AustArch: A Database of ^{14}C and Non-^{14}C Ages from Archaeological Sites in Australia - Composition, Compilation and Review (Data Paper)

Alan N. Williams[1], Sean Ulm[2], Mike Smith[3], Jill Reid[4]

1. Fenner School of Environment and Society, The Australian National University, Canberra, ACT 0200, Australia. Email: alan.williams@anu.edu.au
2. Department of Anthropology, Archaeology and Sociology, School of Arts and Social Sciences, James Cook University, PO Box 6811, Cairns, QLD 4870, Australia. Email: sean.ulm@jcu.edu.au (0000-0001-6653-9963)
3. National Museum of Australia, GPO Box 1901, Canberra ACT 2601, Australia. Email: m.smith@nma.gov.au
4. Niche Environment and Heritage, PO Box W36, Parramatta, NSW 2150, Australia. Email: jreid@niche-eh.com (0000-0002-3581-064X)

Cite this as: Williams, A.N., Ulm, S., Smith, M. and Reid J. (2014). AustArch: A Database of ^{14}C and Non-^{14}C Ages from Archaeological Sites in Australia - Composition, Compilation and Review (Data Paper). Internet Archaeology, (36). http://dx.doi.org/10.11141/ia.36.6

Dataset Location

The dataset has been deposited with the Archaeology Data Service doi: 10.5284/1027216

Referee

Referee statement by Peter Veth

Dataset Content

The AustArch dataset (Williams and Ulm 2014) consists of 5,044 radiocarbon determinations from 1,748 archaeological sites across Australia (Figure 1). The dataset also contains a further 478 non-radiocarbon ages, comprising optically stimulated luminescence (n=220), thermoluminescence ages (n=161), oxidisable carbon ratio (OCR) (n=35), uranium-series (n=28), electron spin resonance (n=26), cation ratio dating (n=7) and amino acid racemization (AAR) (n=1) ages from 86 archaeological sites (Figure 1). The dataset contains up to 26 data fields for each age, including location, site type, biogeographic zone, sample material, context and age details.

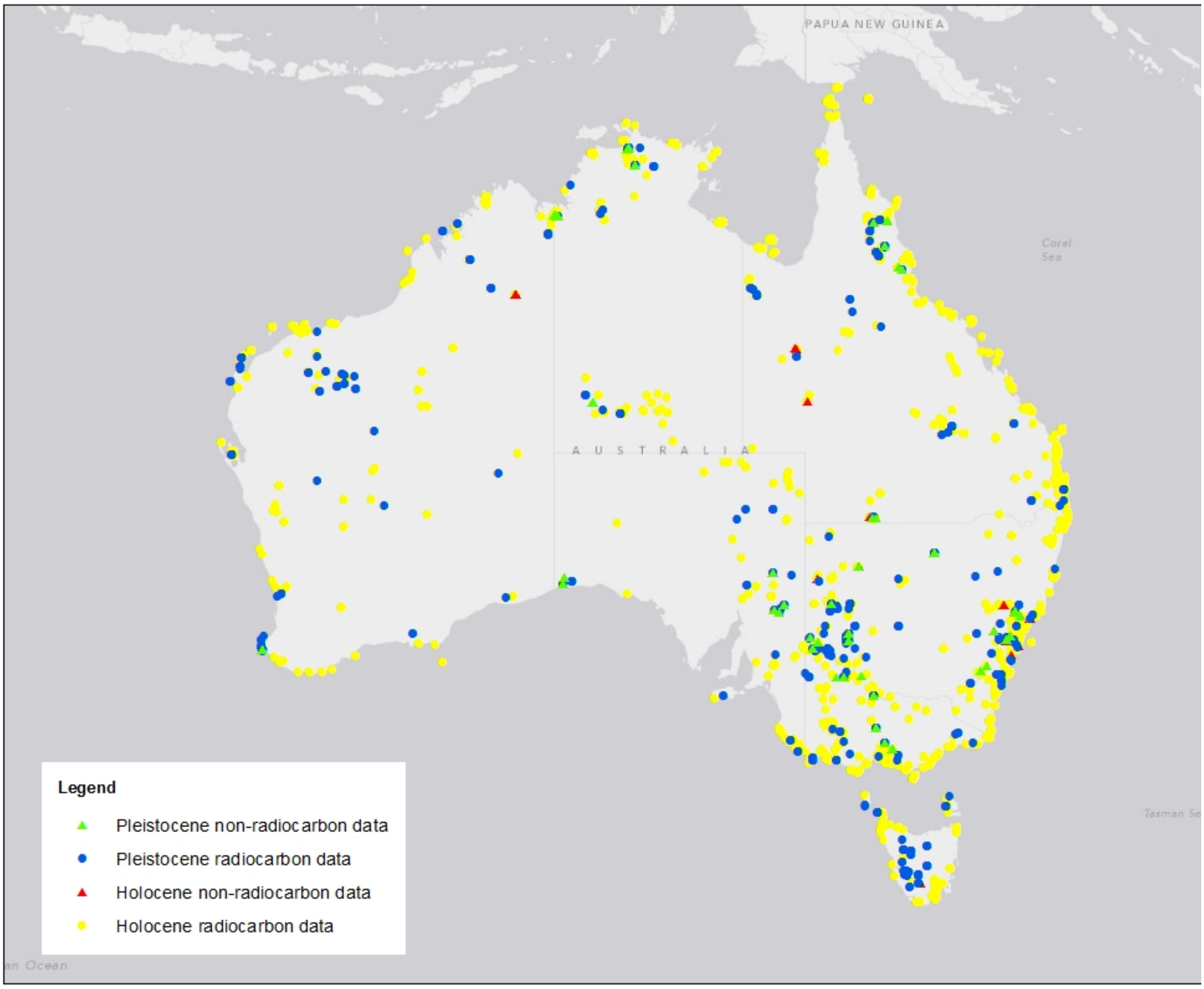

Figure 1: Map of sites with radiocarbon and non-radiocarbon ages across Australia, and included in this dataset. The dates are further divided between Pleistocene (10-50,000 cal. years BP) and Holocene (10,000-0 cal. years BP).

Background

It has been 20 years since Smith and Sharp (1993) undertook the first comprehensive review of archaeological ages across Australia and used them as a proxy for exploring human activity in the Pleistocene. It was a pioneering paper, building on the preliminary application of these techniques in Australia by Bird and Frankel (1991), and with several similar studies to follow (e.g. Holdaway and Porch 1996; Lourandos and David 1998; Ulm and Hall 1996).

The last few years has witnessed increasing use of radiocarbon data as a mainstream proxy with which to explore archaeological trends, facilitated by the increasing publication of large datasets and the availability of calibration and statistical software such as Oxcal, Calpal and R (e.g. Buchanan et al. 2008, 2011; Collard et al. 2010a, 2010b; Peros et al. 2010). In Australia, these advances have not gone unnoticed and, as part of recent research, we have now compiled an archaeological age dataset for Australia. This dataset has been sequentially published as a number of regional datasets and has been used to improve time-series and summed probability methods (Williams 2012) and as a proxy for prehistoric demography (Johnson and Brook 2011; Ulm 2013; Smith et al. 2008; Turney and Hobbs 2006; Williams et al. 2008a, 2010, 2013; Williams 2013). While these regional datasets exist, the complete dataset has special value in allowing trends across an entire continent to be tracked. While not exhaustive, the dataset provides a key resource for researchers with an interest in Australian archaeology, and forms an online repository for ongoing analysis, allowing further additions or amendments in the future. It also provides an indication of the extent and spread of archaeological work across the country to date, and areas where further work may be needed.

Here, we present the complete Australian dataset and undertake a brief review of its composition, strengths and weaknesses.

Scope

The dataset was compiled and published sequentially by region starting initially with Queensland (Ulm and Reid 2000), the arid zone (Williams et al. 2008b), the top end (Williams and Smith 2012) and finally the southern latitudes and Tasmania (Williams and Smith 2013) (Figure 2). The dataset includes *all* radiocarbon and non-radiocarbon ages associated with archaeological deposits published in the last 60 years of research (Figure 3). The dataset also includes extensive, but not comprehensive, unpublished/grey literature data, mainly from New South Wales and Queensland. Some unpublished/grey literature from Victoria and Western Australia is also included through personal communication and/or other databases (e.g. Vines 2010; Langley 2009), but no comprehensive review of archaeological repositories containing such information was undertaken in these states and territories.

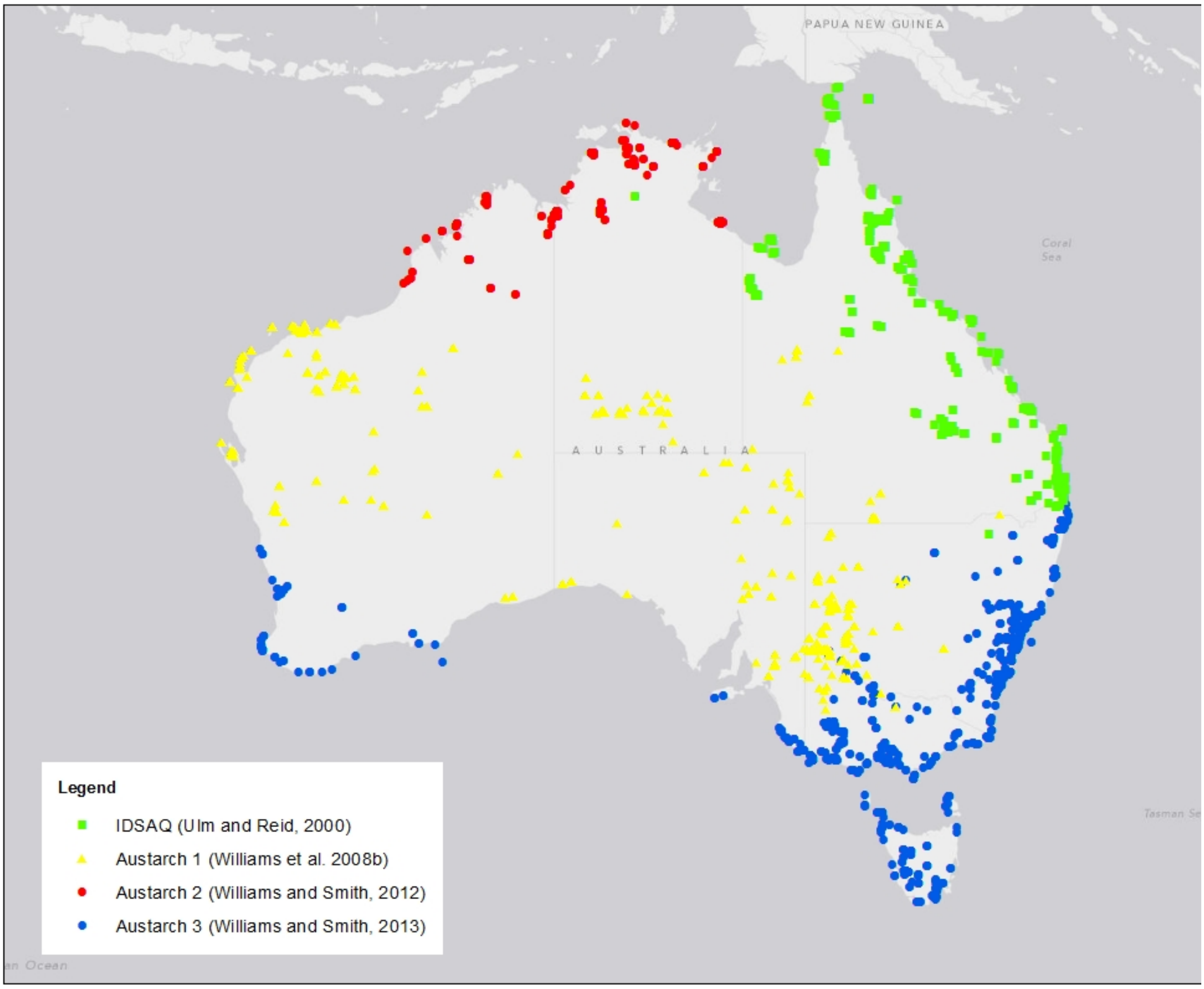

Figure 2: Map showing the different stages of the dataset development since 2000.

Overall, information has been obtained from 1,067 publications in the development of the dataset, with several hundred more being examined but failing to contain pertinent data. Of these publications, 583 (55%) were journal articles; 51 (5%) were books; 159 (15%) were book chapters; 100 (9%) were unpublished undergraduate or postgraduate theses; 164 (15%) were unpublished consulting/commercial reports; and 10 (1%) came from other sources.

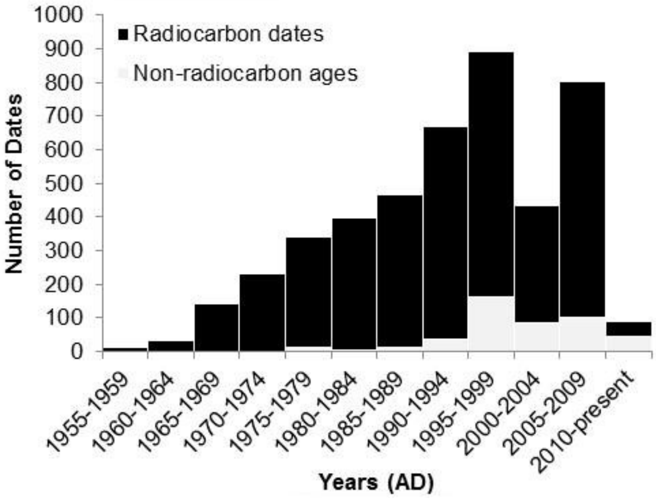

Figure 3: Graph showing the number of new dates published in 5-year intervals from 1955 to the present. Ages using non-radiocarbon techniques begin in the late 1970s, but only significantly increase in the late 1990s.

Dataset Composition

The dataset is comprised of a spreadsheet of radiocarbon and non-radiocarbon ages and a spreadsheet of references from where the data was obtained. In addition, a searchable database of the data is available via the Archaeology Data Service (Williams and Ulm 2014).

Table 1. Summary of the field data recorded for each age determination

Data Heading	Description
ADSID	Archaeology Data Service unique identifier for each age
IBRA Region	The location of the site within the relevant bioregion as defined by the Interim Bio-Regionalisation of Australia (IBRA) framework.
Longitude/Latitude	The spatial location of the site the date was recovered from in decimal degrees.
Site Name	The name of the site the date was recovered from.
Site Type	The type of site the date was recovered from (e.g. rockshelter, midden, burial etc).
Lab Code	The unique laboratory code assigned to the respective age. A list of radiocarbon laboratories is available at http://www.radiocarbon.org/Info/lablist.html
Age	The determined age.
Age Error	The error assigned to the determined age.
Carbon-13 Value	If provided, the 13C isotope value provided with the radiocarbon age.
Carbon-13 Value Error	If provided, the error for the 13C isotope value provided with the radiocarbon age.
Material Type	Detailed description of the type of material dated (e.g. wood, charcoal, shell etc).
Context	A brief description of the date location within the excavations (e.g. the test pit and/or stratigraphic unit containing the sample).
Depth from Surface (cm)	The depth of the date in relation to the surface (or datum) of the site it was recovered from.
Material Top Level	The type of material dated (e.g. bone, charcoal, freshwater shell, marine shell etc).
Method	The method used to calculate the age (e.g. radiocarbon, TL, OSL etc).
Technique	Where relevant, this field notes details of the age determination technique, particularly for luminescence ages.
Data pertinent for time-series analysis or calibration	This field is provided to assist in calibration and/or time-series analysis. It identifies which dates are terrestrial versus marine (the latter requiring additional reservoir correction), and which dates are unusable in time-series analysis, since they do not contain required information (such as location, material dated, radiocarbon errors etc).
Open or Closed Site	This field records whether the site was closed (i.e. a rockshelter, cave or other enclosed site) or open (i.e. an artefact scatter, midden on a beach etc), and is used in the application of taphonomic techniques in time-series analysis. Please note that 'closed' does not relate to availability or accessibility of information.
Directly related to	Where possible to do so, this field records whether a date could be directly applied to a human activity, such as a hearth or burial, or whether it was simply part of a wider archaeological deposit. This information was

occupation	recorded to assist in the development of time-series analysis.
Source	The publication where the age was sourced from.
Notes	A brief description of the archaeological site and any findings from which the age was documented. The field also documents any issues with the age (such as erroneous lab code, or possible duplication etc). Please note that this section was substantially developed only in AustArch 2 and 3, and as such several dates have limited information in this field.
Record Source	A summary of whether the entry was measured using radiocarbon or non-radiocarbon techniques.
Date Issues	This data field provides further detail on whether the entry was considered erroneous by the researchers and/or whether the entry was not related to human activity.
Age Norm	Duplicate of the Age field, but without any non-numerical data to facilitate searching.
Additional Data Issues	This data field identifies were we have inferred information from a publication to produce the entry, such as where the spatial location has been determined from a published map.

Ages are recorded with a series of relevant information (Table 1). At a broad spatial level, each age is listed by bioregion after the Interim Bio-Regionalisation of Australia (IBRA) (Figure 4) (after Thackway and Cresswell 1995); there are 89 IBRA regions across Australia, defined by unique climate, geology, landform, native vegetation and species information, and they provide convenient divisions of the dataset when exploring regional human behaviour. Additional spatial information in the form of decimal degree longitude and latitude are also documented for all sites, however the accuracy of these varies, depending on how the information has been presented in the respective publication.

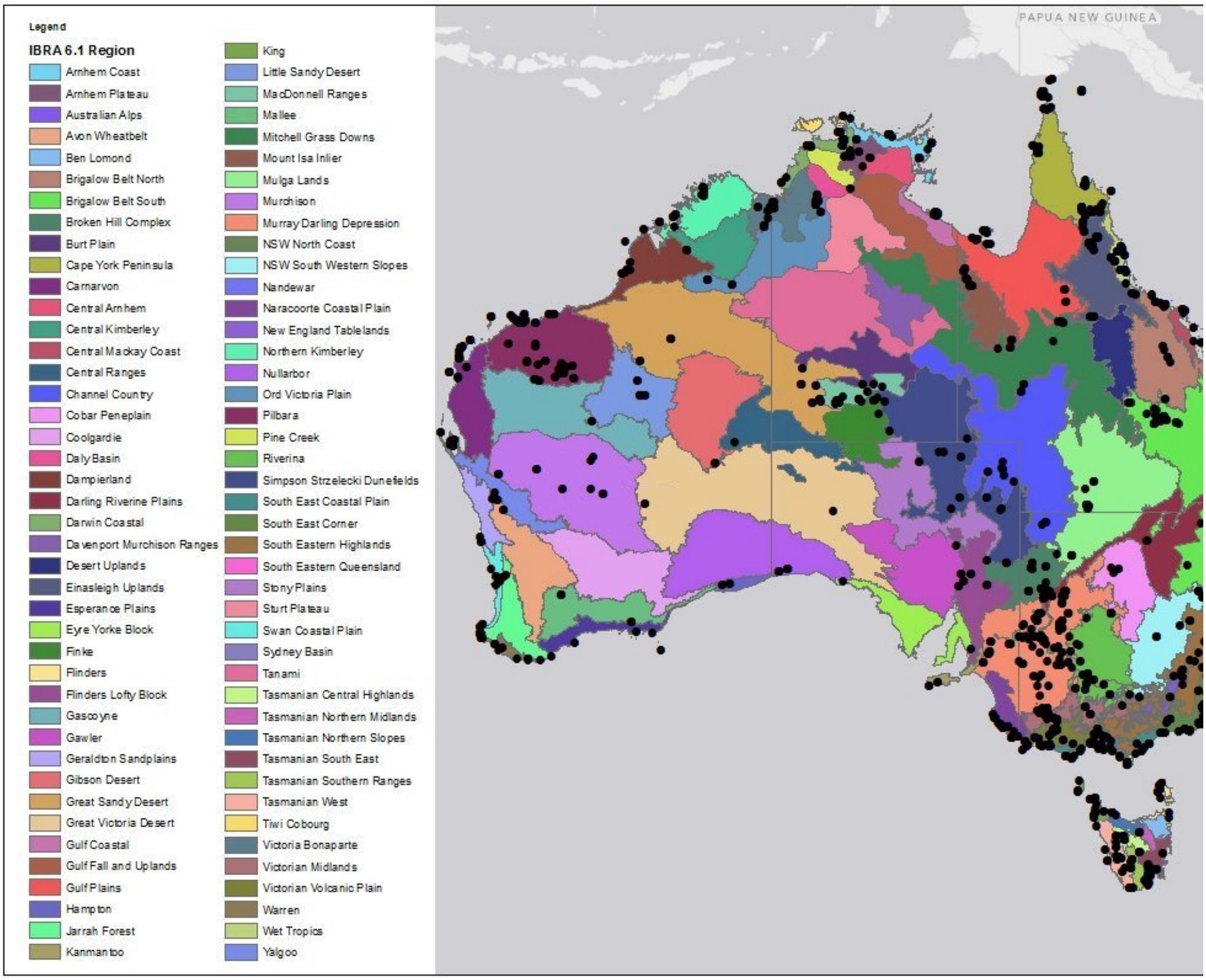

Figure 4: Map of the dataset divided by bioregions after Interim Bio-Regionalisation of Australia (Thackway and Cresswell 1995).

For each age, a range of site information is presented, including the name of the site, the context of the dated sample within the site (i.e. test pit, depth below surface, context), material type dated, and relevant references. We have also included a short description of each archaeological site and its findings in the most recent databases, specifically AustArch 2 and 3 (n=2,374 or 74%); the usefulness of this inclusion only became apparent partway through the dataset compilation and is not present in AustArch 1 or IDASQ, but we are hoping to rectify this in the future. The un-calibrated radiocarbon date and error, along with any associated information on ^{13}C isotope values (which is infrequently published) is also included.

In addition to the archaeological site information, we have included a number of additional fields to support analysis of the dataset and application to time-series or summed probability investigations. Specifically, we include fields of finite identifiers that outline whether the date requires terrestrial or marine calibration, or whether it is unusable (generally due to a lack of key information). We identify whether the site is a closed or open site – this is purely a geomorphic interpretation and is required to apply taphonomic correction procedures after Surovell et al. (2009) and/or Williams (2012). We also identify whether a date directly relates to a human activity (i.e. burial, hearth etc) or was taken from detrital charcoal or other material within a larger archaeological deposit – this information allows consideration of how much the dataset can be considered to directly relate to 'occupation episodes' or events, which is becoming more important in recent studies (e.g. Peros et al. 2010; Williams 2013). These fields are *our interpretations* of the data, and not necessarily those of the original researchers.

Where we have identified minor issues within the dataset, such as a researcher using the same laboratory code for two different ages, we have highlighted them in separate fields identified as 'Data Issues' and 'Additional Data Issues'. The same data fields also include other problems, including when only a general location is known, or interpreted from a figure within the publication; where data are correct but do not necessarily relate to human activity (such as dating of deposits under-lying an archaeological site); and where data are considered erroneous by researchers, or have gaps in the published information. Where such issues are considered to be major, the date is listed as 'unusable'.

Strengths and Weaknesses of the Dataset

Since the development and release of various parts of the dataset, it has proved a well-used resource for a range of research and consulting/commercial works, however its main application has been in the development of time-series or summed probability analyses. Here we outline some of the strengths and weaknesses of the dataset to assist researchers in their application and interpretation of the dataset in these forms of analyses.

Table 2. Summary of main material types dated within the dataset . *Note percentages are created using the overall dataset of 5,044 dates.*

Material Type	Number of Dates	%
Charcoal	2,837	56.2
Marine (see Table 3)	1,110	22
Freshwater shell	252	5.0
Bone (human, mammal)	119	2.4
Wood, nuts, spinifex and fibres	86	1.7
Otoliths	34	0.7
Oxalate coatings	24	0.5
Calcium/Soil Carbonate	22	0.4
Carbonised material	22	0.4

Table 3. Summary of main marine materials dated within the dataset *Note percentages are created using the marine dataset of 1,110 dates*

Marine Material Type	Number of Dates	%
Marine (undefined)	553	49.8
Anadara sp.	240	21.6
Terebralia sp.	42	3.8
Melo sp.	39	3.5
Turbo sp.	32	2.9
Ostrea sp.; *Saccostrea* sp.	18	1.6
Subinella sp.	17	1.5
Donax sp.	16	1.4

The main strengths of the dataset include (note the figures below exclude the 462 dates that are classified as 'unusable'):

- A significant proportion of the ages (82%) was processed in the last 20-30 years (Figure 3). This is a period that saw significant advances in pre-treatment, measurement (e.g. Accelerator Mass Spectrometry), and instruments for radiocarbon dating (e.g. Bird et al. 1999; Hedges and Gowlett 1984), and improves the reliability of the dates within the dataset.
- A wide range of archaeological information and depositional contexts are represented, including both terrestrial (n= 3,472) and marine samples (n=1,110); open/non-rockshelter (n=2,572) and closed (n=2,004) sites; and a wide range of site types (Figure 5). The site types demonstrate an even distribution between rockshelters (44%) and open or midden sites (40%). These divisions have the advantage of providing the entire scope of human activity in the past across the continent, but are still dominated by rockshelters (n=1,971), a robust site type that is generally averse to taphonomic loss (Johnson and Brook 2011; cf. Ulm 2013) and terrestrial material, which removes the need to consider marine reservoir uncertainty during calibration processes (Ulm 2006).
- A well-represented Holocene archaeological record, with 3,729 (74%) dates documented within the Holocene epoch (10,000 years BP – present). This period saw significant changes in population and technology in Aboriginal prehistory, and as such the dataset provides a robust proxy with which to explore these transformations.
- A wide spatial distribution across the Australian landmass, with 75 of the 89 IBRA bioregions represented in the dataset. This allows for investigation of human activity in a number of ecotones, including temperate, semi-arid, arid and tropical environments.

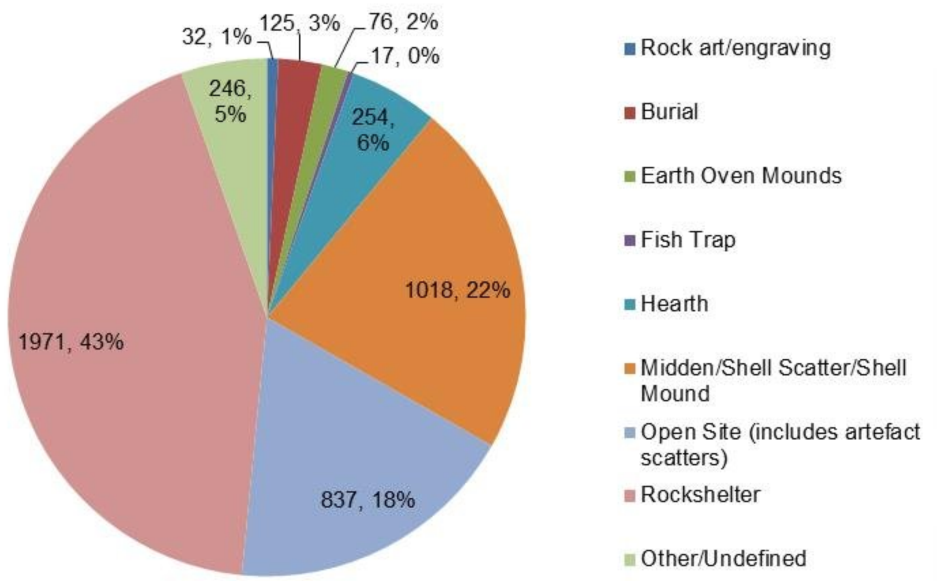

Figure 5: Number and proportion of main site types represented in the dataset.

The weaknesses of the dataset include:

- Low numbers of data in several parts of Australia. While 75 of the 89 bioregions contain data, only two (Murray Darling Depression and Sydney Basin) approach enough data to undertake time-series analysis where a minimum of 500 dates are required (Williams 2012). A further 52 of the bioregions contain fewer than 50 dates. Several areas demonstrate no previous archaeological investigation (at least none where radiocarbon data were reported) (n=12), such as the Tanami and Great Victoria Deserts. This constrains the use of the dataset to regional or continental-scale first-order analysis, rather than allowing more micro-scale investigations.
- Low numbers of Pleistocene data. While the Holocene epoch is well-represented in the dataset, only 853 ages have been documented between 50,000-10,000 years BP. This does not necessarily hinder exploration of this time period with the dataset (e.g. Williams 2013, Williams et al. 2013), but it does constrain analyses to largely preliminary or speculative findings and conclusions. Discovery and/or publication of Pleistocene sites has significantly slowed since the 1990s (Figure 6).
- A large proportion of the data reflect only a single age from their respective archaeological site (Figure 7). To use the data as a proxy for human occupation, it is intrinsically assumed that the ages accurately reflect the archaeological sequence from which they are taken. However this assumption breaks down when the sequence in question is inadequately dated. For example, Puritjarra rockshelter has 39 ages throughout its sequence, and therefore the development of a time-series analysis from the

data will accurately reflect the chronology and intensity of occupation at this site, whereas Artefact Creek Waterfall rockshelter with only one age would not reproduce a valid curve. There are 873 (53%) instances where only one age has been reported at a site, this increases to 1,413 (86%) when considering records with less than four dates.

- Several areas where archaeological research has focussed on a specific site or locale, leading to extensive numbers of ages reflecting largely the same occupation episode, and having ramifications in time-series analysis in the form of artificial peaks. This issue can be largely constrained to two main locations:
  - the Murray Darling Depression where filling of palaeo-lakes in the Darling River and Willandra Lakes (e.g. Lake Mungo) through the Last Glacial Maximum (LGM) led to a focus of archaeological evidence in a period that more widely has relatively sparse archaeological evidence; and
  - Tasmania where expansion of peri-glacial button grasslands similarly led to an unusual peak in human occupation during the LGM. More broadly, the location and age of dates from marine samples are generally limited by sea-level trends in the past, with Pleistocene-aged samples restricted to areas where the coastline has not been submerged in the recent past. There are also a few sites where detailed analysis results in a similar issue, such as Ngarrabullgan rockshelter were 55 dates were reported (David and Wilson 1999).

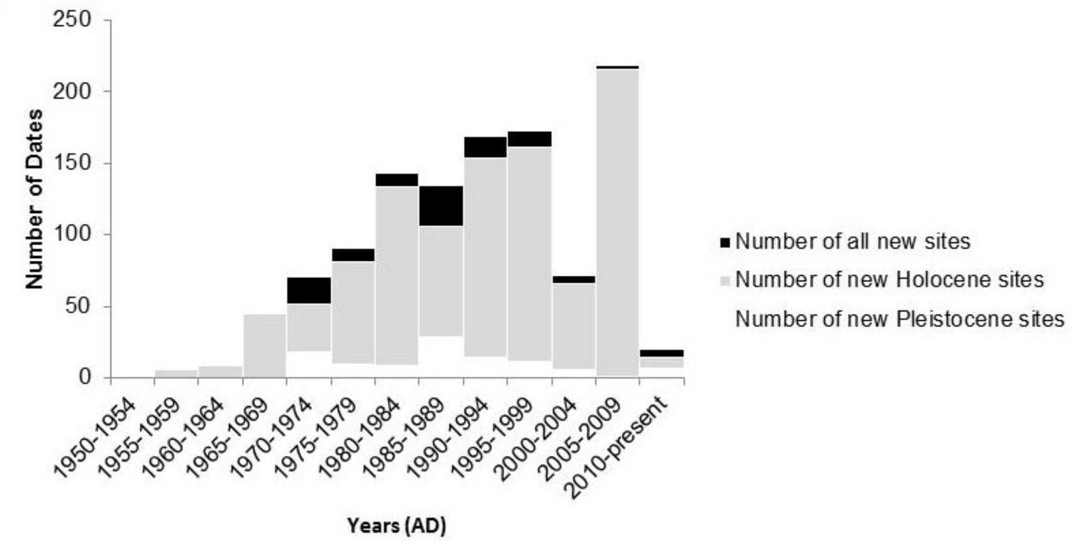

Figure 6: Number of newly reported archaeological ages dating to the Pleistocene (50,000-10,000 years BP) and Holocene (10,000 years BP – present) epochs.

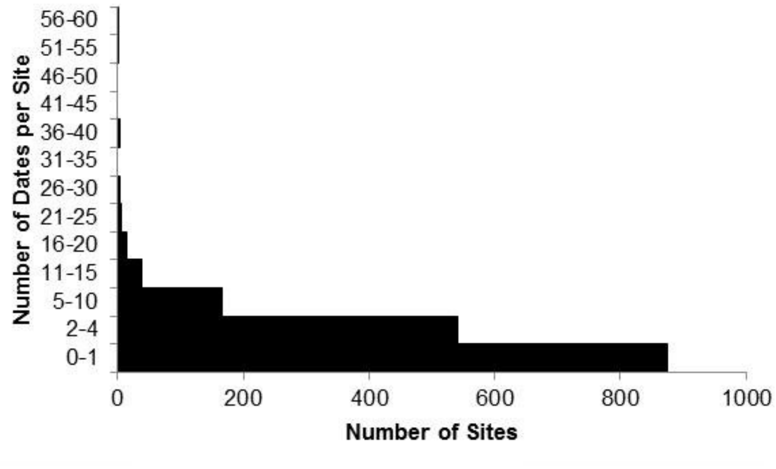

Figure 7: Number of radiocarbon ages per site.

Re-use potential/Future work

Here, we present the most comprehensive dataset of archaeological ages for Australia. However, while containing virtually all published and extensive unpublished information, there are a number of deficiencies that we highlight to improve the dataset in the short-term, and to form a focus for the archaeological community into the future.

In the short-term, the dataset can be significantly improved by the incorporation of all unpublished data, particularly produced in the commercial/consulting sector. The data are not readily available, often contained in State or local repositories and/or by individual companies. Commercial/consulting work has been extensive in the last decade, most notably in Victoria and Western Australia, and the incorporation of data from these States would provide a significant increase in ages for both arid and temperate regions. Improved publication of age data would also greatly improve the dataset. As outlined above, some 462 (9%) ages could not be used in the analysis since adequate information was not provided. We recommend that all journals ensure minimum information as outlined in Table 1 is obtained for all ages to be published. We highlight the absence of ^{13}C values in most publications, with only 190 (4%) ages presenting this information (^{13}C values can provide a range of useful information, including vegetation and dietary information through time).

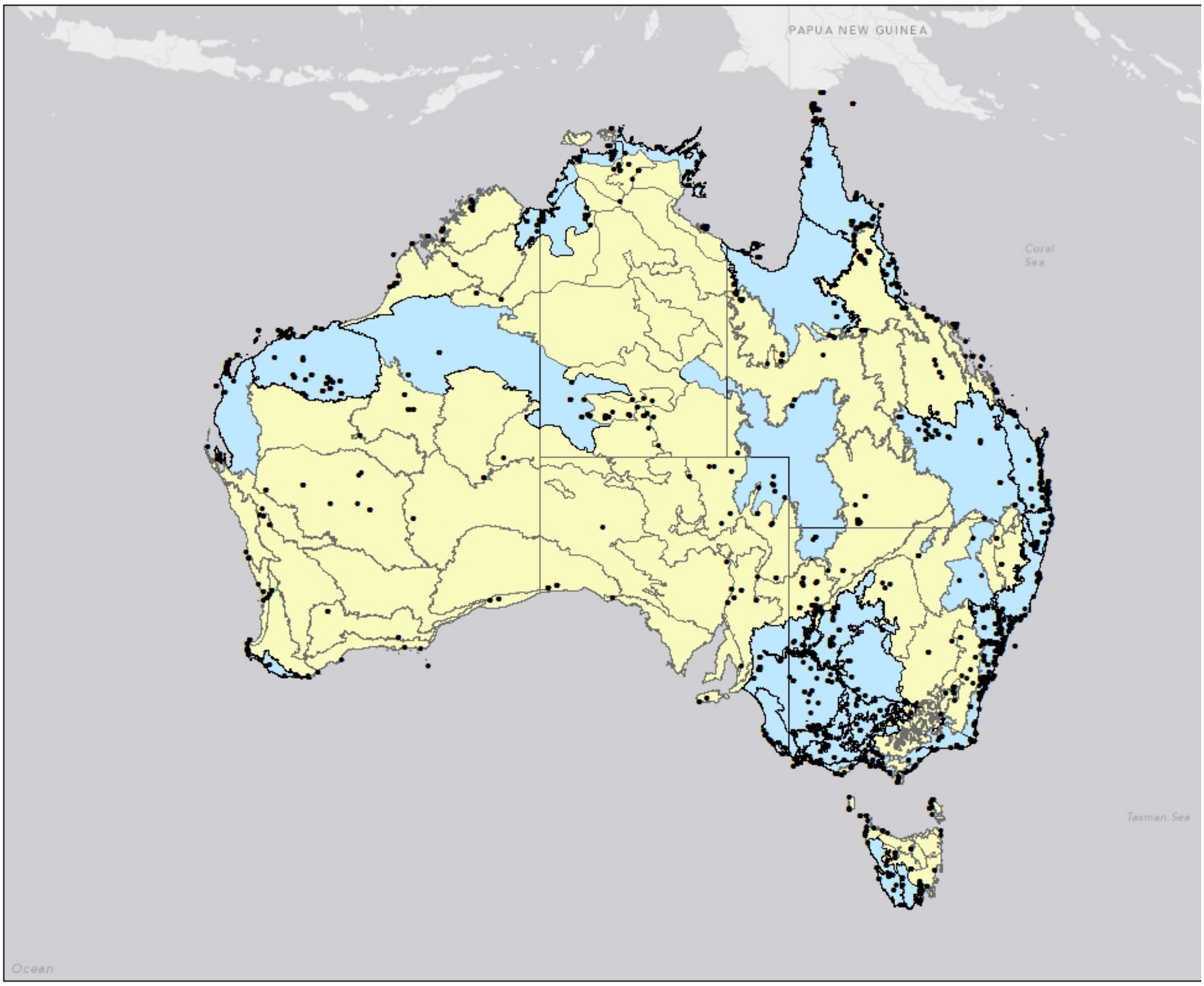

Figure 8: Areas where over 50 archaeological radiocarbon ages have been obtained (blue) versus those with fewer than 50 dates (beige). Archaeological data from the dataset is presented by black dots.

More widely, the dataset highlights a number of areas across Australia where our archaeological knowledge is minimal. Only 25 of 89 bioregions (28%) contained 50 or more ages, and these are primarily located on the periphery of the continent (Figure 8). Almost three-quarters of the continent, some 5.9 million km², contains fewer than 50 ages, with several bioregions having no previous evidence of archaeological investigation. We believe that these areas should form the focus of future archaeological research, most notably those between the tropical north ([Arnhem Plateau]) and the central deserts; between the central deserts and the temperate south; and the western deserts between the southwest coastline, central deserts and [Pilbara] – all areas where people must have travelled extensively throughout the last 50,000 years, but for which no evidence to date has been published. Given the ubiquitous nature of archaeological material across Australia, we consider it unlikely that humans never occupied these areas, but rather that investigation has simply yet to happen.

Relationship to other publications

See References.

References

Bird, C.F.M. and Frankel, D. 1991 'Problems in constructing a prehistoric regional sequence: Holocene southeast Australia', *World Archaeology* **23(2)**, 179-192. http://dx.doi.org/10.1080/00438243.1991.9980170

Bird, M.I., Ayliffe, L.K., Fifield, L.K., Turney, C.S.M., Cresswell, R.G., Barrows, T.T. and David, B. 1999 'Radiocarbon dating of 'old' charcoal using a wet oxidation, stepped-combustion procedure', *Radiocarbon* **41(2)**, 127-140.

Buchanan B., Collard, M. and Edinborough, K. 2008 'Paleoindian demography and the extraterrestrial impact hypothesis', *Proceedings of the National Academy of Sciences USA* **105**, 11651-11654. http://dx.doi.org/10.1073/pnas.0803762105

Buchanan, B., Hamilton, M.J., Edinborough, K., O'Brien M.J. and Collard, M. 2011 'A comment on Steele's (2010) "Radiocarbon dates as data: Quantitative strategies for estimating colonization front speeds and event densities"', *Journal of Archaeological Science* **38**, 2116-2122. http://dx.doi.org/10.1016/j.jas.2011.02.026

Collard, M., Buchanan, B., Hamilton, M. and O'Brien, M.J. 2010a 'Spatiotemporal dynamics and causes of the Clovis-Folsom transition', *Journal of Archaeological Science* **37**, 2513-2519. http://dx.doi.org/10.1016/j.jas.2010.05.011

Collard, M., Edinborough, K., Shennan, S. and Thomas, M.G. 2010b 'Radiocarbon evidence indicates that migrants introduced farming to Britain', *Journal of Archaeological Science* **37**, 866-870. http://dx.doi.org/10.1016/j.jas.2009.11.016

David, B. and Wilson, M. 1999 'Re-reading the landscape: Place and identity in NE Australia during the late Holocene', *Cambridge Archaeological Journal* **9(2)**, 163-188. http://dx.doi.org/10.1017/S0959774300015365

Hedges, R.E.M. and Gowlett, J.A.J. 1984 'Accelerating carbon dating', *Nature* **308**, 403-404. http://dx.doi.org/10.1038/308403a0

Holdaway, S. and Porch, N. 1996 'Dates as data: An alternative chronology for southwest Tasmanian archaeological site occupation' in J. Allen (ed) *Report of the Southern Forests Archaeological Project*, Melbourne: La Trobe University. 251-277.

Johnson, C.N. and Brook, B.W. 2011 'Reconstructing the dynamics of ancient human populations from radiocarbon dates: 10 000 years of population growth in Australia', *Proceedings of the Royal Society B* **278**, 3748-3754. http://dx.doi.org/10.1098/rspb.2011.0343

Langley, M.C. 2009 *Material Culture and Behaviour in Pleistocene Sahul: Examining the Archaeological Representation of Pleistocene Behavioural Modernity in Sahul*, M.Phil. thesis, School of Social Science, The University of Queensland, Brisbane.

Lourandos, H. and David B. 1998 'Comparing long-term archaeological and environmental trends: North Queensland, arid and semi-arid Australia', *The Artefact* **21**, 105-114.

Peros, M.C., Munoz, S.E., Gajewski, K. and Viau, A.E. 2010 'Prehistoric demography of North America inferred from radiocarbon data', *Journal of Archaeological Science* **37**, 656-664. http://dx.doi.org/10.1016/j.jas.2009.10.029

Smith, M.A. and Sharp, N.D. 1993 'Pleistocene sites in Australia, New Guinea, and Island Melanesia: Geographic and temporal structure of the archaeological record' in M.A. Smith, M. Spriggs and B. Fankhauser (eds) *Sahul in Review*, Canberra: The Australian National University. 37-59.

Smith, M.A., Williams, A.N., Turney, C.S.M. and Cupper, M. 2008 'Human environment interactions in Australian drylands: Exploratory time-series analysis of archaeological records', *Holocene* **18(3)**, 389-401. http://dx.doi.org/10.1177/0959683607087929

Surovell, T.A., Byrd Finley, J., Smith, G.M., Brantingham, P.J. and Kelly, R. 2009 'Correcting temporal frequency distributions for taphonomic bias', *Journal of Archaeological Science* **36**, 1715-1724. http://dx.doi.org/10.1016/j.jas.2009.03.029

Thackway, R. and Cresswell, I.D. (eds) 1995 *An Interim Biogeographic Regionalisation for Australia: A Framework for Establishing the National System of Reserves*, Canberra: Australian Nature Conservation Agency.

Turney, C.S.M. and Hobbs, D. 2006 'ENSO influence on Holocene Aboriginal populations in Queensland, Australia', *Journal of Archaeological Science* **33**, 1744-1748. http://dx.doi.org/10.1016/j.jas.2006.03.007

Ulm, S. 2013 ''Complexity' and the Australian continental narrative: Themes in the archaeology of Holocene Australia', *Quaternary International* **285**, 182-192. http://dx.doi.org/10.1016/j.quaint.2012.03.046

Ulm, S. and J. Hall 1996 'Radiocarbon and cultural chronologies in southeast Queensland prehistory' in S. Ulm, I. Lilley and A. Ross (eds) *Australian Archaeology '95: Proceedings of the 1995 Australian*

Archaeological Association Annual Conference, Tempus 6. St Lucia, QLD: Anthropology Museum, Department of Anthropology and Sociology, University of Queensland. 45-62.

Ulm, S. and Reid, J. 2000 'Index of dates from archaeological sites in Queensland', *Queensland Archaeological Research* **12**, 1-129.

Ulm, S. 2006 'Australian marine reservoir effects: A guide to ΔR values', *Australian Archaeology* **63**, 57-60.

Vines, G. 2010 View this page "radiometric dates in Victoria" [Online] 17 August 2010. Available at https://groups.google.com/forum/?hl=en#!searchin/ozarch/vines$20victoria/ozarch/Eczr0JEJlTE/eLjRtyOFaHgJn [Accessed 29 January 2014].

Williams, A.N. 2012 'The use of summed radiocarbon probability distributions in archaeology: A review of methods', *Journal of Archaeological Science* **39**, 578-589. http://dx.doi.org/10.1016/j.jas.2011.07.014

Williams, A.N. 2013 'A new population curve for prehistoric Australia', *Proceedings of the Royal Society B* **280**, 20130486. http://dx.doi.org/10.1098/rspb.2013.0486

Williams, A.N. and Smith, M.A. 2012 'AustArch 2: A database of ^{14}C and luminescence ages from archaeological sites in the Top End', *Australian Archaeology* **74**, 146.

Williams, A.N. and Smith, M.A. 2013 'AustArch 3: A database of ^{14}C and luminescence ages from archaeological sites in southern Australia', *Australian Archaeology* **76**, 102.

Williams, A.N., Santoro, C.M., Smith, M.A. and Latorre, C. 2008a 'The impact of ENSO in the Atacama desert and Australian arid zone: Exploratory time-series analysis of archaeological records', *Chungara, Revista de Antropología Chilena* **40**, 245-259.

Williams, A.N., Smith, M.A., Turney, C.S.M. and Cupper, M. 2008b 'AustArch1: A database of ^{14}C and luminescence ages from archaeological sites in the Australian arid zone', *Australian Archaeology* **66**, 99.

Williams, A.N., Ulm, S., Goodwin, I. and Smith, M. 2010 'Hunter-gatherer response to late Holocene climatic variability in northern and central Australia', *Journal of Quaternary Science* **25(6)**, 831-838. http://dx.doi.org/10.1002/jqs.1416

Williams, A.N., Ulm, S., Cook, A.R., Langley, M.C. and Collard, M. 2013 'Human refugia in Australia during the Last Glacial Maximum and Terminal Pleistocene: A geo-spatial analysis of the 25-12ka Australian archaeological record', *Journal of Archaeological Science* **40**, 4612-4625. http://dx.doi.org/10.1016/j.jas.2013.06.015

Williams, A.N. and Ulm, S. 2014 AustArch: A Database of 14C and Luminescence Ages from Archaeological Sites in Australia [data-set]. York: Archaeology Data Service [distributor]

Acknowledgements/Funding

For advice and information contained in the database we thank Bryce Barker, John Beaton, Andrew Border, Sally Brockwell, Noelene Cole, Malcolm Connolly, Richard Cosgrove, Matt Cupper, Bruno David, Neale Draper, Tony Eales, Jay Hall, Giles Hamm, Fiona Hook, Lara Lamb, Ian Lilley, Roger Luebbers, Ian McNiven, Rob Neal, Jon Prangnell, Kathryn Przywolnik, Norma Richardson, Richard Robins, June Ross, Mike Rowland, Peter Veth, Gary Vines, Lynley Wallis and Esmee Webb. Sean Ulm is the recipient of an Australian Research Council Future Fellowship (project number FT120100656).

Referee Statement

Peter Veth, Faculty of Arts, School of Social Sciences, The University of Western Australia

Cite this as: Veth, P. 'Referee Statement' in Williams, A., Ulm, S., Smith, M. and Reid J. (2014). AustArch: A Database of 14C and Non-14C Ages from Archaeological Sites in Australia - Composition, Compilation and Review (Data Paper). Internet Archaeology, (36). doi:10.11141/ia.36.6

This dataset represents an invaluable compilation of ^{14}C and non-^{14}C ages from archaeological sites for most of the 89 bio-regions of Australia. Critically harvesting some 5,000 ^{14}C and 500 non-^{14}C dates from over 1,000 publications, the dataset provides information on each date in 26 fields including its location, site type, biogeographic zone, sample material, context and age details (including ^{13}C and error). This data provides a comprehensive foundation for any regional archaeology in Australia illustrating past research foci, strengths and biases in sampling of bioregions, geomorphic context, site type, sample type, and adequacy of contextualisation (e.g. association with cultural events). Such datasets can improve time series and summed probability methods and are being used as a mainstream proxy to explore archaeological trends and specifically demographic fluctuations for the tropical northern, central arid zone and southern ocean provinces. Such reconstructions will always rely on coverage and adequacy of sampling (52 bioregions register less than 50 dates). While both closed rockshelter sites and open/midden sites account for a similar proportion of dates, less than 14% of sites have returned 4 or more dates. Given that 74% of dates fall within the Holocene epoch, this period is most amenable to archaeological enquiry at a fine-scaled regional level. For the Pleistocene era, larger scale questions such as occupation patterns during the LGM might reasonably be addressed and refined. The data may be re-used for studies of a) timing of colonisation of differing bioregions, b) characterising varying mobility patterns of groups occupying the arid zone, c) identifying gaps in previous research (the Great Victoria and Tanami Deserts), d) as proxy for demographic changes, e) the responses of groups to environmental stochasticity such as OIS2 and ENSO, f) the relationship between occupation and phases of rock art production through time, g) the nature of coastal occupation during lower sea stands and specifically following mid-Holocene stabilisation, and h) not least, as a fundamental building block for any regional archaeology of Australia.

June 2014

ISSUE HOME

File last updated: Mon Jun 23 2014