

The Canada Lands Surveyor Commission – A Recommended Role in the Certification of Hydrographic/Offshore Surveyors

Andrew LEYZACK, Canada

Key words: Hydrography, Certification, Professional practice, Practical experience, Training

SUMMARY

The scope of hydrography is international and it is practiced according to international standards. While Canada has one of the most extensive inland, coastal and offshore areas in the world, significant portions of these areas are yet to be surveyed to modern standards. Surveys are required for purposes ranging from modern nautical charting to acquiring data in support of Canada's Article 76 claims to the Continental Shelf; from Coast Zone Management and the development of a Marine Cadastre to the exploration and subsequent exploitation of offshore resources. Over the last two decades there has become an apparent lack of IHO/FIG/ICA- accredited training programs for hydrographic surveyors in Canada. If left unchecked this will compromise the profession's capacity to respond to domestic and international hydrographic survey projects.

Recognizing this opportunity as a potential need for a certification program to protect the public from unqualified service providers, the Association of Canada Lands Surveyors (ACLS) Offshore Issues Committee in cooperation with the Canadian Hydrographic Association (CHA) have prepared joint recommendations to implement a national certification program with policy regarding the ACLS Affidavit of Experience & Practical Training specifically for hydrographers. The recommendations suggest that the existing process for obtaining a Canada Lands Surveyor Commission could serve both the Canadian private and public sector as the basis for a national certification program for hydrographers. As with any certification program, it could serve as a recognized part of career development; as a standard to which individuals from varied academic backgrounds could be brought on par and furthermore as a standard to which domestic, in-house training courses could be measured.

Although this paper focuses on the certification and education of Canadian hydrographic surveyors, similar debates are occurring in other maritime nations. The author would like to take this opportunity to encourage further discussion and feedback from the international community.

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1. BACKGROUND

The scope of hydrography is international and it is practiced according to international standards. While Canada has one of the most extensive inland, coastal and offshore areas in the world, significant portions of these areas are yet to be surveyed to modern standards. Surveys are required for purposes ranging from modern nautical charting to acquiring data in support of Canada's Article 76 claims to the Continental Shelf; from Coast Zone Management and the development of a Marine Cadastre to the exploration and subsequent exploitation of offshore resources. Over the last two decades there has become an apparent lack of IHO/FIG/ICA- accredited training programs for hydrographic surveyors in Canada. If left unchecked this will compromise the profession's capacity to respond to domestic and international hydrographic survey projects.

During the 2002 Canadian Hydrographic Conference a Panel Discussion identified the need for accredited training programs to aid in the development of individuals executing hydrographic surveys and to ensure that those surveys meet recognized standards. Furthermore, it was agreed 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".¹ This statement implies that in order to perform a task to recognized standards, the competence of the individuals executing the task should be measured according to a recognized certification criterion.

"Certification is career recognition through the evaluation and approval of individuals engaged in a specific occupation or profession. Certification as a general practice is offered by national membership associations representing a particular career."² Most certification programs also require some form of continuing education to ensure participants remain current in their field and thus maintain competency. A competency-based certification program uses examinations, education, and specific experience requirements. Certification is therefore a means of measuring job-related expertise and "reflects the individual's ability to perform more closely than does a university degree".³ The benefits of certification can provide recognition of competence and career satisfaction, as well as improved performance and client satisfaction.⁴

¹ Brown, (2002).

² URISA, (2001).

³ Somers, (2004).

⁴ Tétreault, (2002).

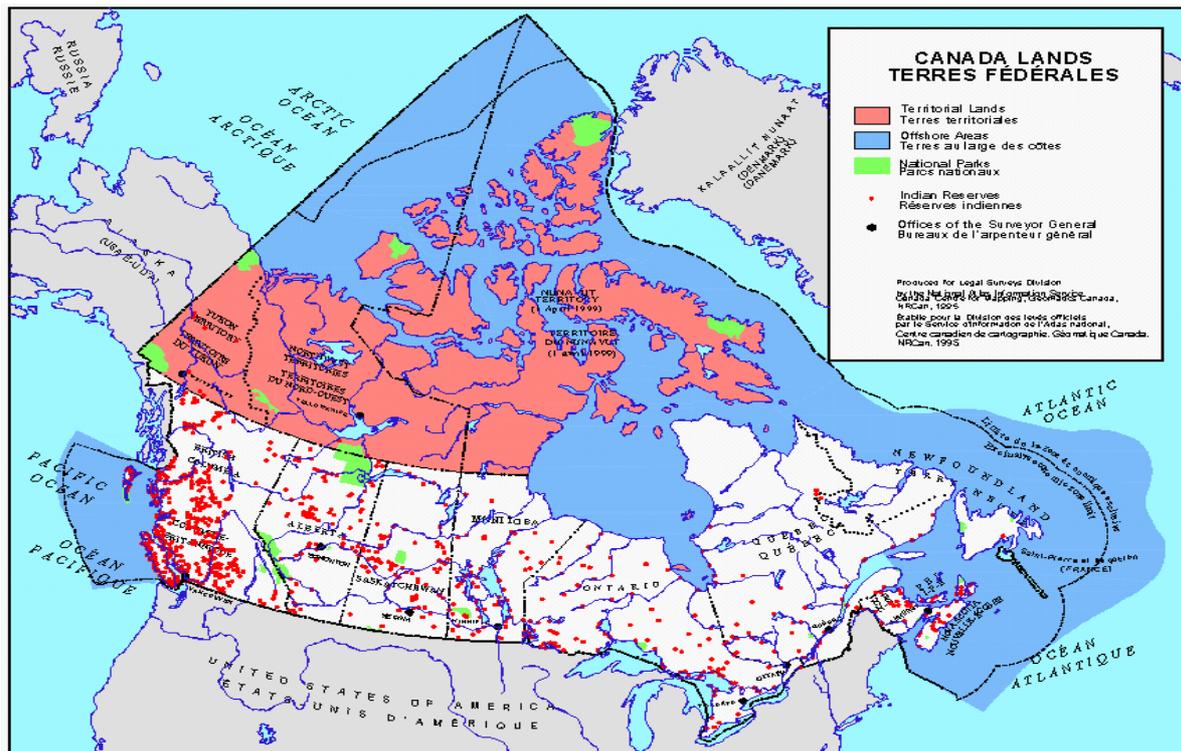
At the 2nd ACLS Offshore Consultation Workshop held in Calgary, Alberta, in October 2003, the author proposed that in the absence of internationally accredited training courses and as a stop-gap measure, the surveying profession, particularly the Association of Canada Lands Surveyors (ACLS) could play a role in certifying hydrographic surveyors in Canada.⁵ The Canada Lands Surveyor (CLS) commission could serve both the Canadian private and public sector as the basis for a national, competency-based certification program; as a recognized part of career development; as a standard for which individuals from varied academic backgrounds could be brought on par and as a standard to which in-house training courses could be measured.⁶ By recognizing the merits of IHO/FIG/ICA accredited hydrographic training within the scope of education and experience prerequisites, such a certification program might help stimulate the need to re-establish accredited hydrographic training programs in Canada.

1.2 The Association of Canada Lands Surveyors

Survey activities in Canada are regulated by 10 provincial associations and one “federal” association - The Association of Canada Lands Surveyor (ACLS). The Association of Canada Lands Surveyors is a national multi-disciplinary organization representing geomatics professionals engaged in hydrography, geodesy, photogrammetry, remote sensing, geographic information systems, data management and cadastral surveying. Canada Lands Surveyors are the only professionals authorized to perform cadastral surveying services on Canada Lands, which include the Yukon, Northwest Territories and Nunavut. Their jurisdiction also includes surveys of National Parks, Aboriginal Reserves and Offshore Canada Lands. The latter is of course relevant to the domain of the hydrographic surveyor. The following illustration best describes the extent of Canada Lands:

⁵ Sutherland, (2004).

⁶ Leyzack, (2003).



Courtesy of Association of Canada Lands Surveyors

1.3 ACLS-CHA Task Force

Recognizing the opportunity to fulfill a need for certification and to protect the public from unqualified service providers, the ACLS Council requested that the ACLS Offshore Issues Committee (OIC) look into this issue and make recommendations. In response, the ACLS OIC and the Canadian Hydrographic Association (CHA) cooperated to form a task force. The task force was asked to prepare joint recommendations to implement a certification program for hydrographers and develop policy on the ACLS Affidavit of Experience & Practical Training specifically for hydrographers.

1.3.1 Terms of Reference

The terms of reference for the task force were to:

- develop a terminology (definitions).
- research other certification models ie. Provincial, National, and International.
- develop a model for the certification of hydrographers by the ACLS, which may involve changes to the CLS syllabus and address issues such as experience (log book), continuing professional development (CPD), and dues.
- develop a policy on the ACLS Affidavit of Experience & Practical Training (log book) specifically for hydrographers.
- look into the possibility of mutual recognition with respect to existing certification models.
- present a report to the ACLS Offshore Issues Committee to be forwarded to council.

1.3.2 Task Force Membership

The task force was composed of members of the CHA and ACLS drawn from private industry, government and academia. The members of the ACLS-CHA Task Force were as follows:

- Andrew Leyzack CLS, Canadian Hydrographic Service (Chair)
- Jean-Claude Tétreault, CLS, ACLS Executive Director
- George Schlagintweit, CLS, Canadian Hydrographic Service.
- Ken McMillan, President McQuest Marine Sciences
- Brian Pyke, CLS, Geomatics Centre for Geographic Sciences

Advisory members:

- Jerry Mills, The Hydrographic Society of America
- Peter Barr, Spatial Sciences Institute of Australia
- Thomas McCulloch, Canadian Hydrographic Association

The Task Force began meeting in February 2004 and continued to discuss the issue of certification over a total of seven recorded meetings. Additionally in May of 2004, the Chair presented a paper on the subject to FIG Commission 4 (Hydrography) in order to gain an international opinion of the Task Force's objectives.

2. FINDINGS

2.1 Certification versus licence

According to URISA (Urban and Regional Information Systems Association), "Certification is career recognition through the evaluation and approval of individuals engaged in a specific occupation or profession". In a certification model, anyone may provide a service but those providers who have met specified education and training requirements would be distinguished with an exclusive designation. Licensing, on the other hand, awards the right, to certain individuals who have met specified educational and training requirements, to provide a specified service.

2.2 ACLS licence

To practice cadastral surveying on Canada Lands or private lands within a territory, individuals have to be licensed by the ACLS. Survey practitioners are required to:

- have a CLS Commission;
- be a member of the ACLS;
- submit a License application form;
- demonstrate at least two years of experience in surveying and practical training;
- submit proof of professional liability insurance (unless a public servant); and
- pay a \$250 License fee.

2.3 Association of Ontario Land Surveyors- Certificate of Registration

The Association of Ontario Land Surveyors (AOLS), has included an Hydrographic Certificate of Registration (C of R) as part of its “Expanded Profession”. While a number of individuals in both the public and private sector have obtained this C of R, all did so through a grandfathering process which has since been discontinued. The AOLS C of R is no longer recognized by the Canadian Hydrographic Service as a professional qualification for staffing within their Engineering Survey (EN-Sur) classification whereas the CLS Commission is and has been recognized for over 20 years.

2.4 International experience

2.4.1 United-States: American Congress on Surveying and Mapping (ACSM) Hydrographer Certification

The U.S., under federal supervision, contracts out the majority of its hydrographic surveys to the private sector. This, in contrast to the Canadian model, has led to the building of a strong capacity to conduct hydrographic surveys within the US private sector. The ACSM Hydrographer Certificate is sought by tendering agencies such as the US National Oceanographic and Atmospheric Administration (NOAA) and the US Army Corps of Engineers (USACE) when evaluating technical proposals. Certification with the ACSM requires:

- at least 5 years experience in hydrographic surveying;
- a 1,000-word essay on the fundamentals of hydrographic surveying;
- submission of references; and
- successful completion of a 3-hour exam.

Examination topics include depth measurement, vessel positioning, horizontal and vertical control, tides and water levels, survey planning, nautical science and general marine science. A person with an FIG/IHO/ICA Category A-accredited education is credited with 2 of the 5 years required experience.

2.4.2 Spatial Sciences Institute, Australasian Hydrographic Surveyors Accreditation Panel

Level 1: Accreditation for eligibility to become a member of the Institute of Surveyors of Australia (ISA) or a corporate member of the New Zealand Institute of Surveyors (NZIS) as a hydrographic surveyor:

Successful completion of a FIG/IHO/ICA-accredited Category A Course and two (2) years of appropriate experience in hydrographic surveying with 50% surveying afloat and 50% in a responsible senior position – preferably in charge.

or:

Suitable bachelors degree in surveying with courses in line with FIG/IHO/ICA-accredited Category B Course and two (2) years of appropriate experience in hydrographic surveying with 50% surveying afloat and 50% in a responsible senior position – preferably in charge.

or:

Suitable bachelors degree in surveying plus five (5) years of appropriate experience in hydrographic surveying with 50% surveying afloat and 50% in a responsible senior position – preferably in charge.

Level 2: Accreditation for eligibility to become an associate member of ISA or NZIS as a hydrographic surveyor:

Successful completion of an FIG/IHO/ICA- accredited Category B Course plus two (2) years of appropriate experience in hydrographic surveying which includes 50% surveying afloat.

or:

An approved diploma or certificate in a discipline of surveying plus five (5) years of appropriate experience in hydrographic surveying which includes 50% surveying afloat.

Applicants must be able to provide a logbook of Practical Work Experience verified by his or her supervisor or client. Peter Barr, an Australian member and correspondent to the CHA has reported that “many surveyors in Australia see hydrographic surveyors as technicians but their accreditation process makes it clear that entry is almost exclusively by FIG/IHO Category A degree with sound seagoing experience, and thus a highly professional classification”⁷.

2.4.3 FIG Commission 4

Feedback from Commission 4 at FIG Working Week 2004 was varied. While some delegates urged the Task Force to create a specialization stream within the CLS discipline, others believed there was an advantage to maintaining a program within the general surveying syllabus. Delegates also recommended that the Task Force bear in mind international mutual recognition for ease of labour mobility when designing the certification program. The US and UK delegates cautioned the Task Force not to create a certification process which would make it unreasonably difficult for the average surveyor to obtain certification. For example, it was identified at the time that the examination failure rate for those challenging the ACSM hydrographer certification program was high.

2.4.4 ISO/TR 19122:2004

As a follow-up and means to affirm the recommendations of this Task Force, the International Organization for Standardization Technical Report ISO/TR 19122:2004 relating to the Qualification and Certification of Geomatics Personnel was referenced. Section 6.4 in particular, which pertains to Current Qualifications and Certification Initiatives, identifies internationally-adopted criteria for:

- national authorities who confer certification,
- methods for determining required competency,
- factors in determining the level of certification, and
- mechanisms for granting qualification/certification.

⁷ Personal correspondence with Peter Barr, January 2004.

A review of Section 6.4 of ISO/TR 19122:2004 found that the ACLS are in-line with existing international certification criteria insofar as the ACLS is a professional organization with clearly defined competency/skills/knowledge guidelines based on standardized curricula, cognizant of international regulations such as those set out by the FIG and the IHO. Furthermore the ACLS use factors such as the level of academic knowledge and practical experience to determine whether or not an individual should be considered for a certain level of qualification or certification. Of the recognized mechanisms for granting qualification/certification, the ACLS uses mutual recognition, examinations, portfolio (project) assessment and supports continuing professional development programs.

3. RECOMMENDATIONS

3.1 Terminology

The Task Force recommended that the ACLS adopt the IHO Hydrographic Dictionary (SP-32) and the Canadian Hydrographic Service Terms and Definitions (ISO9001:2000, 900-F07) as their official sources for hydrographic terminology for the ACLS Practice Manual.

3.2 Certification

The Task Force recommended that the process of certification would involve a number of steps and that specific prerequisites be satisfied.

3.2.1 CLS Commission

The initial step in getting the ACLS Hydrographic Surveyor Certificate would be for the hydrographic candidate to obtain a CLS Commission by challenging the exams of the general syllabus (as any other CLS candidate would) in order to bring all candidates to the same (university) academic level, recognized as a Bachelor's Degree in Surveying.

3.2.2 Certification Considerations and General Prerequisites

Upon receiving a CLS commission, the hydrographic candidate would then be eligible to apply to become a certified hydrographer. Additional considerations include:

- **Licensure:** The applicant would not necessarily have to apply for an ACLS license unless he or she intended to practice cadastral surveying (as specified in Section 2 of the Canada Lands Surveyors Act).
- **Membership:** The applicant would also have to be an individual member in good standing of the ACLS.
- **Professional Designation:** A certified hydrographer would be entitled to use a **CLS Cert. Hydro** (Canada Lands Surveyor – Certified Hydrographer) designation.
- **Fees:** The candidate would also pay a one-time \$150 CDN fee (\$100 for application, \$50 for certification).

3.2.3 Marine Training

Hydrographic candidates would be required to have successfully completed the following training prerequisites:

- Transport Canada (TC), Marine Emergency Duties (MED) A1⁸ and MED A3

or:

- a combination of TC MED A1 and the equivalent of the Canadian Yachting Association's Basic Power / Commercial Endorsement certificate;
- a Canadian Coast Guard-certified small vessel operator's licence; and
- a VHF radio operator's licence.

3.2.4 Education and Experience Prerequisites and Exemptions

Hydrographic candidates would be able to demonstrate hydrographic knowledge and experience and should also be required to:

- submit a Hydrographic Field Survey (Training) Project Report based on a minimum of four weeks supervised and evaluated field training, including launch operations. The report should, as a minimum, demonstrate the candidate's knowledge and ability to position and navigate a vessel at sea while collecting geo-referenced depth data.
- submit an Affidavit or Statutory Declaration with logbook (See Appendix B) demonstrating at least five (5) years of varied experience in hydrographic surveying including: instrument/system calibration, precise positioning, tidal measurements, bathymetric and/or sonar (side scan/multibeam) measurements, land surveys, data transformation and data management.

With proof of successful completion of either an IHO/FIG accredited Category A or B course, hydrographic candidates applying for certification shall:

- be exempt from submitting a Field Survey (Training) Project Report and
- receive a credit of 3 years experience.

3.2.5 ACLS Board of Examiner Considerations

The ACLS Board of Examiners will have the authority to award certificates. As such, this Board will have to set guidelines for the Field Survey Training Project and the Logbook per item 4.2.4.

3.2.6 Maintenance of Certification

In order to maintain their certification, ACLS certified hydrographers would be required to be members in good standing with the ACLS. The ACLS hydrographic certificate holder would therefore be bound by the ACLS Code of Ethics, and subject to the Complaints and Discipline process of the ACLS. Whereas at present, the ACLS currently support a voluntary CPD

⁸ MED A1 focuses on marine firefighting and survival whereas MED A3 focuses on basic seamanship skills

program, the Task Force further recommended that certified Hydrographers maintain their skills through participation in continuing professional development programs.

4. CONCLUSION

The Task Force suggested that above-mentioned recommendations would help to close the gap between the CLS syllabus and the IHO/FIG Category A accreditation described in the IHO/FIG/ICA Standards of Competence for Hydrographic Surveyors (Publication M-5).

The Task Force confirmed that there is a definite need for professional recognition in the hydrographic surveying industry and the existing CLS model alone may not serve as the best fit for that. However, certification provided by a licensing body would provide the credibility and security required for the protection of public interests.

Upon implementation, certification would not necessarily imply that only those holding a certificate would have an exclusive right to perform hydrographic surveying in Canada, but in future the ACLS Hydrographic Certification would become recognized by clients and insurers as a “must have” qualification for those individuals providing hydrographic surveying services. The United States and Australia have successfully adopted hydrographic certification programs. Similar debates on professional certification are occurring in other maritime nations. With due recognition for the IHO/FIG/ICA Standards of Competence the Task Force has anticipated that such a national certification for hydrographic surveyors might contribute labour mobility between countries.

This recommended model for certification has since been approved by the ACLS Council. The file is now with their Bylaws and Legislation Committee to review the legal ramifications of this concept and its impact on the Canada Lands Surveyors Act.

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Systems Association.

BIOGRAPHICAL NOTES

A graduate of Humber College's Hydrographic Survey Technologist program, Andrew has been surveying for over 15 years, with varied experience in topographic, cadastral, offshore/industrial and hydrographic surveys. He is a commissioned Canada Lands Surveyor and is presently employed by Fisheries and Oceans Canada - Canadian Hydrographic Service, Central and Arctic Region. His career postings have included Hydrographer-in-charge of Western Arctic and Hamilton Harbour Surveys. As president of the CHA, he also serves as the technical councilor for hydrography in the Canadian Institute of Geomatics (CIG) and as the Canadian National Delegate to FIG Commission 4.

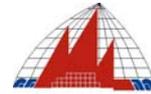
CONTACTS

Mr. Andrew Leyzack
Canadian Hydrographic Service, Fisheries and Oceans Canada
867 Lakeshore Road
Burlington, Ontario
CANADA
Tel. +001 905 336-4538
Fax +001 905 336-8916
Email: leyzacka@dfo-mpo.gc.ca
Website: www.charts.gc.ca/pub/en

APPENDIX A

List of Acronyms Used

ACLS	Association of Canada Lands Surveyors
ACSM	American Congress on Surveying and Mapping
AHSAP	Australasian Hydrographic Surveyors Accreditation Panel
AOLS	Association of Ontario Lands Surveyors
CHA	Canadian Hydrographic Association
CHS	Canadian Hydrographic Service
CLS	Canada Lands Surveyor
C of R	Certificate of Registration
CPD	Continuing Professional Development
FIG	Fédération Internationale des Géomètres
IHO	International Hydrographic Organisation
ICA	International Cartographic Association
ISA	Institute of Surveyors of Australia
ISO	International Organisation for Standardization
MED	Marine Emergency Duties
NZIS	New Zealand Institute of Surveyors
NOAA	National Oceanographic and Atmospheric Administration
OIC	Offshore Issues Committee
SSI	Spatial Sciences Institute
TC	Transport Canada
TR	Technical Report
UK	United Kingdom
URISA	Urban and Regional Information Systems Association
US	United States
USACE	United States Army Corps of Engineers
VHF	Very High Frequency



APPENDIX B

LOG OF EXPERIENCE AND PRACTICAL TRAINING

Applicant's Full Name:

Period of Experience and Practical Training

From: _____ To: _____ Number of Days: _____

Experience - Brief Description of Work Performed¹

- | | |
|--|---|
| <input type="checkbox"/> Construction Survey | <input type="checkbox"/> Control Survey |
| <input type="checkbox"/> Road Survey | <input type="checkbox"/> Mining Survey |
| <input type="checkbox"/> Mapping Survey | <input type="checkbox"/> Topographic Survey |
| <input type="checkbox"/> Land Survey (Legal) | <input type="checkbox"/> Offshore Survey (Legal) |
| <input type="checkbox"/> Photogrammetric Survey | <input type="checkbox"/> Hydrographic Survey (Conventional) |
| <input type="checkbox"/> Hydrographic Survey (LIDAR) | <input type="checkbox"/> Hydrographic Survey (Multibeam) |
| <input type="checkbox"/> Other – please specify: | |

General Location of Work Performed:

Candidate's Position While Performing Work

- | | |
|--|---|
| <input type="checkbox"/> Field Surveyor | <input type="checkbox"/> GIS Technician |
| <input type="checkbox"/> Photogrammetrist | <input type="checkbox"/> Launch Hydrographer |
| <input type="checkbox"/> Data Processor | <input type="checkbox"/> Data Manager |
| <input type="checkbox"/> Crew Chief | <input type="checkbox"/> Hydrographer-In-Charge |
| <input type="checkbox"/> Other – please specify: | |

Candidate's Capacity While Performing Work

- Technical Duties Supervisor Manager

Supervisor's Full Name:²

Supervisor's Qualifications:

Supervisor's Phone Number:

Supervisor's Email (optional):

¹ The Board of Examiners reserve the right to extend the minimum field time requirements in the event the nature of the field experience is deemed to be limited in scope.

² References may be checked.