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Stone, Sources and Social Networks

Tracing Movement and Exchange Across Dharawal
Country, Southeastern Australia.



Karen Stokes
2015
University of Sydney

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Karen Stokes

Thesis submitted in fulfillment of the degree of Bachelor of Arts (Honours) in
Archaeology

University of Sydney

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Abstract

Historical evidence suggests that at the time of European settlement in the NSW Illawarra region, Dharawal groups, who came together for ceremonies, had an established regional network with movement of people, and items, via pathways linking the highlands west of the Illawarra escarpment and the coastal plain. The degree to which the established network described in European accounts reflects pre-colonial patterns or activity affected by early colonial settlement is unclear, however. This thesis examines this topic by comparing archaeological and historical evidence.

Ground edged hatchets, and raw material for their manufacture, are known to have moved within Aboriginal social networks and several sites in the Dharawal region have been identified as likely sources of stone for hatchets and other tools. Non-destructive archaeological provenancing of 148 ground edged hatchets from coastal plain and inland findspots in and adjacent to the Dharawal study area provides an opportunity to characterise pre-colonial patterns of raw material use, and movement of artefacts from source to find-spot. Matches to sources within Dharawal country, as well as beyond the region, trace the local and inter-regional social network within which these artefacts and/or raw materials moved. This provenancing research is a component of a broader, Australian Research Council funded, study of Aboriginal exchange systems and social networks in Southeastern Australia 2012-14: *Axes, Exchange, Social Change: New Perspectives on Australian Hunter Gatherers (DP12010393)*, directed by Peter Grave (University of New England) and Val Attenbrow (Australian Museum).

Spatial reconstruction of Early European observations of movement and gathering of Aboriginal people across, and into and out of Dharawal country between 1788 and 1850, allows archaeological and historical social network patterns to be directly compared. Results suggest significant correlation between the two, as well as consistency in the historical pattern over time. This evidence suggests pathways linking Dharawal groups socially and economically, in place prior to the arrival of Europeans, continued to be used throughout the first fifty years of European

colonisation. These results that support and enhance previous research findings in the region.

Evidence that this cultural pattern may have remained stable through a period of known social upheaval suggests that the network of pathways interconnecting Dharawal groups, pathways aligned with the distinctive physiography of country, may have also been stable through earlier times of change. If so, this may also shed light on the nature, and function, of this network in the culturally, socially and environmentally dynamic, deeper past.

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CHAPTER 1

INTRODUCTION AND RESEARCH AIMS

Introduction

Early European accounts provide an important perspective on movements of Aboriginal people for subsistence and ceremonial purposes. They describe exchange of tools, raw materials and a range of other items in a variety of contexts, including ceremonial occasions (e.g. Howitt 1904). These accounts suggest that throughout Australia, tools and raw materials were often procured through processes of reciprocal gift exchange, involving either travel to the raw material source to collect materials or barter for them with owners, or barter exchanges at large tribal or inter-tribal gatherings (McBryde, 1984, 1987; McCarthy, 1939; Mulvaney, 1976; Stanner, 1933-34; Thomson, 1949 cited in Grave et al. 2012:1674).

Ground-edged hatchets, used in all parts of southeastern Australia from approximately 4000-3500 BP and produced in large numbers, are among the items known to have moved within Aboriginal exchange systems (Grave et al. 2012:1675; Attenbrow et al. 2013). The development, from the 1940s, of petrological methods for tracing these artefacts to their raw material source offered a means for studying the networks within which this material moved. One impetus for the study of exchange in archaeology (along with technological capacity) was recognition of the role exchange plays in stimulating cultural change. Exchange can provide new techniques, materials and ideas, while its networks can act as both unifying and disruptive forces within and between societies (McBryde 1986:77).

In Australia, provenancing research (e.g. McBryde 1974, 1984; McBryde and Watchman 1976) combined ethnographic and historical evidence, petrographic analysis and visual matching to trace large numbers of ground-edged hatchets back to

likely geological sources. These highly influential studies demonstrated the existence of long-distance (trans-continental) exchange networks and diversity in practices linked to environmental context, emphasising the need for a broad but also regional scale approach (McBryde 1974:348; Grave et al. 2012:1675). The destructive nature of these methods, however, which commonly required artefacts to be thin sectioned, restricted their application and led to a hiatus in sourcing studies in Australia.

Recent advances in non-destructive provenancing techniques have revitalised and expanded this area of research in Australia. Portable X-Ray Fluorescence (pXRF) has been demonstrated to be effective in characterising and tracing igneous materials from which many ground-edged hatchets are made (Grave et al. 2012). This method is currently being applied to a large scale, Australian Research Council funded, study of Aboriginal exchange systems and social networks in Southeastern Australia, directed by Peter Grave (University of New England) and Val Attenbrow (Australian Museum). Provenancing research presented in this thesis is a regional component of this study, examining Aboriginal social networks in the Dharawal language group area (see Chapters 3 and 4), which extends from Botany Bay and Campbelltown in the north, through the Nepean, Wollondilly, Georges and Cataract water catchments, west to Moss Vale and south to the Shoalhaven River and Jervis Bay (Wesson 2005:4).

148 ground-edged hatchets held in the Australian Museum collection, 132 from locations within the Dharawal language group area and 16 from Marulan and Bungonia to the west, were analysed. These are compared with geological samples from local and inter-regional potential source locations. The geological reference collection for this project extends from the Shoalhaven River NSW in the south, across the Sydney Basin, to the Bunya Mountains Queensland in the north and as far west as Bathurst/Orange (See Chapter 6 for details). By tracing hatchets to their raw material sources, this research aims to characterise the network pathways along which these artefacts, and/or their raw materials moved. The ethnographic record supports interpretation of these provenancing patterns as a proxy for the broader social

networks within which this material moved (Grave et al. 2012:1674). Exchange of material is understood to have occurred within systems defined also by patterns of interaction in marriage arrangements, ritual, access to country, and inter-group support (McBryde 1986:85). Motivations for exchange included accumulating and cementing relationships, and the meanings and functions of these relationships were not limited to economics (McBryde 1986:77). These networks also represent pathways along which people travelled, interacted with other groups and gathered for ceremony. The interconnectedness of Australian Aboriginal communities, via these complex social networks that fulfilled societal and ritual needs as well as utilitarian requirements, was central to these gatherings (Grave et al. 2012:1674). Results from this analysis provide valuable information about local, as well as inter-regional social network connections in place prior to the arrival of Europeans.

Documentary and ethnographic sources have also been used to study exchange/social networks at the time of, and following, European colonisation (e.g. historical period in the Sydney region (Irish and Goward 2012) and early colonisation period in the study area (Sefton 1980). Historical accounts suggest that at the time of European settlement, Dharawal groups, who came together for ceremonies, had an established regional economy with movement of items (and people) via a network with specific pathways linking the highlands west of the Illawarra escarpment and the resource-rich coastal plains below (Sefton 1980:13; Wesson 2005). This historical evidence is potentially relevant to the Dharawal social network that was in place prior to European colonisation. Historically recorded observations of movements of people, ceremonial gathering and connections between groups describe pathways along which ground-edged hatchets and/or materials for their manufacture may have travelled in the more distant past.

The use of ethnographic and historical evidence to formulate models to be tested against the archaeological record is a valid, and valuable, archaeological tool (Attenbrow 1976:22). Historically recorded evidence cannot be assumed to be a record of 'traditional' Aboriginal behaviour, however. The relevance of any

information gleaned from historical observations to any time preceding the arrival of the observers can only be determined by correlation with, and testing against the archaeological record (Hiscock 2008:1-19). The degree to which patterns of movement and connection described in these accounts reflect pre-colonial patterns, or instead describe phenomena influenced by early colonial settlement, is unclear at present and will be examined within this research.

Ground-edged hatchet provenancing in the study area presents an opportunity to compare archaeological and historical evidence of Dharawal social network connections. Direct comparison, however, requires a common format. In order to examine the relationship between these two forms of evidence, early historical accounts relating to Aboriginal people in the study area were analysed to trace the movements, gatherings and connecting pathways described within, and produce a map of the pattern they, over time and collectively, describe. Extracts from 33 accounts, written between 1795 and 1904, provide information plotted in this analysis.

Spatial mapping of these historical observations is informative in its own right. Spatially formatted incorporation of tangible and intangible evidence of associations and connections within Aboriginal communities has been demonstrated to be a particularly valuable and meaningful approach (Irish and Goward 2012; Irish and Ingrey 2013). Together, these lines of evidence have the potential to inform on more than just the reliability of historical evidence and/or its relevance to the more distant past. Historical and archaeological evidence can shed light on the same aspect of behaviour for it allows it to be considered dynamically, as it functioned, responded and adapted through a period of dramatic cultural change (Hiscock 2008:269). Though on one scale these two sets of evidence are different records of different times, on another they are evidence of the same thing over time, a part of the cultural landscape built by, and subsequently used for, social activity and exchange (Chapter 2 will expand on this). Characterising and examining this network before, and through the period of the first fifty years of European colonisation informs on Aboriginal

cultural responses to European introduced change, social disruption and environmental upheaval in the region. It, therefore, may also inform on the nature, function and history of this network in the deeper, past.

Case Study – Dharawal Country

As a case study, Dharawal country represents a valuable, in some ways exceptional, opportunity for this examination. European expansion during the 1790s from Sydney and Parramatta to the Hawkesbury and Georges River was very rapid, with Aboriginal people dispossessed of land and denied access to plant and animal resources. Colonisation expansion into the south, somewhat protected by its inaccessibility, was less rapid. Larger communities survived, knowledge was retained and practiced for a longer period of time, and traditional practices such as convening for initiation ceremonies continued until the late 19th Century – though with decreasing frequency (Attenbrow 2002:14-15,126). The case study region itself will be discussed in more detail in Chapters 3 and 4. In summary, the following points pertain to its suitability for this research design:

- Historical evidence suggests an established regional economy, with a defined set of pathways in place (Sefton 1980).
- Though there was contact between Europeans and Aboriginal people living in the region from 1798 on, especially along the coast, the area was somewhat protected by its inaccessibility and European expansion into the area was delayed (Attenbrow 2002:14-15,126). The first land grant issued in the Illawarra was in 1816 (Organ 1990:93) and the Shoalhaven settled in the 1820s (Bennett 2003).
- Documentary records relating to Dharawal people in the Illawarra and Shoalhaven region (Bennett 2003) suggest that, despite the impacts of early exploration and settlement, Dharawal people were still engaged in traditional practices of movement, ceremony and resource collection up to the 1850s.

- Previous compilation of documentary evidence relating to Aboriginal people in the Illawarra/Shoalhaven region, (Organ 1990, 1993) provides a comprehensive set of documentary evidence for analysis of spatial information.
- The area has been extensively researched and studies conducted on a regional scale, often in collaboration with Aboriginal communities, provide background material suitable for contextualising this scale of project (e.g. McBryde 1984; Corkill 1986; Boot 2002; Bennett 2003; Navin Officer 2000; Wesson 2005).

Research Aims

The key research aim for this project is to investigate whether pre-1788 patterns of movement and exchange continued unchanged into and throughout the early period of European colonisation in the Dharawal study area, or whether the impact of European colonisation initiated changes to the network organising patterns of movement and exchange. To address this primary research aim, it was necessary to:

1. Identify and examine patterns of ground-edged hatchet raw material use and movement from geological source to hatchet findspot in Dharawal country.
2. Spatially render historically recorded observations movement of Aboriginal people across Dharawal country and examine it for evidence of distortion, post-colonisation change over time, and/or differences in patterns relating to activity types.
3. Examine the relationship between ground-edged hatchet raw material sourcing results and results from analysis of documentary records and identify aspects of correlation and difference between them.
4. Consider how this evidence might inform on the nature of this Dharawal social network before and through the first fifty years of European colonisation.

Research Questions

The primary research questions of this thesis relate to comparing the two evidentiary components previously detailed. Before addressing the primary aims of this thesis, questions specific to each set of evidence (i.e. historical accounts and ground-edged hatchet sourcing) were considered. Their outcomes (as sub-studies) were then compared to address the primary research questions of this thesis (Figure 1.1). Component and primary research questions, and the order by which they will be examined in this dissertation, are presented on the following page (Table 1.1).

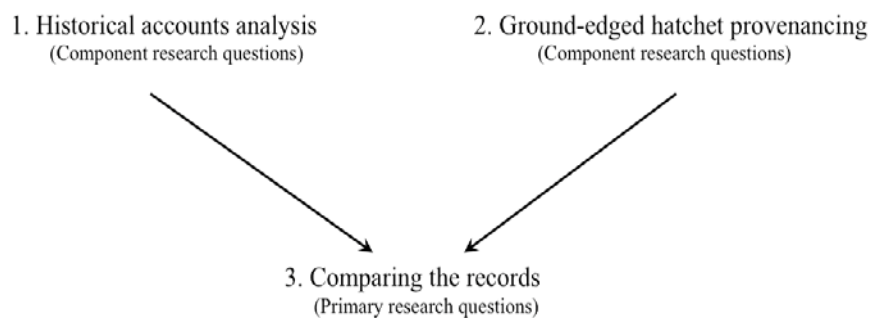


Figure 1.1: Component research questions were addressed and then outcomes brought together to consider the primary research questions of this thesis.

COMPONENT RESEARCH QUESTIONS

<p style="text-align: center;"><u>1. Historical accounts analysis</u></p> <p>What spatial patterns can be seen in historically recorded movements of Aboriginal people in the study region?</p> <p>Does this evidence indicate change to these patterns through the historical period? If so what can be seen to change?</p> <p>Is there evidence for different patterns of movements for different purposes (e.g. ceremonial gathering, subsistence/access to resources, assisting with European exploration as guides etc.)?</p> <p>Can this evidence be considered representative of the social network in place over this period of time?</p>	<p style="text-align: center;"><u>2. Ground-edged hatchet sourcing</u></p> <p>What spatial patterns can be seen in movements of stone and/or hatchets from source to find-spot in the study region?</p> <p>Does this evidence suggest movement of hatchet material from particular locations or in particular directions within this network?</p> <p>Is there evidence for particular raw material preference relating to geological type (e.g. basalt or hornfels) and/or preform (e.g. bedrock or waterworn cobble)?</p> <p>Can this evidence be considered representative of the social network in place over this period of time?</p>
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PRIMARY RESEARCH QUESTIONS

3. Comparing the records

Do patterns described over time in historical accounts correlate with patterns of ground-edged hatchet/raw material movement in the Dharawal country?

What similarities and differences can be seen between these two sets of evidence?

Does this evidence suggest the network Dharawal people moved and exchanged within changed in response to European colonisation?

What might these results suggest about the nature and function of this network in the more distant past?

Table 1.1: Component 1, component 2 and primary research questions.

Dissertation Structure

This research is presented in the following parts:

Chapter two presents key concepts and definitions and discusses theory and research design framing this thesis.

Chapters three and four introduce the study area, provide background on Dharawal country, peoples and past and cultural context for this social network case study.

Chapter five presents the historical accounts analysis, (Component 1) of this thesis. Documentary sources and methods are summarised. Spatially mapped results are presented, with discussion, addressing questions specific to this research component.

Chapters six and seven present the ground-edged hatchet provenancing component of this research. Background and review of literature pertaining to the artefact assemblage and geological samples included in this analysis is covered in chapter six. Provenancing methods and results are presented in chapter seven.

Chapter 8 interprets spatially mapped summaries of these provenancing results, addresses research questions specific to this component. The second section of this chapter overlays provenancing and historical account analysis outcomes to examine and address the primary research questions for this thesis, leading on to broader points raised discussion.

The final chapter steps back to assess research outcomes relative to aims, contribution to current research and understandings, then ahead to questions raised and further research opportunities.

CHAPTER 2

THEORY AND RESEARCH DESIGN

Key Concepts and Definitions

Study of social networks and exchange examines a phenomenon that involves a propensity, a process and its products. What is produced feeds back into the system and changes the outcome of the process from which they are derived. The language of mathematics is well suited to discussion of non-linear systems such as these. Examination and discussion of this theme textually poses more of a challenge, and relies on a set of key concepts and definitions. These terms separate social networks, materials exchanged, and exchange activity and then reconnect them systemically, providing a conceptual framework for examining this topic.

Culture

Culture as: “...A *fuzzy set of basic assumptions and values, orientations to life, beliefs, policies, procedures and behavioural conventions that are shared by a group of people, and that influence (but do not determine) each member’s behaviour and his/her interpretations of the ‘meaning’ of other people’s behaviour...*” (Spencer-Oatey 2008:3) is the definition used for this thesis. By this definition, shared concepts, beliefs, protocols for behaviour, cognitive systems for understanding behaviour of others and meanings of things are cultural. A social network is, therefore, a cultural pattern that organises social relationships and structures social activity. In the context of this study, the social network within which material was exchanged is also understood to have been the connective network for ceremonial gathering and the pathways along which people travelled and interacted with other groups. Road networks today are similar in this respect.

Material

This thesis conceptualises material as distinct from its use and/or modification by people and its cultural meaning. As described by Hodder (2012:4), things are not inert but have force, velocity, charge, weight and vibrant vitality. Though these

characteristics reside in the interconnections between material, human behaviour and cultural meaning, material, or physical reality, is active in this relationship. The physical environment constrains and influences people's use of it, activity within it and experience of it (Attenbrow 1976:13-14). The physical world is a dynamic system that changes, moves, rises and falls, builds up, breaks down, erupts, and transforms. As such it is an active factor in its own right, influencing behavioural and cultural outcomes over time (e.g. Rowland 1999; Veth et al. 2000).

Social

Sociality can be understood as a human propensity to act in particular ways, with 'social' only extant as human action influenced by this propensity. Sociologist Max Weber defines human action as 'social' if, by virtue of the subjective meanings attached to the action by individuals (i.e. its intention), it takes account of the behavior of others, and is thereby oriented in its course. (<http://www.sociologyguide.com/social-action/max-weber.php>). Social interaction (exchange) is understood, here, as the process by which all shared meaning, social connection and cultural identity are constructed. The terms 'material culture' and 'cultural landscape', are both products of exchange.

Material culture

Material culture is understood to be meaningfully constituted (intent) and the relationship between material and meaning partly social, but also dependent on cultural context (Hodder and Hutson 1986:3-4). Things, be they words, institutions, events, gifts or items of exchange, exist in their moment as contained entities defined in a certain way – as matter, energy and information brought together in a heterogeneous bundle. It is in these connections that their 'thingness' resides, not in the objects themselves. The different ways that humans 'know' about things, and understand them and their usefulness leads to different ways of being connected to them (Hodder 2012:12). In simple terms, material/meaning constructs (things) are particular to the material, social and cultural context in, and process by which they are made (culturally relative).

Cultural Landscape

This thesis turns to the culture and the subject studied for a definition and illustration of the term 'cultural landscape'. This is for two reasons. Reference to particular cultural context is central to this concept. The theoretical definition of this term, as with material culture above, relates to interconnectedness of 'things'. This concept is not theoretical in Aboriginal culture, but incorporated into how they know and understand the landscape.

"...Country in Aboriginal English is not only a common noun but also a proper noun. People talk about Country in the same way that they would talk about a person: they speak to country, sing to country, visit country, worry about Country, feel sorry for Country and long for Country. People say that country knows, hears, smells, takes notice, takes care, is sorry or happy..." (Rose 1996 cited in Wesson 2005:8)

Country, for Aboriginal people, is organised and understood by people's various and particular relationships with, and connections to it. Knowledge of the interrelationship of everything binds environmental, spiritual, aesthetic and economic categories of information and life (Wesson 2005:6). In contrast, European culture, at the time of colonisation at least, divided people, land and activities into discretely bordered classes and categories, organised hierarchically. European knowledge structures also involved separation of information into smaller and smaller parts (Wesson 2005:6). Singularity of meaning was a core presumption, underpinning a cultural system where entitlement and authority to assert, assign and own was likewise differentiated, bordered and defined. Understanding of plurality meaning of things underpins both theory and practice in archaeology today (plurality, not relativism – ism denotes (e.g. Hodder above and multivariate methods used later in this thesis). This shift in western thinking, as with all cultural change, is an outcome of exchange. Study of this phenomenon is also directly involved, as illustrated (in context of Aboriginal Australia) in the discussion below leading to a definition for exchange.

Exchange – Background and Definition

Exchange was first defined in the 18th Century by pioneer of economic theory Adam Smith as a universally human “...*propensity to truck, barter and exchange one thing for another...*”, It was understood to be the behavioural phenomenon that had led to, and was driving, economic progress (Smith 2007:15). This concept was incorporated as a key principle in anthropology (Harding 1978:161), along with a definition that linked it, causatively, to economics and economic progress. As McBryde (1984:132) summarises, late 19th Century European observations of exchange among Aboriginal populations reflected this assumption. A Victorian merchant model and vocabulary was applied to interpretations that assumed goods particular to each tribe (i.e. country) were traded inter-tribally for reasons of economic/resource necessity (i.e. commodities and commerce driven) and that exchanges took place specifically at large gatherings such as initiation ceremonies (markets). Interpretations were further distorted by European notions of behavioural and cultural evolution of the time (i.e. progress from simple to complex), comparing trade and exchange among primitive groups with that of civilised practices.

Ethnographers in the early 1930s identified forms of exchange among Australian Aboriginals that could not be explained, or understood, as commercial transactions or in purely economic terms. Objects exchanged in ceremonial contexts were seen to have a ‘value’ apart from their practical uses, with the act of exchange and the relationships formed or maintained by the transaction valued more than the objects exchanged (Stanner, 1933-34, Thomson, 1949 cited in Grave et al. 2012:1675). McCarthy’s (1939) study of trade routes and materials exchanged in the north Kimberly identified objects with dual utilitarian and ritual qualities moving within this exchange system, indicating exchange activities, and what is exchanged, can’t necessarily be separated into discrete categories of economic, social or symbolic function. Tindale recorded songs making their way through Aboriginal trade routes, along with ochres, shells, spear-tips, axes, and other material (Tindale 1953:1015–17 cited in Redmond 2012:62-3), identifying exchange of intangible ‘objects’.

Ethnographic studies in Oceania in the 1970s (e.g. Sillitoe 1978; Healey 1978; Strathern 1978) identified diversity in relationships between exchange/redistribution of stone and other cultural elements, such as production, leadership, ranking, myth, art forms, ritual, marriage, warfare, intra-community relations and socio-political order. Study of exchange in other cultural contexts (above is a small example) deconstructed assumptions and contributed to broader theoretical shifts in anthropology and archaeology (Malinowski 1922, Radcliffe-Browne 1922, Binford 1983, Torrence 1986, Petrequin et al. 1998 to name a few). This research demonstrated the importance of exchange, and the diversity of its symbolic, ceremonial and economic functions in different cultures (McBryde 1986:77).

Interpreting Exchange in the Archaeological Record

The overlay of economic frameworks, as various forms of optimising theory focusing on technology, has been noted (Sheppard 1993:121) as a dominant approach to interpretation of the archaeological outcomes of exchange. These approaches, incorporating notions of least effort for maximum return as measured by some form of currency (e.g. time required, maximum usable edge per unit, increasing return relative to transport distance or tool use life) reflect, according to Sheppard, 'an adaptationist paradigm common to lithic analysis in general' (Sheppard 1993:121). This observation, though perhaps true for its time in some spheres, does not reflect theoretical approaches to the study of exchange in Australia, as has been discussed. Nor does it reflect contemporary paradigms in regard to lithic analysis in Australia.

Hiscock and Clarkson (2000:100,104), raise two important points relevant to interpretation of the archaeological outcomes of exchange. Firstly, examination of the human activities involved in the production of preserved assemblages should not presuppose that information resides only in 'end-products'. Archaeological outcomes inform on the activities of people in the past but cannot be assumed to be, or embody,

the reason for that activity. This is not to say that technological factors are irrelevant. As Malinowski famously stated:

“...Technology alone is scientifically sterile, however the study of technology is indispensable as a means to approach economic and sociological activities...”
(Malinowski 1935:460)

The second point raised by Hiscock and Clarkson (2000:100,104) is that clarifying the role and relative importance of archaeological material requires reference to other aspects of its cultural context and holistic appraisal of archaeological and environmental evidence. Though their applicability as evidence needs to be qualified, as will be discussed below, historical documents and early ethnographic observations can be added to this list as a valuable source of information.

Framework 1 - Ground-edged Hatchet Provenancing

Early ethnographic and historical accounts indicate that Aboriginal networks for exchange of material were incorporated as part of broader social network systems, which were also defined by patterns of interaction in marriage arrangements, ritual, access to country, and inter-group support (McBryde 1986:85). As such, determinates of exchange are understood to have been as much social and ceremonial as economic, and not necessarily motivated by desire for short-term economic returns (McBryde 1984:13). Within the Aboriginal exchange systems of southeastern Australia, ground-edged hatchets, which were often made from particular sources of high-quality and/or valued raw materials, are known to have played an important role in establishing and cementing relationships between groups (Grave et al. 2012:1675). The ethnographic record supports interpretation of patterns of movement of ground-edged hatchets from their raw material source to findspot as a proxy for studying the social network within which it moved (Grave et al. 2012:1674). The results from provenancing research, testing these kinds of models against the archaeological record (e.g. McBryde and Watchman 1976, Corkill et al. 2012, Ulm et al. 2005; Bryant et al. 2014) provide further support for this position. The premise for tracing social network patterns via

provenancing of ground-edged hatchets is that their patterns of movement will not just be an outcome of behaviour revolving around their production, consumption and distribution. The network they moved in is understood as in part built by, but not built specifically for, transport and/or trade of this material.

Framework 2 - Historical Accounts Analysis

Historical documents are artefacts, however their contents (words written) are interpretations. As McBryde (1974:5) notes, ethnographic and historical evidence is scattered, fragmentary, incomplete, and needs to be used with caution. Early European observations of Aboriginal activity were made from a different cultural reality to the one observed. The impacts of this disjunct on information provided, not just in the degrees to which particular aspects of evidence may be distorted but also in what ways, needs to be considered. Issues associated with the use of early ethnographic and historical sources are summarised and expanded on below (Table 2.1). Particular attention was paid to factors that may limit or distort the outcome of Historical accounts analysis in this research.

Selective incompleteness and changes in observer presence, and therefore perception of Aboriginal activity over time (Factor 6) were flagged as most likely to impact on. Historical accounts will only refer to Aboriginal people/groups known and recognised and places at least explored and named, if not also settled. Expanding European perception (i.e. corresponding with colonial expansion) has potential to mimic, and/or be confused with Dharawal network expansion if not taken into account. Tracking of colonisation expansion parallel to historical observations over time was incorporated into research design as a tool for differentiating observer presence change from actual change. Most factors were not able to be mitigated in any way at the point of research design. This framework was applied to interpretation of results from analysis of historical accounts.

Early European observations of Aboriginal people and activities – Potential distortion factors	
1. Change	Changes within Aboriginal societies following the arrival of Europeans may have occurred even before any direct contact between the two cultures was established. (Navin Officer 2000:35) Traditional practices and activities may apply to a very short period, and one in which Aboriginal culture was changing rapidly (McBryde 1974:5)
2. Misunderstanding	A lack of understanding, and therefore misreporting of Aboriginal activities and behaviour (Navin Officer 2000:35)
3. Memory and memoirs	The use of information from reminiscences of long-time (European) residents in their later years, and passage of time between events and their recording can impact on reliability (Navin Officer 2000:35). Memoirs (and memories themselves) may be merged and/or appropriated from other people's experiences for narrative effect.
4. Selective interest	Authors were writing, primarily, about their own settlement activities, with references to Aboriginal activities often just casual asides. Interest in Aboriginal life and customs was variable. The unusual, for example ceremony, initiation rites and burial practices, were described more often than everyday details of life (McBryde 1974:5).
5. Incompleteness	Historical accounts are incomplete as a record. As McBryde (1974:6) notes, they vary greatly in both quantity and quality, with 'tantalizing omissions'. They are not a record of Aboriginal movements and activities, only a record of observations made by Europeans, at best only part of the picture.
6. Limits of perception	Europeans can only observe what they saw. Until at least explored and named, if not also settled, these accounts will, by default, record that there was no activity. Observer presence In the case of the Sydney region, there are very few hinterland observations in the earliest British colonists' writings (Attenbrow 2002:15). Limits of perception can be expected to expand with colonisation over time.
7. Scales of observation and nomenclature	Europeans applied a tribal framework to naming of Aboriginal people that referred to large areas, (e.g. 'Five Islands' was the whole Illawarra region in early accounts (Organ 1990:xiii, xli-xliii). Scales of observations were dependent on the European place/name framework in place at that time. Smaller scale activity can be expected to fill in with settlement of an area.

Table 2.1: Distortion factors that may be involved in the use of evidence of Aboriginal activity described in European early historical accounts.

Movement and Exchange in Dharawal country – Model for Interpretation

As identified by McBryde (1986:78), one of the goals in studying exchange networks is to elucidate the constraints that conditioned their patterns. Attenbrow (1976) proposes a model for studying mobile foraging that suggests factors that may influence movement in the NSW /Far South Coast, which has a similar environment to Dharawal Country (Table 2.2). McBryde's (1986:78) model, derived from early ethnographic records of Australian Aboriginal exchange in Southeastern Australia, identifies factors that may be involved in exchange activities, and pertinent to interpretation of its archaeological outcomes (Table 2.3). Discussion of these factors in the Dharawal study area provides a context specific framework for interpretation. It also provides the background to this case study – presented in the following two chapters.

1. Geographic distribution of seasonal resources
2. Mobility relating to amount of food available at a particular location, knowledge that a preferred food may be available elsewhere, (changes over time in physical environment (i.e. seasonal/larger scale climatic cycles and environmental change, and geographic /regional ecological variation).
3. Size of groups.
4. Cultural factors, local organisation, ties to land and kin, food preferences (within environmental constraints)
5. Range over which a group exploited resources (taking into account physical features).

Table 2.2: Factors that may influence movement in foraging societies. (Summarised from Attenbrow 1976:13-14)

Scales	Small scale, individual and group transactions. Aggregated movement
Directions	Determined by social affiliations of the individuals or small groups involved Conventions regarding direction
Determinants	Social, ceremonial, technologic, economic, geographic distributions of resources
Functions	Social, economic, subsistence

Table 2.3: Factors that may be involved in Aboriginal exchange for southeastern Australia (summarised from McBryde 1986:78-9)

CHAPTER 3

DHARAWAL COUNTRY

Study Area

The study area, referred to as Dharawal country for the purposes of this research, is located in southeastern New South Wales and extends from south of Botany Bay (in the north), west to the Bowral/Moss Vale area and south to the Shoalhaven River (Figure 3.1). This map defines the research area and does not represent Dharawal cultural boundaries.

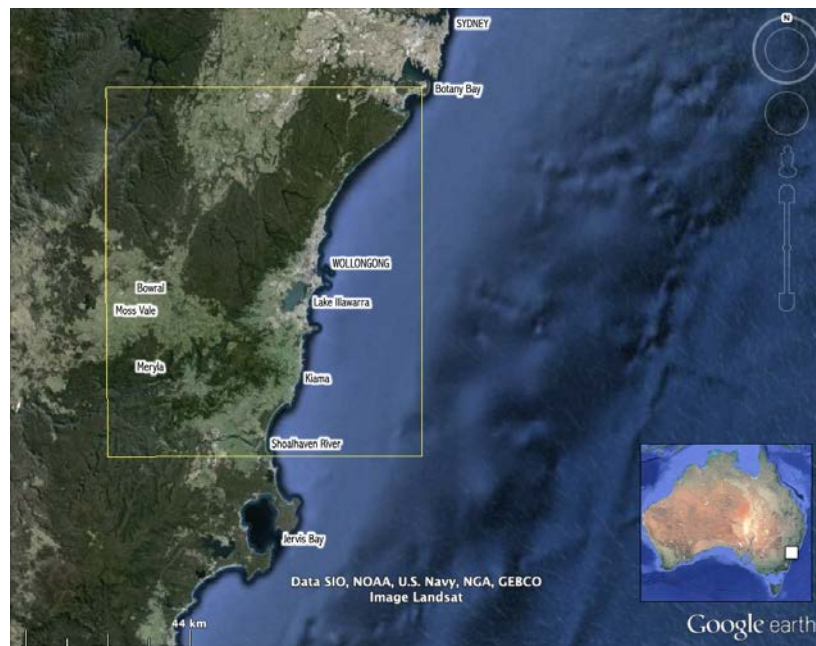


Figure 3.1: Study area (yellow bounded area), referred to as Dharawal country in this thesis (not representative of language group boundaries).

As a study of network connections, including long distance links, aspects of this research expand beyond this defined area. A small number of ground-edged hatchets from findspots as far west as Marulan and Bungonia have been included in the provenancing component of this study. Artefacts are matched to geological samples from locations over a much larger area within and adjacent to the Sydney Basin. Historical accounts examined describe movement and gathering of Aboriginal people

not just within, but also into and out of Dharawal country. It is within this area, in Dharawal country, that all included forms of evidence overlap, and to which this thesis and its research questions, pertain.

Physiographic Overview

For Aboriginal people in the study area, landforms and landscape features are understood to embody the Dreaming ancestors whose being and action were visible in the landscape they created. Through their embodiment in the environment, the Dreaming Ancestors were the providers of the plants and animals the people utilised for food and protection (Timberly, J. (2002:3, Organ and Speechley 1997:11 in Wesson 2005:8). Geological and environmental processes/events are visible in the resulting forms and ecologies of country in the study area. Interplay between physiography, geology and fluvial systems in the study area, provides a diverse suite of environments. Within these zones, landscape-associated variations with respect to temperature, aspect, drainage, regolith substrate, and slope gradients define the differential distribution of vegetation and animal resources (Christian & Hill 2002:9). Major physiographic units of the study area – the Illawarra plateau, escarpment, coastal plain and coastline (Figure 3.2), along with rivers, lakes, lagoons, combine to produce a diverse range of environments, each with their own ecologies.

The Illawarra Escarpment

The Illawarra escarpment (Figure 3.2) is the eastern edge of a raised and bisected sandstone plateau that runs north to south for approximately 120km, like a great wall, through much of the study area. Aside from the Macquarie Rivulet, the Minnamurra Rivulet and the Shoalhaven River to the south, water on the plateau drains northeast or northwest towards the Nepean River. This drainage pattern has left the cliff intact for much of its length - a natural barrier that, in the northern part of the study area is only readily traversable in a few specific places (Young 1980:1). The terms ‘inland’ and ‘coastal plain’ are used in this thesis in reference to areas separated by this natural cliff barrier.



Figure 3.2: Major physiographic features and environmental zones referred to in the study area.

The Shoalhaven River

The Shoalhaven River flows approximately 300kms north then easterly from the Southern tablelands to Shoalhaven Heads, east of Nowra. In the southern part of the study area it has cut across and into the plateau and escarpment- a second major feature that may represent a cultural landscape boundary. This system is not a single feature, but three distinct river reaches (Figure 3:3), with each section quite different in relation to access as well as ecology. Wesson (2005:6) notes that Dharawal people are distinguished as fresh water, bitter water or salt water people, depending on whether they occupied the coastal regions, the swamps or the plateaus and inland river valleys. The role of the Shoalhaven River running through the study area is an important element in relation to raw materials available for the manufacture of ground-edged hatchets, as will be discussed in more detail in the ground-edged hatchet provenancing component of this study in Chapters 6-8). As a cultural landscape feature, each reach of the river is considered separately below – as they are

placed within the context of the plateau, escarpment, coastal plain and ocean/coastline.

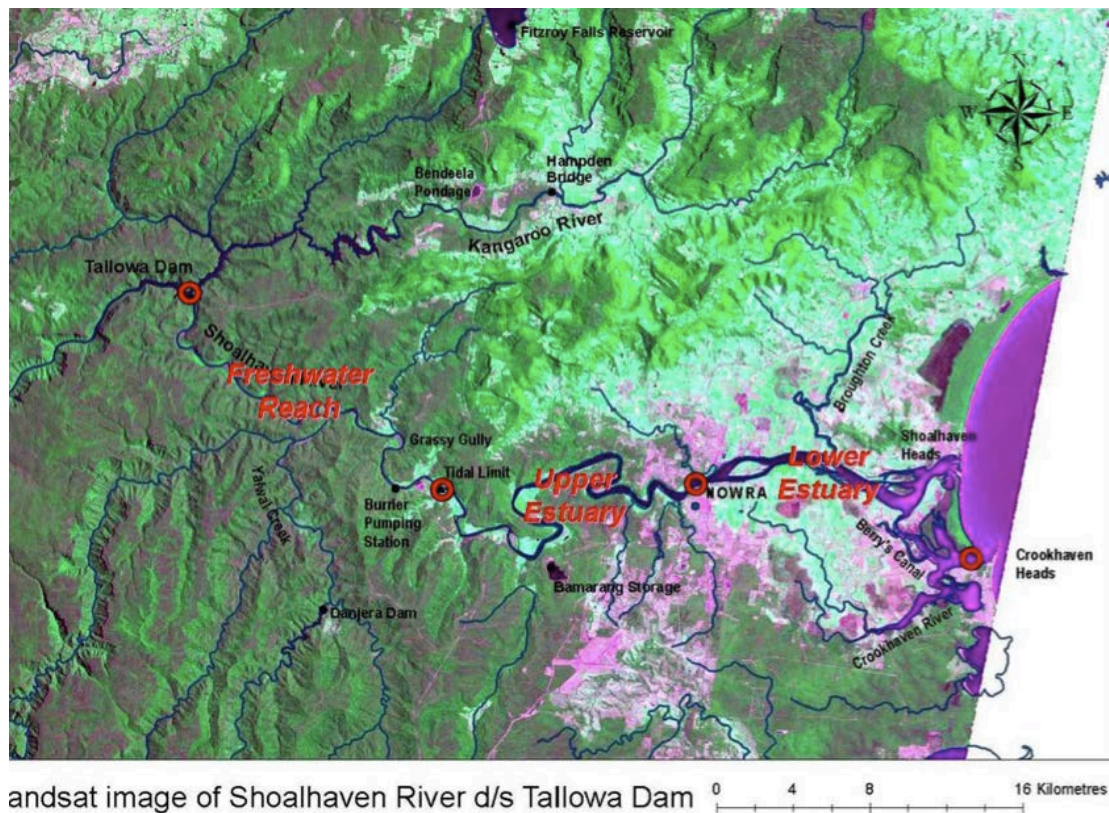


Figure 3.3: Landsat image of Shoalhaven River reaches/zones. (Reproduced from <http://www.water.nsw.gov.au/.../map of Shoalhaven River>)

Plateau

The plateau is predominantly made up of Hawkesbury Sandstone (Young 1980:1) though igneous areas, as will be discussed in Chapter 6, outcrop in some places. Deep gorges have been incised into the undulating surface of the plateau and this area is characterised by mountainous relief with steep sided ridges (Sefton 1980:28). Dry open forests, heaths and upland swamps dominate. Plateau vegetation is broadly defined as open woodland, though steep upper slopes provide niches for open forest and some rainforest species are associated with creek lines (Feary and Moorcroft 2011:6). Fauna found within open forest communities include swamp wallaby, long-nosed bandicoot, eastern pygmy possum, sugar glider, common ringtail possum, Mountain brush-tailed possum, common wombat, bush rat and grey-headed flying

fox. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks recorded by the first settlers in the area (Heritage Concepts 2005:15).

In the south of the study area, the freshwater reach of the Shoalhaven River, between Tallowa Dam and Burrier (Figure 3.4) has incised deeply into the plateau, forming a confined sinuous river valley. Mixed sand and gravel bedload from upstream sources, deposited as well-developed sequence of pools and riffles, provide instream habitat variability. A 'riffle' is a shallow area of a river or stream where water flows rapidly over a gravel or rocky stream bed, as shown in Figure 3.5 below (Boyes 2006:28).

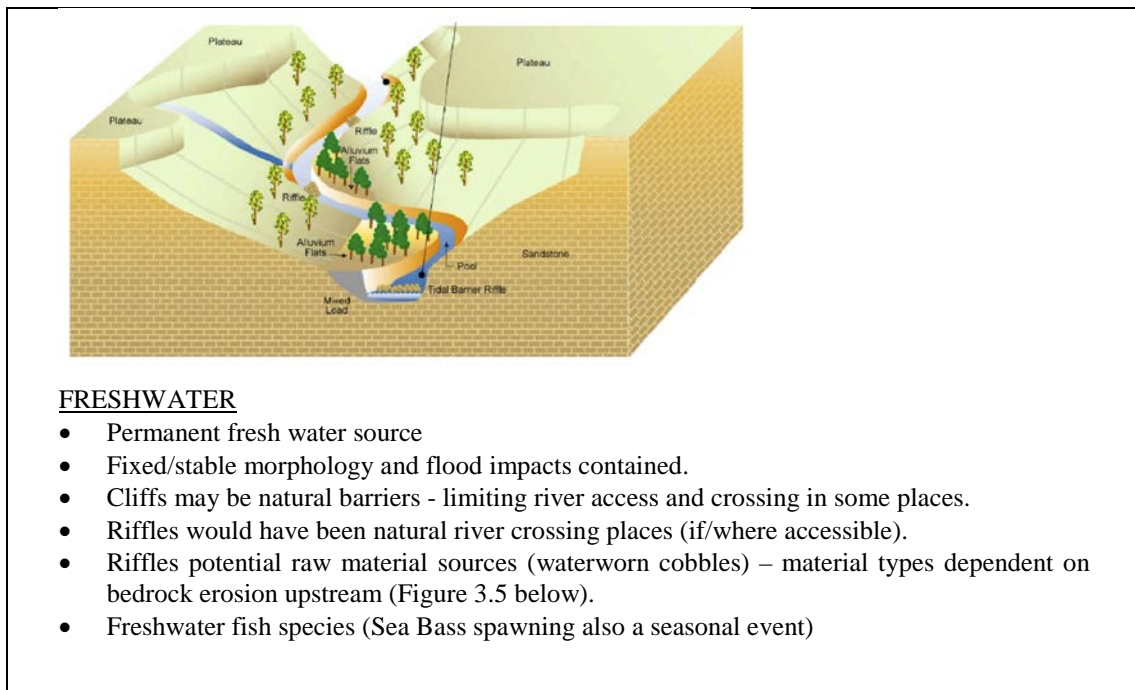


Figure 3.4: Upper (freshwater) reach of the Shoalhaven River between Tallowa and Burrier. (Source: Boyes 2006:28).



Figure 3.5: One of 17 major riffles located in the freshwater reach of the Shoalhaven River, between Tallowa Dam and Burrier. (Reproduced from Boyes 2006:1).

Escarpment Slopes

Geographically, the escarpment includes the slopes to the immediate east of the ridge itself, a zone intermediate between coastal plain and hinterland environments (Sefton 1980:41) on the coast side of the escarpment cliff. Soils on escarpment slopes, derived from cliff weathering and landslides, are nutrient rich. The escarpment generates high rainfall and fog by forcing warm moist coastal air to rise and condense. Moist open forest and rainforest dominates these slopes and benches, as the escarpment also provides shading, favourable to these vegetation types. Sites on the steep slopes receive little winter sunshine, remaining relatively cold throughout the day. Rainforest on slopes and gullies, subtropical rainforest on the lower slopes and temperate rainforest on upper slopes and gullies pattern these areas. North facing slopes and

ridges, which are more exposed to the sun, wind and bushfires, are dominated by open sclerophyll forest (NSW NPWS 2011:7-11).

The Shoalhaven River has eroded the escarpment in the southern part of the study area. The meandering upper estuary section of the Shoalhaven River (Figure 3.6) is tidal, with freshwater inflows passing over the barrier riffle at Burrier. The river valley is wider than the upstream section of the river and slightly more sinuous. Lower parts of the reach have benches incised into the sandstone, with alluvial deposition marking former and present floodplains (Boyes 2006:30).

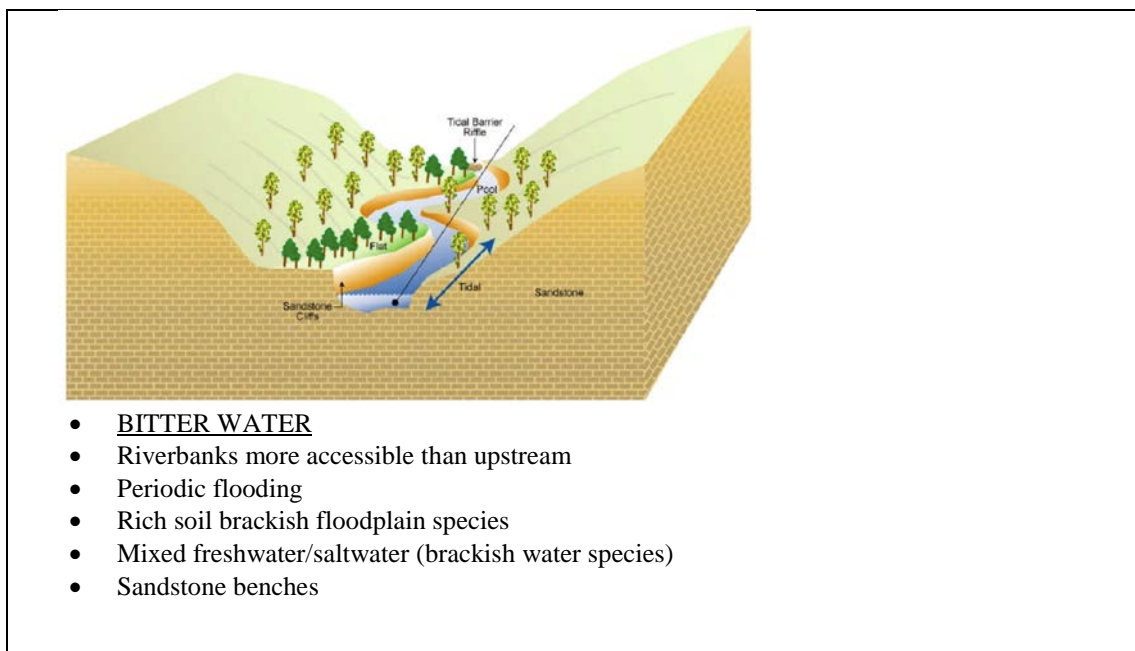


Figure 3.6: Middle reach of the Shoalhaven River (Upper estuary) between Burrier and Nowra. (Source: Boyes 2006:31)

Coastal Plain

Bedrock slopes of the coastal plain are part of the Berry Formation, the Broughton Tuff, and the Bumbo Latite, which dominates the higher relief of the southeastern portion of the study area (Navin Officer 2000:9). The coastal plain is a mosaic landscape of rolling foothills, floodplains, valley floors and littoral zones. Low relief valley floors on the plain are made up of fluvial sediment deposits and features such

as colluvial fans, flood plains, terraces, stream corridors, wetland basins and delta deposits, the majority of which were laid down 20,000 to 30,000 years ago (Walker 1962 in Navin Officer 2000:9-10). Streams on the gently sloping coastal plains are unconfined and have extensive floodplains. (Heritage Concepts 2005:13).

Vegetation on the coastal plain would have originally consisted of large areas of the *Illawarra Brush* or sub-tropical rainforest (incorporating both moist and dry subtropical rainforest communities) on the deeper rich volcanic soils, though would also have been associated with patches of sclerophyll forest and woodland. (Heritage Concepts 2005:13). Areas on the coastal and deltaic lowlands that would have been heathland and shrubland are also identified (Christian & Hill 2002:9). Fauna found within these estuarine environments include water rats, the ringtail possum, the bush rat and the short-beaked echidna, a wide range of fish and mollusc species (Heritage Concepts 2005:14). The wetlands of the Shoalhaven River estuary are an important waterbird habitat in NSW (Boyes 2006:12). Flood plains, as deposits of fine-grained sediments, are generally lacking in raw materials for the manufacture of stone artefacts, except around infill margins and in the beds of former or present watercourses (Corkill 1986:45-6).

Sand barriers, which formed following stabilisation of sea level rise, have impounded estuaries along the coast, leading to the development of depositional floodplain and creating a series of estuarine lagoons (Corkill 1986:32). The largest of these, Lake Illawarra, remains an active tidal estuary (Navin Officer 2000:10).

Lake Illawarra

Macquarie Rivulet and two smaller creeks run into Lake Illawarra. These freshwater sources also have low velocities and meander across the coastal plain. Topography, combined with the available surface water and a high water table, has created a swamp environment (Heritage Concepts 2005:13). There is evidence that Lake Illawarra was prone to flooding in the past, and that the entrance (Figure 3.6) was

managed by Aborigines to mitigate major floods:

“...The tribesmen used to tell Major Weston that down through the ages, when floodrains caused ‘bigwater’ in the lake, if the mouth was closed by a sand bank their camp sites would be flooded and there would be a concerted effort by all hands to cut an opening to the sea. Using sticks, a small pilot trench would be scratched in the sand which soon became a wide swift torrent’...” (Weston 1977:64 in Navin Officer 2000:25).



Figure 3.7: 1840s Entrance to Illawarra Lake from the sea. (Robert Marsh Westmacott. 1840-1846. (Reproduced with permission from the National Library of Australia. nla.pic-an3724127)

The lower Shoalhaven estuary leading to the ocean (Figure 3.8) is understood to have been a highly variable and dynamic estuary and floodplain system, dominated by tidal processes with periodic flooding/inundation events (Feary & Moorcroft 2011:7). Major shifts in egress to the ocean have occurred. It is understood to have exited via Crookhaven Heads c.3000BP, shifted to Shoalhaven Heads by c.2000BP then was moved back to Crookhaven in historical times after a channel was cut in 1822. There is thus a dynamic mosaic of braided channels, wetlands, lagoons, estuary islands,

shoals and sand flats. Breach of the sand barrier at Shoalhaven Heads still occurs periodically during floods (Wearne 1984:42 in Corkill 1986:50-2).

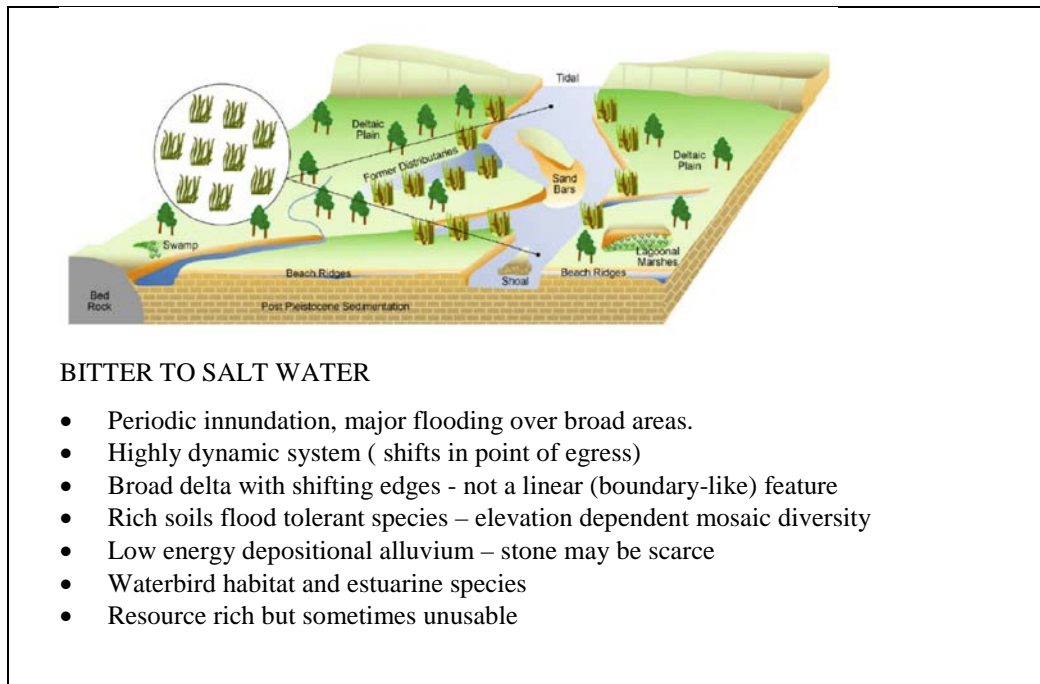


Figure 3.8: Lower (estuary) reach of the Shoalhaven River from Nowra to the ocean. (Source: Boyes 2006:33)

Coastline

The coastline of the study region is a series of steep cliff headlands (Figures 3.9 and 3.10) alternating with bays and barrier beaches of various sizes. The major headland of Red Point divides this coast into the Wollongong Embayment to the north and the Windang Embayment to the south. Small islands at the entrance to Lake Illawarra and the bed of the Minnamurra River are composed of Bumbo Latite, as are all bedrock exposures along the coast from Shellharbour South Beach southward (Navin Officer 2000:11). These exposures, (e.g. columnar latite at Bombo Figure 3.9) are considered a potential source of stone for hatchets, as are beach cobbles of this material in the area.



Figure 3.9: Bombo Quarry (Bumbo latite). (Image reproduced from Geological sites of NSW. <http://www.geomaps.com.au/scripts/bomboheadland.php>)

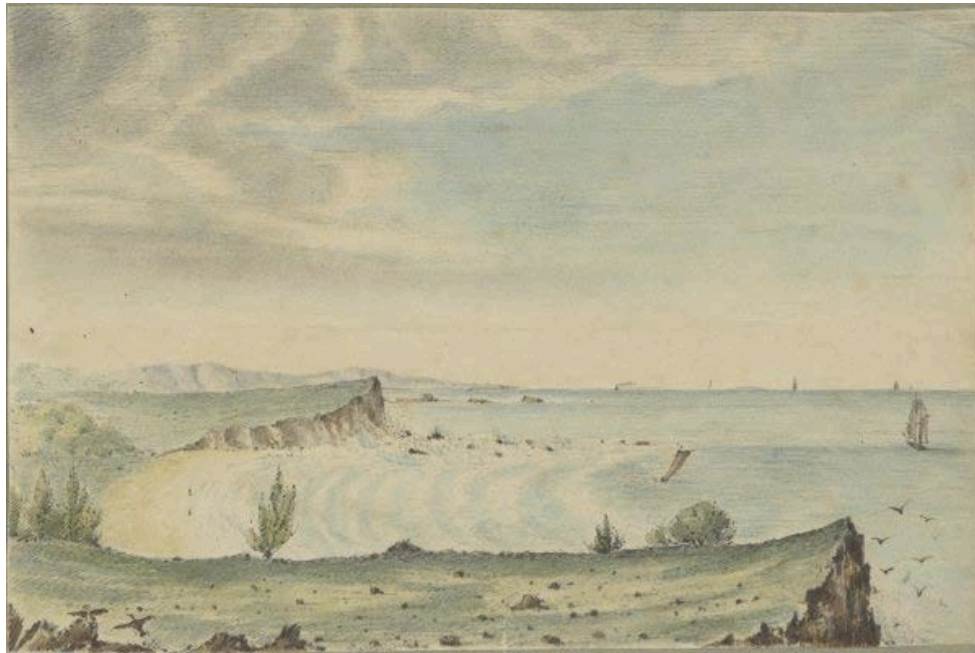


Figure 3.10: 1840s coast view looking north of Kiama. (Robert Marsh Westmacott [between 1840 and 1846]. Reproduced with permission from the National Library of Australia. nla.pic-an3706211)

Middens on the coast in this area have a range of shellfish species, are dominated by fish (in higher proportions than sites further inland), in addition to land mammals, seals, birds and reptiles, possum, rat, potoroo and bandicoot. Sites at Currarong and Burrill Lake, which are some distance from the ocean, land mammals and birds were of relatively greater importance than adjacent to the ocean shoreline (e.g. Bass Point; Bowdler 1970:93, 95, 99).

Summary

The study area can be understood as a number of ecological niches based on physiography: plateau, escarpment coastal plain, and coastline interacting with river, lake and lagoon environments situated within or running across these major physiographic zones. These distinctive geographic features structure the distribution of diverse ecological niches and habitats. Distributions of resources and degrees and directions of access to these locations, defined by this physiography, are certain to have influenced patterns of Aboriginal occupation, land use, movement and exchange.

The following chapter populates this environmental background with a summary of cultural and social factors, flagged in Chapter 2 as likely to be systemically linked to the social network studied here. Though this research topic relates to the recent past, occupation history (temporally and spatially) and cultural change in the distant past are directly relevant as context from which these social networking outcomes derived. A brief on social structure and organisation, rights to land and resources, subsistence/foraging strategies, ceremonial gathering, and, of course, movements and exchange are also provided in the following chapter.

CHAPTER 4

DHARAWAL PEOPLE

Occupation History

Though the archaeological record for southeastern Australia extends back at least 40,000 years, (Grave et al. 2012:1675), the majority of dated sites from the NSW coast and hinterland are less than 5,000 years old. The earliest dates for occupation in the northern part of the study area come from Aboriginal sites excavated in Royal National Park, at around 8,000–9,000 BP. In the southern part of the region, on the NSW south coast, occupation dates to 23,000–26,000 cal BP at Burrill Lake and 19,000–22,000 cal BP at Bass Point, have been found (Lampert 1971 and Bowdler 1976 respectively in Attenbrow 2012:B49,53). These early dates appear to be the exception, rather than the rule, however, and Bowdler (2011:180) notes a general pattern for the coast of Southeastern Australia, of occupation sites on the coastal strip dating to the mid Holocene, while more inland sites commonly date as far back as 12,000 and 8000 BP. Differential site preservation over time, with old sites being destroyed by natural processes (Rowland 1996:195 in Bowdler 2011:181) and population redistribution in response to sea level rise (Feary & Moorcroft 2011:25) have been suggested as explanations for this pattern.

Regional studies (Navin Officer 2000; Heritage Concepts 2005; Feary and Moorcroft 2011) provide a summary of archaeological site distributions in the study area. Within the Illawarra escarpment, foothills and coastal plain, there are rock shelters with art and/or cultural deposits, grinding grooves, artefact scatters, scarred trees, coastal and estuarine midden sites and burial sites. On the coast, shell middens, generally located on headlands and sand dunes adjacent to rock platforms or near entrances to creeks and estuaries, are the most common sites. Further inland small scatters of stone artefacts, referred to as open camp sites, are the most common (Navin Officer 2000:34).

A dearth of Aboriginal sites on recent alluvial deposits around Lake Illawarra, with

the majority of sites located on older, higher sedimentary units, has been noted (Heritage Concepts 2005:18). Distribution patterns of Aboriginal sites around the lower Shoalhaven River (Figure 4.1) also show a concentration of sites on elevated land around the fringes of the swamps, lagoons and wetlands (Feary and Moorcroft 2011:26), but very little evidence of occupation on the floodplain itself. It has been suggested, in the case of the lower Shoalhaven, that this may reflect patterns of avoidance of low lying, poorly drained areas and strategic positioning for access to resources, including potable water (Feary and Moorcroft 2011:25-6). In reference to the Illawarra, this has also been suggested to indicate the degree to which lowland sites have been destroyed or obscured by erosion and sediment deposition (Heritage Concepts 2005:18). Given environmental conditions on the study area coastal plain (see previous chapter), interpretation of this pattern as primarily an artefact of environmental processes is strongly supported. As such, the full spectrum of occupation history is, archaeologically, unclear.

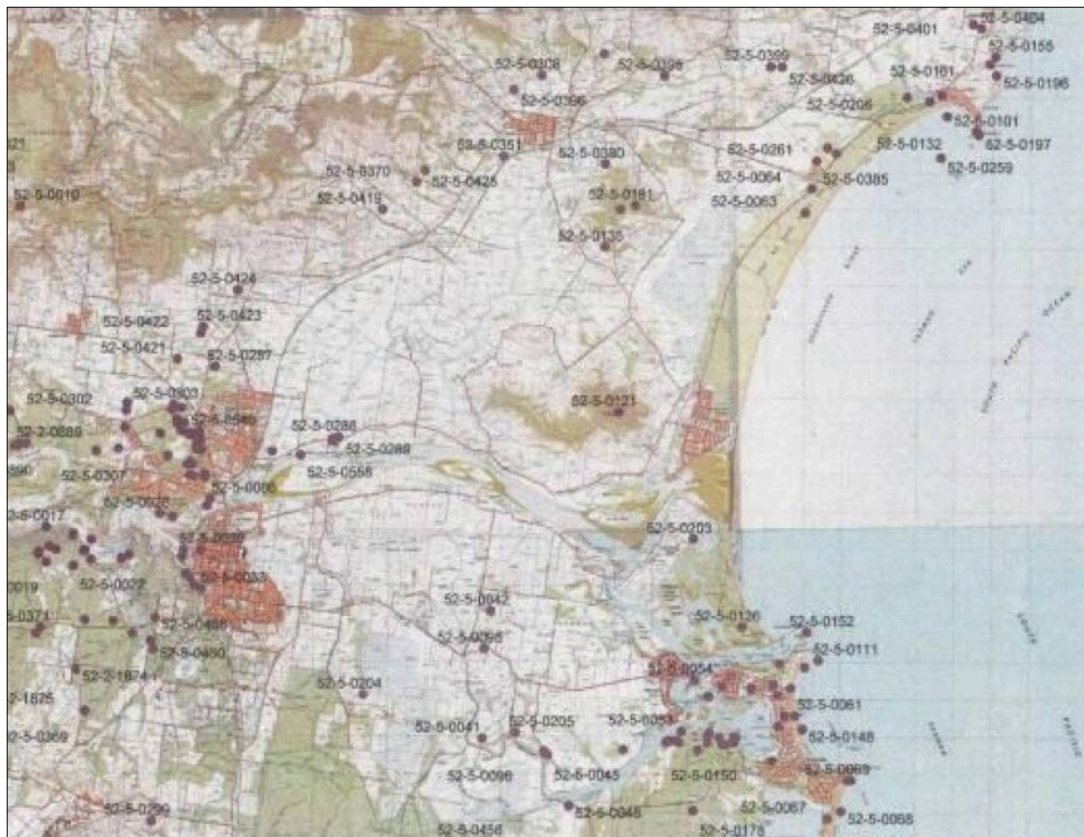


Figure 4.1: Recorded Aboriginal sites associated with the Shoalhaven delta as at 2011 (Source: Feary and Moorcroft 2011:26).

Change Through Time

Aboriginal culture was not fixed, but dynamic and adaptive, as it continues to be today. Archaeological evidence records the development of new technological and subsistence strategies that altered, and altered with, the environment. Changes over time in structure and complexity of social organisation have also been identified (Bennett (2003:34). As Attenbrow (2012:B45) summarises, excavations in the northern part of the study region show that broader technological changes identified and referred to by McCarthy (1963) as the Eastern Regional Sequence, also occurred through the Dharawal study area, though with some variations. The mid-Holocene appearance of backed artefacts and their subsequent demise around 1,500-1,000 cal BP, the appearance of ground-edged implements 4,000-3,500 BP and their increase around 1,500 BP and shifts away from the use of silcrete and tuff in favour of quartz in the last 2,000 years can also be seen in excavations across the region. Changes in use of various stone tools and materials are likely to have been accompanied by changes in social behavior and shifts in social network connections and exchange patterns. (Attenbrow 2012:B45) These patterns in the archaeological record represent the spread of new knowledge, ideas, technologies and innovations via exchange and can be understood to be evidence of the social network connections by which they were disseminated.

Social Organisation

Language groups

British colonists recorded variations in the languages or dialects spoken by people in different parts of the country, however it is only after the 1870s that the names Darug, Dharawal, Darginung, Guringai and Eora were used to refer to languages and the origin of these names usually is not given. Details about language group boundaries from historical and ethnographic records can only be considered indicative at best, as it is now understood that boundaries between language groups are not always precise lines (Attenbrow 2002 [2010]:31-33). Wesson (2005:8) defines the territory of Dharawal and neighbouring language groups as shown below (Figure 4.2).

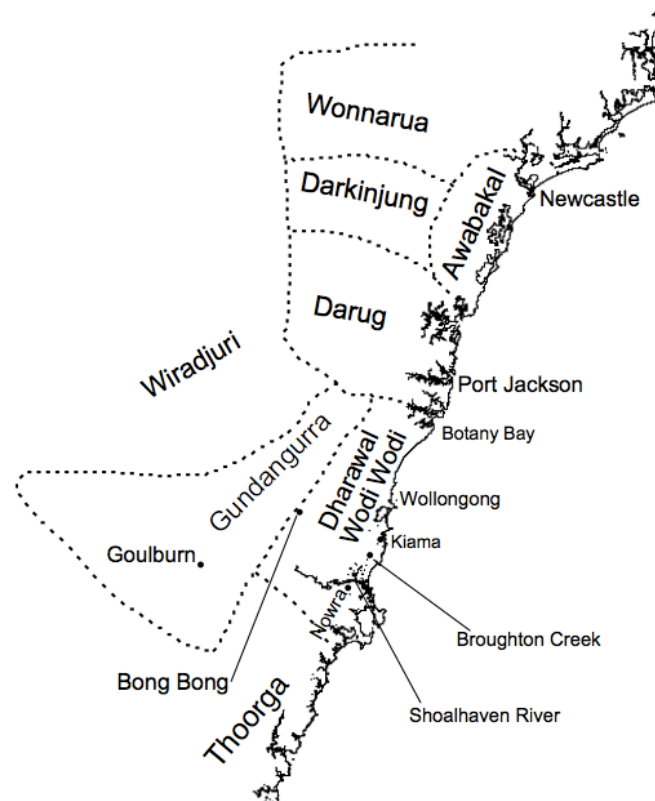


Figure 4.2: Dharawal Language Group area and their neighbours. (Source: Wesson 2005:8)

Local clans and bands

Aboriginal social organisation, kinship structures and connections with the natural environment were, as can be seen in historical and early ethnographic records, not well understood by European observers. Feary and Moorcroft (2011:32-3) suggest that this misunderstanding could, in part, derive from a tendency of Europeans to pay more attention to large gatherings of people, which were not representative of the social organisation of daily life; this factor, raised by McBryde (1974:5), is noted earlier in Chapter 2 (Table 2.1). European observers tended to identify groups as ‘tribes’ associated with a locality (Organ 1990:xiii,xli-xliii). The early European tendency to assign the colonised a ‘tribal’ label was a persistent and active one. Titles of ‘chief’ and ‘king’ recorded historically were imposed European values – titles, Boot (2002:277) suggests, bestowed upon favoured individuals as a means of manipulating Aboriginal communities.

Attenbrow (2002[2010]:22) notes that some of the named 'tribes' referred to in historical accounts are identifiable as local descent groups (also known as local clans or territorial clans). Other groups seen fishing and hunting together would not have all belonged to the same clan – though may have all been related through marriage. The term band is commonly used for these land-using groups.

Social structure, and how it functioned to gather people in the study area, can be seen within the following extract describing spatial organisation for encampments of Aborigines in the Sutton Forest district in the 1820s and 1830s:

"... As the tribe travelled together, or in parties of several families, a number of these gunyahs might sometimes be seen near each other; yet each was so arranged that its open side was turned from its neighbours. On one occasion, when the remnants of three different friendly tribes had assembled for a grand corroboree or dance, I made a plan of the encampment; each tribe was slightly apart from the other, divided by a sort of street. Thus, the inviters were clustered in the centre, having, I think, seventeen camps; the Picton tribe on the right hand, five camps; and the Shoalhaven on the left, comprising ten or eleven gunyahs; consecutively forming a village..." (Atkinson 1863 in Organ 1993:117)

While historical writings are noted to preferentially report on large gatherings, ceremonies and unusual events, depictions of Aboriginal people in early colonial art, perhaps also preferentially, report daily life scenes (e.g. cover and Figure 4.3 below). As described by Peterson & Long (1986: 32 in Bennett 2003:41), households (i.e. the immediate familial group of parents and children) and individuals in a band would each have their own networks within and between bands making it possible for them to join another if necessary.



Figure 4.3: *Kiama, Illawarra, N.S.W.* (Gritten, Henry. 1860. Reproduced with permission from the National Library of Australia. nla.pic-an2288541)

Coastal/Hinterland Distinctions

Howitt (1904) describes hinterland people of southeast New South Wales as specialised in the use of stone hatchets to obtain possums and reports that they were named *Paiendra* after the *Paien* or hatchet. Division into hinterland, coastal and mountain dialects was also documented for the NSW South Coast language groups, who distinguished themselves by the terms Katungal (from katung, the sea), Paiendra (from *paien*, the hatchet), and Bemeringal (from bemiring, a mountain). “Tribes’ between the Shoalhaven and Newcastle are recorded to have had the same sea and inland divisions as these groups to the south, with sea coast natives focusing on fish for subsistence and wood natives reliant on climbing trees after honey, flying squirrels and opossum. (Howitt 1904:82-4) Reframed as particular relationships between people, environment and life way, this information may be pertinent to exchange.

Rights to Land and Resources

Based on historical evidence, Bennett (2003:47) suggests that, though each band is understood to have had its own range, rights were probably not exclusive. Sharing of resources with near neighbours appears to have been the norm and people were able to travel widely and freely. (Organ (1990:xiii) In reference to the Sydney region, Attenbrow notes that many Aboriginal customs relating to land use and responsibilities for country mean boundaries are blurred zones that can change over time. The following extract from an essay written by Jamberoo farmer John Taylor (1869:4) is informative, though its underlying assumption of ‘the tribal right to exclusive occupation’ flags it as requiring cautious interpretation.

“...but the tribal right to exclusive occupation is modified when certain articles of food, material for weapons, and the like, are produced in any particular locality. There are general laws giving all the tribes authority to resort to the place, without offense to the tribe located there, or those whose country it is necessary to pass in order to reach it. Besides the tribal right to property in the land, it belongs to different families in the tribes, and is always jealously watched and transmitted from generation to generation...”

...They also have property in various trees...I remember while exploring and suffering for want of food, our black guide saw a loaded bee and followed it to a tree, but had scarcely got off his horse when he mounted again...he pointed to a mark on the tree, made by a stone tomahawk and said that the tree belonged to one northern blackfellow...If two or more men has a right to hunt over the same land, and one of them breaks off the tops of certain trees, by their laws the grubs in those trees are his, and no-one has a right to touch the tree...” (John Taylor. 1869. Aboriginals of the Colony. Kiama Independent. Thursday 29 April 1869)

Rights to land can be gained or passed on by different means including by descent and residence. Also, rights may be economic, based in ritual and/or based on relationships with other people as well as land. The importance of differentiating between land user and landowner is also now understood (Peterson & Long 1986: 11-12 in Bennett 2003:41).

Subsistence and Foraging Strategies

A number of subsistence/foraging models for Aboriginal occupation of coastal and hinterland regions in southeastern NSW have been proposed. Table 4.1, below, summarises occupation models posited for the Sydney to Batemans Bay area (Poiner (1976), Lake Illawarra (Navin Officer 2000:36-7), the Illawarra and Illawarra/Shoalhaven areas (Sefton 1980 and Bennett 2003 respectively) and the hinterland between Jervis Bay and Narooma (Boot 1994, 1996 in Bennett 2003:38). An expanded summary of Attenbrow's (1976) model of factors that may influence movement in foraging societies (see Table 2.2 previously) is also included. Though developed and proposed for study of the Far South Coast of NSW, this framework is adaptable to the Dharawal study area as it is a model of factors, or variables, that may have been involved. Interpretations, below, of what people did and hypotheses about habitual or embedded practices are equally valuable. Adaptive responses to change is a key theme, suggesting all may be relevant on some scale, at different times, to mobility/foraging activities. Their variability, it is suggested, is an asset if all are considered strategy options that may have been available.

It is noted (Lampert (1971a:63-4 in Attenbrow 1976:18) that lack of marked seasonality on the south coast doesn't support the idea of alternating use of shore/inland by a single group. Wesson (2005:6), in reference to Aboriginal people in the Illawarra, records that knowledge stems from practical experience, understanding of the interrelationships between ecological functions, broader patterns in climate and geophysical features, and understanding and learning the signals of change. Climate and weather events, as variable factors, may still have been influential on the things that structured behaviour.

Aboriginal mobility/foraging models for southeastern NSW	
Poiner (1976) Re: Sydney to Batemans Bay	Possibly semi-nomadic in summer, exploiting mostly marine resources. Nomadic in winter with smaller groups. Dispersal of population inland in winter exploiting mostly land resources, though some continued use of both. Movement between coast and hinterland (in both directions)
Sefton (1980) Re: Illawarra	Nomadic and moved in small bands within tribal areas Travelled larger distances for ceremony Movement in response to seasonal availability of foods Tablelands groups visited coast
Navin Officer (2000:36-7). Re: Lake Illawarra	Possible year round exploitation of Lake Illawarra as resources in this location may have precluded the need to travel great distances Suggests local population was fairly sedentary
Bennett (2003) Re: Illawarra and Shoalhaven	Mobile foraging economy exploiting sea, river, forest, hinterland, and mountain escarpment All locations exploited all year though summer abundance of marine resources meant larger groups formed on the coast Resource rich river systems also supported larger groups in summer. Small bands - probably < 20-30 people except during ceremonies. Bands adapted to short-term environmental change by moving camp and altering numbers. Economy and technology was not static (e.g. changes in technology and subsistence patterns).
Boot (1994, 1996 in Bennett 2003:38) Re: Hinterland between Jervis Bay and Narooma	Hinterland people, as small groups, were always mobile. Only congregated in larger groups for short periods in the areas where resources were abundant. Groups were responsive to changes such as short-term climatic fluctuation. This ability to turn short-term changes to advantage drove social change.

Table 4.1: Aboriginal mobility/foraging models for southeastern NSW.

Aboriginal mobility/foraging models for southeastern NSW	
<p>Attenbrow (1976) Re: the Far South Coast of NSW</p>	<p>Exploitation of food: scheduling of movements to take advantage of seasonal resources</p> <p>Group size and degree/scale of nomadism influenced by:</p> <ul style="list-style-type: none"> • cultural system; • resources available; • accessibility in terms of topography, vegetation, climate <p>Cultural factors (e.g. what people eat, where they move and who they interact with (with choices <i>exercised within the limitations imposed by the environment</i>) (Attenbrow 1976:1).</p> <p>Limitations (e.g. water). Scarcity of water and abundance of food can have the same effect (i.e. congregating)</p> <p>Preferences (preferred foods etc.)</p> <p>Change in diet (i.e. variety) (Attenbrow 1976:6-9-11)</p> <p>Different levels of mobility– camp with some people mobile from a ‘home base’ (Peterson 1971 in Attenbrow 1976:10).</p>

Table 4.1 (continued): Aboriginal mobility/foraging models for southeastern NSW.

A variable climate means the weather can't be predicted for a specific time in the future – though it can, after a period of time, be predicted to continue to be variable. Broader patterns in climate (e.g. El Nino/La Nina in the more recent past) do have signals and bring changes affecting abundance/scarcity distributions of resources. They also bring cyclones, droughts, and flooding rains. A network of social connections, with established access to resources via reciprocal relationship agreements can be understood to be part of the range of strategic response options available. The presence of established, large scale, social network pathways for redistribution of abundance, and insurance against scarcity (via sharing) suggests this may be the outcome of a long-term, mutually beneficial, social strategy. Connections, agreements and arrangements would have been constrained by physical context, as Attenbrow (1976:1) notes. In the case of the Dharawal study area, geophysical features may have not just constrained, but structured the network that operated within them.

Movement and Exchange

Movement of Aboriginal people from the coast to the plateau, either as part of a seasonal round, for ceremonial commitments, or the receipt of Government rations, is noted as a consistent theme in historical accounts relating to the study area. (Navin Officer 2000:35) Sefton used ethnographic evidence to put forward a tentative model for the North Illawarra based on data up to 1836, as she (1980:21) considered traditional activity patterns were likely to have been severely disrupted beyond that date. Sefton notes that there are many references in the memoirs and writings of early Illawarra region settlers to:

- The movement of Aboriginal groups over considerable distances into other tribal areas for ceremonial purposes.
- Frequent movement of Aborigines between the tablelands and all parts of the Illawarra to the shores of Lake Illawarra.
- Trails across the mountain barriers and through dense brush (rainforest), which were later adopted and developed by European settlers.

George Caley (1808), in a letter to Sir Joseph Banks, commented on the habit of the Illawarra and South Coast Aborigines of visiting the hinterland. "*...Sea coast natives were said to visit the country near the hill...*" (The Jib at Bowral). (Banks Papers, Mitchell Library in Organ 1990:32) The European term 'visiting' may be misapplied, however, as it suggests both distinction on one scale and an established broader relationship. Whether coastal and hinterland people were the same, or separate groups may depend on the scale at which the question is asked. Scale may also be incompatible - a number of systems of social organisation and relationship appear to have been in place in parallel. To borrow a concept from Torrence (2011), it might just be the wrong question for its context.

Long distance travel and travel routes

Travel on an individual scale, and over long distances, is noted in early European accounts, as shown in the following chapter. Wesson (2005:4) presents a map

showing Aboriginal traditional travel routes for the Illawarra region (Figure 4.4). Sources for this map are not specified; however this publication (Wesson 2005) is generally defined as being based on evidence from a broad range of sources including government files and reports, newspaper articles, local histories, ethnohistories, journal articles and oral histories. If so, historical accounts are likely to be many of the same ones examined in this thesis.

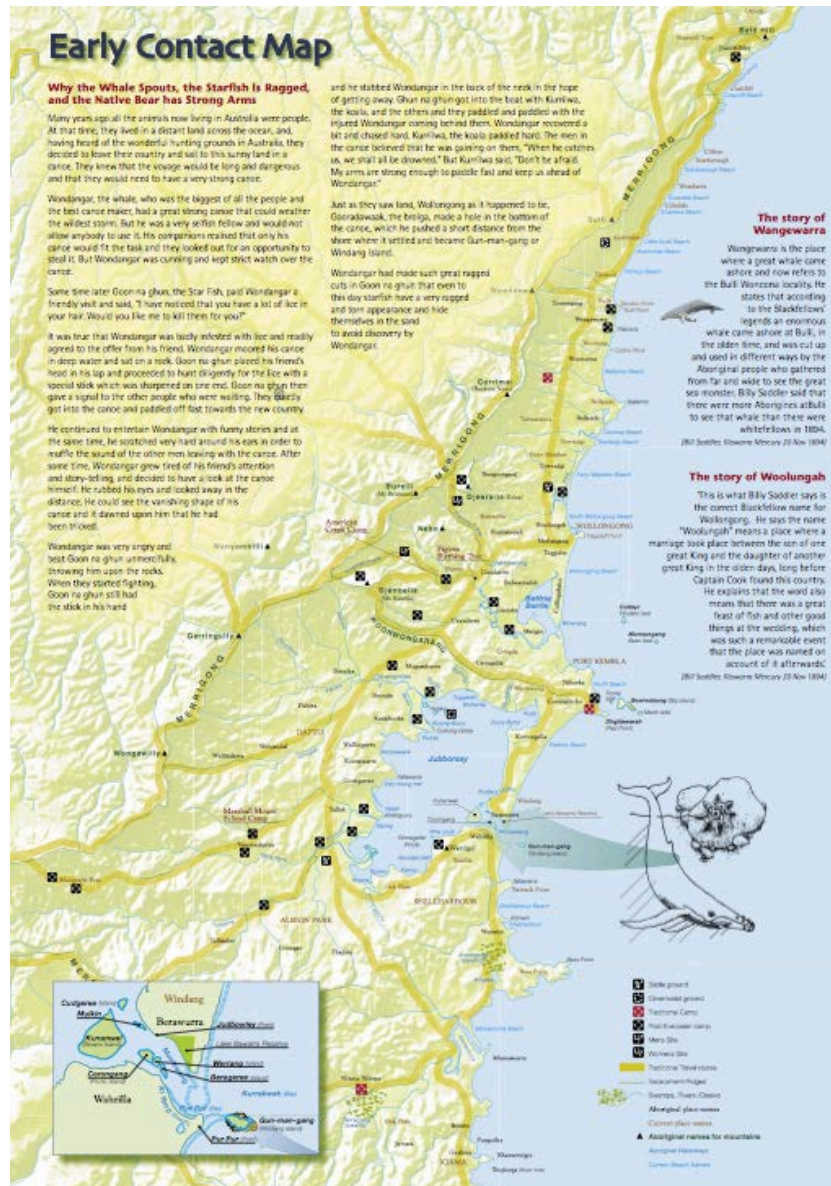


Figure 4.4: Map showing traditional Aboriginal travel routes in the Illawarra region. (Source: Wesson 2005:Early Contact Map)

Ceremonial Gatherings

Sefton (1980:12-13) notes that, within the historical records there are many references to the movement of Aboriginal groups over considerable distances into other 'tribal' areas for ceremonial purposes. Regular excursions to places such as Appin, Bong Bong and occasionally as far as Sydney and the Blue Mountains, for ceremonial purposes, are recorded historically. (Organ 1990:xiii) Attendance at ceremonies is understood to have been an important social mechanism for bringing small groups together for a range of activities such as marriage, information exchange and settling disputes (Feary & Moorcroft 2011:33-4) as well as for exchange of material items. (e.g. McBryde, 1984, 1987)

Exchange of Material

Wesson (2005:8) describes Dharawal people as travelling widely throughout their territories and also, to a lesser extent, through those of their neighbours – depending on season and purpose. Recorded favoured north-south travel routes were along the 'Princes Highway route', Meryla Pass and the Kangaroo River, while east-west routes from the coast were through Bulli Pass, to Bong Bong and along the Cordeaux River. People travelled from the inland to the coast to exchange foods, raw materials and artefacts as coastal food resources were particularly valued by inland people. (R. Mason 2004 pers. comm. in Wesson 2005:8)

Attenbrow, (2002 [2010]:122), notes that raw materials required for making tools, weapons and other items would have been obtained from many different places, with materials not locally available perhaps coming from other areas through trading networks and/or long distance travel, as has been described in other regions. Howitt (1904:54, 716-19) describes the following activities took place at meetings and ceremonies by other groups in other parts of the continent:

- Along the upper and lower Darling River slabs of stone and granite pestles for pounding and grinding seeds were exchanged for nets, twine and fishhooks.
- The Wotjabaluk of North Western Victoria exchanged sets of spears, opossum skin rugs, men's kilts made of the skin of the kangaroo-rat, armlets, wooden

bowls, as well as stone from the quarry at Charlotte Plains to be made into axe-heads.

- The same practices of barter occurred in tribal meetings of the Kulin nation in eastern Victoria.
- People gave presents to others from distant parts ‘to make friends’ (gift exchange).
- Meetings were arranged specifically for the purpose of exchange, ending with agreement to meet again for barter.
- Certain goods could only be exchanged together as a group, for example, a set of articles including a possum string belt, four men’s kilts, a bone nose peg and a set of corroboree ornaments.
- Exchange between women included items such as “opossum rugs”, baskets, bags and digging sticks.

Colonisation and Change

James Cook, aboard the Endeavour, sailed past the Illawarra and South Coast in 1770, observing groups of people on the shore and smoke from fires along the way, but did not land. The first European ‘arrivals’ in the study area are likely to have been European disease. Aboriginal social network pathways were the carriers of these disastrous events. The smallpox outbreak that ravaged the Sydney region in 1789, killing at least half the Aboriginal population, is likely to have reached the Illawarra just 50km south and possibly spread further in this way. (Organ 1990:5)

European expansion during the 1790s was rapid, with the colony expanding from Sydney and Parramatta to the Hawkesbury and Georges River, which dispossessed Aboriginal people of their land and denied them access to plant and animal resources. To the south, along the NSW south coast, larger communities survived and knowledge was retained for a longer period of time than in the Sydney Region. Traditional practices such as convening for initiation ceremonies continued until the

late 19th Century, though with decreasing frequency (Attenbrow 2002[2010]:14-15, 126).

There is evidence that European impacts in the Shoalhaven were, to some degree, gradual, with settlement by Europeans only occurring in the 1820s and Aboriginal participation in European economic systems only partial prior to the 1860s.

Cross Cultural Exchange

Aboriginal people are known to have assisted Europeans with exploration in exchange for food, clothing and tools. Particularly valued by Aboriginal people were the European tomahawks that were similar to their own ground-edged hatchets, but were more durable and efficient, being of tempered steel with a sharper blade than stone. These tools, in some areas, arrived through trade before Europeans themselves. (Wesson 2005:38) The distribution of blankets and food by Europeans can also be considered an act of exchange – in return for use of land and resources, or suggestive of a relationship based on sharing of them. This practice appears to have quickly been reframed as welfare when appropriation of land was well-established and Aboriginal expertise and knowledge was no longer valued.

Many Aboriginal people worked and lived at Alexander Berry's Shoalhaven Estate at the foot of Coolangatta Mountain from 1822 until their movement to a reserve in 1900. Bennett's (2003) analysis of these records and other historical material suggests that, up until 1860, Aboriginal people in the region continued to gain the bulk of their subsistence from fishing, hunting and gathering. Strategies dependent on the colonial economy, such as farm work and trading with settlers, made only minor contributions. After 1860, as European settlement and land use intensified, Aboriginal people were pushed to the periphery and the contribution of hunting and gathering to their diet contracted as a result. Fishing remained an important source of food and cash, though dependence on government assistance increased. (Bennett 2003:ii)

The number of Aborigines living in the Illawarra at the time of the first land grant (in 1816) are not known. By 1834 there were, according to historical records, only 78. (Organ 1990:93) Despite this, there is historical evidence, as in the Shoalhaven district, of continuity of traditional practices and activities – at least up until 1850.

Reports from the 1850s onwards suggest that camps and hunting activities of the remaining Illawarra Aborigines had become concentrated along the coast, in particular the coast and swamps around Tom Thumbs Lagoon. This was a pattern shaped by European settlement, which pushed Illawarra people to the fringes of their country where they occupied land unsuitable for European farming. (Wesson 2005:25-6)

CHAPTER 5

HISTORICAL ACCOUNTS ANALYSIS

Records and Sources

Extracts from newspaper articles, diary and journal entries and official and personal letters describing movements of Aboriginal people within, or into/out of Dharawal country, were included in this analysis. These accounts record activities relating to the Illawarra and South Coast regions, including connections between this area and places to the west, north and south. Organ's (1990, 1993) compilations of primary source extracts, provide the bulk of documentary material used. All extracts compiled in Organ (1990, 1993) dating between 1795 and 1850 that contained sufficient spatial detail for plotting were included, except blanket returns records. The volume and nature of information that they contain was beyond the scope of this thesis, though well worth adding to this spatial data in the future. Two post 1850 extracts describing ceremonial gatherings from Matthews (1896 in Organ 1993:158) and Howitt (1904) were also included. These are distinctive not only as post 1850 accounts but as the writings of pioneer ethnographers/anthropologists.

A total of 31 extracts were included in this analysis. Based on categories suggested by these extracts, these were grouped into five themes (Figure 5.1). 'Habitual movements' refers to observations made about regular patterns of movement (for foraging/subsistence). 'Other/unknown' was applied where reasons for movement were not specified. Full details of each account, including context, quotation and/or summary, and categories in which they have been placed for this analysis, are presented in spreadsheet format in Appendix I. Numbers of people were not recorded, as only some accounts provided indications (beyond generalisation). For full primary source references for historical extracts cited in Organ (1990,1993) see Appendix I.

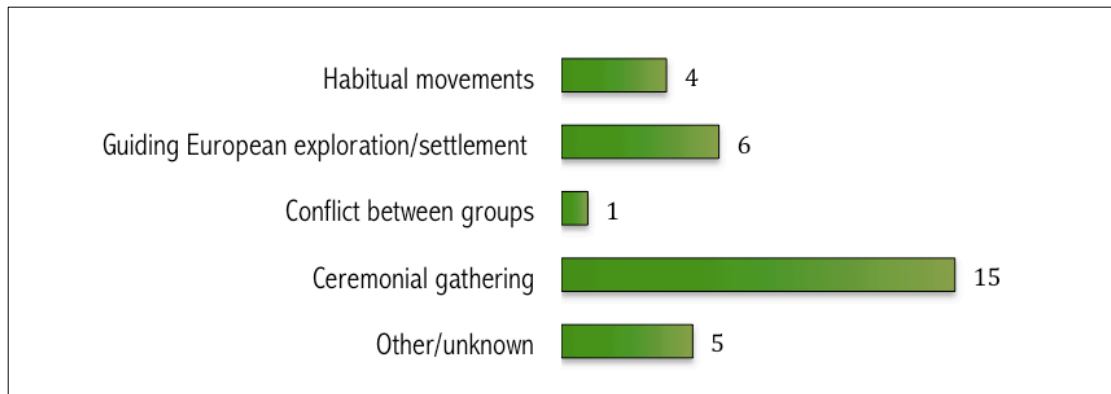


Figure 5.1: Historical descriptions of Aboriginal movements and gathering by theme.

Historical Extracts – Data and Mapping

Care was taken in interpreting place names and their geographic location as many references to locations and groups are broad, particularly within earlier accounts. General, rather than specific location is characteristic of most of this evidence and therefore also reflected in mapped results. Some geographic references are quite vague (e.g. ‘beyond the Ngarigo’ (Howitt 1904:519-20), however still potentially valuable, and were also included as directional vectors. No adjustment of spatial data in relation to geographic features was made, with all information plotted ‘as the crow flies’. Detail about travel routes was rarely provided, nor was it extrapolated by the author. Mapped data represents movements and connections as described

Though also compiled in spreadsheet format, spatial data was rendered and managed using Google Earth software (Figure 5.2). This spatial format database allowed historical data to be rendered and examined for evidence of change over time and variation based on type of activity, as well as characterising it as an overall pattern. Results were mapped in time slices for examination of change over time, while also building a cumulative picture. Variation in patterns relative to types of movement, or the purposes for which it was undertaken, was then tested for by colour coding each category. This methodology also allowed data to be examined, and displayed, on different spatial scales, and to be directly overlaid with ground-edged hatchet provenancing results within this software system.

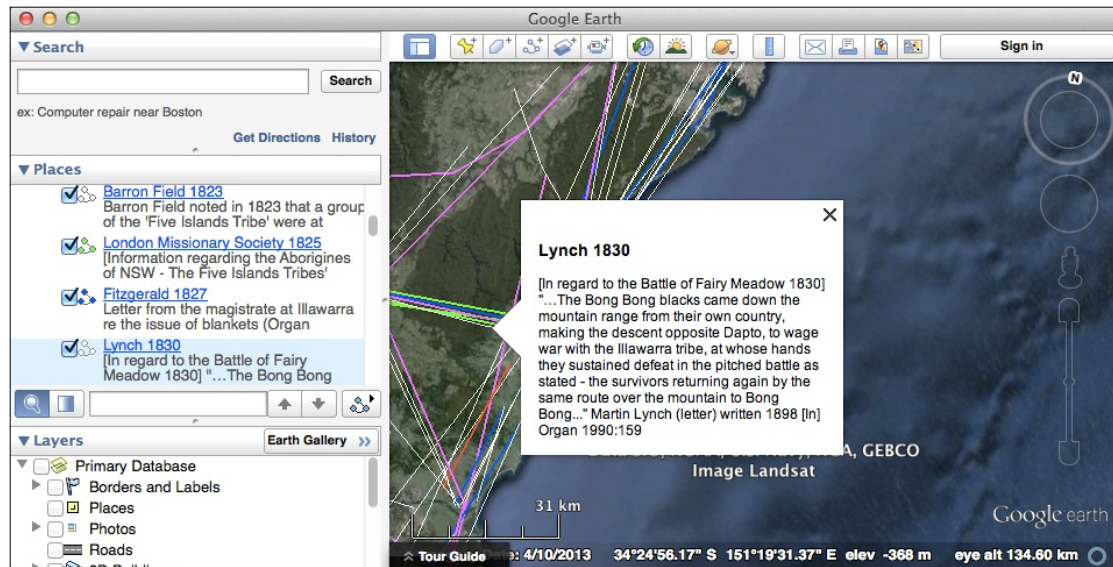


Figure 5.2: Example of Google Earth rendering, compilation and management of spatial data extracted from historical accounts.

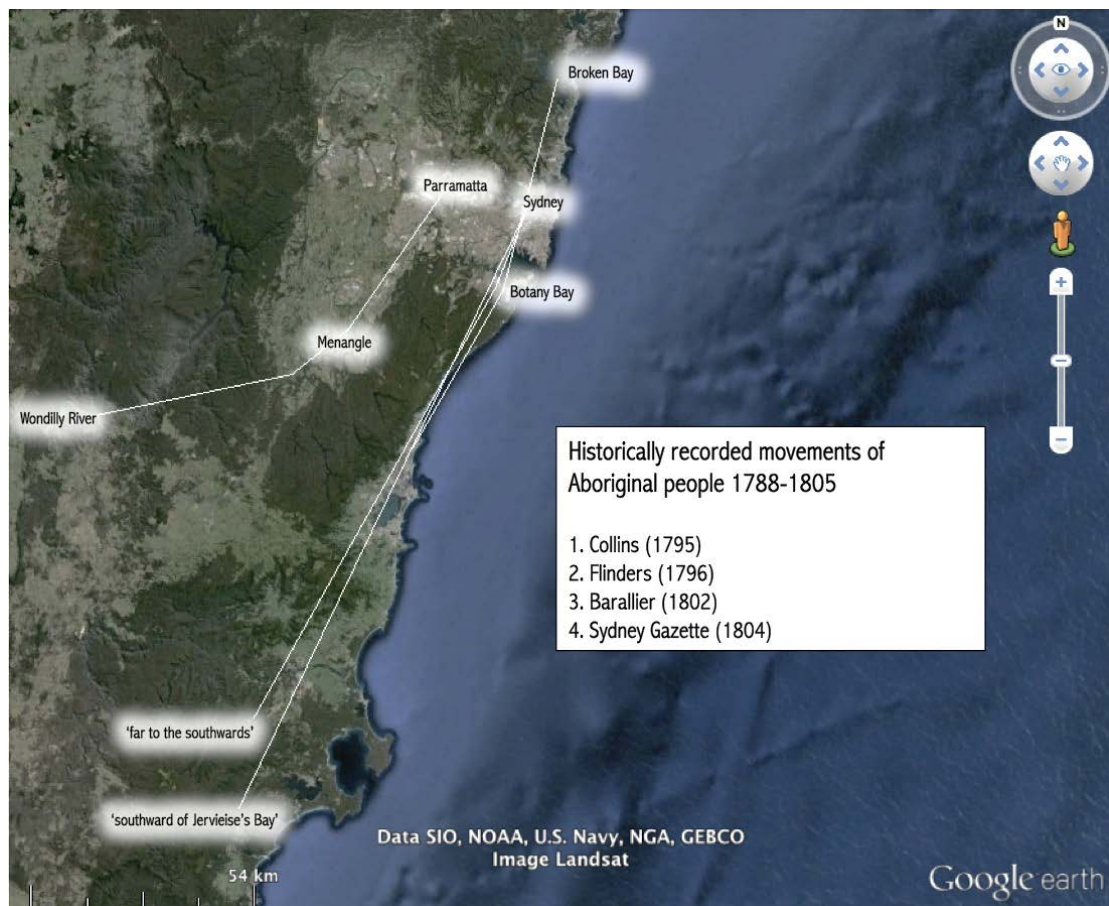
Historical Accounts Analysis – Results and Interpretation

Results and interpretation are presented below in order of relevance to addressing the component research questions. Firstly, evidence for change over time in historically recorded movements of Aboriginal people in the study region is examined. Historical accounts are mapped in time slices with historical maps tracking corresponding expansion of European settlement included for comparison. Secondly, consideration of the pattern overall, and finally, evidence for differences in patterns of movement for different purposes are presented and discussed. Interpretation also includes assessment of distortion factors identified in research design (Table 2.2) that may have impacted on these results.

The Years 1795-1804 AD

These accounts (Figure 5.3) begin with a 1795 report, by First Fleet Officer David Collins (1795 in Organ 1990:7), on the arrival in Sydney of Gome-boak, an Aboriginal warrior from far south of Botany Bay. Bass and Flinders (1796) expedition to Illawarra aboard the *Tom Thumb* is the first officially recorded instance of European presence in the study region, though Flinders' journal records advice by 'two natives' that living amongst them were some white men and two women who

grew Indian corn and potatoes. This suggests runaway convicts had preceded them. At that time little was known about the region south of Port Jackson; it had not been explored or named, except for the coastline and Jervis Bay. There is a strong correlation between what was seen/recorded by Europeans and the extent of colonisation, as illustrated by comparing Figure 5.3 to an 1810 map of the extent of settlement (Figure 5.4).



The Years 1795-1804 AD

1795	Report on the arrival in Sydney of Gome-boak, a warrior Aborigine from far south of Botany Bay. (Collins 1795 in Organ 1990:7)
1796	Journal extract recording journey to the Illawarra by Bass, Flinders and the boy Martin aboard the Tom Thumb - which was swamped near Towradgi Beach, north of Wollongong, the whole party being washed ashore (Flinders 1796 in Organ 1990:7)
1802	Ensign Barrallier travelled to the Cowpastures and Menangle in 1802, accompanied by a number of local Aborigines. The party travelled south west from Parramatta to the Wondilly Wollondilly? River, via Menangle, the Cowpastures, and Nattai. (Barrallier 1897 in Organ (1990:26)
1804	Report on the visit to Woolloomooloo, Sydney, of Aborigines from south of Jervis Bay. (Sydney Gazette 18 March 1804 in Organ 1990:26)

Figure 5.3: Historically recorded movements of Aboriginal people in Dharawal country between 1795 and 1804. See Appendix 1 for expanded extract/summary and full primary source references.

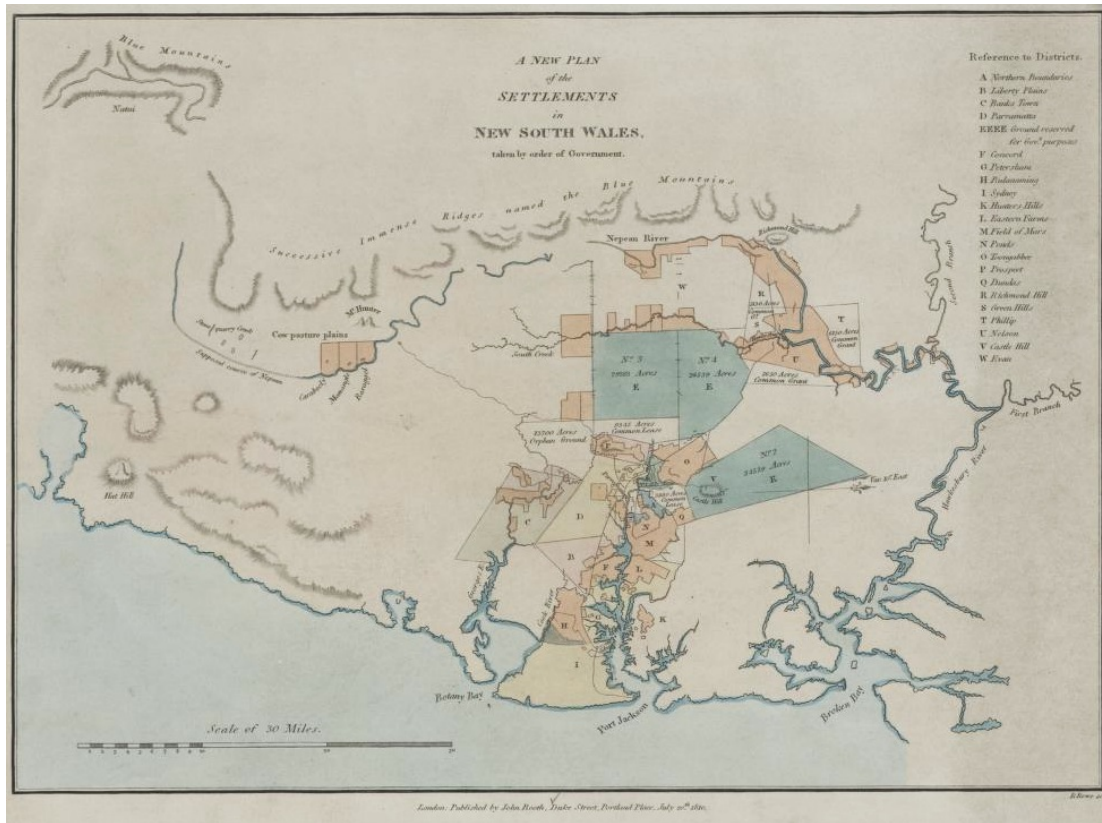


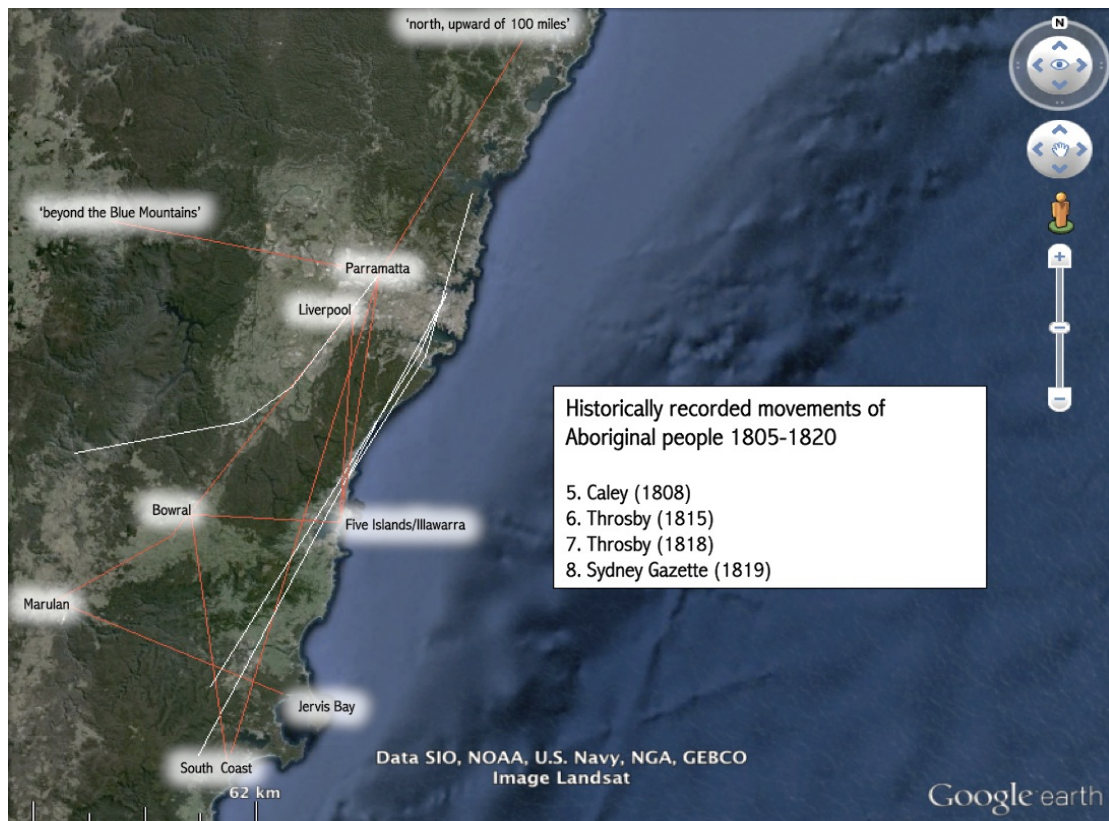
Figure 5.4: A new plan of the settlements in New South Wales, taken by order of Government. 1810. Robert Rowe. 1810. (Reproduced with permission from National Library of Australia. MAP RM 715).

The Years 1805-1820 AD

European observations of Aboriginal activity between 1805 and 1820 again reflect the expanding perspective of a growing colony (Figure 5.5). Aside from shipping activity along the coast, colonisation as at 1810 (Figure 5.4 above) had not yet advanced into Dharawal country. Inaccessibility delayed, but did not prevent, European expansion south. Interest in the Illawarra and Shoalhaven, was not just for their good agricultural land, but for red cedar (Grainger 1972:18), and the pressures of drought led to searches for overland routes. Charles Throsby explored the northern part of the study region (with the assistance of Aboriginal guides), and led a small group that moved cattle down into the Illawarra via the Bulli track in 1815, and first land grants were issued in the Illawarra area in 1816 (Organ 1990:91).

Historical maps show that by 1820 (Figure 5.6), inland routes via Moss Vale and Marulan, south to Jervis Bay had also been explored. No way across the upper (freshwater) reach of the Shoalhaven could be found however, and Throsby, again

assisted by Aboriginal guides, eventually crossed at the lower Shoalhaven ford at Burrier (Throsby 1818 in Organ 1990:95-6). They came across several groups of Aboriginal people in this journey, one of which guided them to Jervis Bay via Currambene Creek, suggesting that they had intimate knowledge of the country south, and rights to travel through it (Feary and Moorcroft 2011:37-8).



The Years 1805-1820 AD

1808	Letter from George Caley to Sir Joseph Banks, commenting on the habit of the Illawarra and South Coast Aborigines of visiting the mountain and highland tribes. "...Sea coast natives were said to visit the country near the hill..." [The Jib at Bowral] (Banks Papers, Mitchell Library in Organ 1990:32)
1815	Nephew of Dr Charles Throsby, who in 1815 moved cattle into the Illawarra - setting up a stockyard and stockman's hut at Wollongong - the first (official) white settlement in the Illawarra. (Throsby Smith 1863 in Organ 1990:48)
1818	On 3 March 1818 a party led by Charles Throsby and surveyor James Meehan set out from Liverpool to Jervis Bay, via Moss Vale and Marulan. The party included two Aboriginal people, Bundell and Broughton, and was joined by other Aboriginal people along the way. (Throsby 1818 in Organ 1990:95-6).
1818	Governor Macquarie hosts a banquet at Parramatta, on 28 December 1818, for the Aborigines of the colony, including those from Illawarra, the South Coast, and beyond the Blue Mountains, an event held by Macquarie for a number of years (Sydney Gazette, 2 January 1819 in Organ 1990:106)

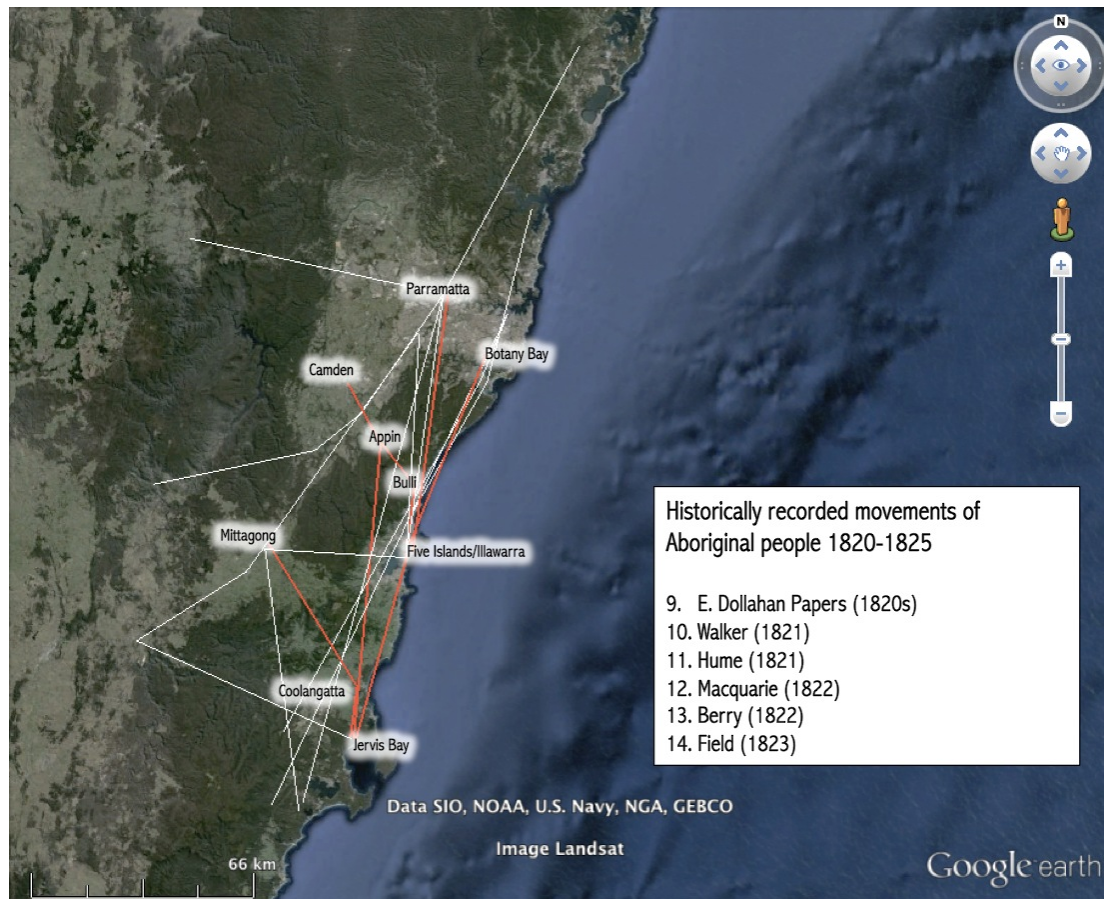
Figure 5.5: Historically recorded movements of Aboriginal people in Dharawal country between 1805 and 1820 (shown in red). Earlier movements are shown in white. See Appendix 1 for details.



Figure 5.6: (Detail) Penny, R. 1820. Map of New South Wales containing the districts of Port Jackson, the Coal River, Illawarra or the Five Islands and the country to the westward of the Blue Mountains. (Reproduced with permission from National Library of Australia. NLA MAP F 864.)

The Years 1820-1825 AD

From 1820 on (Figures 5.7 to 5.12), accounts appear to fill in detail and reiterate previously recorded pathways, rather than record change in patterns of Aboriginal activity. Exploration assisted by Aboriginal guides, and subsequent settlement, continued southward. In 1822, Alexander Berry travelled up the Shoalhaven River as far as Burrier, and settled at the foot of Mount Coolangatta, soon followed by other settlers taking up land along the Shoalhaven River (Feary and Moorcroft 2011:40-41). The volume of written records and extracts containing observations of Aboriginal movements and activity increases correspondingly. Observations relating to habitual movements and ceremonial activities through this period provide evidence of continuation of traditional practices.



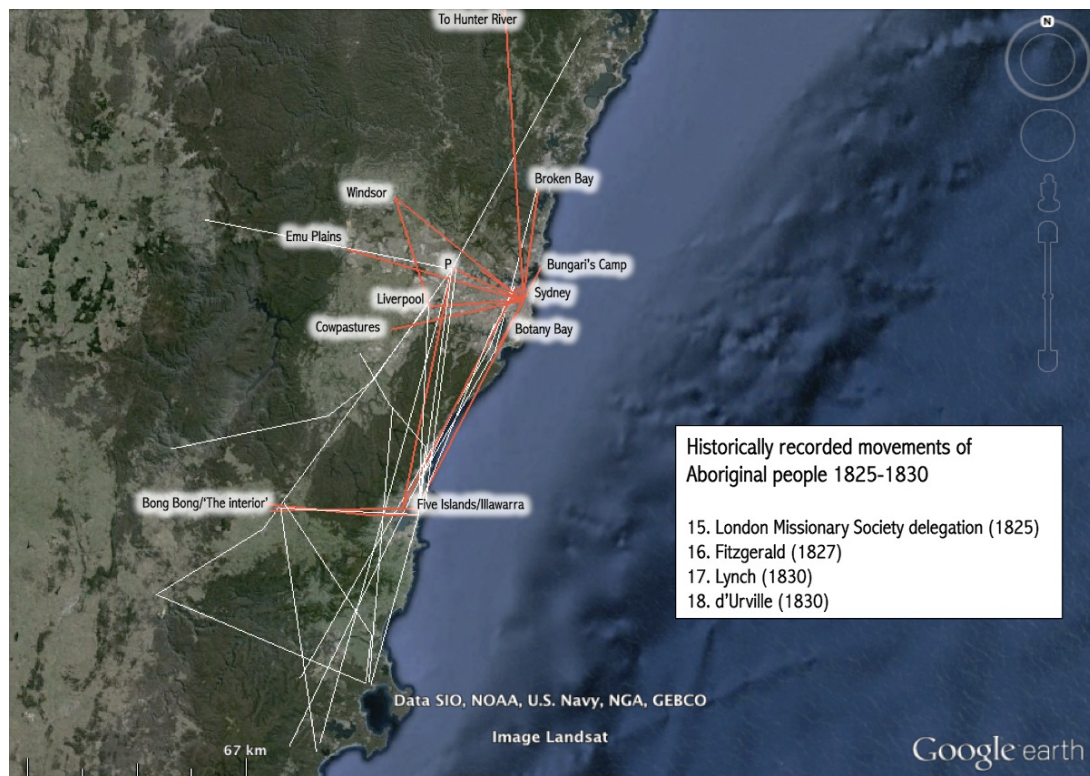
The Years 1820-1825 AD

1820s	Referring to Illawarra and Appin Aborigines from the 1820s (Organ 1990:491) "... <i>The mountain tribes made an annual trip to visit the Coastal tribe, travelling from Camden over the Bulli Mountain for their annual "corrobee"...</i> " (E. Dollahan Papers in Organ 1990:492)
1821	Letter from William Walker, Parramatta, to the Reverend R. Watson, regarding attendance at a Corrobarrara and mentioning the distinctive body painting of the Five Islands Aborigines (Walker 1821 in Organ 1993:43)
1821	Report on Hamilton Hume's overland journey from Appin to Jervis Bay, wherein he was accompanied by the Aborigines Udda-duck and Cowpasture Jack (<i>Sydney Gazette</i> . 11 January 1822 in Organ 1990:113)
1822	Governor Macquarie and party met with a group of approximately 100 Illawarra and South Coast Aborigines at Allans Farm, near Red Point [Wollongong] in 1822 (Macquarie 1956 in Organ 1990:114)
1822	The diary of Berry (1822 in Organ 1993:46-7) includes details of Berry's first efforts in establishing a settlement at Coolangatta, by the Shoalhaven River. It contains specific reference to "an old [Aboriginal] man who claimed the ground, named Wagin, Yager, Chief of the Jervis Bay people, and the Aborigine Charcoal Will [possibly of Bulli] who accompanied the party to the Shoalhaven. (Organ 1993:45)
1823	Barron Field noted in 1823 that a group of the 'Five Islands Tribe' were at Botany Bay to participate in "... <i>a ceremony in which a number of Aboriginal men and women were publicly admonished and punished for the breaking of certain tribal laws...</i> " (Field 1823 in Wesson 2005:27)

Figure 5.7: Historically recorded movements of Aboriginal people in Dharawal country between 1820 and 1825 (shown in red). Earlier accounts shown in white. See Appendix 1 for details.

The Years 1825-1830 AD

Accounts in this period (Figure 5.8), continue to reidentify connections east-west between Illawarra and ‘the interior’, as well as links to the Sydney and Parramatta regions to the north. One account from this time period of note is d’Urville’s (1830 in Organ 1990:133-7) detailed description of groups present at a large ceremonial gathering just south of Sydney. It provides significant detail about connections to the north of the study area. The following timeslice, 1830-1836 (Figure 5.9) also reiterates pathways established earlier.

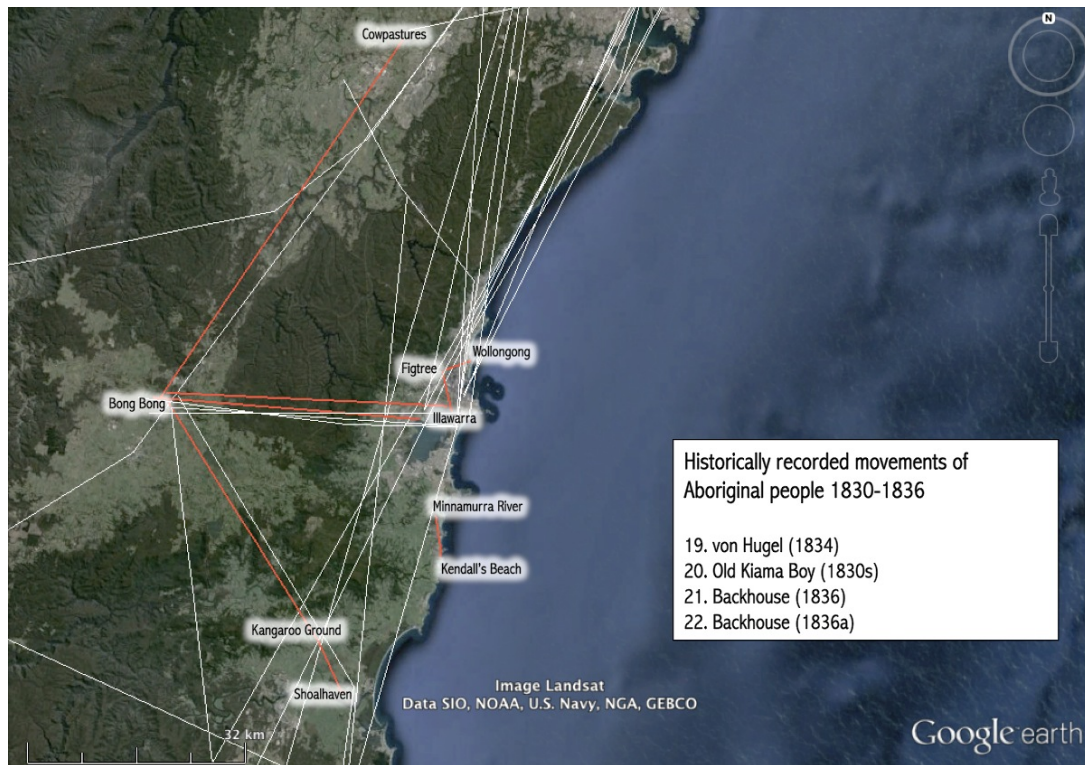


The Years 1825-1830 AD

- | | |
|------|--|
| 1825 | [Information re: 'Aborigines of NSW - The Five Islands Tribes' collected by a London Missionary Society delegation in Sydney in 1825] "... <i>They come from the interior, to the above mentioned quarter of the coast, to obtain fish, oysters, water-fowl, grubs, &c...</i> " (Tyerman and Bennett 1840; Threlkeld 1974:340-1 in Organ 1990:137-8) |
| 1827 | Letter from the magistrate at Illawarra re the issue of blankets (Organ 1993:68-9) "... <i>it is impossible I can comply with those wishes in consequence of all the Natives being at present in Sydney & Parramatta...</i> " (Fitzgerald 1827 in Organ 1993:68-9) |
| 1830 | [In regard to the Battle of Fairy Meadow] "... <i>The Bong Bong blacks came down the mountain range from their own country, making the descent opposite Dapto, to wage war with the Illawarra tribe...the survivors returning again by the same route over the mountain to Bong Bong...</i> " (Martin Lynch (letter) written 1898 in Organ 1990:159) |
| 1830 | Account by Jules Dumont d'Urville, the French explorer in 1830 recording gathering of tribes from north, south and west of Sydney in the bush between Sydney and Botany Bay for ceremony. (d'Urville 1830 in Organ 1990:133-7) |

Figure 5.8: Historically recorded movements of Aboriginal people in Dharawal country between 1825 and 1830. (shown in red). (P) refers to Parramatta.

The Years 1830-1836 AD



The Years 1830-1836 AD

1834	Extract from the Journal of Baron Charles von Hugel, who refers to local Aborigines he met with in the Illawarra at the end of July 1834 (von Hugel 1834 [Transcript by Clark] in Organ 1993:82-4).
1830s (c.)	"...I well remember the Norfolk Pine in front of the school as a very small plant with its secure fence enclosing it. The old Figtree [Kiama], ... was the visiting place of the aborigines when they shifted camp from the Minnamurra River to the stream that flows on to Kendall's Beach..." (Undated newspaper cutting 'Old Kiama Boy' in Organ 1993:74)
1836	Reverend Backhouse (Quaker minister) and companion William Walker visited Illawarra, Shoalhaven and Bong Bong. They encountered a group of local Aborigines at Kangaroo Valley. "...the three tribes were from Shoal Haven, Bong Bong and belonging [to] the Kangaroo Ground: they are all about to visit the Cow Pastures to learn a new song, and object for which they sometimes travel far..." (Backhouse 1836 in Organ 1990:206)
1836a	Reverend Backhouse (Quaker minister) and companion William Walker's visit to Illawarra, Shoalhaven and Bong Bong. "...27 September 1836...When at Dapto, we engaged a native Black, named Tommy, of the Kangaroo Ground, to be our guide to Bong Bong..." (Backhouse 1836a in Organ 1990:208)

Figure 5.9: Historically recorded movements of Aboriginal people relating to the Dharawal region study area between 1830 and 1836. (shown in red).

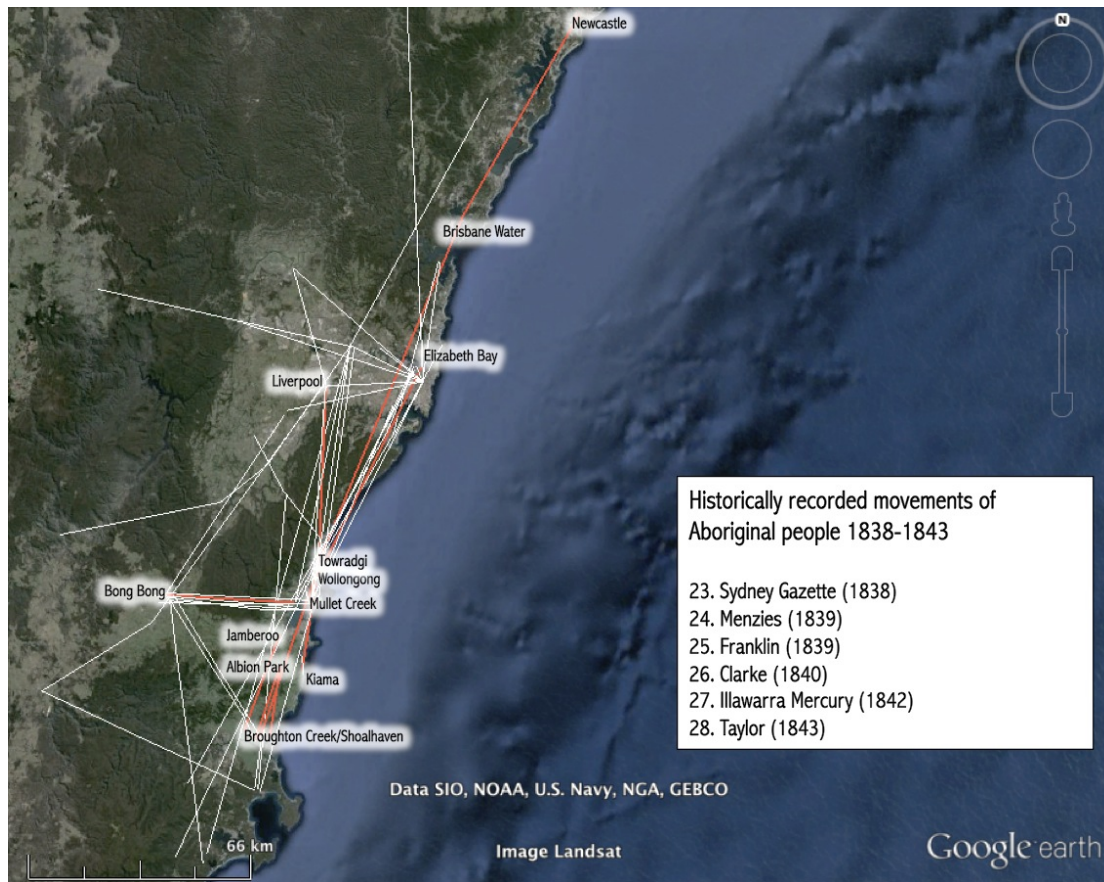
The Years 1838-1843 AD

European presence and land-use in the study region was well established by the mid-1840s. An 1845 map of the study area (Figure 5.10) gives some indication of the scale

of settlement by this time in the now largely cleared coastal area. Despite this, observed movements of Aboriginal people between 1838 and 1843 (Figure 5.11) describe movements along the same pathways as those recorded much earlier in the colonial period. The presence of Aboriginal people from Newcastle at a ceremonial gathering at Towradgi identifies a possibly new long distance link, although this may just be an uncommon occurrence and/or not previously observed by Europeans.



Figure 5.10: Map of the district of Illawarra. 1845. (Reproduced with permission from National Library of Australia. Map F 100.)

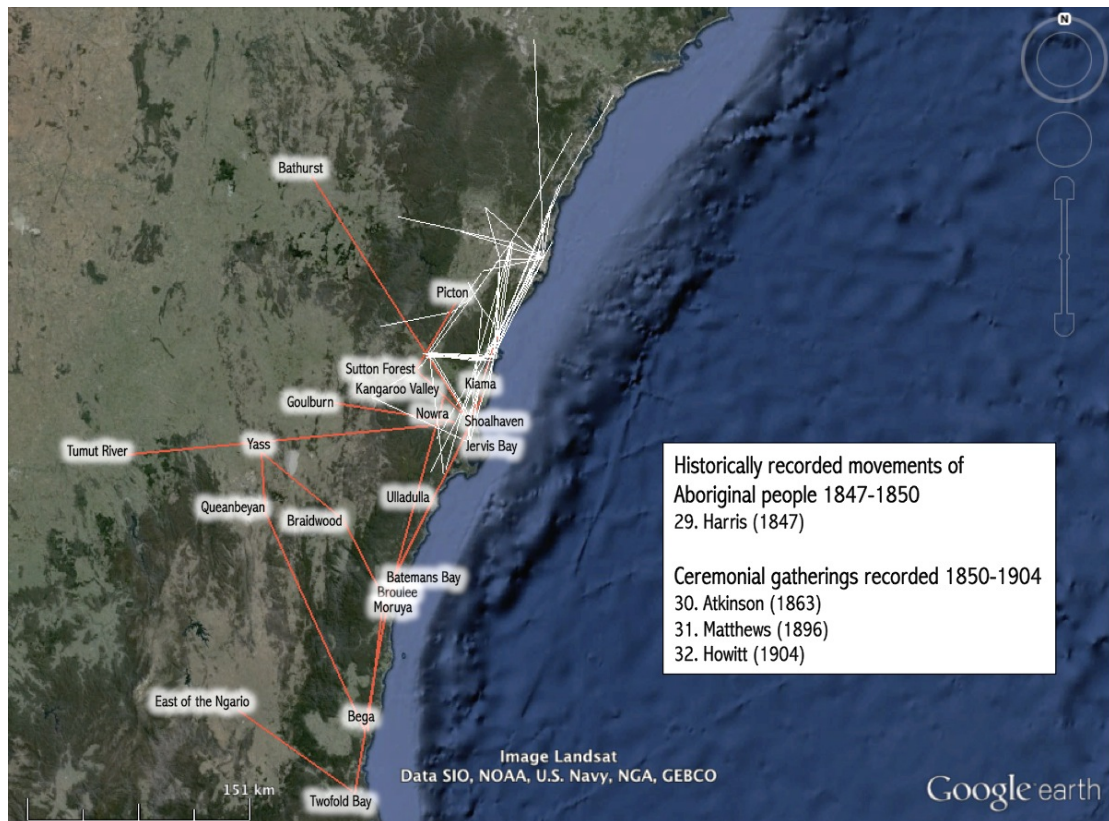


The Years 1838-1843 AD

1838	"... In the early part of the week two tribes assembled at Elizabeth Bay, the tribe of Shoalhaven and that of Wollongong a quarrel ensued, in the course of which, Old Bundle who belonged to the Wollongong tribe was struck on the head with a nulla nulla by one of the other party..." (Sydney Gazette 11 September 1838 in Organ 1993:84)
1839	"...Some of the natives are useful for sending from place to place & deliver their message distinctly. One brought me a lb of lard from Mick Mara's wife at Jamberoo the other day. He told me he was going to Shoal haven & would call for the basin on his return..." (Menzies 1839 in Organ 1990:243)
1839	Lady Jane Franklin, wife of the then governor of Tasmania, Sir John Franklin, visited Illawarra, recording in her diary whilst travelling from Wollongong to Kiama: "...crossed the forced & natural channel of Mullet Creek...Near here saw some natives from Bong Bong (Franklin 1839 in Organ 1990:244)
1840	Reverend Clarke (Anglican minister and geologist visited Illawarra early in January 1840, travelling to Wollongong, Kiama and Shoalhaven "...it appears this corroboree [at Towradgi] was called by the Sydney Blacks, and the ball given by them to the blacks of Kiama, Wollongong, Liverpool, Brisbane Water and Newcastle, from which places some came to this meeting..." (Clarke 1840 in Organ 1990:252)
1842	The [1842] battle between the Hooka warriors and the 'Broughton Creek tribe' is said to have taken place at what is now known as Albion Park. ('Old Pioneer', Illawarra Mercury, quoted in Illawarra Historical Society Bulletin, October 1970:5-6 in Wesson [Ed.] 2005:18)
1843	"...In 1843, at Jamberoo, a young blackman informed me that he had been sentenced to have fifty spears thrown at him by the Shoalhaven tribe: that the tribes would meet on the long beach for that purpose during the fishing season in the Crooked River..." [Crookhaven]"...I came to Jamberoo in February 1842; and in May following the blacks held a corroboree in what was then known as Wood's Forest, prior to engaging the Shoalhaven tribe in battle on the long beach..." (Taylor 1869:4)

Figure 5.11: Historically recorded movements of Aboriginal people in Dharawal country between 1838 and 1843. (shown in red). Earlier accounts (i.e. predating this timeslice) are shown in white.

The Years 1847-1904 AD



The Years 1847-1904 AD

1847	Alexander Harris, lost in the vicinity of St Georges Basin, near Jervis Bay, finds an Aboriginal camp "...They were about a hundred of them; several of them I knew well from their coming to my hut some years before [c. 1827-8], when in the Long Brush, behind Kiama..." (Harris 1846 in Organ 1990:218).
1863	Refers to the Aborigines of the Sutton Forest district from the 1820s and 1830s (Organ 1993:116) "...On one occasion, when the remnants of three different friendly tribes had assembled for a grand corroboree or dance, I made a plan of the encampment; each tribe was slightly apart from the other, divided by a sort of street. Thus, the inviters were clustered in the centre, having, I think, seventeen camps; the Picton tribe on the right hand, five camps; and the Shoalhaven on the left, comprising ten or eleven gunyahs; consecutively forming a village..." (Atkinson 1863 in Organ 1993:117)
1863	"...I witnessed two dances on the Shoalhaven. A Bathurst black had been some months located in the tribe - the dancing master, in fact, teaching them new dances; the result was what I saw...For a considerable time before these corrobories take place the natives assemble and practice, messengers are sent to all the detachments of the tribe, and sometimes neighbouring tribes; a general encampment takes place, and the dance is repeated for some nights in succession..." (Atkinson 1863 in Organ 1993:123)
1888	Account of an Aboriginal initiation ceremony based on one held in the vicinity of Mount Coolangatta, by the mouth of the Shoalhaven River, in 1888 (Matthews 1896 in Organ 1993: 158). See Appendix I for extract.
1904	Howitt (1904:519-20, 718) descriptions of ceremonial gathering on the South Coast at Bega. See above and Appendix I for full extract.

Figure 5.12: Historically recorded movements of Aboriginal people in Dharawal country between 1847-1850 and ceremonial gatherings recorded between 1863-1904. (shown in red). Earlier accounts are shown in white.

This final time slice (Figure 5.12 above) includes later accounts of ceremonial gathering by Matthews (1896 in Organ 1993: 158) and Howitt (1904) that expand the scale of this picture, adding links to the south and west. Where this larger pattern overlies data from earlier accounts, the two correlate, suggesting overlap of two parts of a broader network rather than redirection of any of the established pathways within Dharawal country. Howitt's account was recorded on the South Coast at Bega, rather than the Illawarra/Dharawal country. It has been suggested that by this time decrease in Aboriginal population led to gatherings including people from a larger area (Attenbrow 2015 pers. comm.). The ceremony recorded by Mathews (1896 in Organ 1993: 158) was on the north side of the mouth of the Shoalhaven River. Also included are two extracts from memoirs, Atkinson (1863 in Organ 1993:123) referring to the Aborigines of the Sutton Forest district in the 1820s and 1830s, and Harris (1846 in Organ 1990:218) describing an event 'some years before' [c. 1827-8]. These are placed here, as per date written, as exact time of observations referred to is not clear.

The Year 1861 AD on...

Following the passing of the Robertson Land Acts in 1861, settler populations dramatically increased and towns, industry and transport routes also became established in the region. Mechanisation of many farm activities reduced the need for a big labour force and marginalisation of Aboriginal people in this area increased. No longer able to access their lands for subsistence, they became more reliant on government rations and suffered from poor health and the effects of alcohol, disease and severe social disruption (Feary and Moorcroft 2011:43-4). Further decimation of population, marginalisation, loss of land and resources and enforced relocation and separation followed. In spite of this, evidence shows that maintenance and continued use of this network and its pathways continued. There is a tradition of Aboriginal people from the Sydney region travelling to the Illawarra that is unbroken from the late eighteenth century to the present day (Wesson 2005:28). Aboriginal people's connections and movements continued, through the historical period, to reflect pre-contact social and cultural life and obligations. The degree to which this was the case is further, and more broadly, evidenced in research on Aboriginal people living in South-Eastern Sydney through the nineteenth century (Irish and Ingrey 2013).

Change Over Time

Does this record indicate change in these patterns over time? If so what can be seen to change?

As illustrated through time slice results (Figures 5.3 to 5.12 above), this documentary evidence does change over time. Observations of Aboriginal people indicate expansion and consolidation of their network, and then, between 1820-1850 filling in of 'gaps' and adding of more detail, finally growth of the network south and westward. The degree of congruence between expanding European colonisation and apparent 'expansion' of the Aboriginal social network supports a strong argument. Aboriginal people in the study area were not observed, at any point within this evidence, to be changing their network. There is also no reorientation to different directions or gradual drifts in the pattern overall. There is one pattern. The only unconnected observations were the very first ones.

Spatial Patterns

What spatial patterns can be seen in historically recorded movements of Aboriginal people in the study area?

Despite incompleteness of the documentary record, the results presented here provides a cohesive pattern as a whole (Figure 5.13), identifying a number of strong lines of connection, with their use over time verified by reiteration in historical observations (Figures 5.2-5.12 above). Multiple references to the same pathway and/or connection strengthen evidence for established connections but may not correspond with scale or frequency of use – this is understood to have changed over time.

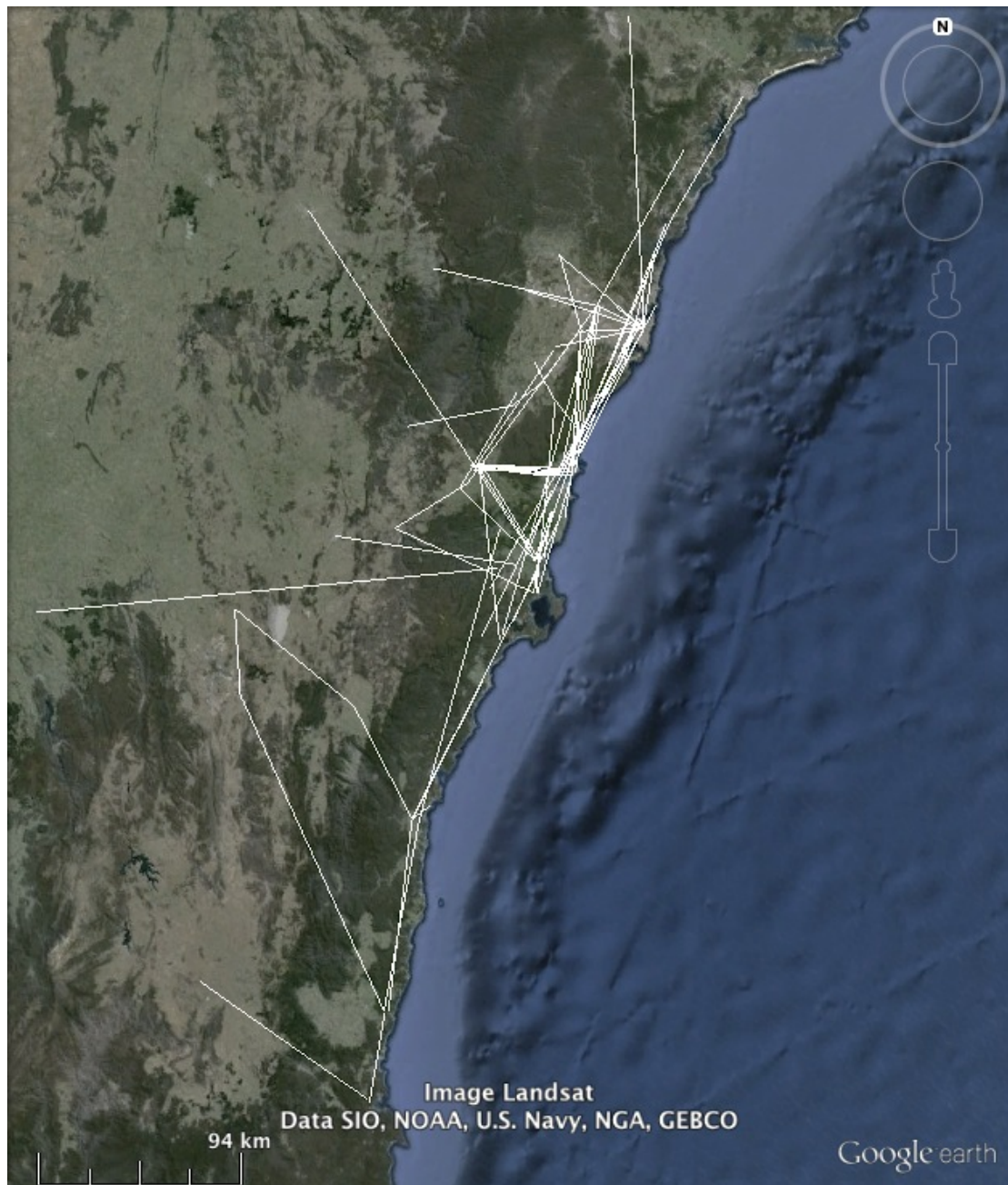


Figure 5.13: Historically recorded movements of Aboriginal people in Dharawal country. All data.

A suggestion that the Shoalhaven River may have been a social boundary has been raised (Peterson 1976 in Feary and Moorcroft (2011:33), though is described by Feary and Moorcroft (2011:33) as difficult to determine from early historical and ethnographic accounts. The Lower Shoalhaven does appear to have significance within this social network. Pathways from a number of directions converge and then overlap and interact on this part of country. This ‘network pathway’ gathering place occupies a core, not peripheral, position, relative to its connections, though this may

be a western overlay. Movements of Aboriginal people reported historically cross it a good number of times. Movements from north, south and west do converge and stop at this location, though there is no suggestion of a social boundary here, or anywhere else within this inter-connective social framework.



Figure 5.14: Historically recorded movements of Aboriginal people in Dharawal country All data. If tangible rather than intangible evidence, the network these activities describe could readily be seen from space.

The scale and scope of connections, movement and gathering observed and recorded historically for Aboriginal people in this case study area, can be appreciated by observing that, if viewed as tangible rather than intangible evidence, it could readily be seen from space (Figure 5.14 above).

Different Patterns for Different Purposes

Is there evidence for differences in patterns of movements for different purposes (e.g. ceremonial gathering, subsistence/access to resources, assisting with European exploration as guides etc.)?

Figure 5.15 shows all accounts relating to movements and gatherings for ceremonial purposes, while Figure 5.16 shows other categories overlain onto this.

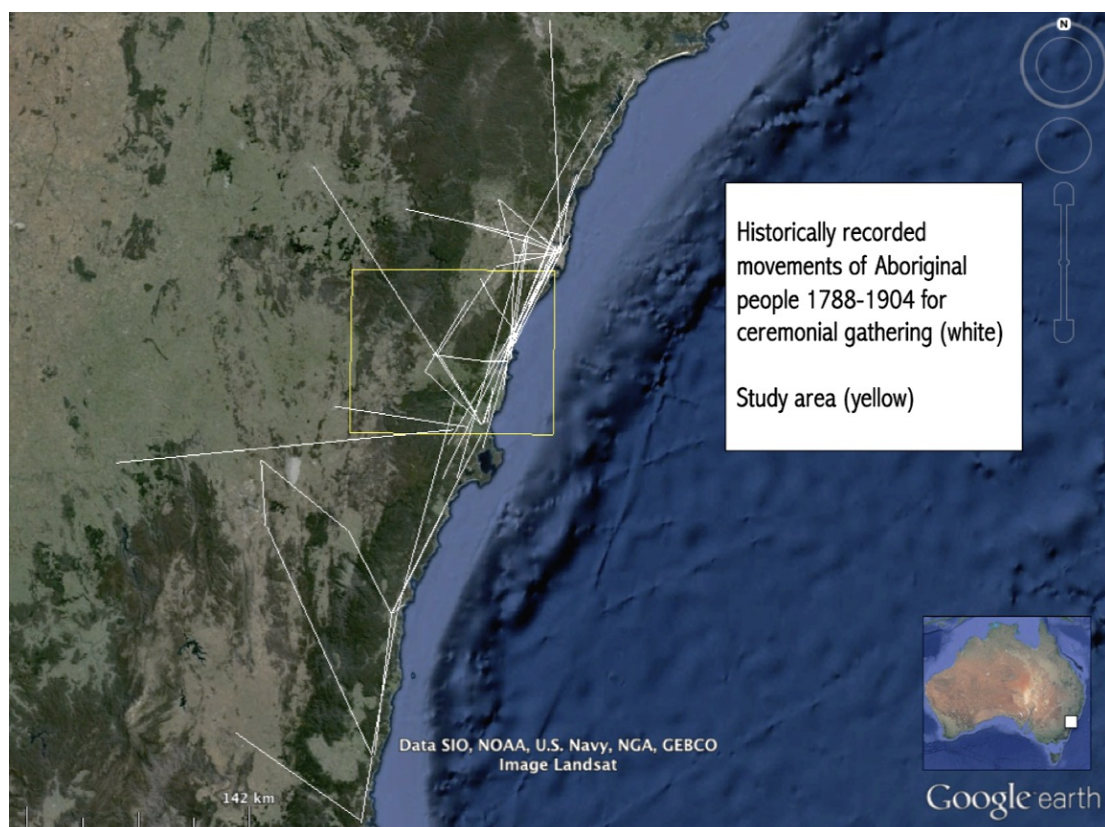


Figure 5.15: Historically recorded patterns of movements for ceremonial gathering in Dharawal country 1780-1904.

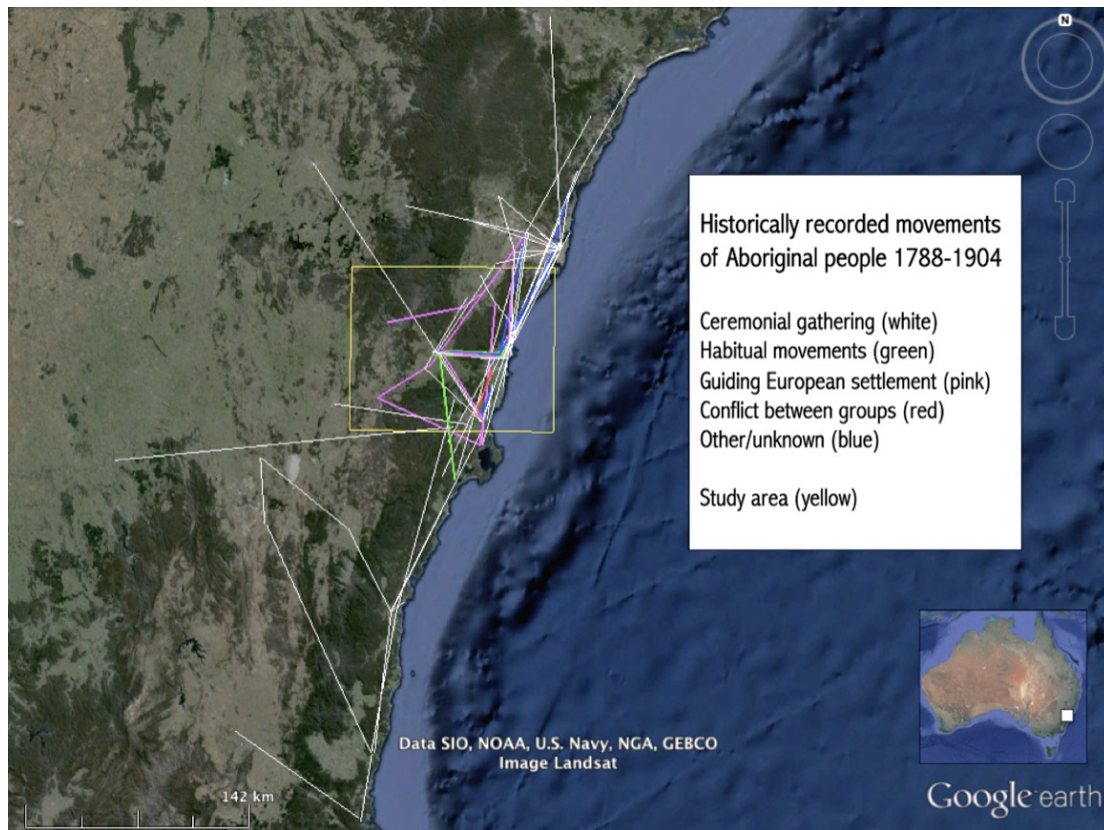


Figure 5.16: Historically recorded movements of Aboriginal people in Dharawal country. All data by categories of: Habitual movements (green), Guiding European settlement (pink), Conflict between groups (red), Ceremonial gathering (white) and Other/unknown (blue).

Records of habitual movements, conflict between groups and other/unknown follow (and reiterate) the same pattern described by accounts relating to ceremonial gathering. Movements relating to Aboriginal people guiding European exploration and settlement also, for the most part, concur though with some variation westward. No significant difference in patterns by movement type is observable, though the dataset for some categories is too small to be a valid indicator. Movement for ceremonial gathering appears to have occurred on a larger scale than habitual activities. Long distance travel by individuals extends well beyond the study area. Use of the same network of pathways is suggested for all activities and scales of movement.

Distortion Factors

Can the mapped data (above) be considered representative of the social network in place over this period of time? As a spatial abstraction of information from documented recounts of observation of movements of Aboriginal people by early Europeans, the short answer is - definitely not. These results are interpreted as evidence of the Dharawal social network, however. Its existence in its cultural landscape is visually, if not empirically, demonstrated. Some aspects of its relationships, its scales and perhaps function, over the time period examined here, needs to consider distortion factors that may have impacted on this pattern. Referring back to the framework compiled for this evaluation (Table 2.2), the following points are suggested:

- The scale at which activity is recorded historically, and therefore portrayed in Google Earth visualisations above, may underrepresent smaller scale movement. Detail of travel routes is also rarely provided. Comparison (Figure 5.17 below) with Wesson's 2005 Illawarra Early Contact Map, which was compiled from traditional knowledge and oral history, as well as documentary sources, confirms predicted lack of detail in historical data alone.
- Documentary sources only included accounts of relevance to Illawarra and South Coast. Coastal connections to hinterland places/people are represented. A lack of detail about activity in the hinterland can be expected.
- Emphasis on movements relating to places settled by, or known by Europeans and corresponding de-emphasis, or blindness, to movements relating to areas not settled.
- Distortion caused by emphasis on places settled by Europeans, although very clear through time, may be less of a factor cumulatively, though may exaggerate the amount of movement relating to places colonised early (particularly between the study area and Sydney, up and down the coast). Earliest accounts do not appear to be representative on their own.

- Primary distortion factors likely to be a lack of detail west of the escarpment and emphasis on movement from the edge of the escarpment into the coastal plain and, most prominently, activity up and down the coast.

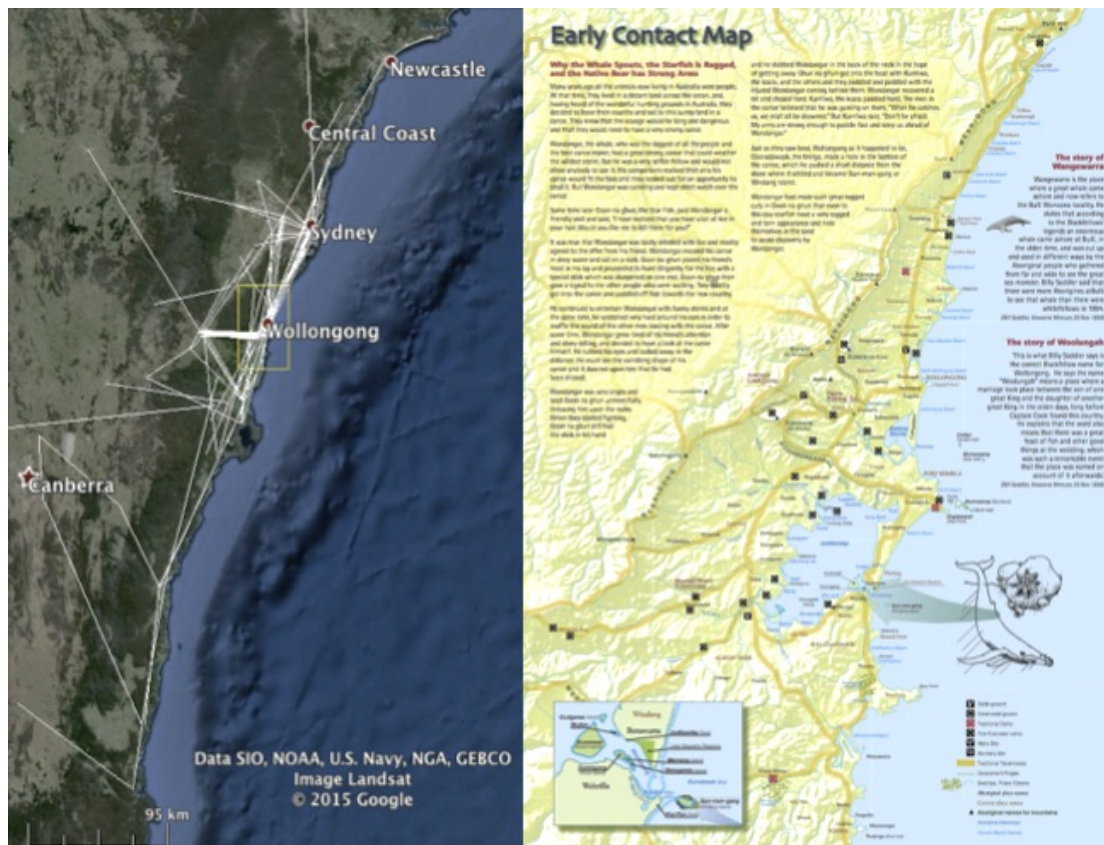


Figure 5.17: Comparison between Wesson ([ed.] 2005) Illawarra Early Contact Map (scale of Wesson map shown in yellow on left) and documentary analysis results (white).

Summary

Results presented here provide a cohesive pattern as a whole (Figure 5.13), identifying a number of strong lines of connection, with their use over time verified by reiteration in historical observations (Figures 5.2-5.12 above). Multiple references to the same pathway and/or connection provide strong evidence of established connections. There is no particular evidence of change in the social network pattern over time, clear evidence of change in the positions of the observers relative to the people using it. This network and its pathways do not appear to have changed.

Changes appear to have, instead, travelled through it, been exchanged within it and spread via it. The collective contents of these historical accounts provide enough evidence for this social network to posit it as evidence of this network. It cannot be interpreted as representative however. Limitations and gaps within this evidence can be assumed. These also need to be taken into account when comparing this outcome with the ground-edged hatchet provenancing component of this research in Chapter 8.

CHAPTER 6

PROVENANCING MATERIAL

Ground-edged Hatchets

Evidence for the production of ground-edged hatchets appears in the archaeological record of southeastern Australia only about 4000 years ago (Attenbrow 2002 [2010]:102). These tools were commonly hafted, with handles ‘aptly and dexterously’ fitted to the stone with joint handles fastened by ‘currajong’ and cemented with grass-tree gum (Collection of Shoalhaven Artefacts. 30 October 1879. *The Telegraph, Nowra*. 1879.[In] Organ 1990:139). The hafted ground-edged hatchet from Mangrove Mountain, NSW, north of the study area (Figure 6.1) illustrates this.



Figure 6.1 Hafted ground-edged hatchet from Mangrove Mountain (AM Registration No E76561).

Photographed by Finton Mahoney. Reproduced with permission of the Australian Museum.

Historical descriptions indicate that ground-edged hatchets were a multi-purpose tool and used for many everyday tasks, such as climbing trees to catch possums, collect honey or access materials from trees themselves (e.g. Figure 6.2 with historical extract below). Stripping bark for shelters and making wooden items such as shields and canoes are also noted. Baron von Hugel (1834 in Organ 1993:83) describes local Aboriginals using hatchets to remove bark for shelters for a campsite at Mullet Creek, the main stream flowing into Lake Illawarra.



Figure 6.2: Cabbage Palms, Dapto, Illawarra, N S Wales. (1845). George French Angas. (Reproduced with permission from National Library of Australia. nla.pic-an2879040).

In sandstone areas of the Illawarra region many rock platforms have ground grooves, (referred to as grinding grooves) that are assumed to have been formed during the making and sharpening of the ground edge of ground-edged hatchets (e.g. Figure 6.3). The abrasive qualities of sandstone made it suitable for shaping and sharpening the working edge of ground-edged hatchets (Attenbrow 2002[2010]:121). Grinding grooves are also present on the driplines of rockshelters and on sandstone blocks. (Sefton 2015 pers. comm.) Some sites have anthropogenic channels that redirect water seepage onto areas where hatchets were ground.



Figure 6.3: Grinding groove open site with associated rock engraving (petroglyphs), Cataract Catchment Area. Photographed by C. Sefton. c. 1970s (Sefton 2015 pers. comm.). (Reproduced with permission from the collections of the Wollongong City Library and Caryll Sefton. Ref: P13/P13883).

Artefact Assemblage and Findspots

A total of 148 ground-edged implements were analysed for this research – 96 from coastal plain findspots and 52 from inland findspots (Figure 6.4). The Australian Museum collection of ground-edged hatchets, as the result of many years of unsystematic accumulation, is not considered representative of original distributions or densities (Corkill 2005:46). Selection was guided, in part, by artefact availability within this collection. All available ground-edged implements from coastal plain findspots were included, except for Wollongong/Port Kembla and Kurnell, where large numbers have been collected. Also included are eight ground-edged hatchets from excavation of a rockshelter at Curracurrang Cove in Royal National Park (Branagan & Megaw 1969), and one from Gynea Bay, Port Hacking. (Megaw and Wright 1966 in Attenbrow 2002:124). All available hatchets from inland findspots

within the study area were included. Eleven hatchets from Bungonia and five from Marulan, were also included to examine the local status of the nearby Bungonia Creek geological sources, identified in preliminary results (Stokes et al 2013) as matching to ground-edged hatchets from Dharawal findspots.

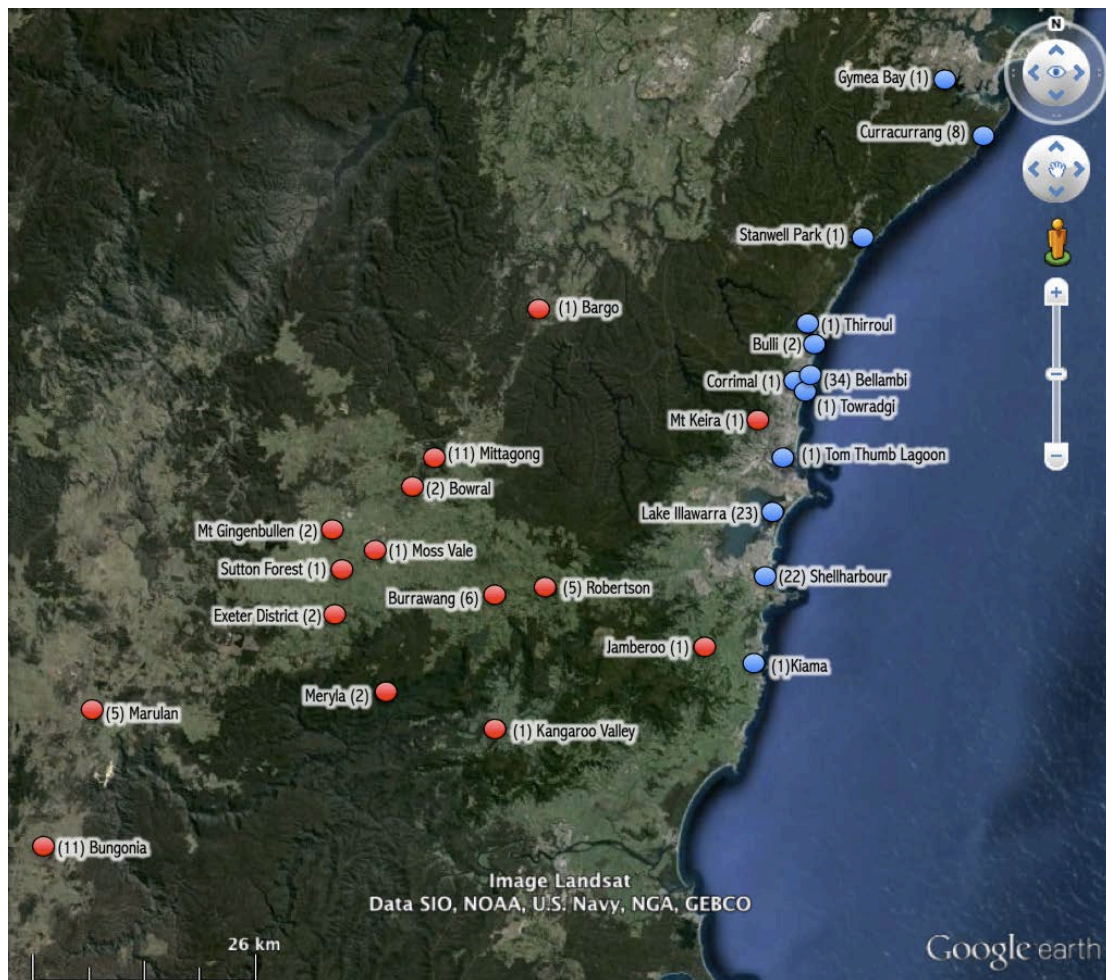


Figure 6.4: Coastal plain (blue) and inland (red) ground-edged hatchet findspots with number of artefacts, from each location.

Many hatchets made their way into the Australian Museum Archaeological Collection. Those currently held were obtained in diverse ways from from the late eighteenth century. In early days they were sometimes presented by their Aboriginal owner or bartered for. Many hatchets were found in rockshelters, during ploughing, or during professional and amateur excavations; whether they were abandoned/discarded

by the owners, or lost or cached is now difficult to determine. For the most part, except those found during documented excavations and surface collections by professional archaeologists or amateur collectors, museum records provide only general location as provenance for these artefacts. (Corkill 2005:41-2) Unless noted otherwise, artefacts in this assemblage can be presumed to be ‘surface collected’ and to be undated/undatable. Appendix II has a full record of artefacts, their findspot locations and Australian Museum register information.

Morphology and Preform

Morphological analysis was not conducted for this research, however length, width thickness and weight for each ground-edged hatchet was recorded (Appendix III). Preliminary evaluation of these characteristics (Figure 6.5) showed no significant variance between coastal plain and inland ground-edged hatchets. Mean weight is also consistent, at 571g for complete coastal plain and 573g for inland findspot ground-edged hatchets.

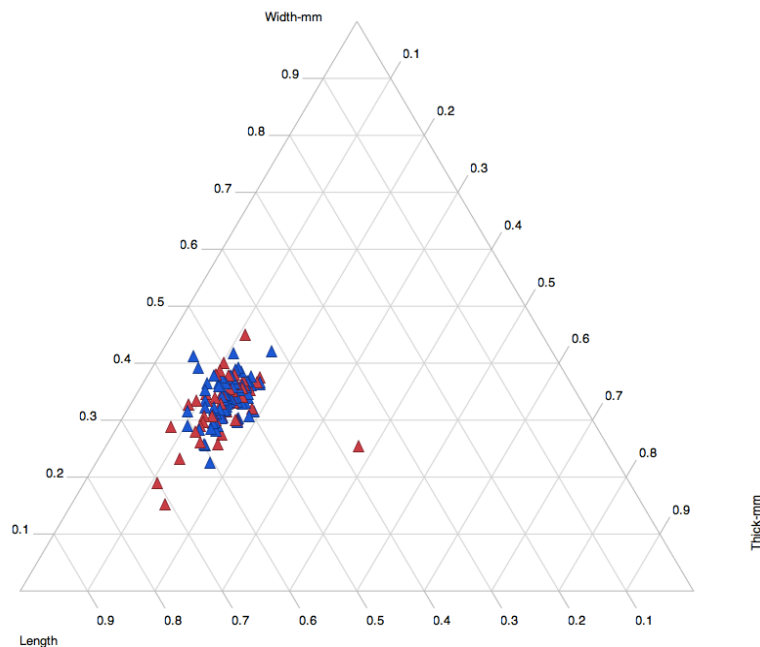


Figure 6.5: Length/width/thickness ternary plot for all complete coastal plain findspot (blue) and inland (red) ground-edged hatchets.

Preform (i.e. whether the artefact was made from a waterworn cobble or bedrock) was recorded, although it was often not clear. (after Corkill 2005:47) The ‘unknown’ category could be cobbles or bedrock. Examples of each category are shown below in Figures 6.6 to 6.10. On coastal plain/inland findspot grouping there was, again, little variation between the two. Figure 6.11 presents minimum cobble preform numbers.



Figure 6.6 Ground-edged hatchet from Bellambi made from a waterworn cobble preform. Project ID 0039. Australian Museum Registration No. E033453. (Photographed by H. Watt (Reproduced with permission of the Australian Museum).



Figure 6.7: Ground-edged hatchet from Bellambi made from a waterworn cobble preform Project ID 1066. Australian Museum Registration No. E053517. (Photographed by H. Watt Reproduced with permission of the Australian Museum).



Figure 6.8: Ground-edged hatchet from Lake Ilawarra made from a waterworn cobble preform Project ID 1058. Australian Museum Registration No. E052578c. (Photographed by K. Stokes. Reproduced with permission of the Australian Museum).

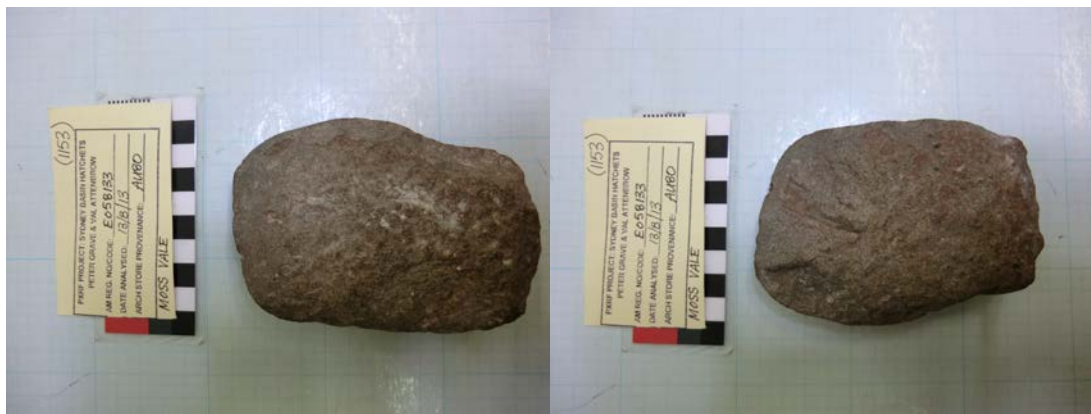


Figure 6.9: Preform unknown. Moss Vale. Project ID 1153. Australian Museum Registration No. E058133. (Photographed by H. Watt. Reproduced with permission of the Australian Museum).



Figure 6.10: Preform unknown. Burrawang. Project ID 1031. Australian Museum Registration No. E03544 (L). (Photographed by H. Watt. Reproduced with permission of the Australian Museum).

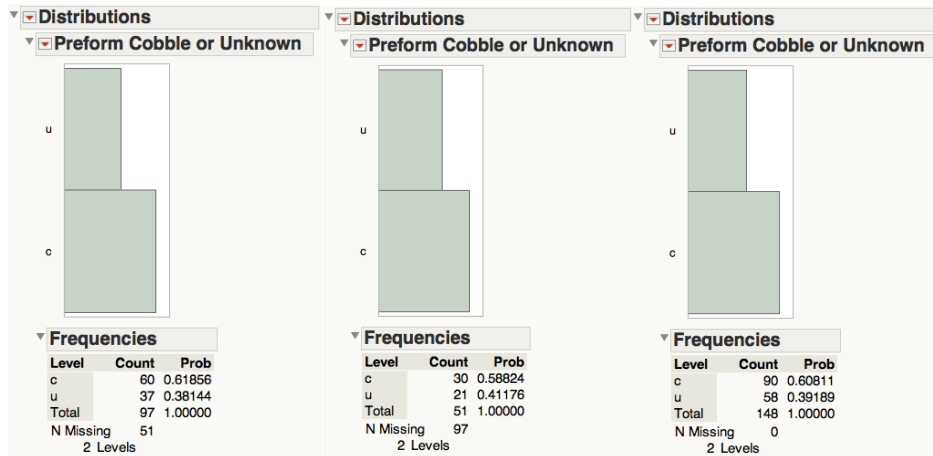


Figure 6.11: Proportions of cobble preform/preform unknown for (left) inland findspots (centre) coastal plain findspots and (right) the full (N=148) ground-edged hatchet assemblage.

Raw Material Preferences

Generally, metamorphic and igneous rocks such as hornfels, greenstone, basalt and dolerite are noted as preferred raw materials (Dickson 1981:26; McBryde 1978:355-356 in Corkill 2005). Preferred characteristics are, as summarised by Corkill, very tough, resistant to fracture and free of cracks and other flaws. Fine to medium grain with strongly interlocking textures or strong intergranular rocks are noted preferences (Corkill 2005; see also Dickson 1981:27-33). Experimental research (Corkill 2005) shows hornfels, though more time consuming to grind than some other materials, is tougher and less inclined to chip. Weighing up time required to grind to an edge against durability of finished product is suggested as likely to have been a selection criteria (Corkill 2005:48). As shown above (Figures 6.9 to 6.11), waterworn cobbles need very little modification. One was just sharpened; others were flaked on one side or split to achieve the thickness needed and then sharpened (for detailed discussion on manufacture see Dickson 2006; McCarthy 1944).

The Geological Reference Collection

Geological samples from over 60 locations (Figure 6.12) between Newcastle to the north, the Shoalhaven River to the south and Orange in the west are included in the geological reference collection for this analysis. They come from 28 locations within

and just west of the study area. Geological specimens in this reference collection are mostly from the Australian Museum Geoscience Collection, supplemented with sampling fieldwork. Samples of bedrock from flows, dykes and sills and waterworn cobbles are included. Geological samples in the Australian Museum collection (with DR prefix) are understood to be bedrock samples.

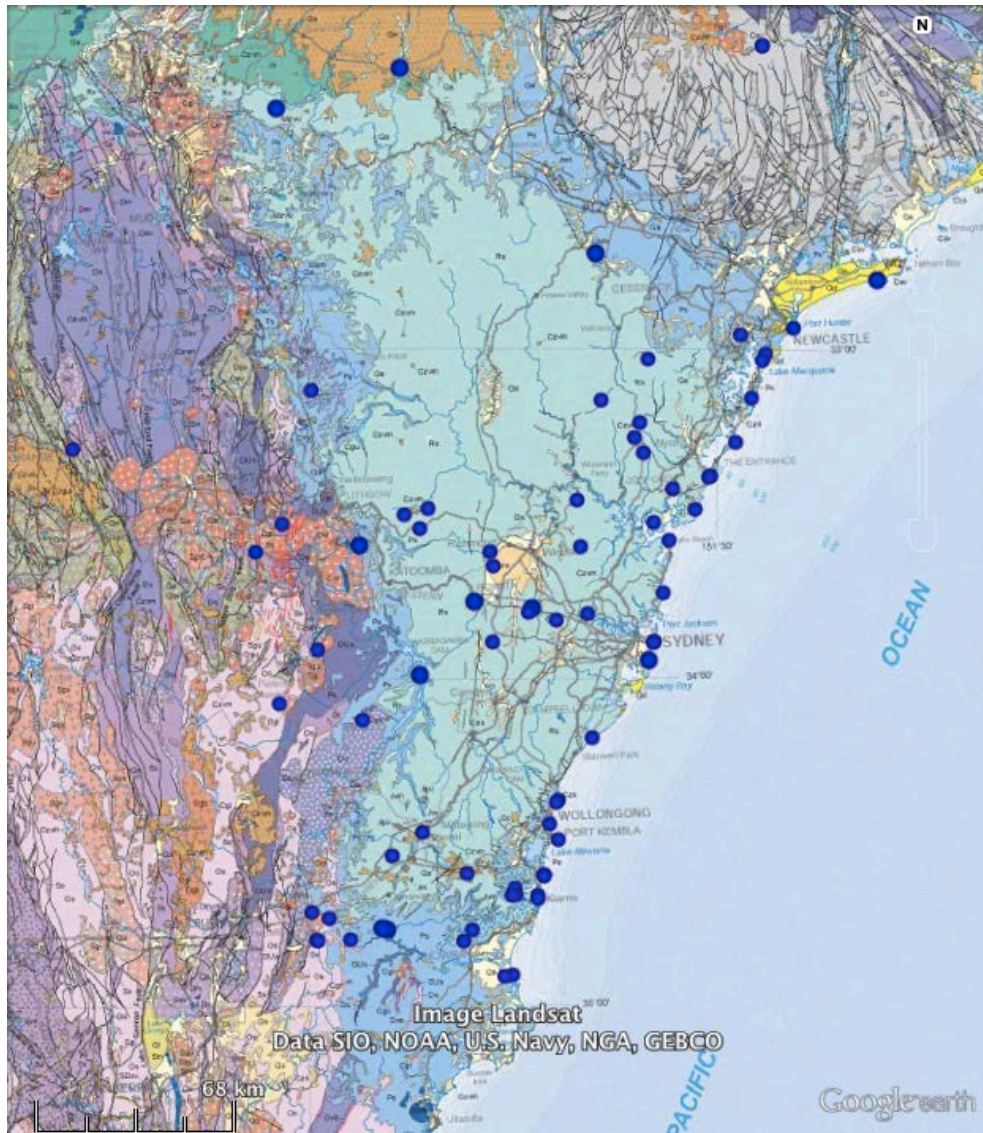


Figure 6.12: Collection locations of samples included in the geological reference collection for this project. (Based on Geological survey of New South Wales 2009. Surface Geology of New South Wales - 1:1 500 000 map. NSW Department of Primary Industries. Maitland. Australia). (see continued for key)

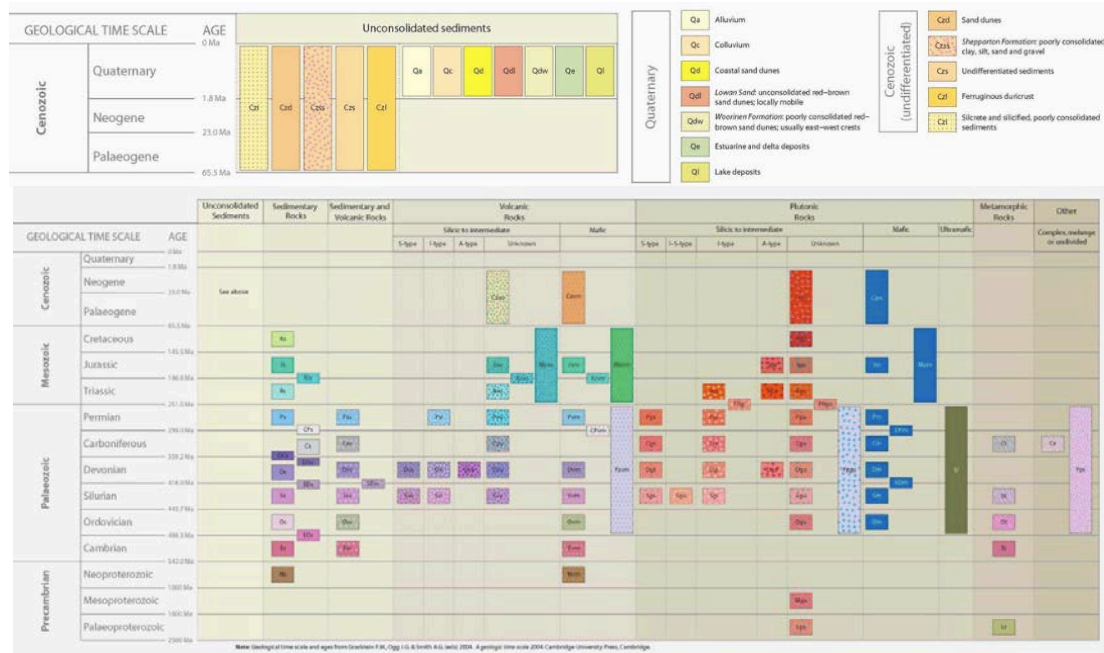


Figure 6.12 (continued): Collection locations of samples included in the geological reference collection for this project. (Based on Geological survey of New South Wales 2009. Surface Geology of New South Wales - 1:1 500 000 map. NSW Department of Primary Industries. Maitland. Australia).

Raw Material Sources in the Study Area

Historical and Ethnographic Evidence

Historical and ethnographic evidence has, in some circumstances, indicated particular sites and sources used for the manufacture of ground-edged hatchets. (e.g. McBryde and Watchman 1976) Though there are no direct historical observations of Aboriginal people collecting stone for this purpose in the Sydney region, there are two historical accounts relating to river gravels near Richmond Hill on the Hawkesbury/Nepean River, “...of very hard stones (of which the Natives make their hatchets &c)...” and of travel to “...procure stone hatchets...” from that location (Bradley 1792[1969]:170 and Phillip in Hunter 1793[1968]:513-525, respectively in Corkill 2005:42). In the case of Dharawal country, within historical accounts reviewed for this thesis, no reference to ground-edged hatchet raw material procurement was found.

Previous Research

Wesson (2005:12), citing Griffin (1985:21-22), McCarthy (1944) and Towle (1930), notes that a number of quarry sites in the Illawarra provided stone to make axes, spears, scrapers and grinding stones. A review of literature, beginning with these papers, found a good number of suggested locations, though very little location specific evidence pertaining to ground-edged hatchet raw material sources used in the Dharawal region. (Appendix III has tabulated summary)

McCarthy's (1944) reports that his analysis of 'Windang' type hatchets from eastern Australian locations showed they are made from sedimentary, igneous and metamorphic rocks of the usual types found among river pebbles (McCarthy 1944:263); he suggests no specific source locations. (Ground-edged hatchet E034266 illustrated by McCarthy (1944:261, 263, Plate XV1) is included in my analysis.

Thin sectioning of ground edged hatchets found during excavations at Curracurrang (Branagan and Megaw 1969) identified one made of tinguaitite –a visually distinctive rock found within the study area at Minnamurra. Prineas, in writing of the Aborigines who inhabited the Colo Wilderness (Blue Mountains), mentions '*An axe specimen was composed of a volcanic material which must have come from the Minnamurra district, seventy kilometres away*'. (Prineas 1978:57 in Griffin 1985:21-22) Suggestions by Branagan and Megaw for possible origins of materials for other Curracurrang hatchets included Gerringong volcanics, the Wollongong-Kiama region and Milton (for igneous materials) and Upper Shoalhaven (Marulan) for hornfels.

Two excavated ground-edged implements found at GyMEA Bay were identified as hornfels. Megaw and Wright (1966:33 in Attenbrow 2002:124) suggested may have come from nearest sources of the Upper Shoalhaven River or perhaps Marulan. Corkill (2005:43) notes that the Hawkesbury/Nepean gravels and Bellambi Point - where this type of material is available - are much closer locations to GyMEA Bay. The artefacts from Curracurrang and one of the ground-edged hatchets from GyMEA Bay are included in my sourcing study.

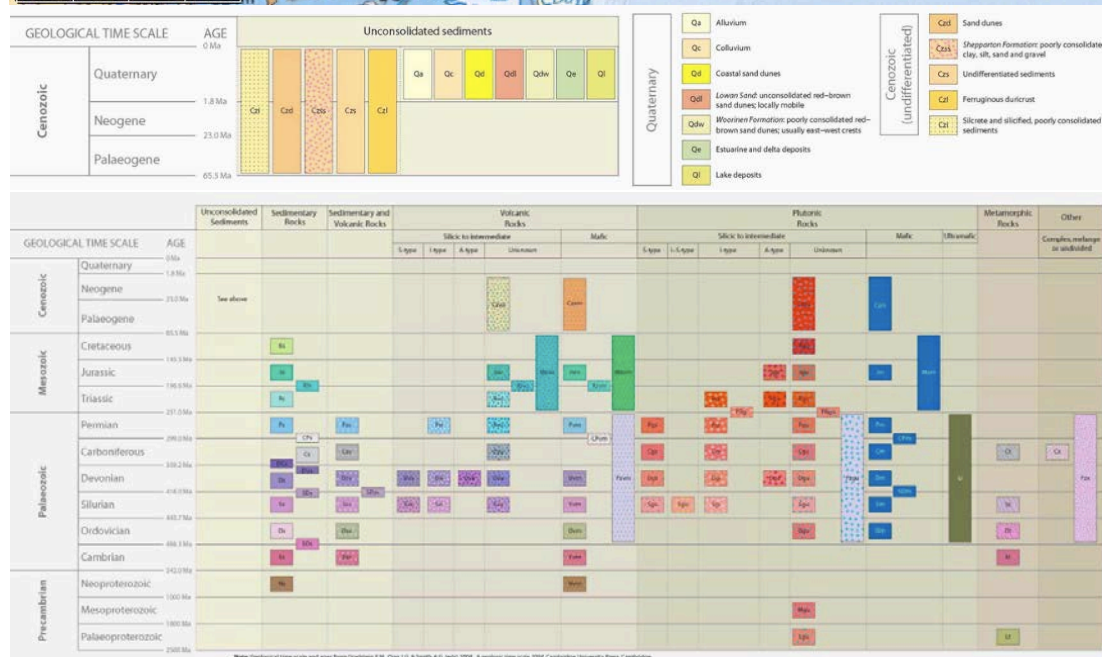


Figure 6.13: Study area collection locations of samples analysed and included in this project. (Based on Geological survey of New South Wales 2009. Surface Geology of New South Wales - 1:1 500 000 map. NSW Department of Primary Industries, Maitland, Australia).

A petrological report of thin section analysis of an excavated hatchet from Bass Point (Bowdler 1970:124) identified the rock as being of volcanic origin and likely to have come from a dyke, rather than a flow – but was not more specific. This ground-edged hatchet was found in an excavation level dated to 3,490 BP (Bowdler 1970). It is one of the oldest hatchets outside ‘tropical Australia’ (one from Graman, New England was dated to c. 3750 BP (Binns and McBryde 1972 in Hughes et al undated). This artefact was unable to be located for pXRF analysis.

Raw material locations suggested and or/mentioned within this literature were, for the most part, included in the geological reference collection (Appendix III). Locations sampled within Dharawal country and immediately adjacent to the west, are shown in Figure 6.13 above (detail from Figure 6.12 above). Major volcanic groups include Cenozoic hot-spot volcanics in the hinterland (Orange) and coastal latites of the Gerringong volcanics. The Bombo latite member is complex, with a number of dykes intruding the latite layers. The reference collection has samples from Bombo Quarry as well as cobbles from beach and river locations within the study area (e.g. Wollongong, Bellambi Point/East Corrimal Beach, North Kiama Sands and Five Islands). Methods used for provenancing analysis and results are presented in the following chapter.

CHAPTER 7

PROVENANCING METHODS AND RESULTS

Background to Methods

Ground-edged hatchets are considered one of the best artefact classes for provenance work, as many rock types from which they are made can be geochemically traced to source (Grave et al 2012:1675). Igneous rock is particularly suited, as trace elements (e.g. rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr) and niobium (Nb)) occur in different proportions depending on specific melt conditions, differentiating volcanic outcrops (Grave et al 2012:1683). A pilot study of Sydney Basin ground-edged hatchets (Grave et al 2012), using non-destructive pXRF analysis, achieved detailed classification of basalt raw materials, with a high degree of geographic resolution for several igneous rock types. The method focuses on the trace elements, Rb, Sr, Y, Zr and Nb, known to differentiate volcanic materials (Grave et al 2012:1683). Since the pilot study, further sampling of a broader range of other geological materials (as suggested by Grave et al 2012:1685) has improved locality resolution. This method is applied as a component of the Australian Research Council funded study of Aboriginal exchange systems and social networks in Southeastern Australia.

Instrumentation, Measurement and Data Output

A Bruker Tracer III-V+ pXRF spectrometer was used to measure elemental compositions of geological and archaeological specimens (Figure 7.1). The instrumentation generates and focuses a stream of primary X-rays that interact with the sample matrix to produce secondary X-rays of different energies that are elementally characteristic.



Figure 7.1: Non-destructive pXRF analysis of a ground edged hatchet – ensuring close and geometrically aligned contact between instrument and hatchet (Source: Grave et al 2012:1681)

These are separated and counted with an onboard multichannel analyser (MCA) and the data is transferred in real time to an attached control PC, running Bruker proprietary software (Bruker S1PXRF Version 3.8.30) where it is graphed as element/keV specific spectra (e.g. Figure 7.2 below). These spectra can then be processed by other Bruker proprietary software (Bruker ASX Artax) to enable semi- or fully quantitative comparison of elemental profiles between geological samples and artefacts (Attenbrow et al 2010).

To ensure measurement and instrument performance consistency and reduce the effects of sample matrix heterogeneity, five readings were taken from locations on the ground area of each hatchet head or, for geological specimens, the flattest surfaces. Where present extreme outliers were removed prior to calculating mean element abundances.

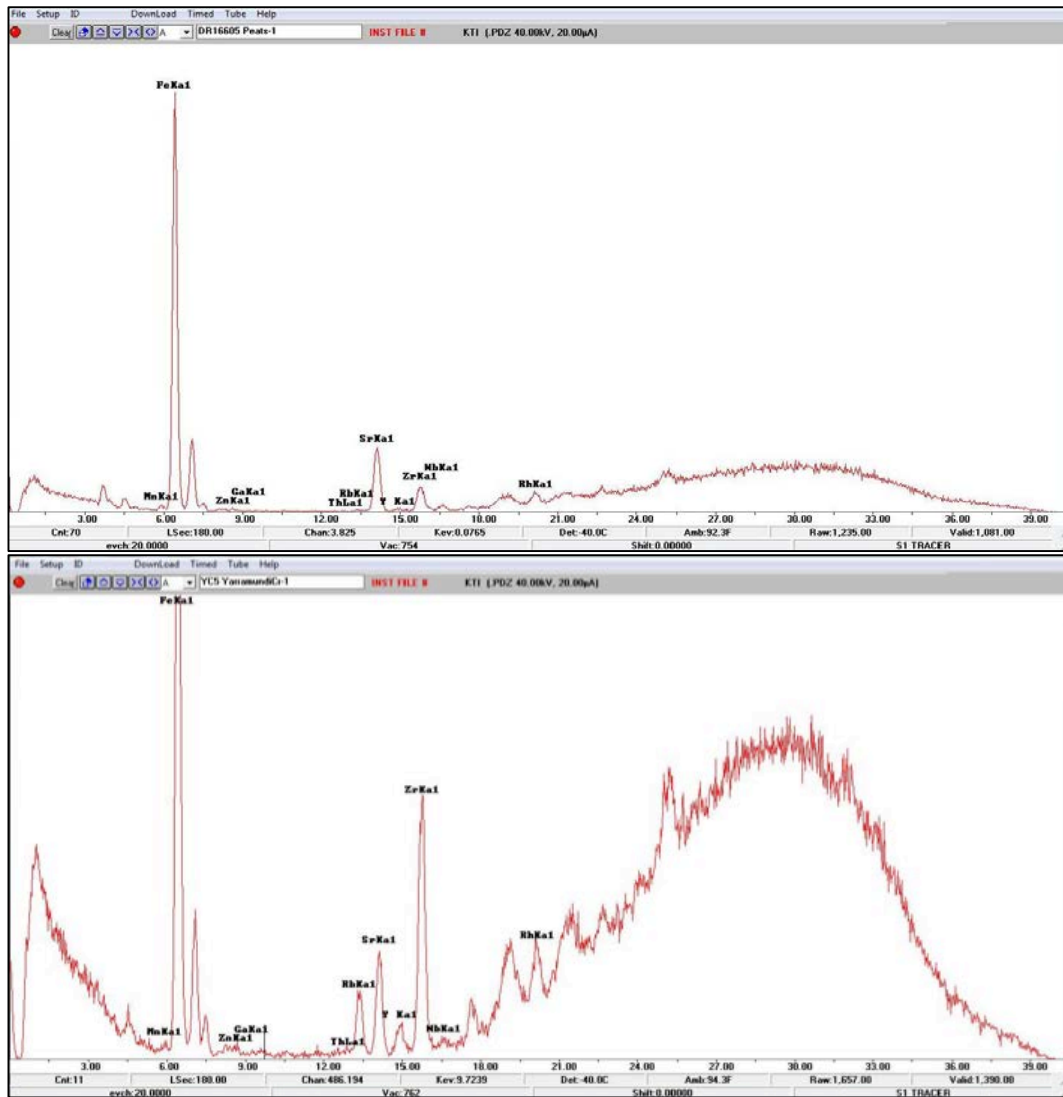


Figure 7.2: Spectra for geological samples from Peats Ridge basalt (above) and Yarramundi Crossing hornfels (below), showing the K shell alpha1 line element peaks (labelled).

Bruker ASX Artax Software (Version 7.4.0.0) was used to deconvolute spectra and calculate net peak area (NPA). Data output expressed as relative abundance maintains multivariate correlations, allowing for numerical comparison of elemental concentrations between samples without conversion to a quantitative (ppm) format. Instrumentation and operating parameters, specifications, and data output, as summarised from Grave et al (2012), are provided in Table 7.1.

INSTRUMENTATION, MEASUREMENT PARAMETERS AND DATA OUTPUT FOR pXRF ANALYSIS

Instrumentation	Bruker Tracer III-V+ portable X-ray Fluorescence spectrometer. Serial number T3V+0908
Settings	40 keV, 2 mA, using a 0.076 mm copper/ 0.0305 mm aluminium/0.006 mm titanium filter with a 300 second live-time count.
Readings	5 readings per artefact/sample from locations on ground area of each hatchet head or, for geological specimens, flattest surfaces. Visible inclusions and weathered areas were avoided. An average of five readings (excluding outliers) was used.
Spectral range and elemental resolution	X-ray energy Ka excitation range (Fe-Nb) measures 16 elements. The seven used directly in this analysis (Fe, Zn, Rb, Sr, Y, Zr, Nb) are all reliably and readily measurable by pXRF, as per detection limit parameters. (For details see Grave et al 2012).
Data output	Bruker ASX Artax (Version 7.4.0.0) software was used for spectral peak deconvolution, net peak area (NPA) calculation and export of data to numeric format. NPA calculation involves filtering of the sample X-ray spectrum to remove background effects and deconvolution of element-characteristic energy peak overlaps. Ka energy peaks are then integrated to calculate net peak area values for elements of interest (Grave et al 2012:1683).

Table 7.1: pXRF analysis instrumentation parameters and specifications (Summarised from Grave et al 2012)

Multivariate Methods

The suite of multivariate methods, techniques and tools used to evaluate data, as with pXRF measurement above, is also standard for this provenancing project. Data analysis was conducted within a JMP11 software matrix. Hierarchical Clustering (Ward method), Principal Components Analysis (PCA) and Discriminant Analysis (conventional multivariate methods) were used in conjunction with tools for multivariate visualisation and evaluation of elemental abundance and PCA score data. Interactive three-dimensional projections (3D Scatterplots) were primarily used for

this process, supplemented by 2D format plots of key elemental ratios. These are demonstrated below, as applied, but not discussed theoretically or in detail. For background on these methods and their use in this provenancing analysis, see Grave et al (2012); Attenbrow et al (2010).

The evaluation process, reflecting both the methodological requirements and thesis aims, is summarised by the following five analytic components:

1. General characterisation of ground-edged hatchet/geological sample data.
2. Identification and exclusion of geological samples not matching to ground-edged hatchets in this assemblage to clarify, by extraction, potential matches and source locations.
3. Clustering of data into geochemically related groups (as/where dataset shows clear separation) for evaluation.
4. Detailed evaluation of each cluster to differentiate matches (i.e. specific location identified), correlate unmatched hatchet clusters (i.e. of similar composition but not attributable to a specific location) and identify material types.
5. Recording of both positive (particular and general) and negative evidence, for mapping of matches between ground-edged hatchet findspot and indicated raw material sources, as well as more general characterisation of patterns of raw material use/non-use suggested within hatchet results.

Procedural detail was also, in part, defined by and refined in response to the dataset itself, as will be shown below. All data used in this provenancing analysis is geographically summarised in Chapter 6 and geochemically summarised below. Raw data is not provided with this dissertation, but is available from the ARC project directors. Full reports of results presented below are also provided in Appendix IV.

Characterising the Dataset

Principal Components Analysis (PCA) of full elemental profiles was conducted to broadly characterise the ground-edged hatchet dataset and assess correlation with geological samples. This preliminary assessment (Figure 7.3) was informative from the outset. Ground-edged hatchets, colour-coded according to coastal plain (blue triangles) or hinterland/plateau (red triangles) findspot, suggested considerable overlap of raw materials used (by types if not by source locations). Similarities as a single group outweighed any clear differences based on coastal plain or inland findspot). Non-correlation with geological samples was high overall. Ground-edged hatchets were identifiable as almost all not matching to basalt samples in the geological reference collection (geosample black dots concentrated in the lower right quadrant). Geochemical diversity and association with non-basalt geosamples indicated compositionally variable hornfels and possibly altered igneous, rather than fresh basalt raw materials, as dominating this ground-edged hatchet assemblage. Basalt geochemistry patterns are, as a consequence, compressed and unclear in this PCA report.

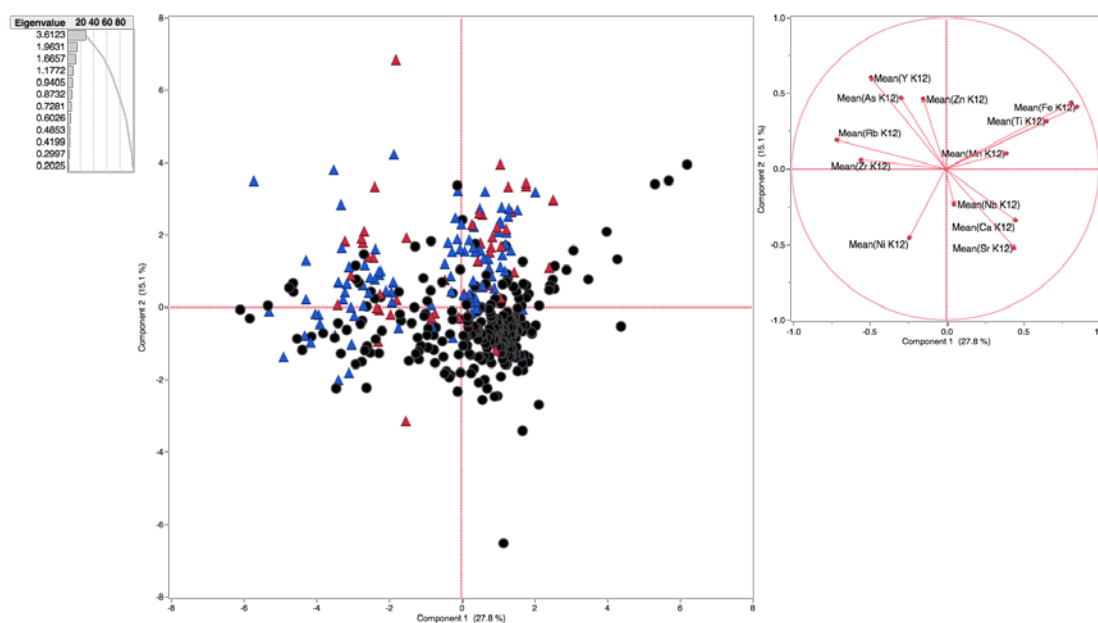


Figure 7.3: Principal components analysis (PCA) for all geological samples (black dots) and ground-edged hatchets from coastal plain (blue triangles) and hinterland/plateau (red triangles) findspots in the study area.

Excluding Unmatched Geological Samples

Extraction of unmatched geological samples was conducted conservatively to ensure all potentially relevant geosamples (for characterisation of unmatched ground-edged hatchets material types as well as for matching) were retained. Exclusion of unmatched basalt geosamples (as shown in Figure 7.3 above) was targeted specifically, in order to clarify this dataset. Multivariate evaluation of elemental and PCA data, visualised in 3D and 2D scatterplot formats, was used for this process (see Figures 7.4-7.7 for examples). Figure 7.4, an Rb-Fe XY plot of all ground edged hatchets (triangles) and geological samples (dots) provided a valuable point of reference guide for this procedure. As mafic/felsic (Fe) and hornfels/igneous (Rb) diagnostics, general indication of data structure, correspondent with material types, can be seen. Two dimensions of data are, on their own, insufficient evidence for matching, however.

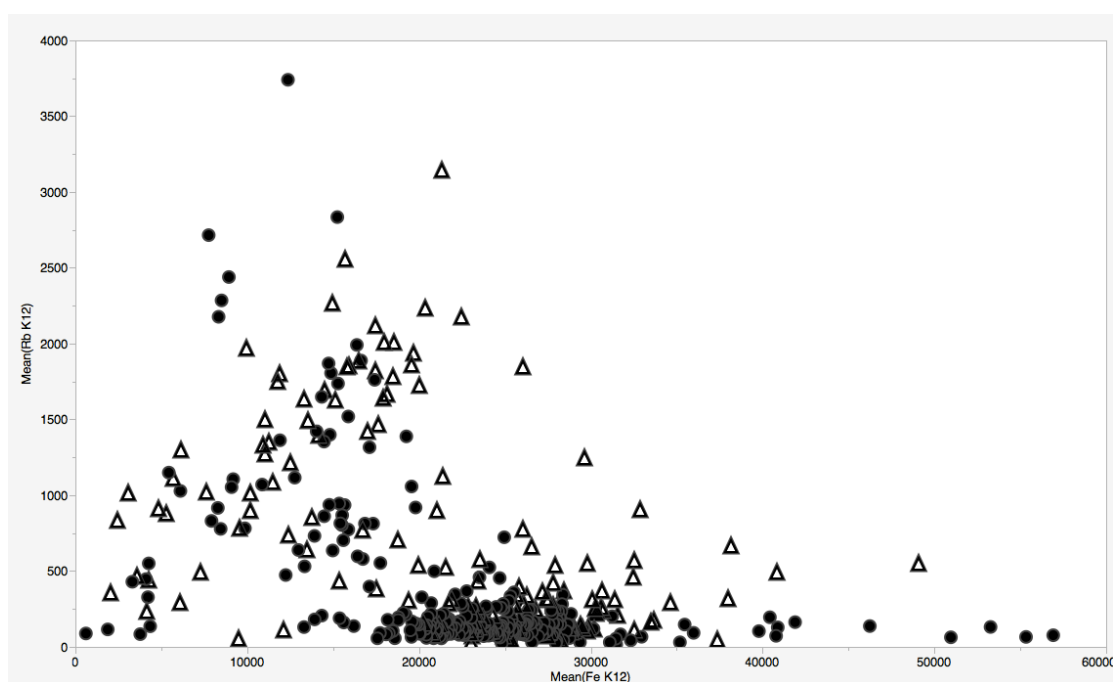


Figure 7.4: Rb-Fe XY plot of all ground edged hatchets (triangles) and geological samples (dots).

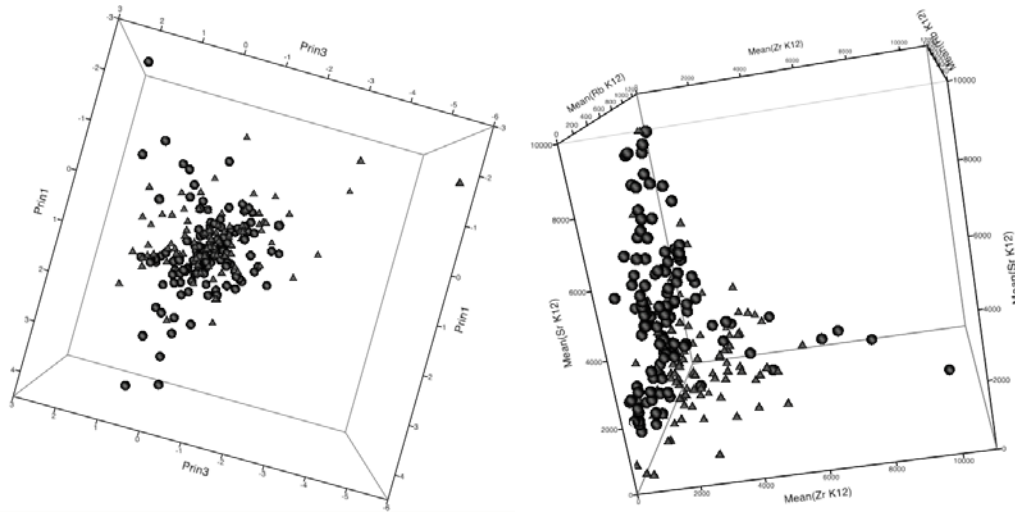


Figure 7.5: Interactive 3D Scatterplot projections of (left) PCA and (right) Sr-Zr-Rb elemental values for all ground-edged hatchets(triangles) and geological samples (spheres).

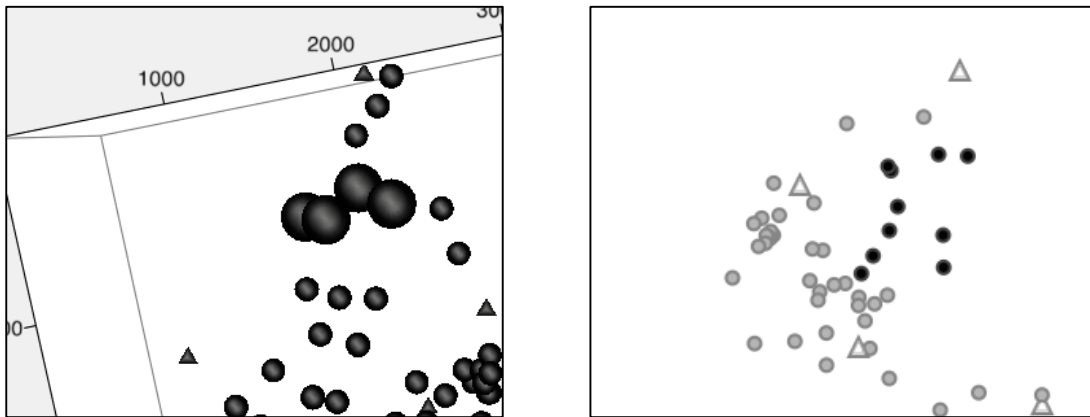


Figure 7.6: Exclusion of unmatched geological samples (highlighted) identified within an elemental 3D Scatterplot (left) and Zr-Nb XY Scatterplot (right)

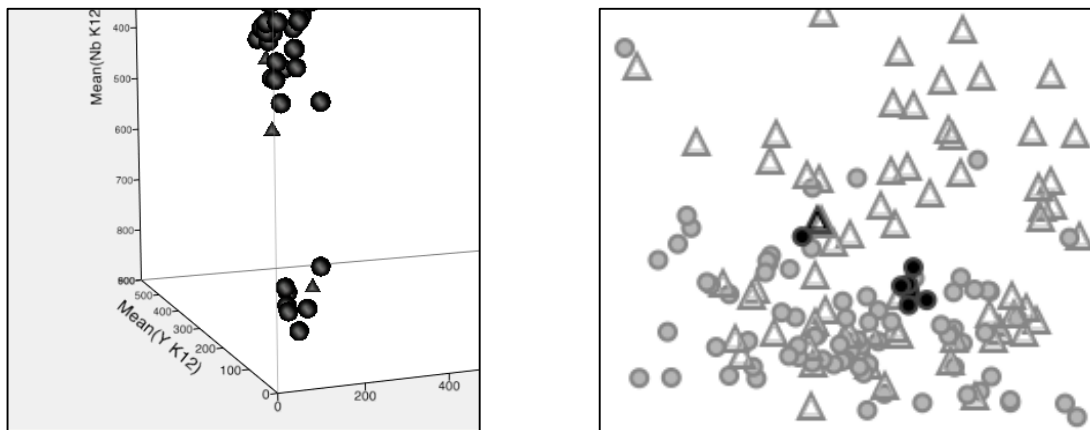


Figure 7.7: Clarifying potential matches to ground-edged hatchet ID0155 E058837b from Bellambi findspot (left) Zr-Nb-Y 3D scatterplot (right) Fe-Rb XY scatterplot indicating a Bombo Quarry (dyke) basalt sample, but not basalt samples from Kulnura correlate on these five elements.

As an additional tool, Hierarchical cluster (Ward method) was also used for identification and extraction of unmatched/unrelated geosamples. This multivariate method, also applied for sorting of remaining data into cluster groups, is illustrated in the following section.

Clustering and Verification

Hierarchical Cluster Analysis (HCA), referencing full elemental profiles for ground-edged hatchet and (remaining) geological samples, was used to cluster data based on elemental similarity (Ward's Method - Figure 7.8). This method clusters data according to proximity in a multi-dimensional 'space' - diagnosis of geological material types relies on geological sample correlations within each cluster. Clusters assigned using this tool were cross-referenced, consolidated and validated (i.e. as providing clear geochemical separation between clusters) using Canonical Variates Analysis (CVA), a linear discriminant function method, to check or confirm group attributions. In this case CVA scores verified 0% misclassifications for the clusters established using HCA (Figure 7.8).

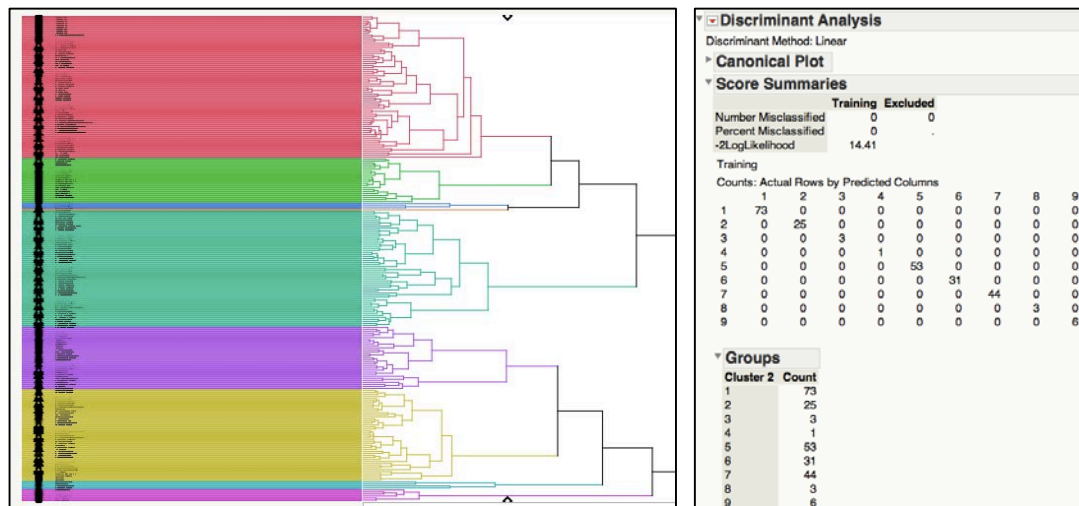


Figure 7.8: (Left) Hierarchical cluster (Ward Method) used to sort data into nine cluster groups and (Right) discriminant analysis scores for clusters assigned for detailed evaluation and matching.

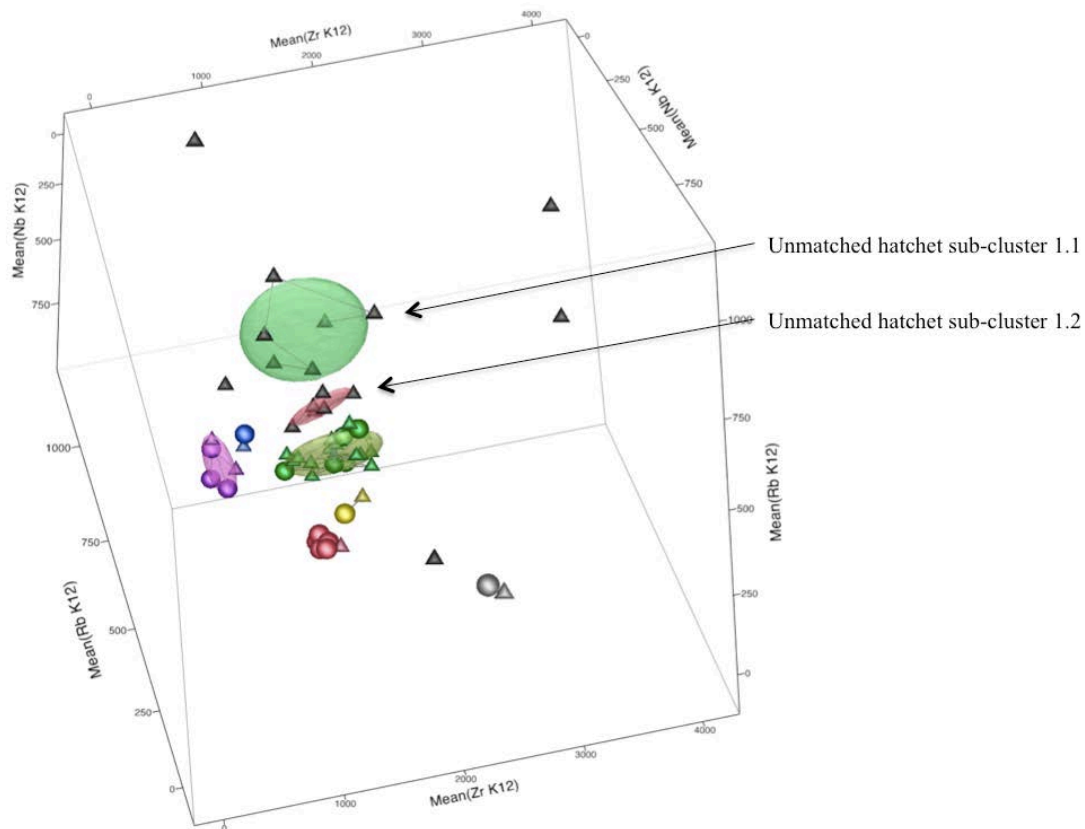
Clusters were individually evaluated using multivariate methods illustrated above (Figures 7.5 to 7.7) to identify and assign matches as well as exclude any further unmatched geosamples. This process also identified sub-clusters requiring a third scale of detail of evaluation. Assigned matches and sub-clusters were checked for validity using normal contour ellipsoids with a coverage of 0.5, as will be illustrated in results.

Results from cluster evaluations are presented below in 3D Scatterplot format. A larger format (and where indicated more detailed) report of these results is provided in Appendix IV. For the purposes of presentation, some clusters are presented together in the same scatterplot. Discussion provided with cluster results below is brief. Spatially mapped summaries of these results are presented and discussed in more detail in the following chapter.

PROVENANCING RESULTS

Cluster 1 Results

Cluster 1 (Figures 7.9-7.10) identified long distance connections to two known Aboriginal hatchet quarry sites, Peats Ridge, which has been identified as an important source of basalt for making ground-edged implements in the Central Coast region (Corkill et al 2012) and Mt Lowes (see Baker 1987). Matches to local basalt source locations include a sub-cluster of matches to Bungonia Creek, the Upper Shoalhaven River and Kangaroo Mountain. Unmatched ground-edged hatchet sub-cluster 1.2 suggests correlation as a group, though not to any geological source sampled to date; 1.1 is more variable and less clearly related (See Appendix IV for full Cluster 1 unmatched artefact listing).



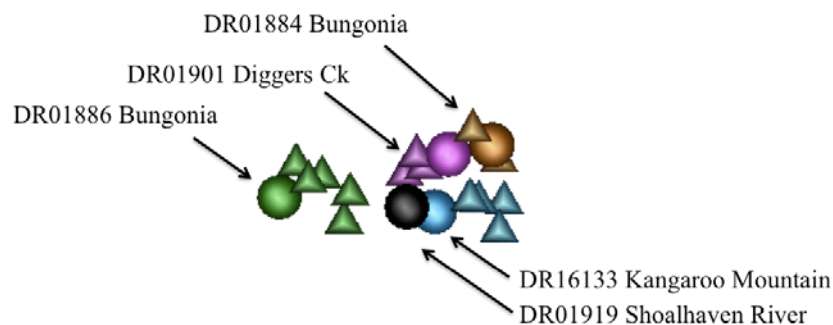
CLUSTER 1 MATCHES

● DR07043 Popran Creek (basalt bedrock)	(1 Match)
▲ ID1014 E030958 Burying Ground Beach SH	(Match to DR07043 Popran)
● DR17825 Caoura - Tallong (basalt coarse feldspathic)	(1 Match)
▲ ID0503 Curra CU5 121	(Match to DR17825 Caoura-Tallong)
● XRF080C Lowes Mt AM (altered igneous bedrock)	(1 Match)
▲ ID1188 E49919C Bungonia	(Match to XRF080C Lowes Mt AM)
● E60474a Lowes Quarry (altered igneous bedrock)	(1 Match)
▲ ID0151 E058838a Bellambi	(Match to E60474a Lowes Quarry)
● DR16196 Bombo Quarry DykeB (basalt dyke)	(1 Match)
▲ ID0155 E058837b Bellambi	(Match to DR16196 Bombo DykeB)
● DR01155 Jamberoo (basalt orthoclase bedrock)	(1 Match)
▲ ID1136 E082935 Lake Illawarra	(Match to DR01155 Jamberoo)
● ▲ Cluster 1 (sub-cluster green)	See following figure for details

CLUSTER 1 UNMATCHED GROUND-EDGED HATCHETS

▲ Unmatched ground-edged hatchets (N=17)	See Appendix IV
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Figure 7.9: Cluster 1 matches and unmatched ground-edged hatchets. For unmatched hatchet listing see Appendix IV). Green sub-cluster matches are shown in Figure 7.10 below.



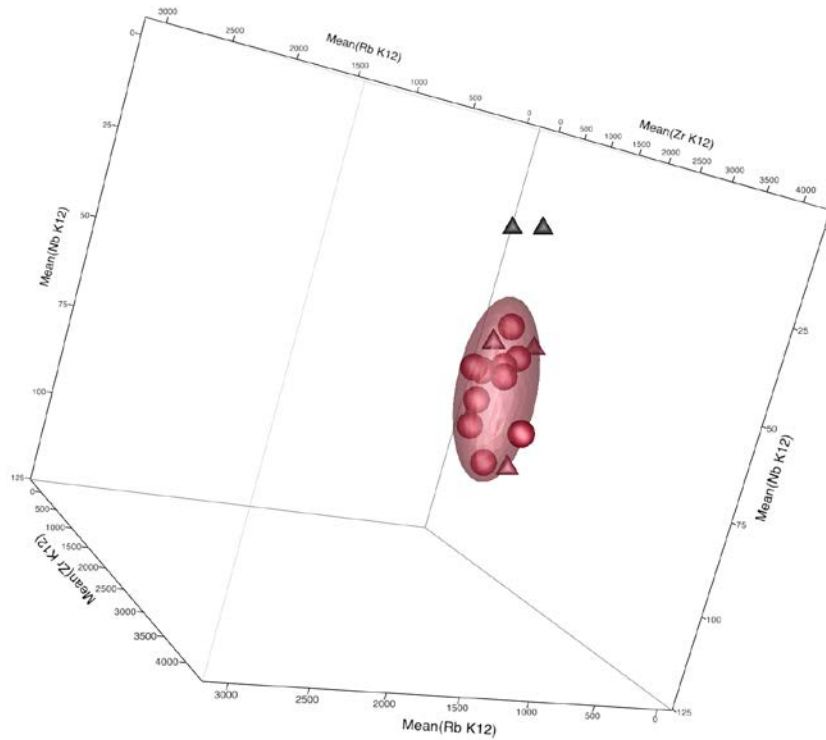
CLUSTER 1 SUB-CLUSTER GREEN MATCHES

● DR01884 Bungonia (basalt bedrock)	(2 MATCHES)
▲ ID0147 E058835d Bellambi	(Match to DR01884 Bungonia)
▲ ID1072 E054781a Mittagong	(Match to DR01884 Bungonia)
● DR01886 Bungonia (basalt bedrock)	(5 MATCHES)
▲ ID0059 E058840 Bellambi	(Match to DR01886 Bungonia)
▲ ID1073 E054782 Mittagong	(Match to DR01886 Bungonia)
▲ ID1032 E035813 Jamberoo	(Match to DR01886 Bungonia)
▲ ID1021 E034262 Old Cemetery South Beach SH	(Match to DR01886 Bungonia)
▲ ID0040 E033454 Bellambi	(Match to DR01886 Bungonia)
● DR01901 Diggers Creek (basalt altered bedrock)	(3 MATCHES)
▲ ID1026 E034268 Barrack Head SH	(Match to DR01901 Diggers)
▲ ID1112 E057362a Illawarra Heads	(Match to DR01901 Diggers)
▲ ID1149 E095515b Mittagong	(Match to DR01901 Diggers)
● DR01919 Shoalhaven River (basalt bedrock)	(Geosample matching to DR16133)
● DR16133 Kangaroo Mountain (igneous basanite)	(4 MATCHES)
▲ ID1016 E030961 Burying Ground Beach SH	(Match to DR16133 Kangaroo Mountain)
▲ ID1178 E59665 Marulan	(Match to DR16133 Kangaroo Mountain)
▲ ID1049 E050157b Shellharbour	(Match to DR16133 Kangaroo Mountain)
▲ ID1120 E059823 Shellharbour	(Match to DR16133 Kangaroo Mountain)

Figure 7.10: Cluster 1 matches within green sub-cluster (see also Figure 7.9 above)

Clusters 2-4 Results

All cluster 2 geological samples (N=10) and ground-edged hatchets (N=4) are Bombo Latites, shown as a single sub-cluster in Figure 7.11 and with match details in Figure 7.12. Cluster 3 contained two ground-edged hatchets and one geological specimen that was not a match to this pair and was excluded. Cluster 4 was a single geological specimen, also excluded as unmatched.



CLUSTERS 2-4 LATITES (See following figure for sub-cluster matches)

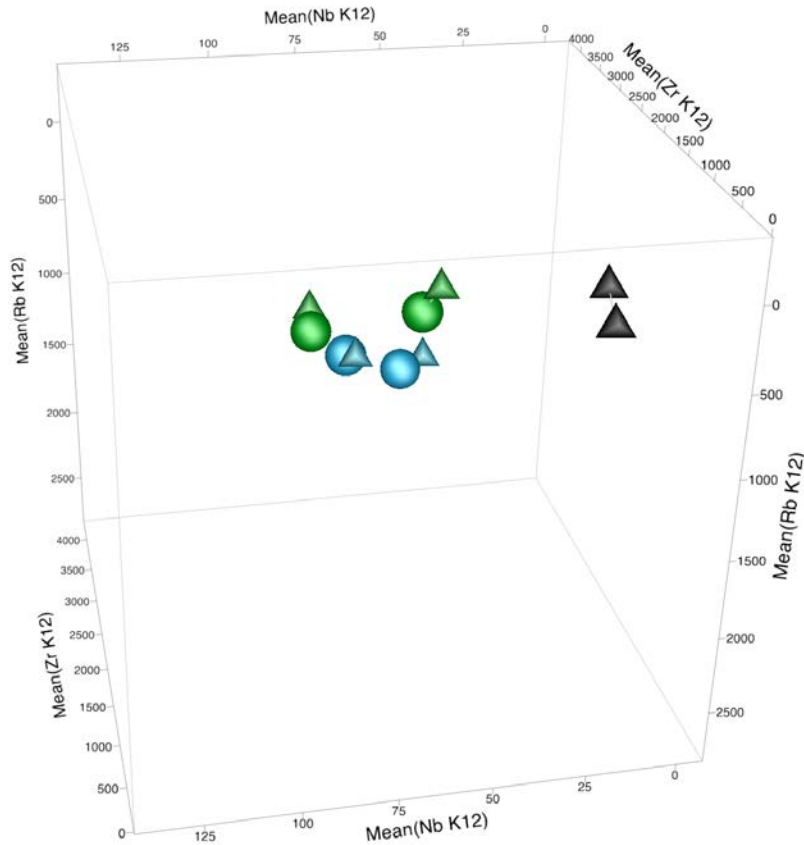
- XRF069C Kiama Rd Cutting AM (latite bedrock)
- XRF066C Shellharbour Sth AM (latite cobble)
- XRF071C Bombo Q AM (latite bedrock)
- XRF072C Bombo Q AM (latite bedrock)
- XRF040C Bombo Quarry AM (latite bedrock)
- XRF068C Bass Pt Q AM (latite bedrock)
- Bombo QRckPlat KS14 (XRF71c) (latite cobble)
- DR04243 Is3 Five Islands (latite bedrock)
- Bombo QRckPlat KS12 (XRF71a) (latite cobble)
- Shellharbour SB KS11 (latite cobble)
- Shellharbour SB KS10 (latite cobble)
- ▲ ID1135 E082934 Lake Illawarra
- ▲ ID1115 E057391 Bellambi
- ▲ ID1070 E054779 Mittagong
- ▲ ID1079 E055134 Meryla

CLUSTERS 2-4 UNMATCHED GROUND-EDGED HATCHETS

- ▲ Unmatched ground-edged hatchets (N=2)

See Appendix IV

Figure 7.11: Cluster 2-four matches to Bombo latites and unmatched ground-edged hatchets.



CLUSTERS 2-4 LATITE MATCHES

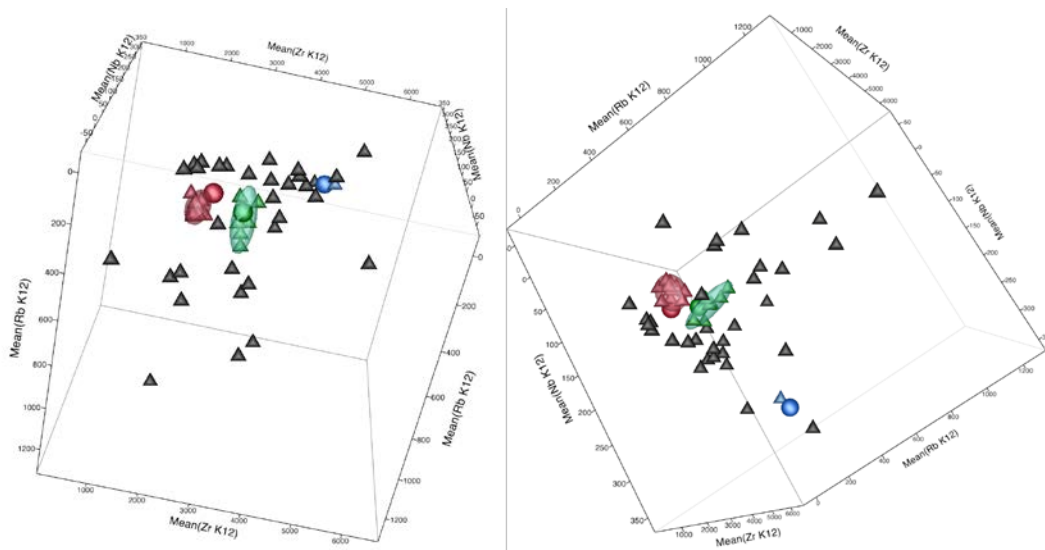
● XRF069C Kiama Rd Cutting AM (latite bedrock)	(1 Match)
▲ ID1070 E054779 Mittagong	(Match to XRF069C Kiama Rd Cutting)
● XRF072C Bombo Q AM (latite bedrock)	(1 Match)
▲ ID1135 E082934 Lake Illawarra	(Match to XRF072C Bombo Q AM)
● Shellharbour SB KS10 (latite cobble)	(1 Match)
▲ ID1079 E055134 Meryla	(Match to Shellharbour SB KS10)
● Shellharbour SB KS11 (latite cobble)	(1 Match)
▲ ID1115 E057391 Bellambi	(Match to Shellharbour SB KS11)

Figure 7.12: Cluster 2-four matches to Bombo latites.

Cluster 5 Results

Cluster 5 (Figure 7.13) groups 50 ground-edged hatchets (1/3 of the artefact assemblage) with just three geological samples. DR01932, a bedrock sample from Tallowal Gully (Upper Shoalhaven) identified in the Australian Museum geoscience collection as basalt (olivine from flow cap) and two cobble samples collected from the Crookhaven River (Lower Shoalhaven). The degree of correlation between this Tallowal Gully sample and Crookhaven River KS06, though not a match, suggests a probable common igneous origin. Investigation (and full sampling) of this bedrock

source material is flagged for future research. Crookhaven River KS03 has been identified as a very fine-grained hornfels. One unmatched artefact, ID0508, was thin-sectioned (Branagan and Megaw 1969:14), and also identified as hornfels, with the Upper Shoalhaven near Marulan suggested as the most likely source. Classification of material type for unmatched ground-edged hatchets, based on this evidence, is unclear.



CLUSTER 5 MATCHES

<ul style="list-style-type: none"> ● Crookhaven River KS03 (quartzite? cobble) ▲ ID1007 E030935 Lake Illawarra 	<p>(1 Match) (Match to Crookhaven River KS03)</p>
<ul style="list-style-type: none"> ● Crookhaven River KS06 (basalt? cobble) ▲ ID0145 E033452 Bellambi ▲ ID1060 E052689 Robertson ▲ ID1187 E49919B Bungonia ▲ ID1028 E034271 Barrack Head ▲ ID0042 E033457 Bellambi ▲ ID0149 E012851 Bellambi ▲ ID1025 E034267 Shellharbour ▲ ID1191 E49931 Bungonia ▲ ID1192 E58327 Bungonia ▲ ID1010 E034270 Barrack Head SH 	<p>(10 Matches) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06) (Match to Crookhaven River KS06)</p>
<ul style="list-style-type: none"> ● DR01932 Tallowal Gully (basalt olivine bedrock) ▲ ID1067 E053665 Towradgi ▲ ID1133 E077084 Tom Thumb Lagoon ▲ ID1195 E057362c Lake Illawarra ▲ ID1109 E057361a Lake Illawarra ▲ ID1179 E59664A Marulan ▲ ID1056 E052578a Lake Illawarra ▲ ID1119 E058836b Bellambi 	<p>(7 Matches) (Match to DR01932 Tallowal Gully) (Match to DR01932 Tallowal Gully) (Match to DR01932 Tallowal Gully) (Match to DR01932 Tallowal Gully) (Match to DR01932 Tallowal Gully) (Match to DR01932 Tallowal Gully) (Match to DR01932 Tallowal Gully)</p>

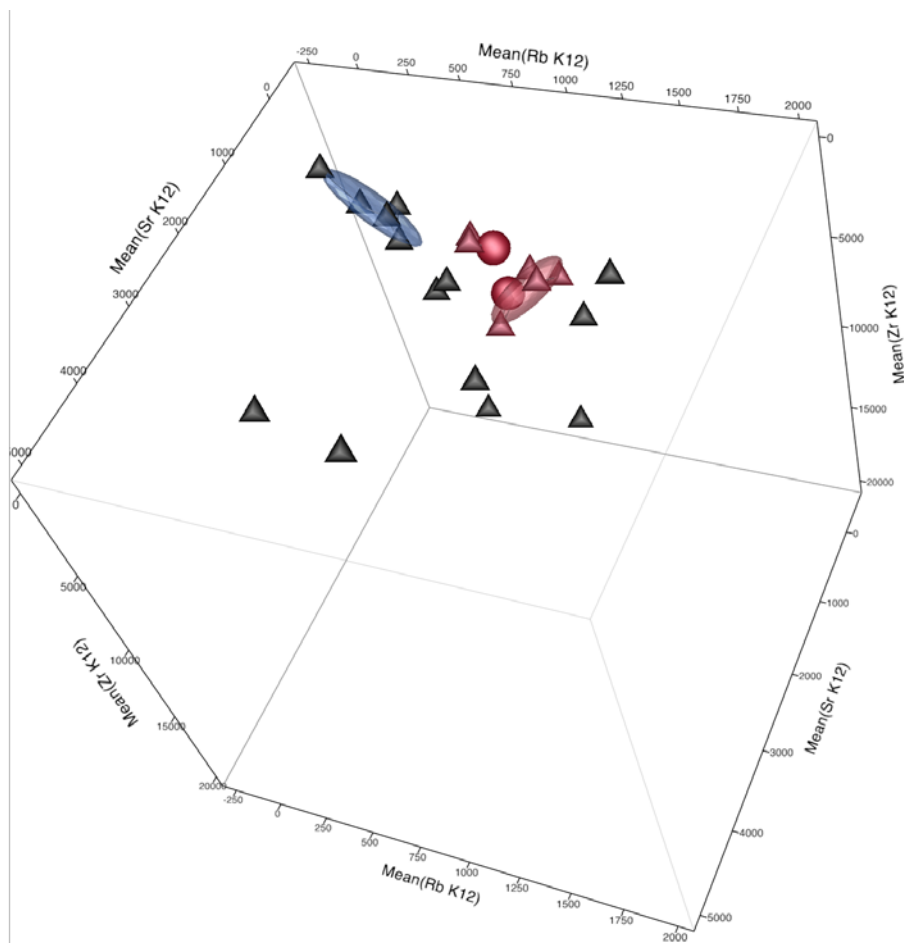
CLUSTER 5 UNMATCHED GROUND-EDGED HATCHETS

▲ Cluster 5 unmatched ground-edged hatchets (N=32)	See Appendix IV for full listing
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Figure 7.13: Cluster 5 matches to lower Shoalhaven River system cobbles Crookhaven River KS06 and KS03 and Tallowal Gully. See Appendix IV for unmatched ground-edged hatchet listing.

Clusters 6 and 8 Results

Cluster 6 results (Figure 7.14) match six ground-edged hatchets to two quartzite samples from the lower Shoalhaven River system, Crookhaven River KS01 and KS04.



CLUSTER 6 MATCHES

● Crookhaven River KS01 (quartzite cobble)	(2 Matches)
▲ ID1182 E59664D Marulan	(Match to Crookhaven River KS01)
▲ ID1074 E054783 Mittagong	(Match to Crookhaven River KS01)
● Crookhaven River KS04 (quartzite cobble)	(4 Matches)
▲ ID1065 E053516d Bellambi	(Match to Crookhaven River KS04)
▲ ID1024 E034266 Barrack Head	(Match to Crookhaven River KS04)
▲ ID0150 E033451 Bellambi	(Match to Crookhaven River KS04)
▲ ID1156 E030936 Lake Illawarra	(Match to Crookhaven River KS04)

CLUSTERS 6 AND 8 UNMATCHED GROUND-EDGED HATCHETS

▲ Unmatched Cluster 6 (N=11) and Cluster 8 (N=3) ground-edged hatchets (See Appendix IV)

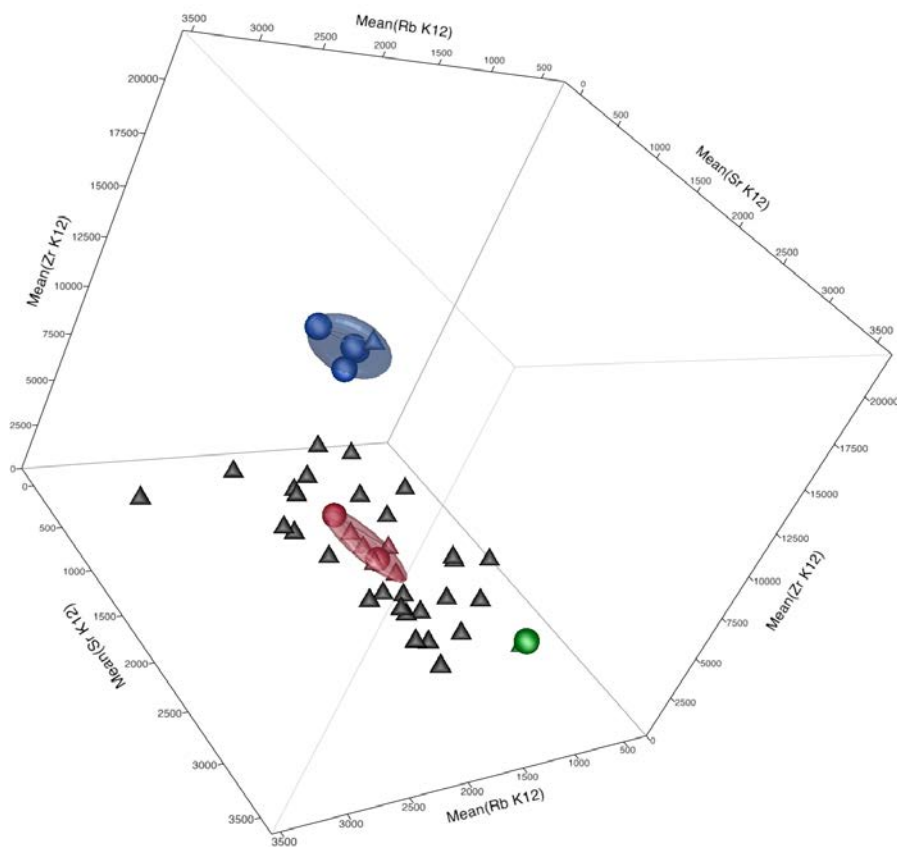
Figure 7.14: Cluster 6 results with matches to Crookhaven River quartzite samples.

This cluster also contained a number of quartzite cobble samples from other locations (e.g. Yarramundi Crossing and Coxs River) excluded as not matching. Cluster 8 comprised three unmatched ground-edged hatchets of variable composition. Unmatched ground-edged hatchets in this cluster, including the sub-cluster in blue (unmatched to a source), are identifiable as quartzite based on other samples in this group. Source locations are not clarified by this result as necessarily connected to the Shoalhaven. Further sampling of cobbles of this type of material, in the Shoalhaven and Hawkesbury/Nepean river systems and on the coast, is recommended.

Clusters 7 and 9 Results

This final set of results (Figure 7.15), shows Cluster 7, which contained a number of hornfels geological specimens, all unmatched aside from Hyams Creek, Jamberoo and Yarramundi Crossing/Devlins Rd (the latter being Hawkesbury/Nepean system hornfels cobbles). A conservative ellipsoid was used to allocate matches to Yarramundi Crossing/Devlins Rd. Variance beyond this ellipsoid is too evenly distributed to assign. Unmatched ground-edged hatchets (in black) are identified as hornfels. The Hawkesbury/Nepean is suggested based on cluster assignment (though this is tentative - other locations cannot be ruled out).

The final match is ID506 to Minnamurra Tinguaita sample DR01157 from Mt Jamberoo, shown in Figure 7.15 below, with the full geological reference collection Tinguaita group. This thin-sectioned ground-edged hatchet (Figure 7.16 below), excavated at Curracurrang and identified as Minnamurra Tinguaita (Branagan and Megaw 1969:14) is one of only two location specific ground-edged hatchet raw-material references identified in literature review for this study area [some likely, probable and possible are noted as also correlating with results].



CLUSTERS 7 AND 9 MATCHES

● YC7 YarramundiCr (hornfels cobble)	(4 Matches)
▲ ID0148 E58836a Bellambi	(Match to YC7 Yarramundi Cr)
▲ ID0144 E012697 Bellambi	(Match to YC7 Yarramundi Cr)
▲ ID0509 Gynea Bay GY	(Match to YC7 Yarramundi Cr)
▲ ID1134 E082933 Lake Illawarra	(Match to YC7 Yarramundi Cr)
● DR3 DevlinsRd (hornfels cobble)	(1 Match)
▲ ID1085 E055943 Lake Illawarra	(Match to DR3 DevlinsRd)
● Hyams Ck Jamberoo KS15 (porphyritic volcanic cobble)	(1 Match)
▲ ID1012 E030956 Burying Ground Beach SH	(Match to Hyams Ck Jamberoo KS15)
● DR01157 MtJamberoo (Minnamurra tinguaita bedrock)	(1 Match)
● Nth Wollongong Beach YKG (Minnamurra tinguaita cobble)	(Minnamurra Tinguaita Geo-group)
● DR06917 Minnamurra (Minnamurra tinguaita bedrock)	(Minnamurra Tinguaita Geo-group)
● DR06916 Minnamurra (Minnamurra tinguaita bedrock)	(Minnamurra Tinguaita Geo-group)
▲ ID0506 Curra CU5 25 B-L	(Match to DR01157 MtJamberoo)

CLUSTER 7 UNMATCHED GROUND-EDGED HATCHETS (N=28)

▲ Cluster 7 unmatched ground-edged hatchets (N=28)	See Appendix IV for full listing
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Figure 7.15: Clusters 7 and 9. Matches to Mt Jamberoo (Minnamurra Tinguaita) and Hyam's Creek, Jamberoo and Yarramundi Crossing/Devlin's Rd.



Figure 7.16: ID0506 Curra CU5 25 B-L excavated at Curracurrang and identified as Minnamurra Tinguaitite (Branagan and Megaw 1969:14) and matched to DR01157 Mt Jamberoo Minnamurra Tinguaitite (Figure 7.15) above. (Photographed by K. Stokes. Reproduced with permission of the Australian Museum).

One Tinguaitite sample (above), a pebble found at North Wollongong Beach (donated Kaiser-Glass 2014), is a reminder that sources have ways of moving on their own. Though not necessarily suggesting this large cobble from Minnamurra is likely to have migrated coastally, this highlights a key point. Even for the most comprehensively provenanced ground-edged hatchet, specific source for a cobble preform ground-edged hatchet can only be set in water, not stone. Interpretation of these results, which are mapped to examine their patterns, follows in the next chapter.

CHAPTER 8

INTERPRETATION – PART 1

STONE SOURCES AND SOCIAL NETWORKS

A total of 55 ground-edged hatchets matched (from source to findspot) provide the data rendered in Figures 8.1 to 8.3 below. Matches are plotted as reported in results (Chapter 7) and represent connections between source and findspot, not suggested travel route. Figures are not overlaid with European places and names. Map version (Figure 8.3) provides corresponding location names. Their interpretation is presented below, addressing the questions for the second component of this research. Part 2 of this chapter brings these components together address the primary research questions.

Spatial Patterns

What spatial patterns can be seen in movements of stone and/or hatchets from source to find-spot in the study region?

The longest distance match is from Peats Ridge to Shellharbour, a straight-line distance of 144km. Two matches from Mt Lowes (one to Bungonia and one to Lake Illawarra) are equidistant at 135km. The Crookhaven River, Tallowal Gully and Bungonia Creek (all part of the Shoalhaven River system) were the sources with the most matches. Five matches from river cobbles sampled at Yarramundi Crossing on the Hawkesbury/Nepean system plot over a long distance, however extent of availability of this material upstream (south towards the study area) is not known.

Aside from these long distance quarry source matches (3) and matches to Yarramundi Crossing (5), the pattern of connections identified by these provenancing results sits within a triangle defined by the coastline and the Shoalhaven River. Locations where no ground-edged hatchets are matched to any source (See Figure 8.1), also a part of

this pattern, indicate use of sources unknown. Both Hawkesbury/Nepean and Shoalhaven cobble samples are flagged as likely sources for these inland findspot hatchets. Hornfels coastal cobbles cannot be ruled out as a third source, however, as samples collected to date may not be representative of the range and types (other than latite) available along the coast in the study area. It is a question for future research. Figure 8.2, which includes unmatched geological samples, places this pattern in its broader context.

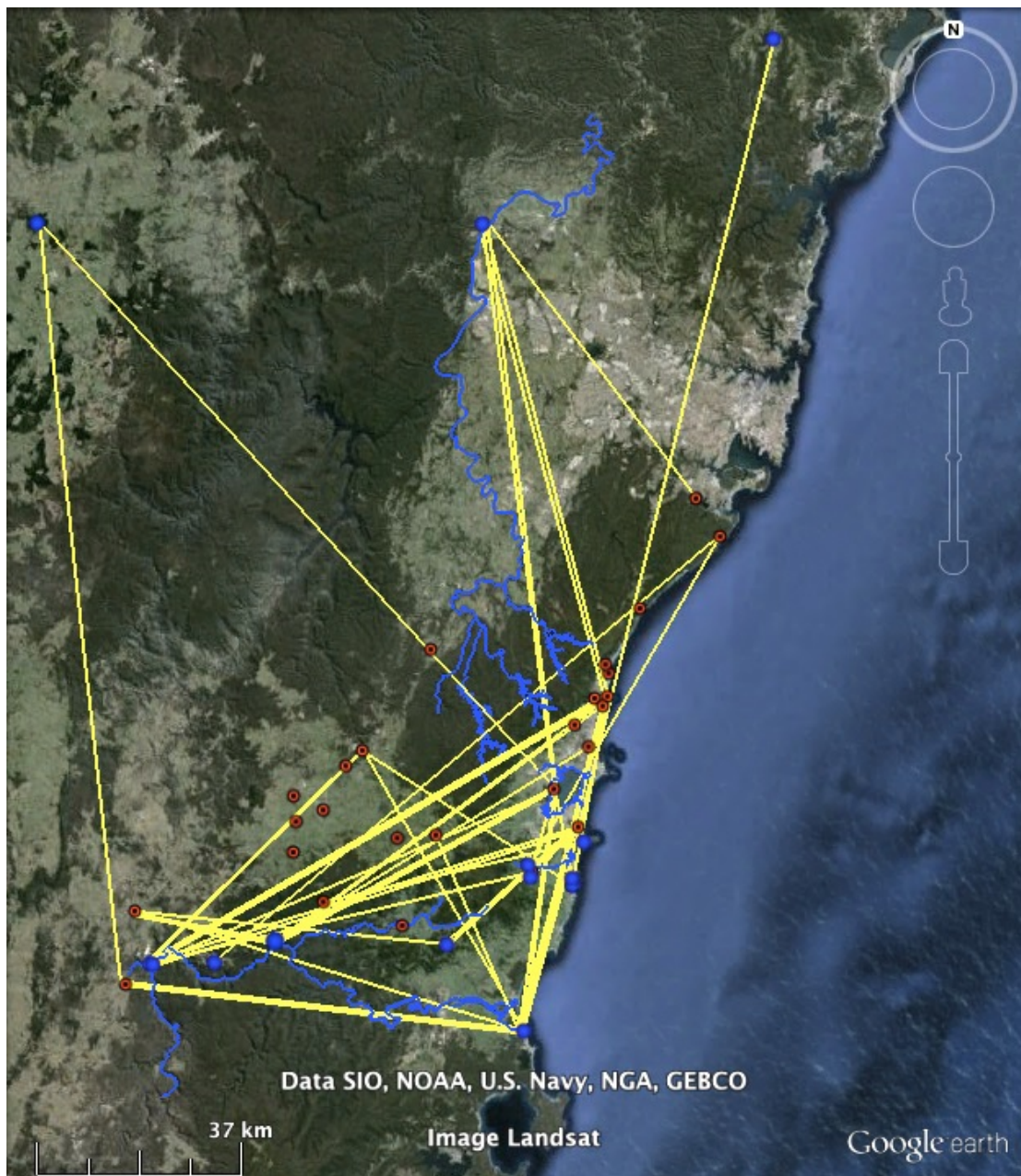


Figure 8.1: Matches (yellow lines) between ground-edged hatchet findspots (red dots) and raw material source locations (blue dots). See Map Figure 8.3 for location names.

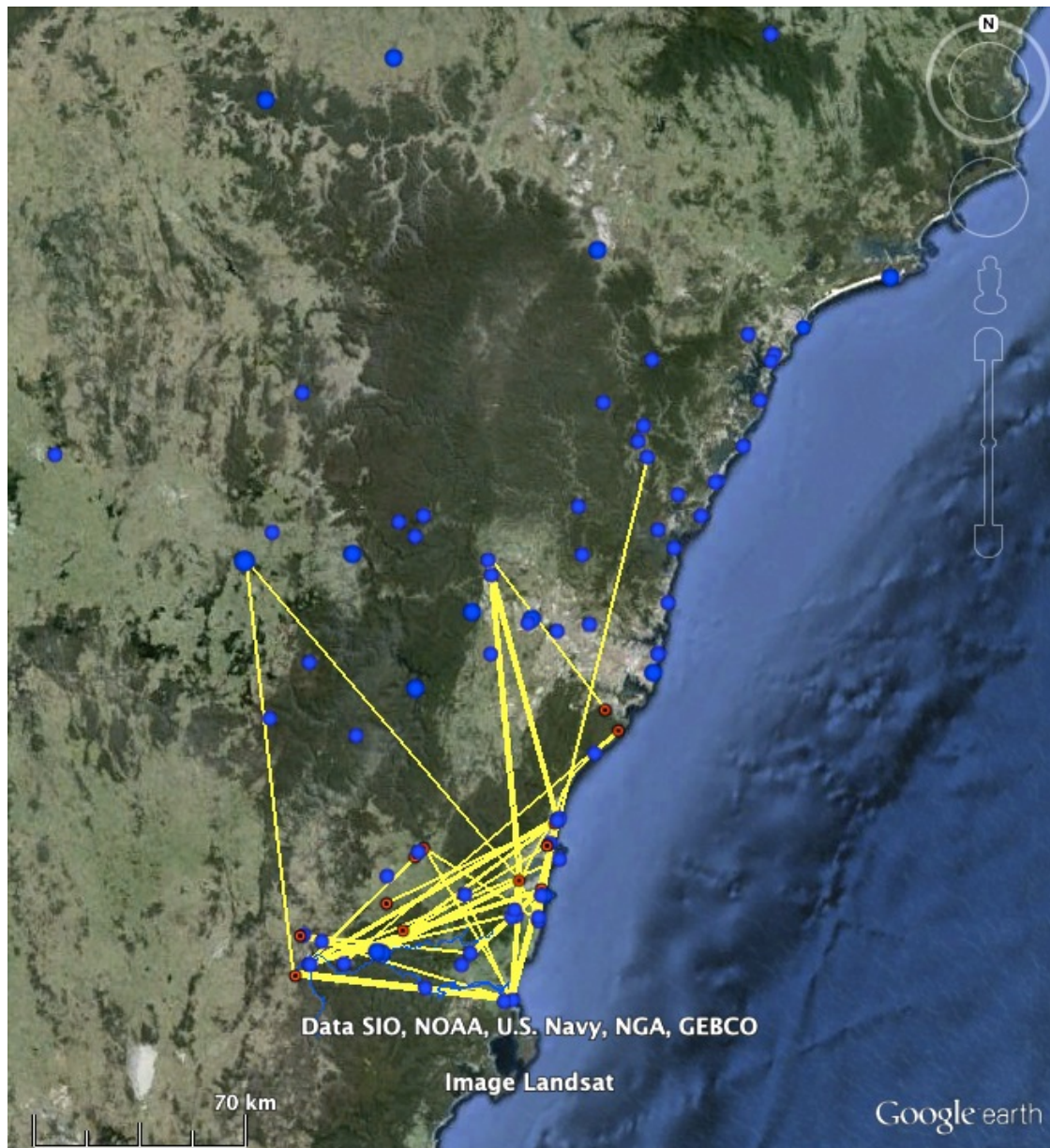


Figure 8.2: Matches (yellow lines) between ground-edged hatchet findspots (red dots) and raw material sources (blue dots). Geo-sampled locations not matching any artefacts also shown

Particular Locations and Directions

Does this evidence suggest movement of hatchet material from particular locations or in particular directions within this network?

Direction of relationships between sources and findspots, when viewed together (Figure 8.3) identify a pattern of movement of material from the south and southwest,

and from the north and northwest, towards the coast show a pattern inverse to radial distribution patterns seen in provenancing results from quarry sources such as Peats Ridge (Corkill et al. 2012), gathering material together from a multiple directions. Movement of material from multiple directions to gather on the coastal plain is not difficult to correlate with social activity. The lack of material moving out is not likely to correspond with people movement.

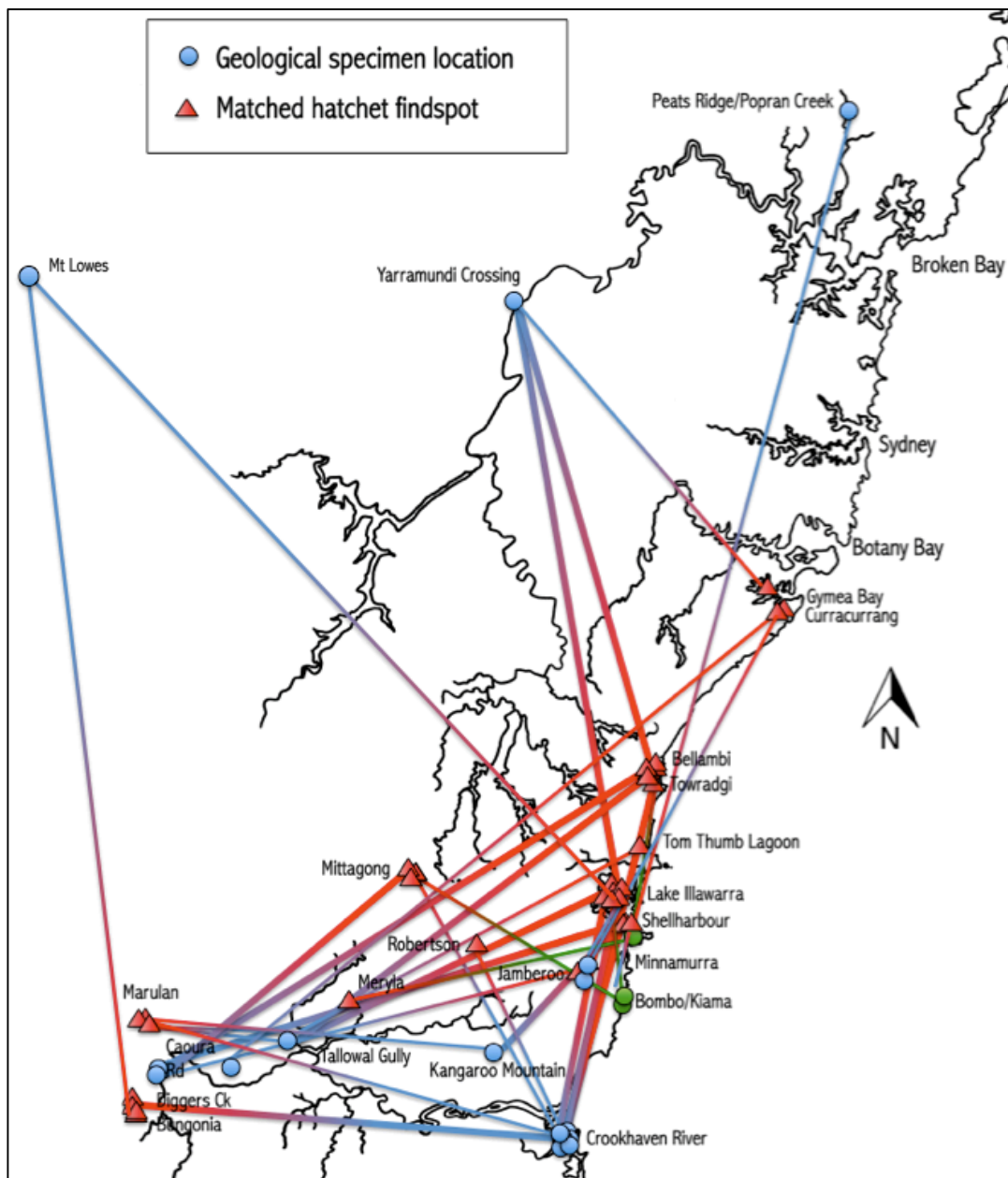


Figure 8.3: Map of provenancing results showing direction of movement from source (blue) to findspot (red). Latite cobble and bedrock sources (green). Multiple match connections are summarised.

North of the Crookhaven River, matched raw material sources on the coast are few. Only four matches to latites were found in results (see Figures 7.11-7.12). A fifth match to Bombo from Bellambi is to a basalt dyke (see Figures 3.9 and 6.13). Cobble and bedrock geosamples from Bass Point, Wollongong, Bellambi Point/East Corrimal Beach, North Kiama Sands and Five Islands (see Figure 6.13) were not matched to any of the 148 ground-edged hatchets analysed. Though there may be other raw material types available as cobbles along the coast (not yet sampled), these results show very few matches to any of the latite sources on the coast.

The geological reference collection has not yet been developed south of the Crookhaven/Shoalhaven River system. Connection between the study region and south of the Shoalhaven/Crookhaven River system is, in this provenancing component, yet to be determined.

Raw Material Preferences

Is there evidence for particular raw material preference relating to geological type (e.g. basalt or hornfels) and/or preform (e.g. bedrock or waterworn cobble)?

Preferences for particular types of stone, and preform, have been identified in materials used (Corkill 2005, Corkill et al. 2012). Wide distribution of unusual or distinctive material, independent of local resource availability (Ulm et al. 2005:337) is also identified. The long distance match to Peats Ridge from Shellharbour, a straight-line distance of 144km, is to a basalt source identified (Corkill et al. 2012) as important, with other long distance matches, and found in all parts of the NSW Central Coast. Among unmatched hatchets there were no large groups (i.e. with the same geochemistry) that might indicate a particular important source, yet to be identified (i.e. a bedrock quarry). As material type was not clearly assigned for some of the unmatched artefacts (see Figure 7.13), assemblage statistics are not presented. Hornfels and quartzites predominate in match results (See Chapter 7). Hornfels is

noted as more time consuming to sharpen, though stronger with an edge that lasts longer (Corkill 2005:48).

62% of coastal plain and 58% of inland ground edged hatchets were identified as cobble preform (see Figure 6.11). Those classified as ‘unknown’ preform (based on absence of diagnostic cortex) may also have come from cobble sources. Ground-edged hatchets from findspots in the Sydney region, the vast majority of were made from waterworn metamorphic cobbles (Corkill 2005:48). Geology south of the Shoalhaven River has not been assayed, nor can cobble material in the river itself be considered sampled (six cobbles from the Lower Shoalhaven and eleven cobbles from coastal locations within the study area were included (see Figure 6.13). Bedrock samples from locations cross-cut by this river system, and intersecting with the coast, were also included.

Material/Social Correlation

Can this evidence be considered representative of the social network in place over this period of time?

The time range represented by the assemblage is not known. The premise of this thesis is that most of the assemblage predates the arrival of Europeans and some may predate it by some time. Raw-material source use may limit the degree to which social activity and connections can be inferred from this evidence. Whether coastal sources were minimally used, or they have just not yet been identified, this obscures connections on the coastal plain of the study area and links to other areas – in particular to the west of the Illawarra and north along the coast. As there are also no matched bedrock sources on the western side of the escarpment in the study area, movement and connections of people across this natural feature will be invisible within this result. South of the Shoalhaven is not represented in this data.

INTERPRETATION - PART 2

COMPARING THE RECORDS

Provenancing results and historical evidence are brought together (Figure 8.4) to consider the primary research questions of this thesis.

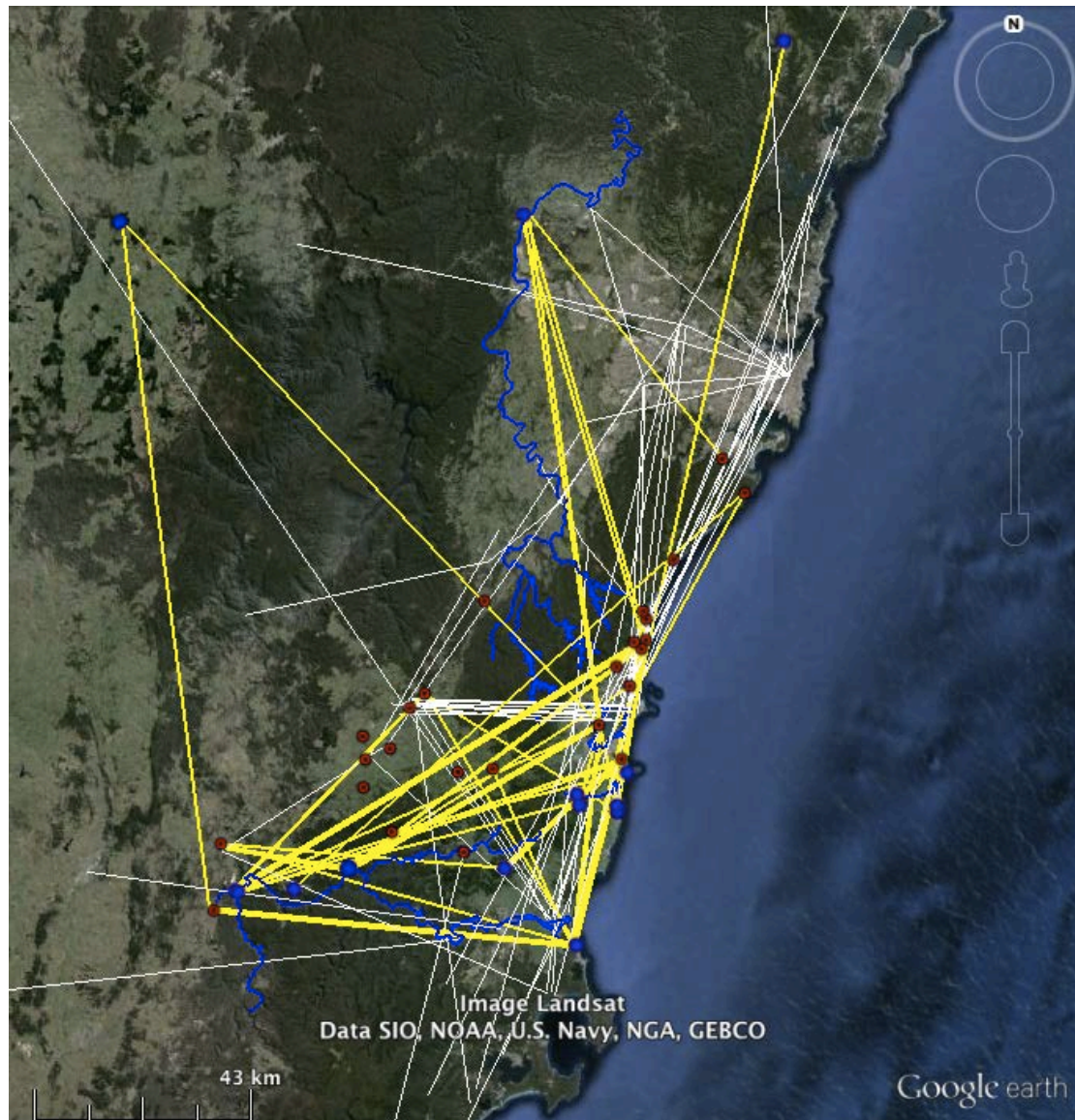


Figure 8.4: Evidence of movement and gathering of Aboriginal people across Dharawal country from ground-edged hatchet provenancing results (yellow) early European accounts (white).

Correlation - Similarities and Differences

Do patterns described over time in historical accounts correlate with patterns of ground-edged hatchet/raw material movement in Dharawal country?

What similarities and differences can be seen between these two sets of evidence?

As interpreted here, the question is not just do these patterns correlate (i.e. with each other). The question is do they correlate with each other in Dharawal country? This thesis proposes - yes. Their relationships to each other are defined by their shared connections to the landscape. There are a number of differences in these sets of evidence however

Historical accounts define strong connections between the Illawarra/Five Islands area on the coast and Bong Bong/Mittagong in the hinterland. They also identify a strong link between the Illawarra/Five Islands area and Botany Bay, Sydney and Parramatta/Liverpool regions. Ground-edged hatchet raw material sourcing results, on the other hand, do not show this. With no ground-edged hatchets from anywhere in the study area matched to sources near Sydney or to the Cenozoic mafic volcanics nearest to Bong Bong, this represents an explained absence of data, not evidence of a clear difference. Provenancing can only identify connections where one of those locations is a place where raw materials were sourced. These may be connections that didn't involve exchange of hatchets or procuring of raw material. With the majority of hatchets still unmatched, and geological sampling an ongoing task, sources used in those areas may have just not been found yet. It may be a difference, but absence of evidence is not evidence of absence in this case.

As discussed in the provenancing results and interpretation, matching to Hawkesbury/Nepean cobbles was approached cautiously, other ground-edged hatchets in Cluster 7 (Figure 7.17) are probably also from this system, though more sampling is needed to confirm this. Connections to the north are likely to be connected to this cobble source, albeit possibly at locations upstream of Yarramundi Crossing. Connections to Bungonia to the west and to the Crookhaven/Shoalhaven are

bound to be, at least to some degree, a function of river transport east from bedrock sources in this region. The proportion of cobbles sourced downstream, and where they were collected cannot be extrapolated from this evidence. Language Group Boundary map (Figure 4.2) supports collection further east – though exchange between groups, then down the line to the coast, may also have played a role. Historical information about activity to the west was not included, and may to be sparse.

Connections south of the Shoalhaven River, indicated in historical accounts, have not yet been examined via provenancing. The south coast and Sydney/Botany Bay are regions also not yet examined. Ground-edged hatchets from findspots in these areas, matching to sources in the Dharawal study area may clarify these connections.

Historical and provenancing evidence are both limited in what they show, but in different ways. Both, to some extent, appear to be showing connections that the other doesn't, or won't, based on results. This suggests that historical accounts may be filling in some of the social network gaps not apparent in sourcing results to date. It also demonstrates that historical extracts are not the full picture. In all other respects, correlations are strong. This further suggests they have a value together, that neither offers on its own.

Change in Response to European Colonisation

Does this evidence suggest the network Dharawal people moved and exchanged within changed in response to European colonisation? If so – what can be seen to change?

There is no evidence of a process of change to the Dharawal social network pattern through time, corresponding with the first fifty years of European colonisation process. A suggestion that the network Dharawal people moved and exchanged within changed in response to colonisation is not supported, or supportable. There is strong evidence for, and of, continuity throughout. There is no clear difference in the

underlying social network structuring the two sets of evidence, though differences in the incompleteness of archaeological and historical records are highlighted.

This result, as presented in Figure 8.4 above, demonstrates the presence of an established network of social connections between people on the coastal plain, groups to the west and southwest of the escarpment and north along the coast and to the northwest in the study area. It also gives some indication of its pattern, and the degree to which this pattern is connected to its physical landscape. As derived from both archaeological provenancing, and historical evidence, this presence in the Dharawal cultural landscape extends from well before and has continued well beyond 1788.

Only an etic interpretation, based on theory (see Chapter 2), can be offered for this last, question. As such it is a reading from the outside. On a cultural scale, this evidence suggests that the response of the Dharawal social network (as shared meaning of country), to the act of colonisation perpetrated by European culture, was to continue, and to survive. Its traffic changed and material culture that moved within it changed, (quickly). As one of this system's functions was to transmit, distribute and share new technologies, knowledge, songs, stories, and new materials – European material moving through an Aboriginal social network indicates continuity of function. Despite social disruption, being pushed to the fringes of their country by advancing European settlement (Wesson 2005:25-6), and all that followed, there is evidence of its continued use and continuity as knowledge (Wesson 2005:28; Irish and Ingrey 2013 see Pg 61).

Social Network Function in the More Distant Past?

What might these results, overall, suggest about the nature and function of these pathways in the more distant past?

The physical landscape, resources and natural boundaries do change, though some of these features were there, or somewhere nearby, long before people may have come to occupy this region. Though the feet that travelled these pathways, their purposes and the degree to which each of them were used is certain to have changed over time, including dramatically following the arrival of Europeans –as connected to, and the best ways of getting from one place to the other in Dharawal country they may have been quite stable. As infrastructure physically existing in its cultural landscape, anchored to country and with multiple functions, its maintenance, use and passing on through time may be particularly resistant to change.

These pathways appear to be the network within which change travelled, or was disseminated, in historical times. It is suggested, therefore, that earlier forms of this social network functioned in a similar way in the more distant past – at least for the last 6-7 thousand years when sea-levels had stabilised after the height of the last glaciation ca. 20,000 years ago.

CHAPTER 9

CONCLUSION

This research supports and adds detail to current understanding, through the research of (e.g. Sefton 1980; Organ 1990, 1993 and Bennett 2003) of the social network across Dharawal country, and connections with neighbouring peoples. This network, as present in the landscape, is intangible. Evidence of its presence is tangible. As a cultural pattern organising social relationships, access to social support, connections to and between places across country and linking collective identity, it may have been particularly resistant to changing. Its resilience, despite comprehensive social disruption and degree of continuity, despite the breaking of intergenerational links for its passing on, supports this interpretation.

As results representing different times as well as different sources of evidence, separating changes to social network patterns from differences in the distortions and limitations of the historical and (to date) archaeological records, presented a challenge. European descriptions of Aboriginal activity are, as discussed in Chapter 2, incomplete and known to be selective in what they record. A framework considering likely distortion factors (Table 2.1) was a valuable aid. The impact of European perception, expanding along with settlement, in particular, has been identified in these results. Descriptions of Aboriginal activity need to be considered in the context of European activity, not just their presence. Provenancing of material, such as ground-edged hatchets, is also an incomplete representation of the social network it moved within, for not all social connections can be expected to have involved movement of this material. In this instance at least, comparative analysis has highlighted the value of combining these forms of evidence.

For the study area examined here, many potential sources are yet to be sampled or sampled comprehensively. More ground-edged hatchets are available for analysis

(some in Australian Museum collection, some from archaeological research within the area), some in local museums. The Shoalhaven River is identified as particularly important. Likely locations for cobble collection can be inferred by the geomorphology of the Shoalhaven system, though not ranges and types of material. Earlier phases of this river system, when sea level was lower, may have transported cobbles to what is now the coastline however, and these may be available where the river system is active (i.e. migrating). The Upper Shoalhaven has multiple riffle systems, located downstream from Tallowa Dam (see Chapter 3). The last of these river cobble deposits occurs at Burrier – the point at which fresh water feeds into the tidal system of the lower reach of the river on the coastal plain. Burrier was also the place where Charles Throsby (1818 in Organ 1990:95-6, pg 52) forded the Shoalhaven, after finding no way across the deep cliff embankments upstream. As a practical and accessible location for sampling cobble materials transported to the lower Shoalhaven River, it may have been equally practical and accessible in the past.

The 33 accounts of people movement and gathering included in this study can be considered a good proportion of, but certainly not all, historical evidence of this type for the Dharawal study area. Coolangatta Estate, near the mouth of the Shoalhaven River, was a blanket issue location between 1833-1844, generating lists of Aboriginal people who gathered to receive them (Feary and Moorcroft 2011:35-6). As future research, information from blanket returns would be valuable to add, as would expanding to include historical evidence from adjacent regions. Though some places are thought to have changed too quickly and dramatically for their pattern to be there, and other regions may be lack historical evidence, what is available may connect to something else. The assumption that they won't be, in some form, should be tested.

Academic separation of prehistoric and historical archaeology reflects its work with different types of evidence, methods and models. Connecting different readings of what is, for Aboriginal people, one story, has needed a connective framework. The study of exchange and social networks via archaeological and historical evidence is, and has been for Australian archaeological research for some time, an important

thematic bridge. Methodological developments, such as pXRF, are opening up new opportunities to help reconnect and rebuild across the colonisation gap.

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APPENDIX I			
Historical Accounts Analysis – Extracts and References			
Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
1	1795	Collins, D. 1795. An account of the Colony of New South Wales. London. p 342 [In] Organ 1990:7	Report on the arrival in Sydney of Gome-boak, a warrior Aborigine from far south of Botany Bay. (Organ 1990:7) <i>"...About the latter end of the month the natives adjusted some affairs of honour in a convenient spot near the brick-fields [Sydney]. The people who live about the south shore of Botany Bay brought with them a stranger...he had been several days on his journey from the place where he lived, which was far to the southward.."</i> (Collins 1795 [In] Organ 1990:7)
2	1796	Flinders manuscript journal. 26 March 1796. National Maritime Museum, Greenwich. Reproduced in W.G. Mc Donald, Earliest Illawarra, Wollongong 1976) [In] Organ 1990:7	Journal extract recording journey to the Illawarra by Bass, Flinders and the boy Martin aboard the Tom Thumb - which was swamped near Towradgi Beach, north of Wollongong, the whole party being washed ashore (Organ 1990:7) <i>"...It was with no small degree of pleasure we saw the dawning which precedes the appearance of that luminary [Sunrise], whose warmth we were in so much need of; and not much less on hearing a voice call to us in the Port Jackson dialect, offering us fresh water and fish. As there were only two natives we rowed towards them...Our friends informed us that they were not natives of this place but of Broken and Botany Bays; and from them having been at Port Jackson it was that we understood some words of their language..."</i> (Flinders 1796 [In] Organ 1990:7)
3	1802	Ensign Barrallier. 1897. Journal of a Tour to the Cowpastures and Menangle. HRNSW, Sydney. 1897, volume V, Appendix A, pp. 749-825. [In] Organ 1990:26	Ensign Barrallier travelled to the Cowpastures and Menangle in 1802. He was accompanied in this journey by a number of local Aborigines, including the 'well known' Gogy. The party travelled south west from Parramatta to the Wondilly River, via Menangle, the Cowpastures, and Nattai. (Barrallier 1897 [In] Organ (1990:26)
4	1804	Sydney Gazette. 18 March 1804. Jervis Bay natives at Sydney. [In] Organ 1990:26	Report on the visit to Woolloomooloo, Sydney, of Aborigines from south of Jervis Bay. <i>"...On Thursday a number of Natives assembled in the neighbourhood of Woolloomooloo for the purpose of deciding animosities, four of whom were from the southward of Jerviese's Bay..."</i> (Sydney Gazette 18 March 1804 [In] Organ 1990:26)
5	1808	14 April 1808: Letter from George Caley to Sir Joseph Banks (Banks Papers, Mitchell Library) [In] Organ 1990:32	Letter from George Caley to Sir Joseph Banks, commenting on the habit of the Illawarra and South Coast Aborigines of visiting the mountain and highland tribes. <i>"...Sea coast natives were said to visit the country near the hill..."</i> (The Jib at Bowral) Letter from George Caley to Sir Joseph Banks (Banks Papers, Mitchell Library) [In] Organ 1990:32)

APPENDIX I Historical Accounts Analysis – Extracts and References			
Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
6	1815	Charles Throsby Smith – reminiscences. 1863. Illawarra Historical Society Bulletin (June-July 1990) [In] Organ 1990:48.	Nephew of Dr Charles Throsby, who in 1815 moved cattle into the Illawarra - setting up a stockyard and stockman's hut at Wollongong - the first (official) white settlement in the Illawarra. (Organ 1990:48) "... <i>In the year 1815 the County of Cumberland was suffering from the effects of drought...and the cattle were dying daily for want of food and water. My late uncle, Dr Throsby, was then residing at a place called Glenfield, a few miles south of Liverpool, and, as he was of an enterprising disposition and fond of rambling, he, in one of his rambles about Liverpool, met with some of the Aborigines who told him there was plenty of grass and water at the Five Islands. From their representations of the area he at once made up his mind to proceed thither...accompanied by a couple of men, two native blacks...he started on his journey...</i> " Throsby Smith 1863 [In] Organ 1990:48)
7	1818	Charles Throsby. 1818. Journal of a Tour of Discovery to Jervis Bay, 3 March to 13 April 1818. (AONSW, Reel 6034, Col. Sec. 9/2743, pp. 1-77) [In] Organ 1990:94-100.	On 3 March 1818 a party led by Charles Throsby and surveyor James Meehan set out from Liverpool to Jervis Bay, via Moss Vale and Marulan. The party, which included two Aboriginal people, Bundell and Broughton, was also joined by Aboriginal people along the way. (Organ 1990:94). "...28 March. At 8 o'clock passed through a very good forest [Sutton Forest], to the place appointed...at which spot we were met by Timelong and Munnaa, who had been in search of us. They are two natives whom I have seen at Five Islands... 29 March 1/2 past two down the hill on a beautiful piece of meadow, by the side of a considerable stream of water running to the right (this stream runs from the Kangaroo Ground where Captain Brooks has cattle about three miles distant...An old native with a wife and eight children came to us at this place, tells me this river rises out of a piece of forest grounds close at the back of the Five Islands Mountain which ground I sent Joseph Wild [member of party in attendance] to examine about 12 months since. He informs me that he met the old Man and Family there and that the land from whence this river takes its sources is a very large piece of excellent forest..." (Throsby 1818 [In] Organ 1990:95-6).
8	1818	Governor Macquarie's Banquet.Sydney Gazette 2 January 1819 [In] Organ 1990:106	Governor Macquarie hosts a banquet at Parramatta, on 28 December 1818, for the Aborigines of the colony, including those from Illawarra, the South Coast, and beyond the Blue Mountains, an event held by Macquarie for a number of years (Organ 1990:106) "...There were other tribes from the North and South, who had travelled a distance of upward 100 miles..." (Sydney Gazette, 2 January 1819 [In] Organ 1990:106)
9	1820s	E. Dollahan Papers [In] Organ 1990:491-2	Referring to Illawarra and Appin Aborigines from the 1820s (Organ 1990:491) "... <i>The mountain tribes made an annual trip to visit the Coastal tribe, travelling from Camden over the Bulli Mountain for their annual "corrobee'...</i> " (E. Dollahan Papers [In] Organ 1990:492)

Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
10	1821	William Walker, Parramatta. 26 November 1821: {Mitchell Library, Bonwick Transcript, Box 52, pp1040-2 [In] Organ 1993:43	Letter from William Walker, Parramatta, to the Reverend R. Watson, regarding attendance at a Corrobbarara and mentioning the distinctive body painting of the Five Islands Aborigines (Organ 1993:43) <i>"...Being desirous of communicating all the information I can possibly acquire, of the state of the Aborigines of New South Wales, I went on Saturday evening, Nov 24th 1821, to one of those festivities known as Corrobbarara...Many of the surrounding tribes were encamped in the woods. The Five Islands blacks, when darkness had shrouded nature in her mantle, began to undress; and immediately to paint themselves with a kind of white earth that resembles our pipe clay..."</i> (Walker 1821[in] Organ 1993:43)
11	1821	Hume 1821 (Sydney Gazette. 11 January 1822 [In] Organ 1990:113)	Report on Hamilton Hume's overland journey from Appin to Jervis Bay, wherein he was accompanied by the Aborigines Udda-duck and Cowpasture Jack (Sydney Gazette. 11 January 1822 [In] Organ 1990:113)
12	1822	Lachlan Macquarie, Journal of tours, Public Library of New South Wales, Sydney, 1956. [In] Organ 1990:114	Governor Macquarie and party met with a group of approx 100 Illawarra and South Coast Aborigines at Allans Farm, near Red Point in 1822 (Organ 1990:114) <i>"... We crossed the entrance of Tom Thumbs Lagoon...and soon afterwards arrived at Mr Allen's lands, meeting there with about 100 natives, who had assembled at this place to meet and welcome me to Illawarra. They were of various tribes, and some of them had come all the way from Jervis Bay, and they appeared to be very intimate with Mr O'Brien...Having remained with them for about ten minutes, we resumed our journey to Mr Allen's establishment..."</i> (Macquarie 1956 [In] Organ 1990:114)
13	1822	Alexander Berry 21 June - 23 July 1822. Diary of an Expedition to Shoalhaven River. ML MSS 315/53. Item 19. [In] Organ 1993:45-7)	This diary includes details of Berry's first efforts in establishing a settlement at Coolangatta, by the Shoalhaven River. It contains specific reference to "an old [Aboriginal] man who claimed the ground, named Wagin, Yager, Chief of the Jervis Bay people, and the Aborigine Charcoal Will (of Bulli?) who accompanied the party to the Shoalhaven. (Organ 1993:45) <i>"...Sunday July 1st... After breakfast ascended the Sugar loaf [Mount Coolangatta]...Returned to the vessel in the evening where on the shore found Steward (Throsby's constable) and a black attendant had left Mittagong on Tuesday and brought me a letter from Throsby. Slept at our hut...Sunday 8[th] ..Took a long walk with Souter over the clear ground on the south bank and a dry slope river. The rest very swampy with high and dry patches. In the evening a party of natives from Jarvis bay headed by Yager arrived..."</i> (Berry 1822 [In] Organ 1993:46-7)
14	1823	Barron Field.1823 [1925] Field Journal of an Excursion to the Five Islands and Shoalhaven. Geographical Memoirs on New South Wales. John Murray, London, 1925:pp133-4 [In] Wesson 2005:27	Barron Field noted in 1823 that a group of the 'Five Islands Tribe' were at Botany Bay to participate in <i>"...a ceremony in which a number of Aboriginal men and women were publicly admonished and punished for the breaking of certain tribal laws..."</i> (Field 1823 [In] Wesson 2005:27)

Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
15	1825	Information regarding the Aborigines of NSW - The Five Islands Tribes' collected by a London Missionary Society delegation in Sydney (Tyerman and Bennett 1840; Threlkeld 1974, Vol 2, pp 340-1 [In] Organ 1990:137	[Information regarding the Aborigines of NSW - The Five Islands Tribes' collected by a London Missionary Society delegation in Sydney in 1825] "...One of the deputy-surveyors here [Sydney] informs us that the natives are, comparatively, numerous in the vicinity of the Five Islands, and, being less debauched by intercourse with the worst class of white men than in some other parts of the colony, they have preserved more of their primitive character and manners. They come from the interior, to the above mentioned quarter of the coast, to obtain fish, oysters, water-fowl, grubs, &c...They have a notion of the rights of real property, the lands which particular families occupy being marked out and bequeathed from the father to his children..." ((Tyerman and Bennett 1840; Threlkeld 1974, Vol 2, pp 340-1 [In] Organ 1990:137-8; Wesson 2005:27)
16	1827	J. Fitzgerald J.P. 12 April 1827: AONSW Col Sec Correspondence, 4/2045, Letter 27/3735 [In] Organ 1993:68-9	Letter from the magistrate at Illawarra re the issue of blankets (Organ 1993:68-9) "...In reply to your Circular of the 31st ultimo...I have the Honor to inform you for His Excellency's information that it is impossible I can comply with those wishes in consequence of all the Natives being at present in Sydney & Parramatta, who are waiting there, I understand, in expectation of getting Slops &c., but the moment they return, I will send in the full particulars required by His Excellency..." (Fitzgerald 1827 [In] Organ 1993:68-9)
17	1830	Martin Lynch (letter) written 1898 [In] Organ 1990:159	[In regard to the Battle of Fairy Meadow] "...The Bong Bong blacks came down the mountain range from their own country, making the descent opposite Dapto, to wage war with the Illawarra tribe, at whose hands they sustained defeat in the pitched battle as stated - the survivors returning again by the same route over the mountain to Bong Bong..." (Martin Lynch (letter) written 1898 [In] Organ 1990:159)
18	1830	recorded by Jules Dumont d'Urville, the French explorer in 1830. (refer Rosenman 1988:85-90. [In] Organ 1990:133-5)	Account by Jules Dumont d'Urville, the French explorer in 1830 recording gathering of tribes from north, south and west of Sydney in the bush between Sydney and Botany Bay for ceremony. (Organ 1990:133-4) "...I had gone to visit Bungari's camp on the peninsula of the north side of Sydney Harbour. Several other tribes were meeting with him and he informed me that the next day a great gathering would take place near Sydney to punish several natives accused of crimes...The two boats carrying Bungari's tribe and his allies passed close to the corvette...on the way out of town, we saw him at the head of all the warriors of his tribe...We followed them at a distance, and in this way arrived on high ground about two miles from the sea, from where the view takes in both the vast harbours of Port Jackson and Botany Bay...At a general signal, all the tribes got up and went to the arena in groups of from fifteen to twenty men, all armed with spears, shields, clubs and boomerangs. Already there were people from Parramatta, Kissing Point, Sydney, Liverpool, Windsor, Emu Plains, Broken Bay, Five Islands, Botany Bay and even from Hunter River etc. etc. All were distinguished by the designs of their body paintings, black, red or white; but there were only five or six complete tribes, and the others had merely sent representatives who had gathered under allied chiefs. Amongst these various crowds, the men from Cowpastures were the most remarkable..." [This account also mentions an alliance between the Windsor and (see next)

Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
		Recorded by Jules Dumont d'Urville, the French explorer in 1830. (refer Rosenman 1988:85-90. [In] Organ 1990:133-5)	<i>(see previous) ...Liverpool tribes in relation to accusations against a third party regarding the death of a Windsor man] "...Bungari, Bidgi-Bidgi and Cogai assured us...that that evening there would be a marri-corroboree, that is a general dance of all the assembled tribes...but this day and the ones following we had foul weather and these savages...not keen to dance in bad weather...disbanded and made their way back to their homes..." (Pg 137). (d'Urville 1830. Refer Rosenman 1988:85-90. [In] Organ 1990:133-7)</i>
19	1834	Baron Charles von Hugel (1795-1867), Journal of a Visit to New Holland, 1833-34, Mitchell Library, Sydney. [In] Organ 1993:82-4	Extract from the Journal of Baron Charles von Hugel, who refers to local Aborigines he met with in the Illawarra at the end of July 1834. The following extract is taken from the transcript by Dymphna Clark (Organ 1993:82) <i>"...Tuesday the 29th of July...We stopped about 8 miles from Mullet Creek, where a series of waterholes ('a chain of ponds') presumably indicates the former bed of the rivulet, which now flows at a distance of a few hundred paces. We were to camp here....Wednesday the 30th of July...One mile from our campsite we came to a large open area, really a plain, apparently swampy, on which a station belonging to the wealthy Sam Terry is situated. We went past this and then travelled for several miles through an arid, stony forest, only slightly elevated above the plain. On the other side once again a swampy plain and several small establishments. Here we saw a blackfellow of the Bong Bong tribe with a white feather in his hair, a sign that he was acting as a messenger to the Illawarra tribe. These messengers are received in a singular fashion: the band to which the messenger has come sits on the ground and he sits down in front of them and then follows a long silence, during which they look at each other. Then there is an exchange, one word at a time, until the reason for the mission, usually war or peace, comes up for discussion. We arranged for the man to come into our camp in order to show us the way to Bong Bong the next day, which he promised to do. Shortly afterwards we found some natives of the Shoalhaven tribe who were living with a planter and working for a few days..." (von Hugel 1834 [In] Organ 1993:82-4)</i>
20	1830s (c.)	Old Kiama Boy. Undated newscutting from the Kiama Independent of about 1900. Reminiscence of Aborigines at Kiama during the 1830s. [In] Organ 1993:74.	<i>"...I well remember the Norfolk Pine in front of the school as a very small plant with its secure fence enclosing it. The old figtree, where the first religious service was held, was a wonderful old tree, and still is. I think that some of the limbs have been lopped. That was the visiting place of the aboriginals when they shifted camp from the Minnamurra River to the stream that flows on to Kendall's Beach...The blacks camped in the bush on the southern side of the steam. I should say there would be about 30 in the camp. Probably they shifted for hygienic reasons, but they frequently moved from one place to the other and then back again. The figtree was where they rested and regaled themselves in the midday...Blankets were issued to each and all every 24th May (Queen Victoria's Birthday), just before winter. There would be a great roll-up of the tribe on that day at the Court House to get the blankets. Mrs. Robertson states that the natives sold brooms and boomerangs. I never saw the latter offered for sale, but well remember the cabbage tree brooms..." (Undated newspaper cutting [In] Organ 1993:74)</i>

Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
21	1836	Reverend James Backhouse (1836) Manuscript Journal. 4 October 1836 .Mitchell Library [In] Organ 1990:204-6	Reverend Backhouse (Quaker minister) and companion William Walker visited Illawarra, Shoalhaven and Bong Bong. They encountered a group of local Aborigines at Kangaroo Valley (Organ 1990:204). "... <i>Eight other Blacks also joined our party and kept with us. One of the tribes here had in it forty men: the three tribes were from Shoal Haven, Bong Bong and belonging [to] the Kangaroo Ground: they are all about to visit the Cow Pastures to learn a new song [a corroboree?] and object for which they sometimes travel far..</i> " (Backhouse 1836 [In] Organ 1990:206)
22	1836	Reverend James Backhouse (1836a) Manuscript Journal. Mitchell Library [In] Organ 1990:208	Reverend Backhouse (Quaker minister) and companion William Walker's visit to Illawarra, Shoalhaven and Bong Bong. "... <i>27 September 1836...When at Dapto, we engaged a native Black, named Tommy, of the Kangaroo Ground, to be our guide to Bong Bong...</i> " ([In] Organ 1990:208)
23	1838	Tuesday, 11 September 1838 {Sydney Gazette} Report on the death of Old Bundle of Wollongong. [In] Organ 1993:84	"... <i>An aboriginal named "Old Bundle", well known about Sydney for several years past, was killed last week under the following circumstances. In the early part of the week two tribes assembled at Elizabeth Bay, the tribe of Shoalhaven and that of Wollongong. On Monday evening while the greater part of them were in a state of intoxication a quarrel ensued, in the course of which, Old Bundle who belonged to the Wollongong tribe was struck on the head with a nulla nulla by one of the other party...</i> " ([In] Organ 1993:84)
24	1839	29 April 1839. Margaret Menzies. Menzies Diary - NLA, MS3261 [In] Organ 1990:243	"... <i>Some of the natives are useful for sending from place to place & deliver their message distinctly. One brought me a lb of lard from Mick Mara's wife at Jamberoo the other day - a good looking fellow. He had a brass medal round his neck which told me he was William Roberts king of Jamberoo...He told me he was going to Shoal haven & would call for the basin on his return...</i> " (Menzies 1839 [In] Organ 1990:243)
25	1839	14 May 1839. Lady Jane Franklin. [In] Organ 1988 [Ed] The Illawarra Diary of Lady Jane Franklin, 10-17 May 1839. Illawarra Historical Publications. Woonoona. (Also in Organ 1990:244)	Lady Jane Franklin, wife of the then governor of Tasmania, Sir John Franklin, visited Illawarra, recording in her diary whilst travelling from Wollongong to Kiama: "... <i>crossed the forced & natural channel of Mullet Creek...Near here saw some natives from Bong Bong & a Lascar of China who sd. he kept to them because they were of his own colour...</i> " (Franklin 1839 [In] Organ 1990:244)
26	1840	January 4 1840 Reverend W.B. Clarke. Diary. Mitchell Library MSS139 [In] Organ 1990:252	Reverend Clarke (Anglican minister and geologist visited Illawarra early in January 1840, travelling to Wollongong, Kiama and Shoalhaven to study the local geology. He records in his diary while at Towradgi: "... <i>it appears this corroboree [at Towradgi] was called by the Sydney Blacks, and the ball given by them to the blacks of Kiama, Wollongong, Liverpool, Brisbane Water and Newcastle, from which places some came to this meeting...</i> " (Clarke 1840 [In] Organ 1990:252)

Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
27	1842	Illawarra Mercury, 'Old Pioneer' quoted in Illawarra Historical Society Bulletin, October 1970. pp. 5-6 [In] Wesson [Ed.] 2005:18)	The [1842] battle between the Hooka warriors and the 'Broughton Creek tribe' is said to have taken place at what is now known as Albion Park and that the Hooka were victorious (Wesson [Ed.] 2005:18). <i>"Early in the morning the tribes gave battle. All day long they fought and at night they retired south leaving the place in charge of the victorious Hooka tribe..."</i> ('Old Pioneer', Illawarra Mercury, quoted in Illawarra Historical Society Bulletin, October 1970. pp. 5-6 [In] Wesson [Ed.] 2005:18)
28	1843	Taylor, J. 1869. <i>Aboriginals of the Colony</i> . The Kiama Independent. Thursday 29 April 1869, Page 4.	<i>"...In 1843, at Jamberoo, a young blackman informed me that he had been sentenced to have fifty spears thrown at him by the Shoalhaven tribe: that the tribes would meet on the long beach for that purpose during the fishing season in the Crooked River..."</i> [Crookhaven?] <i>"...I came to Jamberoo in February 1842; and in May following the blacks held a corroboree in what was then known as Wood's Forest, prior to engaging the Shoalhaven tribe in battle on the long beach..."</i> (Taylor 1869-29 April:4)
29	1847	Alexander Harris. 1847. <i>Settlers and Convicts</i> . London [In] Organ 1990:218	Alexander Harris, lost in the vicinity of St Georges Basin, near Jervis Bay, finds an Aboriginal camp <i>"They were about a hundred of them; several of them I knew well from their coming to my hut some years before [c. 1827-8], when in the Long Brush, behind Kiama..."</i> ([In] Organ 1990:218)
30	1863	Louisa Atkinson: <i>A Voice from the Country: Recollections of the Aborigines</i> , Sydney Mail, 19 September 1863. [In] Organ 1993:117-123	Refers to the Aborigines of the Sutton Forest district from the 1820s and 1830s. (Organ 1993:116) <i>"... As the tribe travelled together, or in parties of several families, a number of these gunyahs might sometimes be seen near each other; yet each was so arranged that its open side was turned from its neighbours. On one occasion, when the remnants of three different friendly tribes had assembled for a grand corroboree or dance, I made a plan of the encampment; each tribe was slightly apart from the other, divided by a sort of street. Thus, the inviters were clustered in the centre, having, I think, seventeen camps; the Picton tribe on the right hand, five camps; and the Shoalhaven on the left, comprising ten or eleven gunyahs; consecutively forming a village..."</i> ([In] Organ 1993:117) <i>"...I witnessed two dances on the Shoalhaven. A Bathurst black had been some months located in the tribe - the dancing master, in fact, teaching them new dances; the result was what I saw...For a considerable time before these corrobories take place the natives assemble and practice, messengers are sent to all the detachments of the tribe, and sometimes neighbouring tribes; a general encampment takes place, and the dance is repeated for some nights in succession..."</i> (Atkinson 1836 [In] Organ 1993:123).

Extract number	Date Re:	Primary source author and reference	Document description and quote/summary
31	1888	R.H. Mathews: The Bunan Ceremony of New South Wales, American Anthropologist, IX, October 1896, 327-344 & plate VI. [In] Organ 1993: 157-8	Account of a South Coast Aboriginal initiation ceremony based on one held in the vicinity of Mount Coolangatta, by the Shoalhaven River, in 1888. (Organ 1993:157) "...Among all the aboriginal tribes of Australia, when the boys approach the age of puberty a ceremony to initiate them into the privileges and responsibilities of manhood takes place. In this paper I propose to describe the initiation ceremonies of the native tribes occupying the southeast coast of New South Wales from about the Victorian boundary northerly to Bulli, a distance of about 300 miles, and extending inland from 80 to 100 miles. Among the tribes inhabiting this district and parts of the counties of Wallace, Cowley, and Murray the ceremony is called the bunan.. ...The tribes occupying the territory to the westward gradually merge into the Wiradthuri community, and the latter extends westerly down Murray and Murrumbidgee rivers to somewhere near their junction. The initiationceremonies of the Wiradthuri tribes referred to are known as the burbung....The Wiradthuri and coast tribes attended one another's meetings for the initiationceremonies, as old men of Shoalhaven river have told me that they attended the burbung on Tumut river, and some of the Wiradthuri people about Yass have stated that they were present at the bunan at Queanbeyan or Braidwood..." (Matthews 1896 in Organ 1993:157). "...The last bunan which was held by the Shoalhaven river tribes took place about eight or ten years ago, at a place two miles and a half N. 13 degrees W. from Cooalongatta trigonometrical station, in the parish of Cooalongatta, county of Camden, New South Wales..." (Matthews 1896 [In] Organ 1993: 158)
32	1904	Howitt, A. W. 1904 (1996). The Native Tribes of South-East Australia. Aboriginal Studies Press. Canberra.	"... Assuming that the Bunan was to be attended by the clans from Moruya, Bega, and Twofold Bay, that is by both the Kurial and Guyangal, and that the meeting was to be near Bega, the following would be the procedure as the contingents arrived. The people from Braidwood, Ulladulla, and Shoalhaven would accompany those from Moruya. With them, people from Broulee would occasionally come. Next would arrive those from Queanbeyan, then Gurungatta from beyond Shoalhave, with whom there might even come some from Jervis Bay; and all these people are true Kurial. The Wollongong people did not attend this ceremony because they go to one farther up the coast. The people from Twofold Bay would arrive about the same time, and bring with them some of the Bemeringal from the country along the coast range, being some of those living to the east of the Ngarigo. The limits within which people would come may be roughly stated at Jimberoo, Kangaroo Valley, Nowra; but at this latter place were Bemeringal, that is, those who lived upon the high tableland, who went to the ceremonies at Goulburn. Nor did the Bemeringal come to these ceremonies from as great a distance as the country of the Ngarigo..." (Howitt 1904:519-20) "...the people assembling for the Kuringal.[at Bega]... I went to the South Coast and there found about one hundred and thirty blacks, - men, women, and children, - waiting for me. They represented mainly the two great divisions of the Murring of the south coast, but there were also people from as far as Batemans Bay and Braidwood, who accompanied the Shoalhaven contingent. Besides these, there were also a few of the Biduelli..." (Howitt 1904:527) "... The Yuin ceremonies of initiation were attended by people from a district included by Shoalhaven River, Braidwood, the southern part of Manero, and Twofold Bay..." (Howitt 1904:718)

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID & AM RegNo	Location	Preform	Completeness	Length mm	Length mm (inc.)	Width mm	Width mm (inc.)	Thick mm	Thick mm (inc.)	Weight g	Weight g (inc.)
ID0020 E053516A Bellambi	Bellambi	c	Complete	125.5		88.6		33.6		681.58	
ID0026 E058835A Bellambi	Bellambi	c	Complete	111.7		70.9		42.6		450.91	
ID0027 E058835B Bellambi	Bellambi	c	Complete	103.2		67.8		34.7		371.12	
ID0039 E033453 Bellambi	Bellambi	c	Complete	163.4		80.5		42.9		938.99	
ID0040 E033454 Bellambi	Bellambi	u	Complete	97.5		77.5		36.5		473.88	
ID0041 E033455 Bellambi	Bellambi	u	Complete	103.6		76.2		33.6		509.06	
ID0042 E033457 Bellambi	Bellambi	u	Complete	146.7		83.5		29.6		679	
ID0046 E054887 Bellambi	Bellambi	c	Complete	114.2		81.9		33.4		498.68	
ID0051 E053519 Bellambi	Bellambi Point	u	Complete	103.5		71.5		35.7		410.28	
ID0057 E058835a Bellambi	Bellambi	u	Complete	103.5		62.6		38		410.89	
ID0058 E058837a Bellambi	Bellambi	u	Complete	137.9		82.4		37.3			471.88
ID0059 E058840 Bellambi	Bellambi	u	Complete	103.8		60.1		33.9		373.91	
ID0144 E012697 Bellambi	Bellambi	u	Complete	90.3		58.6		27.6		227.18	
ID0145 E033452 Bellambi	Bellambi	c	Complete	115.9		78.9		25.3		429.78	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID0146 E046013 Bellambi	Bellambi	c	Incomplete - butt missing		95.4	79.4		26.3			352.04
ID0147 E058835d Bellambi	Bellambi	u	Complete	115.3		86.2		29.6		470.32	
ID0148 E58836a Bellambi	Bellambi	u	Complete	71.7		72.3		28.1			244.63
ID0149 E012851 Bellambi	Bellambi	c	Complete	148.9		96.8		37.6		960.3	
ID0150 E033451 Bellambi	Bellambi	c	Complete	105.9		74.9		35.8		410.35	
ID0151 E058838a Bellambi	Bellambi	u	Complete	106.6		85.2		35		573.25	
ID0152 E058835e Bellambi	Bellambi	u	Complete	127.4		89.8		38		646.65	
ID0153 E053516B Bellambi	Bellambi	u	Complete	112.9		85.6		28		467.03	
ID0154 E053516C Bellambi	Bellambi	c	Complete	81.2		60.8		25.2		195.78	
ID0155 E058837b Bellambi	Bellambi	c	Incomplete		91.6	97.2		30.8		747.46	
ID1006 E034265 Old Cemetery South Beach SH	Shellharbour	c	Complete	119.8		76		30.5		462.08	
ID1007 E030935 Lake Illawarra	Lake Illawarra, South Entrance	u	Complete	110.35		63.21		36.04		457.11	
ID1008 E030937 Lake Illawarra	Lake Illawarra, South Entrance	c	Complete	104.31		69.03		30.35		461.54	
ID1009 E030938 Lake Illawarra	Lake Illawarra, South Entrance	c	Complete	109.41		87.45		27.99		503.09	
ID1010 E034270 Barrack Head SH	Barrack Head, Shellharbour	c	Incomplete	127.4			87.7	33.7			567.84

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1011 E030949 Lake Illawarra Nth Entrance	Lake Illawarra, North entrance	c	Complete	107.24		85.86		30.43		439.43	
ID1012 E030956 Burying Ground Beach SH	Burying Ground Beach, Shellharbour	u	Complete	113.7		87		10.8		441.02	
ID1013 E030957 Burying Ground Beach SH	Burying Ground Beach, Shellharbour	c	Complete	100.2		62.4		27.3		312.84	
ID1014 E030958 Burying Ground Beach SH	Burying Ground Beach, Shellharbour (south end)	u	Incomplete		95	48.9		20.9			149.95
ID1015 E030960 Burying Ground Beach SH	Burying Ground Beach, Shellharbour - sand dunes	u	Incomplete		113.9	94.3		28			438.53
ID1016 E030961 Burying Ground Beach SH	Burying Ground Beach, Shellharbour - sand dunes	u	Incomplete		90.5			93.8	22.2		382.1
ID1017 E030962 Sand Dunes Burying Ground Beach SH	Burying Ground Beach, Shellharbour - sand dunes	u	Complete	173.2		95.5		40.6		1059.5	
ID1020 E033456 Bellambi	Bellambi	c	Complete?	106.7		83.7		40.2		523.65	
ID1021 E034262 Old Cemetery South Beach SH	Old Cemetery, South Beach	c	Complete	133.6		86.4		37.7		703.9	
ID1022 E034263 Old Cemetery South Beach SH	Old Cemetery, South Beach	c	Complete	152.5		84.3		41.2		931.86	
ID1023 E034264 Old Cemetery South Beach SH	Old Cemetery, South Beach	u	Complete	145.6		92.4		40.3		898.8	
ID1024 E034266 Barrack Head	Barrack Head, Shellharbour	c	Complete	126.3		60.3		26.7		500.27	
ID1025 E034267 Shellharbour	Shellharbour	c	Complete	160.4		83.3		39.1		1277.21	
ID1026 E034268 Barrack Head SH	Barrack Head, Shellharbour	c	Incomplete		154.1	100.2		30.3			789.23
ID1027 E034269 Barrack Head SH	Barrack Head, Shellharbour	c	Complete	115.6		57		28.3		597.53	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1028 E034271 Barrack Head	Barrack Head, Shellharbour	c	Incomplete	125.6		46.7		34.9			480.54
ID1033 E035977 Stanwell Park	Stanwell Park	u	Incomplete		73.1	49.3		9			55.48
ID1036 E032644 Corrimal	Corrimal	c	Complete	106.1		62.5		28.5		329.07	
ID1037 E042863 Bellambi	Bellambi	u	Complete	191.7		110.5		44.7		1622.32	
ID1038 E044337 Mt Keira	Mt Keira	u	Complete	139.4		98.8		33.3		758.06	
ID1039 E049481ID1039 E049481 Shellharbour	Shellharbour	u	Complete	109.6		56.6		28.9		227.47	
ID1040 E049489 North Beach SH	North Beach, Shell Harbour	c	Incomplete	138.3		106.9			20.6		618.23
ID1048 E050157a Shellharbour	Shellharbour	c	Incomplete		151.1	106.9		44.5			1143.62
ID1049 E050157b Shellharbour	Shellharbour	c	Incomplete		155.4		91.5		42.1		909.8
ID1055 E052359a	Lake Illawarra South	c	Incomplete		81.01		61.09		17.49		149.15
ID1056 E052578a Lake Illawarra	Lake Illawarra South	c	Complete	121.32		78.17		31.64		671.99	
ID1057 E052578b Lake Illawarra	Lake Illawarra South	c	Complete	142.44		84.9		27.73		617.16	
ID1058 E052578c Lake Illawarra	Lake Illawarra South	c	Complete	134.46		86.42		32.58		552.12	
ID1059red dot E052578 Lake Illawarra	Lake Illawarra South	c	Complete	120.66		88.92		36.8		548.08	
ID1065 E053516d Bellambi	Bellambi	c	Complete	156.8		74.9		26.6		493.46	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1066 E053517 Bellambi	Bellambi Point	c	Complete	102.4		57.8		25		221.94	
ID1067 E053665 Towradgi	Towradgi	c	Complete	116.3		78.4		20.6		446.07	
ID1068 E054210 Bellambi	Bellambi	c	Complete	194.1		141.1		42.4		1869.98	
ID1069 E054211 Bellambi	Bellambi	c	Complete	144.1		80.5		39.1		804.12	
ID1080 E055435 Thirroul	Thirroul	u	Complete	164.1		105.5		29.2		835.49	
ID1081 E055846	Lake Illawarra	c	Complete	111.6		86.24		36.18		512.12	
ID1085 E055943	Lake Illawarra	c	Complete	115.99		83.62		21.94		356.88	
ID1106 E055973 Bulli	Bulli	c	Incomplete		140.4	81		39.2			710.9
ID1109 E057361a Lake Illawarra	Lake Illawarra	c	Complete	135.21		90.24		40.12		736.46	
ID1110 E057361b	Lake Illawarra	u	Incomplete		130.14		95.55		32.99		798.59
ID1111 E057361c	Lake Illawarra	u	Incomplete		97.45		84.27		22.86		312.09
ID1112 E057362a Illawarra Heads	Illawarra Heads	u	Complete	110.29		80.34		30.15		430.16	
ID1113 E057362b	Lake Illawarra	u	Complete	127.84		83.32		41.82		643.12	
ID1115 E057391 Bellambi	Bellambi	c	Complete	112.9		48.2		27.8		202.85	
ID1119 E058836b Bellambi	Bellambi	c	Incomplete		83.9	66.7		30		298.73	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1120 E059823 Shellharbour	Shellharbour	c	Complete	134.4		57.8		32.4		701.51	
ID1132 E070688 Kiama	Kiama	c	Complete	119		66.5		39		470.7	
ID1133 E077084 Tom Thumb Lagoon	Tom Thumb Lagoon	c	Complete	120.6		63.3		30.2		419.72	
ID1134 E082933 Lake Illawarra	Lake Illawarra	c	Complete	83.38		60.66		10.62		141.54	
ID1135 E082934 Lake Illawarra	Lake Illawarra	u	Complete	88.12		56.72		23.81		257.93	
ID1136 E082935 Lake Illawarra	Lake Illawarra	u	Complete	91.66		69.46		31.06		321.02	
ID1137 E082936 Lake Illawarra	Lake Illawarra	u	Complete	127.49		77.23		34.61		687.33	
ID1141 E011337 Bellambi	Bellambi	u	Incomplete		138.6	59.1			45		600.39
ID1142 E033835 Bellambi	Bellambi	c	Complete	78.7		69		17.8		163.88	
ID1143 E049487 Shellharbour	Shellharbour	c	Complete	126.4		88		27.5		775.68	
ID1155 E049908 Bulli	Bulli	u	Complete	82.8		63.5		26.3		245.82	
ID1156 E030936 Lake Illawarra	Lake Illawarra SthEntrance	c	Complete	156.22		91.25		35.98		719.02	
ID1194 E052359b	Lake Illawarra SthEntrance	c	Complete	152.5		89.37		38.47		754.31	
ID1195 E057362c	Lake Illawarra	c	Complete	151.86		99.48		38.1		972.21	
ID501/Curra CU5/D (surf)	Curracurrang 1/CU5	c	Complete	108.73		88.91		29.17			594.57

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID502/CurraCU5/28	Curracurrang 1/CU5	u	Incomplete, butt missing		85.11		49.82		28.31		265.41
ID503/CurraCU5/121	Curracurrang 1/CU5	u	Incomplete, butt missing		108.82		53.53		26.42		317.05
ID504/Curra CU5/82	Curracurrang 1/CU5	c	Complete	100.92		53.59		15.28			193.68
ID505/Curra CU5/CB	Curracurrang 1/CU5	c	Incomplete, butt missing		62.98		52.65		24.21		190.57
ID506/Curra CU5/25 B-L	Curracurrang 1/CU5	c	Incomplete, butt missing		85.77		87.29		33.81		365.28
ID507/Curra CU5/20B	Curracurrang 1/CU5	u	Complete	82.28		61.47		26.35		248.26	
ID508/Curra CU5/5M	Curracurrang 1/CU5	c	Complete	100.88		65.02		24.98			400.05
ID509/Gynea Bay GY/-	Gynea Bay GY/-	c	Complete	142.69		84.8		39.11			856.44
ID1001 E03544d Burrawang	Burrawang	c	Complete	126		57.3		15.9		457.59	
ID1003 E012730 Kangaroo Valley	Kangaroo Valley	c	Complete	216.7		46.6		42.7		685.58	
ID1004 E028545 Exeter District	Exeter district	u	Complete	300.4		107.6		56.5		2069.7	
ID1005 E028546 Exeter District	Exeter district	c	Complete	135.7		81.6		27.1		532.28	
ID1029 E03544i Burrawang	Burrawang	c	Complete	87.9		49.4		28.8		340.24	
ID1030 E03544k Burrawang	Burrawang	c	Complete	136.3		67		28.6		647.91	
ID1031 E03544L Burrawang	Burrawang	u	Complete	112.7		70.7		21.2		408.22	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1032 E035813 Jamberoo	Jamberoo	c	Complete	128.6		62.4		36.9		488.43	
ID1050 E051273 Bowral	Bowral	c	Complete	112.1		84.5		26.9		468.2	
ID1051 E051274 Bowral	Bowral	c	Complete	148.4		107.1		45.8		1259.79	
ID1060 E052689 Robertson	Robertson	c	Complete	103.3		84.8		38.1		482.28	
ID1061 E052690 Robertson	Robertson (52601=hhcore)	u	Complete	162		90		43.7		1075.85	
ID1062 E052691 Robertson	Robertson	c	Complete	93.5		69.4		29		279.62	
ID1063 E052692 Robertson	Robertson	u	Incomplete		79	73.9		37.6		336.59	
ID1064 E052693 Robertson	Robertson	c	Complete	108.6		48.5		31		277.97	
ID1070 E054779 Mittagong	Mittagong	c	Complete	84.4		57.9		23.2		197.27	
ID1071 E054780 Mittagong	Mittagong	u	Complete	58.2		42.4		16.4		62.09	
ID1072 E054781a Mittagong	Mittagong	u	Incomplete		63.5	58.2		33.3			193.94
ID1073 E054782 Mittagong	Mittagong	u	Complete	142.1		66.2		28.4		448	
ID1074 E054783 Mittagong	Mittagong	c	Complete	210.4		56.6		32.6		663.25	
ID1079 E055134 Meryla	Meryla	c	Complete	112.1		88.3		40.4		490.43	
ID1138 E086406 Mt Ginginbullen	Mt Ginginbullen	c	Complete	110.2		88.5		22.6		372.15	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1140 E086408 Mt Ginginbullen	Mt Ginginbullen	c	Complete	103.9		106		25.9		523.54	
ID1144 E03544b Burrawang	Burrawang	c	Incomplete??	128.2		69.8		30.2			568.67
ID1145 E065735 Bargo	Bargo	c	Complete	109.6		69.8		31.9		476.37	
ID1146 E049012 Sutton Forest	Sutton Forest	u	Complete	105.9		54.3		22.6		220.03	
ID1147 E054781b Mittagong	Mittagong	u	Incomplete. Blade end only		50.6	69.1		24.6			130.36
ID1148 E095515a Mittagong	Mittagong	u	Incomplete		93.4	88.9		42.5			552.75
ID1149 E095515b Mittagong	Mittagong	u	Complete	134.9		98.2		46.2		856.8	
ID1150 E095515c Mittagong	Mittagong	u	Complete?	163.3		126.3		42.8		1306.81	
ID1151 E095515d Mittagong	Mittagong	u	Complete	102.7		66.4		38.2		414.04	
ID1152 E095515e Mittagong	Mittagong	u	Incomplete	107.3			97.6	37.2			619.92
ID1153 E058133 Moss Vale	Moss Vale	u	Complete	111.5		76.6		113.1		535.43	
ID1154 E03544a Burrawang	Burrawang	u	Complete	191.6		120.2		42.4		1198.17	
ID 1177 E055134	Meryla	c	Complete	140.09		77.84		20.71		324.56	
ID1178 E059665	Marulan	c	Complete	162.2		122.79		32.85		948.52	
ID1179 E05664a	Marulan	c	Complete	135.07		82.63		33.37		629.19	

APPENDIX II - Ground-edged Hatchet Assemblage. Metrics and preform.											
ID1180 E059664b	Marulan	c	Complete	151.9		81.29		31.94		722.76	
ID1181 E059664c	Marulan	c	Complete	127.34		83.44		30.44		572.81	
ID1182 E059664d	Marulan	c	Complete	140.93		75.6		35.36		505.07	
ID1183 E038365	Bungonia	c	Complete	127.36		92.85		24.89		462.28	
ID1184 E038367	Bungonia	c	Complete	103.12		70.43		32.81		413.5	
ID1185 356K	Bungonia	u	Incomplete		78.11		71.09		26.68		241.61
ID1186 E049919a	Bungonia	u	Complete	123.83		72.3		20.61			312.46
ID1187 E049919b	Bungonia	u	Complete	116.58		68.54		32.44		408.8	
ID1188 E049919c	Bungonia	u	Incomplete		45.68		44.22		21.02		63.3
ID1189 E049919d	Bungonia	u	Incomplete		86.47		71.28		24.1		268.28
ID1190 E049912	Bungonia	c	Complete	96.08		73.59		29.19		302.44	
ID1191 E049931	Bungonia	c	Complete	107.8		60.99		34.58		360.75	
ID1192 E058327	Bungonia	c	Complete	135.19		58.3		30.74		394.5	
ID1193 E038366	Bungonia	c	Complete	122.14		84.38		31.69		478.67	

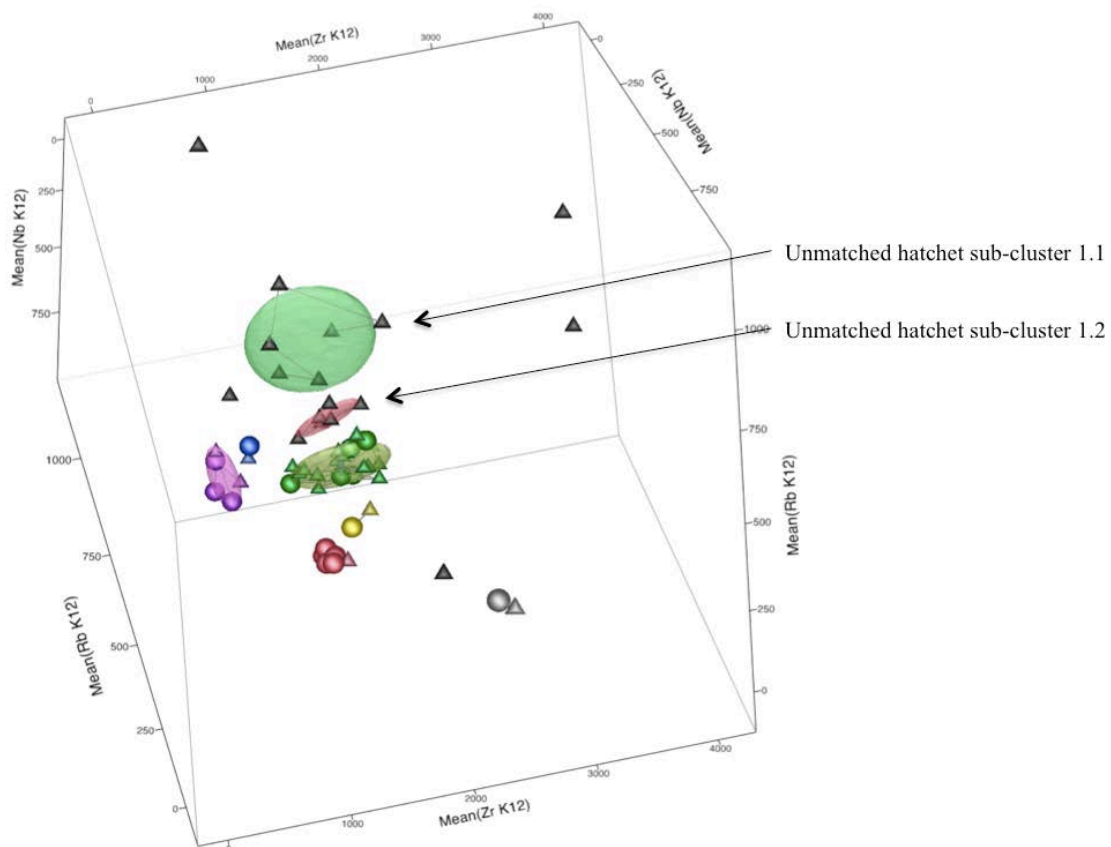
APPENDIX III - Literature review	
Potential raw material sources in study area - and ground-edged hatchets/geological samples included in this study.	
Griffin (1985)	Igneous artefacts found in middens in the Wodi Wodi region of the Illawarra ' <i>presumably latite because of its abundance in the region</i> ' (Griffin 1985:15). <i>"...The cobble beach on the Minnamurra Point side of the river mouth would have been a convenient quarry... artefacts found throughout the Wodi Wodi territory appear to be of almost identical composition (and shape, often)..."</i> (Griffin 1985:21). Latite and Minnamurra Tinguaites samples included
Griffin (1985)	<i>"...Piles of river-washed cobbles on Killalea Beach were believed to have been collected for trading purposes by the Aborigines..."</i> (Mr. C. W. Rutledge. pers. comm. in Griffin 1985:21). Reference could not be traced further. Killalea Beach sits between headland outcrops of Bumbo Latite (Wollongong 250K Geo Map), to the south of, and adjacent to Bass Point Quarry. May refer to latite beach cobbles though possibly palaeo-river lens. Geological samples from Bass Point have been included in the sourcing study for this project.
Griffin (1985)	<i>"...There are other quarry sites in the Wodi Wodi territory such as Shellharbour approximately 1.5 kilometres north of Bass Point, and some sites near extinct volcanoes, such as Knight's Hill and Saddleback Mountain, both sites being inland several kilometres, on the mountains..."</i> Bass Point bedrock and cobbles and Shellharbour beach cobbles included. Jamberoo and Kangaroo Mountain sampled however Knight's Hill and Saddleback Mountain not yet surveyed/sampled.
Griffin (1985)	<i>"...There is also some suggestion that Wodi Wodi stone and/or artefacts may have been traded across tribal boundaries. Prineas in writing of the Aborigines who inhabited the Colo Wilderness mentions:- 'An axe specimen was composed of a volcanic material which must have come from the Minnamurra district, seventy kilometres away' (Prineas 1978:57 In Griffin 1985:21-22). Minnamurra Tinguaites samples included.</i>
Griffin (1985)	<i>"...In the Kurnell region, twenty kilometres south of Sydney, a variety of volcanic stone and fossil wood were recovered in midden sites by Dickson (1968:15). This stone is not local, and Dickson suggests that it came from an area from Wollongong to Kiama (ibid.:15)..."</i> (Griffin 1985:22). Dickson (1968:15) notes that both volcanic stone and fossil wood are available 'at no great distance from Kurnell'. References to the Wollongong area relate to fossil wood only.
Dickson (1972)	Dickson (1972:206 [In] Corkill 2005:44) notes that Kurnell axes made from ' <i>basaltic stone</i> ' may have been obtained from the foot of Macquarie Pass. Dickson also notes that there is a 'basalt reef below high tide at Bellambi'. Cobbles from Bellambi Pt and East Corrimal Beach included. Macquarie Pass area not yet sampled.
Griffin (1985)	Griffin (1985:23) notes raw material for the manufacture of edge-ground axes found during excavations at Curracurrang (Megaw 1976:9) were identified as... <i>the dark cherts of the so-called Wagonga series - from the Bateman's Bay area.</i> Branagan & Megaw (1969:4-7) discuss Cambrian Wagonga Series cherts, in relation to backed blades and flaked material found at Curracurrang. Ground-edged hatchets are not suggested to have been made from chert. See below re: Curracurrang and Gympsea Bay excavated ground-edged hatchets.

APPENDIX III - Literature review	
Potential raw material sources in study area - and ground-edged hatchets/geological samples included in this study.	
McCarthy (1944) cited in Wesson (2005:12-13)	McCarthy's (1944) analysis of 'Windang' type hatchets from eastern Australian locations notes that materials they are made from include sedimentary, igneous and metamorphic rocks of the usual types found among river pebbles (McCarthy 1944:263). No specific locations suggested. Ground-edged hatchet ID1024 E034266 (see McCarthy 1944:261,263 and Plate XV1.) included in analysis.
Towle (1930) cited in Wesson (2005:12-13)	Towle discusses silicate materials available in the Illawarra region, such as jasper, chalcedony and silicified wood (suitable for flaking). No reference to material suitable for ground-edged hatchet manufacture.
Bowdler (1970)	A petrological report from thin section analysis of one hatchet found at Bass Point (Bowdler 1970:124) identified it as of volcanic origin and likely to have come from a dyke source, rather than flow - but was not more specific. Not located for pXRF analysis.
Branagan & Megaw (1969)	Ground edged hatchets from Curracurrang thin sectioned (Branagan & Megaw 1969), One made of tinguaitite -only found in the Minnamurra area, a second fine-grained volcanic rock, possibly Gerringong volcanic. Two other axes of igneous origin identified as probably from the Wollongong-Kiama region or, in the case of the coarse grained igneous material, possibly from Milton. Three of cordierite hornfels - Upper Shoalhaven/Marulan suggested as possible source. Artefacts and raw material samples included.
Megaw & Wright (1966)	Two ground-edged implements found at Gymea Bay, identified as hornfels, with nearest sources - the Upper Shoalhaven River (perhaps Yawal District) or else perhaps from Marulan (Megaw and Wright 1966:33 [In] Attenbrow 2002:124). Megaw (1974:5-31 cited in Corkill 2005:44) also refers to the far south coast as a potential source of hornfels and the Shoalhaven area as a possible igneous source. Corkill (2005:43) notes in reference to these Gymea Bay hatchets that the Hawkesbury/Nepean gravels and Bellambi Point are much closer locations where this type of material is available.

APPENDIX IV – PROVENANCING RESULTS

FULL REPORT

Results – Cluster 1

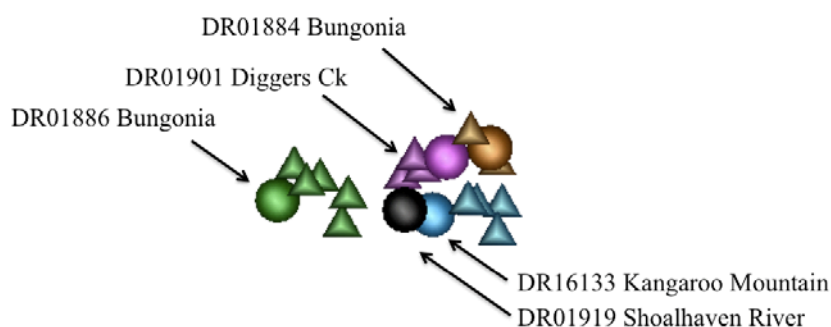


CLUSTER 1 MATCHES

● DR07043 Popran Creek (basalt bedrock)	(1 Match)
▲ ID1014 E030958 Burying Ground Beach SH	(Match to DR07043 Popran)
● DR17825 Caoura - Tallong (basalt coarse feldspathic bedrock)	(1 Match)
▲ ID0503 Curra CU5 121	(Match to DR17825 Caoura-Tallong)
● XRF080C Lowes Mt AM (altered igneous bedrock)	(1 Match)
▲ ID1188 E49919C Bungonia	(Match to XRF080C Lowes Mt AM)
● E60474a Lowes Quarry (altered igneous bedrock)	(1 Match)
▲ ID0151 E058838a Bellambi	(Match to E60474a LowesQuarry)
● DR16196 Bombo Quarry DykeB (basalt dyke)	(1 Match)
▲ ID0155 E058837b Bellambi	(Match to DR16196 Bombo DykeB)
● DR01155 Jamberoo (basalt orthoclase bedrock)	(1 Match)
▲ ID1136 E082935 Lake Illawarra	(Match to DR01155 Jamberoo)
● ▲ Cluster 1 (sub-cluster green) - see following figure for matches	

CLUSTER 1 UNMATCHED GROUND-EDGED HATCHETS

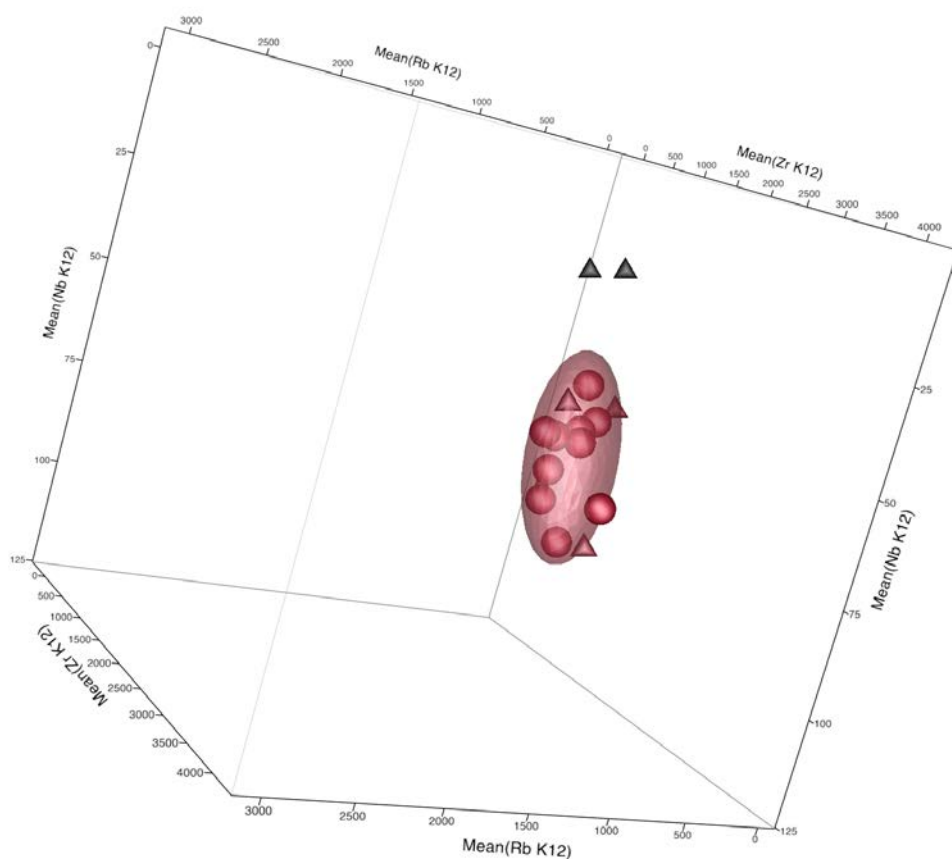
▲ID0501 Curra CU5 D (Surf)	(Unmatched hatchet sub-cluster 1.1)
▲ID1022 E034263 Old Cemetery South Beach SH	(Unmatched hatchet sub-cluster 1.1)
▲ID1177 E55134 Meryla	(Unmatched hatchet sub-cluster 1.1)
▲ID1185 356K Bungonia	(Unmatched hatchet sub-cluster 1.1)
▲ID1023 E034264 Old Cemetery South Beach SH	(Unmatched hatchet sub-cluster 1.1)
▲ID1017 E030962 Sand Dunes Burying Ground Beach SH	(Unmatched hatchet sub-cluster 1.1)
▲ID1146 E049012 Sutton Forest	(Unmatched hatchet sub-cluster 1.2)
▲ID1064 E052693 Robertson	(Unmatched hatchet sub-cluster 1.2)
▲ID0051 E053519 Bellambi	(Unmatched hatchet sub-cluster 1.2)
▲ID1150 E095515c Mittagong	(Unmatched hatchet sub-cluster 1.2)
▲ID1006 E034265 Old Cemetery South Beach SH	(Unmatched hatchet sub-cluster 1.2)
▲ID1151 E095515d Mittagong	(Unmatched hatchet sub-cluster 1.2)
▲ID1189 E49919D Bungonia	(Unmatched hatchet sub-cluster 1.2)
▲ID1061 E052690 Robertson	(Unmatched hatchet cluster 1)
▲ID1111 E057361c Lake Illawarra	(Unmatched hatchet cluster 1)
▲ID1143 E049487 Shellharbour	(Unmatched hatchet cluster 1)
▲ID1152 E095515e Mittagong	(Unmatched hatchet cluster 1)



CLUSTER 1 SUB-CLUSTER GREEN MATCHES

● DR01884 Bungonia (basalt bedrock)	(2 MATCHES)
▲ ID0147 E058835d Bellambi	(Match to DR01884 Bungonia)
▲ ID1072 E054781a Mittagong	(Match to DR01884 Bungonia)
● DR01886 Bungonia (basalt bedrock)	(5 MATCHES)
▲ ID0059 E058840 Bellambi	(Match to DR01886 Bungonia)
▲ ID1073 E054782 Mittagong	(Match to DR01886 Bungonia)
▲ ID1032 E035813 Jamberoo	(Match to DR01886 Bungonia)
▲ ID1021 E034262 Old Cemetery South Beach SH	(Match to DR01886 Bungonia)
▲ ID0040 E033454 Bellambi	(Match to DR01886 Bungonia)
● DR01901 Diggers Creek (basalt altered bedrock)	(3 MATCHES)
▲ ID1026 E034268 Barrack Head SH	(Match to DR01901 Diggers)
▲ ID1112 E057362a Illawarra Heads	(Match to DR01901 Diggers)
▲ ID1149 E095515b Mittagong	(Match to DR01901 Diggers)
● DR01919 Shoalhaven River (basalt bedrock)	(Geosample matching to DR16133)
● DR16133 Kangaroo Mountain (igneous basanite bedrock)	(4 MATCHES)
▲ ID1016 E030961 Burying Ground Beach SH	(Match to DR16133 Kangaroo Mountain)
▲ ID1178 E59665 Marulan	(Match to DR16133 Kangaroo Mountain)
▲ ID1049 E050157b Shellharbour	(Match to DR16133 Kangaroo Mountain)
▲ ID1120 E059823 Shellharbour	(Match to DR16133 Kangaroo Mountain)

Results – Clusters 2-4

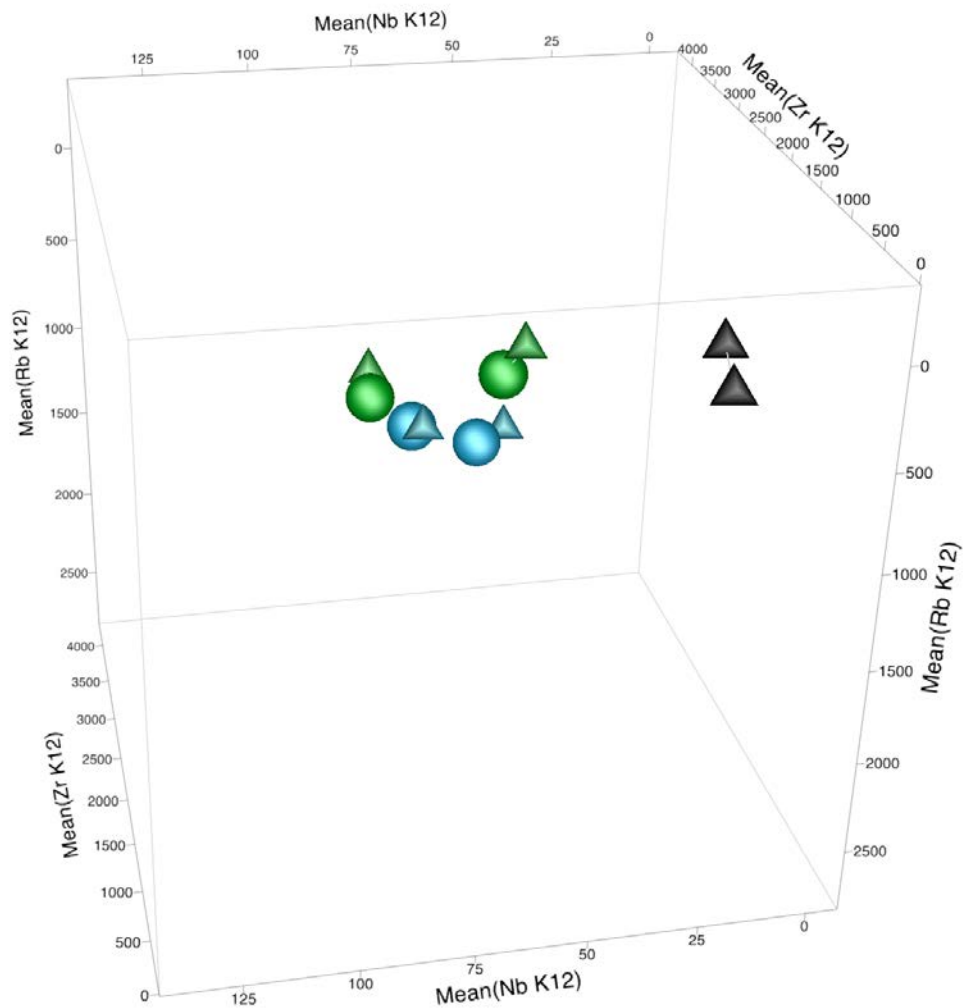


CLUSTERS 2-4 LATITES (See following figure for sub-cluster matches)

- XRF069C Kiama Rd Cutting AM (latite bedrock)
- XRF066C Shellharbour Sth AM (latite cobble)
- XRF071C Bombo Q AM (latite bedrock)
- XRF072C Bombo Q AM (latite bedrock)
- XRF040C Bombo Quarry AM (latite bedrock)
- XRF068C Bass Pt Q AM (latite bedrock)
- Bombo QRckPlat KS14 (XRF71c) (latite cobble)
- DR04243 Is3 Five Islands (latite bedrock)
- Bombo QRckPlat KS12 (XRF71a) (latite cobble)
- Shellharbour SB KS11 (latite cobble)
- Shellharbour SB KS10 (latite cobble)
- ▲ ID1135 E082934 Lake Illawarra
- ▲ ID1115 E057391 Bellambi
- ▲ ID1070 E054779 Mittagong
- ▲ ID1079 E055134 Meryla

CLUSTERS 2-4 UNMATCHED GROUND-EDGED HATCHETS

- ▲ ID1071 E054780 Mittagong
- ▲ ID0057 E058835a Bellambi



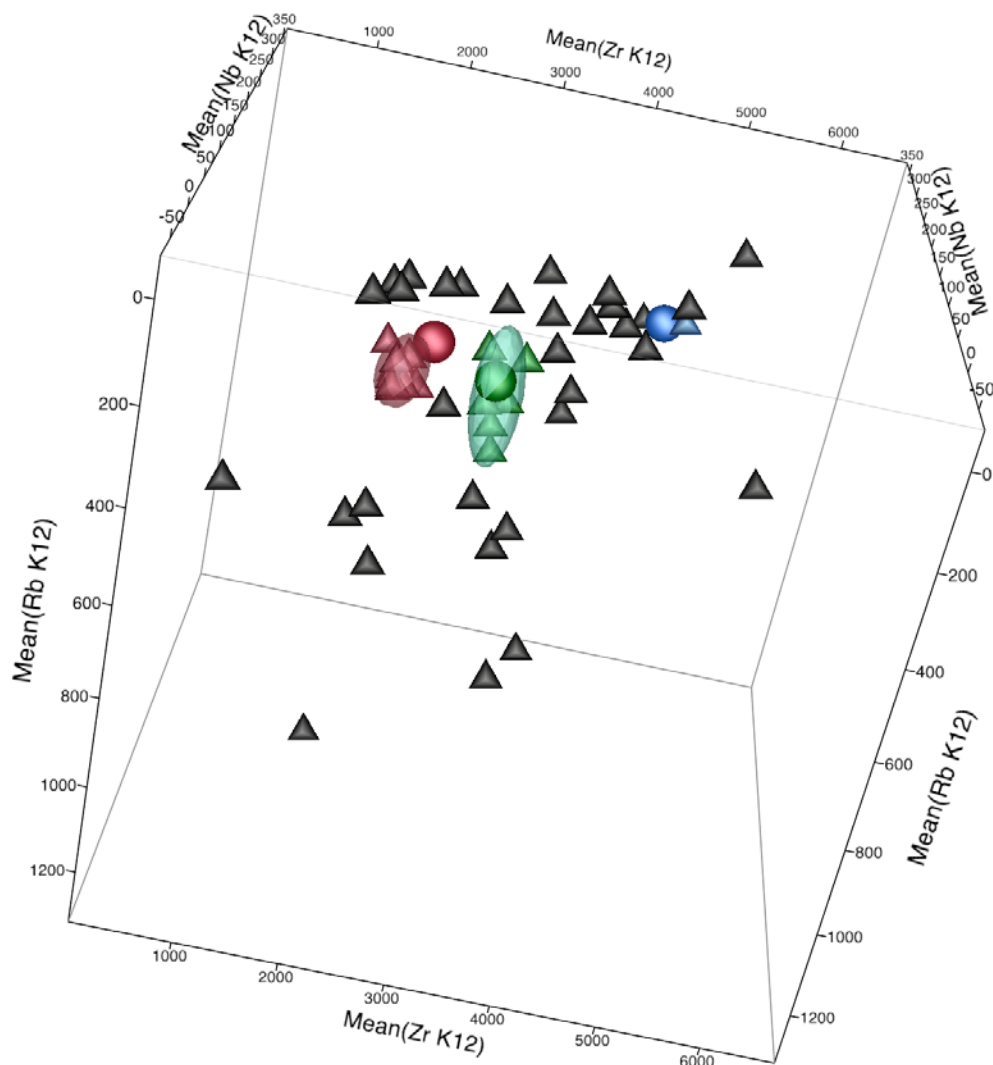
CLUSTERS 2-4 LATITE MATCHES (Clusters 2-4 hatchets)

● XRF069C Kiama Rd Cutting AM (latite bedrock)	(1 Match)
▲ ID1070 E054779 Mittagong	(Match to XRF069C Kiama Rd Cutting AM)
● XRF072C Bombo Q AM (latite bedrock)	(1 Match)
▲ ID1135 E082934 Lake Illawarra	(Match to XRF072C Bombo Q AM)
● Shellharbour SB KS10 (latite cobble)	(1 Match)
▲ ID1079 E055134 Meryla	(Match to Shellharbour SB KS10)
● Shellharbour SB KS11 (latite cobble)	(1 Match)
▲ ID1115 E057391 Bellambi	(Match to Shellharbour SB KS11)

CLUSTERS 2-4 UNMATCHED GROUND-EDGED HATCHETS

▲ ID1071 E054780 Mittagong	(Unmatched hatchet pair clusters 2-4)
▲ ID0057 E058835a Bellambi	(Unmatched hatchet pair clusters 2-4)

Results – Cluster 5



CLUSTER 5 MATCHES (See following figure for unmatched hatchets) (N=18)

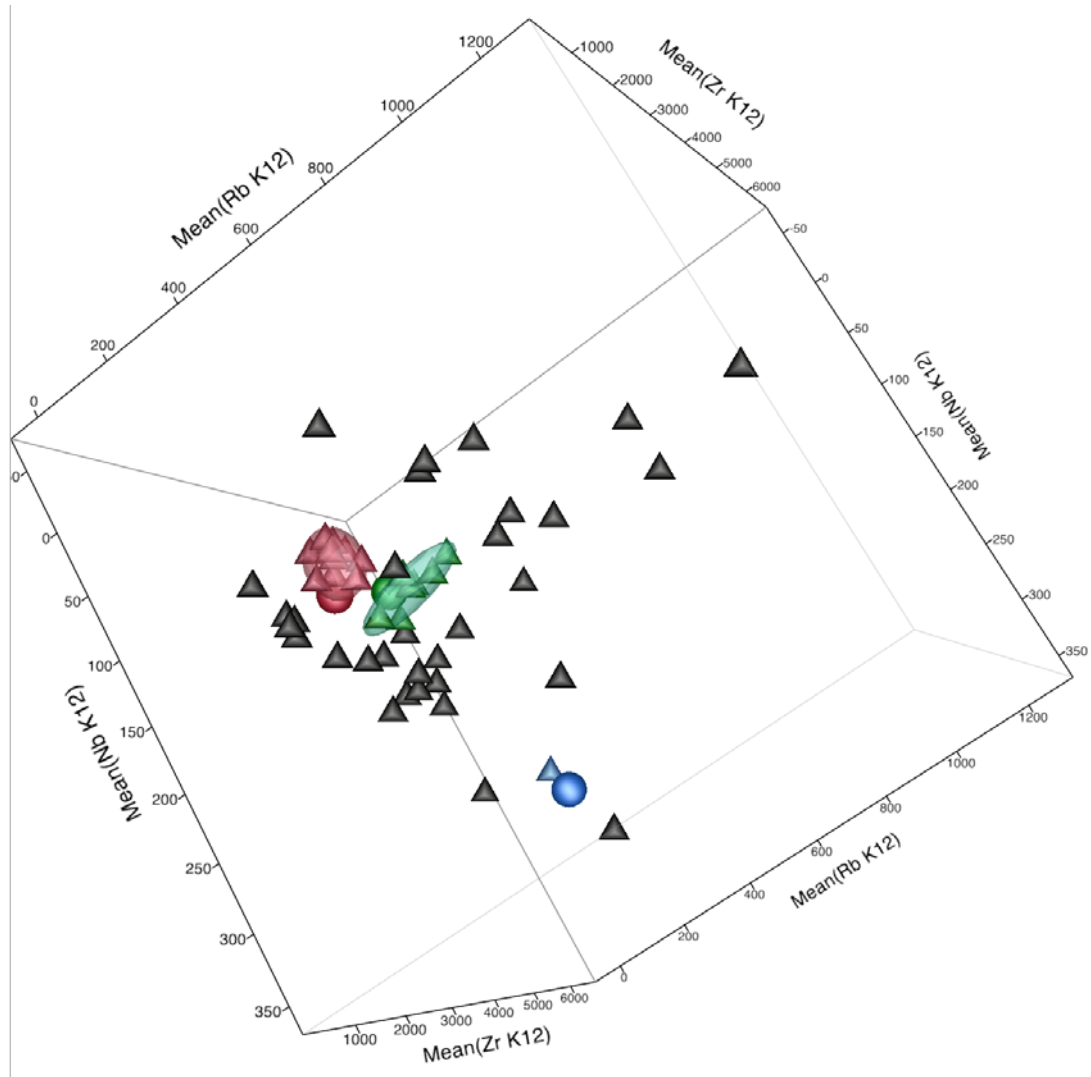
● Crookhaven River KS	(1 Match)
▲ ID1007 E030935 Lake Illawarra	(Match to Crookhaven River KS03)
● Crookhaven River KS06 (basalt cobble)	(10 Matches)
▲ ID0145 E033452 Bellambi	(Match to Crookhaven River KS06)
▲ ID1060 E052689 Robertson	(Match to Crookhaven River KS06)
▲ ID1187 E49919B Bungonia	(Match to Crookhaven River KS06)
▲ ID1028 E034271 Barrack Head	(Match to Crookhaven River KS06)
▲ ID0042 E033457 Bellambi	(Match to Crookhaven River KS06)
▲ ID0149 E012851 Bellambi	(Match to Crookhaven River KS06)
▲ ID1025 E034267 Shellharbour	(Match to Crookhaven River KS06)
▲ ID1191 E49931 Bungonia	(Match to Crookhaven River KS06)
▲ ID1192 E58327 Bungonia	(Match to Crookhaven River KS06)
▲ ID1010 E034270 Barrack Head SH	(Match to Crookhaven River KS06)

● **DR01932 Tallowal Gully (basalt olivine bedrock)**

- ▲ ID1067 E053665 Towradgi
- ▲ ID1133 E077084 Tom Thumb Lagoon
- ▲ ID1195 E057362c Lake Illawarra
- ▲ ID1109 E057361a Lake Illawarra
- ▲ ID1179 E59664A Marulan
- ▲ ID1056 E052578a Lake Illawarra
- ▲ ID1119 E058836b Bellambi

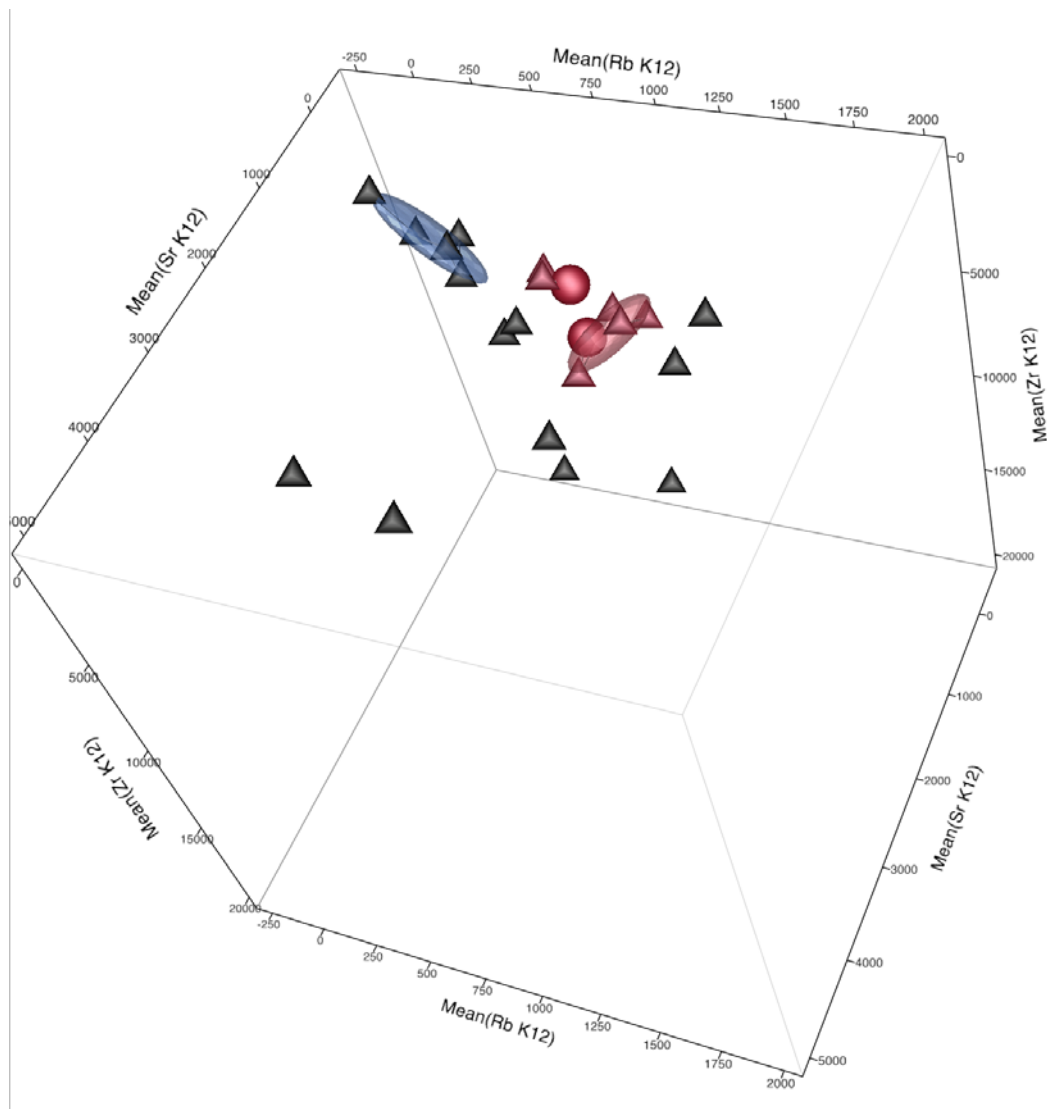
(7 Matches)

- (Match to DR01932 Tallowal Gully)
- (Match to DR01932 Tallowal Gully)
- (Match to DR01932 Tallowal Gully)
- (Match to DR01932 Tallowal Gully)
- (Match to DR01932 Tallowal Gully)
- (Match to DR01932 Tallowal Gully)
- (Match to DR01932 Tallowal Gully)



CLUSTER 5 UNMATCHED GROUND-EDGED HATCHETS

▲ID1048 E050157a Shellharbour	(Unmatched hatchet sub-cluster 5.1)
▲ID0041 E033455 Bellambi	(Unmatched hatchet sub-cluster 5.1)
▲ID1153 E058133 Moss Vale	(Unmatched hatchet sub-cluster 5.1)
▲ID1069 E054211 Bellambi	(Unmatched hatchet sub-cluster 5.1)
▲ID0508 Curra CU5 5M	(Unmatched hatchet sub-cluster 5.1)
▲ID1184 E38367 Bungonia	(Unmatched hatchet sub-cluster 5.1)
▲ID1020 E033456 Bellambi	(Unmatched hatchet sub-cluster 5.1)
<hr/>	
▲ID0058 E058837a Bellambi	(Unmatched hatchet cluster 5)
▲ID0020 E053516A Bellambi	(Unmatched hatchet cluster 5)
▲ID1137 E082936 Lake Illawarra	(Unmatched hatchet cluster 5)
▲ID1181 E59664C Marulan	(Unmatched hatchet cluster 5)
▲ID1186 E49919A Bungonia	(Unmatched hatchet cluster 5)
▲ID1038 E044337 Mt Keira	(Unmatched hatchet cluster 5)
▲ID1180 E59664B Marulan	(Unmatched hatchet cluster 5)
▲ID1062 E052691 Robertson	(Unmatched hatchet cluster 5)
▲ID1009 E030938 Lake Illawarra	(Unmatched hatchet cluster 5)
▲ID0152 E058835e Bellambi	(Unmatched hatchet cluster 5)
▲ID1193 E38366 Bungonia	(Unmatched hatchet cluster 5)
▲ID1190 E49912 Bungonia	(Unmatched hatchet cluster 5)
▲ID1138 E086406 Mt Gingenbullen	(Unmatched hatchet cluster 5)
▲ID1110 E057361b Lake Illawarra	(Unmatched hatchet cluster 5)
▲ID1148 E095515a Mittagong	(Unmatched hatchet cluster 5)
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▲ID1081 E055846 Lake Illawarra	
▲ID1008 E030937 Lake Illawarra	
▲ID1011 E030949 Lake Illawarra Nth Entrance	
▲ID0153 E053516B Bellambi	
▲ID1141 E011337 Bellambi	
▲ID1051 E051274 Bowral	
▲ID1037 E042863 Bellambi	
▲ID0046 E054887 Bellambi	
▲ID1050 E051273 Bowral	
▲ID1113 E057362b Lake Illawarra	



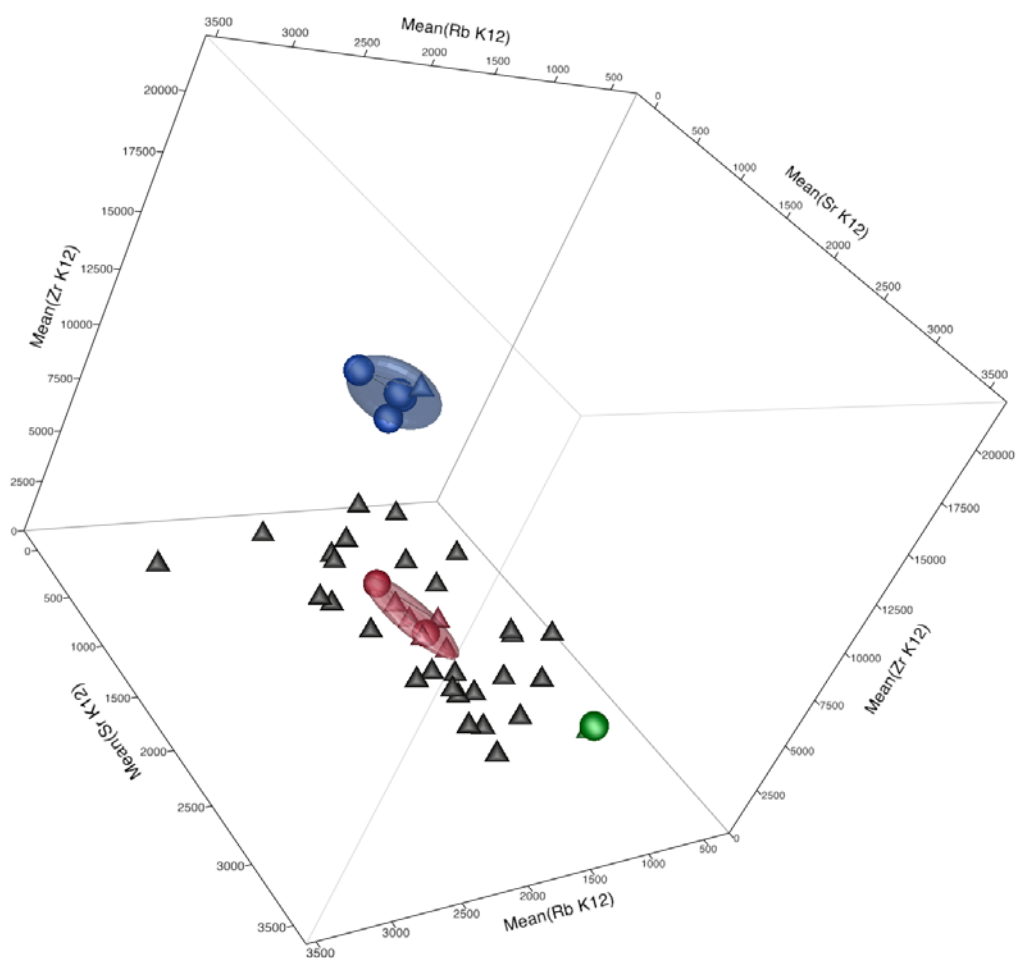
CLUSTER 6 MATCHES

● Crookhaven River KS01 (quartzite cobble)	(2 Matches)
▲ ID1182 E59664D Marulan	(Match to Crookhaven River KS01)
▲ ID1074 E054783 Mittagong	(Match to Crookhaven River KS01)
● Crookhaven River KS04 (quartzite cobble)	(4 Matches)
▲ ID1065 E053516d Bellambi	(Match to Crookhaven River KS04)
▲ ID1024 E034266 Barrack Head	(Match to Crookhaven River KS04)
▲ ID0150 E033451 Bellambi	(Match to Crookhaven River KS04)
▲ ID1156 E030936 Lake Illawarra	(Match to Crookhaven River KS04)

CLUSTERS 6 AND 8 UNMATCHED GROUND-EDGED HATCHETS

▲ ID1147 E054781b Mittagong	(Unmatched hatchet sub-cluster 6.1)
▲ ID1031 E03544L Burrawang	(Unmatched hatchet sub-cluster 6.1)
▲ ID1142 E033835 Bellambi	(Unmatched hatchet sub-cluster 6.1)
▲ ID1066 E053517 Bellambi	(Unmatched hatchet sub-cluster 6.1)
▲ ID1059 E052578red dot Lake Illawarra	(Unmatched hatchet sub-cluster 6.1)
▲ ID1058 E052578c Lake Illawarra	(Unmatched hatchet cluster 6)
▲ ID1055 E052359a Lake Illawarra	(Unmatched hatchet cluster 6)
▲ ID1057 E052578b Lake Illawarra	(Unmatched hatchet cluster 6)
▲ ID1194 E052359b Lake Illawarra	(Unmatched hatchet cluster 6)
▲ ID0027 E058835B Bellambi	(Unmatched hatchet cluster 6)
▲ ID0502 Curra CU5 28	(Unmatched hatchet cluster 6)
▲ ID0039 E033453 Bellambi	(Unmatched hatchet cluster 8)
▲ ID0504 Curra CU5 82	(Unmatched hatchet cluster 8)
▲ ID1005 E028546 Exeter District	(Unmatched hatchet cluster 8)

Results - Clusters 7 and 9



CLUSTERS 7 AND 9 MATCHES

● YC7 YarramundiCr (hornfels cobble)	(4 Matches)
▲ ID0148 E58836a Bellambi	(Match to YC7 Yarramundi Cr)
▲ ID0144 E012697 Bellambi	(Match to YC7 Yarramundi Cr)
▲ ID0509 Gynea Bay GY	(Match to YC7 Yarramundi Cr)
▲ ID1134 E082933 Lake Illawarra	(Match to YC7 Yarramundi Cr)
● DR3 DevlinsRd (hornfels cobble)	(1 Match)
▲ ID1085 E055943 Lake Illawarra	(Match to DR3 DevlinsRd)
● Hyams Ck Jamberoo KS15 (porphyritic volcanic cobble)	(1 Match)
▲ ID1012 E030956 Burying Ground Beach SH	(Match to Hyams Ck Jamberoo KS15)
● DR01157 MtJamberoo (Minnamurra tinguaita bedrock)	(1 Match)
● Nth Wollongong Beach YKG (Minnamurra tinguaita cobble)	(Minnamurra Tinguaita Geo-group)
● DR06917 Minnamurra (Minnamurra tinguaita bedrock)	(Minnamurra Tinguaita Geo-group)
● DR06916 Minnamurra (Minnamurra tinguaita bedrock)	(Minnamurra Tinguaita Geo-group)
▲ ID0506 Curra CU5 25 B-L	(Match to DR01157 MtJamberoo)

CLUSTER 7 UNMATCHED GROUND-EDGED HATCHETS

- ▲ID1013 E030957 Burying Ground Beach SH
 - ▲ID1183 E38365 Bungonia
 - ▲ID0507 Curra CU5 20B
 - ▲ID1132 E070688 Kiama
 - ▲ID1039 E049481 Shellharbour
 - ▲ID1154 E03544a Burrawang
 - ▲ID1155 E049908 Bulli
 - ▲ID1145 E065735 Bargo
 - ▲ID1004 E028545 Exeter District
 - ▲ID1140 E086408 Mt Gingenbullen
 - ▲ID1003 E012730 Kangaroo Valley
 - ▲ID1029 E03544i Burrawang
 - ▲ID1080 E055435 Thirroul
 - ▲ID0146 E046013 Bellambi
 - ▲ID1030 E03544k Burrawang
 - ▲ID1068 E054210 Bellambi
 - ▲ID1001 E03544d Burrawang
 - ▲ID0154 E053516C Bellambi
 - ▲ID1063 E052692 Robertson
 - ▲ID0505 Curra CB
 - ▲ID1144 E03544b Burrawang
 - ▲ID1106 E055973 Bulli
 - ▲ID1015 E030960 Burying Ground Beach SH
 - ▲ID1036 E032644 Corrimal
 - ▲ID1027 E034269 Barrack Head SH
 - ▲ID1033 E035977 Stanwell Park
 - ▲ID0026 E058835A Bellambi
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