Royal Society of New Zealand

Investment Impact Report: Marsden Fund

December 2013

A place for knowledge and excellence
Science • Technology • Humanities

the ROYAL SOCIETY of NEW ZEALAND
TE APĀRANGI

Summary

The Marsden Fund invests in investigator-initiated research aimed at generating new knowledge, with long-term benefit to New Zealand. It supports excellent research projects that advance and expand the knowledge base and contributes to the development of people with advanced skills in New Zealand. These research projects are not selected subject to government's socio-economic priorities.

The Marsden Fund encourages New Zealand's leading researchers to explore new ideas that may not be funded through other funding streams and fosters creativity and innovation within the research, science and technology system.

The primary objectives of the Marsden Fund are to:

- Enhance the quality of research in New Zealand by creating increased opportunity to undertake excellent investigator-initiated research; and
- Support the advancement of knowledge in New Zealand, and contribute to the global knowledge base.

A secondary objective of the Marsden Fund is to contribute to the development of advanced skills in New Zealand including support for continuing training of post-doctoral level researchers and support for the establishment of early careers of new and emerging researchers.

International Collaborations

The proportion of Marsden contracts that begin in collaborations has grown from 23% of the grants in 1995 to 64% in 2012. Most of the collaboration growth has been with international partners; however, the international financial crisis appears to have had a slowing effect on the growth of international collaborations. International collaboration growth is further enhanced as a Marsden project progresses through its lifespan. For the 143 final reports received in 2011- 2012, 50% included overseas researchers at their inception, but by the end of the contract the proportion which reported international collaborations had increased to over 77%. Appendix 2.1.5 Enhancing Global Connectedness has further statistics on international collaborations.

Building Human Capacity

The Marsden Fund has supported a total of 1437 principal and associate investigators over the past six years (2008 – 2013). Over a third of Marsden Investigators are from international institutes located around the world. The Marsden Fund continues to invest heavily in New Zealand's emerging researchers through Fast-Start contracts, which totalled 199 over the same timeframe.

The Marsden Fund's contracts are associated with a large proportion of the postdoctoral researchers funded through Vote S&I. For the 477 contracts awarded between 2008 and 2012, funding has been available for postdoctoral researchers in 160, i.e., roughly a third of them. In the three most recent years for which contracts have been awarded, the Fund provided support for a total of 499.7 FTEs in post-graduate positions.

Although the Fund gives strong support to those at the very early stages of their research careers, recent years have seen shifts in the type of individual being contracted in supporting roles for research. Since the Fund's inception, the level of Post-doctoral and Research Assistant involvement has declined, both as a relative proportion of the FTE supported by the Fund, and to a lesser degree in absolute terms. Post-doctoral support continues to decline with 2012 showing the lowest level of Post-doctoral involvement as a share of contracted FTE. This decline is mirrored by the highest recorded proportion of contracted FTEs going to post-graduate students, as well as historically high Investigator reliance on the Fund. Appendix 2 has further statistics on building human capacity.

Outcomes

Over the past two years, there have been a number of excellent research projects and outcomes. The Marsden Fund has received, evaluated and signed-off on 155 contracts during this period of time. Appendix 3 gives a small sample of the research projects that have been funded, which are creating very exciting and innovative outcomes for New Zealand.

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This report relates to all contracts between MBIE and the Royal Society of New Zealand, which specify a requirement for Investment Impact Reporting and on a schedule agreed between the Ministry and the Society. This IIR is limited to the Marsden Fund impacts, and other contracts are not commented on at this time.

Signed on the 30th June 2014

Phillippa Gardiner, Acting Chief Executive

Under Authority delegated by the Royal Society of New Zealand

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Investment Impact Report 2013: Marsden Fund

Being the 2013 Investment Impact Report of the Royal Society of New Zealand. This biennial report series covers the activity of nominated Society-administered programmes over the preceding two years. For the current report, the period spans 2012–2013 of the Marsden Fund.

Background

The Marsden Fund was established by the Government in 1994 to fund excellent fundamental research. It is a contestable fund administered by the Royal Society of New Zealand. The Marsden Fund Council exists to oversee the Marsden Fund on behalf of the Minister of Science and Innovation.

Marsden Fund research benefits society as a whole by contributing to the development of researchers with new knowledge, skills and ideas. The research is not subject to government's socio-economic priorities, but is investigator initiated. The Fund supports research excellence in science, engineering and maths, social sciences and the humanities. Competition for grants is intense. Receipt of Marsden funding is regarded as the hallmark of excellence for research in New Zealand.

Governance

The Fund is operated under the Terms of Reference issued by the Minister of Science and Innovation, updated in 2012. A Marsden Fund Council of up to 11 eminent researchers, currently chaired by Professor Juliet Gerrard, is appointed by the Minister of Science and Innovation to make recommendations for funding. In accordance with the Terms, selection criteria focus on: the research merit of the proposal; the potential of the researchers to contribute to the advancement of knowledge; and the enhancement of research skills in New Zealand, especially those of emerging researchers. Ten panels have been established across the range of disciplines to help the Marsden Fund Council assess proposals.

Scope and Scale of the Report

The Impact Investment Report will report on activities related to the Marsden Fund from 1 July 2011 to 30 June 2013, covering the past two Fiscal Years.

The Marsden Fund operates as a separate Output Class under the Ministry of Business, Innovation and Employment, non-departmental output classes. In FY 11/12 and 12/13, the Marsden Fund output class had investment budgets of $46,755,000 per annum (GST exclusive). During this time, approximately 400 research contracts were operational, covering the sciences, mathematics, engineering, social sciences and humanities. There were 88 contracts funded in FY11/12 at a cost of $46,780,000 and 87 contracts funded in FY12/13 at a cost of $47,478,000.

The overspending during the previous two years has reduced the Marsden Fund bank account from its peak of $9,921,000 in July 2011 to $3,645,000 by June 2013.

The success rates for Standard and Fast-Start proposals has fluctuated around the 8% level over the last two years as shown in Table 1 and Figure 1 below.

	Standard			Fast-Start		
Year	**Proposals**	**Contracts**	**Percentage**	**Proposals**	**Contracts**	**Percentage**
2001	705	62	8.8%	177	20	11.3%
2002	667	68	10.2%	129	18	14.0%
2003	612	77	12.6%	129	28	21.7%
2004	744	46	6.2%	228	25	11.0%
2005	701	55	7.8%	198	24	12.1%
2006	722	52	7.2%	210	25	11.9%
2007	693	65	9.4%	217	28	12.9%
2008	593	66	11.1%	224	25	11.2%
2009	675	73	10.8%	259	36	13.9%
2010	795	68	8.6%	294	34	11.6%
2011	783	57	7.3%	296	32	10.8%
2012	811	54	6.7%	302	32	10.6%

Table 1. Success rates for Standard and Fast-Start proposals

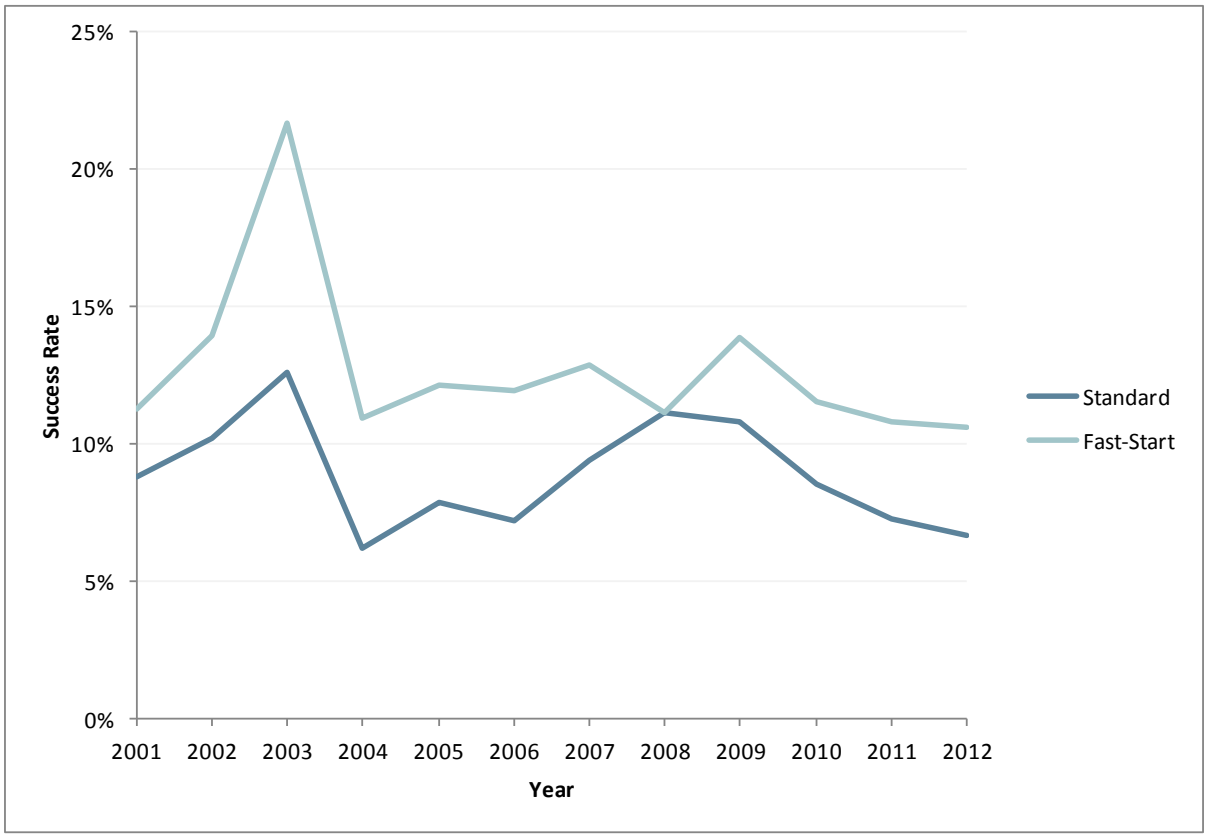


Figure 1. Success rate for Standard and Fast-Start proposals to the Fund, 2001–2012

More detail on the historical growth of the Fund and the support given to discipline areas in past years is given in Appendix 1 – Scope and Scale'.

Research Productivity and Quality

A government initiative, 'Reducing Transaction Costs', was introduced in 2010 with the intention of lowering the transaction costs associated with applying, reviewing and reporting on grants for research within the Science and Innovation sector. Within the different cost saving initiatives was one to lessen the burden on researchers by reducing the number of reports required for each Marsden funded project from three to two. This change has had the effect of decreasing the number of reports the Fund receives, and thus the amount of outputs reported on and measured. This information is detailed in Appendix 2.2 Building New Zealand's Knowledge Base'.

The contracts under the Marsden Fund continue to publish in the top 2% of journals (as ranked by the SJR SCImago system). The figure below shows the number of articles in top journals over the years. It does show a slight reduction from the previous two year period as expected from the reduced reporting. The high standard of outputs over the past two years has been maintained, however the quantity has reduced. The level of Peer Reviewed Publications (PRP) has decreased per dollar spent from approximately 18 PRP/ $million in 2006 to 10 PRP/$million in 2012. However, the overall standard and quantity still remain extremely high at the international and national level (highest of any fund within the Vote: S & I for New Zealand).

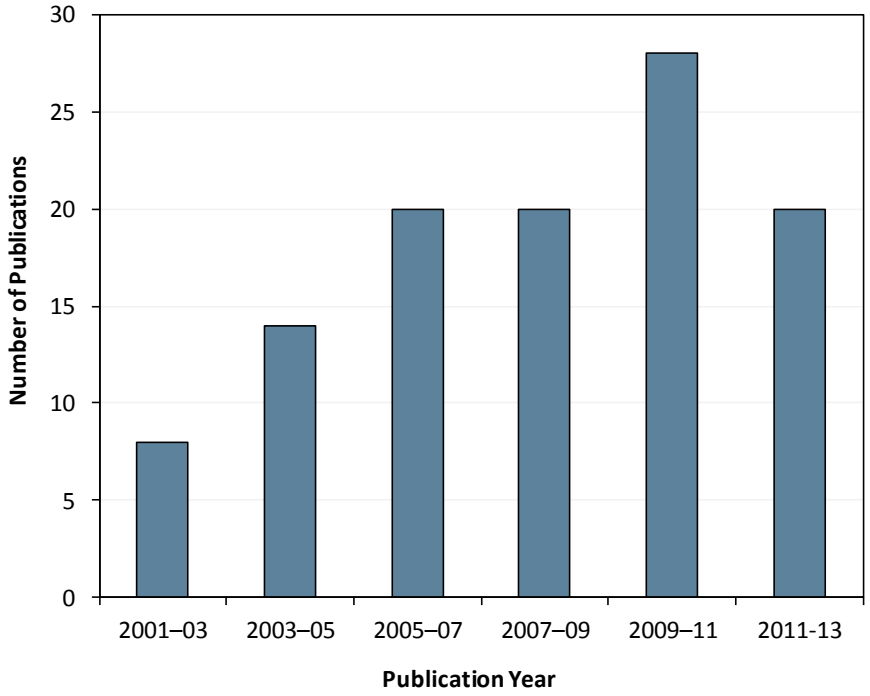


Figure 2. Number of articles in top journals supported by the Marsden Fund.

Building Human Capacity

The Marsden Fund continues to strongly support New Zealand's emerging researchers, through both the Fast-Start scheme and Postdoctoral researchers funded within Standard grants. The Fast-Start scheme was started in 2000 as a minimally funded two-year scheme ($50k per year for two years). The Fast-Start scheme is now a three-year scheme ($100k per year for three years). The extension to the three-year timeframe for Fast-Start contracts has made a large impact on attracting PhD students for the emerging researchers. This along with the incentives from the Tertiary Education Commission for PhD student support have dramatically increased the number of postgraduate students supported by Marsden funded grants. Figure 3 shows the proportion of total FTE contracted in each round since 1996. The increase in postgraduate students is offset somewhat by the decrease in Postdoctoral researchers during the same timeframe. For more information on new and emerging research please refer to Appendix 2.1.2 New and Emerging Researchers'.

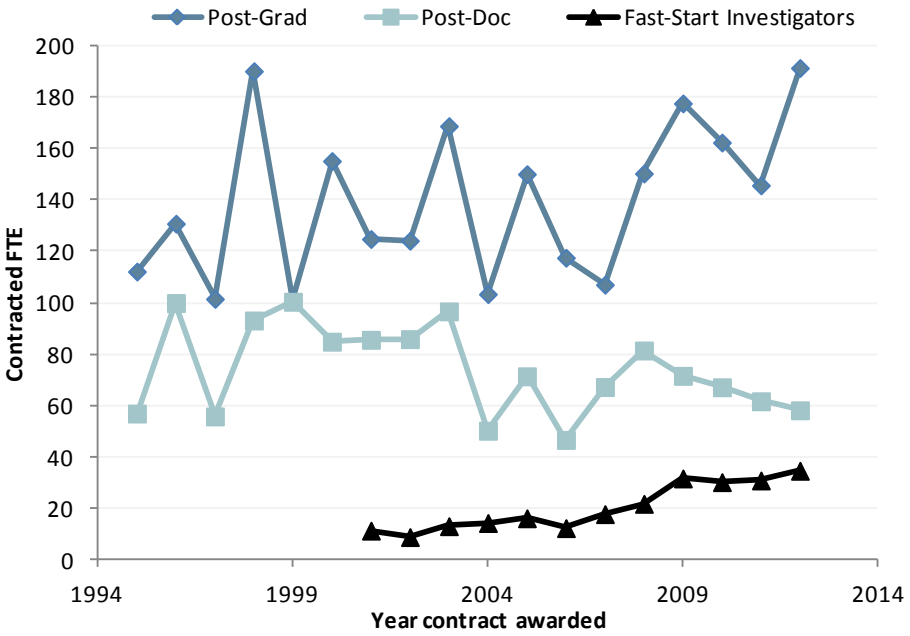


Figure 3. FTE contracted by Marsden grants going to different emerging and early career roles

People Supported by Marsden

Many researchers supported by the Marsden Fund are recipients of prizes, appointments, and awards. In the past two years a long list has been created, including the Prime Minister's MacDiarmid Emerging Scientist Prize; Rutherford Medal; NZ Order of Merit; amongst other distinctions (see Appendix 3.2 Notable publications and awards for 2011–12').

The Marsden Fund supports a larger number of emerging researchers than would be expected under New Zealand's distribution of researchers. This is in part due to the Fast-Start scheme, but is also shown to be true within the Standard scheme. The contracts over the past five years have shown this consistent trend of younger PIs. In fact, for the past five years 39% of PIs and 26% of AIs have been within the first 10 years of their PhDs (see Figure A4).

The percentage of PIs who are women has stayed above the 30% level for the past three years and peaked at 35%. The number of women PIs and AIs is consistent with the number of women applicants, showing no obvious bias in funding (in either direction). Appendix 2.1.3 Women Researchers' has further statistical information.

Collaborations and International Research

The proportion of Marsden contracts that involve institutional collaborations has steadily increased over the years. In 1995, 77% of projects involved investigators who were from a single institution, but only 36 % are not directly collaborating (see Appendix 2.1.5 Enhancing Global Connectedness'). At least three quarters of the contracts reporting collaborations involve international investigators while in recent years only a third to a half possessed national partners.

Examples of researchers using equipment and resources unavailable in New Zealand include research done as part of the International Ocean Discovery Program (IODP) under Professor Tim Naish's Marsden project. Along with the use of a highly technical ship for drilling sediment core, there have been numerous collaborations started with international researchers as part of the project. Other examples of international collaboration and funding are Dr SE Halcrow's presence as an invited bioarchaeologist on the Australian Research Council Grant (2011-2011) project "History in their bones project: A diachronic, bioarchaeological study of diet, mobility and social organisation from Cambodian skeletal assemblages", and a Partner Investigator on an Australian Council Research Grant (2011-2013) "From Paddy to Pura: the origins of Angkor project". A broader list of benefits is given in Appendix 3.3 Benefits to New Zealand Research from Marsden-Funded International Collaboration'.

Evidence from ten years of research contract management

The Prime Minister's Chief Science Advisor created a document called, “Which science to fund: time to review peer review?” in November 2012. The Royal Society of New Zealand wrote a document to contribute to the wider debate about the evolution of the research system entitled, “Evidence from ten years of research contract management”. The document presented a summary of evidence from our last ten years of experience in research funding and can be found on our website here: <http://www.royalsociety.org.nz/media/Evidence-from-ten-years-of-research-contract-management.pdf>.

Applications to the Marsden Fund have a low success rate, down to 7.7% in 2012. Due to the prestigious nature of the fund and the lack of other funding sources for much of the possible research, this discouragingly low rate does not reduce the numbers of applications received which continue to grow each year. The fund uses a two-stage process to reduce effort for all involved. In the first round, preliminary one-page proposals are assessed by panels of New Zealand and Australian based peers. In the second round, five-page proposals are scored by three independent reviewers and then recommended by the panels on the basis of those scores and panel discussions.

The awards are described as being for excellent research rather than for the best research, recognising the role of uncertainty in the research assessment process. The low success rate requires the assessment process to try to identify the top 7.7% of the proposals. Of the applications that we receive, around 15% of those that reach the second stage are described by reviewers as excellent, implying that the fund is a lottery with even odds – an excellent application has a 50% chance of being funded despite that application being assessed to be as good as other applications that are funded.

The Royal Society of New Zealand’s best estimate of total dollar cost of Marsden application process, including the cost to applicants and reviewers is $10-$20 million for a fund size of $54.6 million. This cost breaks down into over 80% to the applicants in writing proposals, 10% to the reviewers and panellists, and less than 10% to the Society in running the fund.

We have looked over the two thousand referee reports from 2008-2010, (Note-95% of reviewers are overseas). There is no significant difference in scores received from Oceanic reviewers when set against those from Asia, the Americas, or Europe. However, investigator-nominated reviewers were found to give more positive scores than independently sought reviewers. They are now no longer used and all reviewers are independently sought.

It is shown in Appendix 2.3 Research Quality' that projects receiving funding are typically judged by their international referees as excellent/ outstanding. Unfortunately, there are also a number of proposals judged in this category which are not selected because of lack of funding.

Based on the Royal Society of New Zealand’s experience of administering a wide range of funds over the past decade and more, it is clear that peer review can be efficient and effective in a small country. It remains the best tool for striking a balance between, for instance, excellence and relevance in research.

We recommended that:

- Peer review processes should be matched to the particular features of funding schemes. There is no singular and perfect model for how peer review fits into funding decisions. The two stage process used by the Marsden Fund is the best fit.
- Peer review processes should be evaluated to understand their impact and adapted to deliver the best possible outcomes. Biases of gender, reward, and nepotism must be monitored and resisted.
- Low success rates discourage risky proposals. Specific tools should be used to support the riskiest research. This is an area of work that the Marsden Fund Council is looking into.
- In the overall context of a wider research funding system, a balance must be struck between building people and supporting ideas. For funding schemes that aim to develop science leaders, the potential of researchers should be based on measures of outputs and opportunity, not measures of inputs.
- Peer review creates value beyond direct funding decisions. If it is carried out credibly, the information created has wide value as external validation, as feedback to researchers and their employers, and as a source of prestige. The role of this alternative value should not be discounted.

Conclusion

Effectiveness of the Marsden Fund

The Marsden Fund's process continues to be very effective given both the number of proposals received, and the level of funding available for the management of the Fund. Close attention is paid to the peer-review process used to assess proposals, and to the overall management of the contracts through reporting and assessment of the research.

The outputs from the research are at a continued high level. The concern over the drop-off of publications from projects could simply be an artefact of the reporting requirement reduction as outlined in this document. A decision to either increase the reporting to three annual reports for the contracts or to move the first report to the second year of contracting and replace the first annual report with a site visit will be made by the Marsden Fund Council after the current round. However, a return to annual reporting would be associated with increased assessment costs.

A continued increase in the number of proposals

The number of proposals received in the preliminary round of the Marsden Fund process has been steadily increasing over the years. In 2009 we received 934 proposals; in 2010, 1089 proposals; in 2011, 1079 proposals; in 2012, 1113 proposals and in 2013, 1155 proposals. This steady increase is in danger of putting unreasonable pressure on the panellists in the first round of the Marsden Fund process. The large number of proposals also means that less time is spent on each proposal during assessment and discussion, and because there are still roughly the same number of proposals passing into the full round, more of the processes weight has been given to the preliminary round than might be desired.

The pressure on panellists in assessing 115 proposals compared with 93 proposals in 2009 has begun to show in a decline in the acceptance and retention rates of panellists. In 2009 the Marsden Fund administration would normally need to replace approximately 35 panellists each year. The number of new panellists needed has risen to 45 for the 2014 round.

Currently the Marsden Fund Council is willing to continue with the status quo and continue to have all panellists read all the proposals for each panel, however there may be a need in the future to look at alternative ways of dealing with this ever increasing number of proposals.

Possible remedies include:

- Limiting the number of proposals allowed from each institute. This could be determined by past success rates and altered accordingly depending on the institute success rate each year, but would significantly change the open nature of the Fund.
- Reducing the areas of research funded each year. This could be as simple as only offering five disciplinary panels of research each year and alternating panels, with the expectation that each panel would be approximately twice as large as contemporary.
- Pre-assigning proposals to panellists and therefore having each panellist only read half of the proposals for their panel. This would make dealing with conflicts of interest difficult, requiring an increase in panellists per panel.
- Increasing the number of panellists by removing the honorarium and/or the preliminary panel meeting. This would mean the first round was completely determined by initial scorings from the panellists with no meeting.

Appendices

Appendix 1 – Scope and Scale

The Fund has increased in size, almost, steadily since its inception 19 years ago and currently stands at $49.255 million ($56.6M including GST) following its increase by $2.5 million in the 2013/14 budget.

Each year, approximately one third of the Fund's budget becomes available for new projects. In 2012/13 and 2013/14, funding totalling $48.44 and $58.97 million respectively were awarded to contracts to run over the following three years. Figure A1 shows the trends in both Government funding and the Fund's disbursement.

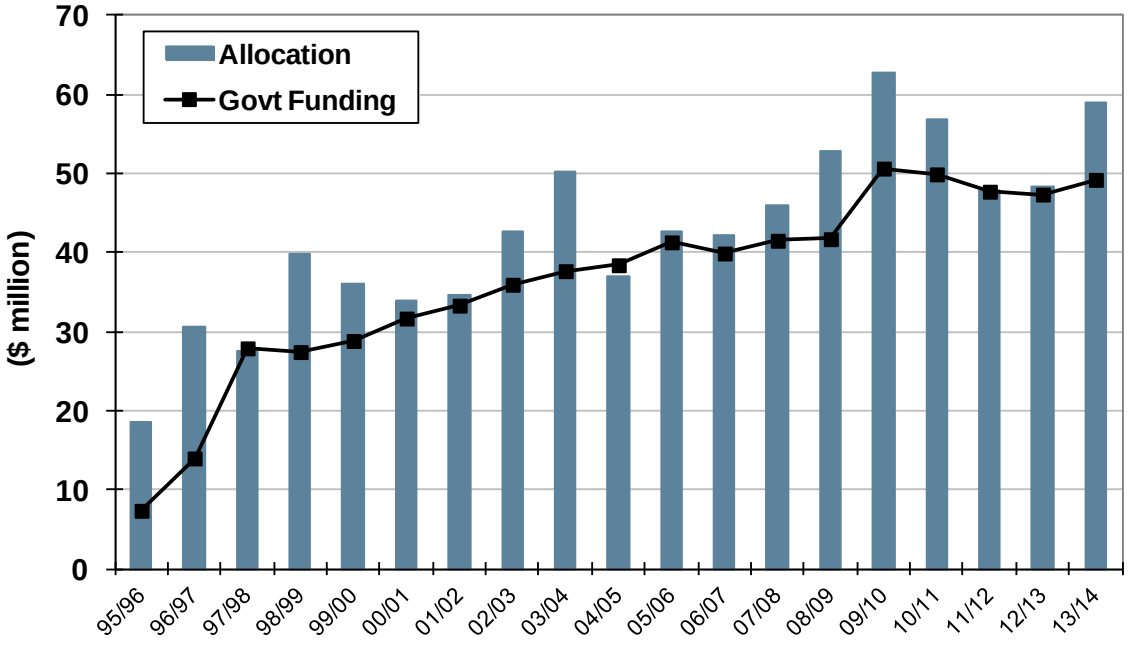


Figure A1. Funds allocated to new Marsden Fund projects (in Millions of 2013 dollars, GST-exclusive)

The distribution of the Fund by research area over 2002 to 2013, is shown in Table A1 and Figure A2. Note that the proportion of the Fund allocated to each area of research is not predetermined, but is a consequence of the numbers of proposals received within each discipline in the current round and the immediate past.

	Round									
Panel†	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
CMP	15.9	15.2	14.0	13.0	14.0	14.1	10.7	9.8	9.4	10.2
BMS	15.8	14.6	12.7	13.0	14.2	15.0	11.5	10.5	10.2	9.8
EEB	16.2	16.1	16.5	17.3	15.9	14.4	14.9	13.5	13.3	13.7
ESA	11.6	11.9	11.0	10.9	10.9	10.8	12.3	11.0	10.4	11.7
PSE/PCB	14.2	13.6	14.4	14.3	13.0	14.5	10.8	9.9	9.4	10.4
EIS	0.0	0.0	0.0	0.0	0.0	0.0	10.4	10.1	8.7	10.1
MIS	7.7	7.2	7.5	7.4	7.6	8.7	5.6	7.6	9.4	7.1
EHB	0.0	0.0	7.1	8.8	7.9	6.3	6.9	7.4	9.1	8.7
SOC	13.7	16.4	10.4	9.6	10.6	10.7	11.1	12.3	12.8	10.7
HUM	4.9	5.0	6.4	5.8	5.9	5.5	5.8	8.0	7.4	7.5

Table A1. Distribution of Marsden support by research discipline over time

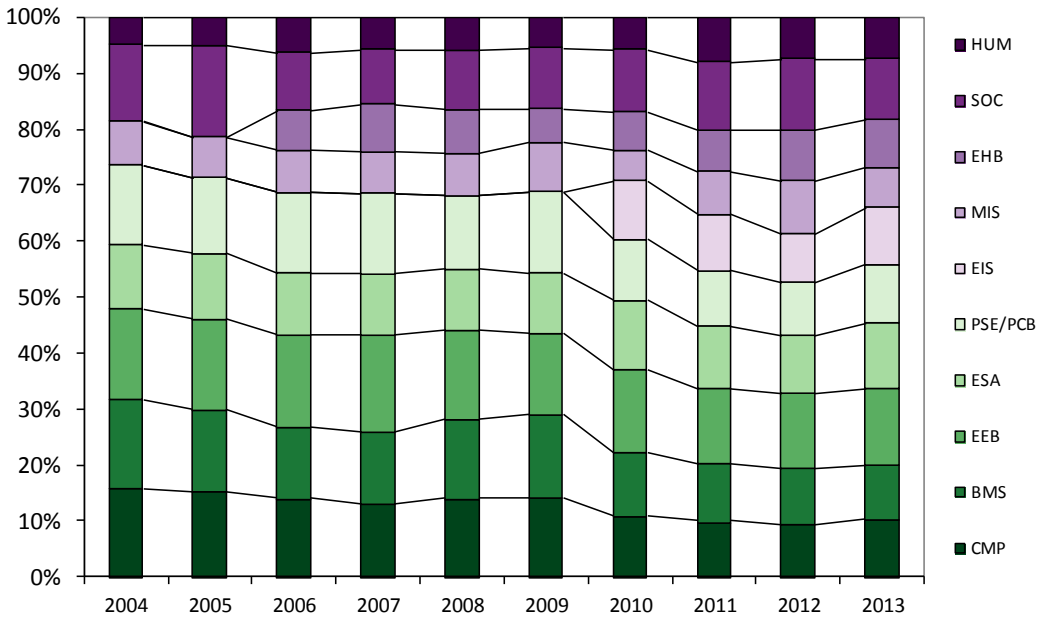


Figure A2. Share of funding by research area† for new contracts and year of award

†The research areas are: CMP - Cellular, Molecular & Physiological Biology; BMS - Biomedical Sciences; EEB - Ecology, Evolution and Behaviour; ESA - Earth Sciences and Astronomy; PSE/PCB – from 2010 Physics, Chemistry and Biochemistry, prior to this Physical Sciences and Engineering; EIS – Engineering and Interdisciplinary Sciences; MIS - Mathematical and Information Sciences; EHB – Economics and Human and Behavioural Sciences; SOC - Social Sciences; and, HUM - Humanities.

For the last two rounds of contracts: 33 % of the funding is to the medical and life sciences; 39 % to the physical sciences, engineering and mathematics; and 28 % to the social sciences and, humanities. The disciplinary spread has been relatively constant since the creation of the EHB panel in 2006, although the creation of the EIS panel has shifted funding to the PSEM subjects from the life sciences.

Appendix 2 – Quantitative Indicators

2.1 Building Human Capacity

2.1.1 Principal and Associate Investigators

The Marsden Fund has supported established researchers by funding contracts that started over 2008 to 2013 involving 685 principal investigators and another 871 associate investigators. The Fund maintains its high international presence with 490 of the 1437 (i.e., 34%) individuals contracted as investigators over 2008-2013 based outside New Zealand.

Investigators	2008	2009	2010	2011	2012	2013	Individuals
Principal	127	143	133	107	104	134	685
Associate	132	183	138	147	120	196	871
All	252	320	270	250	222	324	1437

Table A2. Number of investigators associated with Marsden projects contracted in the year

2.1.2 New and Emerging Researchers

The Marsden Fund continues to invest heavily in New Zealand's emerging researchers.

Over 2008 to 2013, 199 Fast-Start contracts were awarded to researchers who have had no more than 7 years of research experience since completing their Ph.D (25 were awarded in 2008, 36 in 2009, 34 in 2010, 32 in both 2011 and 2012, and 40 in 2013).

The Marsden Fund's contracts are associated with a large number of the postdoctoral researchers funded through Vote S&I. For the 477 contracts awarded between 2008 and 2012, funding has been available for postdocs in 160, i.e., roughly a third of them. Of note, while this represents a total contracted FTE of 354, this represents an overall decline in the level of post-doctoral support directly attributable to the Fund (cf 48 % for all contracts let between 1996 and 2000, or some 435 FTE).

For the contracts awarded between 2008 and 2012, 318 requested funding for post graduate students, i.e., 66 % of contracts cf. 52 % of contracts let between 1996 and 2000. In the three most recent years for which contracts have been awarded, the Fund provided support for a total of 499.7 FTE in postgraduate positions.

Although the Fund gives strong support to those at the very early stages of their research careers, recent years have seen shifts in the type of individual being contracted in supporting roles for Marsden's research. Since the Fund's inception, the level of Post-doctoral and Research Assistant involvement has declined, both as a relative proportion of the FTE supported by the Fund, and to a lesser degree in absolute terms. Post-doctoral support continues to decline with 2012 supporting to lowest level of Post-doctoral involvement as a share of contracted FTE. This decline is mirrored by the highest recorded proportion of contracted FTE going to post-graduate students, as well as historically high Investigator reliance on the Fund (Figure A3).

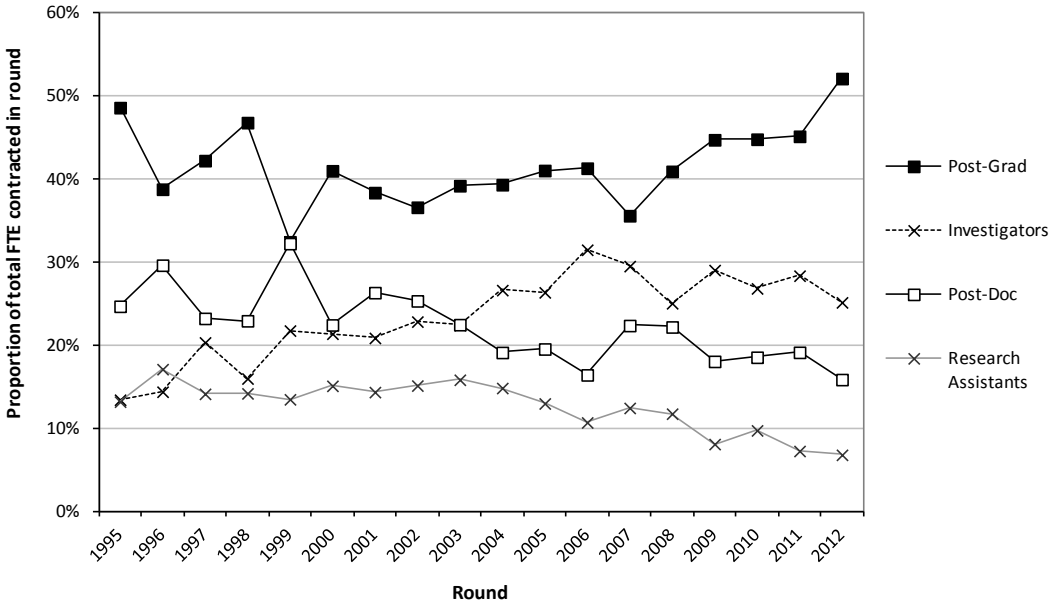


Figure A3. Relative proportions of the FTE contracted by Marsden grants going to different roles

Over 2008 to 2013, 39 % of principal investigators, and 26 % of associate investigators, were within 10 years of completing teir Ph.D (that is, in most cases, are assumed to be under 37 years of age).

Since 93 % of contracts are in the sciences, this distribution for principal investigators has been compared with the distribution of ages of New Zealand scientists, from "Profiles – A Survey of New Zealand Scientists and Technologists"[12]. The participation of emerging researchers is significantly greater than would be expected from demographic considerations alone (Figure A4).

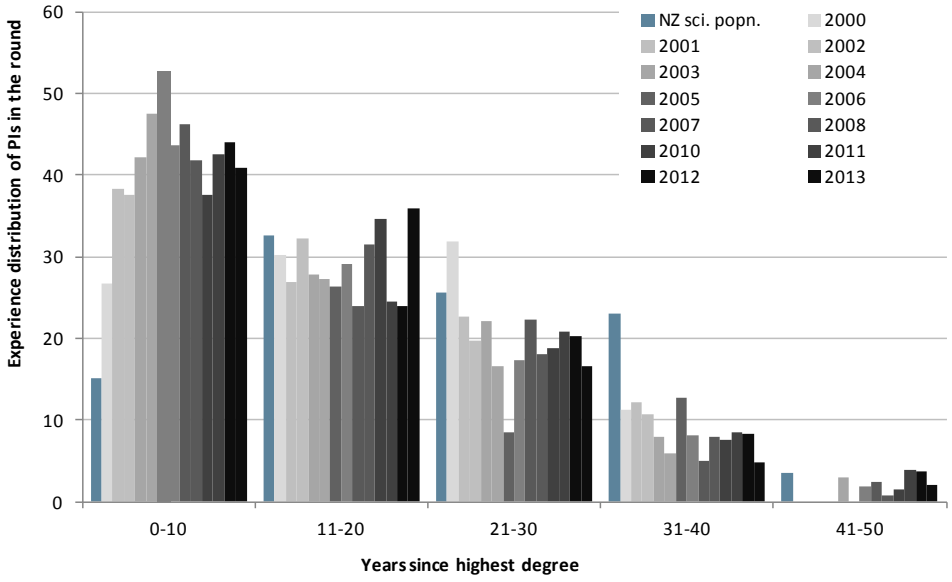


Figure A4. Experience of principal investigators (PIs) on contracts awarded from 2000–2013, as estimated from the number of years since the principal investigator obtained their highest degree

[1] Sommer J (2010) "2008 Survey of New Zealand scientists and technologists"
New Zealand Science Review 67(1):1–40.

[2] Note: the horizontal variables (years since highest degree and age, respectively) have been matched by assuming that the highest degree is obtained at 26 years of age.

2.1.3 Women Researchers

In the 2013 round, 34.6 % of the principal investigators on successful applications are women, making this the second highest year to date[3].

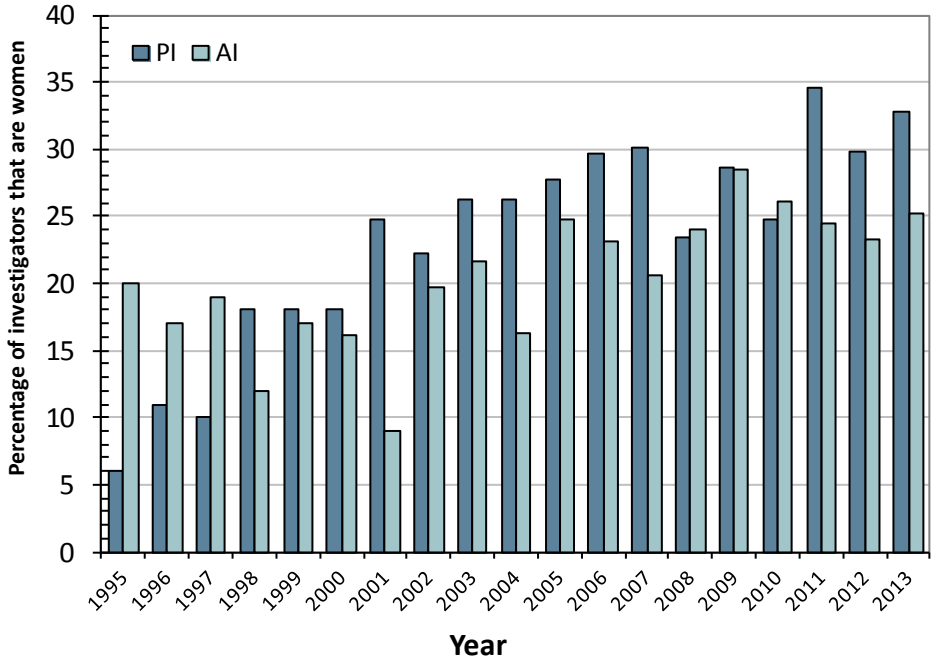


Figure A5. Proportion of principal, (PI) and associate (AI), investigators who are women

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	All
Preliminary	30.1%	31.3%	32.7%	33.8%	34.2%	35.5%	35.7%	34.1%	38.5%	35.8%	37.3%	33.6%
Contracts	33.3%	38.0%	36.7%	37.7%	35.5%	30.8%	32.1%	31.4%	40.4%	32.6%	39.4%	32.4%

Table A3. Proportion of proposals at each stage having a female principal investigator

As can be seen, proposals to the Marsden fund are awarded to female PI's at approximately the rate at which they apply (Table A3, yearly success rate is independent of PI-gender, $\chi 2$ p~0.96).

[3] Of the respondents to the gender question in the "2008 Survey of New Zealand scientists and technologists", 28.8% were women, while data from the 2006 Census suggests that approximately, 24.8% of science professionals were women, ie., the proportion of the ANZSO sub-group "Design, Engineering, Science and Transport Professionals". The corresponding figures for the 1996 survey were 22.8%, and for the 1996 and 2001 Census was 24.0% and 27.5% respectively. Note not all scientists are researchers, nor all researchers scientists.

2.1.4 Māori Researchers

For contracts initiated throughout 2009–2013, Māori researchers were involved with 6.7 % of the projects as an investigator. Over the same period, the percentage of investigators who self-identify as Māori was 3.2 %. Note: In the 2008 survey[4], approximately 2 % of scientists identified as Māori.

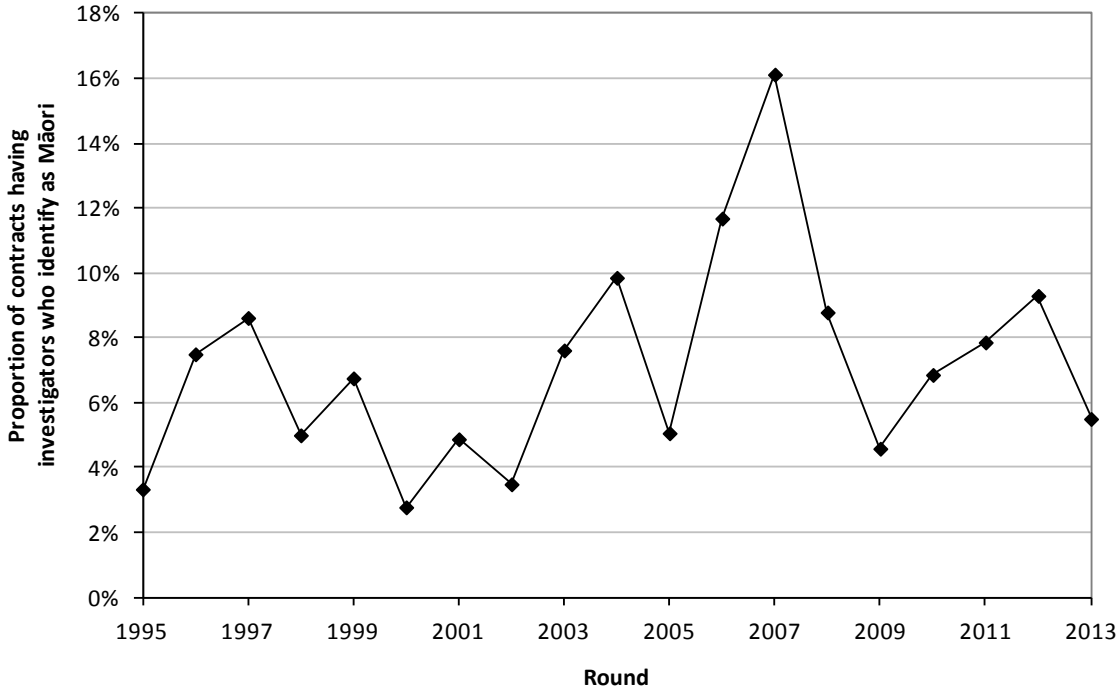


Figure A6. Percentage of contracts with investigators identifying as Māori

[4] Sommer J (2010) "2008 Survey of New Zealand scientists and technologists" New Zealand Science Review 67(1):1–40

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Investigators – Number of separate individuals acting as principal[5] and/or associate[6] investigators on current contracts	923	896	924	942	943	964	1056	1123	1133	1159
Emerging and early career researchers – Percentage of PIs on contracts awarded in the funding round who have received their highest degree within the last 10 years	43%	48%	53%	44%	46%	42%	46%	38%	43%	44%
Postdoctoral fellows[7] – Percentage of Standard contracts in the year's funding round having FTE for postdoctoral fellows	45%	46%	51%	40%	41%	40%	36%	41%	49%	50%
Students[8] – Percentage of contracts in the year's funding round which support postgraduate students	56%	56%	58%	54%	53%	62%	62%	62%	64%	63%
Women – Percentage of PIs on contracts awarded in the funding round that are women	26%	26%	28%	30%	31%	24%	29%	25%	35%	30%
Māori – Percentage of PIs and AIs on contracts awarded in the funding round identifying as Māori	5.6%	4.1%	1.8%	4.6%	6.6%	4.4%	2.8%	3.0%	4.3%	5.0%

Table A4. Participation in Marsden contracts

[5] PIs – Principal Investigators –researchers who lead the research, contribute the main ideas and are responsible, with their institution, for the achievements of the objectives and the management of the contract

[6] AIs – Associate Investigators – researchers who play a lesser role than principal investigators and sometimes are involved with only limited aspects of the work.

[7] Postdoctoral fellows – emerging researchers who have completed a Ph.D., usually within the last few years, and are employed on contract (often 2-3 years). They do much of the day-to-day work on the research programme, and are looking to gain experience to establish themselves as permanently employed researchers.

[8] Postgraduate students – researchers who are working on a Masters or Ph.D. thesis.

2.1.5 Enhancing Global Connectedness

The proportion of Marsden contracts that involve institutional collaborations is now stable at a high level. Projects involving investigators from a single institution comprised 77 % of contracts at the Fund's start at the Society in 1995, but now stands at 36 % in 2012 (see Figure A7). The bulk of contracted collaborations is of an international nature, while national linkages remain comparatively modest; i.e., for projects with contracted collaborations, typically, at least three quarters involve international investigators while in recent years only a third to a half possessed national collaborations.

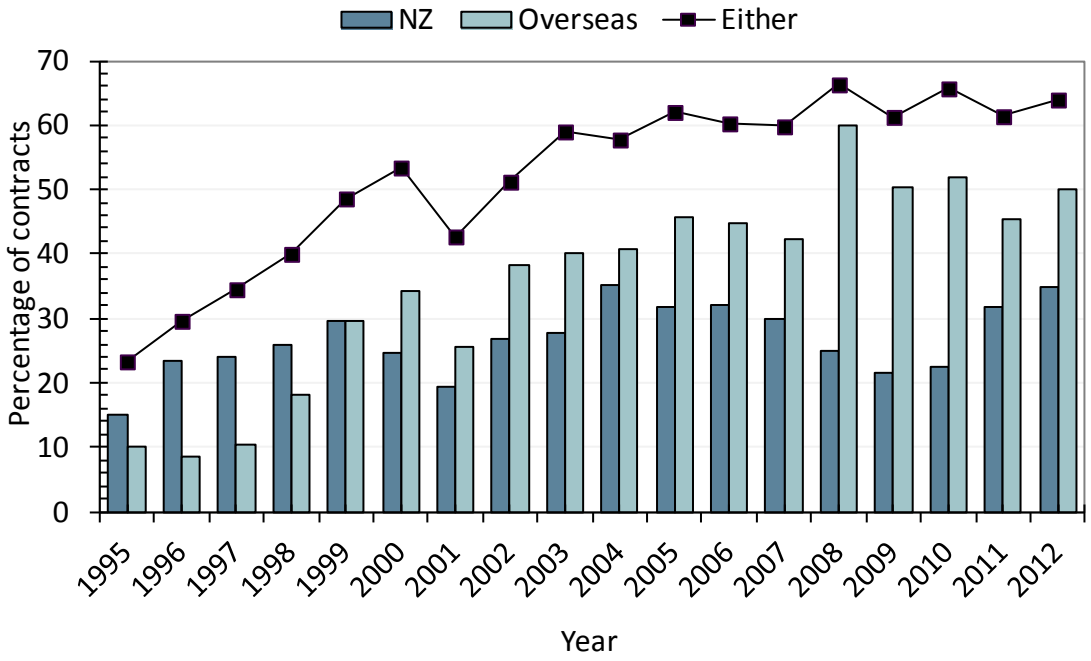


Figure A7. The percentage of projects for which a principal or associate investigator is from outside the contract's host institution, categorised according to whether the collaborations were national, international, and either.

While approximately half of the contracts that were let over 2011 and 2012 involved overseas investigators at their onset, as is typical for Marsden-funded projects, additional collaborations were reported to have been developed throughout the course of the research. For the 143 projects with final reports received in 2011–2012, 50 % included overseas researchers at their inception; but the time they had finished, 77 % had reported, one or more, additional international collaborators.

International collaboration and communication	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Contracts awarded having investigators overseas	44%	43%	58%	51%	52%	46%	52%
Contracts completing in the year with international investigators	48%	40%	50%	52%	50%	52%	50%
Contracts completing in the year reporting additional international collaborations	92%	96%	92%	91%	94%	86%	95%

Table A5. International collaboration and communication on Marsden grants

2.2 Building New Zealand's Knowledge Base

Research Productivity and Dissemination

Year of Publication	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	All Years
Papers	440	441	437	482	478	558	541	567	502	631	506	364	7220
Refereed Conference Proceedings	75	105	76	102	81	96	88	98	103	93	63	54	1210
Book Chapters	53	67	67	75	73	65	67	80	71	83	62	46	925
Books	10	10	16	11	13	11	11	16	14	19	15	11	166
Edited Volumes	10	10	6	13	8	13	8	9	14	8	5	8	119
Reports	15	7	16	9	14	7	8	7	19	18	10	7	204
Patents	3	5	4	4	5	3	3	3	1	2		1	40
Software		3	2	1	3	4	3	2	4	4	1		28
Total	606	648	624	697	675	757	729	782	728	858	662	491	9912

Table A6. Publications, patents and software reported as directly attributable to Marsden grants.
NB: either published or in press, and either wholly or partially attributed to the Marsden Fund. Represents a minimum estimate, as publications from earlier years continue to be reported to the Fund.

Year of Activity	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	All Years
Invited conference talk	109	128	175	214	229	208	235	225	219	322	205	128	2652
Contributed conference talk	410	286	319	291	332	308	446	321	369	408	291	184	4751
Conference poster	88	91	119	142	176	177	141	155	133	187	139	83	2235
Other†	36	45	58	89	102	88	117	91	118	135	94	41	1069
Total	643	550	671	736	839	781	939	792	839	1052	729	436	10707

Table A7. Dissemination of Marsden results through conferences and other channels
†Types of other output include: articles in non-specialist journals, gene sequences deposited in public databases, reagents developed, documentaries, radio interviews, websites, online databases, CDs distributed, and editorials and letters in specialist journals.

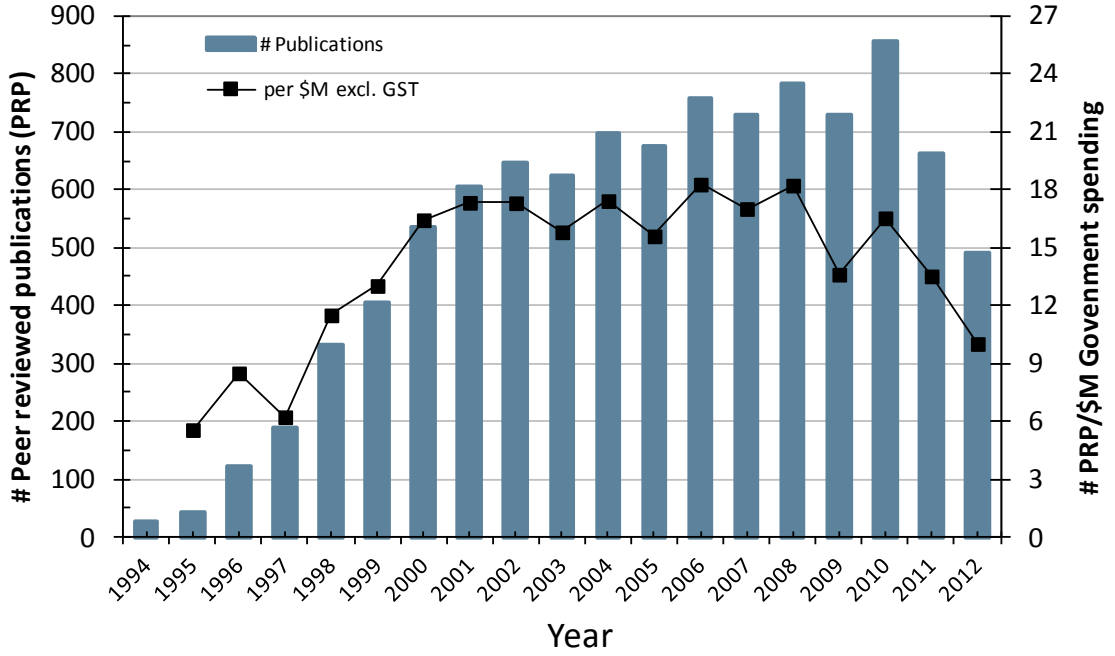


Figure A8. Count of the published output of the Fund (papers, refereed conference proceedings, books and book chapters), and output expressed as the ratio of published output to nominal Govt investment.

Note: what appears to be a decline in the productivity of the Fund's researchers is due to a reduction in reporting frequency introduced in 2010, and imposed as a consequence of the Government's initiative 'Reducing Transaction Costs' by the Society. Instead of annual reporting, the Fund now receives a report in the first and last years of the contract; with first-year reports typically containing fewer outputs and the Fund yet to receive third-year reports from contracts let in, or after, the 2010 round this has the effect of suppressing apparent productivity. Evidence supporting this interpretation is that this decline is visible across all panels, with the exceptions of the new EIS and PCB panels which show no reduction and which have only received first year reports to date, i.e, see Figure A9.

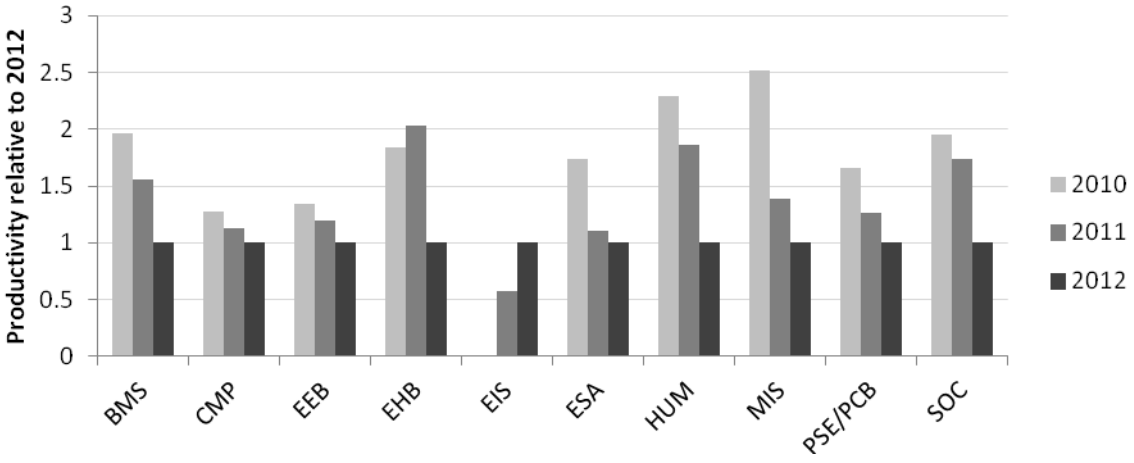
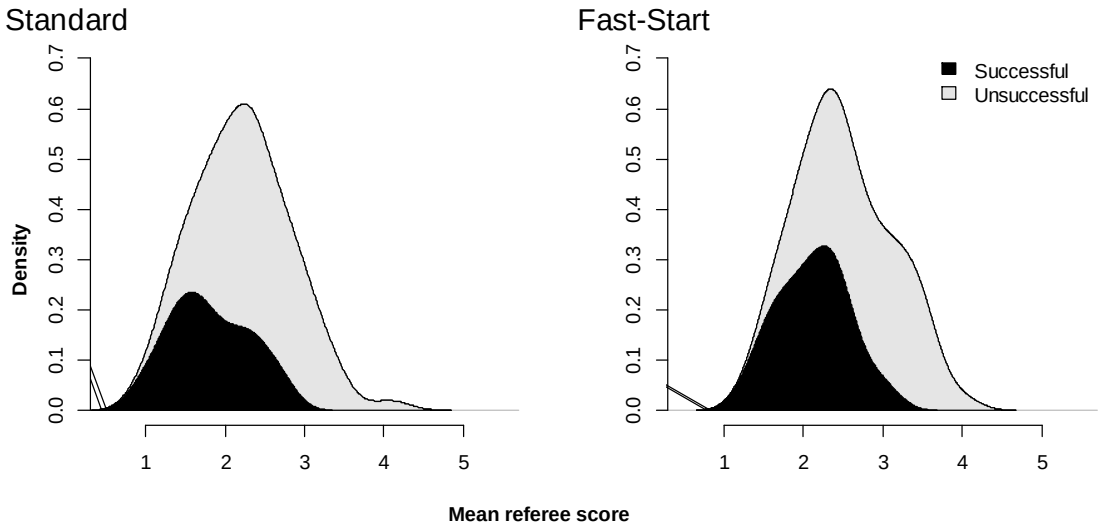


Figure A9. Changes in reported productivity 2010-2012 by panel

2.3 Research Quality

The quality of Marsden-funded research is ensured by rigorous selection procedures, including peer review of all proposals that proceed to the second stage of the evaluation process. The following figures show that projects receiving funding are typically judged as being excellent–outstanding by their, predominantly, international reviewers.

2011 Round:



2012: round:

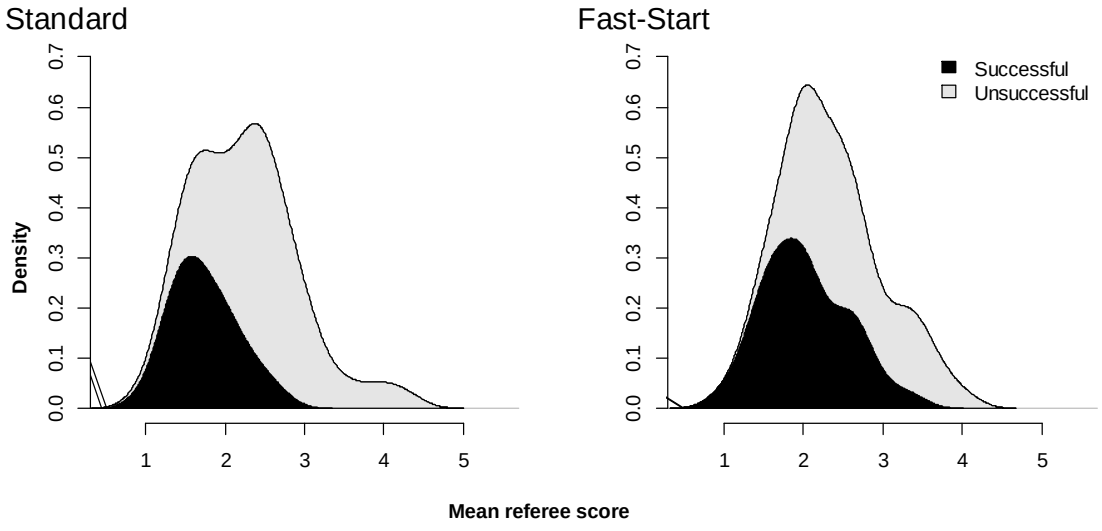


Figure A10. Distribution of the average referee score received for both funded and unfunded proposals to the 2011 and 2012 funding rounds[9].

The vast majority of successful Standard and Fast-Start proposals come from this highest ranked, "Excellent" to "Outstanding", population. As can be seen from these charts, there are many proposals judged as excellent–outstanding but which are unsuccessful due to funding limitation.

[9] Scores equate to: 1 = "Outstanding – among the top 5% of proposals worldwide"; 2 = "Excellent – among the top 10% of proposals worldwide"; 3 = "well above average, top 20%"; 4 = "above average"; and 5 = "average or below average".

Appendix 3 – Qualitative Achievements

3.1 Selected project highlights

A selection of highlights chosen to showcase the impact of Marsden Fund-supported projects.

Mapping the Origin of Indo-European

University of Auckland research published in the journal *Science,* tackles a 200-year old question and supports the controversial hypothesis that Indo-European languages originated in Anatolia 8,000 to 9,500 years ago and spread with the expansion of farming.

Using methods developed to trace the geographic origin of viral outbreaks such as HIV and H1N1, the research shows that the spread of the languages is consistent with an origin in Anatolia in present-day Turkey.

"If you know how viruses are related to one another you can trace back through their ancestry and find out where they originated," explains lead researcher Dr Quentin Atkinson from the Department of Psychology. "We've used those methods and applied them to languages."

Dr Atkinson worked with researchers from Europe and North America as well as with computer scientists Dr Remco Bouckaert and Associate Professor Alexei Drummond and fellow psychologist Professor Russell Gray, all from The University of Auckland.

The study examined basic vocabulary terms and geographic information from 103 ancient and contemporary Indo-European languages. The location and age of the languages' common ancestor supported the Anatolian hypothesis.

The findings are consistent with the expansion of agriculture into Europe via the Balkans, reaching the edge of western European by 5,000 years ago. They are also consistent with genetic and skull-measurement data which indicates an Anatolian contribution to the European gene pool.

The work follows a 2003 *Nature* paper from the same research group, which first used methods from evolutionary biology to build the languages' family tree. The age of the tree was consistent with Anatolian origins as opposed to the more conventional view that the languages emerged thousands of years later near the Caspian Sea.

"The two competing theories imply two different ages and locations for the origin of the language family. We initially used the age of the family to test the theories," says Dr Atkinson of the original work. While the findings made a strong case for the Anatolian hypothesis, some members of the research community remained unconvinced.

The current research, which includes both geographic and historical data, confirms the languages' Anatolian origins. "It reinforces our earlier findings, and applies exciting new methods from epidemiology to study languages," says Dr Atkinson. "We've developed an entirely new methodology for inferring human prehistory from language data. It allows us to place these language family trees on a map in space and time and play out histories over the landscape."

The Indo-European languages, a family of several hundred languages and dialects, are spoken by almost three billion native speakers and include languages such as English, Spanish, French, German, Hindi and Bengali.

The conventional "steppe hypothesis" posits that the languages originated in the Pontic steppe region north of the Capsian Sea, and were spread into Europe and the Near East by Kurgan semi-nomadic pastoralists beginning 5,000 to 6,000 years ago. The "Anatolian hypothesis" argues that the languages spread with the expansion of agriculture from Anatolia beginning 8,000 to 9,000 years ago.

Can Bees Help Postoperative Recovery?

Anaesthesia, jet lag and bees are three concepts that do not usually go together. However research done by Dr Guy Warman and his team at The University of Auckland, with the support of a Marsden grant, has highlighted the links between them, and what we can learn from honeybees about recovering from the effects of general anaesthesia. This work has recently been published in the highly prestigious journal *Proceedings of the National Academy of Sciences*.

Figure A11. Bees tagged with RFID chips to record the timing of their visits to a feeder box

Following general anaesthesia, people are often confused about the time of day and they experience sleep disruption and fatigue – symptoms similar to those following global travel. In their work Dr Warman and his team aimed to find out whether general anaesthesia causes "chemically induced jet lag".

This is where the bees come into the story. Honeybees show a "time sense" based on their ability to continuously consult their inbuilt circadian clock, much as we might consult a wristwatch. They use this time sense in many daily activities, for example navigating using the sun compass and knowing when to visit flowers at the times of maximum nectar production. Usefully, the genetic structure and function of the circadian clockwork of honeybees is remarkably similar to that of mammals – their clocks work in the same ways as ours, making them an excellent model for the effect of anaesthesia on humans.

Dr Warman and his colleagues treated honeybees with the common anaesthetic isoflurane and studied their behaviour and gene expression after the bees had been "knocked out" for six hours. They found that the anaesthesia systematically altered the bees' sun compass, delayed their foraging time, and shifted their daily activity rhythms.

Looking at the bees' gene expression, the researchers found evidence that the changes in the bees' activity are a result of the anaesthetic affecting the molecular clockwork in the brain. This suggests that postoperative symptoms of disorientation may be caused by the effect of the anaesthesia on people's circadian clock, which regulates almost all aspects of our daily biochemistry, physiology and behaviour.

Other key findings are that the effects of the anaesthesia can persist for up to three days before the circadian clock resets itself, and that the time of anaesthetic treatment makes a difference: bees treated with anaesthetic during their night time did not undergo either behavioural or genetic shifts.

In non-anaesthetic work, the researchers have also shown that exposing the bees to a one-hour pulse of light has an impact on their circadian clocks, with advances or delays in their activity cycle of up to one and a half hours, depending on when during their daytime or night time the light was administered.

What does this all mean for anaesthesia use among humans? Tackling the problem of anaesthesia-induced jetlag may significantly speed up the postoperative recovery of a patient. Dr Warman's research suggests two possible avenues for human trials – performing operations at night where the anaesthesia does not impact on the circadian clock, and using light therapy to reset patients' circadian rhythms. The first option is unlikely to receive much favour from doctors and surgeons, but Dr Warman and his team are starting to explore the use of light concurrently with anaesthesia to reduce the jet lag effect in clinical trials.

A new type of volcanic eruption

Professor Colin Wilson and students at Victoria University of Wellington and Professor Ian Wright at the National Oceanography Centre in Southampton have used a Marsden Fund grant to discover evidence for a new type of underwater volcanic eruption, as reported in the highly prestigious journal Nature Geoscience. Described in one summary as being like a "lava lamp on speed", these underwater volcanoes do not erupt in either a violent explosion or a slow flow but instead produce buoyant lava balloons.

The team's work originated in a desire to study the processes of underwater eruptions, to see if there was any way to determine what might cause submarine volcanoes to erupt in a large, explosive, and potentially hazardous fashion. Explosions of this nature could potentially disrupt air and seaborne traffic or cause a tsunami.

Figure A12. Professor Colin Wilson (left), Mike Rosenberg (middle) and Melissa Rotella (right) investigating pumice dredged from the seafloor around Macauley volcano onboard the NIWA ship the RV Tangaroa. Credit - Dr Darren Gravley

However, underwater eruptions cannot be observed directly – instead Melissa Rotella, a PhD student working on the project, and other members of the team catalogued eruption products (including pumice) from three volcanoes in the Kermadec arc, just north of New Zealand. Healy, Macauley and Raoul volcanoes exist respectively in deeper marine, shallower marine and subaerial (where the magma is ejected into the air) settings. This gave them the chance to compare the products from eruptions that occurred under different pressures and quantify the violent degassing processes which drove them.

The team found that much of the seafloor pumice blanket around Macauley shows an unusual mixture of densities and textures, including pieces with strong texture or density gradients contained within one fragment. They have argued that this reflects a distinctive submarine eruption style in which magma-water interaction and the overlying column of water have significantly affected the way in which these fragments are formed.

The "Tangaroan" eruptive style, named after the NIWA research vessel used in this work, itself named for the Maori god of the sea, is thought to be intermediate between explosive and effusive (slow flow) activity. The team thinks that in this eruptive style, the magma rises from the vent of the volcano as a foam, from which balloon-like pieces gently detach and rise due to buoyancy forces.

When these pieces contact the water a rind forms on the surface of the piece, trapping volatile gases and allowing the interior of the piece to remain molten. Gas bubbles within the molten segment can expand due to a pressure decrease as the piece floats towards the surface. These bubbles can also coalesce, allowing the interior of the piece to reach extreme levels of porosity and very low densities.

Further disintegration of these pieces would give the observed mixture of densities and textures – fragments from the rims would be dense and would be lined by stretched bubbles, those from the centres would be much less dense and would have lots of large pores left by the bubbles, and some pieces would show a gradient between these two types.

This work makes sense of previous reports of large pumice balloon finds around the world, such as 1 m pumice balloons on the seafloor at the extinct West Rota volcano in the Marianas arc near Japan. Similarly, at Terceira Island in the Azores, 3 m basalt balloons rose to the surface during an eruption that began in 1998.

More importantly, the work of the Marsden Fund-supported team shows that the presence of pumice near an underwater volcano does not necessarily mean that there has been an explosive eruption at the volcano, as was previously thought. Instead, it might be the result of the newly discovered Tangaroan activity.

Fishing for sprats

Is protecting the young while harvesting the old the best way of commercially managing our marine resources? The "minimum catch size" fishery model is widely used both in New Zealand and around the globe, but there are questions about whether other ways of fishing might be better in terms of both long term fish stocks and fishery yields.

Dr Michael Plank of the University of Canterbury is addressing what the best fishery system is, along with other questions, with the help of a Marsden Fund grant.

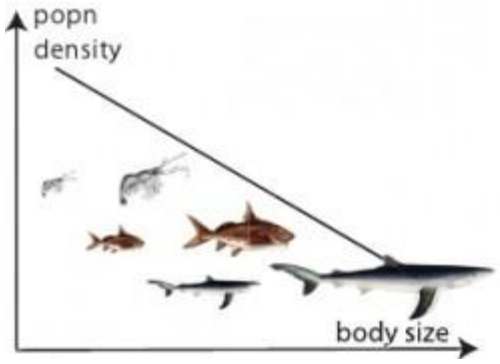


Figure A13. A representation of the size based model of fish predation

His project is focussed around developing a new theory of the dynamics of aquatic ecosystems. Most previous work has looked at ecosystem models based on species (this type of fish eats that type of fish), or based on size (a bigger fish eats a smaller fish). Dr Plank has amended the size based model to include predation at the level of an individual predator and its prey. This means that the variations between individuals in e.g. the number and size of prey ingested, are accounted for by his model, making it more accurate.

Dr Plank and his collaborators, Professor Richard Law and Associate Professor Jeppe Kolding, from the United Kingdom and Norway respectively, have used this model to compare the impact of several different fishing patterns. The first of these is the minimum catch size protocol, corresponding to the familiar convention that small fish should be protected and large ones harvested. The second pattern is the reverse scheme in which fish over a certain size are protected, based on recent suggestions that there might be a benefit in protecting BOFFFFs (big old fat fecund female fish), the fish that are likely to produce the most offspring. The third fishing pattern is a "slot" scheme, where only fish in some defined mid-range are caught. The final fishery protocol studied is known as balanced harvesting, in which different size fish are caught in proportion to the productivity of that size, which can be approximated in a real-world situation by the growth rate of the fish. In effect, in this latter style of fishing, a larger number of smaller fish, a middling number of moderate size fish, and a smaller number of large fish would be harvested.

The researchers have found that, according to their model, the traditional type of minimum size fishery provides a relatively low sustainable yield while causing major disruption to the size structure (the numbers of fish of different sizes) of the ecosystem. Catching only small fish gives reasonable sustainable yields up to a point at which, without warning, the stock catastrophically collapses. The slot type fishing protocol does not show the same collapse scenario but has low yields and disrupts the ecosystem. By comparison, using the balanced harvesting system, it is possible to achieve high yields (up to a point) without causing much change in the resilience of the ecosystem or disruption in its size structure.

There are few real-world examples of balanced harvesting, however two different styles of fishing in Lake Kariba, Africa, can be compared. On the Zambian side of the lake, the fishing pattern is shaped by productivity. By contrast, on the Zimbabwean side, fishing is done using more traditional size regulations. The community of fish on the Zambian side has a size structure that is very similar to the unfished part of the lake, i.e. this balanced style of fishing is not changing the ecosystem of the lake. Also, and somewhat remarkably, the productivity of Zambian fishery is thought to be about six times greater than the traditionally regulated fishery on the Zimbabwe side of the lake. Both of these features fit very well with the predictions made by Dr Plank's work.

This suggests that moving to a balanced harvesting model of fishing that is based on the productivity of the fish may be better for commercial fisheries in New Zealand. The team anticipates that this research will be important for understanding and managing marine fisheries in the future.

Would you 'Like' a drink? Youth drinking cultures, social networking and alcohol marketing.

Preventing alcohol abuse, especially among young people, has long been a focus of public-health campaigns. But despite the well-publicised social and medical consequences of drinking too much it's clear that for many, heavy drinking has become a normal part of life.

And now, public-health professionals have a new force to contend with in their battle against the bottle: social-networking sites (SNS). Writing in a recent issue of Critical Public Heath, researchers from New Zealand consider the extensive, and not entirely positive, impact SNS may have on their efforts to encourage more responsible youth drinking (McCreanor et al., 2013).

Figure A14. Associate Professor Antonia Lyons of Massey University

The authors argue that although SNS users benefit from creating and sharing content, the sites are 'quintessentially commercial platforms' which provide entirely new vehicles for alcohol marketing. The very characteristics that make SNS popular – blurring boundaries between public and private spaces, acting as extensions of face-to-face relationships and being regularly viewed and updated – also contribute to their commercial potential by bringing alcohol producers and consumers closer together.

The researchers note that site owners also have extensive access to valuable information about users' preferences, habits and interests, providing a bonanza for alcohol-marketing dataminers. Evidence suggests that alcohol producers and sellers are already embracing SNS as an effective marketing tool.

Diageo, which has expanded its SNS marketing in recent years, has entered into a deal with Facebook, with over one billion users; other UK brands also employ a range of strategies including games, competitions and 'branded conversation stimulus' in Tweets and wall posts. Well-known brands and alcohol-related events generate vast numbers of 'friends', and alcohol-related apps thrive. The effect of all of this, the authors write, is to 'normalise alcohol within both banal and special occasions in the everyday lives of SNS users'.

And then there is user-generated content. Millions of wall posts, profiles and photos revolving around alcohol play a big role in normalising drinking within young adults' lives and cultural words. But the biggest challenge posed by SNS is that 'they are effectively beyond the domain of public authority, essentially unregulated and possibly uncontrollable'. The authors call for more research into the impact of SNS on youth drinking patterns, as even this initial survey gives a strong indication of how they may come to play a major role in maintaining pro-alcohol environments.

On the positive side, the Critical Public Health study also points out that SNS can be used to encourage young drinkers to change their practices in a more positive way. Unfortunately for public-health practitioners however, photos of people drinking responsibly aren't nearly so much fun to put up on Facebook.

Marsden funded scholar wins Suntory prize

Associate Professor Takashi Shogimen has won the 2013 Suntory Prize for social sciences and humanities (history and civilisation section) for his book, written in Japanese, on the birth of European political thought in medieval times, Yoroppa Seiji Shiso Tanjo.

The prize is awarded yearly for contributions in humanities and social sciences through publications written in Japanese.

Associate Professor Shogimen says the prize-winning book, published in August 2013 by the University of Nagoya Press, and on sale in Japan, is popular and already in re-print. The book was a spin-off from earlier Marsden-funded research into the origins of European political thought.

"Medieval political thought has long been considered to be impenetrable by Japanese historians, so I tried to make the book as accessible as possible and to provide a birds-eye view of the history of medieval political thought as a process in the making of European political thinking," says Associate Professor Shogimen.

Associate Prof Shogimen's research has benefited from two Marsden Fund awards, a Faststart award for his project "Medicine and the body politic: an approach to the global history of political thought" awarded in 2005, and his more recent project, "The idea of Peace in the Age of the Crusades."

Figure A15. Associate Professor Shogimen's prize-winning book.

3.2 Notable publications and awards for 2011–12

Papers reported as attributable to Marsden contracts over 2011-12 continue to be published in the world's most prestigious journals. Table A8 lists examples of Marsden-supported research appearing within the top-100 journals (as ranked by their 2012 Journal Impact Factor).

Kraft NJB, Comita LS, Chase JM, Sanders NJ, Swenson NG, Crist TO, et al. Disentangling the drivers of β diversity along latitudinal and elevational gradients. Science. 2011 Sep 23;333(6050):1755–8. [MAU0713]

Taylor AH, Miller R, Gray RD. New Caledonian crows reason about hidden causal agents. Proc Natl Acad Sci USA. 2012 Oct 2;109(40):16389–91. [UOA0910]

Dickie IA, Hurst JM, Bellingham PJ. Comment on "Conspecific negative density dependence and forest diversity."Science. 2012 Oct 26;338(6106):469; [LCR0902] author reply 469.

Yuen T-Y, Yang S-H, Brimble MA. Total synthesis of paecilospirone. Angew Chem Int Ed Engl. 2011 Aug 29;50(36):8350–3. [UOA0705]

IceCube Collaboration. An absence of neutrinos associated with cosmic-ray acceleration in γ-ray bursts. Nature. 2012 Apr 19;484(7394):351–4. [UOC0606]

Bouckaert R, Lemey P, Dunn M, Greenhill SJ, Alekseyenko AV, Drummond AJ, et al. Mapping the origins and expansion of the Indo-European language family. Science. 2012 Aug 24;337(6097):957–60. [UOA0809 and UOA0709]

Hillman KL, Bilkey DK. Neural encoding of competitive effort in the anterior cingulate cortex. Nat Neurosci. 2012 Sep;15(9):1290–7. [UOO0613 and UOO1106]

Gray JC, Goddard MR. Gene-flow between niches facilitates local adaptation in sexual populations. Ecol Lett. 2012 Sep;15(9):955–62. [UOA0605]

Elliott ABS, Horvath R, Gordon KC. Vibrational spectroscopy as a probe of molecule-based devices. Chem Soc Rev. 2012 Mar 7;41(5):1929–46. [UOO0611]

Stirling CH. Geochemistry. Keeping time with Earth's heaviest element. Science. 2012 Mar 30;335(6076):1585–6. [UOO0718]

Carmichael HJ, Orozco LA. Quantum optics: Atom gives light a subtle squeeze. Nature. 2011 Jun 30;474(7353):584–5. [UOA0706]

Diep CQ, Ma D, Deo RC, Holm TM, Naylor RW, Arora N, et al. Identification of adult nephron progenitors capable of kidney regeneration in zebrafish. Nature. 2011 Feb 3;470(7332):95–100. [UOA1002]

Wilmshurst JM, Hunt TL, Lipo CP, Anderson AJ. High-precision radiocarbon dating shows recent and rapid initial human colonization of East Polynesia. Proc Natl Acad Sci USA. 2011 Feb 1;108(5):1815–20. [LCR0402]

Andersson DI. Evolving promiscuously. Proc Natl Acad Sci USA. 2011 Jan 25;108(4):1199–200. [MAU0801]

Soo VWC, Hanson-Manful P, Patrick WM. Artificial gene amplification reveals an abundance of promiscuous resistance determinants in Escherichia coli. Proc Natl Acad Sci USA. 2011 Jan 25;108(4):1484–9. [MAU0801]

Anderson MJ, Crist TO, Chase JM, Vellend M, Inouye BD, Freestone AL, et al. Navigating the multiple meanings of β diversity: a roadmap for the practicing ecologist. Ecol Lett. 2011 Jan;14(1):19–28. [MAU0713]

Dunn M, Greenhill SJ, Levinson SC, Gray RD. Evolved structure of language shows lineage-specific trends in word-order universals. Nature. 2011 May 5;473(7345):79–82. [UOA0709]

Table A8. A selection of papers of note, published in 2011 and 2012:

Of the 16 holders of the prestigious James Cook Research Fellowship over 2011–2012, 15 have been principal investigators on Marsden contracts, while numerous prizes and awards continue to be given to Marsden researchers – a selection of which are listed in Table A9.

Marsden Researcher(s)	Contract(s)	Distinction awarded
Dr BE Veit	AGR1001	Dumont D'Urville Exchange Fellowship
Dr J Liu	AUT1101	AUT Vice Chancellor Research Award (Emerging Researcher) 2011
Dr PE Huck	BDS0801	Outstanding Presentation among Early Career and Young Scientists, WCRP-OSC, Denver, USA, 2011.
Dr DM Eberhart-Phillips	GNS0802	Honorary Fellowship of the Royal Society of New Zealand, awarded in 2011
Dr MJ Isaac	GNS0803	Hochstetter Lecturer - Geoscience Society of New Zealand
Dr JL Tallon	IRL1001	Dan Walls Medal for Physics (2011)
Dr A Mendoza Mendoza	LIU1001	Lincoln University Research Fund
Professor RP Duncan	LIU1002	Te Tohu Taiao Award for Ecological Excellence 2011 (New Zealand Ecological Society)
Dr JM Steyaert	LIU1101	Lincoln University Early Career Researcher Award 2011
Professor UOP Zuelicke	MAU0702	Fellow, New Zealand Institute of Physics
Professor GRW Quispel	MAU0712	ARC Professorial Fellowship
Professor PB Rainey	MAU0803 and MAU1006	Elected Member, Max Planck Society & Honorary Director, Max Planck Institute for Evolutionary Biology, Ploen
Dr I Horrocks	MAU0811	College of Humanities and Social Sciences Research Award, Massey – Early Career, 2011.
Associate Professor SG Telfer	MAU1009	Distinguished Lectureship Award from the Chemical Society of Japan
Associate Professor SG Telfer	MAU1009	Fulbright Senior Scholar Award
Dr BL Stocker	MIM1101	HRC Sir Charles Hercus Research Fellowship (2012)
Dr LD Shepherd	MNZ0901	Rutherford Discovery Fellowship
Dr CS Law	NIW1001	Prime Ministers Science Award 2011
Professor SF Thrush	NIW1102	FRSNZ
Dr AM Lorrey	NIW1103 and UOA1105	NIWA Excellence Awards 2012 Early Career Science Award
Professor Sir Peter Gluckman	UOA0606	NZBIO's Distinguished Biotechnologist Award
Professor Sir Peter Gluckman	UOA0606	Xu Guanqi Orator, Chinese Academy of Sciences, Shanghai
Dr KA Lillycrop	UOA0804	Award for the best oral BMedSci(Hons) presentation for 2012
Mr AB Pleasants	UOA0806	Best Doctoral Thesis 2010, University of Auckland
Postgraduate student	UOA0806	Hamilton Award of the Royal Society
Associate Professor DR Addis	UOA0810	2010 Prime Minister's MacDiarmid Emerging Scientist Prize
Associate Professor DR Addis	UOA0810	Early Career Research Excellence Award 2012, The University of Auckland
Associate Professor DR Addis	UOA0810	“Rising Star”, Association for Psychological Science
Dr NC Overall	UOA0811	Association of Psychological Science Rising Star
Dr NC Overall	UOA0811	Fellow Society of Experimental Social Psychology
Dr MA Curtis	UOA0904	2012 Butland award for Early career excellence in teaching, FMHS
Professor RD Gray	UOA0910	Mason Durie Medal awarded by the Royal Society of New Zealand in 2012

Marsden Researcher(s)	Contract(s)	Distinction awarded
Professor AJ Scott	UOA0921	2011 Campbell Award of the New Zealand Statistical Association
Professor CJ Wild	UOA0921	2012 Campbell Award of the New Zealand Statistical Association
A. Professor AJ Davidson	UOA1002	Life Technologies Young Scientist Award (presented at the QMB meeting)
Dr CM Rubie-Davies	UOA1006	Early Career Research Excellence Award
Dr MT Cooling	UOA1007	Appointed Associate Investigator of the Maurice Wilkins Centre for Molecular Biodiscovery
Dr MT Cooling	UOA1007	Invited Professional Membership of the International Society for Computation Biology
Professor M Ehrgott	UOA1008	Edgeworth-Pareto Award of the Internatioal Society on Multiple Criteria Decision Making 2011
Professor MDE Conder	UOA1015	Maclaurin Lectureship 2012/13 (American and NZ Mathematical Societies)
Professor MDE Conder	UOA1015	Associate partner in EuroCoRE in priority area 'Graphs in Geometry and Algorithms' (European Science Foundation)
Professor AR Gover	UOA1016	Fellowship of the Royal Society of New Zealand
Professor BD Boyd	UOA1112	Inaugural NOJ (Nabokov Online Journal) Prize for Best Contribution to Nabokov studies, 2000-2011, for book Nabokov's Ada: The Place of Consciousness, 2nd ed. (2001)
Professor MA Brimble	UOA1115	Rutherford Medal for exceptional contributions to the science and technology sector in NZ
Professor MA Brimble	UOA1115	Hector Medal for outstanding work in chemical sciences
Professor MA Brimble	UOA1115	McDiarmid Medal for outstanding scientific research with potential human benefit
Professor MA Brimble	UOA1115	Queen's Honour - Companion of the New Zealand Order of Merit (CNZM) for services to the science
Associate Professor SL Link	UOA1120	The Chris Wallace Award for outstanding research contributions in 2013
Professor JM Tylianakis	UOC0705	Rutherford Discovery Fellowship
Professor PL Cottrell	UOC0708	Appointed to Advisory Board, Monash Centre for Astrophysics, Monash University
Dr BM Kennedy	UOC0904	Four successful beamtime awards for the Australian synchrotron
Professor A Cockburn	UOC1005	Best paper award at ACM CHI 2012 Conference
Professor HG Spencer	UOO0518	Fellowship of the Royal Society of New Zealand
Associate Professor JB Nie	UOO0601	Furong Visiting Professorship, Hunan Normal University, China
Associate Professor JB Nie	UOO0601	Award for Outstanding Contributions to Medical Humanities in China, by the journal Medicine and Philosophy
Professor R Poulin	UOO0708	2011 Hutton Medal, Royal Society of New Zealand
Professor AH McCarthy	UOO0814	Made Visiting Professor in the School of History, Classics and Archaeology at the University of Edinburgh, Scotland.
Dr S Fabrizi and Dr S Lippert	UOO0821	Massey University Research Fund Award for research into Venture Capital and Intellectual Property
Dr S Lippert	UOO0821	Emerging Researcher Award, Massey University
Dr PC Fineran	UOO0911	Early Career Award for Distinction in Research, University of Otago 2011

Marsden Researcher(s)	Contract(s)	Distinction awarded
Dr PC Fineran	UOO0911	Otago School of Medical Sciences Emerging Researcher Award 2012, University of Otago
Dr PC Fineran	UOO0911	Rutherford Discovery Fellow, Royal Society of New Zealand
Dr WM Patrick	UOO0927	Massey University Research Medal -- Early Career (2010)
Dr WM Patrick	UOO0927	NZBio Young Biotechnologist of the Year (2010)
Dr CM Larsen	UOO1001	University of Otago Strategic UORG
Associate Professor CJ Rodger	UOO1012	Invited to join the International Commission on the Middle Atmosphere (ICMA)
Dr AS Bradley	UOO1016	Rutherford Discovery Fellowship
Dr KD Brounéus	UOO1018	New Supervisor of the Year 2011 Award, University of Otago
Professors PW Boyd and KA Hunter, Drs SG Sander and CH Stirling	UOO1117	Inaugural University of Otago Research Group Award 2012
Professor JA Hoek	UOO1126	Best paper in track award at the ANZMAC 2012 conference, December 2012.
Professor R Edwards	UOO1126	"Best Poster" award for one of the top ten posters at the 2012 World Conference on Tobacco or Health, Singapore, March 2012.
Professor JM Haar	UOW0806	Organizational-based self esteem and work outcomes: A within country comparison. University of Ballarat (Australia) Prize
Dr CK Lee	UOW1003	The University of Waikato VC Emerging Scientist Award
Professor AJ Cooper	UOW1006	"Distinguished Award for Sustained Research Excellence", University of Adelaide
Professor DJ Lowe	UOW1006	Awarded “Editor’s Citation for Excellence” for outstanding service as assoc editor of Soil Science Society of America Jl
Dr J Barbour	UOW1103	Vice Chancellor's Staff Excellence Award, for Early Career Research Excellence.
Associate Professor JS Shima	VUW0604	2011 Victoria University of Wellington Research Excellence Award
Dr DH Skinner	VUW0609	Newton Fellowship, UK
Dr LM Bolton	VUW0609	Appointed Head of the Department of Africa, Oceania and the Americas, The British Museum, in 2012
Professor N Thomas	VUW0609	ERC (European Research Council) grant for "Pacific Presences: Oceanic Art and European Museums" research project
Professor N Thomas	VUW0609	Wolfson History Prize from Yale University Press for his book Islanders, published by Yale University Press in 2011
Professor N Thomas and Dr P Brunt	VUW0609	Leverhulme Trust grant (UK) for Multiple Modernities: Twentieth Century Modernisms in Global Perspective project
Dr EM Bargh	VUW0707	Rongomaraeroa Manu Ao Travel Award
Professor TA Stern	VUW0905	Elected fellow of American Geophysical Union
Dr DC Mayhew	VUW0914	Early Career Research Award, Victoria University of Wellington
Professor GP Whittle	VUW1008	Inaugural Aitken Lecturer
Dr JM Hodgkiss	VUW1009	Rutherford Discovery Fellowship
Professor PT Callaghan	VUW1010	Kiwibank NZer of the year
Professor PT Callaghan	VUW1010	Supreme Winner, 2012 World Class New Zealand Awards
Associate Professor EC Le Ru	VUW1107	Research Medal. New Zealand Association of Scientists (NZAS)

Table A9. A selection of notable award granted in 2011 and 2012:

3.3 Benefits to New Zealand Research from Marsden-Funded International Collaboration

Using techniques, equipment or resources that are unavailable in New Zealand, often at no cost. Examples include:

- VUW0714 Dr Eggins (Aust. Nat. U.) provision of both technical support and access to ANU analytical facilities for Dr GB Dunbar's project.
- UOC0605 A student from Prof. W Schuhmann's lab (Ruhr-Universität in Bochum) visiting Professor AJ Downard to prepare samples of carbon nanotube electrode materials for use with techniques available at Ruhr Universitat for biological sensing.
- MAU1008 Collaborative links formed by Dr SJ Matthews with Fraunhoffer Institute for Ceramic Technologies and Systems to provide several techniques not available in NZ.

Visiting overseas laboratories to learn new methods not available in New Zealand. Examples include:

- UOC0601 Dr V Hurry (U. Umea) hosted Professor MH Turnbull's PhD students to allow them to bring western blot methods for determining the content of respiratory proteins from plant extracts back to the UOC lab.
- UOO1117 Prof. T Dittmar (Max Plank/Carl von Ossietzky U.) an expert in compound specific analysis of dissolved organic matter using FT-ICR-MS technology hosting students to prepare and measure samples for Dr SG Sander project.
- UOO0801 Prof. E Cramer Borde (Insitut Cochin) providing advise to Dr EC Ledgerwood on assaying megakaryocyte differentiation and platelet production from stem cells isolated from human peripheral blood in order to establish these techniques in NZ

Drawing on overseas researchers' knowledge by hosting conferences, workshops and individual visits, for example:

- VUW0801 Dr CJ McIntosh was part of the programme-organising committee for the TGF-β Down-under international conference in Melbourne, March 2012

Hosting young researchers and students from overseas, and continuing collaborations with researchers through their early careers to build links for the future. Examples include:

- IRL0802 Professor SC Hendy co-supervising a PhD student at the University of Sydney to work on the simulation of flows over surfaces covered in polymer brushes.
- UOC0705 Professor JM Tylianakis co-supervision of a MSc student with Dr. Etienne Laliberte (U. Western Aust.) to explore experiment designs established as part of his Marsden grant.
- MAU0712 Professor RI McLachlan join supervision of PhD sudent with Professor A Zanna Munthe-Kaas (U. Bergen)
- UOC0708 Professor PL Cottrell's continued collaboration with past-UOC PhD student Dr C Worley (University of Cambridge)
- UOA1016 Professor AR Gover continued collaboration with former PhD student Dr J Silhan (Masaryk U.)

Leveraging Marsden funding with overseas funding. Examples include:

- UOC0707 Professor A Cockburn's team access travel funds from a major Canadian "Network Centers of Excellence" research grant that is directed from the University of British Colombia.
- IRL0802 Professor SC Hendy's participation in Dr C Neto's ARC grant as a consequence of his Marsden-supported collaboration.
- UOO0915 Dr SE Halcrow's presence as an invited bioarchaeologist on the Australian Research Council Grant (2011-2011) project "History in their bones project: A diachronic, bioarchaeological study of diet, mobility and social organisation from Cambodian skeletal assemblages", and a Partner Investigator on an Australian Council Research Grant (2011-2013) "From Paddy to Pura: the origins of Angkor project".
- UOC0904 Dr BM Kennedy is an Investigator on a contemporary NSF research grant for "Workshop on volcanoes" at Santiaguito lava dome, Guatemala.

In addition, another five researchers indicated that they have leveraged funding, or are are currently in the process of pursuing international funding with their collaborators