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Your contributions are required - New Zealand Soil News is your newsletter

News, views, letters, articles (serious or otherwise)—send to:
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Deadline..... For the May issue of Soil News is **Friday 19th May 2017**

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New Zealand Soil News

New Zealand Society of Soil Science Officers 2016–2018

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New Zealand Society of Soil Science Officers 2016–2018

The new Council was elected in December 2016 for a two-year term. Members are:

President:	Dave Houlbrooke	AgResearch Ruakura
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Immediate Past President:	Reece Hill	Waikato Regional Council
Secretary:	Tim Clough	Lincoln University
Treasurer:	Haydon Jones	Waikato Regional Council
	Mike Hedley	Massey University
	Hamish Lowe	Lowe Environmental Impact, PN
	Sam Carrick	Landcare Research
	Selai Letica	AgResearch, Invermay
	Brendan Malcolm	Plant & Food Research Lincoln

David Houlbrooke - AgResearch Ruakura **– (**President**)**

I come from an agriculture background having been brought up on family sheep and beef farms in the Wairarapa and the Waikato. I began studying the discipline of soil science in 1991 while completing a B.Sc in Earth Sciences at the University of Waikato followed by M.Sc research investigating the impacts of soil aeration on soil physical properties, root development and pasture growth. I subsequently spent three years working for the Western Australian Dept. of Agriculture looking into soil water-logging, drainage and crop growth. Upon my return to New Zealand in 2001, I undertook a soil science PhD at Massey University investigating the improved management for the land application of farm dairy effluent and the impact of intensive dairy farming on nutrient loss through artificial drainage systems. In 2004, I began employment with AgResearch as a soil scientist at the Invermay campus near Mosgiel where I was until 2011 when I transferred to the Ruakura campus in Hamilton hold the position of Science Team Leader for the Envionmental Research Team. My current research interests focus on management of farm dairy effluent, soil and forage response to land use intensification, and best environmental management practices under intensive dairy farming.

Megan Balks – University of Waikato (Vice President)

Brought up on a north Wairarapa sheep farm Megan completed a BSc(Hons) in Soil Science at Massey University. She then worked for DSIR Soil Bureau in Dunedin, mainly on soil mapping and soil investigations for irrigation development in Central Otago. Megan moved to the University of Waikato as an assistant lecturer, completing a PhD on effects of irrigation of meat works effluent on soil physical properties. She continued on to teach in Soil and Environmental Sciences at the University of Waikato, including serving two terms as the Chairperson of the Department of Earth and Ocean Sciences.

Megan is involved in a wide range of soil-related graduate research projects. She has a particular interest in cryosols (frozen soils) and permafrost having undertaken 19 fieldtrips to Antarctica. Megan has recently published a popular science book entitled “Celebrating Soil, discovering soils and landscapes”, in collaboration with Prof. Darlene Zabowski from the University of Washington. The richly illustrated book captures Megan’s experience of soils and landscapes ranging from the Arctic to the Antarctic.

Megan’s husband, Errol Balks, is a land surveyor and they have a small sheep farm on the lower slopes of Mt Pirongia which includes about 60 acres of QEII covenanted lowland native forest.

Reece Hill – Waikato Regional Council – (Immediate President)

My first major soils experience was gained when I went across the ditch to join a team mapping state forest soils in Tasmania, Australia. Highlights of this work were the chance to co-author a book ("Forest Soils of Tasmania") and the project receiving the National Australian Landcare Research Award in 1997.

I returned to New Zealand to complete my PhD in Soil Science at Lincoln University. Since its completion in November 1999, I have worked for Environment Waikato as a soil scientist and in a variety of management roles (in the Social Science and Economy, Land and Soil and Land Management programmes). I have always maintained a high level of input into the organisation's land and soil projects. In particular, I drove the development of regional soil quality and erosion monitoring within Environment Waikato and its promotion nationally with other councils. Currently, I convene the Land Monitoring Forum, a council-led group which works with research organisations to improve and rationalise land and soil monitoring for regional authorities. Through my role on the NZSSS Council I look forward to building stronger links between soils researchers and developers of land management policy.

In my non-professional life, I carry out important roles as Chief Entertainment Officer for my two young children and Weed and Pest Controller for my challenging Hamilton gully section.

Tim Clough – Lincoln University (Secretary)

I completed a BAgSci (Hons) in soil science at Lincoln College and started work at MAF's Ruakura campus and was lucky enough to undertake his PhD while on staff there with Stewart Ledgard, through Lincoln University. I returned to Lincoln University as a Marsden Fellow in 1997, with Rob Sherlock and Keith Cameron, to examine the 'Enigma of 15N balances' and then received fellowships to study N cycling processes, first with Jim Stevens in Belfast, 1998, and then using a Fulbright Senior Scholarship with Dennis Rolston, 2000, at UC Davis.

I currently hold a position as Prof. in Environmental Biocheochemistry at Lincoln University with interests in nitrogen and carbon cycling in agricultural and aquatic systems, greenhouse gas emissions, and the use of stable isotope techniques.

Editorial duties encompass serving as a section editor for Soil Biology & Biochemistry and as the Senior Editor for New Zealand Journal of Agricultural Research.

Haydon Jones – Waikato Regional Council (Treasurer)

I was born in Cambridge and grew-up on the family farm at Kaipaki – situated just to the south of Hamilton City, on soils formed in the volcanogenic alluvium of the Hinuera Formation – in the Waipa District.

An interest in physical geography at high school led me to study Earth Sciences at Waikato University. It was there that I discovered a passion for Soil Science and was inspired to pursue a career in the field. I completed an MSc thesis on soil-landscape modelling and soil classification in a planted forest in Southland and followed up with a PhD on the impacts of forest harvesting on the performance of soil-landscape modelling techniques in a planted forest north of Auckland.

After completing my PhD, I began employment as a Soil Scientist at Forest Research (now Scion), Rotorua, in early 2005. While at Scion I worked on aspects of soil carbon stock assessment, forest management impacts, soil erosion, and land use capability assessments. In 2012 I returned home to the

Waikato (and back to the family farm) to take up a position as a Land and Soil Scientist at Waikato Regional Council (WRC). At WRC, my areas of responsibility include riparian characteristics monitoring & reporting, S-map Waikato (and related work), and the administration of the Land Monitoring Forum (LMF) – a regional authority Special Interest Group. I have also been assigned to lead the Land Project within the Environmental Monitoring and Reporting (EMaR) initiative. EMaR is a joint LGNZ Regional Sector Group-Ministry for the Environment initiative that aims to provide integrated regional/national environmental data collection networks and widely accessible reporting platforms.

I have been a member of the NZSSS since 1994 and now look forward to contributing to the society and the promotion of Soil Science in New Zealand as a member of the NZSSS Council.

Roger McLenaghen - Lincoln University

I started my career in soil science at Lincoln College, as it was then named, as a Laboratory Technician way back in 1974. At that time I was working for the late Terry Ludecke with Prof Walker as head of Department. My technical training was from Christchurch Polytechnic were I completed an NZCS in chemistry. Some of the Postgraduate students I worked with in those early days were Bill Risk, Phil Hart and Stuart Ledgard.

Once I completed the NZCS I was fortunate to be able to further my studies and completed a number of Lincoln degree papers, cumulating to a PG Dip Agric Sc in 1990. During this period I was appointed Tutor in Soil Science. A role I continue to this day. As tutor I am responsible all of the diploma and undergraduate soil science laboratories. I also lecture to the diploma students.

I consider myself as a generalist as I teach into a wide range of soil science courses, including the Advanced Soil Management course with the Overseer project. Currently my main research focus has been on the use of green manure crops, working with postgraduate students and Leo Condron. Recently I have been looking at changes in soil physical conditions after conversion to irrigated dairying.

Hamish Lowe – LEI Ltd

I hold the qualifications of a Bachelor of Agricultural Science (Honours) and a Master of Agricultural Science (Honours in Agricultural Engineering), as well as a Certificate in Advanced Sustainable Nutrient Management in New Zealand Agriculture. I have over 18 years' experience in managing and undertaking natural resource and infrastructure investigations, with my key expertise being the land treatment of wastewater from agricultural, industrial and municipal sources.

In recent years my expertise has been called on to assist with project management and strategic direction of rural and urban land development and major resource consent processes. This has involved the bringing together and co-ordination of a range of varying technical expertise, with a focus on natural resource management.

My primary focus has been in two related and overlapping areas. Firstly the sustainable management of nutrients, wastes and environmental impacts in agricultural systems. This includes nutrients in farming systems, animal and processing and wastewaters being applied to production agricultural land and their resulting impact on soil and water quality. The second key area of expertise is the design, evaluation and management of small community wastewater and municipal waste systems.

I am actively involved in the waste land treatment industry, having specialised in waste application to land over the last 18 years, working in New Zealand, Australia and the United States. I have completed two elected terms as Technical Committee Chairman of the New Zealand Land Treatment Collective, and have recently stepped down as a committee member. In 2010 I was presented with a service award for contribution to the Collective during my tenure on technical committee. I have assisted with giving

direction to research and extension of land treatment in New Zealand and this has contributed to me being appointed to a number of research based teams in an advisory capacity, including being a member of the ESR/Scion Biowaste Advisory Board.

A large portion of my projects have involved managing soils, nutrients and wastes. While not all, a large number deal with farming systems; and relate to managing water supplies, irrigation, wastes, nutrients and general farm environmental awareness.

Mike Hedley – Massey University

I am currently Group Leader of Soil and Earth Sciences and Director of the Fertilizer and Lime Research Centre at Massey University. I have extensive research experience in biogeochemical cycles in grazed pasture systems and led the development of the professional development courses in Sustainable Nutrient Management offered by the FLRC.

Sam Carrick – Landcare Research

Land resources were a defining part of my childhood growing up in the Manawatu. My Grandparents' Pohangina farm was governed by the high erodibility of the sand gullies, whereas down home it was the dense Pallic soils which ran the show. On our Taupo holidays it was the pumice soils that captured my attention, in those long hours waiting to hook the big trout!

Originally I left to study Landscape Architecture at Lincoln Uni, but drifted off to work for a few years. Returning to study in the mid 1990's I stumbled on soil science, and the light bulb clicked on! At last I'd found something that I felt at home with. In the late 1990's I headed first to work on completing the regional lowland soil survey for Southland, then joined Landcare Research to complete the Otago region. In the mid 2000's I returned to Lincoln to complete my PhD in soil water physics, before returning to Landcare in 2009. My work now is split between pedology and soil physics work, across a range of collaborative multi-agency projects. Part of my time is also teaching in the Lincoln University Soil and Physical Sciences Department. Thankfully my soil science light bulb that flicked on 20 years ago is still gaining more energy, as I keep learning each new fascinating aspect of the world under our feet and the great influence it has on human society.

I'm really looking forward my role on the NZSSS and working with society members to keep the soils flag of New Zealand flying strong.

Brendan Malcolm – Plant & Food Research

I was brought up in Nelson on a mixed enterprise farm consisting of dairy cows, a stone fruit and pip fruit orchard, and boysenberries. From a young lad I have had a strong interest in farming and was putting cups on cows when physically able.

I went to Lincoln University in 2004 and studied a Bachelor of Agricultural Science with Honours. My intention was to become a dairy consultant and eventually go farming, but my taste for research during my honours year, which was looking at the effect of DCD ('Eco-N') on pasture nitrate concentrations, saw me continue on in research, and resulted in a PhD under the supervision of Prof. Keith Cameron looking at the effects of pasture species composition on nitrate leaching losses. This led to a postdoctoral position at Lincoln University where I was part of the highly collaborative Pastoral 21 team, with a focus on dairy systems research for high productivity and reduced environmental impact.

In 2014 I was fortunate enough to secure a permanent scientist position at Plant & Food Research in Lincoln, which is where I am currently. My area of research is nitrate leaching losses under livestock production systems, which largely involves quantifying N leaching losses from grazed winter forage crops (e.g. fodder beet, kale) and using catch crops directly after grazing to mop up N and reduce leaching.

With an inherited interest in farming and a practical background, my number one aim as a researcher is to ensure that my research has a strong practical application.

Outside of work, I have a love for the outdoors and sport. In particular, I am a keen hunter-gatherer, both on the land and in the sea. I consider it a privilege to be on the NZSSS council and hope that I can promote the importance of soils to a wide range of people.

Selai Letica

I am of Maori descent and raised in Te Taitokerau, Northland in a small rural village in the Hokianga. As a Maori 'soil health' was a core value instilled in me from a very young age. My undergraduate degree however was a Bsc in Botany. I quickly moved to the discipline of Ecology and then Environmental Science. After spending sometime as a field scientist for a small fertiliser company and a field technician for a Resource Management Firm, I quickly rekindled my interest in soil, this time taking a more technical perspective, and it's role to perform and underpin both ecological and economic services. Activities that impact on the sustainability of those core functions became a topic of fascination for me. To that end, I came to the study of soil science relatively late in my study years when I was appointed a PhD Candidacy through a partnership between the Fertiliser and Lime Research Ltd and AgResearch. After completing a PhD investigating the spatial distribution of nitrous oxide emissions from sheep-grazed hill country I went on to be appointed a Post-doctoral position where I investigated the efficacy of a nitrogen mitigation tool in Southern NZ dairy systems. That was a few years ago now, since then I have grown a whanau of 4 (5 if you count our fur-child!), undertaken maori social research and most recently a Relationship Management Role for Maori Agribusiness at AgResearch. My current research interests are focused on agricultural value chains, however my appreciation and enthusiasm for soil research still pervades my thoughts and ambitions!

Editorial: by Dave Houlbrooke

Welcome to the first edition of Soil News for 2017. After six year as Soil News editor this edition will be last which allow me to concentrate on my new NZSSS role as President for the 2017 & 18 term. Your new editor will be Gina Lucci who is a soil scientist based at AgResearch's Ruakura campus in Hamilton. I am sure that Gina will be seeking your feedback on what you would like to see in Soil News going forward and will continue to encourage publishing input from our membership. Over the past six years people have consistently informed me that aspect that they value the most is the ability to keep up with member's comings and goings through our new from the correspondence and to stay informed with upcoming events. Despite constant encouragement for people to use Soil News as a place to publish soil related stories or research summaries, this aspect of Soil News potential remains underutilised. Professor David Lowe from The University of Waikato gets the gold star award for the regularity of material that he has been willing to provide. Some members have taken up the opportunity to publish letters to the editor as a way of sharing their thoughts, especially for more politically and community affected topics such as land use and urban sprawl on high class land. In addition I have heavily used the concept of guest editorials as a way of consistently bringing in different opinions and soil experiences and this has enabled our readership to be introduced to our diverse memberships soil science based activity. Thank you to all of those that I have called on over the past 32 editions.

The 2017-18 NZSSS Council came together for a successful first meeting in Wellington in mid-February. It was a great way to introduce our new council members Selai Letica and Brendon Malcolm into the fold and to review our priorities for the next two years. This was also our first meeting without our recently departed council members Tony VanDerWeerden and Trish Fraser. Tony has been on the council for four years and has fulfilled a critical role as society treasurer. Trish has been on the council for a staggering 24 years and is a Past President as well as a Life member of the Society. Thanks to both of you for your efforts over the years and for your on-going willingness to work with the Council as you transition out of your roles. Please see the full council member profiles in this edition for more information on each council member.

Finally a big congratulations to all of those that played a part in organising our recent joint NZ and Australia Soil Science conference in Queenstown. The event was a huge success from the field trips through to the science programme and social events and feedback that I heard was consistently positive. Please see further discussion and review of this conference in this edition. I am pleased to advise that a local organising committee has already begun forming and planning for our next society conference proposed for the first week of December in 2018 based in the Hawkes Bay.

NZSSS Council members L-R: Sam Carrick, Brendon Malcolm, Hamish Lowe, Haydon Jones, Megan Balks, Dave Houlbrooke, Reece Hill, Tim Clough, Selai Letica.

Obituary – Emeritus Professor Kevin Francis O'Connor ONZM, BAgrSc, BA, PhD (Cornell), FNZIAS, Hon FNZILA

Conspicuous in the Canterbury landscape are the hills, mountains and intermontane basins of the Southern Alps with their distinctive assemblage of soils and plant communities. Throughout the twentieth century there have been a small number of scientists who have dedicated their professional lives to understanding the linkages between plant communities and the soils that sustained them. In Canterbury three names come to mind, Henry Connor, Brian Molloy and Kevin Francis O'Connor. These three share an Irish heritage and were at times likened to the distinctive thorny shrub of the high country, the 'wild Irishman' otherwise known by its Maori name, matagouri. The trio did much to improve our knowledge of the indigenous tussock grasslands of the eastern South Island. Of the three Kevin kept a wide brief, covering aspects of the agronomy, management and conservation of the high country environment, as Director of the Tussock Grasslands and Mountain Lands Institute based at Lincoln College (University) and as Professor of Range Management.

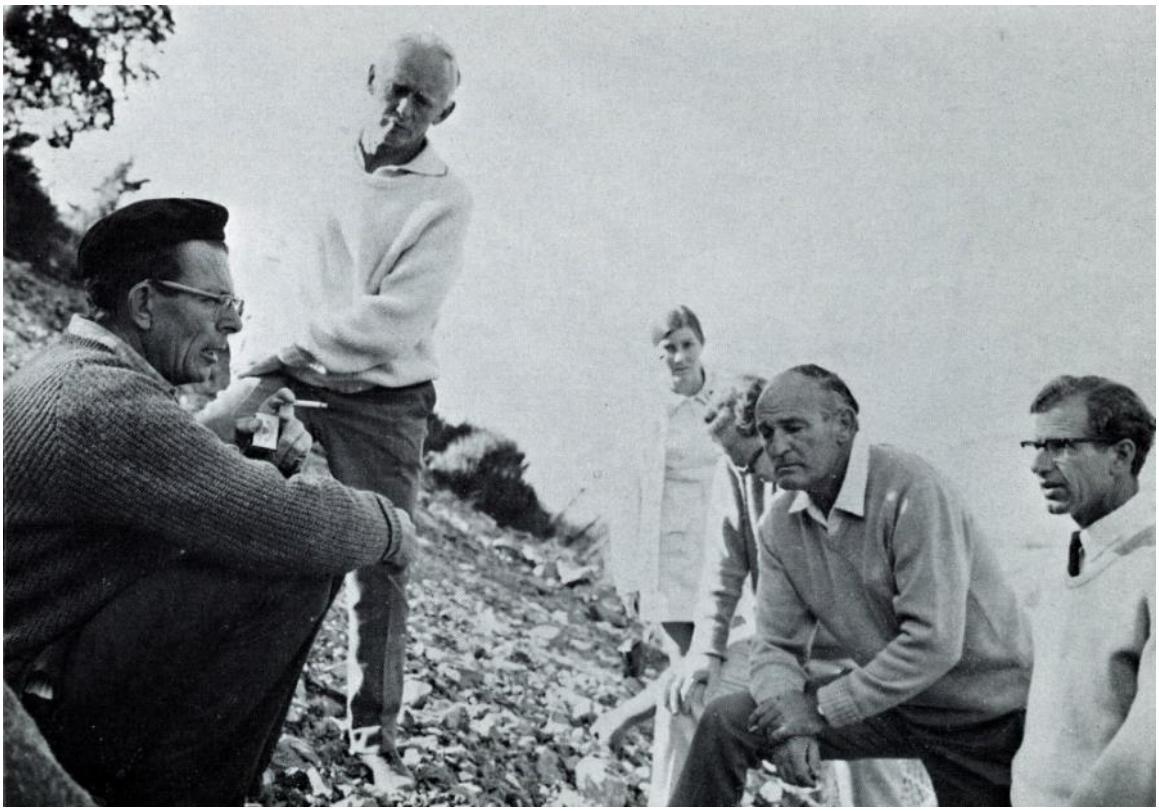
Kevin died at his home in Christchurch on 2 December 2016 aged 90. He was a person of great character who impressed himself on colleagues with his wide knowledge of all aspects of rangeland management, focused on the basin and rangelands of the eastern South Island. At his ninetieth birthday party on 19 April 2016, Kevin gave a full account of his earlier years (upon which much of this obituary is based). This featured a Catholic high school education in Auckland where he grew to love reading and learning and to enjoy writing good prose, skills that were to flourish throughout his later vocation. In 1943 he won a junior university scholarship that was put aside when he began study at the Catholic St Columban's Seminary in Lower Hutt and subsequently in Melbourne to prepare for a missionary priesthood to China. After three years he gave up this path and returned to Taranaki in New Zealand.

There his cousin gave him a bicycle on which Kevin covered some 2200 miles circumnavigating the South Island, from Picton down the West Coast through the Haast Pass (which was at that time only a stock track) and into the Makarora valley. Here Kevin had an experience that was to shape the rest of his life: "heading for Wanaka when Corner Peak first came into view in the warm evening light above Lake Hawea, I saw the gold in Upper Clutha snow tussock for the first time in my life". Picking fruit in Central Otago to pay for bike repairs, he fell in love with the landscape, but recognised that further study was required so he took up his university scholarship with a preliminary year at Victoria University College followed by several years at Massey University College graduating with Bachelor of Agricultural Science. At Massey the prospect of post-graduate study and a career in research was suggested. His continued work in soil science and biological production sciences was augmented by a study programme of continuous adaptation, majoring in Philosophy and Economics in an extramural Bachelor of Arts degree from Victoria University College. Kevin began his post-graduate studies in soil and grassland sciences at Massey with a survey of horticultural, agricultural and pastoral land uses and their integration in the Upper Clutha landscape of Central Otago. This brought him into contact with Doug Campbell who was to become the chief soil conservator in the old Public Works Department (later the Ministry of Works). Before completion of his post-graduate degree, Kevin took up a Fulbright Grant to Cornell University where he took his PhD under the supervision of Harry MacDonald, with a thesis studying the "Influence of wheel and foot treading on soils under grasslands" (New Zealand Society of Soil Science Proceedings Volume 2: 35–37, 1956). His PhD study strengthened his knowledge in the biological, physical and chemical sciences to underpin his knowledge of soil, grassland and pastoral sciences. It was during this time that Kevin courted and married Margaret Schmieg.

Returning to New Zealand in the mid 1950s Kevin was offered employment by Doug Campbell in the Christchurch office of Soil Conservation – within the Department of Agriculture housed in the Old Provincial Building. Here he joined Graham Dunbar, Noel Holmes, Dan Hickey and Dave Wilkie. This team were in the final stages of a soil conservation land inventory survey in the Waimakariri basin. This was Kevin's introduction back into high country grasslands, initiating field trials on the terraces in the Broken River basin, and as a liaison officer for tussock grasslands research. At this time a friendship developed between Kevin O'Connor, Henry Connor – botanist in DSIR, and Brian Molloy – then a post-graduate student at Canterbury University, all with interests in tussock grasslands.

Kevin's knowledge of the agronomy, soils and management of the tussock grasslands evolved over several decades, as he interacted with colleagues in the Department of Agriculture, in the various divisions of the DSIR, and the Forest and Range Experiment Station of the New Zealand Forest Service. In 1959 he was appointed officer-in-charge of the Lincoln substation of the Grasslands Division DSIR where his research focused on agronomic and fertility trials in the tussock grasslands of regions such as the Mackenzie basin. In this decade Kevin was seconded to India under the Colombo Plan and spent time in Chile and Argentina as a United Nations Food and Agriculture Organisation advisor.

In 1969 following the resignation of Dr S.N. Adams, Kevin became the third Director of the Tussock Grasslands and Mountain Lands Institute (TGMLI) based at Lincoln College and at the same time Professor of Range Management. The chair in Range Management initially funded by Water and Soil Division of the Ministry of Works and later by the Lands and Survey Department. Kevin was a popular director of TGMLI and was ably assisted by Graham Dunbar, as administration was not his forte. His directorship was 'hands off' because he was no micro-manager and this allowed his staff to get on with the job. He oversaw a very active research programme with his staff and students. The various staff/student roles crossed over, the main goal being the research itself. Kevin nurtured a cohort of brilliant students who very much saw themselves as part of TGMLI as well as post-graduate students of the university.



From left to right:
Professor K.F. O'Connor, Director TGMLI; J.T. Holloway, Director FRES; Helen Faulls; H.G. Hunt, Secretary TGMLI; A.S. Scaife, Chairman TGMLI; G.A. Dunbar, TGMLI.
Photo J. Runga.

Kevin's research output was prodigious and he was most generous with his sharing of co-authorships among his colleagues and students. Editorial meetings between Kevin and his co-authors were interspersed with long pauses as Kevin searched his prodigious lexicon for the precise word. Any suggestions were spurned and when the exact word was found you moved on and realized that you had lost the thread of the conversation in searching your own lexicon. In his 'Forehead' comments for the TGMLI Review Kevin saw it as his mission to educate as well as inform. How the high country readers absorbed the word 'usufruct' without resource to a large dictionary remains a mystery.

TGMLI came to an end in the late 1980s. In the preceding decade, Canterbury and Lincoln Universities set up a new Joint Centre for Environmental Sciences – headed first by Dr John Hayward in 1978,

following his resignation as Planning Officer at TGMLI. In 1982 Kevin relinquished the directorship of TGMLI, remaining as Professor of Range Management – that same year TGMLI and the joint centre were merged to form a Centre for Resource Management with John Hayward as director. In July 1992 the renamed Mountain Lands Institute was closed following the withdrawal of government funding. It must have been a sad time for Kevin, as his key staff at the former institute retired or were restructured, but fortunately he went on to a more intense teaching role at Lincoln, where he could continue with his students and to provide timely advice to high country run holders.

One anecdote well illustrates Kevin's view of his responsibilities to his students. In a lunchtime conversation about a student who had submitted his thesis for the third time, Kevin intimated that if he told a student to submit and the thesis was rejected, he would resign on the spot. Such was his dedication to his students, but on the other hand their theses were comprehensive!

From 1978 to 1982 Kevin was Chair of the New Zealand National Committee of UNESCO, Wellington. While in this role he put forward the idea of the upper Waitaki–Mackenzie basin being considered as a Man and the Biosphere designated area under the sponsorship of the New Zealand National Committee for UNESCO, and a booklet was published (*Man and the Biosphere Report No. 1, An Introduction to the Waitaki*, K.F. O'Connor 1976). This was identified as an area in which the complex interactions between man and the environment could be studied and Kevin's report outlined the elements of the physical, biological and cultural background for potential studies. The complexities and potential conflicts over land use and the environment are still matters to be resolved with respect to the upper Waitaki–Mackenzie basin. The Mackenzie basin was the first area in the high country to be the subject of a survey of ecologically significant areas outside of national and forest parks (Espie, P.R. et.al. 1984: *Mackenzie Ecological Region, New Zealand Protected Natural Area Programme.* Department of Lands and Survey, Wellington, 140 p.) From 1984 to 1987 Kevin served on the Protected Area Scientific Advisory Committee to the Department of Lands and Survey and the New Zealand Forest Service, adjudicating on the proposals from various Lands and Survey Department and New Zealand Forest Service ecological surveys throughout the South Island and southern North Island.

In addition to many scientific publications of field trials involving the management of Tussock Grasslands, Kevin was noted for the scholarship he exhibited in the many reviews and essays covering the many facets of the land and ecology of the rangelands of the eastern South Island. Some of these were invited lectures such as a lecture to the fifth Hellaby Seminar at the Otago Museum in 1985, titled "The influence of science on the use of tussock grasslands". Many of his reviews were published in the Tussock Grasslands and Mountain Lands Review. Professor Kevin O'Connor retired from Lincoln University in 1992. In his latter years up until the time of his death Kevin was working on his final contribution to understanding the rangelands of the South Island under the title of *An Ecological History of New Zealand Pastoralism.*

Kevin became a Fellow of the New Zealand Institute of Agricultural Science in 1974, recipient of the Leonard Cockayne Lecturer Award of the Royal Society of New Zealand in 1989, the Macmillan Brown Lecturer Award of the Vice Chancellors' Committee New Zealand Universities in 1992, awarded the Ray Brougham Trophy from the New Zealand Grasslands Trust in 1996 and became an Officer of the New Zealand Order of Merit for services to the Environment and Agriculture in 2003, and an Honorary Fellow of the New Zealand Institute of Landscape Architects on 16 April 2010, at the Te Papa Museum of New Zealand, in recognition of his "strong advocacy for an holistic understanding of the New Zealand landscape" during a "long and distinguished career as a range scientist".

A final word from Kevin that typifies the man: "Between learning from high country farmers and from the numerous colleagues, my graduate research students for Masters and Doctors degrees, my time at Lincoln College now University became a peak learning in my whole career. I have long maintained that PhD students are the most significant teachers in the modern University and their Professors are their most important pupils."

This last paragraph is taken from a tribute by Ian Collins of Lincoln University:
"Kevin O'Connor provided scholarship and leadership at a time of emerging public interest and concern for encroachments on the environment, and brought a penetrating intellect to the identification of resource and land-based issues and their resolution. At conferences and forums throughout the country, few speakers, from Ministers of the Crown to fellow academics, were spared the challenge of responding to a question or debating point from Kevin."

Philip Tonkin and Errol Costello

NZASSS Conference Report

Brendan Malone – Research Fellow, Sydney Institute of Agriculture
The University of Sydney

From 12-16 December 2016, I had the pleasure of attending the joint conference of the New Zealand Society of Soil Science and Soil Science Australia. The conference was held in one of the most iconic places of New Zealand: the scenic resort town of Queenstown in the South Island. The overarching theme of the conference was 'Soil, a Balancing Act Down-under' to glance the torch light onto the challenges in managing soils to reach a careful balance between many, often competing, land-use, productivity and environmental aspirations. I report on some of my observations from this interesting conference.

The general schedule of the conference was fieldtrips on day 1, followed by days 2, 3, 4, and half of 5 as normal conference proceedings consisting of keynotes, plenaries, and research presentations (both oral and posters). Some social functions were organised which included a BBQ at the end of day 1, a touch football competition (day 3), and conference dinner (day 4). The conference was situated at the Millennium Hotel, which is more-or-less central Queenstown. I arrived in New Zealand of the 11th December with a few colleagues, and departed for return to Sydney just after lunch on the 16th.

1. Conference fieldtrip

First day of the conference was dedicated to a fieldtrip. There were two options for fieldtrips, and I went on the one that went through the Central Otago area. Most of my work colleagues were on this trip too.

Essentially the trip was a loop of the area to the east and north east of Queenstown. Pretty much after departing Queenstown and heading directly east we headed to the Crown Range Road Summit which is at 1119m elevation. The route to the summit was very steep and winding. Upon disembarking from the bus we were greeted with exceedingly chilly winds and the odd flake of snow. We were also greeted by tour leader Sam Carrick (Landcare Research) who introduced us to a freshly prepared Acidic Brown Soil - largely a silty soil with an abundance of Schist rocks of various size. This particular landscape is an example of New Zealand's high country of which is mainly dedicated to pastoral farming. Tourism is also big in this type of landscape too. The combined pressures of farming and tourism makes management of these delicate landscapes a tricky task as they are both culturally and environmentally significant, yet also are a source of significant dollars in terms of the pastoral outputs and their tourism potential. Similar mindful approaches the land management are common elsewhere where competing and multipurpose land uses are in play. After spending around 20mins at this stop, most people were clamouring to get back onto the buses for the next item of the itinerary due to the near freezing temperature.

Figure 1. An example of New Zealand's high country. Complete with grazing sheep and snow capped mountains.

The second stop was Mt Burke Station which is farmed by Tim Burdon with farm manager Grant Ruddenklau. Mt Burke Station covers approx. 10 000ha and is situated on the shores of Lake Wanaka. There are mixed land uses here with significant numbers of stock that include sheep, cattle (beef), and deer. Some cropping enterprises include Canola, Swedes, Turnips, and fodder beet. We were here to discuss in person some of the land management issues facing farming in high country pastoral stations.

Mt Burke is typical of many high country stations in the lakes catchments. It has hundreds of streams flowing through the property and shallow stony soils that present challenges for water quality and nutrient management, and it also has the vast challenge of having an open lake frontage. Having this lake frontage (Lake Wanaka) leads to higher scrutiny from Government in how the land is managed, and how and to what extent nutrients are used and applied. In fact very stringent monitoring and reporting of nutrient use is the norm on this station (and elsewhere). Also having the lake frontage exposes the farm managers to greater scrutiny from the public who are naturally concerned and oftentimes vocal about the maintenance of a pristine environment. According to the farm managers, sometimes this scrutiny is mis-guided, leading to negative perceptions of agricultural land management in this delicate landscape. From what I could tell though, with government policy in place and stringent monitoring, coupled with a team of knowledgeable land managers, Mt Burke station is doing well and operating well. After having lunch on the shore of Lake Wanaka, Sam Carrick showed us a nice example of soils on this station, where we were introduced to a stunning Stoney Brown soil. There are so many knowledge gaps in understanding these soils, particularly how they respond to the intensification of agriculture. Part of this knowledge gap is trying to understand how nutrients are stored and flow through them, and measuring their water storage capacity.

Figure 2. Left image shows Sam Carrick and others talking about this very interesting Stony Brown Soil profile. The right image is a close-up of the same profile.

The third stop before journeying back to Queenstown was to meet local viticulturist Roger Gibson to talk about horticulture in the central Otago environment. We were specifically located in the Cromwell area which is situated about 50kms due east of Queenstown. What really struck me about this area was how dry the environment was. In fact the area is classified as semi-arid where it receives less than 500mm of rainfall annually. The cool environment coupled with low rainfall, and pretty good soils makes this area quite a famous viticultural region. Roger Gibson manages the award winning Lowburn Ferry wine brand and gave us an excellent talk about the history of the wine industry in this region, and the associated management considerations for producing high quality wines. We were also treated to a delicious Otago Pinot Noir while listening to Roger and taking in the astounding surrounding landscape. We then got the opportunity to meet another great soil which reminded me of something I would see in Australia. This was an apparently weathered soil with a clay pan and a clear presence of pedogentic carbonate materials. The source of pedogenic carbonates is debated, but is probably due to the combination of mineral weathering and microbial action. Coupled with the semi-arid environment, leaching of carbonates would be minimal, leading to an accumulation and precipitation within the soil profile. Sam Carrick mentioned that from dating experiments upon these soils, it is estimated to be around 400 000 years old. Compared to Australian soils, this is relatively young, but by New Zealand standards these are quite old soils. I was fascinated by this stop because I did not expect to experience a semi-arid environment in this part of the world, and to come upon a soil that was so apparently weathered.

Figure 3. Roger Gibson gave an excellent presentation about the wine industry in the semi-arid Central Otago region. The landscape we were situated in was simply breath-taking. The soil profile we view here displayed an apparently clayey sub soil and a pedogenic calcium carbonate horizon too.

In summing up, the Otago fieldtrip was a memorable one. I was beguiled by the landscape and terrain we passed through from stop to stop. I was equally impressed by the variety of soils we experienced too. Sam Carrick's knowledge of the environment and the issues faced with managing it was extensive and augmented the day very nicely. After getting back into Queenstown in the early evening, everyone headed to the pre-conference BBQ where everyone got a chance to catch up and put away a tasty feed and a few quenching ales. The conference BBQ was also where the winners of the soil judging contest were announced. The gong was taken out by a travelling USA team. Second place was taken out by a team from Queensland, and the third place was taken out by our very own University of Sydney Team. Or that's how I interpreted the outcome as it seemed every team got an award somehow.

Figure 4. Quite a gathering of Sydney Uni soil scientists attended the Central Otago fieldtrip.

2. Normal conference proceedings

The format for the four days of conference proceedings were morning keynotes and plenaries to the whole delegation. This was followed by four parallel sessions. I attended a diversity of talks.

The afternoon of the first day I spent most of my time in the pedology, soil landscapes and mapping session. Assoc Prof. Stephen Cattle expertly chaired the first session of the topic, and I was greatly thrilled by diversity of talks. Talks ranged from traditional pedological discussions through to digital soil mapping and informatic presentations. For example from Richard Greene (ANU) about the characteristics of Aeolian accession on soils in the Yass Valley, NSW. Then we were introduced to some innovative digital soil mapping approaches to soil carbon (Sanjee Dwage) and soil moisture (Tom Bishop). Uta Stockmann and Pierre Roudier provided some interesting presentations about use infrared spectroscopy for estimation of soil properties. Pierre's work on digital morphometric analysis of soil profile imagery was exceptional. I really think quality imagery of soil profiles could be considered an art form. Pierre's work demonstrated some tools for visualisation and quantitative analysis of these images.

Late in the afternoon I attended the session called Improved Decision Making. A colleague of mine Ed Jones was presenting in this session where he was elaborating on the design of a soil spectral inference system. In this session I was also fascinated to see the talk from the NSW Govt (Greg Chapman) regarding soil capability prediction throughout the state. I was encouraged to see some adoption of digital technologies in their process. Being in this session from go to end meant I was unable to attend to parallel session on soil carbon where there looked to be some really interesting talks. But at least I have the full handbook of abstracts of all talks presented at this conference to read up on later.

The morning of second day I spent in the second session of the pedology, soil landscapes and mapping session. Colleague Philip Hughes gave a lively presentation about comparing taxonomic similarities between the Australian and USA soil classification systems. I think this type of analysis is critical if the soil science domain is to offer up to the general science community a universal classification system, rather than fragmented systems established by individual organisations and countries. My other colleague Stephen Cattle presented something of a pet topic for him on whether 'parna' - dust derived clay aggregations - existed. Using some micromorphological analyses, Stephen was able to demonstrate that silt-size aggregations of clay did exist in soils where Aeolian accession had occurred upon them. This talk was followed up by Carol Smith (Lincoln University) who gave us an excellent discussion of Aeolian derived soils in New Zealand. I was really fascinated by her use of the QEMSCAN for discrimination of minerals within an albeit small sample. QEMSCAN employs a scanning electron microscope, four X-ray detectors and a software package to enables rapid discrimination of minerals, without reliance on visual judgments. This technology is something I should follow up on as it seems pretty useful. Other talks in this session ranged from digital soil mapping (Sharn Hainsworth, Jon Gray), to farm scale soil mapping - where Alan Palmer highlighted the inefficiencies of applying legacy soil survey mapping for farm scale applications. Marta Camps Arbestian gave a really nice presentation of soil geochemistry and its use in devising a new model of soil formation (need to read the abstract on this one).

A benefit of the parallel sessions being in such close proximity to each other, meant it was pretty easy to jump from session to session. This is what I did during the second afternoon where I jumped between the 3 sessions on offer: Laboratory and Rapid Testing (Galaxy 1), session 3 of pedology (Galaxy 2), and Balanced solutions farm systems and catchments (Galaxy 3). Again the breadth of presentations in the pedology session was remarkable. Bernard Walker (UTAS) presented some of his Honours research about assessing the likely provenance of E Horizons on some soils in Tasmania. For such a fresh young researcher, this was really quality research and more-or-less very thorough detective work. Colleague Stacey Paterson gave a nice presentation on soil variability analysis of soil texture at the continental scale (Australia) using a geostatistical and fractal approach. Then there were a couple of talks from QLD Govt, where I was encouraged by their application of digital approaches for soil mapping. Lauren O'Brien presented some excellent work using disaggregation methods, similar to the DSMART approach, for identifying subsoil constraints. USYD Alumni, Luke Finn also presented in digital soil erodibility mapping in the QLD Fitzroy basin. In Galaxy 3, Darren Kidd presented on a practical approach to quantifying soil security. As a concept, soil security works well for highlighting the importance of soil, and for communicating soil science to the non-soil science community. Trying to quantify the different dimensions of soil security through a digital soil mapping approach is pretty ambitious, but I think Darren communicated quite well the different things that were and could be considered. For example, how do we quantify the cultural value of soils? With some ingenuity and accessing what appear to be excellent

GIS facilities within the Tasmanian Govt, they were able to link tourism activity to cultural value. I acknowledge that Darren's work was a first step in the quantification thing, but at a least it got the cogs turning in how we can develop the concept further and deeper. The last two talks in Galaxy 1 were of interest to me. Les Janik (CSIRO) gave an excellent presentation on the comparative performance of different portable infrared sensors for predicting soil properties in the field. I was really encouraged to hear that the Spectral Evolution vis-NIR was one if not the best performing of the different instruments. Colleague Mario Fajardo pretty much floored the room with an excellent presentation on an App he created that measures soil aggregate stability. The amount of tech savviness and code underlying this App will probably never be appreciated, but this sort of technology gives a glimpse on where soil measurement approaches are headed in the coming years. For his efforts he was ultimately awarded the Bouma Award for best presentation of the conference. Ripper stuff Mario!

Day three meant it was now time for me give my own presentation on work that I had been doing in the past year in terms of spatial downscaling for soil carbon auditing. But before this I attended the Keynote and Plenary session first up in the morning. Without commenting too much about the talk from Julian Cribb, I am always upset by people presenting doomsday predictions of the world future. Julian expertly does this, but I do not think it is entirely useful, and if anything, may cause undue alarm. Sure humans have done severe damage to the earth system, but I think there is a resilient and adaptive quality to these that are often not acknowledged or under appreciated. I acknowledge human behaviour needs to change in order to better manage environmental systems, but it all comes down to education and not frightening the bejesus out of people about predictions of where we are headed. That is my little rant over, but my mood lifted significantly with the following three Plenary talks. A nice heart-warming and inspiring presentation from Alison Collins (Landcare Research) talk about the importance of soil and keeping an eye on it for the future. I liked how Alison used imagery of her young family to highlight that how we manage soils now is of great importance for future generations. Francis Hoyle (UWA) gave us a challenging talk on the dynamic changes in soil carbon. Using research conducted by her group in West Australia, sequestering soil carbon is not a simple cut and dry approach. One needs to consider application rates of amendments in addition to the economic costs of application. Soil carbon sequestration seems possible with the right management practices, but they need to be nuanced and implemented over of a long period of time, are what I think was the ultimate message. Filling in for Sam Carrick, Alan Hewitt (Landcare Research) provided a presentation on the special soil wonders of the Otago basins. This talk augmented really well with what I experienced in the field during the Otago fieldtrip.

My presentation was allocated to the second session of the Improved Decision making session. I was amongst some good company including Peter Wilson (CSIRO) talking about soil data standards of which are necessary for harmonising disparate soil data sets. Peter Dahlhaus added to this concept with work in Victoria using soil data visualisations and analysis for monitoring the condition of soils. Colleague and PhD student Ronald Muchelo highlighted to the audience in his presentation how urban expansion in Uganda is leading to substantial losses of viable agricultural soils. The encroachment of urban development upon agricultural land is very familiar, particularly in Sydney, but it seems to be on a whole different level in Uganda though. Ronald in his talk demonstrated some the analyses he used for quantifying soils of which were based on digital soil mapping approaches of which I found to be really encouraging to see it being used for operational purposes.

With other prior commitments, I was unable to attend the rest of the Thursday conference proceedings. People whom I spoke with after though were really impressed with the panel discussion that occurred. Another notable conference functions that I have not detailed yet is the session dedicated to poster presentations. The poster session was on after lunch on the Wednesday, and provided an opportunity to walk about and look at all the posters of which there were many. Because of the arrangement of the venue, there were posters in all nooks and crannies about the place. This made getting to all posters a little difficult, but the experience was quite enjoyable and I was able to get round to most and have a few good discussions and catch-up moments with a number of people.

The last day of the conference was scheduled as a half-dayer. I admired the people who had to get up and present as I am sure there would have been a few sore heads amongst them, due to the raucous night that was the conference dinner. Highlights were presentations from colleagues and PhD students Patrick Filippi and Liana Johnson. Patrick presented on monitoring soil change in cotton field of western NSW, while Liana gave a nice presentation about heavy metal contamination of soils in the Sydney Basin. After the research presentations were completed the formalities of the conference were over. Just before this however, the Norman Taylor Memorial Lecture was given by Louis Schipper. Norman Taylor has left a huge legacy upon soil science in New Zealand from what I have read, and I think Louis,

more-or-less giving a rundown of the research that comes out of the group at the University of Waikato, gave an excellent taste of soil science research in New Zealand. I was fascinated to hear about their research on soil carbon and nitrogen dynamics, of which has inspired me to follow up more deeply on their excellent research in this field. With the lecture over, the official closing ceremony happened, which included some award giving and awkward thank you and well wishes from committee members of the New Zealand and Australian soil science societies. All in all, I got a lot out the formal part of the conference. It is unfortunate I was unable to catch all that was presented, but I walk away satisfied with what I had taken in.

3. Social functions

A number of social functions were dotted through the conference. As already mentioned there was the welcome BBQ on the Monday after the fieldtrips. On the Tuesday, I attended the Soil Science Australia AGM. Here we were introduced to the newly elected Federal Council. The new Council could best be described as youthful, and consists of John Bennett (President, USQ), Dan Brough (Vice President, QLD Govt), and Zoe Reed (Treasurer, ANU). The departure of several key members of the Federal Council, particularly of Executive officer Linda Bennison, leave some considerably big shoes to fill for the future direction of the society. But the youthful team leading the society now will surely push it to new and unimagined places. I look forward to see where we are headed.

Probably one of the highlights for the conference for me was an organised touch football competition that was held at the end of proceedings on the Wednesday. The concept of having a sporting context amongst colleagues and delegates is a stroke of brilliance. I think there were enough players to fill six teams. There was a USYD team (with a couple of drifters), plus a couple of QLD teams and other teams from NZ. There was even a crowd of onlookers taking in the spectacle. I don't think any team was crowned the ultimate victor, but it was just good all round fun and a chance to blow some steam off. I guess the pinnacle of the competition was a super match between Australia and New Zealand which abruptly ended when one of the Australian players from Queensland (sorry don't know his name) dislocated his shoulder whilst scoring a try. This was obviously terrible news for the player injured, but as this was the only try scored in the match, Australia was the clear winner on the day. New Zealand will get the chance to atone in a rematch I guess at the next joint conference. It was much fun indeed.

Figure 5. The Sydney Uni touch rugby team that took on the world in Queenstown. We did alright too

The conference dinner was located at Skyline Restaurant which overlooks the town of Queenstown from several hundred metres up. The only way to get here is via a very steep gondola ride, where once to the top we were greeted which exceptional views and plenty of free beverages! There was plenty of good spirits on the night amongst the formalities of award giving and presentations. Our own Alex McBratney was awarded a Fellowship to Soil Science Australia. Other Australian award winners included Bob Gilkes (Honorary Life Member) and Jock Churchman (JK Taylor Gold Medal in Soil Science). A couple of the really exceptional awards for the night was the announcement of the winners of the individual prizes in the soil judging contest. I think someone from the University of Wisconsin came in third, but our own USYD stars Bruce Tran and Rebecca McGirr came in second and first respectively. This would have been a massive achievement for them, and I was so happy for them too. All in all, the conference dinner night was super fun and enjoyable, although the body was paying for it the next morning a little bit.

Figure 6. Alex McBratney collected a number of awards during 2016. Here he is receiving his Fellowship Award from Soil Science Australia and giving an entertaining acceptance speech.

Final Points

Much thanks goes to the New Zealand Soil Science Society for putting on a fabulous conference. Although the weather was a bit fickle, and at times pretty unforgiving (especially in December), Queenstown and the surrounding area is a beautiful place of the world. I would love to come visit here again sometime.

"Learning by doing is more memorable"

(Field et al., 2011)

The inaugural Australasian Soil Judging Competition, Wanaka, 11-12 December, 2016.

Carol Smith, Lincoln University; Sam Carrick, Landcare Research, Lincoln.

Prelude

Soil judging has a long and distinguished history in North America; first initiated in 1961 and held annually at a different host institution each year. Institutions compete first within regions, with the winning regional team heading to the National Championships. This year the Nationals are being hosted by Northern Illinois University in April. Recent winners have included Virginia Tech, Kansas State University, West Virginia University and University of Maryland. In North America, soil judging is taken very seriously and is seen as a key component of the soil science curriculum and an important part of the graduate attributes of all soil science graduates. There is stiff competition to be selected into the soil judging team, and team members train weekly during the competition season.

But what exactly IS soil judging and why should we care about it here in New Zealand? There is certainly more to soil judging than just "pedology by stealth". We would all agree it is advantageous for every soil science graduate to be able to describe a soil at a basic level and from this, to make some interpretations therein: whether for land use, fertiliser recommendations, nutrient fluxes, irrigation scheduling or waste disposal.

We teach soil science in a changing world. Students who study soil science increasingly do so as part of other allied disciplines like agronomy, environmental science, horticulture; and often at an introductory

level. But there is also an increasing need internationally for graduates with soil science expertise. A wide-ranging study of teaching soil science around the globe found that the initial focus of soil science teaching is geared towards capturing the attention of the student, and is then followed by courses that deepen that knowledge (Hartemink et al., 2014). Moreover, these global studies have shown that a field component remains vital in our soil science teaching – both at the introductory and advanced levels. Students like learning in the field; it helps them to comprehend soils as not only part of the landscape but also part of a functioning ecosystem. In the field, there is more time to think and to interact with staff so that learning occurs at a deeper level. In a study of graduates who had majored in soil science (as part of a larger study of soil science specific teaching principles) the most effective learning activities reported were: field work (43%), laboratories (36%), tutorials/group discussions (11%), followed by lectures (8%), presentations/assessments (7%) and writing reports (5%) (Field et al., 2011). Clearly, field based learning can only help students in their soil science studies.

And so the conversation started in Australia. The inaugural Australian soil judging competition was held in Tasmania in 2012, organised by Stephen Cattle (U. Sydney) and the 1st international soil judging competition was held at the World Congress of Soil Science in Jeju, S. Korea in 2014. At Jeju, Stephen Cattle suggested…" let's see if we could get a joint Australian- New Zealand soil judging competition going at the 2016 conference…". And so it began.

Part I Venue identification.
Organising a soil judging competition takes time. The key part is to identify a suitable location/venue, with the right mix of soil types, access for vehicles and diggers, a friendly landowner and in close proximity to the conference. While there are many stunning single locations of soil types and iconic landscapes around Wanaka and Queenstown, to find them all on one site is rare. We identified a potential site in Wanaka in 2015, which would also work as part of the field trip for the Joint NZ Society of Soil Science and Soil Science Australia "Soils down under" Conference. Fortunately it tied in with S-Map work that Sam Carrick was helping Chris Arbuckle (Aspiring Environmental) with. Chris was working on a Beef and Lamb Land Environment Plan project for a suite of iconic high country stations around Lakes Wanaka and Wakatipu. Through this, Chris was able to draw on his good relationship with Mt. Burke Station, Wanaka; both through the landowner Tim Burdon, and Grant Ruddenklau, the Mt. Burke farm manager, and owner of the adjacent farm. In April 2016, trial pits were dug and sampled for the necessary chemical and physical characterisation that is required to be provided to competitors at the competition.

Part II. Event management.
With no previous soil judging competitions having been held in New Zealand, we turned to the information available from America and Australia. It was reassuring not to have to reinvent the wheel, we just had to tweak it to fit the New Zealand model. Which soil classification to use? With teams from North America and Australia, should we use all three? Previous international competitions had used either Soil Taxonomy or the World Reference Base. The Australian Classification struggled to key out the New Zealand soils, and it was agreed by all the competing teams that sticking to the New Zealand Soil Classification (NZSC) was the way to go.

Expressions of interest allowed us to start socialising the competition in NZ and Australia. Chris Baxter of University of Wisconsin-Platteville (UW-P) contacted us early on seeking an opportunity to visit New Zealand with his soil judging team and to learn more about our soils and landscapes at the same time. It also proved a wonderful opportunity to learn from his extensive knowledge of competitions in the USA. Referring to the extensive Australian and American resources, we drafted out a competition manual and scoresheet. Much feedback from the other team coaches allowed us to refine it. We based our manual on the 2015 International soil judging competition in Hungary and the 2015 Australian competition. Being an open book competition, teams would refer to the information in the manuals. We now had 13 teams from 11 institutions confirmed - including students from University of Western Australia. Teams came from University of Wisconsin-Platteville, University of Sydney, University of Southern Queensland, University of Queensland, Queensland combined team, University of Melbourne, University of Western Sydney, University of New England, University of Waikato, Massey University and Lincoln University.

Part III. Event week.
With the event kicking off with a practice day on Sunday 11th and the competition on Monday 12th, we had 2 days to prepare the venue. The 1st emergency was the prearranged digger driver cancelling at the last hour. In true high country hospitality, Mt Burke came to the rescue with their local contacts to arrange a hire digger, and lent us a staff member for 1 ½ days to excavate the pits. This was an amazing gesture for which we are truly grateful. While the digger driver was excavating T-shaped trenches, a

small band of helpers beavered away beautifying the profiles, taping off restricted areas and putting up signage. An empty silage pit proved an ideal sheltered spot for the competition control tent, away from the NW winds. Our official judges spent the day evaluating the soils, with Richard Doyle from Australia, and Alan Hewitt representing New Zealand. Their role was as the official arbiters of the pedology – confirming the soil profile descriptions that the competitors would be scored against. Finally, with the arrival of the portaloos, we were all set for the team's arrival.
Setting up an event page on Facebook allowed us to rapidly post progress on the competition, photos of the live action, and for teams to post and comment as well. Communication is an important part of science and we interacted with the conference communication with Trish Fraser sharing Facebook posts and tweeting throughout the competition.

Part IV. Practice day.
One thing we could not organise beforehand was the weather. But under blue skies, light winds and warm, sunny conditions, over 60 competitors from 11 institutions gathered at Mt Burke station on Sunday morning. Teams consisted of 4 to 6 students, plus a team coach. The purpose of the practice day is to allow the teams and coaches to become familiar with the landscape and the range of soils that would be in the competition pits. For the competition, the teams were on their own, with no help from the coaches. The soils at Mt Burke station are dominated by glacial sediments of Last Glacial Maximum age (LGM), sourced from glaciers which were once occupied by the present day Lake Wanaka and Lake Hawea. There are remnants of older surfaces of Q4 age (older dissected fans: Bourke soils) in the upper valley. Holocene alluvial and colluvial fans, as well as terraces and floodplains complete the landscape, while active landslides contribute to the topography. The valley floor of Mt Burke station (where the competition was located) is dominated by LGM glacial outwash surfaces and moraines. These comprise young fans (Q2 age; Maungawera soils) and actively aggrading fans (Q1 Holocene: Speargrass soils). LGM aged moraines (Maude soils) complete the picture. Loess provides depth to some of the soils. So, the soil landscape consisted of low angle alluvial fan systems, with soils ranging from shallow stony to deep, fine textured soils. Venue access and soil-landscape location narrowed our choice of soil types we could use in the competition. This resulted in a focus on the variability of the soils associated with the Q2 young fans, which still offered contrasting soil profiles, which would still test the ability of the teams.

The practice day allowed the teams to get familiar with the venue landscape and soils, and to calibrate their field texturing: as the Australian, US and New Zealand soil texture triangles vary. Time management skills (in particular who does what in the team), are vital. For the competition day, the teams had 60 minutes per pit, with two pits to describe in the morning. The individual competition in the afternoon consisted of one pit, and competitors were allowed 1.5 hours. Teams had to complete a scorecard by describing the site characteristics and soil profile morphology; and to then estimate certain soil profile characteristics such as hydraulic conductivity, effective soil depth and estimate soil drainage class. They also estimated from their soil descriptions the soil water holding capacity. When teams were "out" of the pit, they could complete other tasks on the scoresheet such as texture, colour and structure on the samples they collected from the pit face (Figure 1). A further step was to check against a table of suitability interpretations for 3 different land uses, and assess suitability of each soil for that land use.

Finally, they had to classify the soil to sub group level in the NZSC. Time management skills were just an important as soil skills, as the teams rotated in and out of the pit during the official practise time. In for 5 minutes, out for 5; in for 10, out for 10 and then the last 30 minutes was a free for all with any team members allowed to enter the pit. A pit monitor made sure teams entered and exited the pits on time and abided by the competition rules.

Figure 1. Competition day: University of Western Sydney completing their profile description while out of the pit.

Teams circulated between two pits (one stony and shallow, one deep and fine textured) and the (empty) silage pit (Figure 2), which proved a useful cross section of the alluvial fan land surface. There were some great discussions in the practice pits. For us this was where much of the value in the soil competition was: teams and coaches focusing intently on soil and really "drilling down into the detail" of profile description and observation. It was very intensive (almost "immersive") pedology, and clearly learning was taking place at a deeper level, just as envisaged by Field et al. (2011). The evening of the practice day, we hosted a BBQ in Wanaka. A social event is always encouraged at soil judging competitions, and it allowed the teams and students to relax and network before the competition the next day.

Figure 2. Practice day. Sometimes you have just got to use the natural exposures: Massey University and University of Southern Queensland in the silage pit, discussing the finer points of soils developed on alluvial fans.

Part V. Competition day.

Slightly cooler and overcast conditions met the teams in the morning. Teams were by now well versed in "pit etiquette" with our pit monitors Judith van Dijk (Lincoln University) and James McFarlane (Curtin University) keeping order at the competition pits. The team pits were a Maungawera deep silt loam (Pallic Orthic Brown; Figure 3) and a contrasting stony Maungawera shallow silt loam (Typic Orthic Brown, Figure 4). The individual competition after lunch saw over 30 competitors in the pit, with many finishing well within the time limit (Figure 5).

Figure 3. Competition day: Maungawera deep silt loam (Pallic Orthic Brown). University of Sydney, University of Queensland, Waikato University and University of Melbourne all in the pit. Teams were allocated one of the two profile faces in the trench; Sydney and Melbourne describing the profile face in the foreground.

Figure 4. Competition day. Maungawera shallow silt loam (Typic Orthic Brown). Lincoln University team deep in thought during the 30 minute free-for-all.

Figure 5. Individual competition: Maungawera moderately deep silt loam (Pallic Orthic Brown).

As soon as the first team pit was completed, the judges started marking the scorecards. The role of the official judges from each competing country was to confirm the soil profile description in the competition pits and also to oversee the marking. Alan Hewitt and Richard Doyle performed these roles admirably, and freely gave of their time to help at the competition, which was much appreciated. It was a marvellous opportunity for many of the students, especially from Australia and USA, to have the architect of the NZSC present at a soil judging competition. While the students relaxed and unwound after 2 days of intense soil competition, the marking work was in full swing for the judges back at the control tent, aided by the team coaches and Roshean Woods. With the venue being dismantled around them, the markers retreated to the Millenium Hotel in Queenstown to complete the marking, at least for the team's competition, so we could announce the winners at the Icebreaker function of the main conference with the individual winners being announced at the Conference dinner at the Skyline Gondola. Congratulations to all the winners!

Results:

Overall team:

1st: University of Wisconsin-Platteville A
2nd: Queensland combined
3rd: University of Sydney
4th: Lincoln University

Trans-Tasman:

1st: Queensland combined
2nd: University of Sydney
3rd: Lincoln University

Australian:

1st: Queensland combined
2nd: University of Sydney
3rd: University of Southern Queensland

New Zealand:

1st: Lincoln University
2nd: Massey University
3rd: University of Waikato

Individual:

1st: Rebecca McGirr, University of Sydney
2nd: Bruce Tran, University of Sydney
3rd equal: Brittany Iverson, University of Wisconsin-Platteville
Brandon Hall, University of Wisconsin-Platteville
Tia Koning, University of Wisconsin-Platteville

Top placed New Zealand Student: Josh Nelson, Lincoln University

While there are certainly areas we can improve on for the next competition, the inaugural soil judging competition in NZ ticked many boxes. It was an opportunity for students to participate in a valuable learning experience in a supportive environment, experience some "deep" learning in soil science and to network and meet peers. It was also an opportunity for the organisers to learn from the visiting Australians and also the American team. Chris Baxter of University Wisconsin-Platteville noted that in

his experience, these soil judging competitions do encourage students into the discipline: the tactile and investigative side of soil judging is something that many students can excel in and the competition aspect makes it a fun activity. It engages their curiosity to learn more about soils, and it is a powerful recruiter to University soils courses and degree programmes. And certainly in agreement with Hartemink et al. (2014). We look forward to the next soil judging competition in Queensland in September this year, organised by University of Southern Queensland.

We would like to thank the following who helped us turn this idea into reality: Tim Burdon and Grant Ruddenklau, Mt Burke Station, Wanaka; Chris Arbuckle, Aspiring Environmental; Andre Eger and Alan Hewitt, Landcare Research, Lincoln ; Richard Doyle, University of Tasmania; Roshean Woods, Jen Owens, Judith van Dijk, Roger, McLenaghen, Lincoln University; James McFarlane, Curtin University. Also to Stephen Cattle (U Sydney) for his initial suggestion and ongoing support.

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Review of the Northern Southland Farm Systems Field Trip – NZASSS Joint Conference, Queenstown Dec 2016
By Lucy Burkitt

This field trip explored the breath taking lake and hill country landscapes of Northern Southland and the opportunities and issues facing the region through the perspectives of local consultants, Environment Southland staff, a hill country beef and sheep farming family and an intensive dairy farm business. The field trip organisers assembled a knowledgeable and passionate group of speakers who had us fully engaged as they discussed their journey of land management challenges. It was fascinating to hear about the history and soils of these landscapes and how this has influenced the ground and surface water quality within the region. The trip set the scene for the following few days of the conference beautifully, as the New Zealand regional council model of being charged with the implementation of the Resource Management Act and the National Policy Statement for Freshwater Management, would have been foreign to many of our visitors from across the Tasman.

On a logistical level, the field trip was really well organised, but was flexible enough to allow plans to be modified when the weather turned really cold. A small detail to some, but it possibly meant the difference between a great day and an unbearable one! The field trip booklet was exceptional and contained all the supporting information required to fully appreciate the landscape, soil types, local history and environmental issues facing the region.

The highlight of the trip for me was the panel discussion at the end of the day. Panel members were asked to comment on the role of science in identifying and solving the very complex and difficult environmental issues facing farmers and the regional councils within this region. This topic generated intelligent and thought provoking discussion, which left me in no doubt about the important role soil science has to play to help solve these issues nationally, issues which are critical to the future of New Zealand.

Well done to trip Coordinator Diana Selbie and her team (David Ryder, Dave Houlbrooke and Fiona Young) for organising what I considered to be, the best soil science field trip I have been on so far!

Celebrating success – recipients of the NZSSS awards for 2016

Compiled by Dr Haydon Jones, NZSSS Awards Convenor (2014-2016)

The biennial conference of the NZSSS has traditionally provided an excellent opportunity for the Society to celebrate the success of its rising stars and to recognise the outstanding contributions to soil science and the Society made by its most accomplished peers. The joint conference of the New Zealand Society of Soil Science and Soil Science Australia ("Soil, a balancing act downunder") held in Queenstown on 12-16 December 2016, was certainly no exception with the majority of the NZSSS awards presented. The awards presented and the recipients of those awards are briefly profiled below.

Fellowship of the New Zealand Society of Soil Science
Fellowship of the Society is an honour conferred for distinction in any or all of the following areas; research, technology, teaching, extension, and/or the advancement of soil science.

Dr Ross Monaghan received the award of Fellowship of the NZSSS in 2016. Dr Monaghan is a soil scientist who is held in high regard by his national and international peers, the pastoral industry, and regional councils. He has proven himself to be an international expert in the areas of nitrogen cycling in grazed dairy systems, including N losses to water. He is recognized for the development of practical on-farm mitigation practices that allow for profitable farming while meeting regionally-based targets for water quality. Ross is also actively involved with end user groups through policy development and/or management guidelines that protect water quality. He contributes regularly to industry newsletters, and is regularly asked to speak at field days on farm management practices that reduce impacts on water quality. Ross is a friend of both the pastoral industry and environmental regulators and is highly respected by both groups for producing quality, robust science and advice for the advancement of the primary sector. He can be relied upon for his honest, objective view, a quality that has led to requests by both the primary sector and regional councils as an expert witness in the Environment Court. Much of Ross' research lays down the path for others to follow. He readily collaborates and publishes highly cited research papers with New Zealand and international authors.

In addition to Ross's authoritative command of the science and support to industry and councils, he is also extremely supportive of his colleagues' endeavours, providing a valuable mentoring role to early career scientists within AgResearch and beyond. Mentorship within organisations is extremely important for encouraging the growth and development of future scientists. The inclusive nature that Ross promotes provides a forum for open discussion leading to valuable science outcomes with strong impact.

Photo: Trish Fraser

Life Membership of the New Zealand Society of Soil Science
Life membership of the Society is an honour conferred to members who have given outstanding service to the Society.

In 2016 the NZSSS Council has elected a member to the award of Life Membership for their outstanding service to the Society. The recipient of the award was **Dr Patricia (Trish) Fraser**. Trish has indeed provided outstanding and invaluable service to the Council for 22 years, unsurpassed by any other Council member over the existence of the Society.

Photo: Cecile De Klein

Trish is a senior soil scientist at Plant & Food Research, Lincoln. She has a special interest in soil biology (earthworms in particular) and soil management practices. According to the NZSSS records available, Trish has been on Council since 1994, taking on the role of Secretary. Trish contributed in this role for 16 years, before being elected as vice president, president, and now finishing on the council as immediate past president in December 2016. Since moving to New Zealand in the late 80s, Trish has spent much of that time on Council, and nearly half her life has been dedicated to the New Zealand Society of Soil Science!

In addition to her contribution to the NZSSS, Trish has also made a significant contribution to soil science through her work outside Council and has demonstrated a true passion for soils. As a Senior Scientist at Plant and Food and on council Trish has a fantastic ambassador of soil science in New Zealand, presenting at field days, schools, and her research on earthworms especially is very highly regarded. In 2015, Trish was awarded Researcher of the Year by the Foundation for Arable Research, recognising her involvement in a diverse range of research to benefit the cropping industry. Last year, Trish was a key instigator of a regional NZSSS Seminar day on irrigation, at Lincoln. A former past society president recollects the seminar day as being of a brilliant format and commended Trish's leadership in bringing Canterbury irrigators together.

The Norman Taylor Memorial Award
The Norman Taylor Memorial Award (Lecture) is awarded by the President of the NZSSS in recognition of outstanding contributions to soil science in New Zealand.

Photo: Trish Fraser

The 2016 recipient of the Norman Taylor Memorial Award was **Professor Louis Schipper**. Louis has more than 25 years of experience as an environmental biogeochemist. After receiving his PhD degree in biology from the University of Waikato he accepted a postdoctoral position at the University of Florida before returning to New Zealand to work as a scientist for Landcare Research. Louis then joined the University of Waikato in 2005, becoming a Professor in 2012. His research interests include long-term changes in soil organic matter, nitrogen cycling (with a focus on denitrification and nitrogen immobilisation), impacts of land use change, carbon fluxes, and nutrient cycling in agricultural and indigenous ecosystems, including wetlands and soil microbial ecology. Louis is a Fellow of the New Zealand Society of Soil Science as well as a Fellow of the Soil Science Society of America, is an author on two patents, and has more than 100 peer reviewed publications.

The L.I. Grange Medal for Outstanding Service to New Zealand Soil Science

The Grange Medal is for outstanding service to New Zealand soil science. It commemorates Dr Leslie I. Grange's extraordinary leadership and service to New Zealand soil science through his pioneering pedology, his far-sighted and constructive administration, and for his pivotal role in helping establish the discipline in New Zealand. A summary of Grange's career is given in New Zealand Soil News 55, p.177-180 (2007). The Grange Medal is normally made every two years to one or two individuals who have made an extraordinary contribution to the promotion or advocacy of soil science (in its broadest sense) including for the following reasons: through outstanding use of the media, through outstanding administration or management, through outstanding publications including outreach/extension and other ('non-academic') material (e.g. development of a DVD or CDR), through outstanding advocacy of soil conservation or sustainable land-use practises, and through outstanding mentoring.

The recipient of the Grange Medal for 2016 is **Dr Gerald Rys**. Gerald, Principal Science Advisor, Strategy Systems and Science Directorate at the Ministry for Primary Industries (MPI), is nationally and internationally recognised for his leading contributions across agriculture and environment science policy, including addressing quality of science. The primary focus of his policy formulation is not only to use science-derived knowledge to help meet our society's needs and manage our physical resources, but also to address complex scientific issues and values, ethics and other forms of knowledge and concerns for environmental policy and decision-making. Gerald has had a stellar career in the public service, first as a district agricultural scientist with MAF and, since 1990, as a scientific adviser in the Ministry of Research, Science and Technology (MORST) followed by 16 years as a science/policy adviser in the Ministry for Primary Industries.

Photo: Reece Hill

During his time as a district agricultural scientist in MAF Gerald played a leading role in the setting up and running of the Taranaki Agricultural Research Centre, a centre that 30 years later is now one of the dairy industries showcase regional centres for research into, and demonstration of, industry good practices. While in the Hawkes Bay, Gerald became interested in the role that Near Infra-Red Spectrophotometry (NIRS) could play in the rapid assessment of herbage quality and led the early pioneering work that paved the way for NIRS to become the method of choice for the rapid and low cost assessment of chemical composition by both researchers and farmers.

In the science reforms of the early 1990s, Gerald made a major contribution to the development of a set of national science priorities in the agricultural area and was a strong advocate for greater interaction between science and policy, so that policy was strongly evidence-based.

At the end of the 1990s Gerald moved back into MAF. Since then he has been a pivotal figure in the development of New Zealand's approach to agricultural greenhouse gas measurement and mitigation. He has driven the development of the national agricultural GHG inventory and moved it from a simple methodology based on animal numbers and fixed emission factors per animal, to a sophisticated estimation system based on national circumstance that truly reflects the unique but changing character of New Zealand agriculture. He also initiated policy-science dialogue via the formation of science/policy advisory bodies that since 2002 have worked together to recommend priority areas for inventory improvement investment. Gerald was successful in lobbying for additional investment into inventory development and oversaw this investment from 200 -2009. The New Zealand approach to its agricultural GHG inventory, which is underpinned by a strong policy-science partnership, is now viewed worldwide as a shining example of how an agricultural inventory should be developed.

Gerald's influence has been equally strong in the search for GHG mitigation solutions. He led the development of the agricultural mitigation strategy for the Sustainable Land Management and Climate Change fund and has been a member of its technical assessment panel since 2008. He was also fundamental in developing the concept of a New Zealand Centre of excellence in agricultural GHG mitigation (NZAGRC). On behalf of MPI he led the negotiations to set up this centre in 2009. In this role, Gerald co-developed the science plan for the NZAGRC and since its inception has been the technical liaison between MPI and the NZAGRC Director and management board. He provides

invaluable input into policy thinking and ensures that where applicable the science being undertaken is strongly aligned to policy needs.

Gerald's influence and activities have not been limited to the GHG area. He has also found the time to be actively involved and have an influence on subjects as diverse as cadmium levels in soils through to agricultural water quality, and the influence of elevated carbon dioxide levels on pasture productivity and quality.

Gerald has made a major contribution to New Zealand in both the science and policy sphere. He has had a successful and influential science career, and this success continued in the policy sphere where he has been a tireless advocate for improved science-policy collaboration and the development of policy that is soundly based on the best science available. He is held in great regard in the science and agriculture sector communities and has been instrumental in developing a greater understanding in the science community of the needs of policy and of the benefits to scientists of clearly demonstrating the policy benefits of their research.

The L.C. Blakemore Award

The L.C. Blakemore Award honours the outstanding ability and contributions to New Zealand Soil Science of Les Blakemore and recognises meritorious contemporary work by technicians. It is awarded to the outstanding New Zealand Soil Science Technician or support staff member of the past two years.

The recipient of the L.C. Blakemore Award for 2016 is **Joy Jiao** of Lincoln University. Joy has been employed as a technical officer in the Department of Soil & Physical Sciences, Lincoln University, for 15 years. She has responsibilities in the areas of high performance liquid chromatography (HPLC) and various wet chemical methods. She also operates the DIonex Ion exchange chromatagraph for determining anions and cations in waters, leachates and soil extracts. Joy fulfils the important HSNO Lab supervisor role for the analytical lab. Joy is involved in many aspects of training for postgraduate students and staff, including both analytical methods and Health and Safety. Joy has also done a lot of work in method development.

The M.L. Leamy Award

The M.L Leamy Award commemorates the outstanding ability and contributions to New Zealand Soil Science of Michael Lucas Leamy, and recognises meritorious contemporary work. It is made to the author or authors of the most meritorious New Zealand contribution to soil science, published in the past three years.

Drs **Diana Selbie**, **Laura Buckthought**, & **Mark Shepherd** are the recipients of the M.L. Leamy award for 2016 for the following publication: Selbie, D.R., Buckthought, L.E., Shepherd, M.A., 2015. The challenge of the urine patch for managing nitrogen in grazed pasture systems. *Advances in Agronomy* 129, 229-292.

Photo: Trish Fraser

This critical review in a much-required update to a predecessor publication by Haynes and Williams, 1993 (Nutrient Cycling and Soil Fertility in the Grazed Pasture Ecosystem). The publication now provides a comprehensive review of urine patch characteristics and N cycling processes; implications for N cycling at the farm and paddock scale and strategies available to mitigate N losses from the urine patch. As such it is a valuable source of up-to-date knowledge on the role of the urine patch in N cycling in pastoral grazing systems suitable for a technical audience and policy makers. Furthermore, it provides critical information for the ongoing development and use of nutrient management models and

the framing of future research requirements. This is evidenced by the fact that it has been cited 22 times from multiple countries within only a 22-month period since its publication.

The Bert Quin Postgraduate Bursary

The Bert Quin Award recognises the efforts and present or likely contribution to New Zealand soil science arising from a Doctorate study.

The recipient of the Bert Quin Postgraduate Bursary for 2016 is **Jack Pronger** *(on left).* Jack has been undertaking his PhD in the Department of Earth Sciences at the University of Waikato, and is now into his final year. He is supervised by Professor Louis Schipper (chief), Associate Professor Dave Campbell, and Dr Mike Clearwater. Jack's PhD is on water use and water use efficiency of pastoral land systems with a focus on identifying approaches to help the agriculture sector cope with increased incidence of drought.

Photo: Trish Fraser

In his PhD project, Jack is using the eddy covariance (EC) method to compare water use and carbon uptake from traditional ryegrass/clover pasture systems and diverse mixed sward pastures. The goal is to identify options for the agricultural sector to cope with the anticipated increased incidence of drought associated with climate change. Mixed sward pastures also offer other potential benefits including increased soil carbon sequestration, increased pest tolerance, and reduced nitrate leaching.

The Morice Fields Memorial Award

The Morice Fields Memorial Award recognises PhD theses of exceptional merit. The recipient of the Morice Fields Memorial Award for 2016 is **Yu-Tuan (Doreen) Huang**, University of Waikato. Her PhD thesis was entitled: "Studies on carbon and DNA preservation in allophanic soils and paleosols on Holocene tephras in New Zealand".

The Sir Theodore Rigg Memorial Award

The Sir Theodore Rigg Memorial Award recognises Masterate theses of exceptional merit. **Nadia Laubscher**, University of Waikato, is the recipient of the Sir Theodore Rigg Award for 2016. Her Materate thesis was entitled: "Improvement in soil water availability in pastures by excavating and mixing buried soil horizons from multilayered Pumice Soils (Vitrands) at Galatea, central North Island, New Zealand".

The T.W. Walker Student Prizes

The T.W. Walker Prizes honour the outstanding ability and contributions to teaching and research to New Zealand Soil Science of Professor T.W. Walker and recognise contemporary work by students. Prizes for the best student oral and poster presentations at the Society's conference are awarded.

The recipient of the best student oral presentation at the 2016 conference was **Roshean Woods** (pictured below) representing Lincoln University for her talk entitled: "How could plants help us to reduce nitrogen losses from dairy farms?". The recipient of the best student poster presentation for 2016 was **Anna Carlton**, also representing Lincoln University for her poster entitled: "The effect of optimum vs. deficit irrigation on nitrate leaching from late spring deposited urine".

Photo: Cecile De Klein

NZSSS

New Zealand Soil Science Society Awards 2017

Nominations for the following awards open **1 March 2017** (with the exception of the US/NZ Exchange Award, for which nominations open 25 January). Key details regarding nomination requirements are provided in the table below. Please contact the NZSSS Awards Convenor for full award details (contact details below).

Award	Presented	Nominations close	Nominee eligibility	Nominator eligibility
NZSSS Fellowship	Annually	31 July 2017	Nominees must be active members of the Society at the time of nomination.	Nominations must be made by two Full Members, or Life Members of the Society.
The Grange Medal	Biennially (conference year)	31 July 2018	Open to both non-members of the Society as well as members, fellows, or life members of the NZSSS.	Nominations must be made by two or more active members of the Society.
The Blakemore Award	Biennially (conference year)	31 July 2018	Open to technicians/support staff who have been employed in the field of science for at least three years.	Any two active members of the NZSSS can nominate an eligible candidate from a university, CRI, or other organisation (e.g. a Regional Council).
The Leamy Award	Biennially (conference year)	31 July 2018	Open to the author or authors of the most meritorious New Zealand contribution to soil science, published in the previous three calendar years.	Any two active members of the NZSSS can nominate an eligible candidate(s) from a university, CRI, or other organisation (e.g. a Regional Council).
The Quin Award	Annually	31 July 2017	Open to postgraduate (PhD) students in soil science about to enter their third year of study. Candidates must be either student or full members of the NZSSS and should not be on the academic or technical staff of the department that nominates them.	Nominations must be received in writing from the Head of the Soil or Earth Science Department/Group at a New Zealand University. Only one nomination will be accepted from each University Department/Group.
The Fieldes Award	Annually	31 July 2017	A PhD thesis submitted within the previous calendar year.	The Head of the Soil or Earth Science Department/Group at a New Zealand University may nominate the best PhD thesis from their department/group.

The Rigg Award	Annually	31 July 2017	A Masterate thesis submitted within the previous calendar year.	The Head of the Soil or Earth Science Department/Group at a New Zealand University may nominate the best Masterate thesis from their department/group.
Undergraduate Prizes	Annually	31 December 2017	A third-year student in Soil or Earth Sciences.	The Head of the Soil or Earth Science Department/Group at Massey, Lincoln, and Waikato University may each nominate the best third-year student from their department/group.
The US/NZ Exchange Award	Annually	15 April 2017 for initial submission (18 April for final submission)	Nominees are required to have at least seven years of membership in SSSA or the NZSSS. Former recipients of this Award are not eligible.	This award allows self-nominations.

Nominations and requests for further information regarding NZSSS awards should be addressed to:

Dr Brendon Malcolm
NZSSS Awards Convenor
C/O Plant and Food Research
Private Bag 4704, Christchurch Mail Centre, Christchurch 8140
New Zealand

Email: Brendon.Malcolm@plantandfood.co.nz

NZSSS

Minutes New Zealand Soil Science Society
Biennial General Meeting

6:00 p.m., Tuesday 13th December 2016,
Millennium Hotel Queenstown

1. Apologies
Peter Singleton, David Lowe, Jock Churchman, Steve Thomas.

2. Present
There were 58 members of the NZSSS present.

3. Minutes of the previous meeting
Minutes of the previous meeting (held at University of Waikato, Room S1.10 on 4th December 2015) were read. It was moved and seconded (Tim Clough/Mike Hedley) that these were a true and accurate record. No matters arising.

4. Treasurer's Report.
The treasurer presented the Profit & Loss statement (for year ending 30th June 2016), and the audited balance sheet (as at 30th June 2016). These are presented below (Appendix I).

Treasurer's commentary for Audited Accounts for NZSSS 2015-16

By 30 June, the Current account had a balance of $5627, down on the year before, which was $14,018. This was primarily due to the 2016 joint Australian and NZ SSS conference being provided with seed funding ($10,000) in the current year. We expect this to be returned to the society in early 2017, once the conference costs and accounts have been examined. The combined Term Deposits sit at $169,632, an increase of $7000 over the previous year through term investment interest being re-invested.

Total liabilities sit at $491, which is similar to the previous year ($484).

Current year earnings sit at a small net loss of $903, compared to a net profit of $175 for the year before.

Adding all the assets, liabilities and earnings, the society's Total Equity sits at $177,581, which is similar to the year before ($178,484).

It was moved and seconded (Tony van der Weerden/Richard McDowell) that these were a true and accurate record of the NZSSS financial position.

In response to a question from the floor, querying the sum of the assets the NZSSS has in the bank, it was noted that this allows funding of scholarships/prizes and subsidised post graduate student attendance at conferences.

5. Two yearly report from secretary

The secretary presented the two-yearly report covering the period 4th November 2014 — 21st November 2016. The written copy is as follows:

NZSSS THIRTY-SECOND TWO YEARLY REPORT OF THE NZSSS COUNCIL FOR 2014-2016

(This report covers the period 4th November 2014 — 21st November 2016)

***SECRETARIAT**:*

Council meetings:
Eight full meetings of the present Council were held during the period. Meetings of Council were held on 26 February 2015, 21 May 2015, 14 August 2015, 2 November 2015, 7 March 2016, 6 May 2016, 22 August 2016, and 21 November 2016.

Council:
Members of Council, numbers of meetings attended (out of 8) during the reporting period and roles on Council:

President	Reece Hill	(7)
	Royal Society, Soils and Public Policy Society	
Past- President	Trish Fraser	(7)
	Royal Society, Website and Social Media	
Vice President/Soil News Editor		
	Dave Houlbrooke	(7)
Secretary	Tim Clough	(8)
	Secretariat, Linkages with SSSA	
Treasurer	Tony van der Weerden	(8)

Treasury Members:

Mike Hedley	(4)	Royal Society, Consultancy and Certification
Haydon Jones	(8)	Awards
Hamish Lowe	(7)	Consultancy and Certification, Website and Social Media
Megan Balks	(6)	Public Outreach, International Year of Soils
Roger McLenaghen	(4)	Soils in the NZ Landscape, Science Fairs

Sam Carrick (7) Public Outreach, International Year of Soils

General Meetings:

A Council Meeting was held 21st November 2016 at Lincoln University, Lincoln at which the financial report for 2015/16 was approved. The full financial statement will be, thereafter, in Soil News.

TREASURY:

The full audited financial statement of the Society's accounts for 2015/16 will be presented to the Biennial General Meeting of the Society on13th December 2016. The full statement will be published in Soil News thereafter.

The Society continues to be financially secure. An external contractor (Groundwork Associates Ltd.) conducts administrative duties (including reporting membership changes, sending out annual subscription reminders, recording all income and payments, making invoice payments). This has continued to improve the record keeping of accounts.

MEMBERSHIP:

	2016	**2015**	**2014**	**2013**	**2012**	**2010**	**2008**	**2006**	**2004**	**2002**
Ordinary members	256	252	261	254	252	258	265	263	278	280
Student members	59	53	59	73	53	54	62	61	45	56
Honorary members	1	1	1	3	3	7	8	9	10	12
Life members	10	10	10	10	10	11	12	12	12	12
Corporate members	0	0	1	1	1	1	1	1	1	1
Retired members	25	24	27	30	30	33	32	34	29	29
Total	**362**	**352**	**371**	**383**	**349**	**364**	**380**	**380**	**375**	**390**
Library subscriptions	11	12	13	13	13	16	16	17	16	15

Membership has been steady. Several members have been removed as a consequence of several years of unpaid subscriptions.

Council would also like to take this opportunity to pay special tribute to several of our members who passed away during this reporting period.

- J.D. McCraw; R.G. Duffy; J.A. Pollock; R.J. McPherson; N.A. Trustrum

SCIENCE POLICY

A renewed effort has been made by the Society to respond to national submissions relating to soils, especially those regarding high class soils and land use. Two submissions were made by the Society on; "Proposed National Policy Statement on Urban Development Capacity" and "Draft report on Better Urban Planning" (Appendices I and II, respectively).

The Society will continue its focus on the protection of high class soils and continue to promote where possible, the establishment of a National Policy Statement on Soils.

CONFERENCES & WORKSHOPS

- The 2014 NZSSS conference was held at the University of Waikato from December 1-4. The theme of the conference was 'Soil Science for future generations', a theme to encourage student participation while also pointing to the future issues that the next generation of soil scientists will face. The conference attracted a total of 173 attendees. A post conference survey asked delegates for an 'overall rating of the 2014 NZ Society of Soil Science Conference'. The vast majority thought it was 'Excellent' or 'Very Good' (41% and 52%, respectively), with just 6.5%

rating it 'OK'. The majority of respondents said it was their intention to attend the 2016 Society of Soil Science Conference in Queenstown.

- NZSSS (Tony van der Weerden, Sam Carrick, and Trish Fraser) and ASSS have worked together with others to produce the joint conference in Queenstown (12-16 December 2016).
- Waikato/BOP workshop December 2015. This was a one day regional conference of Waikato - Bay of Plenty based soil scientists held at the University of Waikato, Hamilton. The meeting provided an opportunity for the many soil scientists and others in the region with interests in land and soil to assemble for a stimulating day of talks and networking away from the commitments and rush associated with bigger conferences.
- The 27th and 28th Annual FLRC Workshops at Massey University were held during February 2014 and 2015 respectively more than 250 people attended, with between 95 and 99 oral and poster presentations being given over the 3 day workshops both years. In 2015 evening presentations included the Norman Taylor Memorial Award winners Prof. Stewart Ledgard (2014) and Prof. Richard McDowell (2015).

CONTACT WITH OTHER SOCIETIES:

Australian Soil Science Society Inc.
We continue to exchange Newsletters with the ASSSI and a joint conference will be held in New Zealand in 2016.

Royal Society of New Zealand (RSNZ)
The New Zealand Soil Science Society (NZSSS) is a constituent member of the RSNZ and NZSSS members are regarded as members of the RSNZ. The NZSSS president has a place on the RSNZ Biological and Life Sciences Advisory Panel.

Trish Fraser attended the 'RSNZ Vice President's Biological & Life Sciences meeting'

Trish Fraser attended the 'RSNZ Constituent Organisations' Annual Meeting, October 2014.

Apologies were tended for the RSNZ Constituent Organisations' Annual Meeting, in October 2015

Reece Hill attended the RSNZ Constituent Organisations' meeting in 30th November 2016.

International Union of Soil Science:
Mike and Megan maintained connections with IUSS attending their council meeting at the international soil conference in Korea in 2014.

Soil Science Society of America:
The ANZSSPEF (America/New Zealand Soil Science Professional Exchange Fund) encourages bi-directional sabbaticals between scientists in the U.S. and New Zealand to foster enhanced cooperative soil science research. Funds for the exchange are provided through the Agronomic Science Foundation and the selection process is administered by the Soil Science Society of America and New Zealand Soil Science Society. The travel grant is in the amount of $5000. Nominees are required to have at least seven years of membership in the New Zealand Soil Science Society or Soil Science Society of America. Reciprocal sharing of soil news stories now commonly occurs between the SSSA and the NZSSS Societies via their Facebook pages.

British Soil Science Society:
The Council continues to exchange newsletters/ email messages with the BSSS for enhanced communication and awareness of events and activities. Reciprocal sharing of soil news stories now commonly occurs between the NZSSS and BSSS Societies via their Facebook pages.

EDUCATION, AWARENESS AND COMMUNICATION:

- The NZSSS World Wide Web site is hosted by the Royal Society of New Zealand. Hamish Lowe has lead a revamp of this site.

- Trish Fraser curates the material on the web site this in addition to a NZSSS twitter account. The NZSSS Facebook page continues to grow, with near to 1000 likes. Together with the twitter

account the Society is actively promoting and using different forms of media to share knowledge and or promote communication between its members and across societies.

- International Year of Soils 2015 saw several activities:
  - A NZ soil order poster was prepared by Megan Balks and Alan Hewitt, along with international year of soil (IYS) stickers
  - Leo Condron Lincoln University ran a lecture series on soil science projects underway in the Lincoln science community, with a focus on post graduates.
  - Hamish Lowe presented on IYS at the Land Treatment Collective.
  - Louis Schipper and Jacqueline Rowarth promoted IYS at Mystery Creek Field Days.
  - Trish and Sam organised a soil's workshop at Lincoln to promote IYS, November 2015.
  - A webinar for school teachers was run with soil moisture as a focus (Louis and Angela Schipper).
  - It was celebrated with a cake cutting ceremony and "special coffee mugs" for participants at the WaiBoP meeting.
  - Mike Hedley gave talks on "Sustaining the productive capacity of our soils" at Hawkes Bay Horticulture Field Days June 5th, Manawatu Branch RSNZ August 27th and United Nations Association of New Zealand. 70th Anniversary Dinner in Wanganui 24th October.
  - "I love soil.kiwi" web site was organized,
  - Landcare Research scientist Pierre Roudier had regular radio slots on RNZ promoting and discussing soils.

- NZSSS continued to support science fairs throughout the country by providing copies of Soils in the New Zealand Landscape for the best soil science related project in the Regional Science Fairs. Council wishes to extend grateful thanks to Roger McLenaghen for coordinating this activity.
- Prof. Richard McDowell presented the Norman Taylor presentation four times throughout the country (Hamilton. Palmerston North, Lincoln, and Dunedin).
- Waikato-Bay of Plenty members ran a WaiBOP workshop in early December 2015.
- Roger and Trish organized soil science displays at Ashburton, Ellesmere, and Christchurch shows in 2015.

PUBLICATIONS:

Soils in the New Zealand Landscape:
'Soils in the New Zealand Landscape' is now available in individual chapters on the NZSSS web site and free to download. Some soft copies have been printed.

Soil News:
This continues to provide a highly valued forum for editorial and reader opinion pieces, and plays an essential role in keeping NZSSS members aware of events and points of significance occurring at the various places of work around New Zealand. It has moved to four issues per year (Feb., May, Aug. Nov.).

Soils of NZ Allan Hewitt and Megan Balks are leading an effort to prepare a new book on the soils of New Zealand which will be part of an IUSS –led series of books published by Springers on Soils of various countries.

AWARDS:

NZSSS Fellowships:
2014 None presented
2015 None presented
2016 TBC following conference

Grange medal (new in 2012)
2014 Dr Brent Clothier
2016 TBC following conference

Leamy award (biennial award):
2014 Prof. Louis Schipper
2016 TBC following conference

Blakemore Award (biennial award)
2014 Manjula Premaratne
2016 TBC following conference

Norman Taylor Memorial Award
2014 Dr Stewart Ledgard
2015 Prof. Richard McDowell
2016 Prof. Louis Schipper

Morice Fieldes Memorial Award (PhD thesis)

2014 Dr Paul Mudge, University of Waikato, "Changes in ^{15}N in pastoral soils under varying management intensity."
2015 Dr Brendon Welten, University of Waikato, "Effects of oral administration of dicyandiamide to cattle on nitrogen leaching losses from grazed pastures."
2016 TBC following conference

Sir Theodore Rigg Award (MSc thesis):

2014 Ms Aimee Robinson, Lincoln University, "The effects of soil aggregate size and pH on nitrous oxide emissions, ammonia oxidising communities and DCD effectiveness in a grazed pasture soil"
2015 Mr Timothy Norris, University of Waikato, "Detection of differences in soil carbon and nitrogen stocks between paired dairy and drystock pastures."
2016 TBC following conference

Bert Quinn Award for final year of study:

2014 Sam McNally
2015 No award
2016 TBC following conference

Undergraduate Awards:

2014 Danielle le Lievre, Waikato University
Josephine Winters, Massey University
Sephrah Rayner, Lincoln University
2015 Francis Garrity, Waikato University
Taylor Leabourn, Massey University
Balin Robertson, Lincoln University
2016 TBC following conference

TW Walker Award for best student oral presentation at the NZ Society of Soil Science Conference

2014 Olivia Jordan, University of Waikato
2016 TBC following conference

TW Walker Award for best student poster presentation at the NZ Society of Soil Science Conference

2014 Jen Owens, Lincoln University
2016 TBC following conference

SECRETARIAT:

The Council is very grateful to the many and varied people who have helped the Society in its many and varied activities over the last two years, with extra special thanks to Isabelle Vanderkolk, Carolyn Matheson together with Groundwork personnel.

It was moved and seconded (Tim Clough / Tony van der Weerden) that these were a true and accurate record of the NZSSS activities for 2014-2016.

6. Election of NZSSS council for 2017-2018.

The following were elected:

President	Dave Houlbrooke, AgResearch, Ruakura
Vice President	Megan Balks, University of Waikato
Past President	Reece Hill, Environment Waikato
Secretary	Tim Clough, Lincoln University
Treasurer	Haydon Jones, Waikato Regional Council
Council	Mike Hedley, Massey University; Hamish Lowe, Lowe Environmental Impact, Palmerston North; Roger McLenaghen, Lincoln University; Sam Carrick, Landcare Research; Brendon Malcolm, Plant and Food Research, Lincoln; Selai Letica, AgResearch, Mosgiel.

7. General Business

There was no General business and meeting closed at 6:50 pm

APPENDIX I

Profit & Loss

The New Zealand Society of Soil Science
For the 12 months ended 30 June 2016

	Jun-16	Jun-15
Income		
Awards Sponsorship	-	5,000
Interest (Current a/c)	29	54
Interest (Fixed Deposits)	7,012	6,630
Sales - SITNZL & LUC Handbooks	720	405
Subscriptions (members)	18,175	17,221
Total Income	**25,936**	**29,310**
Gross Profit	**25,936**	**29,310**
Less Operating Expenses		
Awards & Grants	3,123	12,900
Bank fees & Interest	(3)	-
Conference expenses	11,264	(6,694)
Council - General Expenses	4,112	3,963
Council - Travel Expenses	102	1,435
Editor Fees - Soil News	1,725	1,725
Norman Taylor Lecture costs	661	-
Postage - Soil News	-	47
Printing & Stationery - General	2	2
Royal Society Membership Fees	1,214	1,159
Secretarial Services	3,710	5,930
Subscriptions (Xero & Capsule)	930	938
Website & Resources (International Year of Soils)	-	7,730
Total Operating Expenses	**26,839**	**29,135**
Net Profit	**(903)**	**175**

Balance Sheet

The New Zealand Society of Soil Science
As at 30 June 2016

	30 Jun 2016	30 Jun 2015
Assets		
Bank		
BNZ Current Account	5,627	14,018
Total Bank	**5,627**	**14,018**
Current Assets		
Accounts Receivable	2,813	2,330
Term Deposits (Combined)	169,632	162,620
Total Current Assets	**172,445**	**164,950**
Total Assets	**178,071**	**178,968**
Liabilities		
Current Liabilities		
Accounts Payable	491	484
Total Current Liabilities	**491**	**484**
Total Liabilities	**491**	**484**
Net Assets	**177,581**	**178,484**
Equity		
Accumulated Funds (Opening Balance)	178,484	170,309
Current Year Earnings	(903)	175
Total Equity	**177,581**	**178,484**

AUDITORS: I report that in my opinion, according to the best information and explanations given to me, and as shown by the books of the Society, this balance sheet is properly drawn up to give a true and fair view of the Society's transactions from 1st July 2015 to 30th June 2016. R Michelin (Hon Auditor) ..... Date 19/10/16

APPENDIX II

National Policy Statement on Urban Development Capacity [http://www.mfe.govt.nz/more/towns-and-cities/national-policy-statement-urban-development-capacity]

The link above describes the NPS-UDC with a brief extract as follows: *"What it does*
The NPS-UDC directs local authorities to provide sufficient development capacity in their resource management plans for housing and business growth to meet demand.

Development capacity refers to the amount of development allowed by zoning and regulations in plans that is supported by infrastructure. This development can be "outwards" (on green field sites) and/or "upwards" (by intensifying existing urban environments).

Sufficient development capacity is necessary for urban land and development markets to function efficiently in order to meet community needs. In well-functioning markets, the supply of land, housing and business space matches demand at efficient (more affordable) prices.

What it requires
The NPS-UDC contains objectives and policies that local authorities must give effect to in their resource management decisions that provide direction on:

- *the outcomes that urban planning decisions should achieve*
- *the evidence underpinning those decisions*
- *responsive planning approaches*
- *co-ordination between local authorities and providers of infrastructure."*

In response to this NZSSS produced a submission lead by Hamish Lowe and Reece Hill as follows:

Proposed National Policy Statement on Urban Development Capacity
The NZSSS Exec has submitted on the Proposed National Policy Statement on Urban Development Capacity (NPS-UDC).

Over the years many members have been active in identifying and lobbying decisions makers to consider the impact of development on the loss of high class soils. The NZSSS exec has seen this NPS as an opportunity to further the discussion around the impact of losing high class soils. The consultation documents for the NPS-UDC are very high level and are really a political response to deal with housing demand. However, this issues has a far wider impact than just housing and includes development in general. The scope is potentially wide ranging but in our opinion misses several key aspects, particularly it doesn't mention the word 'soil'. This is a point also raised by several other submitters.

The NZSSS approach taken has been a positive one, in that development and increased urbanisation will occur, but it needs to be managed. It is a balancing act with other infrastructure and national resources. It comes with the opportunity cost of losing not only current production, but also the potential loss of land for new and developing production systems on the very soils that may be lost.

The current debate surrounding high class soils has unfortunately been relegated to a development by development level, and soils has lost. Let's hope that the proposed NPS creates the opportunity for debate at a national and regional level and some master planning for NZ Inc. With any luck soil related issues will become an integral part of future development decisions.

Hamish Lowe

14 July 2016

Chair
Local Government and Environment Select Committee
Parliament Buildings
WELLINGTON

Attention: To whom it may concern

Dear Sir/Madam

SUBMISSION – PROPOSED NATIONAL POLICY STATEMENT ON URBAN DEVELOPMENT CAPACITY

The Submitter

The New Zealand Society of Soil Science ("NZSSS") represents the professional and technical interests of professionals engaged in all aspects of the study, management and use of soils in New Zealand. NZSSS provides a forum for the exchange of ideas and information within the profession, and is thus normally engaged more internally in the science of the soil, rather than externally in the politics of its use.

However, an exception to its internal focus is a need to ensure that factual information in relation to our country's soil resources is given due recognition in the context of land use planning and decision making at district, regional and national level.

The Application

This submission is made by the NZSSS in respect of the proposed **National Policy Statement on Urban Development Capacity** (NPS-UDC).

This NPS-UDC proposal is supported, but with a request that the matters for consideration should be expanded and relevant detail incorporated to form a more comprehensive and coherent national guidance document.

We wish to be heard in respect of our submission, and we are willing to attend any convened meeting to orally present and talk to our submission.

www.nzsss.science.org.nz – Phone: +64 7 855 7163 – PO Box 7067, Hamilton 3247, New Zealand

SpecificpParts of proposal on which submission is made

The aspects of the proposal which we wish to have noted and amended are as follows:

- The development of the NPS-UDC is timely and arguably long overdue;
- The NPS-UDC fails to mention soils - not only are soils not mentioned, but the impact of the loss of high class/value1 soils is not addressed, noting that class I-III soils represents 14 % of the NZ land area (Rutledge et al. 2010);
- Urbanisation and sprawling developments have the consequence of pushing a community's food resource further away from the community – an issue not addressed in the NPS-UDC, especially in light of the economic efficiencies of additional supporting infrastructure, transport and the need to generate soil fertility elsewhere. This is an issue that should be addressed at a national and regional level;
- An opportunity to consider the integration and trade-off of critical infrastructure resources, soil being one, in developing a master plan for urban development has been missed. In particular lateral urban spread will incur roading, water and sewer costs while consuming productive land; which in turn will result in further costs associated with having to transport food from further away and the need to spend considerable financial resources to generate the fertility of the land being lost at another location; and
- The NPS-UDC falls short, in that it does not provide for master planning whereby development is considered in light of its impact on the community as a whole, the region and the national economy.

Reasons for making this submission

Infrastructure	The proposed NPS-UDC provides the benefit of enabling a master planning exercise that has the scope to match urban development and expansion pressures against the availability of the resources required and their interconnectivity. These resources necessarily include the infrastructural requirements of water supply, sewer, transport connections and proximity to community services. When considered locally, regionally and nationally, **soils are also a vital infrastructure resource and need to be considered in parallel with other critical infrastructure.**
Previous Protection	The soils that occupy areas of land that have high productive versatility, and that may be considered to have comparatively high value for the production of food, are a finite and diminishing resource (Rutledge et al., 2010). This fact was recognised in the former Town and Country Planning Act, which made the protection of such soils a matter of national significance. The repeal of that Act, and its replacement with the Resource Management Act in 1991, removed the national significance of the protection of such soils; it did not, however, change the fact of the value of the resource, nor its finite and diminishing nature.

[1] High Class/Value Soils – those soils in Land Use Capability Classes I and II (excluding peat soils) and soils in Land Use Capability Class IIIe1 and IIIe5, classified as Allophanic Soils, using the New Zealand Soil Classification (Waikato Regional Council, May 2016). Soil Classes are defined in Lynn et al., (2009), with Class I to III soils typically associated with easy topography, high fertility and production of high value horticultural, vegetable and arable crops, along with historic high value dairy farms.

Recent Focus	In recent debates, the loss of high class soils has typically been considered in development by development discussions, with decisions made about individual land use proposals. Over the years, considerable effort has been made by many soil conservators and land use proponents to realise the value of soil and the social and economic consequence of losing soils in close to proximity urban environments. An opportunity with the NPS-UDC is the ability to develop a master planning approach whereby community, regional and national consequences can be considered, rather than the impacts of small areas where there are development opportunities, with gains solely measured by housing availability.
Loss of High Class Soils	The loss of high class soils has occurred nationally and internationally for many years as communities develop and grow. The rapid growth of communities has seen the rate of loss increase, with 29 % of the 25,000 ha of new urban areas in New Zealand developed between 1990 and 2008 occurring on high class land. Rutledge et al., (2010) indicated that "To date, LUC classes I and II (highest class land) have experienced the highest urbanisation rates as a percentage of original area (5.6% and 3.9% respectively) over the period 1985 to 2002. In addition, based on historical census data, housing density has increased across almost all areas of New Zealand, indicating that the extent of urbanisation may be broader than currently assessed." Between 1990-2008, 29% of new urban land occurred on high class land (Andrew and Dymond, 2013). In Auckland the rate of urban expansion onto high class land (LUC class I-III) has accelerated since 1996, with the majority of land allocated to urban expansion since 1996 has been high class land. Pukekohe has been identified as a potential satellite town with up to 50,000 new dwellings, but is the area where the majority of Aucklands LUC class I or elite land is located (Curran-Cournane et al. 2014). Lifestyle blocks occupy 10% of NZ high-class land, with 35% of the high class land in the Auckland region already occupied by lifestyle blocks. In Hawke's Bay and Marlborough a high proportion of urbanisation has occurred on high-class land (49 % and 50 % respectively).
Economic Future	By general consensus, New Zealand's long-term economic future will continue in large measure to rely on the production, and export, of high quality, high value food products for consumption by discerning purchasers. Such produce cannot be produced at will on just any old land; New Zealand has large areas of land that are suited only to pastoral or forestry uses at best, and only relatively limited areas of "high value soils". To illustrate this point, the Horticulture industry currently utilises approximately 130,000 ha of land and is aiming to be a $20 billion business by 2020. To double this return they need another 130,000 ha, but also they need the better landscape units, the very units which are nationally limited and could be consumed by urban development. Further, in the case of Auckland, but certainly other towns and cities as well, there is also the ongoing logistical issue of food supply for domestic consumption; local communities need to be fed as well.

Historic Investment	High value soils, incorporating unique combinations of geology, landform, climate, and comparatively short histories of productive use must be regarded as the foundation of any comparative market advantage enjoyed by our country. Further, the historic investment into the critical soil infrastructure should be recognised, which in many cases has seen millions of dollars used to create and maintain fertility that provides for financially viable production systems, which to a significant extent our national economy is already based on. The re-investment in developing fertility 'elsewhere' comes at a cost to the community and the nation, and should be considered as an opportunity cost (loss) when considering alternative land uses.
Site vs Community	Urban use can safely and sustainably be established on a wide variety of soils and sites. Provided flooding and landslide hazards are avoided as may be appropriate, a wide variety of topographies, soil types, and locations may be equally suitable for urban development. Therefore, while there is limited choice of whether to develop or not when considered in one area, a wider look at opportunities surrounding the larger community, and in some cases region, may identify scope that had not previously been considered.
Ecosystem & Biodiversity	Urban development has the scope to utilise landscapes that have maintained and developed unique ecosystems, some of which have inherent biodiversity characteristics not seen elsewhere. While not limited to high class soils, urban development can, and will likely, result in ecosystem changes through direct effects and loss of habitat; and also as a result of pressures on the ecosystem and habitat from cumulative effects beyond the development footprint.
Life Style Developments	Accompanying high density urban development is the peripheral development of 'life style' units, where large sections for land and buildings are preferred. These land development units consume large areas of land for limited residential occupancy. Landcare Research (Andrew and Dymond, 2012) estimated that in 2011 there were 175,000 lifestyle blocks, up from 100,000 just 13 years ago. This meant that 10 % of the country's high-class land is now occupied by these blocks of land. Rutledge et al., (2010) also noted "Several recent studies have also documented trends in land fragmentation. Northland Regional Council reported 10% of its LUC Class I–III land has been subdivided into lifestyle blocks between 2001 and 2007 (NRC 2010). If that rate was to continue (1.67 % per year), all of Northland's LUC 1-3 land will be subdivided in 60 years." Between 1990 and 2008, urban areas occupied an additional 0.5 % of high-class soils, with Canterbury (4,800ha) and Auckland (2,600ha) regions having the most high-class land (soils) converted to urban areas. The occupation of high class soils by lifestyle blocks greater. In Auckland region more than a third (35 %) of high class soils have been converted to residential lifestyle blocks.
Overhang	Outward development and not inward development generates an 'overhang factor', whereby further outward development provides for an even greater exposure to land, disproportionately increasing the "zone of influence" on land use beyond the urban boundary. This means there is scope for a rapid consumption of high class soils.

One Chance	Urban encroachment onto adjacent rural land has been seen to be an almost entirely one-way process. Once land has been used for the establishment of housing, commercial and industrial use, with the associated provision of communication and other public infrastructure, it is not cheap, not easy, and mostly not practical to reverse the process, remove the urban development, and return the land involved to its former actual or potential productive use.
The Value of Soil	A blanket ban on urban encroachment onto high value soils is not appropriate, and is not the position of the NZSSS. It is acknowledged by the NZSSS that a balancing of costs and values will be required to arrive at sound decisions on which land should, and should not, be made available for housing and associated developments. There will be circumstances in which it will be appropriate to decide to proceed with an urban development despite its consumption of valuable soils. However, in its present form the proposed NPS makes **no reference** to the need to include consideration of the value of the soils involved in reaching a decision on new urban development, and we consider that this omission needs to be corrected in the long term national interest.
Efficient Communities	The recent lateral spread of our communities shows a clear under-valuation of the natural resources they consume. In an attempt to provide for greater sustainability there is the need to think about where our local produce is grown and transported from. Greater transport adds greater cost to produce. Research by Richardson et al. (2016) has shown that 1-4 % of produce can be produced within an urban environment, with the remaining production coming from beyond the urban boundary. This cost of transport and sourcing produce from outside the urban boundaries needs to be added to the other costs of the spatial sprawl; with consideration given to avoiding cumulative costs by adopting land intensification within existing urban footprints. More roads to transport produce from further away to service a consuming wave of houses may not be as efficient as high value productive hubs that are centred close to the consumer in a more densely developed community.
Big Picture Resource	Looking after soils is important. Providing for growth is important. Dovetailing into existing hard infrastructure is important. Because many facets of development are important not all the objectives will necessarily be satisfied, and hence compromises will be needed. The most logical solution need not be the cheapest or the quickest; and there may be a time where a combination of factors, such as water reticulation limitations, roading limitations and loss of high value soils means that **less favourable and potentially more expensive building sites are best for the community**. These decisions cannot be made on a development by development basis; but require big picture national, regional and community perspectives to direct and influence what is right for New Zealand Inc, and not only for the benefit of expedient progress and the prosperity of developers.

Concluding comment

New Zealand needs an over-riding planning guidance document that provides direction for managing future urban growth, while balancing the needs of both new and existing infrastructural resources; **soils included**. The NPS-UDC could be that document.

The Ministry for the Environment should be commended for developing this national planning document; however, NZSSS believe it should be diligently developed to allow for the balancing of growth and resource use efficiency, and in a controlled and holistic manner that is not simply a kneejerk reaction to urbanisation, and in particular housing pressures.

The balance should consider economic, social, cultural and environmental factors. Not one factor should be the sole contributor to growth, with both positive and negative factors integrated and considered across the larger community, and not on an ad-hoc development by development basis at the whim of political and/or developer pressure. Soil, and particularly the loss and consequence of loss, of high class soils should be an integral part of the decision making matrix.

Decision requested

NZSSS requests that the need to protect and sustain the availability and versatility of New Zealand's high value soil resources is included in the matrix of matters for consideration when evaluating land use changes. Ideally this consideration should occur at a master planning stage and not when evaluating a local development proposal.

Yours faithfully

New Zealand Society of Soil Science

Reece Hill
NZSSS President

References:

ANDREW, R., AND DYMOND, J. 2013. Expansion of lifestyle blocks and urban areas onto high-class land: an update for planning and policy. Journal of the Royal Society of New Zealand Vol. 43 (3), 128-140. http://dx.doi.org/10.1080/03036758.2012.736392

CURRAN-COURNANE, F., VAUGHAN, M., MEMON, A., FREDRICKSON, C. 2014. Trade-offs between high class land and development: Recent and future pressures on Aucklands valuable soil resources. Land Use Policy (2014). http://dx.doi.org/10.1016/j.landusepol.2014.02.020

APPENDIX III

3 October 2016

New Zealand Productivity Commission
PO Box 8036
The Terrace
Wellington 6143

Dear Sir/Madam

New Zealand Society of Soil Science (NZSSS) Submission to the Better urban planning Draft report

Thank you for the opportunity to make a submission on the "Better urban planning Draft report." Attached is New Zealand Society of Soil Science's submission regarding this document.

Should you have any queries regarding the content of this submission please contact the New Zealand Society of Soil Science directly by email nzsss@groundworkassociates.co.nz.

Regards

Dr Reece Hill
President NZSSS

www.nzsss.science.org.nz ~ Phone: +64 7 855 7163 ~ PO Box 7067, Hamilton 3247, New Zealand

Submission from New Zealand Society of Soil Science on the Better Urban Planning Draft Report

The Submitter

The New Zealand Society of Soil Science ("NZSSS") represents the professional and technical interests of professionals engaged in all aspects of the study, management and use of soils in New Zealand. NZSSS provides a forum for the exchange of ideas and information within the profession, and is thus normally engaged more internally in the science of the soil, rather than externally in the politics of its use.

However, an exception to its internal focus is a need to ensure that factual information in relation to our country's soil resources is given due recognition in the context of land use planning and decision making at district, regional and national level.

The Application

This submission is made by the New Zealand Society of Soil Science in respect of the Productivity Commission's 'Better Urban Planning' (BUP) Draft report. We thank the Productivity Commission for the opportunity to provide feedback on the BUP draft report.

There are numerous interchangeable terms used to describe "high quality soils". Other terms include high quality land, versatile land/soils. For the purposes of this submission, the NZSSS prefers to use the term "high class soils"[1] when referring to "high quality soils".

Reasons for making this submission

The BUP Draft report makes a couple of references to '*high quality soils*'. The NZSSS consider it important to clarify points that relate to high class soils, as well as highlight the noted absence of reference to the value of the soil resource in the BUP Draft report as a whole.

The objective of this submission is to raise awareness on matters pertaining to the value of soils including 'high quality soils' in New Zealand urban areas. NZSSS advocate for explicit and accurate evidence based consideration of the soil resource and impacts on high class soils[1] associated with urban planning be included in this report.

High class soils in the planning environment

Caption from the former Minister for the Environment, Simon Upton's 1997 speech

The New Zealand Society of Soil Science does not consider references to statements made by the former Minister for the Environment, Simon Upton in his speech over 20 years ago (p100) to be a suitable reference on which to base findings relating to "high quality soils" such as in F12.1. Although the citation may contribute to historical context, the NZSSS requests that references to "high quality soils" be based on current scientific and evidenced based information. To provide this sole statement by a non-expert and not provide any contrary opinion is unbalanced and could be misleading.

Previous protection

The soils that occupy areas of land that have high productive versatility, and that may be considered to have comparatively high value for the production of food, are a finite and diminishing resource (Rutledge et al., 2010). This fact was recognised in the former Town and

[1] An example definition for high class soils*: Those soils in Land Use Capability Classes I and II (excluding peat soils) and soils in Land Use Capability Class IIIe1 and IIIe5, classified as Allophanic Soils, using the New Zealand Soil Classification* (Waikato Regional Council, May 2016). Soil Classes are defined in Lynn et al., (2009), with Class I to III soils typically associated with easy topography, high fertility and production of high value horticultural, vegetable and arable crops, along with historic high value dairy farms.

Country Planning Act, which made the protection of such soils a matter of national significance. The repeal of that Act, and its replacement with the Resource Management Act in 1991, removed the national significance of the protection of such soils; it did not, however, change the fact of the value of the resource, nor its finite and diminishing nature. The impact of the legislative change from the Town and Country Planning Act to its replacement with the Resource Management Act in 1991, as it relates to "high quality soils" are not adequately addressed in the *Better urban planning* Draft report and should be considered, especially in relation to F12.1.

The commissioner's decision on the Auckland unitary plan supported the protection of high class soils (referred to in as Elite land in their report). There was little objection to protecting this valuable land

from residential development even from developers. This consensus should be recognized in the BUP Draft report.

Historic investment
High class soils, incorporating unique combinations of geology, landform, climate, and comparatively short histories of productive use must be regarded as the foundation of any comparative market advantage enjoyed by our country. Further, the historic investment into the critical soil infrastructure should be recognised, which in many cases has seen millions of dollars used to create and maintain fertility that provides for financially viable production systems, which to a significant extent our national economy is already based on. The re- investment in developing fertility 'elsewhere' comes at a cost to the community and the nation, and should be considered as an opportunity cost (loss) when considering alternative land uses.
High class soils cannot be substituted by using other soils. They have unique properties that are best suited to a wide range of use not found in other soils. For example, they are often the only soils suited to high value export crops such as avocado or kiwifruit. They are also able to be used for wastewater irrigation from dairy factories all year round. This is a quality not available in many other soils. They provide a range in productive and industrial services not readily replaced.

Loss of high class soils/land
The loss of high class soils has occurred nationally and internationally for many years as communities develop and grow. The rapid growth of communities has seen the rate of loss increase, with 29 % of the 25,000 ha of new urban areas in New Zealand developed between 1990 and 2008 occurring on high class land.

Rutledge et al., (2010) indicated that "To date, LUC classes I and II (highest class land) have experienced the highest urbanisation rates as a percentage of original area (5.6 % and 3.9 % respectively) over the period 1985 to 2002. In addition, based on historical census data, housing density has increased across almost all areas of New Zealand, indicating that the extent of urbanisation may be broader than currently assessed." From 1990 to 2008, 29 % of new urban land occurred on high class land (Andrew and Dymond, 2012).
In Auckland the rate of urban expansion onto high class land (LUC class I-III) has accelerated since 1996, with the majority of land allocated to urban expansion since 1996 has been high class land. Pukekohe has been identified as a potential satellite town with up to 50,000 new dwellings, but is the area where the majority of Auckland's LUC class I or elite land is located (Curran-Cournane et al. 2014). In Hawke's Bay and Marlborough a high proportion of urbanisation has occurred on high-class land — 49 % and 59 % respectively (Andrew and Dymond, 2012).

The overhang
Outward development and not inward development generates an 'overhang factor', whereby further outward development provides for an even greater exposure to land, disproportionately increasing the "zone of influence" on land use beyond the urban boundary. This means there is scope for a rapid consumption of high class soils.

One chance
Urban encroachment onto adjacent rural land has been seen to be an almost entirely one-way process. Once land has been used for the establishment of housing, commercial and industrial use, with the associated provision of communication and other public infrastructure, it is not cheap, not easy, and mostly not practical to reverse the process, remove the urban development, and return the land involved to its former actual or potential productive use.
The Resource Management Act requires that the life supporting capacity of the soil be preserved for future generations. This directive is worth acknowledging in the BUP Draft report by providing for the protection of high class soils. District, Unitary and Regional councils are providing for their protection to some degree and it is necessary to support legislation by affording them protection in the BUP Draft report.

Urban planning and the natural environment
Soils in urban areas
NZSSS agree with the finding F8.1 but note that there is no mention of soils and the integral role of soil ecosystem services in urban areas. The inclusion of soils, soil ecosystems services, and the preservation of high class soils (to make best use of their full ecosystems service contributions) within urban environments are seen as essential components to be considered as part of efficient

management of the natural environment in urban areas and sound urban planning. With reference to finding R7.8, retaining high class soil as green spaces within an urban area provides the greatest versatility and flexibility into the future, while maintaining the majority of soil ecosystems services.

Site vs Community
Urban use can safely and sustainably be established on a wide variety of soils and sites. Provided flooding and landslide hazards are avoided as may be appropriate, a wide variety of topographies, soil types, and locations may be equally suitable for urban development. Therefore, while there is limited choice of whether to develop or not when considered in one area, a wider look at opportunities surrounding the larger community, and in some cases region, may identify scope that had not previously been considered.

Ecosystems and biodiversity
Urban development has the scope to utilise landscapes that have maintained and developed unique ecosystems, some of which have inherent biodiversity characteristics not seen elsewhere. While not limited to high class soils, urban development can, and will likely, result in ecosystem changes through direct effects and loss of habitat; and also as a result of pressures on the ecosystem and habitat from cumulative effects beyond the development footprint.

The soil resource in New Zealand's future
A future planning framework
The NZSSS remains neutral on whether a single or two separate laws for the built and natural environments are required (Q13.1). However, the NZSSS advocate that clear national policy (such as a NPS) directing the use of New Zealand's soil resource is required to ensure high class soils especially are available for future generations.

Economic future
By general consensus, New Zealand's long-term economic future will continue in large measure to rely on the production and export of high quality, high value food products for consumption by discerning purchasers. Such produce cannot be produced at will on just any old land; New Zealand has large areas of land that are suited only to pastoral or forestry uses at best, and only relatively limited areas of high class soils. To illustrate this point the Horticulture industry currently utilises approximately 130,000 ha of land and is aiming to be a $20 billion business by 2020. To double this return they will need another 130,000 ha, but also they need the better landscape units (high class soils), the very units which are nationally limited and could be consumed by urban development.

The value of soil
The NZSSS acknowledge that a balancing of costs and values will be required to arrive at sound decisions on which land should, and should not be made available for housing and associated developments. There will be circumstances in which it will be appropriate to decide to proceed with an urban development despite its consumption of valuable soils. The NZSSS advocate to include consideration of the value of the soils involved in reaching a decision on new urban development.

Looking after soils is important. Providing for growth is important. Dovetailing into existing hard infrastructure is important. Because many facets of development are important not all the objectives will necessarily be satisfied, and hence compromises will be needed. The most logical solution need not be the cheapest or the quickest; and there may be a time where a combination of factors, such as water reticulation limitations, roading limitations and loss of high value soils means that less favorable and potentially more expensive building sites are best for the community. These decisions cannot be made on a development by development basis; but require big picture national, regional and community perspectives to direct and influence what is right for New Zealand Inc. and not only for the benefit of expedient progress and the prosperity of developers.

Concluding comments
The balance should consider economic, social, cultural and environmental factors. Not one factor should be the sole contributor to growth, with both positive and negative factors integrated and considered across the larger community, and not on an ad-hoc development by development basis at the whim of political and/or developer pressure. Soil, and particularly the loss and consequence of loss, of high class soils should be an integral part of the decision making matrix.

Decision requested

1. That the BUP report include due consideration of the soil resource, especially the inclusion of current and accurate information on the impacts on the soil resource (especially high class soils) with respect to the period of transition into and during the RMA 1991.
2. That the need to protect and sustain the availability and versatility of New Zealand's high value soil resources is included in the matrix of matters for consideration when evaluating urban planning. Ideally this consideration should occur at a master planning stage and not when evaluating ad hoc local development proposals.

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European Soil Data Centre

Maps indicating the availability of Raw Material from soils in the European Union

This dataset (maps) indicates the availability of Raw Material (organic soil material and soil material for constructions) from soils in the European Union. The evaluation of raw material availability from soil origin is limited to resources above the parent material. The assessment included the following two options, with the relevant criteria: a) Peat (for horticultural and other applications) and organic topsoil: All organic soils (Histosols) are considered and no mineral soils are considered. b) Soil materials for construction: To assess the quality of soils to provide construction materials, the approach presented in the Soil Atlas of Europe was applied, and the presence of sand and gravel was examined for this function. The data come as a single shapefile:

http://esdac.jrc.ec.europa.eu/content/map-indicating-availability-raw-material-soils-european-union-organic-soil-material-b-soil

Global Symposium on Soil Organic Carbon

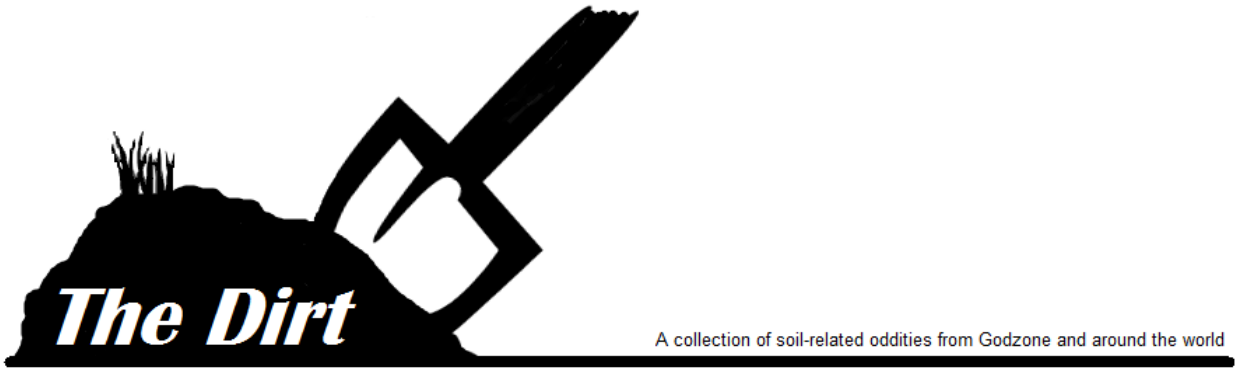
The Global Symposium on Soil Organic Carbon will take place at FAO headquarters in Rome on 21-23 March, 2017. The symposium aims to review the role of soils and soil organic carbon in the context of climate change and sustainable development. The symposium will explore promising research related to soil management practices, policies, and action plans for maximizing the potential of soil carbon management for climate change adaptation and mitigation.

http://www.fao.org/about/meetings/soil-organic-carbon-symposium/about/en/

Call for nominations for the UN Convention to Combat Desertification (UNCCD) Land for Life Award

The UNCCD Secretariat has the pleasure to invite qualified nominators to propose outstanding candidates that demonstrate qualities and results that have been contributing to achieve Land Degradation Neutrality goal at national or international level following certain selection criteria. They are in particular interested in potential nominees who have been contributing significantly to solve or reduce the issue of forced migration due to environmental degradation. **Deadline**: 28 February 2017

http://www.unccd.int/en/programmes/Event-and-campaigns/LandForLife/Pages/2017-Land-for-Life-Award.aspx



How deep is your love?

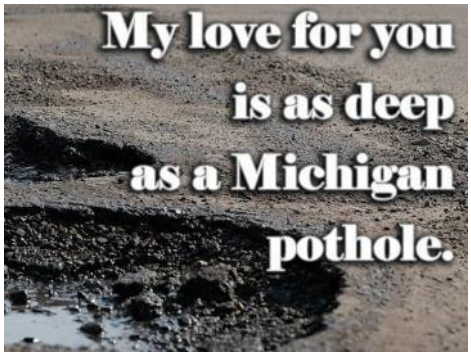
Can soil be romantic, even sexy? A blog post last Valentine's Day by Dr. Laura Bryant [1] made the bold claim that soil could indeed be "sexy", or at least inspire passion of some sort.

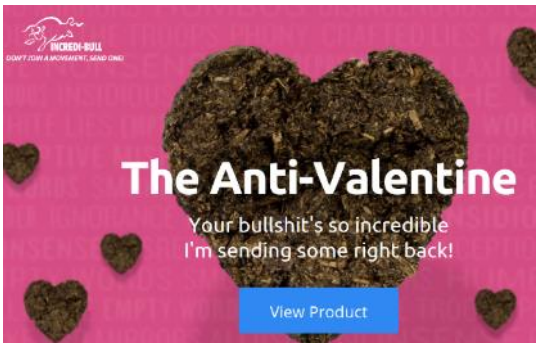
This Valentine's Day we wanted to find out: Does love and soil go together like peas and carrots; or fush and chups? One clue comes from the Soil Survey of Keith County Nebraska (1926:39):

VALENTINE LOAMY SAND

The surface soil of Valentine loamy sand is grayish-brown or dark grayish-brown incoherent fine sand or medium sand containing sufficient organic matter to give it a loamy texture but not enough to prevent soil drifting when the native sod is destroyed. The material

This Valentine loamy sand is surprisingly reminiscent of love: dark and fine, yet incoherent and potentially adrift. Depth of soil could also be compared with the depths of one's love, or as in Michigan, the depths of a pothole. This suggests that there are indeed some parallels between soil and love. However, strong passions run deep and soil may also be compared with other feelings. Enter Incredi-Bull's Anti-Valentine, made with 100% real dung.





Pasteurized and sterilized, it makes a safe impact and will "shake up that bullsh!tter anywhere" (UK only). Therefore, if you want to try and celebrate your special someone with soil next year, be mindful of the message you are trying to send. Soil does indeed inspire passion.

[1] https://www.nrdc.org/experts/lara-bryant/sexy-soil-blog-valentines-day

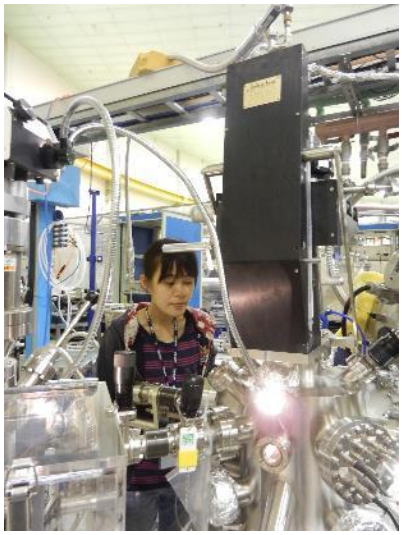
News from the Regions

Waikato/Bay of Plenty

Waikato University

Student awards from NZSSS for 2016

We warmly congratulate Waikato's student prize winners from 2016, who received awards at the ANZ joint soils conference in Queenstown in December, 2016.



The Dr Morice Fieldes award for best PhD thesis was awarded to **Dr Yu-Tuan (Doreen) Huang** (Fig. 1) for her thesis entitled "Studies on carbon and DNA preservation in allophanic soils and paleosols on Holocene tephras in New Zealand". Doreen is currently a postdoc at Umea University in Sweden.

Fig. 1 Dr Doreen Huang in the national synchrotron facility, Taiwan

Fig. 2 Jack Pronger in the field (photo: website)

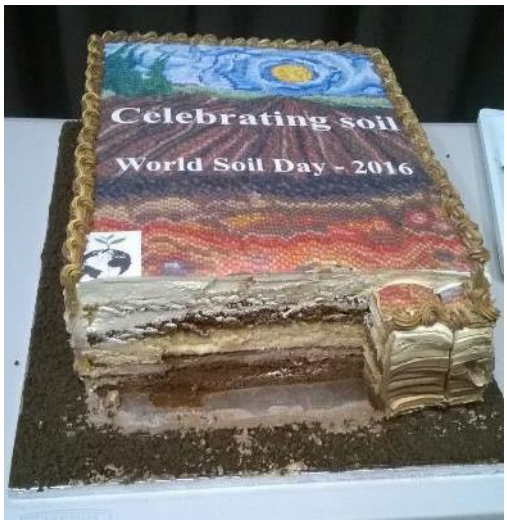
The Bert Quin Award for best PhD student entering 3rd year went to **Jack Pronger** (Fig. 2). In his PhD project, Jack is using the eddy covariance method to compare water use and carbon uptake from traditional ryegrass/clover pasture systems and diverse mixed sward pastures. The goal is to identify options for the agricultural sector to cope with the anticipated increased incidence of drought associated with climate change. Mixed sward pastures also offer other potential benefits including increased soil carbon sequestration, increased pest tolerance, and reduced nitrate leaching. Jack is currently amidst the feverish throes of completing his thesis because he starts at Landcare Research, Hamilton, in early April this year.

The Sir Theodore Rigg award for best masterate was awarded to **Nadia Laubsche**r (Fig. 3) for her thesis "Improvement in soil water availability in pastures by excavating and mixing buried soil horizons from multilayered Pumice Soils (Vitrands) at Galatea, central North Island, New Zealand". Nadia's promise was shown earlier at the World Soils Congress in Jeju in 2014 where she won 'best poster paper' in the session on volcanic soils.

Fig. 3 Nadia Laubscher in the field, Galatea (photo: Megan Balks)

Congratulations are also due to Michelle O'Grady for her award as best completing undergraduate student in soil science at Waikato University in 2016.

World Soils Day 5 December 2016: **Waikato celebration at museum**



World soils day was celebrated at the Waikato Museum in Hamilton in collaboration with sponsors New Zealand Society of Soil Science, Waikato Regional Council, Natural knowledge Ltd, and the University of Waikato. Over 60 participants enjoyed a diverse programme including free entry to check out the new Excite Exhibition at the Waikato Museum entitled "Milk Matters – Towards Sustainable Dairying" which features soil profiles prepared by **Dr Peter Singleton** (and several images provided by **Prof David Lowe**). **Dr Megan Balks** gave an illustrated talk based on her new book "Celebrating Soil: discovering soils and landscapes", which is targeted at a general audience (see details in the November 2016 issue of "Soil News". A special world soils day cake (Fig. 4) was cut and enjoyed along with liquid refreshments.

Fig. 4 Megan's World Soils Day cake, 5 Dec 2016 (photo: Kay Carter)

Australasian Quaternary Association (AQUA) biennial conference "Quaternary perspectives from the city of volcanoes" held at Old Government House, University of Auckland, 5-9 December, 2016

Prof David Lowe, A/Prof Alan Hogg, Dr Adam Hartland (all Waikato University) and four graduate students (Joss Ratcliffe, Alex Harpur, Andrew Douie, and Andrew Pearson) attended this excellent conference that attracted over 100 participants. Quaternary studies are very strong right now in Australia and New Zealand with a lot of new techniques being on display such as the application of ITRAX scanning to sediment cores, and there is clearly a new generation of committed and passionate Quaternarists coming through (Fig. 5). This meeting by AQUA was only the third to be held in New Zealand and was an inspirational event thanks largely to the efforts of **Dr Drew Lorrrey** (NIWA) and his conference organising team, who should take a bow.

Fig. 5 David Lowe enjoying dinner out with some friendly Australian and New Zealand students at the AQUA meeting (photo: website)

A welcome feature of the meeting was that all oral presentations were held in a single session (i.e. no parallel sessions) and so all participants got to see and hear all the papers including many top-notch papers by students. Posters were also in abundance.

New work on Lake Ohau was presented by **Dr Marcus Vandergoes** (GNS Science) in a great opening night plenary presentation that showed a long record of annual/seasonal changes dating back 17,000 years. Another highlight was a brilliant talk by the iconic and iconoclastic **Dr Matt McGlone** (Landcare Research) on *Ascarina lucida* and the climatic interpretation of the New Zealand Quaternary. **Prof Atholl Anderson** (ANU) spoke eloquently and compellingly about the role of climate change in South Polynesian colonization and cultural development AD 1200-1800. **A/Prof Phil Shane** (Auckland University) spoke very entertainingly at the conference dinner (in a volcanic crater) about recent new work on the "long life of Rangitoto volcano" revealed by drilling. Finally, **Prof Chris Turney** (UNSW) gave a stand-out presentation (doubling as a public lecture) entitled "Back to the future: Last Interglacial warmth and the stability of the Antarctic ice sheets".

An intra-conference one-day field trip began on Mt Eden (Fig. 6) and ended at Lake Pupuke (where **A/Prof Paul Augustinus** of Auckland University spoke about palaeolimnological research in the region) with a visit to the fantastic Cascades Kauri Forest Park in the Waitakere Ranges in between (Figs. 7-8). David Lowe ran a 1-day post conference trip to Rangitoto Island (Sat 10 Dec) with **Dr Peter de Lange** (Dept of Conservation) joining him for a most enjoyable geoscientific and botanical trip. Finally, Drew Lorrey led a most enjoyable and informative five-day trip through Northland (11-16 Dec) centred on kauri and Quaternary studies in the region (Fig. 9).

Fig. 6 Dr Gretel Boswijk (Auckland University), atop Mt Eden, explaining the archaeological history of Auckland (photo: David Lowe)

Fig. 7 Cascades Kauri Forest Park with fantastic stands of kauri evident (photo: David Lowe)

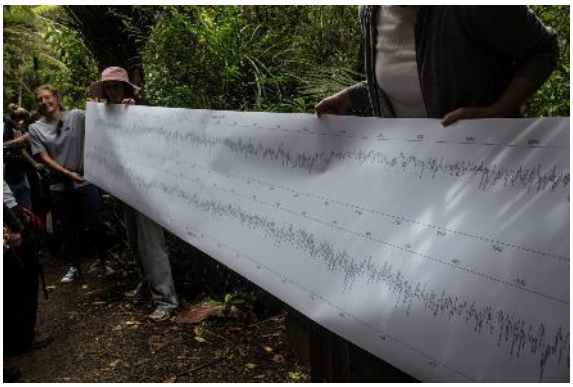


Fig. 8 Part of hard-copy of ~4500-year-long annual temperature record for northern New Zealand derived from kauri-based dendrochronology – an impressive record decades in the making and presented in the Cascade kauri forest walkabout. ***Dr Gretel***

Fig. 9 Post-conference AQUA tour group in Northland near ancient kauri stumps (photo: website)

Andisol excursion in the Waikato-Bay of Plenty: an unofficial Waikato University-led post-conference tour for students from University of Wisconsin at Platteville, USA

Fig. 10 Univ. of Wisconsin-Platteville group, with Prof Chris Baxter in the front, at Te Waiora Falls, Buried Village (photo: Maria Lowe)

Prof Chris Baxter and around 9 students – the newly-crowned Southern Hemisphere 'Soil Judging' champions at the ANZ joint soils conference in Queenstown – spent three days with David Lowe getting a feel for soils formed from volcanic ash during a trip focussed largely on "geology meets pedology" (i.e. upbuilding pedogenesis was the main theme). Day 1 (Wed 21 Dec) was spent on the Mamaku Plateau and in the Rerewhakaaitu and Rotorua areas, taking in a Tirau soil, Rotomahana soil, late Quaternary and Holocene tephra sections, and the Buried Village at Te Wairoa (Fig. 10). Day 2 (Thu 22 Dec) saw the group head south, stopping to see the Kainui soil before checking out the Otorohanga Kiwi House, a bush walk on Mt Pirongia, and dinner at the Lowes residence in Hamilton (on a Horotiu soil). (A planned visit to Waitomo Caves was abandoned because we had not booked and it turned out there were no free spaces until very later in the day.) Day 3 (Fri 23 Dec) featured a trip to Hobbiton near Matamata – which I must say was very enjoyable and well done by the tour operators, and which we had booked several months in advance – and then a visit to Te Parapara Garden at Hamilton Gardens where **Wiremu Puke** (ethnographer and stone-tool master carver, Hamilton) described the special early Maori gardens to the visitors. Many commented later that this garden visit was a highlight of the New Zealand tour.

The American students were very friendly, charmingly polite, and genuinely appreciative of the outings and a great credit to both the University of Wisconsin-Platteville, and to Chris Baxter, who had planned and led the entire New Zealand trip.

From the archives: Norman Taylor and Bill Hamilton

Oliva Petrie (MSc student with **Dr Tanya O'Neill** and **Prof Louis Schipper**) discovered a tangible link between two critical people of New Zealand soil science in the form of a copy of "Soil Survey Method" with a dedication to Bill Hamilton from Norman Taylor (Fig. 11). Olivia was visiting a friend in Northland and a direct descendant of Bill. Both these scientists played a very important role in the development of soil and agricultural science in New Zealand. Norman Taylor is perhaps more familiar to NZSSS members because of his role in founding the society, his leadership of Soil Bureau, and the award named after him, whereas Bill Hamilton helped form the DSIR and served as Director General. See:

http://www.teara.govt.nz/en/biographies/5t5/taylor-norman-hargrave

http://www.teara.govt.nz/en/biographies/5h5/hamilton-william-maxwell

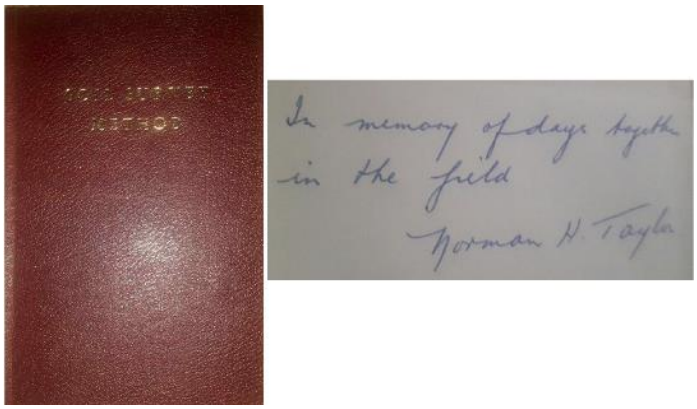


Fig. 11 Bill Hamilton's "Soil Survey Method" (1962) with Norman Taylor's inscription from inside it.

World Soils Day 5 December 2017: Wai-BOP soils biennial conference

We are planning to hold another Wai-BOP soils 1-day conferences on Tuesday 5 December at the University of Waikato, Hamilton. See our preliminary notice elsewhere in this issue and see you there!

Landcare Research

Suzanne Lambie, in collaboration with **Joss Ratcliffe** (University of Waikato), is assessing microbial parameters in peat samples at Kopuatai and Moanatuatua bogs. The objective of the work is to determine the mechanisms for the interaction between water table fluctuation and agricultural drainage on enhanced CO_2 fluxes at Moanatuatua, using Kopuatai as a baseline system. They are also assessing the influence of the dominant plant species on microbial heterotrophic capacity and carbon mineralisation under *Empodisma spp.* and *Sporadanthus spp* at both bogs.

Photo 1: Kopuatai bog

Photo 2: Moanatuatua bog

Photo 3: Peat core from Kopuatai bog

Suzanne Lambie is also leading a SLMACC project investigating the effect of climate change driven drought on microbial function and adaptation and the flow on effects on plant production and nutrient cycling. The project will also include an assessment of the interaction between hydrophobicity and microbial processes and the value of metagenomics for determining the effect of drought on microbial communities. The project is cross organisational and team includes **Kate Orwin** (Landcare Research), **Simeon Smaill** and **Steve Wakelin** (Scion), **Karin Müller** (Plant and Food Research) and **Gavin Lear** (University of Auckland).

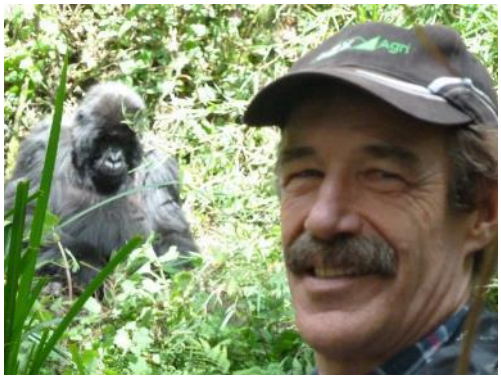
AgResearch Ruakura

Joint conference for the New Zealand Society of Soil Science and Soil Science Australia

The recent NZSSS/SSA conference in Queenstown was well attended by Ruakura members with presentations given by **Natalie Watkins** (environmental impacts of dairy sheep), **Sheree Balvert** (inhibition of N20 emissions using natural compounds), **Diana Selbie** (N mineralisation, immobilisation and turnover in the animal urine patch), **Dave Houlbrooke** (managing dairy effluents in China), **Moira Dexter** (supply of mineralised N from dairy effluents), **Emma Bagley** (urine patch spread as a mitigation for N loss) and **David Wheeler** (soil in Overseer). Most of the crew attended the Northern Southland Farm systems field trip on the opening day of the conference which was led by Diana Selbie. This included a visit to the Selbie family farm (hill country sheep and beef) in Five Rivers and a large dairy farming operation near Mossburn. The day concluded with a panel discussion that covered many topical and difficult issues associated with agricultural sustainability in the Northern Southland region in a climate of land use change, intensification and regulatory pressure. The Ruakura participants (with additional enlisting of **Paul Mudge** and **Sylivia Sabbagha**) were all cajoled (forced) to join the Ruakura touch team in the inaugural NZSSS/SSA touch competition on the Wednesday evening and were happy with their record of 2 wins, 1 draw and 1 loss. Another highlight of the conference was the conference dinner held at the Skyline function centre with incredible views and a fresh dump of snow during the evening as a special treat for our Australian visitors. **James Dicey** (Mt Difficulty Viticulturist) gave a great after dinner speech on the importance of soil in producing quality wine which was well received by the audience while drinking his produce. Congratulations to **Diana Selbie** who together with **Laura Buckthought** (Auckland Council) and the absent **Mark Shepherd** picked up the NZSSS M.L Leamy award for the most meritorious soil science publication over the past three years for their 2015 review published in Advances in Agronomy entitled 'The challenge of the urine patch for managing nitrogen in grazed pasture systems'. Finally a large congratulations to the local organising committee for bringing together a very well run and enjoyable event.

International Nitrogen Initiative Conference

A number of researchers (**Stewart Ledgard, Jiafa Luo, Mark Shepherd** and **David Wheeler**) attended the International Nitrogen Initiative Conference in Melbourne in December. They presented nitrogen research on a range of topics from using OVERSEER, to dairy systems for reducing nitrogen losses, and to the nitrogen footprint of Taupo Beef. Attendee **Mark Shepherd**'s observations were: interesting content, quite high level, mainly around N footprinting; well attended. Attendees were challenged to reduce their own N footprint during the meeting by offsetting their travel footprint by a (financial) contribution to tree planting (uptake of this appeared low!) and by eating less meat during conference meal breaks and at the conference dinner. N footprint values were printed on the conference dinner menu. The steak was delicious! Mark observed that the push by the scientific community for N footprinting to be recognised is growing but: (a) there is no definition of what a 'good' value is and (b) will another footprint confuse the consumer even more. Oh, and the Blackcaps underperformed at the MCG (Melbourne Cricket Ground) the day after the conference (but gained revenge back on home turf!).



Stewart Ledgard is co-chairing an international technical advisory group for Livestock Environmental Assessment and Performance (LEAP) partnership, led by FAO, on "Nutrient Flows and Environmental Impact Assessment of Livestock Supply Chains". This has involved working with researchers from across the globe on developing internationally agreed Guidelines on methods, including for Eutrophication. This included a face-to-face meeting in Kigali (capital of Rwanda), where he met some of the locals (pictured left)! He is currently working on a number of local trials, including measurement of nitrogen leaching in two high rainfall dairy farms on free-draining and podzolised pumice soils around Lake Rotorua, and assessment of environmental effects of dairy farm systems with increasing brought-in feeds across 25 Tatua dairy farms.

Gina Lucci will soon be hopping on a plane to take up a new role for one year as Research Manager for the Strategic Partnership; a new partnership between AgResearch, IRTA Uruguay, Teagasc Ireland and IRTA Spain. The main task for the year ahead is to get some collaborative research projects up and going that involve all 4 partners and to promote the exchange of people, data and research. The position is based in Montevideo, Uruguay so learning some Spanish is also very close to the top of that list! Gina has been to Uruguay once before (Pictured above the "e"), together with Kim Cole (above the "o"), and James Turner (between the "nt").

Manawatu

Plant & Food Research – Palmerston North

Brent Clothier and **Steve Green** spent most of December and January in the United Arab Emirates working on their two projects with Environment Agency – Abu Dhabi (EAD). They were home for Christmas and New Year, although the New Zealand summer proved to be worse than the Emirati winter! Brent and Steve work with Wafa Al Yamani on the use of treated sewage effluent (TSE) to irrigate amenity trees and arid forests. This work forms the basis of her PhD through Massey University. Here's a fish-eye view of the 'forestry team' showing the Arak trees growing in lysimeters, and the TSE tank. Steve is (otherwise) using the fish-eye lens to monitor tree leaf area.

Brent and Steve were also working with Ahmed Al-Muaini on reducing the use of saline groundwater to irrigate date palms. Here's a photo of Ahmed (left) talking with a date farmer (second left) about his irrigation practices and fruit yield. Steve Green is on the right. Ahmed is also doing his PhD through Massey University on this date palm research.

The team farewells summer student **Kurt Villsen** supervised by **Robert Simpson**. Kurt worked on the project 'Forecasting changes in ecosystem services for more sustainable land management' to discover whether the presence of chosen beneficial insects can be determined from soil extracted DNA, rather than more time consuming trapping and identification. His studentship involved sequencing the cytochrome oxidase and 28S genes in a number of insect species, and designing PCR primers to enable detection of these genes within soil DNA, in order to discover whether the insects had been in contact with the soil. He also spent some time optimising the extraction of eukaryotic DNA from soil, Kurt has just completed a BSc(Hons) at Victoria University on the speciation of sea weeds.

Robert Simpson presented at the NZASSS conference Changes in Enzyme Activities and Soil Properties in Soils with Changing Soil Water Repellency.

Massey University

Christine Christensen has contributed to two workshops (May and December) run by Beef + Lamb NZ and Horizons Regional Council, for farmers to 'get the most out of their Whole Farm Plans'. These plans have been developed by Horizons RC in response to the Sustainable Land Use Initiative (SLUI). The Whole Farm Plans contain information on the farms' specific soil types, topography, land use classes, plantings, potential pasture production, etc. They also include suggestions for change and prioritisations for these changes. The need for workshops has arisen to allow farmers to understand what is in their plans so environmental changes can be implemented in a timely and knowledgeable manner.

Associate **Professor Marta Camps** from the Institute of Agriculture and Environment and Professor **Ralph Sims** from the School of Engineering and Advanced Technology received an invitation from the Office Chérifien Des Phosphates (OCP) to visit Morocco and Western Sahara and see some of the company's activities first hand. The OCP Group is interested in broadening the common understanding about their business, its role in New Zealand agriculture, the connection with the Moroccan economy, its environmental impacts, and its goals to improve working and living conditions for their staff, as well as for the people of the Western Sahara. While in Western Sahara they visited the Boucraâ mine (where the phosphate rock purchased by New Zealand originates from), as well the port at Laâyoune-Boujdour-Sakia El Hamra on the Atlantic coast (where the chemical plant – although not yet operational – and storage facilities are based), along with the wharf (where the phosphate is shipped from).

Dragline with trailed electric cable and 42 m^3 bucket removing over-burden in the Section B mine and trucks being loaded with 200 t payloads of rock phosphate before heading to the screening plant to remove large rocks etc. prior to conveying the product to the port facilities for processing or direct export.

At Laâyoune they also visited a primary school and the Community Skills Learning Centre, both funded by the Phosboucraâ Foundation. Once in Morocco, they visited Khourigba (the largest OCP mine), the Jorf Lasfar Industrial complex (the largest fertiliser processing platform worldwide), and the Mohammed VI University in Benguérir, a private university funded by OCP. At the University, they were able to visit the OCP soils' mobile laboratory intended to support farmers by optimising their soil nutrient balance; since 2012, over 50,000 farmer clients have been reached. As part of the tour, Marta and Ralph visited community clubs, a library, a soccer club, a public gymnasium and other sporting facilities, all funded by OCP and managed by enthusiastic and capable staff. Overall, the company's endeavours in supporting staff, their families, and local communities through investing in training, education, sporting and cultural activities were commendable.

The 30th Annual Workshop was held by the Fertilizer and Lime Research Centre (FLRC) on the 7th-9th of February 2017 and was a very well attended and productive event. The organisers continued with the sustainable farming theme from the past several years, with the title of the workshop this year being 'Science and Policy: Nutrient Management Challenges for the Next Generation'. Funding provided by AGMARDT was spent to support travel costs for Professor Brian Kronvang from the Department of Bioscience, Aarhus University in Denmark. Professor Kronvang gave a keynote address titled '30 Years of Nutrient Management Learnings from Denmark: A Successful Turnaround and Novel Ideas for the Next Generation'. This talk was very appropriate to the forum and provoked good discussion and comparisons with the situation being faced by the agricultural sector in NZ.

From left: Dr Ranvir Singh and Prof Mike Hedley, Massey University along with Dr Tommy Dalgaard and Prof Brian Kronvang from Aarhus University, Denmark.

In all, there were 92 presentations (both oral and by poster) during the three days of the workshop and more than 260 delegates. It was a pleasure this year to host a group of research and development experts from the United Kingdom, specialists in Precision Agriculture who were on a New Zealand tour organised with the help of the British High Commission. This tour had been some months in the planning, and specifically timed their visit to Palmerston North to coincide with this event. Four of the tour party gave presentations to the workshop.

NZASSS Conference in Queenstown, December 2016

Twelve Massey University staff and 15 post graduate students attended the 2016 Joint New Zealand and Australian Societies of Soil Science Conference. This was a fantastic opportunity for our staff and students to present their research and to hear about the latest in soil science. The serious sessions were interspersed with lighter, more social activities, with the inaugural touch rugby match (the conference highlight for some!) and of course the conference dinner. A large group of our students competed in the Soil Judging competition, where they pitted their skills against students from other national and international universities and performed very well.

The inaugural Massey University (with a few outsiders) Touch Rugby team.

From Jiajia Liu, Postgraduate student, Massey University

The NZSSS soil conference was held in Queenstown in December 2016. As a student I was very lucky to be given this opportunity to attend and present my masters research. The conference expanded my knowledge and updated my current understanding of the opportunities and challenges faced by soil scientists. This conference was interactive and during the conference I had the privilege to talk to many researchers, educators and entrepreneurs. These conversations have broadened my perspectives. I truly appreciate the work everyone had put in to organizing the event.

Photos courtesy of Jiajia Liu and Qinhua Shen

Canterbury

Plant and Food Research, Lincoln

This report from PFR Lincoln is tinged with sadness over the devastation and destruction that the fires on the Port Hills have caused since Monday 13th. It's been quite stressful to see the situation unfolding from Lincoln. There are several staff who have been directly affected by the required evacuations.

It's been a long time since there's been any report from PFR Lincoln. It seems that copy for Soil News seems to neatly coincide with large field sampling campaigns and a shortage of time!

PFR Lincoln were well represented at the Queenstown conference. **Gina van der Klei**, **Abie Horrocks**, **Weiwen Qiu, Wei Hu, Denis Curtin, Trish Fraser**, and **Mike Beare** presented papers and students Carmen Medina and Tihana Vujinovic were able to attend to network. Trish also was on the conference organising committee. Trish was presented with a Life Membership of NZSSS at the conference dinner (see article below). Brendon Malcolm was elected onto Council to effectively replace Trish as the PFR representative on Council after 22 years.

Last spring, at the FRNL Tillage and Treading Trial, the treading treatment was imposed using the Hoofiroller developed by PFR's Bioengineering group at Ruakura. **Richard Gillespie, Craig Tregurtha** and **Steven Dellow** applied a range of treading treatments by varying weight added to the Hoofiroller (3 pictures below). A campaign of sampling for investigation into soil physical and hydraulic properties from intact cores, led by Wei Hu, and mineralisable nitrogen followed. A test crop of feed barley was then sown and through the growth of this crop, biomass accumulation, mineralisable nitrogen and soil properties were tracked.

The working component of the Hoofiroller

Compaction simulation from the Hoofiroller

A replicate post treading showing the matrix of tillage (intensive top, no till lower) and treading (pairs of vertical strips)

An associated experiment, lead by Trish Fraser, has begun using intact soil cores collected from the treading trial. This new trial aims to look at the effect of type of tillage, compaction and soil wetness on soil physical properties over time, drainage, and gas emissions.

Lysimeters were collected last spring prior to the cultivation and establishment of the barley test crop by Wei Hu, Frank Tabley, Weiwen Qiu and Peg Gosden and were then refrigerated.

The process of preparing the lysimeters and assembling them involved a large number of people. In addition to the above Trish Fraser, Steve Thomas, Gina van der Klei, Chris Dunlop, Michelle Peterson, Kathryn Lehto, Richard Gillespie, Will Burrows and Ash Tabley all played a part in getting the set up done. And last but not least, this complex layout was designed by Esther Meenken, who soon will be leaving PFR, moving to AgResearch.

The compaction treatment was applied using a hydraulic press to known pressure. The lysimeter base contact was prepared to be free of smearing and were then and fitted to prepared bases of saturated sand covering a wick allowing drainage to fall over tipping bucket rain gauges.

^{15}N labelled urine was applied and the lysimeters will be irrigated weekly to induce drainage. Gas emissions will focus on N_2O losses.

The labelled N will be used to determine the losses of N that can be attributed to the urine application.
The trial will run for three months.

Lysimeters in the trench prior to removal

Richard Gillespie and Michelle Peterson weigh the bases containing saturated sand prior to lysimeter installation

Frank Tabley and Will Burrows prepare the lysimeter contact area ready for positioning onto their bases

Trish Fraser seals a lysimeter onto its base

The lysimeter trial ready to go

Soil quality work continues on potatoes. **Sarah Sinton**, **Steve Dellow**, **Alex Michel**, **Farhat Shah** and **Richard Falloon** are investigating the effect of soil compaction on root distribution and presence of disease, this year focussing also on the effect of paddock history. A new development of this work has shown that the source of *Rhizoctonia* can be differentiated by the position it manifests on the stem, with seed borne inoculum showing on roots closer to the seed tuber while soil borne inoculum shows nearer the top of the stem. The team has also shown that the current drive to establish potatoes in ex-pasture paddocks, to find aggraded soils for relatively weak rooted potatoes and also "cleaner" paddocks with less soil borne inoculum, may not be paying off. Soil structural condition scores of aggraded ex-pasture paddocks are severely reduced by the cultivation and establishment systems required. Additionally, *Rhizoctonia* may have multiple plant hosts, therefore continuing to be problematic in potato crops.

Steve Dellow assessing soil quality and the distribution of potato roots as influenced by position in the row, rurrow and wheelmark

The booklet produced from the suite of work on modified land forms on the West Coast, done by Steve Thomas, Abie Horrocks, Craig Tregurtha and Richard Gillespie is available on line now at https://zenodo.org/communities/sff11_091/?page=1&size=20

Customer interaction – A "life time" of service to the soil science community

The impacts of science are delivered through a number of different pathways and to a number of different stakeholders. We often focus on the impact that our science has directly on the productivity, profitability or environmental performance of our primary industries through the development and use of new technology. We also deliver impact by producing data, knowledge and tools that inform the development of government policy. However, science impact is also delivered through incremental gains in knowledge and understanding, where the immediate "customer" or end user of our research is a scientific peer or the wider scientific community. Publication of research findings in scientific journals or presentations at scientific conferences are important mechanisms for sharing this knowledge and delivering peer-to-peer impact.

The open exchange of ideas and knowledge between professional peers is greatly enhanced by our participation in scientific and professional societies. Therefore, those members of our scientific community who volunteer their time and energy to the effective operation of these professional societies obviously play an important role in helping to deliver scientific impact. Trish Fraser is one of those people in Plant & Food Research. Trish was recently awarded an honorary life membership of the New Zealand Society of Soil Science (NZSSS) in recognition of her outstanding service to the Society. Trish has served on the NZSSS Council for the last 22 years, including a 16 year stint as Secretary and a 2 Year term as the first and so far the only female President of the Society. She also instigated and manages both Facebook and Twitter accounts for the NZSSS to keep members and any other interested parties up to date on soils related issues. Membership in the NZSSS has grown significantly over that time, as has the impact of soil science on a wide range of stakeholders, including primary industries, environmental regulators, public policy agencies and, yes, the wider scientific community. Congratulations Trish.

Lincoln Agritech

Compiled by Roland Stenger

Transfer Pathways Research in Hauraki

This component of our Transfer Pathways Programme (TPP) focuses on the understanding of the water flow and contaminant transfer partitioning between shallow lateral flows through subsurface drains and vertical recharge into the deeper groundwater system. While Greg Barkle (Aqualinc Research Ltd) presented our first results from the 2016 drainage season at the FLRC workshop, other team members carried out field research to better understand the reasons for the observed distinct differences between our two Hauraki field sites (Waharoa and Tatuanui). Retrieving intact cores from the top 2 m below the ground surface allowed Malcolm McLeod (LCR) to systematically describe the soil – vadose zone – groundwater continuum at multiple locations (Fig. 1). Together with soil water tension time series recorded at multiple depths (Fig. 2) and drainage flow monitoring (Fig. 3), these profile descriptions will elucidate the water flows in the shallow subsurface.

Kathryn Gale from Kāi Tahu ki Otago visiting LAL's Hamilton office

As part of a Vision Mātauranga project guided by Gail Tipa (Tipa Associates) and Jens Rekker (Lincoln Agritech), Kathryn Gale from Kāi Tahu ki Otago recently spent a few days with Lincoln Agritech's Hamilton team. Apart from exploring VM opportunities with Roland Stenger, Kathryn was introduced to some of the team's experimental and monitoring techniques and had the opportunity to visit the Owl Farm artificial wetland site near Cambridge and the TPP Waharoa field site in Hauraki (Fig. 3).

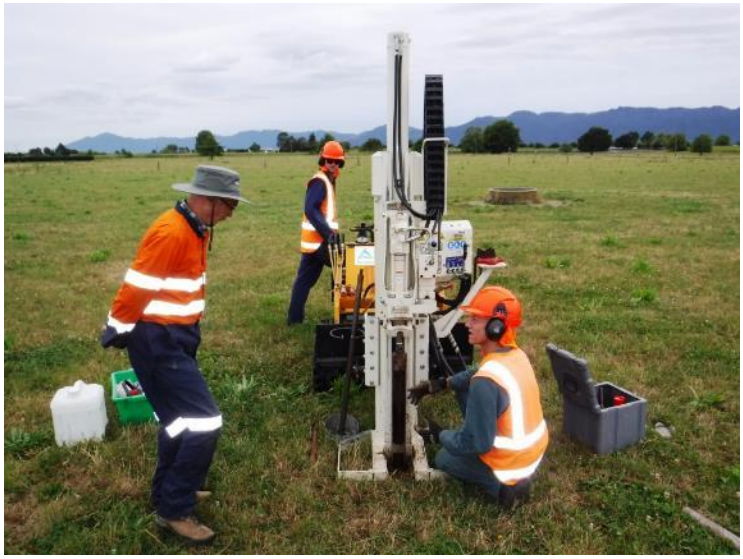


Fig. 1: Malcolm McLeod (LCR), Tasman McKelvey and Brian Moorhead (both Lincoln Agritech) using LAL's Geoprobe drill rig to explore physical conditions and redox status of the shallow subsurface.

Fig. 2: Tasman McKelvey manoeuvring one of the tensiometers at our Waharoa field site.

Fig. 3: Tasman McKelvey explaining our set-up for flow-proportional sampling of drainage water to Kathryn Gale from Kāi Tahu ki Otago.

Lincoln University

On Saturday 18th February Roger McLenaghen and Judith van Dijk attended the first of seven regional TeenAg competitions (junior young farmers) in Roxburgh, Otago. Both staff members ran a module for contestants to determine the soil texture of 2 samples and also answer 3 soil texture questions. A total of 62 contestants all got their hands dirty, with one group getting 100% and going onto the finals. Over the next month both Judith and Roger will be attending TeenAg competitions on the West Coast and as far away as Bay of Plenty and Northland.

The department of Soil Science welcomes two new PhD students. Carolina Lizarralde from Uruguay has arrived to do her PhD on "Methods to mitigate water quality impact from high phosphorus soils receiving wastewater" under the supervision of Richard McDowell and Leo Condron. Zach Simpson from USA (University of Arkansas) has arrived to do his PhD on "Sediment and phosphorus attenuation in-stream and on-land" under the supervision of Richard McDowell and Leo Condron.

Bryony Dignam successfully passed her PhD oral examination on the 23rd of February. The topic was 'Ecological assessments of *Pseudomonas* communities in pastoral soils: implications for disease suppression and sustainable production in agricultural grasslands'. Her supervisors were Dr Steve Wakelin (formerly AgResearch, now SCION), Dr Maureen O'Callaghan (AgResearch) and Prof Leo Condron (Lincoln University)

On the 12th of January, **Hongtao Zhong** successfully defended his PhD thesis, entitled "Soil Chemistry and Ecology on a Restoration Trajectory of a Coastal Sandplain Forest, Punakaiki, New Zealand. Tao's supervisors were Nick Dickinson, Brett Robinson and Carol Smith. Tao has taken up a postdoctoral fellowship in the University of Western Australia.

New publication

An exciting new book for soil scientists
Microbial Biomass – a Paradigm Shift in Terrestrial Biogeochemistry

Microbial Biomass informs readers of the ongoing global revolution in understanding soil and ecosystem processes. The first paper on the subject was written by David Jenkinson in 1966, and here new insights and expansions are given on the fascinating world of soil microbial processes. In terms of contemporary issues, it also serves to support urgent efforts to sustainably manage land to feed a growing world population without compromising the environment. It presents new methods of investigation which are leading to more sustainable management of ecosystems, and improved understanding of ecosystem changes in an increasingly warmer world.

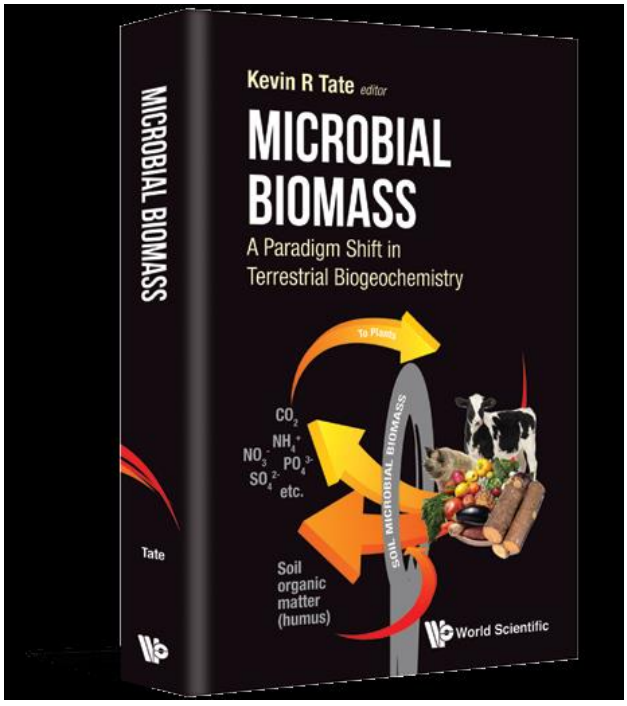
The book approaches the topic by looking at the emergence of our understanding of soil biological processes, and begins by tracing the conception and first measurement of soil microbial biomass. Following this, changes in ecosystems, and in natural ecosystem processes are discussed in relation to land management issues and global change. Microbial biomass and its diversity are recognized as key factors in finding solutions for more sustainable land and ecosystem management, aided by new molecular and other tools. Information from the use of these tools is now being incorporated into emerging microbial-explicit predictive models, to help us study changes in earth system processes.

Perfect for use in research and practice, this book is written for undergraduate and graduate students, researchers and professionals of agronomy, chemistry, geology, physical geography, ecology, biology, microbiology, silviculture and soil science.

Contents: Through the Eye of the Needle-the Story of the Soil Microbial Biomass; The Role of the Microbial Biomass in Cycling Nutrients; Managing Soil Microbial Biomass for Sustainable Agro-Ecosystems; Microbial Biomass and Functions in Paddy Soil; Soil Biodiversity and Ecosystem Functioning; Building Predictive Models for Diverse Microbial Communities in Soil: Dynamic Compound-Specific Stable Isotope Probing of the Soil Microbial Biomass; Emerging Culture-Independent tools to Enhance our Understanding of Soil Microbial Ecology; Microbial Ecosystem Functions in Wetlands under Disturbance; Arctic Soil Microbial Sensitivity to Seasonal Dynamics and Climate Change.

Readership: Undergraduate and graduate students, researchers and professionals of agronomy, chemistry, geology, physical geography, ecology, biology, microbiology, silviculture and ecology.

Online ordering: sales@wspc.com.sg
325pp Mar 2017
978-1-78634-130-3 £115



Abstracts

Journal papers:
Hu, W., Si, B.C., 2016. Technical Note: Multiple wavelet coherence for untangling scale-specific and localized multivariate relationships in geosciences, Hydrol. Earth Syst. Sci., 20, 3183–3191, doi:10.5194/hess-20-3183-2016, 2016.

Pernitsky, T., **Hu,W**., Si, B.C., Barbour, L., 2016. Effects of petroleum hydrocarbon concentration and bulk density on the hydraulic properties of lean oil sand overburden. Canadian Journal of Soil Science, 96(4), 435-446, doi: 10.1139/cjss-2015-0126.

Zhu, H.F., **Hu, W.,** Bi, R. T., Peak, D., Si, B.C., 2016. Scale- and location-specific relationships between soil available micronutrients and

environmental factors in the Fen River basin on the Chinese Loess Plateau. Catena 147 ,764–772. http://dx.doi.org/10.1016/j.catena.2016.08.038.

She, D.L., Chen, Q., Timm, L.C., Beskow, S., **Hu, W**., Leitzke, T., de Oliveira, L.M., 2017. Multi-scale correlations between soil hydraulic properties and associated factors along a Brazilian watershed transect. Geoderma, 286 15–24. http://dx.doi.org/10.1016/j.geoderma.2016.10.017.

Sigouin, M. J.P., Dyck, M., Si, B.C., **Hu, W**., 2016. Monitoring soil water content at a heterogeneous oil sand reclamation site using a cosmic-ray soil moisture probe. Journal of Hydrology, doi: 10.1016/j.jhydrol.2016.10.026.

Conference reports:

Hu, W., Si, B.C., 2016. Application of multple wavelet coherence for revealing multivariate relationships between soil water and environmental factors. Soil, balancing act downunder, NZASSS poster abstract, Queenstown 12-16 Dec 2016, P161.

Hu, W., Si, B.C., 2016. Soil water decomposition for downscaling soil water and understanding its controls. Soil, balancing act downunder, NZASSS oral abstract, Queenstown 12-16 Dec 2016, P78.

Conferences:

May 2017

A conference on the cutting edge of science, management and policy to minimise effects of agriculture and land use changes on the quality of groundwater and surface waters.

LuWQ2017
3rd International Interdisciplinary Conference on LAND USE AND WATER QUALITY:
Effect of Agriculture on the Environment
The Hague, the Netherlands, 29 May – 1 June 2017

More information is on http://www.luwq2017.nl/

14-18 May The 15th International Symposium on Soil and Plant Analysis (ISSPA), Nanjing, China. ISSPA is devoted to the science and practices of soil, plant, feed, animal waste, and water analysis. This symposium provides an opportunity for international scientists interested in agricultural testing and results interpretations to exchange knowledge, foster collaborations, and learn advanced analytical technologies and laboratory management strategies. The registration is open. Please consider presenting a paper, becoming a sponsor/exhibitor. For more information, please visit http://isspa2017.csp.escience.cn/dct/page/1

20 – 23 June 2017

The Second Global Workshop on Digital Soil Morphometrics at The James Hutton Institute in Aberdeen, Scotland UK. For more information see http://www.digitalsoilmorphometrics.org

26 June - 1 July 2017
The 25th anniversary of Pedometrics will be celebrated in Wageningen, the Netherlands. Pedometrics is a branch of soil science dedicated to the application of mathematical and statistical methods for the study of the distribution and genesis of soils. Abstract submissions are now open for conference topics ranging from 'big data, data mining and machine learning for soil science' to 'proximal soil sensing'. The organisers are also calling for submission of proposals for pre-conference workshops. Pedometrics 2017 is organised by the Pedometrics Commission of the International Union of Soil Science and its Working Groups: Stay up to date at http:// www.pedometrics2017.org/ or contact info@pedometrics2017 with specific questions, suggestions or requests.

27-31 August 2017
Soil Science in a Changing World
Wageningen, The Netherlands
http://www.wur.nl/en/Research-Results/Projects-and-programmes/Wageningen-Soil-Conference-2017.htm

Early announcement

WaiBoP Soils Biennial Conference 2017

Tuesday 5 December 2017, University of Waikato, Hamilton

We plan to hold the 4th biennial regional soils conference at the University of Waikato, Hamilton, on World Soils Day (5 Dec). More information will be available later in the year. The meeting is likely to feature members and students mainly from the Waikato-Bay of Plenty regions but we welcome as always soil scientists and associated supporters from elsewhere as contributors or participants to an informative and friendly day. The only criterion for entry is that all participants must be signed-up members (or student members) of NZSSS.

To get you in the mood, check out this photo from way back in 2013!

David Lowe, Louis Schipper, and Megan Balks (convenors)

School of Science, University of Waikato, Hamilton

3 – 7 September 2017

http://www.som2017.org/index.php?id=14387&L=1&type=300

6th International Symposium on Soil Organic Matter

3–7 September 2017 • Harpenden/UK

NZSSS award recipients

President's Invitation Lecture
1972 W A Pullar
1973 T W Walker
1974 A J Metson
1975 H S Gibbs

Norman Taylor Memorial Award
1976 I L Baumgart
1977 G D Smith
1978 J D McCraw
1979 G G Cossens
1980 A C S Wright
1981 C During
1982 C G Vucetich
1983 N Wells
1984 G M Will
1985 J K Syers
1986 L C Blakemore
1987 W M H Saunders
1988 K R Tate
1989 P J Tonkin
1990 E J B Cutler
1991 C Childs
1992 D R Scotter
1993 No award
1994 A Sinclair
1995 B Clothier
1996 A Hewitt
1997 K M Goh
1998 A Mackay
1999 J Watt
2000 V Neall
2001 S Saggar
2002 D J Lowe
2003 P Singleton
2004 G Sparling
2005 R McLaren
2006 G Yeates
2007 A Carran
2008 M. Balks
2009 P Fraser
2010 C de Klein
2011 T Webb
2012 M McLeod
2013 M Hedley
2014 S Ledgard
2015 R McDowall
2016 L Schipper

NZSSS Postgraduate Awards
1971 D W Ives
1972 I Nairn
1973 -none-
1974 V E Neall
1975 -none-

Morice Fieldes Memorial Award for PhD Thesis
1976 J C Ryden
1977 -none-
1978 A N Sharpley
1979 K W Steele
1980 -none-
1981 A G Hogg
1982 A W Limmer
1983 A B Cooper
1984 A D Mackay
1985 R A Petch & P J Tonkin
1986 I R Phillips
1987 D J Horne
1988 J S Rowarth
1989 A W Young
1990 P B Greenwood
1991 C D A McLay
1992 A W Rate
1993 L A Schipper
1994 D Tambunan
1995 No award
1996 R Lieffering
1997 H Wang
1998 P Almond
1999 B Robinson
2000 T J van der Weerden
2001 B Miller
2002 G Barkle
2003 C Rooney
2004 J Menneer
2005 H Jones / F Moreno
2006 D Houlbrooke
2007 S Gaw
2008 M Hughes
2009 M Bloomberg
2010 S Carrick
2011 N Schon
2012 A Eger
2013 N Balaine
2014 P Mudge
2015 B Welten
2016 D Huang

Sir Theodore Rigg Award for Masterate Thesis
1976 K D Earl
1977 T H Webb & N E Logan
1978 -none-
1979 D A McKie
1980 C Hedley (née Hubbard)
1981 D Karageorgis
1982 D J Lowe
1983 L A Benny
1984 K B Marsh
1985 B McLaughlin
1986 -none-
1987 C D A McLay
1988 B E Green
1989 S P Cameron-Lee
1990 P J de Lange
1991 G N A Wigley
1992 R B Doyle
1993 -none-
1994 P L Carey
1995 J Moir
1996 -none-
1997 S Park
1998 S Thiagarajan
1999 H Jones
2000 R Dragten
2001 B Robinson
2002 S Tutua
2003 D J Palmer
2004 M W Hughes
2005 R Standish
2006 D Dewar
2007 E Hoftsee
2008 N Watkins
2009 DA Lloyd
2010 P Mudge
2011 DF Wallace
2012 E Harris
2013 A Barnett
2014 A Robinson
2015 T Norris
2016 N Laubscher

Bert Quin Award 2014 Was Summit Quinphos Bursary (renamed Altum Award 2012)
1993 J Luo
1994 W J Morrell
1995 I Vogeler
1996 C W Gray
1997 B Robinson & B Miller
1998 A Mitchell
1999 A Khan
2000 Chengrong Chen
2001 Suman Mishra
2002 S Gaw
2003 D Houlbrooke & R Bhandral
2004 D Palmer
2005 J Singh
2006 S Khan
2007 B Kusomo
2008 S Carrick
2009 P Jeyakumar
2010 G Lucci
2011 N Wells
2012 R Dodd
2013 No award
2014 S McNally
2016 J Pronger

The L C Blakemore Award
(Biennial award)
1992 N P Smith
1994 H Kettles
1996 No award
1998 L Currie
2000 B Daly
2002 P Theobald
2004 T Hendry
2006 B Toes
2008 C. Smith
2010 M Sprosen
2012 C Tregurtha
2014 M Premaratne
2016 J Jiao

The M L Leamy Award
(Biennial award)
1992 B E Clothier
1994 A Hewitt
1996 No award
1998 S Cronin
2000 H J Di
2002 K R Tate

2004 N S Bolan
2006 S Saggar
2008 R. McDowell
2010 Not awarded
2012 D Curtin
2014 L Schipper
2016 D Selbie, L Buckthought, M Shepherd (jointly)

The T W Walker Prizes

1992 (oral paper) —S T Olykan
(poster)—G N Magesan
1994 (oral paper)—J Luo
1995 J Zanders & S Park
1998 (oral paper)—J Menneer
(poster)—C P Rooney
2000 (oral & poster papers) —L Barton
2002 (oral paper)–D Houlbrooke
(poster)—K Wilkins
2004 (oral paper)─J Singh
(poster)–D Dewar
2006 (oral paper)-R Parkinson
(poster)–F Scherr
2008 (oral paper) – P. Mudge
(poster) – G M Lucci
2010 Not awarded
2012 Not awarded
2014 (oral paper) O Jordan
(poster) J Owens
2016 (oral paper) – R Woods
(poster) – A Carlton

Undergraduate Prizes

1994 R McDowell
(Lincoln University)
R Hodgson
(Massey University)
M Boyes
(Waikato University)
1995 W R Cookson
(Lincoln University)
A Reyland
(Massey University)
J C Menneer
(Waikato University)
1996 R Dragten
(Waikato University)
1997 J McCaw
(Lincoln University)
C Eastwood
(Massey University)
V Gough
(Waikato University)
1998 L Garrett
(Waikato University)
N Treloar
(Massey University)
C Rissman
(Lincoln University)
1999 A Manderson
(Massey University)
K McLauchlan
(Waikato University)
S Petrie
(Lincoln University)
2000 S Pitcher-Campbell
(Massey University)
N Dunn
(Waikato University)
C Ducey
(Lincoln University)
2001 C Davies-Colley
(Waikato University)
M Buchan
(Lincoln University)
P Nelson
(Massey University)
2002 A Souness
(Lincoln University)
T A O'Neill
(Massey University)
D Worthy
(Waikato University)
2003 S O'Driscoll
(Waikato University)
F Shanhun
(Lincoln University)
2004 M Clancey
(Waikato University
J Bertram
(Lincoln University)
2005 Vanessa Coombe
(Waikato University)
Samuel Dennis
(Lincoln University)
2006 Laura Buckthought / Georgina Mackie
(Lincoln University)
Louise Fisk / Paul Mudge
(Waikato University)
2007 Paul Bowater
(Lincoln University)
Hamish Mulcock
(Massey University)
Georg Kruger
(Waikato University)
2008 Glen Treweek
(Waikato University)
Emma Anne Phillips
(Massey University)
Nicola Jane Kelland
(Lincoln University)
2009 Rebecca Bylsma
(Waikato University)
Helen Free
(Massey University)
Sean Gresham
(Lincoln University)
2010 Josh Scarrow & Jack Pronger
(Waikato University)
Louise Anne McCormack
(Massey University)
Aimee Elizabeth Robinson (Lincoln University)
2011 AM Carter
(Waikato University)
Joel Perry
(Massey University)
Roshean R Fitzgerald
(Lincoln University)
2012 L Creswell (Waikato University)
J Howes (Massey)
A Whitley (Lincoln)
2013 H Bredin-Grey (Waikato)
Massey – N Hyslop
N Mesman – (Lincoln)
2014 D Le Lievre – (Waikato)
J Winters – (Massey)
S Rayner – (Lincoln)
2015 T Leabourn (Massey)
B Robertson (Lincoln)
F Garrity (Waikato)
2016 M O'Grady (Waikato)
H Jensen (Lincoln)
SA Whiteman (Massey)

Fellows of the NZ Society of Soil Science

L C Blakemore
M R Balks
N Bolan
K C Cameron
I B Campbell
C W Childs
J Churchman
B E Clothier
I S Cornforth
H J Di
K M Goh
P Gregg
R J Haynes
S F Ledgard
D J Lowe
J D McCraw
A Mackay
L Schipper
L Condron
D Ross
T Clough
R McDowell
R G McLaren
R Naidu
V E Neall
R L Parfitt
J A Pollock
AHC Roberts
S Saggar
A G Sinclair
G Sparling
T W Speir
J K Syers
K R Tate
B K G Theng
P J Tonkin
T W Walker
J H Watkinson
G W Yeates
A Hewitt
M Beare
M Hedley
C De Klein
R Monaghan

Honorary Fellow

B Miller

Life Members of the N.Z. Society of Soil Science

L C Blakemore
I B Campbell
C W Childs
R J Furkert
R Lee
R B Miller
V Orchard
W M H Saunders
J K Syers
P J Tonkin
T W Walker
J P C Watt
J Adams
R McLaren
P. Gregg
A Mackay
P Fraser

Grange Medal

K Tate
B Clothier
G Rys