

The Ecosystem Science and Management Community in Australia: Attitudes towards interdisciplinary research collaboration.

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Introduction

A comprehensive understanding of ecosystem health and function requires a multi-disciplinary effort. In this time of global environmental change, interdisciplinary research collaboration between ecosystem scientists and managers is necessary for developing innovative solutions to address the big ecosystem science issues and questions (Sutherland *et al.* 2006; Morton *et al.* 2009). The ecosystem science and management community in Australia has evolved rapidly over the last 50 years encompassing a complex array of disciplines and specialties. The health and function of Australia's terrestrial and aquatic ecosystems, and the biodiversity they support, however, continues to decline (Pink 2010). Is this apparent inability to effectively manage and protect these ecosystems an indication of inadequate interdisciplinary collaboration within the Australian ecosystem science and management community?

Little is known about collaborative behaviour within the Australian ecosystem science and management community. Understanding the levels of collaborative behaviour within the community, the perceived risks and benefits of collaboration, and the key influencing factors is important for the development of incentives and the promotion of collaborative programs. Effective collaborations will encourage a more unified and collaborative approach to the collection, analysis, synthesis, transfer and implementation of the information and knowledge relating to effective and sustainable management of Australia's ecosystems.

This report describes a project in which we attempted to:

- (i) describe the ecosystem science and management community in Australia;
- (ii) understand the attitudes towards interdisciplinary collaboration and collaborative activities undertaken by community members; and
- (iii) identify the key factors that are associated with attitudes to interdisciplinary collaborative activity and with its practice.

Methods

A questionnaire was developed to seek answers to these questions. In November 2011, hard copies of the questionnaire were distributed to all 650 delegates at the 2011 Ecological Society of Australia conference. Subsequently, a stratified snowball sampling method was used, whereby:

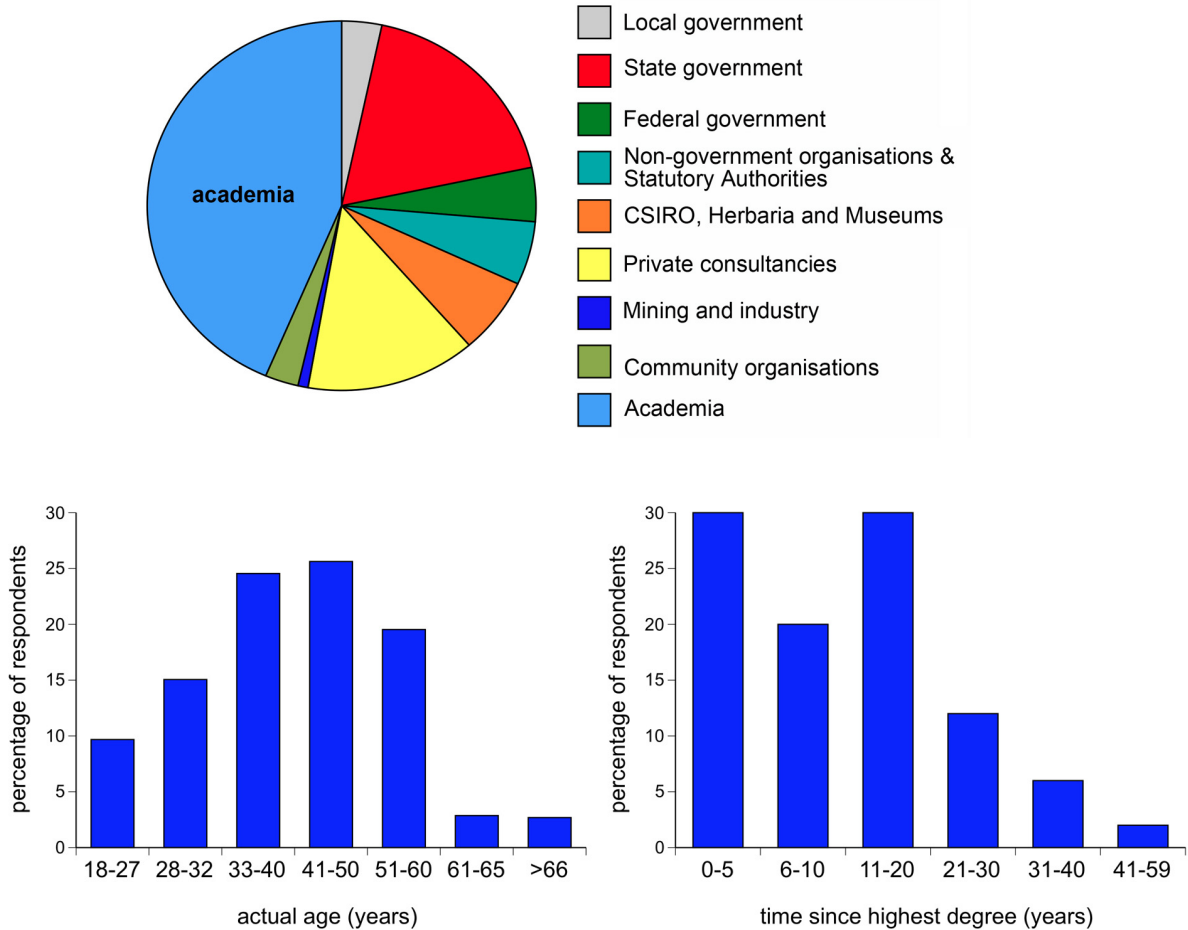
- (i) major organisations (universities, government departments, consultancy companies) and societies of relevance to the ecosystem science and management community across Australia were identified, and
- (ii) an online link to the questionnaire, implemented through SurveyMonkey (2012), was sent to key individuals in each organisation with a request to distribute the questionnaire to all members of their department/team/working group/faculty (or equivalent). An incentive was offered to encourage response.

The link to the on-line questionnaire was emailed to approximately 3200 community members and it remained active for 8 weeks from December 2011 until February 2012. The link was also published in the November edition of the TERN online newsletter and January edition of the ACEAS online newsletter. Given the distribution method, the precise response rate is not known. Overall, 751 respondents answered at least one question.

Results

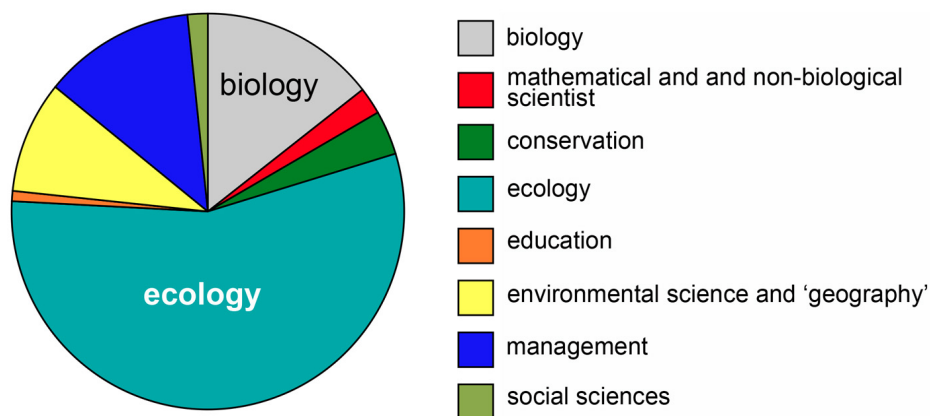
Respondents

The respondents were mainly from universities (45%), followed by government (25%) and private consultancies (15%), and the majority (67%) were from capital cities. The respondents were clustered around 31-40 years of age and most had obtained their last degree within the last 20 years (80%). There there was a small majority of males (57%).



Disciplines of the respondents

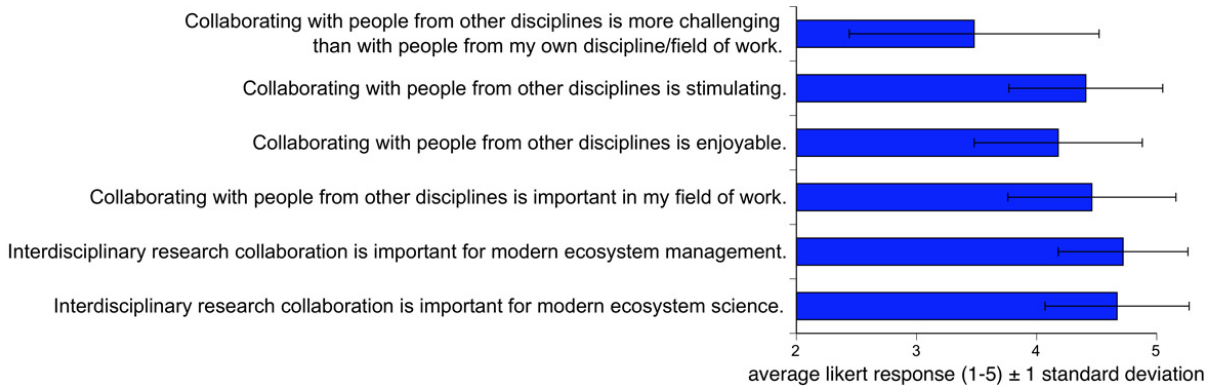
Of the respondents, 48% were members of the Ecological Society of Australia, by far the largest of any membership nominated in the survey. The majority of respondents nominated some form of ecology as their primary discipline, however a diverse range of other disciplines was identified by the community.



The results discussed below are derived from the statistical analyses. Only those differences that were significant are commented on. The data are presented by means of a Likert scale where a value of 1 indicates low agreement while that of 5 indicates strong agreement with whichever proposition is being put.

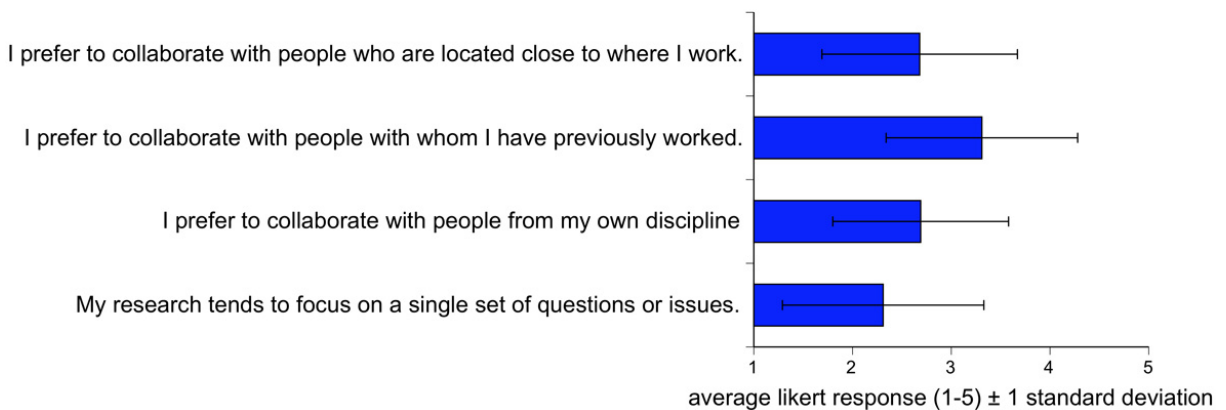
Perceived importance of interdisciplinary collaboration

A large complement of respondents thought that interdisciplinary collaboration was important for both ecosystem science and for management (an average of greater than 4.5 on the Likert scale). The challenging nature of collaboration, however, was less favourably regarded, and gender played a part: women were more likely to find cross-disciplinary collaboration more challenging than men ($p = 0.049$).



Collaborative preferences

Most respondents were fairly ambivalent about collaboration, the average response being neither strongly positive nor negative. The majority of respondents did not indicate any preference to collaborate with people who are located close to where they work, or are from their own discipline, but they showed some favour towards working with people with whom they had worked before. People's preference for only working with people from their own discipline varied according to the institution to which they belonged, and the older they were the more likely they were to prefer to collaborate with people outside their own discipline. Members of ACEAS Working Groups regarded interdisciplinary collaboration more favourably ($p = 0.015$).

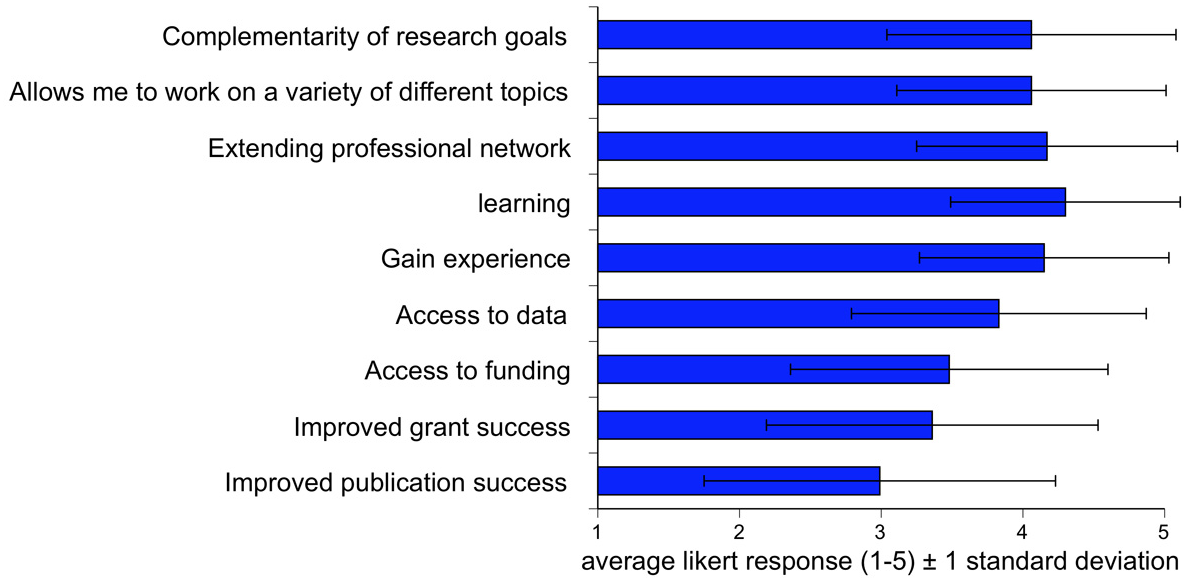


Actual collaborative behaviour

Recent actual collaborative behaviour (within the last 3 years), was too variable to detect any difference in collaboration between those in disciplines close to their own, and those from disciplines remote from that, however there were significant differences in collaboration rates according to institution ($p = 0.029$), age ($p = 0.000$) and time since last degree (0.001). Members of CSIRO had the highest level of collaborative activity, while most of the other groups had medium levels of collaboration. The 41-50 age group had the greatest level of collaboration, which corresponded to the time since their last degree.

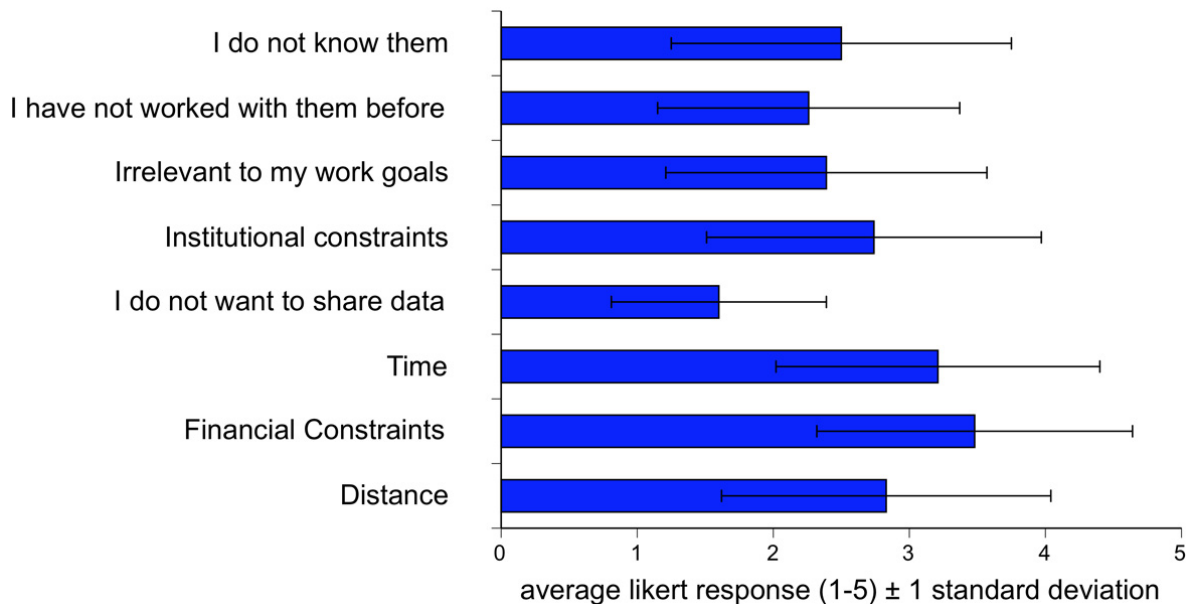
Incentives for collaboration

There are a variety of incentives for collaborating with people from other disciplines. In this community, learning, gaining experience and extending one's professional network were reported as the most important incentives. Improving grant and publication success were not strong drivers for interdisciplinary collaboration.



Barriers to interdisciplinary collaboration

In this section the respondents were asked what would prevent them from collaborating with someone from another discipline. The key barriers to interdisciplinary collaboration were financial and time constraints, institutional constraints, and distance from other potential collaborators. Willingness to share data was **not** considered a barrier to collaboration, having a very low Likert response.



Impediments and concerns about sharing data

Although it transpired from the results that willingness to share data was not a major consideration when engaging in interdisciplinary collaboration, we had posed a series of questions to explore attitudes to data sharing. These questions were modelled on those asked by Tenopir *et al.* (2011) and are relevant given the objectives of the Terrestrial Ecosystem Research Network. These questions explored perceived impediments to data sharing, alongside the importance of data access.

The responses were evenly balanced with respondents leaning to the positive in all cases (an ambivalent response on the Likert scale being 2.5). Lack of access to data for scientific enquiry was regarded as a major impediment to scientific progress, although there was some concern about misinterpretation and lack of citation of data sets provided.

	MEAN (standard deviation) on a scale of 1: strongly disagree to 5: strongly agree.
Lack of access to data generated by other researchers or institutions is a major impediment to progress in science.	3.81 (1.01)
Lack of access to data generated by other researchers or institutions has restricted my ability to answer scientific questions.	3.27 (1.22)
Data may be misinterpreted due to poor quality of the data.	3.76 (0.89)
Data may be used in other ways than intended.	3.79 (0.86)
I would use other researchers' datasets if their datasets were easily accessible.	3.82 (0.60)
I would be more likely to make my data available if I could place conditions on access.	3.40 (0.95)
I would make my data available if any users of the data would cite it, in the same way as a paper I produce would be cited.	3.71 (0.70)
I am satisfied with my ability to integrate data from disparate sources to address research questions.	3.38 (0.90)
I would be willing to share data across a broad group of researchers who use data in different ways.	3.84 (0.57)
It is important that my data are cited when used by other researchers.	3.83 (0.75)
It is appropriate to create new datasets from shared data.	3.67 (0.66)

Fuller versions of these results are being submitted to peer-reviewed journals, where the factors giving rise to these responses will be explored. For more information on the survey please contact Lucy Keniger or Alison Specht.

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About ACEAS

Are you an ecosystem scientist, policy-maker or manager with an important question? ACEAS provides the opportunity to assemble and analyse data that otherwise you could not. For information on funding opportunities, visit www.aceas.org.au

ACEAS is a dedicated facility of the Terrestrial Ecosystem Research Network (TERN), which is a national collaboration of world-class researchers and infrastructure, supporting the collection and management of scientific data which is vital to the positive future management of the Australian ecosystem.

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References

- Morton, S.R., Hoegh-Guldberg, O., Lindenmayer, D.B., Harriss Olson, M., Hughes, L., McCulloch, M.T., McIntyre, S., Nix, H.A., Lefroy, E.C., Lonsdale, W.M., Lowe, I., McMichael, A.J., Parslow, J.S., Steffen, W., Williams, J.E. & Woinarski, J.C.Z. 2009, The big ecological questions inhibiting effective environmental management in Australia, *Austral Ecology*, 34, 1-9.
- Pink, B. 2010, 'Australia's environment issues and trends 2010'. Australian Bureau of Statistics, viewed August 2011, <[http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/41D729B432E03FA0CA2576B800164E89/\\$File/46130_2010.pdf](http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/41D729B432E03FA0CA2576B800164E89/$File/46130_2010.pdf)>.
- SurveyMonkey, <http://www.surveymonkey.com>, last viewed 08 February 2012
- Sutherland, W.J., Armstrong-Brown, S., Armsworth, P.R., Brereton, T., Brickland, J., Campbell, C.D., Chamberlain, D.E., Cooke, A.I., Dulvy, N.K., Dusic, N.R., Fitton, M., Freckleton R.P., Charles, H., Godfray, J., Grout, N., Harvey, H.J., Hedley, C., Hopkins, J.J., Kift, N.B., Kirby, J., Kunin, W.E., Macdonald, D.W., Marker, B., Naura, M., Neale, A.R., Oliver, T., Osborn, D., Pullin, A.S., Shardlow, M.E.A., Sholwer, D.A., Smith, P.L., Smithers, R.J., Solandt, J.L., Spencer, J., Spray, C.J., Thomas, C.D., Thompson, J., Webb, S.E., Yalden, D.W. & Atkinson, A.R. 2006, The identification of 100 ecological questions of high policy relevance in the UK, *Journal of Applied Ecology*, 43, 617-627.
- Tenopir, C. Allard, S., Douglass, K., Aydinoglu, A.U., Wu, L., Read, E., Manoff, M. and Frame, M. 2011, Data Sharing by Scientists: Practices and Perceptions, *PlosONE*, 6(6): e21101, doi:10.1371/journal.pone.0021101.

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