

A Standards Regime – Academic, Technical, Professional

Brian J COUTTS, New Zealand

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SUMMARY

This paper examines historical data on the number of professional surveyors in New Zealand through time. The character of the New Zealand surveyors is considered along with the breadth of the training they receive, and the academic, technical and professional standards they must meet are identified. These standards are put in the context of the global shortage of land surveyors and the marketability of the New Zealand land surveyor is considered. Finally, the relevance of the standards that are required is examined and speculation made on the future requirements of the profession.

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1 THE NEW ZEALAND CONTEXT

As a remote European settlement developed in the late 19th century, New Zealand initially depended on migrant military and naval personnel for the mapping and identification of land parcels. The British settlement companies added to this capability by sending their own surveyors with early settlers to lay out towns, roads, farms and the other utilities required to be established from first principles in a British colonial settlement.

Though the country traces its origins from the Treaty of Waitangi, signed in 1840, it was not until 1874 that a unified national administration was established. Surveyors approved by the Crown to carry out cadastral surveys were identified by relatively *ad hoc* methods of testing by district Chief Surveyors, until the passing of legislation in 1900 that established an examiners Board. Still, uniformity was lacking, and it was not until 1938 that a consistent set of standards, uniformity of designation for recognized professional surveyors, and which included compulsory membership of the New Zealand Institute of Surveyors (NZIS), was established. While subsequent modifications were made to this regime, the basic tenets it set in place remained in place until reforming legislation in 2002.

The remoteness of the nation from the rest of the world, the scarcity of qualified personnel, and the relatively low level of technology not only allowed but required surveyors to become expert in disciplines beyond that of their core speciality, cadastral surveys. Before the emergence of town planning as a profession they became planners, through the need to modify plans made in the United Kingdom that had to be applied to local topography; they became municipal engineers through having to design stormwater and foul sewerage systems, water supply, local roading, newly developed street lighting; and they supplied geodetic control for civil and military mapping. As a consequence, the New Zealand (and Australian) surveyors were required to develop expertise in these related disciplines, all of which became core to the New Zealand surveyor's competencies, and formal examinations were developed for those in the process of becoming a "Registered Surveyor".

Not only in professional life did New Zealanders have to become self-sufficient. Distance and the shortage of goods and services required the New Zealand indigenous settler character to manage without in most aspects of daily life. As a result, most New Zealanders are resourceful people, capable of carrying out tasks and performing duties with the minimum of resources. When added to the breadth of surveying education provided to candidates for the Surveying profession in New Zealand, this independence and resourcefulness contributes to the world-wide acceptance of New Zealand surveyors in the international community.

2 HISTORICAL REGISTRATIONS

It is of interest to look at how many new licenses, or “registrations”, have been issued over time. The graph in Figure 1 clearly shows the impact of the Great Depression of the 1930s, as well as the shortage of personnel, particularly males who were 100% of the qualified surveyors, in the period of World War II. There is then a steady climb until about 1963. It may be noted that the first university qualification for New Zealanders was introduced in 1962, and the decline from 1963 through to about 1990 may be a reflection of the restriction on numbers entering the profession as a result of the constraints on intake numbers imposed by the School of Surveying.

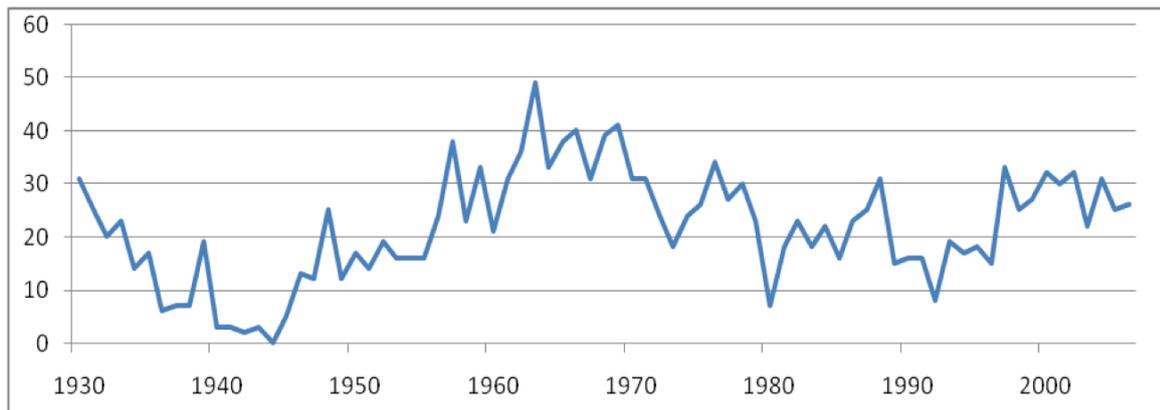


Figure 1 New registrants/licenses 1930-2006 (Coutts, 2007).
(source: the Survey Board of New Zealand Register)

In 1997 the numbers make a dramatic recovery, but again decline. It is possible that this drop in numbers entering the profession in the 1990s is a reflection of tight economic times locally, combined with a demand for graduates in other parts of the world. The late 1990s saw the start of boom times in the construction and development industries in New Zealand. While fluctuating as it always has, the numbers seems to have leveled off in the last 10 years at an average of 28 newly qualified surveyors per year, with the qualification that there may be a slightly downwards trend. The “dip” in 2003 may be as a result of the uncertainty created for a short time as a result of the change in the legislation in 2002.

3. HISTORICAL MEMBERSHIP OF NZIS

Extracting figures from the NZIS Annual Reports, since 1963 when they were first regularly reported, the number of members holding “licenses” (termed Annual Practicing Certificate (APC) prior to 2002), shows a steady increase in the number issued. Figure 2 shows that there has been a steady increase, subject to minor fluctuations, from 428 in 1963 to the present 691. A sharp rise occurred in 2002, just prior to the introduction of the Cadastral Survey Act 2002, when many surveyors who were entitled to an APC but did not hold one, applied to take one out in advance of the new Act.

From 1938 until 2002 it was a legislative requirement for all practicing land surveyors to be members of the NZIS. However, not all of those who were Registered and engaged in aspects of surveying other than land title surveys needed to have an Annual Practicing Certificate (APC). There were, therefore, Registered Surveyors who were denominated non-practicing, indicating that they were not holders of practicing certificates, rather than that they were not engaged in any form of surveying. In fact, most were so engaged. Those who held APCs were designated “practicing Surveyors” in the membership records of the NZIS.

Figure 2 shows the progressive growth in “practicing” surveyors from 1963 to 2007. A clear spike is shown in 2002. It is again speculated that these surveyors who purchased a license (or APC) did so in order to protect their rights in the change in the legislation that took place in 2002. The following dip in the graph may indicate that a measurable number then did not renew their licenses the following year. However the jump from about 600 prior to the change, to about 700 following the change, has been maintained through the following five years.

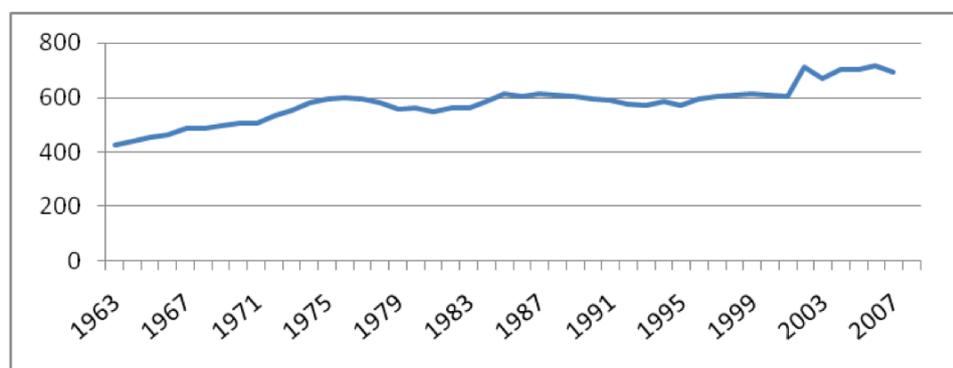


Figure 2 Number of licenses 1963–2006 (Coutts, 2007).

The total number of members of NZIS is shown in Figure 3, separated into “Practicing” Members, “Non-practicing” Members, Associates and Students.

There are one or two points that require explanation. The sudden jump in membership in 1988 represents the assimilation of the Survey Technician Association, with the members of that body later given Associate status. Also, the “bump” in practicing Members in 2002 was as a result of new legislation, and many of those who had been Non-practicing members “resuming” practice, that is, once again carrying an APC. It is noted that the total number of Members (not including Associates and Students) is not significantly affected. The downward “blip” following 2002 reflects the fact that membership became voluntary in 2002, having been compulsory since 1938, indicating that some chose to leave, but the total number has recovered.

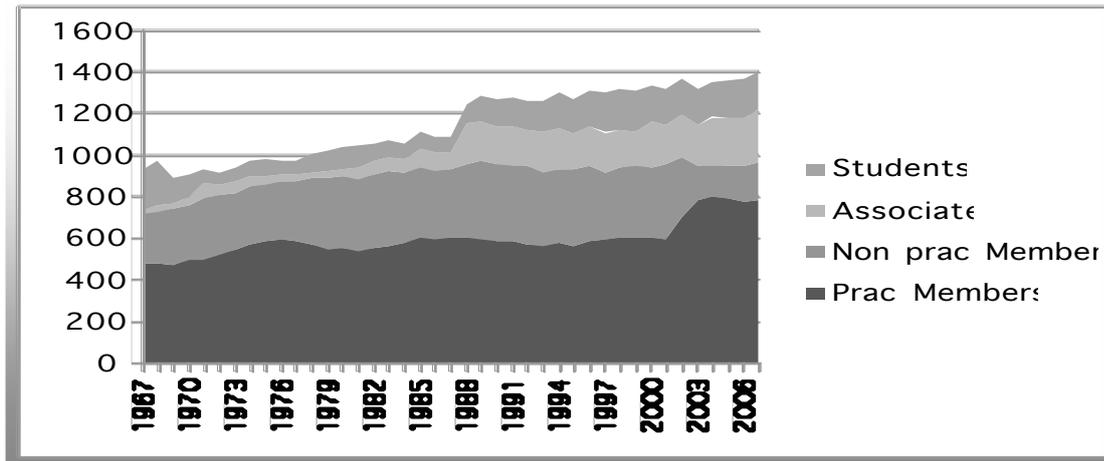


Figure 3 NZIS membership by grade.

4. STUDENT GROWTH AT NSSOU

The data that follows was obtained from the Annual Reports of the NZIS from 1978 to 2006, and from the School of Surveying for 2007. While there is information that relates to the period from 1963, the year 1978 has been chosen as a start date firstly, because it disregards the ‘start-up’ phase of the school; secondly, because the reporting data before this date is not in a consistent format; and thirdly, because that is the year of the start of the Bachelor of Surveying degree, which might be considered as the ‘modern era’

	<u>1978-87</u>	<u>1988-97</u>	<u>1998-07</u>
Applications	60	71	86
Eligible	38	49	63
Intake	29	42	58
Graduates	26	35	48
Total undergrads	91	119	170
Post grads	2	8	9

Figure 4 School of Surveying students statistics by decade. Coutts, 2007.

What can be concluded from these figures? Firstly, there has been a steady growth in the interest in surveying as indicated by the numbers applying to enter. It can be seen that there was considerable interest even in the early days, but that the numbers have fluctuated. However, when one looks at trends over decades, it is clear that the interest has been sustained and has shown a reasonably steep increase in the last five years after recovering from a drop. It is also interesting to note that the gap between applications and those eligible has narrowed. This gap probably reflects the competitiveness for entry, and the fact that students are increasingly more aware of the restrictions.

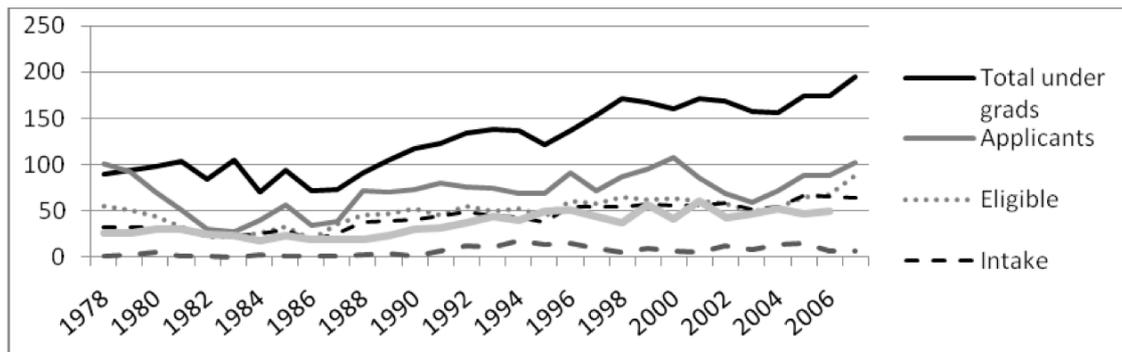


Figure 5 School of surveying statistics in the 30 years 1978-2007 (Coutts, 2007)

Secondly, there has been a steady increase in the production of graduates by the school in each decade, from 26 per annum, to 35, and now to almost 50 per year. A further increase in the intake numbers to the School in 2004 is likely to flow through to another increase over the next decade

Thirdly, after a slow start there is a steady, but not growing, interest in post-graduate study. The competitiveness of salaries now being offered by employers, combined with the level of debt that students incur in gaining their degree(s), mitigates against the School being able to encourage even its best students to engage in further, post-graduate study. Overseas students are likely to be the principal source of post-graduate students in the foreseeable future.

5 STANDARDS

The Surveying profession is well used to standards, given that surveys have had to meet government standards from the earliest days, and that the NZIS has imposed standards, albeit through the SBNZ, for most of its existence. In the 21st century the standards that surveyors have to meet come at a number of levels.

5.1 Educational standards

The first standards in the system are those imposed by the education system. In order to obtain entry into university from secondary school it is necessary to have a defined number of points at Level 3 (typically Year 13 in the New Zealand school system) in the National Certificate of Educational Achievement (NCEA). If these are not achieved, candidates must wait until they are 20 years of age before they can enter. While their NCEA points allow them to enter the university system it does not allow them entry into the national School of Surveying (there is only one course in the country that provides a professional education course in land surveying).

In order to enter the School students must take a minimum of seven one semester papers in their first year. Six papers is the minimum to qualify as a full time student. They are then competing for selection amongst the 60 to 65 candidates who will be accepted into the second year of the four year Bachelor of Surveying degree. In 2008 there are up to 162 students in

the first year delivered by the School. In recent years the average marks needed across those seven papers has been approximately 68%.

The Bachelor of Surveying degree takes four years in total and may be awarded with Credit or with Distinction. The range of core subjects includes Cadastral Surveying, Civil Engineering, Engineering Design, Geodesy, Land Information Systems (GIS), Land Tenure, Planning, Professional Practice, Project Management, Survey Mathematics, and Surveying Methods. Elective papers include Construction Management, Engineering Surveying, Hydrography, Marine Law, Photogrammetry, Property Investment, Remote Sensing, and Urban Design. In order to complete this degree in the four years it is necessary to maintain the equivalent of seven papers per year, or one more than the minimum full time requirement.

5.2 Technical standards

The second set of standards is those imposed by the profession and the licensing authority. Under the latest regime, established in 2002, the regulation of surveyors is separated from the regulation of cadastral surveyors. With respect to the surveyors, regulation for cadastral purposes is the statutory responsibility of the Cadastral Surveyors Licensing Board (CSLB). The Board regulates surveyors by setting competency standards that they are required to meet for the issue of a license, and renews licenses on an annual basis. It has disciplinary powers over those surveyors who fail to meet those standards and are considered to be a risk to the cadastre.

The CSLB has accredited the NZIS with the responsibility of testing the competency of graduate surveyors for a license in the first instance. Competency is established through one-on-one interviews with members of an Admissions Panel who are senior members of the profession, and who examine on a selection of projects based on their post graduation experience. The Board monitors the examination process through the attendance of a Board member at interviews.

The Board is also empowered to receive, accept, investigate and hear complaints against the cadastral competency of all past and present cadastral surveyors from any party. Since the reorganization of 2002, every candidate to appear before the Admissions Panel has included cadastral surveying as an option. What constitutes “Professional misconduct” is defined in the Second Schedule of the Board’s empowering statute. In each of the last three years the Board has dealt with two or three cases of professional misconduct, and all cases that have gone to a hearing have been proven to the Board’s satisfaction.

Thirdly, the NZIS has competency standards that must be met by survey graduates who wish to be full members of the Institute. To be eligible for attendance at an interview, a candidate must have completed a specified period, depending on the five sub-disciplines (measurement science and four others) the candidate chooses to put forward from a list of ten possible topics.

5.3 Professional standards

Fourthly, but only with respect to cadastral surveys, the Surveyor-General issues standards that relate to the quality of cadastral surveys submitted to the cadastral record. These standards are prepared by the Office of the Surveyor-General who consults the profession at large before issuing them as standards that must be adhered to. They are generally referred to as the “Surveyor-General’s Rules”. Not complying with the Surveyor-General’s Rules is an offence under the Cadastral Survey Act 2002, and non-compliance may be a matter for CSLB disciplinary actions.

5.4 On-going competency

Finally, the NZIS has recently instigated a higher level of professional status termed “Registered Professional Surveyor” (RPSurv). To obtain this status, a Member of the Institute must prove a advanced level of competence in two sub-disciplines or specialities of surveying after three years of practice following completion of the full Member requirements. This status incurs an additional fee and requires that the holder undergo a minimum requirement of continuing professional development, which must be accounted to the NZIS on an annual basis. It is proven by peer review by a panel of senior professional surveyor who are specialists in the disciplines being examined.

Only the RPSurv requires that holders make annual returns indicating the number of continuing professional development (CPD) they have gained by undertaking approved educational activities. The CSLB tends to rely on the LINZ approval process for cadastral data sets and the Surveyor-General’s audit regime to detect a falling away of current competence. Surveyors re-applying for their license annually are required to make a declaration that they consider themselves to have undertaken enough CPD or submitted a sufficient number of plans that have not been returned with “requisitions” to demonstrate that they remain competent.

5.5 A Set of Standards

The system in place has a standards base that begins with secondary (high school) education and continues through to the completion of a four year degree, continues with technical on-the-job training, the result of which is tested by the examination of technical experience against a set of standards, and culminates in full recognition that is established by peer review.

5.6 Mutual recognition

In 1892 all of the Australian states and territories and New Zealand entered into an agreement, based on the fact that each of them maintained a similar system, to recognise each other’s standards based system such that a cadastral surveyor who meets the requirements of one would be recognized by all of the others. On production of a “Letter of Accreditation” from

their “home” jurisdiction, the surveyor would be issued with a license to conduct cadastral surveys in any other jurisdiction. This agreement is maintained to the present day.

6. CONVERSION FROM STUDENT TO MEMBER

Further quantitative research is needed to ascertain accurately the conversion rate from graduate to full Member status of the NZIS, or more recently the percentage of graduates appearing before the NZIS Admissions Panel irrespective of whether they actually become members on NZIS. For this reason, at the moment, it is only possible to use the crudest of measures to indicate the success rate of regularly recruiting.

We can observe the following facts. The National School of Surveying has been consistent in its production of graduates, steadily increasing its output over time (Coutts, 2007). The number of Members of the NZIS has been maintained and has shown modest growth over time. While the growth in numbers is not great, it does noticeably exceed the numbers being lost by attrition. Coutts, 2007 (Figure 1, Licensed Surveyors age distribution and Figure 14 NZIS age distribution) shows that there are no “missing” cohorts in the age group distribution. There are, of course, practitioners in other aspects of surveying who are neither licensed nor Members of NZIS, and therefore the figures if extrapolated to a work force, are conservative.

That is, over the 40 year expected career length of working surveyors in New Zealand, there is a steady supply of both licensed and general practice surveyors to supply the New Zealand market, which should allow for a free flow through the generations. There is anecdotal evidence to suggest that young New Zealand surveyors are flowing through into management, partnership and ownership positions in the profession at an increasingly young age. This is a necessity in order to keep these people from taking their knowledge, skills and experience out of the country and offering it on the global market, where the financial rewards can be considerably greater.

7. DEMAND FOR SURVEYORS

There appears to be a world-wide demand for both technical and professional surveyors, driven by economic growth in developing countries and the demand for mineral resources. The New Zealand professional surveyor, with a strong base in meeting practical and technical standards in a broad range of surveying sub-disciplines, is able to get employment in any part of the world. This employability is enhanced by the relatively low political profile of New Zealand that allows nationals to travel without the socio-political “baggage” associated with higher profile countries.

New Zealand appears to be running a model that produces a constant and growing supply of well qualified and in-demand professional surveyors. Interest in becoming a land surveyor through this process is also growing. The number of students enrolling in first year pre-selection courses in Surveying has increased steadily over the last few years, exemplified by a 28% increase from 2007 to 2008. There are no signs at the moment of this increasing demand slowing.

In the last quarter of a century land surveying has developed into a highly demanding, highly technical and challenging profession that can attract a broad range of young people with talents from a broad range of topics. While the fundamental skill is mathematics applied to the art and science of measurement, the basic understanding of which can be applied in a spectrum of applied practice and research. It is possible, and desirable, that these skills be applied to the environmental problems facing those societies that inhabit the planet and who have a desire to survive.

Sustainability is the catch-phrase of the moment. The emerging generation is acutely aware of the necessity to deal with environmental problems, and there is evidence that they also have the desire to face the issues and seek solution in ways that are not necessarily “bottom line” driven. The challenge ahead for educators, legislators, and professional societies is to ensure that the skill set supplied to the new generation of land surveyors remains relevant, applicable and forward-looking so that the generation that will manage the solutions to the global problems are suitably equipped for the challenge facing them. The tools that the land surveyor brings to bear on environmental issues are essential parts of dealing with those problems. Both potential professionals and existing managers and politicians must be aware of what the profession has to offer in the way of underlying information on which sustainable resource management decisions can be made.

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BIOGRAPHICAL NOTES

Brian Coutts JP MSc DipSurv Dip Mgmt FNZIS FRICS MNZPI AAMINZ RPSurv is a Senior Lecturer at the National School of Surveying in New Zealand where he teaches planning and resource management. He is also the University's Director of Environmental Science programme. He is the Chair of the Cadastral Surveyors Licensing Board, the Immediate Past President of the Commonwealth Association of Surveying and Land Economy (CASLE) and a former president of the New Zealand Institute of Surveyors. He has published 2 books and over 40 papers on professional issues related to surveying practice in New Zealand. Brian Coutts is the New Zealand Correspondent to Commission 1, and previously was Correspondent to Commission 8.

CONTACTS

Brian J Coutts
National School of Surveying
University of Otago
P O Box 56
Dunedin 9016
NEW ZEALAND
Tel: + 643 479 7609
Fax: + 643 479 7689
Email: brian.coutts@otago.ac.nz
Web site: www.surveying.otago.ac.nz