huron
Port of Goderich, Ontario

Jan Hawley, Co-Chair, Goderich Marine Heritage Committee

Perched high on the lofty bluffs bordering the eastern coast of Lake Huron, the Goderich Lighthouse stands sentry over this historically charming port, commonly referred to as ***'the Prettiest Town in Canada'***. Although monolithic in design, the Caribbean blue waters of Lake Huron offer one of the most spectacular backdrops along these shores. Under the watchful surveillance of this powerful light, lie 300 miles of mine corridor chiseled in the earth's core at the toe of its bank, almost a third of a mile beneath the lakebed. It is the Goderich Light that provides comforting reassurance to the many ships, that come from all parts of the Great Lakes to fill their hulls with cargo produced from its salt mine, recognized as one of the largest working in the world.

Established in 1847, this lighthouse actually replaced one erected years before on the wrong site. It is reported that Major Strickland built the original log structure in a position that couldn't be seen by ships until they had passed the harbour entrance. This design flaw prompted the Imperial Government to contract Charmin Construction Company of Goderich to build a new lighthouse. Hence, relocation to its present site resulting in Goderich having the first and second lighthouses on the Canadian side of Lake Huron.

After an inquest of the Great Storm of 1913, referred in many renditions as ***"The White Hurricane'***, it was concluded that the light was inefficient. Under Government supervision, Mr. B. C. Munnings pulled down the residential part of the lighthouse and built the lamp room five feet higher to provide the proper lighting. In 1914, electricity was installed and a new light was erected. The lighthouse, as we know it today, is fully automated and operates year round.

Steeped in historic charm and small town splendour, this quaint and scenic community will immediately embrace you with its gracious hospitality and captivating beauty. Winner of the ***'Community in Blooms'*** National title in 1998 and first runner-up in the World Competition held in Japan two years later, Goderich is truly a port to be visited.

The Port of Goderich extends an open invitation to stroll its tree-lined boulevards bordered by vibrant floral displays and flanked by well manicured lawns proudly showcasing impeccably kept mansions, gracing the avenues of this engaging little town. For more information on the Port of Goderich, and this community's rich marine heritage, please visit its website at www.town.goderich.on.ca. or call 1-800-280-7637 (North American wide).

Photograph of the Goderich Lighthouse, Goderich Ontario
compliments of Gordon Strathdee, Photographer

As a young boy, Gordon came to Goderich during a school outing, marking the beginning of a long-term love affair. Using his passion for photography as a vehicle, Gordon recently published 'Tiger's Legacy', a pictorial rendition of the 'Prettiest Town in Canada', a tribute to the memory of Dr. William 'Tiger' Dunlop and the Port of Goderich, which he founded in 1827.

DID YOU KNOW . . .

FIRST NAVY UNIFORMS

Until the year 1747 the dress of sailormen was very nondescript. At that time King George II ordered uniforms to be worn by all navy men, as a means of boosting their appearance and morale.

SCOTTISH ENGINEERS

So strong is the tradition that Scotsmen are born marine engineers, that many folk maintain that you can yell "Are you there, Mac?" into the engine-room of any ship afloat (regardless of nationality) and receive an affirmative answer.

Editors' Note / Note des rédacteurs

The recent Canadian Hydrographic Conference, as reported elsewhere in this journal, was a great success. Participation was higher than anticipated and the quality of the technical and social sessions was excellent. We are very pleased that *LIGHTHOUSE* was part of this success as it was well received and got significant exposure during the conference. The special conference edition of our journal was distributed to approximately 450 conference participants. We wish to thank those who took the time to pass on many positive comments regarding the journal.

Also, we send our congratulations to the conference organizing committee for the new and innovative ideas they implemented for this meeting of hydrographic experts from around the world. Of special note is the emphasis on marine safety, the inclusion of the recreational boating community and the "Toast and Topics" session. We are, of course, pleased that the CHA launch '*Surveyor*' and Admiral Rithcie were again reunited at this conference. What a wonderful sight to see Admiral Ritchie at sea on the *Surveyor* and taking part in the hydrographic re-enactments as well as participating in the traditional 'toast to the King'. Well done Sir!

As the editors of your journal, we are very gratified to see the Association seemingly getting its second wind. New ideas and original thoughts are beginning to surface. If you want some examples, please read the message from the National President. We would be pleased to publish your thoughts on any of the new initiatives that are discussed. Get your comments to us, as it is your association and your journal.

We are happy to announce that we have recently provided an opportunity for individuals, organizations, universities, government departments and others to become "Corporate sponsors of *LIGHTHOUSE*". The new sponsors, as well as the list of benefits, are included in a separate part of this edition. Our sincere thanks go out to those who enthusiastically joined and we look forward to adding to this list of significant sponsors.

You will be pleased to know that our subscribers' list is growing at a steady rate, as is the list of sustaining members in the CHA. We believe this is happening because *LIGHTHOUSE* continues to be of great value to those in the marine community.

Thank you for your continued support and your kind words of encouragement.

Earl Brown and Paola Travaglini

directors directeurs

Message from the National President
Mot du Président national

Since 1998, the Friends of Hydrography (FOH), a small group of retired CHS employees, has been compiling a historical record of the people, ships and the contributions they've made to hydrography in Canada. FOH and CHA share similar interests, objectives and mandates. For example, both our organizations share a desire to document and communicate various aspects of the history of hydrography. We recently met with Ross Douglas and Sid van Dyck, founders of FOH, to discuss the likelihood of the incorporation of FOH under the CHA umbrella. At the time of this writing, a proposal has been put before the CHA Board of Directors for their consideration and I am enthusiastic about the potential to enrich our association when FOH joins with us. Please take the time to read about the FOH at www.canfoh.org.

Also under consideration are the benefits of CHA joining with the International Federation of Surveyors (FIG) through Commission 4. Where traditionally a country could be represented at FIG by only one national surveying and mapping organization, new membership guidelines regarding multiple national representation have provided for the acceptance of multiple representation by various disciplines, such as hydrography. FYI- The Hydrographic Society of America is presently considering federating under FIG Commission 4.

This may be old news for some of our readers, but as a result of their desire to become more autonomous, the various branches of The Hydrographic Society (THS) have instigated a restructuring and reorganisation of THS into what is now a Federation of Hydrographic Societies. So, another avenue to explore is this new Federation of National Societies. Recently at Hydro2002, I had the opportunity to speak with Helen Atkinson of THS on the benefits which could be realized by CHA members in federating with THS. Helen also spoke of the possibility of a membership agreement with FIG Commission 4 as part of membership in THS Federation.

Why federate? Rest assured this will be the topic of future correspondence from the CHA's National office. Meanwhile I'd like to offer a few potential benefits:

Hydrographic surveyors and nautical cartographers are professionals by virtue of the work we perform, and in the interest of safety, we owe a duty of care to our clients, who are the public at large. CHA will continue to strive to serve its members professionally and technically by promoting continual professional development (CPD) through seminars, workshops and conferences. As you will see in this edition of Go F.I.G.ure, one of the functions of Commission 4, specifically workgroup 4.4, focuses on CPD. Federating with FIG could help CHA access additional sources for CPD.

Federation with FIG brings with it a level of professional status in that FIG member organizations include individuals that possess a level of academic qualification and typically have achieved professional or technician recognition. Before we could even consider joining, it would most likely be imperative for us to take inventory to define the competency profiles of our membership. FIG has formal relations with IHO and the International Cartographic Association (ICA) through the FIG/IHO/ICA International Advisory Board (IAB) on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers. The question then arises, are we better off using international standards or a "made-in-Canada" (such as a commission from the Association of Canada Lands Surveyors (ACLS)) solution as the benchmark? If we consider that a fair portion of Canadian talent in the field of hydrography winds up overseas then perhaps measuring up against an international standard is the way to go.

Additionally, members of a professional association should adhere to a model code of ethics (CoE). Central Branch VP Tim Janzen and I have, in recent months, discussed this as beneficial for CHA. Any federation which has its own CoE would, in effect, be adopted by any national association joining that federation and I'm aware that THS is considering the adoption of a CoE.

If raising the profile of hydrography and hydrographers in Canada sounds like a big task? It is, and this is what CHA really ought to be here for.

Andrew Leyzack

The *WEXFORD* – Elusive shipwreck of the 1913 Great Storm

By: P. Carroll, Huron County Historical Society,
Photos by: M. Wachter and G. Wachter, Eriewrecks

The steamer *Wexford* presents a colourful marine history – from her launch across the slipway in the spring of 1883 at Sunderland in northeast England, to her tragic disappearance, along with 18 other vessels, in the Great Storm of November 1913. Her loss on November 9, somewhere in the depths of Lake Huron, has led to a series of seemingly endless searches to identify the mystery location of her underwater tomb. She has eluded all of us, successfully, until a $100 fish finder and a persistent angler tagged the really big one in August of 2000. She lay right where she was reported to be, just as declared in the *London Evening Free Press* of November 14, 1913!

Wexford: She was an unusual vessel on the Great Lakes. The centre pilothouse, twin-sparred profile presented a visible difference from other lake freighters. The British, flared bow configuration was common for package freighters on the high seas but not often seen on the inland lakes. Archives photo courtesy of Dr. W. N. Watters.

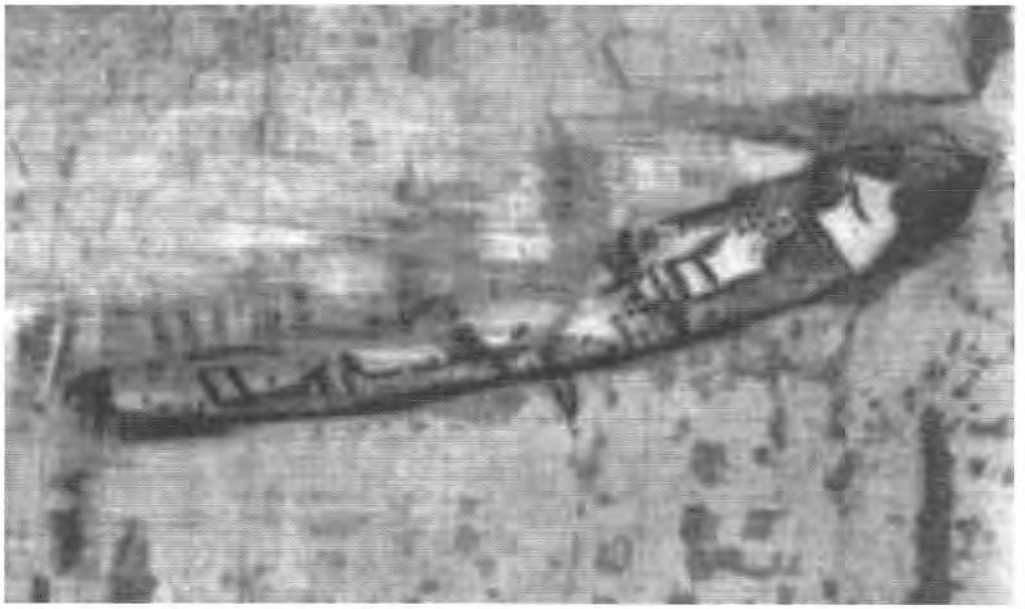
She was ready to be found and presented herself boldly to the team of sidescan searchers who, ironically, were also working just a few kilometres to the north. It seems that the lucky angler and also the diver who had organized the sidescan search worked in the same Ford plant! To conpound the irony, David Trotter, well-known Great Lakes shipwreck finder, who was contracted to do the sidescan work, was also a former Ford employee. (Probably doesn't matter a damn, but the guy who was piloting the survey tug – yours truly - has always driven one of those vehicles!) Maybe that silly coincidence fits well with the crazy conjecture that she, as a package freighter, was carrying a load of Model 'T' Fords when she went down!

She was one of three as yet unfound shipwrecks from the furious 'white hurricane' of November 1913. The 'Great Storm' as it was called, stilled the lives of nearly 250 sailors in a 72-hour period of fury. The actual numbers are undetermined. Crew lists were not always complete, nor kept up to date on a number of the vessels.

Still to be discovered is the *James S. Carruthers*, a 168m Canadian grain freighter owned by the St. Lawrence and Chicago Steam Navigation Co., lost on one of her first voyages. She was a brand new, state of the art vessel, recently launched in the Georgian Bay shipbuilding port of Collingwood. Rumours abound, on the Canadian side of Lake Huron, about the impending discovery of the *Carruthers* somewhere North of Goderich.

Also, still missing is the ship *Hydrus*, the 133m ore freighter, sister to the *Argus* (also lost – but found in 1972), owned by the Interlake Steamship Company of Cleveland. Perhaps the shipping and diving season of 2002 will confirm the speculative tales and confirm the whereabouts of another one of these elusive wrecks.

Following the fierce November storm, chronicles locating the *Wexford* were offered from within a few days of the tempest. Accounts of wreckage from the ship – and bodies – along the Ontario shore, commencing south of Black's Point south of Goderich, all the way through to Kettle Point, near Thedford, abound. Public documentation in the newspapers of the day suggested that an offshore location at St. Joseph was the most likely place of the foundering.



Sidescan: David L. Trotter of Undersea Research Associates took the first sidescan images of the *Wexford* wreck, in August 2000, while working on contract to the Goderich Marine Heritage Committee. The computer image, created and enhanced by Paul Carroll, shows the hull, in an upright position, lying in 23m of water about 14km offshore from St. Joseph, on lower Lake Huron.

There were 'hushed' anecdotes about the *Wexford* pilothouse washing ashore at the Hicks farm by the Cut Line Road, south of Naftel's Creek, where it was said to have been pillaged and stripped of its instrumentation. There is speculation that the brass ship's clock, built by the Crosby Steam Gage and Valve Company, can be seen today, if one has knowledge of the right people to call.

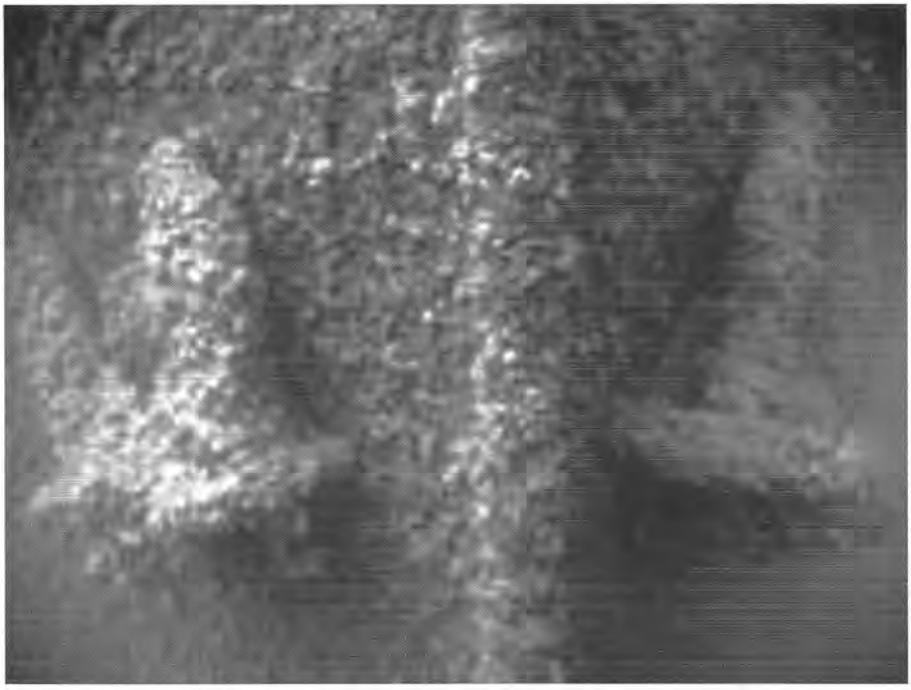
With waning interest, and the devastating impact of the storm fading into history, nothing more was heard about the *Wexford* until 1918. At that time, the Captain of a freighter, fighting his way through an

The recovery of the contorted and partially frozen bodies of as many as 7 *Wexford* sailors between there and Grand Bend, and the retrieval of an unused lifeboat, seemed to confirm the offshore St. Joseph location. The recovery of the body of Captain Bruce Cameron at Kettle Point may have signalled a location even further south.

In spite of the evidence at the time of the tragedy, alternate accounts were provided.

The day after the storm, there are two separate tellings of twin masts being sighted several miles offshore, south of Goderich. One account was by a tug on search and recovery work; the other by a farmer, Knyvet Naftel, checking the lake bank of his father's farm for erosion damage after the fierce tempest.

Dynamo: One of the ship's dynamos provided power for lights and equipment not powered by steam from the ship's boilers.



Bow and anchors: The anchors are clearly locked in place. Her Captain made no apparent effort to hold ground during the storm. One theory suggests that he lost power at the height of the tempest.

August storm, northwest of Kincardine, claimed that he saw, momentarily, in a trough, the twin masts of the sunken steamer *Wexford*. He was certain that he had encountered the *Wexford*, being knowledgeable about its deck and spar configuration.

Further, local marine histories illustrate the *Wexford* shipwreck to be found, in at least three separate locations, running from just north of Goderich to a location off Grand Bend.

The most credible discovery and salvage operation was reported in various publications in 1975, when Bill Humphries, a marine historian; Captain Robert Wilson, a retired ship's master; and a team of divers claimed to have found the wreck. Published accounts state that they had acquired a salvage permit from the Federal Government to begin removing equipment and artifacts from the sunken *Wexford* in 23m of water, off Black's Point, about 6 kilometres south of Goderich.

It is claimed that artifacts would be placed in the museums at Goderich and Mooretown (near Sarnia) and in the custody of the Knox Presbyterian Church, where an annual mariners' memorial service is held.

There are a number of other strange tales. One claims that the 76m hull has been dragged, underwater, to her present location!

She has been found, finally. We know that she sits, virtually upright, in 23m of water, with her decks at about the 17m level. At first impression she was thought to be sound and secure for safe sport diving, but following the detailed survey conducted in the summer of 2001, there is some evidence of deterioration and de-stabilization of certain parts of the hull and deck structures. Regardless, she presents a wonderful dive site for those who want to swim through and around the hull, and into the accessible areas in the holds and engine room areas. The deck area around the bow is gradually collapsing and seems to be held in place by the chain of the main anchors, still locked in place at their chocks. The area beneath, including the chain lockers and the crew cabin

Steering Mechanism: The secondary steering mechanism was located on the stern deck, open to the elements. A small portion of the wheel still remains.

Below decks: This spectacular view illustrates the open area below decks through which a diver can easily swim. There is good light. Visibility can range from just a few metres to 10-15m depending on surface conditions and the presence of a 1.5 to 2 knot current.

area, is inaccessible and considered to be unsafe.
Although most of the hull and its interior are encrusted with a thick coating of zebra mussels, there are areas that the razor-backed underwater glutinants have mostly avoided.

Artifacts abound, although many rest unseen and inaccessible in the two-metre bed of silt lining the open holds. There is a myriad of crockery, china, tableware, and remnants of human occupation. There are spare porthole glass covers, radiator coils, and pieces of lamps, furniture and plumbing items.

The officially sanctioned survey has now been completed. When the report is written during the winter of 2002, it will reveal no surprises, nor will it unveil any secrets about how the vessel perished or why she remained hidden for 87 years.

Her discovery has led to a renewed interest in charting the underwater heritage of the Ontario Lake Huron shore. With most of the Michigan shoreline surveyed, and the establishment of underwater marine heritage preserves, the focus will now shift to the systematic sonar search of these waters – particularly between Grand Bend and Chantry Island – to search for any number of uncharted wrecks. Of course, the *Carruthers* and the ore carrier *Hydrus* top the list of vessels being sought.

There are accounts, documented in the most detail, by David Swayze in his well-known list of shipwrecks on the Great Lakes, of up to 40 or even more wrecks lying somewhere on the Huron lake bed begging for discovery and attention. Marine historians and the dive community will be the beneficiaries of such work.

One group, inspired by the rich maritime heritage along this part of the Lake Huron shoreline, is the Port of Goderich Marine Heritage Committee. The mandate of that group of volunteers is to discover, document and promote maritime history. It was the founding Chair of that committee, Bob Carey, who instigated the formal *Wexford* hunt, following many years of his own informal searching. The group is creating a Marine Heritage Walkway along the Port of Goderich waterfront. Several shore dives are being promoted for beginners on two shallow-water wreck sites and the remains of the old Canada Company piers, where a lifeboat is being sunk next spring as an underwater point of interest. Plans are also afoot for an artificial reef in the next year or two.

But first, comes the *James Carruthers*. "She's out there just waiting for us to greet her!" declares Jan Hawley, the current Co-chair of the Marine Heritage Committee, with a lively sparkle of knowing satisfaction in her disclosure.

Do you suppose she's on to the location?

About the Author...

Paul Carroll is a marine heritage enthusiast who grew up as a 'wharf rat' at the Port of Goderich, on Lake Huron. He had the privilege of gamming with the last of the old 'salts' who gave us some of our most colourful marine history. His first part-time job was to pilot the fishing tug, *Larry John*, for Ab Leonard, the last in a line of lake fishermen who saw the transition from sail to mechanized power in vessels working the Great Lakes. Paul was part of the sonar team that surveyed the *Wexford* shipwreck. He is an advanced open water diver.

Websites: www.shipwreckwexford.ca and www.eriewrecks.com

Minimising Offshore Survey Product Liability

By: B. Calderbank, FRICS, CLS, P. Eng.
Hydrographic Survey Consultants Intl. Ltd., Calgary, Alberta, Canada

Abstract

Some current best practices are discussed in order to minimise or reduce liability in a variety of offshore survey products. Also discussed are what steps can be taken to ameliorate possible claims or legal action should the offshore survey product contracted and delivered be different.

Introduction

In this article, offshore survey products are meant in the broadest sense. Not just survey, navigation and positioning, but the purpose or projects that the dependent results are used for in the environmental, geophysical, geotechnical and hydrography. No work in the offshore industry can proceed efficiently without good positioning data and survey information. From the initial 2D and eventual 3D surveys through to the commissioning of the offshore installation and pipelines, offshore survey is the link between the various pieces of the complex puzzle.

Although survey, navigation and positioning is critical to these operations, it is used to derive specific ends. In seismic surveys, the positioning of a source and receivers is to eventually define sub surface strata. In site surveys, the positioning (again) of a source and receivers is to eventually define near surface strata, and the positioning of echo sounder, side scan sonar, sub bottom profiler, remotely operated vehicle (ROV) and other tools is to be able to map the surface features and hazards. In rig positioning the placement of the sub sea tree over the chosen location, and ensuring appropriate anchor placement when required. And if the drilling is successful, the positioning required for the installation of platforms, seabed structures and pipelines to exploit the oil and gas resources.

Whatever offshore survey product is required, necessitates that both the Client and Contractor should know what are the achievable results in the expected environmental and site conditions. However, there are many instances where the final outcome is not known or appreciated until the survey product has been delivered. Consequently, there are occasions where it is not possible to provide the required survey product because a survey is needed beforehand in order to help complete a proper set of specifications. It would be a rare situation where it would be cost effective to allow this to occur. How then to help avoid situations where there are differences between the Client and Contractor with respect to the offshore survey product contracted and delivered, which could lead to possible claims or legal action?

Some current best practices are discussed to hopefully provide a means to avoid such confrontations. In addition, some general comments are provided on situations within and outwith specifications that could be borne in mind by both parties to ameliorate possible claims or legal action should the offshore survey product contracted and delivered be different.

Seismic Acquisition

At the start of a field's development, the use of remote sensing leading to 2D regional and more focused 3D seismic surveys are the elements which allow the Client to identify the prospectivity of any geological leads. Depending on the area there may be wildcat wells drilled in the prospect to aid in the modelling of the seismic data. However, because the development is only in its early stages, the Client may have only an imprecise image of the geology.

To allow for this uncertainty, the general industry approach has been for 3D surveys to acquire the geophysical and positioning data of a good standard. For instance, with respect to survey, navigation and positioning, as detailed in Calderbank 1998, which is achievable and practicable. These guidelines invariably ensure good positioning and good streamer control with subsequent low streamer noise seismic data (other variables such as ship and tow noise being favourable).

Of particular importance is that the datum, spheroid and projection information from the 3D survey is correctly input into the seismic interpretation software. As is true throughout the exploration and exploitation phases, this critical process needs to be paid close attention least inappropriate combinations and values are used, and hence the survey and all its results are relocated unintentionally. For seismic data the UKOOA P6/98 format could be used to transfer bin data information and coverage parameters along with the correct geodetic information to facilitate this process.

In addition, poor or marginal positioning data, particularly that caused by poor or marginal weather, is generally excluded from the data set. The various navigation post processing models used in the seismic industry expect that good data will be input into the model to derive the positioning solution. If the observables are filtered and smoothed beyond the standard diagnostic filters, then there is understood to be a level of uncertainty in the derived positions. None of these systems generate information that can be used in real time to derive the expected accuracy in marginal or poor weather. Consequently, unless reprocessed and analyzed, it is not known with any certainty how the relaxation of navigation specifications in such situations, will affect the final positioning data or consequently the final seismic interpretation.

As an aid, when considering exploration drilling, the seafloor morphologic renders from the 3D seismic survey can be compiled from the seafloor picks of the 3D seismic data set and used in geohazard and environmental assessments to characterise the seafloor. In deep water, the coverage of depth soundings by 3D seismic and multibeam sonar are at a similar scale. In theory, the best water pick achievable is probably within ± 1.5 metres of the actual bottom. See Mosher et. al. 2002. In practice, depending on the geomorphology and sediments, large errors may occur, especially in areas where there have been recent active flows. Even so, using water depth picks from the seismic data could help alleviate unwelcome surprises when the hazard site survey is conducted, and could be used to good advantage in the right area.

Site Surveys

Once a prospective drilling target has been identified, a hazard site survey will be used to map any geohazards in the local area, both on the seafloor and near surface. If allowance has not been made in the specifications, it is possible that hazards or potential hazards may not be surveyed appropriately due to the lack of onboard equipment that was not known would be needed. In remote locations where logistic constraints would hamper ready access to needed equipment, this could impose a severe handicap on the site survey operation.

Retaining consultants who have worked in the prospect area previously would help to ensure these factors are taken into consideration when preparing the bid package. In addition, such experience can be helpful in identifying local geohazards, such as shallow gas and boulder fields.

The development of Autonomous Underwater Vehicle (AUV) survey platforms for deep water applications has provided considerable improvement in the survey product capabilities in this area. The high resolution survey data that can be acquired to a maximum depth of 3000 metres with an AUV in a matter of hours, would have taken conventional deep towed systems several days. Critically, the AUV positioning accuracy achievable has improved to ± 5 metres for post processed data, which makes the acquired deep water geophysical data very easy to process and interpret. See George et. al. 2002.

Rig Positioning

With the advent of GPS, the potential for incorrect positioning of the drilling rig has been reduced. However, it is still essential that the Client, or their consultants, and the Contractor are fully aware of the datum, spheroid and projection to be used. Generally, a host country will require the final well co-ordinates to be in the legal datum of that country, while the seismic acquisition may have been acquired on the WGS84 datum.

The geodetic transformation of offshore positioning data from WGS84 datum may not be a simple process if the host country geodetic network has not been extended offshore or there are no legally recognised transformation parameters available. The Client may, independently or in conjunction with other offshore operators, undertake the necessary geodetic survey in order to define appropriate multi-parameter transformation values, as opposed to the more limited 3 parameter Molodensky shift. This may generate goodwill with the host country and allow offshore survey positioning data to be reliably exchanged as required.

In developed areas, the requirement to avoid damage to structures and pipelines on the seabed will be paramount. For previously installed features, the positioning methods and when installed could be researched. This will allow decisions on whether the positioning would be acceptable to the current needs. Possibly, during the site survey, important items could be mapped to ensure positioning accuracy compliance. Situations where co-ordinates are defined for fixed structures for legal or political reasons, which are not the actual co-ordinates, need to be identified and dealt with appropriately.

Installation and Construction Support

Once a field has been proven, the Client will need to install structures and pipelines to get the oil and gas to market. Desk studies, possibly using satellite imagery, will help identify possible locations and routes, not only onshore but offshore as well. The availability and quality of satellite imagery has improved markedly over the last few years and should be used to full advantage. Site and route surveys will be required in order to choose the optimum location(s).

Installation and construction survey support should be aware of the potential for acoustic interference which needs to be examined closely to ensure nothing untoward occurs related to the positioning of various drillships, lay vessels and survey vessels when operating in close proximity. Appropriate frequency allocations for the ultra short (USBL) and short baseline (SBL) systems, and priority of use standards should be addressed and understood by the Client and the various Contractors.

The software and hardware, for survey supporting dredging, installation and construction, needs to be appropriate to the environmental and site conditions. The correct speed of sound in water needs to be obtained via regular periodic casts, particularly in deep water. Survey offsets and gyrocompass corrections should be accurately attained and monitored as required.

Having looked at some best practices to ensure good quality survey products, steps to minimise offshore survey product liability will be discussed.

Performance Within Specifications

In order to understand the issues necessitating the required survey product, a detailed desktop study prior to the commissioning of the survey can alleviate many uncertainties and lead to adequate specifications and inclusion of optional extras. Both the Client and Contractor need to be able to adapt and be responsive to situations and results obtained while a survey is in progress. Generally, survey specifications should be used as a guideline to ensure quality survey data and an achievable survey product. This will require, at times, a flexible attitude by both the Client and Contractor to the survey

objectives. To achieve this, the Client and Contractor lead personnel need to have a certain level of shared confidence in the capabilities of the survey platform and equipment to achieve the aims of the survey.

The Client and the Contractor should have confidence in the Client Representatives so that while in pursuit of the survey objectives, sufficient provision and decision-making latitude is allowed and acceptable. For example, the role, responsibilities and benefits of the Client Navigation Representative have been discussed in Calderbank 2001.

Good communication with the Client ashore, including the availability of adequate access to email and voice communication systems, is necessary in order to be able to inform, discuss and act on daily offshore activities and data results. It is important that decisions referred ashore are made in a timely fashion so that potential delays are avoided and the project is completed efficiently to everyone's satisfaction.

Performance Outwith Specifications

Consideration may be appropriate that to some extent the specifications provided and the deliverables required may be capable of adapting to technological and reporting advances due to delays between the contract award and execution. Poorly worded or limited scope specifications may not protect the interests of either the Client or the Contractor. A healthy, positive attitude to the process is needed to ensure that the Client achieves the objectives of the offshore survey and the Contractor is compensated fairly under the contract.

Due diligence by the Client to ensure that the Contractor to be engaged will be capable, has the proper equipment, and the necessary trained and experienced personnel are essential. By the same token, the Contractor via its own processes must be informed about the Client's business culture and practices with respect to survey services provided and payment received, and make appropriate preparations and allocations.

During offshore surveys, blunders and errors can happen, which can have environmental, safety and cost implications. These can be minimised by the Contractor having procedures and standards in place that are understood and acted upon by the Contractor's personnel and third-party suppliers. Such situations can also be minimised by the Client through the use of qualified and experienced Client Representative consultants.

An arbitration or mediation process should be agreed beforehand as part of the contract, as should all other liability and insurance issues. Such a process could be used in situations where the Client may have been provided with services and products that are outwith the contract specifications and a claim or legal action is contemplated. Alternatively, in situations where the Contractor does not believe it has been adequately compensated under the contract, legal action would be the only remedy. Arbitration or mediation would ensure a fair and speedy settlement of any dispute arising from the provision of the survey services or product. The liability of the individual offshore surveyor in such cases has been discussed in Calderbank 1992.

Acknowledgments

The author wishes to thank various colleagues for their suggestions and comments.

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About the Author...

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Lighthouse puzzler

By Beth Weller

	Cartographer	GIS Specialist	Hydrographer	University lecturer	Australia	New Zealand	United Kingdom	USA	Canadian Power and Sail Squadrons	Company of Masters Mariners	International Hydrographic Organization	The Hydrographic Society
Bob												
Peter												
Steve												
Tim												
Canadian Power and Sail Squadrons												
Company of Masters Mariners												
International Hydrographic Organization												
The Hydrographic Society												
Australia												
New Zealand												
United Kingdom												
USA												

Lighthouse Puzzler # 22

Four CHA worthies assembled in Burlington this past summer for the Multibeam training course arranged by Central Branch. Each of these distinguished persons was also a member of one of the organizations supporting CHC 2002 held in Toronto the following week. Remembering some of what you overheard at the ice-breaker beer seminar, can you figure out which person was also a member of the Company of Master Mariners?

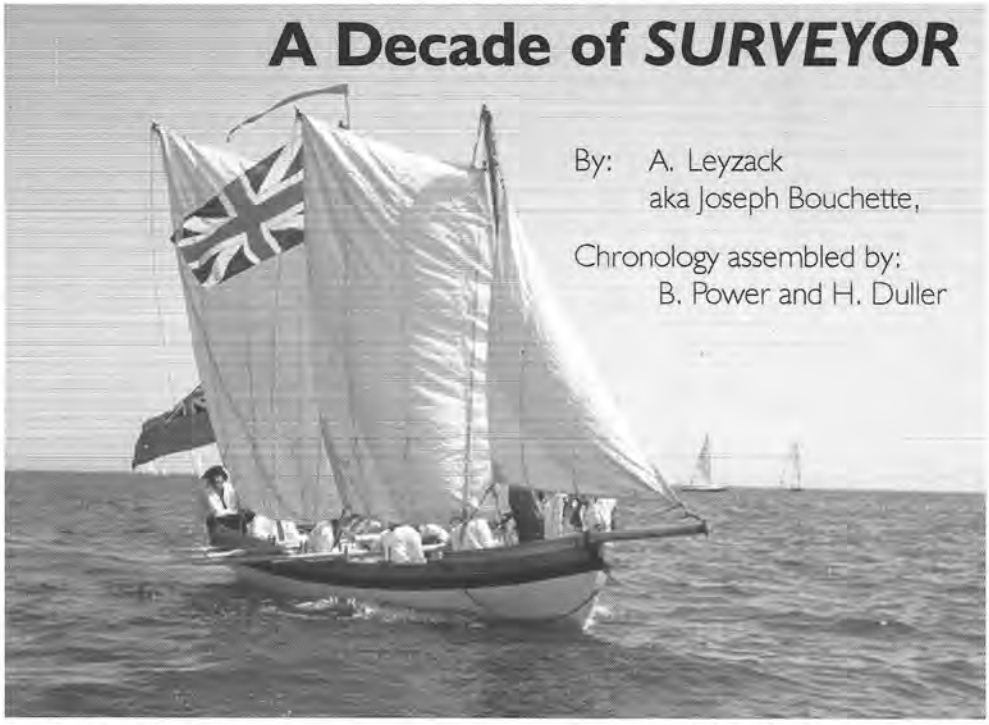
1. Peter and the one with The Hydrographic Society arrived after the university lecturer from the United Kingdom.
2. Bob is with the International Hydrographic Organization.
3. Steve, the GIS specialist, is not from New Zealand.
4. The cartographer, who was not from Australia, joined the Canadian Power and Sail Squadrons while he was in Burlington.
5. Tim, the Australian, is not with The Hydrographic Society.

Solution to Puzzler #21

The one from Scotland, Keininger (clue 2), is not the one interested in GPS (clue 1) or multibeam (clue 2) or transducers (clue 4) so he must be interested in electronic charts, and the one from Australia must be the one interested in multibeam, so the GPS person is the Canadian navigator, who is Gilles (clue 1).

Filling in the spaces in the lines, the person from USA interested in transducers must be the hydrographer, who must be McFarlane. We are told that Berry is the sponsor so, by eliminatiion, Keininger must be the retired admiral.

A Decade of *SURVEYOR*



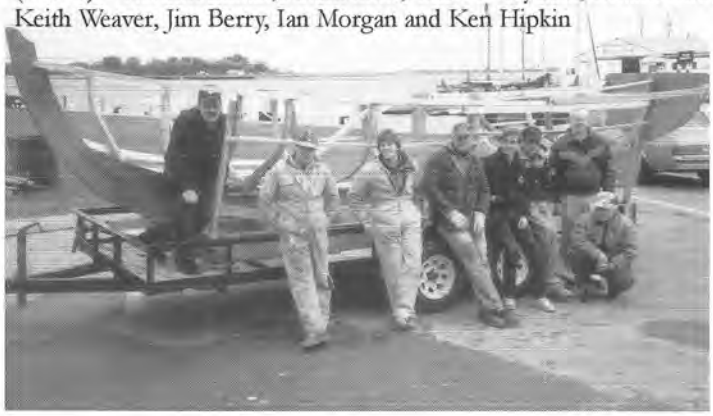
By: A. Leyzack
aka Joseph Bouchette,

Chronology assembled by:
B. Power and H. Duller

In the beginning...

Built to commemorate over 200 years of hydrography in Canada, the Admiralty Launch *Surveyor*, a reproduction of a circa 1790 patent Admiralty launch has been a part of the Canadian Hydrographic Association (CHA) for over ten years. The concept attributed early hydrography on our inland seas to one of the functions of the Provincial Marine, a Naval militia which preceded the arrival of the British Navy on the Great Lakes. A proposal to build the launch and re-enact early hydrography was presented by marine historian and painter Ian Morgan at CHA Central Branch's 1990 Annual General Meeting. Jim Berry led an ad hoc committee to verify the historical significance and feasibility of the project and in the fall of 1991 a working committee was formed to build the launch. Sean Hinds, who was VP of Central Branch at the time, took on the role of chair of what was then called the Heritage Launch committee. Sean prepared the business plan which secured us the charity status necessary to begin fund raising. It all became a reality when *Surveyor's* keel was laid at Toronto Harbourfront during the summer of 1992. In itself, 1992 was a fitting year to begin construction as it marked the 200th anniversary of the first hydrographic survey of Toronto Harbour. The following year, 1993, was to mark the 200th anniversary of the founding of Toronto, then called York.

Launch Construction on Toronto's Waterfront 1992
(L to R) – Ken McMillan, Sean Hinds, Andrew Leyzack, Brian Power, Keith Weaver, Jim Berry, Ian Morgan and Ken Hipkin



1993 – A Dream Realized, an Admiral in Stockings at CHC1993, Toronto's 200th and the Battle of Lake Erie

By January 1993 the launch had begun to show her form through the assembly of her ribs, stringers, stem and stern posts and was displayed at the Toronto International Boat Show. By then it was becoming apparent that we would need to contract a boat builder to help complete the project. After entertaining a number of proposals, we eventually settled on Gill Bibby's boatshop in Binbrook. Our confidence was shored up by the fact that Gill's shop had already built a (circa 1812) replica of HMS *Hamilton*'s boat. Plenty of hard work continued through the winter and early spring and by late May the finished launch was delivered to the Canada Centre for Inland Waters (CCIW) launch basin in Burlington. A small ceremony was held when *Surveyor* touched water for the first time. During the following week, our volunteers trained hard in preparation for the official launch and survey re-enactment which was to be held at the Surveying and Mapping Conference in Toronto.

Toronto International Boat Show 1993

During most of the '93 conference, *Surveyor* was displayed inside the Royal York Hotel. To our amazement, she actually fit into the hotel's freight elevator that moved her to and from the conference exhibit hall. For the official launch and re-enactment, we were fortunate to enlist the services of the former

***Surveyor* Touches Water**
The big moment finally arrives, *Surveyor* enters the water at CCIW on May 28, 1993.

hydrographer of the Royal Navy, retired Rear Admiral Steve Ritchie. Steve came well prepared having done his own research into the life and times of Joseph Bouchette, the surveyor who, two centuries earlier, executed the survey which we were about to re-enact. When the day came, Steve and crew, decked out in period fashion, put on a show which was to be the highlight of the conference. The fact that Upper Canada Brewing Co. had gratiously offered to supply us with a beer tent may have had some influence in attracting the crowd of delegates and onlookers. Donning circa 1790 Admiral's apparel, Steve narrated over a PA system, while the wretched surveyors toiled under oars and leadline. News of our project would spread throughout the historical community as that day marked the start of years of re-enactments and other public appearances. For the *Surveyor* and crew, 1993 was to be our busiest year.

How deep is it? – 1993 re-enactment of Joseph Bouchette's 1792 survey of Toronto Harbour.

Our first engagement following the conference was by invitation from the town of Grimsby, where *Surveyor* took part in a re-enactment of Lt. Governor Simcoe's landing at the Forty Mile Creek. John Graves Simcoe, the first Lt. Governor of Upper Canada and who ordered the survey of Toronto Harbour, had apparently called in at Grimsby during reconnaissance trips between his headquarters in Newark (later named Niagara-on-the-Lake) and the future town of York.

To help celebrate our American neighbours' Independence Day, July 4th, *Surveyor* and crew paid a visit to Erie, Pennsylvania, home port of the c. 1812 Brig *Niagara*. Later that month, by invitation of the Etobicoke Historical Society, we dropped anchor next to the Old Mill on the Humber River. August of '93 proved to be another busy month which included appearances at Old Fort York, the Toronto Wooden Boat Festival and a BBQ/re-enactment to showcase the launch at CCIW.

On August 7th, the 200th anniversary of the founding of York (aka. Toronto's 200th), *Surveyor* played a major role in the celebrations by re-enacting the landing of Lt. Governor and Lady Simcoe amidst pipers and gun salutes. The following day we changed colours and flying the Stars and Stripes, we landed troops on the western beaches of Toronto Island in a Naval re-enactment of the American invasion of York. It was the first time *Surveyor* had spread her wings under sail and much to the relief of our oarsmen she carried herself well. The August 7-8th weekend was the first of many events sponsored, in part, by the Museum of Civilization's Canadian War Museum (CWM). By September the Americans were beckoning again, this time to participate in the 180th anniversary of the Battle of Lake Erie. This, the second CWM cosponsored event, took us to the American side of Lake Erie to South Bass Island. There, we were to (once again) go American and intercept a fleet of British (Canadian) warships arriving from Amherstberg. Our participation at Toronto and Put-In-Bay had by now caught the attention of Victor (Vic) Suthren, author, Honorary Captain Canadian Navy and then Director General (DG) of the CWM. Impressed with our beautiful craft, our seamanship and enthusiasm to apply a hydrographic theme to living history, Victor was to become a significant patron of the project. Our first year on the water, 1993, came to a close with an appearance at the Picton Antique Boat Show.

1994 – Tall Ships, Powder Burns, Dismasting and Pocahontas

1994 began with a triumphant return to the Toronto International Boat Show where the year prior, *Surveyor* was but a bunch of bones and a dream. Now, we could show her in Bristol fashion. July was to be the month in which practically every weekend, we were on the go. Our schedule was as follows:

15-17 July	Loyalist Days/Fort Wellington Pageant, Prescott, ON
22-24 July	Aquafest, Hamilton, ON
29-30 July	Tall Ships Tour, Midland, ON and Queen's warranting of HMS Schooner *Tecumseth*, Penetanguishene, ON

While sailing in Severn Sound off Midland, we had the pleasure of meeting up with the Brig Niagara. Unfortunately, during a close range salute, we were reminded of the dangers of black powder when our gunner, Terese Herron, accidentally caught some discharge from the vent of *Surveyor's* signal gun and took a powder burn to her hand.

Penetanguishene was the site of an 1813 British Naval Base and home to a detachment of the Royal Newfoudland Regiment.

Lt. Henry Bayfield established his base here in the 1820's, from which the first surveys of Georgian Bay were conducted. It was here, after transiting around from Midland, that the surveyors were to experience their first dismasting at sea when the foremast broke in a sudden gust of wind. Later that summer we visited the Collingwood Marine Museum where a second mishap occurred. While attempting to manoeuvre in the harbour amidst high wind gusts, an abrupt landing put us smack up against the Collingwood tide gauge house.

That fall, *Surveyor* and crew had their first movie role in the filming of Pocahontas, The Legend.

Pocahontas The Legend - filmed at Buffers Park, Scarbourgh (L to R) Keith Weaver, John Dixon, and near right in rain gear is Bill Warrender.

As a winter storage solution that year, Sean Hinds and Maurice Smith, curator of the Marine Museum of the Great Lakes at Kingston, worked out an arrangement to display *Surveyor* indoors at the museum as part of an exhibit on hydrography.

1995 – Everywhere from Great Lakes to the Salt Chuck, Meandering Rivers to Duck Ponds

July of 1995 saw a return to Hamilton's Aquafest and an invitation to the largest re-enactment ever, the Grand Encampment at the Fortress of Louisbourg on Cape Breton Island, Nova Scotia.

A CWM cosponsored event, the Grand Encampment drew over

Grand Encampment at the Fortress of Louisburg 1995

1200 re-enactors, a flotilla of longboats and launches as well as a parade of sail, which included Nova Scotia's own schooner *Bluenose* and the HMS *Bounty*. It was truly a step back to the 1750's and a magical experience to walk the streets by lamplight, your favourite cup of grog in hand. On the day the ships arrived, a dance was held across the harbour, in the modern town of Louisbourg. *Surveyor*, her crew and camp followers had a lively run down the harbour before a gusty nor'easter. On our way, we overtook the *Royal George* longboat and crew from Penetanguishene but our victory was short lived. While hardening up to pass under the counter of the HMS *Bounty*, the foremast, which had gone by the board the previous year, let go a second time. Could it have been the curse of Tanglefoot? It was more like a bad selection of knotty spruce to begin with!

From the Atlantic Ocean to the Great Lakes, *Surveyor's* next voyage was to be a 14km row down the Nottawasaga River to an encampment at Nancy Island. Located near the mouth of the Nottawasaga, the island had formed over the course of 180 years around the sunken remains of HM armed Schooner *Nancy*. Rowing in the company of two of Canada's Atlantic Challenge boats (Bantry Bay gigs) carrying the Royal Newfoundland Regiment from Penetanguishene, *Surveyor* and crew faired well until the river turned to shallow rapids. With a little creative ballasting and a short trip by trailer, we were able to haul out and put in downstream while the Newfs in their shallow draft Bantry Bay gigs were able to continue on through.

In August, coxswain Bill Warrender arranged for the *Surveyor* and crew to camp out and launch in a pond at a vintage automobile show called the Christie Sprints, at the Christie Conservation Area, Flamborough. Despite the fact the show was geared towards a different sort of crowd and theme, both automobile buffs and the surveyors enjoyed each other's company. Canadian actor, vintage motorcycle and car buff Don Franks was among those who welcomed the motley crew and craft.

As yet another season had passed, discussion among the Heritage Launch Committee turned to an unresolved issue which stemmed from the original business plan, the terms of which had earned us our charity status. According to the plan, an agreement to transfer the launch and her assets to the Toronto Historical Society/Toronto Marine Museum (THS/TMM) was to have been struck at the close of 1993. However, as it turned out, the THS/TMM had too many boats and neither the space nor the funds to display them all. In principal, the terms of the plan called for a transfer of ownership of the launch to a public museum or like-minded, not-for-profit organization. In view of the situation with THS/TMM (aka. Toronto Hysterical Society), a willing recipient was found and discussions began with Vic Suthren, DG of the Canadian War Museum.

Vic was (and still is) a firm believer and supporter of the benefits of communicating history through the medium of re-enactments (aka. "living" history). A far cry from burying oneself in a history book, to experience living history is the ability to learn in a very interactive environment using all your

senses. I believe that by supporting groups like ourselves, the CWM was able to extend itself beyond the walls of 330 Sussex Drive, beyond Ottawa and reach Canadians where they lived and where they traveled.

1996 – Force From Sea, Burlington Races and Convergence on Fort Niagara

The number of CWM cosponsored events and consequently funding for the Heritage Launch was on the increase. These events included a return to the Naval Establishments at

Discovery Harbour Penetanguishene
Earl Brown officially opens the CHS Hydrographic Display

Penetanguishene in June for a "Force From Sea," an enhanced program at Hamilton's Aquafest in July to re-enact the "Burlington Races" and in August a "Convergence on Fort Niagara." All events were an 1812 theme and all were excellent opportunities for CHA to showcase the role of hydrography in the development and defence of our nation.

Earl Brown and CHS-DG Steve McPhee thank Brian Power and the crew of *Surveyor* during celebrations at Discovery Harbour.

Other events that year included Heritage Fest at Fort Maulden, and the Amherstburg and Canadian Hydrographic Service dedication of Bayfield's memorial at Penetanguishene.

1997- Title Transferred to Canadian War Museum

CHA and the Hamilton Ship's Company of 1812 (an organization formed with the aim to recreate a working 19th century shipyard from which to build an 1812 warship) joined forces at the 1997 Toronto International Boat Show. In addition to showcasing hydrography, *Surveyor* and crew were on hand to help promote the Ship's Company and their objectives. In March of '97, the committee approved a memorandum of understanding with the Canadian War Museum, our charity status was revoked and title to the launch was transferred to the CWM. The terms of our original business plan had been fulfilled.

The venue at Hamilton's Aquafest had, after the success of the "Burlington Races," now reached a new level to include a small scale Grand Encampment of its own. As a precursor to next year's International Year of the Ocean, *Surveyor* and crew contributed to an Oceans exhibit sponsored by Fisheries and Oceans Canada at the Canadian National Exhibition. In the fall of '97, launch and crew teamed up with staff from the CWM to participate at the Faire at the Forks, Chatham. This event in particular hosted a large student turnout during its education day and provided an excellent opportunity for one-on-one discussions between hydrographers and students.

1998 - International Year of the Ocean and Dr. Granatstein Wants a Submarine

In fulfillment of our MOU with the Canadian War Museum, *Surveyor's* first event of 1998 was May in Ottawa as a representative of the CWM at the Spring Tulip Festival. Working closely with the CWM and the National Capital Commission, a 1790's base camp was established near the shores of Dow's Lake. Members of the CHA's Ottawa Branch visited throughout the weekend. The *Surveyor* and crew participated in an evening parade of lights in which they took second place. *Surveyor's* role the following day was to sound the way while leading the flotilla in a parade down the Rideau. Thankfully, Ottawa Branch member Ray (Chopper) Chapeskie enlisted as our company's fiddler to scratch out tunes for those on the oars. That same weekend, the survey crew presented a plaque to the CWM in appreciation for their past and present support. Unfortunately, this support was soon to end following a change of direction at the CWM. Apparently, a disagreement had arisen between CWM and the CWM's parent agency, the Canadian Museum of Civilization, and led to Vic Suthren's resignment from the CWM. In his place, Dr. Jack Granatstein assumed the role of Director General.

Later that month, *Surveyor* was to rendezvous with the replica of the John Cabot's *Matthew* for a static display at the Royal Hamilton Yacht Club. It was at this time that we had our first crew member desert ship to join the *Matthew* for a return trip to England!

In July, we showed up with launch and crew to present a copy of Bouchette's 1792 chart at the opening of the Pier (Toronto's new, albeit short-lived, location of its marine museum).

Flotilla of Spring – Rideau Canal, Ottawa - Ray Chapeskie (Chopper) provides the music

Following the presentation in Toronto, we then hit the road for Sarnia to re-enact hydrography at the Fisheries and Oceans celebration of the Year of the Ocean. On Simcoe weekend, the Pier sponsored Joseph Bouchette's return to Toronto where a 1790's base camp was established on Snake Island (part of the Toronto Islands group) and several hydrographic re-enactments were given on the Toronto harbour front. In August, we managed to visit Penetanguishene for the "Battle of Georgian Bay" and kept both our masts intact! The '98 season came to a close with a return to Heritage Days – Faire at the Fork at Chatham where once again school-aged-kids were entertained, en-mass, by the surveyors.

By year-end, Jack Granatstein, the new DG of CWM, had made his intentions known. Apparently, Jack's concept of Canadian military history began somewhere between the Boer War and the dawn of the 20th Century and despite my attempts to convince him otherwise, this scholarly type failed to see the value of living history. Perhaps this could be attributed to a generational difference. Whatever the case, Dr. Jack had bigger boats in mind as his wish was to tow a retired Oberon-class submarine up the Rideau and cement it to a dock on the Ottawa River. In the end, the CWM returned title to *Surveyor* to CHA, Central Branch.

1999 – The Founding of Halifax and *Surveyor* Promotes CHS Products

With *Surveyor* back in the hands of Central Branch, we continued in earnest to seek out a new home for the launch. Meanwhile, Vic Suthren continued to instigate and orchestrate living history events. Most notable was the 250th anniversary of the founding of Halifax, where, like Simcoe's Landing at Toronto six years earlier, *Surveyor* and crew took the spotlight in a re-enactment of the landing of the founders of Halifax. HMS *Rose*, a reproduction 18th century frigate, stood off the downtown area while *Surveyor* transferred the founders from ship to shore. This event provided an opportunity for CHS staff at the Bedford Institute of Oceanography (BIO) to join the crew. A 1750's base camp was established for the crew in the Halifax common. Back on the Lakes, we were invited to participate in the Georgian Bay Sailing Regatta from Meaford to Thornbury. A valiant attempt was made to keep up with the flotilla of modern sailboats but foul weather and *Surveyor*'s inability to sail very close to windward sent us back to Meaford and down highway 26 to Thornbury. At Thornbury, we were joined by the HM Schooner *Bee* from her base at Penetanguishene and together contributed to a CHS presentation of the New Chart 2283 to the mayors of the local municipalities. The International Cartographic Conference brought us back to Ottawa for both a static dockside display as well as demonstrations on the Rideau. Conference delegates were "treated" to a turn on the oars. Later that month, Grimsby invited us back to set up a static shore-based display at their downtown summer festival called the Festival of the Forty. Here the surveyors helped deliver some of the 1812 history of Grimsby. As in past years, the season wound up early October in Chatham for the Faire of the Forks.

International Cartographic Conference, Ottawa
(L to R) Earl Brown, Les Peer and John Dixon

2000 – An agreement with the Marine Heritage Association and Tall Ships from Halifax to Sarnia

The new millennium brought new opportunities for *Surveyor*. The first occurrence of the Upper Canada Trade Fair, held in early April, prompted an early revival of *Surveyor* from her winter berth. Like Chatham's Faire of the Forks, the Trade Fair offered an education day which drew school kids from Odessa and Kingston areas.

An earlier letter written to Federal Heritage Minister Sheila Copps had yielded a response from her office, which recommended the Historic Military and Naval Establishments at Penetanguishene as a likely home for *Surveyor*. As we were aware of the significance of the location and some of the players involved, this was no surprise to us. Furthermore, owing to

CHS's stakehold in the Bayfield exhibit, an agreement with the site seemed the most sensible thing to do. Out of a desire to remain at arm's length from the provincial government (the site was and still is provincially operated) an agreement was penned between Central Branch and the Marine Heritage Association (MHA). The MHA were a support group for the site (which since had been renamed Discovery Harbour) and had recently taken over operations of the HM Schooners *Bee* and *Tecumseth*. The MHA, under President Mike Rudy, had agreed to the terms of a MOU and on June 9, 2000, title was transferred from Central Branch CHA to the MHA.

For most of the early summer, *Surveyor* was operated out of Discovery Harbour on behalf of the Huronia Parks Program. Discovery Harbour staff used her for rowing and sailing instruction.

Vic Suthren had organized another event this year at Toronto for a re-enactment of the American invasion (this time held off the eastern beaches) and I orchestrated participation at Tall Ships 2000, Halifax. Thanks to the hospitality offered by the Museum of the North Atlantic, our crew was able to obtain accommodations aboard the retired hydrographic steamer *CSS Acadia*. It was a special experience for one crew mate in particular, Ken Dexel, who was among the last hydrographers to serve aboard the coal-fired *Acadia* prior to her retiring from service. As a visiting "small-ship", *Surveyor* represented CHS and Fisheries and Oceans and once again we were able to enlist CHS staff from BIO. While aboard *Acadia*, we not only acted as interpreters for our own vessel which had been secured alongside, but as spokespersons for Boating Safety, Safe Navigation and, at times, interpreters for *Acadia*.

In August, a less substantial but nonetheless significant Tall Ships parade was held in Sarnia and, at the request of then CHS Regional Director, Julian Goodyear, the *Surveyor* and crew joined the flotilla. As usual, the season finished with a Faire at the Forks in Chatham.

Battle of Georgian Bay - Crew of *Surveyor* faces American naval attack

2001 – Under Marine Heritage Association Management

As was becoming tradition, the year began and ended at Odessa and Chatham, respectively. The MHA arranged for their use of the *Surveyor* at the Owen Sound festival. In place of the HM Schooner *Bee*, MHA also booked *Surveyor* and crew to yet another Battle of Georgian Bay.

2002 – Marine Heritage Association Returns Title to CHA, and Steve Ritchie Joins as Honorary Crew at CHC2002

CHC 2002 Toronto - Nine years later and Admiral Ritchie (retired) is back on board *Surveyor*

On February 27, a letter was received from MHA explaining that the HM Schooners *Bee* and *Tecumseh* were more than enough work for the volunteer group to handle and, for the second time, title to the launch had reverted back to Central Branch. Unfortunately, it may have been a case of biting off more than one could chew and it was evident that MHA had maintenance issues to contend with on both *Bee* and *Tecumseth*. However, as in the case of our experience with the CWM, faces change and so do one's priorities.

After a very rainy Upper Canada Trade Fair in Odessa, the launch was returned to Burlington for final preparation for the Canadian Hydrographic Conference in Toronto (CHC2002). To assist us in the event, Steve Ritchie was invited from the UK to join us once again as our special guest. The weather was marginal and had whipped up the harbour into quite a chop when we decided to go ahead with our re-enactment with Steve on board. With an eye on the ever darkening sky, we shoved off with some of our regulars manning key rowing stations and guests such as Adam Kerr taking up an oar where

required. Steve didn't seem to mind in the least, in fact, the grin on his face suggested the rougher the seas, the better. It was a proud moment for us all to have Steve back again. It was as if the Heritage Launch Project had come full circle and found its anchor point.

The remainder of this past summer has seen *Surveyor* take part in a number of static, shore-based events. This year marks the 40th anniversary of the Canadian Coast Guard as it is today, and this past June, *Surveyor* was invited out to Sarnia to join in the celebrations. Another static display was attended in Port Dover where *Surveyor* joined the HM Schooner *Bee*. Grimsby called again and recently *Surveyor* was leased out for the filming of a Robinson Crusoe story.

At the end of the day...

The CHA Central Branch will continue to look for a suitable home for *Surveyor* but meanwhile we'll continue to keep both the launch and hydrography in living history alive. Imagine the smell of pine tar and gun smoke while witnessing a crew hard at work pulling away in unison at the oars. Fore and aft, respectively, one would see the casting of the lead and an officer taking bearings. Imagine the sound of eight oars dipping and the report from the bow as the depth is called out.

This article attempts to summarize a decade of events in chronological order. Inevitably, we have elaborated on some events more than others and most likely have not done justice to those deserving a better story. The fact is that for every event, every time *Surveyor* has left CCIW to go on the road, there is a story itself deserving of the telling. Over the years, some great contributions were made to the project: the ongoing maintenance and special winter projects, stories written for Central Branch's newsletter and some very memorable photos were taken by those who had given of their own time to bring the history of hydrography to life.

Growing up with *Surveyor* - Julia Duller and Jason Power have both contributed to the project

The reader may have noticed that a majority of events have involved us in military and naval battles. Although not exactly the sort of theatre that would best suit our sort of work, these events draw the crowds and with the crowd come opportunities for an audience who will hopefully take an interest when we identify ourselves not as soldiers, not strictly as sailors, but as the surveyors and cartographers who helped open up the lands and waters to commerce and development (and unfortunately, war). Besides all that, these events help pay the expenses incurred to maintain and insure *Surveyor*.

The Parks Canada Marine Discovery Centre will soon be opening up at Pier 8 in Hamilton. I hope that the Centre will provide additional opportunities, not just for *Surveyor*, but also for the CHA to get more involved in delivering its mandate.

About the Authors...

Andrew Leyzack is a Hydrographer employed by Canadian Hydrographic Service, Central and Arctic Region. Prior to going to school to learn hydrography, Andrew spent many a year "before the mast" as a cadet and officer aboard square-rigged sailing ships.

Brian Power is a Hydrographer with the Canadian Hydrographic Servic, Central and Arctic Region, currently working as a supervisor in Electronic Navigational Chart Production. Brian has been a CHA member of Central Branch since 1975 and was one of the original committee members responsible for the building of the Heritage Launch - *Surveyor*.

Heimo Duller is a Chiropractor / CHA member who loves naval history. As a close friend of Brian, Heimo joined the heritage launch project when it first began. Heimo brought many skills to the project. As a talented carpenter he was responsible for making the wooden oars and as a tailor he has manufactured period hats for the crew of *Surveyor*. Heimo is a continuing member of the CHA launch committee.

Go F.I.G.ure

by Andrew Leyzack

In previous contributions to Lighthouse, Dennis St. Jacques, then Chair of FIG Commission 4, outlined the structure of the Fédération International des Géomètres (FIG) and its nine technical Commissions representing various surveying activities. Commission 4 strives to represent hydrographers internationally from every discipline and is at present encouraging national hydrographic associations to join. Commission 4 has formal relations with the International Hydrographic Organisation (IHO) and more recently the International Cartographic Association (ICA).

Terms of reference

- Hydrographic surveying
- Hydrographic education, training and Continuing Professional Development (CPD)
- Marine environment and Coast Zone Management
- Data processing and management
- Nautical charting and bathymetric maps - analogue and digital, including ENCs (Electronic Navigational Charts).

Mission Statement

- Promote the aims and objectives of FIG to hydrographers through the active involvement of national delegates from member associations and other interested parties in the activities of the commission.
- Foster closer links with all sister organisations currently active within the global hydrographic community.
- Develop guidelines and standards that will assist hydrographers in the provision of their services.
- Disseminate information relevant to the profession through participation in international meetings, conferences and committees.

This and future editions of "Go F.I.G.ure" will offer readers an overview of the current activities and developments within the commission representing hydrography, Commission 4. To begin with, the new chair of Commission 4 is Adam Greenland, Port Hydrographer for the Port of London Authority. Adam began his four-year term at the FIG international congress held in April of this year. Commission 4 officers for the term 2002-2006 are as follows:

Chair
Adam Greenland- Port of London Authority
UNITED KINGDOM

Vice Chair Communications & Administration (Secretary)
Andrew Leyzack- Canadian Hydrographic Service
CANADA

Working Group 4.1 - Strategic Partnerships
Adam Kerr- International Hydrographic Review
UNITED KINGDOM

Working Group 4.2 - Vertical Reference Frame
Dr. Ahmed El-Rabbany- Ryerson University
CANADA

Working Group 4.3 - Coastal Zone Management (CZM)
Mr. Michael Sutherland- University of New Brunswick
CANADA

Working Group 4.4 - Education and Continuing Professional Development (CPD)
Adam Greenland

In a recent interview with Hydro International, Adam offered some background information on Commission 4 while distinguishing between it and other "sister" organizations which represent the interests of hydrographers, in particular the IHO and The Hydrographic Society (THS). For the benefit of our readers, I am compelled to relate the same information. An intergovernmental organisation (IGO), the IHO's interests are governed by the hydrographic offices of its member states and are primarily directed towards nautical charting. FIG is a non-government organization (NGO), and has in recent years expanded its membership to include national surveying associations, representative of specific surveying disciplines. In particular, national hydrographic associations, whose members include academic and private sector surveyors, are invited to join. The present-day scenario for international representation of hydrographers in Canada is as follows:

Canadian Hydrographic Service => IHO
Individuals, Companies or Institutions from Government, Academia, Private Sector and CHA* => Canadian Institute of Geomatics (CIG) => FIG

*Indirectly, by way of the CHA's affiliation with CIG, members of CHA are represented internationally via CIG.

For information on the specific objectives of Commission 4 and its working groups, look up Commission 4 under *www.FIG.net*.

A Comparison of Shallow Water Multibeam Systems from a Commercial Viewpoint

By: D. Mallace, Managing Director, NetSurvey

There are now almost as many shallow water multibeam systems as there are sidescan sonars, with varying levels of sophistication and price. One of the main areas of debate is in the performance between interferometric multibeam systems and digital beamformers. Interferometric systems are based on less advanced technology and therefore are substantially cheaper than digital beamformers, but are the accuracy and performance adequate for today's hydrographic survey standards? Are there specific areas where a digital beamformer has to be used?

This paper uses the data collected for the Shallow Water Survey Conference in New Hampshire (Sept 2001) as the basis for the comparison. The data was collected either by reputable survey companies/organisations or the manufacturers themselves with a differing array of peripheral sensors. To this end it is not definitive but will serve as a guideline in the use of shallow water multibeam systems. The systems compared are Reson 8125, Reson 8101, GeoAcoustics GeoSwath and the Atlas Fansweep 20.

CARIS HIPS was used to process some of the data and Fledermaus was used for statistical comparisons and visualisation.

Introduction

At latest count, there are now 17 different types and configurations of shallow water multibeam system worldwide. They are broadly split into two types, digital beamformers and interferometric systems. Some systems, like the Atlas ones, are hybrids, combining both types. The digital beamforming group can also be sub-divided into different types of beamforming. When you bring backscatter and pseudo-sidescan methods into play, the picture starts to get incredibly complicated and very complex.

What this paper attempts to provide is a look into the different types and applications of each type of system from a user's viewpoint using data sets from various multibeam systems over the same sections of seabed.

Money is the driving force behind most decisions and this is very much so in this particular battle. Your typical digital beamformer will cost approximately $US 150,000, whereas the typical interferometric multibeam will cost approximately $US 100,000. The companies behind digital beamforming multibeams have invested heavily to publicise the results achievable with their systems and have been quick to pick out research results and some of the science behind it showing the shortcomings of interferometry. The companies behind interferometric multibeams have themselves invested heavily to publicise the benefits of their systems, with the biggest benefit being cost. Roughly the same price difference can also be expected for higher costs. This is a significant saving and overrides any concerns they may have for data quality.

This paper has only been possible thanks to the Shallow Water Survey Conference in Portsmouth, New Hampshire in September 2001, itself following on from its predecessor in Sydney, Australia in 1999. Hardware and software manufacturers demonstrated their systems over the same area of seabed, creating the Common Dataset, which allows consumers to see for themselves the differences between the systems and software. Conference papers are then written by research and commercial figures alike using the common dataset for the majority of the data. It is a very successful formula and is being repeated at Sydney again in 2003.

The Common Dataset is not completely homogenous. The data was collected over the course of the proceeding year (in Portsmouth's case from Nov 2000 to almost the actual conference date in Sept. 2001), with different temporal variations adding small variations. The greatest difference will be the different peripheral sensors used. In the case of the Reson 8125 and 8101 dataset an Applanix POS MV was used for motion and heading reference. This system has the greatest accuracy of any system at present and will consequently allow for better results over the course of the swath. All other systems used either Kongsberg Seapath & MRU or TSS DMS2-05 motion sensors. Most of the systems were installed onto the same vessel and used the same DGPS system.

With the exception of the Reson 8125 dataset, which I post processed myself, I have taken the 1 metre gridded data files processed by the manufacturers who performed their own surveys. This is for two reasons, firstly that they would not be able to say that it was due to my processing that the differences occurred and secondly because I presumed that they would be spending a good deal of time producing the results as the data was going to be made public. The quality of the record keeping varied from the fantastic (NOAA, who performed the 8101

survey as part of their 2001 survey program) to appalling (I won't shame them). This was another reason why it was better to take the manufacturer's processed output.

For most hydrographic surveys used for the production of nautical charts, IHO Order 1 is the accepted standard for all but the most critical areas. This accuracy is quoted as;

The IHO Special Order depth Accuracy (95% Confidence Level) is given by the following equation

$$\pm \sqrt{[a^2 + (b \times d)^2]}$$

Where;

a = constant depth error, i.e. the sum of all constant errors
b x d = depth dependant error, i.e. the sum of all depth dependant errors
b = factor of depth dependant error
d = depth

Using the following IHO Criteria from S44 for depth accuracy for MB-2 Order of Survey

Factor	
a	0.25m
b	0.0075m

Examples of Depth Accuracy

The following table indicates the results of calculations of depth errors at 95% Confidence Levels for the multiples of IHO SO and various depths.

DEPTH ACCURACY IN MULTIPLES OF IHO SPECIAL ORDER (SO)

	DEPTH ACCURACY	
Depth (m)	1 X SO (m)	2 X SO (m)
5	0.2528	0.5056
10	0.2610	0.5220
15	0.2741	0.5483
20	0.2915	0.5831
25	0.3125	0.6250
30	0.3363	0.6727
50	0.4507	0.9014

However, do we need this degree of accuracy for, say a wind farm assessment? Would it be better to gain an understanding of the topographic structure and at the same time gain a good understanding of the seabed texture type with a system that is two-thirds of the price?

These are some of the questions that are being continually asked of and by survey companies, service providers, MDs, and the client (whose degree of understanding ranges from excellent to not a clue and doesn't care apart from the bottom line!).

The Theory

Regardless of the type of multibeam, all of the systems measure both the angle and two-way travel time of the acoustic signals. They also all transmit a fan of ultrasonic energy into the water along a narrow fan in the fore-aft direction between 0.7° and 1.5° (transmit beam width) and the frequencies of the systems range from 200 kHz to 455 kHz. The reflected energy returns to the transducer, where it is detected. The way in which the return signal is received is one of the main differences between beamformers and interferometry. Digital beamformers have a defined number of beams and a specific beamwidth for the receive transducer, whereas the interferometric systems sample their receive beam across its length at varying intervals. From the received angle and the two-way travel time, the position for each beam relative to the transducer is computed.

The main difference between beamforming and interferometry is the way in which the angle and travel times determine the beam locations. A digital beamformer determines the travel time as a function of angle whereas the interferometer determines the angle as a function of travel time. What this means is that a beamformer can differentiate between two beams received at the transducer at the same time but can't differentiate two beams at the same angle, whereas, an interferometer can differentiate two beams at the same angle but not the same time.

Different travel times and the same angle does not cause any problems, except for making the data a bit noisier, but same travel time and different angle does. This causes most problems when the terrain is rough and specifically in harbours. Figure 2 shows this clearly.

Further theory behind the differences between the two types can be gleaned by Gerrit Blacquiere and Koos van Woerde's paper to Oceanology 1998, from where the two diagrams below came.

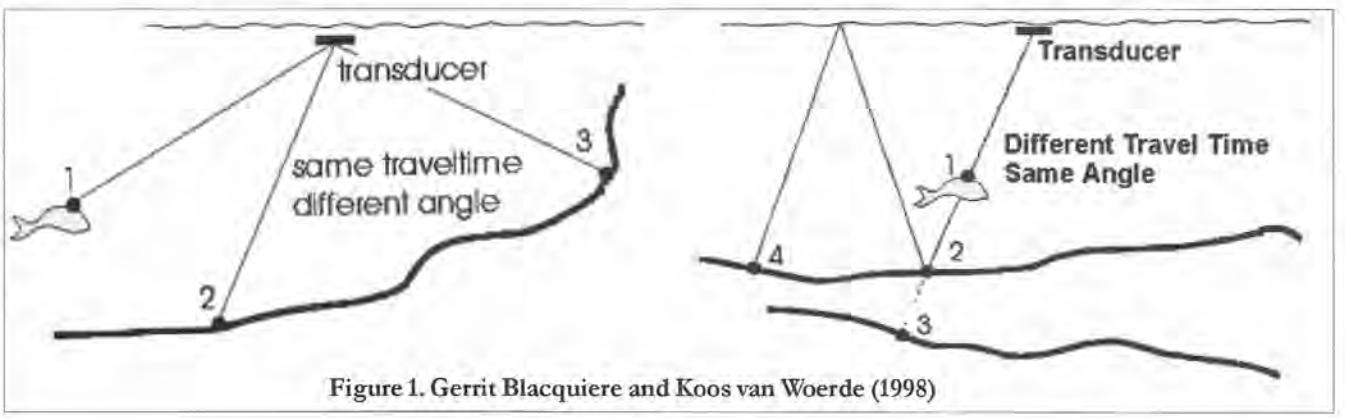


Figure 1. Gerrit Blacquiere and Koos van Woerde (1998)

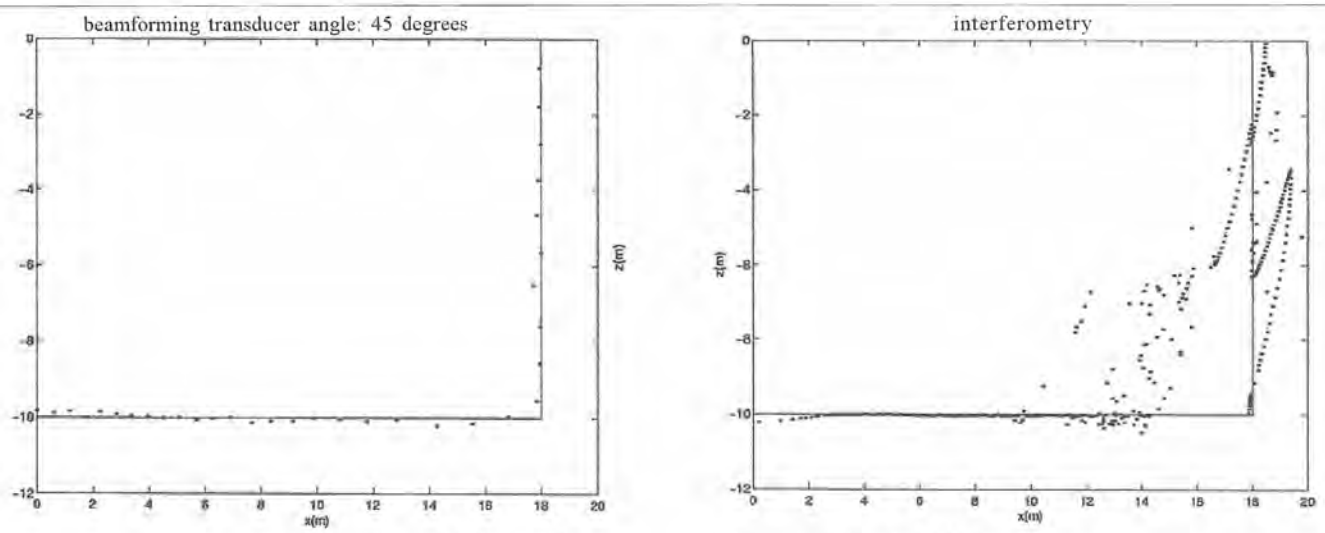


Figure 2: Gerrit Blacquierre and Koos van Woerde (1998)

Beamformer results (dots). The resolution is lower than in the case of interferometry, however, the result is better. In particular the harbour wall is represented correctly.

Interferometer results (dots). Note the high resolution and accuracy along the seabed. The harbour wall is not represented correctly, nor is the seabed in the area from 13m to 18m. The resolution is somewhat lower in an area underneath the transducer (from 0m to 3m).

The Multibeams

The following is a brief description of each multibeam, complete with the manufacturers' supplied specifications.

Reson 8125

The Reson 8125 is a digital beamforming multibeam. It utilises 240 dynamically focused receive beams. The system measures a 120° swath across the seafloor, detects the bottom, and delivers the measured ranges at a depth resolution of 6 mm. This is the highest resolution survey grade digital beamforming multibeam available today and in this dataset was used in its dual head configuration. For the acquisition and processing software, the system appears as two different systems, however the 81-P (topside electronics unit) has to be configured to enable the synchronising of the transmit/receive cycle to only one system at one time.

Figure 3:
Reson 8125 multibeam

Specifications (Single Head);

Frequency:	455 kHz
Depth Resolution:	6 mm
Swath Coverage:	120°
Max Range:	120 m
Number of Beams:	240
Along-Track Beamwidth:	1°
Across-Track Beamwidth:	0.5°
Accuracy:	IHO Special Order
	U.S. Army Corps of Engineers Special Order
Operational Speed:	Up to 12 knots
Max. Update Rate:	40

Reson 8101

The Reson SeaBat 8101 is a digital beamforming multibeam. It utilises 101 receive beams measuring across a 150° swath across the seafloor and collects up to 3000 soundings per second. In terms of numbers sold, this system is probably the leading shallow water multibeam (certainly for commercial organisations).

Figure 4:
Reson 8101 multibeam

Specifications;

Frequency:	240 kHz
Range Resolution:	1.25 cm
Swath Coverage:	150°
Depth Range:	320 m
Number of Beams:	101
Along-Track Beamwidth:	1.5°
Across-Track Beamwidth:	1.5°
Accuracy:	IHO Special Order
	U.S. Army Corps of Engineers Special Order
Operational Speed:	Up to 18 knots
Max. Update Rate:	30

GeoSwath

GeoSwath is one of the newest interferometric systems in the market. It has been designed to survey areas or routes in water depths up to 200 metres and is priced very competitively. The Geoswath is probably making more inroads into the coastal survey market (predominantly single beam and lower spec) than any other multibeam at present. GeoSwath is available in two frequency versions, 125 kHz and 250 kHz. The system is PC based and comes complete with acquisition and processing software.

Figure 5: GeoSwath multibeam

Specifications;

Sonar Frequency	125 kHz	250 kHz
Maximum Water Depth	200 metres	100 metres
Maximum Swath Width		600 metres
300 metres		
Range	Up to 12 x depth	Up to 12 x depth
Resolution Across Track		15 cm 7.5 cm
Beam Width	1.7° Azimuth	1.0° Azimuth
Transmit Pulse Length	100 µS to 1mS	50 µS to 500 µS
Swath Update Rate		
150m Swath Width	10 swaths per second	10 swaths per second
300m Swath Width	5 swaths per second	5 swaths per second
600m Swath Width	2.5 swaths per second	

Atlas Fansweep 20

The Atlas Fansweep 20 is unique in the multibeam world in that it combines both digital beamforming and interferometric technologies and for a long time, quite how the system worked was kept a mystery. The system comprises of two transducers mounted in 'v' formation similar to the interferometric systems and also to the Seabeam-ELAC 1000 series multibeams. Atlas has had quite a good sales record with navies around the world due to it being a systems integrator.

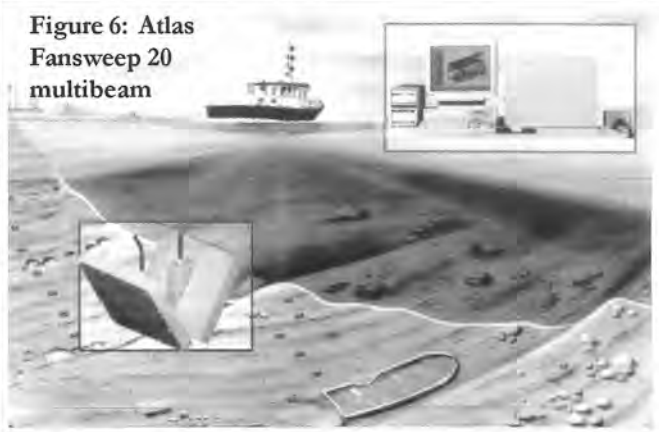


Figure 6: Atlas Fansweep 20 multibeam

Specifications;

Sonar Frequency	100 kHz	200 kHz
Maximum Water Depth	300 metres	600 metres
Maximum Swath Width	161 metres	300 metres
Range	up to 12 times water depth for bathymetry and 180 degrees for side scan	
Transmit Pulse Length	Min. 40 µS	Min.120 µS
Swath Coverage	161°	161°
Accuracy	better than IHO required	
Number of Amplitude Values per Swep		4096
Number of Beams	Up to 1440	
Swath Update Rate	Up to 12 sweeps per second	

- Output and display of side scan data for object detection simultaneous with bathymetry data

The Results

Figure 7 below, shows an overview of Portsmouth's Outer Harbour. Figure 8 shows the two areas that were used for this comparison. As you can see, there are areas of differing slope and roughness which should provide good areas for comparison. I did not use the sand wave area as the positioning systems on board the vessels would have to be using RTK techniques to guarantee that the comparison differences were not position error related.

Area 1 (Figure 9) is a flattish area that would not suffer as a result of positioning errors and should, in theory and going by the science, prove that the interferometric systems results tie in closely to the beamformers.

Figure 7: Portsmouth Outer Harbour

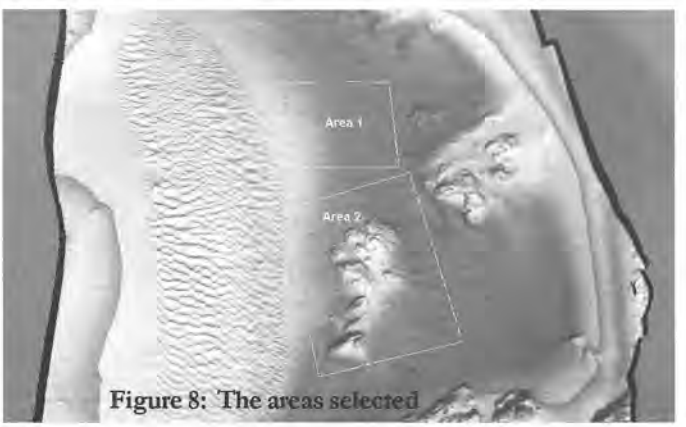


Figure 8: The areas selected

Figure 9: Area 1 – The flattish area

Area 2 was chosen because the seabed feature was quite large, so positioning difference should show up in the comparison, but would for this reason allow for good comparisons as we should be able to quantify the results. The feature will also offer a good opportunity to see the theory (Figure 2) in practise in a real-world scenario.

Figure 10: Area 2 – The rougher area

I have used the Reson 8125 data set as the bench mark surface for the comparison test. The reasons for this are as follows;

- I processed this data set from raw, so I know what was applied to the data and the quality of the data gathered.
- From taking subsets of the data, I know that there are no major issues with tidal or sound velocity errors.
- Historically, digital beamformers are supposed to be the most accurate so it was better to take one of their datasets than use one of the interferometric systems.
- The Reson 8125 was actually installed as a dual-head configuration which produces 480 beams per second at up to 40 Hz. One of the arguments for the interferometric systems is that they produce much more data and therefore have more redundant data. By taking the maximum amount of data possible from a digital beamformer it would, I thought, help in the comparison techniques.

The Reson 8125 is the highest frequency multibeam used in this comparison and this would have the advantage of being able to resolve more detail than the other systems. The marketing material put out by the interferometric manufacturers, however, claims beam numbers in the thousands, so one of the aims of this comparison is to see if more is better, or is there more to multibeam resolution than just the number of beams.

Binning the 8125 data set at 1 m interval actually produces quite a smooth surface. This is a function of the amount of data rather than any smoothing or interpolation of the actual raw data. To give you some idea, I extracted each cleaned and accepted sounding from this data set and it gave me a 1.4 Gigabyte ASCII x, y, z file! So what you are actually seeing is the result of meaning something in the order of 100 soundings per metre. It is possible to bin this data set down to 0.25 m and still not have any gaps in the surface. It does however, take a fair amount of time, memory and disk space.

The Comparisons

8125 v 8101

I thought I would start off with a comparison of digital beamformers by the same company. Over the flat area (Figure 11) the two data sets compare quite closely and certainly within 0.5% of water depth, which is the quoted accuracy. There are a couple of features which are clearly seen to be in error, but these look to point towards a positional error rather than a bottom detection difference. The average error is shown in the histogram (Figure 12) and is 0.146 m. The histogram trend is consistent with a systemic error (probably tide or z offset) and with a standard deviation of 0.03 m, the comparison is within the manufacturer's specifications of the systems.

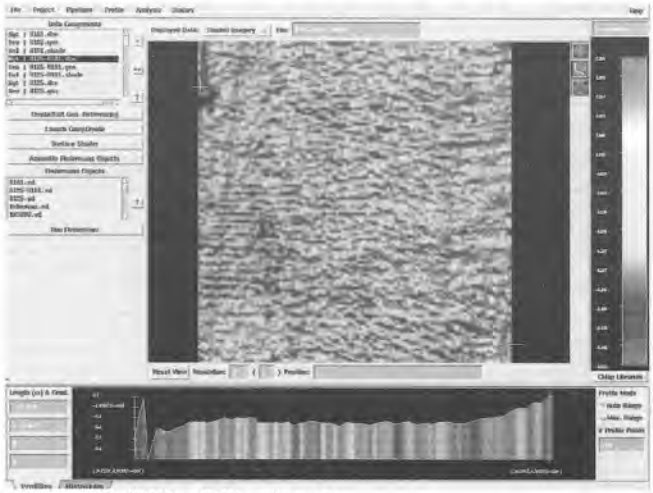


Figure 11: 8125 v 8101 – Area 1

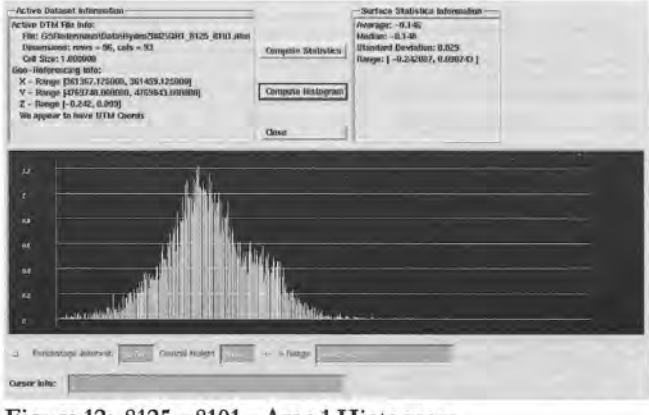


Figure 12: 8125 v 8101 – Area 1 Histogram

In Area 2 (Figure 13) those same positional differences come to prominence as the comparison closely follows the terrain. The histogram for this area shows two peaks. This seems to coincide with the area to the west (left) on the screen. This is probably due to a tidal difference of approximately 5 cm on the 8101 line.

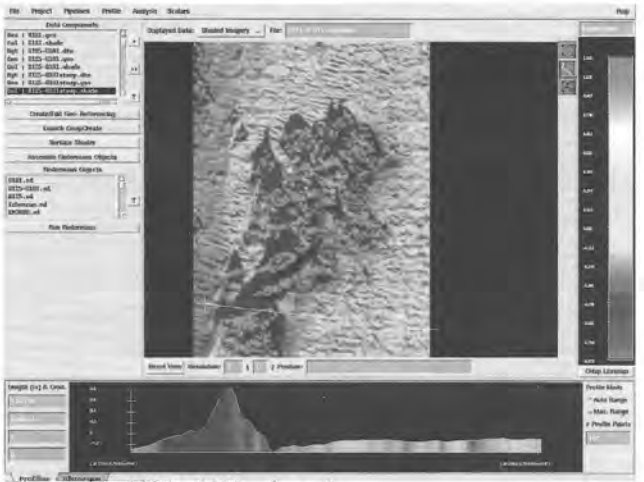


Figure 13: 8125 v 8101 – Area 2

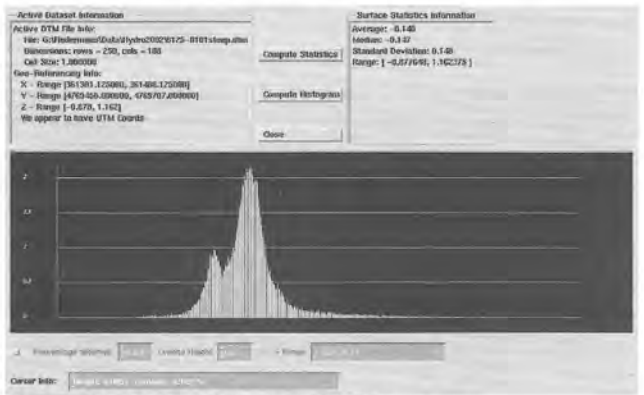


Figure 14: 8125 v 8101 – Area 2 Histogram

The two systems compare well with the positional differences accounting for the higher standard deviation in the Area 2 histogram.

Reson 8125 v GeoSwath

The first thing that I noticed was the comparative roughness of the GeoSwath surface compared to the 8125 (Figure 15), which considering there should have been more individual beams in the GeoSwath than the 8125, was surprising. This, I took to be noise in the system. I should add here that since this survey, the GeoSwath has been improved, especially with regards to the area directly under the transducer. The update rate has also been improved due to faster processors.

On closer examination of the comparison surface (Figure 16) it can clearly be seen that there are systemic errors in the GeoSwath. It is possible to pick out the single beam echosounder data (used to infill directly under the transducer) as this appears to tie in closely with the 8125 data set. The actual differences range from -0.97 to +0.36 with the mean being -0.17

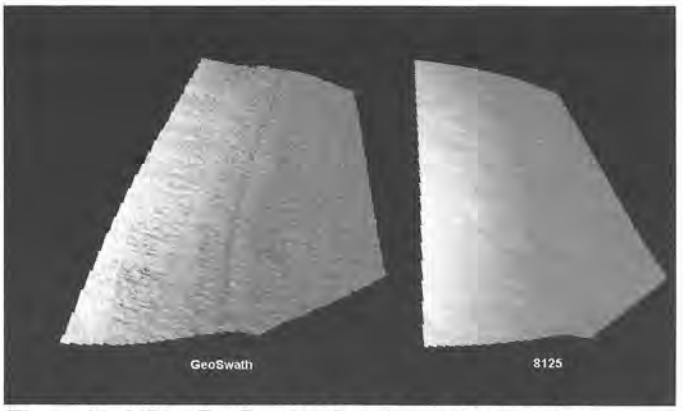


Figure 15: 8125 v GeoSwath – Area 1 individual surfaces

m. Clearly this is outside IHO Order 1, but is it acceptable? The difference is not that large and will not result in major construction problems (unless it has to be completely flat) and the backscatter data (as it is derived from sidescan philosophy) is very good and will enable a good understanding of the seabed's texture to be ascertained.

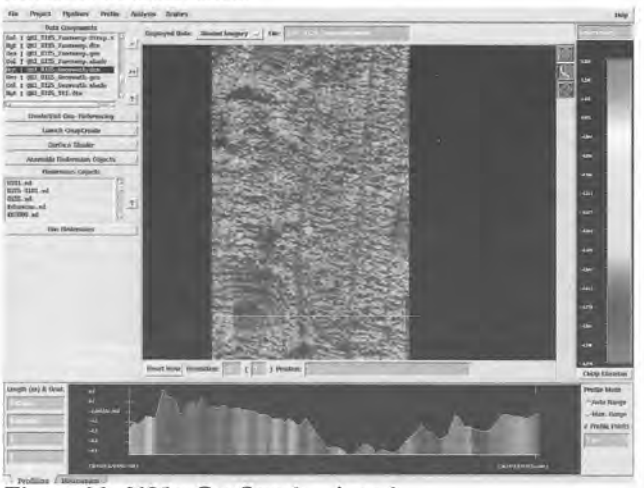


Figure 16: 8125 v GeoSwath – Area 1

This is, however, the flat surface and if we turn our attention to Figure 17, the seabed feature surface, then the story is a little different.

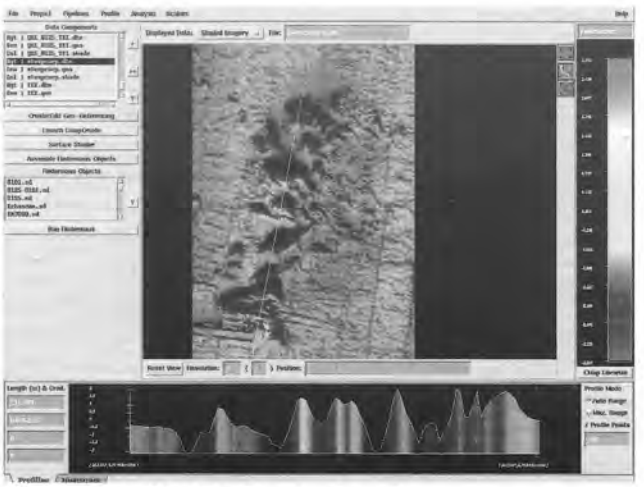


Figure 17: 8125 v GeoSwath – Area 2

There is again a pretty consistent positional error (which I believe was due to the latency in the GPS system). However, if you look at the comparison of the surfaces again (Figure 18) you see that the 8125 depicts the outcrops in a well defined manner, whereas the GeoSwath data is much noisier. This would lead me to believe that this is a function of the interferometric technology, receiving returns at the same time and not being able to differentiate which one goes where. This will have the effect of blurring the steepness of the slope and the feature.

Again the question that you must ask is, do I need the defined detail for my survey? The GeoSwath quite clearly shows that there is a feature on the seabed at that position after all. However the shoal to the right of Figure 18 is 1.4 m deeper as sounded by the GeoSwath. This may be fine for some site surveys but I would be hesitant in a port or harbour. The depth with the 8125 was 10.98 m and with the GeoSwath it was 12.36 m, so we are not talking deeper than normal water here.

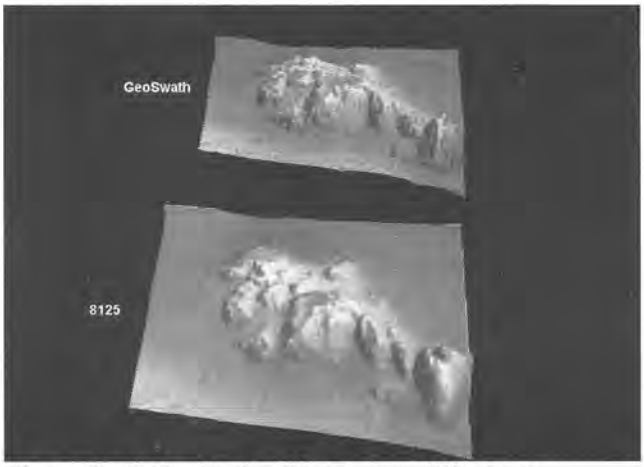


Figure 18: 8125 v GeoSwath – Feature differences

Reson 8125 v Atlas Fansweep 200

Again the dataset is noisier than the 8125 (Figure 19), and there is slight striping along the lines as systemic errors which are easily visible. It can also be seen that the shoal, incorrectly

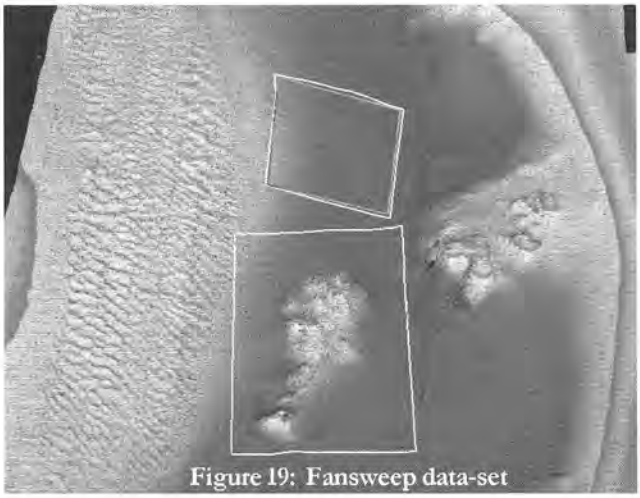


Figure 19: Fansweep data-set

reported by the GeoSwath, is visible in this data set. There seems to be a 0.3 m error between the 8125 and the Fansweep, which is most probably incorrectly measured Z-offsets or tidal errors (most likely to be the former).

The results of the flat area comparison (Figure 20) and histogram (Figure 21) are interesting. The two systems appear very similar except for the z offset error with good statistical shape and standard deviation. It must be said though that the range of error is quite large with 0.3 m either side of mean and would definitely be out of specification if it had been a proper survey. It is interesting to note here that the differences between beamformers are much smaller than that between interferometry and beamforming.

When it comes to Area 2 the Fansweep compares well to the

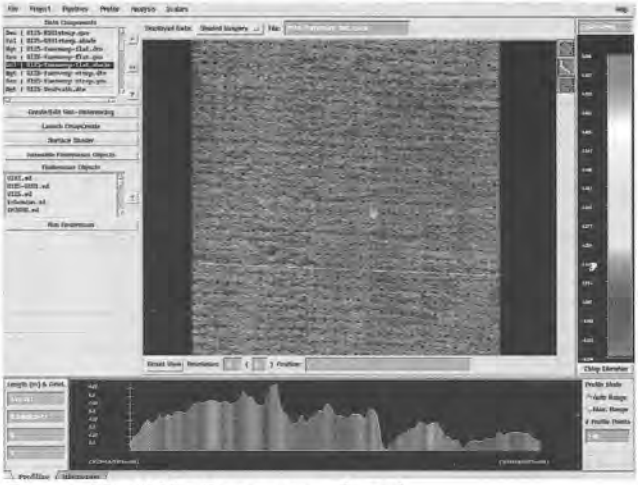


Figure 20: 8125 v Fansweep – Area 1

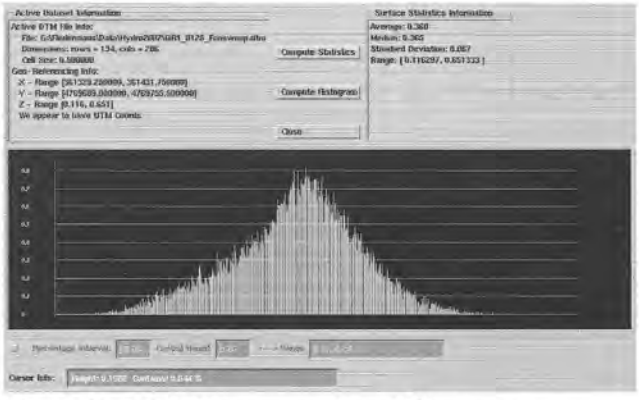


Figure 21: 8125 v Fansweep – Area 1 Histogram

8125 (Figure 22). The actual feature itself is not as clearly defined, but that may be as much to do with the higher frequency of the 8125 giving much better definition. There are big differences that look like they equate to positioning errors. The actual shoal depths compare well to the 8125. What I am not able to ascertain is where this feature fell in the swath width of the Fansweep system and therefore whether the beamforming or interferometric part of the system was used to collect this data.

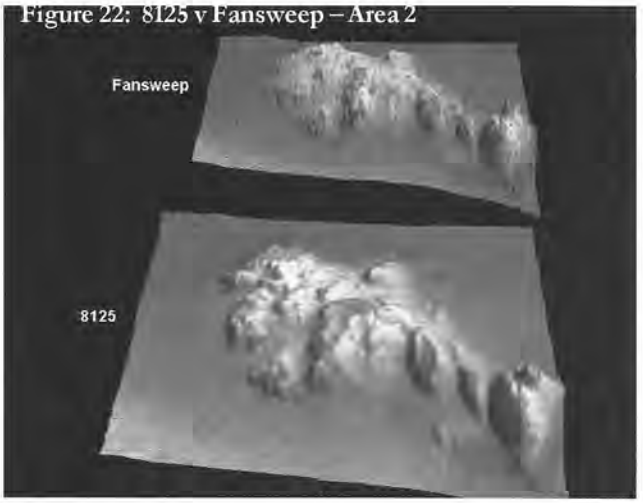


Figure 22: 8125 v Fansweep – Area 2

Figure 23: 8125 v Fansweep – Area 2

The histogram (Figure 24) shows that the Fansweep system has a good statistical distribution and its standard deviation of 0.175 m, though high, probably derives from the positional errors.

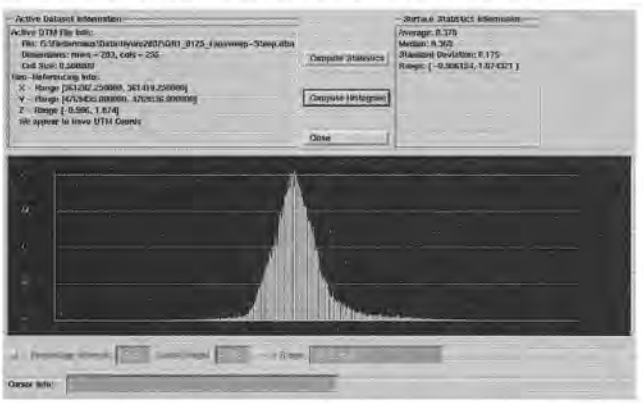


Figure 24: 8125 v Fansweep – Area 2 - Histogram

Conclusions

It can be seen from the examples shown that digital beamforming multibeams, or systems which use the technology in part, produce accurate, repeatable results with low errors. Interferometric multibeams, while still producing digital terrain models that are a good guideline to the seabed topography, produce noisier and less accurate data when compared to the beamformers.

Whether the interferometric systems meet the specifications will come down entirely to the required tender document and any price/quality constraints that the client wishes to make. However, as a guideline, I would be hesitant to use an interferometric system when shoal soundings were required. In answer to a question previously posed, more does not equate to better (number of beams). It would appear that the combination of high frequency and quite a larger number of beams is better that just insonifying the area with as many beams as possible, again proving the science. The specification of the motion sensor has helped produce a more reliable and less noisy data set for the Reson systems. The Applanix POS MV does allow the use of more of the outer beams, though during processing of the 8125 I did delete most of the outer beams as the coverage was over 100% for most of the survey. It may be that using a higher specification motion sensor would improve the bottom detection capabilities of the interferometric systems. The cost of a POS MV is however about $US 35,000 more than the cost of the GeoSwath, thereby reducing the chances of that happening.

What these data sets do show is how easy it is to produce errors by other means. It is of no use having either the most or least accurate multibeam if errors of greater magnitudes will be made by incorrectly measuring offsets or applying tidal information incorrectly. The importance of accurate positioning for repeatable surveys is also easy to see. If we were looking at sand bar movement, the positioning system alone could move it by 2 m a year!

As long as the cost differential between interferometric and digital beamformers remains, most of the arguments of one against the other will persist. The vast majority of hydrographic surveys are still carried out using single beam echosounders. Multibeam technology is now pretty much accepted worldwide, however its cost is still the prohibitive factor. Now if someone brought out a digital beamforming multibeam for the same price as an interferometric one – that would be interesting!

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Gerrit Blacquiere and Koos van Woerde 1998, Multibeam Echosounding: Beamforming versus Interferometry; OI 98

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About the Author...

Duncan Mallace is the Managing Director for NetSurvey Ltd., one of the leading multibeam service solution providers.

SOUNDINGS ...

"Soundings" is a regular feature of Lighthouse. It is named in recognition of a newsletter named "Soundings" that was produced by the Dominion Hydrographer's Office many years ago. It is intended to stimulate thought and discussion within the hydrographic community. We invite your comments.

Recovery of Digital Data

As a result of some experiences with the publication of *LIGHTHOUSE*, edition 59, I would like to share with you some thoughts about digital data. The experiences were somewhat painful at the time, but in the long run perhaps they will be of benefit to those in the hydrographic and other communities who collect and store large amounts of digital information. I recognize that my concerns may not be shared by all and will perhaps be considered by those in the business of archiving digital data to be superficial and with little substance. However, my recent discussion of this topic with several individuals convinces me that the topic deserves some serious thought.

The "theme" of this article is digital data or digital information and its archival and subsequent unaltered retrieval.

As a "field" hydrographer I collected digital data, including soundings, as far back as 1972 (others were involved earlier than I). The digital soundings collected were presented in "traditional" field sheet format and, as well, a copy of the digital data was archived, presumably with the intent that it would and could be retrieved again at a later date. That data was collected over 30 years ago and since then a lot of digital information has been collected, processed and archived in much the same manner. Modern survey systems collect huge amounts of digital information. Can all of that data that has been archived be recovered and presented in its original form? Most believe it can – but can it really?

Rigid procedures and standards have been introduced over the years and considerable effort has been expended to ensure that the digital data being archived is in fact "good" data. As I recall, data was measured as being "good", if the digital file was identical to some printed hardcopy. In the case of "field sheets" the digital files had to be certified as being identical to the printed hardcopy (if there were exceptions, they were noted).

The data printed on the field sheet from the digital file was used as a measure for the quality of the digital file. The main concern was that data had to look good on the printed sheet. Nothing is wrong with that - but there are other considerations which may be problematic.

Let's return to *LIGHTHOUSE* edition 59 and see how these issues are related and why I believe this story needs to be told.

As edition 59 was being finalized, we had a digital file on CD and a hardcopy produced from that file. This was relatively the same situation as a file of digital soundings and a printed hardcopy of that data, which we call a field sheet.

The hardcopy of the digital *LIGHTHOUSE* file was used for final proofreading. As expected, errors were found and corrections were made. We had to ensure the digital file was exactly the same as the corrected hardcopy.

When we were satisfied that the digital file was exactly the same as the "good" hardcopy, we went to the printer. In one hand we had a good looking hardcopy and in the other a digital file from which that hardcopy was produced. We had to be happy – right?

Wrong! We admit to making a few costly rookie errors, but more importantly, our fundamental thinking was flawed. We believed that all necessary quality control was in place as the digital file and the hardcopy were identical. We assumed that any and all subsequent hardcopies would also be "good".

By now you have probably correctly concluded that our copy from the printer was not identical to our hardcopy from the same digital file. Some of you have seen the results and they were not pretty. Hopefully we have learned a good lesson and will not repeat our errors. Life is full of learning experiences and perhaps we can all benefit from this exercise.

With *LIGHTHOUSE* edition 59, our main problem after the initial printing was a font change. The printed text was difficult to read because of little spacing between words. A more significant problem, which could not be explained by the printer, (or anybody else) was that some text was simply omitted. When

the same file was subsequently printed with different software, most–but not all–of the missing information magically appeared. Real scary!

Different computer programs can and do produce different results. Different versions of programs can result in different output. If I print this Word file with a Mac or a PC, I can get something that may look different.

I write about this issue so those responsible for digital information are aware of possible problems. This is not new - but sometimes we need to be reminded. Don't assume that your data is safe because of whatever reason.

Many of these concerns can perhaps be explained by some of our experts. However, we are not all experts and most of us believe what we see.

Can all offices responsible for the storage of digital information recover that data so that it looks exactly the same way it was when it was filed?

Do I believe that the sounding information archived from the survey I conducted in 1972 can now be routinely recovered and used to produce a hardcopy identical to the one that was used as a quality control document?

With the computer world and that of digital information as well as software and hardware evolving so very quickly, I'm not sure that collectively we have given enough thought to the painless recovery of error-free digital information at any point in time down the road.

Your comments are invited.

Earl Brown
Hydrographer (retired)

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Please contact the editors at Lighthouse@car.dfo-mpo.gc.ca for details.

Canadian Hydrographic Conference 2002

"Innovation and Excellence: Focusing on client requirements and their changing needs."

The 2002 Canadian Hydrographic Conference (CHC 2002) was hosted at The Westin Harbour Castle hotel (Toronto) in May this year by the Canadian Hydrographic Association, the Canadian Coast Guard, the Canadian Power and Sail Squadrons, *Fédération Intérnationale des Géomètres*, the International Hydrographic Organization, The Hydrographic Society of America, the Canadian Hydrographic Service, and The Company of Master Mariners of Canada.

This annual hydrographic conference is an important forum for the marine community and alternates each year between the United States and Canada (the next conferences will be in Biloxi, Mississippi, in 2003 and in Ottawa in 2004).

The conference appeals to a wide range of businesses and individuals with an interest in marine matters or in surveying and is a focus for navigators, inshore and offshore fishers, recreational boaters, engineers, scientists and educators, as well as for government and industry representatives.

Given the focus of hydrographic conferences, the Toronto Harbourfront was the ideal location as some exhibitors took the opportunity to demonstrate their equipment on several survey vessels docked right at the hotel and on the Canadian Coast Guard icebreaker *CCGS Griffon*.

Dr. Wendy Watson-Wright, Assistant Deputy Minister, Science, of the Department of Fisheries and Oceans, opened the conference on behalf of the Minister. Our keynote speaker, Bill Stoehr, President of National Geographic Maps, then spoke on the importance of our clients. Led by a piper, Tony O'Connor, Dominion Hydrographer, opened the conference tradeshow where over 60 exhibitors displayed the latest tools in hydrography and other marine applications. There were also displays by several organizations that promote safety, education and marketing.

The theme this year was "Innovation and Excellence: Focusing on client requirements and their needs". This reflected the ever-increasing demand by today's marine clients for new technologies and better ways to use hydrographic data, and offered a real opportunity to meet and explore new ideas and technologies in charting. The conference sessions inspired some lively discussions between the various communities that share an interest in hydrography and navigation.

A special feature of this year's conference was that one day was devoted to the needs and concerns of the recreational boater, the first time a hydrographic conference has done this. The special day was so well received and so successful that future conferences will probably do the same. After all, the recreational boater is the biggest and most active market for our nautical charts and publications.

As always at our hydrographic conferences, there was a great social calendar. This year we had a dinner cruise on a sailing schooner, a pub-crawl in downtown Toronto, two excellent lunches at the hotel, and a theme buffet dinner at the Hockey Hall of Fame. The Hockey buffet even featured an impressive serving bar cut out of a solid block of ice with our conference logo carved in it and "shooters" made of ice. At the end of the evening, there were souvenir hockey pucks with the conference logo.

With some 475 delegates from across Canada and around the world, this was a great opportunity to keep up with recent developments and to meet old and new friends.

All in all, the conference was a great success... and now we are starting preparations for CHC2004 in Ottawa. See you there!
For more information, please visit our CHC 2002 web site: www.chc2002.com.

Central & Arctic Region of CHS has an Internet site with links to other sites. Check us out at

http://chswww.bur.dfo.ca/dfo/chs/chs-home.html

CHC2002 Toast and Topics - Friday, May 31, 2002

As part of the Conference a 'Toast and Topics' breakfast meeting was held to address a variety of current issues within the hydrographic community. The meeting was attended by about 40 individuals representing a good cross section of the conference participants. The participants were seated at 6 tables and each table had a topic for discussion. The topics were discussed for approximately 40 minutes, during the breakfast, followed by a presentation to all attendees. The topics and reports are summarized as follows:

Table 1.
What does the future have in store for paper charts?

In 2050 it will come down to the Captain and the dog. The captain feeds the dog, and the dog makes sure the captain does not touch anything.

Based on past funding pressures experienced in CHS, we will have a very difficult time maintaining our portfolio of 950+ paper charts, therefore we expect to see more separation between the commercial product suite and recreational charts. We could see recreational charts handed over to the private sector to let them be produced in response to consumer demand. Then, CHS could focus on ensuring that commercial charts are up-to-date and the best quality possible.

It was pointed out that IMO have seen the need for the requirement of paper charts for a long time to come. Even so, the point was made that if you lose power on a ship, even with a paper chart, you can only watch yourself run aground. Survival of the paper chart will also depend on infrastructure issues such as Notices to Mariners, insurance requirements, and the costs involved in running separate product lines.

Table 2.
How should distributors of hydrographic products ensure that the consumers get the products they need when they need them?

We begin to address the question of distribution with an anecdote. It concerns a certain clothing store (the name has been omitted to protect the innocent), which has both retail stores throughout Canada and on-line shopping. After being unable to locate a jacket she wanted in the right size and colour at a couple of the local stores, and after being given the run-around by the retail staff, the consumer resorted to the on-line shopping option. There she placed her order and the requested item showed up the next day. If she had gone that route in the first place she would have saved herself considerable time and frustration.

This situation can apply to the distribution of hydrographic products as well. Distributors must have a fully integrated inventory system that allows them to determine what and where the stock is at any time. Following this to get stock from where it is to the user the next day.

Table 3.
Should a country endeavouring to maintain its capacity to conduct hydrography strive to maintain FIG / IHO accredited hydrographic training programs?

This issue is larger than the question and there is agreement that certification is important. According to Dave Wells, Canada has at this time, CAT A accreditation for at least one more year. These training programs are expensive so not every country can afford to run them. Smaller countries may consider joining a regional certification program. Another consideration is whether the programs recognised by FIG and IHO meet the needs of the workplace and the academic institutions. Students may take CAT A at UNB and end up with a Bachelor's degree. Other universities offer it at a Master's level if a thesis is written. More standardisation may be required. All were in agreement that the concept of certification is important for the field of hydrography in general, and that if our agencies are to rely more and more on contractors, we need the confidence that the contracted work was being done to recognised standards. [Editors' note: The current register of FIG/IHO Recognized Courses does not list any accredited programs in Canada.]

Table 4.
Are we collecting too much data, and can we manage it effectively?

There is no such thing as too much data. Our technology is advancing quickly; we can store the data but can we process it effectively? And if we can process it for storage, how do we disseminate it effectively in an all-encompassing database for

all users? We do not know who all the potential users are. We have to store all the data we collect; nothing should be discarded because technology is advancing on us quickly and things we think we have no use for today may have a use in the future. In the future, technology may allow us to present more of the information in our products. Currently we tend to do a poor job in archiving and warehousing our data. Storing historical data is important to serve as a baseline for future comparison. We put out immediate fires and little regard is given to the effect on future projects. Once the work is done and the project is complete, the data is not often adequately archived and this makes it difficult to access for other projects in the future. A national standard for identifying and storing data is required since not all agencies have the same requirements for data quality. Standard data formats should be adopted and when there is migration, all data should be migrated to the new technology. What use is data stored on a system that no one has anymore? How do you identify what is important to various users? Comprehensive metadata can help the users decide for themselves as to what data is important to their needs.

Table 5.
What will be the next significant technological breakthrough(s) in hydrography?

This can be related back to what was going on when building the railroad expressed the technology of the time. At the same time the Wright brothers were creating the airplane which would impact greatly on transportation in the future.

We have identified the next phase in hydrography as being the consolidation of many technologies that are out there and this can be achieved with technology that exists. With the consolidation of different types of data and different technologies and the miniaturisation of technical systems, all the dreams of the past 20 years are now feasible. Information is coming out in mass data, new ways to customise data making it useful to a range of people from science to recreational boaters. There is a new product of opportunity.

Key events are pointing the way into the future of hydrography, such as the use of autonomous remote underwater vehicles, untethered craft that can be programmed and released then retrieved at a specific place and time. These devices use their own position information and sensing systems. The LIDAR airborne system will continue to be used. The finite measurement of the geoid is not being done but should be undertaken; new technologies could be used for that purpose. In October 2002 an important event will occur, where all 911 services will be using GPS and cell phones will be equipped with GPS. This will allow everyone to see where EMS people are, everyone will be able to see where they are but the flip side is that everyone will also see where you are. This will provide an opportunity for someone to collect and sell that information.

In terms of hydrographic information, we believe one of the future desires of hydrographic information will be a MAPQUEST™ type service. The user would go to the internet to find information on the best route to get from A to B at sea. Users will harness the power of the computer to customise passage plans and bring in other data sets to support parameters of their activity.

An important aspect and focus of hydrography in the future is defining the shoreline, especially if the Koyoto Protocol does not do something to reduce global warming. If the ice cap melts, shoreline will have to be redefined and that is important given that it is projected by the UN that two-thirds of the population of earth is going to be living within 60 km of the shoreline. If the defined shoreline moves this will have a great impact on the human population.

The only thing we are absolutely sure of is that tele-transportation is not going to be the next technological breakthrough in hydrography!

Table 6.
What marketing initiatives will create a significant increase in chart sales to the recreational community?

Many good ideas were discussed.
The four P's of marketing are Product, Price, Place and Promotion and have to be discussed the four C's in relation to the client: Customer, Cost, Convenience and Communications. The eight ideas were discussed. We need to get the product to the customer and look at the needs of the customer, consult them and look at how the product is used. Packaging and appearance is especially important to the recreational community to make the product more attractive to this community and add value to it, such as Triptik™ (CAA). Offer the service to the boating community so they can make use of the product. Updating of product is important - products must be up-to-date. An easy-to-use and convenient product is needed which would make use of GPS in conjunction with the chart. Get the right product to the right people, which leads into distribution. Provide the customer with a test product and the customer will let you know if it is what they want. Communication and promotion, behavioural change and education, both take a long time and are costly. We need to get to boaters early on and raise their awareness of available products. Make navigation products compulsory, part of safety equipment required, get insurance companies onboard perhaps offering discounts to boaters making use of hydrographic products.

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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:

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News From Sustaining Members
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NetSurvey

NetSurvey is one of the leading multibeam service solution providers worldwide. We provide a specialist service to survey companies, ports & harbour authorities and research & government organisations. This service covers the installation, calibration and acquisition of multibeam data all the way through to final post-processing and visualisation.

We can supply any portable multibeam system suitable for vessel, ROV or AUV deployment including but not limited to the following systems:

Reson:	8101, 8125, 8128, 8111, 8160
Simrad:	EM3000, EM2000, SM2000, EM1002
Seabeam-ELAC:	SB 1185, SB 1180, SB 1050
Omnitech:	Echoscope
GeoAcoustics:	GeoSwath

These systems can be supplied with all the ancillary sensors required to complete a multibeam survey (motion sensor, gyro, SVP). The multibeam hardware is then installed, operated and processed by a team of highly trained multibeam surveyors and engineers. Our specialist personnel are also available to supplement survey company offshore teams or to act as client representatives.

Post processing is achieved by using the following software;

IVS:	Fledermaus (3D spatial editing, 3D visualisation, volume calculation, route planning)
CARIS:	HIPS (for bathymetry) and SIPS (for backscatter)
QPS:	Basic multibeam editing

We offer an in-house data processing service that can range from simple swath bathymetry cleaning to full 3D Visualisation and fly-through using Fledermaus software. NetSurvey also offer bespoke training courses with a practical emphasis.

All of our surveyors/engineers are trained up on Reson, ELAC, Simrad and Omnitech multibeams, Applanix, TSS and Seatex motion sensors, QPS, Eiva, CARIS HIPS/SIPS and Fledermaus software.

With its large equipment pool available for hire and some of the most experienced multibeam specialist personnel, NetSurvey can provide you with peace of mind and the complete multibeam solution at a very competitive rate.

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l'Institut maritime du Québec

Un dirigeant dans l'industrie de la construction navale au Québec Préside la campagne de souscription annuelle de la fondation de l'Institut maritime du Québec.

C'est sous la présidence d'honneur de M. Réjean Verreault, vice-président aux opérations pour Les Chantiers Verreault et Les Ateliers Maritimes Verreault, situés à Les Méchins en Gaspésie, que la Fondation de l'Institut maritime du Québec lance sa campagne annuelle de souscription avec l'objectif d'amasser 40 000$ en dons.

L'industrie maritime et du transport connaît actuellement un dynamisme remarquable tant sur le plan canadien qu'international et plus que jamais le besoin d'une main-d'oeuvre bien formée se fait sentir. C'est dans cette perspective et en considération du rôle joué par la Fondation de l'Institut maritime du Québec pour supporter les jeunes qui promettent un jour d'être à l'avant-scene de cette industrie que M. Verreault, lui-même diplomé de l'Institut en architecture navale en 1985, a accepté de s'associer à la campagne annuelle de financement de la Fondation.

Au cours des prochaines semaines, le plus grand nombre d'entreprises et d'individus oeuverant dans les domaines maritme et du transport seront sollicités. La Fondation invite aussi toutes les personnes sensibles aux objectifs qu'elle poursuit à contribuer au succès de cette levées de fonds.

L'action de la Fondation à l'Institut maritime du Québec est remarquable. Depuis 1991, la Fondation a été en mesure de verser plus de 400 000 en bourses et en subventions. Partenaire dynamique des industries maritime et du transport, l'Institut maritime du Québec ne cesse d'ajouter à sa reputation d'excellence, cependent le support de sa fondation est primordial pour faciliter son développement.

Les personnes intéressées à contribuer à la campagne peuvent faire parvenir leur don à la Fondation de l'Institut maritime du Québec, 53 rue-Saint-Germain Ouest, Rimouski, Québec, G5L 4B4. Un reçu pour l'impôrt sera émis sur demande.

Source: Jean Lavigne, agent d'information
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DID YOU KNOW . . .

The deepest spot yet found in the ocean is near the Philippine Islands, where a sounding of thirty-five thousand four hundred feet has been reported.

News From Sustaining Members
Nouvelles de Membres de soutien

Gemini Positioning Systems Ltd.

Gemini Positioning Systems Ltd. is a Calgary based GPS company with over 20 years experience in satellite positioning technology. In addition to providing integrated GPS based solutions, Gemini is the exclusive Canadian Ashtech distributor for Thales Navigation. Gemini also distributes the CSI Wireless brand of DGPS receivers and software.

The knowledge and experience of the management and staff have gained Gemini the distinction of being one of the premier Canadian companies geared exclusively towards the promotion, integration and support of GPS based solutions. On staff engineers, programmers and technicians allow Gemini to successfully find solutions to our clients needs.

Various industries that Gemini provides product and technical support for include surveyors, forestry, marine, seismic, mining, municipal and aerial applications. Gemini supports a national network of dealers and sub-dealers that provide coverage to all regions in Canada. Gemini's relationship with our sub-dealers includes provisions for joint sales and marketing efforts as well as educational seminars, product training and presentations of new technologies.

Due to the acquisition of Ashtech by Thales Navigation the DSNP product names such as 6501 SK/MK, 6502 SK/MK, Aquarius and Sagitta and the full Ashtech product line will be re-branded under the Thales Navigation brand name. Thales concluded that to enhance marketing efficiency these two product lines would best be represented under one professional brand name.

Gemini maintains an extensive lease pool of precision GPS products that are available for daily, weekly and monthly rentals. This lease pool is maintained at both our Ottawa and Calgary facilities and available for immediate delivery.

No matter what your GPS demands entail, Gemini has the means to provide top line GPS equipment and unique solutions for all types of GPS applications.

For further information contact:
Frank Wiskar
Tel: (403) 252-5007
E-mail:fwiskar@gps1.com
Web site: www.gps1.com

DID YOU KNOW . . .

The first early English charts were known as sca-cards or sea-cards.

C & C Technologies

The R/V Rig Supporter, C & C Technologies' AUV support vessel, began transiting from the Mediterranean Sea to the coast of West Africa on July 18, 2002. The Rig Supporter is a 260-foot research vessel equipped with C & C's HUGIN-3000 Autonomous Underwater Vehicle (AUV). C & C's AUV is the world's most successful survey AUV providing multibeam swath high-resolution bathymetry and imagery, chirp side-scan sonar and sub-bottom profiler with a capability of working in water depths up to 3000 meters. The AUV has been operational since January 2001 and completed more than 11,000 KM of survey lines.

For futher information contact:
Jay Northcutt
Tel: 337-261-0660
E-mail: info@cctechnol.com
Website: www.cctechnol.com

C & C Technologies and Century Subsea Alliance

C & C Technologies (Lafayette, Houston & Trinidad) and Century Subsea (Aberdeen & Houston) have strengthened their Alliance by extending their alliance agreement for an additional three years. The Alliance has been operational for over six months.

The Alliance will provide deepwater construction companies operating in the Gulf of Mexico with a comprehensive range of survey services which include: Flowline & Umbilical Installation, Template & Spar Installation, Subsea Metrology and Deepwater Acoustics.

Thomas Chance, President of C & C Technologies stated "This is a great thing for our clients and for the employees of both companies. Century Subsea brings a wealth of subsea marine construction survey experience that further strengthens C & C's already comprehensive range of survey services. The Alliance is a real powerhouse." Mark Vorenkamp, President of Century Subsea commented "Century Subsea's construction expertise gained in the North Sea provides a unique, totally independent level of service not previously available in the Gulf of Mexico, and C & C is a great company to work with."

The Alliance aims to provide technically competent and innovative positioning solutions to assist subsea engineers from project conception to final installation. The combined group has over 200 people and has performed projects worldwide.

For futher information contact:
Jeff Fortenberry
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E-mail: info@cctechnol.com
Website: www.cctechnol.com

"What's new in CHS?"
«Quoi de neuf au SHC?»

It is with great pleasure that I have returned to the Canadian Hydrographic Service (CHS) as the Acting Dominion Hydrographer until April 2004. You will find below a summary of my career. I am thrilled to be in a strategic position to be fully part of the decision-making process with the management team of CHS at a very challenging time for the organization. I am very supportive of professional development and more specifically the role of professional associations such as the Canadian Hydrographic Association that have been providing a function in that field for CHS, as well as for all its members in Canada. I hope to meet many of you in the months to come.

Denis Hains, B.Sc., a.g.

C'est avec plaisir que je me joins à nouveau au Service hydrographique du Canada (SHC) en tant qu'Hydrographe fédéral intérimaire jusqu'en avril 2004. Vous trouverez ci-après un sommaire de ma carrière. Je suis très enthousiaste à l'idée d'être dans une position stratégique pour être pleinement engagé dans le processus de décision avec l'équipe de gestion du SHC dans une situation pleine de défis pour l'organisation. Je suis aussi un fervent partisan du développement professionnel, et plus spécifiquement, du rôle d'associations professionnelles telle que l'Association canadienne d'hydrographie qui a joué un rôle dans le secteur pour le SHC, en plus pour tous ses membres au Canada. J'espère avoir la chance de rencontrer plusieurs d'entre vous dans les prochains mois.

Denis Hains was appointed Acting Director General of the Canadian Hydrographic Service (CHS) in the Department of Fisheries and Oceans Canada in October 2002. For the previous two years, he was Director General of the Audit and Evaluation Branch in Natural Resources Canada (NRCan). He has had broad experience in the delivery of operational programs to Canadians, in a regional environment with the Department of Fisheries and Oceans, and more recently with the Earth Sciences Sector, and Audit and Evaluation of NRCan. He holds a Bachelor Degree in Science (Geodesy). He is a member of the Québec Land Surveyor Corporation and a member of engineering and technical associations, as well as the Association of the Professional Executives of the Public Service, and was a member of an Advisory Committee for the University of Calgary and Laval University.

Mr. Hains has extensive experience in hydrography as well as in sciences, research and development related to geomatics/ geodesy with Geomatics Canada. He has led regional, national, and international initiatives that required accuracy of measurement and quality control and strong leadership. More specifically, he undertook ISO 9000 certification with the three organizations he has had the privilege of leading in his career. He is also committed to leadership training and development closely associated with Canadian Centre for Management Development (CCMD), and graduated from the Mastery of Coaching and Leadership Intensive Programs.

Denis Hains a été nommé au poste de Directeur général intérimaire du Service hydrographique du Canada (SHC) au ministère des Pêches et des Océans du Canada en octobre 2002. Précédemment, il fut Directeur général de la Direction de la vérification et de l'évaluation à Ressources naturelles Canada (RNCan) durant 2 ans. Il a une vaste expérience dans la livraison de programmes opérationnels aux Canadiens dans un environnement régional avec le ministère des Pêches et des Océans, et plus récemment avec le Secteur des sciences de la terre, ainsi que de la vérification et de l'évaluation à RNCan. Il détient un Baccalauréat ès Sciences (géodésie). Il est membre de l'Ordre des arpenteurs-géomètres du Québec et d'associations d'ingénierie et techniques, ainsi que de l'Association professionnelle des cadres de la fonction publique, il fut membre de Comités Conseil à l'Université de Calgary et l'Université Laval.

M. Hains a une grande expérience en matière d'hydrographie, ainsi qu'en matière de sciences, de recherche et de développement en relation avec la géomatique / géodésie è Géomatique Canada. Il a dirigé des projets tant régionaux, nationaux, qu'internationaux nécessitant impliquant la mesure de précision et le contrôle de qualité ainsi qu'un sens élevé de leadership. Plus spécifiquement, il a entrepris des certifications ISO 9000 dans les 3 organisations qu'il a eu le privilège de diriger. Il est aussi très engagé dans la formation en leadership avec le Centre canadien de Gestion (CCG), et a obtenu un diplôme du « Mastery of Coaching Program » et du « Leadership Intensive Program ».

Russ Melanson 1923 - 2002

MELANSON, Russel Cameron – 79, Broad Cove, passed away peacefully Thursday, July 4, 2002, in South Shore Regional Hospital. Born in Mill Village, he was retired from the Bedford Institute of Oceanography, where he was Atlantic Regional Hydrographer for the Canadian Hydrographic Service. He served in the Second World War as a member of the First Canadian Parachute Battalion, and was a past vice president of the First Canadian Parachute Battalion Association. Russel was a son of the late Alexander and Cassie (Boland) Melanson. He is survived by daughter, Laurie (David) Ewer, Sackville; sons, Russel C. Jr. (Sandra), Charlottetown, P.E.I.; Garron (Gay), Bible Hill; Ronald (Tina Newcombe), Upper Tantallon; brothers, Rod (Estelle), Mill Village; Rex (Muriel), Bridgewater; Royce (Shirley), Liverpool; seven grandchildren. Russel was predeceased by his wife, Shirley (Hall), to whom he was happily married for 53 years; infant son, Stanley Alexander; sisters, Sandra, Muriel, Madge, Merlene; brother, Robert.
(The Halifax Herald Limited, Monday, July 8, 2002)

Russ Melanson, Regional Hydrographer, Atlantic Region, retired on December 28, 1978 after a long and colourful career with the Canadian Hydrographic Service.

Russ joined the CHS in April 1948 taking part in surveys of the Atlantic Provinces, Sub-Arctic, High Arctic and the west coast for 16 consecutive seasons. Many of the establishments with which he served are long gone – either retired, sold or sunk. Some of these were the Kapuskasing, Acadia, Henry Hudson, Cartier, M.V. Terra Nova and Theron.

His first assignment as Hydrographer in Charge was on the CHL Anderson in 1953. Following this assignment, he was given charge of the Cartier, M.V. Arctic Sealer, CSS Baffin and William J. Stewart.

In 1963, Russ transferred from Ottawa to the Atlantic Region. He was appointed Regional Hydrographer, Atlantic Region in 1964. He held this position until his retirement.
(LIGHTHOUSE, April 1979, page 21)

Upon retirement, Rus and Shirley moved to Broad Cove, where they could enjoy a beautiful panoramic view of the Atlantic and the adjacent landscape. Ironically, their home overlooked a large rock formation where the Baffin had run aground years earlier. After years of spending more time away than at home, Rus was quite content to spend his time in and around Broad Cove. And probably his favorite pass time was travelling over the back roads of his youth along the Medway river, reminiscing about a time which many of us were never privileged to experience.
(From son, Rus, Charlottetown, P.E.I.)

Pacific Region

Hydrographic Surveys Division (2002)

The move of the EM1002 from the *R.B. Young* to the *Vector* was successfully completed, including testing and calibration, in mid-August. Q-Route surveys from Vancouver to Juan de Fuca Strait have been completed for the year and include some very impressive imagery of dozens of pockmarks in English Bay. Multi-disciplinary surveys are being conducted in collaboration with NRCAN and Moss Landing Research Laboratory on the US side of Haro Strait. Subsequent patrols in November and January will focus on the Canadian side of Haro Strait and surveys to support Shrimp Habitat mapping for Stock Assessment Division in the Strait of Georgia.

While several Revisory Surveys had to be cancelled or postponed due to resource shortfalls, Pitt River and Pitt Lake (Chart 3062) Revisory Surveys were carried out in April by a shore party.

The *Revisor*/EM3000 has been quite busy to date. Revisory Surveys of Charts 3711, 3891 and 3955 were carried out along

with investigations of reported uncharted hazards to navigation from Sidney to Prince Rupert and the Eastern Queen Charlotte Islands. Several large-scale multibeam field sheets have been produced to prove or disprove these reported hazards.

In addition, a multibeam survey of Skidegate Narrows was carried out, which included a GPS-walked definition of the low-water line on both sides of the channel. This line has allowed a more precise definition of the zone boundaries through this complex tidal area where the range changes from 7.8 to 4.5 metres in a distance of 3 nautical miles. The tide zoning feature of HIPS is being used to apply this new definition during the data merge stage of processing.

Several other multibeam and Acoustic Seafloor Classification (ASC) surveys have been conducted for other sectors and departments. A survey of Trail Bay for the Pacific Pilotage Authority, a post-trawl survey of Clio Channel for DFO Marine Environment and Habitat Science, and geohazards and sediment transport surveys on the east coast of the Gulf Islands, at Sandheads and Roberts Bank and in English Bay for NRCAN are notable examples. The MVP-30 has proved invaluable in oceanographically dynamic areas such as off the mouth of the Fraser River.

Monitoring, maintenance and upgrades to the Permanent Water Level Network and Emergency Response (Tsunami) gauges has continued along with field gauge support for Georgia Basin, Skidegate Channel and Revisory Surveys. Gauge installation support has also been provided to Central and Arctic Region at Alert and Holman, to PWGSC at Sandheads and to DFO Ocean Science and Productivity (OSAP) in the Broughton archipelago.

Processing of the Sidney multibeam data is moving along quickly thanks to a collaborative agreement with Terra Remote Sensing. Two Terra employees were trained in HIPS processing in exchange for several weeks of processing time dedicated towards the Sidney project. CHS has now a developed external capacity to process multibeam data should the need arise.

Nautical Publications Division

The Nautical Publications division of CHS Pacific has had another busy year. In addition to the work scheduled to complete chart upgrades identified under the Program Integrity 2 project, approximately 60 charts required immediate attention due to stock issues. To complicate matters, the Traffic Separation Scheme (TSS) in the Juan de Fuca area was revised, which led to the production of nine new editions of charts.

The TSS changes have an implementation date of December 1, 2002, which resulted in tight deadlines for chart production staff. The production team was lead by Les Pickell, who did an outstanding job of co-ordinating staff and complying with the requirements of the regulatory bodies involved.

Our ENC production team has also had a busy year producing New Editions and updates that were required to keep our inventory of ENCs current. Staff have worked hard to eliminate the backlog of updates while working through growing pains associated with the Product Database.

This year also saw the retirement of two long-time CHS staff. Our Sailing Direction Officer, Rikki Farrel, left the CHS after 29 years of service. November will see the retirement of Ron Korhonen, who has worked in Chart Production for 29 years. We wish both of them a long and happy retirement. Their contributions to our organisation will be greatly missed.

Central and Arctic Region

CHC2002

In May, an enthusiastic committee put their plans and preparation into action at the Canadian Hydrographic Conference 2002 held at the Westin Harbour Castle Hotel in Toronto. The papers, poster sessions, trade show, workshops and delegates well represented the conference theme "Innovation and Excellence - focusing on client requirements and their changing needs". The tradition of a highly technical conference merged well with the needs of users of hydrographic information. Recreational boaters made a significant impact by actively participating in various activities scheduled specifically for the "Recreational Boaters' Day". Marine safety was highlighted by introducing the visible use of lifejackets.

Tides and Water Levels - Arctic Gauging Project

Over the summer, Ron Solvason, along with assistance from Pacific Region CHS and Natural Resources Canada Geodetic Survey Division, was involved with the installation of the tide and water level stations at Alert and Holman. Along with the tide gauging equipment there is also a continuously recording GPS station to monitor changes in the elevation of the earth's crust. Last fall, the Atlantic Region Office CHS established a Water Level station at Nain on the Labrador coast. Personnel from the Geodetic Survey Division are establishing a continuously recording GPS station at Nain this summer. Later this fall, a reconnaissance trip will be made to the communities of Pond Inlet and Clyde River on Baffin Island, by Atlantic Region CHS and Geodetic Survey personnel to check on the feasibility of installing a Tide and GPS station at one of these communities.

The installation of these gauging stations is being funded through the Canadian Climate Action Fund administered by Environment Canada to establish a network of gauging stations in the Canadian Arctic to monitor the elevation of Mean Sea Level. Changes in the elevation of Mean Sea Level are one indicator of Global Climate Change.

Hydrographic Surveys

The Georgian Bay survey with HIC John Medendorp was cancelled a few days after it started as the *CCGS Griffon* had to complete the Navigational Aids work assigned to the *CCGS Samuel Risley*, when the Risley developed mechanical problems.

Revisory survey with HIC Bob Covey, completed a survey in Nipigon Bay on Lake Superior, conducted a harbour approach survey in Thunder Bay harbour and investigated items on charts in the North Channel and Manitoulin Island areas of Lake Huron. A survey was completed in Lake Muskoka following the grounding of a passenger ferry. The survey then reviewed Charts 2020, 2023 and 2024 on the Trent-Severn waterway for "refer to revisory" items and positioned fixed aids and shoreline in order to shift these charts to NAD 83. The season finished with the investigation of over four hundred items on Chart 1437 on the St. Lawrence River.

Funding for the work in the Beaufort Sea from the *CCGS Nahidik* in 2002, was not approved so this proposed survey was cancelled. A memorandum to Cabinet requesting funding for this work for the next two years was recently approved. The multibeam launch and staff scheduled for this survey were moved to the Lake Timiskaming survey.

The Lake Timiskaming survey, with HIC John Medendorp, started working in July out of Haileybury at the north end of the lake and out of Témiscaming at the south end of the lake. The multibeam launch *Petrel*, with single-beam launches *Whistler* and *Widgeon*, started in the north end and multibeam launch *Merlin* started in the south. The survey staff numbered sixteen, with thirteen in the north and three in the south. Multibeam data (156.4 sq. km) was collected across the entire lake, in depths greater than five metres, and the multibeam work was completed by the end of July. The EM3000 multibeam system on the *Merlin* collected data to the maximum depth of the lake at two hundred fifteen metres. The shallow areas, shoal exams, and other items for the chart were finished by the end of August.

The eastern Arctic survey was carried out aboard the *CCGS Henry Larsen*, with Jon Biggar as HIC. Two Hourston Launches and gear were driven to St. John's Newfoundland in June, to be put aboard the *Larsen* and four staff met the ship in Iqaluit in mid-August for an eight-week survey. The project is on an opportunity basis and hopes to conduct surveys at Hall Beach, Igloolik, Repulse Bay, Cape Dorset Lake Harbour and Iqaluit.

Electronic Navigational Charts (ENCs)

The following ENCs were released and published over the summer: Lake Erie, Main Duck Island to Scotch Bonnet Island, Jackfish Bay to St. Ignace Island, Kingston to False Duck Islands, Approaches to Parry Sound, and a large scale ENC of Nanticoke wharves.

Sailing Directions

Did you know that our Sam Weller in Sailing Directions, writes the quarterly article called "From the Chart Room" for the Company of Master Mariners of Canada newsletter "From the Bridge"?

Nautical Publications

On July 1st, 2002, the Canadian Hydrographic Service unveiled their new line of Lake of the Woods charts. These charts addressed the practical needs of both recreational boaters and anglers alike. The series contains ten folded (14 cm x 26.5 cm), double-sided, waterproof charts, each available at an introductory price of $19.95 for the 2002 season.

Atlantic Region

On the morning of October 02, 2002 *CSS Acadia* had a brief jaunt out in the harbour. She is normally berthed behind the Maritime Museum of the Atlantic in halifax N.S., but every five years they rotate the direction of her hull to even out weathering and permit work to be done on different sides. That morning a tug took *Acadia* for a brief voyage.

In some photographs she looks like she is under her own power!

CENTRAL BRANCH

The CHA Central Branch executive is organized into five distinct Committees, each tasked with maintaining certain functions of the Branch. They are: Communication and Publicity; Membership; Admiralty Launch Surveyor; Education and Development, and Social Events.

Member News

Congratulations to Scott Youngblut and wife Kelly who were married on 21 September at Port Severn, Ontario. Thankfully Scott had recovered in time from a bad infliction of poison ivy which he, Ken Dexel and Bob Strachan all managed to contract while on a field assignment to Revisory Survey.

This late summer and fall, CHS hydrographers Jon Biggar, Tim Janzen and Arnie Welmers were on assignment aboard *CCGS Henry Larsen* in the Eastern Arctic while Paola Travaglini joined the JAMSTEC (Japan Marine Science and Technology Centre) Research Vessel *Mirai*,to participate in a joint science program in the Beaufort Sea.

During the latter part of the summer, Dan Dexel was involved in a dredging program with Great Lakes Dredge and Dock in the Magdalen Islands, Gulf of St. Lawrence. Also on assignment with Great Lakes is Ron Dreyer in Ghana.

Brad Robinson has returned from an overseas assignment with Dutch Onshore-Offshore Recruitment (D.O.O.R.). Congratulations to Brad and wife Debbie who are expecting their third child this January.

Congratulations also to Peter Knight and his colleagues at the School of Surveying, University of Otago, NZ whose hydrography program has been accepted in principle at the IHO/FIG Category A level.

Coastal Multibeam Sonar Training Course

47 Participants attended the course that was held during the week prior to CHC2002. Equipment and software demonstrations were offered by Applanix, CARIS, Helical Systems, Interactive Visualization Systems, Klein Associates, Kongsberg Simrad Mesotech, McQuest Marine Sciences, Quality Positioning Services Ltd., RESON Inc., Roxar and Valeport. Central Branch would like to take this opportunity to acknowledge the efforts of Paul Davies and his committee for organizing a most successful program.

CHC2002

As an organization which supported the 2002 Canadian Hydrographic Conference, it is noteworthy that of the various CHC2002 committees, almost all were chaired by Central Branch members. In addition to the efforts of the committee chairs, Central Branch would like to thank its out-of-house members as well as those members visiting from other branches who volunteered at the registration desk.

Summer BBQ

This year's annual CHA Central Branch BBQ was held at the residence of Anna and Brian Power on June 8th. The BBQ was moved forward to accommodate Branch members heading out on CHS hydrographic surveys. Attendance was down slightly from previous years [there were about 25 members and friends this year], possibly due to the fact that the 2002 Canadian Hydrographic Conference (CHC2002) had ended the weekend before and members whose lives were on hold until then took the opportunity to relax and catch up!

Admiralty Launch Surveyor

Surveyor and crew participated in two static (dry-land) events this summer; at Odessa for the Upper Canada Trade Faire, and at Grimsby for the Festival of the Forty. In September, *Surveyor* was leased out to be used as a prop in the making of a Robinson Crusoe film.

[Editors' note: please see the excellent paper entitled "A Decade of *Surveyor*" on page 15.]

DID YOU KNOW . . .

DINGHY

This name for a ship's smallest boat is a contribution to our nautical vocabulary from India. Dinghy means "small", and from the same word we get also our slang "Dinky".

DAVITS

These devices for hoisting boats were named for their inventor, a Welshman named David, and given the Welsh pronunciation of that word, i.e. Davit.

PACIFIC BRANCH

On Tuesday October 29, members attended a lunch time seminar held at the Institute of Ocean Sciences. Mike Brisett, Department of National Defence, presented a seminar on "An Introduction to Mine Warfare". The talk focused on a history of mine warfare and talked about how bathymetric route surveys are being used to aid in the mitigation of these weapons. Mike was presented a CHA Beer glass as a token of appreciation for his talk.

The 2002 BCIT Pacific Branch bursary award was presented to Scott Rhodes, Geomatics Engineering Technology. Scott received a bursary in the amount of $600.00. CHA Pacific Branch executive member, Craig Lessels, presented this award.

Ron Korhonen of CHS Pacific (Nautical Charts and Publications) had his retirement luncheon at Glen Meadows Golf and Country Club on Thursday November 28. Doug Cartwright is back from working on his Masters in Geodesy and Geomatics Engineering, with the Ocean Mapping Group at UNB. We also welcome back Shelly Parkhouse to Pacific region. Shelly spent the last year on a personnel exchange with Quebec region. We also say good bye to Julie Remy, from Quebec region, as her exchange with us comes to an end.

The Annual General Meeting will be held on Tuesday December 3, at the Institute of Ocean Sciences. We will also be holding a Christmas luncheon and social, at the Glen Meadows Country Club, on Tuesday December 17.

Congratulations!
CHA Award Winner Jade Van Peteghen

B.M. Lusk, Manager, CHA Award Program

Ms. Jade Van Peteghen is a 24 year old student at the Northern Alberta Institute of Technology. NAIT is in Edmonton and serves some of the educational needs of the students from this region. Her home town is Vermilion which is about 100 miles directly east of Edmonton on highways 16 and 41. She is this schools first winner of this award.

Jade graduated from J.R. Robson High School in 1996 and has been pursuing various studies since that time most of which had to do with animal medicine.

In 2001 she saw the light and began her studies of Geomatics at NAIT. In her first term her grade average was 96 percent and in the fall term 91 percent. So as you can see she is a very good student. She has made the dean's honour roll.

Her future ambitions are to become an Alberta Land Surveyor and work in the oil fields.

The Canadian Hydrographic Association congratulates Jade on her award.

It's Your Life...
C'est votre vie...

Preserve It!
préservez-la!

Take the Course ... Get the Card!

Requirements for operators of pleasure craft fitted with a motor & used for recreational purposes.

Boat Operators	Date when proof of competency required on board
All operators born after April 1, 1983	September 15, 1999
All operators of craft under 4 m in length, including personal watercraft	September 15, 2002
All operators	September 15, 2009

Suivez un cours ... Obtenez la carte!

Règlement sur la compétence des conducteurs d'embarcation de plaisance

Conducteurs d'embarcations	Date à laquelle une preuve de compétence est requise à bord
Tous les conducteurs nés aprè le 1er avril 1983	Le 15 septembre 1999
Tous les conducteurs d'embarcations de moins de 4 m de longueur, y compris les motomarines	Le 15 septembre 2002
Tous les conducteurs	Le 15 septembre 2009

For Boating Safety Information call/Pour information sur la sécurité nautique composez
1 877-281-8824
Or visit/ou visitez
www.ccg-gcc.gc.ca

Fisheries and Oceans Canada / Pêches et Océans Canada
Coast Guard / Garde côtière

Canada

Take a Course...Get Your Card!

Boating is one of Canada's favourite family activities. And no wonder! Our country boasts tens of thousands of beautiful lakes and the longest coastline in the world. While recreational boating is a lot of fun, it also requires responsibility.

Perhaps you have already heard about the Canadian Coast Guard regulations requiring recreational boaters to show proof of operator competency when operating a power craft. Phased-in over a ten year period that started on September 15th 1999, these regulations affect all boaters, including children. By the year 2009, all recreational powerboat operators will be required to have proof of competency, regardless of their age or the size of their boat.

As of September 15, 2002 the law requires that all operators of pleasure craft under 4 metres in length, including personal water craft, to show proof of operator competency when operating a recreational power-driven vessel.

These new regulations affect approximately 1.2 million boaters and are designed to increase awareness of safe boating practices and reduce boating-related accidents and fatalities. In a 1998 survey, Canadians identified youth as having the greatest need for safe-boating education. According to national figures over 400,000 boaters have received their card since implementation of the program.

As well as your pleasure craft operator competency card you are also required to carry the proper personal protection equipment. The equipment that you are required to carry is based on the size of your vessel and is listed in the Canadian Coast Guard's Safe Boating Guide.

The Canadian Coast Guard encourages boaters to take an accredited boating safety course and to get their Pleasure Craft Operator Card to help ensure safer waterways and reduce the number of boating injuries and fatalities that occur each year.

For more information about Canada's safe boating regulations, accredited safe boating safety courses and how to obtain proof of operator competency, visit the Canadian Coast Guard, Office of Boating Safety Web Site at www.boatingsafety.gc.ca or call the Boating Safety Info line toll free at 1-800-267-6687.

"Back to Back Down Under"

17th - 20th November 2003
Third International Conference in High Resolution Surveys in Shallow Water - Shallow Survey 2003, Sydney, Australia.
www.dsto.defence.gov.au/corporate/conferences/swsurvey/
Contact: Philip Chapple
Tel: 61 2 96921536 Fax 61 2 96921560
E-mail: philip.chapple@dsto.defence.gov.au

24th - 26th November 2003
Fourth Australasian Hydrographic Symposium - Hydro 2003-Surveying Extremes Christchurch, New Zealand
www.hydrographicsociety.org.nz
Contacts: Wendy Barker Tel: & FAX: 64 3 3831749
E-mail: wendybarker@xtra.co.nz
or
Ron Whitmore, Tel: 61 2 94892091 FAX: 61 2 94892048
E-mail: seacon@sydpcug.org.au

The Hydrographic Society

- serves the interests of the world hydrographic surveying community
- promotes knowledge and expertise at symposia, seminars and workshops
- supports improved standards in education and training through Education Funds and Award Schemes
- publishes both the prestigious quarterly Hydrographic Journal and other specialist literature
- provides vital worldwide links between Corporate and Individual Members – and employers and employees
- offers a wide range of additional information and services at www.hydrographicsociety.org

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in association with Deutsche Hydrographische Gesellschaft

8–10 October 2002
Kiel, Germany

www.hydro2002.org

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E: helen@hydrographicsociety.org
W: www.hydrographicsociety.org

CHA l'ACH

The Canadian Hydrographic Association (CHA) is a non-profit, scientific and technical group of more than 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) and 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 900.

Membership

Membership is open to all those associated with the hydrographic community as well as those working in associated disciplines.

Branch & Regional Activities

The Canadian Hydrographic Association has five (5) branches located across Canada. National headquarters is located in Ottawa.

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 professionel 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 The Hydrographic Society.

Ce qu'elle L'ACH peut faire pour vous:

- 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 900 copies.

Comment devenir membre

Le statut de membre est offert aux tout ceux oeuvrant ou ayant un intérêt dans des disciplines associées.

Sections et activités régionales

L'Association canadienne d'hydrographie possède cinq (5) sections à travers le Canada. L'administration central se trouve à Ottawa.

For further information write to / Pour plus d'information, s'addresser au:

National President/Président national
Canadian Hydrographic Association
1390 Promenade Prince of Wales Dr., Suite/Bureau 400
Ottawa, Ontario Canada K2C 3N6

Rates Tarifs

POSITIONING / EMPLACEMENTS

The acceptance and positioning of advertising material is under the sole jurisdiction of the publisher.

L'approbation et l'emplacement de l'annonce sont à la discrétion de l'éditeur.

DIGITAL REQUIREMENTS
EXIGENCES NUMÉRIQUES

Advertising material must be supplied by the closing dates as digital Tiff 600dpi files. 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).

L'annonce publicitaire doit être fournie aux dates de tombée. 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.

PUBLICATION SIZE
DIMENSIONS DE LA PUBLICITÉ

Publication Trim Size/ Dimension de la revue:	**8.5"**	**x**	**11.0"**
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Full Page/ Pleine page:	**7.0"**	**x**	**10.0"**
1/2 Page/ Demie-page:	**6.875"**	**x**	**4.75"**
or/ ou:	**3.375"**	**x**	**9.75"**

PRINTING / IMPRESSION

Offset screened at 133 lines per inch.
Internégatif tramé à 133 lignes au pouce.

CLOSING DATES / DATES DE TOMBÉE

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

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

RATES / TARIFS

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

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

	B & W/ N & B	Colour/Couleur Four/Quatre
Outside Back Cover *Couverture arrière*	NA/SO	$1,025
Inside Cover *Couverture intérieure*	NA/SO	$825
Body, Full Page *Pleine page*	$275	$675
Half Page *Demie-page*	$200	$475
Single-page Insert *Insertion d'une page*	$275	$675
Professional Card *Carte d'affaire*	$125	NA/SO

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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.

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.

All advertising material should be directed to:
Tout le matériel publicitaire doit être acheminé à:
Advertising Manager/ *Directeur de la publicité*

LIGHTHOUSE
P.O. Box 5050, 867 Lakeshore Rd., Burlington, ON L7R 4A6
Telephone (905)336-4558 Fax (905)336-8916
E-mail lighthouse@car.dfo-mpo.gc.ca

HINTS TO AUTHORS

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

1. **Submit a hardcopy complete with graphics including tables, figures, graphs and photos.**
2. **Submit digital files, one with text only and a separate file for each graphic (tables, figures, photos, graphs) in its original form or in .tif format (600 DPI). Photos may be submitted separately to be scanned. These may be submitted via E-mail or on CD ROM to the Editor.**
3. **Papers should be in either English or French and will be published without translation.**
4. **An abstract, information about the author(s) and contact information should be included.**

THE CANADIAN HYDROGRAPHIC ASSOCIATION AWARD
LA BOURSE DE L'ASSOCIATION CANADIENNE D'HYDROGRAPHIE

(est. 1992 / établie en 1992)

$2,000 for a "Deserving Student" / 2000$ pour un étudiant méritant

1. The applicant must be a full time student registered in an accredited survey science program (the program must have a Geographic Information Systems, Cartographic, Land or Hydrographic Survey component) in a university or technological college anywhere in Canada. The Administrator of this award will determine the eligibility of the program for the award.

2. The award will be available only to students who are in their second year of study in the degree or diploma program (under graduate) 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 under no condition less than 70%.

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 applicant will be required to write a short paragraph explaining his/her financial need in a clear, concise manner on the application form or, if necessary, attached piece of paper. The importance of this aspect of the application is emphasized.

5. The award application will be submitted to the Administrator of Canadian Hydrographic Association Award Program by June 30 each year and to the address in item 11 below.

6. The value of the award is $2,000. There is one award only each calendar year.

7. The successful applicant will be issued with a special Hydrographic Association Certificate, duly framed, at the time the award is made. He/She will also receive a medallion with the Hydrographic Association Crest and have his/her name mounted on a perpetual winner's plaque. A picture of the plaque duly inscribed will be mailed to the winner along with the $2,000 cheque during the second week of July.

8. The applicant must submit one letter of reference from a official of the university or college where the applicant spent the previous year. This letter of reference must include the address and phone number of this official.

9. An individual student may receive the award once only.

10. The successful applicant's letter of appreciation will be published in the next issue of our professional journal "Lighthouse".

11. Application will be made on the form supplied, which is available from your school's awards office, and sent to:

Critères d'admissibilité:

1. Le candidat doit être un étudiant inscrit à plein temps à un programme reconnu en sciences géodésiques (ce programme doit inclure les systèmes d'informations géographiques, la cartographie, les levés terrestres et hydrographiques) dans une université ou un collège au Canada. L'administrateur de cette bourse déterminera l'éligibilité du programme pour la bourse d'études.

2. La bourse s'adresse seulement aux étudiants qui seront à leur deuxième année d'étude dans un programme menant à un diplôme collégial ou de premier cycle universitaire conforme aux 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 inconditionnelle supérieure à 70 %.

3. La bourse sera remise au candidat qui, de bonne foi, peut démontrer ses besoins financiers et qui respecte les performances académiques exigées ci-haut.

4. Le candidat devra écrire un court texte, d'une manière claire et concise, démontrant ses besoins financiers sur le formulaire de la demande ou, si nécessaire, sur une lettre jointe. Une grande importance est accordée à cet aspect de la demande.

5. La demande doit être soumise à l'administrateur du programme de la bourse de l'Association canadienne d'hydrographie au plus tard le 30 juin de chaque année à l'adresse mentionnée à l'article 11 ci-bas.

6. La valeur de la bourse est de 2000 $. Il n'y a qu'une seule bourse remise à chaque année civile.

7. Le récipiendaire recevra un certificat spécial de l'Association canadienne d'hydrographie, dûment encadré . Il recevra aussi un médaillon à l'effigie de l'Association canadienne d'hydrographie et son nom sera ajouté sur la plaque des gagnants. Une photo de la plaque gravée sera postée au gagnant avec un chèque de 2000 $ au cours de la deuxième semaine de juillet.

8. Le candidat doit soumettre une lettre de référence d'un représentant de l'université ou du collège où il a suivi son cours l'année précédente. Cette lettre de référence doit inclure l'adresse et le numéro de téléphone de ce représentant.

9. Un étudiant peut recevoir la bourse qu'une seule fois.

10. Une lettre d'appréciation du récipiendaire sera publiée dans l'édition suivante de notre revue professionnel "Lighthouse".

11. La demande devra être faite sur le formulaire prescrit, lequel est disponible aux bureaux de vos écoles, et envoyée à :

Barry M. Lusk, Manager / Administrateur
Canadian Hydrographic Association Award Program / Bourse de l'Association canadienne d'hydrographie

4719 Amblewood Drive, Victoria, B.C. V8Y 2S2
email/ courriel luskbm@telus.net Fax : 250 658 2036 Web site: chswww.bur.dfo.ca/dfo/chs/cha

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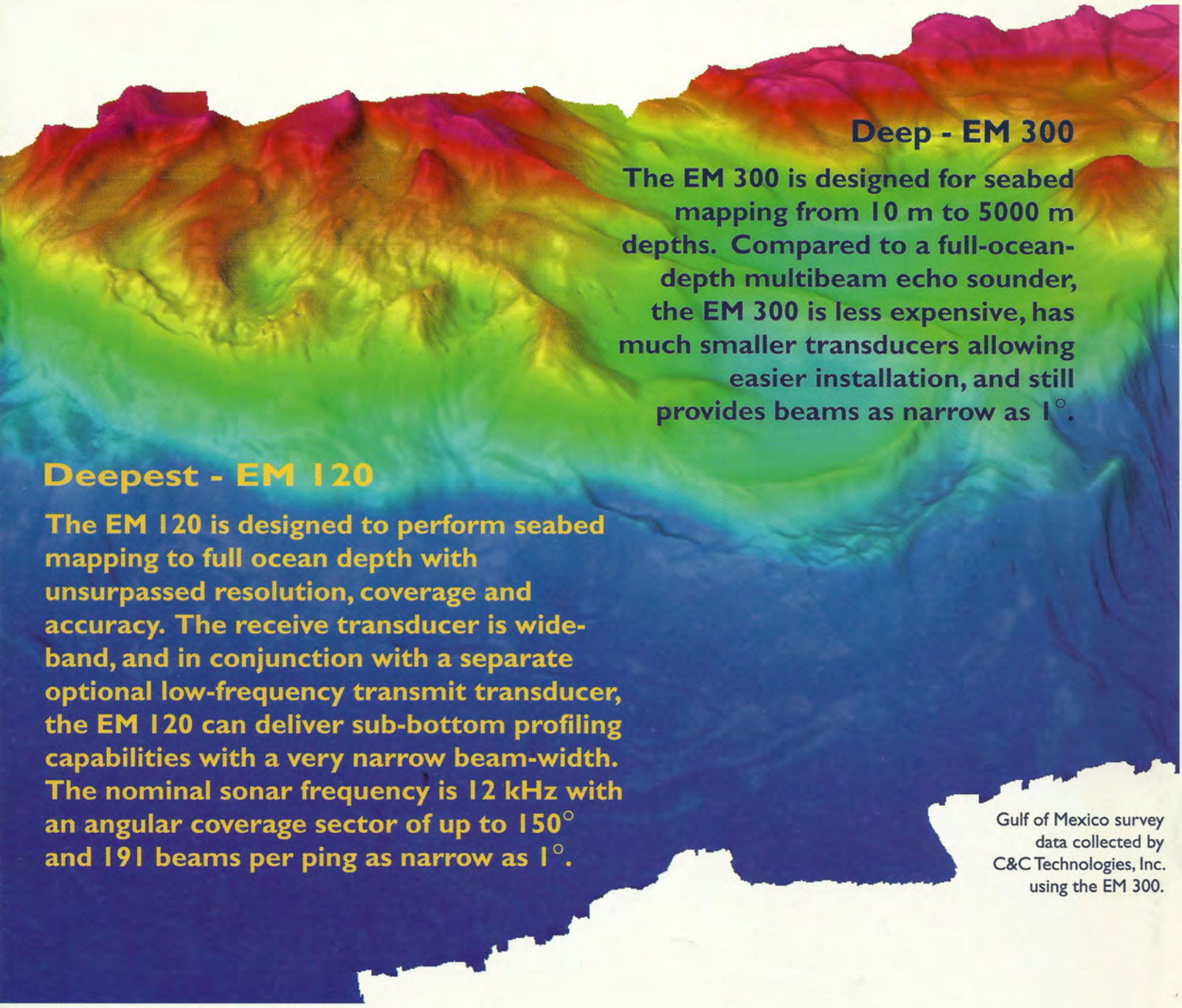

Deep - EM 300

The EM 300 is designed for seabed mapping from 10 m to 5000 m depths. Compared to a full-ocean-depth multibeam echo sounder, the EM 300 is less expensive, has much smaller transducers allowing easier installation, and still provides beams as narrow as 1°.

Deepest - EM 120

The EM 120 is designed to perform seabed mapping to full ocean depth with unsurpassed resolution, coverage and accuracy. The receive transducer is wide-band, and in conjunction with a separate optional low-frequency transmit transducer, the EM 120 can deliver sub-bottom profiling capabilities with a very narrow beam-width. The nominal sonar frequency is 12 kHz with an angular coverage sector of up to 150° and 191 beams per ping as narrow as 1°.

Gulf of Mexico survey data collected by C&C Technologies, Inc. using the EM 300.

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