Burial Cairn Taxonomy and the Mortuary Landscape of Rocky Point, British Columbia

by

Darcy Mathews
B.A. Honours, Simon Fraser University, 1993

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SUPERVISORY COMMITTEE

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ABSTRACT

Prior to European contact, the Straits Salish people, an ethnolinguistic group centred on present day Victoria in southwestern British Columbia, built a distinctive form of grave. The burial cairn and mound, a phenomenon occurring 1500–1000 years before present, consist of an arrangement of rocks and soil placed over the deceased. The Rocky Point site is the largest remaining intact site of this kind on southern Vancouver Island. I hypothesize that the external attributes of these burial features – their location and shape – are important signifiers of the social identity of the person buried within. Patterns in burial cairn morphology are identified with a cluster analysis. The geographical placement of the resulting feature types is subject to a GIS–based spatial analysis. The resulting model is interpreted through a humanistic model of social theory, addressing underlying social structures that culminated in the creation of the Rocky Point cemetery.

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1 Introduction

Prior to European contact, the Straits Salish people, an ethnolinguistic group centred on present day Victoria in southwestern British Columbia, built a distinctive form of grave. The burial cairn and mound, a phenomenon occurring 1500–1000 years before present (Thom 1995), consist of an arrangement of rocks and soil placed over the deceased. Cairns and mounds vary in form, often occurring in a variety of shapes and sizes. They also vary in their distribution on the landscape. Sites comprise as few as one and as many as 300 or more of these burial features. These burials occur throughout the Strait of Georgia region. During the late nineteenth century, burial cairns in the Victoria area attracted international attention from early researchers (Bancroft 1875; Smith and Fowke 1901) but have received virtually no archaeological attention during most of the twentieth century. Recent research on burial cairns and mounds in the Fraser Valley on the mainland of British Columbia has begun to address the interpretive potential of these important features (Lepofsky, et al. 2000). Although there has been very productive work on similar mortuary features in Europe (Barrett 1990; Holtorf 1997), burial cairn research in British Columbia is a remarkable but largely untapped avenue for exploration into the social aspects of Straits Salish life. Building on the proven method and theory of this earlier work, I documented the largest remaining burial cairn cemetery on southern Vancouver Island at Rocky Point outside of greater Victoria (Figure 1). Working with members of the Scia'new First Nation, I mapped and recorded almost 400 features at the Rocky Point site in great detail using a geographical information system. This fieldwork has generated a substantial volume of information on the burial features at the Rocky Point site.

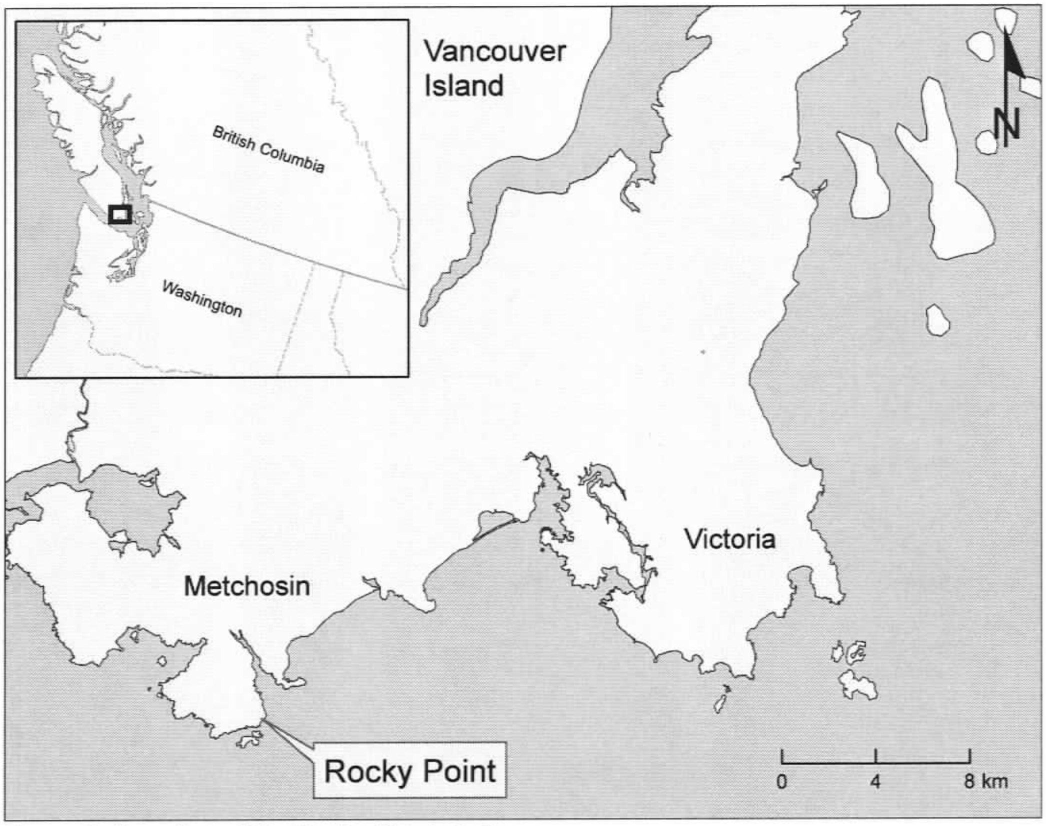


Figure 1: Location of the Rocky Point study area.

My hypothesis is that the external attributes of burial cairns – their location and shape – are important signifiers of the social identity of the person buried within. One of the most valuable aspects of burial memorials is that they are built within the context of social relationships and are designed to encapsulate aspects of the identity of the dead. By extension, burial cairns at the Rocky Point cemetery can be reasonably viewed as memorials, built to endure and presumably to express the identity of the deceased. The manner in which mortuary space is used – the style, material choice, size, and placement of cairns – has great interpretive potential to identify socially meaningful patterns.

There are three central research questions addressed in this research, which are outlined in Table 1. The sources of data used, and the methods employed to answer these question are briefly discussed below.

Table 1: Thesis research questions, sources of data, and methods employed.

Research Question	Source of Data	Methods
Is there morphological patterning in the construction of burial cairns at Rocky Point?	Field collected qualitative and quantitative data	Univariate analyses and hierarchical agglomerative cluster analysis
What is the spatial patterning in the placement of burial cairns at Rocky Point?	Field collected qualitative and quantitative data	Euclidean cluster analysis, exploratory GIS analysis
What does the presence or absence of morphological and spatial patterning at Rocky Point mean in terms of understanding precontact Straits Salish social practice?	Results of morphological and spatial analysis	Application of social theory and regional culture history to results of numerical taxonomy and spatial analysis

In this thesis, I examine the morphology of the cairn features through numerical taxonomy, namely cluster analysis, to identify and test patterns in the types of methods and materials used to build these burials. Cluster analysis will also be employed in the initial spatial analysis, to determine if there are spatial clusters of features on the landscape. Using a Geographic Information Systems (GIS)–based analysis, the physical attributes of these burial features will be compared to their geographical placement on the landscape, relative to other cairns and physical elements of the landscape. The resulting model of the spatial distribution of burial features, interpreted through a humanistic model of social theory, will be used to address underlying social structures at play, which culminated in the creation of the Rocky Point burial cairn cemetery. The social theories I employ provide a bridging framework between the empirical cairn data (physical structure and placement) and the community that made them.

The theoretical framework employed in this thesis is outlined in Chapter 2. It discusses theoretical approaches to social practice and the formation of the archaeological record. Also discussed are the special dimensions death and the materiality of the mortuary ritual. This chapter forms, in part, the interpretive framework for situating the results of the morphological and spatial analysis within the larger picture of precontact Straits Salish social practice.

Next is an introduction to DbRv-3, the Rocky Point cemetery. Outlined in Chapter 3 is the physical landscape at the site and a history of previous research there. This is followed by a brief discussion on burial cairns and the archaeological context in which these features were built. Also discussed is a brief history of burial cairn research in Victoria and a synthesis of this earlier work and what it can contribute to the current research.

Chapter 4 is a detailed description of the Rocky Point site and the archaeological context in the immediate area. The natural and anthropogenic site formation processes affecting the site are outlined, which is then followed by a discussion on the suitability of DbRv-3 for a detailed morphological and spatial analysis. The following chapter 5 summarizes the Rocky Point data set, outlining field survey techniques, spatial and morphological data collection, and discussing the implications of the temporal scale in the analysis.

Chapter 6 is a detailed discussion of the key concepts of numerical taxonomy and the methods employed in the hierarchical agglomerative cluster analysis of the DbRv-3 burial cairn morphological attributes. Chapter 7 is a discussion of the morphological cluster analysis results. This chapter summarizes the resulting feature types derived from the numerical taxonomy.

With the morphological data analysis complete, it is necessary to attend to the spatial analysis. Chapter 8 introduces the theory and method behind heuristic spatial analysis and the research objectives of this component of the research. First is a test of the validity of the observation that there is spatial clustering of burial features at the site Rocky Point site using spatial autocorrelation techniques. Following this is a discussion on the application of nearest neighbour and average neighbour cluster analyses to identify spatial groupings on the landscape.

The results of the spatial analysis are discussed in Chapter 9. Based on these results the distribution of the feature types derived from the morphological cluster analysis are analyzed within each of the spatial localities identified by the spatial cluster analysis. Following this is a detailed analysis of the distribution of burial features within each of the spatial clusters and their relationship to the landscape. Next is a discussion of several themes relating to the intersection of the morphological and spatial data. These themes include the recursive relationship between the burials and the physical landscape, the spatial patterning of the burial features, feature size and monumentality, and feature visibility. The chapter is concluded with a synthesis of these four themes, which examines feature placement and the landscape from a dwelling, or experiential aspect.

Chapter 10 is a brief summary of the morphological and spatial analysis. In addition to summarizing the results of the present study, it outlines some key quantitative and spatial analysis methods and approaches that could shed more light on the interrelationship between different feature types and the landscape.

The body of social theory introduced in Chapter 2 and the archaeological context of the burial cairn and mound phenomenon outlined in Chapter 3 are applied to the results of the morphological and spatial analysis in Chapter 11. The concept of the Rocky Point mortuary landscape is introduced, which is an explanatory model for the role of the mortuary ritual shaping the manner of burial feature construction and placement at DbRv-3. Recognizing that funerary practice is deeply rooted within a social context of familial relations, concepts of identity, and power relations, the placement and form of the Rocky Point burial features shaped the local landscape, which in turn informed those dwelling and interacting with this place of their position in the social web of precontact Straits Salish society.

The thesis is concluded in Chapter 12, which briefly summarizes the results of the morphological and spatial analysis and recapitulates the implications of this study for understanding precontact Straits Salish social practice.

Mortuary features, such as burial cairns, are a robust and multi-dimensional source of social information. This research is the first comprehensive and encompassing intra-site examination of the spatial distribution of burial cairns at any site in the Strait of Georgia region, despite being one of the earliest types of archaeological sites studied in the region. By integrating empirically collected and analyzed spatial and morphological data with social anthropological theory, meaningful interpretations about antecedent Straits Salish can be offered. This work is modelled, in part, on similar recent approaches to the analysis of mortuary spatial data from sites in the United States and Europe, which have met with great success. Burial cairns are a uniquely archaeological phenomenon and no discipline is better suited to their analysis than archaeology. Burial cairns present a unique opportunity to investigate prehistoric concepts of identity, the use of social space, and concepts of landscape that are expressed through the material remains of mortuary ritual. This study pursues a significant, and largely unknown, chapter of the precontact lives of the peoples of southern Vancouver Island.

2 Theoretical Framework

Death is not an individual experience. It is the crucible within which the identity of the deceased is expressed at multiple levels within the context of the mortuary ritual. Confronting death requires relatives and friends of the deceased to review mutual obligations and relationships with society and the supernatural. The version of social relationships shown in mortuary ritual is frequently idealized and legitimized through references to the past and the ancestors; it provides a forum in which to disperse and conceal social conflicts (Bender 1992; Kristiansen 1991; Pader 1982).

Recent theoretical approaches in the social sciences that focus on identity and social practice (Cannon 2002; Fisher and Loren 2003) offer archaeology a robust theoretical framework with which to interpret the material remains of mortuary practice. Archaeology is perfectly situated to detect and interpret such information at multiple scales, especially over the long term (Bradley 1991; Gosden and Lock 1998; Mizoguchi 1993). Although it is not expected that every important aspect of the mortuary ritual can be preserved within the archaeological record, global ethnographic accounts of mortuary behaviour suggest a degree of redundancy is a typical part of the funerary display. This redundancy suggests that the material remains of the mortuary ritual allow for a relatively encompassing record of what transpired at the time of interment, and therefore the materiality of the burial is a valid source for deductions regarding social practices at play during that point in time.

Mortuary rituals are essentially the cultural practices concerning the transition from life to death (Pearson 2000). In many cultures, mortuary rituals act as a means for the community to cope with and try to overcome the absence of balance and crisis caused by the death of a community member. Beliefs concerning death suppress fear, and contribute to returning safety and order in the community (Malinowsky 1960). They tend to take care of the deceased, supply his or her needs, and satisfy the wants of those left behind while protecting them simultaneously against supernatural forces (Barley 1995). Taking care of the fate of the deceased as well as settling of the mutual relationships of those left behind is a symbolic way of expressing the process through which the living gradually release the social and emotional ties to the deceased (Pearson 2000).

The corpse and the ways of handling it contain a strong symbolic means of expressing the transition from life to death. Mortuary rituals are rites of passage meant to locate the deceased conclusively and permanently in the realm of death. The ritual includes the opportunity of renewed discussions or repudiations concerning categories and rules thus making transitions between sociocultural categories possible. Consequently, social categories are thus defined, overstepped, and redefined (Barrett 1996).

Anthropology has a long history of engaging the connections between mortuary rituals and societal structures. Many of the earlier ethnographic approaches to mortuary analysis emphasized the description of the mortuary ritual themselves, cataloguing and interpreting the social significances of these ritual actions (for example Goody 1962; Levi-Strauss 1983). Archaeologists paralleled this descriptive process, concentrating on the material description of grave goods, skeletal remains, and tomb construction.

More recent ethnography concerned with death and mortuary ritual has increasingly incorporated issues of social memory and the creation and negotiation of identities (for example Bloch and Parry 1982; Kan 1989). This research illustrates the refinement in theoretical and methodological approaches to the connection between mortuary practices and social structures. For example, Weiner's study of the Trobriand Islanders describes the mortuary ceremonies as "moments of spectacular visual communication. They serve as a vehicle for the financial and political assessment of each participant, and for an instant, through the use of such visual qualities as style, color, and space, they frame the oppositional nature of relationships" (1976:61). Weiner demonstrates how the elements of performance and material culture as expressed through mortuary ritual involves an emphasis on social relationships and individual and group identities while simultaneously reconstituting life's social order which has been threatened by the death of a community member, a context in which relationships and social memories are strengthened, reassessed or even shattered (Metcalf and Huntington 1991).

Archaeological approaches also illustrate a recent refinement in the types of questions posed and methods employed in the study of mortuary practice. By necessity, archaeologists are concerned with questions of the form and space of material culture within the built environment as potential expressions of societal structures and issues of identity. In the last decade, archaeologists have increasingly utilized the ethnographers' awareness of the manner in which social memories and identity of the living and the dead are asserted within the context of mortuary ritual (for example Brown 1995; Cheeson 1999a; Fisher and Loren 2003; Gillespie 2001; O'Shea 1996; O'Sullivan 2003; Stone 2003).

There are numerous theoretical intersections between contemporary ethnography and archaeology in the study of mortuary ritual, including the structuring forces in a community (kinship, social stratification, and gender), religious and spiritual beliefs, and the individual, ceremonial specialist and group practice of ritual action. In particular, there is a pronounced trend in recent archaeological literature to refine concepts of agency, personhood, social structure and practice within the context of mortuary ritual, emphasizing Bourdieu's (1977) *Outline of a Theory of Practice* (for example Barrett 2000; Chattopadhyaya 1996; Dobres and Robb 2000; Hodder and Cessford 2004; Lightfoot, et al. 1998; Thomas 2000a). Following is a discussion of this theoretical shift towards addressing the polyvocal and integrative understanding of society and its practices, including the mortuary ritual.

2.1 Habitus, Social Practice and the Dead

The theoretical shift to a people-centred social theory coincides with a post-modern view of culture as "fragmented and contested rather than integrated and normative" (Robb 1998). The two complementary social theories of structuration (Giddens 1984) and practice theory (Bourdieu 1990) can be used as 'bridging arguments' between the archaeological record and a meaningful and humanistic interpretation of prehistoric social systems (Barrett 2000).

To elaborate, Giddens (1984) argues that the structured actions of human agents through space and time reproduce the institutionalized forms of the social system. He writes that "all human action is carried on by knowledgeable agents who both construct the social world through their action, but yet whose action is also conditioned or constrained by the very world of their creation" (Giddens 1981). Social structure, therefore, entails a duality in that "the structural properties of social systems are both the medium and outcome of the practices they recursively organize" (Giddens 1981). The material world, then, acts as a series of *locales* within which these meaningful and authoritative modes of discourse are maintained and perpetuated (Barrett 2000). Bourdieu (1977) discusses the importance of material situations occupied by social practices. His classic paper on the Berber House (Bourdieu 1970) is an analogy for the way in which "a constellation of meanings structure the interior of the house, providing a microcosm of the social world" (Thomas 2000b). The conceptual categories that define and separate the internal space of the dwelling are the same as those that divide up the outside world. Bourdieu suggests that the meanings of the placement and use of the hearth, the loom and the other internal elements of the house are not fixed but learned through socialization and perpetuated forward in the practice of every day life within the house (Bourdieu 1970).

The material world is a powerful medium of social practice. It is both permanent and ephemeral, constructed and demolished, accumulated and exchanged (Barrett 2000). The daily routine in social space is a mechanism by which people become socialized into particular rules and orientations; these dispositions, learned by physical movement through space and interaction with people over time become embodied, as a function of incorporation (Ingold 1990, 1993). Embodiment defined as "social rules and dispositions become embedded within mundane bodily practices, often nondiscursively" (Hodder and Cessford 2004). Dwelling unites people with their environment (Heidegger 1977); it is an 'inconspicuous familiarity' bound up with human social action (Thomas 1993).

People's practice then creates, reproduces and changes social taxonomies that are mutually understood on the basis of social relations. These taxonomies "do not merely reflect the ideas about the world, but actually make the world what it is for the people who live in it" (Erikson and Murphy 2003). Social structure is recursively perpetuated by actors dwelling in space, whose understanding of their daily routine is constructed by the material architecture around them and by their movement through these social spaces and across their boundaries through time (Barrett 2000). What emerges then is a mutual sense of rightness in which the powerful taxonomies are obscured and a sense of social security is achieved; a feeling that Giddens (1984) terms "ontological security", representing a human psychological need for stability and structure. Yet the underlying disposition of society does not consist of entirely rigid structures; there is leeway in which agents have room to interpret and interact with the immediate world around them in a fluid, non-rigid way within the boundaries of their personal concepts of rightness (Hodder 1991).

Barrett argues that "social practices are the object of our study: archaeology is the empirical examination of material evidence to discover how such practices were maintained within particular material conditions" (2000). The archaeological record is not a static outcome of these past dynamics, but is the surviving fragments of the media through which the recursive practices of social discourse were constructed (Barrett 2000; Thomas 1993).

Individual agents are powerful to the extent that they can impose on other people's taxonomies to reproduce their own power and authority. They are simultaneously powerless in that they are unable to escape their social positioning in relation to the taxonomies created by others. However, the taxonomies of the powerful are still ultimately constituted by the larger configurations of social relations (Erikson and Murphy 2003). These discourses of power shape relations between peoples at all levels of society (Foucault 1982). Such discourse is a means of communication drawing upon and reproducing structures of knowledge, thereby also reproducing relations of dominance between individuals and groups within society (Bourdieu 1979). This authority extends to material resources and is "signified by the symbols through which the participants know, and acknowledge the validity of, the conditions under which they act. That acknowledgement reproduces the authority of the code, but may transform the conditions under which it is sustained" (Barrett 2000).

Although authoritative knowledge is reproduced in discourse, power also resides in the hegemonic ability of other agents to contest and resist this authority. "Even the most successful organization never goes unchallenged. The enactment of power always creates friction — disgruntlement, foot-dragging, escapism, sabotage, protest, or outright resistance" (Wolf 1994:223). Change becomes possible because of these tensions that exist between alternative forms of discourse and the evolving material conditions under which existing forms of discourse lose their authority (Barrett 2000).

Barrett (2000) argues that archaeologists need to move away from the patterning of things and employing concepts of space and time merely at the descriptive level. Rather, archaeologists need to examine the structuring of social relationships and the way in which these practices occupy time and space, a heuristic device termed the "field of discourse" (Barrett 2000). Society is ultimately not about things, but about systems of relationships, or fields. Societies comprise numerous fields (i.e., spiritual, artistic, intellectual, economic, etc.) that co-exist spatially and temporally but are nevertheless discrete and integrated with their own internal logics (Erikson and Murphy 2003). The archaeological record is evidence of various fields of discourse, each having a specific spatial, temporal and social context (although fields are not closed and may encompass, share or cross-cut other fields). A 'natural order,' or *doxa*, is maintained through daily routinized practice.

Practice is the shared grammar of action, the dispositions of which constitute socially acceptable behaviour. It is this mutually shared and understood, although 'fuzzy knowledge' of day-to-day practices, which results in the formation of the archaeological record. In this sense, time has a role in the maintenance of social structures. However, as Mizoguchi (1993) illustrates, time also has a role in the transformation of social structures. For example, when the memory of a specific ancestor was recalled, competition over dominant interpretations would have challenged pre-existing authority, operating within the larger internalized structures (Giddens 1984) or *habitus* (Bourdieu 1977) of society. Through such processes, practice was created and recreated, although subject to strategic manipulation by agents. "Individuals would have conceived of their actions as being basically the same as those of their predecessors, although they were unknowingly making changes in the rules" (Mizoguchi 1993). Over time, this process resulted in unintended transformation to the *habitus*, although the "rules which would have been embedded in people's consciousness would have been continuously transformed yet still conceived of as 'unchanged', cyclical' or 'frozen'" (Mizoguchi 1993).

The analytical strengths of this approach are that it is ultimately concerned with human relationships, not material entities; and that space and time are inseparable and fundamental to its definition (Barrett 2000). By exploring how bodies would have moved and structured interaction with landscapes and monuments, archaeologists can examine changing ways in which social practices, such as the mortuary ritual, are linked to particular forms of relationships between peoples and to particular forms of power (Hodder and Cessford 2004).

2.2 Spatial and Material Dimensions of the Mortuary Ritual

The spatial and material representation of death underlies the ritual actions of the living — it is the physical expression of individual decision-making and the long-term cumulative process of a society's shared dispositions about social structure. Over the short term, efforts to create, enhance, and maintain memories of the dead are unconsciously reinforced and simultaneously contested. Over the long term, this process is archaeologically visible as "the cumulative sum of reactions to past expressions and changing social and political circumstances" (Cannon 2002:192). This is information that can best be detected and interpreted through archaeological means (Bradley 1991; Gosden and Lock 1998; Mizoguchi 1993).

The strength of the Rocky Point burial cairn data rests in the fact that "the dead retain a place in the memories of the living and that memory is created and maintained by their placement in space" (Cannon 2002:192). The spatial dimension of death is a robust and meaningful focus for mortuary archaeology, which has traditionally lacked a unified theoretical perspective. In contrast to the functionalist explanations of the processualist and the contextualist approaches of post-Processual archaeology, emphasis on the historical and spatial dimensions of death and, further, social memory and identity, is a more coherent and integrated approach to the archaeology of death (Cannon 2002:192). This approach has great interpretative potential, as outlined by Cannon:

> Analysis of the spatial and historical dimensions of mortuary expressions, and explicit recognition of their basis in personal, social, and symbolic memory, are the foundations of an emerging approach to the archaeology of death. Spatial representations of death are viewed in this perspective as elements in the ritual creation and maintenance of personal and social memories of the dead to serve the needs and interests of the living (Cannon 2002:191).

It is during moments when people's awareness is seized and held, such as those during mourning for the dead, that the place on which that awareness is focussed becomes what Basso (1996:54) describes as a place of "reflection and resonating sentiment". It is at times such as these that people "step back from the flow of everyday experience and attend self-consciously to places—when, we might say, they pause to actively sense them — that their relationships to geographical space are most richly lived and surely felt" (ibid.). This understanding of place is:

> Fuelled by sentiments of inclusion, belonging, and connectedness to the past, sense of place roots individuals in the social and cultural soils from which they have sprung together, holding them there in a grip of a shared identity, a localized version of selfhood. (Basso 1996:85).

Hillier and Hanson (1984:82-90) state that human settlement is a product of the recursive application of rules and resources. As such, every settlement is both a member of a broad class of equivalency defined by a shared set of markers, while at the same time possessing discrete and unique characteristics that differentiate it from members of the same class. Although speaking of settlements for the living, I argue that the same syntax applies to places for the dead. The use and arrangement of mortuary space is related to social interaction, and that a practice (for example, building burial cairns) may be simultaneously shared by many yet specifically restricted or controlled (possibly by type and placement of cairn) according to rules and resources not equally available to all.

To provide a theoretical context for understanding the spatial and material expression of societal processes and relationships that may be expressed in the place and manner in which the Rocky Point burial features were built, the following section discusses four themes. These themes include mortuary ritual and the material record, monumentality, time and the mortuary ritual, and landscape.

2.2.1 Material Mortuary Ritual and the Material Record

This section is a discussion of mortuary ritual with specific reference to the social significance attributable to material culture and the archaeological implications of this process. Based on the brief discussion earlier, it is clear that there are shared topics in the archaeological and cultural anthropological literature regarding mortuary studies. Based on syntheses of mortuary ritual, I suggest that both archaeology and anthropology share four key themes relating to mortuary practice. These themes include treatment of the remains of the deceased by the living; material culture employed during mortuary ritual; aspects of the built environment including funerary structures and monuments; and lastly, specific ceremonies and practices as part of the mortuary ritual. Naturally there is overlap between and among these categories, particularly considering the enormously complex and creative practices typical of the mortuary ritual, and the underlying social subtext of the process, but this positing of themes is useful as a means of analyzing shared archaeological and anthropological approaches to the study of death.

As previously mentioned, archaeology by necessity places a particular emphasis on the material record and the physical remains of behaviour when examining the reflexive relationship between material culture and social practice. In regard to past mortuary practices, the four shared themes listed above, as employed by archaeologists, include first, the processing and elaboration of the remains of the deceased by the living. This includes acts such as embalming, defleshing, cremation and adornment of the remains with paint or pigments, textiles, or ornamentation, which may survive in an archaeological context. Second, the material culture employed in the mortuary ritual is preserved by the placement of material, with the bodily remains. This includes grave goods typically encountered by archaeologists, such as food remnants, domestic items, and other objects. Next, the built environment entails the nature and scale of funerary structures and monuments, structures which provide a great deal of information on the interrelationships between death, social structures, and society. Finally, the specific practices of the mortuary ritual that is expressed and preserved in the patterns of skeletal remains, material culture, and funerary structures.

There are recent examples of archaeological analysis acknowledging and addressing the multidimensionality of the mortuary ritual. For example, Kuijt (1996; 2001) examines Neolithic mortuary practices in the southern Levant, addressing all of the categories outlined above. Kuijt observes that the physical remains of mortuary practices at several sites, demonstrate that pre-Pottery Neolithic people practiced ritualized skull removal and secondary reburial. Sometime after death, graves were reopened, skulls were removed and decorated with paint and plaster to create a life-like appearance, and were reburied in the floor of communal courtyards. From this physical evidence, Kuijt hypothesizes how the creation of social memories and the assertion of group identities may have played important roles in the formation of these early agricultural communities by "the interweaving of social memory, death, and place" (Kuijt 2001:80). Further, he suggests that the mortuary ritual may have functioned as a means of social integration and negotiating equality, in that "powerful communal acts symbolically and physically linked communities and limited the perception or reality of social differentiation" (Kuijt 1996:313).

A similar approach was also recently applied by Hastorf (2003), in which community creation and social experimentation, charged by mortuary ritual, were practiced at the Formative Period site of Chirpa on the Taraco Peninsula of Bolivia. During the Spanish conquest, the role of ancestors among the indigenous peoples of the Andes as an important focus of power was documented by the Conquistadors. Hastorf's archaeological work suggests that ancestral worship and the perpetuation of power was achieved long before the arrival of the Spanish through burials and mortuary rituals, as well as the creation of ancestral space by the strategic placement of monuments. She explores the place of burials in the Andean world and the creation of community through mortuary ritual and how mortuary practice plays a central role in personhood, kinship, and social memory over a 1500 year period (Hastorf 2003:328). Variations on this approach have also been recently employed in studies of personhood and mortuary ritual among the Maya (Gillespie 2001), the role of death and mortuary ritual in Natufian social structure (Byrd and Monahan 1995), matrilineally-ascribed group membership and affinities for specific burial practices from a Neolithic cemetery at Lake Baikal in Siberia

(Mooder, et al. 2005), and the implications of mortuary ritual and biological kinship in protohistoric Germany (Harke 2000).

Ethnographers have also documented these same categorizations of mortuary practice and like the archaeological examples above, this focus on material culture and the built environment of the dead illustrates the fundamental intersection between the creation, maintenance and contesting of identities and social memory during the memorialisation of the dead.

As the above examples show, archaeologists and ethnographers have recently begun to approach the concepts of group and individual identities, the structuring forces in communities such as social hierarchies, kinship and gender, and the practice of ritual. For example, archaeologists are currently refining interpretations of mortuary rituals through employing key practice theory concepts of agency, personhood, structure and practice (Bourdieu 1977; 1990). Ethnographers, characteristically earlier than archaeologists, have been using practice theory as a means of addressing the tensions between structure and agency in human cultural expresion (Battaglia 1992; Connor 1995; Foster 1990; George 1996; Graeber 1995; Hodder 1991).

One element of the mortuary ritual not adequately addressed by practice theory is reflexive and conscious individual decision making, which is prevalent in most contemporary studies of past and present funerary ritual. So while all individuals and groups work within a social structure and although no one person has a perfect knowledge of the whole structure, "people are aware of the material and social constraints that affect their daily lives and actively negotiate their position in society within these constraints" (Stone 2003:41). This is at odds with Bourdieu's concept of *habitus* in the sense that he argues that individuals are largely not conscious of these constraints, and therefore do not consciously and reflexively negotiate their social identities. I suggest, however, that death and the funerary ritual are not everyday life, but rather a liminal or "in-between" state. The mortuary ritual includes the opportunity of renewed discussions concerning social categories and rules, thus making transitions between sociocultural categories possible. Consequently, social categories are thus defined, overstepped, and redefined (Barrett 1996).

Based on this recent trend in approaching mortuary ritual as a form of *habitus* Cheeson (2001:3) identifies five topics shared by archaeology and ethnography that resonate in this current discourse in mortuary behaviour. Introducing these topics briefly, the first entails mortuary ceremonies as public venues for the assessment of social relationships. The second theme addresses the nature of identity, social memory and social structures, incorporating ideas of "biological death" and "social death". The next theme is awareness that identities and social memories are asserted through ritual performance and material culture. Next, the constructing, and reconstructing of social memories occurs in a ritualized context. Finally, that there must be a consideration of emotional response and the nature of the lived experience involved in the expression of the mortuary ritual.

These themes are central to a more humanistic, practice-centred understanding of mortuary ritual. Following is a discussion of how archaeologists and ethnographers have approached these subjects in the research of mortuary practices, and the implications of this manner of research in implementing a more integrative understanding of past and present society.

The public nature of mortuary ritual, particularly secondary ceremonies, have been recognized by archaeologists and anthropologists as public forums for communicating and assessing individual and group identities and social memories (for example Fentress and Wickham 1992; Gillespie 2001; Hastorf 2003; Hodder and Cessford 2004; Kuijt 2001; Schiller 1997).

Archaeologists and ethnographers have also approached mortuary ritual in the creation and assertion of individual identity and "personhood," with more traditional archaeological analyses examining the social structures of status, rank and to a lesser degree gender. Most archaeological themes have viewed the material record of mortuary ritual as indications of social hierarchy and elite control of surplus non-elite labour (Brown 1981; O'Shea 1981). For example, early theoretical work on the study of mortuary practice, such as that by Saxe (1970) and Binford (1971) attempted to define cross-cultural laws, viewing the process of burial as a faithful reproduction of social organization. There are significant flaws with this approach, including the assumption that archaeological evidence is an exact reproduction of social structure; the over-reliance on generalized ethnographic analogy; a de–emphasis on the role of ritual and ceremony of death and burial; and the assumption that all people in the community shared a single attitude about death. So whereas the concern for archaeologists, particularly during the initial stages of mortuary analysis, should be in the quantifiable identification of structural patterns and their potential meanings, it is only when archaeologists understand what is being symbolized by burial that other inquiries into social structure can take place. For example, Williams (2004) asserts that the bodies of the dead themselves, which are typically perceived by archaeologists as merely osteological data, have social and mnemonic agency, and that the cremated bodies and ashes of the human body and the cremation rites of Early Anglo-Saxon Britain operated as practices of remembrance. He argues that cremation encouraged distinctive forms of engagement with the physicality of the dead, which possess material agency, thereby influencing the selective remembering and forgetting of the deceased's personhood (Williams 2004).

In addressing the idea of "personhood" in mortuary contexts, anthropologists are increasingly recognizing the distinction between "biological death" and "social death" and how these emic conceptions of death are critical (for example Lock 1997, 1999). It is through the primary and secondary mortuary rituals that people often enact a series of stages in which the deceased's social death follows his or her physical death, a process by which the dead leaves the realm of the living and successfully joins with the community of ancestors (Feeley-Harnik 1989; Kan 1989). In addition to this transitory ritual, mortuary ceremonies are a public venue in which to assess relationships, identities and social memories, a significant integrative process for the community (Metcalf and Huntington 1991).

The socially unifying force of secondary mortuary rituals is exemplified by Kan (1986; 1989) in his study of the Tlingit memorial potlatch as it was practiced in the 19^{th}-century. Kan observes that the community created and recreated the social order in the context of mortuary rituals, the basis of which was an encompassing ancestral ideology. By focussing on the emic characterization of the ritual as the "finishing of the body," Kan illustrates how it resembles other global rites of secondary treatment of the dead, applying a Hertzian theoretical model (Hertz 1960; Huntingdon and Metcalf 1979) to the transformation of the deceased, the mourners and their affines (Kan 1986). Tlingit funerals reconstituted the dead into a resource for the living, transforming death "from a threat to the social order into the major opportunity for strengthening and enhancing it" (Kan 1989:288). The Tlingit memorial potlatch emphasizes the relationships with the dead, how that death potentially affects the relationships within the community, and how the mortuary ritual directly addresses the communal tensions caused by that death.

In Kan's discussion of social order and the conception of personhood, or what Donald (1990) suggests as Tlingit ethnopsychology, it was the aristocratic elite who dominated Tlingit ideas of what a person was and should be (Donald 1990:482). Naturally, this hegemonic situation makes it difficult to address the views of other segments of society, which is a significant and larger theme within the study of identity and mortuary practices. The diversity of the social positions of the peoples participating in mortuary rituals is significant in the context of the breadth of human experiences. To expand on this, each participant may have ties to different social groups that have competing interests, forcing agents to continually negotiate these complex interrelationships within different segments and factions of society (Meskell 1999). Furthermore individuals may approach their role in any given mortuary ritual from a position different than that otherwise held in the social hierarchy, For example, at the New Kingdom site of Deir el Medina in Egypt, Meskell (2001) utilizes ethnographic, archaeological and historical data to explore the issues of identity and emotion associated with death across the social spectrum. Extracting information about attitudes toward the body and selfhood from text, and collecting archaeological data from a cemetery at the site, Meskell describes, in the context of Egyptian belief systems, how the individual self persisted after death. The Egyptians at Deir el Medina believed in five essential components of identity: name, personal magic, vital force, shadow, and personal character. This multiply-constituted identity was used by individuals to transcend death, acting as powerful agents for the living and creating and maintaining connections between the living and dead members of society. The transcendence of death, reflected in family tombs, offerings, festivals and other commemorations, bound together people through life and death, providing a foundation for the creation of a shared social memory and of identities (Meskell 2001).

Linked closely with the creation and assertion of identity, the issue of adornment, performance and material culture offers meaningful insight for archaeologists and ethnographers in how people use material culture in the context of the mortuary ritual. To paraphrase Gosden (1994), the material world is not a passive medium for social action, but a set of material forces which play a role in human action. In fact, a single symbol "represents many things at the same time: it is multivocal, not univocal. Its referents are not all of the same logic order but are drawn from many domains of social experience and ethical evaluation" (Turner 1969: 52). As Jones suggests, material culture is used in mediating social relations and social strategies (1997:113). As such, the choice of symbols and the instances of their usage are not random but predicated upon being used correctly by the sender and understood by the receiver, if they are to be meaningfully displayed as a form of social communication or performance (Rothenbuhler 1998), although there is some latitude and variability in both the understanding and the successful use of symbols depending upon the sender and receiver's status, gender, and kin relationships within society (Stone 2003). During mortuary rituals, people often adorn themselves and the dead with material culture that reflects the complex relationships between the living, the deceased and the community.

In her analysis of Formative period burials at Tlatilco, Mexico, Joyce (2001; 2004) also addresses the use of material culture in the mortuary ritual, analyzing the patterns of objects associated with individual burials at the site. She explores the placement of different types of grave goods with the dead during the mortuary ritual, surmising the nature of the relationship between the deceased and their mourning community based on the social significance of these items. Joyce traces the trajectory of identity and memory from statistical trends in interments of female individuals to discussing the particular lives of women who lived, died, and subsequently were buried at Tlatilco. She argues that neither perspective alone is a sufficient focus of study. Whereas each approach complements the other, without a particularistic examination, burials as social occasions will be lost under the weight of their decontextualization (Joyce 2001). Expanding on this, Joyce proposes that:

> Burials deserve their privileged place in archaeology because they are one of the few locations where past ritual practices are preserved in structured form. But they do not passively reflect social reality at the time they were created. Instead, they were active media for the constitution of social relations in ongoing time: points in individual biographies that were partly freed from individual biography to become strands in wider social histories, not only through oral tradition but also through their physical reworking over time. Providing precedent for later practices, burials allowed the construction of relations of continuity through repetition. They facilitated the linking of historical practice to place, through their permanent emplacement in locations whose character derived in part from the presence of the dead. (Joyce 2001:22)

These approaches to material culture and performance as exemplified by Joyce (2001; 2004), are in contrast to earlier archaeological approaches in the reconstruction of social structure using the materiality of burial evidence (for example Brown 1981; Chapman, et al. 1981; Roberts, et al. 1989; Saxe 1970). The most regularly used processualist method was to examine one or more aspects of the scale of the burial custom, such as associated grave goods or the form of the entombment and the location of the cemetery, and to correlate these factors with rank or status (Brown 1981; O'Shea 1981). Somewhat more recent theory, primarily originating in Britain, has concentrated on historical contexts for the explanation of burial practice, in particular, focussing on the importance of ideological processes in burial (for example Bradley 1984; Tilley 1993; Whittle 1988). This post-processual tautology, fraught with 'cautionary tales,' ultimately leaves one questioning the utility of burials as a source for identifying meaningful interpretations of social practice. This has been countered recently (Barrett 2000; Kuijt 2001; Meskell 2001 and many others) with Joyce suggesting that "ancient burials can be viewed as particularly charged sites where living survivors inscribed the dead into social memory in particular ways, as part of an ongoing process of spinning webs of social relations between themselves and others" (2001:13). Further, the biographies of the deceased are the material from which social memory and identity are created, maintained and contested. Imbued with social meaning, the recursive manner in which the mortuary ritual is conducted and the burial settings are constructed is an extension of those established social histories (Joyce 2004).

Continuing with the discussion of approaching mortuary ritual as a form of *habitus* is the issue of constructing social memories in a ritual context. Archaeologists rely on the material remains of the mortuary ritual to understand the means by which people commemorated the dead and created social memories of individuals, groups, and communities. Many archaeologists have recently addressed the issue of social memory in mortuary rituals (Cheeson 1999a, 1999b; Dillehay 1990; Gillespie 2001). For example, in *Tombs for the Living*, Dillehay (1993) explores commemoration in both prehistoric and historic Andean communities, demonstrating how commemoration of the dead and the creation and recreation of traditional practices link the past, present and future in the physical monuments and the memories associated with individuals and communities.

The final point is the consideration of emotional response expressed through the mortuary ritual. The death of a loved one is naturally a deeply emotional experience for many of the family, friends and community of the deceased. The expression of emotion at mortuary rituals often reflects the complex relationship between societal restraints and the person's obligations to the living participant's network of social, political and economic ties (George 1996; Kan 1989; Metcalf and Huntington 1991). Although each society has conceptions of duty and beliefs about death that shape and inform the expression of emotions at mortuary ceremonies, Metcalf and Huntington (1991) address the difficult issue of emotional expression in living societies. Some researchers however have broached the subject of imparting emotion on the prehistoric past in the burying of their dead, such as Joyce (2001) and Meskell (1999), both discussed earlier in this chapter.

Although the variability of emotional behaviour makes archaeologists wary of its interpretation in the past, the social constructivist view of emotion, which stresses the way in which emotional responses and experiences are created socially can be insightful (Harre 1986). According to this perspective, death is an emotional experience, but the nature of the emotions surrounding it and the responses to those emotions are socially created. Material culture is thus involved in the structuring of emotion, making both available to the archaeologist. For example, war memorials produce and enable certain emotional responses. The form and location of the memorial not only reflects the grief of the bereaved, but also shapes the understanding of bereavement in war by establishing spatial and figurative structures of remembering, through the meanings associated with them, such as community, identity, death, and redemption (Tarlow 1999:183).

Perhaps the most thorough and immersive examination of emotion in the mortuary ritual is that of Tarlow (1999), who examines death and remembering, specifically how death, bereavement, and commemoration have been understood in British society in the 500 years between the Reformation and the Second World War. Although there has been a large volume of research done on historic cemeteries both in the United States (e.g. Bell 1994; e.g. Dethlefsen and Deetz 1969; Meyer 1993) and Britain (e.g. Cannon 1989; e.g. Mytum 1993; Rahtz and Watts 1983), the potential for historical cemetery research is huge and archaeologists have barely begun to explore it, particularly in terms of more complex, social and political analyses. One of Tarlow's main objectives is to:

> emphasize the importance of emotional experience in structuring social, political and economic relationships in the past, and to stress the importance of material culture in representing and constructing those experiences. The history of burial in the post-Reformation period in Orkney can be seen as a history of emotion, of changes in the objects and the nature of sentiment. (Tarlow 1999:183)

In broaching the range of metaphors, emotions, rituals and practices through which people understood bereavement and mortality, Tarlow also addresses the way that death was understood throughout 500 years of dying and remembering, ideas which changed significantly during that time.

2.2.2 Monumentality

In recent years, the megalithic monuments in Europe have been interpreted as socially constructed community narratives. A community's history was materialized by constructing durable symbolic artificial artifacts and constructions, particularly megalithic graves. Monuments were time markers on the landscape and carriers of material memory which were meant to endure for the coming generations (Holtorf 1997; Ingold 1993). Neolithic monuments marked significant sites, and the memories associated with these sites were expressed, interpreted, idealized, and renewed in oral narratives. The construction of monuments would have required remarkable efforts and concentration of the available labour of the Neolithic community and as such it is generally thought that the monuments were erected in a period of social inequality and therefore are expressions of power (Earle 1991). Essentially, these models all view monumentality as an elite theme, "more often reduced to accentuated social hierarchy and elite control of surplus non-elite labour rather than as the outcome of processes that are characteristic of the changing relations and strategies between different social groups (Barrett 1990; Dillehay 1990).

Monumentality, however, is not absolute. As a representation of prestige, visibility, and durability, it is likely that each community relates to its own cultural traditions and prevailing socioeconomic and natural circumstances. The size of mortuary monuments may have less correlation to the political or social power of the person buried inside than on other cultural considerations, for example beliefs about death instead of individual social status or ethnic identity may dictate the style, material and form of a mortuary monument (Rainville 1999). In his ethnoarchaeological study of the Mapuche society of south-central Chile, for example, Dillehay (1990) notes that deceased chiefs were buried in earthen mounds, the size of which was dependent upon the duration of office of the dead chief's successor and the number of relatives participating in the mound building, rather than on the actual power of the chief himself. Cannon (1989) demonstrates that ostentation in mortuary behaviour does not always correlate with elite families. For example, ostentatious mortuary elaboration can at first separate elites from non-elites, but non-elites often imitate this elaboration. This results in what Cannon calls "expressive redundancy" wherein elites are no longer symbolically separated from non-elites who aspire to copy the material symbols associated with higher status. When this occurs, elites often turn to less elaborate mortuary practices, such as the adoption of less elaborate or plain headstones in contrast to more elaborate non-elite markers, a phenomenon observed recently at several historic cemeteries in the United States (Rainville 1999; Small 2002).

2.2.3 Time and the Mortuary Ritual

Change through time is a hallmark of archaeological research, and no other discipline is better suited to the study of material culture and ideological change through time than archaeology (Mizoguchi 1993). Many researchers have investigated the diachronic change in mortuary practices as an avenue to potential insights into changing societal structures and institutions (Cannon 1989; Goldstein 2002; Kuijt 1996; Mizoguchi 1992; Small 2002). For example, drawing upon archaeological data from an early urban community in the Early Bronze age settlement of Babe dh-Dhrá in present day Jordan, Cheeson (1999a; 2001) explores how living members of a community mapped individual and group identities onto themselves and the deceased in the creation of social memories. She links the interplay between the archaeological data (grave goods, the nature and timing of the memorial ceremonies, and the biological sex of individual burials) with the changes in household structure, kinship systems, and the interaction between men, women, and children during the early period of urbanization. Diachronic changes in mortuary practices, in particular the transition from shaft tomb burials to charnel houses, were associated with the transition from a nonsedentary lifestyle to settled life in a fortified town, and a subsequent return to rural life (Cheeson 1999b). Cheeson's research illustrates that with each profound shift in lifestyle there was a fundamental change in the societal bonds of the community, particularly with respect to kinship. The process of urbanization and ruralization transformed relationships and ultimately social memories among and between individuals on multiple levels, as local as between genders (or more accurately biological sexes), kin, and households, to the broader community at Babe dh-Dhrá.

2.2.4 Landscape

The aspects of social structure discussed earlier in this chapter and the concepts of materiality, monumentality and time as expressed through the mortuary ritual are compiled on the landscape, a culturally interpreted material record that consolidates the ties between the past and the present. Tradition, experience, and description structure landscape. The landscape is composed of a continuum of historical events, which constitutes both the medium for, and the outcome of action, movement, and memory. The landscape is a means of conceptual ordering that stresses relationships (Richards 1996; Tilley 1996), a "formalization of the social landscapes of daily life" (Richards 1996).

In contemporary social sciences literature, landscape has been seen more frequently as a sociocultural construction, examined from varying angles with an emphasis on the meaning of the landscape, the textuality of the landscape, or the landscape as memory. New cultural geography has adopted a view emphasizing description and representation, which is often interested in the individual experience of a place, and its social context. Typifying the new cultural geography approach, Barrett sees landscape as:

> the entire surface over which people moved and within which they congregated. That surface was given meaning as people acted upon the world within the context of the various demands and obligations which acted upon them. Such actions took place within a certain tempo and at certain locales. Thus landscape, its form constructed from natural and artificial features, became a culturally meaningful resource through its routine occupancy. (1991:18)

Landscape can be perceived as a means by which to observe and analyze the cultural environment. Landscape always contains subjects which produce and renew the significances and discourses of landscape (Knapp and Ashmore 1999). The concept of landscape applied in this thesis might be labelled as a 'symbolic landscape', embodying elements of constructed and ideational landscapes (Knapp and Ashmore 1999). Landscape is a lived context experienced by human beings; gaining structure from human activity carried out through it; it is more than a place but also a process (Ingold 1993).

Constructed landscapes consist of even subtle construction of the landscape by people, which can transform meaning without radically changing the topography (Bradley 1993). Ideational landscapes are both 'imaginative' and emotional, depicting the emic perception of landscape. Ideational landscapes can "provide moral messages, recount mythic histories, and record genealogies, but we can not assume that they always or necessarily comprise the kind of unified, fully articulated doctrine commonly implied by the word "ideology" (Knapp and Ashmore 1999).

It has been argued that approaches emphasizing the cultural meanings of landscape are subjective, tempting the researcher to make far-reaching interpretations regarding a landscape's features and elements. Others still argue that direct access to the interaction between landscape and people is possible only through historical sources or ethnographic analogies (Stoddart and Zubrow 1999). However, if it is possible to demonstrate in the landscape empirical patterns or configurations of monuments, which cannot be explained as pure coincidences or as consequences of formation processes or field methodology; it makes sense to attempt an interpretation based upon what we have learned about the way in which peoples structured their constructed and ideational landscapes. In this respect, the interpretation of the evidence does not differ from other interpretations of archaeological material.

Social memory and landscape are inexorably linked, solidified and generalized by the tensions between 'practices of bodily incorporation' and 'practices of inscription' (Connerton 1989). The bodily practices of the short-term social time, although unpredictable, are open to influence and renegotiation (Herzfeld 1991), whereas inscriptional practices "make permanent more ephemeral actions and appearances, and separate them from their locally situated position in the bodies and lives of particular persons" (Bachand, et al. 2003). Inscriptional practices are marked in monumental time, structuring events as "realizations of some supreme destiny, and it reduces social experience to collective predictability. Its main focus is on the past-a past constituted by categories and stereotypes" (Herzfeld 1991). Agents in Late period Straits Salish society would have had the embodied experience of comparing themselves against these inscribed ideals of the past, reinforcing and asserting group membership and identity

(Bachand, et al. 2003). There was likely enough flexibility for agency within this structure for some members to subvert this permanence, thereby detaching their embodied personhood from group membership, allowing some to create new social histories legitimated by the permanency of the grave (Bachand, et al. 2003).

It is well documented that many non-western societies divide space according to their conceptions of the mythological or cosmological order, which is often a reflection of the human social order itself (Hugh-Jones 1979). Human beings, therefore, consider themselves to be very much a part of the landscape in which they live, interacting with the world around them on a physical as well as a symbolic and spiritual level. The experience and structure of space and landscape takes place within the context of people's preconceptions. Landscape itself does not have an inherent meaning, but becomes a text that that is uniquely understood by those who apply meaning to the place (Thomas 1990). Landscape is transformed from a physical place to a symbolic or ideological concept and this becomes inscribed upon a location, strongly influencing the way in which others within the same region will dwell within and interpret it (Richards 1996).

2.3 Summary of Theoretical Perspective

In summary, there is a complex mosaic of relationships between kinship, social identity and landscape, which together under the rubric of *habitus* form the basis of the mortuary record. This inter-dependence suggests that changes in the material expression of the mortuary ritual, such as the emergence of burial cairns and mounds in the Strait of Georgia, may denote cascading shifts in kinship and social structure, the conceptual ordering of space on the landscape, and notions of identity, possibility at multiple scales.

The theoretical framework presented here will be used to address the morphological and spatial patterning, if any, of burial cairns and mounds at Rocky Point subsequent to the analysis.

3 The Rocky Point Cemetery: Context and Description

This chapter is an introduction to the Rocky Point burial cairn site, with the intention of contextualizing the thesis questions regarding burial cairn morphology and the spatial dimension of cairn placement at Rocky Point within the larger framework of the local landscape and the known archaeological record.

This chapter begins with a discussion on the physical landscape of Rocky Point and a brief introduction to DbRv-3, as well as a short history of archaeological work at the site. This is followed by a discussion of the archaeological context of burial cairns and mounds in the Strait of Georgia and the current body of knowledge surrounding the social dimensions of the transitional Marpole/Late period. The chapter is concluded with a discussion of the early history of burial cairn research in Victoria and a synthesis of the results of this work regarding burial cairn construction and spatial patterning.

3.1.1 The Rocky Point Physical Landscape

The Rocky Point Training Area and Ammunition Depot is a Department of National Defence property situated approximately 16 km southwest of Greater Victoria, in the Municipality of Metchosin (Figure 1). The property encompasses the majority of a large peninsula-like landmass between Pedder Bay to the east and Becher Bay to the west (Figure 2). The Rocky Point property is 1052 ha in area, with over 12 km of coastline. In contrast to Greater Victoria, Rocky Point is a largely undeveloped. This translates into a landscape with a rich and diverse record of precontact land use and ecological diversity that has been largely fragmented or destroyed elsewhere in the Greater Victoria area.

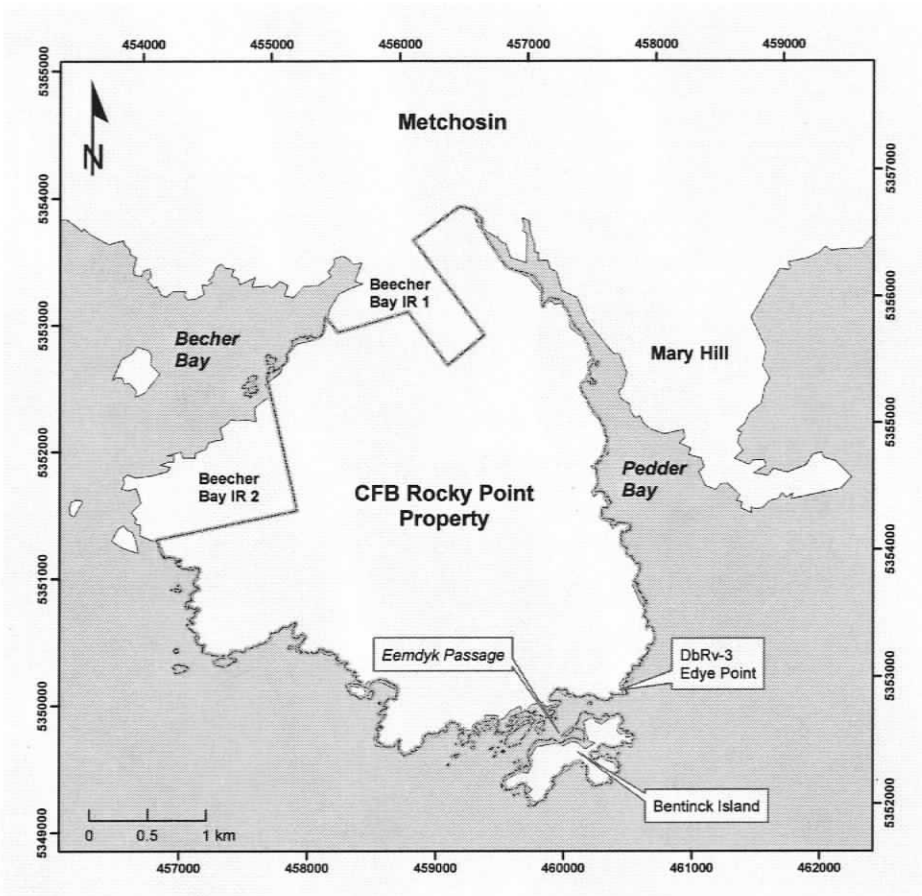


Figure 2: The Rocky Point property, showing location of DbRv-3.

The surficial geology of the eastern half of Rocky Point is part of the Metchosin Igneous Complex (Yorath and Nasmith 1995) which in the vicinity of DbRv-3 is locally characterized by Tertiary-aged gabbro (Timpa 2004). The western half is within the Metchosin Volcanics Formation, which is comprised of pillow basalt, breccia, and tuff, all with a low to medium grade metamorphism (Yorath and Nasmith 1995). Terrain within the immediate study area is relative flat, with low bedrock outcrops and a rocky veneer of ice-proximal glaciofluvial sediment and reworked till (Huntley 1998:4). Erratics are common. The Metchosin Igneous complex bedrock and glaciofluvial till are the principle materials with which burial cairns at DbRv-3 were built. West of the Rocky Point site, terrain has considerably more vertical relief, with undulating rocky terrain characterized by many very large steep-sided hills, gullies, and numerous bedrock exposures.

Located in the rain shadow of the Olympic Mountains, the eastern half of Rocky Point is typified by a cool Mediterranean climate. Summers are temperate and dry, often to the point of drought, and winters are wet and rarely very cold. This climate, rare to the Canadian landscape gives way to a more transitional climate westward along the coast (Hardie and Mondor 1976). Rocky Point is somewhat more exposed to the stormy influence of the Strait of Juan de Fuca than nearby Victoria. Fog is prevalent along the coast from Race Rocks to Beechey Head during the fall and winter. A maritime climate occasionally intrudes onto Rocky Point, bringing with it cool, wet and foggy weather primarily between fall and spring (Hardie and Mondor 1976). The southeasterly and southwesterly gales that blow frequently in the fall and winter months subject Rocky Point to stormy weather.

Rocky Point is an important habitat for a diverse community of marine and terrestrial flora and fauna. The project area is within the Coastal Douglas Fir (CDF) biogeoclimatic zone (Nuszdorfer, et al. 1991) and paleoenvironmental studies indicate that relatively modern environmental conditions, with local minor variations, were established by 4500-3000 years before present (Hebda 1995; Mathewes 1985). The Coastal forest region at Rocky Point is composed of the Douglas-fir dry forest. The parkland shore is dotted with groves of Arbutus and Garry Oak tree species characteristic of regions without harsh climatic extremes (Pojar and MacKinnon 1994). Outside of the

Gulf Islands, Rocky Point has the best represented arbutus and Garry oak parkland in the province (Mondor 1976). West of Rocky Point, toward the Sooke Peninsula, Garry oak gradually disappears and the parkland character is replaced by coastal forest.

Marine fauna species of the southwest coast of Vancouver Island gradually merge at Rocky Point with the species of the exposed heavy wave action west coast of the island. Species entering Juan de Fuca Strait from the more open Pacific extend their range to the semi-exposed coast in the western portion of Rocky Point but gradually disappear from the more sheltered environs eastward to Victoria (Hardie and Mondor 1976).

Paraphrasing Hardie and Mondor (1976), a number of cetaceans and pinnipeds frequent the shorelines around Rocky Point. The most common of these are the harbour seal, the northern sea lion, the California sea lion and the harbour porpoise. Principle near-shore, shallow water fish species common to Juan de Fuca Strait can be found at Rocky Point, including dogfish, lingcod, black rockfish, and greenling. Intertidal fauna include echinoids such as green and purple sea urchins, and the reddish sea cucumber. Barnacle, mussels, snails and the limpets are frequent in the upper intertidal zones at Rocky Point (Hardie and Mondor 1976). Clams are somewhat less conspicuous at Rocky Point relative to greater Victoria, as outside of the head of Pedder Bay, there is a general lack of salt marsh, lagoon and tide flats. However, shellfish, particularly butter clam, and other bivalve molluscs, are still relatively common in the shallow bays and tide flats in the eastern half of Rocky Point (Hardie and Mondor 1976).

There are abundant year round birds at Rocky Point, in addition to common or uncommon migrants and winter visitors. Many mammals common to the Coastal Forest and Gulf Islands Biotic Regions can be found at Rocky Point. Some species of shore land mammals are distinctive and unique to Rocky Point, such as the Columbian blacktail deer (Hardie and Mondor 1976). The river otter, the mink, the short-tailed weasel and the racoon are frequently seen along the shoreline areas. Larger predators such as the cougar and the American black bear are also known to sometimes frequent areas of Rocky Point and Becher Bay.

The shoreline along Eemdyk Passage, fronting the cairn site DbRv-3 and the nearby shell midden site DbRv-2, deserves specific mention. Located on the southeast side of Rocky Point opposite Bentinck Island, Eemdyk Passage (Figure 2) is the most biotically productive body of water in the area. It has strong ocean currents with shoals and reefs, kelp forests and intertidal habitats, providing a home to marine mammals such as killer whales, harbour seals, otters, minks, sea lions, porpoises and baleen whales (Hardie and Mondor 1976). The shoreline is characterized by protected bays with shingle beaches, largely sheltered by Bentinck Island from the southeasterly winter winds. In addition, Eemdyk Passage would have likely served as the main water transportation route through the area prior to European contact, as traversing the outer coast of Bentinck Island between it and Race Rocks is an extremely treacherous water body. The outer shoreline of Bentinck Island has been the location of a number of shipwrecks (Mathews 2003). Despite tidal currents, Eemdyk Passage would undoubtedly have been the preferred water route for those travelling from the outer coast of Vancouver Island east towards present day Victoria.

To summarize, the physical geography and environment in which DbRv-3 is situated is biotically productive, and was likely a very significant and important landscape for the precontact Straits Salish people. In many ways it is a transitional landscape from the outer coast of Vancouver Island and the inner protected coastline and waterways approaching Victoria. Eemdyk Passage was likely the route by which most people travelled by boat through the area, as well as an economically significant waterway for local inhabitants. This bottleneck effect of forcing people to use Eemdyk Passage and therefore pay reference or homage to its inhabitants, both living and dead, potentially made the shoreline of Eemdyk Passage a socially significant and strategic location for the Rocky Point cairn cemetery DbRv-3.

3.2 An Introduction to the Rocky Point Cemetery

DbRv-3 is one of the largest remaining and undisturbed burial cairn and mound sites in British Columbia. The site is situated on the east side of the Rocky Point Training Area near Edye Point (Figure 3). The majority of the features at DbRv-3 occur within 400 m of the shoreline, on relatively low and flat terrain. A total of 382 petroform features have been recorded at the site (Figure 3). Most of these features (323) are burial cairns, with smaller numbers of burial mounds (10). The types and proportions of these features are discussed in more detail in Section 4.2. The burial features occur in a variety of shapes and sizes, ranging from circular to square to irregular features with poorly defined shapes. Features were made with locally available cobble and boulder-sized glacial till, weathered bedrock, and soil. There appear to be significant preferences for the types and relative proportions of material selected as well as distinct methods used in the construction of these features. Combining these simple attributes of feature shape, constituent materials, and method of construction, there are definite patterns in how people were choosing to build these graves. Furthermore, there appears to be distinct clustering of features on the landscape. Therefore, the observable and quantifiable morphological attributes of these features, combined with their placement on the landscape, presents a significant opportunity to identify socially meaningful patterns in the use of mortuary space at DbRv-3.

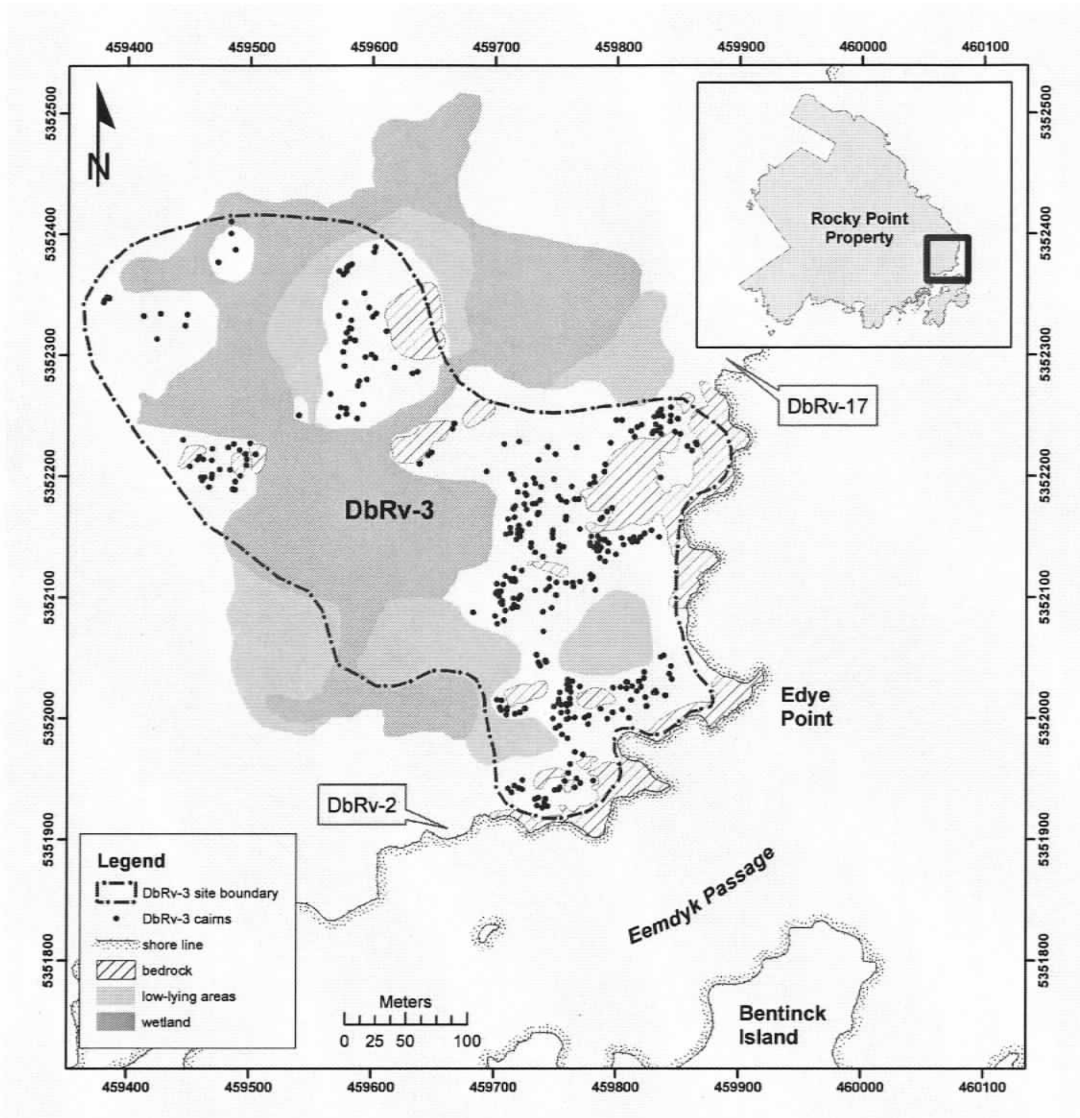


Figure 3: Archaeological site DbRv-3.

3.3 History of Archaeological Research at DbRv-3

The current research follows several previous archaeological investigations at the Rocky Point property. The first recorded mention of burial cairns at Rocky Point comes from Harlan Smith, who noted that "Mr. [Albert] Argyle reported some [cairns] at Rocky Point, which is about twenty-two miles by road southwest of Victoria, in Metchosin County, and on Church Hill near Beecher Bay, a mile and a half beyond Rocky Point" (Smith and Fowke 1901:58). As outlined in more detail in the following Section 3.5, Harlan Smith did not actually travel to Rocky Point to see the cairns in person, although it is implied that Argyle subsequently excavated a number of them on his own volition. Incidentally, a recent systematic survey of Church Hill did not identify any burial cairns (Mathews 2004).

The first contemporary reference of DbRv-3 comes from Don Abbott and Nancy Condrasshoff of the British Columbia Provincial Museum, who made two trips to Rocky Point, one in 1962 and a second in 1974. It was during the earlier visit that Abbott preliminarily recorded the large burial cairn site DbRv-3, which he described on the provincial site form as "Practically undisturbed. Cairns in best condition of any observed. Magazine personnel taking pains to preserve them." Other than these brief comments, no other information was noted.

In 1999, a partial and judgemental archaeological inventory of the Rocky Point property was completed by Millennia Research Limited, with a focus on the coastal portions of the property (Dady, et al. 1999). These baseline data provided some indication of the density and distribution of the largely intact and undisturbed archaeological sites at Rocky Point, identifying 20 new archaeological sites and revisiting the six previously recorded sites discussed above. The project was limited to select portions of the property and site boundaries and significance were established by visual assessment only. Considering these limitations, the 1999 inventory provided a preliminary framework upon which the current inventory was built.

Between July 23, 2003 and March 31, 2004, an archaeological inventory study was conducted at Rocky Point to identify and record all physical evidence of past human activities predating AD 1950 (Mathews 2004). The inventory documented 19 additional archaeological sites with burial cairns and was also the first detailed recording of DbRv-3. During the 2003-2004 inventory, DbRv-3 was revisited and considerable time was spent surveying and documenting the burial features. Based on these observations, it is concluded that DbRv-3 is an extremely large pre-contact mortuary complex comprised of at least 244 burial cairns, mounds and other petroforms distributed over a 3-hectare area (Figure 3). Culturally modified trees (CMTs) and historic materials were also recorded within the boundaries of the site (Mathews 2004).

The current project was initiated in July 2004 by the author under the terms and conditions of Environmental Sciences Advisory Committee Permit P104, issued by the Department of National Defence. The Scia'new First Nation was consulted during the permitting process and approved of the project objectives and methods. Fieldwork was conducted at DbRv-3 between July 2004 and April 2006. The scope of the fieldwork and the methods used during the present study are outlined in detail in Chapter 5.

3.4 Burial Cairns: The Archaeological Context

Prior to 1,500 years ago, simple flexed midden burials were the primary means of interment with the deceased placed in shallow pits dug into midden. Occasionally some of the graves had very elaborate mortuary inclusions associated with them (Burley and Knusel 1989). Sometime shortly thereafter, some people were buried in elaborate cairns and mounds at certain sites in the Strait of Georgia region. The known distribution of burial cairn and mound sites is illustrated in Figure 4. Like midden burials, these graves contained single burials representing the entire demographic of age and biological sex (Thom 1995). This may mark a significant ideological shift in the concepts of social organization.

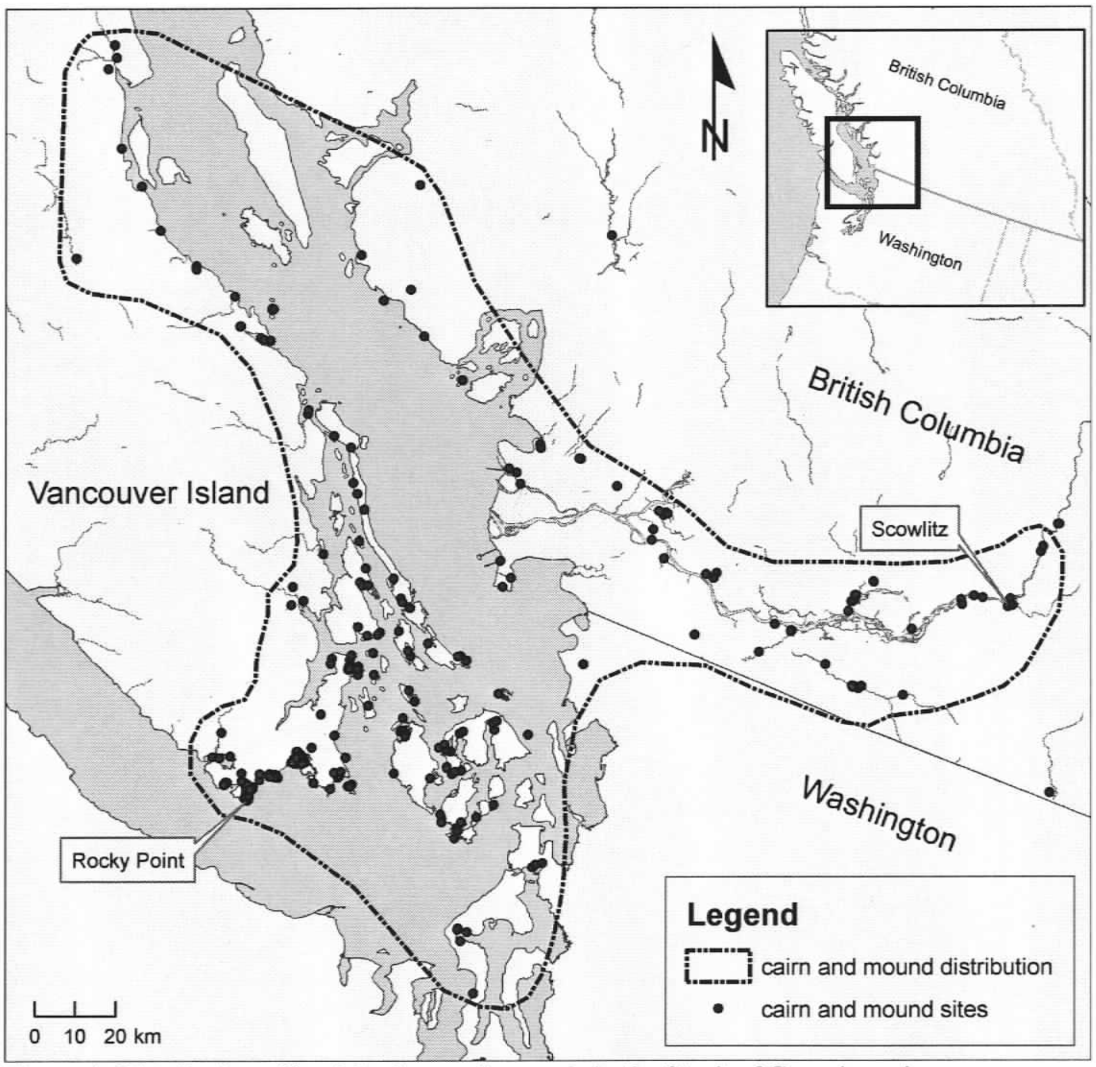


Figure 4: Distribution of burial cairns and mounds in the Strait of Georgia region.

Around 1000 years ago, the practice of below ground burials and burial cairns and mounds virtually disappears (Thom 1995). As some point after this, mortuary ritual shifts again, this time to above-ground box, canoe or burial house interments placed behind the village or nearby offshore islands (Suttles 1990) or on top of previous village sites which henceforth functioned as cemeteries (Lepofsky, et al. 2000).

To contextualize the phenomenon of burial cairns, it is necessary to describe briefly the broader historic background of southern Vancouver Island during the transitional Marpole/Late period. Southern Vancouver Island is situated in the Strait of Georgia, possibly the most documented archaeological region on the Northwest Coast of North America. The chronological sequence relative to this study begins with the terminal Marpole phase at approximately 1,500 years BP and the Late Period (1,500 BP to European contact). This cultural sequence has been constructed based largely upon the types of artifacts from chronometrically dated sites in the Strait of Georgia.

There has been some recent debate whether the Marpole phase was present on southern Vancouver Island (Clark 2000). This is based on an apparent absence of stored salmon on southern Vancouver Island during this period, a hallmark of the Marpole phase. Paraphrasing Clark (2002), Straits Salish people did not have access to the large salmon runs of the Fraser River, which is supported by the ethnographic data, and that reef-netting, the Straits Salish means of procuring surpluses of salmon, was a invention attributable to the Late Period. Clark argues this "represents a lag time in technology and/or social organization" (Clark 2000:135). He offers that the preceding Locarno Beach phase continued unabated on southern Vancouver Island (which he terms the Bowker Creek phase), contemporaneous with the Marpole phase in the adjacent Gulf

Islands and Fraser River. A point of conjecture regarding the transitional Locarno/Marpole culture types on southern Vancouver Island involves the appearance of burial cairns and mounds at southern Vancouver Island sites such as Rocky Point. Presumably, the appearance of these features marks a significant increase in socio-political organization and escalating elite participation within regional economic and social spheres (Ames and Maschner 1999; Lepofsky, et al. 2000; Thom 1995). If the practice of burial cairn and mound construction is contemporaneous throughout the Strait of Georgia, then this does not seem to support a lag time in technological or socio-political complexity as Clark (2000) contends. His point, however, is that the Strait Salish people on southern Vancouver Island, and the Halkomelem people on the Fraser River and adjacent Gulf Islands were on two separate, although parallel cultural trajectories (Terry Clark, personal communication, July 22, 2006).

The Marpole phase is generally regarded as the emergence of the 'classic' Northwest Coast culture in the Strait of Georgia (Ames and Maschner 1999). Typical Marpole technology consists of ground-slate knives and points, chipped stone points, celts and hand mauls, perforated stones, distinctive unilaterally barbed antler points, large bone needles, elaborate stone and antler sculpture, native copper ornaments, very elaborate burials, and cranial deformation for some individuals (Matson and Coupland 1994). The end of the Marpole phase has been difficult to define solely on the basis of artifact assemblages. Terminal dates for Marpole range from 1,500 to 1,000 years B.P. (Matson and Coupland 1994). Material characteristics of the Late Period include a predominance of bone and antler points and bi-points, composite toggling harpoon valves, flat-topped mauls, continued use of pecked and ground stone objects, very few below-ground burials, and trench embankments (Ames and Maschner 1999; Burley 1980; Matson and Coupland 1994).

The literature demonstrates ample descriptions of artifact form and function, in addition to describing subsistence strategies and related technologies. These sources have largely been the basis for the construction of regional chronologies and culture "types". However, there is minimal explanation for the significant social, political, economic and cultural changes reflected in the archaeological record that occurred within in last 2000 years in the southern Strait of Georgia (Thom 1996). In addition to burial cairns and mounds, one of the most significant change between the Marpole/Bowker Creek and Late Periods was the dramatic increase in the number of defensive trench embankment sites (Ames 1994; Keddie 1984; Moss and Erlandson 1995) and deaths due to violence (Cybulski 1994). It has been suggested that the bow and arrow was introduced from the southern Interior between 1900 and 1600 years before present (Charlton 1980), and as Maschner contends for the northern Northwest Coast at least, this technology probably altered inter-village politics and warfare strategies (Maschner 1991). This still does not adequately explain the need or rationale for increased warfare, but it is clear that the increase in trench embankments and violent deaths indicates a level of inter-community raiding unsurpassed in previous periods. Ames and Maschner contend that:

> Wars are most common during times of social, political, or economic stress. It is during the stressful periods that people will more often choose violence over some other means of conflict resolution. But it is also during times of stress that the strongest and most powerful groups will take advantage of small, less intimidating villages to increase status and prestige through acquisition of wealth, slaves, and other goods. (Ames and Maschner 1999:217)

The Marpole phase witnessed the formation of large households and towns composed of many different corporate groups. As Ames and Maschner assert: "The evolution of ranking and stratification among Northwest Coast societies is at the heart of any understanding of the coast's cultural history" (1999:254). As Thom offers, the transition from below ground midden burials to the practice of building cairns and mounds marks a significant social change between the transitional Marpole/Late Period, demarking a change from Marpole ranked status to Late period society differentiated by social classes (Thom 1995:47). Expanding on this:

> The time period from 1500 to 1000 BP was one where elites competed for social status which was gained mainly through life achievements and somewhat less by inheritance…As access to owned resources became more critical to gaining wealth to achieve prestige, networks of inter-married families formed over a wider region. These families gained control of wealth and formed the historically-known Central Coast Salish upper-class. Lower class individuals provided labour in complex fishing operations. Ritual specialists (such as carvers and sea-mammal hunters) gained social and economic status through using their skills and inherited privileges. Slavery likely began to increase the wealth of upper-class individuals. (Thom 1995:47)

Thom (1998) offers a model to explain the Marpole-Late transition in the Strait of Georgia region, which stresses the importance of social networks in the formation of social classes in Coast Salish communities. He argues that changes in settlement patterns, tool assemblages, subsistence strategies, increased warfare and the advent of burial cairns and mounds are a consequence of intensified social networking during the Marpole Period. He posits that intensifying inter-marrying of elites from different families resulted in an expanding network of high-status people. This period witnessed an intensification of food production from seasonally occupied limited activity sites to be used as gifts for exchange with other members of the social network. Access to key resources was restricted, thereby limiting the number of families that could participate in this network of elites. This resulted in the ethnographically documented Coast Salish pattern of social classes (Thom 1998:7).

The point is that Marpole household and regional economies evolved along with the elite, who in turn gained additional influence via economic control by using increased production as an opportunity to compete for prestige. By the end of the Marpole phase, mortuary practice in the Strait of Georgia reached its most costly form with the advent of burial cairns and mounds (Ames and Maschner 1999). Monumental burials and the associated mortuary rituals are inexorably linked with the identity of the dead and establishing and defining the social status of the living. As such, changes in funerary practice as dramatic as the transition from midden to cairn and mound interment have important implications for understanding social process.

Significant progress has been made in the investigation between burial cairns and mounds, kinship, and the role of social networks at multiple scales by recent work at the Scowlitz site.

3.4.1 The Scowlitz Site

The best investigated burial cairn and mound site in the Strait of Georgia is the Scowlitz site. Although there are very likely some regional differences between the two sites, the archaeological investigations at the Scowlitz site are the first contemporary and systematic examination of burial cairns and mounds in the Strait of Georgia Region (Blake, et al. 1993a, 1993b; Lepofsky, et al. 2000; Matson 1994; Morrison and Myles 1992; Thom 1995). The Scowlitz site, situated on a terrace near the confluence of the Harrison and Fraser Rivers, is a village and burial site with 18 house depressions and at least 42 mounds and cairns (Lepofsky, et al. 2000). Survey behind the Scowlitz site indicates that the burial cairn and mound complex extends beyond the main residential terrace, covering a 2 km^2 area with an elevation rise of 300 m (Lepofsky, et al. 2000).

The volumes of the features on the residential terrace range in size from less than 1 m^3 to 166 m^3, with most of the cairns in the smaller size range while five mounds are greater than 9 m long. Two of the larger mounds, Mounds 1 and 23, were excavated, as were two of the small mounds and cairns (Mounds 9 and 20). Mound 1 is very large, with an estimated volume of 164 m^3. It is somewhat isolated from the rest of the other burial features and appears to have been constructed in a single event. The feature was built by placing clay over two concentric square boulder petroforms surrounding a central cairn. The inner cairn was constructed with approximately 200 rocks, which covered a small burial pit containing the flexed skeletal remains of an adult male. Significantly, there were a large number of high status mortuary inclusions, including four perforated copper disks, four abalone shell pendants, fragments of a copper ring, and approximately 7,000 cut and ground dentalia shells. All of these items represent distant trade connections with both the coast and interior (Lepofsky, et al. 2000:406). A sample of human bone yielded a calibrated radiocarbon age of 1290 B.P. (Lepofsky, et al. 2000:400). Mound 23 in contrast, had a volume of approximately 53 m^3. This feature was part of a large cluster of cairns and mounds at the north end of the site. No human remains were preserved and no mortuary inclusions were identified. This feature dates between approximately 1100 and 1200 B.P. (Lepofsky, et al. 2000:407). Mound 20 was a small cairn approximately 3.8 m long, and built with boulders 1 m thick above a shallow burial pit that contained seven infant deciduous teeth (Thom 1995). Again, no grave goods were found. The results of the Scowlitz research offer some interesting parallels and differences between this site and the Rocky Point site in terms of feature morphology and intra site spatial patterning. This is discussed some detail in Chapter 11.

Returning to early cairn research in Victoria, such as that conducted by Harlan I. Smith and the Jesup North Pacific Expedition, is a necessary first step in any examination of burial cairns in the Greater Victoria area.

3.5 Ancient Cities of the Dead: Early Cairn Research in Victoria

This section is a brief history of burial cairn investigation in Victoria during the later half of the nineteenth and early twentieth centuries, a period in which a flurry of both local and international attention was focussed on these features. This period remains the most intensive period of archaeological research into cairns in the Victoria area to date. Some of these investigations were published and are an important source of information of burial cairn morphology and spatial patterning.

Early historic accounts of burial cairns report their numbers in the thousands in the Victoria area, with sites varying from several cairns to large complexes of more than two hundred (Keddie 1984). The burial cairns of Victoria attracted the attention of the Victoria's earliest Euro-Canadian settlers, many arriving from England in 1858 to work on the newly founded Hudson's Bay Company farms. That same year, the gold rush attracted large numbers of people from the United States, many travelling north to Victoria from the gold fields of California.

The burial cairns on the outlying farms and countryside around the burgeoning city of Victoria, such as those at Cadboro Bay (Figure 5), uncannily resembled similar cairns and mounds that were built across much of Europe and the southeastern United States, a familiarity not lost on these early arrivals. The period of intensive immigration to Victoria in the mid- to late-nineteenth century coincided with the final years of antiquarianism and the emergence of archaeology as a scholarly discipline (Mathews

2006). Large–scale excavations of cairns and mounds had been underway for almost a hundred years in the southeastern United States and even longer in northern Europe. Needless to say, the numerous burial cairns around Victoria attracted not only local interest, but soon thereafter, the attention of international scholars and research expeditions as well.

Based on the observations of early researchers, the phenomenon of burial cairns in southwestern BC seems to be centred in Victoria. Burial cairns and mounds were also located elsewhere in the Strait of Georgia area, such as in the Fraser River Valley and northwards along Vancouver Island in Nanaimo, Comox and other localities. It was in Victoria, however, that cairns were concentrated in the greatest numbers and varieties, with such burials reported to be in the thousands, arranged in sites varying from a few cairns to large cemeteries of several hundred burials:

> in the vicinity of Victoria the custom of constructing cairns seems to have had its highest development. The type of structure appears to have undergone modifications with increasing distance from this point…The most elaborate cairns, and the greatest variety, are found near Victoria. (Smith and Fowke 1901:58-59)

One of the earliest references to the cairns of Victoria is in an 1862 essay on the suitability of Vancouver Island as a colony, in which Dr. Charles Forbes, a surgeon serving with the Royal Navy aboard HMS *Topaze*, wrote that:

> the general feature of the landscape is very similar to many parts of Devonshire, more especially to that on the eastern escarpment of Dartmoor, and the resemblance is rendered the more striking by the numerous stone circles, which lie scattered round…these stone circles are found, crowning the rounded promontories over all of the South eastern end of the island." (Forbes 1862:3)

The Scot James Deans arrived in Victoria in 1853 and on first seeing the cairns, believed them "to be burial places, from their resemblances to the cairns of my native Scotland" (Deans 1892:41). Speaking about the burials of Victoria, the visiting French naturalist Alphonse Pinart stated that "the name of cairns...is used on account of the striking resemblance between this Indian cairn mound and the celebrated cairns of Scotland, Wales, &c" (Pinart 1876).

Beginning in the early 1870s, documented accounts of cairn and mound investigation begin to surface with increasing frequency. Although laws protected recent aboriginal cemeteries and graves, the laws were largely ignored in the case of ancient burials (Keddie 1997). By 1871, James Deans, who had arrived as a farm labourer, had become Victoria's first antiquarian of note, as well as a prominent member of the Natural History Society. It was in that year that Deans assisted the geologists James Richardson and Alfred Selwyn in the recording of cairns and mounds around Victoria. The geologists were conducting preliminary explorations of British Columbia for the Geological Survey of Canada. While in Victoria, they recorded nine mounds and eighty-five cairns at a site in the vicinity of Victoria and the approximate location of eight cairns on Beacon Hill (Richardson 1871). That same year, Deans excavated five burial features at Cadboro Bay, documenting his results in an article for the *Daily British Colonist and Victoria Chronicle* entitled "The Cadboro Bay Cairns. An Ancient City of the Dead!" Located on the hillside on the south side of Cadboro Bay (Figure 5), Deans described the Cadboro Bay site as numbering between two hundred and three hundred cairns, which is likely a conservative estimate considering that no systematic survey or mapping was conducted by Deans. He noticed two types of features, those towards Uplands Farm that were composed primarily of earth and stones, whereas the burials somewhat farther north towards Cadboro Bay and at a lower elevation were built almost entirely of stone.

Deans provided information to historians and visiting archaeologists based largely on his own excavation of numerous burial cairns around Victoria. A regular contributor to the *Daily British Colonist*, Deans wrote a series of newspaper articles on the antiquities of southern Vancouver Island, and between late 1871 and early 1872, on the cairns of Victoria specifically. These articles, and the editorials that followed, illustrate the intense local interest in these features. It was at this time that Deans also began earnestly collaborating with researchers outside of Victoria, including the American historian and publisher Hubert Bancroft. Based solely on Deans' observations, Bancroft wrote a detailed account of the burial cairns and mounds of Victoria in his seminal work, *Native Races of the Pacific States, Volume IV, Antiquities*, first published in 1875. Widely distributed and read, Bancroft's work was acknowledged as the outstanding voice in historical research of the western Americas (Caughey 1946). Bancroft undoubtedly brought the spotlight to bear on the antiquities of coastal British Columbia, with the beam focussed on the burial cairns and mounds of Victoria.

In addition to his own explorations, Deans assisted visiting researchers, such as Alphonse Pinart, in excavating cairns around Victoria. In a September 1, 1876 article in the *Daily British Colonist*, Pinart noted that "it is a very interesting fact to find on this coast remains so similar to what we are used to see in the old Celtic countries" (Pinart 1876). Based on his excavations of an undisclosed number of cairns, however, Pinart concluded that "I have not the slightest doubt that the cairnbuilders whose bones have been lying in the ground for six, seven, or more centuries, were the ancestors of the present race of Indians" (Pinart 1876). This view was at odds with popular thought in Victoria at the time, such as that widely espoused by Deans, that the cairns were built by an extinct race that predated the Straits Salish peoples (Mathews 2006).

Throughout the eighteenth and nineteenth centuries, European antiquarians were preoccupied largely with burial mounds and other Neolithic monumental features. The comparison of cairns and mounds in Victoria to those in Europe and the southeastern United States—and most likely the expectations of what lay inside—were ideas that travelled along with immigrants arriving in Victoria from those places.

Franz Boas investigated some near Parson's Bridge and North Saanich during an 1888 visit to Vancouver Island (Figure 5). Boas conducted these trips on behalf of the British Association for the Advancement of Science under the direction of a panel of three Canadians, including the geologist George Dawson. After conducting a five–year reconnaissance of the geology of British Columbia, Dawson was familiar with the cultures and antiquities of British Columbia. Having spent the winter of 1875-76 in Victoria, Dawson was well aware of the burial cairns and mounds of that city, noting in his diary on April 6, 1876, that he noticed the "Indian burial Mound and Cairns very frequently" (in Cole and Locknell 1989:171).

It was during the 1888 trip that Boas, under pressure from his BAAS backers, for the first time seriously collected physical remains. To collect his physical data, Boas dug at several sites in Victoria and Saanich, including the burial cairns at Parson's Bridge and North Saanich (Figure 5), collecting a dozen burials himself and returning to New York with a total of eighty-five skulls and fourteen complete skeletons (Cole 1999:112).

Subsequent to his early fieldwork in British Columbia, Boas became a curator at the American Museum of Natural History, from 1895 to 1905. Shortly after starting at the American Museum of Natural History, Boas proposed, organized and led the Jesup

North Pacific Expedition (1897–1902), a systematic ethnological and archaeological investigation on both sides of the north Pacific (White 1963).

The Jesup Expedition resulted in the most comprehensive examination of cairns and mounds in Victoria, and indeed in British Columbia and western Washington, before the turn of the twentieth century. Over three consecutive field seasons, Harlan Smith worked under the guidance of Boas as the principal North American archaeologist for the Jesup Expedition (Cole 1999).

Smith conducted almost all of the Jesup Expedition fieldwork on the burial cairns of Victoria, with the exception of explorations made by Gerard Fowke in 1898. Throughout the three field seasons of the Jesup expedition, six mounds and eighty-eight cairns were investigated (Smith and Fowke 1901). Smith and Fowke's cairn explorations focussed on two areas of Victoria: Cadboro Bay in 1897 and several sites at the north end of the Saanich Peninsula in 1898 and 1899 (Figure 5).

Smith first investigated cairns in British Columbia in October of 1897. He and his assistants examined some of the burial cairns at Cadboro Bay, where in seven days, they excavated twenty-one cairns. Smith was disappointed that only a "handful of bone dust" was recovered (Thom 2001). Three months before Smith began excavating cairns at Cadboro Bay in 1897, George Dorsey of the Chicago Field Museum, assisted by Deans, had already excavated a few cairns there, although his results remain unreported.

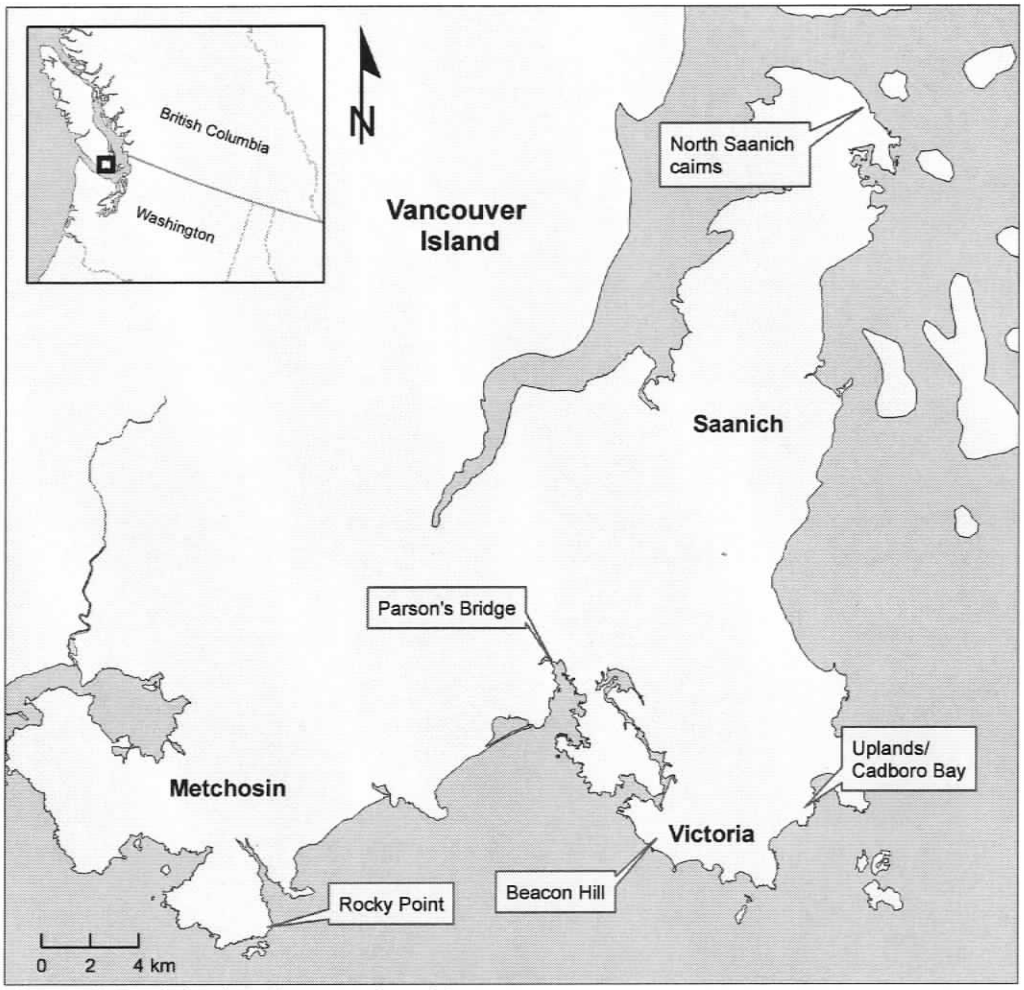


Figure 5: Burial cairn sites mentioned in text

The next year, in late August of 1898, Smith and his crew worked at several cairn sites in North Saanich, leaving Albert Argyle to excavate twelve cairns there (Thom 2001). Argyle, a Victoria local, was the son of Thomas Argyle, a former Royal Engineer and the first light keeper at Race Rocks. The Argyle family also had one hundred and fifty acres at Rocky Point (Figure 5), where Smith learned from Argyle that "cairns abound, but he had not found any skeletons in any of them" (Smith 1907). This is very likely the Rocky Point site (see Section 4.4.2). Smith concluded the last year of the Jesup Expedition by returning to North Saanich, without Fowke, in August 1899. Winding down the last season of the Jesup Expedition, Smith and his crew excavated thirty cairns at five different locations in North Saanich (Smith and Fowke 1901; Thom 2001).

Smith was very descriptive in his excavation and publications, and verified many of the earlier field observations of Deans in terms of cairn construction and contents. Smith's work was published in 1901 as the *Cairns of British Columbia and Washington*, as part of the Memoirs of the American Museum of Natural History series.

The burial cairns and mounds of Victoria have received little archaeological attention since the beginning of the twentieth century, but they have great interpretive potential for examining precontact culture process in the Strait of Georgia. As such, the work of these early researchers is still most relevant and it is still in many ways the most comprehensive knowledge available on the burial cairns and mounds of Victoria.

3.6 Synthesis: Cairn and Mound Construction and Typology

Synthesizing early investigations into burial cairns on southern Vancouver Island, several interesting patterns emerge. For example, cairns significantly outnumbered mounds; there was generally one body per cairn; preservation of human remains was generally poor; there was no obvious correlation between age, sex and other biological factors in who was buried beneath a cairn; and there was a general lack of grave goods. Interestingly enough, there were also no obvious indications of status within the cairns. Skulls with and without cranial deformation, often interpreted as an indicator of status (Cybulski 1975), were present, and the few grave goods recovered do not suggest status differentiation between those who were interred within cairns. This is marked contrast with the largest feature, Mound 1, excavated at Scowlitz (Lepofsky, et al. 2000).

Summarizing these early descriptions of cairn and mound morphology, these features are comprised of several components. Figure 6 illustrates some of the principle components common to many cairn features. The burial enclosure, or cyst as it was commonly called, consisted of tabular or larger rocks situated in such a way as to provide a small space for the flexed body. Many features also had an external structure of larger cobbles and boulders around the perimeter of the cairn, acting as a retaining structure and providing a clear definition of the external shape of the feature. The intervening space between the internal enclosure and the external structure was typically filled with smaller cobbles and boulders and soil fill (Figure 6). Mounds were structurally similar in most regards, except they had a large amount of soil placed on top of the stone cairn.

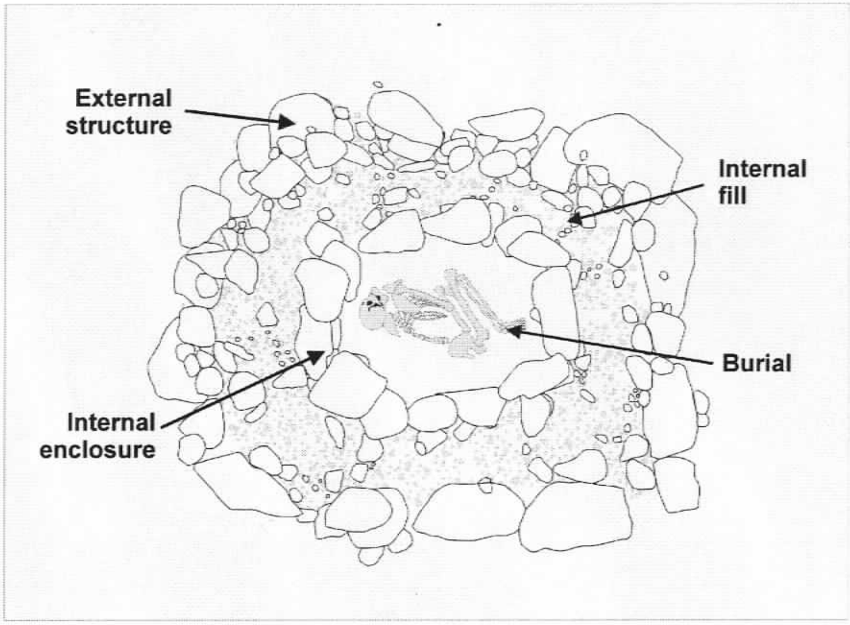


Figure 6: Generalized cairn construction, based on descriptions, diagrams, and photographs in Smith and Fowke 1901.

Based on the descriptions of these early researchers, most notably Harlan Smith, several patterns emerge in their observations about variation in feature structure and the choices of material that people were using to build these burials. Figure 7 illustrates some of the variability in feature morphology described by these researchers.

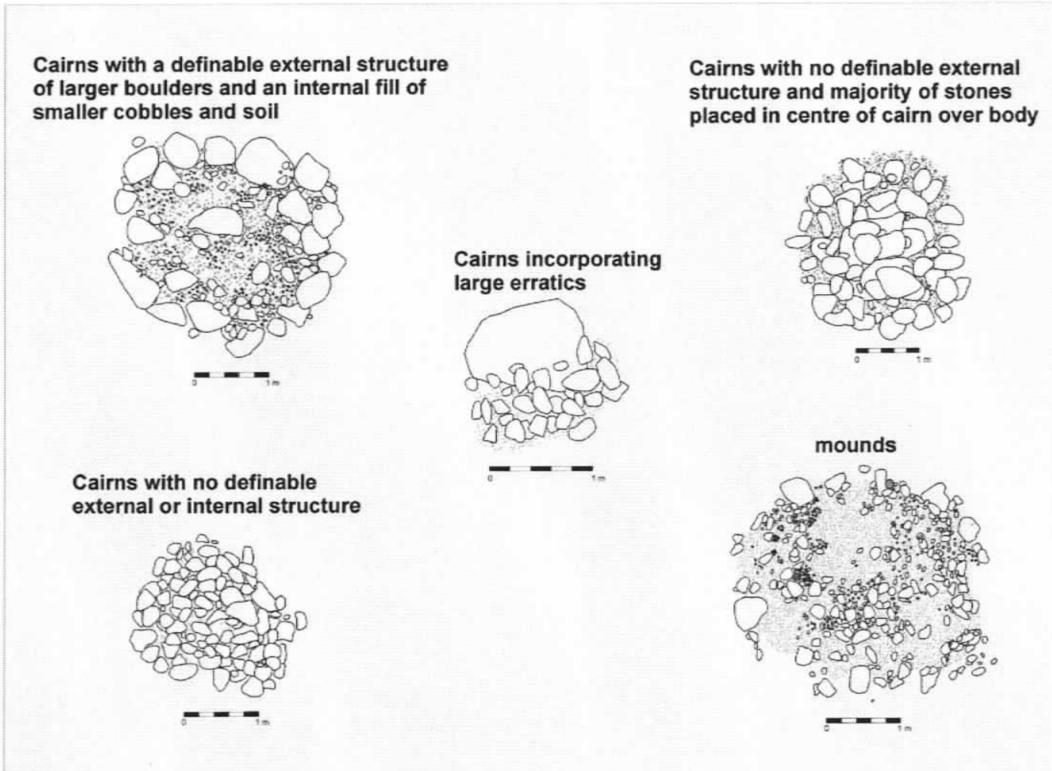


Figure 7: Synthesis of cairn construction techniques based on work of early researchers.

An intensive examination of this literature certainly shed some light on the variability inherent in cairn and mound morphology, but also hinted at similarity or patterns in how these features were constructed.

These early investigations, in part, defined the research objectives of this thesis in terms of identifying whether there really is patterning in cairn morphology and spatial arrangement on the landscape. What is necessary is an empirical means of testing patterning in the cairn data, such as that hinted at by these early researchers, but avoiding the use of their untested *a priori* notions.

4 The Rocky Point Cairn Cemetery

This chapter is an introduction to the Rocky Point burial cairn and mound cemetery. This site is also designated DbRv-3 in the Borden System. Canada uses the Borden System for providing unique identifiers for archaeological sites, which is comprised of a system of upper and lower case letters to divide the country into discrete units based on latitude and longitude. The designation "DbRv-3" is used synonymously with "Rocky Point" throughout the remainder of this thesis.

The chapter begins with a section of what constitutes a burial cairn and mound, and how these features were identified during the current study. Following this is a detailed description of the site, and a brief summary of other archaeological sites in the vicinity that may have some bearing on situating DbRv-3 on a larger archaeological landscape. A discussion of the natural and cultural site formation processes is necessary and the chapter is concluded with a discussion of the suitability of DbRv-3 for a taxonomic and spatial analysis such as that proposed in this thesis.

4.1 What is a burial cairn? Identifying Archaeological Features at Rocky Point

The first consideration during the research was to select appropriate terminology for the features under study. As discussed in Section 3.6, the terms "cairns" and "mounds" are derived from the work of earlier researchers in the region (for example Bancroft 1875; Deans 1891; Oakes 2000; Pickford 1947; Smith and Fowke 1901; Thom 1995). Terminology in use today, such as the word "cairn," have roots in Old World antiquarianism; terms that were extended to the Strait of Georgia by Harlan Smith and others, and have perpetuated in usage since (see Section 3.5 for a discussion). Paraphrasing Sprague (2005:160), however, the distinction between the terms "cairns" and "mounds" is problematic. Wood (1967:109) makes the distinction as cairns being composed entirely of stone, whereas mounds are of mixed stone and soil. Although writing about burial features in Missouri, this definition would be applicable as it is currently used in the Strait of Georgia today. Sprague contends, however, that with time, most cairns would become mounds (2005:160). I would counter that if it were possible to differentiate between the anthropogenic placement of sediment, as opposed to *in situ* pedogenesis (which may be an unintended consequence rather than an intentional part of the mortuary ritual), then perhaps this distinction would be applicable. Regardless, Sprague makes the valid point that there is a lack of a well-defined and consistent usage of terminology for burial features (Sprague 2005:140). In fact, the poorly defined and inconsistent usage of the terms "cairn" and "mound" was part of the basis for the intention of abandoning these terms during analysis, and more importantly, their typological implications, in favour of a quantifiably determined numerical taxonomy specific to the burial features at Rocky Point.

During the field component, however, the terms "cairn" and "mound" were used as defined by Thom (1995:19). He describes a mound broadly as "an earth covered cairn", whereas a cairn is "a burial with significant rock associations" (1995:19). Thom continues by further dividing cairns and mounds into different classes based on an intuitive classification scheme. This classification was not used during the current study, as the intention here was to ultimately derive a numeric taxonomy independent of *a priori* categorizations.

An early consideration during the field studies at DbRv-3 was what specifically constitutes a burial cairn and how does one differentiate a burial cairn from natural features on the landscape? Factors such as pedogenesis, natural and cultural taphonomic agents, and the accumulation of detritus in forested environments can make it very difficult to identify cairns once covered with moss and forest litter mat. There have been no systematic studies in British Columbia that question whether burial cairns have any external characteristics to discern them from other natural and cultural stone and soil formations. This is a similar problem in Europe (Tuovinen 2002:75), and presumably in other parts of the world, where burial cairns are not always easily distinguishable based on their external attributes. Excavation of these features does not necessarily clarify the situation either, as many cairns excavated by Harlan Smith at Cadboro Bay in 1897 did not yield any significant skeletal material. Although there have been some recent advances in identifying "shadow burials", that is, identifying the chemical remnants of human remains in the absence of skeletal material (for example Bethell 1989), contemporary excavation techniques are generally no better than earlier researchers at determining whether a body was actually present at one time in a "bodiless" cairn.

In his seminal study of Norwegian burial cairns, the archaeologist Tapani Tuovinen has argued that:

> In a way, the "objective" identification of a burial cairn is an absurd task. Our knowledge of mortuary rituals thousands of years ago is rather insufficient, and it has been acquired basically through material remains. We cannot trust that all mortuary rituals will have resulted in building and preserving of the very formations we regard as burial cairns or that these formations will always contain or signify material remains of the mortuary ritual which we can expect. The word "grave" itself contains an archaeological interpretation. It carries a connotation confined to our own language(s) and cultures(s) which is not necessarily anything close to 'graves' and beliefs concerning the realm of the dead in non-western cultures and early epochs.[2002:76]

Recognizing this, however, some practical rules had to be formulated to identify cairns during the field study. To do this, the results of earlier cairns studies, as outlined in Section 3.6, were compared with preliminary field observations at DbRv-3. Based on this process, there appear to be are several attributes characteristic of burial cairns that differentiate them from natural, or even historic features. Although not an exhaustive list, four of these principle attributes include:

1. Presence of a definite shape: cairns often have a definite structure or form. In outline, these features are often clearly oval, circular, square, or rectangular. Field clearing associated with historic farming, for example, tends to form linear rows (often along the edges of fields) and tree throws tend to result in curvilinear mounds with a matching depression.
2. Presence of a definite structure: cairns often have a definite, patterned structure. For example, some cairns have an external structure of larger rocks, sometimes set on edge, and an internal structure of smaller rocks. Tree throws and field clearing typically lack structure. Bedrock weathering *in situ* sometimes produces piles of rock adjacent to bedrock exposures; these features are poorly formed and lack the other attributes described in this list.
3. Presence of soil fill: the vast majority of features at DbRv-3 have soil fill in the void spaces between the rocks. This soil has pebbles in it, typical of the surrounding soil, and is therefore not an *in situ* development (the pebbles being too large for aeolian transportation). For cairns in exposed locations, the soil fill may deflate, leaving a thin lag aggregate of pebbles.
4. Location: cairns at Rocky Point are not built directly on top of bedrock (although they are built against bedrock and very rarely in bedrock crevices). Cairns are also not built on side slopes over approximately 20 degrees. Only very rarely are they built along the immediate shoreline.

Returning to Tuovinen's quote, while many petroforms were identified at DbRv-3 during the field study, archaeologists do not understand the full range of the precontact Straits Salish mortuary rituals. In addition to burial cairns and mounds, there may be other material remnants of funerary practice not recognized during the current study, such as burials associated with a single boulder, or markers made out of material other than stone, which have not survived. This study does not assume that the full range of the mortuary ritual is completely represented at DbRv-3. However, we are left with a material record that is still of great potential for understanding social process. The pitfall of burial cairn and mound categorization in the past is that they have been based largely on qualitative and incomplete observations. In this thesis, I attempt to formulate quantifiable and replicable empirical categories for the burial features at DbRv-3, that translated through their spatial association, and a body of social theory, may offer insights into the social processes behind burial cairn construction.

4.2 Detailed Site Description

DbRv-3 is approximately 3 hectares in area and encompasses 540 m of shoreline, extending inland up to 620 m (Figure 8). The majority of the 382 petroforms at DbRv-3 occur within 400 m of the shoreline, on relatively low and flat terrain characterized by numerous gabbro bedrock exposures. Large amounts of exposed boulders and cobbles, as well as erratics and bedrock exposures provide plentiful material with which to build burial cairns. A significant but shallow marsh system, consisting of water-saturated ground, with seasonally standing water, encompasses approximately one third of the entire site area (Figure 9). DbRv-3 has a canopy of mature Douglas fir, with lesser numbers of arbutus, red alder, Garry oak, and shore pine. There are numerous places with a dense under story of immature fir, a result of intensive fire suppression. Invasive species such as Scottish broom and gorse grow in thick patches along the coast.

A total of 382 petroform features have been recorded at the site (Table 2), 240 of which are intact burial cairns and mounds.

While the majority of the features are oval in outline, they occur in a variety of shapes, from square and rectangular, to irregular features with poorly defined shapes.

Features were made with locally available materials, including cobble and boulder-sized glacial till, pieces of weathered bedrock, and soil.

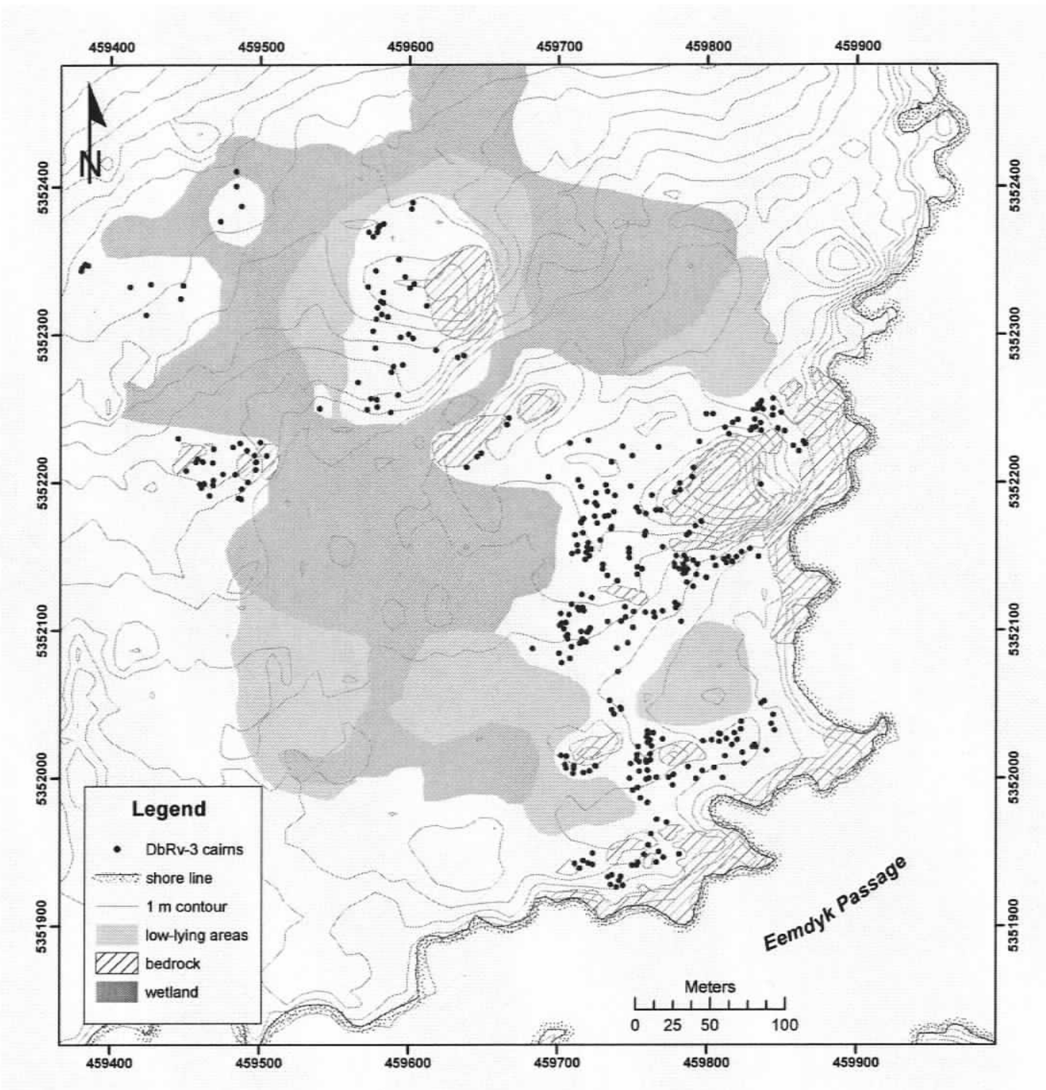


Figure 8: Burial feature locations at DbRv-3 relative to terrain and hydrological features.

Although many features are made with a combination of these materials, there appear to be significant preferences for the types and relative proportions of material selected. For example, one feature may be made with granitic till boulders and cobbles, the intervening space between which is filled with significant amounts of soil, while an adjacent cairn will be made largely with angular bedrock and little or no soil fill.

Furthermore, there appear to be distinct methods used in the construction of these features. For example, some cairns have a distinctive external structure of larger boulders and an internal fill of smaller cobbles and soil fill, whereas other features do not have any visible distinction between the internal and external structure.

Table 2: Summary of Features recorded at DbRv-3

Feature Type	Frequency
Cairn	323
Mound	10
Petroform	8
Rock ring	7
Rock scatter	12
Historic petroform	6
Natural feature	16
Total	**382**

Combining these simple attributes of feature shape, constituent materials, and method of construction, there are definite patterns in how people were choosing to build these graves. Furthermore, there is distinct clustering of features on the landscape (Figure 8). While landforms, such as bedrock exposures and wetland define to some extent where people could have built cairns, there are distinctive patterns visible where people were deciding on building cairns.

4.3 Archaeological Sites at Rocky Point

In order to situate the burial cairn cemetery DbRv-3 on the cultural landscape, a brief discussion of the known archaeological sites at Rocky Point and their potential relationship DbRv-3 is necessary. These sites were all recorded and inventoried prior to the commencement of this thesis during a comprehensive archaeological inventory of the entire Rocky Point property (Mathews 2003). In total, 61 archaeological sites were identified, comprised of burial cairns and mounds, shell middens, cultural depressions, culturally modified trees (CMT's) and a trench embankment.

Of these, 19 of the sites had a burial cairn component. In total, 366 burial cairn features were recorded (excluding all features that were not conclusively identified as burial cairns). Excluding DbRv-3, however, the remaining 18 sites only had 55 cairns. With the exception of DbRv-3, all burial cairn sites at Rocky Point consisted of 15 cairns or less, with most sites averaging about three cairns. All cairn sites were restricted to the eastern half of the property, which as outlined in Section 3.1.1, coincides with an environmental shift from less rugged coastline and Mediterranean climate to a physical environment more characteristic of the outer coast of Vancouver Island. Outside of DbRv-3, the cairn distribution pattern consists of a sparse number of cairns placed in somewhat isolated places on the landscape, but within easy walking distance of the shoreline. Therefore, while these sites represent specialized places on the landscape for the dead, they are generally small and isolated, in stark contrast to DbRv-3. It appears that the majority of people who were interred in burial cairns in the Rocky Point area were placed at DbRv-3.

There are shell midden sites to the immediate north and south of DbRv-3 that are potentially significant to the burial cairn site (Figure 9). The site to the south is DbRv-2, a village site that was likely contemporaneous with the DbRv-3 cemetery.

DbRv-2 is situated along the northern shoreline of Eemdyk Passage, opposite Bentinck Island (Figure 9). This channel is biotically productive, with a variety of shellfish, sea mammals, including numerous sea lions and seals, in addition to fish and waterfowl. The site encompasses 206 m of the Eemdyk Passage shoreline—shoreline which is comprised mostly low gabbro bedrock, with a few small pebble beaches. The western extent of the site is demarcated by a fresh water marsh, which was originally a small inlet (Figure 9). The inlet has been subsequently cut off from Eemdyk Passage by a man-made dike. Early maps show this as an open inlet until at least the beginning of the Twentieth century (Figure 10). Shell midden site DbRv-9, on the far side of the original inlet, likely predates the occupation at DbRv-2 (Mathews 2006).

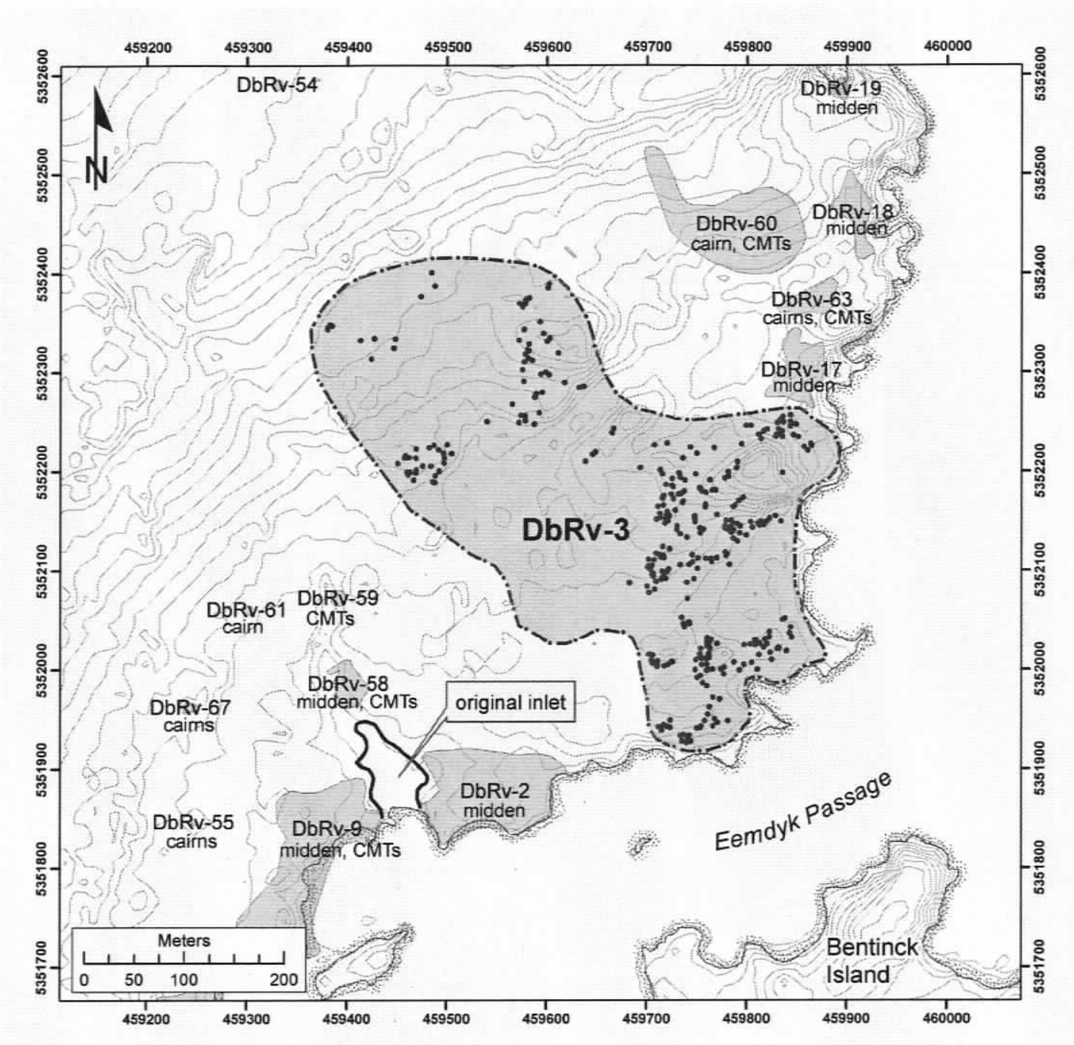


Figure 9: Archaeological sites in the vicinity of DbRv-3.

The artifactual assemblage at DbRv-2, although not collected in any systematic manner, is suggestive of a Late Period occupation, and tentatively cross dates the site to between 1500-200 years BP. Human remains were also previously collected from DbRv-2 and are now accessioned at the RBCM. These include the remains of three people. The first is a skull fragment from an adult male, which has evidence for a death–dealing blow to the head. The second is a skull fragment from an adult, and the third is a right humerus fragment. No burial cairns are located at DbRv-2. There is a clear physical separation between DbRv-2 and the nearby burial cairn site DbRv-3—there is more than 100 m separating the two sites.

Shell midden site DbRv-17 is to the immediate north of DbRv-3 (Figure 9). This site is situated on a relatively flat bench landform and fronted by a steep, rocky shoreline and a narrow pebble beach. Based on the results of subsurface testing, DbRv-17 is 75 m long and extends inland for up to 50 m—midden deposits are up to 60 cm deep (Mathews 2003). The only diagnostic artifact recovered from the site is a very small infant-sized labret (DbRv-17:001). The labret, an ornamental lip plug often attributed to persons of high status (Matson and Coupland 1995), is T-shaped and manufactured from siltstone. A preliminary investigation into infant-sized labrets did not identity any similar types in the Greater Victoria area— in fact only a few such artifacts are known from the southern Strait of Georgia area, mostly from the Lower Mainland (Martina Steffen, personal communication, January 13, 2005). In the southern Strait of Georgia, T-shaped labrets occur in the Marpole and to a lesser extent Locarno Culture types (Mitchell 1990), suggesting that the site was occupied sometime between 3500-1500 years BP. Therefore, the occupation of DbRv-17 may have overlapped with the use of the cemetery at DbRv-3, or if the village was no longer in use, it may have been remembered as such by those building the cairns. Either way, there is a supply of rocks available at DbRv-17 with which one could have readily made cairns and mounds. Subsurface testing, however, indicates a distinct separation between the DbRv-17 midden and the cairns at DbRv-3.

4.4 Site Formation Processes at DbRv-3

The section is a brief discussion of natural and anthropogenic site formation processes affecting DbRv-3. This is important in terms of identifying factors other than mortuary behaviour that could affect burial cairn morphology and spatial patterning. This is a necessary step in identifying the suitability of the DbRv-3 dataset for a detailed morphological and spatial study, as proposed in Chapter 1. The condition of each feature and the agent and degree of disturbance was noted during the fieldwork (see Section 5.3) and taken into consideration during analysis. Following is a discussion of site formation processes at DbRv-3 and their implications pertaining to the research objectives.

4.4.1 Natural Site Formation Processes

The primary source of natural disturbance to the DbRv-3 is tree growth. Many features had trees growing adjacent to, or through the middle of them. While in some instances this disturbance was relatively minor, particularly if the tree was sufficiently small, this also resulted in a high degree if disturbance or destruction of other features. This situation was compounded when the tree eventually fell, with the root mass sometimes dislodging some or all of the remaining cairn stones.

In one instance at DbRv-3, human remains were observed within the root mass of a fallen tree that had been growing through Feature C113. These remains were cremated, which appears to have been relatively common in some cairns in the Victoria area (Smith and Fowke 1901). A cursory analysis of these fragmented remains identified the individual as an adult of indeterminate sex. In addition to the human remains, calcined bird bones and burnt clamshell were associated with the burial, suggesting a ritual feeding of the dead such as outlined in the ethnographic record (Barnett 1955:226), a practice that continues to this day. The cairn was rebuilt and the remains interred by Hank Chipps and the author, under the direction of Scia'new Elder Bert Charles.

In addition to natural site formation processes, post contact activities associated with early historic settlement and subsequent military use have affected DbRv-3, and are discussed below.

4.4.2 The Early Historic Period and Site Formation at Rocky Point

Rocky Point was the site of some of the earliest historic settlements on southern Vancouver Island. As such, it is important to understand the timing, location, and intensity of disturbance associated with these activities at they may potentially relate to DbRv-3. Historic factors are important site formational processes.

The first mention of Euro Canadian settlement in Metchosin was in the 1855 census, after Bilston Farm was established in 1854 by Thomas Blinkhorn. The first settlers to Rocky Point arrived shortly thereafter. The John Parker family arrived in Victoria on January 16, 1853 aboard the Hudson Bay Company's sailing ship *Norman Morison* and acquired large tracts of Rocky Point from the Hudson's Bay Company in 1858, including Lot 53 (Helgesen 1983), upon which DbRv-3 is located. Parker built a manor farm in the centre of Rocky Point on adjacent Lot 54 (Figure 10) and was later commissioned to build the Rocky Point Road, which was completed in 1878, running from Victoria and ending at the shoreline of Choked Passage (Figure 11). Choked Passage was renamed Eemdyk Passage sometime after 1935, presumably in reference to the Holland Amerika Freightliner *Eemdyk* that ran aground off Bentinck Island in 1925.

Three maps of the Rocky Point area were identified at the British Columbia archives that showed the shoreline in sufficient detail to assess the potential for historic impact to DbRv-3. These maps were scanned and geo-rectified in ArcMap 9.1 (Figure 10 and Figure 11). The first map is an 1846 admiralty chart of Rocky Point completed by Captain Henry Kellett (BC Archives CM/82509), which is the first map of Rocky Point coastline. Not shown, is J.D. Pemberton's 1853 District Map of Metchosin (Hudson's Bay Company Archives G.1/258f), which is consistent with Kellett's map. The 1870 map (BC Archives CM/A169), also an admiralty chart, by Daniel Pender, shows the location of the Parker Manor Farm and cultivated fields. These maps, quite accurate for their time, illustrate that no impacts associated with land clearing or farming had occurred within DbRv-3. The 1935 map, however, shows several possible structures in the vicinity of Edye Point (Figure 11). No information could be acquired at the archives to identify these structures more specifically. In an attempt to identify the type of features and scale of disturbance, these locations were investigated during the field component of the research.

All of the potential sources of historic disturbance and the results of the field inspection of these localities are illustrated in Figure 12. Four areas of possible historic disturbance were noted, which roughly correspond with the structures identified on the 1935 map (Figure 11 and Figure 12). Historic Feature 1, consisting of small concrete pads on top of bedrock, and scattered brick, may relate to livestock handling, as sheep were plentiful in the area during the Parker Family ownership of the land (Helgesen 1983). Historic Feature 2 is located along the shore of Eemdyk Passage, at the south end of DbRv-3 (Figure 12). This historic feature consists of a 1 m long section of picket fence. The pickets are approximately 40 cm long, so the fence would have been very low, with the pickets set close together. The wood is saw-cut and in a poor state of preservation. The nails appear to be square-cut, suggesting that the fence may predate the beginning of the twentieth century. This fence is consistent with grave fences placed around Euro-Canadian graves, however, no other indications of a historic burial, such as a rectangular depression or headstone, were observed.

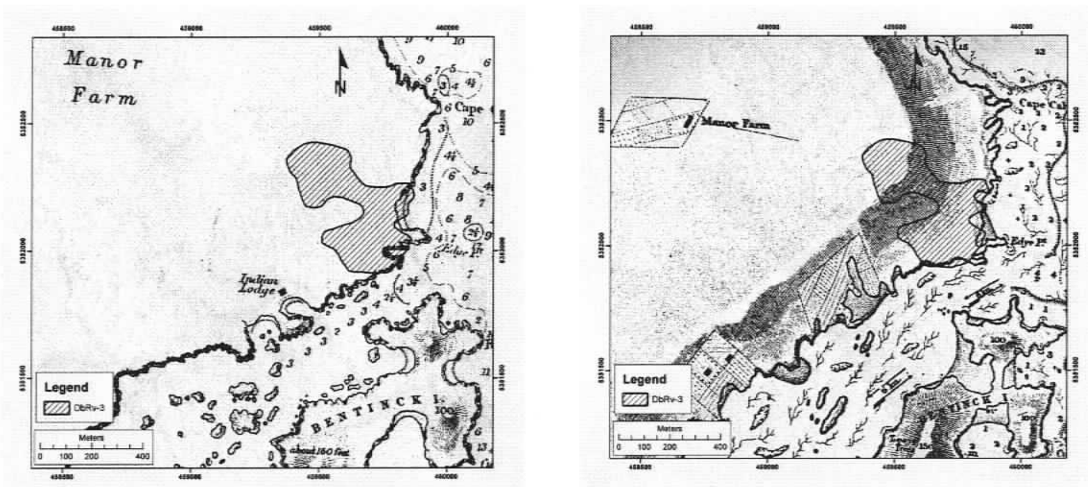


Figure 10: Rocky Point, Kellett's 1846 and Pender's 1870 Admiralty charts (left to right) geo-rectified with DbRv-3 transposed.

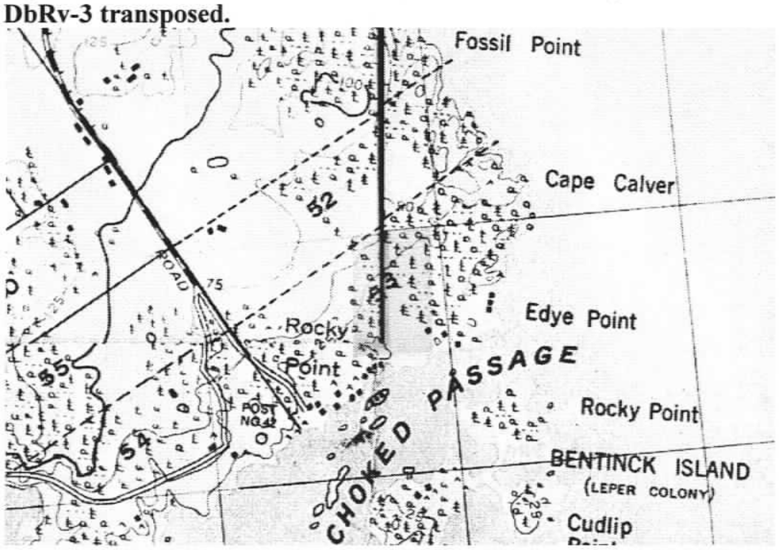


Figure 11: Rocky Point, Department of National Defence map, 1935 (BC Archives CM/B688).

Historic Feature 3 (Figure 12) consists of two split cedar posts. Both posts have now rotted and fallen onto the ground. An identical post to these two was observed on the ground near Feature C120 and other comparable posts have been observed elsewhere outside of DbRv-3 in and around cleared fields. Historic Feature 3 may relate to livestock handling by the Parker family in the late 1800's (Helgesen 1983) and may be associated with a large water hole 20 m to the west, and nearby Historic Feature 1. Historic Feature 4 (Figure 12) is on the shore of Eemdyk Passage and consists of the dilapidated remnants of a very small single-room cabin, made primarily of saw-cut driftwood. Glass bottles date the structure to the 1920's.

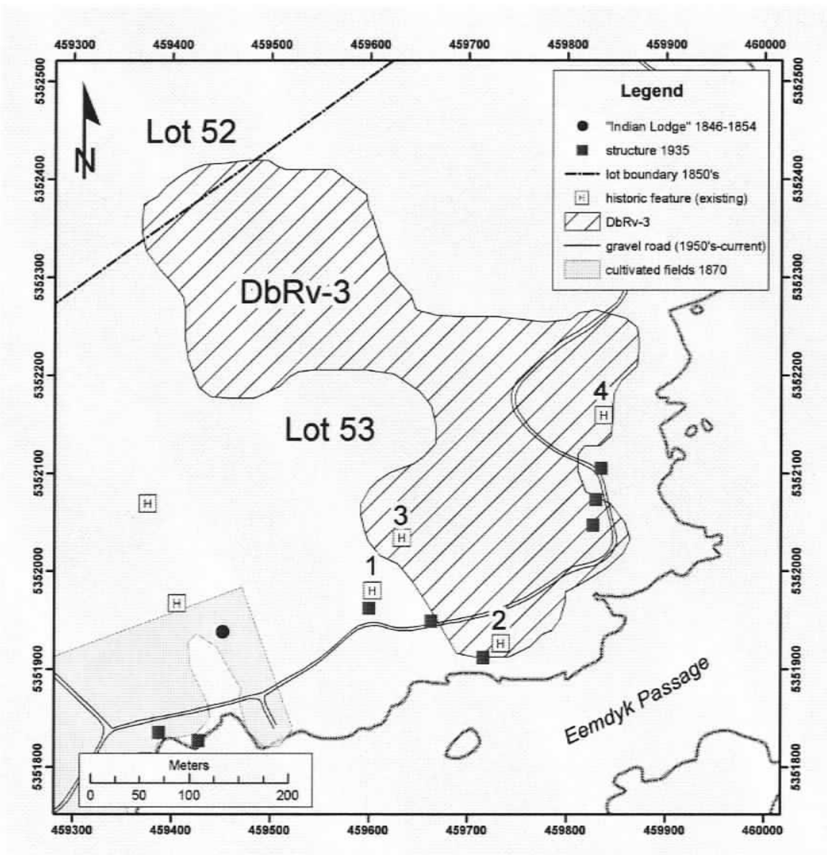


Figure 12: overview of possible historic disturbance to DbRv-3.

In addition to these features, there are indications that selective logging for Douglas fir occurred within DbRv-3. Impact from this appears to have been minimal—perhaps logged using horse teams to remove the trees rather than heavy equipment.

Although the exact age of this is unknown, it likely to have occurred prior to the Department of National Defence taking ownership of the property in 1953.

There is remarkably little evidence of pot hunting at DbRv-3, despite how common the practice was in Victoria (Mathews 2006). The most likely candidate for pot hunting is Feature R9 (Figure 13). The rocks in the centre of this cairn have been rolled away in all directions, suggesting that the centre of the feature was intentionally excavated. Tree disturbance, in contrast, results mounding on one side where the uprooted tree mass has disintegrated over time, piling the rocks and soil within the roots in one spot. There is one documented incidence of intentional disturbance of cairns at Rocky Point, very likely at DbRv-3.

In 1863, the Thomas Argyle family settled on Lot 54 at Rocky Point. Thomas Argyle's son Albert was Harlan Smith's field assistant in Saanich in 1899 and 1900 (see Section 3.5). Although Smith never went to see the Rocky Point cairns, he was certainly aware of them (Smith 1901:58). It was later implied by Smith that Argyle excavated some of them: "He [Argyle] reports that cairns abound [at Rocky Point], but he has not found skeletons in any of them" (Smith 1907:361). It is not unreasonable that Feature R9 may be one of the cairns examined by Albert Argyle.

Based on the above analysis, the early historic occupation at Rocky Point has had minimal impact on the burial cairns at DbRv-3—the structures on the 1935 map, for example, appear to have been temporary shelters involving minimal disturbance.

The Rocky Point property was appropriated by the Department of National Defence in 1953 as the site for a West Coast ammunition depot, which it continues to serve in this capacity at present. Virtually all of the military activity has been confined to the centre of the property, in the location of the original Rocky Point town site.

Figure 13: Feature R9, cairn possibly excavated by Albert Argyle, late 1890's.

The most significant impact to DbRv-3 appears to have been the construction of a perimeter fire road in the late 1950's, which circumnavigates the entire property. The road meanders near the shoreline, and traverses through the centre of DbRv-3 (Figure 12). During its construction, cairns were undoubtedly impacted or destroyed. The road, however, is quite narrow and had obviously been constructed in such a way as to avoid the larger features along its course. In most instances, the disturbance is obvious and judging from the small number of rocks along the edges of the road, impact was localized and minimal considering the density of burial cairns and the potential for more significant damage to have occurred to the site.

The final source of historic disturbance is not related to the cairns per say, but possibly to the surface drainage. It is clear that the distribution of burial cairns at DbRv-3 is defined in no small way by small-scale inland hydrology (Section 3.1.1). In the 1930s, a dike was built across what was an inlet bisecting the two shell midden sites DbRv-2 and DbRv-9, 230 m southwest of DbRv-3 (Figure 12). This former inlet is now a fresh water pond. The marsh system that bisects DbRv-3 drains into the former inlet. The possibility of the dike construction altering the dimensions of the marsh was addressed by systematically inspecting the marsh for indications of inundated cairns or other archaeological features. None was identified. This suggests that the level of surface water, if altered by the dike construction, has not directly impacted DbRv-3.

Considering the early historic and modern site formation processes, localized and limited impacts to DbRv-3 have occurred, but the site is still intact enough to be considered for a detailed morphological and spatial analysis. This is discussed in more detail in the following section.

4.4.3 Suitability of DbRv-3 for Analysis

The Rocky Point cemetery DbRv-3 is perfectly situated for a detailed taxonomic investigation of burial cairn and mound morphology and a spatial analysis of feature distribution over the landscape. This section outlines some of the key features of DbRv-3, in addition to the background in which the work was conducted, that make this site appropriate to achieve the stated research objectives of this thesis.

DbRv-3 may be the largest remaining site of its kind within the Straits Salish ethnolinguistic area. The Rocky Point Training Area and Ammunition Depot, as well as other Department of National Defence properties on southern Vancouver Island, provide a refuge for some the last remaining intact burial cairn sites in the region (Mathews 2004). DbRv-3 is comparable to other large cairn and mound cemeteries recently identified in the Fraser Valley (Lepofsky, et al. 2000; Oakes 2000). Gaining an understanding of cairn and mound distribution and form on southern Vancouver Island is key to identifying local variation and regional similarity in the archaeological record.

One of the principle strengths of the DbRv-3 data rests in the large number of features at the site. Even though many are disturbed, primarily by natural site formation processes, there are still 240 intact features, providing a broad sample size for a morphological analysis. Impacts have occurred to the site, but this can be reasonably taken into consideration during analysis. This section of coastline has been well mapped as early as 1846 (Figure 10), well before EuroCanadian settlement. As illustrated in Section 4.4.2, information on post-contact disturbance can be derived from archival research into historic land use at Rocky Point and verified by in–field examination.

The burial cairns and mound features at DbRv-3 exhibit visible variation in shape and size, yet intuitively there appear to be distinct patterns in how these features were made. Furthermore, the cairns and mounds at DbRv-3 occur in distinct spatial clusters on the landscape. Combined with the morphological data, a quantitative examination of this patterning would be a significant contribution towards understanding burial cairn and mound morphology and the conceptual use of mortuary space. As outlined in Chapter 2, patterns in burial form may have significant implications for understanding social process.

Lastly, and most importantly, this research has the support of the Scia'new First Nation and the Department of National Defence has provided admittance to the property, which is otherwise not accessible to the public. Working together with these partners, this research is well positioned to provide meaningful information to all interested parties regarding the present and future management of this very significant place, while providing ideas about how this landscape was used in the past to express people's connections with their ancestors and the physical, spiritual, and social world around them.

5 The Rocky Point Data Set

This section details the methods utilized during the field survey, feature and landform mapping, detailed feature recording, and data base design. This process provided the data necessary for the morphological and spatial analysis of the DbRv-3 burial features.

5.1 Field Survey Techniques

An intensive surface survey program was implemented to identify all archaeological features within DbRv-3. A crew of three to five archaeologists walked systematic transects with a 2 m interval between surveyors, marking each suspected petroform feature with a high-visibility pin flag. Each pin flag was labelled with the feature number. The entire site was traversed east-west in this manner, then again north-south to ensure thorough coverage. The site was surveyed 200 m beyond site boundaries in each direction to ensure that all features associated with DbRv-3 were accounted for. Despite this intensive level of effort, additional features were identified during the recoding phase of the project. This resulted in virtually every topographic high point being closely inspected to determine whether it was a cultural or natural feature. In addition, the low-lying areas and wetlands were surveyed during the summer months with the same level of intensity to insure that no archaeological features were present, accounting for the possibility of rising water levels in the wetland subsequent to the site being used as a cemetery.

In addition to the visual survey, a minimal amount of judgementally placed shovel and hand auger tests were completed in an attempt to identify possible buried cultural matrices and materials potentially associated with the cairn features. Subsurface tests were conducted with square-nosed shovels and 8 cm diameter hand augers. Shovel tests measured approximately 30 x 30 cm wide. All sediments from the shovel and auger tests were screened though ¼" mesh.

5.2 Spatial Data Collection

Collection of spatial data was done prior to the detailed feature recording. Once all features were identified during the field survey, spatial data was collected. The methods used to collect the data are discussed below.

5.2.1 Mapping: Features and Terrain

All mapping, a great deal of data acquisition, and much of the subsequent analysis for this project was accomplished with the use of a geographic information system (ESRI Arc Map 9.1).

Archaeological feature provenience was collected with a Trimble 4700 global positioning system (GPS) and a TSC1 data collector. Based on the capability of the instrument and the specific satellite telemetry during data collection, accuracy was estimated to be within 20 cm. In some instances the tree canopy was too dense to permit reliable GPS reception. When this occurred, the GPS data was supplemented with triangulated provenience collected with a compass and 50-m tape from surrounding cairns with reliable GPS data.

Aerial photographs were important in Geographic information system (GIS) data acquisition and visualization. They supplemented the fieldwork by provide a secondary source for gathering spatial information. The aerial photos used in this study were orthorectified, that is, sources of distortion were removed to equilibrate photo units with real life distances. High-resolution colour orthophotos were provided by the Department of National Defence, with each orthophotos pixel equating to 20 cm of real life distance (Figure 14).

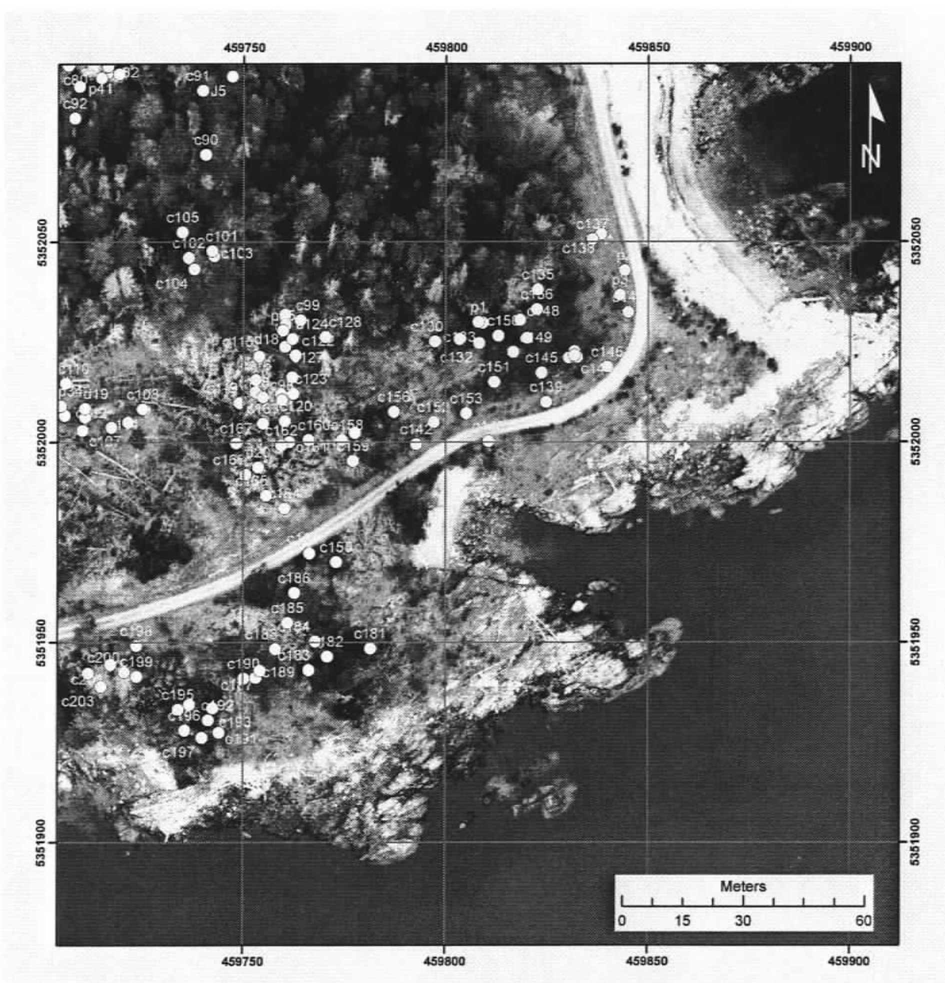


Figure 14: Example of GIS mapping at DbRv-3 showing GPS mapped features on the project orthorectified aerial map.

This high level of resolution made it possible to pick out individual trees and bedrock exposures on the landscape allowing for very detailed mapping of terrain features.

During the field component, terrain features such as bedrock exposures and water features were mapped on colour orthophotos. All mapped features were then digitized as layer files and imported into the GIS.

5.2.2 Elevation: LiDAR

To better understand the spatial distribution of the burial cairns on the Rocky Point landscape, accurate elevation data was required. To accomplish this, Light Detection and Ranging (LiDAR) data was used to generate site contours. Briefly, LiDAR is an active remote sensing technique in which pulses of laser light are directed towards the ground from an aircraft. The time taken for these pulses of light to return to the sensor is measured and processed in order to determine the distance between the sensor and the object or surface (Smith 2003:176-7), resulting in a high resolution series of x, y, z point data across the entirety of the study area. These data were imported into Surfer Version 8 and a grid was made. Interpolated contours (in both 20 cm and 100 cm intervals) were then generated. This contour layer was exported to the project GIS (Arc Map 9.1). This contour data is used in a purely descriptive, exploratory way, but has the potential for future digital elevation model-based studies, such as view-shed analysis.

5.3 Morphological Data Collection: Detailed Feature Recording

To insure consistency in recording, a standardized feature form was devised (Figure 15) for this research project.

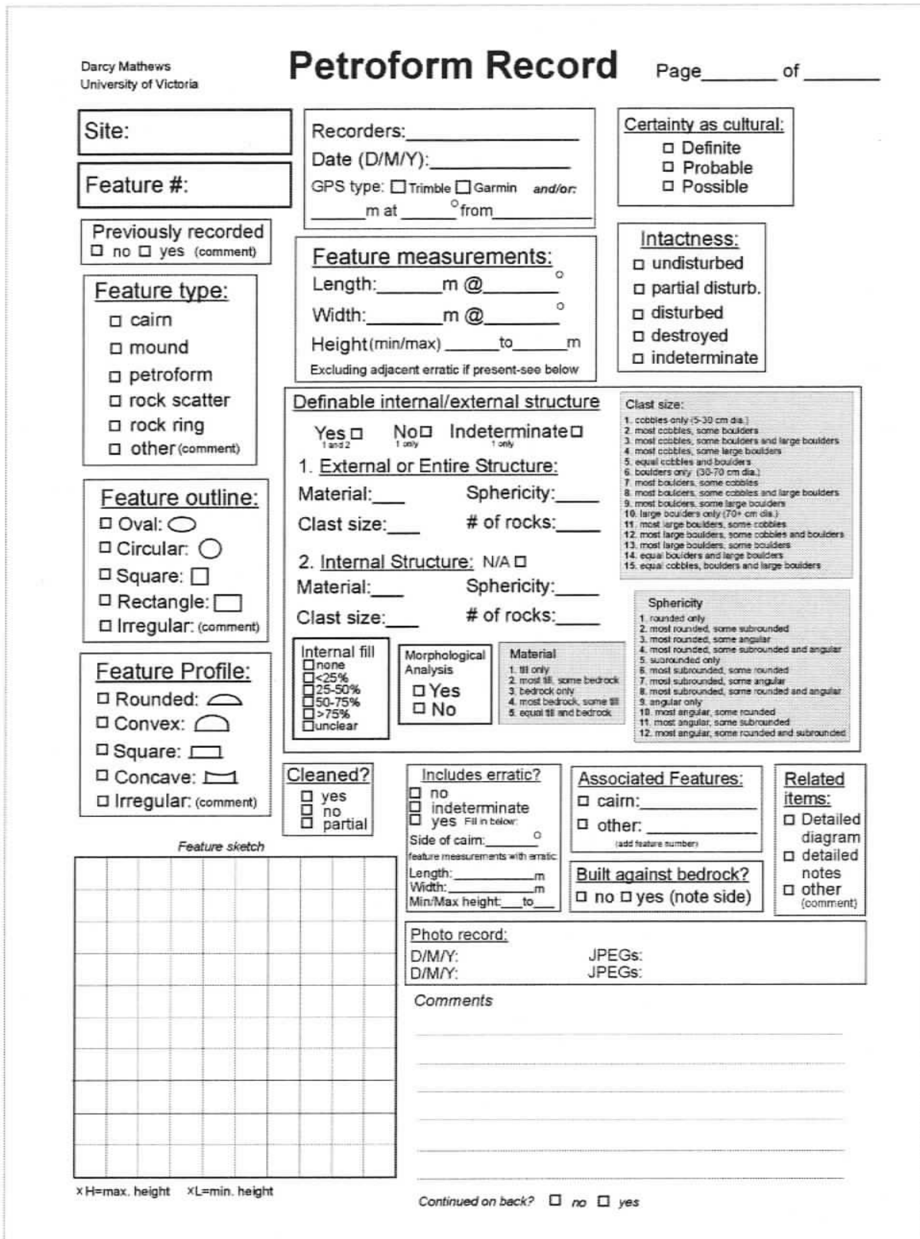

Darcy Mathews
University of Victoria
Petroform Record Page______ of ______
Site:
Feature #:
Recorders:______________
Date (D/M/Y):____________
GPS type: ☐ Trimble ☐ Garmin and/or:
______m at ______° from__________
Certainty as cultural:
☐ Definite
☐ Probable
☐ Possible
Previously recorded
☐ no ☐ yes (comment)
Feature type:
☐ cairn
☐ mound
☐ petroform
☐ rock scatter
☐ rock ring
☐ other (comment)
Feature measurements:
Length:_______m @_______°
Width:_______m @_______°
Height (min/max) _____to_____m
Excluding adjacent erratic if present-see below
Intactness:
☐ undisturbed
☐ partial disturb.
☐ disturbed
☐ destroyed
☐ indeterminate
Definable internal/external structure
Yes ☐ (1 and 2) No ☐ (1 only) Indeterminate ☐ (1 only)
1. External or Entire Structure:
Material:___ Sphericity:____
Clast size:___ # of rocks:____
2. Internal Structure: N/A ☐
Material:___ Sphericity:____
Clast size:___ # of rocks:____
Clast size:
1. cobbles only (5-30 cm dia.)
2. most cobbles, some boulders
3. most cobbles, some boulders and large boulders
4. most cobbles, some large boulders
5. equal cobbles and boulders
6. boulders only (30-70 cm dia.)
7. most boulders, some cobbles
8. most boulders, some cobbles and large boulders
9. most boulders, some large boulders
10. large boulders only (70+ cm dia.)
11. most large boulders, some cobbles
12. most large boulders, some cobbles and boulders
13. most large boulders, some boulders
14. equal boulders and large boulders
15. equal cobbles, boulders and large boulders
Sphericity
1. rounded only
2. most rounded, some subrounded
3. most rounded, some angular
4. most rounded, some subrounded and angular
5. subrounded only
6. most subrounded, some rounded
7. most subrounded, some angular
8. most subrounded, some rounded and angular
9. angular only
10. most angular, some rounded
11. most angular, some subrounded
12. most angular, some rounded and subrounded
Feature outline:
☐ Oval:
☐ Circular:
☐ Square:
☐ Rectangle:
☐ Irregular: (comment)
Internal fill
☐ none
☐ <25%
☐ 25-50%
☐ 50-75%
☐ >75%
☐ unclear
Morphological Analysis
☐ Yes
☐ No
Material
1. till only
2. most till, some bedrock
3. bedrock only
4. most bedrock, some till
5. equal till and bedrock
Feature Profile:
☐ Rounded:
☐ Convex:
☐ Square:
☐ Concave:
☐ Irregular: (comment)
Cleaned?
☐ yes
☐ no
☐ partial
Includes erratic?
☐ no
☐ indeterminate
☐ yes Fill in below:
Side of cairn:_______°
feature measurements with erratic
Length:__________m
Width:__________m
Min/Max height:___to___
Associated Features:
☐ cairn:__________
☐ other: __________
(add feature number)
Related items:
☐ Detailed diagram
☐ detailed notes
☐ other (comment)
Built against bedrock?
☐ no ☐ yes (note side)
Feature sketch
xH=max. height xL=min. height
Photo record:
D/M/Y: JPEGs:
D/M/Y: JPEGs:
Comments
Continued on back? ☐ no ☐ yes

Figure 15: Standardized form used during field recording

Attributes selected for collection were based largely on the recording of cairn and mound features in Europe (for example Tuovinen 2002), although a number of attributes, such as the percentage of soil fill, and the presence or absence of an external structure, were based on in-field observations during the initial stages of field research.

5.3.1 The Morphological Attributes

The attributes collected for each feature are listed below:

1. Feature Number
2. Recorder and date of recording
3. Provenience
4. Feature Type
5. Feature Outline
6. Feature Profile
7. Length
8. Width
9. Height (minimum and maximum)
10. Long axis orientation
11. Certainty as cultural
12. Condition
13. Structure type
14. Type and relative proportion of rock
15. Rock size
16. Rock sphericity
17. Number of external rocks
18. Relative percentage of soil fill
19. presence and location of *in situ* erratics
20. Measurements of the feature including an *in situ* erratic
21. Bedrock association
22. Cleaning required
23. Associated features
24. Related documents
25. Photographic record
26. Comments
27. Feature sketch

Following is a brief explanation of the attributes and how they were recorded.

Feature number: Each feature was assigned a letter and a number. It was unclear during the initial survey in 2003 if the cairns were part of one or several sites. To avoid potential numbering problems, the arbitrary letters C, D, I, J, T and R were used in separate parts of the site during initial recording, with the numbering starting at 1 after each letter. During survey between 2004 and 2006, a number of additional features were observed throughout the site and these were assigned the letter P. Each feature was flagged with a red pin flag and the corresponding letter and number written of the flag.

Recorder and date of recording: Subsequent to the initial baseline recording, each feature was revisited and rerecorded in more detail. The name of the recorder and the date of the work were documented.

Provenience: The location of a newly recorded feature was recorded and the method used to determine provenience was noted.

Feature Type: Five basic feature type categories were using during the field recording. These are cairn, mound, petroform, rock scatter, and rock ring. These *a priori* operational categories were based largely on previous burial cairn and mound research in the region (Bancroft 1875; Deans 1871, 1891; Hill-Tout 1933; Lepofsky, et al. 2000; Pickford 1947; Smith and Fowke 1901; Thom 1995). These previous classifications are largely intuitive and not based on any quantifiable studies. Cairns consist of a visible, discrete pile of rocks purposefully placed over the dead, typically in a patterned way. For example, an external circular structure of boulders with the centre filled with smaller cobbles or a uniform pile of cobbles, all approximately the same size and material. Mounds are distinct, shaped piles of soil, often with an internal structure of rocks that may be visible along the edges of the feature.

Distinguishing between mounds and cairns was problematic in some instances. To simplify this during fieldwork, the relative proportion of rock to soil fill used in external cairn construction was the basis for distinguishing between the two types of features. Features that were more than half covered with soil were classified as mounds and those features with less than half soil covering were classified as cairns. The presence or absence of pebbles in the soil is the distinction between pedogenesis and anthropogenically transported soil fill. *In situ* soil development is very unlikely to have pebbles, as there is no natural depositional agent to transport clasts larger than silt or sand onto the cairn. The natural soil on the forest floor, presumably the origin of the anthropogenically placed soil covering, is comprised of silt loam with a significant content of rounded and subrounded pebbles. The presence of soil fill is discussed in more detail shortly.

Petroforms are humanly arranged rocks that are unlikely to cover a burial but are likely associated with a cairn or burial area. These include, for example, a ring of rocks around a cairn. A distinctive type of petroform is the "rock ring", consisting of a circular arrangement of rocks, typically boulders, with no indication of soil fill or other rocks inside. Rock scatters are distinctive concentrations of rock, often of comparable material and size, concentrated around or adjacent to burial areas. There is no obvious geological explanation for these features and they likely represent anthropogenic process. Not all rock scatters were recorded during the current project; they were ubiquitous and occurred throughout the site. Rather they are features initially recorded as cairns during the inventory and upon closer inspection after cleaning were clearly not cairns. Rock features that did not meet any of these criteria, but for which there was no geological explanation, were recorded as possible cairns or petroforms.

Feature Outline: The outline shape of each feature fit into one of five categories: oval, circular, square, rectangular, and irregular.

Feature Profile: Five categories are employed to describe the profile of each feature in cross section. Illustrated in Figure 16 are the feature profile types, which include rounded, convex, square, concave, and irregular.

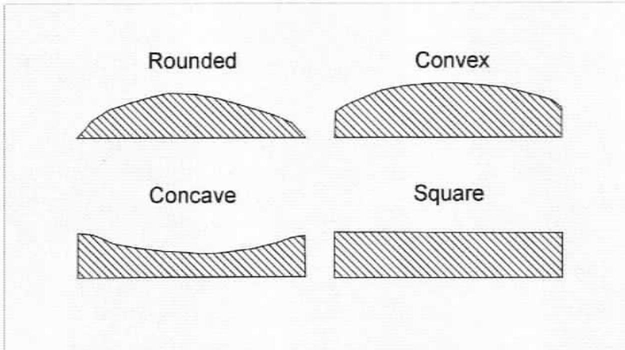


Figure 16: Feature profile categories (in cross-section).

Length: Length is the maximum extent of the feature measured along its long axis. Features with right-angled sides were measured parallel to the sides and not obliquely along the hypotenuse. Measurements were taken from the definite edges of the feature and excluded adjacent rocks, such as those that may have rolled off the cairn. Measurements were taken to nearest centimetre. Length measurements excluded erratics if they did not appear to have been moved into position, such as those that were partly buried or obviously too large to move. The rationale for this is discussed shortly.

Width: The attribute Width is the maximum extent of the feature perpendicular to the Length measurement. Like Length, width was taken to nearest centimetre from the definite edges of the feature. Width measurements also excluded erratics if they did not appear to have been moved into position.

Height: The minimum height of the feature is the lowest point on the feature that is still a definite part of the structure. Typically, the minimum height is along one of the edges of the cairn, and excluding loose rocks. The maximum height is the highest point on the feature. A line level was extended from the highest point to the ground to insure accuracy. Both height measurements were taken to the nearest centimetre and excluded erratics if they did not appear to have been moved into place. The locations of the minimum and maximum height measurements were noted on the feature sketch.

Long Axis orientation: The orientation of the long axis was recorded relative to true north with a sighting compass using an 18° east declination. Measurements were taken to the nearest degree. For features with no definable long axis, the orientation of the length measurement was recorded. As the long axis of each feature actually consists of two opposing degrees, the degree closest to true north was recorded as the long axis orientation.

Certainty as Cultural: The confidence in which a feature was believed to be cultural was defined by one of three categories: definite, probable, and possible. This attribute was important in selecting features that would be appropriate for morphological and spatial analysis. The characteristics used to distinguish cairn and mound burials from other cultural or natural features is outlined in Section 4.1.

Condition: The condition of each feature was recorded as undisturbed, partially disturbed, disturbed, destroyed, or indeterminate. This attribute was an important determinate in selecting features for analysis. Features that are undisturbed are the best candidates for detailed analysis. Features that are partially disturbed, such as a cairn having a small tree growing next to it, are also generally good candidates for detailed analysis. Features that are disturbed are generally unsuitable candidates for analysis. Features that are essentially destroyed—such as a cairn with a tree growing though it which has subsequently blown over—are also inappropriate for analysis. When the condition of the feature could not be reliably assessed, it was categorized as indeterminate and also excluded from detailed analysis. The cause of any impacts to features, such as natural phenomena like tree growth, or historic disturbance like land clearing, was documented.

Figure 17: Example of feature minimally affected by natural processes, in this case, a wind-fallen tree (Feature R24).

Figure 18: Example of feature essentially destroyed by natural processes, in this case tree growing through it (Feature C203). Tree fell in Spring 2006 and completely destroyed cairn.

Structure Type: It was noted if a feature had a definite difference in the size, type, shape, or placement of rock within the cairn. Differential internal/external structure was noted by earlier researchers (Smith and Fowke 1901) who observed, of example, that some cairns had distinctively larger rocks around the periphery of the feature, often set on edge, while rocks within the centre were typically smaller. Other features demonstrated no apparent difference in the size of the rocks selected to build the feature.

Figure 19: Example of feature with an external structure of larger rocks and an internal structure comprised of smaller rocks (Feature C158).

Figure 20: Example of a feature with no internal-external difference in rock size (Feature C159).

Type and relative proportion of rock: There were two basic sources for the rocks used to build cairns at Rocky Point: till and bedrock. Till consists of ice-proximal glaciofluvial sediment and reworked till, and is generally rounded or subrounded and consists largely of igneous rocks such as granodiorite and diorite. The feldspar content in these rocks appears quite high, accounting for the generally light coloured character of the rocks. Till is locally available, plentiful and typically occurs throughout the site. Much smaller amounts of sandstone and conglomerate till were also available. The second source of materials with which cairns were constructed is gabbro bedrock, which occurs throughout the Rocky Point site in a series of low weathered outcroppings. The gabbros consist mainly of gray, calcium-plagioclase feldspar, dark greenish pyroxene crystals and small reddish crystals of olivine. The gabbro is cut in places by white veins and dyklets composed of fine to medium grained quartz and feldspar (Yorath and Nasmith 1995:122-123). Gabbro bedrock is generally angular or occasionally subrounded, depending upon the degree of weathering. Many bedrock outcroppings are quite weathered and are exfoliating, making removal of loose rock relative easy. An ordinal scale was developed in which to visually assess the relative proportion of till and bedrock (Figure 15).

Figure 21: Example of feature built primarily with gabbro bedrock (Feature R8).

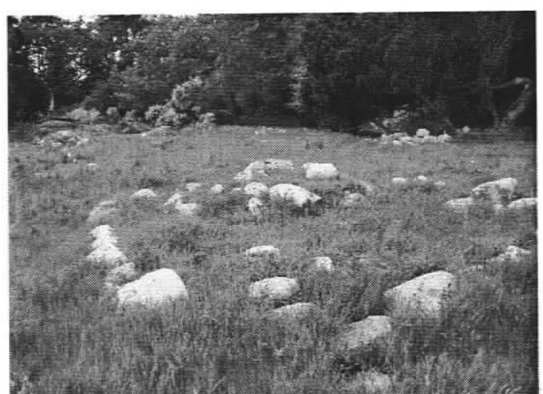


Figure 22: Example of feature built primarily with glacial till (Feature C144).

Rock Size: The method used to record the size of the clasts used in the construction of each feature is based on a modified Wentworth Scale, which is used to define grain size by imposing logarithmic subdivisions on a natural continuum of clast size. Measured at maximum clast diameter, three sizes of rocks were recorded. All rocks between 5 and 30 cm in diameter are classified as cobbles (rocks smaller than 6 cm in diameter are excluded from analysis as they tend to be the size of naturally occurring pebbles in the surrounding sediment). Anything larger than 30 cm is classified as a boulder. The scale was modified during this study to divide boulders into two categories. For this study, any boulder between 30 cm and 70 cm in diameter was arbitrarily classified as a "boulder" and any rock exceeding 70 cm in diameter identified as a "large boulder." The justification for this is that there is a significant difference in the amount of effort necessary to move a boulder 35 cm in diameter as opposed to one 90 cm in diameter. This distinction may have important implications in determining the intensity of labour invested in the construction of a feature. This attribute excludes erratics that were obviously not moved into position. They are discussed as separate attributes.

A scale was developed during this research to record the relative proportions of cobbles, boulders and large boulders for each feature. This scale has 15 categories of clast size, ranging from cobbles to large boulders (Figure 15). It is not a truly ordinal scale in the sense that it has categories for equal or mixed proportions of different sizes of rock. The relative abundance of each clast size is based on a visual assessment of the overall distribution of rocks in each feature. This was done in the field and reassessed during data entry by examining feature diagrams and field photographs.

Rock Sphericity: This attribute is a measure of the degree of roundness of the rocks within a feature. For descriptive purposes, the gradation of roundness is broken up into a small number of divisions, each referred to as a roundness class (Powers 1953). Three roundness classes are employed in this study. Rocks classified as "rounded" are curving in shape with corners and edges smoothed and few or no flat sides. Rocks that are "subrounded" have the edges and corners rounded to smooth curves but the original form is still evident and may have small flat surfaces. Rocks classified as "angular" have relatively sharp edges and corners with little or no rounding.

An ordinal scale was developed during this research to record the relative proportions of the overall sphericity of rocks for each feature. This scale has 12 categories of clast roundness, ranging from rounded to angular (Figure 15). The relative abundance of each roundness class is based on a visual assessment of the overall distribution of rocks in each feature during field recording.

Number of External Rocks: This attribute is a count of the total number of rocks visible on the external part of the cairn. Rocks smaller than cobbles (5 cm in diameter) were excluded from the tally since they are small enough to have been transported onto a feature with soil fill.

Relative Percentage of Soil Fill: The presence of soil fill is a common occurrence on the surficial burial features at Rocky Point. An ordinal scale of the relative proportion of soil fill to rock was established to document this. This visual assessment utilizes six categories, including: no soil fill, <25% soil fill, 25-50% soil fill, 50-75% soil fill, >75% soil fill, and indeterminate. The category indeterminate was used when it was unclear if the soil on top of a feature was natural pedogenesis or the result of human agency. As previously mentioned, the two were distinguished based on the presence of small pebbles, which are common within the Rocky Point sediment. There are no natural processes that could transport a significant number of pebbles from the ground onto the feature. It was assumed during this study that a lack of pebbles within the soil covering a feature was an indication that the soil was an *in situ* pedogenic development and likely not the result of human action.

Figure 23: Example of feature with minimal soil fill (Feature C83, foreground).

Figure 24: Example of feature with dense soil fill (Feature C82).

Presence and Location of *in situ* erratic: This attributes is a presence or absence of whether a feature was built against or actually incorporate a glacial erratic into the feature. The erratic is usually conspicuously larger than the rest of the cairn. Glacial erratics at Rocky Point are usually large rounded granodiorite boulders. Although some features do incorporate smaller erratics in their construction, which were clearly moved into place, the erratics recorded in this category are ones that do not appear to have been moved, and are generally partially buried, while the adjacent cairn is not.

Figure 25: Example of feature built against erratic (Feature C63).

Measurements including *in situ* erratic: Whereas the primary burial features measurements excluded adjacent or incorporated erratics, this category is a measure of the size of a feature including any erratics, using the same procedures outlined for the main feature measurements outlined above. In addition to the length, width, minimum and maximum height measurements, the location of the erratic, measured to the nearest degree, was recorded relative to the feature.

Bedrock Association: This category is a presence or absence of whether a feature is built against a bedrock exposure or outcropping. It was measured to the nearest degree and noted against which face of the bedrock the cairn was constructed.

Figure 26: Feature R57, cairn built against bedrock.

Figure 27: Feature R55 built in bedrock crevice.

Cleaning Required: Many features required intensive cleaning, particularly in areas with dense invasive species such as Scotch Broom. Accumulated forest detritus was also removed as necessary, although no invasive cleaning was done. Roots of plants were left in place and cleaning was a balance between exposing the feature enough to allow accurate recording, ensuring the continued preservation of the feature, and preserving the natural environment.

Figure 28: Sequence of photos showing clean up procedure for removing invasive floral species, (Feature P11).

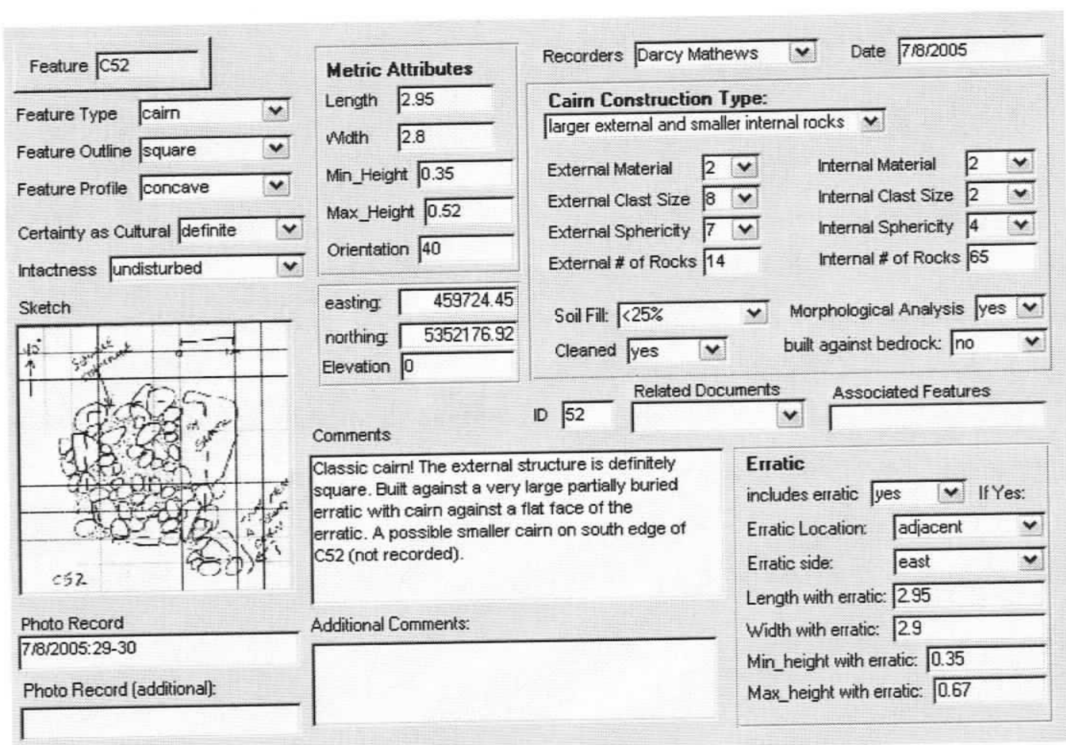
Associated Features: Any obviously associated features were noted here. For example, if a rectangular petroform was built around three small cairns, the numbers of the cairns were noted to facilitate analysis.

Related Documents: A number of features had additional notes or detailed diagrams associated with them, which were completed on separate pieces of paper. This field is a record of the type and location of those documents.

Photographic Record: Each feature was photographed with a scale, north arrow and photo board using a digital camera. Images were identified according to the date of the photograph and numbered in the order that they were taken that day.

Comments: This field is for any additional observations about the feature not adequately covered by any other category, or a further explanation of an observation.

Scale feature sketch: A detailed scale sketch was made of every feature. Included were the location of significant attributes, erratics, and areas of disturbance, if any. The minimum and maximum heights of the feature were also plotted on the feature sketch.


Feature: C52
Feature Type: cairn
Feature Outline: square
Feature Profile: concave
Certainty as Cultural: definite
Intactness: undisturbed
Sketch
Photo Record: 7/8/2005:29-30
Photo Record (additional):

Metric Attributes
Length: 2.95
Width: 2.8
Min_Height: 0.35
Max_Height: 0.52
Orientation: 40
easting: 459724.45
northing: 5352176.92
Elevation: 0

Recorders: Darcy Mathews
Date: 7/8/2005

Cairn Construction Type: larger external and smaller internal rocks
External Material: 2
External Clast Size: 8
External Sphericity: 7
External # of Rocks: 14
Internal Material: 2
Internal Clast Size: 2
Internal Sphericity: 4
Internal # of Rocks: 65
Soil Fill: <25%
Cleaned: yes
Morphological Analysis: yes
built against bedrock: no

ID: 52
Related Documents:
Associated Features:

Comments: Classic cairn! The external structure is definitely square. Built against a very large partially buried erratic with cairn against a flat face of the erratic. A possible smaller cairn on south edge of C52 (not recorded).

Additional Comments:

Erratic
includes erratic: yes — If Yes:
Erratic Location: adjacent
Erratic side: east
Length with erratic: 2.95
Width with erratic: 2.9
Min_height with erratic: 0.35
Max_height with erratic: 0.67

Figure 29: Sample entry from DbRv-3 feature Access database.

5.4 The Temporal Scale: A Discussion

This thesis approaches the morphological and spatial aspects of burial cairn construction, recognizing that there would be no access to temporal data concerning the timing of when these features were built. In a sense, time is collapsed into one dimension, with the entire range of cairn construction and placement occurring on this flat temporal scale. Like all aspects of culture, mortuary practice is affected by incremental change over time, even though it may be occurring at an almost imperceptibly slow rate, over the long-term this process results in significant differences in material culture (Mizoguchi 1993). Undoubtedly, cairn morphology, and likely even placement with DbRv-3, has been in part a product of time. Unfortunately, there was no access to temporal data as part of this research.

During the research design component of the project, a number of ideas were entertained to address this issue of time. The first dealt with weathering studies. It is possible that weathering studies could identify the relative ordering of the episodes of cairn construction within and between sites constructed from the same parent bedrock material. On rocks, the surface hardness and compressive strength are related to degree of weathering, and thus surface age (McCarroll 1994). This technique has been used successfully in geological studies (for example Ericson 2004; White, et al. 1998). It was thought that this principle could be applied to the Rocky Point cairns by measuring the relative rates of weathering of the surface of gabbro bedrock used to build cairns. Assuming it was removed from adjacent bedrock exposures, the weathering rates could be measured against a "fresh" bedrock sample to provide a baseline for comparison, creating a relative chronology of cairn construction. Measurement of weathering would entail the use of a Schmidt hammer, a device that delivers a minor non-invasive spring-loaded impact to gauge rock weathering. This non-destructive technique has been used successfully on cairns in Norway, where rocks were removed from newly exposed shoreline during a sea level drop during the Neolithic, and used to build burial cairns (Tuovinen 2002). The validity of this weathering approach, however, depends on the real time of the first exposure of the rocks to weathering (Tapani Tuovinen, personal communication, June 2, 2004). In the case of Rocky Point, this raised many methodological concerns. For example, it is an assumption that bedrock used to build some of the cairns was removed directly from the adjacent bedrock exposures. Furthermore, identifying the surface of the previously unweathered face of the gabbro rock would have been very difficult, requiring extensive Schmidt hammer readings per rock. During fieldwork, it was also observed that till was used to a much more significant extent than bedrock, thereby further limiting the usefulness of weathering studies on bedrock. This process, although not without great potential, was deemed too problematic and time-intensive for the purposes of this research.

Other techniques were also considered, including the use of lichenometry, which has been used successfully in archaeological applications (Beck 1994) as well as surface exposure of rock surface dating by cosmogenic chlorine-36 accumulation (Zreda and Phillips 1994). These techniques were also deemed too time-intensive, and as such were not included in the analysis.

The most obvious method of dating the features directly is the use of radiocarbon dating. There were two ways this could have been approached. First was the excavation and collection of human bone from these features. This was not an option as this research was intended to be a non-invasive study. The second was to collect charcoal from beneath rocks along the edges of the features (Dana Lepofsky, personal communication, October 7, 2005). Subsurface testing during the archaeological inventory of DbRv-3 indicated dense concentrations of charcoal with sediment immediately adjacent to, and potentially beneath some of these features (Mathews 2004). Although it was unclear if the charcoal accumulations were related to mortuary ritual, or natural or anthropogenic fires, radiometric dates would provide a maximum age of feature construction.

Finally, minimum ages could be obtained from collecting tree ring cores via incremental coring of those trees which have grown through cairns (Baillie 1990; Nash 1999).

In the end, it was decided that the chronometric techniques discussed above were either too problematic, or required an intensive amount of time and money to complete. The objective of this research was also to examine the entire range of cairn construction, so that identifying the individual episodes of feature construction, while of great benefit to a more detailed study, was not necessary considering the approach taken here. The objective of this research was to observe the DbRv-3 cairn cemetery in its entirety, recognizing that time has a role in the formation of the site, but also recognizing that I am examining the overall patterns in cairn construction and placement, not the evolution of the cemetery through time.

5.5 Data Set Summary

The DbRv-3 data set consists of 358 petroforms of archaeological origin, 333 of which are cairns and mounds. Of these, 240 are intact enough for a detailed taxonomic study. This large number of features, and the morphological and spatial diversity they exhibit, will lend itself well to a detailed analysis of the site. The DbRv-3 data set has been accurately mapped and the variability of these features has been recorded in great detail. A univariate analysis of these features substantiates the variability of these features and hints at patterning in the morphological data. This is included as Appendix 1. Furthermore, I understand the limitations of the data, and the natural and cultural agents that have affected the site, and have taken this into consideration.

The existing knowledge on the morphological and spatial aspects of these features is poor. Even at well studied sites such as Scowlitz, the morphological and spatial dimension of these features has not been investigated in much detail and certainly not as part of a rigorous numerical or quantified analysis.

Understanding morphological and spatial variability of the burial cairns at DbRv-3 is key to applying social theory to the mortuary data. To explore the variability of the Rocky Point cairns and mounds, I am applying methods of numerical taxonomy to the DbRv-3 data.

6 Feature Morphology and Cluster Analysis

This chapter is an examination of the principles and procedures appropriate to the classification of the burial features at the Rocky Point site. Numerical taxonomy is a broad approach utilizing numerical methods to quantify objectively similarities and dissimilarities within a large body of data. To address the larger thesis questions relating to identifying patterns in burial cairn morphology, numerical taxonomy is an appropriate means of deriving useful means of examining the pattern of relationships between several variables simultaneously. This includes multivariate statistical methods such as factor analysis, multidimensional scaling and cluster analysis. This is in contrast to dependence-based methods such as multiple regression and analysis of variance (ANOVA) that utilize several variables to predict or explain one dependent variable. Of the multivariate methods that examine interrelationships between variables, cluster analysis is best suited for the morphological analysis of burial cairns. The following sections of this chapter discuss some of the relevant principles of numerical taxonomy, the rationale for the selection of cluster analysis as the principle means of taxonomic analysis, and the methods employed in the cluster analysis of burial cairn morphology.

6.1.1 Key Concepts of Numerical Taxonomy and Classification

This section summarizes numerical taxonomy, the assumptions and methods involved, and some of the problems inherent in the process. Sneath and Sokal define numerical taxonomy as "the grouping by numerical methods of taxonomic units into taxa on the basis of their character states" (1973:4). Although largely developed within the biological sciences, numeric taxonomy has been widely adopted in the social sciences. This is a rubric for a variety of numerical techniques applied to problems of classification. As a multivariate descriptive method, numeric taxonomy is a process of creating taxa through a variety of statistical procedures such as cluster analysis, multidimensional scaling and principle components analysis.

Sneath and Sokal (1973:5) define several fundamental assumptions inherent in the practice of numerical taxonomy that are relevant to this study. First, "the greater the content of information in the taxa of a classification and the more characters on which it is based, the better the given classification will be." (Sneath and Sokal 1973:5) Ensuring the use of the greatest number of variables possible, measured at appropriate scales, will produce is the broadest information upon which taxa can be created. Sneath and Sokal warn against the exclusion of pertinent material because it does not strictly fulfill the *a priori* criteria for the taxon being studied. This includes attributes that the systematist does not consider essential or diagnostic (Sneath and Sokal 1973:68). The Rocky Point burial features have a sufficiently complex morphology, and detailed field recording allowed for the documentation of a large array of attributes. The description of these quantitative and qualitative observations was presented in the previous chapter.

The second principle offered by Sneath and Sokal states that: "A priori, every character is of equal weight in creating natural taxa" (1973:5). This assumption is one of the controversial aspects of numerical taxonomy. First, this assumption of equal weight ignores the possibility that some attributes of a given object of study may be of greater classificatory value than other attributes. Sneath and Sokal counter, however, that differential weighting would have to be very significant to surmount the cumulative effect of using a large number of attributes (Sneath and Sokal 1973:113). Furthermore, weighting can only be based on an intuitive judgement of what observations are more important than others, thereby defeating the objectivity of numerical taxonomy. In addition, the methods of numerical taxonomy are typically applied to a set of data to potentially identify groups previously unnoticed by the researcher, or conversely, to question the assumptions that the investigator may have about the structure of the data if the *a priori* groups do not turn up because they are unsupported by the data (Everritt 1993:40). An additional problem with Sneath and Sokal's second principle, when applied to archaeology, is the assumption that natural classes exist in the data that had meaning to the makers (Mackie 1995:25). In the case of the Rocky Point data, it is an assumption that there are in fact groupings in burial cairn morphology that may have had an emic meaning to the people who built those features. As such, the investigator must consider attributes that are inappropriate for inclusion in the resemblance matrix. A caution offered by Mackie (1995:25) includes a clustering result based on morphological characteristics that might define temporal or spatial variation within the data, which is itself dependent upon a number of different cultural and circumstantial pressures, ranging from stylistic preferences, to raw material availability and trade patterns. As such, Mackie (1995:25) suggests that interpretation of these clusters must stop with their definition and that further deduction of any cultural meaning of the resultant clusters necessitates one or more of the following:

1. Discussion of the individual or grouped attributes that drive clustering, possibly through an attribute reduction technique such as multidimensional scaling.
2. A Middle Range–like approach in which clusters resulting from numerical taxonomy can be correlated with outside variables that have cultural, ethnographic, or archaeological relevance.
3. The conscious selection of attributes limited to those relevant to a special purpose typology.

Further to this discussion, is Sneath and Sokal's Principle 7, which states that: "Classifications are based on phonetic similarity" (1973:5). This means there is more than one process that could result in the observed diversity of attributes classified by numerical taxonomy. As such, relationships inferred by taxonomic similarity are the result of present day patterning and cannot be assumed to directly reflect historic process, which is essentially unknowable. Mackie states that the archaeological implication of this principle is that:

> …the types generated by cluster analysis will have no necessary reference for establishing culture history except by correlation with attributes outside of those used in calculation of the resemblance matrix. That is, other attribute types such as provenience and age can be correlated with the "natural" types to create a special purpose classification. (Mackie 1995:26)

As such, the taxonomy produced in this thesis is not intended to be a typology of burial cairns applicable throughout the Strait of Georgia, or even elsewhere in the immediate area, but rather taxonomy particular to Rocky Point with the intention of exploring morphological patterning at the intrasite level. Future analysis incorporating similar data from multiple sites throughout the Strait of Georgia, however, may have larger scale implications in terms of understanding transitional Marpole/Late period social process.

6.1.2 Feature Morphology and Cluster Analysis Methods

The term cluster analysis encompasses a number of different algorithms and methods of grouping objects of similar kind into respective categories. These methods are designed to detect natural groupings in data based on the idea that attributes within a group should simultaneously exhibit internal cohesion and external isolation (Cormack 1971). Cluster analysis, and classification studies in general, should aim towards discovering the pattern in groupings in a set of data with as few assumptions as possible about the nature of the grouping (Shennan 1997). Of particular interest to this study is how to organize observed data into meaningful structures, that is, to develop taxonomies. Cluster analysis, among other things, is an exploratory data analysis tool that aims to sort different objects into groups in a way in which the degree of association between similar objects is maximal and minimal otherwise.

Paraphrasing Aldenderfer and Blanshfield (1984:9), multivariate statistical methods such as cluster analysis are typically used in the social sciences to:

1. develop a taxonomy or system of classification
2. investigate meaningful ways to conceptualize or group data
3. generate hypotheses through data exploration
4. test hypotheses

In this thesis, cluster analysis is used primarily to test the hypothesis that there is significant patterning in the external morphology of burial cairns at Rocky Point. The resultant taxonomy, if valid, will facilitate the conceptualization of the spatial patterning of cairns at Rocky Point across the landscape.

Before outlining the cluster analysis methods used in this thesis, a brief discussion of some of the precautionary generalizations and limitations inherent in cluster analysis is appropriate. Aldenderfer and Blashfield (1984) offer the following points of caution. First, "most cluster analysis methods are relatively simple procedures that in many cases are not supported by an extensive body of statistical reasoning" (Aldenderfer and Blanshfield 1984:14). So while many of the clustering algorithms have significant mathematical properties, they are still based largely on heuristic methods. Furthermore, cluster analysis assumes that the data itself is valid because these methods do not use the same logic of statistical inference that dependence methods do. Second, different cluster analysis methods "can and do generate different solutions to the same data set" (Aldenderfer and Blanshfield 1984:15). This is the result of different clustering methods emphasizing diverse rules of group formation. This point necessitates some form of validation procedure to insure that the most "natural" groups in the data are identified. This means that the resulting groups, or taxa, must be meaningful to the research objectives and not arbitrary or artificial constructions with little or no relevance to the goals of the investigation. Therefore, the choice of clustering methods selected for analysis must also be appropriate to the purpose of the research.

Lastly, "cluster analysis is structure–seeking although its operation is structure–imposing" (Aldenderfer and Blanshfield 1984:16). Cluster methods are used to discover patterns in data that are not apparent to visual identification and will always place objects into groups. Cluster analysis will produce clusters even where none may exist. So unlike other identification procedures like discriminant analysis which does not create new groups but assigns objects to existing groups, cluster analysis may be structure–seeking but in its function is structure-imposing.

A final point is the problem of missing data. Cases without complete data can complicate the construction of a similarity matrix. For the Rocky Point data, however, there was no missing data with which to contend because heavily disturbed cairns were eliminated at the outset of analysis.

Aldenderfer and Blanshfield (1984:12) identify five basic steps in cluster analysis studies. These are:

1. selection of a sample to be clustered
2. definition of a set of variables on which to measure entities in the sample
3. computation of the similarities among the entities
4. use of a cluster analysis method to create groups of similar entities
5. validation of the cluster solution

These steps are discussed in detail below as they apply to this thesis.

6.1.2.1 Data Collection and Variables

The first step in cluster analysis, as defined by Aldenderfer and Blanshfield (1984) is the selection of a sample to be clustered. As outlined in Section 5.3.1, a total of

382 features were recorded during the fieldwork. Of these, 240 features (or cases) were selected for analysis on the basis that the features were anthropogenic and not subject to significant taphonomic disturbance. No sub sampling was employed within the population of the 240 cases.

The second step in cluster analysis was the selection of the variables to be used in the construction of the similarity matrix. A description of the attributes and how the data were collected is outlined in Section 5.3.1 of this thesis. In the current study, 18 variables were selected for inclusion into the similarity matrix. The rationale for attribute selection and treatment for inclusion in the similarity matrix is discussed in Section 7.1. Briefly, however, a discussion of the importance of variable choice in cluster analysis is appropriate. Aldenderfer and Blanshfield (1984) argue that variables should be chosen within the context of an explicitly stated theory that is used to support the classification. Theory is the basis for the rational choice of the variables to be used in the study rather than the option, which is to "succumb to a naïve empiricism (Aldenderfer and Blanshfield 1984:20). By naïve empiricism, the authors mean the collection and subsequent inclusion of as many variables as possible in the hope that structure will emerge if only enough data is included. Although seemingly contrary to Sneath and Sokal's (1973) Principle 1 of numeric taxonomy (the inclusion of as many variables as possible), it is dangerous in the context of cluster analysis because of the heuristic nature of the technique (Everritt 1993). In this thesis, I have selected as many variables as possible for inclusion in the cluster analysis that are relevant to feature morphology. A few attributes were excluded from the cluster analysis because they were not directly appropriate to the theoretical orientation of the study, or in the case of feature type for example, were *a priori* classifications based on existing heuristic typologies and therefore contrary to objective taxonomy.

6.1.2.2 Selection of a Similarity Matrix

The similarity coefficient measures the similarity and dissimilarity between pairs of cases. The results of all paired comparisons for the set of cases under investigation are stored in the similarity matrix. Of particular importance to cluster analysis is the selection of an similarity coefficient appropriate for the scale of data in question.

While many similarity coefficients have been proposed for cluster analysis (for a detailed discussion see Spath 1980), most of these are designed for a single scale of measurement. The data in this research are at multiple scales of measurement (continuous, ordinal, nominal, and binary) which limits the choice of similarity coefficient. While it may be possible to transform the scales of measurement of the Rocky Point feature variables in such a way as to make it compatible with these algorithms, it is generally not considered prudent as variables in multivariate data sets may have different distribution parameters across cases. Standardization of these attributes, therefore, may not transform equivalently and could possibly change the relationships between them (Edelbrock 1979).

Considering the multiple scale Rocky Point data and the problems inherent in standardizing several scales into one, it was decided that a coefficient capable of creating a similarity matrix using multiple scales of analysis would be applied to the feature data. Following is a discussion of Gower's general similarity coefficient, which is suitable for variables at all scales of measurement, and was selected to create a similarity matrix for the Rocky Point data.

6.1.2.2.1 Gower's General Similarity Coefficient

Many taxonomic methods are based solely on either continuous data or binary data. Cluster analysis, however, is capable of using multi-attribute data, which is one of the principle reasons for the selection of the method given the multi-state nature of the Rocky Point data. This can be done with a variety of clustering algorithms, such as Average Linkage, provided that a suitable similarity coefficient can be defined. Gower's coefficient of similarity (Gower 1971) is one of the most often used in such instances. The potential of this coefficient in an archaeological application has been discussed as early as Doran and Hodson (1975). The successful use of Gower's Similarity Coefficient has been reported in a number of archaeological studies. For example, Palumbo (1987) used Gower's coefficient in a study of mortuary practices and social structure at Jericho. The author had binary and multi-state data with which Gower's Coefficient produced "meaningful interpretable groupings" (Palumbo 1987:407).

Gower's coefficient is not complicated and employs three different, but parallel, methods of calculating similarity for each of the three scales of measurement. This coefficient transforms attributes at a variety of different scales into a single similarity matrix without recoding or dissection. It is intended to minimize information loss and to simplify character coding (Gower 1971). As such, it is an ideal measure of similarity for the purposes of identifying significant grouping, if any, among the Rocky Point burial cairns data.

Gower's General Similarity Coefficient (s_{ij}) is defined as follows:

$$S_{ijk} = \sum_k W_{ijk} S_{ijk} \Big/ \sum_k W_{ijk}$$

For the kth variable, the similarity needs to be defined between two individual cases, i and j, and a weight (s_{ijk} and w_{ijk}). Where s_{ijk} denotes the contribution provided by the *k*th variable, w_{ijk} is usually 1 or 0 depending upon whether or not the comparison is valid for the *k*th variable. If differential variable weights are specified, however, it is the weight of the *k*th variable or 0 if the comparison in not valid. The effect of the denominator $\Sigma_k w_{ijk}$ is to divide the sum of the similarity scores by the number of variables (unless variable weights have been specified, then it is divided by the sum of their weights).

For ordinal and continuous variables, Gower defines the value of s_{ijk} as follows:

$S_{ijk}=1-|x_{ik}-x_{jk}|\ /r_k$

where r_k is the range of values for the *k*th variable. For continuous variables, s_{ijk} ranges between 1 (for identical values $x_{ik}=x_{jk}$), and 0, for the two extreme values $x_{max}-x_{min}$.

For binary variables (or present–absent variables), Gower's coefficient classifies the component of similarity and the weight according to Table 3, reproduced from Wishart (2006). The presence of the attribute is denoted by "+" and absence indicated by "–".

Table 3: Component of Similarity and weight for binary variables, Gower's Similarity Coefficient

	Value of Attribute k			
Case i	+	+	–	–
Case j	+	–	+	–
s_{ijk}	1	0	0	0
w_{ijk}	1	1	1	0

Therefore, s_{ijk}=1 if cases i and j both have an attribute k present or 0 if absent. The weight w_{ijk} results in negative matches being ignored.

For nominal variables, the value of s_{ijk} is 1 if $x_{ik}=x_{jk}$, or 0 if $x_{ik}\neq x_{jk}$. Therefore $s_{ijk}=1$ if cases i and j have the same state for attribute k, or 0 if they have different states (and $w_{ijk}=1$ if both cases have observed states for attribute k).

Gower's similarity coefficient is available as part of Clustan Graphics version 8.0 commercial software package (Wishart 2006). All cluster analysis in this thesis was conducted using the Clustan software.

6.1.2.3 Selection and Application of the Clustering Algorithm

A number of clustering algorithms are available to join the individual cases in the similarity matrix together. These algorithms fall into two categories, hierarchical and partitive. Both of these approaches to cluster analysis are similar in that clusters are imposed on the data regardless of whether the similarity matrix is structured that way, thereby making the definition of what are "real" clusters of central importance.

Partitive algorithms begin with an *a priori* decision to form *n* groups (Everritt 1993). Clustering begins with either an initial set of *g* seed points or an initial partition of the data into *n* groups. If beginning with a set of seed points, a partition of the data into *n* groups is achieved by assigning each observation to the nearest seed point. On the other hand, beginning with a partition of the data into *n* groups, *n* seed point locations are calculated by a centroid of these *n* partitioned groups. In both cases, an iterative process occurs in which new seed points are calculated from partitions and then new partitions are created from the seed points (Everritt 1993). This process continues until no reassignments of observations from one group to another occur. This method has the disadvantage that the number of clusters has to be specified prior to the analysis, although in practice it is not uncommon to find solutions for a range of *n* values (Baxter

1994). One of the most commonly used of these techniques is k-means clustering (Shennan 1997). This method is inappropriate for the Rocky Point morphological data because it can only deal with a matrix of Euclidean distances, which cannot be calculated for qualitative variables. As discussed earlier, collapsing qualitative observations is objectionable due to a critical loss of information. Furthermore, there must be *a priori* reasons suggesting what the number of clusters should be, which is counter to the creation of an objective taxonomy of the burial features at Rocky Point.

There are two types of hierarchical methods: agglomerative and divisive (Shennan 1997). In both methods, all cases are grouped together in a hierarchical tree of clusters, with all individual cases in separate clusters at one end and all cases clustered into one group at the other end. Between these two extremes is the clustering result that is most appropriate to the research objectives. The results of hierarchical clustering are displayed in dendrogram; a tree diagram representing the relationships between individuals and groups (Shennan 1997).

Divisive clustering begins with all cases in one cluster, which is divided successively into larger numbers of clusters containing fewer numbers of cases (Everritt 1993; Shennan 1997). Agglomerative algorithms do the exact opposite, starting with n clusters (where n is the number of cases). Then two cases are merged into a cluster, leaving n–1 clusters remaining. This agglomerative process continues until only one cluster remains (this resulting cluster contains all n cases). In both agglomerative and divisive methods, the process is hierarchical because the merger of two clusters cannot be undone—once two observations have been placed together in the same cluster, they stay together for the remainder of the grouping process (Everritt 1993; Shennan 1997).

Divisive hierarchical approaches are rare in archaeology and are generally restricted to dichotomous data where cluster divisions are made in terms of the presence or absence of a single attribute at any given time (Shennan 1997:247). Mackie (1995) raises the point that the traditional archaeological typology, such as that constructed for the Strait of Georgia region, is hierarchical and based on a simple divisive dichotomous algorithm (the presence or absence of qualitative traits).

The Rocky Point similarity matrix is constructed with non-Euclidean space, and as such, is restricted to three types of agglomerative hierarchical clustering algorithms. These include single linkage (or nearest neighbour), complete linkage (furthest neighbour), and average linkage. The last method, average linkage, is also referred to as unweighted pair-group method (UPGMA).

Single linkage is the simplest of the three algorithms, in which the criterion for linkage is that to join a given group, an individual must have a specified level of similarity with any member of the group. For two groups to join, any member of the one group must have a specified level of similarity with any member of the other. Similarities or distances between individuals, or between groups and other groups, are defined as those between their nearest neighbours (Baxter 1994; Shennan 1997). Single linkage clusters lack internal cohesion (Wishart 2006). The resulting chaining occurs when a series of cases with similar coefficients join onto an otherwise well-defined cluster, which becomes less distinct with the addition of the new member. Ultimately, the entire sample is joined into a single chain.

Complete linkage, or furthest neighbour analysis, entails the criterion that to join a cluster, a given case must have a specified degree of similarity with the member of the group from which it is most dissimilar. For two groups to join, the two individuals, one from each group, which are most dissimilar from one another, must have a specified degree of similarity. Like single linkage, this analysis is looking for the highest similarity values in the succession of the matrices, but is defined on the basis of furthest rather than nearest neighbours (Baxter 1994; Shennan 1997). Complete linkage produces very tight clusters and is resistant to chaining, but can potentially produce large numbers of unclassified objects.

Average linkage is the preferred clustering algorithm for the current research as a balance between single and complete linkage. In average linkage, the similarity or dissimilarity between groups is defined as the arithmetic average of the similarities between pairs of members. So that when a pair is added to a cluster, a new similarity coefficient is calculated. This new coefficient is the average of the coefficients of the cluster members. This method reduces chaining, which is problematic in single linkage, as the criteria for membership are not as stringent as for farthest linkage. This is the most widely used technique in archaeology and consistently produces results satisfactory to archaeological research (Baxter 1994:158). Furthermore, a comprehensive study of clustering algorithms by Milligan (1980) illustrated that no single method was superior for all types of data. Rather, an appropriate clustering algorithm should be selected according to the objectives of the research and the nature of the data. In the case of the Rocky Point data, it was suspected that there is a true cluster structure masked to some extent by 'noise', or outliers. For example, in Section 14, the univariate examination of the 240 cases indicated strong uniformity in feature size (length, width, mean height, volume, and area), with several significant outliers at the extreme edge of the distribution. Milligan (1980) concluded that average linkage and Ward's methods had a superior performance over single linkage and centroid methods in such cases. As such, average linkage was selected as the clustering coefficient for the present study.

6.1.2.4 Cluster Validation

A clustering algorithm will always produce clusters. Considering this, how does one determine if the clusters are valid or if they are artifacts of the algorithm? Related to this is the issue of when to stop and make the "best cut" in the dendrogram. In other words, if a hierarchical tree is produced, what levels of the tree are significant?

The final process of cluster analysis deals with this issue of cluster validation. It can be difficult to assess the number of 'real' clusters from typical cluster analysis output. While the dendrogram visually displays a large matrix of similarities, it represents a multidimensional space in only two dimensions, and as such, there is often an incongruity between the similarity coefficient and the dendrogram levels of similarity. It is not entirely adequate to evaluate the number of clusters by inspecting the dendrogram (Baxter 1994). Any decision on the number of clusters and the soundness of such a determination, then, requires a means of validation. Although the literature surrounding this issue is enormous, there is no definitive method and attempts to create such a method tend to have little sound statistical basis. For example, solutions based on statistical hypothesis testing procedures described in Everett (1993) make strong distributional assumptions about the data. Furthermore, aside from Aldenderfer (1982) and Whallon (1990) discussing aspects of validation, there are few discussions on the topic as it relates specifically to cluster validation with archaeological data. As stated earlier, one of the primary weaknesses of numerical taxonomy, and cluster analysis specifically, is that these methods have evolved from many disciplines and the biases of those disciplines are inherent in these processes (Aldenderfer and Blanshfield 1984:14-15). This is an important point, as the kinds of questions asked of the data, and types of data thought to be useful for building a classification are different in archaeology, as opposed to the biases of other disciplines. Considering this, the problem of determining the best number of clusters is a difficult one with which no completely satisfactory solution exists. However, the success of archaeological cluster analyses are often judged by their ability to produce meaningful groups relevant to the research questions. This means that "informal and subjective criteria, based on subject expertise, are likely to remain the most common approach" (Baxter 1994:164). In light of the exploratory nature of this research, it was decided that a simple intuitive method of validation was appropriate. To summarize a similar approach offered by Mackie (1995:30), clusters will be validated if they demonstrate cultural and archaeological meaning, external to the procedures that produced them.

6.1.3 Conclusions

In summary, it was determined that a hierarchical, agglomerative clustering method was the best method for objectively describing the similarity relationships among the burial features at DbRv-3. Gower's general similarity coefficient was selected as the most appropriate means of construction of a similarity matrix. Furthermore, Average linkage was determined to be the most suitable way of building a similarity matrix, considering the research objectives of defining pattering in feature morphology.

Once the clusters are defined, they will then be used to identify and describe structure, if any, within the spatial arrangement of the burial features at DbRv-3. This analysis of the spatial data will be an exploratory heuristic approach, with the aim of identifying high–level patterning in the placement of the different taxa of burial cairns relative to each other and across the landscape.

7 Morphological Cluster Analysis Results

The cluster analysis presented in this thesis is a special purpose classification generated to solve a specific research problem —the identification of patterning in cairn morphology at DbRv-3. To reiterate, the intention is not to create a typology in the formal archaeological sense, but rather to explore in as objective a manner as possible, patterning in the shape, size, and construction materials employed by the precontact Straits Salish peoples when building these burials. This chapter outlines the results of the results of the cluster analysis of DbRv-3 feature morphology.

As stated in the previous chapter, cluster analysis does not define a set of classes, but rather a set of hierarchical clusters. The decision on if to cut a dendrogram, and if so where to cut it, is external to the clustering procedure. While delimiting the operational clusters into manageable units for further analysis, it is a somewhat subjective process requiring transparency on the part of the researcher and a discussion of the choices made and the assumptions inherent in the process. Discussed roughly in the chronological order of the choices made and results derived from the methodology, this chapter outlines:

1. the rationale for the inclusion of attributes for cluster analysis
2. data reduction techniques applied to variables, if any, prior to inclusion in the similarity matrix
3. results of the agglomerative hierarchical cluster analysis using Gower's general similarity coefficient

4. results of the validation procedure
5. best-cut decision process
6. final results of taxonomy

As discussed in the previous chapter, the more variables included in cluster analysis, the better the taxonomy will likely be, although the selection of attributes should be relevant to the research objectives. The intention of this classification is to disclose phylogenic relationships in cairn morphology; therefore, attributes that do not pertain to feature morphology are not appropriate for the analysis. The obvious attributes for exclusion are those coded for space (feature location) and general record keeping (such as date recorded, photographic record, etc). The spatial data are reincorporated into a special purpose analysis in Section 9.1.2. The feature number was exported with the attributes into Clustan Graphics Version 8, but was specified as the case label column and therefore not included in the construction of the similarity matrix.

Several of the attributes, such as material type and sphericity, were originally recorded on ordinal scales with many categories. The original intention was to use the subtlety of the information for a very detailed analysis. For a morphological study, however, it was later determined this would result in too many mismatches during clustering. Anticipating this, some of the ordinal scales were therefore collapsed and recoded based on the results of the univariate analysis (Section 14). This is discussed in detail below.

Subsequent to the field program, there were 389 entries made in the DbRv-3 database. As illustrated in Table 4, the *a priori* category cairn (n=323) is the most numerous type of feature at DbRv-3. A much lower frequency of mounds (n=10), petroforms (n=8), and rock rings (n=7) were recorded. As mentioned in Section 5.3.1, during the initial inventory, a number of features initially thought to be cairns, were later discovered to be either natural or potentially anthropogenic scatters of rock, as well as historic rock features, such as field clearing (n=36). In addition, seven numbers were assigned in the field but were not actually used.

A total of 240 burial features were included in the analysis, described using 19 variables (Table 5). There was no missing data for any attributes. The similarity matrix and clustering algorithms were all conducted using Clustan Graphics version 8 clustering software package (Wishart 2006).

Table 4: Frequency of feature types recorded in database

Feature Type	Frequency	Included in morphological analysis
Cairn	323	231
Mound	10	9
Petroform	8	0
Rock ring	7	0
Rock scatter	12	0
Historic petroform	6	0
Natural feature	16	0
Numbers not used	7	0
Total	**389**	**240**

7.1 The Cluster Analysis Attributes

The morphological attributes collected during the field component of the research were at four different levels of measurement: continuous, nominal, ordinal, and binary. The scale of measurement for each attribute included in the cluster analysis is summarized in Table 5.

Briefly, continuous (or ratio) scale measurement is the most advanced scale used in this analysis. It is the quantitative expression of the physical properties of an item. Ratio scales are isomorphic, meaning that because the structures are all identical, all arithmetic operations can be performed on continuous level attributes without destroying the relationship between the variables (Thomas 1986:28). This includes measurements such as length and width (Table 5). Conversely, the nominal scale is the simplest scale of classification and involves simply assigning names to different categories within it and lacking any rank ordering (Shennan 1997:8). In the present study, nominal scale attributes include categories such as outline and profile shapes (Table 5). The ordinal level of measurement involves a ordering of discrete categories into a meaningful sequence along a continuum, although the distance between each category is either unknown or undefined because of imprecise measurement (Thomas 1986:22). Binary level measurements are a dichotomous classification of either the presence or absence of a single attribute, and in this study include the presence or absence of erratics and whether or not a feature is built against bedrock (Table 5).

Table 5: Cluster analysis attributes and their scale of measurement.

Variable	Scale
Length	continuous
Width	continuous
Mean height	continuous
Maximum height	continuous
Area	continuous
Volume	continuous
Construction type	nominal
Feature outline	nominal
Feature profile	nominal
Orientation	nominal
External material	ordinal
Internal material	ordinal
External clast size	ordinal
Internal clast size	ordinal
External sphericity	ordinal
External sphericity	ordinal
Soil fill	ordinal
Includes erratic	binary
Built against bedrock	binary

Following is a discussion of the attributes included in the cluster analysis, discussed in order of scale of measurement. Also included in each category are any data reduction techniques used to prepare the attribute for inclusion into the similarity matrix.

7.1.1 Continuous scale variables

There were six continuous scale attributes used in this study, including feature length, width, mean height, maximum height, area, and volume. Minimum height was excluded from the analysis as it was of little analytical use beyond calculating mean feature height. These features were exported into Clustan Graphics and transformed into range values, which equated each variable to a range from 0 (minimum value) to 1 (maximum value).

7.1.2 Nominal scale variables

There were four nominal scale variables included in the cluster analysis (Table 5). These included construction type, outline, profile, and orientation. With the exception of construction type, all were unmodified for cluster analysis. These are summarized in Table 6 as they are coded for cluster analysis.

Based on the results of the univariate analysis of construction type, virtually all features (96%) fall into one of two categories: those with a definite external and internal structure and those with no definable internal and external difference. The remaining two categories accounted for 4% of the overall number of features. It was decided that to reduce the number of mismatches during cluster analysis that the remaining two statistically insignificant categories would be collapsed into one category classified as "other" (n=10), thereby reducing construction type to three categories from the original five.

Table 6: Cluster analysis ordinal, nominal, and binary variables and standardized values

Variable	Standardized value						
	0	1	2	3	4	5	6
Construc-tion type	n/a	external structure	no external structure	other	n/a	n/a	n/a
Feature outline	n/a	oval	circular	square	rectangle	irregular	n/a
Feature profile	n/a	rounded	convex	square	concave	irregular	n/a
Orientation (°)	n/a	0-45 and 181-225	46-90 and 226-270	316-0 and 136-180	91-135 and 271-315	n/a	n/a
External material	n/a	till	most till	till and bedrock	most bedrock	bedrock	n/a
Internal material	n/a	till	most till	till and bedrock	most bedrock	bedrock	n/a
External clast size	n/a	cobbles	boulders	large boulders	n/a	n/a	n/a
Internal clast size	n/a	cobbles	boulders	large boulders	n/a	n/a	n/a
External sphericity	n/a	rounded	subrounded	angular	n/a	n/a	n/a
Internal sphericity	n/a	rounded	subrounded	angular	n/a	n/a	n/a
Soil fill (%)	n/a	0	1-25	26-50	51-75	76-100	indet.
Includes erratic	no	yes	n/a	n/a	n/a	n/a	n/a
Built against bedrock	no	yes	n/a	n/a	n/a	n/a	n/a

7.1.3 Ordinal scale variables

There are seven ordinal scale variables included in the cluster analysis. Six of these variables are a measure of the three potential differences between the type, size, and sphericity of rock used to build the external and internal parts of cairns. The seventh is a measure of the relative amount of soil fill included in a feature (Table 6).

External and internal material type and is comprised of five ordinal categories, ranging between till only to bedrock only (Table 6). Each of these five categories is reasonably represented, therefore collapsing this category into three categories (till, equal till and bedrock, and bedrock) was deemed unnecessary at the risk of loosing potentially meaningful differences.

As originally recorded, internal and external rock size was comprised of 14 different ordinal categories ranging from cobbles only to large boulders only. As identified in Section, the distribution of rock size exhibits a clearly multimodal distribution between the three basic sizes (cobbles, boulders, and large boulders). It was decided that to reduce mismatches during cluster analysis, that these 14 categories would be collapsed to three categories: cobbles, boulders, and large boulders (Table 6), which corresponds very well with the natural distribution of clast size.

The attribute sphericity exhibited some modality during univariate analysis and, although not as strongly as clast size. Like the former category, however, the 12 categories of sphericity were collapsed for the sake of cluster analysis into three categories, rounded, subrounded, and angular (Table 6), which correspond with distribution modality.

7.1.4 Binary scale variables

There are two binary scale variables: features that include erratics in their construction, and features that are built against bedrock. The category "Features that include erratics" was initially recorded on a nominal scale, with three categories (absent, present and unclear). I reduced this to a binary scale of presence or absence, with the third category "unclear" changed, reasonably I think, to absent (Table 6). The category "Features built against bedrock" was originally recorded as a dichotomous value of no or yes and remained as such for the cluster analysis (Table 6).

The cluster analysis is based on visible morphological attributes of the cairn features at Rocky Point. One final point before a discussion of the cluster results concerns the attributes that could not be collected during the fieldwork. All data collected during the current study concerned the outward morphology of the features. Undoubtedly, there are structural attributes within these features that would be appropriate to include in any taxonomic study. For example, the presence or absence of an internal structure for the body, which was documented by earlier researchers such as Harlan Smith (Smith and Fowke 1901) and more recently at the Scowlitz site (Lepofsky, et al. 2000; Thom 1995). Obviously, correlating the morphology of any burial structure with the burial inside would be of great benefit. It is important to recognize that the current study pertains only to the exterior morphology of the features and their location in space. While these attributes are undoubtedly very significant, they are by no means a complete material record to the funerary ritual that resulted in the construction of these burials.

7.2 Agglomerative Hierarchical Cluster Analysis Results

As discussed in detail in a preceding section, the cluster analysis was completed using an agglomerative hierarchical approach. Gower's general similarity coefficient was used to construct the similarity matrix and the average linkage algorithm to generate the cluster solution. The variables used in the analysis are also discussed in the preceding section, and are summarized in Table 7 below by data type, number of cases, transformation type if any, and variable weighting.

Table 7: summary table of variables, data type, transformations and weighting from morphological cluster analysis

Variable	Data type	No. cases	Transfor-mation	Variable weight	Missing	Minimum	Maximum
construction	Nominal	240	none	1	none	1	3
outline	Nominal	240	none	1	none	1	5
profile	Nominal	240	none	1	none	1	5
length	Continuous	240	range	1	none	0.850	5.699
width	Continuous	240	range	1	none	0.649	4.599
max_height	Continuous	240	range	1	none	0.119	1.019
mean_height	Continuous	240	range	1	none	0.100	0.709
volume	Continuous	240	range	1	none	0.120	17.020
area	Continuous	240	range	1	none	0.620	78
orientation	Nominal	240	none	1	none	1	4
ext_material	Ordinal	240	none	1	none	1	5
int_material	Ordinal	240	none	1	none	1	5
ext_size	Ordinal	240	none	1	none	1	4
int_size	Ordinal	240	none	1	none	1	3
ext_sphericity	Ordinal	240	none	1	none	1	5
int_sphericity	Ordinal	240	none	1	none	1	5
Soil fill	Ordinal	240	none	1	none	1	6
erratic	Binary	240	none	1	none	0	1
bedrock	Binary	240	none	1	none	0	1

7.3 Results of the Validation Procedure

The resulting clustering solution produced the dendrogram illustrated in Figure 30 below. As discussed in the last chapter, it can be difficult to assess the number of 'real' clusters from typical cluster analysis output. While the dendrogram visually displays a large matrix of similarities, it is not entirely adequate for evaluating the best number of clusters. Validation of the final cluster solution was achieved through a heuristic and intuitive method in which three differing levels of clustering: a large cluster solution of 42 clusters, a moderate cluster solution of 18 clusters, and a small solution of 6 clusters. The goal was to make the final cut and produce a cluster solution that would produce meaningful groups relevant to the research questions. Considering the research objectives, a smaller number of internally homogenous and externally heterogeneous clusters was determined to be best.

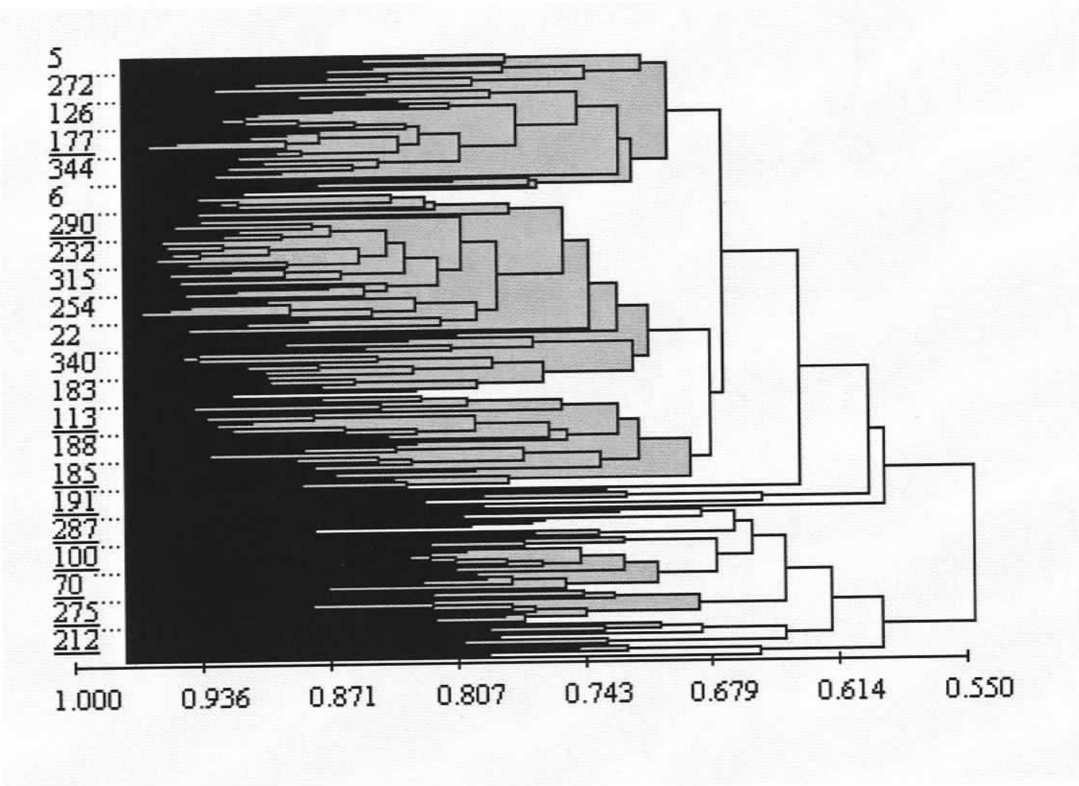


Figure 30: Dendrogram showing results of cluster analysis, Gower's similarity coefficient and Average Linkage. Shaded areas are the 18 clusters associated with the moderate clustering solution.

Each of the three clustering solutions was examined through univariate analysis in a Microsoft Excel spreadsheet. The solution consisting of 42 clusters produced fine-resolution clusters that were internally cohesive and externally diverse. For example, it produced one large cluster of 54 cases and a secondary cluster of 29 cases. The remainder of the clusters, however, were comprised of a much smaller numbers of cases, therefore presenting a cluster solution too large for the research objectives at hand. The solution consisting of 6 clusters was considering inappropriate for the analytical objectives as it obscured what I felt were important distinctions, In essence, the clusters produced were meaningless in terms of examining patterning in feature morphology, as the clusters were so inclusive as to increase internal variability to a pointless level.

The results of the moderate cluster solution included an initial count of 18 clusters (Figure 30). This included three distinct clusters of cairns with an additional 15 much smaller clusters. The univariate statistical and visual tests of internal cluster homogeneity and external cluster heterogeneity indicated that the three larger clusters were valid. The remaining 15 smaller taxa, however, also were valid. All clusters, regardless of size, exhibited logical taxonomy that displayed internal cohesion and external isolation. Essentially, this cluster solution made sense. The number of clusters, however, was still considered too great for the analytical goals, therefore necessitating a reduction in the number of taxa for sake of analysis. Increasing clustering, however, grouped the largest taxa together while simultaneously clustering the outliers together at a lower degree of similarity. Although the clustering solution for the outliers at this higher level of clustering produced clusters that, while somewhat less homogenous, still made sense. The simultaneous consequence, however, was the grouping of clusters 2 and 3. It was felt that this clustering would blur important distinctions between these taxa. In an attempt to maintain the integrity of the three large clusters and reduce the number of smaller clusters, the latter were examined in detail to see if a compromise could be achieved.

Briefly, clusters 4 to 7 were comprised of features that were unusually large—essentially the biggest outliers at the site. There were fine-grained distinctions within each of these small clusters that would be obscured by grouping them together, it was felt necessary given the research objectives, recognizing that these features are already anomalous relative to the majority of the features at DbRv-3. Clusters 8 through 18 were all circular in outline. In general, circular features exhibited the greatest range in variation among the features at DbRv-3. Again, each cluster in this group, although small, was internally very homogenous. These small clusters, however, accounted for 11 out of 18 clusters and were therefore unmanageable considering the somewhat more generalized nature of the analysis. Therefore, these 11 clusters were manually reduced to two clusters by grouping them together at a slightly lower level of similarity than clusters 1 to 3 were grouped. In other words, some lumping was done within what were otherwise a diverse group of clusters, recognizing that potentially interesting and meaningful fine-resolution data was being traded for a broader level of analysis.

7.4 Feature Types: Results of the Morphological Taxonomy

The univariate validation procedure resulted in the moderate sized cluster solution producing the results most suitable to the stated research objectives of the morphological analysis of the burial features at DbRv-3. The largest three clusters were internally homogenous and externally heterogeneous while the remaining 15 clusters were also valid, required reclustering at a higher level than that of the largest three clusters. This process resulted in six clusters that are appropriate to the stated research objectives. A detailed quantitative description of these types is included as Appendix 2. The characteristics of each of each type are outlined in the following section and their metric attributes are summarized in Table 8.

Table 8: Summary of continuous variables for cluster analysis types.

Type	Statistic	Length	Width	Mean Height	Volume	Area	n
Type 1	Mean	2.657	2.012	0.363	6.679	14.894	55
	Standard deviation	0.651	0.557	0.104	4.235	9.4989	
	Minimum	1.18	0.85	0.17	0.308	1.2325	
	Maximum	4.9	3.3	0.71	18.254	50.005	
Type 2	Mean	2.364	1.645	0.286	3.744	11.792	80
	Standard deviation	0.741	0.537	0.096	3.540	8.478	
	Minimum	0.85	0.65	0.115	0.122	1.066	
	Maximum	4.8	3.43	0.67	16.927	43.403	
Type 3	Mean	2.386	1.744	0.313	1.715	5.243	37
	Standard deviation	0.900	0.532	0.088	1.633	4.195	
	Minimum	1.14	0.76	0.11	0.351	1.944	
	Maximum	5.7	3.5	0.515	9.352	25.277	
Type 4	Mean	4.3	3.586	0.525	22.263	40.583	9
	Standard deviation	0.709	0.607	0.133	17.055	23.947	
	Minimum	3.05	2.5	0.285	4.422	7.625	
	Maximum	5.4	4.6	0.685	53.428	77.997	
Type 5	Mean	2.351	2.194	0.329	1.604	4.570	45
	Standard deviation	0.546	0.562	0.092	1.013	2.149	
	Minimum	1.31	1.2	0.135	0.181	1.347	
	Maximum	3.94	3.87	0.55	4.996	12.186	
Type 6	Mean	2.257	2.146	0.276	1.612	4.608	14
	Standard deviation	0.913	0.868	0.126	1.869	3.750	
	Minimum	1.23	1.14	0.1	0.130	1.187	
	Maximum	4	4	0.54	6.121	12.56	

7.4.1 Type 1 Features

Type 1 features are the second most common type at DbRv-3. The cluster analysis resulted in a group of mostly oval features in the magnitude of 2 m long, with a definite external structure of mostly till (and to a lesser extent bedrock) boulders and an internal structure of primarily till and lesser amounts of bedrock boulders and cobbles (Figure 31 and Figure 32). Type 1 features are typically concave in profile, a result of the larger external rocks and the smaller internal rocks. External rocks are primarily subrounded but there is an equal occurrence of rounded and subrounded rocks within the interior of Type 1 features. Angular rocks are very rarely used. Features almost all have soil fill, but it generally accounts for less than 50% of the overall construction material. Most features do not incorporate erratics and are only rarely built against bedrock.

Orientation appears random within this taxon. This type does not include any features with circular outlines and only minimally, those with rectangular, square and rectangular outlines.

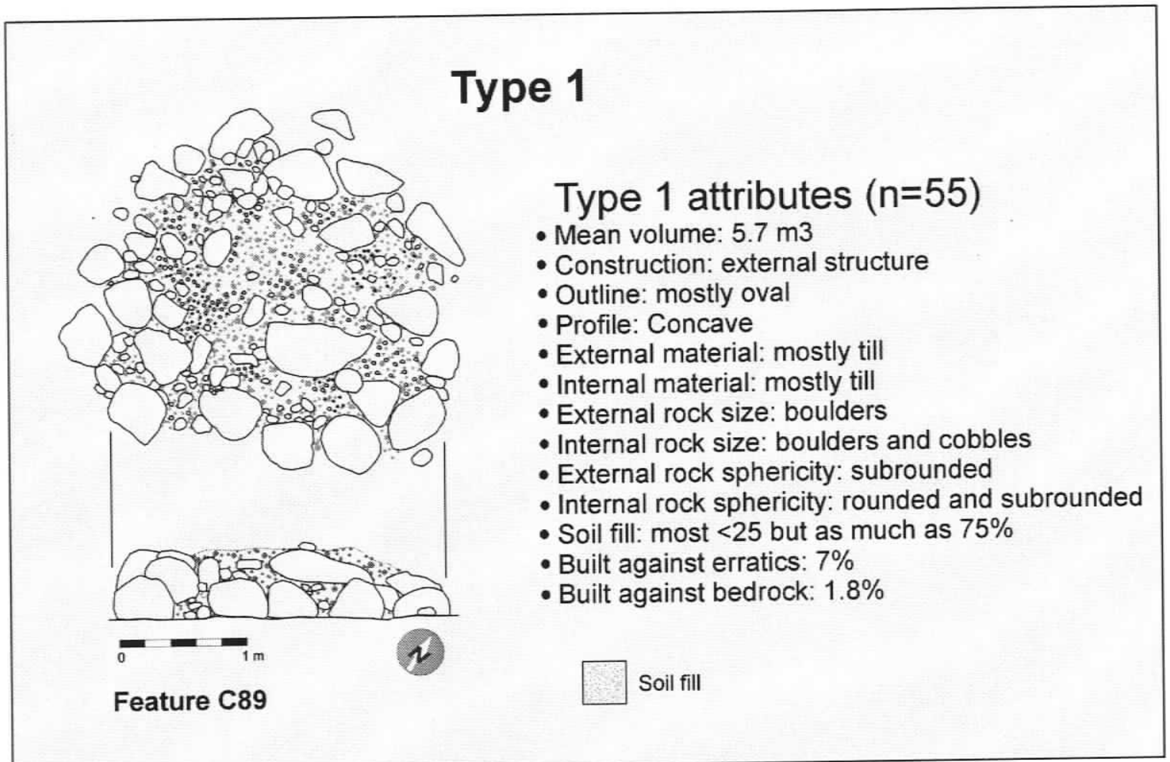


Figure 31: Type 1 Feature with archetypal example.

Figure 32: Type 1 Features (Features C151 and C59, left to right).

7.4.2 Type 2 Features

The primary characteristic of Type 2 features is that they lack any external–internal structural difference; in marked contrast to Type 1 Features (Figure 33 and Figure 34). These features are slightly smaller than those of Type 1, in the order of 2 m long, but like Type 1 features, there is considerable range in feature size (Table 8). The majority of Type 2 features are oval in outline, with lesser numbers of rectangular and minimally square and irregular outlines. Interestingly, no Type 2 features have circular outlines. Feature profiles are overwhelmingly rounded. Long axis orientation of Type 2 features is random.

Type 2 features are built primarily of till or mostly till rocks, with significantly lesser amounts of bedrock material used. Exterior rocks are almost exclusively boulder sized, with lesser numbers of cobbles and large boulders. Internal rocks are also primarily boulders, but with a somewhat lesser occurrence of cobbles and virtually no large boulders. There appears to be a general trend for both internal and external rock sphericity to be subrounded, with a significant number being primarily rounded. There are a minority of features with angular rocks. This is consistent with the use of till as a material type, as till tends to be rounded and subrounded whereas bedrock tends to be angular or occasionally subrounded if heavily weathered. Most features in Type 2 have less than 50% soil fill. Like Type 1 features, erratics are rarely incorporated into Type 2 features. Furthermore, most Type 2 features are not built against bedrock.

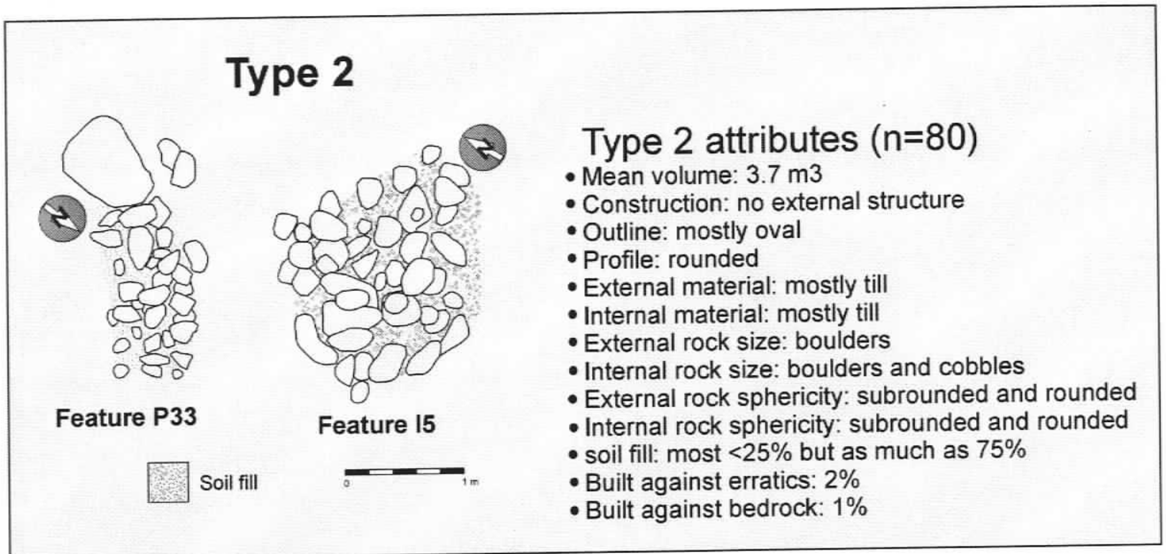


Figure 33: Feature Type 2 with archetypal examples.

Figure 34: Examples of Type 2 Features (Features C159 and C145, left to right).

7.4.3 Type 3 Features

One of the defining characteristics of Type 3 features is their overall irregularity of outline and construction. These features typically have no definable structural difference between the internal and external parts of the features, and have irregularly shaped outlines and profiles (Figure 36 and Figure 35).

These features are significantly smaller than Types 1 and 2 (Table 8), but there is considerable range in size. Most irregular features are relatively small, but there several much larger ones, such as Feature R55 (Figure 35). As mentioned above, Type 3 features generally display no internal–external structural difference, but 35% of them do have an external structure, so this is not quite so clear–cut as it is for Types 1 and 2. Orientation appears random within this cluster. Type 3 features are constructed primarily out of till, but like Types 1 and 2, there is a amount of bedrock incorporated into some of these features. Interestingly, however, despite only a very minor increase in the relative amount of bedrock to till in Type 3 (relative to Types 1 and 2), rock sphericity is notably less rounded than the first two types, Type 2 features having an equal occurrence of subrounded and rounded rocks. External rocks are primarily boulders whereas internal rocks are an equal proportion of cobbles and boulders. Large boulders are completely absent in this type. Virtually all Type 3 features have soil fill, but no features have more than 50% soil fill, so therefore they have somewhat less soil fill than Types 1 and 2. Erratics are occasionally incorporated into Type 3 features, and features are periodically built against bedrock.

Figure 35: Examples of Type 3 Features (Features R55 and R57, left to right).

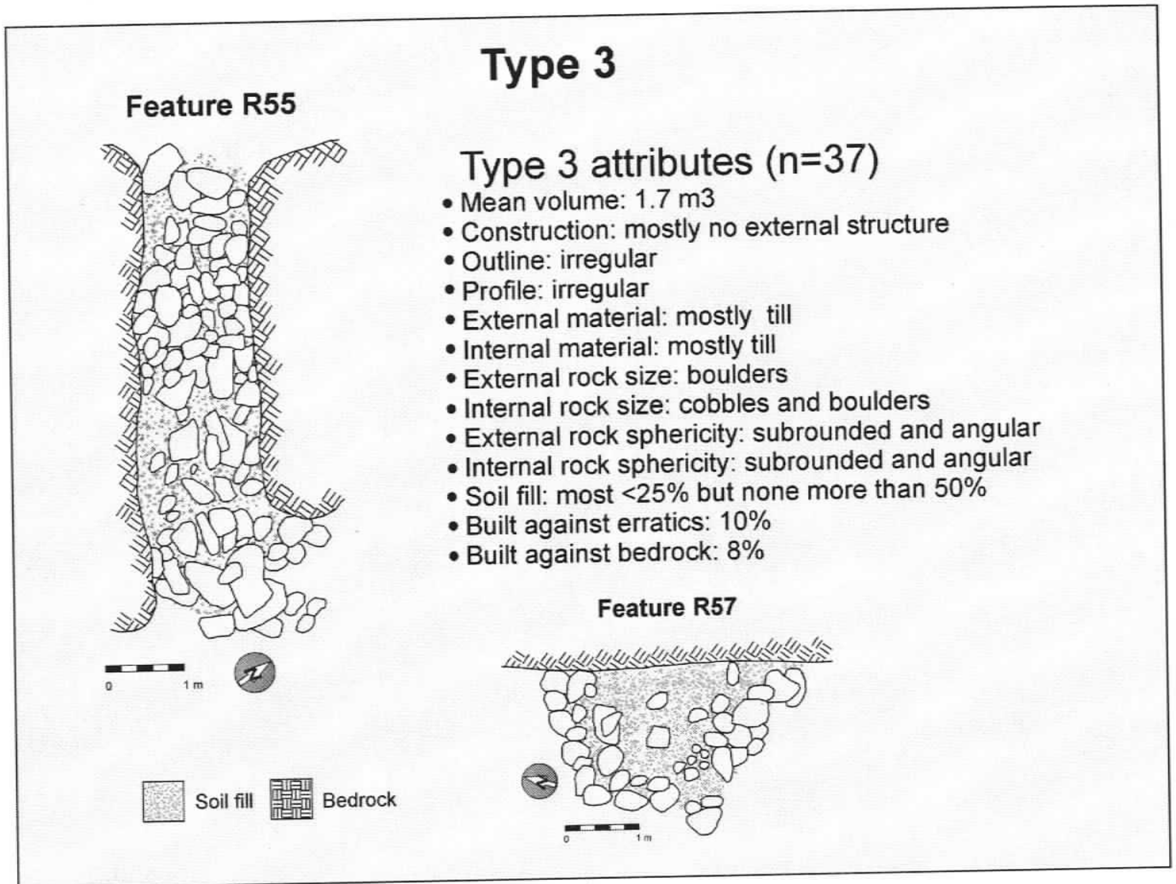


Figure 36: Feature Type 3 with archetypal examples.

7.4.4 Type 4 Features

Type 4 features are a grouping of four of the original 18 clusters resulting from the agglomerative hierarchical cluster analysis. While these features all fit well into the much smaller original clusters, these features were manually grouped together into one category to reduce the overall number of types for the sake of the analysis. This makes Type 4 the most artificial category in this taxonomy. These features represent the anomalously large features at DbRv-3. This category includes features that would have been traditionally categorized as both "cairns" and "mounds" by the existing, but poorly defined terminology in use on the Northwest Coast (Section 3.6). The attributes of Type 4 features are summarized in Figure 37. Photographic examples of these features are shown in Figure 39.

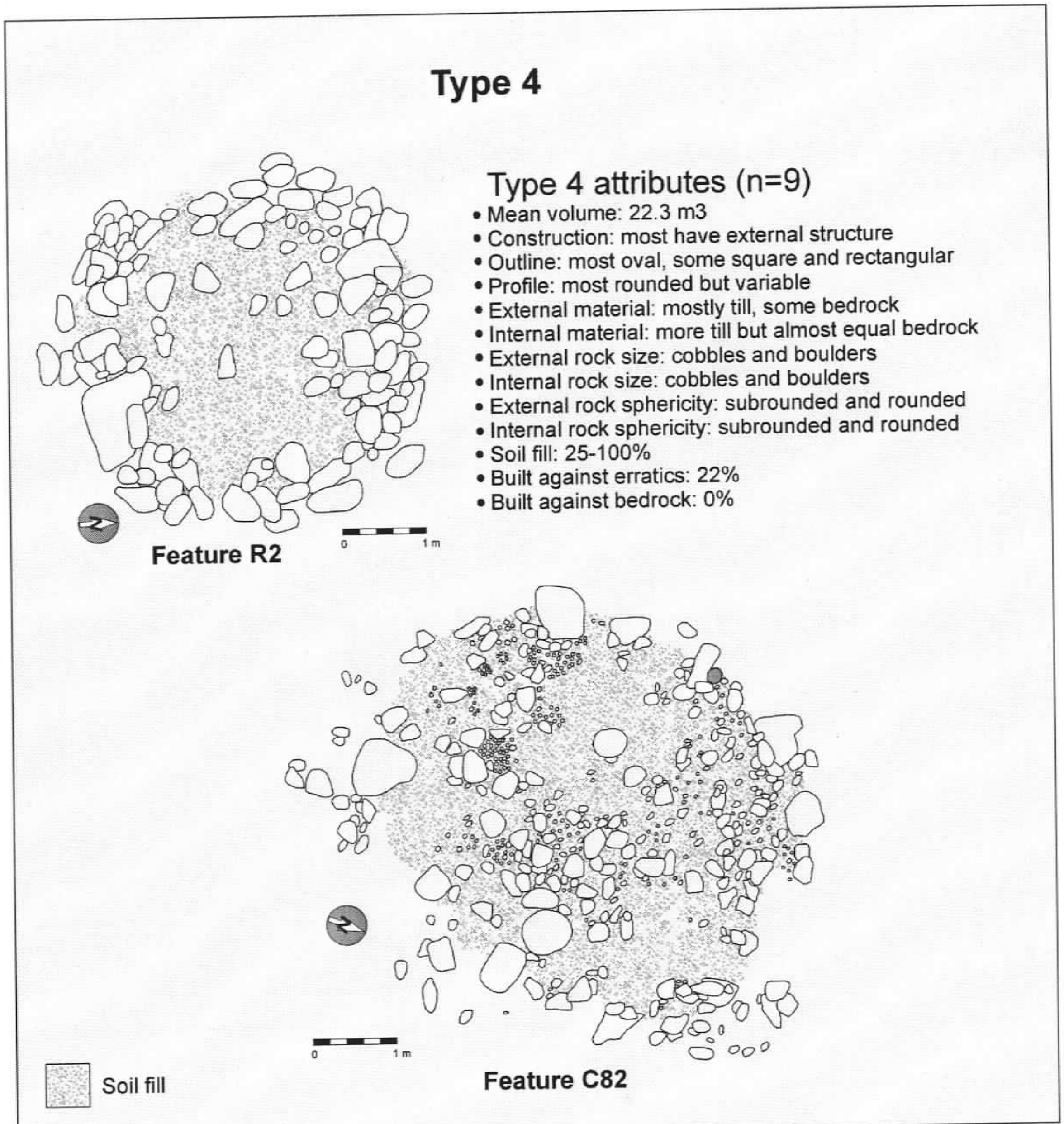


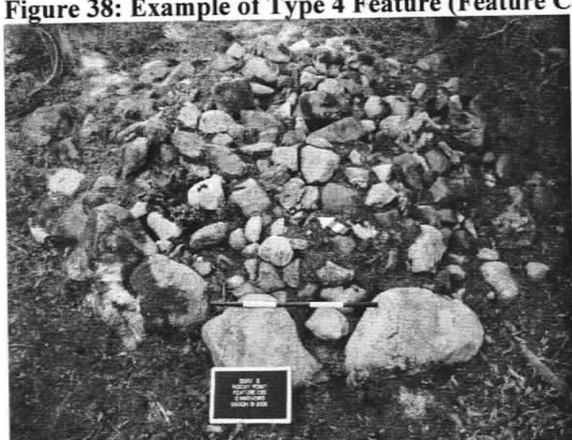
Figure 37: Feature Type 4 with archetypal examples.

Type 4 features have a mean volume of 22.3 m^3, but have a standard deviation of 17 (Table 8). Therefore, while Type 4 Features are generally much larger that other types, some Type 4 features are comparable to the very largest of other feature types, mainly Type 1 features. Size, therefore, while important, did not solely drive the original clustering solution.

These features have the greatest proportion of soil fill, significantly more so that the other five feature types. This type is also the most likely to incorporate erratics and the least likely to be built against bedrock. These factors, as well as the large size of the features, were significant to the results of the clustering solution.

The external material of Type 4 features is primarily till, but the internal material, while having slightly more till, incorporates an almost equal proportion of bedrock. Speculatively, the need to build larger features may have necessitated the use of more bedrock (and soil) for fill than appears to have been common in most other features types.

Figure 38: Example of Type 4 Feature (Feature C82, foreground, left).



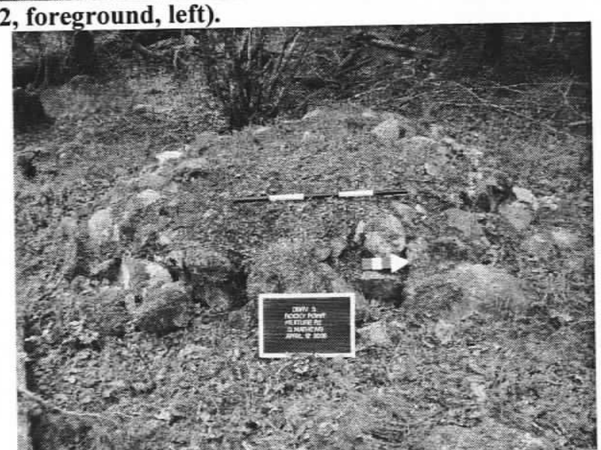


Figure 39: Examples of Type 4 features (Features C25 and R2, left to right, 1m scale bar).

One cairn that did not end up as a Type 4 Feature is Feature C144. This petroform consists of three separate cairns enclosed within a rectangular petroform enclosure

(Figure 40). Unique to DbRv-3, this feature was difficult to record and code within the existing research design, and as such was recorded as four separate features. In addition, during cluster analysis, the three cairns were identified as Type 1 and 2 features.

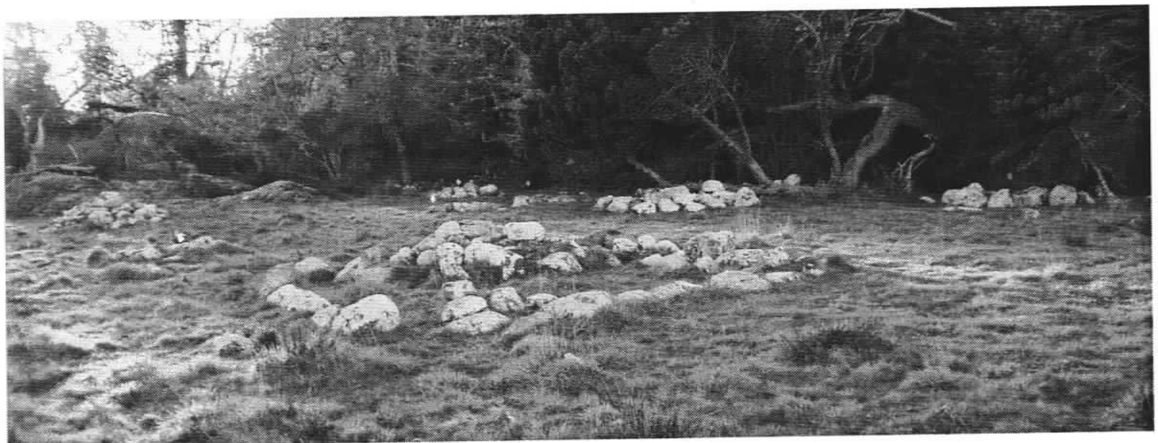


Figure 40: Feature C144 (foreground, centre)

Considered together, however, Feature C144 is a distinctive and significant feature, reminiscent of the internal structure of the largest burial mounds at Scowlitz (Mike Blake, personal communication, October 9, 2006). Considering the size and obvious significance of this cairn, and recognizing that its classification during cluster analysis is the result of the limitations of the field coding, for the purposes of subsequent analysis, Feature C144 is considered a Type 4 feature.

7.4.5 Type 5 Features

Type 5 features are similar to Type 1 features in that both have a distinct external structure comprised of till boulders and an internal fill consisting of till boulders and cobbles. The primary difference between the two types is that Type 5 features are all circular in outline (Figure 41). Type 5 features are also generally significantly smaller (Table 8). Furthermore, whereas the sphericity of the internal fill of Type 1 features are primarily rounded and subrounded, Type 5 features have an almost equal occurrence of rounded, subrounded and angular rocks included in the internal fill. Type 5 features typically have a rounded profile, but there is variation, including all other categories of profile shapes. Again, this is in contrast to Type 1 features, which are primarily concave in profile.

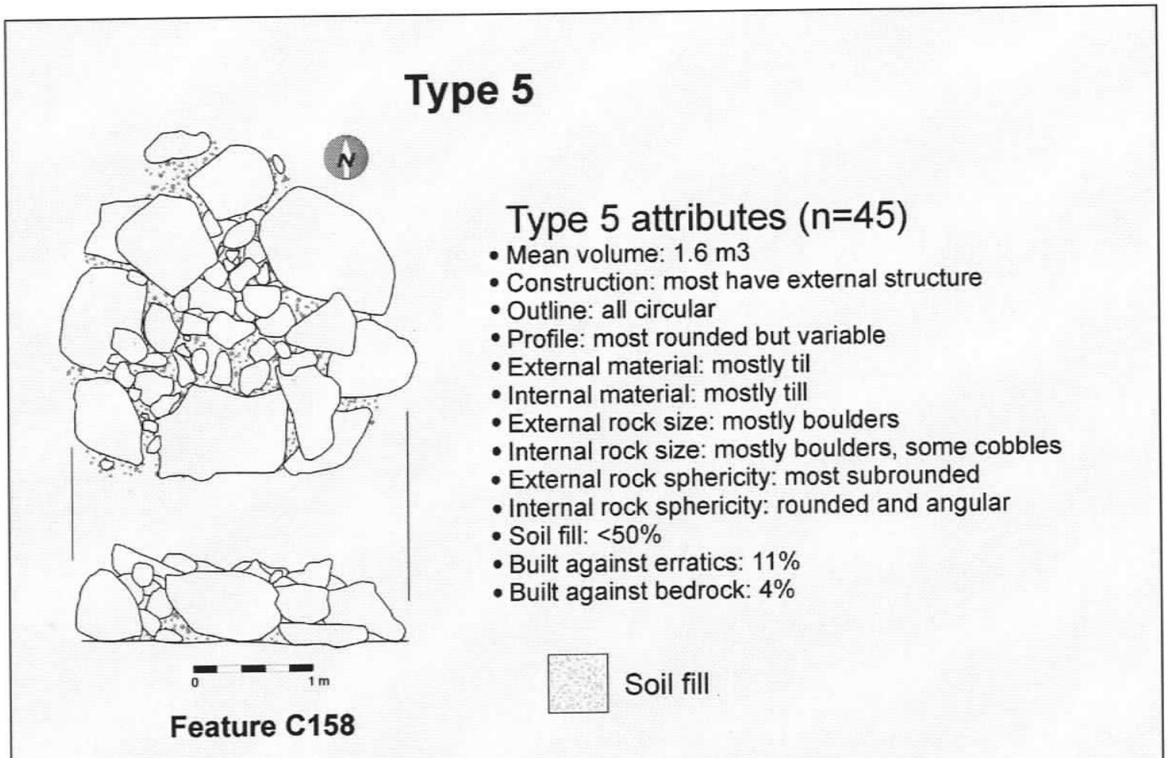


Figure 41: Feature Type 5 with archetypal example.

Figure 42: Examples of Type 5 features (Features R54 and C158, left to right, 1 m scale bar).

Like most other feature types, Type 5 features generally have soil fill. Most Type 5 features have less than 25% but as much as 75% of the overall proportion of the internal fill being comprised of soil.

7.4.6 Type 6 Features

Type 6 features constitute a small, but internally homogenous type of cairn at DbRv-3. Their attributes are summarized in Figure 43 and Table 8. Photographic examples are included as Figure 44. These features are all circular in outline, but do not have a distinctive external structure. There is, however, some difference in the rock size along the periphery of the features, with those external stones consisting of boulders and cobbles, with some large boulders. Interior rocks are both cobbles and boulders.

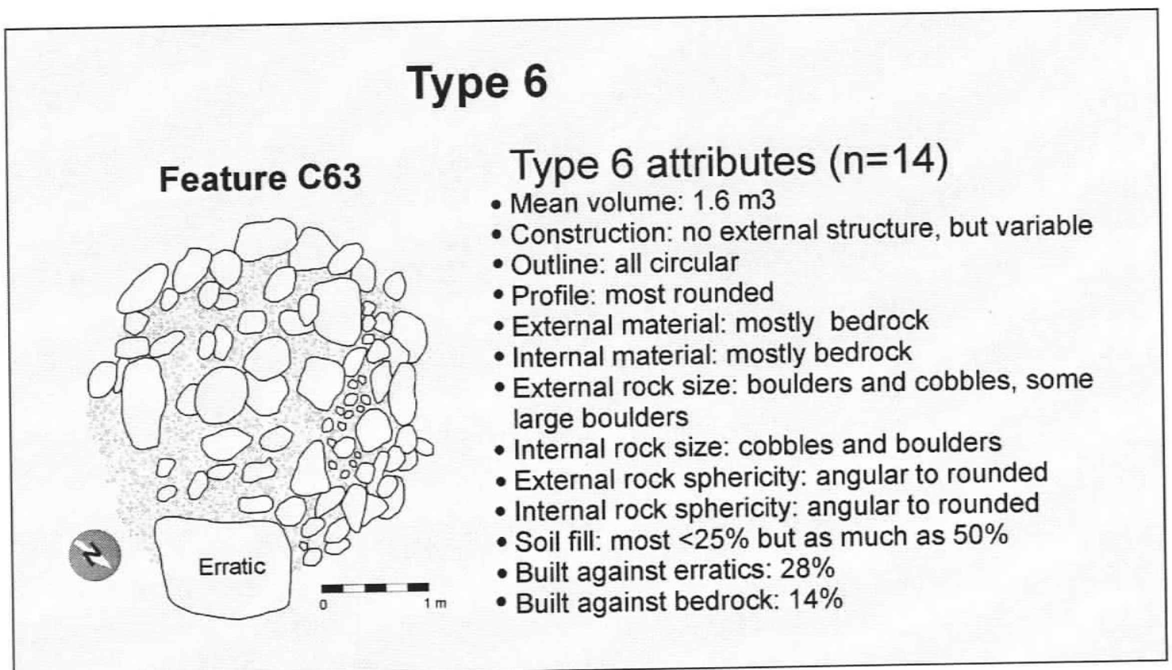


Figure 43: Feature Type 6 with archetypal example.

Notably, bedrock was the material of choice for people building these features, which is unusual at DbRv-3, where till appears to be much more commonly selected to build all other types of features. Although bedrock was the material choice, the sphericity of the rocks ranges from angular to rounded. Qualitatively, it was observed that weathered bedrock was often selected, which exhibits some rounding opposed to angular unweathered bedrock. Type 5 features are also the most likely to incorporate an erratic and to be built against bedrock.

Figure 44: Examples of Type 6 features (Features R45 and R68, left to right, 1 m scale bar).

7.5 *Cluster Analysis Discussion*

The hierarchical agglomerate cluster analysis resulted in the identification of six different types of features at DbRv-3. Based on the preceding section, there is definite morphological patterning of the burial features at DbRv-3. Although there is some degree of overlap amongst some of the attributes between types, such as the proportion of soil fill, when all attributes are considered together, these feature types are internally homogenous and externally diverse. The characteristics of these six types are summarized in Table 9.

Interestingly, the hierarchical agglomerative cluster solution did not differentiate between the *a priori* categories "mound" and "cairn". Even the large mound was not isolated in clustering (even before all large features were grouped during the cluster validation stage).

Table 9: Summary of Special purpose feature types resulting from cluster analysis

Attribute	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
number of features	55	80	37	9	45	14
mean volume m^3	5.7	3.7	1.7	22.2	1.6	1.6
construction	external structure	no external structure	most no external structure	most external structure, some none	most external structure, some none	most no external structure, some with
outline	mostly oval	mostly oval	irregular	most oval	circular	circular
profile	concave	rounded	irregular	most rounded	most rounded but variable	most rounded
orientation	variable	variable	variable	variable	variable	variable
external material	mostly till	mostly till	mostly till	mostly till some bedrock	mostly till	mostly bedrock
internal material	mostly till	mostly till	mostly till	mostly till some bedrock	mostly till	mostly bedrock
external rock size	boulders	boulders	boulders	cobbles & boulders	mostly boulders	boulders & cobbles, some large boulders
Internal rock size	boulders & cobbles	boulders & cobbles	cobbles & boulders	most cobbles, some boulders	most cobbles, some boulders	cobbles & boulders
external rock sphericity	subrounded	subrounded & rounded	subrounded & angular	subrounded & rounded	subrounded	angular to rounded
internal rock sphericity	rounded & subrounded	subrounded & rounded	subrounded & angular	subrounded & rounded	rounded to angular	angular to rounded
soil fill	mostly <50%	mostly <50%	<50%	25-100%	<50%	<50%
built against erratic	7%	2%	10%	22%	11%	28%
built against bedrock	1.8%	1%	8%	0%	4%	14%

The cluster solution distinguished between those features that have a distinct differentiation in internal and external material type and size, dividing features into those that do, and do not, have an obvious external–internal structure. This is consistent with observations of earlier researchers, such as Harlan Smith (Section 3.6).

One result that was somewhat unexpected was that all features have a seemingly random long axis orientation. This is consistent with other studies on the Northwest

Coast, which considered burial orientation (Cybulski, et al. 1992). This is not to say that orientation in some form did not occur, but that orientation according to cardinal directions does not seem to be the case at DbRv-3. As Cybulski conjectures at the Greenville Burial Ground, orientation may be relative to some other factor other than a celestial one (Cybulski, et al. 1992:61-62). As outlined in Appendix 1, a more rigorous analysis of DbRv-3 feature orientation, that combines the circular normal distribution with elements of the physical and social landscape, may provide additional illumination on this issue.

7.6 Morphological Analysis Conclusions

The results of the numerical taxonomy and hierarchical agglomerate cluster analysis indicate definite patterning in the morphology of the DbRv-3 burial features. This variation is the result of people selecting certain types, shapes, and sizes of rocks with which to build these features. People were also using two basic construction techniques, features which had a definite external structure of larger rocks, presumably acting as a retaining structure, but also providing a clear and definite demarcation to the edge of the feature. The other category of construction were those features that did not have an external structure, rather the sizes and types of materials selected are uniform across the entirety of the feature. These features were the most numerous at DbRv-3. Virtually all features had some proportion of anthropogenically transported soil fill within them. While most types of features generally had soil accounting for less than half of the overall proportion of the fill, there were numerous exceptions to this rule across all types. The numeric taxonomy as it was conducted in this thesis, did not differentiate between the traditional categories of "cairn" and "mound", which was an unexpected result, remembering that the a priori category "feature type" was excluded from analysis. Rather, I had somewhat expected the cluster analysis to differentiate cairns and mounds on its own. This suggests a gradation of soil fill across the spectrum of different feature types at DbRv-3, although some types were more likely to have greater or lesser proportions of soil fill than others were. In addition, some feature types were more likely to incorporate erratics as part of the feature structure, as were some features more likely to be built directly against adjacent bedrock exposures. Although running additional permutations of the cluster analysis with different clustering algorithms or using different validation strategies would likely result in somewhat different classifications than presented here, I am confident that the results of the current numeric taxonomy are a valid representation of the patterning in feature morphology at DbRv-3 and are appropriate to the research objectives of this thesis.

As indicated in the previous section, some of the results of the numeric taxonomy matched the observations of earlier cairn and mound researchers in the Victoria area, particularly concerning cairn construction. This analysis, however, represents a much more rigorous and objective investigation into surficial burial feature morphology. Despite the success of this result, however, it is still difficult to say what this patterning or variation might mean about Late Period mortuary practice without additional information.

The spatial record of the Rocky Point burial cairns provides an additional dimension to the analysis of these features. In an attempt to infer meaning in these feature types, I propose to use spatial analysis to interpret the connectedness of feature types and their placement on the landscape relative to each other and the physical world.

As outlined in Chapter 2, the physical and spatial attributes of burials, cemeteries, and other places for the dead are the material expression of social, economic and political relationships in the community of the living: "identities and relationships are preserved through spatial association and the perceptions this creates and sustains in the minds of survivors and future generations" (2002:194). Understanding the placement of the dead on the landscape, therefore, is central to understanding the intersection between mortuary ritual, identity, and society.

To address the spatial dimension of the mortuary ritual at DbRv-3, I propose two basic strategies. First, to determine through statistical means if there is in fact spatial patterning of the burial features on the landscape. Second, if patterning is present, to use an exploratory geographic information system (GIS) based analysis to derive further attributes from the data, with which it will be possible to compare new spatial groupings to the results of the morphological taxonomy.

8 Spatial Analysis Methods

Space is a cultural artifact that has often been assumed by western researchers to be purely neutral, conferring neither disadvantage or benefit to any individual or group (Shields 1997). The conception of "empirical" space is typically understood to be fully defined by dimensional measurements and Euclidean geometrical relationships between objects. Paraphrasing Shields (1997:18), this way of thinking does not consider the overall social conditions that constitute such spatial arrangements, the methods or forces that shaped these relationships or the significances attributed to this by the people who made them. While the use of empirical space is a useful analytical tool, researchers must recognize that space is a culturally created system of overlapping social relations and ideas — an ethos. As such, in this thesis, the analysis is a means of exploring spatial associations, recognizing that these relations are likely coded within social significance. Spatial patterning, if any, at the Rocky Point cemetery may be the result of socially produced associations between burials and elements of the landscape.

Kintigh and Ammerman (1982:31) define spatial analysis in archaeology as the process of searching for theoretically meaningful patterns in spatial data. The placement of burial cairns on the Rocky Point landscape is at the core of the archaeological interpretation of these features. One of the fundamental questions generated during this research attempts to address is how these features came to be where they are, and perhaps as importantly, not in any of the other places they might have been.

One of the most troublesome problems in archaeology has to do with the recognition of patterns in data, compounded by the fact that archaeologists are often not certain about what kinds of patterns one should be looking for. Somewhat ironically, the human mind is particularly good at recognizing visual patterns (Rogerson 2001:155), therefore making it difficult to make objective conclusions based on visually identified patterns. Conversely, statistical analyses can only deal with numbers and they are generally incapable of integrating the intuitive knowledge that anthropologists have learned about human behaviour or the formation of the archaeological record. To address this dichotomy, Kintigh (1987:131) argues for methods of analyzing archaeological data that combine the benefits of intuitive analysis and the rigour and replicability of quantitative methods. There is a necessary and productive relationship between quantitative and actualistic observations that necessitates a variety of analytic methods for developing research goals and the recognition of spatial patterns in the archaeological record (Kroll and Price 1991b:7).

8.1 Heuristic Spatial Analysis: Theory and Method

In this thesis, the placement of the Rocky Point burial is the subject of a heuristic spatial analysis. Kintigh and Ammerman (1982:31) define heuristic analysis as a synthetic approach to spatial data that it recognizes the value of contextual knowledge and human expertise, within a formal computer-executed procedure for aiding human directed spatial analysis. This approach is a response to the more "traditional" processual approaches to spatial analysis in archaeology, in which context does not play a significant role in the formulation of statistical measures or in their evaluation. However, contextual information is key to the recognition of meaningful complex patterns in spatial data (Toussaint 1978). On the other hand, informal approaches to spatial analysis, such as those typically used by post-processualist archaeologists, are hindered by a lack of systematic rigour and information processing capability (Kintigh and Ammerman 1982:33).

The heuristic approach was pioneered in cognitive science, recognizing that people are extraordinarily good at solving complex spatial problems (for example, the best human chess players still beat the best computer programs). Kintigh and Ammerman (1982:33) argue that spatial analysis in archaeology lends itself well to a computer-assisted heuristic approach. Archaeologists engaged in spatial analysis examine spatial distributions and relate them to theoretical constructs, and computer programs can enormously expedite the analysis as they can processes large volumes of data efficiently. Heuristic analysis in archaeology is comparable to exploratory spatial data analysis

(ESDA) in the physical sciences. Both are a collection of techniques for exploring spatial data, including: detecting spatial patterns in data, formulating hypotheses in reference to the physical geography of a dataset, and identifying cases or subsets of cases that are unusual in their placement in space (Haining 2003:182). Techniques employed in ESDA are visual (including charts, graphs, and maps) and numerical in the sense of being quantitative summaries of the data.

The research objective of the spatial analysis component of this research is to determine if there is spatial patterning in the placement of the burial features and if present, to explore these patterns at a broad scale of analysis. As such, the heuristic method is an appropriate means of approaching the research objectives of the Rocky Point spatial analysis, considering the exploratory nature of this study.

To begin, Kintigh and Ammerman (1982:34) outline three components necessary for a heuristic problem solving strategy:

1. Sources of data
2. A statement of research goals
3. Formulation of the heuristics method

8.2 Sources of Data

There are two sources of data used in this analysis. First is the special purpose typology generated by the morphological cluster analysis. Each individual feature is identified as one of the six types based on the results of the morphological cluster analysis and reattributed their original x and y coordinates (attributes which were excluded from the morphological taxonomy). The resulting georeferenced points, therefore, represent the location of each feature on the landscape and their membership in one of the six morphological taxa. The second source of data are the environmental variables that were collected and mapped during the fieldwork. This includes the shoreline of Eemdyk passage, the location of significant bedrock exposures, and interior wetlands and low-lying areas.

8.3 Research Goals of the Heuristic Analysis

The primary research goal for the heuristic spatial analysis is to identify if there is spatial patterning in the placement of burial cairns within DbRv-3. If spatial patterning is identified, more specific research questions of an exploratory nature are asked of the data. These questions and the sources of data and methods used to address them are summarized in Table 10.

Table 10: Spatial Analysis Research Questions, Sources of Data, and Methods of Analysis

Spatial Analysis Question	Source of Data	Method of Analysis
Is there spatial clustering of features on the landscape?	The x,y coordinates for all features at DbRv-3, including disturbed features.	• Spatial autocorrelation • Agglomerate hierarchical cluster analysis
How are intrasite localities spaced on the landscape relative to other localities and the physical environment?	Results of spatial agglomerate hierarchical cluster analysis	• GIS-based heuristic analysis
What is the relative distribution of feature types between clusters?	Feature types and spatial localities derived from morphological taxonomy and spatial cluster analysis	• GIS-based heuristic analysis
Do the features form internal clusters, linear networks, or are they randomly distributed?	Distribution of feature types within each locality	• GIS-based heuristic analysis using buffers and corridors
How to the features relate spatially to elements of the physical landscape within each locality?	Distribution of feature types and landform features within each locality	• GIS-based heuristic analysis using buffers and corridors
How do the features relate spatially to other features within each locality	Distribution of feature types within each locality	• GIS-based heuristic analysis using buffers and corridors

The remainder of this chapter is a discussion of the methods employed in the DbRv-3 heuristic spatial analysis.

8.4 Heuristic Analysis Methods

The approach to the spatial data taken here is largely derived from basic geographic information system (GIS) analysis. Although GIS is in a sense revolutionizing the way that archaeologists approach the problem of space, there is a long tradition of the analysis and interpretation of space in archaeology (for example Kroll and Price 1991a). Processualist archaeology of the 1970's and 80's, however, for all of its methodological rigour, has offered little more than a sophisticated description of patterns rather than and interpretation of them (Hodder 1992). The post-processual critique of space has focussed on the centrality of the body and highlighted the complexity and historic specificity of the concept of space. Approaches to the human use of space in post-processualist archaeology has largely been qualitative in nature (for example Tilley 1994).

Although GIS has prompted greater sophistication in the formal analysis of space in archaeology, there are critiques that GIS-based studies seem to merely portray results in the form of a computer graphic in place of a formal method of analysis and inference (Kvamme 1995; Lock and Harris 1992). Statistical tests identify patterns when they are difficult or impossible to visualize, and can objectively measure the strengths of those spatial associations. Conversely, however, "statistics can not convey the essence of spatial pattern in the same way than an effective graphic can" (1995:7). Lock and Harris (1992) argue for a dual approach to spatial analysis in archaeology which incorporates both visualization and formal statistical analysis. Kvamme elaborates, stating that "Both approaches to spatial analysis complement each other, they go hand-in-hand, and one should not be undertaken without the other" (Kvamme 1995:7). This is the approach taken here.

8.4.1 Methods for the Identification of Intrasite Spatial Clustering

This section addressed the first of the three spatial analysis question: Is there spatial clustering at DbRv-3 suggestive of separate intrasite localities? To attend to this question, two separate types of analyses are implemented. These include spatial autocorrelation and cluster analysis. The following sections briefly outline the methods used to complete the identification of intrasite spatial clustering of the burial features at DbRv-3.

The identification of intrasite spatial patterning at DbRv-3 begins with a preliminary visual assessment of feature distribution. This is the first stage of a heuristic spatial analysis. If spatial clustering is suspected, analysis will proceed with a quantitative test for spatial clustering using spatial autocorrelation, which is discussed below.

8.4.1.1 Spatial Autocorrelation: Moran's I_i Analysis

Geographic features that are near to each other are more likely to be similar than more distant ones, a trend called spatial autocorrelation (Mitchell 2005). There are a number of spatial autocorrelation methods, all of which demonstrate the absence or presence of clustering; they do not define the specific clusters. The technique used here is the Moran's I_i statistic.

Moran's I statistic is used to identify similar values among neighbouring features. In this case, pure spatial data is used — the Universal Trans Mercator (UTM) coordinates

— to identify patterning. Moran's I_i emphasizes how features differ from other values in the study area as a whole, as it compares the values of each feature in a pair wise fashion to the mean value of all the features in the study area. In other words, with Moran's I_i, the researcher is interested in local variation.

To calculate Moran's I_i, the values of the target feature and neighbouring features are both compared to the mean. The GIS first calculates the mean value for the attribute (a cairn's x–y UTM coordinates). It then calculates the difference from the mean for each neighbour and multiplies it by the weight of the neighbour. Next, it sums these products. Finally, it multiplies the sum by the ratio of the difference from the mean for the original feature's attribute value, divided by the variance:

$$I_i = \frac{\left(x^2 - \bar{x}\right)}{s^2} \bullet \sum_i w_{ij}\left(x_j - \bar{x}\right)$$

The ratio of the difference from the mean divided by the variance is a constant (the same value is used for each calculation of I_i). The constant is then used to scale each I_i value to the value of the global I statistic.

In the case of testing the observation that the burial cairn point data exhibits clustering (based solely on the UTM coordinates of all burial cairns), I used the Global Moran's I_i function in ArcMap 9.1, using inverse distance for the conceptualization of the spatial relationships and Euclidean Distance as the means of measuring geographic distance. The variables did not require standardization, as they were all the same scale (continuous variables), and were unweighted.

8.4.1.2 Spatial Cluster Analysis: Euclidean Distance Similarity Matrix and Clustering Algorithms

As spatial autocorrelation confirmed clustering, it was then necessary to define the clusters on the landscape. To explore this I completed a spatially derived hierarchical cluster analysis. To reiterate, hierarchical cluster analysis is a statistical method for finding relatively homogeneous clusters of cases based on measured characteristics. It starts with each case in a separate cluster and then combines the clusters sequentially, reducing the number of clusters at each step until only one cluster is left. This hierarchical clustering process is represented as a dendrogram, where each step in the clustering process is illustrated by a joint of the tree.

To define spatial clusters on the landscape, I ran two separate cluster tests. The first test used Euclidean distance to compute the proximity matrix and single linkage as the clustering algorithm. The second test used Squared Euclidean Distance to derive the proximity matrix and Average Linkage as the clustering algorithm. The most appropriate cluster solution was then be considered using the same validation techniques outlined for the morphological cluster analysis (Section 6.1.2.4).

Both analyses used the UTM locations of all classes of features identified as "cairns" and "mounds" during the fieldwork. This includes those features excluded from the morphological analysis, as the spatial attributes of all features are intact even if the features are disturbed. The same procedures for cluster analysis applied to the morphological numerical taxonomy were applied to the spatial analysis. Although the procedures were the same, a brief discussion of the methodological consideration of Euclidean or distance–based clustering methods requires is necessary.

Like the morphological clustering technique, Euclidean clustering is agglomerate and hierarchical, but uses distances to compute the similarity matrix to join cases. The most straightforward way of computing distances between objects in a multi-dimensional space is to compute Euclidean distances. For the spatial analysis, the distances (similarities) are based on two dimensions (the UTM coordinates, or x and y axes), with that dimension representing the rule or condition for grouping objects. Although in this case two–dimensional space is the measure of an actual geometric distance between features, the joining algorithm does not distinguish whether the distances are real distances, or some other derived measure of distance that is more meaningful to the researcher (Wishart 2006). Two similarity matrixes are considered here: Euclidean Distance and Squared Euclidean Distance.

Squared Euclidean Distance is the most commonly chosen type of distance measure. Simply, it is the squared geometric distance in the multidimensional space. Squaring standard Euclidean distance places progressively greater weight on objects that are further apart. As summarized by (Wishart 2006), the General Squared Euclidean Distance Coefficient compares two cases i and j, and is computed as:

$$d_{ij}^{\,2} = \frac{S_k\, w_{ijk}(x_{ik} - x_{jk})^2}{S_k\, w_{ijk}}$$

This is where x_{ik} is the value of variable *k* in case *i*, and w_{ijk} is a weight of 1 or 0 depending upon whether or not the comparison is valid for the *k*th variable. The effect of the denominator $S_k\, w_{ijk}$ is to divide the sum of the distance scores by the number of variables.

Euclidean Distance (d_{ij}) is calculated by taking the square root of Squared Euclidean Distance d_{ij}^2 as computed above (Wishart 2006). Euclidean and squared Euclidean distances are usually computed from raw data, and not from standardized data. Distances can be greatly affected by differences in scale among the dimensions from which the distances are computed (Aldenderfer and Blanshfield 1984; Sneath and Sokal 1973). In this case, however, distances are measured on the same continuous scale (UMT coordinates) so no data transformations are necessary.

For the Euclidean distance proximity matrix, a Single Linkage (or nearest neighbour) agglomeration procedure will be used, whereas for Squared Euclidean distance, Average Linkage (or average neighbour) will be implemented as the clustering algorithm. These agglomeration procedures are discussed below.

The Single Linkage method computes the distance between two clusters determined by the distance of the two closest objects, or nearest neighbours, in the different clusters. This rule will string objects together to form clusters, typically resulting in long "chains." With Average Linkage, the distance between two clusters is calculated as the average distance between all pairs of objects in the two different clusters. This method is very efficient when the objects form natural distinct "clumps," such as that suspected at DbRv-3.

8.4.2 Methods for Cross Locality Analysis

Once spatial clusters, or “Localities” as will be the term used from this point forward, have been identified on the landscape, an examination of the distribution of the six feature types within each of these localities may yield some useful information on the distribution of these types across the landscape.

This analysis will be a GIS-based heuristic analysis entailing the display of each feature type separately across each locality to see if visible patterns emerge in feature distribution. Simple exploratory statistics will then be used to discuss the relative distribution of feature types between localities.

8.4.3 Methods for Intrasite Analysis by Locality

To address the thesis questions relating to intrasite spatial analysis within each of the localities defined during the spatial cluster study, a GIS–based heuristic analysis is proposed using basic summary statistics and buffering.

One of the most basic and useful abilities of GIS is the production of distance products. Within a vector–based GIS such as that used in this analysis, the primary distance products are called "buffers" or "corridors". These are useful for visually expressing a range of proximities between entities (Wheatley and Gillings 2002:148). The term "buffer" is typically reserved for a map with one or more distance bands generated from either points or lines. The term "corridor" is sometimes used to specify the case in which a single distance buffer is generated from a line. Both buffers and corridors are used to conduct the intrasite analysis within each locality that was defined during the cluster analysis.

The process of creating a buffer or corridor involves the selection of the source features, in this case burial features and elements of the local landscape such as the shoreline of Eemdyk Passage or bedrock exposures. A desired distance is then specified depending upon the needs of the buffer width. As Wheatley and Gillings (2002:149) state, "Distance buffers and corridors have been widely used in archaeological analysis to construct hypothesis tests regarding the distribution of archaeological sites or find spots", or in this case, burial features.

Buffering will be useful for determining if the burial features within each spatial locality form internal clusters, linear networks, or if they are randomly distributed on the landscape. Furthermore, this application may illustrate how the features relate spatially to elements of the physical landscape within each locality. Lastly, buffering may shed some light on how features relate spatially to other features within each locality. As a primarily visual analysis buffering lacks the statistical validity of quantitative methods, however, considering the thesis objectives, this method will prove useful as an exploratory means of examining the distribution of burial features at DbRv-3.

Each locality will be examined, using the methods outlined above, to discuss the following topics as they relate to the objectives of the spatial analysis outlined in Table 10 :

1. The types and relative occurrence of burial features
2. Distribution type: internal clusters, linear networks, or random distribution
3. Distribution of features relative to the physical landscape
4. Distribution of features relative to other feature types

8.5 Spatial Analysis Methods Summary

The methods discussed in Chapter 8 address the spatial distribution of the DbRv-3 features relative to the landscape and each other. To determine if there is spatial clustering at DbRv-3 suggestive of separate intrasite localities, three separate types of analyses will be conducted. These include a preliminary visual assessment, spatial autocorrelation, and cluster analysis. Data resulting from the cluster analysis will be used to derive localities on the landscape, which will essentially act as smaller units of analysis within which to conduct a heuristic GIS–based analysis.

The intention of the heuristic spatial analysis is to approach the data in an exploratory manner and investigate some basic ideas about how the features are distributed within each locality, how features relate to elements of the physical landscape, and how features elate spatially to other types of features within each locality.

The following chapter presents the results of the Rocky Point spatial analysis.

9 Spatial Analysis Results

Not all archaeological sites share the same potential for spatial analysis—those sites with a structure that is clear to the naked eye provide the best opportunity for reconstructing and interpreting the spatial dimension of social process (Kroll and Price 1991b:5). A first look at the feature types distributed across DbRv-3 suggests strong clustering of these burials across the landscape (Figure 45). The spatial analysis presented in this chapter tests the validity of this observation, and continues to further explore the spatial distribution of these features at the site.

Using the methods outlined in Chapter 8, the spatial analysis attempts to identify spatial clustering on the landscape (Section 9.1); examine the relative distribution of feature types within each cluster, or locality (Section 9.2); and to identify the spatial patterning of features within each locality relative to other features and the landscape (Section 9.3). The results of the DbRv-3 spatial analysis are discussed below.

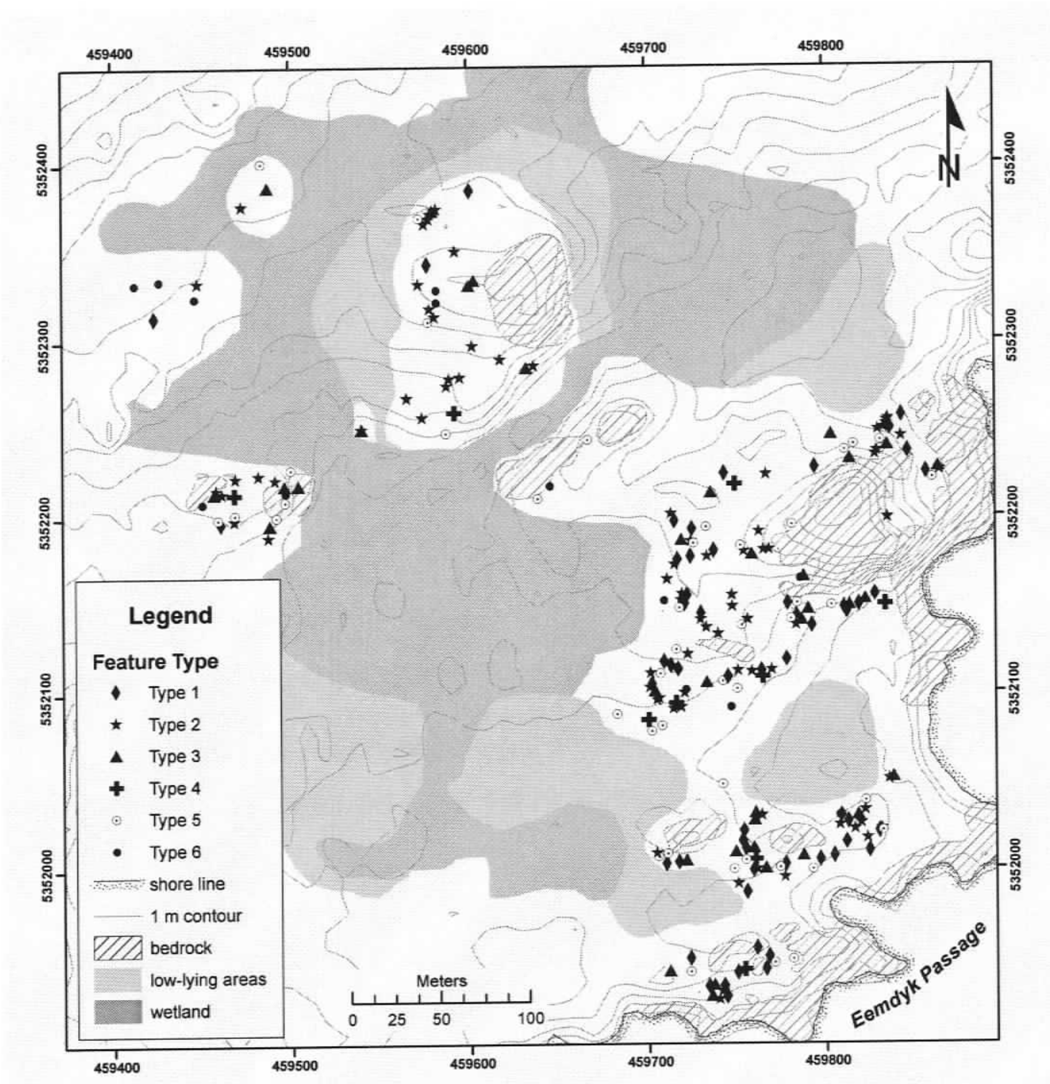


Figure 45: Distribution of Feature Types at DbRv-3

9.1 Identification of Intrasite Spatial Clustering: Results

A first look at the feature types distributed across DbRv-3 suggests spatial clustering of these burials across the landscape Figure 45. The spatial analyses presented in this chapter test the validity of this observation (Section 9.1.1), and then attempt to define spatial clusters using an agglomerate hierarchical cluster analysis (Section 9.1.2 and 9.1.3).

9.1.1 Moran's I_i Analysis: Spatial Autocorrelation Results

To test the spatial data for evidence of clustering, Moran I_i spatial autocorrelation was used. The methods for this analysis are discussed in Section 8.4.1.1. The result of the test indicated that the DbRv-3 burial cairns are highly clustered. The resulting Moran's I_i index is 0.48, (Z score=47.1 standard deviations, significance level=0.01), therefore there is less than a 1% likelihood that the clustered pattern could be the result of random chance.

Although Moran I_i test does not describe or explain clustering, this result appears to be due in part to geographical constraints placed on the choice of where people could or could not build a cairn. The wetlands and low-lying areas that punctuate DbRv-3 were unlikely locations for the building of cairns. However, there were no practical constrains for people building cairns on top of bedrock, which in fact, was a common practice in parts of Europe, such as those in the Åbolund Archipelago of Norway (Tuovinen 2002). Yet, people at Rocky Point do not appear to have considered those locations as appropriate for the construction of their burials. Therefore, while the natural environment influences spatial clustering of cairns at Rocky Point to some degree, there are also significant cultural factors at play.

Based on the above results, a more detailed analysis with the objective of identifying spatial patterning within DbRv-3 is appropriate. To achieve this, a cluster analysis of the spatial point data is undertaken. The results of the morphological taxonomy will then be applied to the results of the spatial cluster analysis to investigate the correlation, if any, between cairn morphology and placement of the landscape.

9.1.2 Nearest Neighbour Cluster Analysis Results

As outlined in Section 8.4.1.2, in an effort to detect spatial patterning based purely on the DbRv-3 point data, that is the location of the feature in Euclidean space, an agglomerate hierarchical cluster analysis was conducted. The analysis used Euclidean distance to construct the proximity matrix and the single linkage (nearest neighbour) algorithm to define the cluster solution. The goal of this analysis was to identify clusters of features on the landscape independent of morphological attributes, as defined by their pure spatial attributes. Subsequent analyses will then reintroduce morphology into the resulting spatial clusters.

The nearest neighbour cluster analysis utilized all definite archaeological features, including disturbed features excluded from morphological analysis. The rationale for this was two fold. First, disturbed features still retain their spatial attributes, even though the morphological attributes are no longer completely discernable. Second, as the objective as to define clusters on the landscape, including as much data as is available would substantiate spatial cluster solutions, whereas including only those 240 features used in the morphological cluster analysis would likely result in a less accurate cluster solution. Therefore, a total of 311 features were included in the analysis, using the methods outlined in Section 8.4.1.2.

The nearest neighbour cluster analysis produced six spatial clusters (Figure 46). This method defines separate clusters in the western half of the site, but group all features together in the east half of the site into Cluster 1. Although appropriate for the western half of the site, which has geographically distinct groups due in part to terrain considerations, it obscures potential clustering in the eastern half of the site, which has fewer terrain restrictions and a somewhat more diffuse distribution of features. This is likely an artifact of the nearest neighbour algorithm, which produces very tight clusters.

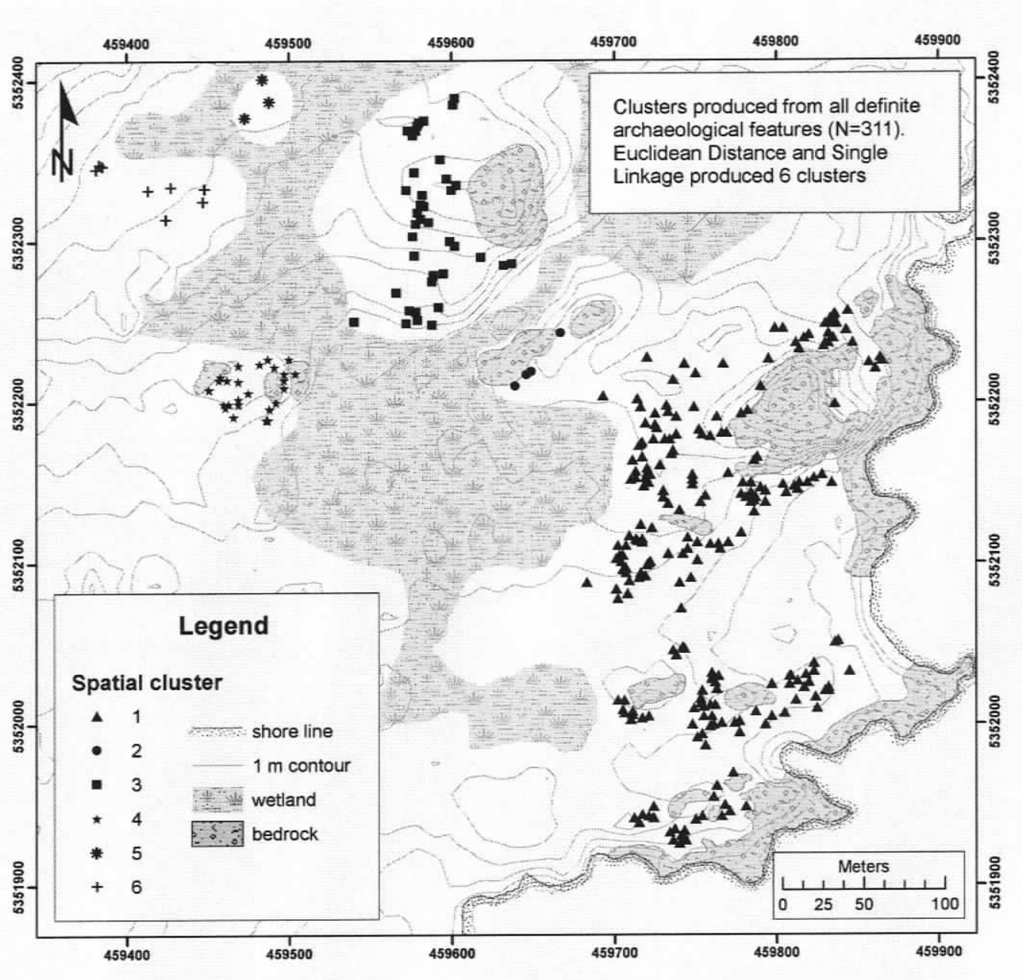


Figure 46: Spatial cluster analysis using Euclidean distance and single linkage (nearest neighbour) clustering method.

The results of the nearest neighbour cluster analysis define clusters appropriately in the western half of the site, but Cluster 1 is too large and this potentially obscures meaningful spatial differences among these features. Therefore, it was decided that a second spatial cluster analysis would be tried, using the same principles but a proximity matrix and clustering algorithm less prone to over clustering than nearest neighbour method.

9.1.3 Average Neighbour Cluster Analysis Results

The same cluster analysis was completed using the squared Euclidean proximity matrix and average linkage (average neighbour) method outlined in Section 8.4.1.2. This trial produced seven clusters, demonstrated in the resulting dendrogram (Figure 47).

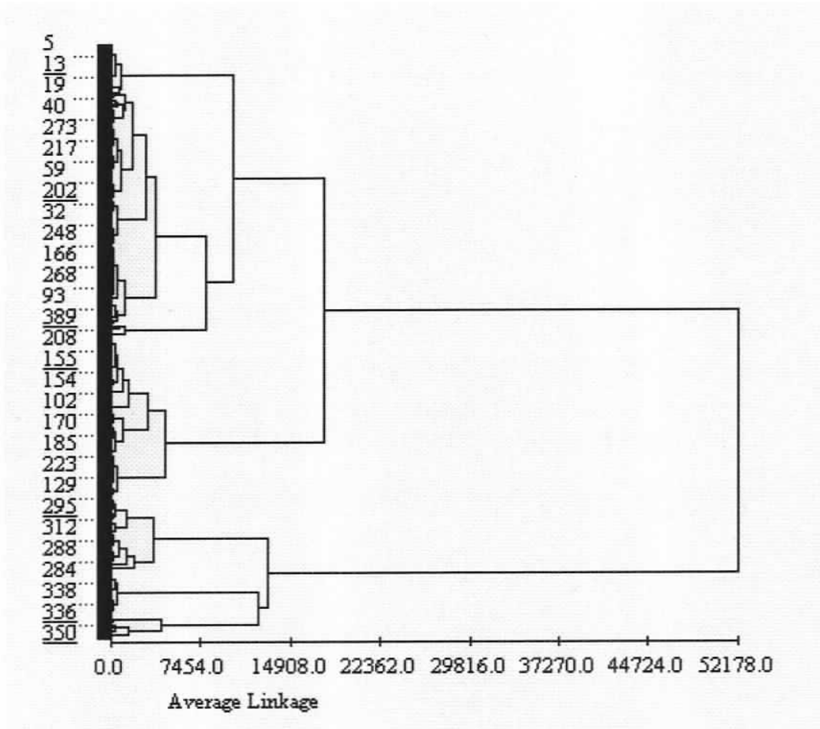


Figure 47: Dendrogram for squared Euclidean distance and average neighbour method.

Imported in the GIS, these spatial clusters are illustrated in Figure 48. This more moderate cluster solution defines separate spatial groups without suffering from the over clustering of the nearest neighbour method. The average neighbour cluster solution "makes sense" and is more appropriate to the DbRv-3 spatial data than the prior method.

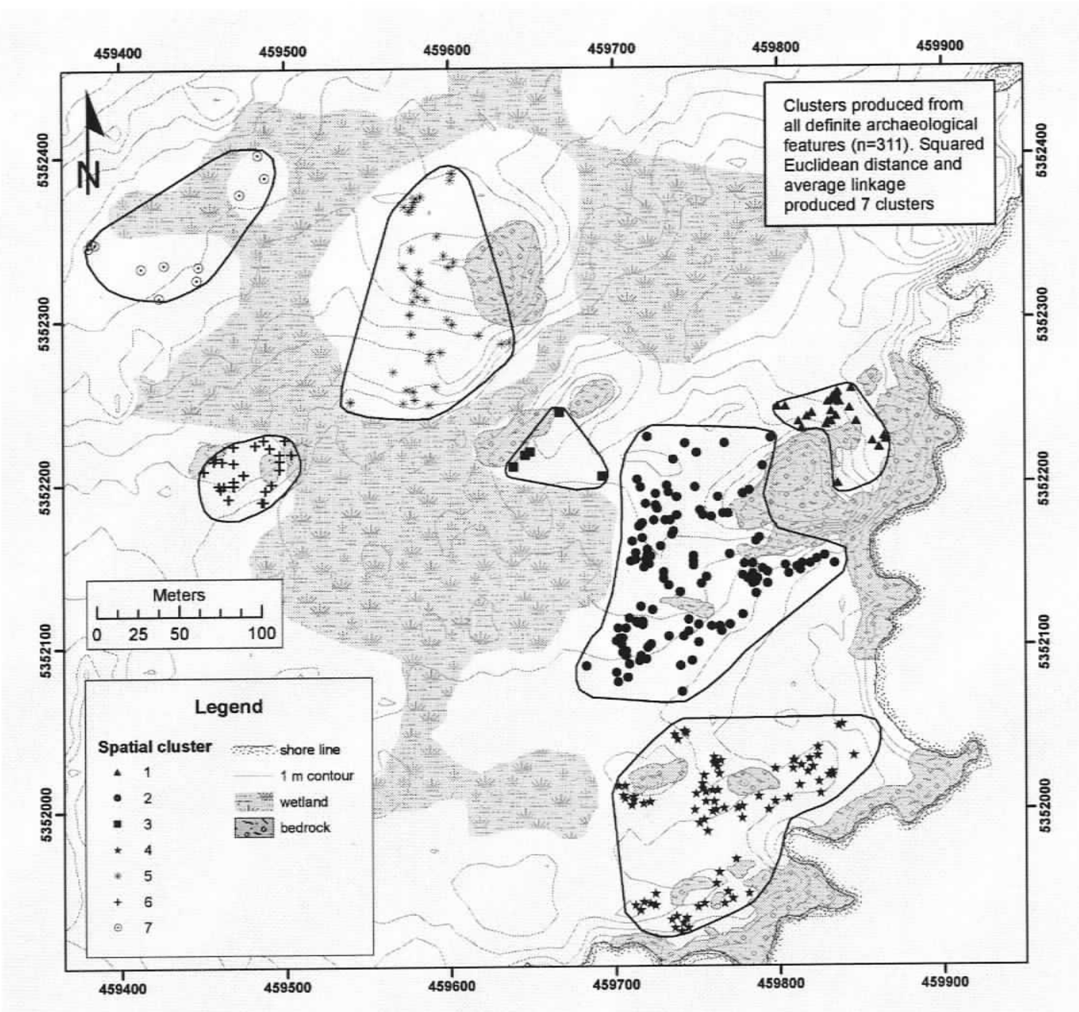


Figure 48: Spatial cluster analysis of all cairn features (n=311) using squared Euclidean analysis and average linkage clustering method.

9.1.4 Spatial Clusters at DbRv-3: A Discussion

As discussed in detail above, the results of the Moran's I_i spatial autocorrelation test indicate strong clustering of the burial features at DbRv-3. This high degree of clustering suggests that an intra–site analysis of the burial features within clusters could be a productive means of further examining the use of mortuary space at the site. As such, a spatial cluster analysis was undertaken using squared Euclidean distance to construct the similarity matrix and average linkage as the clustering algorithm. This produced seven distinct spatial clusters at DbRv-3.

The first component of the spatial analysis is complete. To address the possible patterning of features across each of these spatial clusters, heron out called "localities" to avoid confusion between the different cluster analyses, the following sections discuss the results of the heuristic spatial analysis.

9.2 Cross Locality Spatial Analysis: The Distribution of Feature Types across DbRv-3

One of the fundamental objectives of this research is to identify if any patterning exists in the use of mortuary space at DbRv-3. Plotted together, however, it is difficult to discern visually any patterning in feature type distribution across DbRv-3. To examine the relative distribution of each type of feature, and to discern any patterns in feature density, each feature type was summarized by percentage throughout each of the seven spatial clusters (Table 11) and plotted separately for visual comparison (Figure 49 to Figure 54). This simple analysis revealed very useful results, which are discussed below.

Table 11: Distribution of feature types between spatial clusters

		Area 1	**Area 2**	**Area 3**	**Area 4**	**Area 5**	**Area 6**	**Area 7**	*Total*
Type 1	frequency	4	23	0	24	2	1	1	*55*
	percentage	7.3	41.8	0	43.7	3.6	1.8	1.8	*100*
Type 2	frequency	10	30	0	14	17	7	2	*80*
	percentage	12.5	37.5	0	17.5	21.3	8.7	2.5	*100*
Type 3	frequency	4	11	0	12	5	4	1	*37*
	percentage	10.8	29.8	0	32.4	13.5	10.8	2.7	*100*
Type 4	frequency	0	5	0	2	1	1	0	*9*
	percentage	0	55.6	0	22.2	11.1	11.1	0	*100*
Type 5	frequency	5	17	2	12	3	5	1	*45*
	percentage	11.1	37.8	4.4	26.7	6.7	11.1	2.2	*100*
Type 6	frequency	0	5	1	1	2	2	3	*14*
	percentage	0	35.7	7.1	7.1	14.3	14.3	21.5	*100*

9.2.1 Type 1 Features

Type 1 features account for the second most common surficial burial type at DbRv-3. Briefly, Type 1 features have an external structure of rounded and sub-rounded boulder-sized till and an internal fill of cobble and boulder-sized till, and less than 50% pebble soil fill. These features tend to be relatively larger than the most common feature, Type 2, and are generally better built. As illustrated in Table 11 and Figure 49, Type 1 features are almost exclusive to Areas 2 and 4. This feature type is conspicuous in its near absence in Areas 5 and 6. Considering the relatively large sample size (n=55), it is unlikely this is a result of sampling bias. Therefore, it appears that Type 1 features are strongly correlated with the eastern half of the site and generally do not extend inland beyond the wetland that bisects the site.

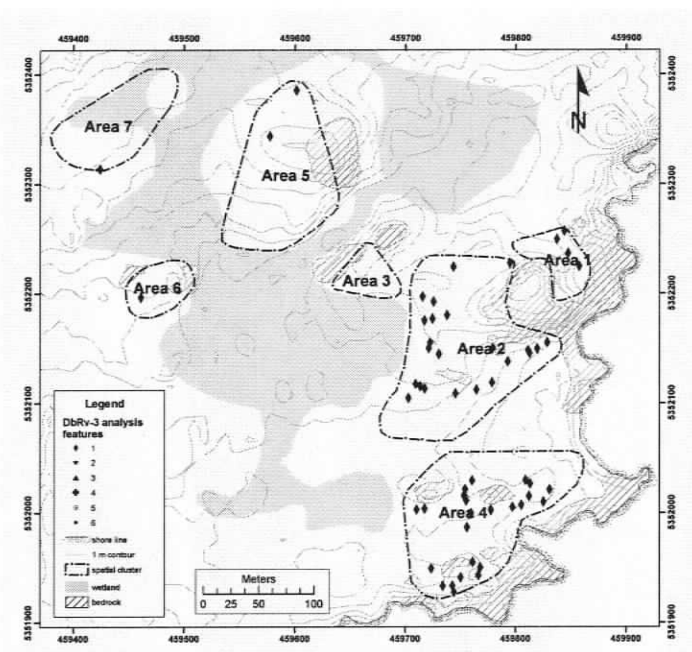


Figure 49: Feature Type 1 distribution across DbRv-3 spatial clusters.

9.2.2 Type 2 Features

These features are the most common type of burial cairn at DbRv-3. They have no distinction between the interior or exterior part of the features, are generally the smallest features at the site, and are typically oval in outline with a rounded in profile. They are made primarily with rounded to sub-rounded boulder and cobble-sized till. Like most features, Type 2 taxa occur most densely in Area 2 (Figure 50).

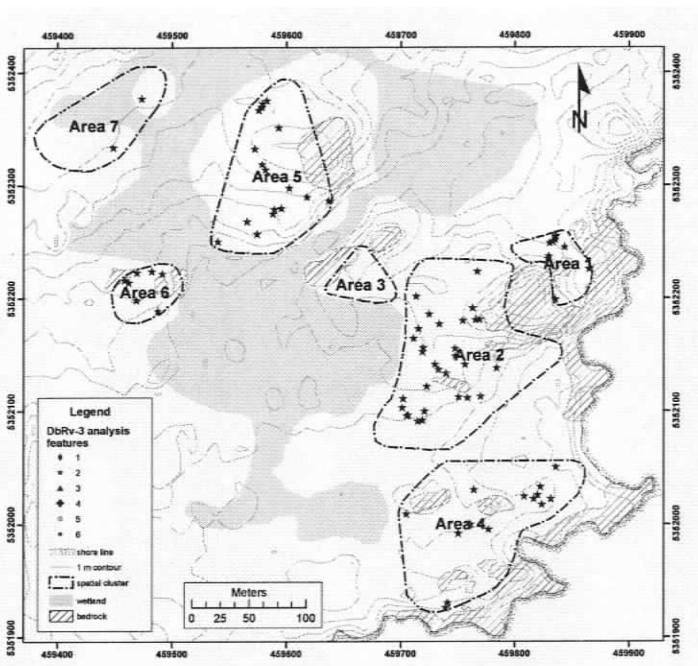


Figure 50: Feature Type 2 distribution across DbRv-3 spatial clusters.

Unlike Type 1 features, however, these cairns occur in relative density throughout the site, including Area 5, which is the second largest concentration of Type 2 features. This is in contrast to Type 1 features, which are specific to the eastern half of the site, whereas Type 2 features are the most numerous features in the inland portions of the site east of the marsh that bisects DbRv-3. Although there are significantly more Type 2 features than Type 1 features at Rocky Point, the former are strongly outnumbered by the later in Area 4, which is closest to the village site DbRv-2. Beyond Area 4, however, in the main part of the site at Area 2, Type 2 features are well represented (n=30).

9.2.3 Type 3 Features

Type 3 features are irregular cairns that generally have no external structure. Although made primarily with cobble to boulder–sized till like Type 1 and 2 features, the rocks selected to build these features is generally subrounded or angular. The defining attribute of Type 3 cairns is their irregular construction. They are either irregularly shaped or have poorly defined margins. This irregularity is unlikely to be the result of site formation processes, as disturbed features were not included in the morphological cluster analysis. Rather, these features were constructed with subrounded and angular till and were not built according to more conventional forms, such as that of Type 1 and 2 features.

Type 3 features occur throughout most of DbRv-3, although most commonly in Areas 2 and 4. Unlike Type 1 and 2 Features in Area 2, however, the material selected for these irregularly shaped cairns was more angular. It is unlikely that the angular nature of the material was a contributing factor to the irregularity of the Type 3 cairns, rather these features were intentionally built in this shape, using a material type less commonly used to build other features in Area 2. While not all Type 2 features are poorly built, to use a subjective term, many lack the distinctiveness of most Type 1 features.

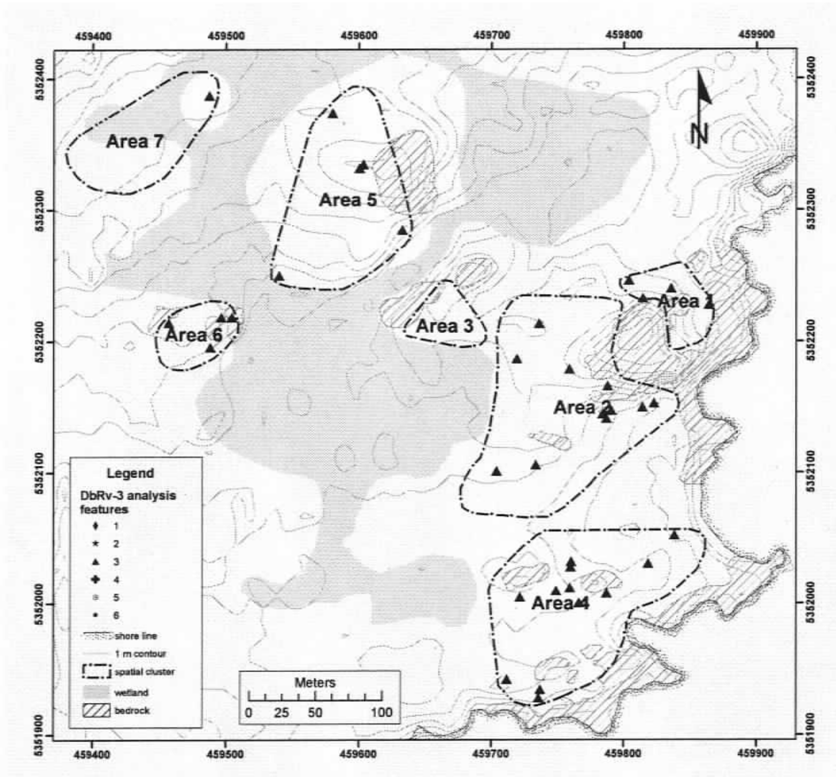


Figure 51: Feature Type 3 distribution across DbRv-3 spatial clusters.

9.2.4 Type 4 Features

Type 4 features are the largest burials at DbRv-3. Most have an external structure of larger rocks with an internal fill of smaller rocks and more soil fill than other feature types. People were selecting subrounded and rounded till and bedrock to build these features. This category also has a significant percentage (22%) of features that incorporate *in situ* erratics, which may have determined, at the local scale anyway, where these features were built.

Type 4 Features occur throughout DbRv-3, although are not surprisingly most numerous in Area 2 (this is the densest spatial cluster at the site). These features are not spatially clustered, but are relatively dispersed across the landscape. Type 4 features, where present, appear to correspond in density with the overall number of other feature types. In Areas 2, 4, 5, and 6, the Type 4 features account for 5.5%, 3%, 3% and 0.5% of the overall number of features, respectively. This suggests that there may have been a rough ratio of Type 4 features relative to all other feature types. In other words, a fixed number of anomalously large features may have been built relative to the overall number of other features. Interestingly, however, no Type 4 features were present in Area 1.

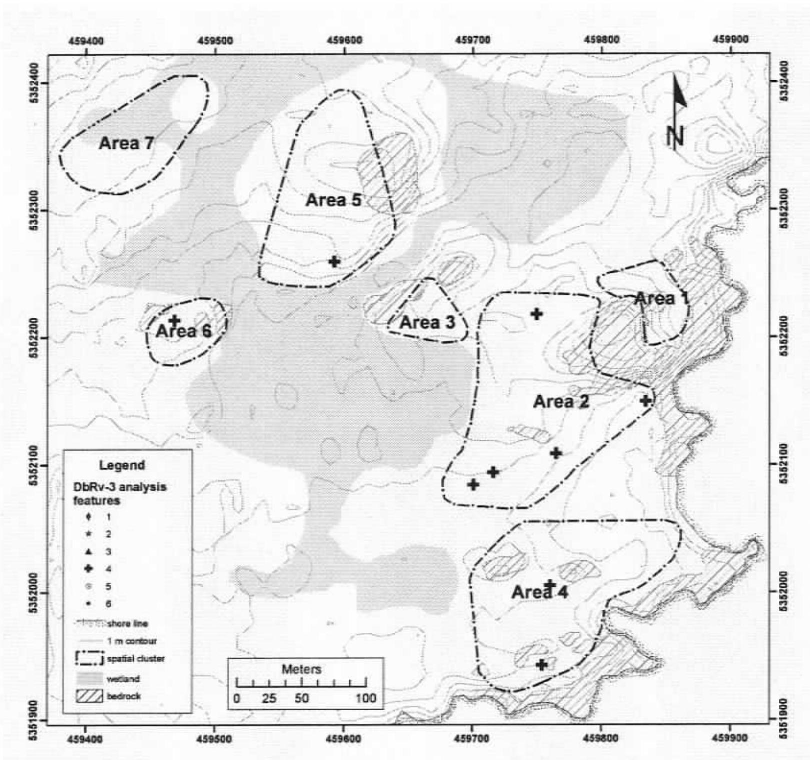


Figure 52: Feature Type 4 distribution across DbRv-3 spatial clusters.

9.2.5 Type 5 Features

To reiterate, Type 5 features are circular in outline and have an external structure of mostly subrounded till boulders and an internal structure of mostly till boulders, with some cobbles and less than 50% soil fill. Type 5 features are most similar to Type 1 features, the primary differences being a circular, as opposed to oval outline, and being slightly smaller. Like Type 1 features, Type 5 features occur almost exclusively in Areas

2 and 4 (Figure 53). This indicates that features with a distinct external structure of larger rocks (excluding the anomalous Type 4 features), are significantly concentrated in Areas 2 and 4. Specifically, features with an external structure are much more likely to occur in the southeastern portion of DbRv-3. Although it may be incidental, this distribution places these features closest to the contemporaneous village site and the shoreline of Eemdyk Passage. Incidentally, most Type 4 features have a definite external structure. In Areas 1 and 2, 71% (n=7) of the Type 4 features have definite external structures.

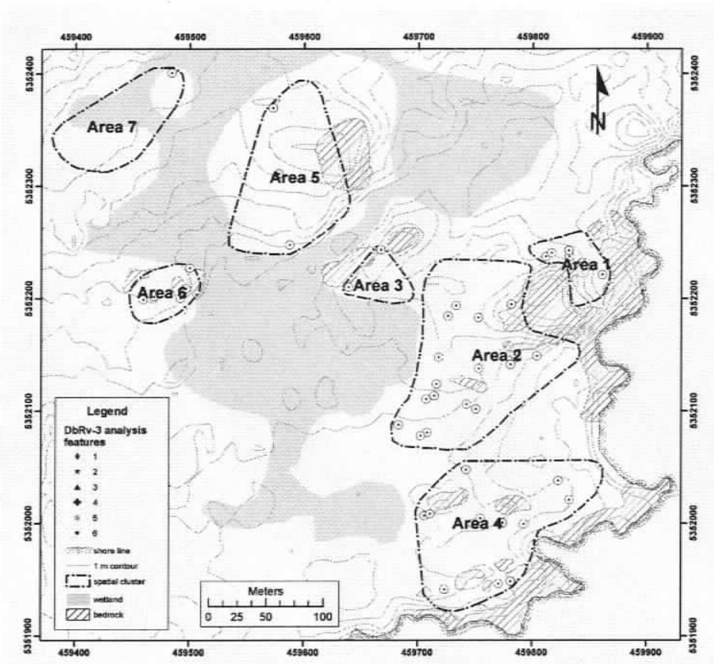


Figure 53: Feature Type 5 distribution across DbRv-3 spatial clusters.

This suggests that a very specific construction technique, features with an external retaining structure of larger rocks and an internal fill of smaller rocks and soil fill, was used almost exclusively in the construction of many cairns in Areas 1 and 2, to the exclusive of the rest of the site.

9.2.6 Type 6 Features

These features are circular in outline and generally have no external structure. The are constructed primarily with angular gabbro bedrock and minor amounts of subrounded and rounded glacial till. They are the most common feature type to be built against an erratic (28%) or bedrock (14%). Type 6 features are most common in Areas 2 and 7. Area 2 is not surprising, as this is the commonality between all feature types at DbRv-3, but Area 7 is unusual. This could be the result of the small sample size (n=14), however, the three Type 6 features are the most common type in Area 7 (Table 11), further suggesting this may be the result of intentional action.

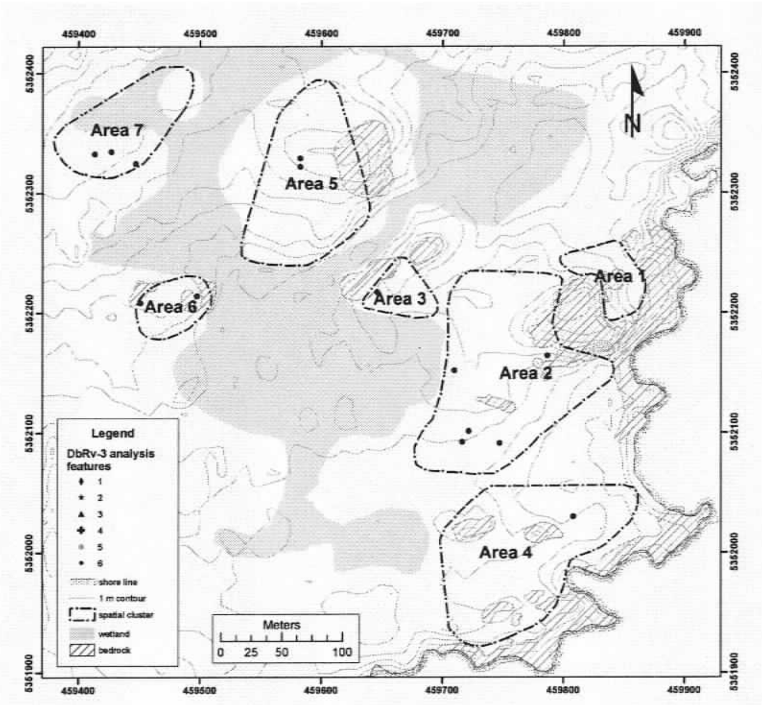


Figure 54: Feature Type 6 distribution across DbRv-3.

9.2.7 Discussion

This basic analysis of the six feature types within each of the seven spatial clusters has yielded some significant results. This analysis suggests three significant points. First, people were building cairns with a definite external structure (Types 1, 5 and to a lesser extent Type 4) in Localities 2 and 4, and virtually nowhere else. This suggests an exclusiveness of this construction method limited to the southeastern corner of the site closest to the village site DbRv-2. Second, features without external structures (Types 2 6) were built throughout the site with no apparent spatial preference. Third, the number of the anomalously large Type 4 features corresponds to the overall number of other feature types, accounting for between 3 and 5.5% of the overall number of features in each of the three largest areas (Localities 2, 4 and 5).

This preliminary assessment suggests that a more detailed examination of feature types within each of the seven spatial clusters would be an appropriate approach to examining spatial patterning at DbRv-3.

9.3 Intrasite Spatial Analysis

The results of the previous analysis indicate that there is a differential distribution of feature types between each of the seven spatial localities. This distribution is summarized in Table 12.

Each of the spatial clusters exhibits minor variations in micro topography that may be important to understanding feature placement on the landscape. To attend to the distribution of burial features relative to the landscape and other burial features, the following analysis examines each of the seven localities with the following considerations in mind:

1. The types and relative occurrence of burial features
2. Distribution type: internal clusters, linear networks, or random distribution
3. Distribution of features relative to the physical landscape
4. Distribution of features relative to other feature types

Following are the results of the intrasite spatial analysis.

Table 12: The distribution of feature types by Locality

		Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	*Total*
Locality 1	frequency	4	10	4	0	5	0	23
	percentage	17.4	43.5	17.4	0	21.7	0	100
Locality 2	frequency	23	30	11	5	17	5	91
	percentage	25.5	32.9	12.2	5.5	18.7	5.5	100
Locality 3	frequency	0	0	0	0	2	1	3
	percentage	0	0	0	0	66.7	33.3	100
Locality 4	frequency	24	14	12	2	12	1	65
	percentage	36.9	21.6	18.5	3	18.5	1.5	100
Locality 5	frequency	2	17	5	1	3	2	30
	percentage	6.7	56.6	16.7	3.3	10	6.7	100
Locality 6	frequency	1	7	4	1	5	2	20
	percentage	5	33	20	5	25	10	100
Locality 7	frequency	1	2	1	0	1	3	8
	percentage	12.5	25	12.5	0	12.5	37.5	100

9.3.1 Locality 1

Locality 1 is situated adjacent to the shoreline of Eemdyk Passage at the north edge of DbRv-3. The northern boundary of the site appears to be defined by the southern extent of shell midden site DbRv-17. Interestingly, there is no overlap between the shell midden deposits and the surficial burial features, despite it otherwise being logical place in which to build cairns and mounds, having a plentiful supply of rock. Boulder and cobble-sized glacial till are common. This implies a defining or determining variable other than the presence of material with which to build cairns and mounds.

Locality 1 is divided from Locality 2 by a 5 m high, steep sided bedrock exposure. None of the features in Locality 1 is built on this bedrock (Figure 55). Terrain in Locality 1 is very well drained and currently vegetated with a small grove of Garry oak. The firs access road traverses the north end of Locality 1 at an oblique angle and has impacted some features, which were excluded from the morphological analysis (Figure 55).

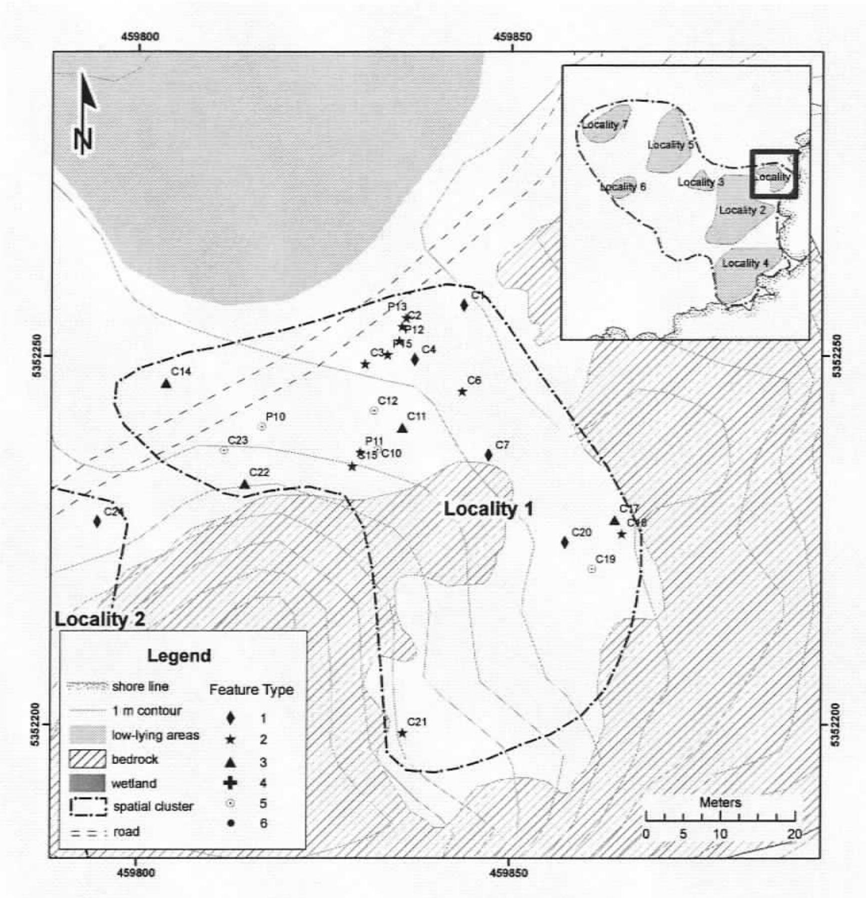


Figure 55: Locality 1, spatial distribution of morphological analysis features.

Locality 1 has 23 features that were used in the morphological numerical taxonomy and an additional 7 disturbed features that were excluded from analysis. The features appear to be concentrated at the north edge of the cluster, which is somewhat less spatially confined by bedrock exposures relative to the rest of the area.

Almost half of the burials at Locality 1 are Type 2 features. There are almost equal proportions of Type 1, Type 3 and Type 5 features (Table 12). Interestingly, there are no Type 4 features, which is unusual considering the number of features within this Locality (n=23). The largest intact burial is Feature C4, which has a volume of 14 m^3, which is significantly smaller than the mean volume of Type 4 features (22.3 m^3). All other localities at DbRv-3 with more than 10 features have at least one Type 4 Feature. There are also no Type 6 features. Those features were constructed primarily from bedrock, and qualitatively speaking, bedrock was not a common component in the construction of Locality 1 features.

The results of placing an arbitrary 2.5 and 5 m buffer around the Locality 1 features suggests that the majority of these features form tight internal clusters around the mean centre of the locality (Figure 56). There are some features, such as C21, that are clearly isolated from the others.

There is a small cluster of Type 2 features (C2, P12, P13, and P15) at the north end of the locality (Figure 55). Defining any additional visual patterning of features relative to other feature types, however, is not possible.

All features in Locality 1 are at the same approximate elevation, between 5–8 m ASL. Despite being one of the closest localities to the shoreline of Eemdyk Passage, the closest feature to the shoreline is 33 m away, and separated from the water by a broad, low exposure of bedrock. None of the Locality 1 features is visible looking towards the site from the shoreline or from the water.

Placing a 5 m buffer along the bedrock indicates that there are six features in close proximity to the bedrock (Figure 57). One feature, C7, is built against the bedrock exposure. While some features are built in close to bedrock, the majority of the features, however, are built at least 10 m away.

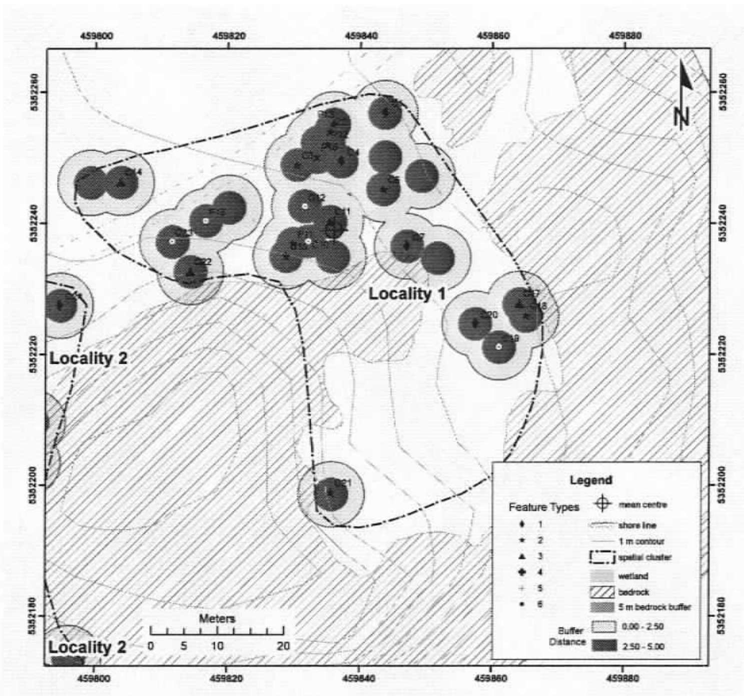


Figure 56: All Locality 1 features with a 5 m buffer around them, illustrating feature density and proximity.

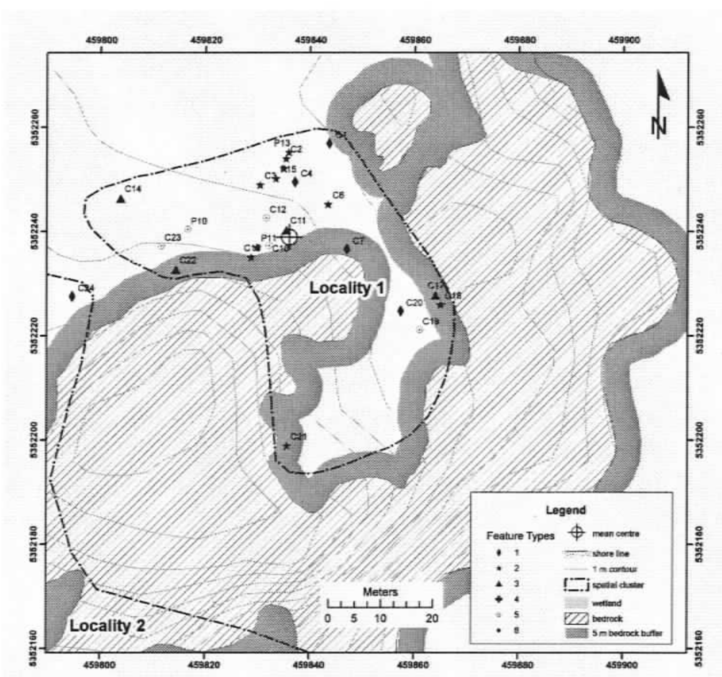


Figure 57: Locality 1 with 5 m bedrock buffer and mean centre of features.

9.3.2 Locality 2

Locality 2 is situated in the eastern half of DbRv-3 along the shore of Eemdyk Passage, extending inland up to 140 m. There is a small beach along the channel in the vicinity of Feature C27 (Figure 58), meaning that Locality 2 could have been accessed directly by canoe. Locality 2 is also easily and quickly accessible by land if walking from the village site DbRv-2. There are numerous small bedrock outcroppings throughout, with a significant bedrock knoll in the northeast corner dividing these features from those in Locality 1. Boulder and cobble-sized glacial till are common and there are occasional erratic scattered throughout the area, although less so than in Locality 4 to the south. The western edge of the site is defined in part by the wetland that separates the eastern and western halves of the site (Figure 58). The location of the wetland, low-lying areas, and bedrock confine the location of burial cairns through parts of Locality 2. Compared to other parts of DbRv-3, however, there are less physical constraints to cairn placement as terrain is generally flat, open and well drained. The fire access road built in the 1950's intersects Locality 2 and has undoubtedly destroyed some features (Figure 58). Other features, impacted by the road, were excluded from morphological analysis but were included in the spatial cluster analysis.

Locality 2 is the largest spatial cluster at DbRv-3; it is 1.7 hectares in area and has 91 features that were included in the morphological analysis and 50 disturbed features that were excluded from analysis. All six feature taxa are represented in Locality 2 (Table 12). Type 2 features are the most common type in Locality 2, followed by Type 1 features, which is consistent with Locality 1 to the north. Locality 2 has the most Type 4 features at DbRv-3 (Figure 59). These features appear to be relatively dispersed within the locality and tend to occur along the edges of the spatial cluster, but are centrally located within the overall boundaries of DbRv-3. The statistical centre of the DbRv-3 feature distribution is in close to Feature C82, which is the largest feature at the site (Figure 59).

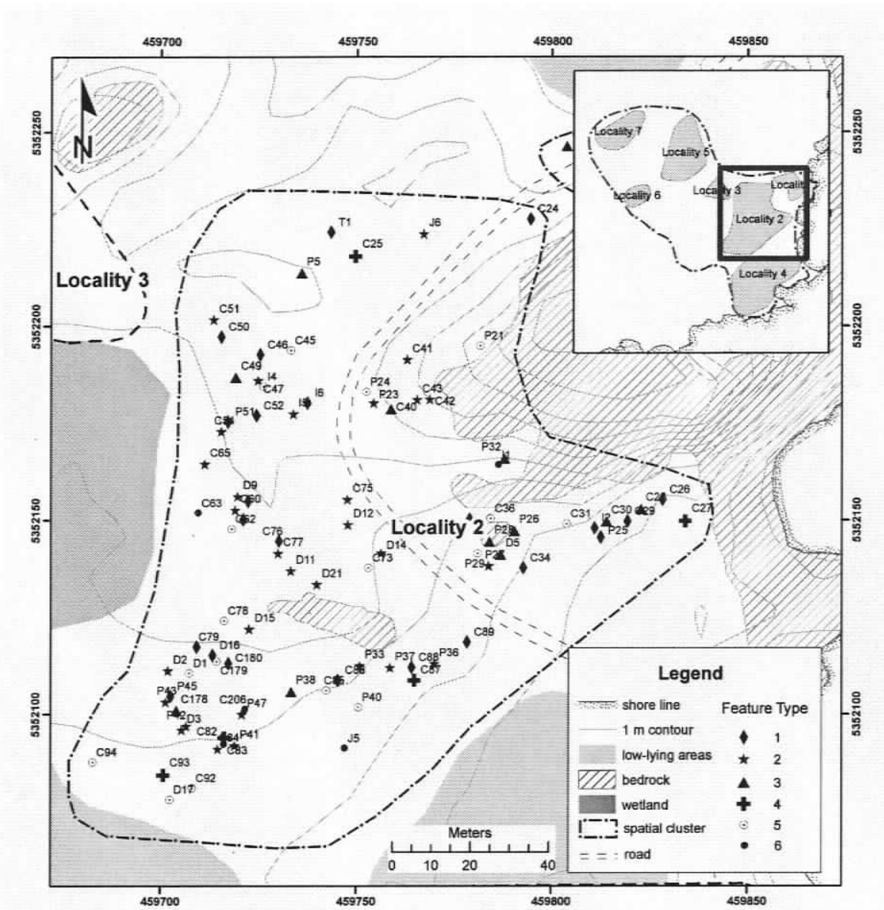


Figure 58: Locality 2, spatial distribution of morphological analysis features.

It is somewhat counter–intuitive when one thinks of large burials and the concepts of monumentality discussed in Chapter 1, but Feature C82 in not in a visible location at the site. It is far removed from the shore of Eemdyk Passage, as are most features in Locality 2, and is built on otherwise flat and featureless terrain.

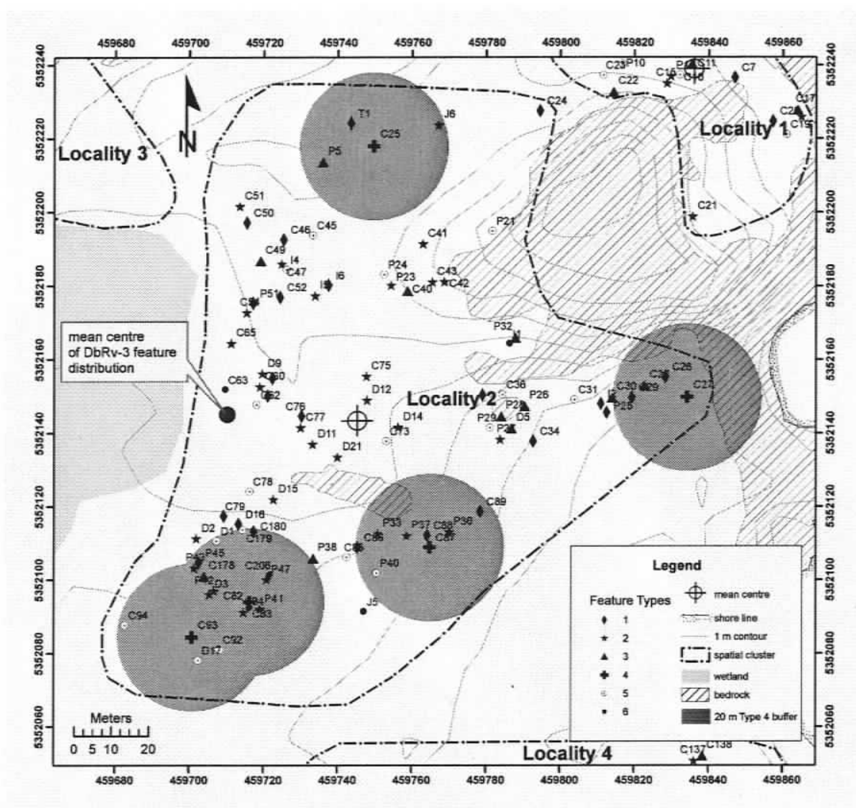


Figure 59: Locality 2, Type 4 features with 20 m buffer.

Although the overall distribution of features in Locality 2 is somewhat more dispersed than in Locality 1, the buffering analysis indicates that the distribution of features appears to be linear, particularly in the southern half of the locality (Figure 60). These linear distributions are punctuated by a several internal clusters.

The heuristic spatial analysis is not able to distinguish the distribution of one feature type relative to other feature types in Locality 2. This is a significant methodological limitation. The distribution of features is complex and requires a quantitative approach to discern any specific patterning among the feature types..

Terrain in Locality 2 is generally flat, and although there are bedrock outcroppings along the northeast side of the area, and wetland along the west side (Figure 58), the features in Locality 2 are not especially constrained by the physical environment relative to other localities at DbRv-3, such as Locality 1 to the north. Although there are a number of features in close proximity to bedrock (Figure 61), no features in locality 2 are built on exposed bedrock. Several features, however, were located along the lower edges of the large bedrock exposure in the northeast corner of the locality. These burials, including features P32 and I1, are built only where it is flat and there is a substantial amount of soil development. This appears to have been a common practice throughout DbRv-3 where features were built in close proximity to bedrock.

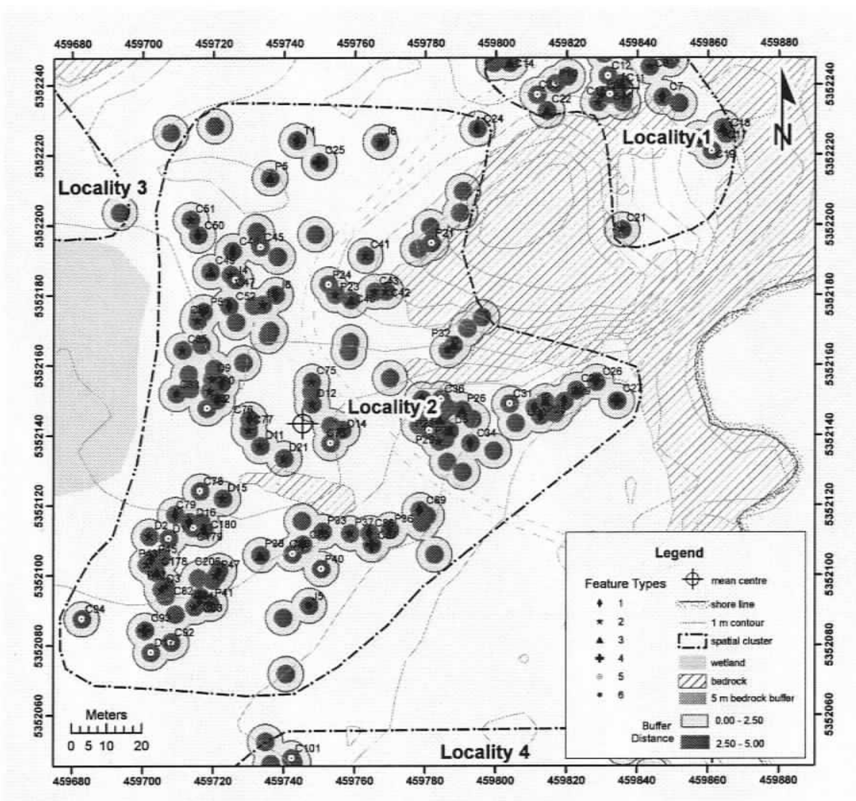


Figure 60: All Locality 2 features with a 5 m buffer around them, illustrating feature density and proximity.

Furthermore, no features in Locality 2 were built on top of the bedrock rise in this area. Erecting a burial in this location would have dramatically increased the visibility of the feature, as was a common practice in parts of Europe during the Neolithic (Tuovinen 2002).

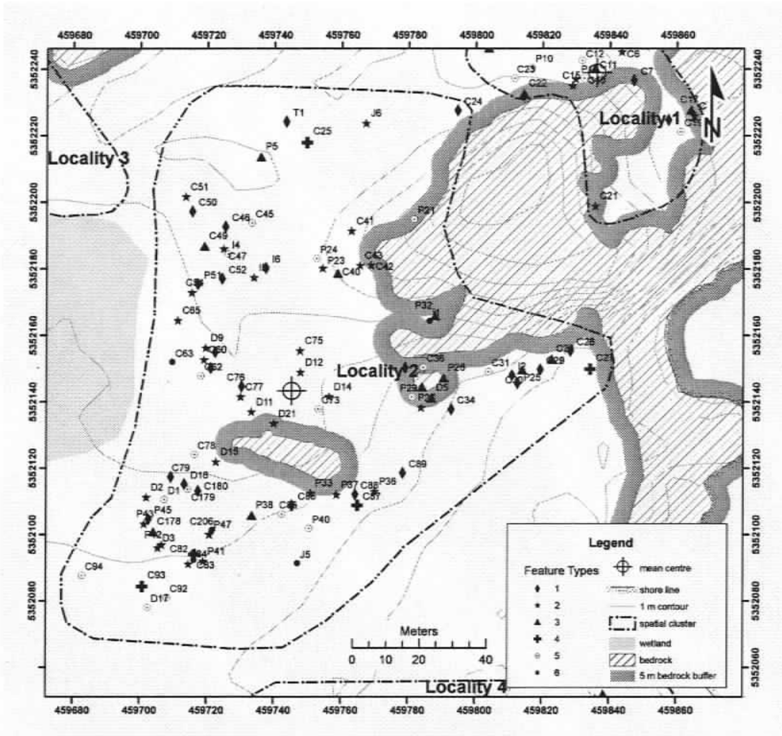


Figure 61: Locality 2 with 5 m bedrock buffer.

Along the eastern edge of Locality 2, there are a number of features built quite close to the shoreline, including a Type 4 feature, C27. A linear distribution of features appears to parallel the southern edge of the bedrock exposure from C27 west to P29 (Figure 61). Feature C27 is unusual in its proximity to the shoreline of Eemdyk Passage, although this location is otherwise sheltered. This position is not visible from Eemdyk Passage.

Lastly, it is surprising that there is not a concentration of burial features at the north edge of the Locality 2. This place has an abundance of rocks on the ground surface and is flat and well-drained. There is a clear spatial demarcation, however, between the north edge of Locality 2 and Locality 1 to the north. In the absence of a physical boundary or obvious rationale for the absence of features, it may be surmised that a potential cultural or social boundary was enacted here, that resulted in the separation of these two areas.

9.3.3 Locality 3

Locality 3 is situated between the two largest clusters of cairns at DbRv-3: Locality 2 is to immediate southeast and Locality 5 is to the northwest, on the opposite side of a narrow section of the wetland. This narrow section of wetland is the point at which crossing this water feature, which bisects the site, is easiest. Locality 2 is in a low–lying and moderately drained area of DbRv-3. The wetland system surrounds Locality 3 to the south and west. Most of the features are located along the southeastern side of a distinctive 3 m high bedrock exposure (Figure 62). Being such a low–lying area, there are generally less rocks exposed with which to build cairns and mounds, which may explain in part the grouping of burials around the bedrock exposure where terrain is somewhat better drained.

There are three features in locality 3 included in the morphological analysis and three disturbed features that were excluded. Two of these features were Type 5 features and one as a Type 6 burial (Table 12) — interestingly all three features have a round profile.

The features in Locality 3 are distributed in a linear network (Figure 63). To reiterate, they are built along the south side of a bedrock outcropping, where the terrain is better drained. Again, features were not built on the top of the large bedrock exposure, which would have increased the visibility of the features.

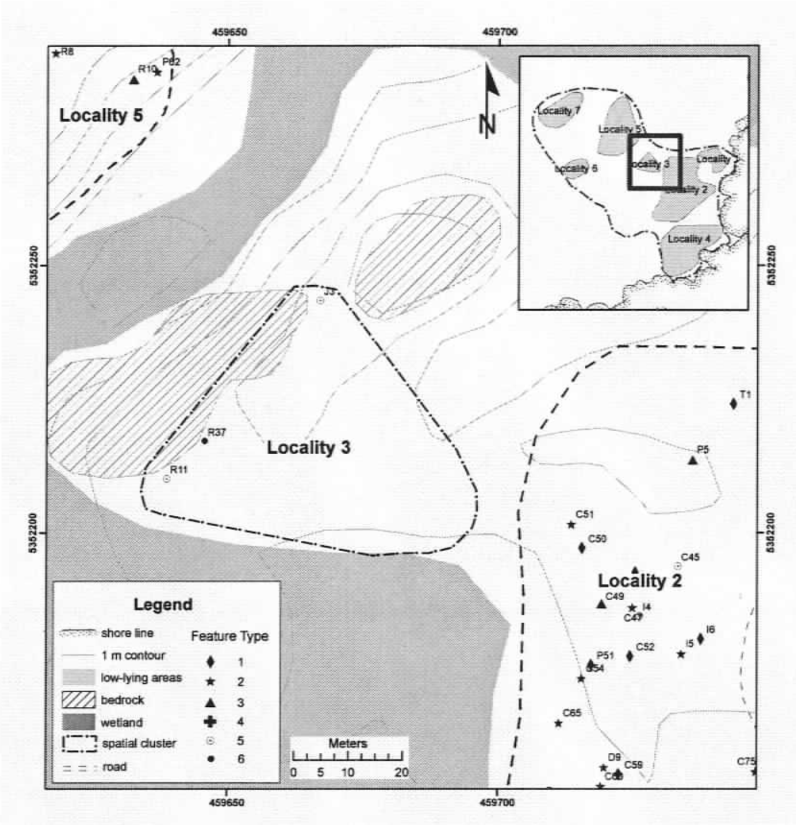


Figure 62: Locality 3, spatial distribution of morphological analysis features.

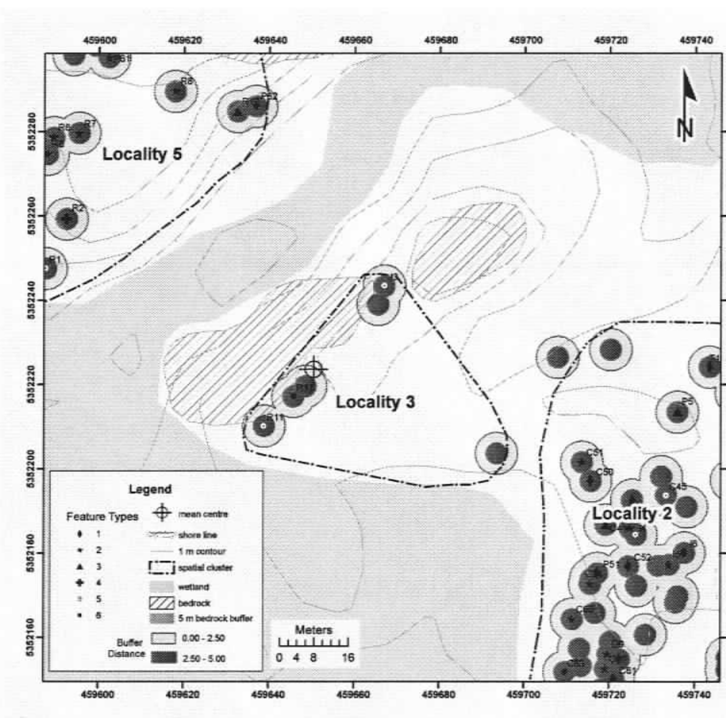


Figure 63: All Locality 3 features with a 5 m buffer around them, illustrating feature density and proximity.

9.3.4 Locality 4

Locality 4 is located along the shoreline of Eemdyk Passage in the southeast corner of DbRv-3 (Figure 64). This cluster of features is the closest part of the Rocky Point cemetery to the village site at DbRv-2, approximately 80 m to the southwest.

Locality 4 extends up to 135 m inland from the shoreline, the northwestern extent demarcated by a low saturated area, which grades into the wetland that bisects the site (Figure 64). Terrain throughout the area is characterized by numerous low bedrock exposures that are generally less than 3 m in height. While it is possible to traverse these exposures, these features tend to constrain movement through this area and appear to dictate in part where cairns were constructed. In the southern part of Locality 4, the burial features are tightly clustered between the wide shoulder of bedrock along the shoreline of Eemdyk Passage and inland outcroppings of low bedrock (Figure 64), blocking visibility from the water. The northern half of the locality consists of a low flat rocky area at Edye Point. Again, there are numerous low bedrock exposures.

The area around Edye Point represents the part of DbRv-3 most exposed to Eemdyk Passage, and if features were to be visible from the water, this is where they would be most noticeable. The fire access road follows the shoreline of through Locality 4 and has likely done the most damage to this part of the site than anywhere else. The inland edge of the road in the vicinity of Feature C144 consists of a low and continuous row of stones that were undoubtedly from burial cairns at Edye Point.

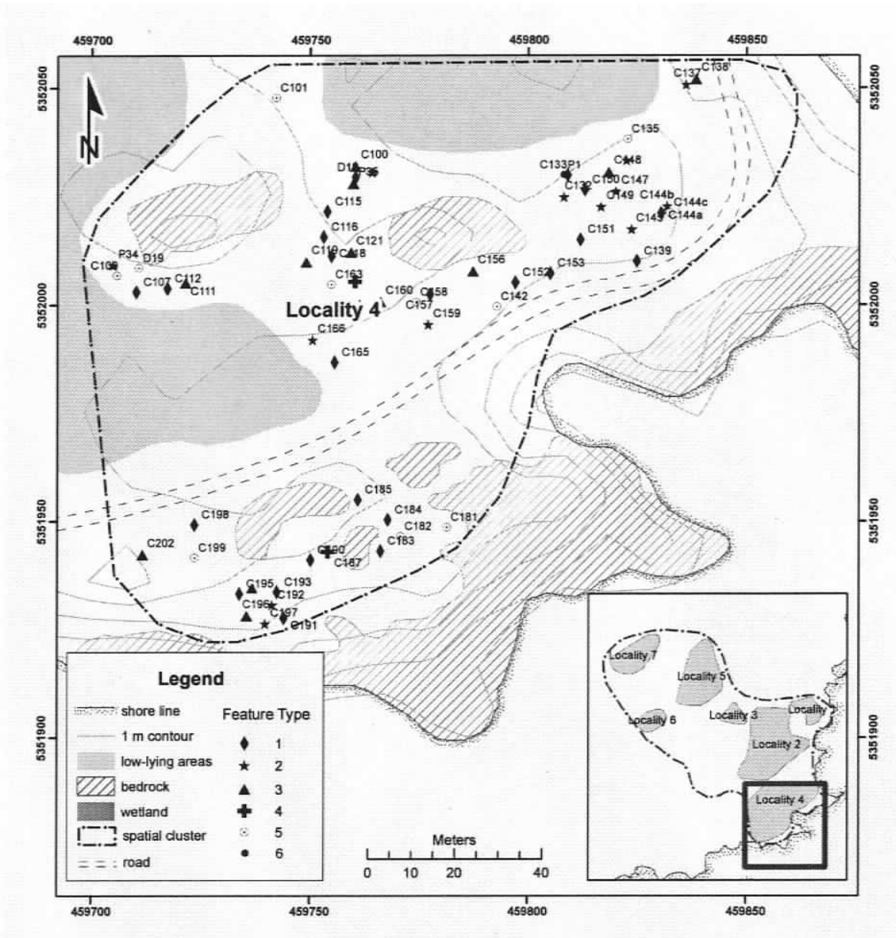


Figure 64: Locality 4, spatial distribution of morphological analysis features.

A total of 98 features are present in Locality 4, 65 of which were included in the morphological analysis. All feature types are present (Table 12), however Locality 4 is unusual in that Type 2 features, which are typically the most common form of burial at DbRv-3, occur in lesser numbers relative to Type 1 features. The majority of these features are constructed almost exclusively with granodiorite till. Particularly in the vicinity of Edye Point, where although features exhibit different morphologies, they are uniformly made with cobble and small boulder sized rounded granodiorite stones.

There are two Type 4 features at Locality 4. They appear to be placed centrally with two of three internal clusters of features (Figure 65). There is a third cluster of features in the area inland of Edye Point without a Type 4 feature. I content, however, that there is a feature there that may have been on par with Type 4 features, however due to the structure of the field recording methodology, was not recorded as such.

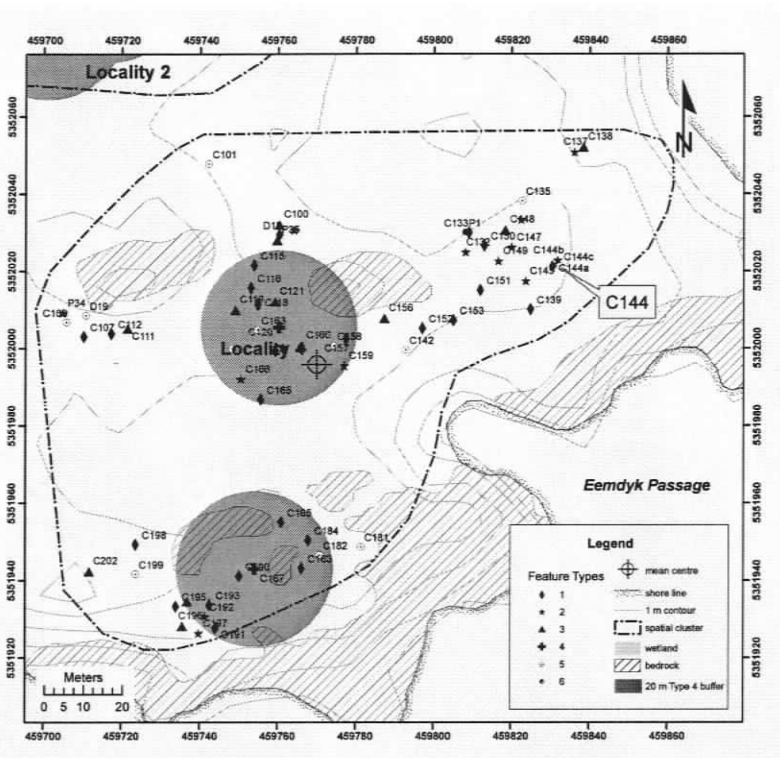


Figure 65: Locality 4 with a 20 m buffer around Type 4 features. Also included is Feature C144 (see text for description).

Feature C144 is located in the centre of the cluster of features at Edye Point (Figure 64). As discussed in Section 7.4.4, this feature consists of a rectangular row of stones, within which one large cairn was built at one end and two smaller cairns in each oppose corner (Figure 40). Feature C144 is identical in structure to the interior structure of larger mounds in the Strait of Georgia, although it lacks soil covering. It is untested whether this lack of soil covering is a cultural process or related to site formation processes such as deflation.

The distribution of features within Locality 4 appears to form linear networks (Figure 66), which correspond with the distribution of bedrock exposures and low–lying areas, and hence the placement of the burial features.

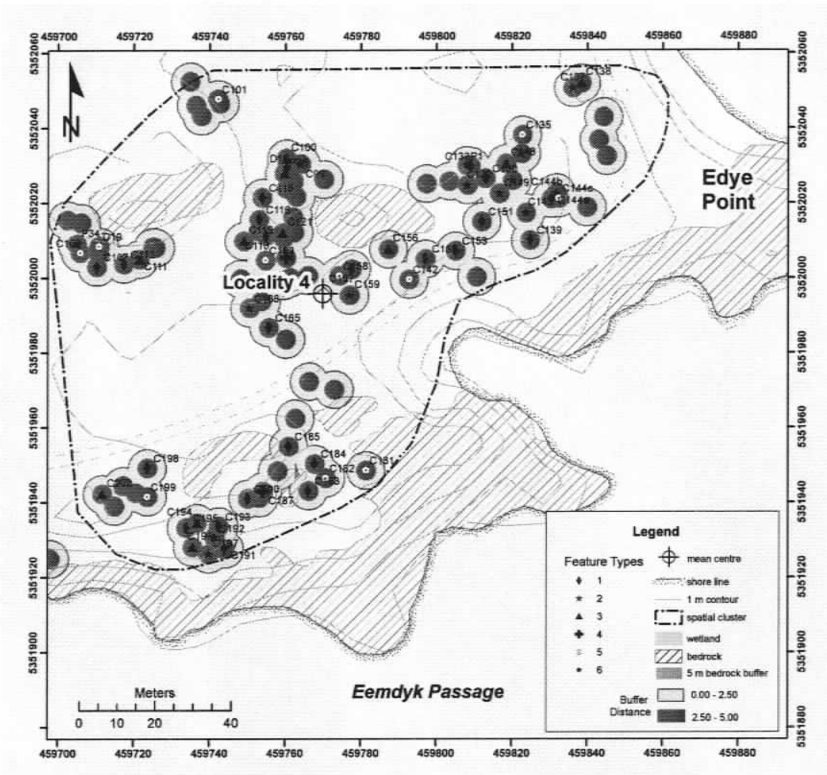


Figure 66: All Locality 4 features with a 5 m buffer around them, illustrating feature density and proximity.

Despite its somewhat more exposed location, even those features in Locality 4 closest to the shoreline of Eemdyk Passage are still greater than 20 m inland. Furthermore, despite their relative proximity to the water, they all built on the leeward side of the bedrock exposures along the shoreline, which restricts their visibility from the water. The water, however, is visible from the burials.

Features are not built on top of bedrock, which is consistent with elsewhere at DbRv-3. Furthermore, most features in Locality 4 are not built within less than 5 m of exposed bedrock and bedrock was only rarely incorporated into any of the features.

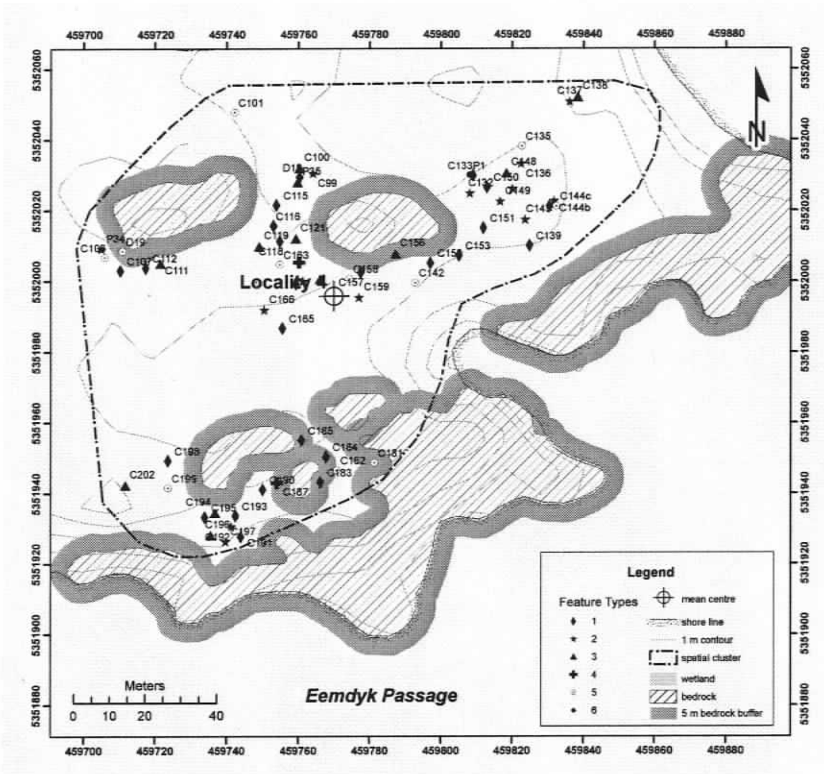


Figure 67: Locality 4 with 5 m bedrock buffer.

Like other localities, the distribution of one feature type relative to other feature types does not appear to form identifiable patterns. This may be due to the analytical limitations of the heuristic analysis rather than to the lack of patterns in feature placement.

9.3.5 Locality 5

Locality 5 is situated 250 m inland form Eemdyk Passage in the west side of the wetland that intersects DbRv-3 (Figure 68). This landform consists of a low rise, which is up to 7 m above the level of the wetland that surrounds it on three sides. Most of this landform is well drained and rocky, and has several small bedrock outcrops. It is presently vegetated with arbutus, Douglas fir and Garry oak.

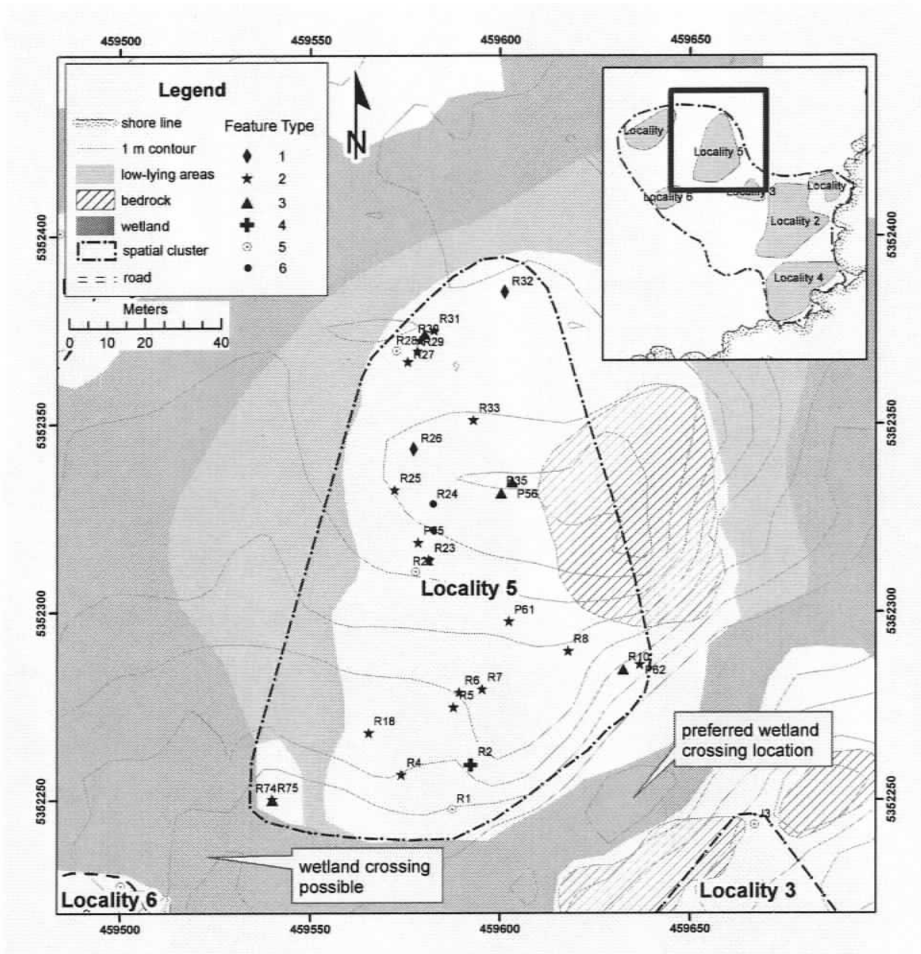


Figure 68: Locality 5, spatial distribution of morphological analysis features.

There are 42 features in Locality 5, 12 of which were excluded from morphological analysis. Several of these disturbed burials, such as Feature R9 (Figure 13), appear to have been intentionally disturbed. It is possible these were burials examined by Albert Argyle in the late 1800's (Section 4.4.2).

Although all types of features occur in Locality 5, Type 2 features account for more than half of the burials (Table 12). The second most frequent type of burial is the Type 3 feature. Type 1 features are notable in their near absence, as is consistent with the observation in the previous spatial analysis (Section 9.2.1).

There is only one Type 4 feature in Locality 5, which is situated at the south end of the landform closest to the two narrowest sections of wetland separating this locality from the rest of the site (Figure 69).

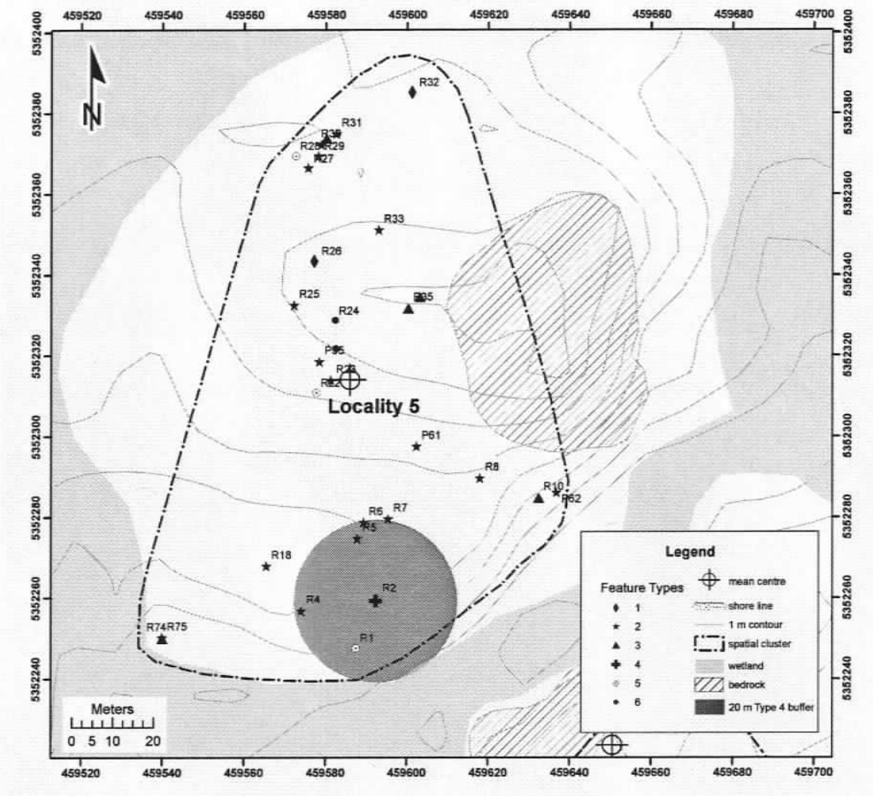


Figure 69: Locality 5 and Type 4 feature with 20 m buffer.

The features in Locality 5 appear more dispersed than in other areas of DbRv-3. There are fewer internal landform constrains than in some localities, however there is still a slight linear distribution of features from north to south (Figure 70).

Accessing Locality 5 from most directions necessitates on having to traverse the wetland. The most logical place to cross is at the south end via a narrow gully that separates this landform from Locality 2 (Figure 68). This gully has knee–deep water during the winter months. It is also possible to access this landform from Locality 6, but the terrain is considerably wetter, there is a longer section of wetland to traverse, and it presently has dense undergrowth.

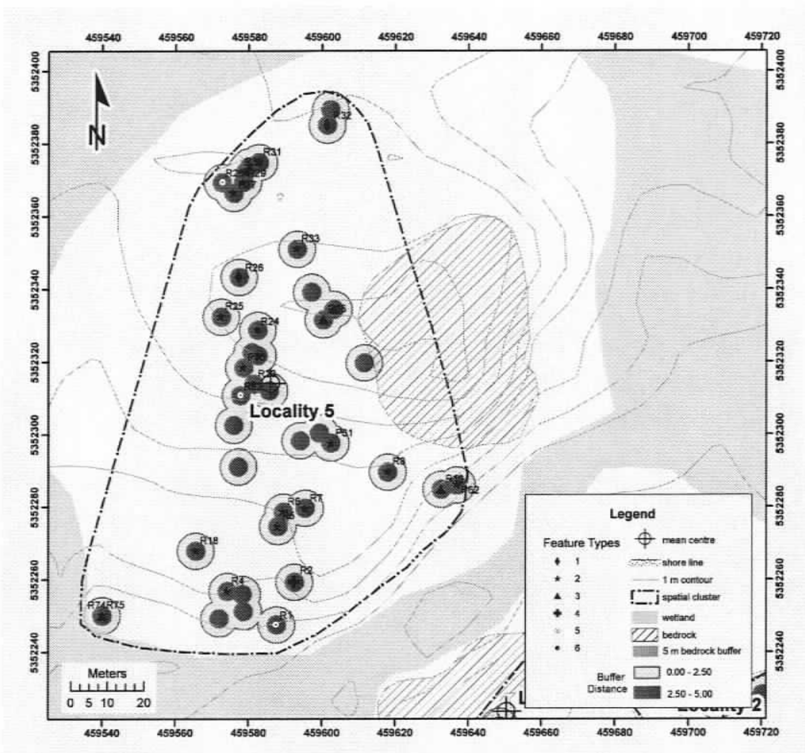


Figure 70: All Locality 5 features with a 5 m buffer around them, illustrating feature density and proximity.

It is possible to access Locality 5 from any direction if one so chooses, these two points, however, represent the places that present the least difficulty, and are hence the most logical crossing points. In addition, it is possible that there have been hydrological changes in drainage patterns since the features were constructed. Considering the lack of burial features within the wetland itself, however, it is unlikely that water levels were any lower than those at present.

9.3.6 Locality 6

Locality 6 is located in the northwest corner of DbRv-3, approximately 350 m north of the midden at DbRv-2 on the shore of Eemdyk Passage. It is situated on a small rocky knoll surrounded by poorly drained flat and featureless ground to the west or wetland to the northeast and southeast (Figure 71). There are numerous low bedrock outcroppings throughout this small rocky knoll. The site was vegetated with large Douglas fir trees before it was selectively logged at some point in the early to mid twentieth century.

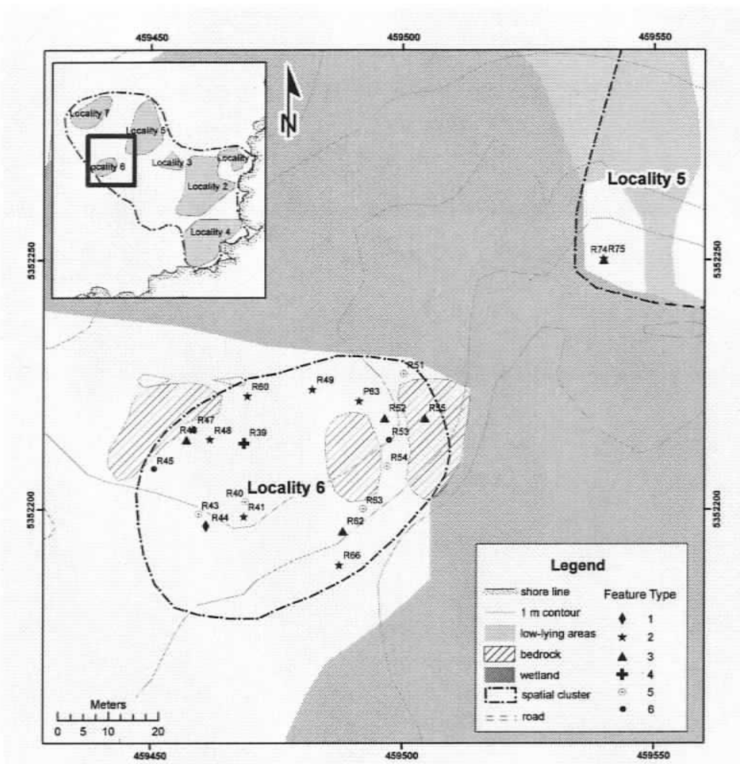


Figure 71: Locality 6, spatial distribution of morphological analysis features.

There are 25 features in Locality 5, five of which were excluded from morphological analysis. All feature types are present, although the most common feature is Type 2. Type 3 and Type 5 features occur in only slightly lower abundance (Table 12). As in other areas west of the wetland, Type 1 features are very rare, which is unusual as they are numerous east of the wetland. There is only one Type 4 feature in Locality 6, centrally located on the knoll. It is the smallest Type 4 feature at DbRv-3.

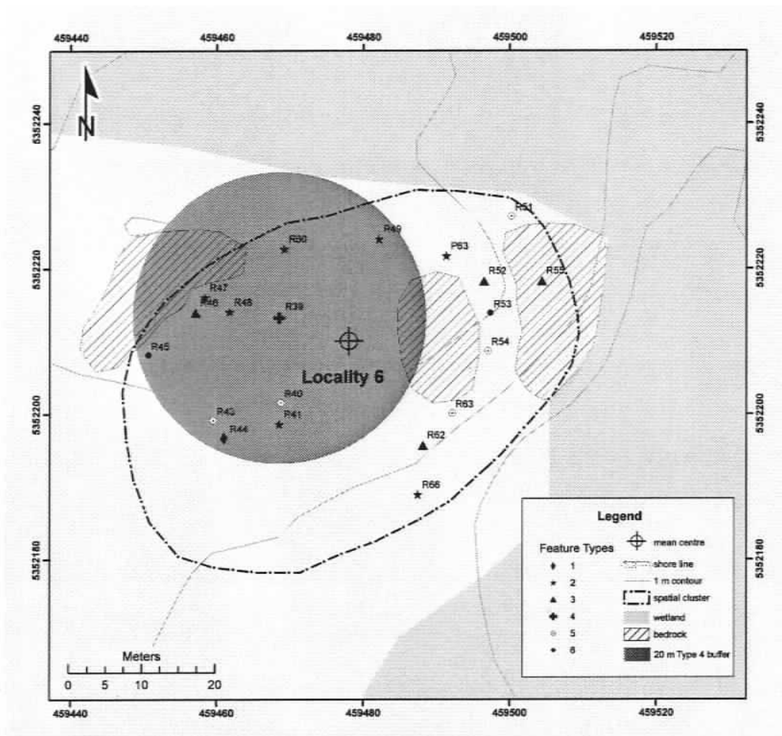


Figure 72: Locality 6 with 20 m buffer around Type 4 feature.

Features in Locality 6 form a tight cluster on what is a very small landform. There is a small linear network of features in the eastern half of the site that are within a low narrow gully between two bedrock exposures. These features are somewhat concealed and not visible except when standing within the gully.

Features around the periphery of Locality 5 are built close to bedrock and are not overtly visible. The majority of features in this area are within 5 m or less of bedrock (Figure 74). This is very usual compared to the rest of the site. Although this is a small rocky landform with many bedrock exposures, there are areas with few features where additional burial could have been placed. Feature R55 is an example of the apparent strong association with bedrock in this locality. It is a large burial, comprised of both till and bedrock cobbles and boulders, built into a bedrock cleft; this burial is unique within the site (Figure 27).

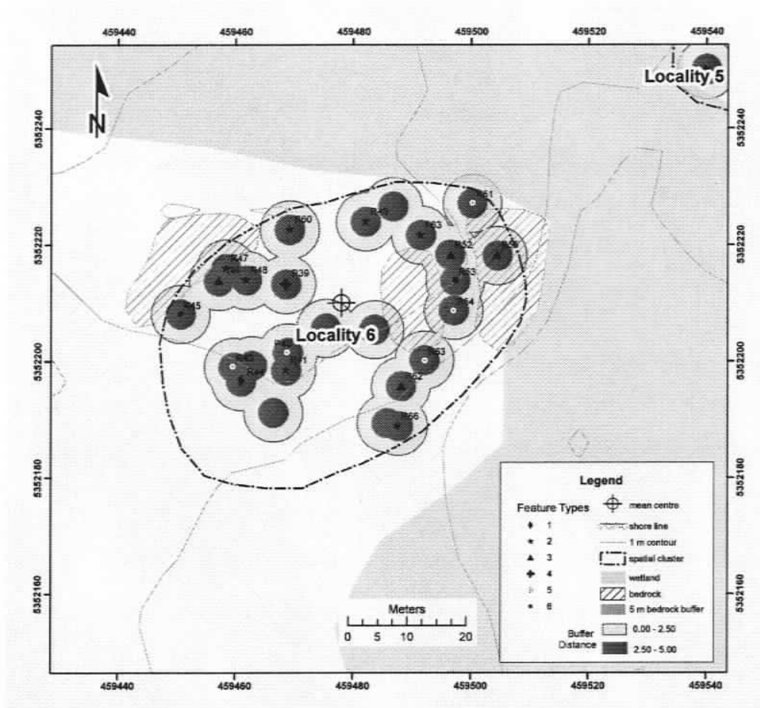


Figure 73: All Locality 6 features with a 5 m buffer around them, illustrating feature density and proximity.

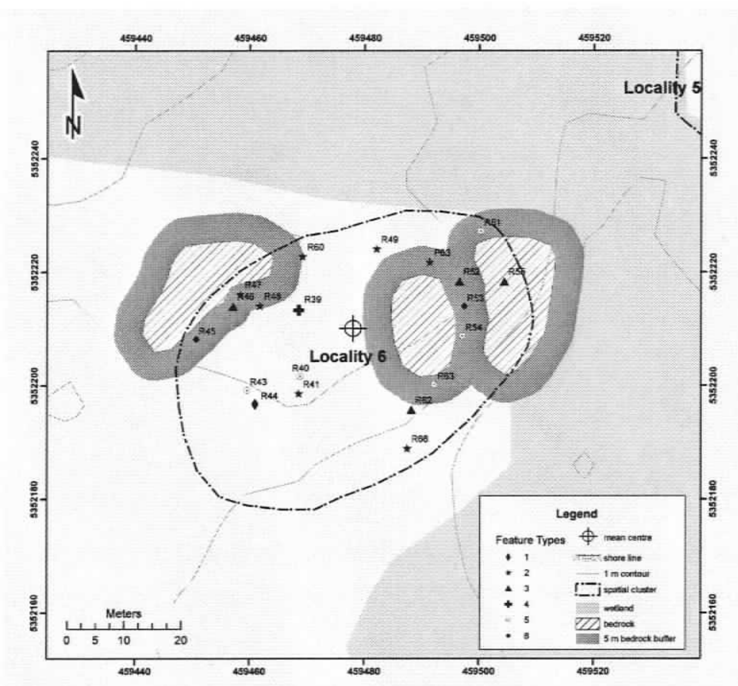


Figure 74: Locality 6 with 5 m bedrock buffer.

9.3.7 Locality 7

Locality 7 is at the far north end of the Rocky Point site. It is the most distant part of DbRv-3; situated 500 m inland from the shoreline of Eemdyk Passage and village site DbRv-2. Terrain in Locality 7 is flat and very rocky, with few low bedrock outcroppings. There are very old Douglas fir trees growing in the area. Areas of slightly lower relief are poorly drained and have seasonally standing water.

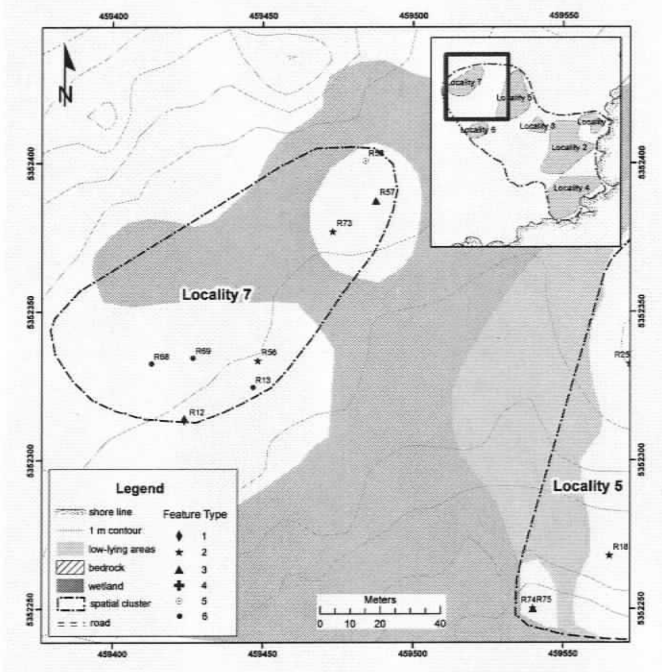


Figure 75: Locality 7, spatial distribution of features included in morphological analysis.

There are 13 features at Locality 7, five of which were excluded from morphological analysis (Figure 75). As summarized in Section 4.4.2, despite this group of burials being closest to the original Rocky Point settlement and the John Parker manor house (this locality is on the edge of the cleared farmland), the features appear to be relatively undisturbed. They are widely dispersed on the landscape, with a slight, low-lying area dividing the locality into two. All feature categories are present, with the exception of Type 4 features. Although the sample size for this locality is very low, it interesting that there are three Type 6 features in this locality. These burials account for 37.5% of the burials in Locality 7 (Table 12) and represent 21% of the overall number of Type 6 features at DbRv-3. Type 6 features are circular in profile and built primarily with bedrock (Section 7.4.6). It is interesting that the use of bedrock is so prevalent within this locality, considering the relative lack of bedrock exposures and the abundance of available till.

The features in Locality 7 are widely dispersed and do not appear to form any internal clusters.

9.4 Spatial Analysis Discussion

This analysis suggests that there is simultaneously differential distribution in feature types across the landscape at DbRv-3, as well as an even distribution, depending upon the type of feature in question. For example, Feature Types 1 and 5 are almost exclusively located in Localities 2 and 4, whereas Type 2 features (the most common type of feature at DbRv-3) occurs uniformly throughout the site. Type 4 features, the anomalously large features, appear to occur in numbers relative to the overall number of other types of features. These large–scale differences in feature distribution are likely to be socially significant given the theoretical knowledge we have about the cross-cultural nature of mortuary behaviour.

While there appears to be spatial patterning across the site, discerning spatial patterning within each cluster by heuristic methods has proven very difficult. The methodological approach used here is admittedly somewhat generalizing, in that the morphological cluster analysis suggests that a there may be 18 or more meaningful taxa of features, which were collapsed into six for the sake of the analytical objectives. Discerning the fine scale differences in feature morphology and how this is expressed in the spatial placement of features on the landscape requires a less restrictive morphological clustering solution, and a more sophisticated quantitative method of spatial analysis. The alternative is that there is in actuality little or no internal patterning of one type of burial relative to another within each locality, and that the differences between feature type distributions operate at the site-wide scale rather than within each spatial cluster.

The results of the current approach, however, sufficiently address the thesis questions of whether there is patterning in feature morphology and where and how these burials were placed on the landscape. There is discernable and finite patterning in how these graves were built, and they were placed on the landscape in a visibly deliberate way.

Calculating the mutual distances between burial cairns, both within the different clusters at DbRv-3, and across the entire site, would be a beneficial avenue for future analysis. Indeed, calculating the mutual distance between features across entire landscapes, and the region would be productive in terms of investigating the Straits Salish people's conceptual and strategic use of mortuary space at multiple scales. Calculating mutual distance is best achieved by using local density analysis, or LDA (Johnson 1984; Kintigh 1990). Local density analysis involves the calculation of a triangle matrix of local density coefficients, which expresses the degree of spatial clustering between features. The local density of each cairn gives the number of cairns located within a fixed distance from the cairn being examined. While this was achieved in a sense using the heuristic buffering techniques in this thesis, LDA is a more versatile means of statistically computing the average number of neighbours cairns have at multiple scales.

To contextualize the results of the spatial analysis, the following section discusses four themes that form the basis of the subsequent interpretation of the morphological and spatial analysis, as they will be interpreted through the body of social theory. The following themes include: feature placement of the landscape; spatial patterning of the burial features; monumentality; and feature visibility. The section is concluded with a synthesis of these four themes as they relate to the social implications of feature morphology, the conceptual ordering of space and the experiential aspects of traversing DbRv-3.

9.4.1 The Physical Landscape: Feature Placement and Topography

The results of the spatial analysis indicate there is a strong correlation between the role of micro topography within each locality at DbRv-3 and burial feature placement. Three aspects of the physical landscape were considered in this thesis. These include feature correlation with the shoreline of Eemdyk Passage, the relationship between burial location and wetland, and proximity of the features to bedrock exposures and topographic high points.

Although the Rocky Point burial feature distribution shows a clear association with some elements of the landscape, there appears to be a negative correlation between the shoreline of Eemdyk Passage and the location of burial cairns and mounds. Contrary to what one might expect when considering these features as not only burials but also visual statements, it is surprising that so few features are built within less than 20 m of the shoreline. In only a few instances are there features located along the shoreline, most notably Feature C27 in Locality 2 (Figure 58). Also in Locality 2, there are numerous features built on Edye Point, but again, they are set back at least 25 m from the modern shoreline.

The second consideration is the proximity of burial features to wetlands and low-lying areas. An extensive but shallow wetland bisects DbRv-3, essentially dividing the site into eastern and western halves. The wetland is water saturated throughout the winter season with pockets of perennial standing water throughout. In addition, there are low-lying areas, typically the outer margins of the wetland, which are poorly drained in the winter and dry in the summer. These areas generally lack much rock with which to build cairns. The hydrological features discussed above have likely been extant since at least the time the burials were constructed. An intensive survey of the wetland and low-lying areas failed to identify any burials in those places, suggesting water levels have not risen significantly since the features were built. Future collection of environmental data and the computer modelling of hydrological changes may prove fruitful in further exploring the relationship between the wetland and site use.

The wetland was obviously not a desirable place to build cairns and mounds, not to say that it did not have some as of yet unbeknownst role or relationship with the mortuary ritual. The adjacent low–lying areas were also apparently not desirable, likely due to the potential for seasonal flooding and the general unavailability of rock with which to build features.

To reiterate, wetland and low–lying areas constrained the places where people could build burial features. This mosaic of micro topography, consisting of expanses of rocky terrain along the shoreline environs of Eemdyk Passage and small "islands" of rocky knolls interspersed throughout the wetland. Judging by the definite spatial clusters of burial features on the landscape, it is not hard to imagine people using this dissected characteristic of the physical landscape to their own benefit, potentially using the physical landscape to partition the placement of the dead relative to their identity in life.

Like the wetland, bedrock exposures punctuated the Rocky Point landscape, but on a more localized level. Unlike the wetland, bedrock does no dramatically partition the landscape and is intermittent and localized. While in most instances it is possible to walk or climb over these exposures, many of which are no more than 3 m in height, they are typically much easier to walk around. In this way, bedrock may have dictated to some degree movement over the landscape and defined the location of where burials could be placed.

One of the most interesting results of this study is the absence of burial features on top of these low bedrock rises. Typically, these bedrock exposures are the topographic high point at any given point at the Rocky Point site. Contrary to concepts of monumentality, in which people typically exploit topographic high points for the placement of burials and other monuments (for example Richards 1996; Tilley 1996; Tuovinen 2002), no burials were placed on the tops of these landforms at Rocky Point.

This is not to say that there was no relationship between bedrock exposures and burial feature placement. In areas with many bedrock exposures, such as Locality 4 (Figure 64), burial features were typically built along the intervening lengths of these bedrock landform features. Furthermore, bedrock constituted on the key materials with which many burials were constructed. Although till typically constituted the prime material choice for features, bedrock was often incorporated to some degree into many features. Type 6 features were the extreme example of this, being constructed almost exclusively with bedrock as the principle building material. Furthermore, Type 6 features were also the kind of burial most likely to have been built against bedrock. All other feature types, with the exception of Type 4 burials, were also built against bedrock to lesser degrees. One area of DbRv-3, Locality 6, displays a distinct pattern in which all feature types (except again Type 4 features) were built in close proximity to bedrock exposures (Figure 74). It is likely that this proximal association with bedrock evident at multiple scales, from individual burials, to feature types and localities within the site, may have had significant ideological meaning.

Although there is clear association with some types of features to incorporate bedrock as a building material and some locations to build features in close proximity to bedrock, it is an almost universal rule throughout the site that no burials were built directly on bedrock. Some cairns were built along lower parts of larger bedrock exposures, but only in those places where there was existing soil development. This similar pattern was observed at nearby Race Rocks, where there are precious few patches of soil on what is otherwise a windswept and exposed rocky islet. Burial cairns were located, however, in those few relatively sheltered locations that had some soil development. Immediately adjacent areas with no soil development lacked burial features. The exception to this rule at Rocky Point is feature R55 in Locality 6, which is a unique feature built with till and bedrock cobbles and boulders within a cleft of bedrock

(Figure 27). There is no indication that soil was present within this cleft before the feature was constructed.

9.4.2 Spatial Patterning of the Burial Features

The heuristic spatial analysis in this thesis addresses, at an exploratory level, burial distribution, but a more sophisticated method is required to analyze the relationships between features and their placement on the landscape. The understanding of the spatial relationships between burial features at DbRv-3 would benefit from a more encompassing suite of quantitative analyses. Correlation-based analyses such as Pearson's correlation coefficient and Spearman's rank correlation coefficient, for example, are appropriate for measuring spatial relationships for interval or ratio values, and ordinal values, respectively (Mitchell 2005). Correlation-based analyses only measure covariation, however, they do nor measure causation—in other words, correlation analyses cannot determine if an increase in the value of one variable causes an increase in the value of the other. Furthermore, correlation analysis, like all statistical techniques, does explain relationships, only that variables are, or are not, related. Lik the present study, future attempts to infer meaning on the spatial and morphological patterning of the Rocky Point burial features would require the research design and quantitative results to be framed in the context of social theory and existing archaeological knowledge.

Although the intra locality analysis of spatial patterning used in this study was not able to identify any spatial patterning of one type of feature relative to other features, there are still some meaningful attributes of feature placement on the landscape left to discuss. One is the issue of feature density. Visually, it is apparent that some localities have more densely concentrated features than other localities. The density of features per locality is summarized in Table 13, and the following is a brief discussion of the issue.

Feature density is highest in the two smallest localities at the site (Localities 1 and 6). Locality 1 is peripheral the main concentration of features in Locality 2 and has a feature density almost twice as high as in the later area. Locality 6 is quite isolated and very restricted by terrain and hydrology. It is almost as densely clustered as Locality 1, and is dramatically more clustered than the other areas in the western half of DbRv-3.

Table 13: Feature Density by Locality

Locality	Locality (ha)	Features (n)	Features/ha
1	0.2419	23	95.0
2	1.7003	91	53.5
3	0.1897	3	15.8
4	1.3896	65	46.7
5	1.0701	30	28.0
6	0.2368	20	84.4
7	0.6091	8	13.1

Feature density in Localities 2 and 4, which have the highest numbers of features, have the third and fourth highest density of features per hectare. Locality 5 has the fifth highest density. Features there are widely dispersed, markedly so in contrast to the other areas in the eastern half of site, and in contrast to the nearby Locality 6.

In other words, places on the landscape that are peripheral to the centre of DbRv-3 (Locality 2 and 4) and that may have be physically constrained by shoreline, bedrock exposures, and most significantly low lying and wetland areas, appear to have the highest density of features (such as Localities 1 and 6). Features could also have been potentially confined by cultural factors, such as mutually understood internal boundaries within the site. Locality 5 is interesting in that it is not centrally located, in fact it is somewhat removed from the main body of the site and separated from Locality 2 by a narrow section of wetland (Figure 58). Locality 5 is the third largest cluster in area, and has a relatively large number of features (n=42) dispersed over the landscape. So although somewhat peripheral to the centre of the site and constrained by wetland on all sides, it is still a relatively large area, and the features are more widely dispersed than in other localities.

This is in contrast to Area 1 at the northeast edge of the site, which is strongly constrained by bedrock and shoreline and has the highest density of features at the site. It is also situated along the south side of shell midden site DbRv-17, which as discussed in Section 4.3, tentatively predates the use of DbRv-3. However, it is interesting that no surficial burial features overlap with the midden, despite a good supply of nearby rocks with which to build burials. It is not unreasonable to expect that even if the midden site was not contemporaneous with the cemetery, that people would have retained some memory of its former use, transmitted through stories, legends, and songs, as being a place for the living. That is not to say that burial cairns and mounds were not built at habitation sites elsewhere in the Strait of Georgia, as may have been the case at Scowlitz (Lepofsky, et al. 2000). At Rocky Point however, there does not appear to be any overlap with shell midden sites and burial cairns and mounds. This may also correspond with a recent reinterpretation of the Scowlitz "house floors" as actually representing special-use ceremonial platforms rather than residential features (Ewonus 2006).

To summarize, feature density appears to correlate with a number of physical, and most likely cultural, factors. Areas tightly constrained by elements of the landscape, particularly those peripheral to the geographic centre of the site, exhibit a denser concentration of burials. Within the centre of the site, features are less constrained by natural features and are more widely distributed. They do, however, appear to occur in both linear distributions and smaller internal clusters (Figure 66). It is likely that there were mutually understood rules about what constituted an appropriate distance or proximity at which to build one burial relative to another. It is interesting that in the centre of the Rocky Point site, there were many areas in which one could have built additional burials, whereas in other parts of the site, such as in Localities 1 and 6 where the features were all very tightly placed. This suggests a form of social control over who was being buried where. While it is difficult to define this without demographic information on who is interred within these burials, one could speculate based on what is known about the cultural context of the Late Period in the Strait of Georgia. This is addressed in more detail in the Chapter 11.

9.4.3 Feature Size and Placement: Monumentality

The heuristic spatial analysis identified patterns in feature size correlating with what part of the site the feature was built. When one speaks of the size of surficial burials, such as those at Rocky Point, one is apt to discuss monumentality (Section 2.2). The following is a discussion of feature size by type and this distribution across the Rocky Point site. Feature size in this discussion is measured by volume, and the data is summarized by spatial locality in Appendix 3. When comparing groups of volumes, the statistic "median" rather than "mean" is used, as the median is the middle of the distribution and is less sensitive to extreme values. This makes it a better measure

The majority of the burial features at DbRv-3 exhibit a degree of uniformity in size. The general impression is of an overall small size of most features in the order of about 1.5 to 5 m^3, punctuated by several anomalously large features. While the morphological analysis identified variability in feature size between different types of features, the spatial analysis identified some differences in feature volume by type depending upon where the features were built. In general, the variability seems to be between those features built on the east side of the wetland and those constructed on the west side.

The heuristic spatial analysis indicated that Type 1 features are located almost exclusively in the southeastern quarter of the site, although they do occur in very low numbers elsewhere throughout the site (Section 9.2.7). However, when Type 1 features do occur in other parts of DbRv-3 west of the wetland, the median volumes are significantly larger than those east of the wetland. For example, in Locality 4 in the southeast quarter of the site, there are 24 features with a median volume of 4.7 m^3. In Locality 5 west of the marsh, where there are only two Type 1 features, but they have a median volume of 10.4 m^3. Although restricted in distribution east of the wetland, there is a conspicuous inflation in the size of Type 1 features relative to those east of the wetland, where they are most numerous. Morphologically, Type 1 features are similar to the large Type 4 features. Those Type 1 features west of the wetland may, in a sense, be emulating Type 4 features, or alternatively, exaggerating the significance of Type 1 features where they occur in fewer numbers. This is in contrast to the east side of the wetland where Type 1 features occur in much greater numbers but where they are uniformly smaller. The potential social significance for this distribution is discussed in Chapter 11.

Similarly, the median volume of Type 2 features appears relatively uniform across the eastern half of the site (approximately 2.4 m^3). West of the wetland, however, there is considerable variation in Type 2 size; they are somewhat larger in Localities 5 and 7 (4.4 to 6.8 m^3) and significantly smaller in Locality 6 (0.9 m^3).

The median volume of Type 4 features in Locality 2 suggests a significant range in the volume of this feature type, with the average Type 4 feature somewhat smaller in Locality 2, the geographic centre of the site, than in more peripheral areas such as Localities 4 and 5. In other words, the "monumentally" large Type 4 features in Locality 2 are on average smaller than in other localities with the same type of burials, with the exception of one anomalously large feature. This burial, Feature C82 (Figure 38), is significantly larger than any other feature at DbRv-3. As outlined above, this pattern corresponds with Type 1 feature size distribution on the east and west sides of the wetland. It is believed that Locality 2 is the central part of the Rocky Point cemetery as it has the largest number of features, has the most Type 4 features (with the assumed association with elites), and is the physical centre of the feature distribution. As such, it is interesting that the two largest types of features, Type 1 and 4 are smaller in the centre of the site relative to more peripheral locations, particularly west of the wetland. Again, one has to be cautious of overstepping the data, particularly in the absence of temporal information, but this possible inversion of feature size is an observation worth further investigation.

In contrast, other feature types appear to have a uniform distribution in feature size across the site regardless of their location. The median volumes of Type 3 features (1–2 m^3), Type 6 features (0.4–1.5 m^3), and Type 5 features (less than 2 $m^{3)}$ are generally uniformly across the Rocky Point site.

As a final note, it is interesting that Locality 5, on the west side of the marsh, has the highest median feature size at DbRv-3 while simultaneously having the lowest feature density (excluding the two anomalous least populous localities).

These preliminary results suggest that a quantitative examination of the correlation between feature size, type, and placement on the landscape may be useful in identifying complex multivariate relationships between the spatial and morphological attributes of the Rocky Point burial features.

9.4.4 Feature Visibility

Concepts of visibility and inter–visibility are important in archaeological analysis and interpretation, particularly as it relates to monumental features (Holtorf 1997; Tilley 1994; Watson 2003) or looking from the sea to land (Cooney 2003). The level of visibility of sites from landscape features and the intervisibility of features within a site has long been acknowledged in the structuring of archaeological sites (Wheatley and Gillings 2002:201).

There appears to be a dichotomy between the concepts of monumentality and the actual visibility of features at the Rocky Point site. The advent of burial cairns and mounds during the end of the Marpole/Bowker Creek phase and the beginning of the Late Period denotes a remarkable shift in the funerary treatment of the dead. This marks the gradual decline of below ground interments, where the dead were presumably removed from long–term visible reference, to surficial burials where the placement of the dead constituted a physical and material monument on the landscape. The burial features at Rocky Point were presumably meant to be seen.

However, these features are not visible from the water, not visible from the village, and not built on the most visible parts of the local landscape (such as on top of bedrock knolls). So how were they being seen and who was seeing them? In other words, who was the intended audience?

I suggest, despite the large size of many of the features and the generally flat terrain on which they are built, that people would to have known where these cairns were, as they are typically not visible from more than 50 m away. The features are also not visible from Eemdyk Passage (Figure 76). Although the features themselves are not visible from the water, Eemdyk Passage and the Edye Point landform are very distinctive elements of the Metchosin coastline.

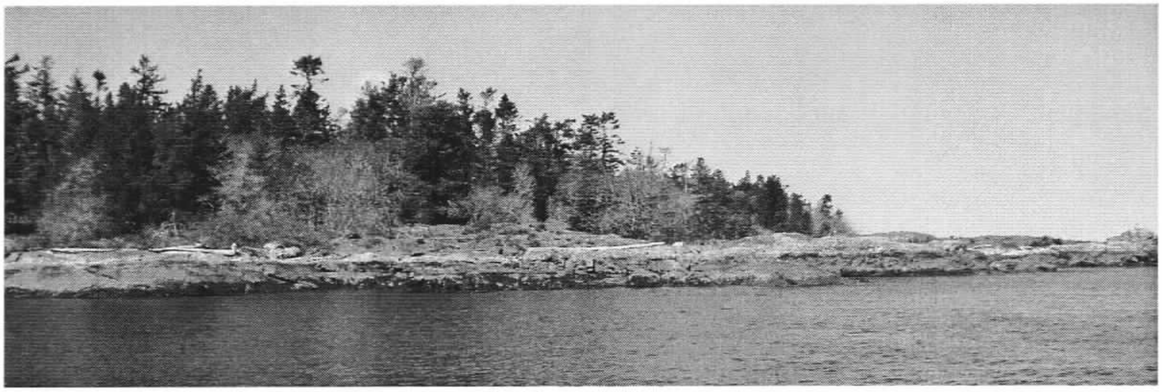


Figure 76: Shoreline of DbRv-3 from Eemdyk Passage, Edye point to right.

Naturally, these burial features could have been more visible in the past, if vegetation and tree cover was different, which it likely was when the area was subject to natural and possibly anthropogenic fires. There could also have been elements of these features, such as associated wooden structures, that have not preserved with time. Although the analytical approach used in this thesis did not directly consider visibility as an empirical attribute, I question how visible these features really were from any distance beyond a few dozen meters.

As Wheatley and Gillings state, "The acts of looking and seeing are very hard to operationalize in any traditional methodological sense" (Wheatley and Gillings 2002:201). GIS, however, provides archaeologists with a set of functions with which to calculate line of sight from digital elevation models of surface topography. There are multiple means of addressing visibility in the archaeological record, such as cumulative view shed analysis. This approach allows the researcher to identify terrain and cultural features as seen from a viewer's position from a given point on the landscape (Wheatley and Gillings 2002:208). Conducting future GIS-based visibility studies at DbRv-3 would be an appropriate means of testing, as well as investigating in more detail, the apparent dichotomy in the lack of visibility of the DbRv-3 features on the landscape. Furthermore, it shifts the axis of perspective from the top-down Cartesian point of view to a more agent-centered perspective of the landscape. This shift is what Witcher (1999) calls the "Landscape of perception." It can be argued that people's decisions on how to use the landscape or to use one area in preference to another, are related to how that landscape and its attributes have been perceived, and simultaneously structured (Stead 1995). Acknowledging the potential for power asymmetries to be encoded in the Rocky Point landscape, and by recognizing landscapes as social, ideological and political — as well as physical, Witcher (1999:19) argues for a reconciliation between the abstract and scientific nature of GIS, to be more subjective and phenomenologically grounded in approaching the past.

9.4.5 Routes: Synthesis of Feature Placement and the Landscape

Based on the results of the 10 m feature buffering in the last chapter, it appears as if the feature distribution on the landscape consists of linear, or sinuous distributions of features punctuated by dense clusters of burials. This result is consistent with observations made during the fieldwork. The spatial analysis used in this thesis is based on a Cartesian perspective of the landscape, that is, the land as seen from above. This is not consistent with the dwelling perspective in which one "experiences" this landscape on the ground. Based on considerable time spent traversing the site over several years, it was observed that "natural" routes existed when crossing the site. This entailed avoiding the deeper or wider sections of wetland that bisects the site and walking around bedrock outcroppings. Researchers tended to cross the landscape across these routes, which typically follow along the same linear distributions of burial features identified during the spatial analysis.

The linearity of the feature distribution at DbRv-3 is evocative of Neolithic monumental landscapes in parts of Europe, in which archaeologists have agued that these places were experienced along fixed routes, with monuments placed strategically along them (for example Barrett and Edmonds 2002; Petts 2003; Tilley 1996; Watson 2003). While this conclusion is speculative for DbRv-3, it is possible that a similar phenomenon was occurring here. It is clear that these burials were meant to be seen; any other alternative is illogical considering the dramatic transition from essentially invisible underground interments to above ground visible interments during the transitional Marpole/Late period. However, these features were not placed on the most visible parts of the landscape, those places being the immediate shorelines and tops of bedrock exposures. This raises the important question: who was the intended audience for these features?

Clearly not visible from the water, the primary means of transportation through this area, these burials could only be experienced from the land, by walking across the landscape. While cairn placement was in some ways constrained or even partially defined by the natural landscape, the most significant geographical factors being well–drained locations with an ample supply of rock with which to build cairns, the landscape also constrains the way in which people most naturally traverse it.

The knowledge of not only the best locations to build cairns, but the "best routes" through the site, could be used to ones advantage if trying to make a statement about the place of the dead within society. Figure 77 illustrates the results of the spatial buffering of the cairn features, which resulted in linear arrangements, or "corridors," of burial features in parts of the Rocky Point site. Also included are the locations where it is currently possible to land a shallow-draft boat such as a dugout canoe along the shoreline of Eemdyk Passage. Note that some of these trails cross the wetlands, which has knee-deep water during the winter and spring months. While not a serious impediment to travel along the narrow sections, it is significantly more difficult to cross these sections in the wider parts of the marsh; one would imagine particularly so for the very elderly or very young.

These qualitative observations were combined with observations of the fieldworker's recursive movement over the landscape, resulting in the lines indicating the most logical paths along which to traverse the site. While not devoid of an element of speculation, this illustrates the potential logic of linear feature placement on the landscape.

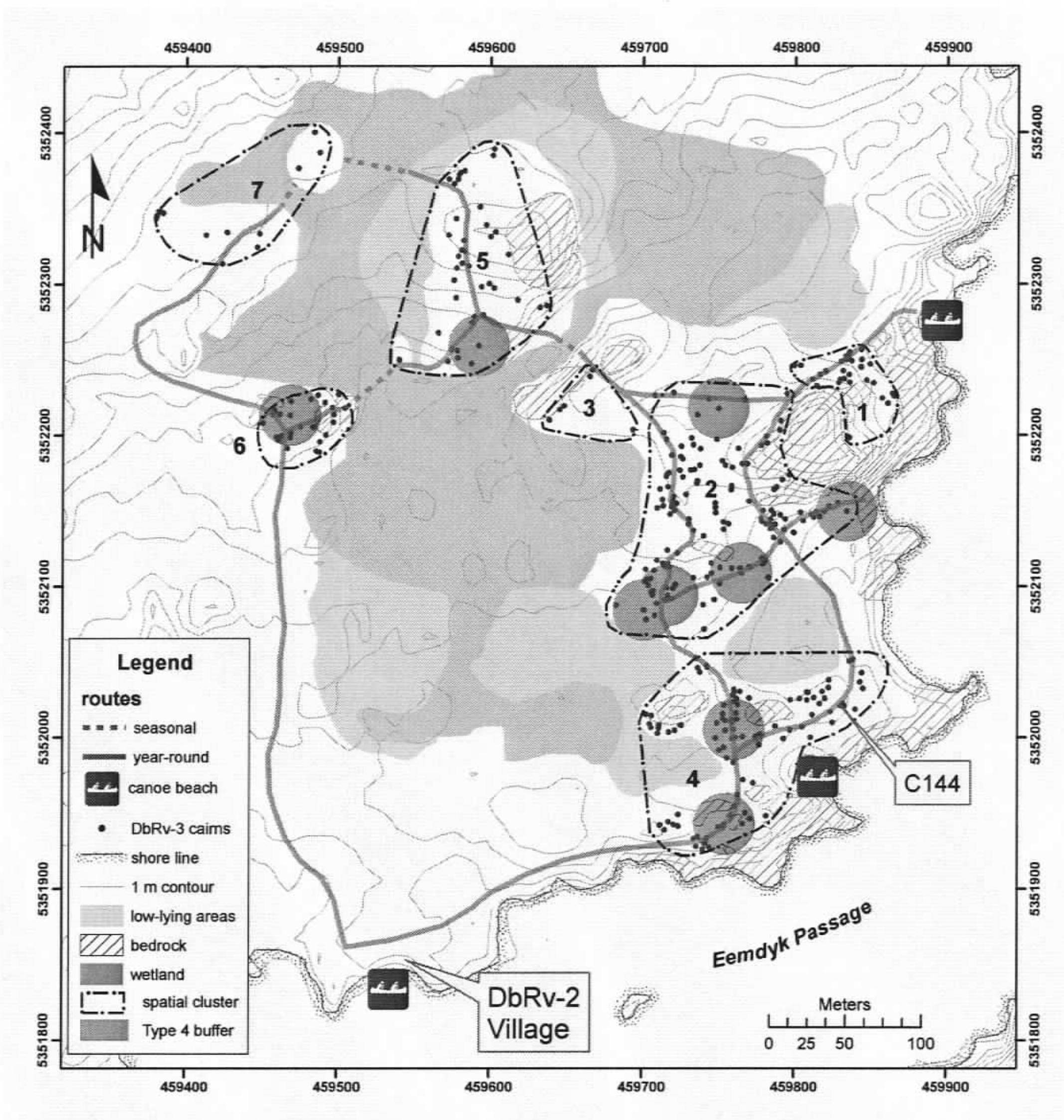


Figure 77: Feature distribution, landscape attributes, and possible transportation routes at DbRv-3.

I suggest that the placement of these features on the landscape was strategic in the sense that as people moved across the landscape, they had to bypass existing monuments while presumably acknowledging (either formally or informally) the social references that these burials possessed. The placement of the dead on the Rocky Point landscape may reflect the social dynamic in play at the time of interment: an expression of the social ordering of the living.

This basic analysis suggests that a more detailed analysis of pathways through DbRv-3, and other large burial sites such as Scowlitz, may be a productive avenue of further research. This could be effectively accomplished by a least cost pathways analysis. The relationship between terrain types, energy expended, factors that adversely affect movement such as barriers (like wetland), as well as factors that are beneficial to movement, can all be addressed in a GIS-based analysis. Cultural or archaeologically derived factors, such as the need to reference certain types of burial features along the route, can also be included in the analysis. Using least cost pathways analysis, it is possible to ascertain the most likely, or "least cost" route across a given landscape (Wheatley and Gillings 2002:157).

Ultimately, what is necessary is a means of mitigating the two extremes of landscape archaeology:

> Cultural behaviour undoubtedly has a spatial consequence…and despite recognition of the lack of complete objectivity in landscape perception, it is equally impossible to claim total subjectivity either. (Witcher 1999:20)

This necessitates a middle ground that incorporates the post-processual ideas of power relations and social order expressed across the physical landscape and the totalized and quantitative understanding of geometric systems.

10 Summary of the Spatial and Morphological Analysis

This research has attempted to address patterning in how burial features at the Rocky Point cemetery were built and how they came to be where they are on the landscape. As stated earlier, the recognition of patterns in archaeological data is difficult, especially as archaeologists are often not certain about what kinds of patterns one should be looking for. To address the recognition patterning in burial cairn construction and spatial location, a combination of statistical and heuristic methods were used, recognizing that independently, each method has its merits and drawbacks (Kintigh and Ammerman 1982; Kvamme 1995; Lock and Stancic 1995). While the statistical methods identify patterns when they are difficult or impossible to visualize, and objectively measure the strengths of those spatial associations, they are generally incapable of integrating the intuitive knowledge that anthropologists have learned about human behaviour or the formation of the archaeological record.

The analytical approach used in this thesis attempted to find the best fit between the thesis questions and the selection of quantitative methods appropriate to the analysis. The intent of the quantitative framework was to provide an objective foundation for the analysis of morphological and spatial patterning of the burial cairns at DbRv-3.

The morphological cluster analysis resulted in the identification of six taxa of burial features at DbRv-3. This result indicates that there is significant and detectable patterning in how burial cairns were constructed at the Rocky Point site.

Following the morphological analysis, a GIS-based spatial autocorrelation test indicated significant clustering among the DbRv-3 features. To explore this further, a cluster analysis of burial feature distribution across DbRv-3 was conducted. This resulted in the identification of seven distinct intra-site areas. A heuristic GIS-based analysis of the distribution of the features types across each of these seven areas indicated that there was patterning in what types of cairns were built where. Each area was then examined for internal pattering of features types relative to each other and the natural landscape. This analysis identified several broad observations about where features were built. These results, although exploratory, indicate significant potential for future analysis of this dataset, and the morphological and spatial distribution of other burial cairn and mound sites in the Strait of Georgia. More statistically robust analyses, such as regression-based tests of associations, particularly among the different types of cairns, and GIS-based analysis to quantitatively identify the placement of features relative to the natural landscape (for example, least cost path analysis) have the potential to explore the morphological and spatial distribution of these features in more detail.

The methods selected for the collection and analysis of the DbRv-3 morphological and spatial data have proven successful in identifying patterning in the construction and placement of burial cairns at Rocky Point.

What is necessary now is a means of discussing the social implications of this patterning. What follows is the results of the morphological and spatial analysis interpreted through the body of social theory introduced at the beginning of this thesis, and compared with the known archaeological context of the Late Prehistoric Strait of Georgia.

11 The Rocky Point Mortuary Landscape

The physical and spatial attributes of burials, cemeteries, and other places for the dead are the material expression of social, economic and political relationships in the community of the living. As Aubrey Cannon states, "identities and relationships are preserved through spatial association and the perceptions this creates and sustains in the minds of survivors and future generations. Tombs and cemeteries become visible expressions of the stability and identity of the community" (2002:194). Understanding the placement of the dead on the landscape as a culturally constructed symbolic and physical process is central to understanding the intersection between mortuary ritual, identity, and society. It is this spatial aspect of the cognitive and sociocultural environment of burials, and the association created between the living and the dead, that I term the mortuary landscape.

Processual and well as some later post-processual archaeological perspectives view formal areas for the placement of the dead on the landscape as representative of a mapping onto the land by claimants of its physical and social resources (Goldstein 1981; Saxe 1970). Recognition of this relationship is exemplified by Goody's (1962) ethnographic study of mortuary rituals among the Lodagaa of West Africa, in which he documents the links between death, property, and the ancestors. McAnany (1995) illustrates how the Maya literally lived with the ancestors and that the ancestors legitimated the present and the future, including the inequities in rights and privileges of lineage and land. McAnany presents a strong case for the Formative Period roots of ancestor veneration, suggesting that it is an ancient agrarian practice linked to the emergence or restrictive patterns of land tenure and unequal access to resources. Pearson (1993) has aptly coined the term "the powerful dead" in this type of recursive role of the individual and collective dead in society.

The grave emphasizes the permanence of the authority and power of ancestral knowledge and the transition of this security, power, and identity into the present and the future (Tacon 1994). Burials reinforce this legitimacy of territoriality, asserting land tenure by relating kinship between the dead and the living to the landscape (Dark 1995:100). When graves and cemeteries are constructed on social peripheries, it is possible they could represent the liminal space between different collective identities. The placement of burials could therefore:

> bring us closer to conscious acts in which the unthought habit meets thought-out symbolic forms. The landscape and its artefacts form a complex intermingling of conscious and unconscious acts…Conscious and symbolic actions are most likely to arise where problems are encountered. (Gosden 1994:18)

The living know where the dead are (Silverman 2002). The living often have a need to "view" or "reference" their ancestors, and the long-term placement of the dead creates, reinforces, and maintains identity. As such, graves symbolically placed on the landscape in relation to each other may reflect social and cognitive ideals or realities. When burials are structured into cemeteries, it is possible that a collective identity for contemporary society is being asserted (Shanks and Tilley 1982). Aries (1991) has referred to cemeteries as part of the topography of a society and an identifying sign of a culture, as such, the layout, construction and use of cemeteries provides a unique perspective on the interrelationships between social practice and ideology. The deconstruction of this rigid separation of landscape, monument, and mortuary ritual has been characteristic of recent post-processual critiques of archaeological inquiry into the Neolithic cairns and mounds in Europe (Barnett and Edmonds 2002; Richards 1996; Thomas 1990; Tilley 1996; Tuovinen 2002).

I argue that the Rocky Point mortuary landscape represents a process resulting from practice shaped by shared and mutually understood concepts of identity and social space, although not always consciously recognized and verbally articulated as such (Ingold 1993). Mortuary ritual is a conversation with no end product, an ongoing process of people interacting with the dead and reaffirming or creating social ties by grouping the dead on the landscape.

To gain some insight into the spatial layout of the Rocky Point Cemetery, it may be useful to examine briefly the spatial geography of the living. As summarized in Section 3.4, the appearance of burial cairns appears tied to development of large houses and ascribed social inequality, and the culmination of the long-term development of extra- and intraregional trade in the Strait of Georgia. Village and household layout is meaningful proxy evidence for the use of social space. The house is essential to understanding the social and economic dynamics of Straits Salish life. As Ames and Maschner state:

> households were the basic and social units of Northwest Coast societies. Northwest Coast households were residential corporate groups: the members lived together in close proximity. They held and transmitted common property across generation; the household functioned as an individual in economic production and consumption. (1999:147)

Furthermore, the interior arrangement of these houses could be thought of as a map of the identity and relative standing of the household's members in society—these "houses were maps of the Northwest Coast cosmos" (Ames and Maschner 1999:148). Generally speaking, large household size means either big household populations, or household social stature and rank. The appearance of large houses in the archaeological record marks a significant change, indicating the formation of the residential corporate groups, or households (Ames and Maschner 1999:150). Unfortunately, there has been little household archaeology done on Late Period sites in the region, and to my knowledge, no systematic household excavations have been published for the Victoria area. Grier's excavations at Dionisio Point, however, suggest that the large house sizes there at ca. 1500 BP are a result of regional interactions, in that case with the Fraser River (Grier 2003:186). Again, paraphrasing Grier (2003:172), it has been argued that increasing regional interactions, such has that witnessed at the Dionisio Point site, often prefaces the development of increasingly robust social and political networks and ultimately hierarchical social forms, regionally integrated economic systems, and polity formation. Working forward from the archaeological data, the spatial organization of ethnographic Coast Salish villages may shed additional light on the conceptual ordering of social space. As I will argue shortly, the way in which villages were spatially structured, may have direct bearing on the spatial placement of the dead.

Recognizing that burial types shortly prior to and subsequent to Euro Canadian contact were subject to a great deal of variability, the spatial arrangement of villages may have been a somewhat more stable proxy for Coast Salish notions of social space. In his seminal discussion of social stratification among the Coast Salish, Suttles (1958) argues convincingly for the existence of distinct social classes of nobles and commoners and how this stratification plays out spatially in village organization. Briefly, Suttles presents evidence for the existence of a distinct, although relatively small, lower class. Furthermore, he argues for a relationship between social class and certain beliefs regarding morality. He concludes with the possibility that a strategic use of concepts of morality and the absence of any developed system of ranked individual positions may have allowed for a clear distinction of social classes among the Coast Salish (Suttles 1958:167). Suttles cites village structure and inter–village relations as evidence for the reality of social classes in the past (Suttles 1958:168). There are many descriptions of villages in which there is a residential division between people of lower and upper class. Most villages were laid out in a linear manner, with the spatial arrangement of the houses generally reflecting the relative status of the household. In some villages, for example, households of lower class people were at one end or one side of the village. In other villages, the lower class people were somewhat removed and placed in more exposed locations where an enemy might strike first (Suttles 1958:168). The largest houses were those of the highest ranked households, and typically the highest ranked households lived in the middle of the house rows (Ames and Maschner 1999:152). There were also villages of lower class peoples separated from, but in a serf-like vassalage to, upper class villages. Therefore, the layout of villages was a map of the social identity, status and relationships of the households and extended kin groups living there.

The parallels between the use of social and architectural space and mortuary space, such as that in a formal cemetery are worth noting. Social relations and processes are expressed in space through the organization of buildings, in the case a village, or the configuration of graves in a cemetery. Ferguson (1996:144) identifies the logic of space as being derived from two relationships: the relations between occupants, and the relations between the occupants and other people. Furthermore:

> This logic derives from the paradoxical need to maintain continuity in a system of space that is constructed by erecting discontinuities, that is, the walls and buildings that comprise the cells of architectural space. These discontinuities are designed to either constrain or enable social interaction. (Ferguson 1996:144)

So if social space is being used in a comparable way in the Rocky Point cemetery as it is in villages, this begs the question: is the spatial arrangement of burial cairns at DbRv-3 suggestive of a hierarchical or strategic placement of certain types of cairns on the landscape?

The first consideration would be who is being buried at the site? Cybulski (1992:169-170) hypothesizes that the Greenville site in Prince Rupert may have been the burial ground for a single high status lineage. He suspects a similar pattern at other Prince Rupert Harbour sites, such as the Boardwalk site (Cybulski 1988). Were both lower and upper class peoples being interred at Rocky Point, or does the site represent just one segment of society? At Scowlitz, Lepofsky et al. conclude that:

> The timing, variation, and spatial distribution of the mounds and cairns are doubtless relevant to the social standing of the interred individuals. The burial mound and cairn complex shows considerable variation from the few large, elaborate earthen mounds to the larger number of small burial mounds and cairns…the relatively small numbers of interments in each mound and cairn cluster (usually no more than 50) cannot possibly account for the entire population of the village over that span of time. Perhaps all the burials in the mounds and cairns represent a relatively high status group and most in the society did not merit large visible monuments. If so, the variation may represent rank within the highest stratum of society. (Lepofsky, et al. 2000:412)

Suttles equates the structure of Coast Salish society to that of an inverted pear, with the greater number of peoples belonging to an upper or respectable class, from which leaders emerged for various occasions. These people had the ability to exercise some hereditary right. Ritual knowledge, in particular, was a source of wealth to persons who functioned as ritualists during life crises, such as a death in the community. Conversely, low class people were those "who didn't know anything", or people who "had lost their history" (Suttles 1958: 172). As such, hereditary right may have controlled the ceremonial knowledge associated with building burial cairns, being the material product of mortuary ritual. This would have meant that lower class people would have effectively "lost their history", if the practice of building burial cairns was specific to some lineages, with the lower class peoples having no material reference, or a common yardstick, so to speak, against which to measure their place in society.

Alternatively, even if the practice of constructing burial cairns at Rocky Point were initially controlled by hereditary right, it could be argued that Straits Salish society was polyvocal and in a perpetual state of vertical social movement, with certain families or individuals moving up or down within the social standing. It is unlikely, however, that people ever moved from lower to upper class (Suttles 1958:170). In a more extreme example, the ritual right to build burial cairns could have eventually been co-opted by lower class peoples. The time and material expenditure to build most cairns (aside from the enormous Type 4 cairns) was likely not excessive, suggesting that building cairns was generally not restricted by having a surplus of available labour. Where one could build a cairn, however, would have likely been restrictive according to one's place in society. Does this explain the clustering across the landscape? Do certain localities on the landscape represent more socially prestigious parts of site?

Evidence from the Scowlitz site indicates that there is a large complex of burial cairns and mounds behind the main residential terrace (Lepofsky, et al. 2000). Although to my knowledge no quantifiable spatial analysis has been completed for this distribution, qualitatively, the burial features tend to be arranged in dispersed clusters with each group containing from 3 to 30 features (Lepofsky, et al. 2000:412). A few features occur in isolation. The Scowlitz researchers tentatively conclude that these inland burial locations, which are not as large as the main concentration on the residential terrace but show the same degree of internal variation, may contain the deceased from other communities in the Harrison-Fraser River region. If this is the case, it may represent a high degree of regional integration, and "Just as the larger houses may have incorporated family groups into larger households, the large cemetery may have integrated households or local groups into larger regional groups" (Lepofsky, et al. 2000:413).

Locality 2 is the geographic centre of the DbRv-3. It also has the most number of features, including the most Type 4 features. The outlying localities, particularly those on the west side of the wetland, are separated from the main body of site. If the village layout analogy holds true, than these localities may represent burial places for households of lower social standing, those households spatially removed from the centre of the village, and in this case, spatially removed from the centre of the cemetery.

The manner in which people chose to use mortuary space at Rocky Point is reminiscent of the linear village layout pattern. Village sites were adapted to the local landscape, with houses placed not only relative to each other in a social hierarchy, but built within the physical boundaries of the beach or waterway fronting it. Similarly, burial cairn layout at DbRv-3 adapted itself to the confines of the local landscape, with bedrock exposures, low-lying areas and wetland dividing the site into a number of areas where it was physically possible to build cairns without having to resort to transporting huge volumes of rocks from the shoreline or elsewhere. It is unlikely that the character of the naturally partitioned Rocky Point landscape was lost on those building burial features. Rather, it was something to be harnessed and used to one's advantage, with the strategic placement of the dead accentuating the deliberate actions of the living.

In addition to spatial restrictions, what role did feature morphology play in representing the social identity of the dead? Excavation of Mound 1 at the Scowlitz site (Section 3.4) indicated that the internal structure of that feature consisted of a rectangular external petroform around the perimeter of a large central rock cairn. This burial was interpreted as that of a high status individual, based on the size of the burial feature (and the amount of labour invested in its construction), and the presence of an enormous amount of high status mortuary inclusions, such as 7000 cut and polished dentalia shells. Harlan Smith (1901:55) identified features with similar structures in Victoria, although no grave goods were identified with them. Presumably, some of the largest of the Type 4 features at the Rocky Point site have a similar internal structure. A comparable feature at DbRv-3, although it lacks soil covering, is Feature C144 (Figure 78). This feature consists of a low rectangular outline of rocks around three cairns. Two small cairns are situated at one end in each corner. These small features are atypical cairns—they lack a well-defined structure and have no soil fill; it is unlikely they mark burials. At the opposite end, however, is a large, well-built cairn.

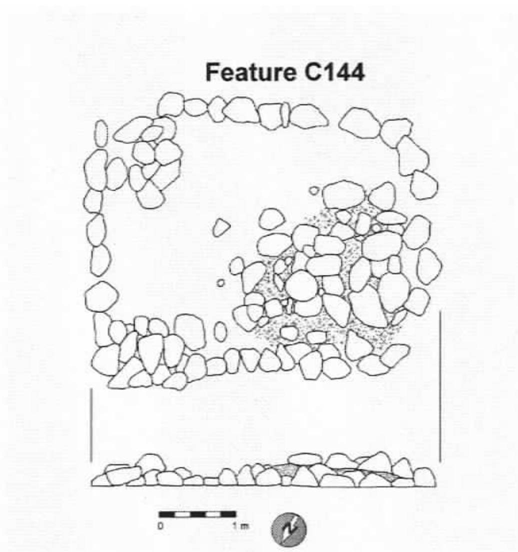


Figure 78: Feature C144

To extend the analogy of village and household space a little further, rectangular house structures appear on the Northwest Coast with the advent of linear villages, a form of layout that Ames and Maschner argue could "easily convey information about the relative status of households to anyone who knew the code" (Ames and Maschner 1999:161). Hypothetically, these rectangular features, considering their seemingly strategic placement on the landscape relative to other burial features, particularly along the linear distributions of cairns (Section 9.4.2), and the possible relationship between the households of the living and the placement of the dead, may symbolically represent an inscription on the landscape of a high status household. This inscription closely and permanently tied the deceased, and their living relations, to symbolically strategic places on the landscape.

Returning to the discussion of routes through DbRv-3, these large features appear to have been placed strategically within each locality (Section 9.4.5). Although Type 4 features are not highly visible on the landscape from a distance, which is somewhat at odds with the traditional concepts of monumentality, it was likely common knowledge who was buried where. Or more specifically, whose household that burial represented. Moreover, traversing DbRv-3 as part of the mortuary ritual, all people navigating the mortuary landscape, with the same understanding applied to village layout, may have openly expressed or at least shared an unspoken understanding of, their place in society by way of narrative, songs, or legends. Of course, until such time as more information is available to test this notion, it remains highly speculative. However, this thesis has demonstrated that there is definite patterning in the types of features people were making, and that their placement on the landscape was intentional, conscious, and had social meaning that all agents in society would have understood.

It is not hard to imagine that contesting this understanding, either openly or by more subtle means, was a likely scenario that played out from time to time. With respect to burial cairns and mounds, Thom (1995:43-44) argued that the very act of building burial cairns may have been a socially restricted form of knowledge and social practice for a time. Thom applies Morris' (1987) idea that as elite people gain control of and manipulate symbols, which they use to reinforce their status and prestige, people of much lower status begin to challenge the ideology of the elite. Thom concludes that elites then change the nature of the symbols they use, change that is implied as being incremental through time, elites have the power to change what symbols can be used to represent high status (Thom 1995:43-44). This is comparable to the practices of wearing labrets and cranial deformation that were originally hallmarks of the elite, and subsequently became a form of social currency available to a wider and less affluent audience.

Cannon (1989) demonstrates that ostentation in mortuary behaviour does not always correlate with elite families. For example, ostentatious mortuary elaboration can at first separate elites from non-elites, but non-elites often imitate this elaboration. This results in what Cannon calls "expressive redundancy" wherein elites are no longer symbolically separated from non-elites who aspire to copy the material symbols associated with higher status. When this occurs, elites often turn to less elaborate mortuary practices, such as the adoption of less elaborate or plain headstones in contrast to more elaborate non-elite markers, a phenomenon observed recently at several historic cemeteries in the United States (Rainville 1999; Small 2002).

One would imagine, however, that even if the idiom of building cairns became somewhat relaxed with time for whatever reason, that the place where these burials were constructed remained strictly controlled and sanctioned by high status households. Even though the poorest families had houses of their own within the village, they were still socially and physically removed from the centre of the village. As such, it may be possible that the localities on the west side of the wetland, most removed from the centre of the cemetery, were the places for the interment of households of lower standing. There is, for example, a conspicuous absence of Type 1 Features from Localities 5, 6 and 7. To reiterate, I speculate that Type 1 were emulations of the much larger, but similarly constructed Type 4 Features. This, however, does not explain the presence of the two Type 4 features in these two western localities. The Type 4 features west of the wetland, however, are generally smaller than the Type 4 Features on the east side of the wetland (Appendix 3). It appears that although people did built at least two Type 4 Features west of the wetland, they were comparable to the average Type 4 Features east of the wetland, but magnitudes smaller than the largest Type 4 Feature in the geographic centre of the site, such as Feature C82 in Locality 2.

Perhaps one of the most startling and unexpected results of the spatial analysis was the apparent dichotomy between feature size and placement on the landscape. The general lack of visibility of the Type 4 Features was unexpected, considering the apparent visibility of comparable features at the Scowlitz site (Lepofsky, et al. 2000). At that site, the researchers argue that the features on the main residential terrace at Scowlitz were generally visible features on the landscape. Features inland from the terrace, in some instances, are located on elevated ridges or other landforms that would have been visible from the river, although many others are not prominently located and would have not been visible from a distance (Lepofsky, et al. 2000:409). This is a significant difference between the two sites, as even the largest features at DbRv-3 are generally no more visible than smaller features. This could, in part, be due to that fact that even the largest features at DbRv-3 are somewhat smaller that the larger features on the main residential terrace at the Scowlitz site.

This general lack of visibility of features at DbRv-3 is somewhat counter–intuitive to the expected pattern when one speaks of concepts of monumentality. It was unexpected that features were not built along the most visible parts of the DbRv-3 landscape, namely the immediate shoreline where they would be visible from the narrowest part of Eemdyk Passage, or on top of bedrock rises where they would be most visible from the surrounding landscape. Although a more rigorous view shed or intervisibility analysis could conceivably shed more light on this situation, I find it hard to believe that the largest of the Type 4 features would be visible at more than 50 m, even if ground and forest cover was relatively open. This leads me to suspect that these features, if they were meant to be seen at all, were part of a well–known landscape, where the audience who witnessed and experienced these burials had intimate knowledge of their location, or were made aware of such as needed, by those privy to such knowledge. In other words, it was the local households who knew where their dead were buried, and it was the living who may have controlled the manner in how these burials were seen. Although they were not built on the most prominent points of the landscape, funeral processions, whatever their composition, would have most likely proceeded overland from the village (archaeological site DbRv-2). Accessing the cemetery meant following one of several possible routes, which were defined in part, by the layout of the natural terrain. I hypothesize that those leading the procession, possibly ritual specialists, knew these routes. The role of ritual specialists, such as those hired by households during the ethnographic period (Barnett 1955:222-226), seems likely, considering the overall trend towards increasing specialization during the Late Period (Ames and Maschner 1999). These routes appear to correspond with the general linear layout of burial features on the landscape (Figure 77). Although it uncertain which came first, the route or the cairns, the presence of existing cairns imprinted the landscape as an appropriate place to built future cairns. One can imagine the cemetery growing incrementally, almost organically, with cairn placement dictated by a number of simultaneous rules, or dispositions, about what constituted a socially appropriate place for any given individual to be buried, considering his or her place in society. And how cairn placement could best serve the needs and aspirations of the living by either maintaining the *status quo*, serving as a means of the elite to exert more control over other households, or as a way in which the alienated or the ambitious could contest or attempt to redefine the social norm.

Turning from the Rocky Point site to the larger social world of the Strait of Georgia region, the largest features at DbRv-3 are still relatively small compared to the larger cairns and mounds at Scowlitz. While it would be tempting to make regional generalizations if only considering the two sites, this is not the case. For example, there are three large mounds at DcRv-24 near the head of Pedder Bay adjacent to the Rocky

Point study area. The largest feature there (Figure 79) has a volume of approximately 200 m^3 (Mathews n.d.), which is larger than Mound 1 at Scowlitz.

This raises the issue of what the size of the features at DbRv-3 means in terms of the status of the peoples or households building these features, relative to comparable cairn and mound cemeteries in the region. If there is an approximate correlation between feature size, acting as a relative yardstick by which status is measured (Ames and Maschner 1999; Grier 2003), then does the overall smaller size of features at DbRv-3 mean these peoples were of lesser social standing? Or does the size of features have a relative, internal significance, that is, is there a "yardstick" specific to DbRv-3.

Figure 79: previously unrecorded large burial mound at DcRv-24, near Rocky Point. Author standing inside ditch to left, which surrounds mound and continues to right side of frame.

As a representation of prestige, visibility, and durability, it is likely that each community relates to its own cultural traditions and prevailing socioeconomic and natural circumstances. The size of mortuary monuments may have less correlation to the political or social power of the person buried inside than on other cultural considerations. For example, beliefs about death instead of individual social status or ethnic identity may dictate the style, material and form of a mortuary monument (Rainville 1999). Again, as

Mizoguchi (1993) cautions, one should not overlook the role of time in this discussion of mortuary variability.

12 Conclusions and Implications

As Susan Kus (1992) argues, there is something fundamentally human about burying and memorializing the dead that is often missing when archaeologists excavate and interpret these material remains. The emotions, sights and other experiential aspects of the mortuary ritual are rarely considered as part of the cultural forces structuring the burial of the dead, and ultimately, the creation of the archaeological site. That absence deprives us of a deeper understanding of burials as social practices by the living through which enduring social memory is created, through which the shared experiences of life and death are transformed into common experiences that bind families and communities together. It is this "collective and individual memory in its multiple traces and expressions" that is "the crucible for the self-recognition of an identity" (Marcus 1994:47).

Traditionally, archaeologists approached the material record in one of two ways. Summarizing Partik (2000), the first was to examine cultural material as a fossil record where direct mechanical relationships are inferred between past processes and the resulting physical results observable in the archaeological record. The second approached the archaeological record as a form of text, allowing for an examination of emic meanings. Whereas the first approach was concerned with issues of methodology and necessitated a connective process to link phenomenon with the archaeological record, such as Middle Range theory (Binford, et al. 1983), the second 'textual' approach (Hodder 1984) lacked a clearly defined procedure to objectively 'translate' the archaeological record. As Patrik (2000) observes, "if neither seems to capture the actual connection between archaeological evidence and what it is evidence of, then perhaps the whole concept of recording is not appropriate for the evidence."

A meaningful interpretation of the social dimensions of material culture requires the integration of the social setting and an understanding of the options and demands in play within these structures (Dietler and Herbich 1998). Pierre Bourdieu's concept of *habitus* "provides a bridging framework that mediates structure and agency to facilitate our understanding of material culture and of the associated social actors and actions" (Fisher and Loren 2003). *Habitus* is both product and producer, generating habitual actions that are reproduced through time while simultaneously being transformed by changing circumstances (Mizoguchi 1993). *Habitus* is socialization producing natural perceptions of what is 'normal' and 'right'; it is the embodiment of the social and physical landscape enabling and reproducing social identities through time. Burial cairns are an extension of the body and the concept of embodiment "provides us with ways to understand how bodily identity was constituted in and through the social and physical landscape (Fisher and Loren 2003). Long-term habitual action of constructing burial cairns is a reflexive engagement with the landscape.

In this thesis, I propose that a 'bottom–up' approach utilizing a quantitative model of burial feature morphological and the spatial distribution of burial cairns, interpreted using a humanistic model of social theory, can identify underlying social structures and recursive practices.

The location of burial cairns themselves would have played an active role in the recursive construction of subsequent cairns, shaping the *habitus* of future action, dictating where people chose to build cairns. Future generations may have been cued in a non–discursive way to build their cairns all agents in society know cairns already exist, with no central planning, blueprint or intended end-product. Although as archaeologists we may be unable to understand specific individual agent's motivations for building the first cairns in a specific place, the reflexive construction of subsequent cairns may speak of larger societal conceptions of social space and identity by which people, both intentionally and unconsciously, structured cairn placement within "the place where we bury our dead." The transformation of space imprints the location, strongly influencing and constraining the way that place will be interpreted and used in the future (Thomas 1990).

Alternatively, and perhaps even simultaneously, the layout of burial features within the Rocky Point mortuary landscape may have been intentionally orchestrated by agents seeking to control movement, and hence people's perception, as they moved across the landscape from shoreline, west through the narrow constrictions of marshland to the far reaches of the site, experiencing, rereading and reinterpreting the space as part of the mortuary ritual. The constraining of movement through the site could, speculatively, represent the larger themes of social boundaries experienced and reinforced (or contested) by living agents within society. The spatial references of cairns, may therefore, reflect the fluid processes of habitual recursive practice, while simultaneously resonating as a field of discourse within society.

Specific themes or fields of discourse, such as the treatment of the dead, involve changes in temporality, memory and relationships with the past (Hodder and Cessford 2004). Using the example of burial cairns, social practice, as illustrated through the metrically observable spatial and morphological dimensions of these burial features, can be used to examine larger themes of identity and concepts of social space during the Late Period in the Strait of Georgia. The phenomenon of building cairns may signify a conscious inscription of identity within potentially contested space. The existence of widespread cairn construction in the southern Strait of Georgia during the Late Period may indicate that people were attempting to link disparate points in space. It is interesting to note that at the Scowlitz site, Lepofsky et al. (2000) observe that the cairns and mounds on the hillsides and adjacent terraces may contain the deceased from other communities in the Harrison-Fraser River region, suggesting a regional integration. They argue that "as larger houses may have incorporated family groups into larger households, the large cemetery may have integrated households or local groups into larger regional groups" (Lepofsky, et al. 2000). Such networks may have informally interacted at different levels (for example, marriage, exchange and defence).

I hypothesize that burial cairn and mound cemeteries on southern Vancouver Island represent a similar regional integration in the absence of larger polities; with cairns strategically placed to inscribe specific social claims to space at a time of increased residential mobility. This is reflected in cultural change from the Marpole to the Late Period is illustrated by the increased frequency of archaeological sites occurring in a greater variety of physical localities in the Late Period than they did in the preceding Marpole phase (Thompson 1978). Changes in settlement pattern, intensification of use of resources and warfare may be attributable to the increased importance of social networks. People with access to abundant, specialized foods from specific family–owned areas, such as camas fields on the southeastern tip of Vancouver Island, would be able to take their surpluses to others within their social network in exchange for food, wealth or future economic, social or ritual obligations. As members of extended families became involved in these exchanges, their social networks would become increasingly important, as would the symbolic and visible expression of a mutual identity, possibly expressed through the shared practice of building cairns and mounds.

I propose that future research exploring the spatial distribution of burial cairns and mounds in the southern Strait of Georgia can be utilized to examine the symbolic relationship between peoples who constructed these features as elements of their landscape. The mortuary landscape, as illustrated by the analysis of the Rocky Point burial cairn construction and distribution, represents the process of a society constructing and interpreting the world around itself. The manner and location in which burial cairns were constructed may reflect a peoples changing understanding about their world and their social identities while operating as a strategy for managing dynamic relations in society. Having identified the spatial and landscape context of burial cairns, a social theoretical examination of the recursive practice of cairn construction may be viewed as a reflection of larger societal themes of identity and the ideational structuring of social space.

This research is not necessarily an exhaustive or all–inclusive analysis of the entire range of mortuary behaviour at the Rocky Point site. While focussing on the surficially visible features, this analysis does not address the presence of buried features, including buried cairns. Further, there is the possibility that there are grave markers that are unrecognized as such. Large boulders, or even single rocks, could mark burial locations. And the materiality of burials may also be a factor, as only those features made of stone and soil were identified—no features made with wood were identified, and even if present at one time, are unlikely to have survived for long in the acidic podzolic soils at the site.

Furthermore, the taxonomy produced in this thesis is not intended to be a typology of burial cairns applicable throughout the Strait of Georgia, or even elsewhere in the immediate area, but rather an idiographic taxonomy particular to Rocky Point with the intention of exploring morphological patterning at the intrasite level.

Additionally, the archaeological features at DbRv-3 do not necessarily represent the full range of mortuary ritual practiced by the Straits Salish people at this time. There are obvious limitations to site interpretation involved in a study of this type, and indeed, in archaeological studies generally. Briefly, the mortuary ritual is not an exact reproduction of the social rule, but is laden with symbolic action, the subversion or even an inversion of the social norm, and is fraught with extenuating circumstances potentially beyond the purview of the archaeologist. Human remains are also an obvious component of mortuary record, but this research was concerned solely with the physical external attributes of the grave, not with the body inside. With the exception of one burial exposed by natural processes (Feature C113), no skeletal data was collected or observed. Further sources of missing or obscured data include the obvious site formation issues such as tree growth and other types of bioturbation and taphonomic problems such as the preservation of organics. Recognizing these limitations, the Rocky Point cairn cemetery represents one of the most significant archaeological sites in the Strait of Georgia, with an immense potential for examining, among many things, the use of material culture and conception of space in precontact Straits Salish mortuary ritual.

As Ingold (1993) proposes, "meaning is there to be discovered in the landscape, if only we know how to attend to it. Every feature, then, is a potential clue, a key to meaning rather than a vehicle for carrying it." Burial cairns are a uniquely archaeological phenomenon and no discipline is better suited to their analysis than archaeology. Burial cairns present a unique opportunity to investigate precontact concepts of identity, social space and landscape as the material expression of mortuary ritual. This study pursues a significant, and largely unknown, chapter of the prehistory of the peoples of southern Vancouver Island. The Rocky Point cemetery provides a significant opportunity to investigate how these monuments may have recursively structured and renegotiated multi-agent social systems within the emergent complexity evident during the Late Period.

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14 Appendix 1: Univariate Analysis Results

Subsequent to the field program, there were 389 entries made in the DbRv-3 database. As illustrated in Table 14, the *a priori* category cairn (n=323) is the most numerous type of feature at DbRv-3. A much lower frequency of mounds (n=10), petroforms (n=8), and rock rings (n=7) were recorded. As mentioned in Section 5.3.1, during the initial inventory, a number of features initially thought to be cairns, were later discovered to be either natural or potentially anthropogenic scatters of rock, as well as historic rock features, such as field clearing (n=36). In addition, seven numbers were assigned in the field but were not actually used (these numbers are C95, C129, C134, C141, C168, D4, and P4).

Table 14: Frequency of feature types recorded in database

Feature Type	Frequency	Included in morphological analysis
Cairn	323	231
Mound	10	9
Petroform	8	0
Rock ring	7	0
Rock scatter	12	0
Historic petroform	6	0
Natural feature	16	0
Numbers not used	7	0
Total	**389**	**240**

The morphological analysis is based on two of the *a priori* categories: "cairns" and "mounds". Of these, only those features not significantly impacted by natural or cultural processes subsequent to their construction were included in the analysis. Out of the cairns, 231 of the 323 features (71.5%) were selected for analysis and of the mounds, 9 out of 10 (90%) were selected for analysis. A total of 240 features were included in the morphological analysis.

14.1 Preliminary Univariate Analysis

Table 15: The length, width, mean height, maximum height, area (product of length and width) and volume (product of length, width, and mean height) of the DbRv-3 burial features.

Variable	Mean	Minimum	Maximum	Standard Deviation	*N*
Length	2.49	0.85	5.70	0.81	240
Width	1.95	0.65	4.60	0.69	240
Mean height	0.32	0.1	0.71	0.11	240
Max. height	0.45	0.12	1.02	0.16	240
Area	10.8	1.07	78.0	10.93	240
Volume	1.96	0.12	17.02	2.00	240

Length: A range of the real values with the number of intervals equal to the square root of the number of observations (Shennan 1997:26).

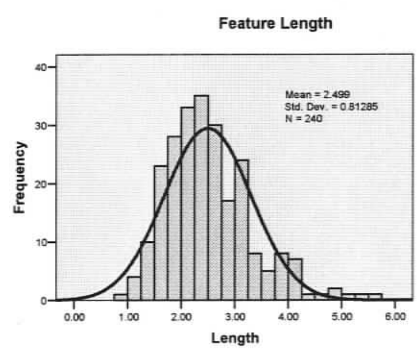


Figure 80: The distribution of feature lengths (n=240) with normal curve.

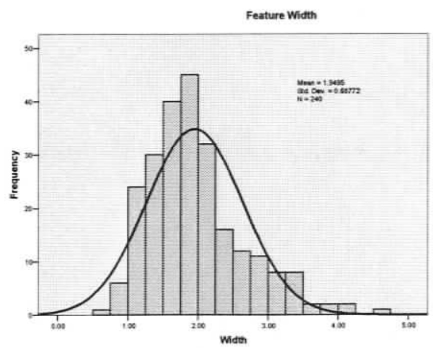


Figure 81: The distribution of feature widths with normal curve (n=240).

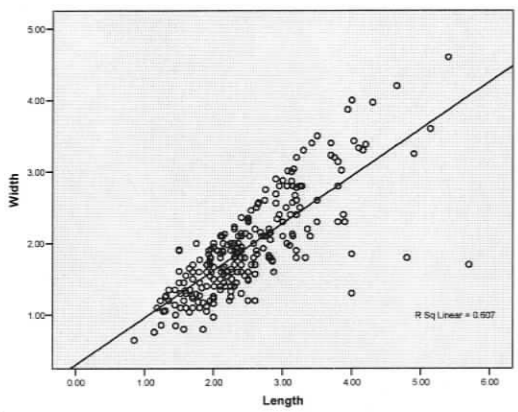


Figure 82: Scattergram illustrating relationship between feature length and width.

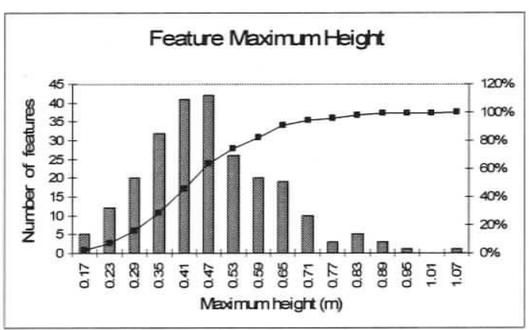


Figure 83: Frequency of feature maximum height with cumulative percentage

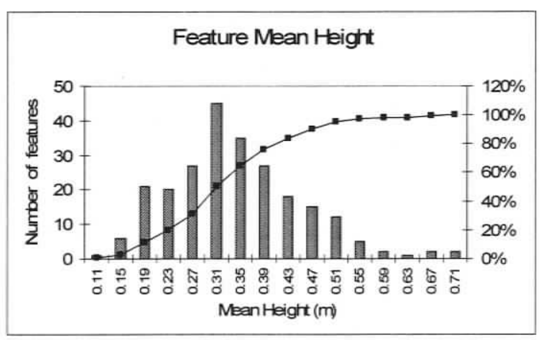


Figure 84: Frequency of feature mean height with cumulative percentage.

Feature area (m^2) was calculated according to the feature outline and the following formulas:

- Features with a circular outline: Area=πr^2
- Square/Rectangular/Irregular: Area=ab (where a=length and b=width)
- Features with an oval (elliptical) outline: Area=πab (where a=length and b=width)

Features with an irregular outline were calculated with the same formula as square and rectangular features. This was done to standardize the area measurements of the 31 features with irregular outlines.

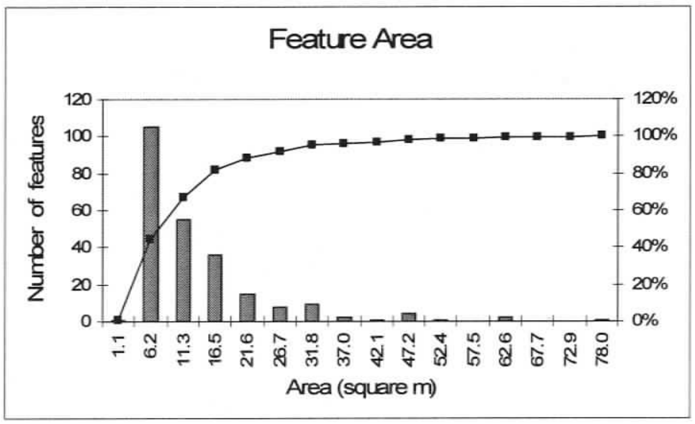


Figure 85: The distribution of the area of burial features (n=240), with cumulative percentage.

Feature Outline

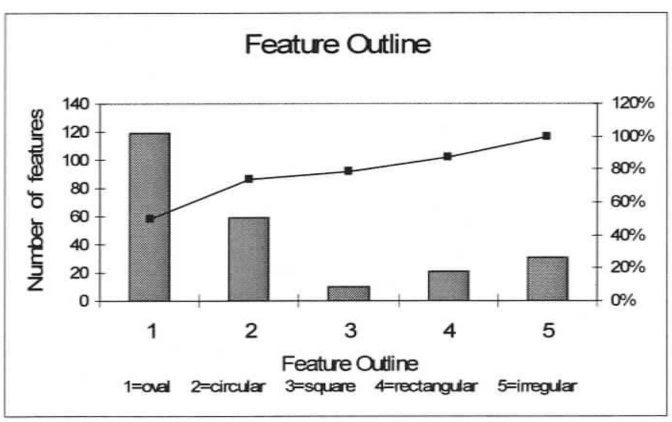


Figure 86: Feature outline frequency with cumulative percentage.

Feature Profile

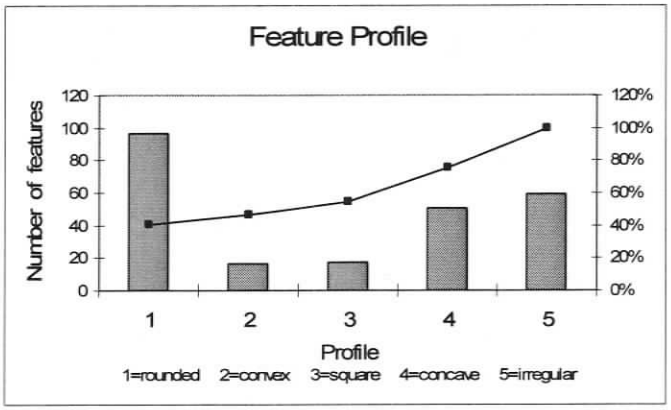
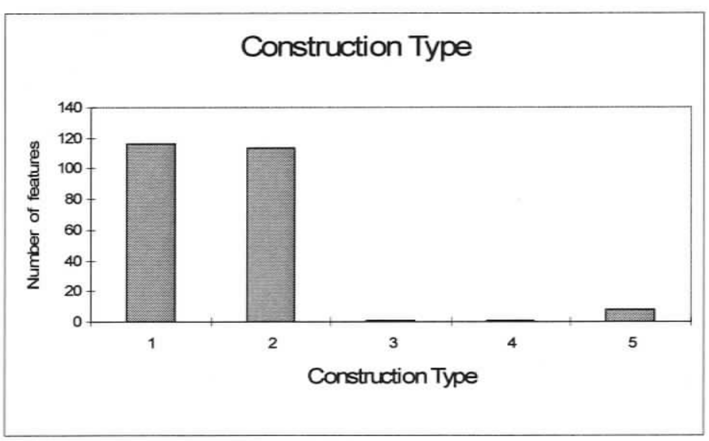


Figure 87: Frequency of feature profiles with relative percentage.

Cairn Construction Type

Overwhelmingly with or without eternal structure, encourages me to examine differences in internal and external rock size as a category of analysis.



1: larger external rocks, smaller internal rocks

2: no internal/external difference in rock size

3: external structure only with soil fill

4: smaller external rocks, larger internal rocks

5: indeterminate

Figure 88: Frequency of feature construction type.

Internal and External Rock Size

No features has the internal or external clast size 15 (equal cobbles, boulders, and large boulders), so this category was disregarded from further analysis. It is also an awkward category as it represents equal amounts of cobbles, boulders and large boulders, which prevents rock size from being an ordinal scale. As such it was excluded from any further analysis form this point forward.

External clast size is multimodal, with a clear distinction between the size categories cobbles, boulders and large boulders. Internal clast size is bimodal, again with clear distinction between the categories with primarily cobbles and those with primarily boulders.

For the external parts of cairns, there is a strong occurrence of boulder-sized rocks, with a lower occurrence of cobbles and large boulders. There is a minimal occurrence of large boulders in the internal structure of cairns and a greater occurrence of cobbles than external feature structures. This suggests a clear distinction in the selection of rock size in the construction of many features.

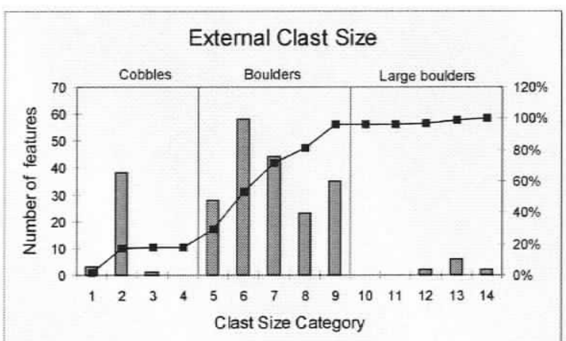


Figure 89: Frequency of feature external clast size with multimodal divisions.

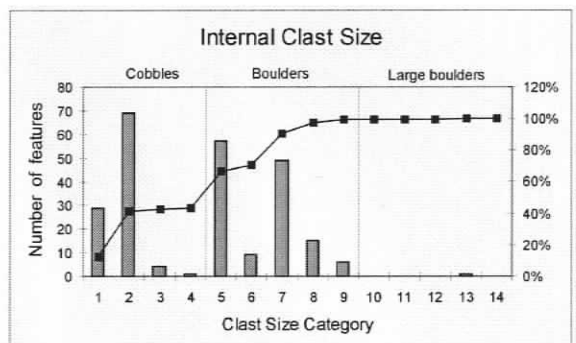


Figure 90: Frequency of feature internal clast size with multimodal divisions.

Internal and External Rock Material

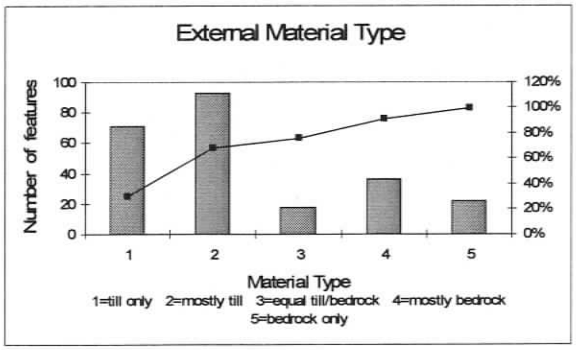


Figure 91: Frequency of external material types with relative percentage.

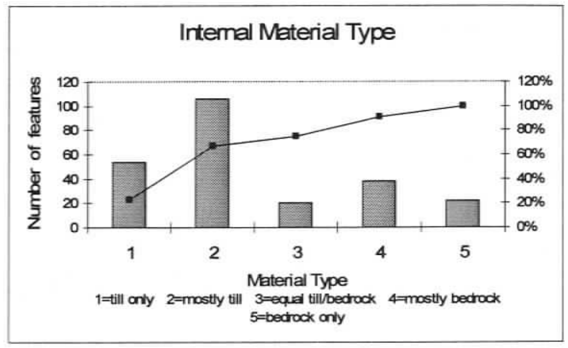


Figure 92: Frequency of internal material types with relative percentage.

Internal and External Rock Sphericity

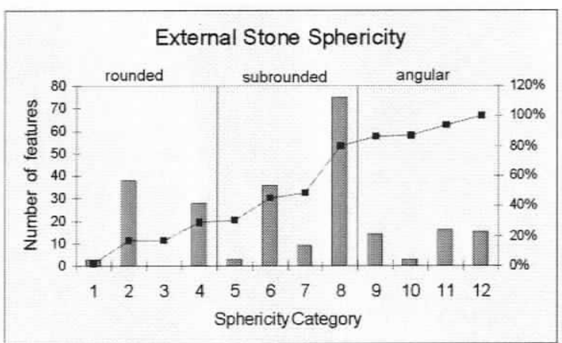


Figure 93: Frequency of feature external stone sphericity with relative percentage.

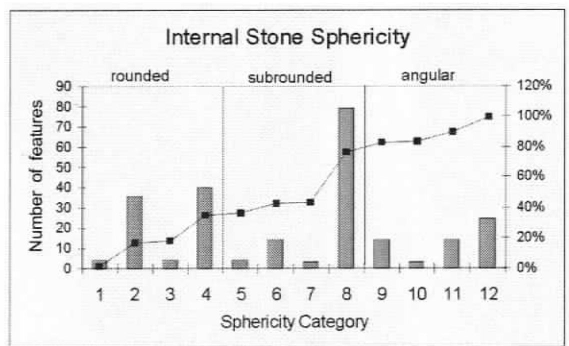


Figure 94: frequency of feature internal stone sphericity with relative percentage.

Feature Orientation

Based on magnetic orientation. The assumption, however, is that the body inside is oriented parallel with the long axis of the feature.

Split into four categories, do not know which part of the cairn is the "head" so the cardinal angle and its inverse used.

With all features, this includes circular features, which generally had a value of 0 entered for orientation, so throws off inflates category 1 somewhat.

Features do not seem to have any significant difference in the orientation of the long axes. If orientation was a significant part of the mortuary process, it was not based on the long axis of the cairns.

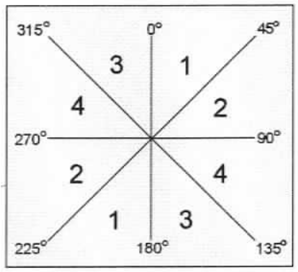


Figure 95: Feature orientation key with four categories

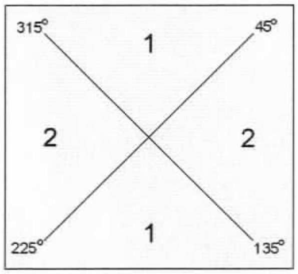


Figure 96: Feature orientation key with two categories.

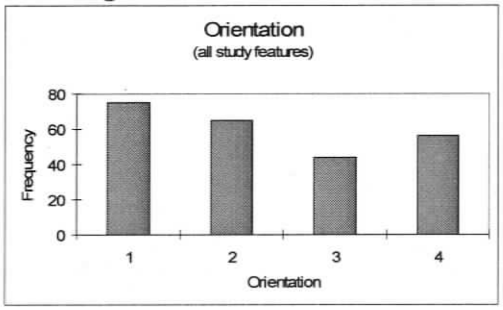


Figure 97: Frequency of the orientation of all study features with four orientation categories.

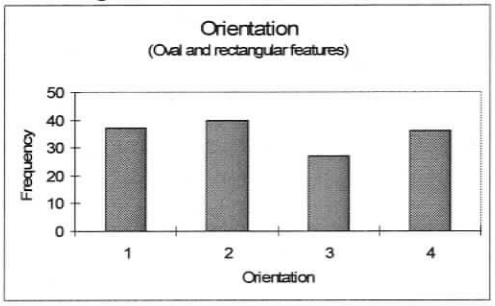


Figure 98: Frequency of the orientation of features with long axes, with four orientation categories.

Optional orientation

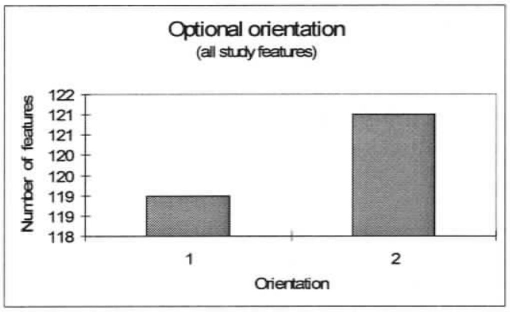


Figure 99: Frequency of the orientation of all study features with two orientation categories.

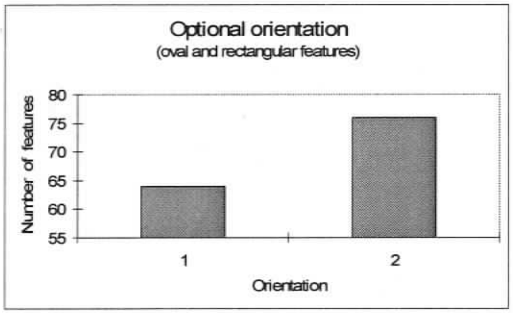


Figure 100: Frequency of the orientation of features with long axes, with two orientation categories.

This analysis suggests that orientation may not be related to a celestial value. There is another means of examining orientation, however, which was not attempted during the current study. In their analysis of Iroquoian longhouses, Norcliffe and Heidenreich (1974) applied inferential statistics developed to analyze azimuth data. By examining the circular normal distribution, or the Von Mises distribution, of longhouses, the authors were able to identify a marked preference for longhouse orientation. Circular normal distribution utilizes an integral scale of analysis, that is, a scale with an arbitrary 0 point (Gumbel, et al. 1953), in this case azimuth data. Applying the circular normal distribution to the Rocky Point feature orientation data and plotting the mean vector on a rose diagram may be useful in terms of identifying an overall pattern, or cluster specific patterns, in orientation not identified by the heuristic methodology employed here. Finally, if there is a pattern in the orientation of feature long axis, it may not be related to cardinal points but rather to elements of the observed local landscape or built environment, such as shoreline, bedrock exposures, larger adjacent cairns, or village locations. Testing this hypothesis would be best suited to a GIS-based analysis.

Soil Fill

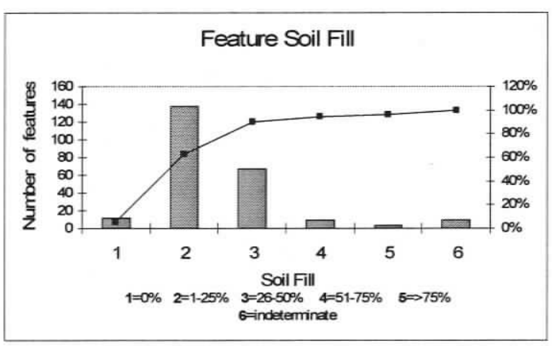


Figure 101: Frequency of feature soil fill with the 6 categories of soil fill.

15 Appendix 2: Detailed Feature Morphological Metric Attributes

15.1 Type 1 (n=55)

	Length	Width	Mean Height	Volume	Area
Mean	2.657	2.012	0.363	5.680	14.894
Standard Error	0.087	0.075	0.014	0.571	1.2808
Median	2.64	1.95	0.35	4.421	13.612
Stand. deviation	0.651	0.557	0.104	4.235	9.4989
Sample Variance	0.424	0.311	0.010	17.936	90.229
Kurtosis	1.695	-0.292	0.961	0.584	2.4436
Skewness	0.590	0.384	0.715	1.084	1.2874
Range	3.72	2.45	0.54	17.946	48.772
Minimum	1.18	0.85	0.17	0.308	1.2325
Maximum	4.9	3.3	0.71	18.254	50.005
Count	55	55	55	55	55

Continuous variables summary: So, generally medium sized features, although quite a large range between min and max sizes. Average size cairns.

Type 1 Outline: mostly oval, with some rectangular and minimally square and irregular. No circular.

Standardized value	Feature outline	n
1	oval	42
2	circular	0
3	square	3
4	rectangular	8
5	irregular	2

Type 1 Profile: features are typically concave in profile with significantly lesser occurrence of other types.

Standardized value	Feature outline	n
1	rounded	4
2	convex	6
3	square	8
4	concave	32
5	irregular	5

Type 1 construction: so overwhelmingly has external structure. This is in stark contrast to Type 2.

Standardized value	Construction type	n
1	Definite external structure	53
2	No internal–external structural difference	1
3	other	1

Type 1 erratics: 4 present, 51 absent

Type 1 soil fill: so mostly less than 50% soil fill, 1 that is mostly soil and 1 with no soil.

Standardized value	Amount of soil fill	n
1	none	2
2	1–25%	33
3	26–50%	15
4	51–75%	3
5	76–100%	1
6	indeterminate	1

Type 1 orientation: so no real clustering within orientation, but typical of the variable orientation.

Standardized value	Orientation (degrees)	n
1	0–45 and 181–225	17
2	46 –90 and 226–270	12
3	316–0 and 136–180	11
4	91–135 and 271–315	15

Type 1 Material Types: so primarily till both internally and externally, with lesser amounts of bedrock, although a bit of a continuum.

Standardized value	Material Type	External rocks (n)	Internal rocks (n)
1	till only	18	13
2	mostly till	20	25
3	equal till and bedrock	4	4
4	mostly bedrock	7	7
5	bedrock only	6	6

Type 1 Rock size: exterior rocks are almost exclusively boulders, with lesser numbers of cobbles and large boulders. Internal rocks are also primarily boulders, but with a much greater occurrence of cobbles and no large boulders. This is consistent with Construction results.

Standardized value	Rock size	External rocks (n)	Internal rocks (n)
1	cobbles	9	23
2	boulders	45	32
3	large boulders	1	0

Type 1 Rock sphericity: External rocks in Type 1 tend to be subrounded, with a lesser occurrence of rounded rocks. Very few are angular. Internal rocks on the other hand tend to have a co-occurrence of both rounded and subrounded rocks. Again, very few are angular.

Standardized value	Rock sphericity	External rocks (n)	Internal rocks (n)
1	Rounded	13	22
2	Subrounded	37	24
3	angular	5	9

Type 1 bedrock: 54 features not built against bedrock, 1 built against bedrock. Not being built against bedrock is typical of Type 1.

Comments: A fairly good cluster of mostly oval features in the magnitude of 2 m long, with a definite external structure of mostly till (and to a lesser extent bedrock) boulders and an internal structure of mostly till and lesser amounts of bedrock boulders and cobbles. Cluster 1 features are typically concave in profile, a result of the larger external rocks and the smaller internal rocks. External rocks are primarily subrounded but there is an equal occurrence of rounded and subrounded rocks within the interior of Cluster 1 features. Angular rocks were very rarely used. Features almost all have soil fill, but it accounts less than 50% of overall construction material. Most features do not incorporate erratics and are only rarely built against bedrock. Orientation appears random within this cluster. No circular cairns and only minimally rectangular, square and rectangular outlines. Continuous scale measures of feature size appear to be somewhat variable and do not appear to be driving clustering despite having five different attributes (whereas there is significant homogeneity in clustering among most ordinal and nominal attributes).

15.2 Type 2 (n=80)

	Length	Width	Mean Height	Volume	Area
Mean	2.364	1.645	0.286	3.745	11.792
Standard Error	0.082	0.060	0.010	0.396	0.947
Median	2.24	1.585	0.282	2.567	9.792
Stand. deviation	0.741	0.537	0.096	3.541	8.478
Sample Variance	0.549	0.288	0.009	12.538	71.881
Kurtosis	0.717	1.130	2.018	4.085	2.149
Skewness	0.827	0.900	0.907	1.916	1.392
Range	3.95	2.78	0.555	16.805	42.337
Minimum	0.85	0.65	0.115	0.123	1.066
Maximum	4.8	3.43	0.67	16.928	43.403
Count	80	80	80	80	80

Continuous variables summary: comparable in size to Type 1, although slightly smaller. Cairns in the magnitude of 2 m long. Average sized cairns.

Type 2 Outline: majority of Type 2 features are oval in outline, with a few rectangular ones and minimally square and irregular. No circular.

Standardized value	Feature outline	n
1	oval	66
2	circular	0
3	square	2
4	rectangular	8
5	irregular	3

Type 2 profile: feature profiles are overwhelmingly rounded.

Standardized value	Feature outline	n
1	rounded	63
2	convex	2
3	square	1
4	concave	1
5	irregular	13

Type 2 construction: Overwhelmingly these are features with no external-internal structure difference. This is in stark contrast to Cluster 1. Only a few (10) have a definite external structure in Cluster 2.

Standardized value	Construction type	n
1	Definite external structure	10
2	No internal–external structural difference	66
3	other	4

Type 2 orientation: Orientation appears random within this cluster.

Standardized value	Orientation (degrees)	n
1	0–45 and 181–225	25
2	46 –90 and 226–270	28
3	316–0 and 136–180	8
4	91–135 and 271–315	19

Type 2 Material Types: There is great similarity between the internal and external material types, but this is not surprising as Type 2 is characterized by a lack of internal and external rock structural difference. Features that had no obvious internal/external structure were typically coded in the field as having the same material type, as was the norm. Like Type 1, Type 2 consists primarily of till or mostly till rocks (70% external and 67.5% internal), with lesser amounts of bedrock material used (23% both internally and externally).

Standardized value	Material Type	External rocks (n)	Internal rocks (n)
1	till only	21	16
2	mostly till	35	38
3	equal till and bedrock	5	7
4	mostly bedrock	12	12
5	bedrock only	7	7

Type 2 Rock size: exterior rocks are almost exclusively boulders, with lesser numbers of cobbles and large boulders. Internal rocks are also primarily boulders, but with a somewhat lesser occurrence of cobbles and virtually no large boulders. This is consistent with Construction results, however, there is still a pattern, although significantly less so than Type 1, of exterior rocks being somewhat larger than interior rocks. Some cairns with no definite external structure had the occasional larger rock along the exterior, although not continuously so along the perimeter. For example, if the feature was built on a slight incline, somewhat larger rocks were located on the downhill side while the rest of the exterior rocks were generally slightly smaller in size, thereby shoring up the downhill side of the feature.

Standardized value	Rock size	External rocks (n)	Internal rocks (n)
1	cobbles	10	32
2	boulders	67	47
3	large boulders	3	1

Type 2 Rock sphericity: There appears to be a general trend for both internal and external rock sphericity to be subrounded, with a significant number being primarily rounded. There are a minority of features with angular rocks.

Standardized value	Rock sphericity	External rocks (n)	Internal rocks (n)
1	Rounded	28	30
2	Subrounded	38	37
3	angular	14	13

Type 2 erratics: 64 have no erratics, 16 do have erratics. So out of the 35 features with erratics in the whole sample (N), almost half of them (45%) are in Type 2.

Type 2 soil fill: so most features in Type 2 have less than 50% soil fill (with 60% having between 1-25%), 4 with no soil. Four of the features have more than half soil fill. Feature 22 has 76-100% soil fill (but aside from this fits well within Type 2).

Standardized value	Amount of soil fill	n
1	none	4
2	1–25%	48
3	26–50%	20
4	51–75%	3
5	76–100%	1
6	indeterminate	4

Type 2 bedrock: 72 features not built against bedrock, 8 built against bedrock. I wonder if being built against bedrock is an important typological attribute, or just a variation within the taxa.

Type 2 Comments: Comparable in size to Type 1, although slightly smaller. Cairns are in the magnitude of 2 m long but like Cluster 1 there is considerable range in feature size. Majority of Cluster 2 features are oval in outline, with a few rectangular ones and minimally square and irregular. Interestingly, no circular features. Feature profiles are overwhelmingly rounded, followed distantly by irregular profiles. Overwhelmingly these are features with no external-internal structure difference. This is in stark contrast to Type 1. Orientation appears random within this cluster. There is great similarity between the internal and external material types, consisting primarily of till or mostly till rocks, with significantly lesser amounts of bedrock material used. Exterior rocks are almost exclusively boulder sized, with lesser numbers of cobbles and large boulders. Internal rocks are also primarily boulders, but with a somewhat lesser occurrence of cobbles and virtually no large boulders. This is consistent with Construction results, however, there is still a pattern, although significantly less so than Type 1, of exterior rocks being somewhat larger than interior rocks. There appears to be a general trend for both internal and external rock sphericity to be subrounded, with a significant number being primarily rounded. There are a minority of features with angular rocks. This is consistent with material type, as till tends to be rounded and subrounded and bedrock tends to be angular or occasionally subrounded if heavily weathered. Erratics are rarely incorporated into Cluster 2 features, but more so than in other clusters. Most features in Type 2 have less than 50% soil fill (although Feature 22 has 76-100% soil fill, but aside from this fits well within Type 2). Most features are not built against bedrock, but it does occur more frequently than in other clusters.

15.3 Type 3 (n=37)

	Length	Width	Mean Height	Volume	Area
Mean	2.386	1.744	0.313	1.715	5.243
Standard Error	0.148	0.087	0.014576	0.269	0.689
Median	2.25	1.7	0.31	1.173	3.91
Stand. deviation	0.900	0.532	0.088	1.634	4.195
Sample Variance	0.811	0.283	0.007	2.668	17.598
Kurtosis	3.813	3.258	0.127	13.173	14.400
Skewness	1.599	1.334	0.144	3.242	3.396
Range	4.56	2.74	0.405	9.001	23.333
Minimum	1.14	0.76	0.11	0.352	1.944
Maximum	5.7	3.5	0.515	9.352	25.277
Count	37	37	37	37	37

Continuous variables summary: comparable in size to Types 1 and 2-features in the magnitude of 2 m long. Average sized cairns. Considerable range, however, between sizes.

Type 3 Outline: primarily irregular outlines, minor numbers of oval, square and rectangular. No circular.

Standardized value	Feature outline	n
1	oval	5
2	circular	0
3	square	3
4	rectangular	3
5	irregular	26

Type 3 profile: primarily irregular profiles, minor numbers of concave.

Standardized value	Feature outline	n
1	rounded	2
2	convex	0
3	square	1
4	concave	5
5	irregular	29

Type 3 construction: mainly no internal-external difference, but still 35% do have an external structure, so not quite so clear-cut clustering as Types 1 and 2.

Standardized value	Construction type	n
1	Definite external structure	13
2	No internal–external structural difference	23
3	other	1

Type 3 orientation: Orientation appears random within this cluster.

Standardized value	Orientation (degrees)	n
1	0–45 and 181–225	12
2	46 –90 and 226–270	7
3	316–0 and 136–180	12
4	91–135 and 271–315	6

Type 3 Material Types: primarily till but comparable to Clusters 1 and 2 in that there is a minor occurrence of bedrock. There is only a very minor increase in the relative amount of bedrock to till in Type 3 relative to Type 1 and 2, yet rock sphericity is notably less rounded, with an equal occurrence of subrounded and rounded rocks.

Standardized value	Material Type	External rocks (n)	Internal rocks (n)
1	till only	11	9
2	mostly till	14	14
3	equal till and bedrock	3	4
4	mostly bedrock	6	8
5	bedrock only	3	2

Type 3 Rock size: external rocks are primarily boulders whereas internal rocks are an equal proportion of cobbles and boulders. Large boulders are completely absent in this cluster.

Standardized value	Rock size	External rocks (n)	Internal rocks (n)
1	cobbles	7	18
2	boulders	30	19
3	large boulders	0	0

Type 3 Rock sphericity: Unlike Types 1 and 2, this cluster's rocks are almost equally subrounded and angular, with a lesser occurrence of rounded rocks.

Standardized value	Rock sphericity	External rocks (n)	Internal rocks (n)
1	Rounded	8	8
2	Subrounded	16	15
3	angular	13	14

Type 3 erratics: 33 no, 4 yes.

Type 3 soil fill: virtually all features have soil fill, but less than half. No features have more than half soil fill, so therefore somewhat less soil fill than Types 1 and 2.

Standardized value	Amount of soil fill	n
1	none	1
2	1–25%	23
3	26–50%	12
4	51–75%	0
5	76–100%	0
6	indeterminate	1

Type 3 bedrock: 34 no, 3 yes.

Type 3 results: comparable in size to Types 1 and 2. Features in the magnitude of 2 m long. Average sized cairns. Considerable range, however, between sizes. Type 3 features primarily have irregular outlines and profiles. They generally have no internal-external difference, but 35% of them do have an external structure, so not quite so clear-cut clustering as Types 1 and 2. Orientation appears random within this cluster. Primarily till but comparable to Types 1 and 2 in that there is a minor occurrence of bedrock. There is only a very minor increase in the relative amount of bedrock to till in Cluster 3 relative to Types 1 and 2, yet rock sphericity is notably less rounded, with an equal occurrence of subrounded and rounded rocks. External rocks are primarily boulders whereas internal rocks are an equal proportion of cobbles and boulders. Large boulders are completely absent in this cluster. Virtually all Type 3 features have soil fill, but no features have more than half soil fill, so therefore somewhat less soil fill than Clusters 1 and 2. Erratics are rarely incorporated into Type 3 features, and features are occasionally built against bedrock.

15.4 Type 4 (n=9)

	Length	Width	Mean Height	Volume	Area
Mean	4.3	3.586	0.525	22.264	40.583
Standard Error	0.236	0.202	0.044	5.685	7.982
Median	4.2	3.4	0.58	15.734	43.105
Stand. deviation	0.709	0.607	0.133	17.055	23.947
Sample Variance	0.503	0.369	0.017	290.882	573.466
Kurtosis	0.230	0.578	-0.324	-0.582	-1.036
Skewness	-0.096	-0.008	-0.7306	0.746	-0.046
Range	2.35	2.1	0.4	49.006	70.372
Minimum	3.05	2.5	0.285	4.423	7.625
Maximum	5.4	4.6	0.685	53.428	77.997
Count	9	9	9	9	9

Continuous variables summary: these are the largest features at DbRv-3. Essentially outliers as they are significantly larger than all other features.

Type 4 Outline: most features are oval. Interesting to note there are no irregular features, suggesting these features were well constructed.

Standardized value	Feature outline	n
1	oval	6
2	circular	0
3	square	2
4	rectangular	1
5	irregular	0

Type 4 profile:

Standardized value	Feature outline	n
1	rounded	5
2	convex	2
3	square	2
4	concave	0
5	irregular	0

Type 4 construction:

Standardized value	Construction type	n
1	Definite external structure	6
2	No internal–external structural difference	3
3	other	0

Type 4 orientation:

Standardized value	Orientation (degrees)	n
1	0–45 and 181–225	3
2	46 –90 and 226–270	2
3	316–0 and 136–180	4
4	91–135 and 271–315	0

Type 4 Material Types:

Standardized value	Material Type	External rocks (n)	Internal rocks (n)
1	till only	3	2
2	mostly till	3	3
3	equal till and bedrock	1	1
4	mostly bedrock	2	2
5	bedrock only	0	1

Type 4 Rock size:

Standardized value	Rock size	External rocks (n)	Internal rocks (n)
1	cobbles	4	6
2	boulders	4	3
3	large boulders	1	0

Type 4 Rock sphericity:

Standardized value	Rock sphericity	External rocks (n)	Internal rocks (n)
1	Rounded	3	3
2	Subrounded	5	5
3	angular	1	1

Type 4 erratics: 7 no, 2 yes

Type 4 soil fill:

Standardized value	Amount of soil fill	n
1	none	0
2	1–25%	4
3	26–50%	2
4	51–75%	2
5	76–100%	5
6	indeterminate	0

Type 4 bedrock: none

Type 4 results: must remember this is likely the most artificial category in this taxonomy, as they represent the largest features at DbRv-3, and each fit well into much smaller clusters.

15.5 Type 5 (n=45)

	Length	Width	Mean Height	Volume	Area
Mean	2.351	2.194	0.329	1.604	4.570
Standard Error	0.081	0.083	0.013	0.151	0.320
Median	2.34	2.1	0.34	1.292	4.298
Stand. deviation	0.546	0.562	0.092	1.014	2.149
Sample Variance	0.299	0.315	0.008	1.028	4.620
Kurtosis	0.426	0.508	-0.302	1.479	2.190
Skewness	0.465	0.664	-0.027	1.108	1.179
Range	2.63	2.67	0.415	4.814	10.838
Minimum	1.31	1.2	0.135	0.182	1.347
Maximum	3.94	3.87	0.55	4.996	12.186
Count	45	45	45	45	45

Type 5 Outline:

Standardized value	Feature outline	n
1	oval	0
2	circular	45
3	square	0
4	rectangular	0
5	irregular	0

Type 5 profile:

Standardized value	Feature outline	n
1	rounded	16
2	convex	6
3	square	5
4	concave	9
5	irregular	9

Type 5 construction:

Standardized value	Construction type	n
1	Definite external structure	29
2	No internal–external structural difference	13
3	other	3

Type 5 orientation:

Standardized value	Orientation (degrees)	n
1	0–45 and 181–225	21
2	46 –90 and 226–270	7
3	316–0 and 136–180	10
4	91–135 and 271–315	7

Type 5 Material Types:

Standardized value	Material Type	External rocks (n)	Internal rocks (n)
1	till only	18	14
2	mostly till	17	25
3	equal till and bedrock	4	3
4	mostly bedrock	4	3
5	bedrock only	0	0

Type 5 Rock size:

Standardized value	Rock size	External rocks (n)	Internal rocks (n)
1	cobbles	7	16
2	boulders	35	29
3	large boulders	3	0

Type 5 Rock sphericity:

Standardized value	Rock sphericity	External rocks (n)	Internal rocks (n)
1	Rounded	13	17
2	Subrounded	22	14
3	angular	10	14

Type 5 erratics: 5 yes, 40 no

Type 5 soil fill:

Standardized value	Amount of soil fill	n
1	none	3
2	1–25%	24
3	26–50%	14
4	51–75%	2
5	76–100%	0
6	indeterminate	2

Type 5 bedrock: 2 yes, 43 no

15.6 Type 6 (n=14)

	Length	Width	Mean Height	Volume	Area
Mean	2.257	2.146	0.276	1.612	4.608
Standard Error	0.244	0.232	0.033	0.500	1.002
Median	2.12	2.05	0.257	0.846	3.528
Stand. deviation	0.913	0.868	0.126	1.869	3.750
Sample Variance	0.835	0.754	0.016	3.495	14.064
Kurtosis	-0.342	0.068	-0.059	1.717	0.466
Skewness	0.831	0.838	0.506	1.616	1.271
Range	2.77	2.86	0.44	5.990	11.372
Minimum	1.23	1.14	0.1	0.131	1.187
Maximum	4	4	0.54	6.121	12.56
Count	14	14	14	14	14

Type 6 Outline:

Standardized value	Feature outline	n
1	oval	0
2	circular	14
3	square	0
4	rectangular	0
5	irregular	0

Type 6 profile:

Standardized value	Feature outline	n
1	rounded	7
2	convex	0
3	square	0
4	concave	4
5	irregular	3

Type 6 construction:

Standardized value	Construction type	n
1	Definite external structure	5
2	No internal–external structural difference	8
3	Other	1

Type 6 orientation:

Standardized value	Orientation (degrees)	n
1	0–45 and 181–225	0
2	46 –90 and 226–270	8
3	316–0 and 136–180	1
4	91–135 and 271–315	5

Type 6 Material Types:

Standardized value	Material Type	External rocks (n)	Internal rocks (n)
1	till only	0	0
2	mostly till	2	1
3	equal till and bedrock	1	1
4	mostly bedrock	5	6
5	bedrock only	6	6

Type 6 Rock size:

Standardized value	Rock size	External rocks (n)	Internal rocks (n)
1	cobbles	5	8
2	boulders	7	6
3	large boulders	2	0

Type 6 Rock sphericity:

Standardized value	Rock sphericity	External rocks (n)	Internal rocks (n)
1	Rounded	4	4
2	Subrounded	5	5
3	angular	5	5

Type 6 erratics: 4 yes, 10 no

Type 6 soil fill:

Standardized value	Amount of soil fill	n
1	None	2
2	1–25%	7
3	26–50%	4
4	51–75%	0
5	76–100%	0
6	Indeterminate	1

Type 6 bedrock: 2 yes, 12 no

16 Appendix 3: Feature Volumes by Spatial Locality

Locality	Type	$\bar{x}$	median	s	min	max	n
1	All types	3.652	2.40	3.423	0.544	14.032	23
	Type 1	9.637	9.587	3.852	5.341	14.032	4
	Type 2	2.931	2.474	1.626	1.101	6.774	10
	Type 3	1.314	1.308	0.639	0.544	2.098	4
	Type 4	n/a	n/a	n/a	n/a	n/a	0
	Type 5	2.176	2.067	1.326	0.763	3.638	5
	Type 6	n/a	n/a	n/a	n/a	n/a	0
2	All types	4.087	1.970	7.122	0.122	53.428	91
	Type 1	4.415	3.085	3.707	0.850	14.663	23
	Type 2	3.592	2.359	3.902	0.122	16.886	30
	Type 3	1.187	1.102	0.537	0.489	2.476	11
	Type 4	23.229	12.704	20.559	5.912	53.428	5
	Type 5	1.447	0.988	1.219	0.181	4.996	17
	Type 6	1.771	0.715	2.462	0.130	6.121	5
3	All types	1.788	2.445	1.175	0.431	2.486	3
	Type 1	n/a	n/a	n/a	n/a	n/a	0
	Type 2	n/a	n/a	n/a	n/a	n/a	0
	Type 3	n/a	n/a	n/a	n/a	n/a	0
	Type 4	n/a	n/a	n/a	n/a	n/a	0
	Type 5	2.466	2.466	0.029	2.445	2.486	2
	Type 6	0.431	0.431	n/a	0.431	0.431	1
4	All types	4.055	2.612	5.271	0.143	38.347	65
	Type 1	5.471	4.743	3.339	0.308	12.858	24
	Type 2	3.226	2.447	2.522	0.330	9.864	14
	Type 3	1.942	1.066	2.447	0.577	9.352	12
	Type 4	21.385	21.385	23.988	4.422	38.347	2
	Type 5	1.740	1.629	0.771	0.432	2.838	12
	Type 6	1.43	1.43	n/a	1.43	1.43	1
5	All types	5.402	3.025	5.933	0.185	25.722	30
	Type 1	10.492	10.492	10.977	2.730	18.254	2
	Type 2	5.641	4.422	4.278	0.372	16.927	17
	Type 3	2.198	2.097	1.315	0.950	3.981	5
	Type 4	25.722	25.722	n/a	25.722	25.722	1
	Type 5	1.131	1.245	0.830	0.250	1.899	3
	Type 6	2.542	2.542	3.332	0.185	4.898	2
6	All types	2.289	0.998	3.437	0.296	15.733	20
	Type 1	4.48	4.48	n/a	4.48	4.48	1
	Type 2	1.092	0.942	1.086	0.296	3.461	7
	Type 3	2.212	1.753	2.047	0.351	4.990	4
	Type 4	15.73	15.73	n/a	15.73	15.73	1
	Type 5	1.185	0.934	0.538	0.612	1.885	5
	Type 6	1.574	1.574	0.960	0.894	2.253	2
7	All types	4.714	2.601	5.022	0.801	15.501	8
	Type 1	15.5	15.5	n/a	15.5	15.5	1
	Type 2	6.881	6.881	1.116	6.092	7.670	2
	Type 3	1.99	1.99	n/a	1.99	1.99	1
	Type 4	n/a	n/a	n/a	n/a	n/a	0
	Type 5	1.2	1.2	n/a	1.2	1.2	1
	Type 6	1.635	0.890	1.367	0.801	3.213	3