PREHISTORIC MORTUARY VARIABILITY ON GABRIOLA ISLAND, BRITISH COLUMBIA

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Cover photo: Wolf and bird petroglyph near the Gabriola bluff burial sites. Photo by R.L. Carlson courtesy of the Museum of Archaeology and Ethnology, SFU.

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Chapter 1

Introduction

Archaeological sites on the Northwest Coast of North America have yielded evidence for a variety of mortuary practices, including midden interment, tree burial, cremation, cairn or mound burial, and surface disposal in caves, grave houses, mortuary poles, or canoes. The meaning of this variability is unclear, although social differentiation and chronological change have been suggested as possible explanations. This project examines the problem of mortuary variability in the Gulf of Georgia region of the Northwest Coast through analysis of two burial samples from Gabriola Island, British Columbia, that exhibit widely differing burial practices: primary midden inhumation and secondary surface disposal in rockshelters and caves. Demographic, osteological, and radiometric data will be used to examine three hypotheses:

1. That the two burial samples represent diachronic variations in mortuary practices;
2. That the two burial samples represent different biological populations with different burial customs; and
3. That the two burial samples represent different social groups within the same biological population.

Mortuary Variability

It has long been recognized by ethnographers, social anthropologists, and archaeologists that burial customs vary widely throughout the world. Inter-group variability in mortuary practices can often be satisfactorily explained by differences in ecology, economy, ideology, religion, social complexity, and past histories of migration and cultural interactions. The origins and meaning of intra-group variation, however, are less readily explained, and have generated much discussion and research, particularly in the past forty years.

Late 19th and early 20th century students of mortuary behavior tended to view their data from a normative perspective, that either ignored variability, or perceived it primarily as evidence of the overlay of foreign elements onto what was originally a uniform practice, as a result of population movement or the diffusion of ideas. The first serious challenge to this perspective occurred in 1927, with Kroeber's review of burial customs in aboriginal California. Kroeber found such diversity in methods of disposal of the dead, apparently uncorrelated with cultural, climatic, or geographic boundaries, and such rapid changes over time, that he questioned the utility of funerary remains for meaningful cultural analysis. He suggested that mortuary practices, due to their "affect-laden" nature, and what he perceived as their dissociation from core cultural features such as subsistence, material culture, law, religion, and social organization, were inherently unstable and better characterized as labile "fashions" than as significant cultural traits.

Kroeber notwithstanding, social scientists have continued to search for meaning in mortuary variability, focusing since the early 1970s on exploring the social dimensions of mortuary practices. The first, critical links between funeral practices and social structure had been established in the early 20th century by sociologists Robert Hertz (1960 [1907]) and Arthur Van Gennep (1960 [1909]). They interpreted the fu-

neral as a rite of passage, whose function, according to Hertz, was to facilitate three major transitions: that of the deceased from 'dangerous' corpse to relatively innocuous skeleton; that of the soul or spirit from the real world to the "land of dead"; and that of the survivors from a liminal state of mourning into a reintegrated society without the deceased.

It is this recognition of mortuary ritual as an act of social reintegration that permits the development of general principles for interpreting mortuary variability cross-culturally, and forms the rationale underlying most recent studies of the social dimensions of mortuary practices.

> The funeral is one occasion where the ideal norms of the social roles of the survivors and the dead are played out with the greatest clarity...so, something of the ideal social structure is captured in the funerary process....On the one hand, the status of the deceased affects the scale of rites necessary to achieve separation; on the other hand, the reintegration of the mourners with the living requires restatement of the social structure and the relationships of the living to the dead (Morris 1987: 32-33).

The most significant theoretical development in mortuary studies in recent years is what has come to be known as the Saxe-Binford program (Brown 1995), which draws heavily on role theory (Goodenough 1965; Linton 1936) in accounting for systematic differences in mortuary treatment, particularly with reference to issues of social complexity. The basic premises of the Saxe-Binford program are that an individual's treatment in death bears some predictable relationship to: (1) the individual's state in life; and (2) the organization of the society to which the individual belonged. From these premises, Saxe (1970) developed eight testable hypotheses which predicted how the social persona of the deceased and the social structure of the group would be differentially represented within the disposal domain.

Binford (1972) addressed himself more directly to Kroeber's claims of inherent instability in mortuary practices, and their independence from core biological or social behaviors, using empirical data drawn from the ethnographic literature and the Human Relations Area Files. He found (contra Kroeber), that there existed considerable variability in the stability of mortuary practices, and more importantly, that mortuary behavior was intimately connected to the organizational principles of a society. Binford identified some of the personal variables or dimensions that may be distinguished in mortuary ritual (including age, sex, social standing, occupation, clan membership, and manner, place, and time of death), and demonstrated that the number and types of dimensions so distinguished were determined in part by the complexity of social organization. Like Saxe, Binford developed specific, testable hypotheses that predicted how mortuary ceremonialism would covary with social complexity.

Mortuary Archaeology

Although their hypotheses were derived from and tested with ethnographic data, the explicit aims of both Saxe and Binford were to develop a methodology applicable to the explanation of variability in archaeological remains, and their publications have stimulated an outpouring of research in mortuary archaeology (e.g., Brown 1971; Chapman et al. 1981; Beck 1995). Applications of the Saxe-Binford program have been numerous and varied, employing a variety of analytical techniques and theoretical approaches (including component analysis, cluster analysis, formal analysis, systems theory, role theory, communication theory, information theory, and set theory), in the examination of many different lines of funerary evidence, including burial treatment, artifact associations, energy expenditure, and spatial patterning (Brown 1971; Goldstein 1981, 1995; Larson 1971; Peebles 1971; Saxe 1970; Tainter 1975, 1978; Voorrips and O'Shea 1987). This research has most commonly been directed to the identification of rank and status differences in archaeological cultures (Brown 1971, 1981; Peebles 1971; Peebles and Kus 1977; Larson 1971; Orton and Hodson 1981), but has also examined such diverse social factors as deviancy (Shay 1985), ethnicity (Beck 1995), marriage and residence patterns (Saxe 1971), and lineal descent groups (Charles 1995). All, however, have shared the basic underlying assumption that aspects of the structure of past social organization could be determined by the appropriate analysis of mortuary remains.

The Saxe-Binford program has not met with unqualified acceptance, however (Brown 1995). Some have pointed out the numerous ethnographic exceptions to the predicted isomorphism between social organization and mortuary treatment (Childe 1945; Leach 1977; Ucko 1969), including cases where mortuary ritual is used to manipulate or even subvert the social order (Chapman and Randsborg 1981; Trinkaus 1984). Pearson (1982) made the case that mortuary practices are conservative, and tend to reflect traditional roles as a reaffirmation of the past. In a similar

vein, Morris (1987) suggested that mortuary ritual reflects an *idealized* social structure that may deny, reflect, or exaggerate empirical relationships of authority. Even those who accept the postulated relationship between mortuary ritual and social organization may question how accurately archaeological data reflect the behaviors that generated the remains. Archaeologists typically deal with only one facet of mortuary behavior: that concerned with disposal of the corpse (Bartel 1982). But, as Morris (1987: 29) notes, "burial is only part of a funeral, and a funeral only part of the social circumstances surrounding the biological fact of death". Equally importantly, burial is only one of many possible methods of corpse disposal, but the only one likely to be identifiable archaeologically (Leach 1977; Ucko 1969). If some members of a past society were left exposed, or placed in trees, or deposited in the water, all evidence of these alternative burial treatments, and the true complexity of the mortuary program, would be lost.

Burial samples are often recovered incidental to other archaeological research programs, raising problems of inadequate or inconsistent data collection (Humphreys 1981). Entire cemeteries are rarely excavated, introducing the possibility of sampling bias, particularly for rare or unusual burial types, or where there exists unrecognized spatial patterning (Peebles 1971; Tainter 1978). The collection of samples large enough to draw statistically valid conclusions is always a problem archaeologically, but large samples may present equally vexing problems of diachronic distortion (O'Shea 1984). Spurious organization may be introduced by post depositional transformation processes (O'Shea 1984) while other organization and information may be lost due to differential preservation (Brown 1995). Finally, there are problems of interpretation, including distinguishing idiosyncratic variation from emically meaningful differences (Ucko 1969), and the selection of appropriate methods of analysis (Braun 1981).

Attempts in recent years to overcome some of the more obvious limitations of mortuary archaeology have resulted in a shift away from the study of individual burials from a single site, to the examination of burial data from a regional perspective (e.g., Beck 1995). Although something of the true range of variation will inevitably be lost through archaeological transformations, it is expected that the broader perspective provided by a regional focus will provide a more representative picture of the prehistoric mortuary program.

Mortuary Analysis On The Northwest Coast

In the past, interpretations of mortuary variability on the Northwest Coast have tended to focus on diachronic change as an explanatory model. This emphasis on temporal variation is a natural outgrowth of the cultural-historical paradigm that has directed much of the previous archaeological research in the region. The major goal of such research has been the construction of a classification of normatively-defined cultures in time and space (Nash 1983). In keeping with this cultural-historical perspective, burial remains were examined primarily in an attempt to determine the "typical" mortuary practice(s) characteristic of each cultural-chronological unit. For example, burial position (extended versus flexed) is one of the traits used by Carlson (1970) to distinguish Mayne phase from Marpole phase components in his San Juan and Gulf Islands excavations. Burials with abundant and/or exotic grave inclusions, especially beads, were generally assumed to date to the Marpole period (Hall and Haggarty 1981; Calvert 1970; Murray 1982; Burley 1980). Borden (1970) lists midden interment among the traits distinguishing the Locarno Beach, Marpole, and Whalen II phases in the Gulf of Georgia, with inhumation being replaced by disposal in above-ground mortuary houses in the subsequent Stselax phase.

With an increasing number of sites excavated, and the accumulation of more abundant and varied data, previous perceptions of prehistoric mortuary practices have been modified and refined. The search for "normative" burial patterns has yielded to the recognition that all cultures are characterized by a variety of burial treatments, which are correlated with such variables as the individual's age, gender, social status, and the circumstances or manner of death. Earlier normative interpretations are now seen to be too simplistic and often erroneous. For example, it is now known that Mayne phase components contain both flexed and extended interments, and that extended burial occurs, albeit infrequently, throughout the temporal and spatial continuum of the Northwest Coast culture area (Curtin 1999). Application of radiometric dating techniques to human skeletal remains has demonstrated that lavish grave goods, including abundant beads, are not limited to Marpole burials, but occur in both earlier and later contexts (Curtin 1999; Cybulski 1991b).

Coincident with the realization of the limitations of the normative approach and the recognition of variability in mortuary practices within cultures, there

has occurred a shift in research objectives away from cultural-historical reconstruction and towards the understanding of cultural processes. On the Northwest Coast, this shift in theoretical perspective has led to an increased interest in the use of mortuary data to identify social patterns, and in particular to detect the presence and/or possible origins of social stratification (Burley 1989; Burley and Knüsel 1989; Brown 1996; Curtin n.d.; Thom 1995). So far, these attempts have met with only moderate success, due in part to the limitations of the available data.

Diachronic change has not been entirely abandoned as an explanation for at least some of the apparent mortuary variability, however. Borden's (1970) suggested shift in disposal methods in the Fraser Delta region has been enlarged on and applied to the entire Northwest Coast culture area by Cybulski (1992) who postulates a radical shift from exclusively subsurface midden interment to exclusively above ground disposal occurring sometime around A.D. 1250. In particular, the use of caves and rockshelters as burial sites is thought to have a very recent history, dating to the protohistoric or early historic period (Cybulski 1978, 1992).

Mortuary Variability On Gabriola Island

The False Narrows site on Gabriola Island has yielded one of the largest, well-documented prehistoric human skeletal samples in the Gulf of Georgia region. Excavations of this large shell midden in the late 1960s recovered 49 burials containing the remains of 82 individuals (Mitchell 1967; Gordon 1974). These included flexed, semi-flexed and extended inhumations, some of which were associated with rock features, and many of which contained elaborate grave goods. The majority of the False Narrows burials were attributed to the Marpole culture type (ca. 2500-1500 BP) on the basis of their stratigraphic provenience and associated grave goods; the remainder were assigned to a Developed Coast Salish component (1500 BP - Contact). None of the burials was directly dated. The sample was analyzed by Marjory Gordon as part of her M.A. research at the University of Calgary (Gordon 1974), and has lately been reexamined in an attempt to identify the presence of ascribed status (Burley 1989).

Recently a cluster of small caves and rockshelters containing human bones was discovered about one kilometer inland from the False Narrows site, at the base of a steep sandstone bluff (Wilson 1987). Surface skeletal remains were collected in an attempt to discourage pothunting at the sites; a preliminary examination of this material suggested that they represented secondary surface disposals, some of which had been cremated. Because of the physiographic context, it was initially assumed that the remains were of late prehistoric or early historic provenience (Skinner 1991), but radiometric dating of four of the recovered skeletal elements produced unexpectedly old age estimates ranging from 2170-2760BP. Therefore the inland cave/rockshelter burials therefore appear to be roughly contemporaneous with, or slightly older than the False Narrows midden burials, assuming that the latter's Marpole attribution is correct.

The inland bluff burials of Gabriola Island represent a unique form of prehistoric disposal practice, previously unknown in the Gulf of Georgia region, and one that is in imminent danger of destruction through pothunting and land development. Their relationship to the nearby midden burials is unclear, although three possibilities are suggested: they may represent a different biological population with different mortuary customs; they may represent diachronic changes in burial practices within the same group; or they may represent differential mortuary treatment of one or more segments of the same population.

A small-scale survey and excavation program was initiated in 1989 to locate additional burial features along the inland bluffs of Gabriola Island, and to recover the human remains interred there (Curtin 1991b). The goal of this project was to recover a sufficiently large sample of cave/rockshelter burials for comparison with the existing collection of midden burials from False Narrows, and to examine the biological and physical attributes of the skeletons in an attempt to determine the relative contributions of temporal change, population differences, and social differentiation to the observed variability in mortuary practices.

Organization

Chapter 2 places the study in regional context, describing the physical setting, the ethnographic peoples, and the history of archaeological research in the area, with a focus on burial remains. Chapter 3 outlines the methods of data collection and analysis employed in all four phases of investigation: burial site survey, excavations, osteological analysis, and hypothesis testing. The following six chapters are primarily descriptive, presenting the results of the site reconnaissance and the excavations of five selected burial features, respectively. The three hypotheses are addressed in turn in Chapter 10 which also summarizes the characteristics of the Gabriola Island cave/crevice burials and their place in regional prehistory.

Chapter 2

The Study Area

Physical Setting

Gabriola Island is situated in the Gulf (Strait) of Georgia, a distinct natural region bounded on the west by the mountain ranges of Vancouver Island, on the east by the Coast Mountains and the Fraser River canyon, on the north by Seymour Passage, and on the south by Puget Sound (Mitchell 1971). The region as a whole is characterized by a temperate climate and abundant and varied food resources, including fishes, shellfish, waterfowl, land and sea mammals, roots, and berries, making it an appealing setting for human habitation. Of particular importance to the earlier inhabitants were the many streams and rivers flowing into Georgia Strait, which attracted the large populations of anadromous fish upon which traditional subsistence was based.

Gabriola Island is the northernmost of the southern sub-group of Gulf Islands, lying along the southwestern side of the Gulf of Georgia opposite the modern city of Nanaimo (Figure 2.1). The island, which is 15 km long and ranges from 3.5 to 6 km in width, lacks primary streams, and fresh water sources are limited to a few small, marshy lakes and occasional springs. Its terrain is hilly rather than mountainous, with a maximum elevation of 160 m above sea level. The dominant landforms are long, low, westerly-facing cuestas (steep ridges), capped by hard conglomerate and sandstone of Upper Cretaceous age (Williams and Pillsbury 1958). These ridges form a dramatic shoreline escarpment along the western half of the southern shore, then veer several hundred metres inland opposite Mudge Island and False Narrows. Sandy soils derived from bedrock occur above the escarpment, and a transitional zone of thicker material, a mixture of sandy till and colluvium (fallen sandstone and conglomerate blocks), forms an apron along its toe. Behind False Narrows, a gently-rolling lowland of glacial till and marine sediments, underlain by relatively soft and erodible shales and siltstone, extends from the escarpment westward to the ocean front (Muller 1977).

The area was ice-covered during the last Pleistocene (Fraser) glaciation, from about 17,000-13,000 BP (Clague et al. 1982), and since the direction of ice flow was generally parallel to the axis of the Gulf of Georgia, which is also parallel to the bedrock structures of Gabriola Island, the lowland-escarpment contrast may have been enhanced by selective glacial erosion of the softer rock. Between 12,000 and 11,500 years ago, when sea level was much higher than at present, the False Narrows bluffs would have formed a sea cliff; distinctive honeycomb weathering on some of the fallen sandstone blocks and rock outcrops suggests that the fallen blocks reached their present position about this time (Ryder 1992).

Relative sea level dropped abruptly after deglaciation due to isostatic rebound, which outstripped the absolute eustatic rise from glacial meltwater, reaching a nadir of -11 m by about 8,000 years ago. Since then sea level has risen steadily as a result of residual eustatic effects and/or tectonic subsidence of the coast, approaching its present position sometime after 2,000 years ago (Clague et al. 1982; Williams and Roberts 1989; Clague and Bobrowski 1990). From archaeological evidence, Burley (1989) has argued that sea level in the False Narrows region was 3 m *higher* than present until about 1,800 years ago, when an unspecified seismic event uplifted the coastline to its present position. Although localized fluctuations in land-sea relationships are certainly possible, a change of this magnitude is not supported by evidence from other archaeological sites in the region (Whittaker and Stein 1992; Carlson and Hobler 1993).

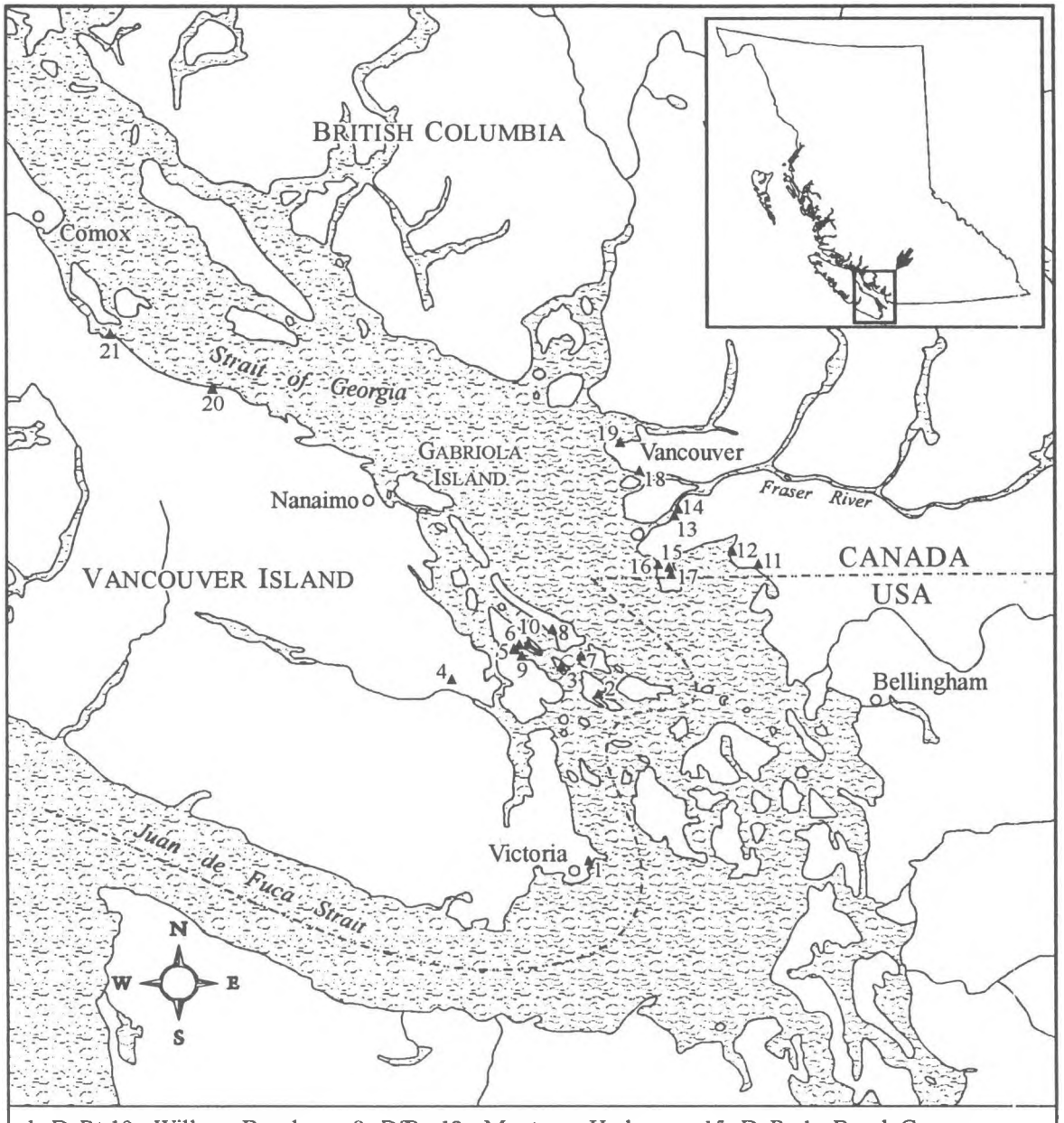

Figure 2.1 Gulf of Georgia region with selected burial sites (scale 1:1,500,000).

Ecologically, Gabriola Island falls within Krajina's (1965) Coastal Douglas-fir Drier Biogeoclimatic Subzone, and the Gulf Islands Biotic Area as defined by Cowan and Guiget (1975). The climate is characterized by warm, dry summers and mild, wet winters. Major vegetation consists of mixed coniferous and hardwood forest; dominant species include Douglas-fir (*Pseudotsuga menziesii*), Western red cedar (*Thuja plicata*), and grand fir (*Abies grandis*), with groves of Garry oak (*Quercus garryana*) and arbutus (*Arbutus menziesii*) occurring on dry, rocky hillsides, and western hemlock (*Tsuga heterophylla*) on cool, north-facing slopes (Williams and Pillsbury 1958).

Currently, mammalian fauna on the island are limited to coast deer, northwest raccoon, and red squirrel, but in the past may have included wapiti, black bear, cougar, and wolf. Birds, especially sea birds, are abundant, particularly in the spring and fall when migrating flocks of ducks and loons pass through the area. Marine life is both plentiful and diverse, with many species of sea mammal, fish, molluscs, and crustaceans colonizing the surrounding waters (Williams and Pillsbury 1958). Modern climatic patterns and biotic regimes in the Gulf Island region are thought to have been relatively stable for the past 3,000 years or more, although minor intra regional fluctuations may have occurred.

Ethnographic Context

Gabriola Island falls within the traditional territory of the Nanaimo peoples, a Halkomelem-speaking division of the Coast Salish ethnolinguistic group. The Coast Salish inhabited the central portion of the Northwest Coast culture area, including the circumference of the Gulf of Georgia, Puget Sound, parts of the Olympic peninsula, and most of western Washington (Drucker 1955). The Halkomelem language includes three main dialect groups: an Island group, spoken by people, including the Nanaimo, who wintered on Vancouver Island; and Downriver and Upriver groups, spoken by people who lived on the mainland along the Fraser River. In addition to the Nanaimo, the Island Halkomelem are comprised of the Nanoose, the Chemainus, the Cowichan, and the Malahat (Suttles 1990).

Boas described the traditional territory of the Nanaimo (Snanaimuq) people as extending from Five Finger Island in the north to Dodds Narrows in the south, encompassing the Nanaimo River basin and Gabriola Island (Figure 2.2). In addition, a coastal strip from Dodds Narrows to Yellow Point was shared by the Nanaimo and the Qalältq (Boas 1889). Bouchard (1992) gives the Nanaimo Lakes area as the inland (western) boundary, and suggests that Nanaimo territory may have extended slightly further north (to Neck Point) and south (to Boat Harbour) than Boas indicated, and included other offshore islands as well as Gabriola.

In the 19th century, the Nanaimo occupied five fall villages along the Nanaimo river (Boas 1889). Each village was inhabited by a distinct, named group (Barnett 1955), which may have represented a single, large extended family (Rozen 1985), gente or clan (Boas 1889). The names, which apparently referred to village locations, have been variously transcribed as Tē'wětqĕn (Tewahlchin or téytexen), Yē'cĕqĕn (Ishihan or yéshexen), *K*oltsī'owotl (Kwalsiarwahl, or kwelsíwelh), Osâ'loqul (Solachwan, or xwsó'lexwel), and Anuĕ'nes (Anuweenis, or enwínes) (Boas 1989; Jenness n.d.; Bouchard 1992). The Tē'wětqĕn and the Yē'cĕqĕn were the highest ranking or "noblest" of the five groups, and they alone had the hereditary right to use the sxwayxwey mask and dance (Boas 1889; Rozen 1985). The Osâ'loqul, on the other hand, may have been more dominant economically, since they controlled the only salmon weir on the Nanaimo River (Barnett 1955; Rozen 1985).

The Nanaimo River villages were occupied from August or September until December, during which time the people fished for chum on the Nanaimo River, fished for halibut and collected clams and cockles at Nanaimo Harbour, and collected fern roots from family-owned beds near the Nanaimo River (Rozen 1985). Four of the groups moved to their villages at Departure Bay for the winter ceremonials, where they remained until March; the fifth group, the Osâ'loqul, maintained a separate winter village at the mouth of the Nanaimo River. Subsistence activities while in the winter villages included collecting butter clams and little neck clams along the inner shore of Departure Bay and the northwest side of Newcastle Island, smoke-drying coho salmon, and collecting herring roe (Rozen 1985).

In March or April, the seasonal round brought the Nanaimo to Gabriola Island, where a significant amount of the next winter's food was collected. From their temporary shelters on the island, they fished for cod, grilse, and halibut, gathered clams and mussels, hunted seals and sea lions, raked herring and gathered herring spawn, collected sea urchins, and gathered camas bulbs (Barnett 1955; Jenness n.d.; Rozen 1985). Permanent house frames may have been maintained at the village of *Senewélets* at False Narrows, the site of a major clam bed, and certain clamming areas and camas beds may have been owned by individual families.

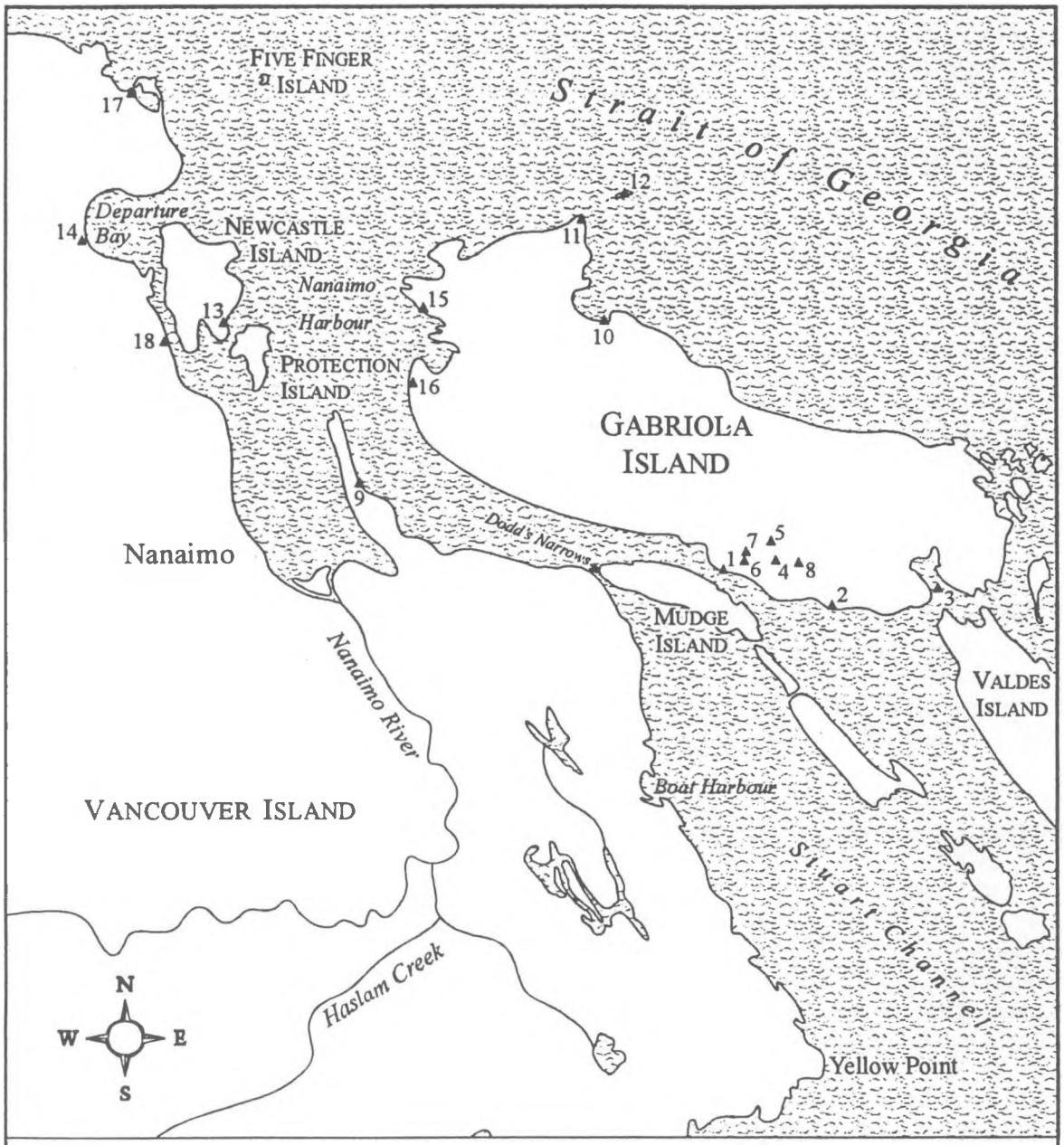

Figure 2.2 Nanaimo region with selected burial sites (scale 1:150,000).

Duff (1952) reported considerable intermarriage between the mainland and island Halkomelem speakers, and those of the Nanaimo with relatives on the lower Fraser River would move there in July and August to fish for sockeye and humpbacks. One of these Nanaimo fishing villages is said to have been located near Fort Langley (Rozen 1985). Other subsistence activities that took place on the mainland were hunting for deer and elk, and gathering edible roots and berries (Murray 1982).

While no comprehensive account of Nanaimo burial practices is available, a general picture of Salishan mortuary ritual may be gleaned from various ethnographic sources, with the understanding that specific practices varied somewhat according to ethnic group, individual family customs, personal characteristics of the deceased, and the preferences of the ritualist who presided over the ceremonies (Barnett 1938, 1955; Boas 1889, 1891, 1894; Jenness n.d.; Maud 1978). After death, the corpse would be washed, dressed in its best clothing, and painted with ochre around the head and face; it was then wrapped in a blanket, bound in a tightly flexed position, and placed in a cedar box which would be deposited either on a raised platform supported by posts, in a mortuary house, on a nearby rocky islet reserved for cemetery use, or, less often, in the branches of a spruce tree. Whatever the location of the final disposal site, family members tended to be placed near one another, either in the same grave house or in family clusters in the communal burial area. Personal belongings of the deceased might be placed in the burial box with the corpse, burnt at the grave site, or distributed amongst the mourners. Food offerings were burnt at the grave site within a few days of the funeral, and periodically afterwards food would be set aside and burnt to propitiate the spirits of the dead.

Exceptions to this general pattern, where reported, appear to have been based primarily on age and status distinctions: infants and slaves might be buried in baskets or blankets rather than in boxes; wealthy or high-ranking individuals might be placed in canoes, or have their burial boxes and/or grave posts embellished by carving or painting; the grave of a renowned warrior might be marked by a carved human figure holding a war club. Other possible bases for differentiation, such as occupation in life (e.g., shaman) or manner of death (e.g., suicide) do not appear to have been recognized in mortuary treatment, and many prehistoric practices, such as cremation, subsurface inhumation, and cairn burial, were unknown ethnographically (Barnett 1955; Jenness n.d.).

Corpses were viewed with apprehension as a possible source of spiritual contagion, so much of the ritual surrounding death was concerned with cleansing the mourners, particularly the surviving spouse, from their contact with the deceased. Again, specifics of these ceremonies and their length varied according to ethnic identity, degree of relationship to the deceased, and the individual ritualists' practices, but common features appear to have included avoidance of others, dietary restrictions, early morning rites, bathing, cutting/washing/combing the hair, and painting with ochre.

Although little (apart from Boas' cursory 1889 paper) has been reported in the ethnographic literature that deals specifically with the burial customs of the Nanaimo people, 19th century paintings of the Departure Bay cemetery by James Alden illustrate many of the features reported by Coast Salish ethnographers, including an apparent canoe burial, carved mortuary posts, above-ground box burials, a carved/painted mortuary house, and a standing human figure holding a rifle (Bouchard 1992: A19; Wilson 1994: 22).

Regional Culture History

The results of almost 100 years of archaeological investigations in the Gulf of Georgia region have illuminated the past 9,000 years of human occupation of the area. This broad span of human history has been placed in a chronological framework of five sequential, named "culture types" (Mitchell 1971), each defined by variations in artifact types and technologies, and inferred subsistence patterns and organizational features. Although some differences of opinion exist on the exact dates (measured in "years before present" or BP) and time spans of these cultural-chronological divisions, the following framework is generally accepted.

Old Cordilleran Culture Type (9000-4500 BP)

The earliest evidence of human occupation of the Gulf of Georgia region has been attributed to the Old Cordilleran culture, which is best known from the Glenrose Cannery site on the Fraser River (Matson 1976). The material culture is dominated by pebble tools, flake tools, and leaf-shaped bifaces. Ground stone is uncommon, but does occur in the form of abraders used in the manufacture of bone and antler tools, which are relatively abundant. Some sites show extensive use of maritime resources, including salmon, shellfish, and sea mammals, while others exhibit a more terrestrial orientation, indicating a variable focus on locally-available resources. The archaeological re-

cord, which is admittedly sparse, shows no evidence of long-term occupations, seasonal population aggregates, or food storage technology, which are so important to the ethnographic Northwest Coast pattern (Matson and Coupland 1995: 96). However, tantalizing evidence for the beginning of status differentiation has recently been recovered from DeRt 2 on Pender Island, where a midden burial with ochre associations (Weeks 1985: 98) and unequivocal evidence of labret wear on the anterior mandibular teeth (Cybulski 1991a: 7) has been radiometrically dated at 5150 ± 220 BP (Carlson and Hobler 1993: 38). The archaeological culture represented by the Early Midden component materials from this site has not yet been fully characterized, but appears very similar to the succeeding Mayne Phase component (Carlson and Hobler 1993: 45).

The origins of the earliest occupants of the Gulf of Georgia are somewhat controversial. Matson and Coupland (1995: 67) derive Old Cordilleran from the earlier Protowestern Tradition (Borden 1969), which in turn they see as originating from the Paleoindian populations of the continental interior, the big-game hunting Clovis Tradition. Carlson, on the other hand, sees the earliest culture, which he terms the Pebble Tool Tradition, as an extension of coastal Beringinan culture that expanded southward down the coast after deglaciation, and only later progressed up the river valleys into the interior (Carlson 1995:13-18; 1996:8-9).

Charles Culture Type (4500-3300 BP)

The Charles culture is commonly subdivided into three regional variants: the St. Mungo phase in the Fraser delta; the Mayne phase on the Gulf Islands; and the Eayem phase in the Fraser Canyon (Pratt 1992: 6). It is distinguished from the preceding Old Cordilleran Culture by a substantial decrease in the number of pebble tools, the introduction of stemmed projectile points (in addition to the leaf-shaped varieties which persist), and a significant increase in ground stone technology (Matson and Coupland 1995: 100). Bone and antler tools are common, and shell artifacts, mainly in the form of beads and other decorative items, appear. Artifacts unique to the Charles Culture include shaped stone tablets with incised marginal lines, and bipointed bone objects ("grubs") incised with parallel grooves (Pratt 1992: 20).

Faunal remains from Charles Culture sites indicate a broad-based subsistence pattern. Large mammals are still present, but there is an increasing emphasis on marine resources, particularly salmon and shellfish, with bay mussel predominating. The frequency of salmon cranial parts at some sites led Matson and Copeland (1995: 125) to infer that large-scale storage was absent, but recent evidence of wooden-stake fish weirs at the Glenrose Cannery site, radiocarbon dated to 3950 ± 60 BP and earlier, suggests that intensification of salmon procurement, and by extension, preservation and storage, developed during the Charles culture (Eldridge and Acheson 1992).

Charles period human burials have been reported from a number of sites in the Gulf of Georgia region, including Helen Point (Carlson 1970), Bliss Landing (Beattie 1972), Crescent Beach (Percy 1974), Glenrose Cannery (Matson 1976; Styles 1976), Tsawwassen (Curtin 1991a), and Pender Canal (Carlson and Hobler 1993) but only at the latter two sites have these attributions been substantiated by direct dating of the burials. A multiple burial of 10 individuals at Duke Point, DgRx 5, with a radiocarbon age of 3490 ± 125 BP, may also belong to this culture type, although it has been reported as a Locarno phase interment (Cybulski 1991b). With the exception of the as yet incompletely described collection from Pender Canal, reported to comprise 105 individuals (Carlson and Hobler 1993: 38), burial samples from Charles components are relatively small (2-13 individuals). Burial features range in complexity from simple shallow pits, to rock-lined graves, to more elaborate stone slab cists (Percy 1974; Curtin 1991a; Carlson 1990). Deposition may be on the side, back or seated; legs may be flexed or extended; and both single and multiple interments are known. Intriguing evidence for associated mortuary ritual involving the ceremonial feeding the dead (large clam shells placed near the hand, carved antler spoons placed near the mouth) is reported from Pender Canal (Carlson 1990: 84, 1999).

Charles period burials are often characterized as impoverished and egalitarian in comparison with later Marpole burials (Burley and Knüsel 1989; Matson and Coupland 1995), but this impression may have to be reevaluated as more information on the earlier burial types becomes available. Labrets have been reported as grave goods at Pender Canal (Carlson 1990: 84), while labret facets were observed on the anterior mandibular teeth of two adult males from Tsawwassen (Curtin 1991a: 82). Other inclusions indicative of personal wealth or status, including red ochre, and shell and soapstone ornaments have been found with both adults and subadults at Glenrose Cannery, Pender Canal, Tsawwassen, and Duke Point. Significantly, two of the richest burials known from the entire Gulf of Georgia region, burials D-14 and D-16 from Tsawwassen, have been firmly established in Charles context, with bone collagen dates of 3880 ± 50 BP and 3800 ± 60 BP respectively (Curtin 1991a, 1999). The

subadult age of D-14, buried with more than 53,000 beads, effectively challenges the premise that ascribed status was absent prior to the Marpole culture.

Locarno Beach Culture Type (3300-2400 BP)

The Locarno Beach Culture, once thought to herald the migration of "Eskimoid" peoples to the Gulf of Georgia region (Borden 1951), is now accepted as an evolutionary transition from the earlier Charles Culture (Mitchell 1990: 352; Pratt 1992: 224). In terms of material culture, the main differences between the two are an increase in ground stone and bone tools in Locarno, and the introduction of new ground stone tool types (Matson and Coupland 1995: 163). Distinguishing features of Locarno Beach Culture include composite toggling harpoons, unilaterally barbed bone points, large faceted ground slate points, thick ground slate knives, ground stone and coal labrets, small well-made ground stone celts, chipped stemmed points, obsidian microblades, quartz crystal microliths, and a distinctive group of finely-made ground stone or bone objects of uncertain function, known as Gulf Island Complex artifacts (Mitchell 1990: 341; Matson and Coupland 1995: 156). Wet sites such as Musqueam NE have also yielded evidence of material culture that normally doesn't preserve in archaeological settings: twine, cordage, netting, basketry, woven hats, wooden wedges, and bentwood fishhooks (Archer and Bernick 1985).

Subsistence data reveal a continuation of the trend towards salmon intensification; not only are salmon remains much more common than in earlier deposits, but the rarity of cranial parts implies that the fish were being processed and stored as preserved salmon backs (Matson and Coupland 1995:173). Innovations in subsistence during the Locarno Beach period include the introduction of large scale herring use, and a shift in emphasis in shellfish utilization from mussel to various species of clam.

The Locarno Beach culture is perhaps the least well known in terms of mortuary patterns, although burials attributed to this period are reported from many sites: Montague Harbour (Mitchell 1971), Crescent Beach (Percy 1974; Trace 1981), Locarno Beach (Beattie 1980), Beach Grove (Ball 1979), Duke Point (Cybulski 1991b), Whalen Farm (Thom 1992), and Pender Canal (Carlson and Hobler 1993). Possible late Locarno (or early Marpole) burials have also been recovered from Willows Beach (Kenny 1974) and Helen Point (McMurdo 1974). [Despite Cybulski's statement (1992: 35) to the contrary, no known Locarno burials were recovered from Tsawwassen]. Cultural-chronological attributions of these burials were based primarily on stratigraphic and artifactual associations, with only the Beach Grove, Duke Point, and Pender Island assignments supported by radiocarbon dates (and, as was noted above, the Duke Point burials may actually belong to a late Charles rather than a Locarno component). In most cases, sample sizes are quite small, ranging from 2-10 individuals.

Most commonly, Locarno period burials feature semi-flexed to tightly flexed skeletons, placed in shallow oval pits dug into midden deposits, with few or no grave goods. Several burials have associated rock features, varying in elaboration from a simple ring of cobbles capping the burial pit (Percy 1974), to large sandstone slabs placed over a portion of the skeleton (McMurdo 1974), to moderate-sized boulder and cobble cairns (Mitchell 1971; Kenny 1974). One *possible* cremation was reported from Montague Harbour, although it was uncertain that the observed burning was related to mortuary ritual (Mitchell 1971: 149). Many of the Crescent Beach burials exhibit labret wear facets on the anterior mandibular teeth, which has been variously interpreted as evidence for ascribed (Cybulski 1991a: 15) or achieved status (Matson and Coupland 1995: 182) in Locarno culture; however Cybulski's (1991a: 11) suggestion that *all* of the burials from the site with such facets date to the Locarno period appears unwarranted given the substantially earlier examples of labret wear at Pender Island and Tsawwassen (see above) and the much later specimen from Coldicutt Creek (see below). The Pender Island burial collection also includes one of the earliest well-dated (2620 ± 50 BP) examples of cranial deformation known from the Gulf of Georgia region (Carlson and Hobler 1993: 39).

Marpole Culture Type (2400-16/1500 BP)

This period in the prehistory of the Gulf of Georgia saw the full achievement of the Developed Northwest Coast Pattern. Marpole Culture exhibits many continuities with the preceding Locarno Culture, and is commonly regarded as an *in situ* development. Distinctive elements of material culture include thin, finely made ground slate knives and points, celts, microblades and microcores, labrets, nipple-top hand mauls, perforated stones, large needles, unilaterally barbed antler harpoons, unilaterally barbed fixed antler points, stone and antler sculpture, and native copper ornaments (Mitchell 1990: 344; Burley 1980: 19-28). Overall, there is a reduction in chipped stone technology, and a greater reliance on ground stone and bone

tools. Perishable artifacts, such as cordage, basketry, and wooden wedges, have been recovered from waterlogged deposits of at least one site (Bernick 1989). House remains are known from a number of sites, providing evidence for both multifamily households, and large villages of planked houses, two essential features of the ethnographic cultures of the Northwest Coast. Faunal analyses and seasonality studies further indicate the presence of the traditional subsistence round, including both specialized resource procurement locations and winter villages dependent on stored salmon (Matson and Coupland 1995: 224).

Marpole period components have yielded the largest sample of burials from the Gulf of Georgia region, as well as the most complex in terms of abundance and richness of grave inclusions (Burley 1980: 29; Burley and Knüsel 1989: 7; Cybulski 1992: 34). So strong is the perceived correlation between mortuary elaboration and Marpole affiliation that in the past many burials with moderately abundant grave goods, especially shell or stone disc beads, have simply been assumed to be of Marpole age (Calvert 1970: 59; Hall and Haggarty 1981: 99; Murray 1982: 128), despite, in some cases, other lines of evidence that clearly indicated otherwise. The rich bead burials recovered from the St. Mungo component of the Tsawwassen site (Section 2.3.2), however, demonstrate that neither the presence of beads nor the abundance of associated grave goods can be considered diagnostic markers of the Marpole culture, as has been suggested in the past (Borden 1970; Mitchell 1971; Burley 1980). This raises some uncertainty as to the accuracy of the cultural-chronological placement of some of the largest and best known "Marpole" burial samples (e.g., Beach Grove, False Narrows, Hill Site) for which no corroborative radiocarbon dates are available, and whose cultural attributions were based primarily on artifact associations. The following discussion of current knowledge of Marpole mortuary practices should be read with these cautions in mind.

Marpole-age burials are reported from at least 14 sites in the Gulf of Georgia, including, on the mainland: Beach Grove (Beattie 1980), Crescent Beach (Percy 1974), Glenrose Cannery (Matson 1976; Styles 1976), Marpole (Beattie 1980), St. Mungo (Calvert 1970) and Tsawwassen (Curtin 1991a); on Vancouver Island: Deep Bay (Monks 1971), Maple Bay (Simonsen 1988), and Somenos Creek (Brown 1996); and on the Gulf Islands: Helen Point (Carlson 1970), Pender Canal, DeRt 1 (Carlson and Hobler 1993), Long Harbour (Johnstone 1991), False Narrows (Burley 1989), Hill Site (Hall and Haggarty 1981), and Montague Harbour (Mitchell 1971). Additional burials from either late Marpole or early Gulf of Georgia contexts are known from Tsawwassen (Curtin 1991a), Departure Bay (Arcas 1994b) and Willows Beach (Eldridge 1987a, 1987c).

Marpole burial practices appear to have been extremely variable, although the most common mode of corpse disposal was simple unelaborated flexed midden interment with few or no grave inclusions. In some cases, bodies were partially covered by rock slabs (Montague Harbour, Somenos Creek, False Narrows), and larger, more elaborate stone cairns were constructed over others (Hill Site, Deep Bay, Somenos Creek, False Narrows). One of the Somenos Creek burials featured a hearth on top of the burial pit and beneath the cairn (Brown 1996), a possible indication of mortuary ritual involving the burning of food for the dead. Burial boxes may have been utilized at the Hill Site (Burial 4) and Montague Harbour (Burial 7), based on the presence of wood fragments above and below the skeletons; definite box outlines were found at Long Harbour and Somenos Creek, the latter example with a boulder placed on top of the lid (Brown 1996). At False Narrows and at Somenos Creek burials were distributed very densely within a relatively limited space, leading to frequent disturbance of earlier burials by subsequent interments; Brown (1996) interprets this pattern at Somenos Creek as a deliberate attempt to group individuals spatially (perhaps along kinship lines) within the cemetery.

Within the Marpole burial sample there is considerable variability in the distribution and frequency of grave goods. In their 1989 review paper, Burley and Knüsel evaluated the reported burial associations of 145 individuals from 9 designated Marpole components, and concluded that 34 (23%) had well-documented grave inclusions; only 20 (14%), however, were buried with wealth objects or ritual items. The most common wealth indicators were profuse quantities of dentalia and/or disc beads of either stone or shell, in a few cases occurring so abundantly as to form a thick blanket over the body (reminiscent of the two elaborate St. Mungo phase burials from Tsawwassen, described above). The demographic profile of the "rich" burials mirrors that of the sample as a whole, with both sexes and subadults as well as adults represented, ample evidence to support the existence of ascribed status differences in Marpole times (Burley and Knüsel 1989: 9). Additional evidence of status differentiation may be found in the occurrence of labrets with two of the Hill Site burials, and the presence of labret wear facets on the teeth of a third (Hall and Haggarty 1981).

Gulf of Georgia Culture Type (1500 BP - Contact)

Due to what Matson and Coupland (1995: 218) refer to as a "seamless evolutionary transition" between Marpole and Gulf of Georgia cultures, it is often difficult to distinguish the two archaeologically, or to establish boundary dates between them. Technologically, there is a continuation of the trend, first observed in Marpole, of reduction in chipped stone and increasing dominance of bone and antler in tool manufacture. Some artifact types characteristic of Gulf of Georgia culture are: thin, triangular ground slate points, large ground stone celts, flat-topped hand mauls, antler composite toggling harpoons, decorated bone blanket pins, decorated antler combs, triangular ground mussel shell points, and a variety of bone bipoints and unipoints (Mitchell 1990: 346). Two regional variants of this culture have been identified, the San Juan phase (centred on the Gulf and San Juan Islands) and the Stselax phase (mainland Fraser delta region), but differences between the two appear minimal (Matson and Coupland 1995: 268).

In addition to the winter villages and limited activity, specialized procurement sites known from the Marpole period, defensive sites marked by "trench embankment" fortifications appear after about 1200 BP; these seem to be indicative of a significant level of inter-group conflict during this period (Matson and Coupland 1995: 270). Burial practices undergo marked change as well. The Gulf of Georgia culture saw the appearance of large, earthen burial mounds with interior rock alignments and/or cairns, often containing elaborate grave goods; although few direct dates are available they seem to date between 1500-1000 BP (Thom 1995). Finally, sometime after 700 BP, a shift from sub-surface to above-ground disposal took place, so that by the time of European Contact, interment was virtually unknown (Barnett 1955; Jenness n.d.).

Midden interments dating to the early part of this period, and apparently contemporaneous with the earthen burial mounds and large surface cairns, are reported from a number of sites: Beach Grove (Abbott 1962), Coldicutt Creek (Oliver and Skinner 1986), Crescent Beach (Ham 1982; Conaty and Curtin 1984), and Tsawwassen (Curtin 1991a) on the mainland; Cypress Street (Oliver 1993, Arcas 1993), Departure Bay (Wilson 1990b), Deep Bay (Monks 1977), Little Qualicum River (Bernick 1983), and Piper's Lagoon (Wilson 1988; Skinner and Waddell 1990b) on Vancouver Island; and DfRu 42 (Skinner and McKendry 1984), False Narrows (Burley 1989), Harbour House (Arcas 1994a), Montague Harbour (Mitchell 1971), Mueller's Cabin (Skinner and Thacker 1988), and Pender Canal (Carlson and Hobler 1993) on the Gulf Islands. With the exception of the large Tsawwassen sample, numbering 76 individuals, burial samples from these sites are small, generally less than 10 individuals, and often consisting of a single skeleton.

A range of variation comparable with the previous Marpole culture is apparent in mortuary patterns, which include simple inhumations in shallow pits (False Narrows, Montague Harbour, Tsawwassen), more elaborate rock-lined pit burials (Tsawwassen, Deep Bay), rock slab burials (Harbour House), cairn burials (Harbour House, Deep Bay), and box burials (Piper's Lagoon, Tsawwassen). Two of the Tsawwassen box burials were capped by a large boulder in a manner similar to the earlier Somenos Creek box burial, and one (D-32) was covered by a large cairn (Curtin 1991a). The Piper's Lagoon box burial may also have originally had an associated cairn, but house construction destroyed much of the contextual data (Wilson 1988). Most bodies appear to have been interred without grave goods, but at least one "rich" burial is known, with more than 100 disc and dentalium beads, some of which were elaborately carved (Curtin 1991a, n.d.); many other burials have small numbers of inclusions, primarily personal ornaments such as pendants or beads. An unusually late occurrence of labret use has been reported from the Coldicutt Creek site near White Rock, where a flexed midden burial of an adult male with artificially deformed skull was found to have labret wear on five anterior mandibular teeth; this skeleton was radiocarbon dated at 1280 ± 135 BP (Oliver and Skinner 1986).

Hearth features have been found in association with burials from Pender Canal, Little Qualicum River, and Tsawwassen, suggesting that burning of food or possessions may have figured in mortuary ritual; more direct evidence of the provision of food for the dead is apparent from the presence of articulated fish remains with one of the Tsawwassen burials, and large whole clam shell valves with two others.

The sudden appearance of burial mounds and large surface burial cairns near the beginning of the Gulf of Georgia period, their co-occurrence with midden interment for at least 500-700 years, and the sudden and apparently total replacement of both forms by the ethnographic pattern of surface corpse disposal is one of the most intriguing puzzles of Northwest Coast prehistory. Thom (1995: 45) has suggested that these changes mark the emergence of social classes in the Gulf of Georgia region, from an earlier social system based on rank status differences, a challenge to previous views that social classes were identifiable by Marpole times (Burley 1989: 62); further research is clearly needed to evaluate this provocative hypothesis.

Nanaimo Area Prehistory

Archaeological research in traditional Nanaimo territory was initiated in the 1960s and 1970s with a series of large-scale regional site inventory projects (Abbott 1963; Acheson et al. 1975; Cassidy et al. 1974; Murton and Foster 1975; Will and Cassidy 1975), that recorded hundreds of heritage sites along the shorelines of the Gulf of Georgia. The following two decades saw a narrowing of focus of archaeological surveys to the impact zones of specific development projects (Apland 1977, 1980; Duff and Brolly 1978; Simonsen 1991, 1996; Wilson 1987). Apart from small-scale evaluative testing on Newcastle Island (Monks 1971; Noury 1971), Protection Island (McMurdo and Lundy 1975), Gabriola Island (Wilson 1987), and at Departure Bay (Sendey 1970), most excavations in the Nanaimo area have been salvage-oriented, stimulated by the anticipated deleterious impact of major development projects to known archaeological sites. These include large-scale mitigative excavations at False Narrows (DgRw 4) on Gabriola Island (Mitchell 1967; Burley 1989), at a series of sites (DgRx 5, 11, 29, and 36) in the vicinity of Duke Point (Apland 1977; Mitchell 1979a; Murray 1982), and at Departure Bay (DhRx 16) in Nanaimo (Wilson 1990a, 1990b, 1991, 1994; Arcas 1994b, 1994c). Additional small-scale salvage excavations have been implemented periodically to recover human remains from a number of sites in the vicinity (Oliver 1990, 1993; Skinner and Thacker 1988, 1989; Skinner and Waddell 1990a, 1990b; Wilson 1988). At nine sites, C-14 dates and/or the presence of temporally-diagnostic artifacts have permitted their placement within the regional cultural chronology, demonstrating a history of occupation dating back more than 4,000 years (Table 2.1).

Of particular relevance to the current project are the many sites in traditional Nanaimo territory that are reported to contain human remains. In Nanaimo itself, the large Departure Bay midden (**DhRx 16**) has yielded abundant evidence of burials dating to the Marpole and Gulf of Georgia cultures (Acheson et al. 1975; Arcas1994b, 1994c; Wilson 1990a, 1990b, 1994). The majority appear to be flexed midden inhumations with few or no grave goods, but one possible cremation (Arcas 1994b) and several possible surface interments (inferred from the presence of disarticulated skeletal elements) have also been reported (Wilson 1994). Pathological lesions suggestive of syphilitic osteomyelitis were identified on the long bones of one fragmentary, disarticulated skeleton from the Randle Road site (Wilson 1990b). Also in Nanaimo, the Cypress Street site (Oliver 1993; Arcas 1993) has yielded evidence of one of the latest midden burials recorded in the region, dated at 410 ± 50 BP (Curtin 1999).

On nearby Duke Point, an unusual mass burial of 10 individuals (two young adult males, two young adult females, an adolescent, a juvenile, two children, an infant, and a fetus) was recovered from midden deposits at **DgRx 5** (Murray 1982). The skeletons were aligned more or less parallel to each other, with heads oriented either north or south, and, unlike the Departure Bay burials, they appear to have been deposited on their backs with legs semi-flexed or extended (except for one individual whose legs were tightly flexed to either side of the torso). Grave inclusions were limited to 158 shell disc beads, found in association with two subadults, and a bone blanket pin with one of the adult females. The burial was initially attributed to the Marpole component, based primarily on the presence of the shell beads (Murray 1982), but later radiocarbon analysis of bone collagen from one of the skeletons yielded a much older age estimate of 3490 ± 125 years BP, which places the burial event near the end of the Charles or the beginning of the Locarno Beach cultures (Cybulski 1991b). Six of the skeletons exhibit pathological lesions that Cybulski interpreted as evidence of a variety of treponemal diseases, including venereal, congenital, and endemic syphilis; he implies (based on the unusual burial context) that they may have been deliberately killed to prevent further transmission of the disease (Cybulski 1991b: 17).

Just north of Departure Bay at Piper's (Page) Lagoon, a charred cedar box containing the tightly flexed remains of an adult female was recovered from another midden site (**DhRx 44**); the burial may originally have been covered by a stone cairn that was disturbed during house construction (Wilson 1988). Wood from the box yielded a radiocarbon date of 1480 ± 60 years BP, placing it near the Marpole/Gulf of Georgia interface (Skinner and Waddell 1990b).

Human burials have also been found on two small islands in Departure Bay. Oliver (1990) salvaged the flexed burial of a young adult female with artificially deformed skull (suggestive of Marpole or later contexts) from an unspecified midden site on Protection Island, and noted previous reports of human skeletal remains eroding out of the same site. Excavations at **DhRx 6** on Newcastle Island (Monks 1971) uncovered seven inhumations, six of which were found very close to the surface and thought to be relatively recent, possibly the remains of smallpox victims. The historic provenance of two of these was established by the presence of Eurocanadian artifacts (porcelain buttons, silver earrings) and square nails in the burial boxes. Excavations at **DhRx 6** on Newcastle Island (Monks

1971) uncovered seven inhumations, six of which were found very close to the surface and thought to be relatively recent, possibly the remains of smallpox victims.

Table 2.1 Cultural components reported from Nanaimo area sites.

Site	Archaeological Components	Source
DgRx 29	historic Nanaimo; Gulf of Georgia	Murray 1982
DgRw 20	Gulf of Georgia	Skinner & Thacker 1988
DhRx 66	Gulf of Georgia	Arcas 1993
DgRw 4	historic Nanaimo; Gulf of Georgia; late Marpole	Burley 1989
DgRx 36	historic; early Gulf of Georgia/late Marpole	Murray 1982
DhRx 16	historic Nanaimo; Gulf of Georgia; Marpole; Locarno Beach	Arcas 1994b, 1994c Wilson 1990, 1991, 1994
DgRx 5	Gulf of Georgia; Marpole; Locarno Beach; Charles*	Murray 1982
DgRw 200	early Marpole/late Locarno Beach	Wilson 1987
DgRx 11	Marpole; Locarno Beach	Murray 1982

* not reported by Murray, but Component I radiocarbon date of 4130 ± 100 years BP exceeds known range of Locarno Culture Type.

Two small, rocky islets off Gabriola Island were reported to have been used as burial islands by the Nanaimo people in the late prehistoric and early historic periods: Entrance Island (**DhRw 12**) north of Gabriola Island in Forwood Channel, and a small unnamed islet (**DgRw 169**) in Degnen Bay off the southeast tip of Gabriola. No burials were present, however, when the sites were formally recorded in 1975.

The remaining ten known burial sites are all located on Gabriola Island. They include seven cave/crevice burial sites and three shell midden sites from which burials or scattered human remains have been recovered. Each of the ten is briefly described below.

DhRw 1, located above Lock Bay near the northeast end of the island, is a complex of rockshelters and crevices beneath massive sandstone boulders, at least four of which contained human remains. Although the skeletal remains had already been removed by the time the site was formally recorded in 1974, some information on the original burial context was provided by a local resident who had visited the site about 10 years previously (Cassidy et al. 1974). The largest shelter was reported to contain 8-10 individuals, some with intact skeletons possibly in extended position, along with some small fragments of charred cedar; one of the skulls may also have been partially charred. The two smaller shelters contained the disarticulated remains of two individuals each; and a crevice contained the remains of one individual. The RBCM (Royal British Columbia Museum) skeletal collection from DhRw 1 is comprised primarily of cranial remains from a minimum of 15 individuals (14 adults and one child); some, but not all, of the skulls are artificially deformed, suggesting a late Locarno/early Marpole age. No artifacts are present in the collection.

Almost no information is available about **DhRw 3**, except that it is a small (1.5 m) rockshelter located "just east of Berry Pt. [Orlebar Point?], Gabriola Island". The skeletal remains of two infants were collected from the site in 1968 and accessioned by the RBCM. The pronounced artificial deformation of both skulls and the presence of fragments of cedar bark matting together suggest that these burials may date to the late prehistoric period.

Information about **DhRx 28** is also scanty. The site is described as "cave burial", located on the north shore of Descanso Bay, but no details on burial context are available since the skeletal remains were removed before the site was recorded. The RBCM collection from the site is comprised of primarily infracranial remains from a minimum of 11 individuals: 4 adults, 1 adolescent, 5 children, and 1 infant. With the exception of the infant and a 4-6 year-old child, the skeletons are very incomplete, many represented by fewer than 10 elements. The only cranial remains recovered are those belonging to the infant; both frontal and occipital bones have been artificially deformed, suggesting a post-Locarno age for this individual. No artifacts were reported in association with the human remains, but the distal left tibia of a 7-9 year-old child exhibits a pronounced green stain suggesting former contact with a copper object.

DhRx 29, a late prehistoric or early historic rockshelter site, is located near sea level, below the steep sandstone bluffs south of Descanso Bay. The site, first recorded by Sendey in 1967, and revisited by Cranny and Cassidy in 1974, is said to contain the remains of at least seven individuals, as well as fragments of painted bentwood cedar boxes, and cedar or spruce root rope. A local informant indicated that the site has been disturbed over the years, and copper bracelets and a painted panel had been removed.

The three remaining cave/rockshelter burial sites are all located inland along the base of the sand-

stone bluffs behind False Narrows, and were recorded by Ian Wilson (1987) during his survey of the bluff area. The largest of the three, **DgRw 199**, consists of a small, two-chambered cave containing the remains of at least seven individuals, and two smaller nearby crevices, each containing at least one individual. The main cave was apparently being vandalized, as digging implements were found inside the chamber. To protect the burials from further vandalism, surface remains from the main cave and one of the crevices were collected later that year (Skinner 1991). **DgRw 204**, near the top of the bluff system, was described as a severely disturbed burial under a rock overhang. Only two human skeletal elements were visible at the time the site was recorded; both were collected by Wilson. **DgRw 210** also appeared to be severely disturbed, either through vandalism or animal activity, when recorded by Wilson. The site was described as a rockshelter containing the remains of at least one individual. All human elements visible on the surface were collected in February, 1988 (Skinner and Waddell 1990a).

Excavations at a large shell midden site, **DgRw 4**, on False Narrows in 1966 and 1967 recovered 49 burials reported to contain the remains of 82 individuals (Gordon 1974; Burley 1989). This site and its burial assemblage are discussed at greater length in Chapter 3.

The final site on Gabriola Island that is known to contain human burials is **DgRw 20**, a shell midden with associated petroglyph, located on the south side of the island between False Narrows and Degnen Bay. In 1987 human skeletal remains were reported by a local resident to be eroding out of the midden bank, and the partial skeleton of an adolescent male was subsequently recovered (Skinner and Thacker 1988). A primary inhumation, the body was lying on its left side in a tightly flexed position with ochre flecks scattered over top and three polished green pebbles placed by the right wrist. Charcoal samples from beside and above the burial yielded radiocarbon dates of 900 ± 60 and 730 ± 55 years BP.

Finally, a human skull fragment was recovered by Ian Wilson from **DgRw 209**, a large midden site located near the base of the False Narrows bluffs (Wilson 1987: 57). This fragment, which was found in a test pit about 40 cm below surface, appeared to be an isolated find, but the occurrence of scattered human remains suggests that intact burials may also be present in the midden.

Chapter 3

Materials And Methods

This chapter describes the methods employed in all four phases of the project: site reconnaissance, excavation, data collection, and analysis.

Site Reconnaissance

Survey Methods

Although our reconnaissance, which took place in autumn of 1989, covered the same 3-km stretch of bluffs that was investigated by Wilson two years earlier, our survey methods were significantly different. Whereas Wilson relied on judgmental survey techniques, focussing on large boulders with prominent, open-mouthed crevices, we attempted total systematic coverage of the study area, examining the perimeter of every boulder for small, hidden crevices that might contain human bone. The reconnaissance was conducted in longitudinal transects oriented parallel to the bluffs, with crew members positioned between five and ten metres apart. The crew maintained constant visual and voice contact to ensure that all boulders and rock outcrops were thoroughly examined on all faces. Since several traverses were necessary to cover the entire rockfall area and bluff face, the crew member at the end of the survey line marked his/her position with red flagging to delineate the edges of the surveyed area for ready identification on the return sweep.

Areas surveyed included the vertical rockfaces exposed at the top of the bluffs; the steep, forested slopes below the rockface which were littered with exfoliated sandstone and conglomerate boulders and marked by occasional bedrock outcrops; and the boulder accumulations along the toes of the slopes. Boulders located at the base of the slopes were often covered with brush piles and logging slash from adjacent cleared fields, which tended to obscure any crannies or declivities beneath or between the rocks. Long sticks were employed to probe through the brush along the base of the boulders; if a cavity or depression was detected between the bottom edge of the boulder and the ground surface, the brush piles were pulled apart or cut away until the area was clear enough for close inspection.

Crevices and crannies were inspected with high-powered flashlights, and wherever the openings were sufficiently large, a crew member would crawl inside to inspect the chamber at close range. In cases where the openings were too narrow to permit entry, flashlights supplemented with mirrors were employed to inspect the interiors. When a feature containing human bone was located, it was flagged with red survey tape labelled with site and feature number, and pertinent information was recorded on a standard Feature Record Form.

Once a section of the bluffs had been surveyed, the provenances of the identified features were recorded. Burial features located in proximity to the Mussel Heights housing development were provenienced with reference to the nearest property pin. Prominent boulders were selected as arbitrary datum points for features not located within convenient distance of a permanent established datum. Given the serious problem of vandalism at some of the burial features, it was necessary that these arbitrary datums be conspicuous enough for easy relocation, but not so conspicuous as to draw the attention of pothunters or vandals to previously undisturbed burials. Datum points were marked with red paint on the selected boulder, and true compass bearings and taped dis-

tances measured from this point to the feature in question. The labelled flagging was then taken down and placed in an inconspicuous location within the feature, to avoid drawing unwanted attention to the human remains.

Recognizing that our skills in identifying burial features improved with experience, after the site reconnaissance was completed, the crew re-surveyed the portions of the upper bluffs that had been examined during the first week of field work. Three additional burial features were discovered during this re-survey. Two of these features had previously been inspected: in one case the human bones were newly exposed by animal activities; in the other the bones had been missed during the first inspection. In the third case, the feature entrance was so well concealed that its eventual discovery was surprising.

Recording Procedures

Since many of the features appeared to be associated spatially, it was decided that each crevice or cave containing human remains would not be assigned a separate site number, but that clusters of such features would be considered part of the same burial site. As a result of Wilson's survey, site numbers had already been assigned to three burial areas: DgRw 199, DgRw 204, and DgRw 210. Additional burial features discovered in the vicinity of these previously recorded sites were subsumed under the same site number, but assigned a unique feature number, with Feature 1 at each site reserved for the burials recorded by Wilson (i.e., DgRw 204-F1). Burial features remote from existing sites were assigned a new site number.

In areas of dense boulder concentrations, it was sometimes difficult to determine where one burial feature ended and another began. To facilitate recording it was decided that all caves or crevices located beneath a single capping stone would be considered part of the same feature, and that caves or crevices capped by different boulders would be considered different features regardless of their proximity. The sole exception to this rule was DgRw 199-F1, which, following Wilson's (1987) and Skinner's (1991) previous work, was treated as a single feature despite the fact that the two burial chambers were capped by separate sandstone blocks.

Standardized feature recording forms were completed in the field for each burial feature. The following information was included on each form: **Site Number,** following the Borden (1952) system of site designation; **Feature Number,** assigned sequentially within each site, as new burial features were discovered during the survey; **Location:** legal description of the property on which the feature is located; **Provenience:** true compass bearing and tape distance from site datum or property pin; **Orientation:** direction the cave/crevice opening faces, using true compass bearings; **Feature Type:** the structure of the feature, whether it is formed by a cluster of fallen boulders (Type I), a crevice beneath a single boulder (Type II), a ledge or crevice in the cliff face (Type III), or is located in the open, unassociated with rock formations (Type IV); **Number of Chambers:** if the feature is subdivided internally into two or more sections by component boulders, ceiling extensions, or other structural elements; **Height of Opening:** maximum height of the entrance to the burial cave/crevice, measured with metric tape to the nearest centimetre; **Width of Opening:** maximum diameter of the entrance; **Depth of Chamber:** a measure of approximate chamber size, obtained by extending the tape measure from the feature entrance to the back wall; **Sediments:** a description of the non-cultural materials visible on the floors of the burial features, including leaf litter, sandstone and conglomerate rubble, and animal faeces; **Bones Visible:** a catalogue of all human skeletal remains visible in the feature, with determination of broad age categories (infant, child, adolescent, adult) where possible; **Minimum Number of Individuals:** an estimate of the minimum number of individuals represented in each burial feature, based on visible skeletal elements; **Inclusions:** any materials that may be of cultural origin, such as artifacts, hearth features, midden deposits, or faunal remains; **Disturbance:** any evidence of animal or human intervention that may have affected the integrity of the deposits; **Documentation:** a record of field photographs, field notes, and drawings made of the feature; **Comments:** additional information about the structure of the feature, its setting, and any peculiarities worth noting.

Excavation Methods

Five of the burial features recorded during site reconnaissance were selected for excavation in order to collect a sample of human skeletal remains for analysis. Prior to excavation, the area around each of these features was mapped at a scale of 1:100 to illustrate its location relative to the site datum and to other features in the vicinity. Accumulated brush and leaf litter were cleared away from the perimeters to expose structural details. Plan drawings were made of each floor, indicating the positions of identifiable surface remains, and the features were mapped in cross-section to illustrate the slopes of ceiling and floor. A grid of 1.0 x 1.0 m excavation units (EUs) was then established over the

feature floor, augmented by small unit extensions (EXs) of variable size and shape where necessary to ensure complete coverage of the floor. Excavation units and unit extensions were sub-divided into 50 x 50 cm quadrants, and dug by trowel in 5-cm arbitrary levels; excavated sediments were sieved through nested screens of 6-mm and 3-mm mesh. Cultural materials (human bone, vertebrate fauna, and artifacts) collected from the screens were bagged according to three-dimensional provenience (unit/ extension, quadrant, and level). In most cases, floor plans were drawn to scale at the bottom of each excavated level, and the locations of all human elements discovered *in situ* plotted on the plan. This was not possible at DgRw 199-F1 due to the high density of human remains in this feature. All human bone clusters encountered during excavation were examined for possible anatomical articulations between elements before removal.

Excavation continued until culturally sterile deposits were encountered, or until further excavation was blocked by the presence of large immovable boulders. Stratigraphic profiles were drawn of the walls of one or more excavation units to illustrate the natural layers comprising the cultural deposits. Two-litre matrix samples were collected from each natural layer of DgRw 204-F1, and each arbitrary level of DgRw 199-F1 and DgRw 199-F9 to ensure the recovery of microfauna that might be missed during excavation and screening, and to provide quantifiable information on the abundance and species of invertebrate fauna present.

Data Collection

Human Remains Catalogue

Recovered human remains were washed in clear water and air dried for several days before further processing. Since the vertical and horizontal distribution of elements across the burial chamber can provide useful information about burial practices and post-depositional taphonomic processes, specimens were first catalogued according to three-dimensional field provenience before reconstruction was attempted, with one exception: specimens exhibiting recent fractures indicative of recovery/transport damage were reconstructed prior to cataloguing and treated as a single fragment rather than as two conjoined pieces (see below). Bone fragments too small to identify or to carry a catalogue number were counted, bagged by provenience unit, and assigned a single catalogue number.

More detailed information was collected on the remaining specimens. In addition to provenience, twelve categories of information were recorded in the Human Remains Catalogue. The first three categories are concerned with specimen identification: **skeletal element** (e.g., mandible, femur, rib), **side**, and **portion recovered** (e.g., complete, distal third, metaphysis fragment). Long bones shaft fragments that could not be attributed to a specific element were sorted into two groups based on approximate shaft diameter: humerus/tibia/femur and radius/ulna/fibula.

The next two categories (**age** and **sex**) refer to demographic characteristics of the individual from whom the specimen came. Where possible, specimens were assigned to the following age classes: infant (<2 years of age), child (2-10), juvenile/adolescent (11-20), young adult (21-35), middle adult (36-50), and old adult (> 50 years). Subadult age determinations were based on dental development, long bone lengths, and sequence of epiphyseal closure, according to the standards recommended by Buikstra and Ubelaker (1994). Adult ages were estimated from the extent of ectocranial suture closure (Meindl and Lovejoy 1985), progressive degenerative changes in the pubic symphysis (Brooks and Suchey 1990) and auricular surfaces (Lovejoy et al.1985), and degree of dental attrition, using the prehistoric Tsawwassen sample as a standard (Curtin 1991a). In practice, however, very few specimens could be aged with this degree of precision, and in most cases only an adult/subadult differentiation was possible. Sex determinations were even more problematic. With the infrequent exceptions of unusually well-preserved cranial and pelvic elements, only those elements at the morphological extremes of size and robusticity could be assigned a sex attribution with any degree of confidence. Later in the analysis, after the conjoining exercise was completed (see below), age and sex attributions were reassessed for the larger and more complete reconstructed specimens, and in many cases it was possible to refine earlier demographic estimates, or assign values to previously unaged or unsexed elements.

Next, the **condition** of each specimen was subjectively assessed as poor, fair, or good, according to the degree of weathering and/or exfoliation of cortical surfaces, and the preservation and integrity of trabecular bone. Many bone fragments were observed to be coated with an opaque, greyish-white calcareous plaque that was very resistant to removal. Most often this presented as small discontinuous patches, but occasionally it formed a thick, continuous sheet completely encasing the fragment and obscuring the cortical surface. Presence and extent of this **mineral plaque** was also recorded in the Human Remains

Catalogue, in the hopes that the distribution of affected elements throughout the burial chambers would provide clues as to its origin.

The next three data categories (**burning**, **chew marks**, and **tool marks**) record *post mortem* modifications to the specimens. The presence and degree of **burning** was assessed primarily on the basis of bone colouration as follows: (a) absent: no apparent heat-related changes; (b) slight: very light or localized discolouration with reddening or darkening of the bone; (c) moderate: extensive discolouration, dark brown to black charring or "smoking"; or (d) severe: heavily calcined, white, grey, or blue-grey in colour, often exhibiting shrinkage and warping. Once the burnt specimens had been reconstructed (see below), they were reevaluated with reference to patterns of burning damage over skeletal elements and anatomical regions of the body in an attempt to discern the condition of the bones at the time of burning, i.e., fleshed, defleshed but "green", or dry. Although the original state of the bone is only one of several variables that may affect osseous burning patterns (others include length of time in the fire, intensity of heat, and location of the bone relative to the point of oxidation of the flame), experimental studies have shown that it is possible to distinguish between the three states by examining such features as the presence and depth of surficial checking, frequency and orientation of fracture lines, and patterns of burning with reference to soft tissue cover in life (Baby 1954; Binford 1963; Shipman et al. 1984; Buikstra and Swegle 1989). From this information it is possible to infer whether the burning was a product of deliberate cultural practices, such as mortuary ritual (cremation) or food preparation (cannibalism), or the result of accidental exposure to fire, as in a forest fire.

Presence, location, and form of modification resulting from **animal chewing** was recorded as an indicator of post depositional taphonomic processes inside the burial caves. Two main types of chew marks were distinguished: rodent gnaw marks (continuous series of short, shallow, relatively broad grooves along bony ridges and crests, and at the sites of muscle and ligamentous insertions) and carnivore chew marks (conical puncture marks and linear scratches or "scoring", often in association with splintering of thinner cortical areas).

The third category of *post mortem* bone modification recorded is **tool marks**, which are always diagnostic of deliberate human intervention. Tool marks were classified into four types based on morphology and inferred etiology, following White (1992): cut-marks (narrow, linear, v-shaped incisions produced by slicing with a sharp blade); chopmarks (broad, wedge or v-shaped depressed fractures, produced by a striking action with the edge of an implement); scraping marks (clusters of superficial striations across a bone surface, produced by the removal of large segments of soft tissue); and percussion striae (very localized clusters of short, fine striations found in association with percussion fractures). The anatomical location, number, dimensions, and type of all tool marks were recorded.

The final category of information recorded in the Human Remains Catalogue is **pathology**; it includes observations on trauma, degenerative changes, infectious processes, and congenital anomalies, as well as non-specific alterations in bone texture, quantity, or morphology.

Reconstruction and Conjoining

Once all the human remains from a burial feature had been catalogued they were sorted according skeletal element and all fractured edges compared for possible articulation with other fragments. Pieces found to conjoin were reconstructed using water-soluble white glue, and a record was kept of both the number of articulating pieces and the original field provenience of each constituent piece in a conjoined "set". This information was then used to assess the degree of horizontal and vertical dispersal of fragments from a single bone. Conjoined sets whose constituent pieces all came from the same 50 x 50 x 5 cm provenience unit (unit/quadrant/level) were assigned horizontal and vertical dispersal scores of 1 (H=1, V=1); these numbers were summed to provide a total scatter score (TS) of 2. Similarly, sets whose members were found at the same level of two adjacent quadrants were scored H=2, V=1, TS=3, and sets whose members came from 4 levels of the same quadrant were scored H=1, V=4, TS=5. Calculated dispersal scores were then used to evaluate mortuary behaviour and taphonomic processes both within and between burial features.

Dispersal scores are subject to a number of biases, however, and can provide only a rough approximation of the true extent of scattering of bone fragments within burial features. Time constraints were a serious limiting factor during this exercise, allowing only a fraction of potentially conjoinable fragments to be reconstructed. It seems plausible that fragments from the same or adjacent provenience units would be more likely to be successfully conjoined than those from widely dispersed areas, simply because familiarity would enhance the likelihood of pattern recognition. Another potential problem is the lack of equivalency of the horizontal and vertical dispersal scales, although the ones arbitrarily selected may reflect actual

dispersal processes more accurately than a strictly equivalent scale.

Data Collection

After the conjoining exercise was completed, age and sex determinations and observations on pathology were reassessed in the light of the more complete reconstructed specimens. Standard osteometric data were collected on the reconstructed elements, following methods described in Buikstra and Ubelaker (1994). It should be emphasized, however, that due to the highly fragmented condition of the remains, these data are very sparse and incomplete. Observations on nonmetric traits of the teeth and infracranial skeleton were also made at this time. Traits recorded include 43 crown and root variants of the permanent dentition (defined in Turner et al. 1991), which were scored using the Arizona State University visual reference plaques to standardize observations, and 54 morphological variants of the infracranial skeleton, following the trait definitions and scoring procedures of Saunders (1978).

Minimum number of individuals (MNI) was then calculated for each skeletal element by subdividing the sample by age (adult/subadult) and by side and counting the number of adult specimens from the same side which exhibited a readily identifiable anatomical landmark, such as radial tuberosity or femoral lesser trochanter. All subadult specimens (both sides) were then seriated according to age (based on relative size) and the minimum number of subadults estimated based on a combination of age/side considerations. The adult and immature MNI estimates were summed to produce a total MNI score for each skeletal element, and the highest MNI derived from a particular skeletal element was accepted as the minimum number of individuals represented in the burial feature.

Upon completion of data collection, selected specimens were photographed and radiographed before the cave/crevice burial collection was returned to the Nanaimo First Nation for reinterment.

Comparative Analysis

To test the relative contributions of biological, chronological, and cultural differences to mortuary variability on Gabriola Island, the inland cave/crevice burials were compared with an existing human skeletal collection from the False Narrows midden, located on the shore approximately 800 m southwest of the inland bluffs.

False Narrows Burial Sample

False Narrows (DgRw 4) is a large (ca. 1,300 x 100 m) shell midden located near the middle of the southern shore of Gabriola Island, opposite Mudge Island. It contains archaeological components dating to the Marpole and Developed Coast Salish periods of coastal prehistory, as well as a more recent occupation identified with the ethnographic Nanaimo village of *Senewélets*, a seasonal clam-gathering location (Burley 1989). The False Narrows midden burial sample was recovered in the course of controlled excavations at DgRw 4 in 1966 and 1967 (Mitchell 1967, 1968; Burley 1989), and analysed by M. Gordon for her 1974 M.A. Thesis. On the basis of their stratigraphic location and associated grave goods, the majority of the recovered burials were assigned to the Marpole component; a smaller group of 4-5 individuals was attributed to the later Developed Coast Salish component.

There is some uncertainty as to the exact number of individuals represented in the False Narrows collection. Based on the sequence of assigned burial numbers, it appears that 53 burials were identified in the field. Gordon's subsequent analysis was based on 49 of the original burials (four could not be relocated); however among these 49 burials, she identified the remains of 82 individuals. Individuals newly identified in the lab were differentiated by lower case letters appended to the original burial number (i.e., Burial 51a, Burial 51b). While it is not uncommon for the more careful and detailed inspection that is possible under lab conditions to result in the identification of individuals not initially recognized in the field, there appear to be other factors operating in the case of the False Narrows burial sample. Re-examination of these remains in the course of the current project demonstrated that many of the "new" individuals defined by Gordon were actually parts of the original 53 burials. For example, the remains designated Burial 51b were found to articulate with elements from Burial 50, and remains designated Burial 30b contained elements from at least three different burials (Burials 19, 22, and 26). Two processes appear to have contributed to this confusion. The first is the prehistoric disturbance of earlier burials by later interments, a common occurrence in cemetery areas that have been repeatedly used over long periods of time. This was clearly a significant problem at False Narrows, where a minimum of 46 burials were recovered from one relatively small 5 x 4 m excavation area (Unit 1). There are also indications that some of the burial remains were inadvertently commingled prior to cataloguing, when the

bones were in transit to the University of Calgary for analysis.

Because of the uncertainty of many of the existing burial attributions, the entire sample was reassessed in terms of individuation, age, and sex, before data were collected for use in the current analysis. Methods of age and sex determination followed the recommendations of Buikstra and Ubelaker (1994), with the specific standards employed dependent on the relative age and completeness of each skeleton. Most of the skeletons are relatively incomplete, due in part to the problem of prehistoric burial disturbance, but also as a result of the excavation strategy, which dictated that only those portions of a burial which actually intruded into an excavation unit would be collected. Since many burials were not fully exposed or collected, it was often difficult to differentiate intact primary interments from scattered, disturbed remains both in the field and later in the lab.

Reevaluation of the burial sample resulted in a revised estimate of between 62-64 individuals, including 37 adults (> 20 years of age), 4 late adolescents (15-20 years), 7-8 juveniles (11-15 years), 9-10 children (2-10 years), and 5 infants (< 2 years). The False Narrows collection is remarkable for the unusually high proportion of subadults (41%), which are usually under-represented in Northwest Coast burial sites. No significant sex bias is apparent among adults from the site: 19 were classed as females, 16 as males, and 2 were of indeterminate sex. Due to the incompleteness of most of the skeletons, adults could be aged only within rather broad categories: young adult (approximately 21-35 years), middle adult (36-50 years), and old adult (> 50 years). Adult age determinations are presented in Table 3.1 for the whole sample, and for each sex separately.

Mortuary treatment at False Narrows is similar to that recorded at other prehistoric midden cemeteries: most of the bodies appear to have been placed in a flexed or semi-flexed position in shallow pits dug into the midden matrix. At least 11 of the burials have associated rock features, either one or two boulders or sandstone slabs placed over a portion of the body, or in two cases, a cairn of several large boulders completely covering the skeleton (Burley 1989). One of the cairn features (associated with an adult female/infant double interment) was capped by a cluster of whole horse clam shell valves. Grave goods were found in association with 19 (30%) of the burials (including an adolescent, Burial 52, whose skeleton could not be relocated, and which is not included in the above tabulations or in the comparative analysis). Interestingly, with the exception of infants (none of which had associated artifacts), grave inclusions were more likely to be found with all categories of subadults (child n=4, 42%; juvenile n=3, 40%; adolescent n=2, 40%) than with adults (n=10, 27%). Artifact associations range from very simple (single ornaments or tools) to very elaborate (thousands of beads, elaborately carved pendants, and ceremonial paraphernalia); a complete catalogue of grave goods and associated burials can be found in Burley (1989).

Biological Distance

The biological distance between the two Gabriola Island skeletal samples was assessed through analysis of nonmetric dental and skeletal morphological variants (also known as discrete, epigenetic, or quasi-continuous traits). The genetic basis of such variants and their utility in the elucidation of biological relationships was first demonstrated by the pioneering studies of Grüneberg (1952), Grewal (1962), and Berry (1963, 1964, 1968) on wild populations and inbred strains of mice, and the methodology has since been applied with considerable success to studies of past human populations. Although their precise mode of inheritance is unclear, it is postulated that nonmetric traits are determined by multiple genes with additive effects. The underlying genetic component is continuous in distribution, but the phenotypic expression of the genotype is governed by a threshold effect based on size, such that if the additive effects of the genes involved fall below a critical level, the trait will not be expressed morphologically, but if the additive effects exceed the threshold the trait will be expressed. Theoretically, within a biological breeding population, the probability of offspring having below-threshold or above-threshold gene associations is fixed within limits, so discrete trait frequencies are a real property of that population (Berry 1968).

Nonmetric traits were initially thought to be superior to metric variables in discriminating between populations because they appeared to be less affected by environmental influences, less subject to age and sex bias, free from intervariable correlations, and unambiguous in expression (Howe and Parsons 1967; Berry 1968; Anderson 1968); consequently it was felt that they reflected the underlying genotype more faithfully than did skeletal measurements. More recent research has demonstrated that these assumptions are not necessarily valid for all morphological variants, so some caution is necessary in selecting traits for use in distance studies. One definite advantage of nonmetric traits, however, is that they can be scored on very fragmentary and incomplete skeletal remains giving them a wider applicability than strictly metric analyses.

Studies of biological distance between human populations have relied primarily on cranial and dental traits, probably because the skull is the most intensely studied region of the human skeleton and therefore the most likely to be preserved in museum collections. Cranial variants were deemed inappropriate for this study, however, due to the possible confounding effects of artificial cranial deformation, which is prevalent in the False Narrows midden sample but rare among the cave/crevice burials. Although there is no consensus as to the magnitude of the effect of artificial deformation on cranial trait frequencies, the usual practice is either to exclude deformed skulls from distance analyses altogether (Ossenberg 1970), or to compare them only with other deformed skulls (Konigsberg et al. 1993).

Table 3.1 Adult age distributions, False Narrows burial sample.

Age	Male	%	Female	%	Total	%
Young Adult	7	0.44	11	0.58	20*	0.54
Middle Adult	6	0.38	7	0.37	13	0.35
Old Adult	3	0.19	1	0.05	4	0.11
Total	**16**	**1.00**	**19**	**1.00**	**37**	**1.00**

*Includes two individuals of undetermined sex

Infracranial morphological variants have been used much less frequently in biodistance studies, although in theory they should be analogous to cranial and dental traits in their reflection of underlying biological relationships (Saunders 1978). The validity of any biological distance analysis, whether based on dental, cranial, or infracranial traits is dependent on the selection of appropriate traits for study: those with a strong genetic component, that are unaffected by dietary, pathogenic, functional, or mechanical influences, are independent of sex and age, are not correlated with other traits, occur with variable frequencies in different populations, and can be scored accurately and reliably.

Variants employed in this biodistance analysis are a subset of the dental and infracranial traits described above. Due to the incomplete and fragmented nature of both the False Narrows and the cave/crevice collections, in most cases it was not possible to test the samples directly for intertrait correlations or age and sex bias; therefore traits selected for inclusion were ones that have been demonstrated to be free from such influences in previous studies. Using this criterion, Turner's (1990) 28 key traits recommended for population characterization were chosen from the original suite of 43 dental observations, along with two additional numerical variants, mesiodens and mandibular incisor agenesis. Both of the latter traits have been shown to be controlled primarily by genetic factors, and appear to be inherited as autosomal dominant Mendelian traits (Burzynski and Escobar 1983). Dental trait frequencies were calculated using the individual count method (Turner et al. 1991), and do not include observations on isolated teeth to avoid the possibility of double scoring one individual.

Similarly, a subset of 17 infracranial traits demonstrated to have a substantial genetic component and good reproducibility in scoring (Saunders 1978) was selected for inclusion in the biodistance analysis, along with three additional traits found to occur with variable frequency in the Gabriola Island material: notching of the tibial distal articular surface lateral to the medial malleolus; first metatarsal proximal articular facet double; and cuboid medial facet double. Only observations made on adult specimens were included in the analysis. Infracranial traits frequencies were calculated by side rather than by individual, due to the difficulty in recognizing antimeres in the fragmented and disarticulated cave sample; for each element, the side with the highest number of observations was arbitrarily selected for inclusion in the distance analysis.

Intraobserver consistency was evaluated by scoring a subsample of remains from one burial cave feature (Skinner's 1987 collection from DgRw 199-F1) on two occasions: at the beginning of data collection in 1992, and at the end in 1994; traits that showed significant differences in observations were eliminated from the analysis. Also deleted were traits with very low sample sizes (<10 observations per group), those that did not occur in both groups, traits with very high (>.95) or very low (<.05) frequencies, and those that showed no variability between groups. In order to achieve adequate sample sizes for analysis, data from the two largest burial features (F1 and F9 from DgRw 199) were pooled to form the cave/crevice burial sample; this was considered appropriate since the features are geographically clustered and contemporaneous. The final list of 11 dental and 18 infracranial variants that were used in the distance analysis is presented in Table 3.2, along with the criteria used for dichotomizing multi-state expressions into simple presence/absence scores.

The biological relatedness of the two samples was assessed using the multivariate Mean Measure of Divergence statistic (Sjøvold 1973) with the Freeman-Tukey inverse sine transformation recommended by Green and Suchey (1976) for small sample sizes.

Table 3.2 Trait lists for biodistance analysis.

Dental Trait	Scoring	Infracranial Trait	Scoring
Mesiodens	any expression	Scapula circumflex sulcus	any expression
UI1 winging	any expression	Humerus septal aperture	any expression
UM2 two roots	separate > 1/4 length	Humerus supratrochlear spur	any expression
UM3 reduction	peg-shaped - absent	Ulna trochlear notch bipartite	2 separate facets
LI1 agenesis	tooth absent	Femur third trochanter	any expression
LM1 three roots	any expression	Patella vastus notch	any expression
LM1 enamel extension	expression ≥ 1	Tibia distal articular notch	any expression
LM1 cusp 7	expression ≥ 1	Talus os trigonum	unfused ossicle
LM2 protostylid	expression > 1	Calcaneal anterior/middle facet	separate facets
LM2 cusp 6	expression ≥ 1	Calcaneus secondarius	any expression
LM3 reduction	peg-shaped - absent	Cuboid double medial facet	2 separate facets
		Metatarsal #1 double proximal facet	2 separate facets
		Atlas double condylar facet	2 separate facets
		Atlas bridging	complete bridge
		Axis transverse foramen open	any expression
		Lumbar #5 spina bifida	any expression
		Transitional lumbosacral vertebra	any expression
		Sacral accessory facet	any expression

$$MMD = \frac{\sum_{i=1}^{t} \left([\theta_{1i} - \theta_{2i}]^2 - \left[\frac{1}{n_{1i} + \frac{1}{2}} + \frac{1}{n_{2i} + \frac{1}{2}} \right] \right)}{t}$$

$$Var_{MMD} = \frac{2}{t^2} \sum_{i=1}^{t} \left(\frac{1}{n_{1i} + \frac{1}{2}} + \frac{1}{n_{2i} + \frac{1}{2}} \right)^2$$

where: t = the number of traits employed in the study; n_{1i} and n_{2i} = the number of individuals observed for the i^{th} trait in samples 1 and 2 respectively; and θ_{1i} = the angular transformation of the frequency of the i^{th} trait in population 1, measured in radians, such that:

$$\theta = \frac{1}{2} \sin^{-1} \left(1 - 2 \frac{k}{n+1} \right) + \frac{1}{2} \sin^{-1} \left(1 - 2 \left[\frac{k+1}{n+1} \right] \right)$$

where: k = the observed frequency of the trait and n = the number of individuals observable for that trait.

The significance of the calculated MMD is evaluated by means of the Chi Square statistic with t degrees of freedom:

$$X^2 = \sum_{i=1}^{t} \left(\frac{(\theta_{1i} - \theta_{2i})^2}{V_i} \right)$$

where:

$$V_i = \left(\frac{1}{n_{1i} + \frac{1}{2}} + \frac{1}{n_{2i} + \frac{1}{2}} \right)^2$$

Diachronic variation

The contemporaneity of the two skeletal samples was assessed by evaluation of several lines of evidence, including radiometric data (where available), stratigraphic interpretations, and cultural associations.

Social differentiation

The theoretical bases for evaluating social differences in burial remains was addressed in Chapter 1. In population.practical terms, differences in social status are usually evaluated on the basis of differential energy expenditure in mortuary programs, including the size and elaboration of the burial enclosure, time investment in body preparation, and amount of wealth invested in the dead (Binford 1972). These variables will be considered in evaluating the hypothesis that the two buria forms represent different social classes within the same population.

Chapter 4

Site Reconnaissance

Introduction

The False Narrows bluffs are comprised of a series of steep, boulder strewn, heavily treed slopes, topped by vertical bedrock exposures of sandstone and conglomerate, separated from each other by narrow, relatively level benches. The escarpment can be roughly divided into upper, middle, and lower bluff systems. The upper and middle bluffs are comparatively short, irregular, and discontinuous, whereas the lower bluffs are longer, steeper, and more continuous, with higher rockfaces. Currently, vegetation along the bluffs consists of mixed deciduous and coniferous forest; identified species include broadleaf maple (*Acer macrophylum*), Douglas-fir (*Pseudotsuga mensiesii*), western red cedar (*Thuja plicata*), western yew (*Taxus brevifolia*), grand fir (*Abies grandis*), dogwood (*Cornus nuttallii*), and arbutus (*Arbutus mensiesii*). The understory contains huckleberry (*Vaccinium sp.*), oregon grape (*Berberis nervosa*), salal (*Gaultheria shallon*), and several varieties of ferns and mosses.

Recent human activity has altered the landscape in the vicinity of the False Narrows bluffs. The lowlands at the east end of the lower bluffs have been logged, as have the benches along the upper bluffs, in some cases right up to the toe of the rocky slopes; a housing development encroaches on the lower bluffs immediately west of the logged area. The slopes of the lower bluffs, particularly the section north of the housing development, may also have been selectively logged in the early historic period, as many old stumps and cut logs were observed during the survey.

The False Narrows bluffs had previously been surveyed by Wilson (1987), who identified 17 heritage sites in the area, including 3 burial sites (described in the previous chapter), 3 petroglyph sites, 10 inland shell middens, and an historic brickworks. Several other archaeological sites are located near the burial sites, and are possibly associated with them: DgRw 208, a small, shallow shell midden ca. 100 m east of DgRw 210; DgRw 209, an extensive, deep midden ca. 100 m south of DgRw 210; DgRw 198, a petroglyph site with at least 7 carved panels, ca. 60 m east of DgRw 199; DgRw 196, an extensive shell midden (now virtually destroyed) immediately south of DgRw 199; and DgRw 203, sparse, shallow midden deposits ca 50 m. south of DgRw 204.

Survey Results

A 3-km long section of the False Narrows bluffs was investigated during the burial reconnaissance, but burial features were found only at the eastern end of the survey area. Four burial sites (Figure 4.1) were identified, the three sites previously recorded by Wilson (1987), and one previously unknown site (DgRw 213). One of the sites (DgRw 204) is located on the upper bluffs and the remaining three are situated along the lower bluffs. No burial features were discovered along the middle bluffs; this area has a low potential for such sites, since rockface exposures are low, short, and discontinuous, and large boulders and boulder clusters are uncommon. Each burial site is described in detail below; individual feature descriptions may be found in Curtin 1991b: Appendix I.

DgRw 204

Five previously unknown burial features were identified on the upper bluffs in addition to the on recorded in 1987, referred to here as Feature 1 (DgRw

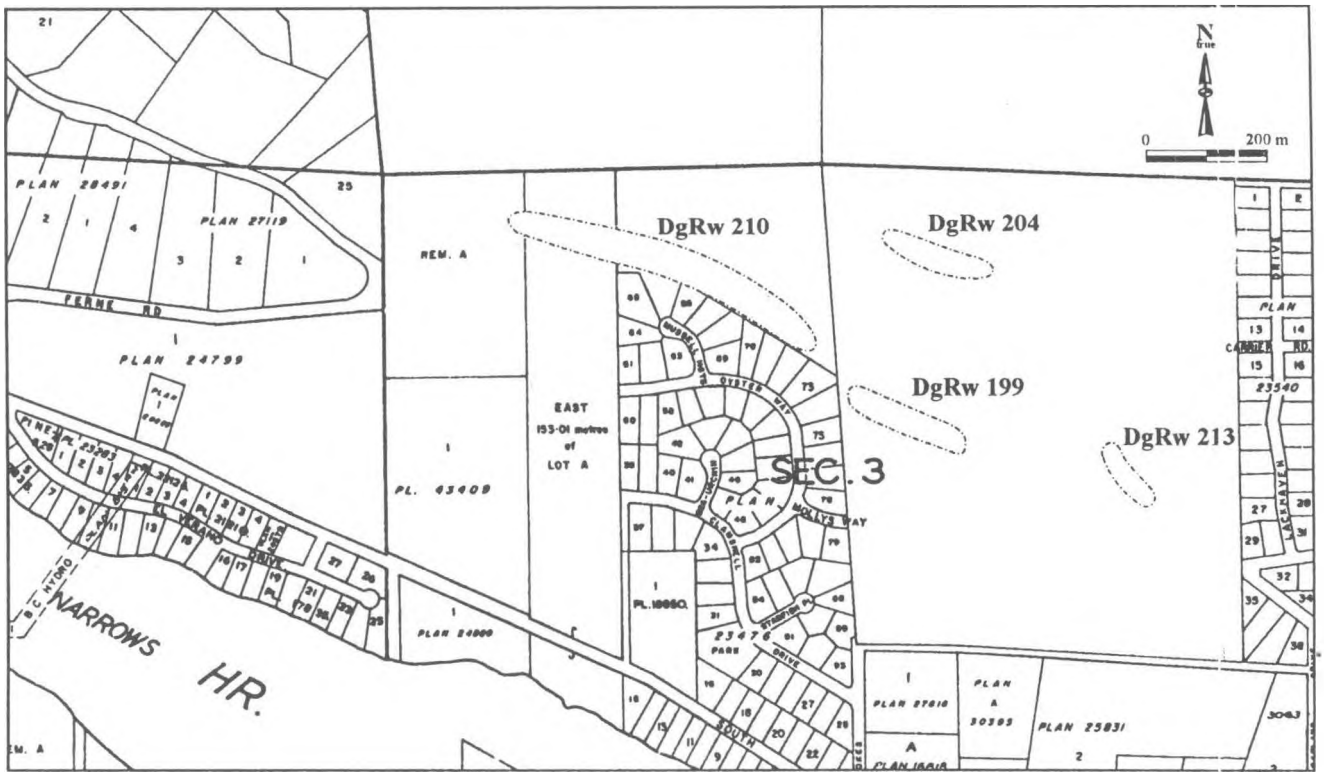

Figure 4.1 Gabriola Island cave/crevice burial site locations.

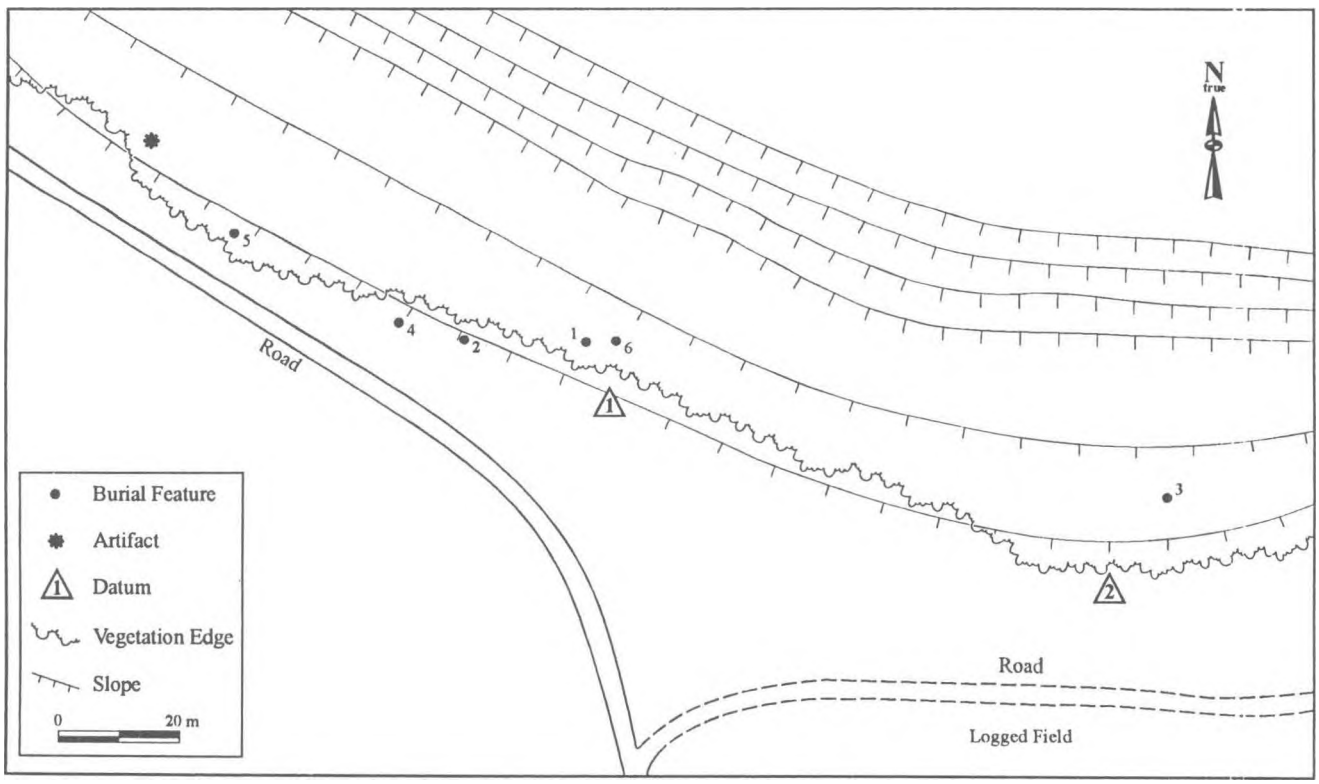

Figure 4.2 DgRw 204 burial feature locations.

Table 4.1 DgRw 204 burial feature summary.

FEATURE #	TYPE	CHAMBERS	HEIGHT	WIDTH	DEPTH	ORIENTATION	BURNING	ARTICULATION	MNI	INCLUSIONS	DISTURBANCE
1	I	1	0.83	4.50	2.28	210	A	A	1	shell, burnt bark	animal
2	I	2	0.22	1.30	1.60	118	A	A	2	shell	animal
3	II	1	0.33	1.71	3.30	223	A	A	1		
4	IV						P	A	1		
5	I	1	1.14	0.89	3.17	250	A	A	1	matting?	rockfall
6	I	2	0.72	0.52	4.60	180	A	A	1	charcoal	animal

204-F1). All five new features are located within 100 m of Feature 1, and are considered to be part of the same site (Figure 4.2); one isolated artifact, a complete antler tine wedge, was also discovered in a rock crevice at the north end the site approximately 50 m northwest of F4. Four of the features (F1, F2, F5, and F6) are classified as Type I, located in nooks and crevices between groups of boulders; one (F2) is in a shallow depression beneath a single boulder (Type II); and one (F4) is located on the open ground, not directly associated with a rock feature (Type IV), although it is surrounded by large boulders (Table 4.1). F4 is the only one at DgRw 204 where burnt bone was observed (six small skull fragments). It is possible that the location represents a cremation site, and that the bone fragments were overlooked when the burnt remains were collected for interment in a rock crevice. Alternatively, the bones may have been transported, through erosion or animal activity, out of a nearby rock feature that was overlooked in the survey.

Feature orientation ranges from 118° to 250°, but the tendency is to follow the trend of the slope, facing south or southwest towards False Narrows. Burial features at DgRw 204 tend to be larger than those from the other three sites, using chamber depth as an estimator of feature size. Mean depth at this site is 2.99 m, with a range of 2.28 to 4.60 m; three of the features (60%) have depths in excess of 3.0 metres. Three features (F1, F5, and F6) have spacious entrances and easily accessible burial chambers, but in two cases (F2 and F3) the openings are very low, and entry into the chamber would not be possible without some excavation at its mouth. The burial chamber in F2 may have been deliberately closed off by the placement of small sandstone boulders across the entrance. Two of the rock features (F2 and F6) contain two chambers, but in each case only one of the two chambers contains visible human remains.

From the surface remains, it was estimated that a minimum of seven individuals, all adults, were interred at this site. At five of the burial features, the visible remains are consistent with a single individual, but F2 contains the remains of at least two people, based on the presence of three innominates and two crania. No skeletal anomalies or pathologies were observed. None of the exposed bones is in correct anatomical order, which suggests that they are either from secondary burials or have undergone significant disturbance since interment. The presence of animal faeces indicates that at least three of the features have served intermittently as animal dens, which may account for the disarticulation of the skeletal elements contained within. Possible cultural associations include shell fragments in F1 and F2, pieces of burnt bark or other organic material in F1 and F5, and chunks of charcoal in F6.

The burial features at DgRw 204 appear to have been utilized over a relatively short time span during the early Marpole period of Coastal prehistory. Small bone fragments from three of the burial features

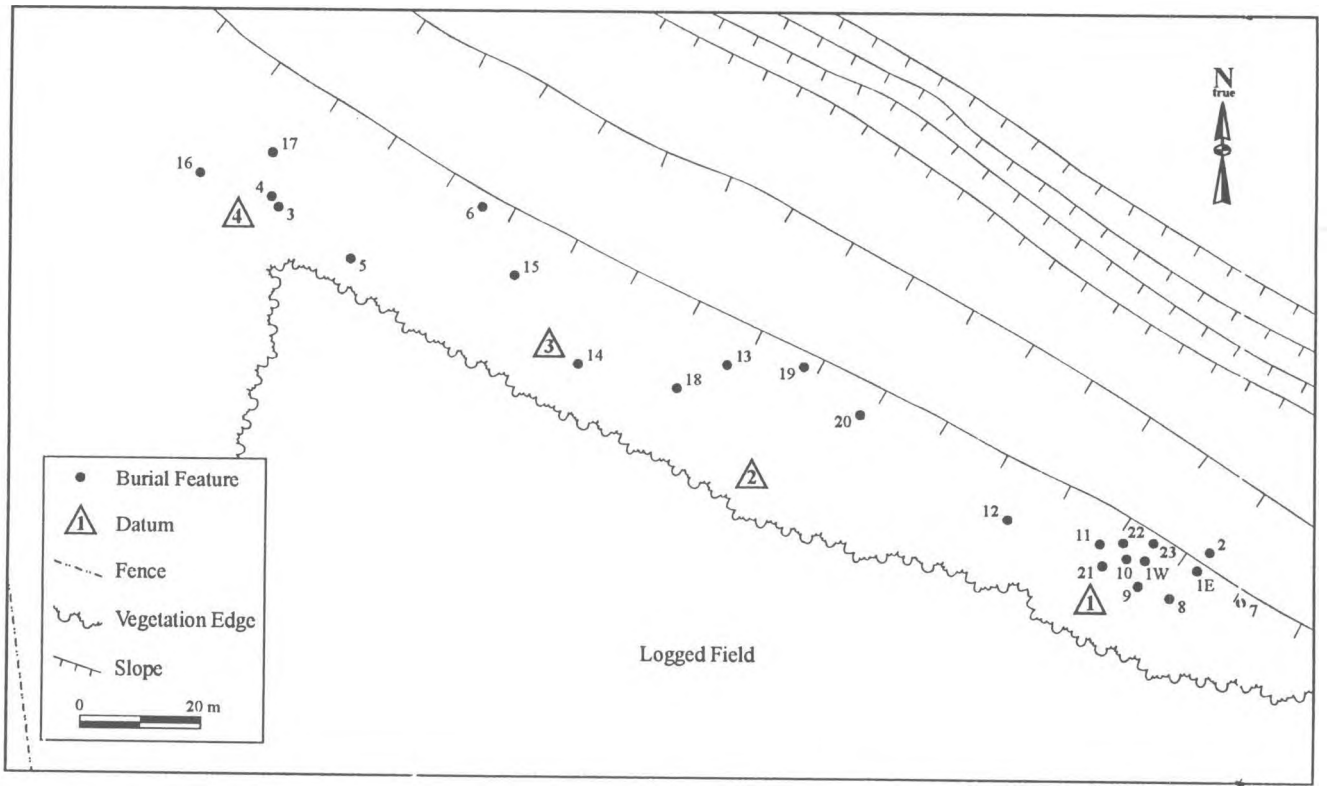

Figure 4.3 DgRw 199 burial feature locations.

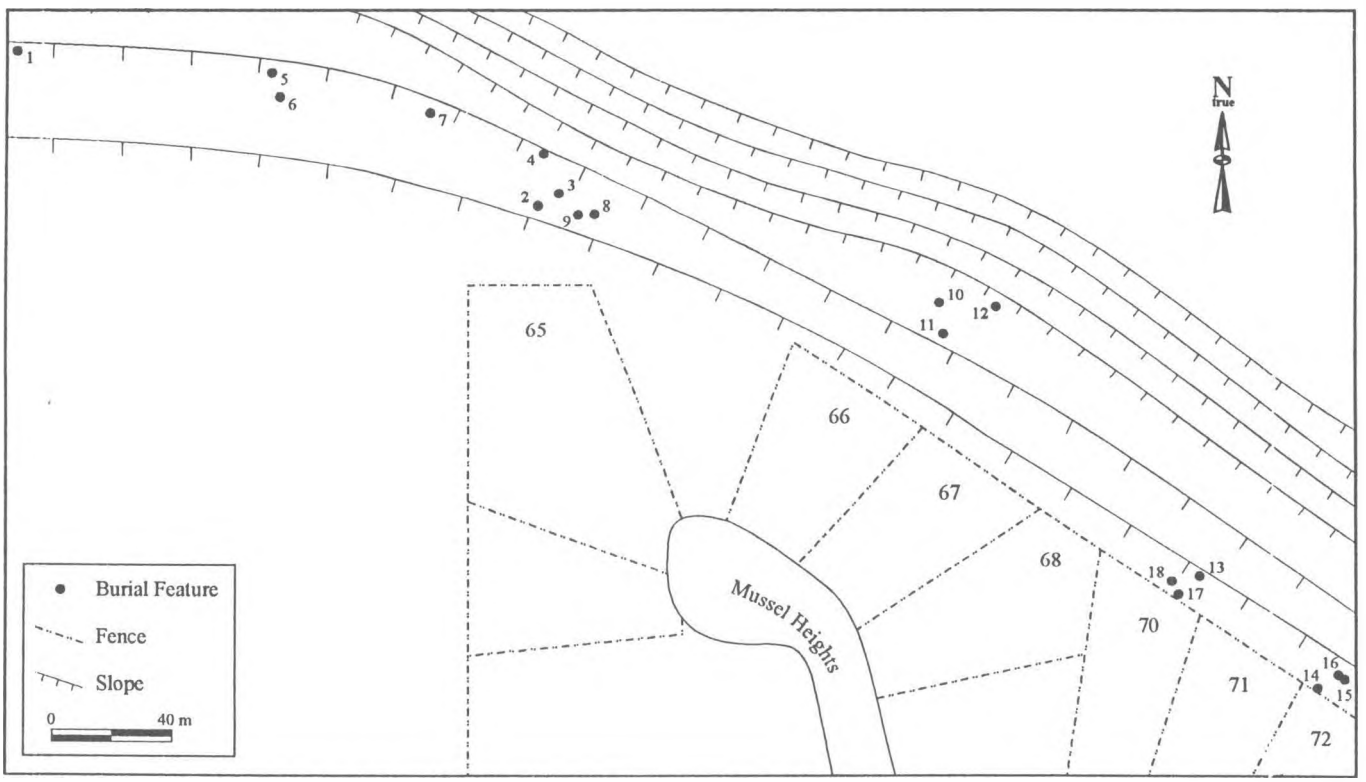

Figure 4.4 DgRw 210 burial feature locations.

showed some degree of post-depositional disturbance: half contain animal faeces indicative of prior use as a lair or den, while pothunters' holes and digging implements at F1and F9 indicated disturbance by humans.

The burial features at DgRw 199 tend to be structurally complex (Table 4.2). Fewer than half (10/23 or 43%) are single-chambered, whereas 22% (5/23) contain three or more chambers, although burial remains were not observed in each chamber of the multi-chambered features. Most of the features are relatively accessible; only four (17%) have entrances 30 cm or lower in height, too low to permit entry without excavation. At F15, the entrance had been deliberately sealed off by a wall of sandstone slabs and conglomerate cobbles. Piles of sandstone rubble that may represent the remains of sealing walls were observed near the entrances to three additional features: F12, F13, and F19. Entrance orientation is variable, ranging from 96° to 300°, but the majority (18/23 or 70%) face roughly south or southwest, down slope towards False Narrows. Mean chamber depth of 2.86 m (range 1.20-9.25) is smaller than at DgRw 204, but larger than the other two burial sites. However, this value is somewhat skewed by the presence of the largest feature in the entire study area (F1), and the majority (74%) of the burial features at this site are less than 3.0 metres deep.

Shellfish remains were observed at six of the features from DgRw 199: F1, F5, F11, F17, and F23. A possible wooden plank fragment was recorded at F23, and a charred, whittled stick, similar to those found in a cache at DgRw 213 (see below) was found at F1.

The estimated minimum number of individuals (MNI) represented by the visible surface remains at DgRw 199 is 45: 30 adults, 3 adolescents, 8 children, and 4 infants. Eleven features (48%) appear to contain a single individual, five (22%) contain two, five (22%) contain three, and the remaining two features contain a minimum of four and five individuals respectively. Bones at four of the features (F1, F11, F21, and F22) exhibit evidence of burning that may be the result of deliberate cremation (in secondary or compound burial, cremation is one method of reducing the corpse to bone fragments prior to final disposal). Not all of the human remains are secondary interments, however. At F17 the visible skeletal elements (vertebrae and ribs) are still in anatomical order, indicating that the body was articulated when interred. Given the amount of visible disturbance from animals, humans, and natural occurrences such as rockfalls, it is possible that some of the other, currently disarticulated remains were originally intact primary burials.

Since most of the skeletal remains visible at these sites were not accessible for close inspection, no attempt was made to systematically record skeletal pathologies or other anomalies; where such traits were visible, however, they were noted. Two of the crania from DgRw 199, a child's skull in F15 and an adult's skull in F18, appear to have been artificially deformed by anteroposterior compression, in a manner typical of ethnographic Coast Salish. This cultural practice first becomes apparent in the archaeological record about 2500 BP, and is characteristic of both Marpole and Gulf of Georgia Culture Types. The child's skull also exhibits a small, *ante mortem* perforation of the occipital bone above *inion*, a defect that may be related to the effects of the pressures imposed on the developing skull during the deformation process (Curtin 1990b).

Radiocarbon dates derived from bone collagen have previously been reported for two features (F1, F9) from the east end of the site (Skinner 1991: 47); they range in age from 2170 ± 70 to 2760 ± 60 BP. During the current project two more bone collagen dates were obtained on features near the middle (F14) and west end (F17) of DgRw 199. Both dates are younger than those reported by Skinner: 1970 ± 60 BP (F14) and 1720 ± 60 BP (F17). The radiometric evidence therefore suggests a chronological progression of feature utilization from east to west over a period of about a thousand years, from the middle/late Locarno to late Marpole.

DgRw 210

The 18 burial features at DgRw 210 are distributed discontinuously over approximately 240 m. They tend to occur in small, discrete clusters of between two and five features, at irregular 20-50 m intervals (Figure 4.4). As was the case at DgRw 199, most of the burial features at DgRw 210 (16/18, or 89%) are located in crevices between clusters of boulders (Type I). The two exceptions are F18, located in a depression beneath a single boulder (Type II), and F7, located on a ledge in the vertical rockface near the top of the bluffs (Type III). The latter is the only example of a rockface burial feature in the entire study area. The burial features from DgRw 210 tend to be smaller and less complex than those from DgRw 199: 72% (13/18) are single-chambered, and none has more than two chambers (Table 4.3). Mean chamber depth is 1.41 m (range 0.11-2.30 m); only DgRw 213 has smaller burial chambers. Half of the entrances (9/18) are less than 30 cm high, too low to permit easy access. This relative inaccessibility probably accounts for the fact that these features tend to exhibit less post-depositional disturbance than those from DgRw 199. Animal dis-

Table 4.2. DgRw 199 burial feature summary.

FEATURE #	TYPE	CHAMBERS	HEIGHT	WIDTH	DEPTH	ORIENTATION	BURNING	ARTICULATION	MNI	INCLUSIONS	DISTURBANCE
1	I	3+	1.10	0.66	9.25	300	P	A	5	shell, burnt stick	animal, human
2	II	1	0.18	2.14	2.57	202	A	A	3		human
3	I	1	1.04	1.29	1.70	264	A	A	2		
4	1	1	0.43	3.53	1.90	228	A	A	2		
5	I	2	0.72	2.54	2.56	170	A	A	3	clam shell	animal, human
6	I	1	0.42	1.47	1.91	220	A	A	1		
7	I	3	0.30	1.80	2.36	130	A	A	1		animal
8	I	1	0.23	1.70	2.46	115	A	A	1		possible?
9	I	1	0.90	2.46	2.50	120	A	A	3		human
10	I	2	0.60	1.10	1.20	233	A	A	2		animal
11	I	3	0.77	0.40	1.52	242	P	A	4	shell	animal
12	I	1	0.50	1.12	2.53	160	A	A	2		animal
13	I	2	0.57	1.20	3.10	193	A	A	1		animal
14	I	2	0.33	1.22	4.00	180	A	A	1		
15	II	1	0.30	1.41	1.75	96	A	A	3		animal, rockfall
16	II	2	0.39	2.78	2.52	202	A	A	1		animal
17	I	2	0.55	1.06	3.75	181	A	P	2	shell	animal
18	I	3	1.86	1.95	1.65	176	A	A	1		animal
19	I	2	0.43	0.62	2.60	118	A	A	1		
20	I	1	0.50	1.36	2.87	246	A	A	1		
21	I	2	0.55	0.38	1.90	206	P	A	1		
22	I	3	1.11	0.44	5.00	216	P	A	1		
23	I	1	0.40	0.82	4.23	221	A	A	3	cedar plank, shell	animal, rockfall

turbance was noted at only four of the features, and there was no direct evidence of pothunting, although human intervention may have been responsible for some of the skeletal disarticulation observed at two of the more accessible features. Piles of sandstone rubble that may represent the remains of sealing walls were observed near the entrances of F1, F11 and F17. Entrance orientation ranges from 145° to 280°, but the majority (15/18 or 83%) face south or southwest down slope towards False Narrows.

Based on visible surface remains it is estimated that a minimum of 29 individuals were interred at DgRw 210: 16 adults, 3 adolescents, 6 children, 3 infants, and 1 individual of indeterminate age. These are distributed as follows: ten features (55%) with an MNI of 1; five (28%) with an MNI of 2; and three (17%) with an MNI of 3. Burnt bone in some of the features (F4, F5, F7, F13, and F14) and articulated skeletal elements in others (F10, F11, F15, and F17) suggests that both primary and secondary burials are represented at this site.

Apart from the degenerative changes typical of osteoarthritis, which are relatively common in older

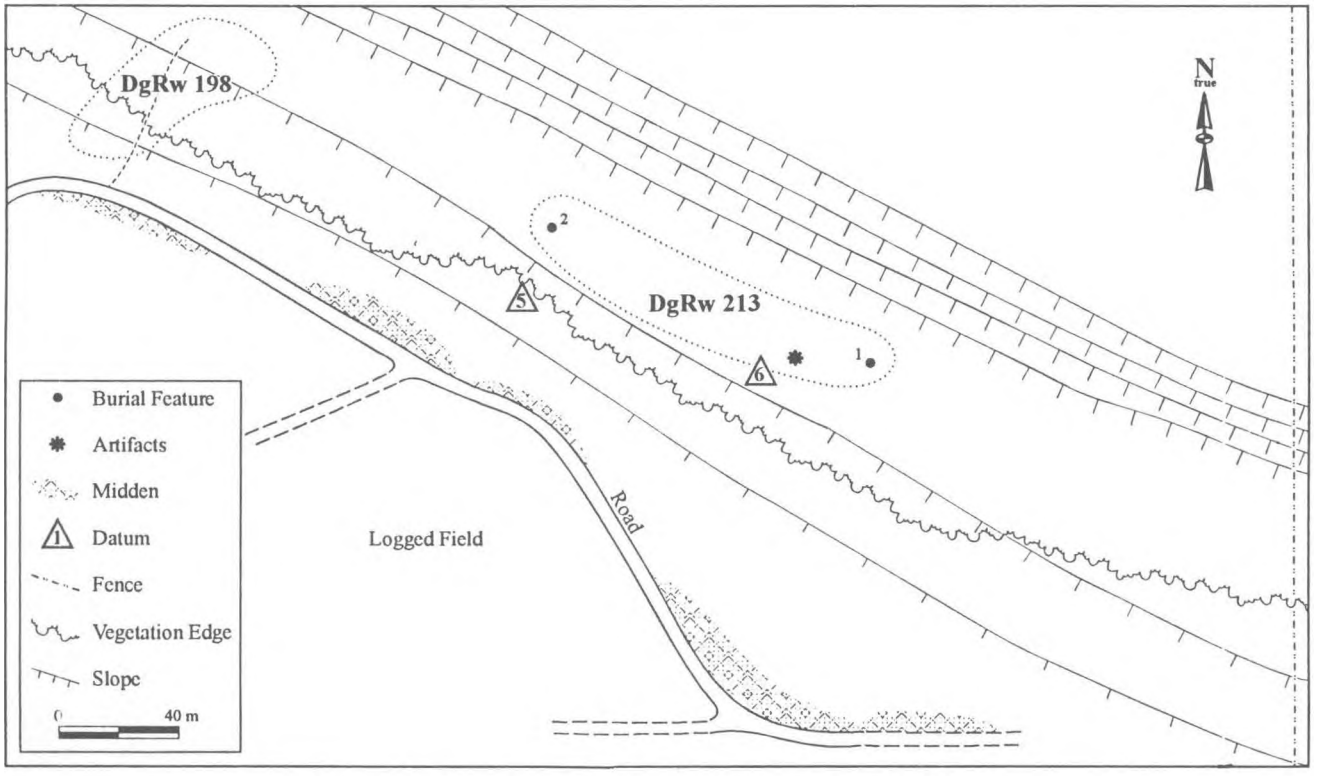

Figure 4.5 DgRw 213 burial feature locations.

individuals, the only pathological condition observed in the skeletal material was a severe inflammatory response in the fibula and tibia of a child from F16. Both bones have very swollen diaphyses as a result of subperiosteal deposition of coarse, disorganized fibre bone. Several pathological conditions could trigger such a response, and no diagnosis is suggested (but see Ch. 8).

The only definite burial inclusion was a basalt projectile point fragment found in F7.

Radiocarbon dates were obtained on bone samples from three areas of the site: the east end (F15: 2280 ± 60 BP), the east-central cluster (F11: 2140 ± 60 BP), and the west-central cluster (F9: 2220 ± 60 BP). Unlike DgRw 199, the burial features at DgRw210 appear to be roughly contemporaneous, with a relatively restricted time span; all fall within the known age range of the Marpole period of Northwest Coast prehistory.

DgRw 213

One new burial site, DgRw 213, was discovered in the course of the survey of the lower bluffs, at the extreme eastern end of the study area approximately 200 m east of DgRw 199 (Figure 4.5). The site consists of two widely separated features (Table 4.4): F1 is of the "single-boulder" type (Type II), and F2 is located in a crevice between a fallen boulder and a bedrock outcrop (Type I). Both contain a single burial chamber, and both have entrances too small to admit any of the crew members, so information on their contents is limited. At least three adults are represented: two in F1 and one in F2. The visible bones do not appear to be articulated, nor do they appear burnt, and no direct evidence of disturbance was seen. The burial chambers are the smallest recorded in the study area, with a mean depth of 1.18 m (range 0.95-1.40 m). Both entrances face southwest towards False Narrows

A bone sample from F1 was radiocarbon dated at 2050 ± 60 BP (middle Marpole), making it slightly younger than the dated burial features at DgRw 204 and DgRw 210, but within the range of dates for DgRw 199.

Although no artifacts or other cultural inclusions were observed in either of the two burial features, a cache of 16 partially charred, whittled cedar stakes was discovered in a rock crevice about 25 m west of F1. One end of each stake had a rectangular cross-section and was blunted and charred; the other end was round in section and had been whittled down to a dull point. They ranged in length from 16 cm (broken) to 53 cm (whole). The age and function of these objects is unknown; they were left *in situ*.

Table 4.3 DgRw 210 burial feature summary.

FEATURE #	TYPE	CHAMBERS	HEIGHT	WIDTH	DEPTH	ORIENTATION	BURNING	ARTICULATION	MNI	INCLUSIONS	DISTURBANCE
1	I	1	0.58	2.73	1.42	170	A	A	3		animal?
2	I	1	0.73	0.81	2.30	145	A	A	1		animal?
3	I	1	0.69	0.40	1.50	212	A	A	2		
4	I	1	0.47	2.72	1.88	225	P	A	2		rockfall?
5	I	1	0.55	0.74	2.21	162	P	A	1		
6	I	1	0.18	0.55	1.10	280	A	A	1		
7	III	1	1.14	5.40	2.14	210	P	A	3	projectile point	animal
8	I	2	0.14	0.84	1.53	223	A	A	2		
9	I	1	0.20	1.03	1.32	198	A	A	1		
10	I	1	0.08	0.40	1.04	165	A	P	1		rockfall
11	I	1	0.83	0.48	1.60	203	A	P	3		
12	I	2	0.20	1.14	1.80	146	A	A	2		rockfall
13	I	2	0.15	0.27	0.11	227	P	A	1		animal, rockfall
14	I	2	0.25	1.67	1.40	236	P	A	1		
15	I	2	0.40	2.10	0.84	212	A	P	2		
16	I	1	0.16	0.54	0.89	176	A	A	1		
17	I	1	0.53	0.97	1.43	222	A	P	1		
18	II	1	0.09	1.24	0.89	210	A	?	1		

Table 4.4 DgRw 213 burial feature summary.

FEATURE #	TYPE	CHAMBERS	HEIGHT	WIDTH	DEPTH	ORIENTATION	BURNING	ARTICULATION	MNI	INCLUSIONS	DISTURBANCE
1	II	1	0.17	1.24	0.95	226	A	A	2		
2	I	1	0.20	0.29	1.40	235	A	A	1		

Discussion

As a result of the 1989 site reconnaissance, the inventory for the study area now stands at four sites containing a total of 49 burial features: DgRw 199 (23 features), DgRw 204 (6 features); DgRw 210 (18 features); and DgRw 213 (2 features). This represents an ten-fold increase in the number of known burial features in the area. In addition, what was originally thought to be two distinct burial sites (DgRw 199 and DgRw 210) approximately 850 m apart, is now revealed to be a nearly-continuous kilometre-long distribution of burial features. Based solely on surface skeletal elements these sites are estimated to contain the remains of at least 84 individuals; given the problems of visibility resulting from ceiling exfoliation and accumulated debris, this is almost certainly a gross underestimate of the true size of the burial population.

The goal of the site reconnaissance was to locate all of the burial features along the False Narrows bluffs, but this proved to be unrealistic. The entrances to some features are so well concealed, either by being deliberately walled-off, or through the accumulation of organic debris, that they are unlikely to be discovered except by accident. Others may be overlooked because sedimentation or rock falls have completely covered the contents of the feature. In such cases, identification of the burial feature will only be made if further disturbance re-exposes the bones. Although the survey resulted in a significant increase in the number of known burial features, it is probable that others, perhaps as many as 10-25% of the original total, remain undetected.

Re-examination of the burial features first recorded by Wilson in 1987 produced interesting results. All visible surface remains had previously been collected from four features: DgRw 204-F1 (Wilson 1987); DgRw 210-F1 (Skinner and Waddell 1990a); and DgRw 199-F1 and F9 (Skinner 1991). Yet during our survey in 1989, skeletal remains were again visible, in some cases abundantly so, in all four features, suggesting that some form of disturbance, whether frost heave, animal activity, or human vandalism, is churning up the feature sediments, bringing buried remains to the surface. Evidence of vandalism was clear in both F1 and F9 from DgRw 199, but the nature of the disturbance at the other two locations is uncertain.

A variety of burial practices are present at these four sites. Many burials appear to have received secondary or compound treatment; that is, the bodies had been reduced to disarticulated skeletal elements or bone fragments before being placed in the rock crevices. In some cases, this assumption was based on the discovery of skeletal remains in rock niches or crevices too small to have accommodated an intact corpse. In other cases, this determination was based on evidence of cremation. Burnt, fragmented bones were observed in 20% (10/49) of the recorded burial features. Not all of the burials are secondary interments; in five features the visible skeletal elements were still articulated and in correct anatomical order, indicating deposition of an intact body.

The results of the survey indicate that burial among the fallen boulders of the False Narrows bluffs was a relatively common occurrence over a period of at least 1,000 years, during the Locarno and Marpole phases of prehistory. Why were the rock features selected as a burial place? As was discussed in Chapter 2, shell midden interment was a much more common means of disposal of the dead throughout the Gulf of Georgia region in the prehistoric period, and is known from other sites in traditional Nanaimo territory, including at least two sites on Gabriola Island. Why was the usual practice of midden interment not followed for those interred on the bluffs? To address this question it was necessary to acquire a sample of skeletal remains from the False Narrows bluffs for analysis and comparison with midden interments from the area. The following five chapters describe in detail the excavation of selected burial features from two of the burial sites, DgRw 199 and DgRw 204.

Chapter 5

Excavations At DgRw 204-F1

DgRw 204-F1 was first recorded by Ian Wilson during his 1987 survey of the False Narrows bluffs. He assessed the burial site as being "extremely disturbed", with only a human rib fragment, a scapula fragment, and two possibly human long bone shaft fragments visible. These elements were collected, along with a horse clam shell valve and a cormorant humerus. When the site was revisited in 1989, several additional human bones had been exposed at the eastern end of the feature, indicating the possible presence of sub-surface remains. This was the first feature selected for excavation; it was chosen because its open entrance provided easy access to the chamber and few technical challenges to excavation, and because of the existence of a previous collection of human remains.

Feature Description

Feature 1 is located in a cluster of large boulders at the toe of the slope beneath the upper bluffs (Figure 5.1). It is formed by a large, tilted sandstone block whose south-east corner is resting on two smaller sandstone boulders. The south edge of the block overhangs its base, creating a shallow rockshelter-like cavity facing south-southwest (Figure 5.2). The back wall of the sheltered space under the overhang is scalloped, creating an internal sub-division into eastern and western sections (Figure 5.3). The western portion measures approximately 3.0 x 2.0 m and is relatively open and unprotected, with a high (2.23 m) ceiling and a level floor (Figure 5.4). The eastern half is narrower (3.0 x 1.5 m) and more enclosed, with a lower ceiling 0.83 m); its east end forms a short, narrow, low-roofed tunnel between the main block and the two supporting boulders on the southeast (Figures 5.2 and 5.3). Animal faeces were visible inside the "tunnel" indicating previous use as a carnivore's den.

The floor of the eastern section slopes upward to the southeast, where debris has filtered down through a rubble-filled crevice between the ceiling block and adjacent boulders. This crevice was later discovered to lead to 204-F6, immediately above and to the east of 204-F1 (see Chapter 7). Along the south edge of the rockshelter an accumulation of small sandstone slabs and decaying organic debris has created a shallow sill which corresponds roughly with the drip line from the overhang above (Figure 5.3). This may represent a natural accumulation of forest litter and exfoliated sandstone slabs, but it is also possible that the slabs are the remains of a deliberately constructed wall that formerly closed off the eastern section of the shelter containing the burial remains. From this sill the floor slopes downward towards the back of the shelter to the northeast.

Scattered human remains, including a clavicle, an innominate fragment, a lumbar vertebra, a thoracic vertebra, and a rib fragment, were observed in the east half of the feature. No human remains were apparent in the west half, which contained a recent, partially disarticulated deer skeleton. Shell midden deposits were visible beneath the leaf litter and organic debris covering the floor of the shelter, and extended 2-3 m down slope to the south and west. Sporadic patches of midden were observed for a further 10 m south of the feature.

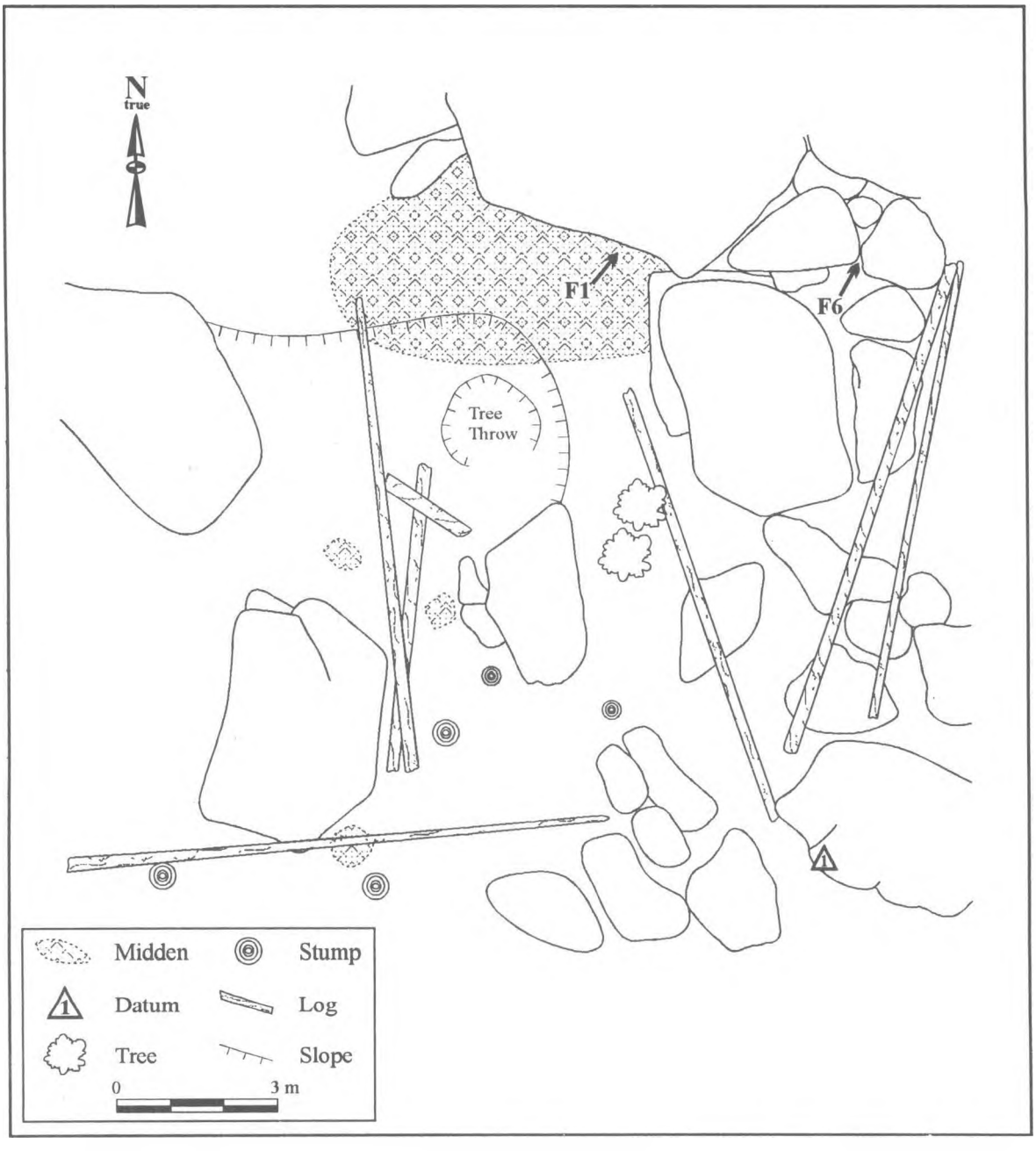

Figure 5.1 DgRw 204-F1 location.

Excavation Results

Three 1.0 x 1.0 m excavation units (EUs) were laid out on an east-west axis in the eastern half of the shelter where the human remains were located, and unit extensions (EXs) of variable size were excavated to the north (3N, 2N), south (2S, 1S), east (1E), and southeast (1SE) of the units to complete coverage of the entire floor (Figure 5.3). EUs 2 and 3 were excavated to culturally sterile deposits, encountered at 85 cm BS (below surface). The results of these excavations indicated that human remains were restricted to the top 20 cm of the deposits. The remaining unit (EU 1) and all unit extensions were therefore dug only as far as necessary to recover the human remains, that is to the bottom of level 4, at 20 cm BS.

Stratigraphy

Six distinct strata were identified in the excavations of EU 2 and 3. Stratigraphic profiles of the north and south walls of these units are presented in Figure 5.5, and the strata are described below.

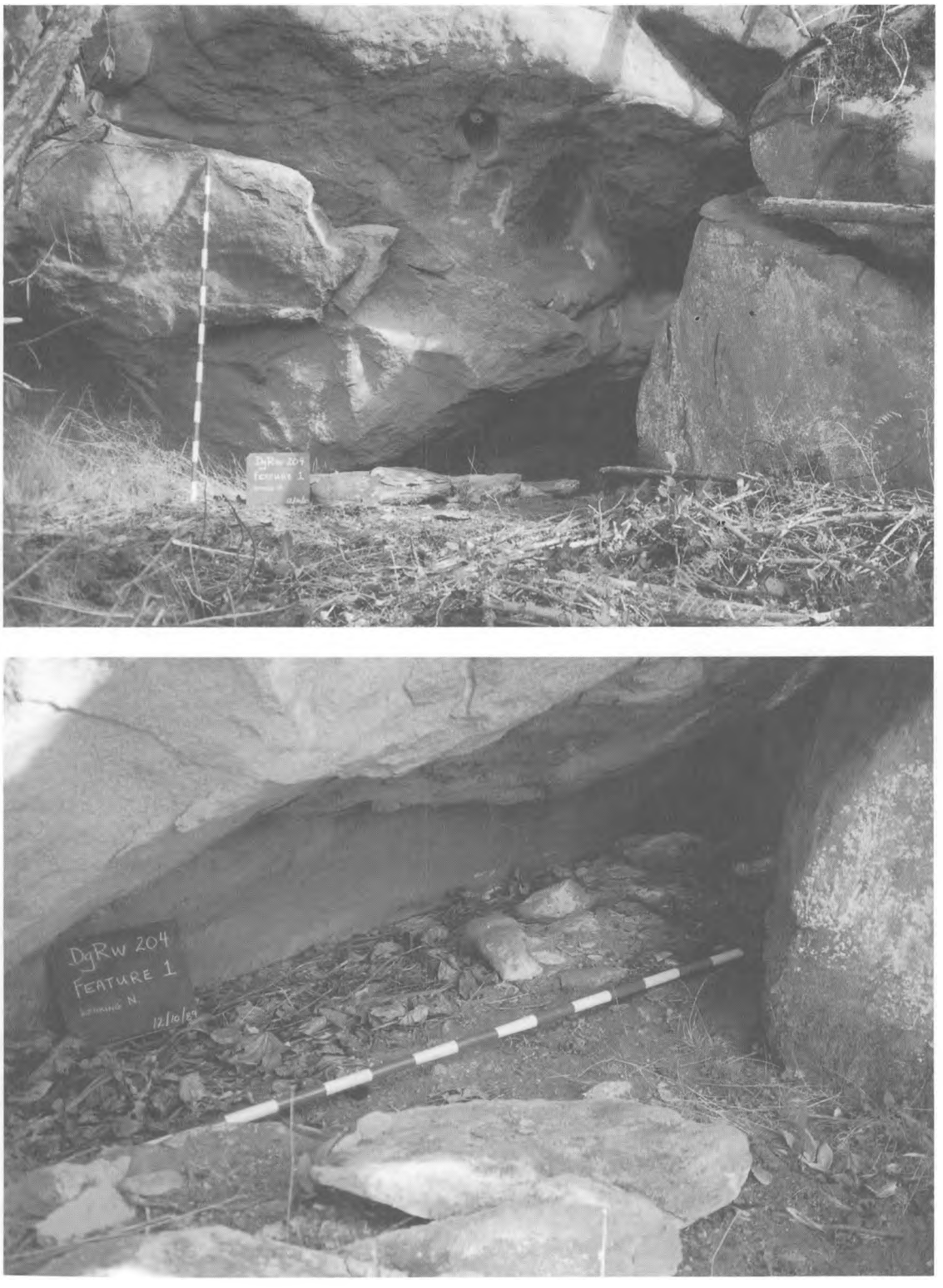

Figure 5.2 Entrance to DgRw 204-F-1 (top); inside burial chamber looking east (bottom);scale bars 10 cm.

Layer A: shell midden deposits consisting of loose, dry, fine sandy silts ranging in colour from very dark brown (Munsell 10YR 2/2) to dark greyish brown (10YR 4/2), containing abundant shell fragments, small charcoal flecks, and sparse angular sandstone pebbles, cobbles, and slabs. The matrix is intersected by numerous roots (ca. 10 cm diameter) and rodent burrows; a moderate-sized lens of grey ash was found

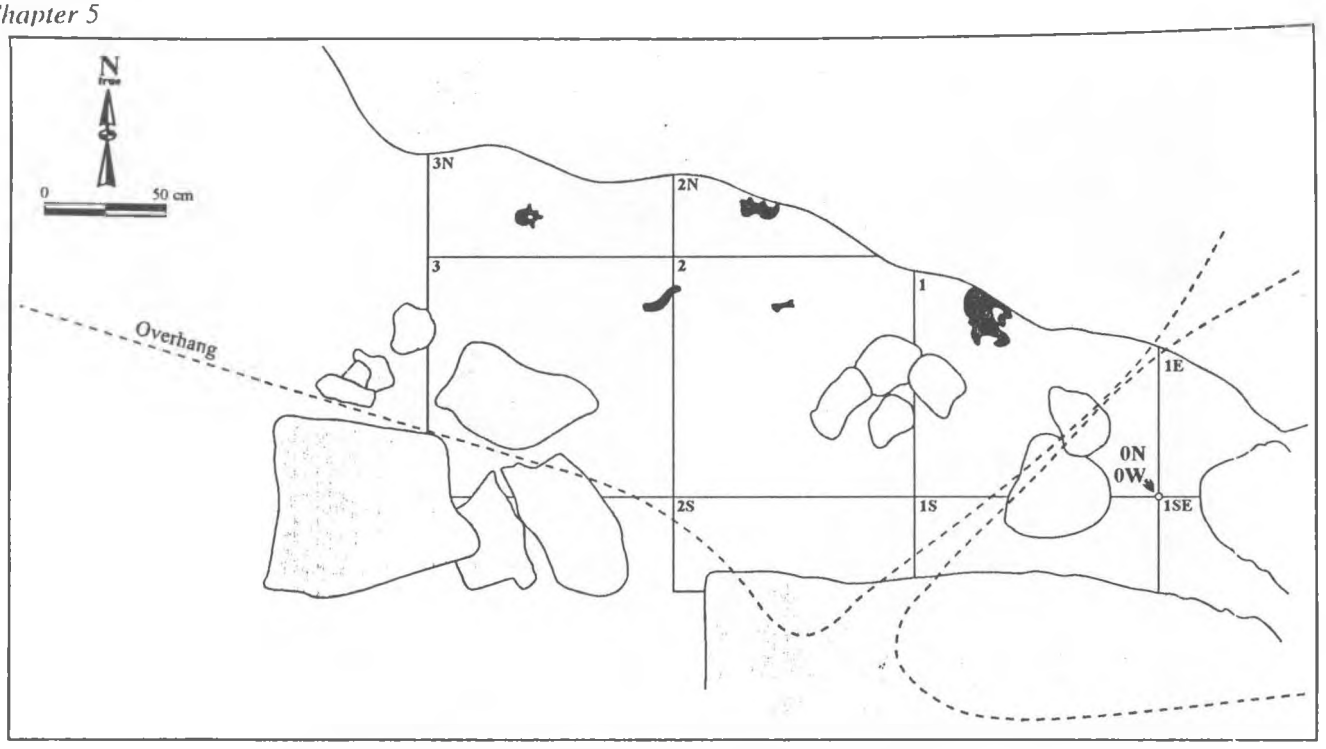

Figure 5.3 DgRw 204-F1: floor plan.

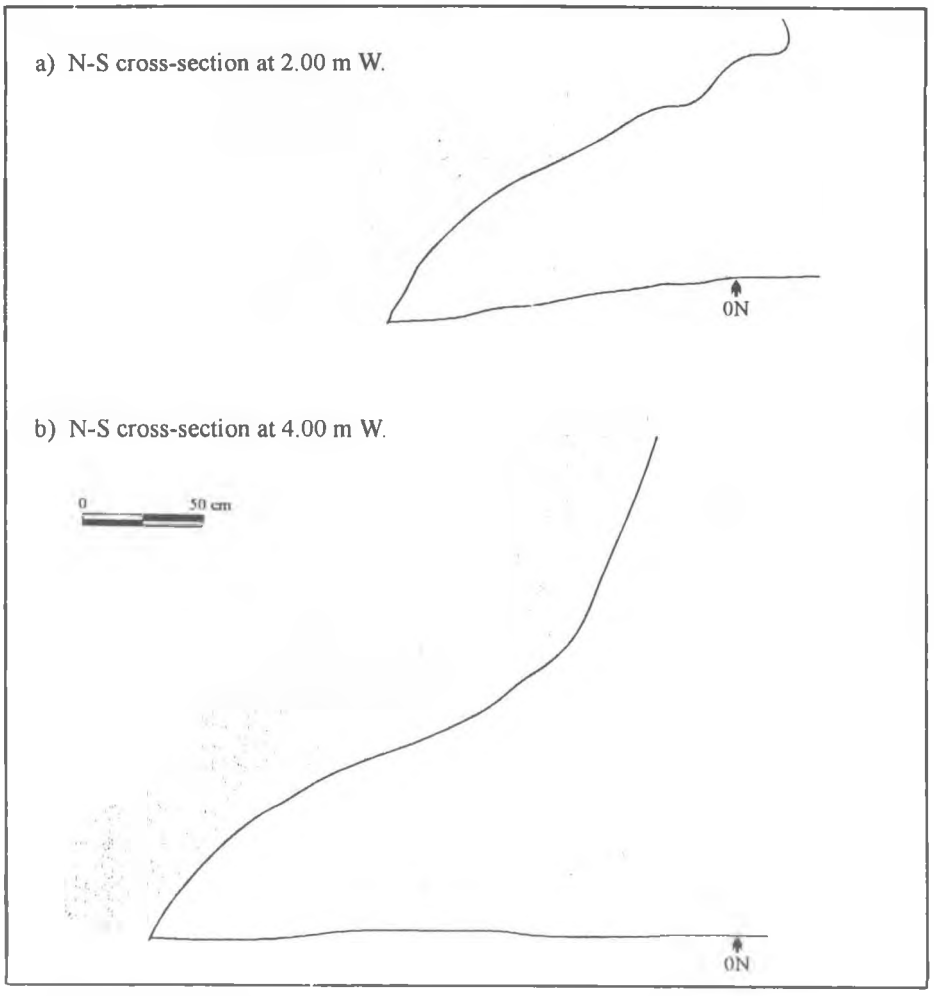

Figure 5.4 DgRw 204-F1: cross-sections of burial chamber.

near the surface of this layer in the NE corner of EU 3. The majority of the recovered faunal remains, particularly the fish and shellfish, came from this stratum, as did all of the human bone and most of the artifact assemblage, including 80% of the formed tools.

Layer B: loose, powdery, ash-stained silts, mottled pale brown (10YR 6/3) to grey (10YR 5/1), containing small amounts of sandstone debris but very little sand. Cultural contents include moderate amounts of bone (predominantly herring) and abundant burnt and unburnt shell (mainly mussel) but no artifacts. This layer is restricted to the northeast third of the burial chamber, and caps the pit feature in EU 2 and 3.

Layer C: mottled dark grey (10YR 4/1) to very dark brown (10YR 2/2) compact sandy silts with a low proportion of sandstone rubble, and occasional small (ca. 10 cm diameter) ash lenses. Artifacts are limited to lithic detritus. Moderate amounts of fauna were recovered, including fragmented shell (primarily clam and mussel) and mostly unidentified fish and mammal remains. This layer fills a pit feature in the NE corner of EU 3 and the north half of EU 2.

Layer D: loosely compacted yellow-brown (10YR 5/4) to brown (10YR 5/3) sandy silts, with a high proportion of angular sandstone rubble. Faunal remains are sparse, with shellfish and unidentified mammal predominating. Of note are a few small pieces of native oyster shell, the only such occurrence at this site. Recovered artifacts include three formed tools in addition to a small amount of lithic detritus.

Layer E: compact, carbon-stained, very dark grey (10YR 3/2) to very dark brown (10YR 2/2) sandy silts with a moderate proportion of finely fragmented shell (mainly mussel and clam) but little other fauna. A single flake was recovered from this layer.

Layer F: moderately compacted yellowish brown (10YR 5/6) to light yellowish brown (10YR 6/4) silty sand with very sparse fauna and shellfish remains. With increasing depth below surface, matrix colour lightens, compaction increases, proportion and size of rock inclusions increase, and cultural content decreases, until it is completely sterile by 85 cm BS.

Comparison of the north and south profiles reveals some interesting differences. In the south profile, along the exposed, open face of the rockshelter, three carbon-stained shell midden layers (Layers A, C, and E) are visible, separated by layers of rubbly, yellowish brown sediments (Layer D). In contrast, in the north profile, along the inner wall of the rockshelter, the midden deposits appear to be more-or-less continuous, probably because this area was more protected from those natural forces (wind, rain, erosion) responsible for capping the discrete occupation levels with sterile materials, as was the case along the more exposed southern rim. This pattern, together with the faunal and artifactual data, suggests intermittent utilization of the feature as a temporary shelter where food was prepared and expedient tools manufactured. Some undetermined length of time after the final use of the feature as a shelter, it was re-used as a mortuary chamber. Over time, as a result of the activities of the various rodents and carnivores using the shelter, the surface-deposited human remains became intermixed with the top levels of the underlying shell midden deposits.

Faunal Remains

The following discussion is a summary of the results of the faunal analyses undertaken by van Gaalen (1991, 1994) and Kusmer (1992). A total of 1795 bones and bone fragments were collected from the excavation units and unit extensions, and an additional 855 fragments were recovered from matrix samples taken from EU 2 (Table 5.1). 911 of the excavated fauna (50.8%) and 288 of the matrix sample fauna (33.7%) could be identified to taxon. Numbers of identified specimens (NISP) are tabulated by excavation unit and by layer in Appendix A, Tables A.1-A.3; these data are summarized below. For the purposes of this analysis, the two north unit extensions were combined into one analytical unit (N.EXT), as were the two south extensions (S.EXT), and the two eastern ones (E.EXT).

Table 5.1 Summary of vertebrate fauna (NISP), DgRw 204-F1.

Sample	Fish	%	Bird	%	Mammal	%	Total
Excavation Unit	823	52.9	84	97.7	888	88.1	**1,795**
Matrix Sample	733	47.1	2	2.3	120	11.9	**855**
Total	**1,556**	**100.0**	**86**	**100.0**	**1,008**	**100.0**	**2,650**

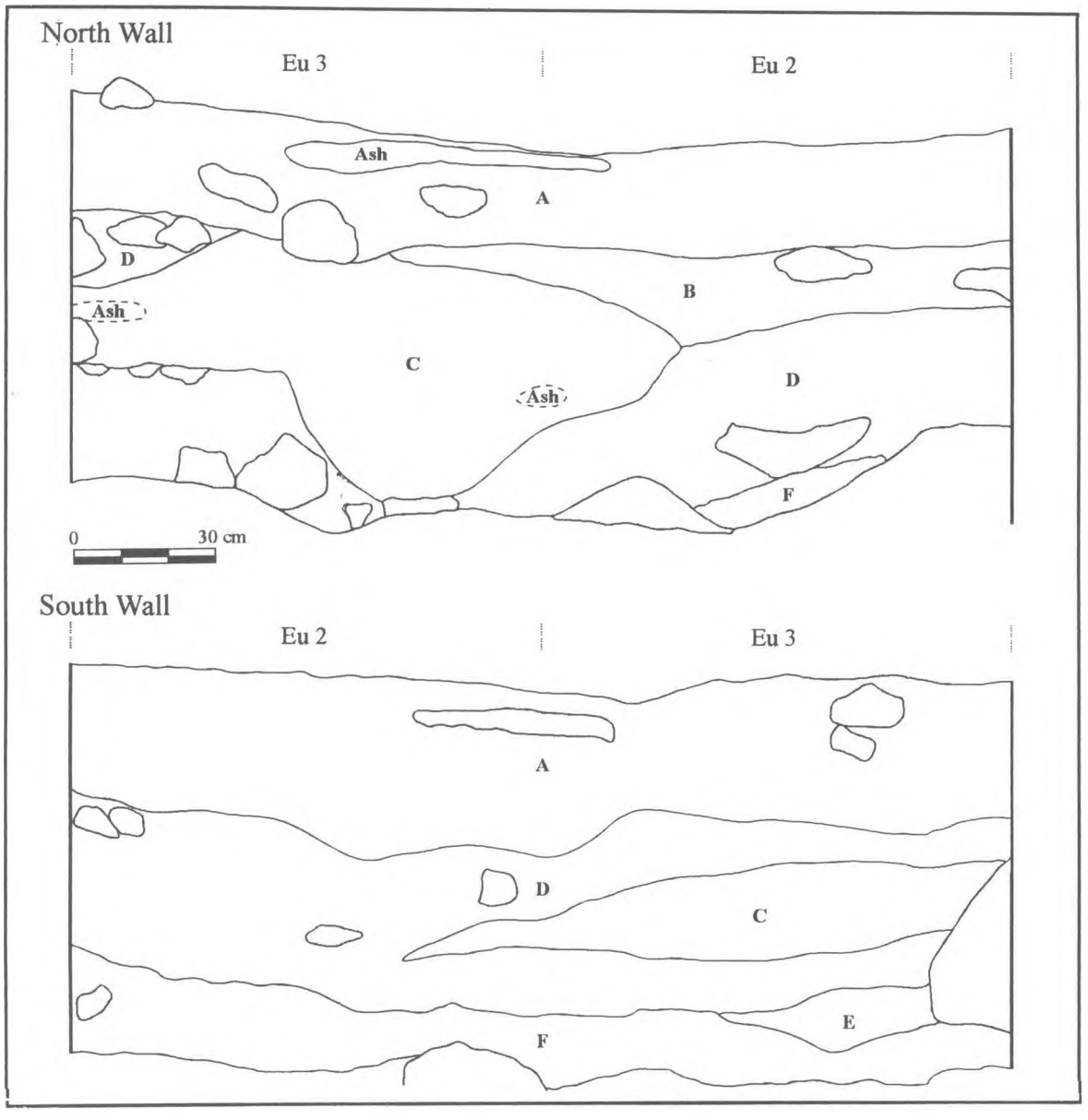

Figure 5.5 DgRw 204-F1: stratigraphic profiles of Eus 2 and 3.

Fish remains constitute 46% of the excavated fauna and more the 85% of the matrix sample. Herring (*Clupea harengus*) is the dominant species in both collections, comprising more than half of the identified fish remains, with dogfish (*Squalus* sp.), salmon (*Oncorhynchus* sp.), and midshipman (*Porichthys* sp.) present in lesser amounts. Other remains identifiable only to family include rockfish, scorpionfish, greenling/lingcod, sculpin, surfperch, and gunnel/prickleback. With the possible exception of the gunnel/prickleback, which are not typically considered food, the fish bones probably represent food remains left by the people who utilized the rock-shelter. Few skeletal elements other than vertebrae were recovered, suggesting that the fish had been dried or processed before being brought to the site.

Mammals represent nearly half (49.5%) of the excavated fauna but only 14% of the matrix sample. Canid remains (dog/coyote/wolf) are the most common identified mammal taxon (63.5%), followed by deer (*Odocoileus* sp.,17.5%) and voles (*Microtus* sp., 9.5%); small numbers of racoon, squirrel, rat, and mice elements were also recovered. In contrast to the fish remains, the majority of the mammalian fauna, particularly the rodent and canid remains, probably accumulated as a result of natural rather than cultural processes. These remains are concentrated in the innermost, eastern recesses of the burial feature, where faecal remains testify to intermittent use as a carnivore's den. Approximately half of the deer remains are from immature animals, which supports this interpretation.

Bird remains are the least common type of fauna represented in 204-F1, both as recovered elements and as identified taxa. They comprise 4.8% of the excavated fauna, and less than 1% of the matrix sample. Geese, duck, grebe, and grouse remains were identified, as well as members of the waxwing/flycatcher and thrush/blackbird families. Their presence could be the result of either human or scavenger activity.

No cutmarks were observed on any of the faunal remains from 204-F1, but approximately 10% of the recovered elements were burnt.

A variety of shellfish remains were identified in the invertebrate fauna from the EU 2 matrix samples (Table A.4), including bay mussel, native littleneck clam, horse clam, butter clam, cockle, barnacle, limpet, periwinkle, whelk, native oyster, and crab. Shellfish remains were most abundant in Layers A, B, and E; lesser amounts were found in Layers C and D, while Layer F was virtually shell-free. The most common identified species are bay mussel, which dominates in Layers A, B, and D, and varieties of clam, which dominate in Layer C. Clam and mussel occur with similar frequencies in Layer E.

Artifacts

A total of 57 artifacts were recovered from the excavations in 204-F1. Twenty-six items (45.6%) came from the top 4 levels (0-20 cm BS), which were excavated in all units and unit extensions; the remaining 31 items (54.4%) were recovered from levels 5-17, which were excavated only in units 2 and 3. The most common material utilized in artifact manufacture was stone (50 items, or 87.7% of the assemblage), followed by shell (4 items, 7.0%) and bone (3 items, 5.3%).

Formed tools or tool fragments comprise 26.3 % of the assemblage (n=15); the rest of the collection consists of 41 pieces of stone flaking detritus and a single small fragment of worked shell. The vertical distribution of formed tools does not reflect that of artifacts in general. Although slightly less than half of the total collection was recovered from the upper 20 cm of midden deposits, fully 80% of the formed tools (n=12) came from these levels. Formed tools comprise 46.2 % of the artifacts recovered from excavation levels 1-4, but only 9.7% of the artifacts from the lower 13 levels. Since the first four levels also delimit the distribution of human remains in 204-F1, it seems probable that at least some of the formed tools were associated with the burials as deliberate grave inclusions.

Among the formed tools recovered from the burial levels are three ground slate fragments that were successfully reconstructed to form a nearly complete leaf-shaped projectile point (Figure B.1d). The pieces of this artifact were found at opposite ends of the burial chamber, and it seems to have been broken *in situ*, perhaps deliberately, before being deposited there.

Other tools recovered from the upper four levels of 204-F1 are: one chipped slate knife (Figure B.1h) and two possible ground slate knife fragments (Figure B.1g, j); a basalt pièce esquillée; two carefully worked, thin, flat rectangular bone artifacts of unknown function (Figure B.4b, d; see Chapter 7 for a similar artifact from 204-F6); two California mussel shell adze/chisel blades (Figure B.8a, b); and a small abalone shell pendant (Figure B.8g). The remaining three artifacts collected from the lower levels of the midden deposits are a sandstone abrader fragment (Figure B.2f), a cobble chopper, and a bone barb fragment from a fish gorge or leister (Figure B.4j). The artifacts are described in detail in Appendix B.

Feature Dating

One radiocarbon date was obtained on bone collagen extracted from a sample of human rib and vertebra fragments recovered from the feature. The sample yielded an uncorrected date of 2150 $\pm$ 70 years BP; the C^{13}-adjusted age of the sample is 2320 $\pm$ 70 years BP (Beta-37844). Within the cultural chronological framework established for the Gulf of Georgia region, this date is consistent with the early Marpole Culture Type. It must be emphasized, however, that this date is applicable only to the burial component; the underlying shell midden deposits clearly predate the burial episode(s). Unfortunately, no datable carbon samples were recovered from the base of the midden deposits, and none of the artifacts recovered from these deposits is temporally diagnostic, so the age of the earliest utilization of the rockshelter cannot be determined at this time.

Human Remains

A total of 655 human teeth, bones, and bone fragments were recovered during the excavation of 204-F1, of which 260 (39.7%) were unidentifiable as to element. Long bones and bones of the hands and feet are well represented in the skeletal collection, but large bones of the pelvic girdle are uncommon (Table C.1). Particularly striking is the paucity of cranial elements, especially considering the fact that 39 isolated teeth were recovered, indicating that skulls were present at one time. The openness of the rockshelter, and its easy visibility from a dirt logging road that appears to be a popular local hiking route, together with the lack of surface remains and the virtual absence of

skulls, the most popular trophy for pothunters, suggest that this burial feature was vandalized in the past.

Condition

The condition of the human skeletal remains from 204-F1 is extremely variable. Some elements are unusually well-preserved, complete, and in excellent condition; the majority, however, are incomplete and fragmented, with cancellous bone eroded or missing, and cortical bone friable and exfoliating. It is possible that the variability in preservation reflects different periods of deposition, with more recent burial(s) being better preserved than earlier ones. Alternatively, these differences may reflect the original site of deposition. The poorly-preserved bones are very similar in condition to those recovered from 204-F6, and may have been redeposited from that feature. Their spatial distribution supports this interpretation, since they tend to come from EU 1 and the unit extensions to the east, south, and southeast, that is, from the portions of the burial chamber nearest the chimney. Most of the well-preserved bones come from EU 2, EU 3, and their northern extensions, that is, the less enclosed west end of the burial area, adjacent to the back wall of the shelter. It is unclear to what extent micro-environmental differences may have affected preservation; perhaps the enclosed, tunnel-like passage in which the poorly-preserved remains were found had a deleterious effect on preservation. Rodent gnaw marks were observed on one element, a left first metatarsal. Three other bone fragments, a cervical vertebra, an ulna shaft and an ulna olecranon process, exhibit carnivore chewing marks. A possible cutmark was observed on the same ulna shaft.

Spatial distribution

All but three of the human remains were found in the top 20 cm of the midden; an anterior tooth and a foot phalanx were recovered from level 5 (20-25 cm BS) and an infant's vertebral arch was recovered from level 8 (35-40 cm BS). These three elements are all very small, and probably were displaced downward through the deposits as a result of rodent activity. The tooth actually fits in a maxilla fragment recovered from level 2.

The distribution of human remains across the burial chamber is summarized in Table 5.2 by excavation unit/extension and level. Omitted from these calculations are four elements of uncertain provenience. The same data are displayed graphically in Figures 5.6 and 5.7. As the table indicates, very little of the skeletal assemblage was found on the surface of the burial chamber, and the majority (61%) was located between 5 and 15 cm below current ground surface. The densest concentration of human remains was found in the southeast corner of the feature. The SE and SW quads of EU 1, the SE quad of EU 2, the W quad of EX 2S, the S quad of EX 1E, and unit extensions 1S and 1SE, which together cover approximately one-third of the area of the chamber, contained 77.2% of the human remains.

The concentration of human remains in the southeast corner of 204-F1, at the base of a crevice leading down from 204-F6, raises the question of how much of the bone assemblage recovered from F1 was originally deposited in F6 and worked its way through the chimney to be redeposited in F1. Given the demographic similarities between the two collections, it was impossible to determine with certainty which of the remains found in the southeast corner of F1 actually came from F6, except in those rare instances when two articulating fragments of the same bone could be conjoined.

When the two skeletal collections were compared, nine of the bone fragments from F1 were found to articulate with bone fragments from F6: two tibia fragments from EU 1, SE quad; a radius fragment from EX 1E, N quad; one fibula and two tibia fragments from EX 1SE; a tibia fragment and an unidentified long bone fragment from EX 1S, E quad; and a tibia fragment from EX 2N, E quad. The last item is significant in that it was found approximately 2.5 m from the base of the chimney, beyond the area of densest bone concentration. Its location suggests not only that there has been considerable horizontal displacement of remains in this burial feature, but that in theory, all of the bones in F1 could have been redeposited from F6.

Skeletal Reconstruction

Forty-eight bone fragments from 204-F1 were found to conjoin with other fragments, producing 17 conjoined "sets" of from two to six pieces. Seven of the reconstructed sets are long bone fragments; the remainder are vertebra (n=3), scapula (n=2), skull (n=2), metatarsal (n=2), and innominate (n=1) fragments. The conjoined sets are generally small; most consist of only two (70.6%) or three (23.5%) pieces, and in no case was a complete bone reconstructed. Approximately half of the conjoined sets (n=8) are comprised of fragments from the same provenience unit (TS=2), and two sets contains pieces recovered from adjacent provenience units (TS=3). Members of the remaining eight sets come from relatively scattered locations across the burial feature (TS 4-9), indicating a moderate degree of post-depositional disturbance of

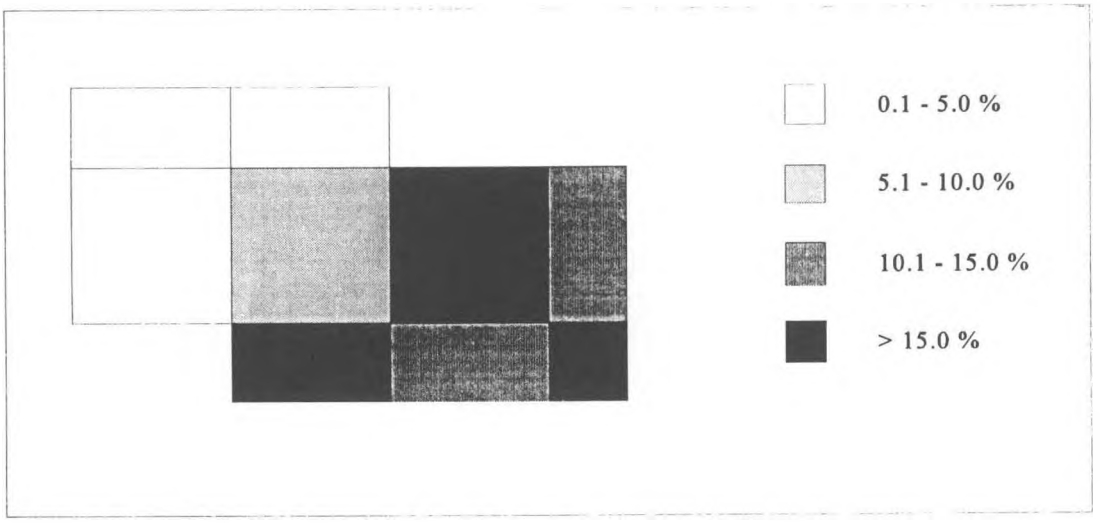

Figure 5.6 Horizontal distribution of human remains, DgRw 204-F1.

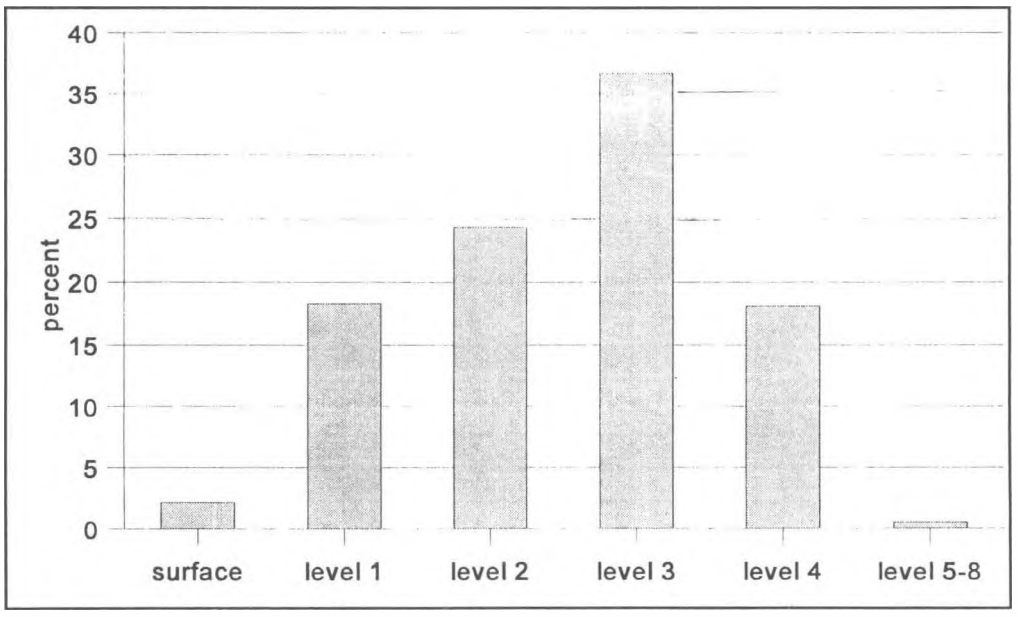

Figure 5.7 Vertical distribution of human remains, DgRw 204-F1.

Table 5.2 Spatial distribution of human remains, DgRw 204-F1.

Unit	Surface	Level 1	Level 2	Level 3	Level 4	Level 5-8	Total	%
EU 1	1	38	44	40	43	0	**166**	25.5
EX 1E	5	16	22	26	15	0	**84**	12.9
EX 1SE	3	48	20	27	4	0	**102**	15.7
EX 1S	0	2	5	44	16	0	**67**	10.3
EU 2	1	6	24	18	2	2	**53**	8.1
EX 2N	1	2	19	1	3	0	**26**	4.0
EX 2S	0	2	13	78	30	0	**123**	18.9
EU 3	1	1	9	3	0	1	**15**	2.3
EX 3N	2	4	2	2	5	0	**15**	2.3
Total	**14**	**119**	**158**	**239**	**118**	**3**	**651**	100
%	2.1	18.3	24.3	36.7	18.1	0.5	100	

the remains. Horizontal dispersal (mean = 2.12) tends to be greater than vertical dispersal (mean = 1.64): 84% of reconstructed fragments came from the same or adjacent excavation levels, while only 65% came from the same or adjacent excavation quadrants (Figure 5.8). Dispersal scores for the five excavated features are compared in Appendix C, Table C.2.

Burning

Seven elements (1.1%) exhibit evidence of burning: a rib fragment, a metacarpal shaft, a femur distal epiphysis fragment, a tibia shaft fragment, and three small unidentified pieces (see Table C.5 for a comparison of burning patterns in the five excavated features). There is no apparent patterning in the spatial distribution of the burnt fragments: they are scattered across the deposits both vertically and horizontally. Given their rarity and distribution, it seems unlikely that the burning resulted from deliberate cremation; the fragments were probably burnt accidentally, through proximity to a fire built for other reasons, perhaps related to mortuary ritual. Two ash dumps, evidence of such burning, were encountered during the excavation of 204-F1; one of these was located in the upper levels of the midden that are associated with the human remains.

Demography

Although preliminary examination of this burial feature suggested the presence of a single adult, the results of the excavation indicate that a minimum of five individuals are represented in the skeletal assemblage. This estimate is based on the presence of four left calcaneus fragments from mature individuals (late adolescent/adult), and a vertebral arch half from a small, probably newborn, infant. It is unlikely that this estimate has been skewed by the introduction of extraneous elements from 204-F6, since all three of the individuals identified in F6 were also represented by the left calcaneus (see Chapter 7).

The five individuals include the newborn infant (represented by a single skeletal element), an adult female, an adult male, an adolescent of unknown sex, and one individual of uncertain sex and age (adolescent/adult). The adult female was identified by left and right innominate fragments exhibiting broad sciatic notches, small acetabula, and the "groove of pregnancy" type of preauricular sulcus (Houghton 1974). Degenerative changes to the auricular surface of the right innominate indicate that this woman was probably between 35-39 years of age at the time of death (Lovejoy et al. 1985). A third innominate fragment exhibits the narrow sciatic notch typical of males, but was too incomplete for an age estimate more precise than "adult". The presence of an unfused femur epiphysis and some relatively unworn teeth indicate that at least one of the individuals was an adolescent.

Anomalies and Pathologies

There are no skeletal indications of the cause or manner of death of any of the individuals from this burial feature. The most common pathological condi-

tion observed is osteoarthritis, which affects at least 18 skeletal elements, mostly from the hands (n=5) and feet (n=6). Other affected areas include the cervical and thoracic spine, the shoulder (scapula), elbow (distal humerus), and knee (patella and distal femur). Severity of involvement ranges from slight (minor lipping of joint margins and/or minor pitting of articular surfaces) to severe (pronounced lipping or eburnation). Other degenerative changes apparent in the skeletal material are a manubrium with mineralization the first costal cartilage, and a thoracic vertebra with a shallow Schmorl's node on the inferior centrum.

Two examples of skeletal trauma were noted: a middle foot phalanx with a healed fracture of the proximal articular surface; and a lower cervical vertebra with a healed but ununited fracture (pseudoarthrosis) of the spinous process. The cervical lesion is a type of activity-related trauma often referred to as "clay-shoveller's fracture", resulting from "powerful muscle contraction in activities producing hyperextension or hyperflexion of the neck or, more commonly, in those requiring retraction of the scapula toward the spine while elevating the ribs" (Knüsel et al. 1996: 429). Despite the appellation, such fractures have been observed among hunter-gatherers as well as in agricultural and industrialized societies; in all contexts, however, they occur almost exclusively in males (Knüsel et al. 1996: 434).

The only other anomaly observed was a small osteoma (benign bone tumour) on the ventral surface of a right zygoma.

Mortuary Practices

In view of the generally poor preservation and fragmentary condition of the human remains, the evidence of post-depositional disturbance of the burial chamber by both animals and humans, and the undeterminable degree of commingling with remains from DgRw 204-F6, it is difficult to draw any firm conclusions regarding mortuary practices at this burial feature. It is unclear whether these were primary or secondary interments; however there is very little evidence for secondary treatment of the corpse (dismemberment, cremation), apart from one equivocal cutmark and a few slightly burnt bone fragments that may have resulted from accidental exposure to fire. The distribution of artifacts within the burial chamber suggests that some grave goods, primarily utilitarian items, were deposited along with the bodies, and perhaps deliberately broken at that time. The burial chamber may at one time have been sealed off by a wall of fallen sandstone slabs, although the evidence for this is not abundant.

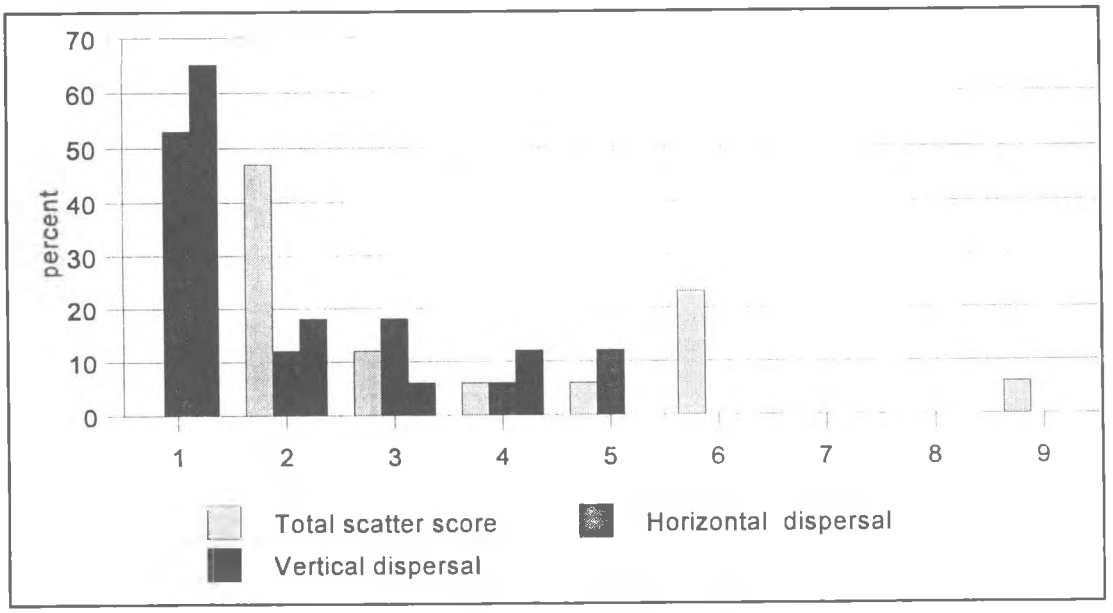

Figure 5.8 Dispersal scores of reconstructed elements, DgRw 204-F1.

Chapter 6

Excavations At DgRw 204-F2

DgRw 204-F2 was selected for excavation as an example of a small, undisturbed burial feature. This feature was so inconspicuous, and the entrance so well concealed that it was overlooked during the initial reconnaissance, and was not discovered until the upper bluffs were re-examined at the end of the site survey. Although various animals may have used the burial chamber as a shelter, there is no evidence for and little likelihood of human disturbance of the remains.

Feature Description

Feature 2 is located near the centre of a cluster of sandstone boulders at the toe of the upper bluffs, about 10 m north of an old logging road that skirts the base of the bluffs (Figure 6.1). The feature is formed by a large wedge-shaped sandstone block whose southern edge rests on several smaller blocks. When first discovered, the feature was nearly covered by brush piles and other logging debris (Figure 6.2).

Preliminary evaluation of 204-F2 identified two chambers beneath the large sandstone block which forms the roof, but only the larger south chamber appeared to contain human skeletal remains. The entrance to the burial chamber is located at the southeast corner of the ceiling block (Figure 6.3), and faces southeast (118°); when found, it was partially blocked by two large and several smaller sandstone boulders, leaving an opening 1.30 m long and 0.23 m high. These boulders appear to have been deliberately placed to wall off the entrance to the burial feature. The roof of the burial chamber slopes downwards to the west at a 10° angle; it also slopes very slightly to the north (Figure 6.4). The chamber floor, which is littered with sandstone slabs and cobbles, measures a maximum of 1.40 m north-south by 1.60 m east-west. It is slightly uneven, dipping near the centre of the chamber from high points along the north, south, and west walls.

A number of human skeletal elements were visible towards the back (west end) of the burial chamber (Figures 6.2, 6.3), including two skulls, a mandible, a scapula, three innominates, several long bones, ribs, and a lumbar vertebra. From these remains it was estimated that at least two adults were represented in this burial feature. Several small clamshell fragments were also observed scattered among the bones, and a small patch of ash was observed 0.50 m east of the entrance (Figure 6.3).

Excavation Results

Four 1.0 x 1.0 m excavation units were laid out in a square grid across the floor of the burial chamber, but the south, west, and north walls of the feature limited the extent of excavation that could be undertaken: in EU 3 only the SE and SW quadrants were dug, and in EU 4 only the SE quadrant. The lowness of the ceiling created problems of access to the interior of the burial chamber. Once the boulders blocking the entrance were removed, the height of the opening was increased to 45 cm, high enough to admit an excavator lying on her side or stomach. However, the back of the chamber, where most of the human bones were located, was only 10-20 cm high, too low to permit access. To overcome this difficulty, unit quadrants were excavated in sequential strips from east to west, progressively creating openings deep enough to allow the excavator access to the next quadrant. Although each unit was excavated to a minimum depth of

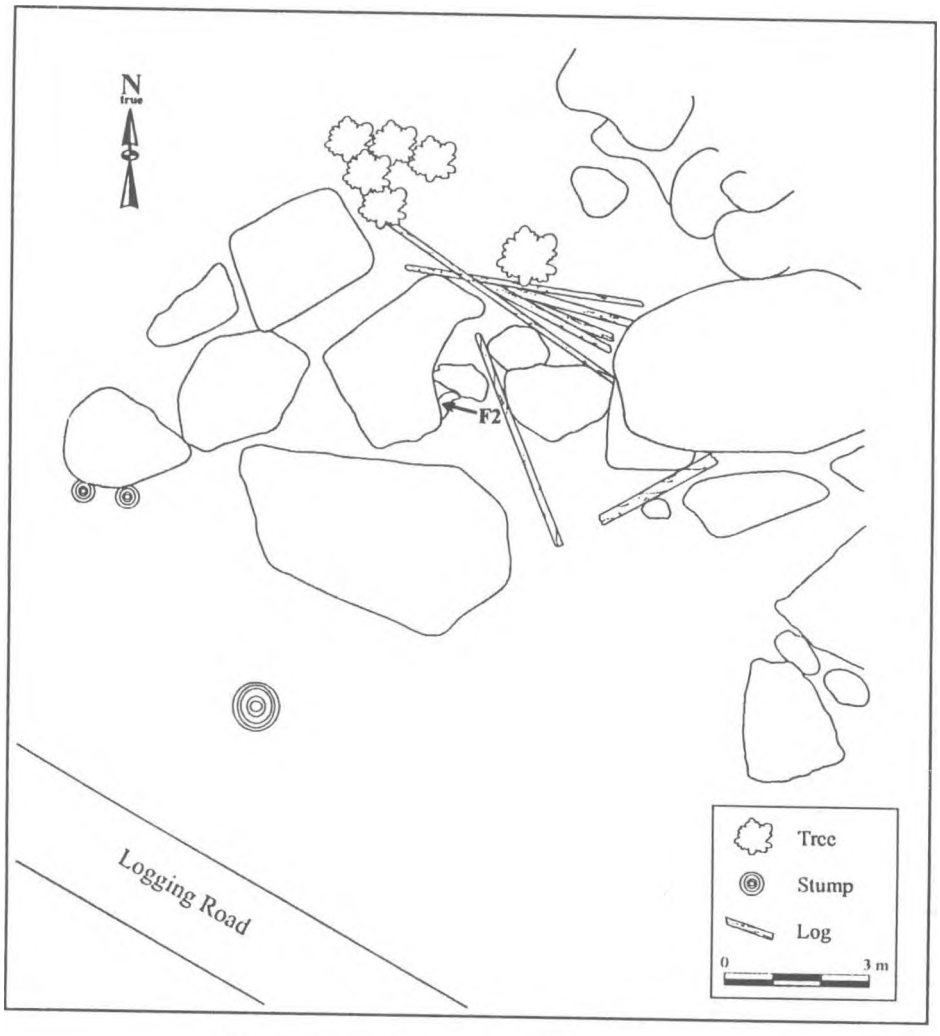

Figure 6.1 DgRw 204-F2 location.

20 cm below surface, cultural material inside the feature was restricted to the surface and the upper 5 cm of the deposits.

Matrix Description

The surface of the burial chamber was covered with organic litter, primarily decaying leaves, twigs, and dead vines, and partially buried under fallen sandstone slabs. The sediments beneath this surface litter consisted of very dry, loose, medium brown (10YR 5/3) sandy silts containing a high proportion of angular sandstone slabs, cobbles, pebbles, and gravel. Small bits of charcoal and fragmented shell were present in the upper 5 cm of the deposits (level 1). Sediments below level 1 were increasingly compact, culturally sterile sandy silts, containing no bone, shell, or charcoal. Due to the shallowness of the cultural deposits and the difficulty of access, no stratigraphic profiles were drawn of this feature.

Faunal Remains

The following discussion summarizes the results of faunal analyses by van Gaalen (1991) and Kusmer (1992). Fauna collected from the feature include sparse shellfish fragments and a total of 116 vertebrate elements, representing mammal (41%), reptile (27%), fish (22%), and bird (10%) remains. The majority of these specimens were collected from EU 2, which also contained most of the human remains. Seventy-nine of the collected bones (68%) could be identified to a specific taxon (Table A.5). Mammalian fauna include various rodents (squirrel, rat/mouse, and vole), carnivores (raccoon, weasel), and deer; a few small mammal fragments appear to be burnt. Only herring and salmon were identified among the fish remains, but the avian fauna are more varied, including waterfowl, grouse, and perching birds. The fish and reptile (snake) are represented almost exclusively by vertebral elements, but the bird and mammal remains include

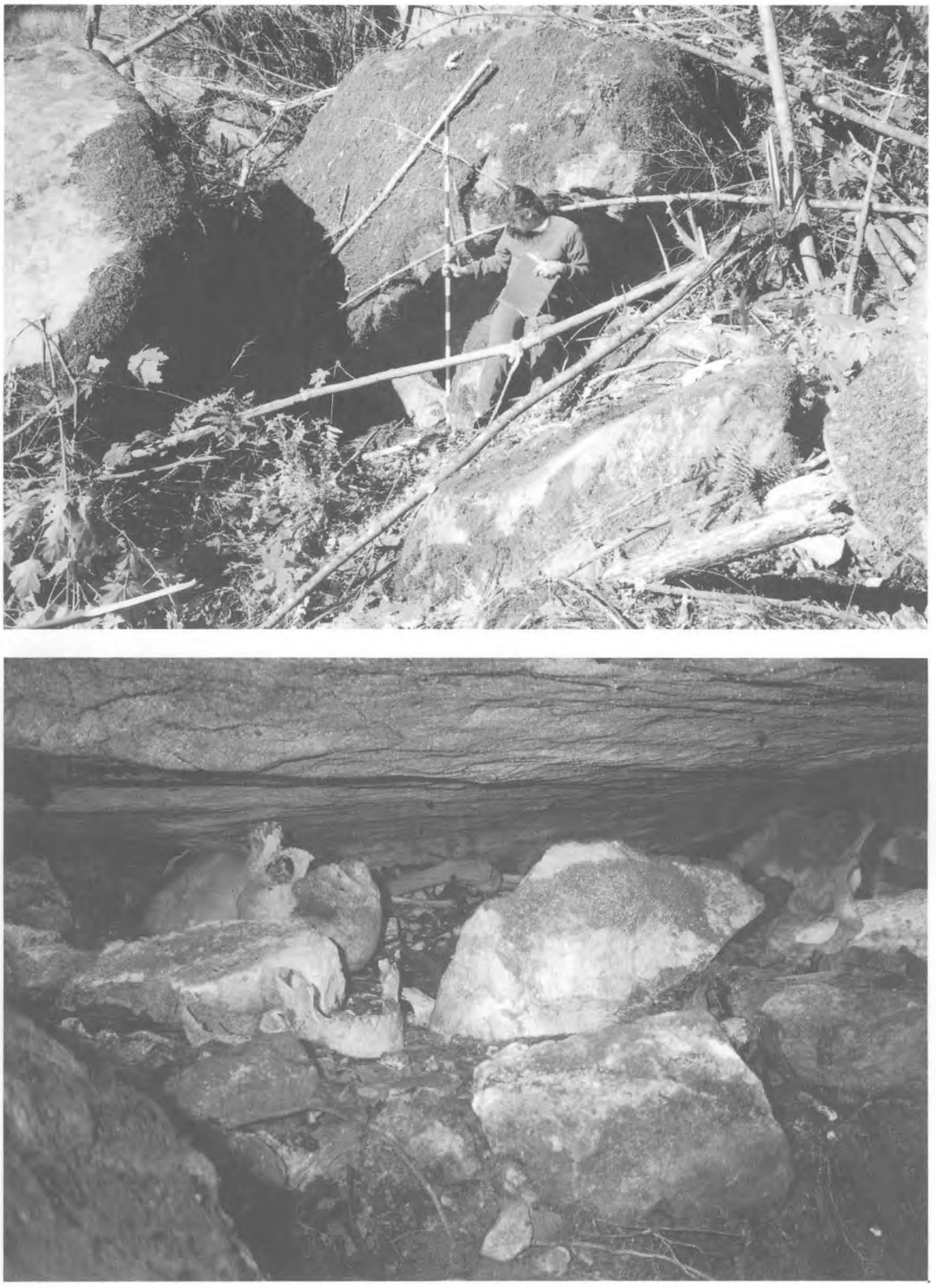

Figure 6.2 View of DgRw 204-F2 entrance (top); view inside burial chamber, looking west (bottom); scale bars=10 CM.

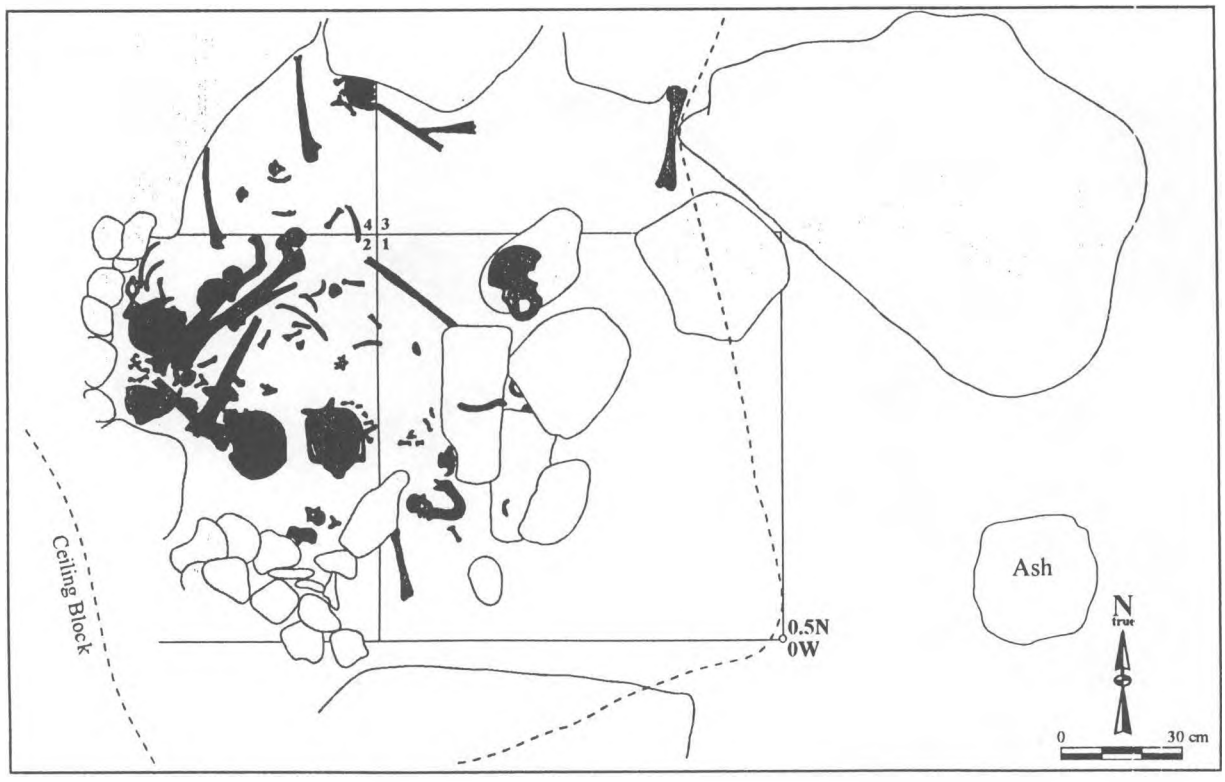

Figure 6.3 DgRw 204-F2: floor plan.

cranial, limb, and vertebral elements. All of the deer and raccoon remains are from immature animals.

Shellfish remains, although uncommon, were found in all of the excavated quadrants. Due to their rarity, they were quantified by counting numbers of identified specimens (NISP) rather than as a proportion (by weight) of collected matrix samples, as was the case with the other excavated features. Several shellfish species were identified, including bay mussel (8), clam (12), littleneck clam (10), butter clam (5), horse clam (1), whelk (3), cockle (5), and barnacle (1). Approximately 25% of the shell fragments are burnt.

Both natural and cultural processes appear to have contributed to the collection of this faunal assemblage. The bird, carnivore, reptile and deer remains probably represent a natural accumulation of animals that either used the crevice for shelter/habitation (rodents, snakes, etc.), or ended up there as carnivore prey. The fish, shellfish, and burnt bones are indicative of human activity. Specifically, the evidence of burning of both bone and shell, the presence of charcoal flecks in the matrix, and the occurrence of a small ash patch immediately outside the chamber together suggest some form of mortuary ritual that involved the burning of food items. The preponderance of vertebral elements may indicate that the fish had been processed and preserved prior to deposition.

Artifacts

No tools or other objects of human manufacture were recovered from 204-F2.

Dating

The estimated age of this burial feature, based on radiocarbon analysis of bone collagen obtained from miscellaneous rib and vertebra fragments is 2290 $\pm$ 60 years BP (uncorrected), or 2450 $\pm$ 60 years BP (C^{13} adjusted age) (Beta-37843). These dates place the feature near the end of the Locarno Beach phase and/or the beginning of the Marpole phase of the Gulf of Georgia cultural chronology

Human Remains

A total of 582 human teeth, bones, and bone fragments were recovered from 204-F2, of which 208 specimens (36.7%) were unidentifiable as to element. All portions of the skeleton are well represented, including the skull, teeth, and small bones of the hands and feet. In this respect, 204-F2 differs from the other two excavated features at DgRw 204, both of which contain relatively few cranial elements, and is more similar to the excavated features from DgRw 199 (see Appendix C, Table C.1).

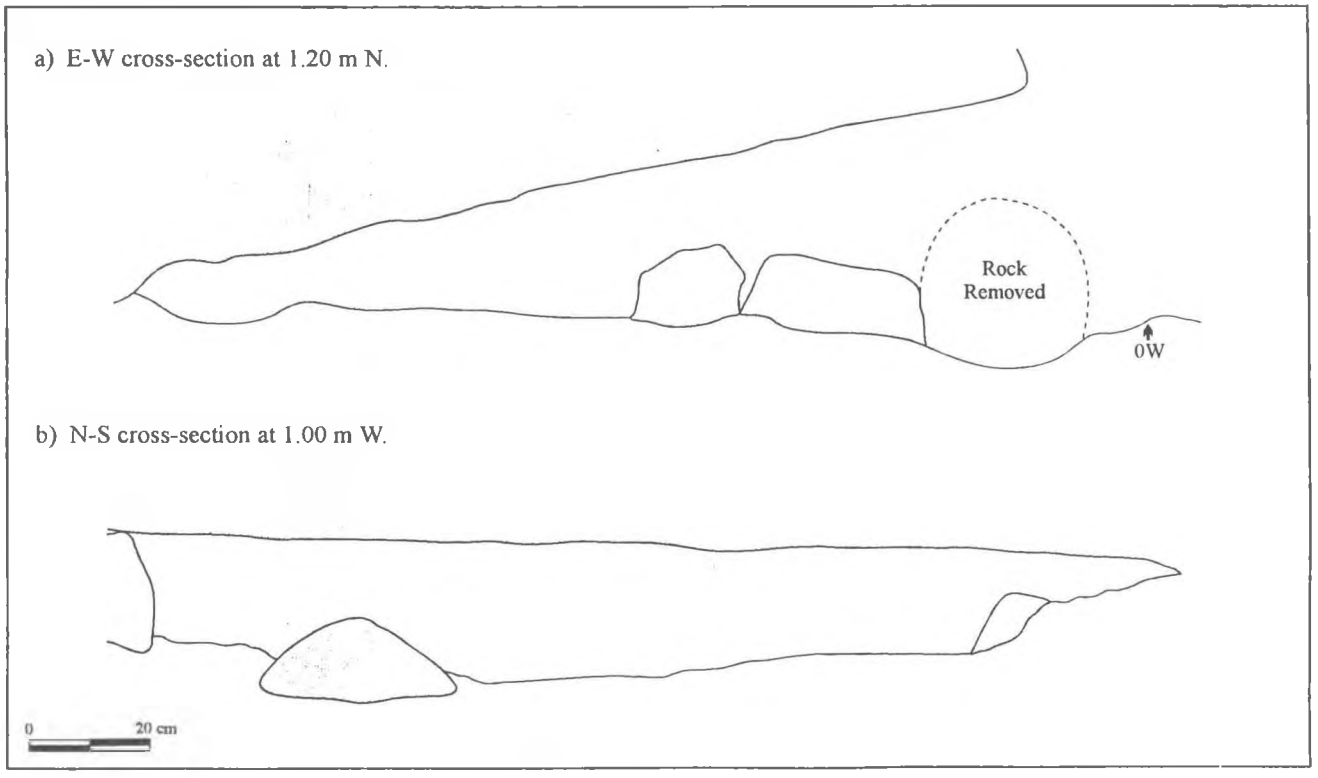

Figure 6.4 DgRw 204-F2: cross-sections of burial chamber.

Condition

The condition of the recovered remains is variable. Dense cortical bone is generally well preserved, but cancellous bone tends to be eroded, so that long bones consist mainly of diaphyseal fragments with the metaphyses and articular surfaces damaged or missing. White calcareous patches, apparently a mineral precipitate from the surrounding rock walls and ceiling, coat many skeletal elements.

Evidence of animal disturbance was seen on six skeletal elements. Rodent gnaw marks were observed on an infant frontal bone (left orbit), an infant ulna (midshaft), and an adult female skull (right orbit, left zygoma). Conical punctures and/or bone splintering from carnivore chewing were apparent on a tibia, metacarpal, and innominate, all from adults. This is consistent with the results of the faunal analysis, which indicated that the burial chamber had been used as a shelter by a number of animals, including both rodents and carnivores.

Spatial distribution

Of the 582 recovered fragments, 576 are of known provenience as to unit, level, and quadrant. The remaining six small fragments were found while cleaning the chamber floor prior to photography, and their original provenience is unknown. The spatial distribution of human remains is summarized in Table 6.1. In contrast to the other excavated burial features, horizontal distribution was calculated by quadrant rather than by excavation unit due to the small size of the burial chamber, and the fact that only portions of EUs 3 and 4 were excavated. As is illustrated in Figure 6.5, the strongest concentration of human bones occurs in the south-central portion of the burial chamber, particularly the NE quadrant of EU 2.

The sediments in which the bones were partially buried are primarily of natural rather than cultural origin, resulting from the decay of the overlying sandstone slab combined with wind-deposited silts and organic debris. The bones do not appear to have been

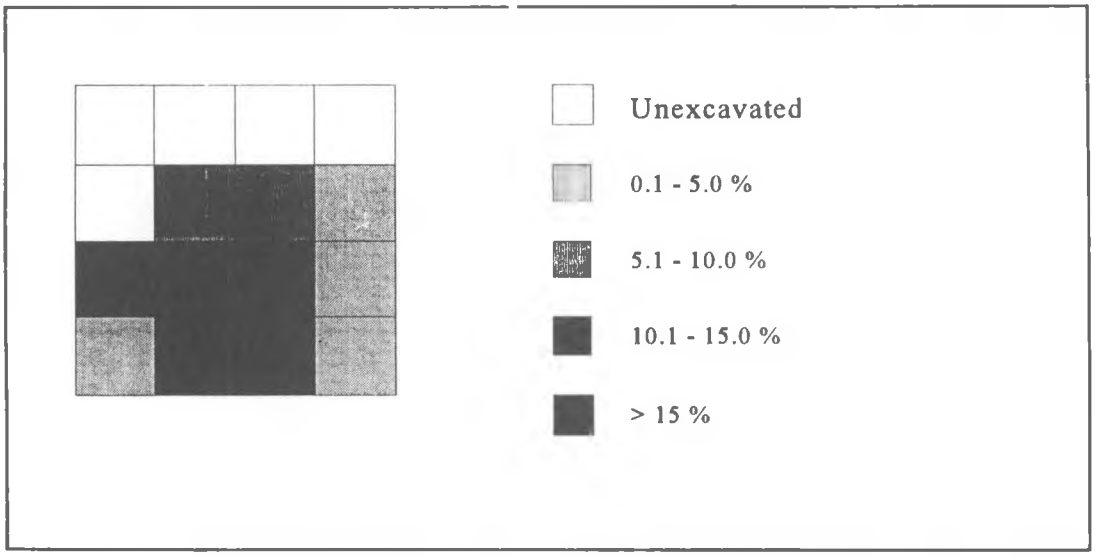

Figure 6.5 Horizontal distribution of human remains, DgRw 204-F2.

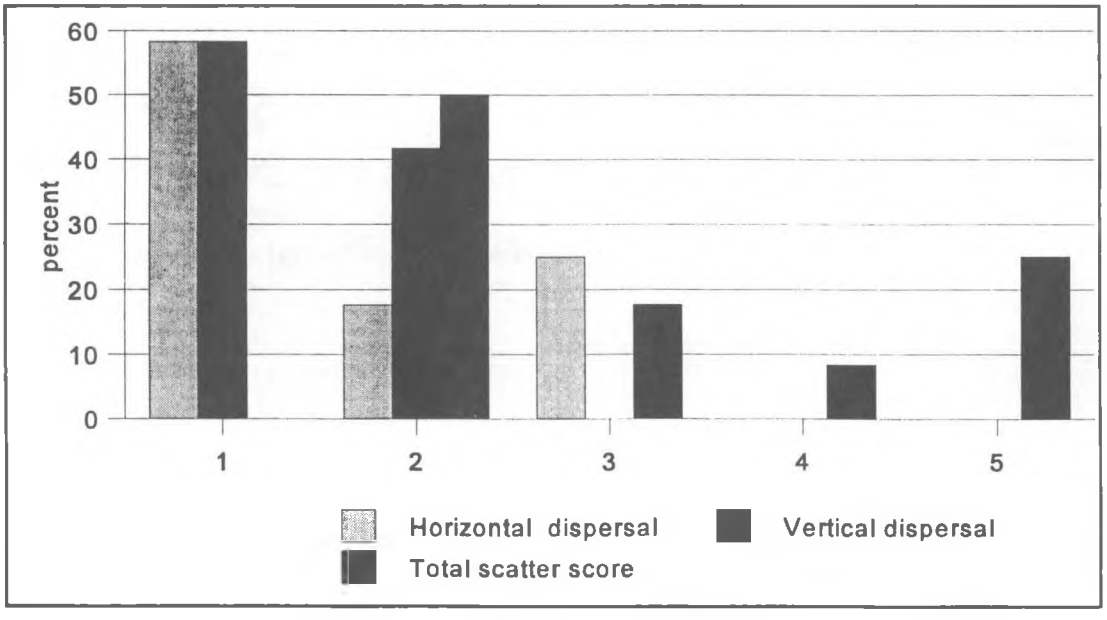

Figure 6.6 Dispersal scores of reconstructed elements, DgRw 204-F2.

deliberately buried, but were probably originally placed on the ground surface, with the sediments building up around and over them with time. The areas of the chamber furthest from the partially blocked entrance (EU 4-SE and EU 2-NW) appear to have experienced the least sedimentation, with more than half of the recovered remains from these quadrants (60.5% and 56.7% respectively) found on the surface. Throughout the rest of the burial chamber proportionally more elements were recovered from sub-surface deposits than from the surface, attesting to the accumulation of sediments around the chamber entrance.

Skeletal Reconstruction

Thirty-seven bone fragments (6.4%) were found to conjoin with other fragments, producing 12 conjoined "sets" of from two to nine pieces. Six of the reconstructed sets are skulls or cranial fragments; the remainder are long bones (n=2), ribs (n=2), an ilium, and an axis. In six cases, all of the members of a conjoined set come from the same provenience unit (TS=2), and in two cases, the set members come from adjacent units (TS=3). Members of the remaining four conjoined sets were slightly more widely dispersed, with total scatter scores of 4 or 5 (Figure 6.6). As would be expected given the shallowness of the cul-

tural deposits, horizontal scatter is on average (mean = 1.67) slightly greater than vertical scatter (mean = 1.42). All measures of dispersal (horizontal, vertical, and total) have lower values than at 204-F1 (Appendix C, Table C.2), a possible indication of the greater integrity of the deposits at 204-F2, or perhaps a reflection of the small size of the F2 burial chamber.

Burning

Sixty bones (10.3%) show evidence of having been exposed to fire; 45 are small fragments not attributable to a specific element, but 15 were identified as to element and in some cases to a specific individual. The effects of burning are limited to slight discolouration or patches of black charring over small areas; none of the bones is calcined or burnt over its entire surface. In many cases, the charring is restricted to one end of a broken bone, and occasionally extends onto the medullary (internal) surface. This might suggest that the burning occurred some time after death, after the body was skeletonized and the skeletal elements fragmented. That is, the burning may have been the result of some accidental exposure to fire, perhaps through a natural occurrence such as a forest fire.

However, there is some evidence of non-random patterning in the elements affected by fire that argues against this interpretation. Of the fifteen identified specimens, five are hand bones, three are clavicles, two are tarsals, four are femurs, and one is a skull fragment. No ribs, vertebrae, pelvic bones, or arm bones are burnt. Each of the three individuals represented in the burial chamber is affected to some degree. Interestingly, half of the identified burned elements are from the adult female, whose skeleton is the most incomplete of the three. Only two burnt bones are attributable to the adult male (right third metacarpal, left clavicle), but the adult female also exhibits burning on these same two bones (among others).

The distribution of burnt bones across the burial chamber also argues against accidental exposure to fire. They are not clustered near the entrance to the burial chamber, where an ash dump attests to at least one earlier burning episode. A forest fire would presumably have affected all of the surface remains to some degree, but only two surface elements show any evidence of burning. Interestingly, no burnt bones were found in the area of highest bone density, EU 2-NE, but the surrounding quadrants to the south, east, and west each contain a few burnt elements, intermingled with unburnt bones.

Although deliberate cremation cannot be invoked as an explanation for the mild and sporadic burning on the human remains in this burial feature, it is possible that some other form of mortuary ritual may be responsible. Burning patterns at 204-F2 are compared with the other four excavated burial features in Appendix C, Table C.5.

Table 6.1 Spatial distribution of human remains, DgRw 204-F2.

Unit/Quad	Surface	Level 1	Total	%
EU 1 - SE	0	1	1	0.17
EU 1 - SW	10	67	77	13.37
EU 1 - NE	1	2	3	0.52
EU 1 - NW	12	50	62	10.76
EU 2 - SE	12	46	58	10.07
EU 2 - SW	0	23	23	3.99
EU 2 - NE	54	145	199	34.55
EU 2 - NW	34	26	60	10.42
EU 3 - SE	2	9	11	1.91
EU 3 - SW	2	42	44	7.64
EU 4 - SE	23	15	38	6.60
Total	150	426	576	100.00
%	26.04	73.96	100.00	

Demography

Preliminary evaluation of this burial feature during the site reconnaissance suggested an MNI of two adults represented by the visible remains; excavations revealed the presence of a third individual, an infant. The differences between these three in age, size, and skeletal robusticity are so pronounced that it was possible to attribute all complete elements and many bone fragments to one of the three. The skeletons of the infant and the adult male are both fairly complete, but the female skeleton is very poorly represented, consisting mainly of the skull, three limb bones, and several hand and foot bones.

The infant is estimated to have been between 12 and 18 months of age at the time of death, based on dental development and long bone lengths (Stewart 1979). Age determinations of the two adults are based on the degree of closure of the ectocranial sutures (Meindle and Lovejoy 1985), and on the level of dental attrition, based on standards established for a prehistoric skeletal population from the Tsawwassen site (Curtin 1991a). In both cases the two independent criteria yielded similar results. The female was judged to be 35-40 years old by the dental standards, and 34.7-

41.1 by the cranial suture standards. The adult male appears to be slightly older: 40-45 years (dental attrition) or 43.5-45.2 (suture closure). Demographic profiles of 204-F2 are compared with the other four excavated features in Appendix C, Tables C.3 and C.4.

Living stature of the adult male was reconstructed from femur and tibia lengths using Trotter and Gleser's (1958) formulae for Mongoloid Males, which yielded a calculated stature of 162 cm. This is well within the normal range of variability established for other prehistoric skeletal samples from the Gulf of Georgia region (Beattie 1980; Curtin 1991a). No complete long bones are present in the female skeleton, so stature reconstruction was not possible, beyond the general observation that she was very gracile and considerably smaller than the male.

The skeletal remains were completely disarticulated when found, and there was no apparent clustering of elements by individual in the burial chamber; instead, the horizontal distribution of elements from each identified individual parallels that of the skeletal assemblage as a whole, with the greatest density of remains in EU 2-NE, and lesser amounts in the surrounding quadrants. It is unclear, however, to what degree the observed disarticulation can be attributed to interference by animals inhabiting the cave, or to intentional mortuary practices.

Anomalies and Pathologies

Several pathological conditions are apparent in the skeleton of the adult male. These include degenerative joint disease (osteoarthritis) affecting the right elbow and right wrist; a healed fracture of the left first toe (distal phalanx), with associated traumatic arthritis of the joint; a lytic lesion of unknown etiology on the superior centrum of the first lumbar vertebra; and an unhealed *peri mortem* fracture to the left mid-parietal region of the skull, which may have caused the death of this individual.

The adult male also experienced poor dental health, particularly in the upper jaw, which features at least six periapical cavities attributed to granulomata (Dias and Tayles 1997) and the *ante mortem* loss of three upper incisors and a premolar. The mandible exhibits few pathologies, but some interesting congenital anomalies, including agenesis of both central incisors and both third molars. The only other anomaly observed in this skeleton was a lumbosacral vertebra (sacralized fifth lumbar), with *spina bifida*. This condition may be entirely asymptomatic, or may be accpanied by other neurological abnormalities; both genetic and environmental factors apparently play a role in its development (Saunders 1978: 238).

The only pathological conditions observed in the adult female are osteoarthritis, affecting the cervical spine and left foot, and a healed fracture of the right third metatarsal. However, this skeleton is so incomplete that other pathological conditions may not have been preserved, even if originally present.

The infant may have suffered from some form of anaemia, as indicated by the presence of cribriform lesions (*cribra orbitalia*) on the roofs of both orbits. The lesions are small, and do not appear to be active, which may signify an earlier episode of ill-health that the baby survived. The proximal shaft of the left ulna appears unnaturally swollen due to deposition of a layer of periosteal new bone; by itself this finding is not diagnostic of a specific pathological condition, but given the prevalence of treponemal lesions in skeletal remains from another burial feature (see Chapter 8) its occurrence here is suggestive.

None of the three crania exhibits evidence of artificial deformation or of labret wear on the teeth.

Mortuary Practices

DgRw 204-F2 is the only one of the five excavated features that exhibited no evidence of human disturbance; however the presence of rodent and carnivore chewing damage on several bones indicates some degree of post depositional disturbance from animals. Unfortunately, the extent to which this disturbance has altered the original burial context is unclear. The degree of disarticulation of all three skeletons and the incompleteness of the adult female remains would seem to suggest that at least one and perhaps all three of the burials were secondary interments, but there is no convincing evidence for *post mortem* reduction processes such as defleshing, dismemberment, or cremation. No cutmarks were observed, and burning, although present, is apparent on only a few bones, appears to be of low intensity, very localized in extent, and patterned with respect to affected elements, suggesting a ritual context, such as the ceremonial burning of hand-held food offerings. However, the incomplete, sporadic burning could also be interpreted as representing symbolic rather than complete cremation of the body, perhaps for less wealthy or lower-ranking persons who could not afford or were not entitled to a full ceremonial cremation. The absence of grave inclusions, either utilitarian or wealth/ status goods, coupled with the sparsity of food offerings (fish, shellfish, etc.) supports the suggestion that these individuals were not among the social elite, and may have received only perfunctory mortuary treatment.

Chapter 7

Excavations At DgRw 204-F6

Feature 6 was overlooked during the initial site reconnaissance of DgRw 204, and was only discovered during the excavation of 204-F1, when human remains were observed in a rubble-filled, chimney-like crevice leading from the southeast corner of F1 to a previously unrecorded upper chamber, which was subsequently designated 204-F6. The possibility of commingling of remains between F6 and F1 led to the selection of F6 for excavation.

Feature Description

204-F6 is situated on the upper bluffs, near the base of a steep slope, beneath a jumble of large sandstone boulders immediately adjacent to and east of 204-F1 (Figures 7.1, 7.2), so that the ceiling slab of F1 forms part of the west wall of F6. It is a complex feature, consisting of a relatively spacious, south-facing entrance passage (0.72 m high and 0.52 m wide), with a chamber opening off either side of the north end (Figure 7.3). The eastern chamber has a low (0.33 m) but relatively wide (0.80 m) entrance; the chamber itself is small (1.36 m north-south by 1.40 m east-west) and triangular in shape, with no skeletal elements visible on the surface. The entrance to the western chamber is larger (0.86 x 0.82 m), as is the chamber itself (2.90 m north-south by 1.20 m east-west). A sparse scattering of human bone (femur, vertebrae) was visible among a jumble of rocks at the south end (Figures 7.2, 7.3) and animal faeces were observed as well.

The ceiling of the west chamber is extremely irregular, ranging in height from 1.13 m just inside the entrance, to a minimum of 0.68 m beneath a downward projecting block, to a maximum of 2.50 m near the west wall (Figure 7.4). The floor exhibits a slight slope from east to west, and a more definite slope from north to south, with a very pronounced dip at the south end, where the human remains are exposed.

Excavation Results

Due to the narrowness of both chambers, standard sized 1.0 x 1.0 m excavation units were not employed here. Instead, each EU measured 50 x 50 cm, the equivalent of a unit quadrant at the other excavated burial features. In the western chamber, four EUs were laid out along a north-south axis, and numbered sequentially from south to north (Figure 7.3). In addition, a small, irregularly-shaped extension (WX) was excavated to recover remains from a narrow strip against the wall to the west of EU 2 and 3.

In the east chamber a single unit, EU 5, was excavated in two levels to a depth of 10 cm BS, exposing the underlying boulders, but no evidence of human remains was found, and no further work was undertaken in this chamber. The four EUs in the west chamber were dug to variable depths: EU 1 was excavated in three levels to a depth of 15 cm BS; EU 2 in ten levels to 50 cm BS; EU 3, EU 4, and WX in seven levels to 35 cm BS.

In EU 1, excavation of level 3 exposed the top of a large boulder jamming the "chimney" leading down to the east end of F1 below. Human bones were visible in the chimney below the boulder, but were inaccessible from 204-F6, and since the boulder was immovable, excavations in EU 1 were halted. An attempt was made to reach these remains from below, from the southeast corner of 204-F1, and some elements were collected in this manner, but the rubble filling the chimney was very unstable, and after one

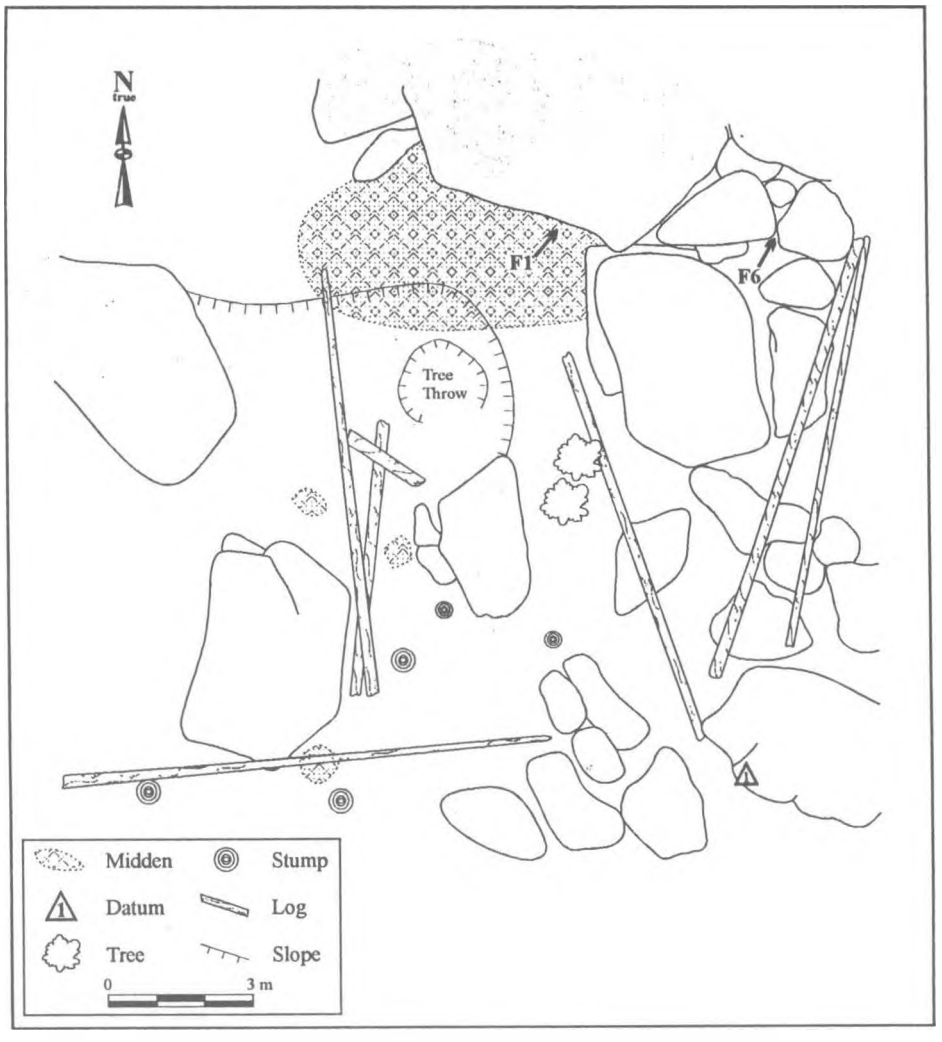

Figure 7.1 DgRw 204-F6 location.

sode of slumpage, it was deemed too dangerous to pursue this course of action, and attention was transferred to the north half of the west chamber.

Bones found in the north half of the chamber were buried to a greater depth below surface, indicating higher sedimentation rates in this portion of the feature. After one heavy rainfall, evidence of a drainage route was seen running from the ground surface above the feature down the face of the west wall near the middle and north end of the chamber. This drainage route is probably responsible for the greater sedimentation in those areas. Most of the recovered bones were oriented obliquely rather than horizontally, probably as a result of the underlying sediments being washed or filtered down between the rocks filling the chimney, creating an uneven surface.

Excavation in EU 2, EU 3, EU 4 and WX continued until the fine sediments which formed the floor were completely removed, exposing angular sandstone rubble filling a narrow crevice between the large sandstone slab forming the west wall of 204-F6 (also the ceiling slab of 204-F1), and the cluster of boulders forming the floor. This crevice appears to be a northern continuation of the "chimney" between F6 and F1, but does not communicate directly with F1. Some skeletal elements may still be present beneath this rubble; if so, they are inaccessible, since the boulders filling the crevice are too large to remove from above, and too unstable to attempt excavation from below.

Matrix description

The surface of the east chamber was covered by organic litter, mainly decaying leaves with some burnt roots. The underlying non-organic matrix is comprised of yellow sandy silts mixed with angular gravel, cobbles, and sandstone slabs. Removal of level

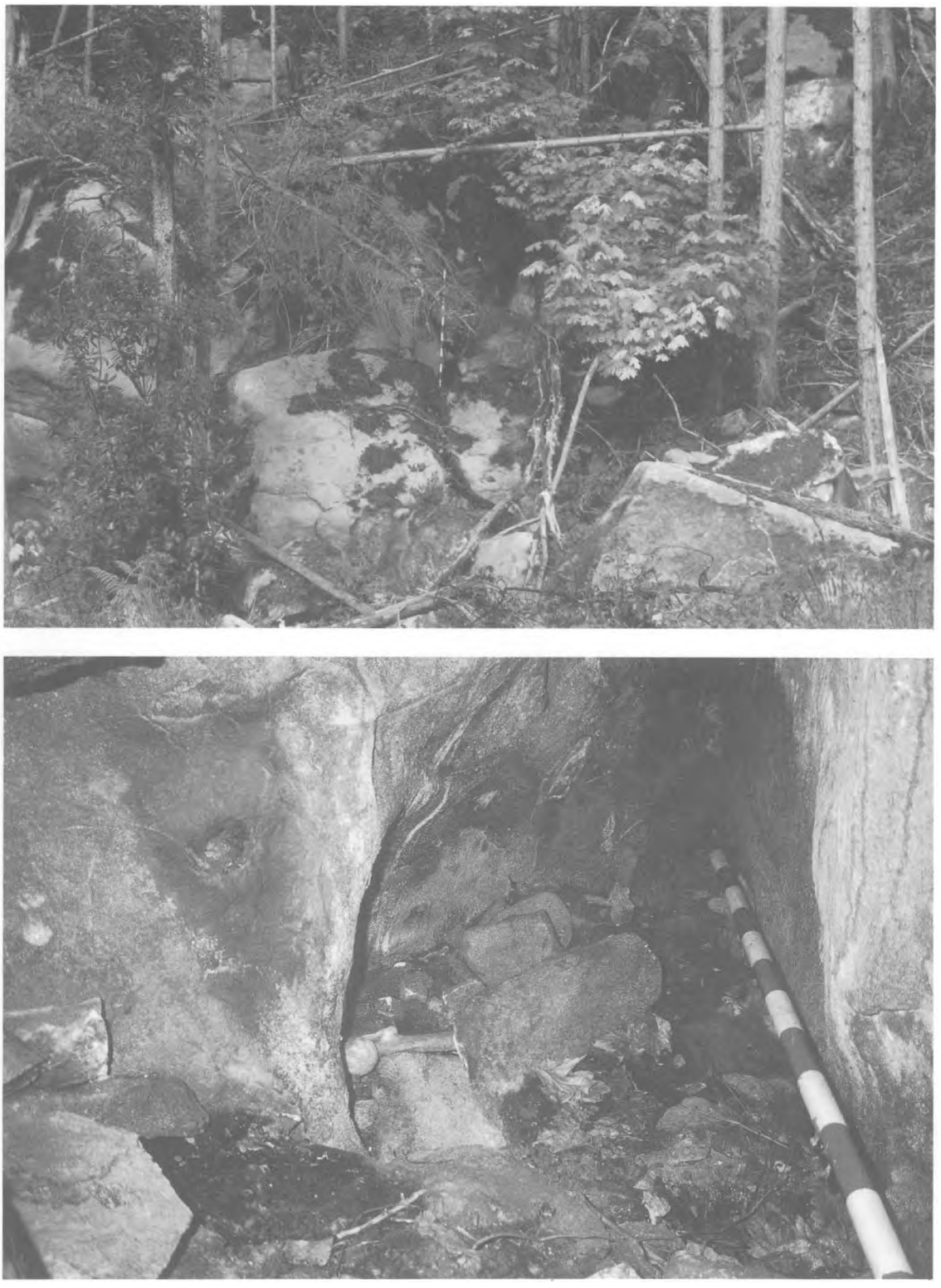

Figure 7.2 View of DgRw204-F6 from logging road (top); view inside burial chamber looking south (bottom).

2 exposed the tops of the underlying boulders, and no further excavation was possible.

The surface of the west chamber was also covered by organic litter. Once this was removed, the floor of the chamber was found to consist of a veneer of loose, dark yellowish brown (10YR 3/4) sandy silts, overlying sandstone slabs and rubble filling a narrow crevice between large sandstone boulders to the east and west. Small chunks of charcoal were observed in this matrix, particularly along the west wall of the chamber, but whether these are of cultural or natural origin is uncertain. They may have been washed down into the chamber from the surface above, or have resulted from some mortuary ritual associated with the bones.

Faunal Remains

The shells of land snails (Oregon forest snail, *Allogona townsendiana*), which occur naturally in this habitat (Pilsbury 1939), were the most common type of faunal material recovered from 204-F6, and the only type found in the east chamber. In the west chamber, seven skeletal elements were also recovered, with grouse, deer, and canids represented (van Gaalen 1991; Table A.6). Animal faeces were present on the surface of the west chamber, and it is probable that the bird and mammalian fauna represent a natural carnivore accumulation. No shellfish remains of any kind were recovered.

Artifacts

Two bone artifacts were recovered from the west chamber of 204-F6, both from EU 4. One, recovered from level 2, is a thin, rectangular, spatulate piece of mammal bone, which has been ground and polished on all surfaces (Figure B.4c). Both ends are blunt, and the lateral margins are gently tapered and rounded. Two similar artifacts were recovered at the base of the chimney in 204-F1, and it seems likely that they were originally deposited in F6, but washed down into F1. The second artifact, recovered from level 4, is an incomplete worked bone fragment (Figure B.4k). This burnt, rod-like object has been ground and polished on all sides, creating a rectangular cross-section; the extant end is blunt. The function of these artifacts is unknown.

Dating

Analysis of bone collagen extracted from a sample of human rib and vertebra fragments yielded an uncorrected radiocarbon age of 2170 ± 70 years BP, or a C^{13} adjusted age of 2300 ± 70 years BP (Beta-37846). This date places the burial within the early Marpole phase of the Gulf of Georgia chronology.

Human Remains

A total of 596 human bones and bone fragments were recovered from 204-F6; 383 of these (64.3%) were fragments too small to be identified as to element. One peculiar feature of the human bone assemblage from F6 is the almost total absence of cranial elements, apart from six teeth, a temporal fragment, and a small mandible fragment. It is difficult to determine whether this bias is a product of mortuary behaviour or of post depositional disturbance. Skulls are generally of much greater interest to the general public than are other skeletal elements, and although there was no direct evidence of vandalism or pot-hunting in this feature, its open entrance and ease of access make its contents a likely target for collectors. The frequency of identified skeletal elements in the five excavated features is presented in Appendix C, Table C.1.

Condition

The bones are in extremely poor condition, being incomplete and highly fragmented. In most cases, only long bone diaphyses were recovered, and few metaphyses or articular surfaces have preserved. Crushing of the bones by shifting rocks appears to be responsible for at least some of the severe fracturing observed. Evidence of animal disturbance, in the form of rodent gnaw marks, was observed on one humerus.

Spatial distribution

Of the 596 recovered human bones, 48 were collected from the chimney between 204-F1 and 204-F6, and were not excavated in arbitrary levels. The horizontal and vertical distribution of the remaining 548 elements is summarized in Table 7.1 and illustrated in Figures 7.5 and 7.6. Consistent with the structure of the feature, it appears that natural processes, such as sedimentation, slumpage, and downwash have contributed more to the observed distribution than cultural processes. It is likely that few, if any, of the recovered remains were found in precisely the same context in which they were originally deposited.

Skeletal Reconstruction

Fifty-three bone fragments were found to conjoin with other fragments from 204-F6, producing 16 conjoined "sets" of between two and seven pieces. These sets include 11 long bone fragments, 2 tali, 2 innominates, and a sacrum. Seven of the 16 sets (44%) are comprised of fragments from the same provenience

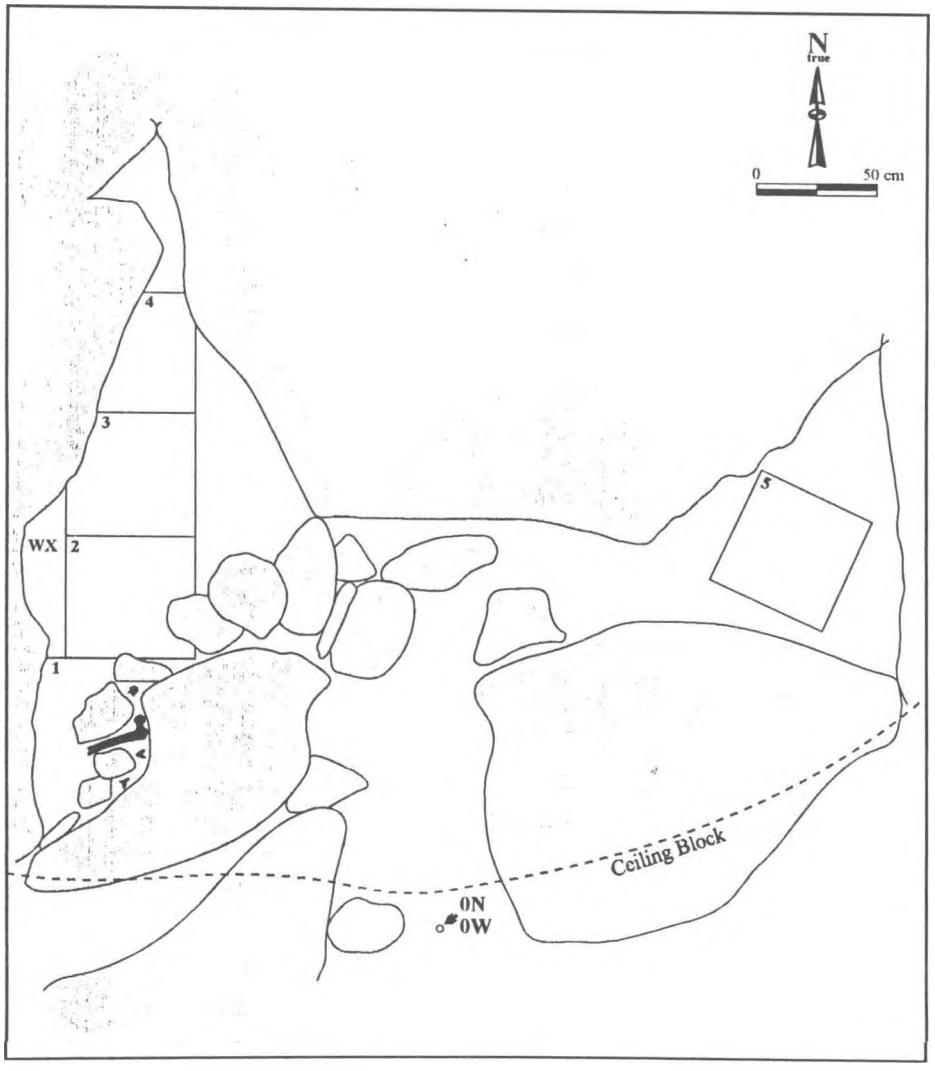

Figure 7.3 DgRw 204-F6: floor plan.

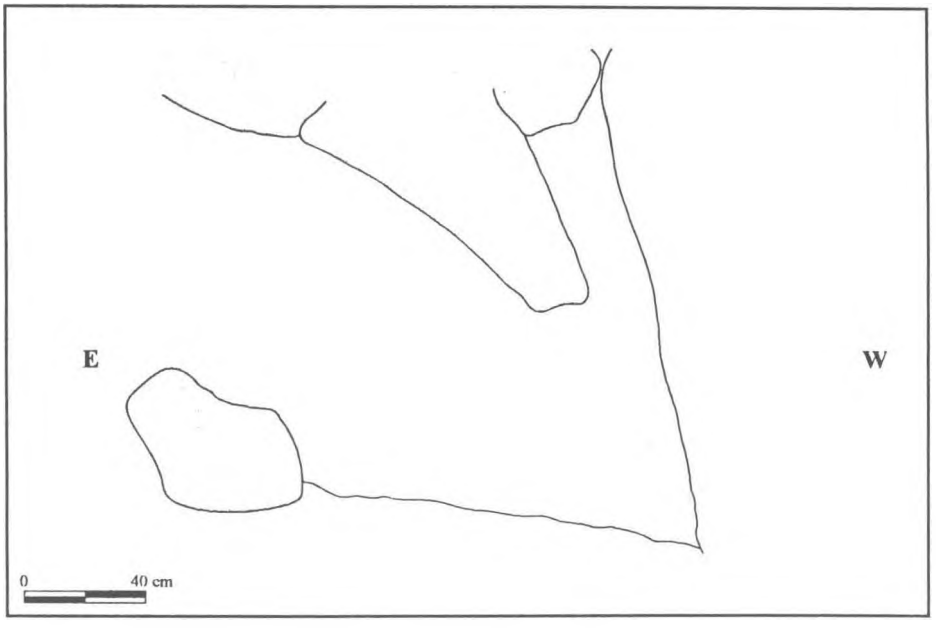

Figure 7.4 DgRw 204-F6: cross-section of burial chamber.

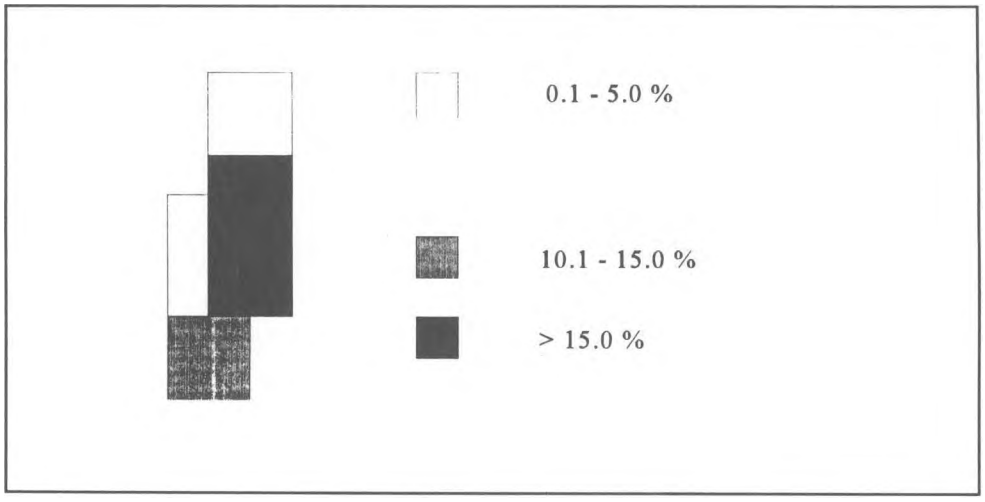

Figure 7.5 Horizontal distribution of human remains, DgRw 204-F6

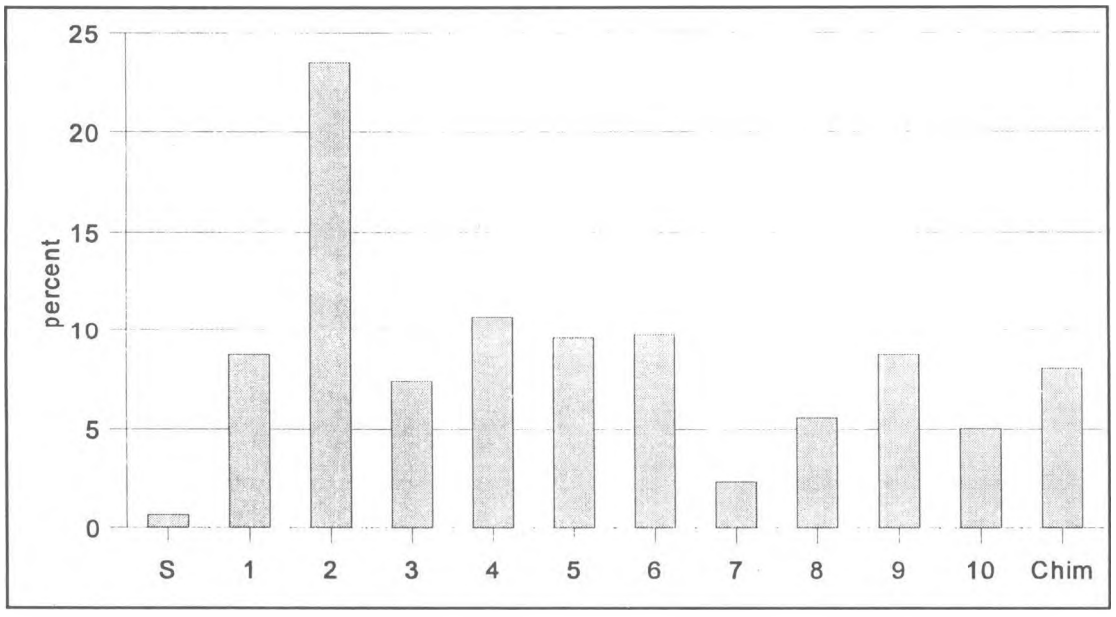

Figure 7.6 Vertical distribution of human remains, DgRw 204-F6.

unit (TS=2); the remainder exhibit significant vertical displacement, with articulating fragments sometimes more than 50 cm apart. Mean vertical displacement score was 4.25. Horizontal displacement of fragments from the same element is generally less pronounced, with an average score of 1.56. The distribution of horizontal, vertical, and total dispersal scores is presented in Figure 7.7, and mean values for these variables are compared with the other four excavated burial features in Appendix C, Table C.2.

The presence of human bone in the chimney between 204-F6 and 204-F1 raised the possibility that some of the bones recovered from F1 may have originally been deposited in F6, and slumped down into the lower chamber. Consequently, the two assemblages were examined for possible cross-linkages, with some success. Nine bone fragments from F1 were found to conjoin with five elements (all long bones) from F6.

Burning

There is no evidence of burning on any of the human remains from 204-F6.

Demography

Although preliminary inspection of this feature suggested an MNI of one adult, excavation revealed at least three individuals represented among the remains. This estimate is based on the presence of three left tibia shafts and three left calcaneus fragments. One of the three individuals is an adolescent male, identified by an incomplete right radius with unfused distal epiphysis, an incompletely developed maxillary second molar, and thoracic vertebra with unfused epiphyses; this developmental stage is indicative of an individual less than 16-18 years of age (Stewart 1979). The male sex determination is based on an incomplete radial length of 216 mm; considering that the distal epiphysis is missing and the head broken off, the length of the complete element is estimated to have exceeded the range of female radial lengths determined from other Northwest Coast skeletal populations (Curtin 1991a).

The two remaining persons appear to be adult females, as determined by the presence of two right innominate fragments, each with a wide sciatic notch and "groove of pregnancy" type of preauricular sulcus (Houghton 1974). Evidence of moderate degenerative changes on the auricular surfaces of one innominate, and on the articulating sacral auricular surface, suggests that one of the adult females was middle-aged or older at the time of death. For the other female, no narrower age estimate than "adult" was possible. Because of the highly fragmented condition of the skeletal remains and the similarities in demographic characteristics of two of the individuals, it was not possible to separate the recovered remains by individual as was the case with the remains from F2.

Demographic profiles of the five excavated burial features are compared in Appendix C, Tables C.3 and C.4.

Anomalies and Pathologies

No gross pathologies were observed in this collection, except for a few instances of osteoarthritis, affecting an elbow joint (proximal radius), a knee (distal femur), and the sacroiliac joint mentioned above. The poor preservation of most articular surfaces has probably masked other instances of arthritic degeneration in the sample.

Table 7.1 Spatial distribution of human remains, DgRw 204-F6.

Unit	Surf	Lev 1	Lev 2	Lev 3	Lev 4	Lev 5	Lev 6	Lev 7	Lev 8	Lev 9	Lev 10	Chi m	Total	%
EU 1	4	16	10	10								48	88	14.8
EU 2		33	53	1	15	8	16	2	33	52	30		243	40.8
EU 3		2	76	28	48	20	38	12					224	37.6
EU 4		1	1	5	1	4							12	2.0
WX						25	4						29	4.9
Total	4	52	140	44	64	57	58	14	33	52	30	48	596	100.1
%	0.7	8.7	23.5	7.4	10.7	9.6	9.7	2.4	5.5	8.7	5.0	8.1	100.0	

Mortuary Practices

The very incomplete and highly fragmented condition of the human remains from 204-F6, the severe post depositional disturbance apparent in the burial chamber, and the commingling of bones with 204-F1 place serious constraints on what can be inferred about mortuary practices at this feature. There is no evidence for *post mortem* reduction of the bodies for secondary burial (e.g., cutmarks, burning), but the skeletons are so incomplete that such evidence, even if once present, may have been obscured or lost. Unlike the other four burial features, there is no evidence for ritual feeding of the dead interred here; however the presence of two artifacts suggests at least some attendant mortuary ritual.

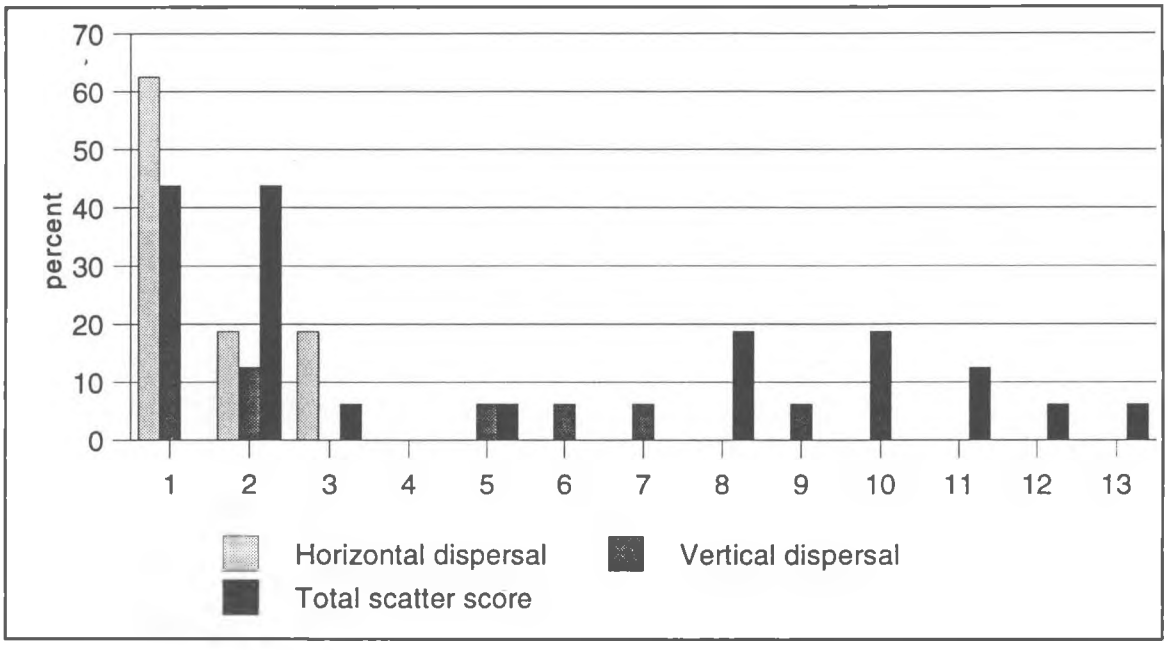

Figure 7.7 Dispersal scores of reconstructed elements, DgRw 204-F6.

Chapter 8

Excavations At DgRw 199-F 1

The existence of a burial cave at DgRw 199 has long been known to local residents and visitors to Gabriola Island, but it was not until 1987 that the cave was formally recorded as an archaeological site, during a systematic reconnaissance of the False Narrows bluffs (Wilson 1987). Wilson described three separate burial areas at DgRw 199, the largest of which [Feature 1] contained the remains of a minimum of seven individuals, based on the number of skulls visible. Differential preservation of these skulls led Wilson to conclude that the burials had been deposited on the surface, and represented more than one interment event. He also observed evidence of disturbance from both animal scavenging and human vandalism, including a small hand screen and spoon which had presumably been used to sift the cave sediments for artifacts.

Later that year a burial recovery project was initiated to collect all cultural material visible on the surface of the cave, and if possible to determine the nature of the site (Skinner 1991). The surface collection was augmented by small-scale test excavations in two locations, which established the presence of shallow subsurface cultural deposits. A minimum of 17 individuals were represented in the skeletal material collected at this time. Skinner suggested that the burials at 199-F1 were probably secondary interments that had been removed from their original burial context and placed in the cave in recent (though pre-Contact) times.

Unfortunately, Skinner's removal of all surface cultural material from the cave did not have the desired effect of discouraging pothunting at the site. Evidence of continued disturbance was a prime factor in the selection of this feature for excavation in 1992. The existence of the earlier skeletal collection was also an important consideration, given the expressed wishes of the Nanaimo First Nation that all of the human remains from a burial site be kept together.

Feature Description

Feature 1, the largest of the burial features discovered in the study area, is located on the lower False Narrows bluffs, at the eastern end of the DgRw 199, about 100 m west of the petroglyph site DgRw 198. Situated near the base of a steep, boulder-strewn, forested slope, in a dense cluster of 11 burial features (Figures 8.1, 8.2), it is fashioned from two massive sandstone blocks which form the ceiling/south wall, and a number of smaller but still substantial sandstone and conglomerate boulders that contribute primarily to the north wall. Beneath the two ceiling slabs is a long, narrow cave-like recess that is constricted near the middle to form two chambers (Figure 8.2). The west chamber is 2.10 m wide, 3.30 m long, and 1.30 m high (maximum dimensions); the east chamber is 2.29 m wide, 3.05 m long, and 0.95 m high (Figures 8.3, 8.4). North of the two principal chambers the jumble of boulders forming the north wall has created numerous small crevices, chimneys (Skinner's "fissure"), and ledges (Skinner's "Upper Gallery") in which human remains were also found. Bats were observed roosting in the Upper Gallery during the 1989 survey.

Access to 199-F1 is via a narrow, low-ceilinged, steeply-sloping, 3-m-long passage located at the west end of the burial feature; this entrance faces roughly northwest. Entry can also be gained (with some difficulty) from the west by climbing over a jumble of boulders and down through the "Upper Gallery". A crack at the east end of the feature was enlarged by Skinner to form a secondary entrance in

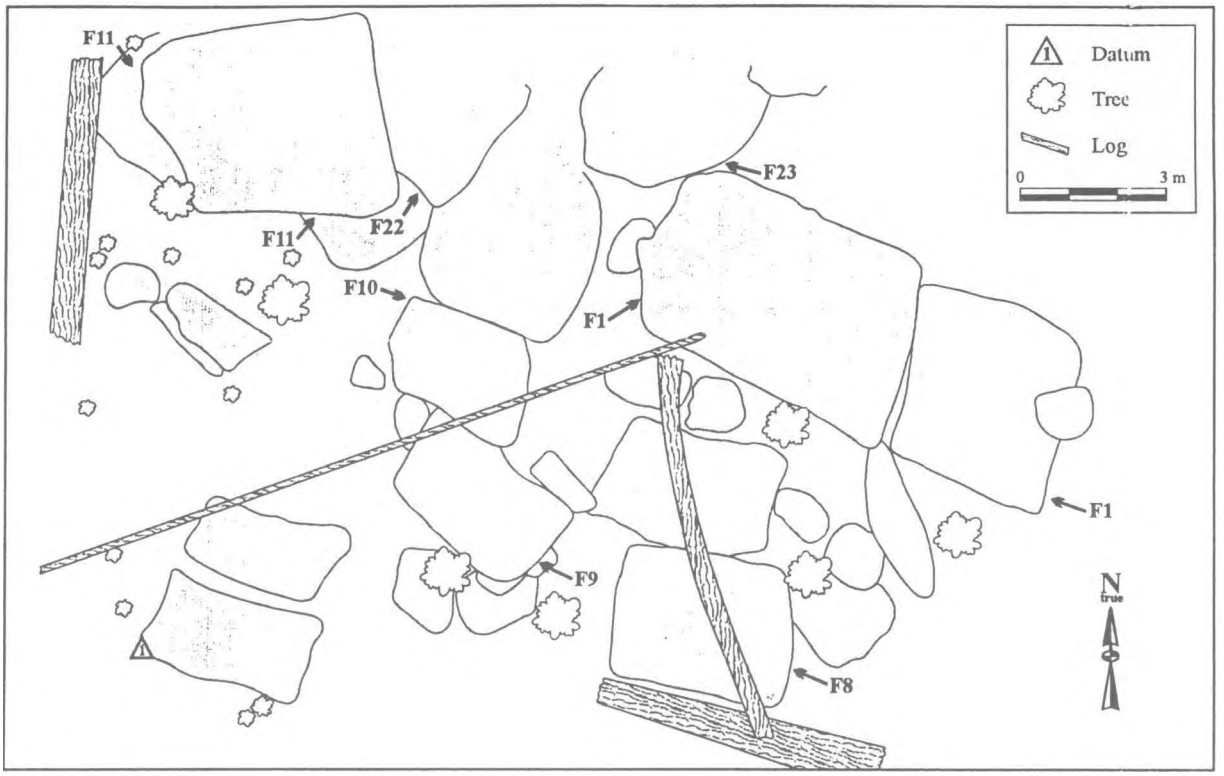

Figure 8.1 DgRw 199-F1 location.

1987, and may have been used as such prehistorically before filling in with sediments; this opening faces almost due south. Another gap between the two ceiling slabs admits some light to the middle of the cave, but is too narrow to allow entry.

Despite the 1987 surface-collection, when 199-F1 was reexamined two years later, more than 100 human bone fragments were visible on the surface, attesting to the degree of continued disturbance to the feature. In the course of the 1989 site survey, several persons were observed visiting the cave site, and there was some evidence of ritual use of the feature by non-Natives on two occasions, on the autumn and spring solstices. Some of the observed disturbance may also have resulted from animal activity, as carnivore faeces were observed in the main cave area.

Excavation Results

A grid of fifteen 1.0 x 1.0 excavation units (EUs) was laid out on the floor of the cave (Figure 8.3), using the east-west baseline established by Skinner in 1987 so that proveniences of the second skeletal collection would be consistent with the first. A natural stone cist located to the north of the main entrance passage was designated EU 16; it also measured approximately 1.0 x 1.0 m. Small unit extensions (EXs) of variable size were excavated to the north of EUs 2, 6, and 15, and to the south of EUs 1, 4, and 13 to complete coverage of the entire floor. All EUs and EXs were excavated in 5-cm arbitrary levels except EU 15, which was dug in natural strata subdivided into 5-cm arbitrary levels.

The entire cave floor, with the exception of EUs 15 and 16, was excavated to culturally sterile deposits (often bedrock or immovable boulders), encountered at 10-40 cm below surface in the east chamber, and 20-60 cm below surface in the west chamber. The bottom levels of EU 16, a deep, well-like stone cist, were inaccessible to the excavator, and although all visible human remains were removed it is possible that additional buried skeletal material is present in this unit. EU 15, located in the west entrance passage, presented an excavation challenge due to the steeply sloping surface and the presence of large unstable boulders that were loosened by removal of the surrounding sediments; as much of this unit was excavated as was consistent with the safety of the excavation crew, but again, some human remains may still be present in this portion of the site. Slumping of loosened sediments also occurred in the lower levels of excavation in EUs 8, 10, 11, and 12, resulting in loss of vertical provenience of materials collected from some quadrants.

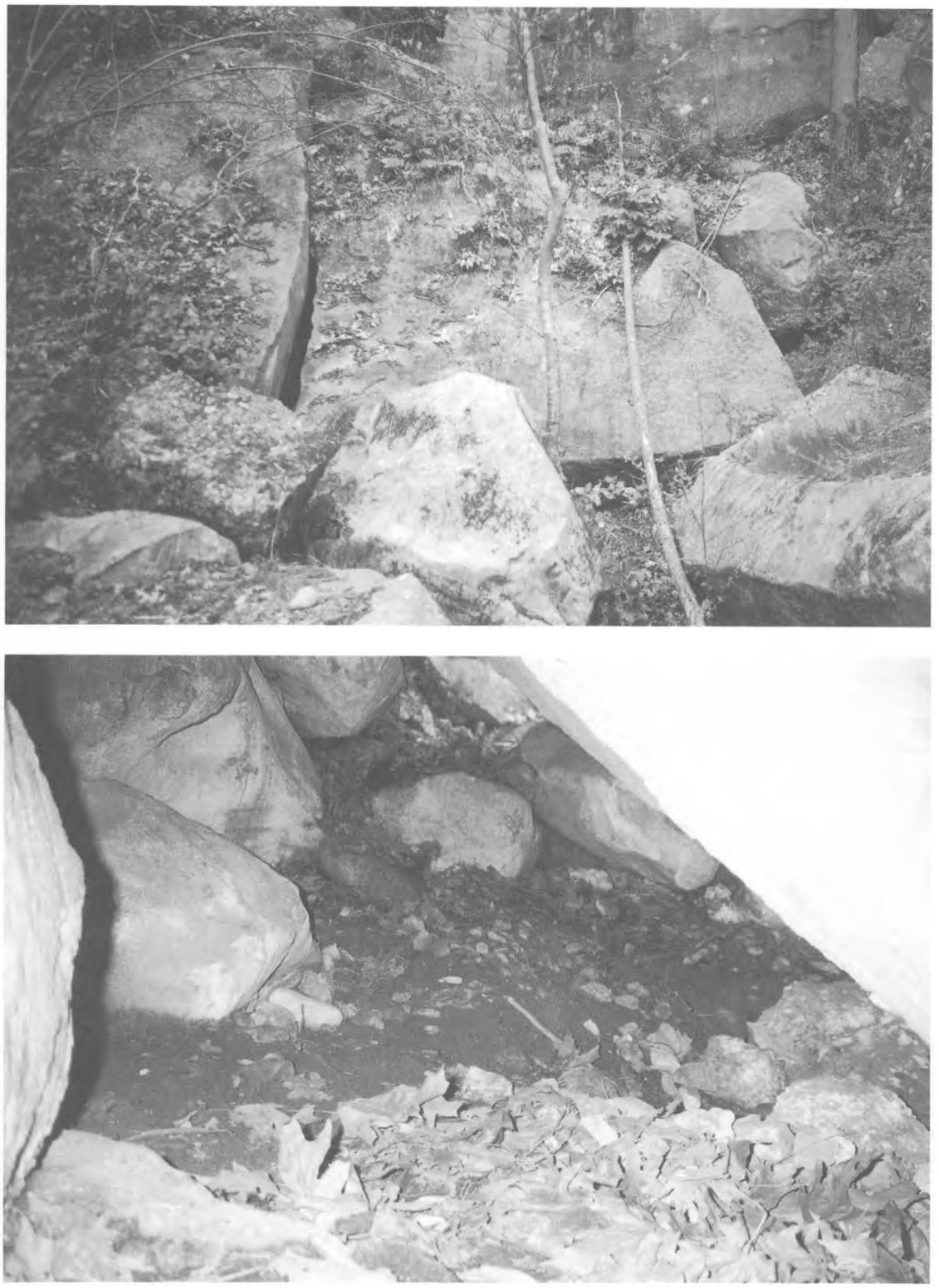

Figure 8.2 View of DgRw 199-F1 from south (top); view inside east chamber, looking east (bottom).

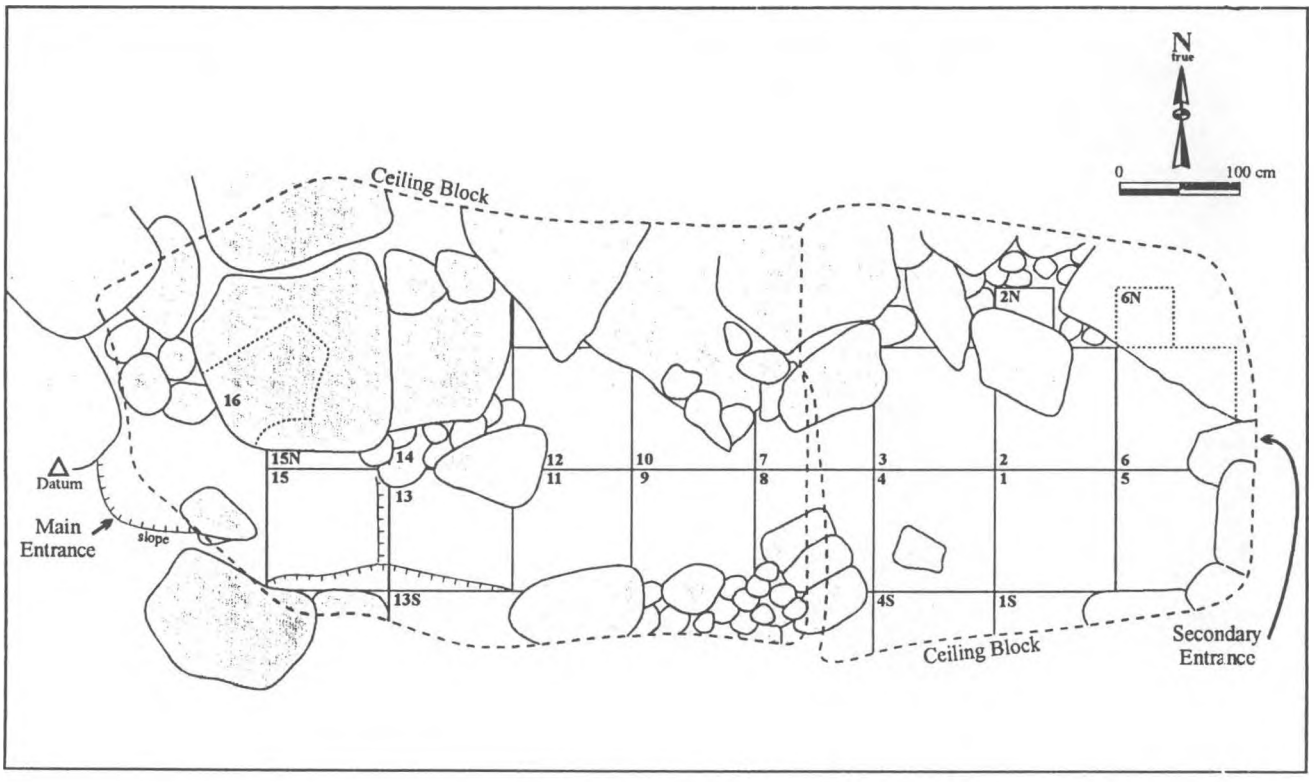

Figure 8.3 DgRw 199-F1: floor plan.

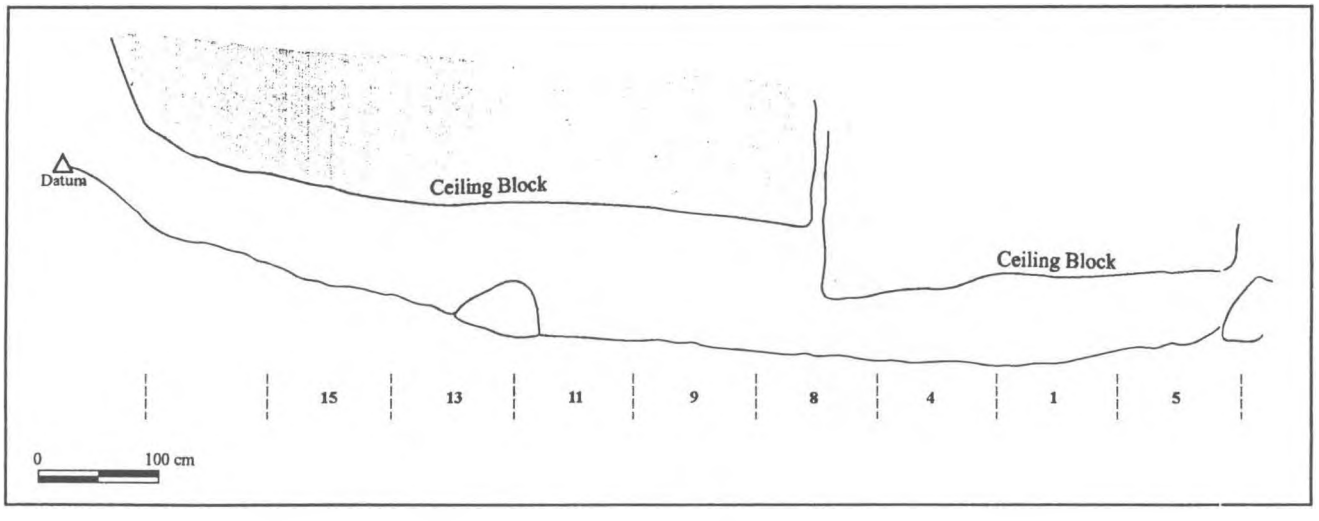

Figure 8.4 DgRw 199-F1: cross-section of burial chambers.

EU 1 from the 1992 project coincides with Skinner's 1987 test unit 7.5-8.5S, which he excavated to a maximum depth of 25 cm below surface, at which point he reports encountering bedrock along the south margin of the unit. In 1992 we were able to excavate another 15 cm in this unit, which was found to contain the deepest deposits in the entire east chamber.

Matrix Description

Stratigraphic profiles were drawn at two locations in 199-F1, 4.5 m east (east wall of EUs 11 and 12), and 6.5 m east (east wall of EUs 7 and 8), to illustrate the sequence of cultural deposits in the west and east chambers, respectively. Four major stratigraphic layers were identified in the profiles (Figure 8.5).

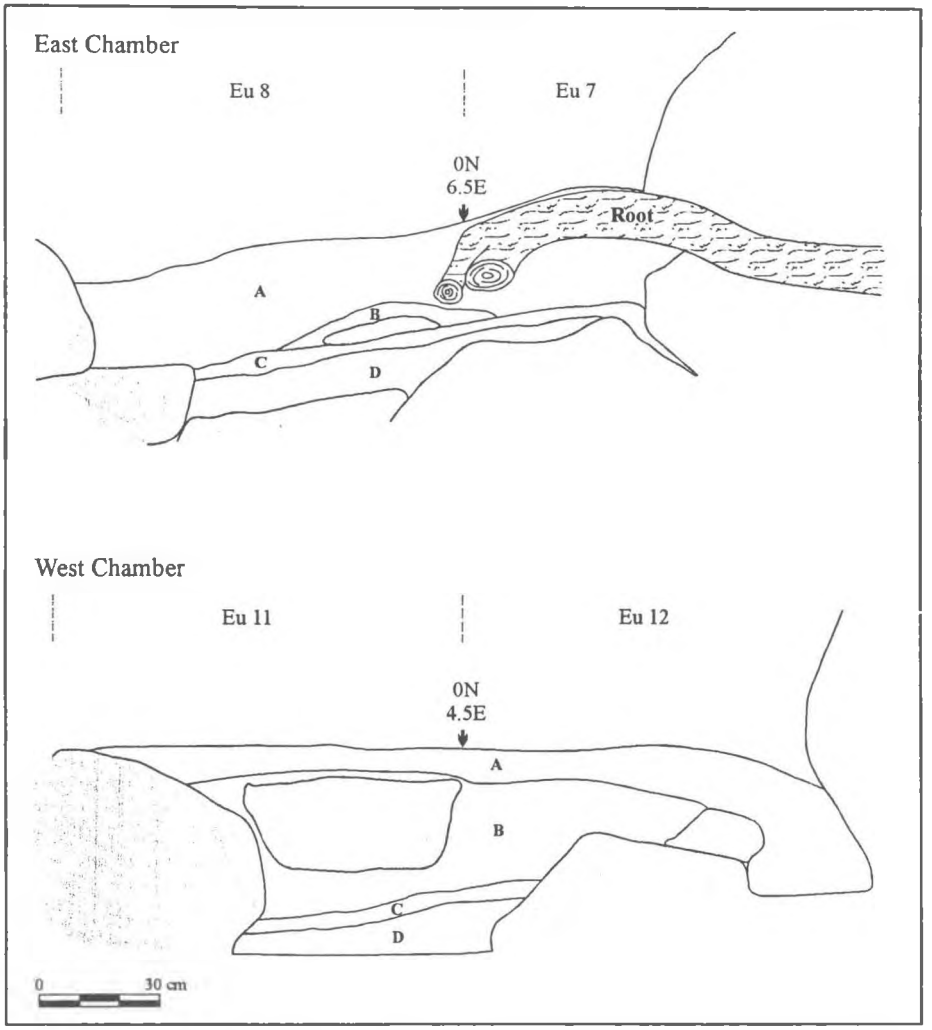

Figure 8.5 DgRw 199-F1: stratigraphic profiles at 6.5 and 4.5 m east.

Layer A: organic dark yellowish brown (10YR 3/6) to dark brown (10YR 3/3) loose, dry, silty sand with abundant sandstone and conglomerate rubble intermixed with decaying leaves, wood, bark, roots and rootlets. Small amounts of marine shell, land snail, and both burnt and unburnt human bone are present, along with occasional charcoal chunks, probably of modern origin. Lenses of concentrated fish bone occur in EUs 3 and 9. Organic litter is most prevalent along the west entrance passage and adjacent EUs, and near the middle of the feature below the crack between the two ceiling blocks. Layer A ranges in thickness from <10 cm in the west chamber, to 30 cm in the east-central region.

Layer B: very dark brown (10YR 2/2) to black (10YR 2/1) moist, moderately compact silty sand mixed with sandstone and conglomerate rubble ranging in size from cobbles to boulders. Constituents include abundant marine shell (mainly clam and/or mussel), fish bones (sometimes in discrete lenses), and highly fragmented burnt human bone. Stains, flecks, and small chunks of charcoal were noted throughout, but no fire-altered rocks (FAR) were observed. Roots are still frequent. This layer predominates in the west chamber, where it reaches depths of >30 cm; in the east chamber it is considerably more shallow, and is limited in extent to the western half of the chamber.

Layer C: a thin layer of dark brown (10YR 3/3) to very dark greyish brown (10YR 3/2) moist, slightly silty sand containing decayed conglomerate rubble and small to huge sandstone slabs. Fish bones, marine shell, and human remains are still common, but less frequent than in Layer B. Charcoal flecks and chunks occur throughout, but no FAR was found. Root penetration continues. Layer C extends throughout both chambers, but is less than 10 cm in thickness.

Layer D: dark yellowish brown (10YR 4/4) to brownish yellow (10YR 6/6) compact, moist silty sand with sandstone slabs and conglomerate cobbles and boulders. This layer contains no shell, fauna, human remains, or charcoal, although roots and rootlets are still common.

Faunal Remains

The faunal assemblage from DgRw 199-F1 is derived from four sources: Skinner's 1987 project; the 1992 excavations; and two matrix samples (MS) collected from the east (EU 3) and west (EU 9) sides of the feature, also in 1992. Skinner's sample consists of 552 shell fragments and 69 skeletal elements either surface-collected from the main cave or excavated from the fissure area and the upper levels of EU 1 (Skinner 1991: 73-74, 94-96). It comprises less than 1% of the total faunal assemblage, and contains no unique or unusual specimens. Because methods of collection and analysis differ from the current study, it is not directly comparable to the rest of the faunal assemblage, and will not be considered in detail. The 1992 excavation sample consists of all non-human skeletal remains recovered during the excavation of EUs 1-16; it comprises 10,555 specimens, or approximately 40% of all vertebrate fauna from the feature. MS-3 yielded 11,440 vertebrate specimens (43.3% of the assemblage), compared with 4,378 (16.6%) from MS-9. Detailed catalogues of the excavated and matrix sample fauna may be found in Appendix A, Tables A.7-A.9. The following discussion summarizes the results of the faunal analysis undertaken by van Gaalen (1994) and Kusmer (1992).

Fish remains dominate all four samples, and comprise more than 90% of the total vertebrate assemblage (Table 8.1). Only 11% of the excavated sample and less than 5% of the matrix samples could be identified to taxon, but an extraordinary variety of fish are represented in the identified remains. Local, non-migratory fishes, readily procurable year round in the shallow waters, bays, and tidal pools off Gabriola Island, predominate. Common in all three samples are members of the gunnel/prickleback and sculpin families; rockfish and surfperches also occur relatively frequently (>10%) in the excavated sample. Interestingly, in contrast to the burial features at DgRw 204, salmon is virtually absent at DgRw 199-F1, and herring is rare except in MS-9, where it comprises about 16% of the fish sample.

Spatially, fish remains are not randomly distributed throughout the cave: more than half of the excavated fish sample came from EU 9 in the west chamber, and a further 30% came from EU 3, in the east chamber. This pattern is due to the presence of five dense concentrations of fish bones which were discovered during excavation and collected separately: two from levels 4 and 5 of EU 3, and three from levels 2 and 6 of EU 9. These concentrations are comprised of combinations of midshipman, various flatfishes,surf perch, gunnel/prickleback, rockfish, and sculpin, as well as many unidentified fish (van Gaalen 1994). An unusual characteristic of these concentrations is that all of the fish represented are approximately the same size (i.e., all the vertebral centra measure about 2 mm). They include not only small species of fish, such as gunnel, but also immature specimens of larger species of fish, such as rockfish and sculpins. Juveniles of some of these larger species range near the shores from spring to summer, and may have been caught in shallow waters and inter-tidal pools along with the smaller, more permanent residents. The fish are represented by vertebrae, various skull and pectoral elements, and the occasional pelvic portion.

The sheer abundance of fish remains in 199-F1, their occurrence in dense concentrations in specific locations within the cave, and the evidence of burning on some of the specimens, all suggest that these fauna were introduced into the burial cave by human agency, probably in the form of food offerings for the dead. The large number of gunnel/prickleback remains is somewhat puzzling, however, since they are not traditionally known as a food fish (van Gaalen 1994), although they have previously been found in archaeological fauna assemblages (Wigen and Stucki 1988). Perhaps these small fish were collected adventitiously along with other targeted prey, such as rockfish, or perhaps the food requirements of the dead differed from those of the living. Once introduced into the feature, many of the fish offerings were scavenged by carnivores who intermittently inhabited the cave: carnivore chew marks were observed on 1518 fish bones or 6.3% of the collection.

Mammals are the second largest class of vertebrate fauna at 199-F1, representing slightly less than 9% of the assemblage. Of the 2,268 specimens recovered, only 8% could be identified to taxon. Identified mammalian remains from the two matrix samples are almost exclusively those of rodents (rats, mice, voles). The excavated sample is also dominated by rodents (55%), followed by carnivores (25%) including racoons and canids, and ungulates (16.8%), particularly deer. Most of the racoon remains (80%) are from immature individuals, as are approximately half of the deer remains. The canid bones, on the other hand, are predominantly from mature individuals. Mammal remains also exhibit a non-random distribution at the site, with frequencies of $\geq$ 20% in EUs 3, 4, and 9, and $\leq$ 5% in all other excavation units.

Table 8.1 Summary of vertebrate fauna (NISP), DgRw 199-F1.

Sample	Fish	%	Bird	%	Mammal	%	Other	%	Total
1987 Exc.	58	84.06	3	4.35	8	11.59	0	0.00	**69**
1992 Exc.	9,856	93.38	149	1.41	540	5.12	10	0.09	**10,555**
MS-3	10,299	90.03	14	0.12	1,125	9.83	2	0.02	**11,440**
MS- 9	3,771	86.14	11	0.25	595	13.59	1	0.02	**4,378**
Total	**23,984**	**90.70**	**177**	**0.67**	**2,268**	**8.58**	**13**	**0.05**	**26,442**

Other = reptile & amphibian.

Both natural and cultural processes contributed to the mammalian assemblage at 199-F1. The majority of these remains, particularly the rodent, rabbit, racoon, and canids, probably represent natural accumulations, but the presence of cut marks, spiral fractures, and evidence of burning on some elements points to human intervention in some cases.

Avian fauna are scarce at 199-F1, contributing less than 1% to the total vertebrate assemblage (n=177 specimens). Approximately 40% of the specimens, the majority of which came from the excavated sample (n=72), could be identified to taxon. Most common are grouse (29.7%) and waterfowl (29.7%), especially ducks. A variety of perching birds are also represented, including crow, raven, finch, blackbird, and thrush. Identified elements include wing and leg bones, vertebrae, and the occasional skull/mandible, sternal, and pelvic portion (van Gaalen 1994). Two chicken bones attest to the presence of modern or recent inclusions in the cave. Evidence of spatial patterning in the distribution of avian fauna is less clear than for the fish or mammal remains, but the densest concentration also occurs in EU 3 (20.8%). The other excavation units each contribute less than 8% to the bird assemblage, except for EU 4 (14.1%), EU 13 (12.1%), and EU 9 (11.4%).

Most of the identified bird species are not cavern dwellers or nesters, and therefore must have been brought in by an outside source. The gull, falcon, pigeon, and perching birds probably represent carnivore prey, whereas the waterfowl and grouse are more likely to have been introduced by humans. Some of the bird remains exhibit evidence of human intervention, in the form of burning and spiral fractures.

The remainder of the faunal assemblage consists of a few snake and frog/toad remains.

Stratigraphically, the vertebrate fauna exhibit a bimodal distribution, with peak frequencies near the surface (levels 1 and 2) and near the middle (levels 5 and 6) of the deposits (Table A.11). To a large extent this reflects the vertical distribution of fish remains, the most common class of vertebrate fauna, and in particular the fish concentrations in EUs 3 and 9. Mammalian and avian fauna from the excavated sample occur in peak frequencies in level 2 and decline steadily in frequency with increased depth below surface. Too few bird remains were recovered from the matrix samples to detect patterning in their vertical distribution, but the mammal distributions differ slightly: in MS-9 they decline steadily from a peak in level 1, whereas in MS 3 they are most frequent in level 3.

Invertebrate fauna in the form of fragmented shell is very common at 199-F1. Identified taxa include bay mussel (*Mytilus edulis*), Pacific little neck clam (*Protothaca staminea*), horse clam (*Tresus* sp.), butter clam (*Saxidomus giganteus*), basket cockle (*Clinocardium nuttalii*), barnacle (Subclass Cirripedia), limpet (Acmaeidae family), periwinkle (Littorinidae family); crab (Order Decapoda), whelk (*Thais* sp.), sea urchin (Class Echinoidea), and Oregon forest snail (*Allogona townsendiana*) (Kusmer 1992). To estimate the relative frequency of invertebrate fauna, all shell remains were extracted from the two matrix samples, identified to taxon, and weighed (Tables A.12 and A.13). The two matrix samples show different distributional patterns. In MS-3 shell is relatively scarce at the bottom of the deposits, abruptly increases in frequency to a maximum in level 5, then declines steadily to a minimum in level 1. In MS-9 invertebrate remains are most abundant at the bottom of the deposits, and decline steadily in frequency to reach a minimum, like MS-3, in level 1. The two samples also differ in composition: MS-3 is dominated by mussel, except in level 2 where varieties of clam are more common; in MS-9 mussel dominates only in the lower three levels of the deposits, after which it is gradually replaced by clam species, until, in the upper two levels of deposits varieties of clam are virtually the only invertebrate fauna recovered.

Artifacts

DgRw 199-F1 has yielded a total of 148 artifacts and artifact fragments, eight of which were recovered in 1987 (Skinner 1991: 52-54, 71-72), and 140 in 1992. The majority (79%) came from the west chamber, but small numbers of artifacts were also recovered from the east chamber (13%), EU 16 (4%), and the "fissure" (4%). Although artifacts were recovered from every level of the deposits, the greatest number (63%) came from levels 3-5 (10-25 cm BS), which also coincides with the densest concentration of human bone. A variety of materials was used in the manufacture of these items, including antler, stone, bone, shell, copper, and wood. Some of the artifacts are complete, but many have been burnt and broken, perhaps deliberately, so that the number of worked fragments (148) is considerably larger than the number of identified artifacts (89). It was often possible to reconstruct pieces of the same object, or to ascertain that fragments were from the same artifact, even when the pieces did not articulate. The artifacts are discussed briefly below; complete descriptions and illustrations may be found in Appendix B.

Antler. Distinguishing antler from bone was sometimes difficult given the highly fragmented and burnt condition of the majority of the specimens. However, 52 items were identified as antler, including one badly weathered, long, slender, unilaterally barbed point decorated with incised parallel lines down the long axis of the shaft (Figure B.7a). This was the only complete antler artifact. The remaining 51 antler specimens represent fragments of at least three different artifacts: another decorated barbed point (41 small fragments, Figure B.7b-q), an elaborately carved piece of art with a curvilinear design (6 pieces, Figure B.5), and a spoon (?) with a zoomorphic design carved in relief on the handle (2 pieces, Figure B.6). Two miscellaneous worked fragments complete the antler collection.

Bone. The 25 pieces of worked bone recovered from 199-F1 can be divided into two categories: tools, and modified objects of no known utilitarian function. Among the tools are three small, carefully worked unipoints (Figure B.4g-i), a harpoon foreshaft (Figure B.4a), and a whale bone bark shredder (Skinner 1991: Figure 13), all of which are unburnt. Burnt bone tools include an awl tip (Figure B.4e), a ground, faceted point fragment (Figure B.4f), and 12 ground and polished fragments of an unusual object with longitudinal grooves carved on opposite surfaces (Figure B.4l-o). Seven of the pieces articulate with others, but not enough of the artifact is reconstructed to determine its ultimate shape or function. The remaining modified bones include a ground canid maxilla (Skinner 1991: Figure 8), two small cut and smoothed skull sections, and three very small long bone pieces with smoothed edges and polished surfaces.

Shell. The artifact assemblage includes twenty-two items made of shell, most of which are ornaments. The majority (n=13) are dentalium beads or bead fragments, including one carved with a zigzag geometric pattern (Figure B.8i-m). The remaining shell ornaments are three small rectangular pendants (Figure B.8e, f, h), made of clam, abalone, and California mussel shell, and an unusual, finely-worked U-shaped object, possibly a nose ornament (Figure B.8n).

In addition to the ornaments, three fragments of scallop shell (*Pecten caurinus*), possibly pieces of a ritual rattle, were recovered (Figure B.8c-d). The final two modified shell objects are fragments of California mussel and unidentified clam shell with ground or sectioned edges but no discernible shape or function.

Stone. The forty-five stone artifacts include 19 decorative items, 11 tools, 5 obsidian microblades (Figure B.3s-v), 7 pieces of lithic detritus, 1 utilized flake, and 2 ground stone fragments. The decorative pieces are all personal ornaments: 12 beads (disc and barrel-shaped, Figure B.3g-r), 6 ground stone ovals perforated at both ends (Figure B.3a-f), and a thin siltstone disc with two perforations (Figure B.3y), which Skinner (1991) referred to as a button, but which may be a pendant. With the exception of the "button" and one mudstone bead, all of the ornaments are made of soft black stone (steatite?) or cannel coal. Several of the decorative items are very friable, and appear to be burnt; one is reconstructed from two fragments recovered from different excavation units. These artifacts have restricted distributions within the feature: all of the barrel beads came from the west-central area (EUs 8, 9, and 10); all of the disk beads from the east-central area (EUs 3, 4, and 7); and all of the perforated ovals from the west end (EUs 11, 12, and 14).

The stone tools include a thin ground slate knife fragment (Figure B.1i), two nephrite or greenstone adze blades (Figure B.2a, c), a small tear-shaped chipped chert point (Figure B.1a), a stemmed chipped basalt point (Figure B.1c), a ground slate point fragment (Figure B.1e), a sandstone atlatl weight (Figure B.2g), two small triangular sandstone abraders (Figure B.2c, d), a large wedge-shaped abrasive stone, and a hammerstone. The lithic detritus includes five platform-bearing flakes, one flake shatter, and wedge-shaped piece of block shatter; most are made of medium to coarse-grained basalt, but quartzite, quartz

Table 8.2 Radiocarbon dates from DgRw 199-F1.

Lab Number	Item	Provenience	Measured C-14 Age [2]	Conventional C-14 Age [3]
TO 11451[1]	zygoma	EU 1 Surface	2760 ± 60	
SFU 546	ribs	EU 1 Level 1-5	2420 ± 70	
SFU 610	misc. bone	Fissure	2170 ± 70	
SFU 542	burnt wood	EU 1 Level 1-5	760 ± 65	
BETA-74076[1]	fibula	EU16 Level 4	3120 ± 50	3240 ± 50
BETA-90639[1]	mandible	EU13 Level 3	1260 ± 40	1400 ± 40

[1] AMS date.
[2] radiocarbon years before present (AD 1950); 1 sigma, 68% probability.
[3] conventional C-14 age, corrected with reference to measured C13/C12 ratio; 1 sigma, 68% probability .

porphyry, and greywacke were also employed. The remaining two items are a small nephrite block with one ground and polished surface, and a coarse reddish sandstone block with one highly polished surface.

Copper. The single copper artifact is a small, thin, rectangular ornament with a drilled perforation at one end (Figure B.3z).

Wood. One possible wooden artifact was collected: a slender cedar stake with one end bifacially ground to a blunt point. This object is very similar to a cache of worked cedar stakes discovered near DgRw 213 during the 1989 burial reconnaissance.

Dating

Skinner obtained four radiocarbon dates on materials from 199-F1, including three bone samples (a pathological skull from the surface of the main cave, a rib sample from EU 1, and a miscellaneous bone sample from the fissure area), and one piece of charred wood, also from EU 1 (Skinner 1991: 47). During the current study, two additional bone dates were obtained, on a fibula fragment from EU 16 and a child's mandible from EU 13. Dates obtained are presented in Table 8.2.

Based on these dates it appears that 199-F1 experienced a long history as a burial site, perhaps a thousand years or more. The "west crevice" area (EU 16), just inside the entrance to the main cave, was utiized first, in late St. Mungo or early Locarno times, followed by the main cave (Locarno age), and finally the fissure area (Marpole age). The two outlying dates require some explanation. The date of 1400 ± 40 obtained on the child's mandible from EU 13 almost certainly underestimates the true age of the burial, as a result of contamination by fine rootlets that could not be effectively removed before dating (Darden Hood, personal communication 1996). The origins of the burnt wood sample that yielded the youngest date are unclear: it may be from a burnt root, or wood introduced during a later intrusion into the cave, perhaps by a curious passer-by, or by descendants of the deceased bringing food to their ancestors

Human Remains

Feature 1 yielded the largest human skeletal assemblage of all the burial features investigated on the False Narrows bluffs, a total of 159,323 bones, teeth, and fragments, including 1,178 specimens collected by Skinner in 1987. The number I have cited here differs slightly from the total of 1,098 reported by Skinner (1991), due mainly to the presence of multiple fragments assigned a single catalogue number. None of the elements recovered *in situ* were articulated in anatomical position, but several bone clusters sorted by element (skulls, mandibles, humeri, ulnae, innominates) were found in deep deposits near the entrance passage (EUs 13 and 15).

The assemblage from 199-F1 is characterized by extreme fragmentation: 51.7% percent of the recovered specimens (n=82,330) were too small to be identified to skeletal element, and were merely counted and bagged according to provenience. The extreme fragmentation may be due in part to the frequency of foot traffic through the feature, including a minimum of three archaeology field crews and at least one organized archaeological tour (William Paull, personal communication 1989), as well as numerous tourists, local residents, and casual visitors to the area. Despite the degree of fragmentation, most skeletal elements are well represented in the human bone assemblage, particularly the cranial remains that are so uncommon at DgRw 204 (Table C.1).

Condition

With the possible exception of DgRw 204-F6, the human remains from 199-F1 are the most poorly preserved of all those collected in the course of the project. Only 3.5% of the recovered elements were assessed as being in good condition, while more than

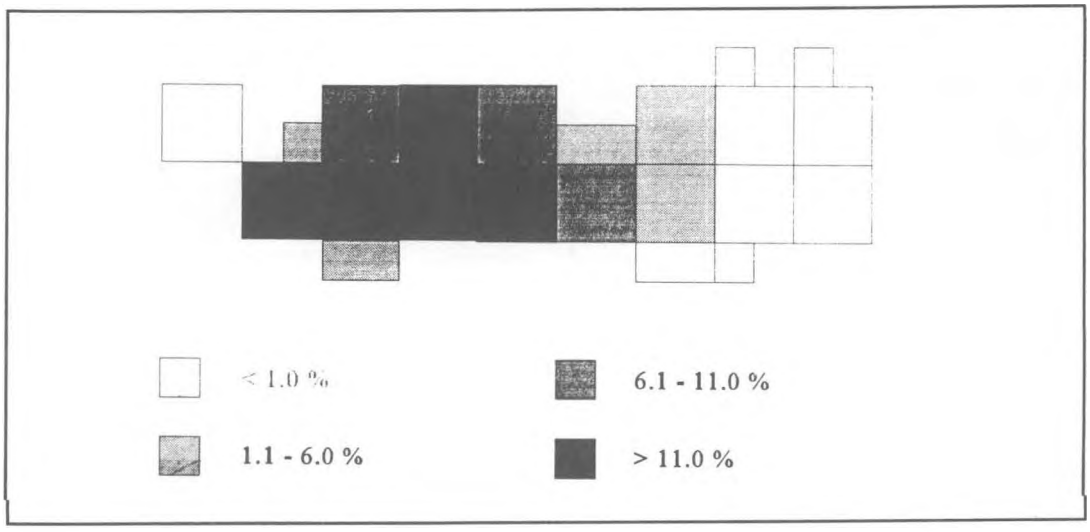

Figure 8.6 Horizontal distribution of human remains, DgRw 199-F1.

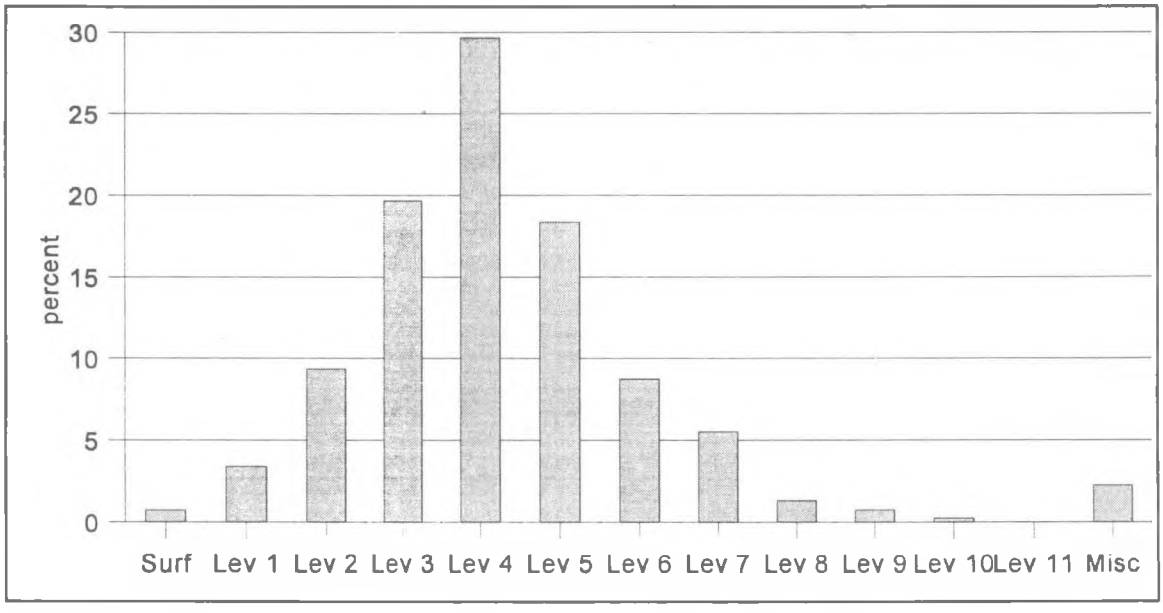

Figure 8.7 Vertical distribution of human remains, DgRw 199-F1.

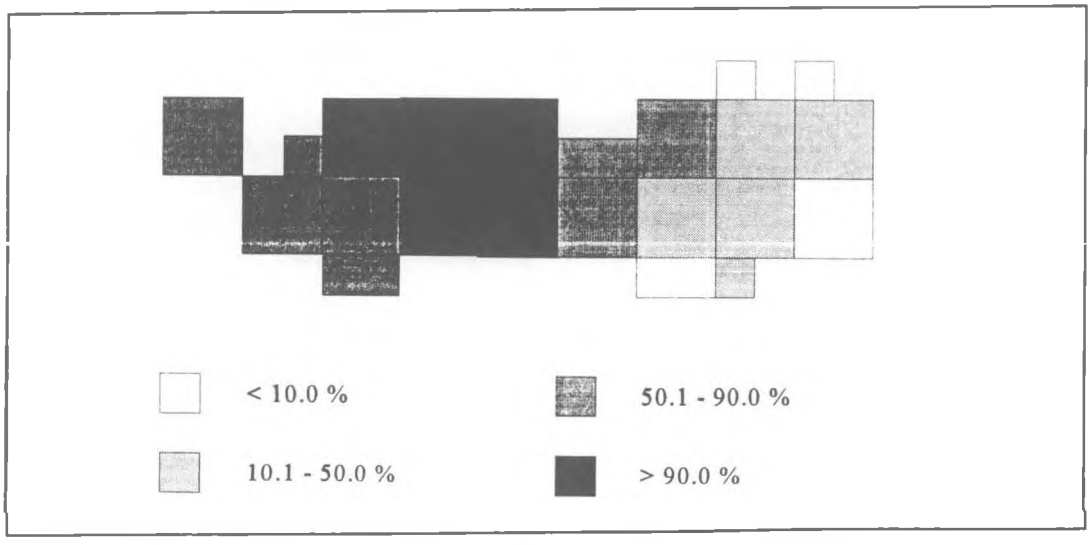

Figure 8.8 Horizontal distribution of burnt human bone (% of unit total).

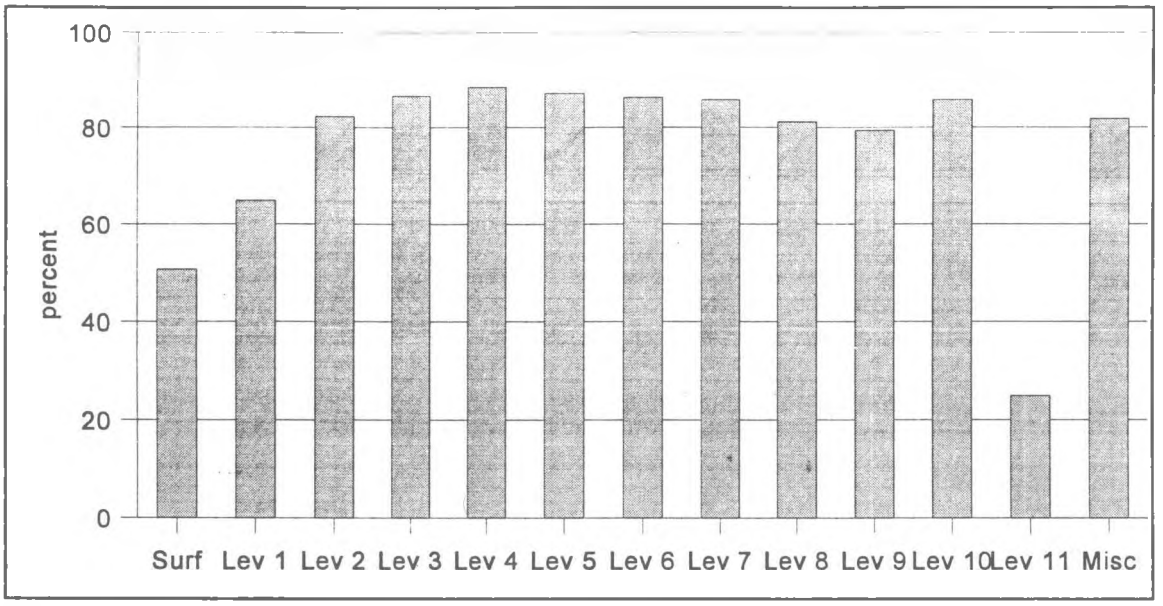

Figure 8.9 Vertical distribution of burnt human bone (% of level total).

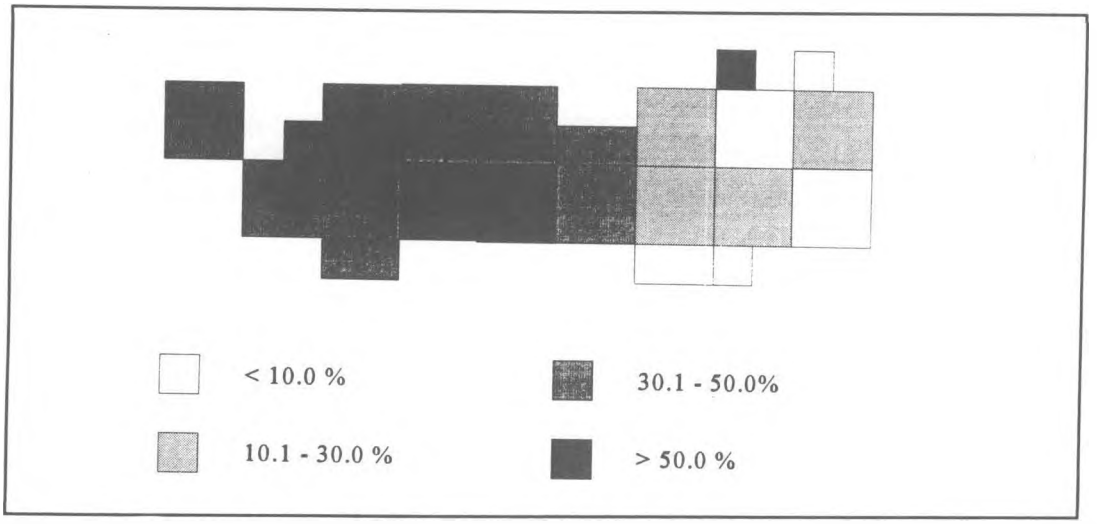

Figure 8.10 Horizontal distribution of calcined human bone (% of burnt total).

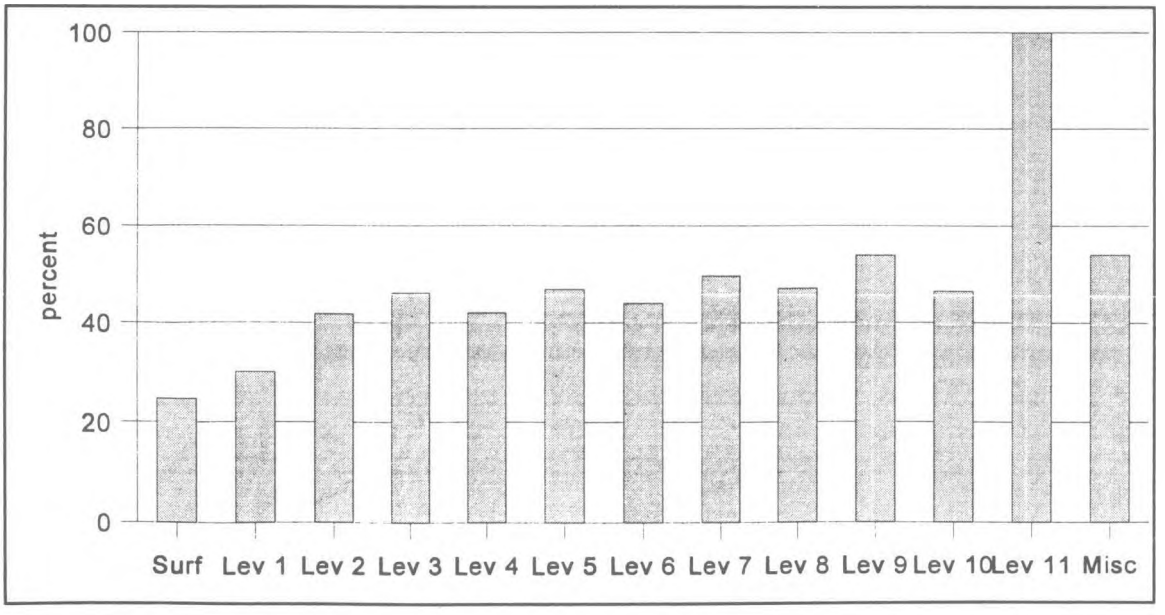

Figure 8.11 Vertical distribution of calcined human bone (% of burnt total).

two-thirds were deemed poorly preserved. Few skulls or long bones were found intact, and the frequency of unidentifiable pieces (51.7%) attests to the high degree of fragmentation. Areas of the skeleton with thinner cortical bone were particularly prone to post depositional damage, with the result that cranial remains typically consist of calvaria lacking facial elements, and long bones are usually represented by diaphyses, with metaphyses and articular surfaces damaged or missing. This pattern of survival is directly correlated to regional differences in bone mineral density throughout the skeleton (Willey et al. 1997), and is not thought to reflect mortuary treatment or deliberate *post mortem* modification, such as cannibalism (e.g., White 1992). Teeth are frequently broken (or completely shattered if burnt), and even the more complete specimens often have large areas of enamel exfoliated.

Bone preservation was best (23% - 67% in "good" condition) at the extreme east end of the feature (EUs 1, 2, and 6; EXs 2N and 6N) and worst (<5% in "good" condition) in the west chamber near the main entrance. This difference may be due to the higher amounts of traffic through the more accessible and spacious west chamber. State of preservation is not consistently correlated with depth of burial, although the cause of the damage may be: surface remains are more likely to be "weathered" (expressed as cortical pitting and erosion), while subsurface remains are more subject to root damage, in the form of surface etching and/or medullary penetration with subsequent destruction of adjacent cancellous bone.

Of the skeletal remains recovered in 1992, 986 specimens (0.62%) exhibit some degree of calcareous plaque, usually in small discontinuous patches on exposed surfaces. Occurrence of the plaque appears to be correlated with proximity to chamber walls and ceiling, with the highest frequency (>5% of fragments affected) along the south wall of the east chamber (EUs 1, 4, and 5) where the ceiling is lowest, and in EU 16, a small, natural stone cist. Two other relatively enclosed areas, the entrance tunnel (EU 15) and the constricted neck between the east and west chambers (EUs 7 and 8) do not exhibit the expected frequencies of calcareous plaque, probably because both are open to the outside (the former through the main entrance, the latter through a large crack between the two ceiling blocks), and subject to increased sedimentation and the accumulation of forest litter which presumably would bury fragments before the mineral precipitate could develop. Affected fragments are most common on the surface and in the upper levels of the deposits (88.6% in levels 1-4), and decrease in frequency with increased depth below surface.

Thirty-two bone fragments are marked by areas of bluish-green staining, probably the result of contact with copper artifacts. With one exception (from EU 16), all of these pieces came from the west chamber, and most (n=25, 78%) were found in adjacent EUs 11 and 12, in excavation levels 3 and 4 (10-20 cm BS). The only copper artifact recovered from the feature also came from EU 12, level 3. It is unlikely that this small artifact could be responsible for all the copper-staining observed, particularly in bones located one or two metres distant, which raises two possibilities: (1) that additional copper artifacts were once present, but have been removed by looters; or (2) that the copper-stained bone fragments originally were more clustered in space, but have been scattered as a result of some post-depositional disturbance. These possibilities will be explored in greater detail below. The affected pieces are all heavily burnt (calcined) long bone and skull fragments, and may be from a single adult individual.

Four additional bone fragments exhibit reddish-orange staining suggestive of ochre, but no pieces of ochre were recovered during the excavations. The stained bones come from the west chamber, EUs 9, 11, and 12, excavation levels 3-5.

Evidence of modification by animals was observed on 127 specimens, 23 of which (18%) were gnawed by rodents and 104 (82%) chewed by carnivores. The rodents exhibit a preference for articular surface margins and bony ridges and projections, such as orbital margins, zygomatic arch, ascending ramus of the mandible, and *linea aspera* of the femur. Carnivore damage, on the other hand, was more common in parts of the skeleton with thin cortical cover over underlying cancellous bone, including ribs, vertebrae, innominates, and the metaphyses of long bones. Both rodents and carnivores show a predilection for unburnt bones: 84% of affected specimens are unburnt, and another 9% are only slightly burnt.

Human-induced bone modifications in the form of cutmarks were observed on 94 specimens (0.06% of the assemblage). The toolmarks tend to occur as clusters of short, parallel, narrow incisions with V-shaped cross-sections, apparently produced by a slicing or back-and-forth sawing motion, rather than hacking or battering. The skeletal element most commonly affected is the skull (n=43, 45.7%), followed by rib (n=4, 4.2%), vertebra (n=4, 4.2%), femur (n=3, 3.2%), innominate (n=3, 3.2%), humerus (n=2, 2.1%), scapula (n=2, 2.1%), and single instances of clavicle, ulna, tibia, 3rd cuneiform, triquetral, third metacarpal, and middle hand phalanx. The remaining 26 specimens are unidentified long bone shaft fragments, most of which come from large-diameter long bones such

as the femur, humerus, and tibia. The majority of the cut specimens are from adults (n=82, 87.2%), but child (n=7) and infant (n=3) remains are also affected, as well as two additional fragments from unaged subadults.

Interpretation of cutting patterns is hampered by the small size and undifferentiated morphology of the majority of the specimens. Most of the affected cranial (n=32) and long bone (n=26) fragments could not be attributed to a specific skeletal element, much less to a particular region of an element. In those instances where such attributions are possible, however, cutmark location seems indicative of skeletal dismemberment, specifically decapitation (mastoid process, atlas vertebrae), and disarticulation of the mandible (severing of *masseter* and *temporalis* muscles), shoulder (circum-glenoid region of the scapula), and elbow (distal humerus). Additional transverse cutmarks across the mid-frontal squama, frontal bosses, mid-coronal sutures, and inion region of the occipital may be indicative of *peri mortem* scalping, which has been documented elsewhere in Coast Salish territory in the prehistoric period (Curtin 1992). The origins of the remaining cutmarks are unclear, but *peri mortem* violence is a possibility: cutmarks on finger and metacarpal shafts may be defensive wounds, while cutmarks along the iliac crest and anterior superior iliac spine would sever the oblique muscles of the abdomen, and may be evidence of disembowelment.

A second form of human-induced modification, burning, is discussed at greater length below.

Spatial Distribution

The spatial distribution of the human remains is summarized in Table 8.3 by excavation unit and level. The column labelled "?" refers to specimens for which the vertical provenience is uncertain, including Skinner's excavated material from levels 1-5 of EU 1 (his unit 7.5-8.5S), and material collected from the slumped levels 5-8 in EUs 8, 10, 11, and 12.

The majority (77.2%) of the surface remains encountered in 1987 were found in the east chamber of the burial cave, but as Figure 8.6 illustrates, when the assemblage is considered as a whole, human remains are most densely concentrated in the west chamber. This is due in part to the greater depth of deposits in the west chamber, which have more potential for subsurface remains, but it is also possible that surface remains were deliberately moved from the west to the east chamber by some of the recent visitors to the cave, to clear a space for whatever activities were held there. When Skinner visited in 1987 he found numerous skulls and other bones heaped in a pile in the vicinity of EU 1.

Human remains were found to a maximum depth of 55 cm below surface, but the majority (67.7%) were found from 10-25 cm below surface in levels 3-5 (Figure 8.7)

Burning

The majority of the human bones collected from 199-F1 exhibit some evidence of burning. Although this attribute was not scored for most of the small, unidentified fragments, of the 88,832 specimens for which the information was collected (55.8% of the total assemblage), a total of 75,662 (85.1%) were burnt to some degree. There is definite patterning to the spatial distribution of burnt remains, with the east chamber containing predominantly unburnt remains and the west chamber mainly burnt specimens (Figure 8.8). Unburnt skeletal remains tend to be found on the surface or in the first 5 cm of the deposits; below this, burnt remains predominate (Figure 8.9). A sub-sample of 68,353 burnt specimens was scored for intensity of burning, which ranged from slight or localized discolouration, to deep charring, to severe calcination. Nearly half of these (44.3%) were classed as severely burnt or calcined. The vertical and horizontal distribution of severe burning parallels that of burning in general: it is most common in the west chamber of the cave, and below the first level of deposits (Figures 8.10 and 8.11). Both the likelihood and the intensity of burning are strongly correlated with age-at-death: 82.3% of infant remains are unburnt, compared to 50.6% of children, and only 13.4% of adults; severe burning (calcination) was seen in only 10.3% of infant bones, compared with 25.8% of children and 38.7% of adults. Patterns of burning for the five excavated features are compared in Appendix C, Table C.5.

The burnt bones exhibit a suite of traits characteristic of the cremation of fleshed remains or green bones: deep, curved, transverse cracks and fractures often ending in longitudinal hinge terminations, and frequent exfoliation of cortical surfaces, with warping and shrinkage evident in the most severely affected specimens (Binford 1963; Baby 1954; Buikstra and Swegle 1989). Only one long bone shaft fragment (humerus/ femur) displayed the distinctive colour pattern identified by Buikstra and Swegle (1989) as indicative of the intense burning of dry bone: light brown to tan coloured outer cortex overlying black, grey, or white inner cortex and trabeculae. This interpretation is further supported by evidence of differential burning within elements that can be attributed to the shielding effects of muscle cover. Three ulnae, for example, are unburnt except for their distal shafts which are discoloured to charred. Two femurs have

Table 8.3 Spatial distribution of human remains, DgRw 199-F1.

Unit	Surf	Lev 1	Lev 2	Lev 3	Lev 4	Lev 5	Lev 6	Lev 7	Lev 8	Lev 9	Lev 10	Lev 11	?	Total	%
1	147					52	123	26	6				309[1]	663	0.42
1SX		26	7											33	0.02
2	13	62	75	15	13	2	4							184	0.12
2NX			13											13	0.01
3	19	370	424	474	589	78	28	2						1,984	1.25
4	192	517	523	819	1,044	133	11	7						3,246	2.04
4SX		85	57											142	0.09
5	3	15	10	5										33	0.02
6		15	13	6	1									35	0.02
6NX					1	2								3	0.00
7	15	61	178	401	846	3,103	822	1,095	134	43				6,698	4.20
8	122	192	520	1,003	4,768	2,972	378	690	35	2			346[2]	11,028	6.92
9	28	2,346	2,475	6,811	7,650	1,651	411	91	22				4	21,489	13.49
10	423	329	1,356	2,620	2,144	3,159	484	199	14				101[2]	10,829	6.80
11	13	760	3,887	7,370	7,255	690	341	54	94	27			234[2]	20,725	13.01
12	56	438	1,837	7,534	5,046	2,057	368	1,320	84	43			2,049[2]	20,832	13.08
13	4	11	52	743	9,052	5,441	2,989	3,107	950	472	177	3		23,001	14.44
13SX		4	55	123	176	183	583	1,196	343	111	45	1		2,820	1.77
14	5	182	3,371	3,076	2,443	1,347	818	39	7	13			34	11,335	7.11
15	1	10	16	78	5,993	7,152	4,612	427	79	465	153			18,986	11.92
15NX	4					1,047	1,910	387	186					3,534	2.22
16	2	33	45	221	237	160	48	174	145					1,065	0.67
Misc [3]													194	194	0.12
Fissure													337	337	0.21
Gallery	114													114	0.07
Total	**1,161**	**5,456**	**14,914**	**31,299**	**47,258**	**29,229**	**13,930**	**8,814**	**2,099**	**1,176**	**375**	**4**	**3,608**	**159,323**	100
%	0.73	3.42	9.36	19.65	29.66	18.35	8.74	5.53	1.32	0.74	0.24	0.00	2.26	100	

[1] Material excavated by Skinner from top 25 cm of deposits; no vertical proveniences available.
[2] Material recovered from slumped deposits, levels 5-8; no exact vertical provenience available.
[3] Material recovered from re-screened backdirt; no vertical or horizontal provenience available.

unburnt proximal shafts and burnt distal metaphyses. Tibias tend to exhibit more intense burning on the anterior crest. Frontal and facial bones are generally more heavily burnt than the inferior occipital. In all cases, the effects of burning are more pronounced on the more superficial regions of the skeleton.

It is difficult to extrapolate from the frequency of burnt bone fragments to the frequency of cremated bodies. Although approximately 85% of the catalogued specimens were burnt it does not follow that 85% of the bodies interred in the burial feature were cremated, because burnt bones are more likely to be broken into small fragments, thus inflating the frequency of burnt specimens relative to unburnt ones. A survey of 30 skeletal elements (long bones, carpals, and tarsals) reveals that anywhere from 27% to 83% of the identified elements were scored as unburnt (mean = 54.6%). It does not necessarily follow, however, that because one long bone was unburnt that the body from which it came was not exposed to fire to some extent. Several of the crania and long bones appear to be completely unburnt except for one or more very small, localized patches of charring. In these cases it may be that the burning employed as part of the mortuary ritual was more symbolic than complete.

Table 8.4 Summary of reconstructed skeletal elements, DgRw 199-F1.

Element	Sets	% Sets	Pieces	% Pieces
Skull	643	18.72	3484	29.15
Mandible	125	3.64	490	4.10
Vertebra	286	8.33	690	5.77
Rib	235	6.84	638	5.34
Sternum	12	0.35	36	0.30
Clavicle	30	0.87	81	0.68
Scapula	51	1.48	139	1.16
Humerus	117	3.41	629	5.26
Radius	43	1.25	149	1.25
Ulna	56	1.63	227	1.90
Carpal	10	0.29	21	0.18
Metacarpal	49	1.43	105	0.88
Hand phalanx	74	2.15	158	1.32
Sacrum	14	0.41	37	0.31
Innominate	81	2.36	229	1.92
Femur	150	4.37	950	7.95
Patella	10	0.29	22	0.18
Tibia	76	2.21	418	3.50
Fibula	77	2.24	335	2.80
Tarsal	42	1.22	92	0.77
Metatarsal	70	2.04	159	1.33
Foot phalanx	13	0.38	26	0.22
Radius/ ulna/fibula	320	9.32	828	6.93
Humerus/ femur/tibia	814	23.70	1,907	15.96
Long bone	24	0.70	66	0.55
Misc. articular surface	13	0.38	36	0.30
Total	**3,435**	**100.00**	**11,952**	**100.00**

Skeletal Reconstruction

The more than 150,000 bone fragments recovered from 199-F1 presented a significant challenge in reconstruction. The success rate was determined primarily by time constraints, and it is certain that much more could have been accomplished given unlimited time and personnel. Despite these limitations, a total of 11,952 pieces of bone or tooth (7.5% of the total assemblage, or 15.5% of the identified sub-sample) were found to conjoin with other fragments, yielding 3,435 reconstructed "sets" consisting of from 2 to 99 fragments. Greatest success in terms of both numbers of reconstructed sets and numbers of conjoined pieces was achieved for the skull and for undifferentiated large-diameter long bones (humerus, femur, tibia) (Table 8.4). The majority of the reconstructed sets are very small: about two-thirds contain only two articulating fragments, and 90% are comprised of five or fewer pieces. A small number (n=13) of the sets are very large, however, with more than 50 conjoined pieces. All of the very large sets consist of reconstructed crania.

In general there appears to have been very little scattering of broken pieces of the same bone. In more than 80% of the conjoined sets, all members came from the same or adjacent provenience units (TS scores 2-3), and less than 1% showed substantial dispersal (TS > 10). Vertical and horizontal dispersal scores are very similar, although fragments are slightly more likely to be dispersed vertically (mean = 1.5) than horizontally (mean = 1.3); 93.6% of conjoined pieces come from the same or adjacent quadrants, whereas 87.2% are from the same or adjacent levels. Maximum vertical dispersal (10) is less than maximum horizontal dispersal (15) because the former measure is limited by the depth of the cultural deposits, which is less than their horizontal extent. The distribution of dispersal scores is presented in Figure 8.12, and compared with the other excavated features in Table C.2.

Thirty conjoined sets with very high total scatter scores (TS > 10) were examined in greater detail for the information they could provide about post depositional taphonomic processes in the burial feature. These 30 sets can be grouped into three categories, defined by their dispersal values and the inferred agent of dispersal. Type I sets have high horizontal and low vertical dispersal values, and appear to have been scattered shortly after being deposited in the cave. Their members are found at moderate depths below surface (levels 3-6), in the densest bone deposits, and are scattered horizontally from one end of the cave to the other. Elements from one set (an immature skull) exhibit carnivore chew marks, a good indication of the source of the disturbance. Alternatively, the fragments may have been dispersed through deliberate scattering when initially deposited in the feature.

Type II sets, in contrast, show greater vertical than horizontal dispersal, with some pieces recovered from moderate depths (the dense bone layer) and others from very deep levels, often in EUs 13, 14, and 15. This pattern is probably the result of the natural downward filtering of some elements through cracks on the boulder-strewn cave floor.

Type III sets are dispersed both vertically and horizontally; typically some of their members were

found at moderate to deep levels of the deposits (mainly EUs 4, 7, 9, 10, 13, and 14) while others were found scattered on or near the current ground surface some distance away. This pattern is suggestive of recent disturbance from the digging of pits, probably by the pot-hunters who frequented the cave. It is interesting to note that the results of the faunal analysis also indicated recent disturbance to at least 30 cm below surface in EU 9 (van Gaalen 1994).

Demography

Minimum number of individuals (MNI) was calculated for several different skeletal elements, including five of the six major limb bones (the fibula was not considered due to poor preservation and difficulties in siding shaft fragments), scapula, clavicle, atlas, axis, mandible, and petrous portion of the temporal bone. Adults are best represented by the midmandibular region, followed by the odontoid process of the axis vertebra, while subadults are best represented by the frontal bone, mandible, and axis vertebra. The largest estimated MNI derived from a single element is 114, based on a count of 95 adult mandibular symphyses with intact genial tubercles, plus 19 immature mandibles or unfused right hemi-mandibles. This is almost certainly an underestimate of the true number of interments, since at least 21 immature frontal bones are present. When all of the immature dentitions (maxillae, mandibles, and loose teeth) are considered together and seriated by dental development, a total of 23 subadults can be distinguished, which, added to the 95 adults identified by mandibular symphyses, yields a best estimate of 118 individuals represented in this burial feature. It is interesting to note that based on a calculated MNI of 17 individuals among the materials collected in 1987 from the cave surface and the partial excavation of EU 1, Skinner (1991: 57) predicted that the feature might contain as many as 126 individuals, a remarkably accurate estimate given the limited data available to him.

Table 8.5 Adult age estimates, DgRw 199-F1.

Element	Young Adult	%	Middle Adult	%	Old Adult	%	Total
Skull	15	33.3	19	42.2	11	24.4	45
Mandible	14	32.6	17	39.5	12	27.9	43

The subadult remains consist of 14 infants less than two years of age, 7 children between the ages of 3 and 10 years, and 2 older juveniles/adolescents (12-15 years old). Among the infants are five very young individuals, probably newborns, including two possible fetuses between 8 and 9 lunar months in age. Subadult age determinations were based on dental development standards (Trodden 1982; Buikstra and Ubelaker 1994) augmented by skeletal measurements for the possibly fetal remains (Fazekas and Kósa 1978). Although immature remains were recovered from all excavation units in the feature, they are clearly concentrated in the east chamber (Figure 8.13).

Adult age estimates were derived from ectocranial suture closure and dental attrition, since the two best indicators of adult age, the pubic symphysis and auricular surface, were so poorly represented in the assemblage. Degree of suture closure was assessed for 45 adult cranial specimens using the standards of Meindl and Lovejoy (1985). Given the fragmentary nature of some of the cranial remains, only very broad age estimates could be made: young adult (21-35 years), middle adult (36-50 years), and old adult (50+ years). More precise estimates were possible for crania with associated maxillary dentitions, and these skulls were used to determine age category limits among the cranial remains seriated by suture closure. A second set of age determinations based on dental attrition was made for the 43 mandibles and mandible fragments containing teeth. Dental ages were derived from standards established on the prehistoric skeletal sample from the Tsawwassen site (Curtin 1991a). The skulls and mandibles yielded roughly equivalent results (Table 8.5), and show that, unlike 199-F9 (see Chapter 9), a cross-section of adult ages is represented in this assemblage.

Among adults, males and females appear to be present in roughly equal proportions. The best skeletal indicator of sex, the innominate bone, is poorly preserved in this collection; only 29 specimens from each side are suitable for sex determination, providing estimates for less than 1/3 of the adult assemblage. Right innominates include 14 (48.3%) designated male and 15 (51.7%) designated female, while left innominates reveal a definite female bias: 21 (72.4%) female versus only 8 (27.6%) male. Cranial elements are more complete and more abundant at the site, but provide less reliable evidence of sex. Of the 50 complete or partially reconstructed skulls, 27 (54%) were estimated to be male, and 23 (46%) female, based on such criteria as general size and robusticity. Tentative sex attributions were also made on 67 partial or complete mandibles: 37 (55.2%) were categorized as male, and 30 (44.8%) as female. The demographic profile of 199-F1 is compared with the other four excavated features in Tables C.3 and C.4.

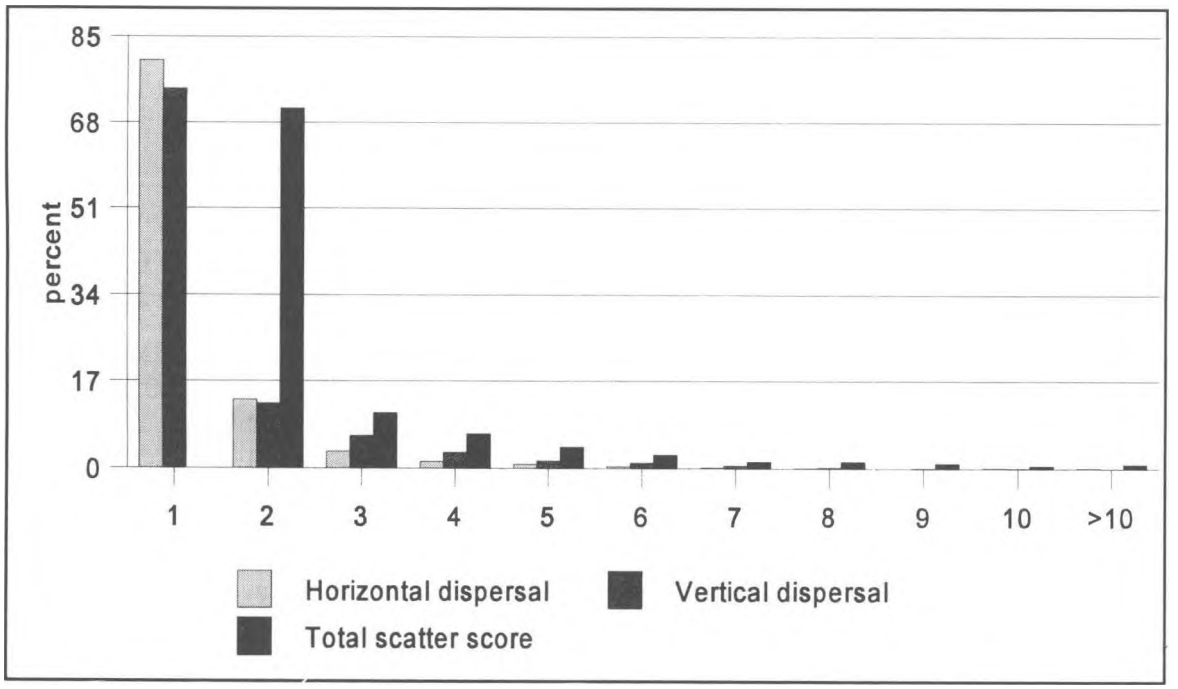

Figure 8.12 Dispersal scores of reconstructed elements, DgRw 199-F1.

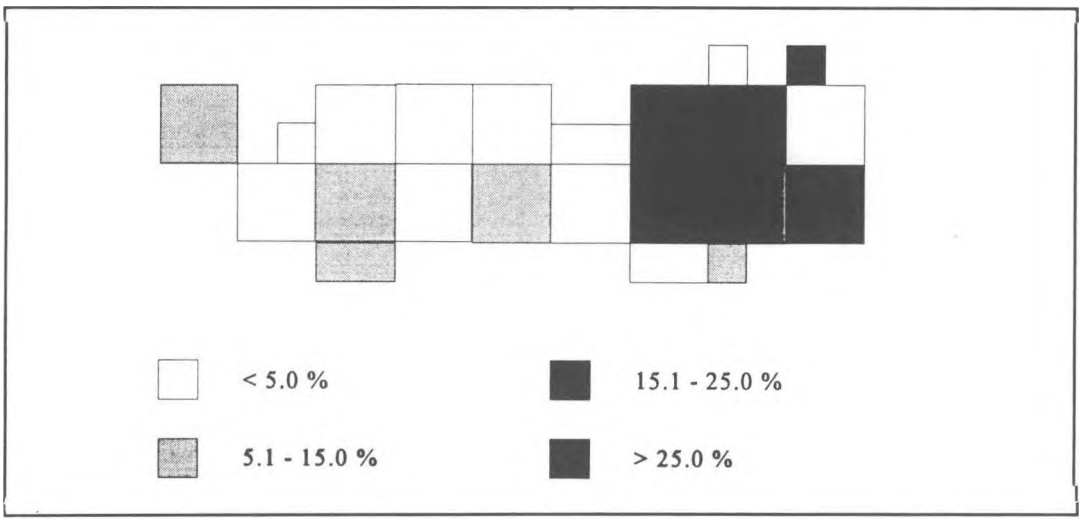

Figure 8.13 Horizontal distribution of subadult remains (% of unit total).

demographic profile of 199-F1 is compared with the other four excavated features in Tables C.3 and C.4.

Anomalies and Pathologies

Numerous anomalous and pathological conditions were observed in the skeletal material from 199-F1. Only the most significant are discussed below.

Degenerative joint disease is ubiquitous in the collection, but is not quantified here due to the difficulties encountered in identifying individual joints in such fragmented material. The impression given by viewing the remains, however, is one of higher prevalence and greater severity of osteoarthritic lesions than any of the other four excavated skeletal samples. Of particular interest are the distinctive lesions observed on seven right and eight left distal humeri, which exhibit hypertrophic bone deposits in the radial, coronoid, and/or olecranon fossae (illustrated in Skinner 1991: 64ff). While similar lesions in other skeletal collections have been attributed to severe degenerative arthritis (Ortner and Putschar 1981: 425), Skinner raises the possibility of a treponemal origin, suggest-

sals, 6 metatarsals, and 27 phalanges. Next in fracture frequency is the hand (n=6: 1 metacarpal, 5 phalanges), followed by the knee (n=3: 1 tibia, 2 fibulae), shoulder (n=2 clavicles), arm (1 humerus), and forearm (1 radius), and an unidentified long bone shaft.

The cranial fractures provide good evidence for direct interpersonal violence in the False Narrows bluffs population, which in at least five cases (*peri mortem* and incompletely healed fractures) may have led to the deaths of the affected individuals. Some or all of the rib fractures may also have resulted from interpersonal violence, although in these cases it is difficult to distinguish from accidental trauma such as would occur in a fall, or from a blow to the chest or back. The remainder of the skeletal fractures are probably the natural result of the indirect traumas and long-term stresses experienced in the course of a vigorous, active life. The clavicle and radius fractures, for example, are typical of injuries incurred in falls onto the shoulder or outstretched hand; wedge compression fractures of the vertebrae are a common sequella of heavy falls onto the feet or buttocks (Adams 1978); spondylolysis tends to develop in response to chronic heavy-loading stress to the lower back (Merbs 1989); fractures to lower cervical and upper thoracic spinous processes have been attributed to strenuous muscular exertion in shovelling or similar activities (Knüsel et al. 1996); and the ubiquitous ankle and foot injuries can be attributed no doubt to inadequately shod travel along our perilous rocky coastline.

Chronic stress to the vertebral column can result in injuries other than skeletal fracture, including subluxation of apophyseal facets and Schmorl's nodes on vertebral centra, both of which were observed in this assemblage. Remodelling of apophyseal facets indicative of subluxation was observed in 15 cervical and 18 thoracic vertebrae. In five cases, the altered joint space brought the spinous processes of adjacent vertebrae into contact, with the subsequent development of flat articular facets on their dorsal and/or ventral surfaces. Schmorl's nodes, resulting from the degeneration of the intervertebral disc, were observed in 3 cervical, 16 thoracic, and 8 lumbar vertebrae.

Only one example of chronic dislocation was found in the appendicular skeleton, involving a pedal distal interphalangeal joint. The distal articular surface of the middle phalanx is rough and pitted, and a new articulation with strongly lipped margins has formed on the distal plantar surface.

Numerous **developmental defects** of the skeleton and teeth were also observed in this collection. Axial defects include one definite and two possible instances of "block vertebrae", resulting from segmentation failure of the sclerotomes. The first example, from a very young, possibly newborn infant, involves the neural arches from two lower cervical vertebrae that are joined posteriorly near the spinous process. This is most likely a case of Klippel-Feil syndrome, Type II, which is inherited as an autosomal recessive trait, and is generally asymptomatic (Barnes 1994). The other possible examples of Type II block vertebrae are two pairs of thoracic vertebral arches joined from the articular facets to the spinous process; unfortunately these are incomplete specimens lacking centra, so one cannot eliminate trauma or other pathological conditions (e.g. DISH or ankylosing spondylitis) as diagnostic possibilities.

Six examples of vertebral border shifts were identified, two involving the thoraco-lumbar region (vertebrae intermediate morphologically between thoracic and lumbar), and four the lumbosacral region (one completely and three partially sacralized fifth lumbar vertebrae). One of the latter is an unusual tripartite fifth lumbar vertebra exhibiting both spondylolysis (see Table 8.6) and spina bifida (cleft neural arch). Two other cases of spina bifida were recorded, one a complete but narrow cleft in an adult axis vertebra, the other a cleft first sacral vertebra from a 6-7 year old child. The latter may be merely a case of delayed rather than failed union, but the articulating second sacral vertebra has already fused completely, so this possibility seems unlikely. Possible cases of delayed union of neural arch halves include seven thoracic and one first sacral vertebrae with deep midline notches on the superior margins of their neural arches.

Dental anomalies observed in the collection include one mesiodens (midline supernumerary tooth) in an child's maxilla, a notched permanent lateral incisor in a child's mandible, and two examples of mandibular supernumerary teeth, occurring in the premolar region of adult mandibles. One supernumerary has erupted lingual to and between the two right permanent premolars; the other is unerupted and located in a crypt between the two left permanent premolars.

Bilateral agenesis of the permanent central incisors was seen in four mandibles (two children, two adult females); in these cases the morphology of the developed lateral incisors is intermediate between a normal central and normal lateral incisor, and a diastema of variable size is present between them. Bilateral agenesis of the permanent central incisors was seen in four mandibles (two children, two adult females); in these cases the morphology of the developed lateral incisors is intermediate between a normal central and normal lateral incisor, and a diastema of variable size is present between them. Agenesis of the permanent third molar occurs unilaterally in three mandibles (all left sides), and bilaterally in one of the

Table 8.6 Skeletal fractures, DgRw 199-F1.

Element	Portion	Comment
Skull D	anterior R. parietal	healed depressed fracture; margins incomplete; inner table unaffected
Skull F	mid-frontal squama	healed depressed fracture; 20 x 14 mm; deep; inner table unaffected
Skull H	middle L. parietal	healed depressed fracture; 21 x 16 mm; well-defined; inner table unaffected
Skull U	posterior R. parietal	healed depressed fracture; 16 x 12 mm; shallow; inner table unaffected
Skull Z	L. frontal squama	healed depressed fracture; 12 x 10 mm; ill-defined; inner table unaffected
Skull Z	L. coronoid suture	healed depressed fracture; 27 x 20 mm; deep; inner table unaffected
Skull 7580S:1	R. superior occipital	*peri mortem* linear fracture, runs down to F. magnum and forward to R. orbit
Skull 7580S:4	R. parietal/temporal	*peri mortem* linear fracture, from parietal notch forward across middle of R. coronal suture
Skull 8085S:3	L. frontal squama	healed depressed fracture; 14 x 9 mm; ill-defined; inner table unaffected
Skull 10396	posterior R. parietal	healed depressed fracture; 25 x 20 mm; deep; inner table unaffected
Skull 34051	L. lambdoidal suture	healed depressed fracture; 25 mm; deep; inner table thinned and pitted
Skull 36656	anterior L. parietal	healing depressed fracture; 17 mm; perforation due to necrosis/ sequestration; exposed diploë thickened; spongy reactive bone on inner table
Skull 40563	L. frontal	healed depressed fracture; 27 x 10 mm; slight bulge on inner table
Skull 40563	anterior L. parietal	unhealed depressed fracture; 15 mm circle; 34 x 29mm inner table displaced inward; triangular area of hyper-vascularity surrounds lesion on inner and outer table
Skull 41110	R. frontal	healed depressed fracture, 26 x 20 mm; inner table unaffected
Skull 5295	R. frontal	healed depressed fracture; 6.5 mm diameter; inner table unaffected
Skull 1167	R. frontal	healed depressed fracture; 8 x 5 mm; shallow; inner table unaffected
Skull 53690	superior R. occipital	healed depressed fracture; 18 mm; shallow; inner table unaffected
Skull 29380	L. parietal	*peri mortem* penetrating wound; 11 x 6 mm; inner table curled inward
L. rib 10-11	middle/vertebral 1/3	healed fracture, dorsal displacement vertebral 1/3
R. rib	sternal 1/3	healed fracture with non-union of ends
R. rib	angle	healed fracture, slight inferior displacement
R. rib	sternal end	healed fracture
R. rib	sternal tip	healed fracture with non-union of ends
R. rib	shaft fragment	healing fracture with callus (juvenile)
R. rib	shaft fragment	healed fracture with slight angulation
R. rib	shaft fragment	healed fracture with non-union of ends
L. rib	shaft fragment	healing fracture with callus (juvenile)
R. rib	shaft fragment	healing fracture with callus
L. rib 11-12	shaft fragment	healed fracture
Rib (immature)	sternal end	healed fracture with non-union of ends
L. rib #1	complete	well-healed fracture of neck; slight distortion
R. rib	shaft fragment	healed fracture with slight angulation
R. rib	angle fragment	healed fracture with moderate displacement
rib	shaft fragment	healed fracture
cervical vert. #7	spinous process	healed fracture, spinous process deflected to left
thoracic vert. #2	spinous process	healed fracture, slight deformity near tip
thoracic vertebra	spinous process	healed fracture with lateral displacement to left
thoracic vertebra	inferior centrum	healed compression fracture, centrum collapsed
thoracic vertebra	inferior centrum	healed compression fracture, centrum collapsed
thoracic vertebra	centrum	healed compression fracture; wedge-shaped centrum

Table 8.6 Skeletal fractures, DgRw 199-F1 continued.

Element	Portion	Comment
thoracic vertebra	inferior centrum	healed compression fracture; wedge-shaped centrum
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	centrum	healed compression fracture; anterior wedging
thoracic vertebra	L. sup. articular facet	healed fracture superomedial margin
thoracic vertebra	L. sup. articular facet	healed fracture superolateral margin
thoracic vertebra	R. sup. articular facet	healed fracture lateral margin
lumbar vertebra	R. inf. articular facet	healed fracture inferior tip, slight dorsal displacement
lumbar vertebra	centrum	healed compression fracture; moderate wedging
lumbar vertebra	centrum	healed compression fracture; moderate wedging
lumbar vertebra	centrum	healed compression fracture; centrum collapsed
lumbar vertebra	centrum	healed compression fracture; centrum collapsed
lumbar vertebra	centrum	healed compression fracture; centrum collapsed
lumbar vertebra	centrum	healed compression fracture; slight anterior wedging
lumbar vertebra 5	complete	complete bilateral spondylolysis
lumbar vertebra 5	complete	complete bilateral spondylolysis
lumbar vertebra 5	complete	tripartite: complete bilateral spondylolysis with *spina bifida* of inferior arch half
lumbar vertebra 5	inferior arch	complete bilateral spondylolysis
R. clavicle	lateral shaft	healed fracture, anterior displacement lateral end
L. clavicle	medial shaft	healed fracture; strong angular deformity
long bone	shaft fragment	partially healed fracture with callus formation
L. humerus	midshaft	partially healed oblique fracture, large callus, incompletely closed medullary canal; proximal shaft osteoporotic (pathological fracture?)
L. radius	distal shaft	healed fracture with remodelled callus and slight dorsal displacement of distal fragment
metacarpal 3	prox. articular surface	fracture to base of styloid and metacarpal 2 facet
prox. hand phalanx	prox. articular surface	healed fracture right margin
prox. hand phalanx	distal articular surface	healed crush fracture of central articular area
dist hand phalanx	prox. articular surface	healed crush fracture of articular facet
dist hand phalanx	prox. articular surface	healed crush fracture with severe osteoarthritis
dist hand phalanx	prox. articular surface	healed fracture, articular surface inferior margin
L. tibia	lateral condyle	healed compression fracture, dorsal-lateral margin
L. tibia	medial malleolus	healed avulsion fracture with non-union of malleolus
L. fibula	prox. articular surface	linear oblique fracture with secondary osteoarthritis
R. fibula	proximal shaft	fracture callus at broken end of shaft fragment
L. fibula	distal shaft	well-healed fracture, slight lateral displacement
R. fibula	distal articular surface	oblique linear fracture of articular surface
L. fibula	distal articular surface	oblique linear fracture of articular surface
L. calcaneus	anterior talar facet	healed crush fracture of medial margin of facet
L. cuboid	distal articular surface	crush fracture inferior margin 4th metatarsal facet
L. cuneiform #1	prox. articular surface	crush fracture of navicular facet
L. cuneiform #3	distal articular surface	crush fracture inferior margin 3rd metatarsal facet

Table 8.6 Skeletal fractures, DgRw 199-F1 continued.

Element	Portion	Comment
L. metatarsal #1	prox. articular surface	crush fracture superior margin 1st cuneiform facet
L. metatarsal #2	prox. articular surface	crush fracture superior lateral corner of facet
R. metatarsal #2	prox. articular surface	transverse linear fracture mid-facet
R. metatarsal #2	prox. articular surface	crush fracture superior-lateral corner of facet
L. metatarsal #3	prox. articular surface	crush fracture superior-medial corner of facet
metatarsal #2-5	prox. articular surface	crush fracture middle articular surface
prox. foot phalanx	prox. articular surface	crush fracture inferior lateral corner of facet
prox. foot phalanx	prox. articular surface	crush fracture inferior third of facet
prox. foot phalanx	prox. articular surface	healed fracture with secondary arthritic lipping
prox. foot phalanx	prox. articular surface	oblique linear fracture of facet
prox. foot phalanx	distal articular surface	crush fracture with severe secondary osteoarthritis
prox. foot phalanx	distal articular surface	crush fracture of proximal interphalangeal joint
prox. foot phalanx	distal articular surface	crush fracture of proximal interphalangeal joint
prox. foot phalanx	distal articular surface	crush fracture of proximal interphalangeal joint
prox. foot phalanx	distal articular surface	crush fracture of proximal interphalangeal joint
mid. foot phalanx	prox. articular surface	crush fracture inferior lateral corner facet
mid. foot phalanx	prox. articular surface	crush fracture
mid. foot phalanx	prox. articular surface	crush fracture inferior third of facet
mid. foot phalanx	prox. articular surface	transverse linear fracture of facet
dist. foot phalanx 1	prox. articular surface	crush fracture medial half facet
dist. foot phalanx 1	prox. articular surface	crush fracture medial half facet
dist. foot phalanx 1	prox. articular surface	transverse linear fracture with secondary osteoarthritis
dist. foot phalanx 1	prox. articular surface	crush fracture lateral half facet
dist. foot phalanx 1	prox. articular surface	comminuted crush fracture of entire articular surface
dist. foot phalanx 1	distal shaft	transverse fracture, lateral displacement of distal end
dist. foot phalanx	prox. articular surface	crush fracture
dist. foot phalanx	prox. articular surface	comminuted crush fracture with severe osteoarthritis
dist. foot phalanx	prox. articular surface	crush fracture
dist. foot phalanx	prox. articular surface	crush fracture with secondary osteoarthritis
dist. foot phalanx	prox. articular surface	crush fracture
dist. foot phalanx	prox. articular surface	crush fracture
dist. foot phalanx	prox. articular surface	transverse linear fracture
dist. foot phalanx	prox. articular surface	transverse linear fracture with secondary osteoarthritis

adult females with central incisor agenesis. Four additional partial mandibles exhibit third molar agenesis on one side (three right, one left). Dental reduction or agenesis is considerably less common in the maxillary teeth, with only three instances observed: agenesis of the left lateral incisor in an incomplete child's maxilla, a peg-shaped right third molar in a partial juvenile maxilla, and agenesis of the right third molar in an incomplete adult maxilla.

Developmental defects of the appendicular skeleton are limited to the hands and feet. The presence of anomalous accessory ossicles in the wrist region are inferred from the absence or reduction of the hamulus on two right hamates (*os hamulare basale* or *os hamuli proprium*), and absence of the styloid process (*os styloideum*) on six right and two left third metacarpals (O'Rahilly 1953). Abnormal shortening (*brachydactyly*) was observed in four metapodials: a right third and fourth metacarpal (possibly from the same hand), and a left and right fourth metatarsal (probably antimeres from the same skeleton). Finally, 12 fifth pedal digits exhibit fusion of the middle and distal phalanges. Although ankylosis secondary to trauma cannot be ruled out in the etiology of this variant, the fact that only fifth digits are affected, that only one of the 12 examples exhibits any overt evidence of trauma, along with the observation that ankylosis was

not observed in other unequivocal cases of trauma, argues against this interpretation.

Evidence of **cultural modification** is not common in the skeletal remains from this assemblage. Artificial cranial deformation is limited to one definite case (an adult female skull with mild bifrontal-occipital deformation) and two possible examples involving subadults: an infant with bilateral flattening and focal resorptive lesions on both frontal bosses, and a child's frontal bone exhibiting the median frontal ridge and flattened frontal bosses typical of the bifrontal mode of deformation. Similar lesions were observed in infant skulls from the Tsawwassen site, and were also attributed to deformation (Curtin 1990b).The introduction of artificial deformation is thought to have occurred sometime in the late Locarno or early Marpole periods of prehistory in this region (Beattie 1980), which would make the specimens from Gabriola among the earliest documented examples of the practice.

Cultural modification is more common in dental remains from 199-F1. Polish and/or attrition of the lingual surfaces of anterior teeth were observed in 15 mandibles and one maxilla (6 males, 6 females, 3 adults of indeterminate sex, and one child). Since tooth wear from masticatory function is normally confined to the occlusal/incisal surfaces, this pattern of lingual attrition is suggestive of non-masticatory tooth use, probably in some task-related function such as the processing of hides or fibres. Irregular patterns of occlusal attrition on the posterior teeth of seven mandibles and on the anterior teeth of three others provides corroboratory evidence of the frequent use of the teeth for task-related functions. One final example of dental modification was seen in an adult male mandible with a narrow, obliquely-oriented groove on the occlusal surface of the left first premolar. Similar grooves have been reported in the prehistoric skeletal samples from Prince Rupert Harbour (Cybulski 1974) and Tsawwassen (Curtin 1991a), where they were attributed to the processing of plant fibres or animal sinew.

There are many indications of **infectious disease** processes affecting the skeletal remains from 199-F1. In an earlier report on the small sample of human bones collected from this burial feature in 1987, Skinner (1991: 61-66) described pathological changes affecting 10 skeletal elements (a skull, 2 ulnae, 4 femora, a tibia, a fibula, and a rib) from a minimum of three individuals, which he attributed to treponemal infection. Although the infracranial lesions are suggestive but not diagnostic of this syndrome of diseases, the skull exhibits ectocranial lesions of the classic *caries sicca* sequence, including confluent clustered pits, focal superficial cavitations, circumvallate and serpiginous cavitations, and radial scars (Figure 8.14; Skinner 1991: Fig. 16-24) which are considered pathognomic of treponemal disease (Hackett 1976).

The larger assemblage of human skeletal material recovered in 1991 provides abundant additional evidence of infectious disease, and corroboration for Skinner's initial diagnosis. The osseous changes are most commonly manifested as periostosis, the deposition of hypertrophic new bone on periosteal surfaces, primarily but not exclusively affecting long bone diaphyses. The morphology of the periosteal deposits varies from small diffuse patches of spongy-textured fibre bone, to larger, localized fusiform swellings often with a lamellar structure, to more extensive sclerotic expansions involving large areas of the shaft and in severe cases substantially altering its shape. In at least one tibia, apposition along the anterior crest has resulted in the characteristic "sabre shin" appearance often associated with treponemal infection. In the more severely affected specimens, hypertrophic endosteal deposits may also be present either as small localized patches of spongy bone adhering to the endosteal surface or as an expansive mass of fine cancellous tissue occluding the medullary cavity. In a few, diagnostically significant cases, sharp-margined expanding cavitations are found in the hypertrophic periosteal new bone, apparent foci of gummatous inflammation. This combination of periosteal apposition and focal cavitation was considered by Hackett (1976: 93-97) to be a diagnostic criterion of "syphilis" (treponemal disease).

A total of 232 identifiable skeletal elements exhibit these osseous changes to some degree, in addition to 526 unidentified long bone shaft fragments from an undetermined number of skeletal elements (Table 8.7). A minimum of 17 individuals are affected, including at least 11 adults and 6 subadults (3 infants, 2 children, 1 adolescent). Figures 8.15 - 8.17 illustrate typical infectious lesions in a femur, humerus, and two fibulae. The distal two-thirds of the right femur (Figure 8.15a) appears swollen due to the presence of rugose periosteal new bone cloaking the shaft; in close-up (Figure 8.15b), it has a smoothly rippled appearance marked by vascular grooves, small clusters of pits, and small depressions or "dimples" that probably represent healed, remodelled gummatous lesions. An active lesion is present on the ventral-medial aspect of the proximal shaft (Figure 8.15c): a small irregular sharp-margined cavity surrounded by an oval area of reactive fibre bone and periostitis.

Table 8.7 Evidence of infectious disease, DgRw 199-F1.

Element	N	Periosteal Deposition	Endosteal Deposition*	Cavitatation	MNI	Adult	Sub Adult
skull	1	1	1	1	1	1	
zygoma	1	1	1		1	1	
mandible	1	1			1	1	
sternum	2	2			2	2	
clavicle	18	18	4		9	8	1
scapula	8	8		1	2	1	1
rib	28	28	4	1	3	1	2
humerus	22	22	3	3	11	11	
radius	7	7	2	1	4	3	1
ulna	13	13	2	1	4	3	1
carpal	1	1			1	1	
metacarpal	18	18	1		4	4	
phalanx	14	14	1		2	2	
innominate	3	3			1	1	
femur	17	17	4	5	7	6	1
tibia	25	25	2	1	10	5	5
fibula	26	26	9	5	5	5	
tarsal	3	3			1	1	
metatarsal	8	8	3		3	2	1
phalanx	6	6			1	1	
vertebrae	8	8			2	2	
sacrum	2	2			2	2	
long bone	526	526	89				
Total	**758**	**758**	**26**	**19**	**17**	**11**	**6**

* underestimates true frequency, since only observable in fragmented or radiographed specimens.

Similar but more extensive changes are apparent in the right humerus, shown in ventral (Figure 8.16a) and dorsal (Figure 8.16b) views. The distal shaft is grossly swollen and distorted, and pocked with superficial cavitations in various stages of healing. The more proximally-located lesions appear to be more recent than the distal ones, whose margins are collapsing and smoothing over as they begin to heal (Figure 8.16c). The two fibulae illustrated in Figure 8.17a exhibit varying degrees of periostosis on their distal shafts, including diffuse striated and pitted deposits (left) and localized fusiform swellings (right). The periostosis may occur alone (Figure 8.17b) or in conjunction with a focal cavitation (Figure 8.17c).

In younger subadults (infants and children) the diaphyseal periosteal reaction is typically expressed as a superficial sleeve of new bone which cloaks the original cortex (Figure 8.18); in some cases several distinct layers of periosteal bone are apparent. Unfortunately, poor preservation of immature long bone metaphyses precludes the identification of Wimberger's sign (symmetrical osteomyelitis of the proximal tibia), but one distal femoral epiphysis exhibits the distinctive jagged, erose margin of osteochondritis, another characteristic lesion of childhood treponematosis (Mansilla and Pijoan 1995).

In addition to these infracranial changes, dental remains from a six-year-old child exhibit morphological characteristics suggestive of congenital treponemal infection (Jacobi et al. 1992). The affected teeth are the two permanent mandibular first molars and the right permanent mandibular canine. The molars are severely hypoplastic, with rounded, bulbous cusp tips constricted at the base by a deep, irregularly pitted hypoplastic line that encircles the crown (Figure 8.19). The cusp tips appear crowded together towards the centre of the occlusal surface, which itself features many small irregular enamel globules (most apparent on the left molar), producing the "mulberry" appearance characteristic of Moon's molars. The canine (of which only the crown has yet formed) exhibits a deep, circumferential groove around the cusp tip, below which is a broad band of pitted hypoplastic enamel covering approximately one-third of the vertical di-

mension of the crown. The unerupted permanent mandibular incisors of this individual appear normal radiographically. Since the affected areas of the permanent molars and canine are those that are developing in the perinatal period, congenital transmission of the infectious agent seems indicated (Turner 1993). Similar dental stigmata are reported to occur in 30-45% of cases of congenital syphilis (Steinbock 1976: 106), although there is difference of opinion as to whether they can be considered pathognomic of that disease (Baker and Armelagos 1988; Hackett 1976).

Taken together, the neonatal dental lesions, the cranium with *caries sicca*, and the long bones with periostosis and focal cavitations all support a diagnosis of treponemal disease endemic in this population. There are four closely-related diseases or syndromes subsumed under the term treponematoses: pinta, yaws, treponarid (also known as bejel or endemic syphilis), and venereal syphilis; each results from infection with a variety or species of the *Treponema* spirochete, but only the last three are known to affect the skeleton (Ortner and Putschar 1981: 180). Yaws and treponarid are typically contracted in childhood, and most commonly transmitted by body contact or by the use of common eating utensils; syphilis usually affects older adolescents and adults, and is transmitted primarily through sexual contact. Unfortunately, the osseous lesions of yaws, treponarid, and venereal syphilis are morphologically indistinguishable, although some attempts have been made to differentiate between the three entities on the basis of their patterns of skeletal involvement (Steinbock 1976; Ortner and Putschar 1981; Rothschild and Heathcote 1993; Rothschild and Rothschild 1994, 1995; Hershkovitz et al. 1994).

The demonstration of congenital infection has long been considered essential to the diagnosis of venereal syphilis in skeletal remains (e.g., Baker and Armelagos 1988; Powell 1994; Cook 1994), since transplacental infection of the fetus, while *theoretically* possible in all three syndromes, can only occur if the maternal infection is in the secondary phase during pregnancy, and with yaws and treponarid, which are normally contracted in childhood, this stage is never found in pregnant women, at least in modern cases (Grmek 1994). Baker and Armelagos (1988: 705), for example, consider the occurrence osteochondritis and the dental stigmata as pathognomic of venereal syphilis. At 199-F1, therefore, the association of bone lesions pathognomic of treponemal disease with dental lesions indicative of congenital infection suggests that the specific treponemal infection afflicting the population was venereal syphilis. The high frequency of periostitis in arm bones at 199-F1 is also consistent with a diagnosis of venereal syphilis, since these bones are rarely affected by other infectious diseases (Steinbock 1976: 112; Rose and Hartnady 1991: 125).

Other diseases affecting the skeleton were considered in the differential diagnosis of the F1 infectious lesions, including neoplasm, trauma, pyogenic osteomyelitis, leprosy, Paget's disease, tuberculosis, and chronic leg ulcer but none of these were consistent with the observed skeletal manifestations.

Mortuary Practices

Despite the confounding effects of post depositional taphonomic processes on the integrity of the deposits at 199-F1, some clear patterns of mortuary behaviour can be discerned. The artifact associations indicate that at least some of the bodies interred here were people of wealth and prestige in their community. The high incidence of cranial fractures, and the tentative evidence of post mortem mutilation suggest that some may have died violently. Others may have succumbed to infectious disease. Many of the bodies were thoroughly cremated, and all may have been exposed to fire at least minimally during the mortuary ritual. Some of the crania with pathological or traumatic lesions are largely unburnt except for localized areas of charring in the vicinity of the lesions, suggesting an intimate association between burning ritual and cause or manner of death.

Burning patterns indicate that the bodies were cremated in the flesh, and the presence of cutmarks near major joints suggests that some were at least partially dismembered prior to cremation. There are no indications that the cremation took place inside the burial feature: no fire-altered rocks, no ash layers, no dense concentrations of charcoal. Although none of the skeletal remains was found articulated in anatomical position (further support for *post mortem* dismemberment), the relatively low dispersal rate of fragments from the same bone, and of elements from the same individual (where discernible) suggest that the bodies were processed individually, instead of part of a mass cremation. Food offerings consisting primarily of fish and shellfish were left for the dead at the time of deposition and perhaps periodically afterwards.

There are some suggestions that skeletal elements, particularly near the entrance passage, may have been cleared aside and sorted prior to subsequent interments, and that the remains of subadults were preferentially placed in the east chamber of the cave. Radiocarbon dates indicate that this feature was reused over a long span of time, perhaps a thousand years or more, and that the likelihood of cremation, or the intensity and thoroughness of cremation, or both, diminished during the later history of the burial cave.

Figure 8.14 ***Caries sicca*** **lesions on cranium: (A) frontal view; (B) vertical view.**

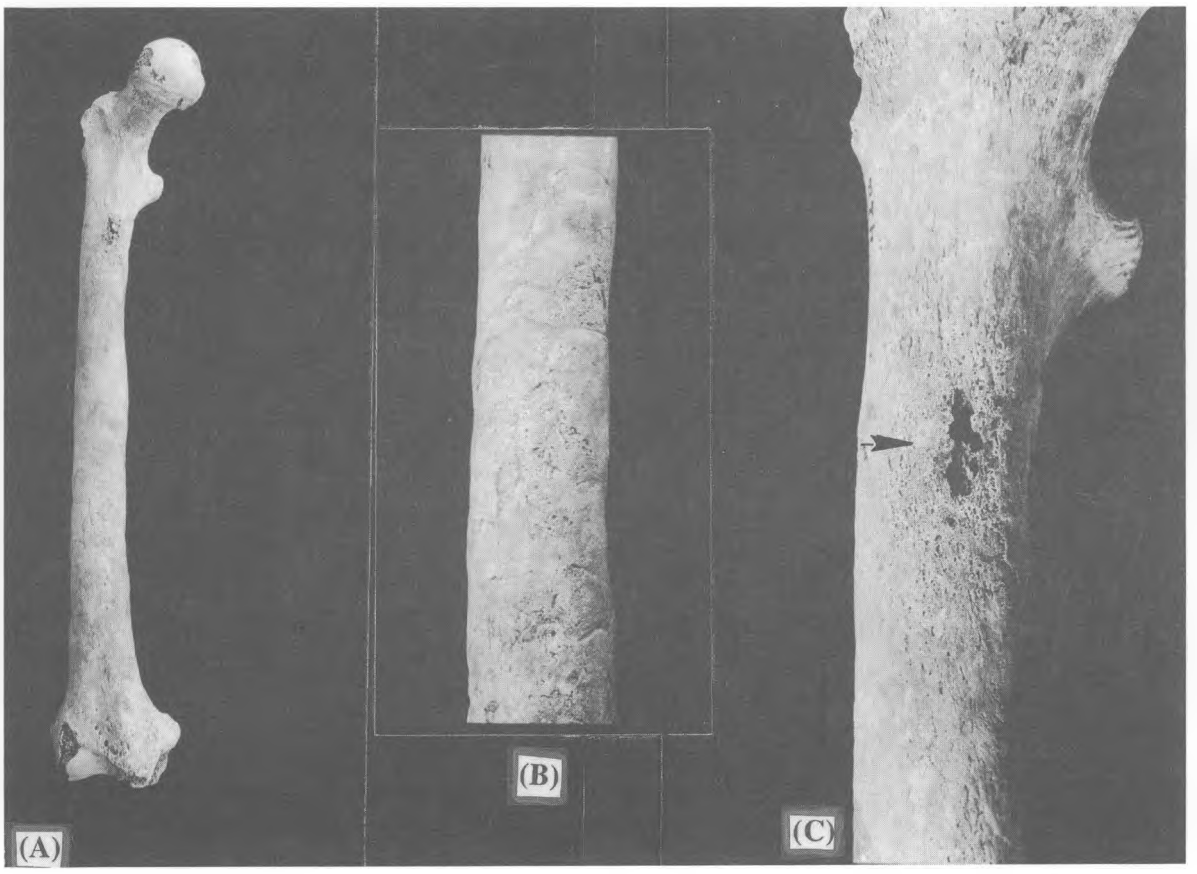

Figure 8.15 Periosteal lesions on femur: (A) ventral view: (B) close-up of midshaft periostosis: (C) focal cavitation on proximal ventral shaft.

Figure 8.16 Periosteal lesions on humerus: (A) ventral; (B) dorsal; (C) close-up.

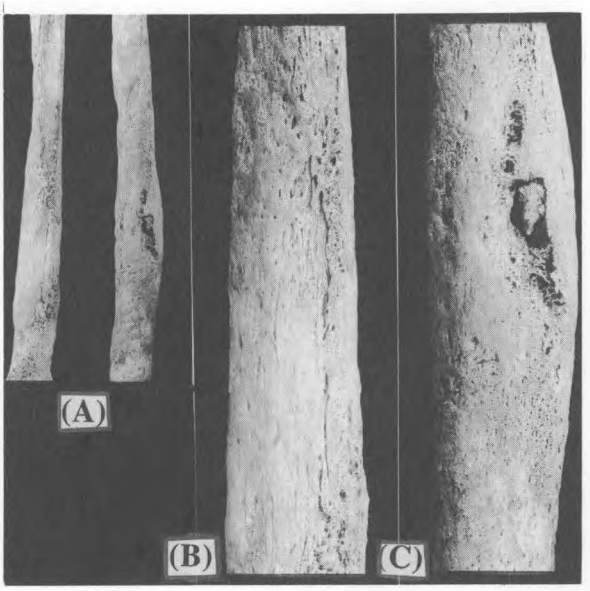

Figure 8.17 Periosteal lesions on fibulae: (A) two distal shafts; (B) periostosis: (C) focal cavitation.

Figure 8.18 Child's femur with sleeve of periosteal new bone.

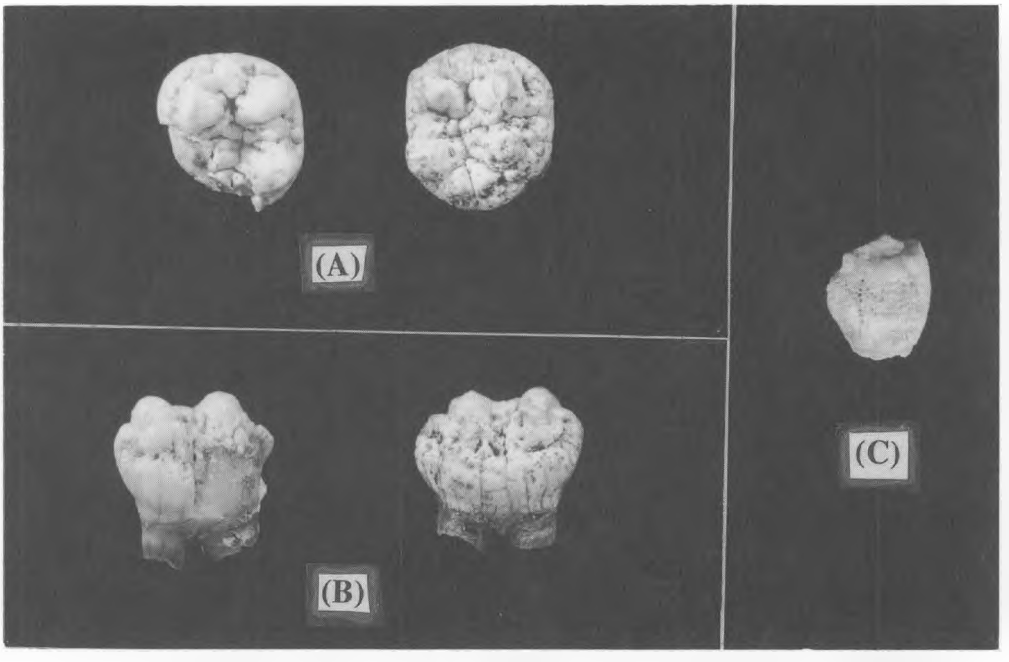

Figure 8.19 Dental stigmata of congenital treponemal disease: mandibular first molars: (A) occlusal; (B) buccal; (C) right canine crown, labial view.

Chapter 9

Excavations At DgRw 199-F9

Feature 9 was first discovered by Ian Wilson during his 1987 survey of the False Narrows bluffs. After describing the contents of the large burial cave [Feature 1] at DgRw 199, he noted that human remains were also visible "in a low crevice to the east (sic) of the cave" [Feature 9] (Wilson 1987: 12). Later that year, a small-scale burial salvage project, directed by Mark Skinner, collected all human remains visible on the surface of 199-F9, which Skinner referred to as "the crevice" (Skinner 1991: 51). Skinner and his crew also removed two large boulders that partially blocked the entrance, and exposed a layer of highly fragmented, burnt human bone beneath the surface leaf litter which they decided to leave undisturbed.

When 199-F9 was reexamined during the current project, a recently excavated shallow pit was observed against the south wall of the chamber, and several human long bones, presumably removed from the pit, were found piled to one side of the hole. This disturbance was clearly the result of vandalism, and must have occurred sometime in the two years that elapsed between Skinner's project and ours. The threat of ongoing vandalism was one of the factors leading to the selection of this feature for excavation during the current project. The presence of an earlier skeletal collection from the feature was also an important consideration, given the Nanaimo First Nation's expressed wish that all the human remains interred together be kept together.

Excavation at 199-F9 was initiated in the fall of 1989, but was not completed until the end of the second field season, in summer 1992.

Feature Description

Feature 9 is located in a lightly wooded area near the base of the lower bluffs, in one of the densest concentrations of burial features discovered in the course of the project. Immediately to the southeast is F8; to the northeast are F23 and F1; due north is F10; and to the northwest are F11 and F22 (Figure 9.1). Feature 9 is formed from a massive sandstone slab that lies with its western edge resting on the ground, and its northeast and southeast corners propped up by smaller sandstone and conglomerate blocks, creating a wedge-shaped chamber beneath (Figure 9.2). The entrance faces southeast, and is a maximum of 2.46 m wide and 0.90 m high, giving easy access to the chamber inside. Although the entrance is relatively high, the roof slopes sharply downward to the northwest until it reaches ground surface, where it forms the back wall of the burial chamber. The floor also dips downward for a distance of about 60 cm west of the entrance , then runs more-or-less horizontally to the back of the chamber (Figure 9.4). Maximum dimensions of the chamber floor are 2.5 m northwest-southeast by 2.0 m northeast-southwest. Near the centre of the chamber, and occupying much of the floor space, is a large sandstone boulder which partially supports the ceiling slab, and effectively divides the chamber into eastern and western sections (Figure 9.3).

When reexamined during the 1989 site reconnaissance, the only human remains visible on the surface of the chamber were those piled to the side of the pothunter's pit described above: two femurs, three tibias, several ribs, a patella, and some cranial fragments, along with a deer humerus. Additional surface remains were later discovered in the western section of the chamber, but were initially obscured by the low ceiling and large cental boulder. These included a mandible, tibia, humerus, radius, several ribs and vertebrae, and numerous long bone fragments.

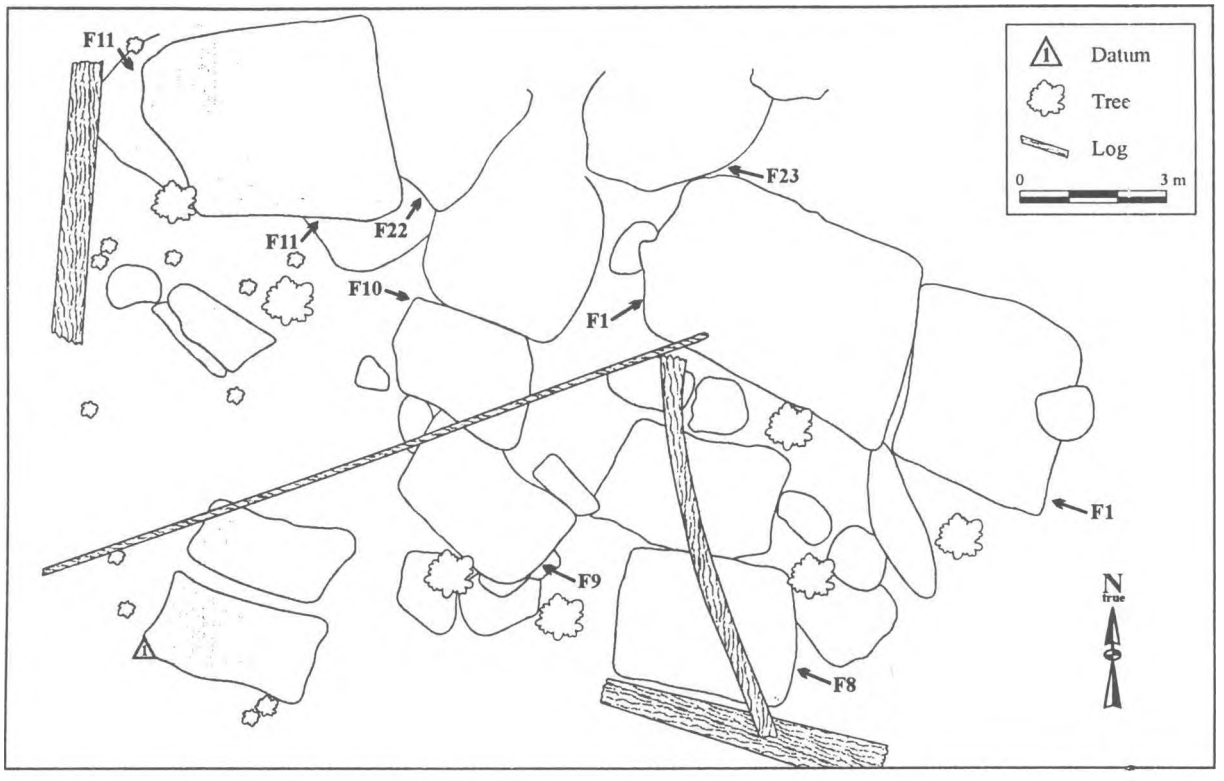

Figure 9.1 DgRw 199-F9 location.

Excavation Results

A grid of eight 1.0 x 1.0 m excavation units was laid out on the floor of the burial chamber (Figure 9.3), but the walls of the feature and the boulders supporting the ceiling slab placed restrictions on the extent of excavation possible, so that not all quadrants could be excavated. In EU 3 only the NE and SE quads were dug; in EU 5 only the NW and NE quads; in EU 7 only the SW and SE quads, and in EU 8, only the SE quad. Two-litre matrix samples were collected from each arbitrary level and natural stratum in EU 6 for later sediment and faunal analysis.

In the first of the two field seasons at 199-F9, the entire feature was surface-collected, EU 1 was excavated to what were thought to be culturally sterile deposits at 20 cm below surface, and EU 2 was partially excavated to a depth of 5-10 cm BS. On recommencing excavations in 1992, it was discovered that additional human remains were present in EU 1 below some sandstone slabs apparently fallen from the roof. All units were therefore excavated to 35-40 cm below surface, until no further human remains were encountered.

Matrix Description

The floor of the feature was covered by leaf litter and sandstone rubble, with occasional small shoots of oregon grape (*Berberis nervosa*) growing near the entrance. Three stratigraphic layers were tentatively identified during the excavation, although the abundance of intrusive roots and the filtering of sediments down through crevices between the many large boulders resulted in some matrix mixing, and tended to obscure stratigraphic details. A stratigraphic profile of the west walls of EUs 3, 4, and 8 is presented in Figure 9.5.

Layer A: moist, moderately compact, carbon-stained, medium to fine-grained sandy silt, ranging in colour from very dark brown (10YR 2/2) to dark greyish brown (10YR 3/2). The matrix is very organic, with a dense root mat throughout, as well as occasional larger roots extending from the arbutus tree in the southeast corner of the feature. It contains abundant sandstone cobbles, slabs, and boulders, some of which are ceiling fall, while others may have been deliberately placed to close off the entrance. Snail shells are a frequent natural inclusion. Cultural content includes burnt, fragmented human bone, one ba-

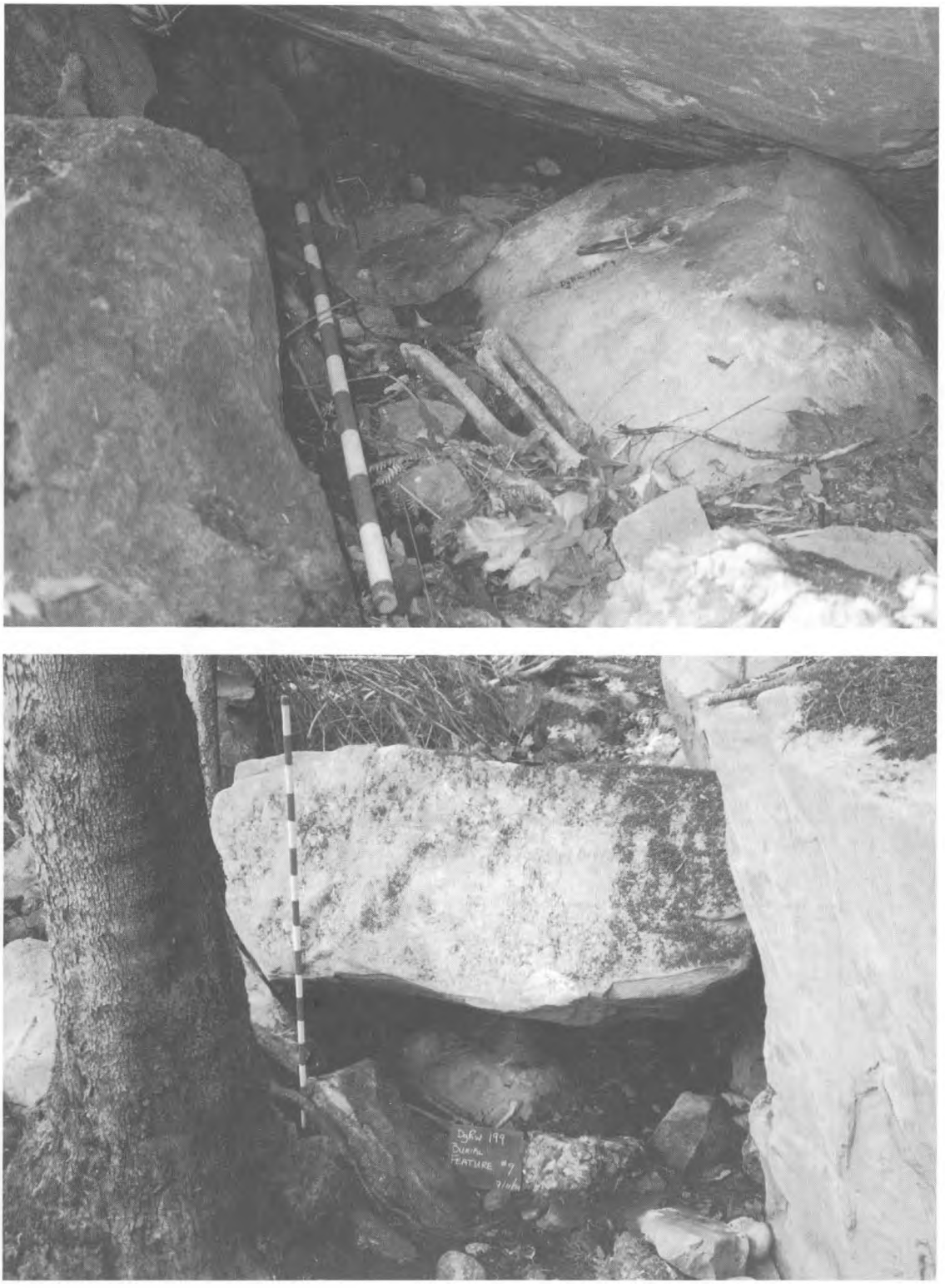

Figure 9.2 Entrance to DgRw 100-F9 (top); view inside burial chamber (bottom); scale bar 10 cm.

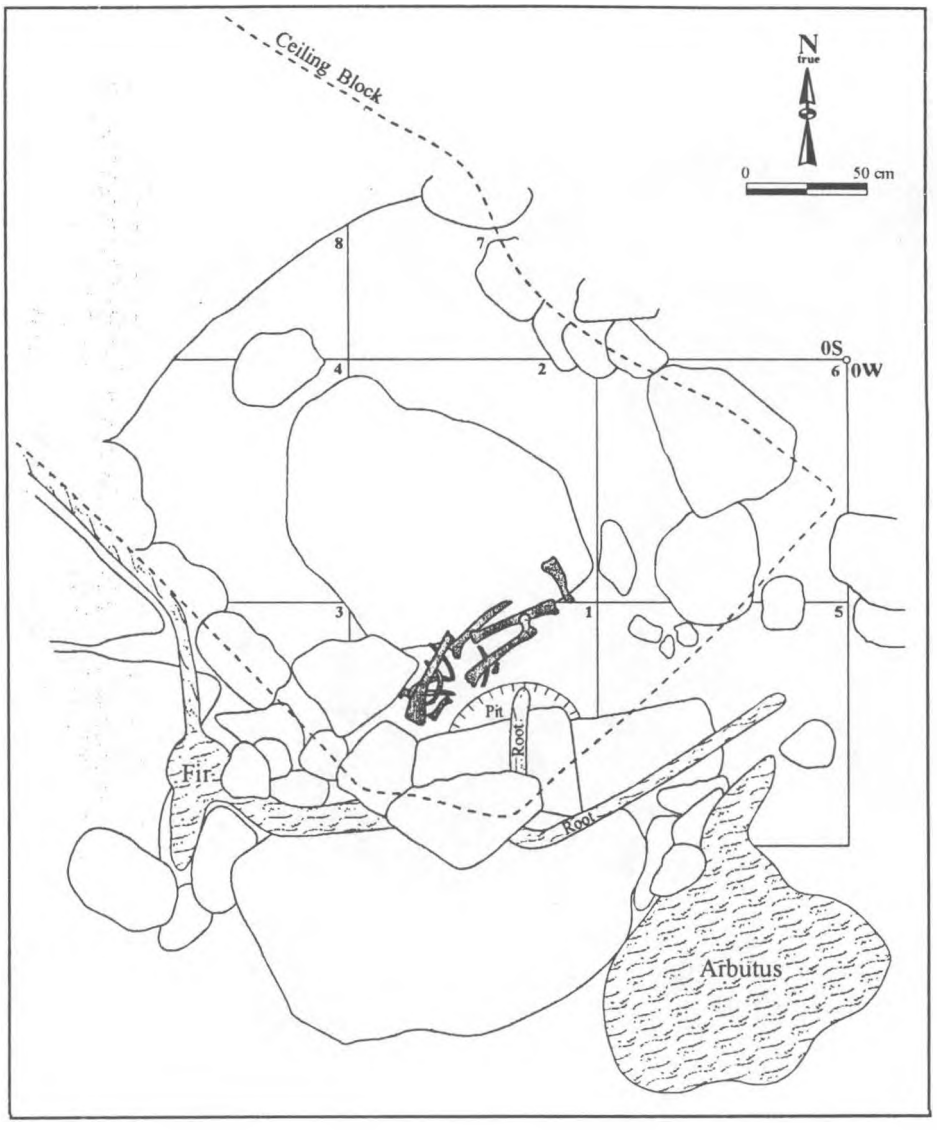

Figure 9.3 DgRw 199-F9: floor plan.

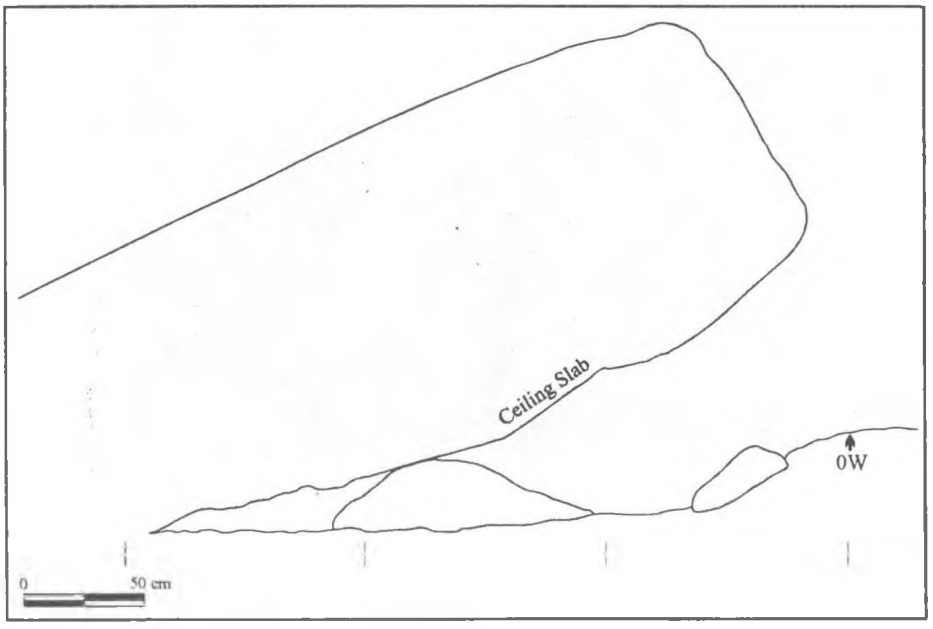

Figure 9.4 DgRw 199-F9: cross-section of burial chamber.

salt flake, some mammal bone, and minimal amounts of crushed clamshell. No fire-altered rocks were found, suggesting that the human bones were not burnt *in situ*, but removed to the feature after cremation. Layer A ranges in thickness from 5-25 cm, being thinnest along the perimeter of the feature and thickest around the central boulder.

Layer B: moist, moderately loose, medium-grained, dark brown (10YR 3/3) to dark yellowish brown (10YR 3/4) sandy silt. This layer is lighter in colour and contains more sand but less carbon than the overlying Layer A. Roots and rock inclusions, predominately sandstone slabs and conglomerate rubble, are still abundant, but human and faunal remains are appreciably less frequent. Five stone flakes were found in this layer; three additional artifacts (a flake, a core, and a ground slate point fragment) were recovered from the Layer B/C interface and could not be attributed with certainty to either layer. Layer B ranges in thickness from 15-25 cm, and like Layer A, is thickest in the central portion of the feature.

Layer C: loose, dry, medium to coarse-grained, dark yellowish brown (10YR 3/6) silty sand. This layer is lighter in colour than Layer B and contains more rocks, particularly pebbles. Roots continue to be abundant. No charcoal or shellfish remains were observed, and the only cultural material possibly attributable to this layer are a cluster of heavily weathered, unburnt human bones and three artifacts recovered from the Layer B/C interface of units 1 and 3. Four additional human fragments collected from Layer C in EUs 4 and 8 were clearly redeposited from Layer B. Layer C was exposed throughout the feature except EUs 5 and 6 at depths of 30-40 cm BS.

Faunal Remains

The faunal assemblage from 199-F9 is derived from three sources: Skinner's 1987 project, the excavated sample from the 1989 and 1992 field seasons, and 2-litre matrix samples collected from each level of EU 6. Apart from abundant land snail shells, which are a natural occurrence in this habitat, the only faunal remains collected by Skinner were a horse clam valve, a burnt bird tarsometatarsus, a deer scapula with cutmarks, and three elements from medium-sized mammals, two of which were burnt (Skinner 1991: 74, 95-96). The two seasons of excavation during the present study yielded 198 skeletal elements, and an additional 387 vertebrate specimens were recovered from the matrix samples. Table 9.1 summarizes the vertebrate faunal distribution by sample source, and complete faunal catalogues are presented in Appendix A, Tables A.14-A.16. The following discussion is based on the results of the faunal analyses of van Gaalen (1991, 1994) and Kusmer (1992).

Table 9.1 Summary of vertebrate fauna (NISP), DgRw 199-F9.

Source	Fish	%	Bird	%	Mammal	%	Misc	%	Total
Skinner	0	0.0	1	20.0	4	80.0	0	0.0	**5**
Excavation	52	26.3	52	26.3	94	47.5	0	0.0	**198**
Matrix Sample	111	28.7	13	3.4	260	67.2	3	0.8	**387**
Total	**163**	**27.6**	**66**	**11.2**	**358**	**60.7**	**3**	**0.5**	**590**

The vertebrate faunal collection from 199-F9 differs from that of 199-F1 in the preponderance of mammalian remains, which comprise nearly half of the excavated sample and two-thirds of the matrix sample; in this characteristic, 199-F9 most closely resembles 204-F2. More than half of the mammal bones from the excavated sample were identified to taxon. In terms of numbers of identified specimens (NISP), domestic rabbit (*Oryctolagus* sp.), deer (*Odocoileus* sp.), raccoon (*Procyon lotor*), and various members of the mice and rat family (Muridae) dominate the assemblage; about one-quarter are from immature individuals (rabbit, raccoon, deer, and unidentified mammal). The domestic rabbit remains are all consistent with a single individual and probably represent a family pet that fell prey to a carnivore. Mammal remains recovered from the matrix samples, although numerous, are generally small and very highly fragmented, so that fewer than 10% (mainly small rodents) could be identified to taxon.

Fish remains comprise approximately one-quarter of both the excavated and matrix samples from 199-F9. These proportions are similar to 204-F2, but the constituent species are very different: only salmon and herring were recovered from 204-F2, while 199-F9 yielded no salmon and very little herring, and (like 199-F1) is dominated by local, non-migratory fish (van Gaalen 1994:15).There is surprisingly little over-

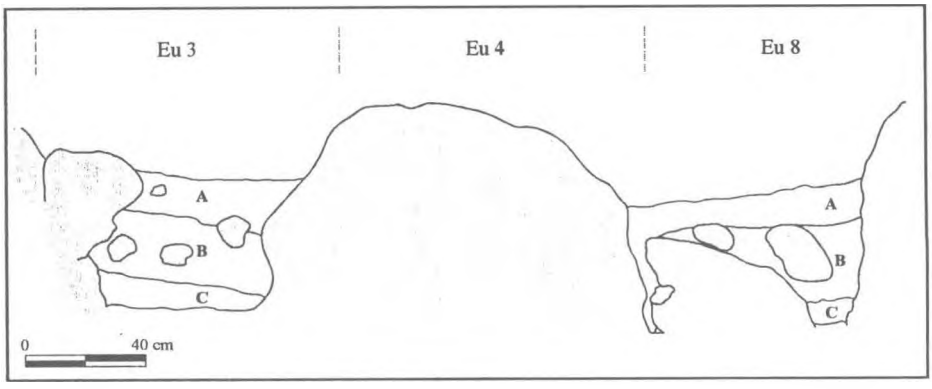

Figure 9.5 DgRw 199-F9: stratigraphic profile at 2.0 m west.

lap in identified fish species between the excavation and matrix samples (Table A.16), with rockfish (*Sebastes* sp.) most common in the former, and cabezon (*Scorpaenichthys marmoratus*) in the latter. However, since the majority of fish remains from both samples could not be identified to taxon, this difference may be more apparent than real. Skeletal elements from the vertebral column, pectoral girdle, opercular region, branchial arch, and mandibular arch were identified.

Avian remains were considerably more numerous in the excavated sample than the matrix sample, and in contrast to fish specimens, the majority could be identified to taxon. Waterfowl, including bay and surface-feeding ducks (Aythyini and Anatini tribes) are most abundant, followed by perching birds such as thrush (Turdinae) and crow (Corvidae), woodpecker (Picidae), and grouse (Tetraoninae). Wing and leg elements predominate in the skeletal collection, but pelvic bones were also found.

Modifications attributed to animal activity (rodent gnawing, carnivore chewing) were observed on 3.0% of the collected remains, all mammal. More frequent was the evidence for human modification (burning, cut marks, spiral fractures, etc.), which affected 13.6% of the excavated assemblage, and all three faunal classes to some extent. Burning was even more prevalent in the matrix sample fauna, with 64% of the fish, 67% of the reptile, 62% of the bird, and 91% of the mammal bones affected (van Gaalen 1994:18). The latter figure may be inflated, however, by the inclusion of small fragments of cremated human bone that were not identified as such during the analysis.

Spatially, the excavated fauna tend to be concentrated along the back wall of the burial feature, in EU 4 (47.5%), EU 8 (17.2%), and EU 3 (13.6%), and in the upper 10 cm of the deposits (56.6%). The vertical distribution of fauna from the matrix samples collected near the entrance to the feature (EU 6) is quite different, as shown in Table A.17, with the majority of specimens recovered from level 4 (15-20 cm BS).

Shellfish remains were conspicuously scarce during the excavations at 199-F9, although occasional occurrences of butter clam, littleneck clam, basket cockle, mussel, and crab were noted. The six matrix samples collected from EU 6 yielded a total of 6.6 grams of shell: 54.5% Oregon land snail (*Allogona townsendiana*), 43.9% clam, and 1.5% crab by weight (Table A.18). Not unexpectedly, snail shell predominates in the upper levels of the unit, with clam shell more common in levels 3 and 4 (Kusmer 1992).

As was the case with all of the other excavated burial features except 204-F6, the faunal assemblage at 199-F9 appears to have accrued through a combination of natural processes, including carnivore scavenging, and human intervention, particularly the provision of food remains for the dead.

Artifacts

Eight stone artifacts were recovered from 199-F9: one ground slate point fragment (Figure B.1f), one flaked core, and six pieces of flaking detritus. The artifacts are dispersed throughout the feature both horizontally and vertically, being found in five of the eight excavation units and six of the eight excavated levels. The flakes are generally large and crude. Four of the six retain remnants of cortex on striking platforms and dorsal surfaces, suggesting very early stages of lithic reduction (primary decortication), or perhaps the testing of raw materials for flaking suitability. The core is also partially cortex-covered; in this case the cortex is very smooth and highly polished

suggesting that the core originated as a water-rolled cobble. A variety of raw materials were employed, including a light green felsite, greywacke, basalt, and a reddish gritstone; all are coarse-grained with poor flaking qualities. Detailed descriptions of the artifacts may be found in Appendix B.

Dating

Analysis of bone collagen extracted from unburnt human rib and vertebra fragments yielded a radiocarbon age of 2670 ± 60 years BP, or a C^{13}-adjusted age of 2830 ± 60 years BP (Beta-37845). The former date is virtually identical to the unadjusted radiocarbon age of 2680 ± 70 years obtained by Skinner (1991: 47) on a femur fragment he collected from the surface of this feature in 1987. The C^{13}-adjusted date places the burial feature within the late Locarno Beach Culture Type of the Gulf of Georgia chronology.

Human Remains

A total of 9,906 human skeletal fragments were recovered during the 1989 and 1992 excavations at 199-F9, which, in addition to the 2,623 fragments collected during Skinner's 1987 project, yields a total human bone assemblage of 12,529 pieces. Of these, 6,258 fragments (49.9%) were too small to be identified to element. It should be noted that Skinner (1991: 58) originally reported collecting only 467 human bone fragments from the feature, but reexamination of this material revealed several discrepancies in the human remains catalogue, including instances where hundreds of hand and foot bones were bagged together under a single number, or a single element was assigned several numbers. Although some fragments could not be relocated, the revised total of 2,623 is the best estimate of the number of human remains actually collected in 1987. Most skeletal elements are well represented in the human bone assemblage from 199-F9. In particular the frequency of cranial remains serves to distinguish the two DgRw 199 burial features from those of DgRw 204 (Table C.1).

Condition

Nearly 70% of the assemblage was categorized as in "poor" condition, whereas less than 10% was deemed "good". Most of the bones are highly fragmented and even the more complete specimens tend to exhibit weathered or exfoliated cortical surfaces with broken or missing metaphyses. Root penetration into medullary cavities appears to be largely responsible for the poor preservation of cancellous bone, which, when present, tends to have a loose, sawdust-like texture, with most structural detail lost. Location within the burial cave clearly affected preservation. The two innermost units (EU 4 and EU 8) yielded the highest frequencies of well-preserved bone (31.5% and 25.4% respectively), whereas bones from nearest the entrance (EU 5 and EU 6) were the most poorly preserved (only 3.2% and 2.5% classified as "good" condition).

Approximately 2% (n=192) of the skeletal fragments were coated with an opaque, greyish-white calcareous plaque, apparently a precipitate from the walls and/or ceiling of the feature. Most often this presented as small discontinuous patches, but occasionally it formed a thick continuous sheet completely encasing the element and obscuring the cortical surface. Proximity to the walls was clearly a contributing factor in the development of the plaque, with bones from the innermost recesses of the feature being most frequently affected. None of the elements from EU 5 exhibited the plaque, but fully 30% of the remains collected from EU 8 were affected. Depth below surface is also a contributing factor: 89% of the mineral-coated fragments come from the top 10 cm of the deposits, and none was found below 20 cm BS.

Evidence of animal disturbance is uncommon. Of the total sample, including Skinner's surface collection, only 15 elements (0.12%) are affected. Rodent gnaw marks were observed on 11 elements: a humerus, three radii, a hamate, a middle hand phalanx, an innominate, a rib, a femur, and two unidentified long bone shaft fragments. Four additional specimens (a mandible, two ulnae, and a calcaneus) exhibit splintering and conical puncture marks attributed to carnivore chewing. Both rodents and carnivores appear to prefer unburnt bones for their meals: 12 of the 15 affected bones are unburnt, and the three burnt specimens exhibit only slight discolouration.

Possible cutmarks were observed on five specimens. Three distal humerus fragments (two unburnt, one charred black) exhibit series of three to five narrow, parallel, transverse to oblique cuts 2-7 mm in length on the anterior prominence of the shaft above the distal articular surface. This location is the typical cutting site for severing the flexor tendons of the elbow, and such marks may be viewed as unequivocal evidence for *post mortem* disarticulation (White 1992: 241). Another unburnt humerus fragment shows five short (< 3 mm), closely-spaced transverse cuts on the lateral wall of the bicipital groove above the deltoid tuberosity; additional narrow cuts interspersed with broader, deeper hack marks extend down the anterolateral border to the deltoid tuberosity. Cutting in these locations would sever the *deltoideus* and *pectoralis major* muscles, and may have served to disarticulate the arm at the shoulder. The fifth specimen is a slightly burnt rib shaft fragment which has two longer

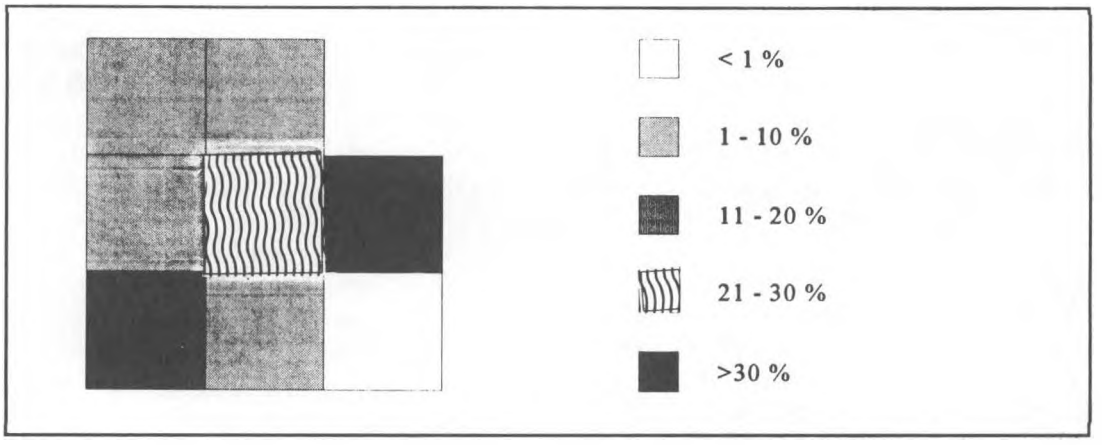

Figure 9.6 Horizontal distribution of human remains, DgRw 199-F9.

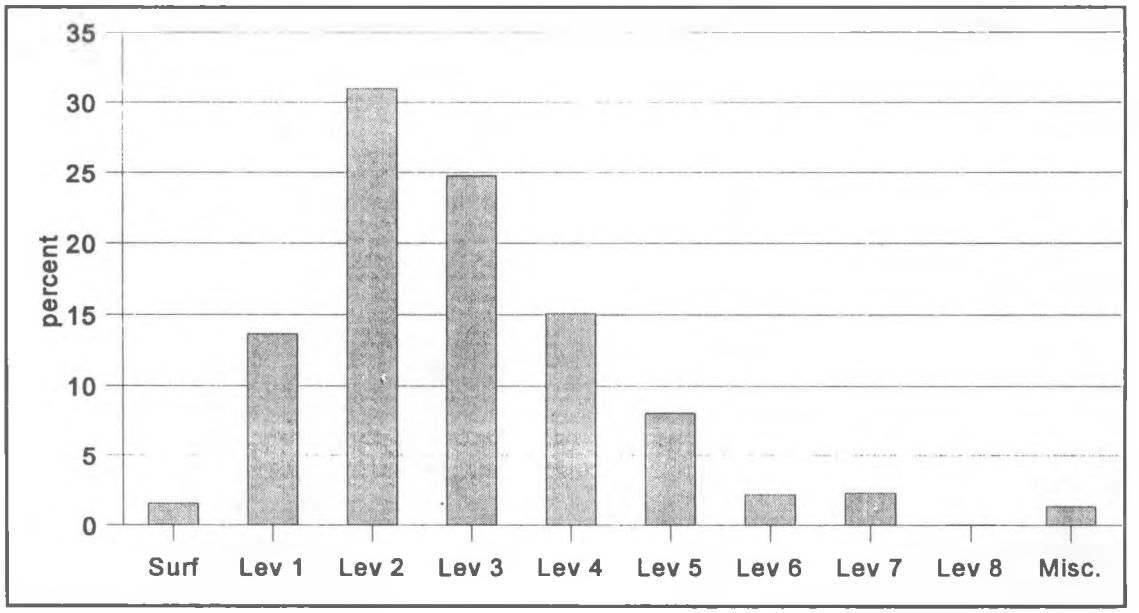

Figure 9.7 Vertical distribution of human remains, DgRw 199-F9.

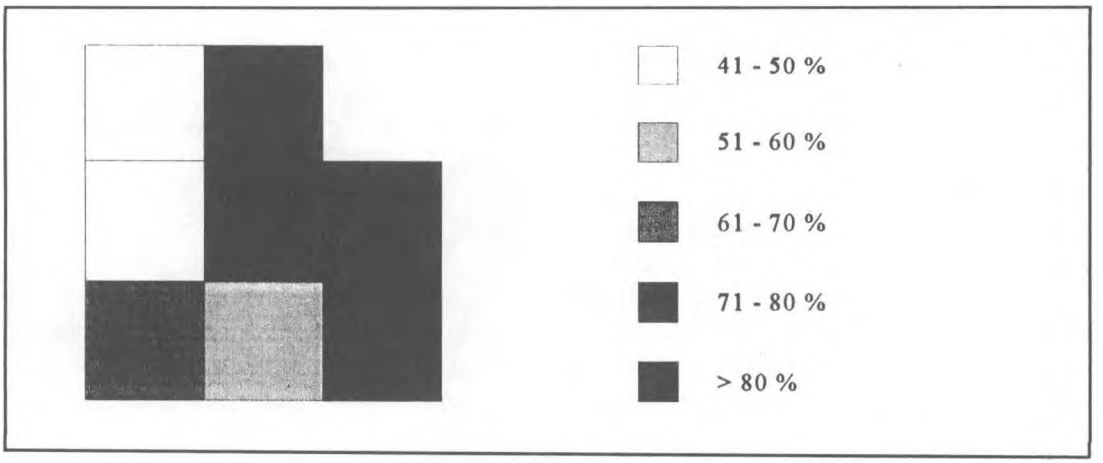

Figure 9.8 Horizontal distribution of burnt human bone (% of unit total).

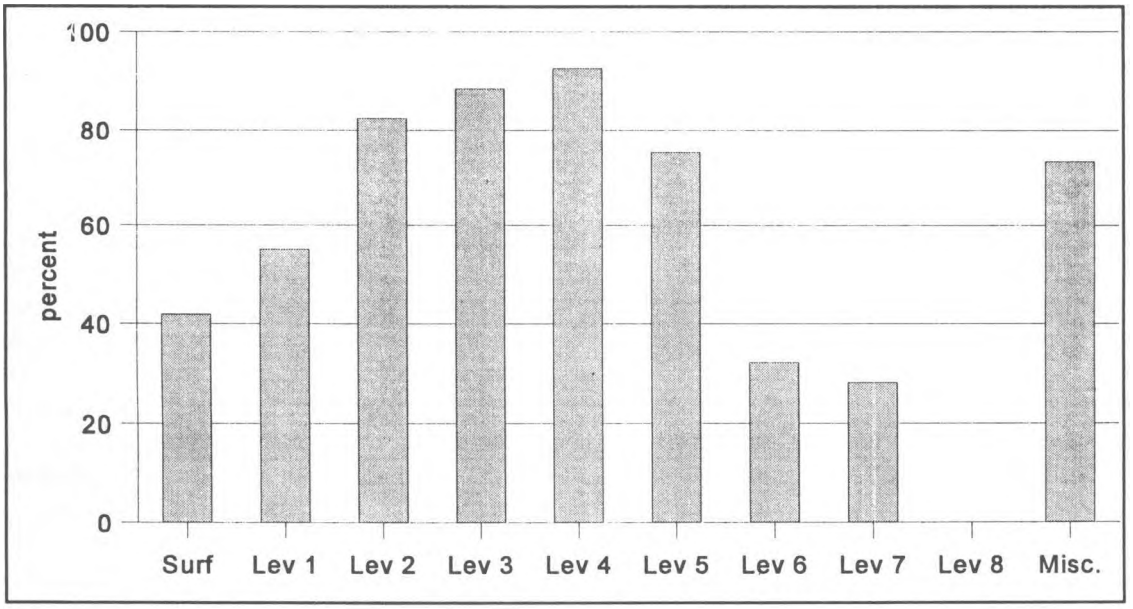

Figure 9.9 Vertical distribution of burnt human bone (% of level total).

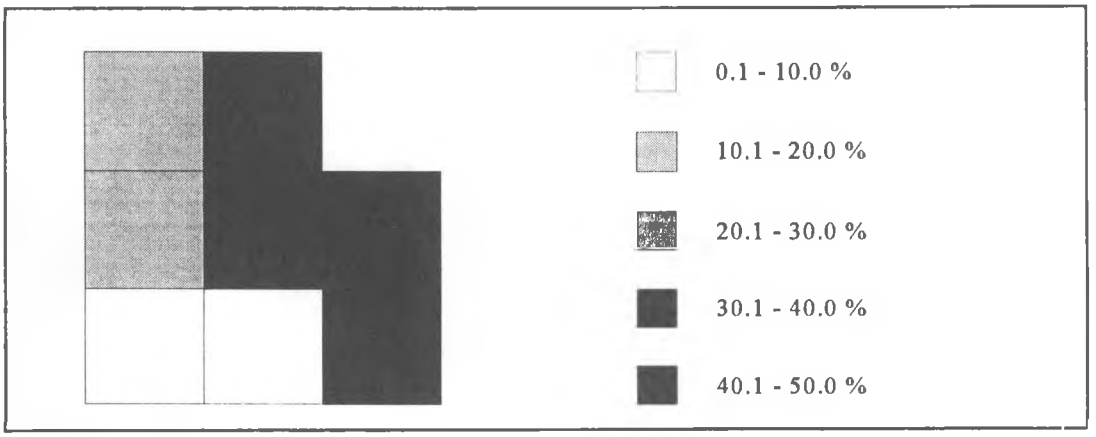

Figure 9.10 Horizontal distribution of calcined human bone (% of burnt).

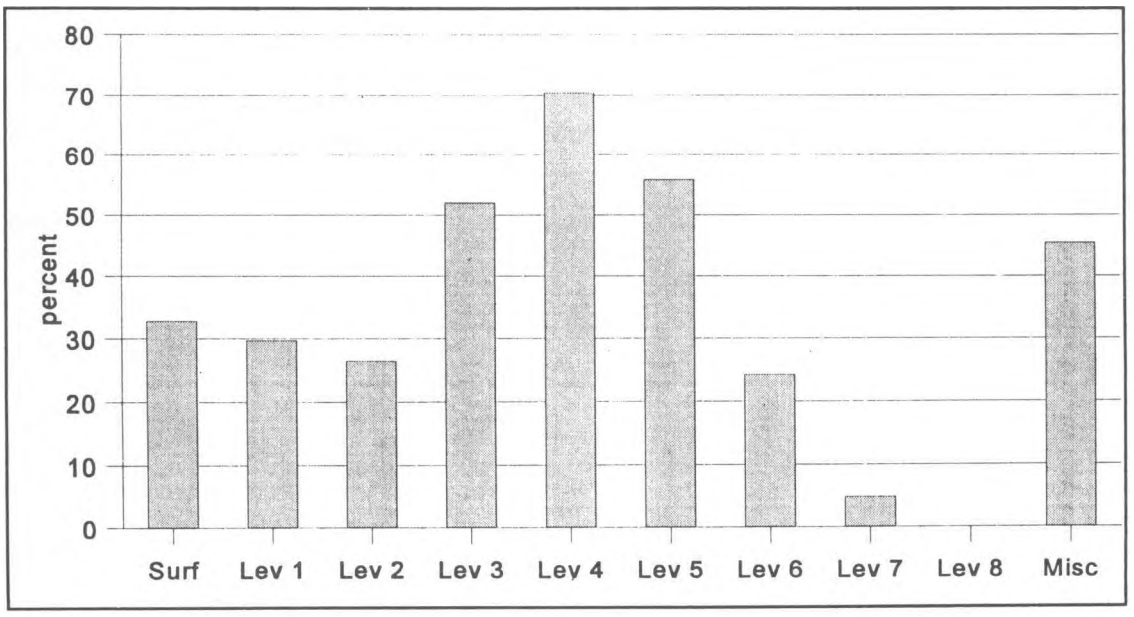

Figure 9.11 Vertical distribution of calcined human bone (% of burnt).

(9 mm, 14 mm), slightly curvilinear cuts on the visceral surface. Whether these are true cut marks or post-depositional artifacts is unclear. Certainly their location, orientation, and configuration are not typical of other documented tool marks on ribs, either human (White 1992) or faunal (Binford1981; Grayson 1988; Villa et al. 1986), which have been interpreted as evidence for defleshing.

Distribution

Horizontal and vertical provenience are known for 9,774 of the fragments recovered during the 1989 and 1992 excavations, or 78% of the total sample. An additional 132 pieces (1.05%) were recovered from re-screened backdirt, and are of unknown provenience. The provenience of the rest of the sample, collected by Skinner in 1987, is problematical. Presumably most of these were surface remains, since his stated mandate was to collect all human bone visible on the surface. However, his report (Skinner 1991: 51) also makes reference to some excavation at the feature ("...as it became obvious that bones were to be found deeper into the matrix...excavation ceased..."), although no details are provided as to the location, size, or depth of the excavation unit(s), and no evidence of the excavation was apparent when the feature was revisited in 1989. Further, although his system of cataloguing implies that some horizontal controls were imposed in the field, the collection method is not described, so reconstruction of horizontal provenience for this material was not possible. Therefore analysis of the spatial distribution of human remains in the feature (summarized in Table 9.2) is based solely on the excavated sample, except where noted.

As Figure 9.6 illustrates, the densest concentrations of human remains occur near the entrance to the burial chamber, in EU 6 (particularly the NW quadrant) and EU 2 (NE quadrant). The sparsest concentrations are found along the northwest (EUs 4, 7, and 8) and southeast (EUs 3 and 5) perimeters of the feature. Human remains were found to a maximum depth of 37 cm below surface, but the majority were recovered from the upper 20 cm of the deposits, most particularly levels 2 and 3 (Figure 9.7).

Table 9.2 Spatial distribution of human remains, DgRw 199-F9.

Unit	Surf.	Lev 1	Lev 2	Lev 3	Lev 4	Lev 5	Lev 6	Lev 7	Lev 8	Total	%
EU 1	17	263	212	130	26	28	26	14	0	716	7.3
EU 2	5	207	994	954	678	80	12	0	0	2,930	30.0
EU 3	53	217	664	404	72	180	145	212	0	1,947	19.9
EU 4	41	173	110	17	12	14	5	2	1	375	3.8
EU 5	2	15	12	29	3	1	0	0	0	62	0.6
EU 6	7	350	909	795	591	486	28	0	0	3,166	32.4
EU 7	3	37	137	105	104	7	0	0	0	393	4.0
EU 8	25	92	32	22	9	3	1	0	1	185	1.9
Total	153	1,354	3,070	2,456	1,495	799	217	228	2	9,774	100.0
%	1.6	13.9	31.4	25.1	15.3	8.2	2.2	2.3	0.0	100.0	

Burning

Evidence of burning is pervasive in the assemblage (see Table C.5 for a comparison of burning frequency in the five excavated burial features). Very small fragments were not scored for this variable, but of the 8,038 pieces for which this information was recorded, 77.5% (n=6,229) exhibit some degree of burning. Although burnt bone is present in all excavation units, it is much more prevalent in units 5, 6, 2, and 7 which are located at the entrance to the feature (Figure 9.8). It is unclear whether this pattern reflects prehistoric mortuary behaviour or more recent activities, such as Skinner's 1987 surface collection, which appears to have focussed on the more readily accessible entrance area. The apparent differences in ratios of burnt to unburnt bone may simply reflect the earlier removal of unburnt bones from the anterior areas of the cave.

The vertical distribution of the burnt remains is also not uniform: they are significantly less common in the top 5 cm and bottom 15 cm of the deposits. To a certain degree this pattern is governed by the distribution of human bone in general; that is, the amount of human bone recovered from the upper and lower levels is also low. However, when the frequency of burnt bone is expressed as a percentage of the level

totals (Figure 9.9), the same general pattern is apparent, although the magnitude of differences between the upper, middle, and lower deposits are less pronounced. With reference to the surface remains, the calculated percent of burnt bone is certainly inflated, since most of the unburnt surface bone was removed in 1987 when the feature was surface-collected, and is not included in this analysis.

Intensity of burning was scored for 4,709 bone fragments, or 75% of the burnt assemblage, following the methods described in Chapter 3. Of the subsample of burnt remains, 46% (n=2,167) were categorized as severely burnt. Spatially, the horizontal distribution of severely burnt (calcined) remains mirrors that of the burnt bone in general (Figure 9.10), except at the back (west) of the feature where calcined bone is slightly more common in EUs 4 and 8, and slightly less common in EUs 1 and 3. These calcined remains also show an interesting vertical distribution (Figure 9.11). In the upper and lower deposits, a smaller proportion of the burnt remains were calcined, but in the middle deposits (levels 3-5) more than 50% of the burnt remains were severely burnt.

The burned fragments show a preponderance of deep, curved, transverse cracks and fractures, sometimes ending in "hinge" terminations. Exfoliation of the outer table of cranial fragments and the external cortex of long bones sometimes occurs, and severely burnt pieces are frequently shrunken and warped. These features are characteristic of bodies burned while fleshed, or the cremation of green, defleshed bones (Baby 1954; Binford 1963; Buikstra and Swegle 1989). The patterns of burning on some of the reconstructed elements supports this interpretation. One nearly complete left femur has an unburned proximal end, moderately burned midshaft, and calcined distal metaphysis. Another femur exhibits an unburned proximal end and charred distal shaft. An otherwise unburnt tibia displays charring on the medial midshaft and anterior distal metaphysis. In all three cases, the intensity of burning is greatest where, in life, there is least muscle cover, suggesting that the bones were fleshed when burnt. A similar pattern is seen with the reconstructed skulls: the occipital and inferior parietals tend to be less severely burned than the superior parietals, frontal, and face, presumably because they were somewhat shielded by the nuchal and temporal musculature.

Curiously, the vertebrae do not conform to the expected pattern, which would predict that the more superficial regions (transverse processes and spinous processes) should be more severely burnt than deeper regions (the centra). Instead, the vertebrae tend to be consistently affected: either completely unburnt, or completely charred, or completely calcined. This may be a factor of the position of the body in relation to the oxidizing point of the fire in which it was burned.

It should be emphasized that the ratio of burnt to unburnt bone fragments does not necessarily reflect the ratio of cremated to uncremated bodies, since unburnt bones tend to be larger and more complete than the burnt bones, which, being very friable, are more likely to be fragmented into tiny pieces, thus inflating the relative frequency of burnt remains. When the *element* is the unit of analysis, unburnt bones represent approximately half of the identified specimens. Similar unburnt to burnt ratios were obtained for all of the major long bones studied: right clavicle 5:4; left humerus 5:7; left ulna 6:5; left radius 7:4; right femur 6:3; left patella 3:5; left tibia 7:7; right fibula 4:4. This suggests that although burnt pieces greatly outnumber unburnt ones, this is primarily a function of their higher fragmentation rates, and that the ratio of unburnt to cremated bodies may be roughly equal.

Of course, there are some problems with this interpretation as well, since minimum number of elements (e.g., left radii) was not calculated from whole bones but from fragments (e.g., the number of left radial distal articular surfaces), and it does not necessarily follow that because the distal articular surface was unburnt, the (unrecovered) rest of the bone was also unburnt. In fact, if the bodies were indeed burnt while fleshed, one would expect the bones to display differential burning with some portions apparently unburnt and others burnt to a greater or lesser degree.

Skeletal Reconstruction

Reconstruction of fragmented skeletal elements is a very labour intensive activity, particularly when the assemblage consists of a large number of very small fragments. Time constraints established limits to the amount of reconstruction that could be attempted, and it is certain that more could have been accomplished given unlimited time and labour. Despite these restrictions, a total of 1,227 fragments (9.8% of the assemblage) were found to conjoin with other fragments, yielding 332 conjoined "sets" of between 2 and 77 pieces. In terms of numbers of conjoined pieces, greatest success was achieved in reconstructing the skull, probably due to its distinctive shape and the number of easily identifiable anatomical landmarks. Vertebrae produced the largest number of conjoined sets, probably for similar reasons, followed closely by the skull. An element-by-element breakdown of the reconstruction is presented in Table 9.3.

Table 9.3 Summary of reconstructed skeletal elements, DgRw 199-F9.

Element	Sets	% Sets	Pieces	% Pieces
Skull	44	13.25	346	28.20
Mandible	15	4.52	58	4.73
Vertebra	46	13.86	122	9.94
Rib	19	5.72	40	3.26
Sternum	1	0.30	3	0.24
Clavicle	1	0.30	2	0.16
Scapula	7	2.11	16	1.30
Humerus	14	4.22	62	5.05
Radius	2	0.60	7	0.57
Ulna	10	3.01	31	2.53
Carpal	2	0.60	4	0.33
Metacarpal	5	1.51	10	0.82
Hand phalanx	9	2.71	19	1.55
Sacrum	5	1.51	12	0.98
Innominate	16	4.82	40	3.26
Femur	26	7.83	149	12.14
Patella	2	0.60	5	0.41
Tibia	19	5.72	72	5.87
Fibula	21	6.33	74	6.03
Tarsal	7	2.11	18	1.47
Metatarsal	4	1.20	10	0.82
Foot phalanx	1	0.30	2	0.16
Radius/ ulna/fibula	16	4.82	39	3.18
Humerus/ tibia/femur	36	10.84	78	6.36
Long bone	4	1.20	8	0.65
Total	**332**	**100.00**	**1,227**	**100.00**

The number of fragments incorporated into the conjoined sets is extremely variable. The majority of the reconstructed sets are comprised of only two articulating pieces (n=199; 59.9%), but three-piece (n=61), four-piece (n=25), and five-piece (n=14) sets are not uncommon. Sets comprised of more pieces are correspondingly rarer, but include six-piece (n=6), seven-piece (n=5), eight-piece (n=4), nine-piece (n=2), ten-piece (n=2), and thirteen-piece sets (n=3). The remaining 11 sets are comprised of 12, 15, 17, 18, 19, 20, 22, 26, 27, 43, and 77 pieces respectively. All of the very large sets are reconstructed cranial elements, but some long bone sets also contained relatively large numbers of fragments.

Comparisons of degree of dispersal of the component members of the reconstructed sets was made for all sets whose provenience was known. A total of 74 sets containing elements from Skinner's surface collection were eliminated from this analysis due to their lack of provenience, leaving 258 sets for consideration. Horizontal, vertical, and total dispersal scores were calculated for each conjoined set, as described in Chapter 3. The results of this categorization are displayed graphically in Figure 9.12, and compared with the other five excavated features in Table C.2. Overall, there appears to be relatively little dispersal of fragments from the same broken element. In three-quarters of the cases, all members of a conjoined set came from the same or adjacent provenience units (TS scores of 2 or 3), and only 5% showed substantial dispersal (TS >6). Vertical dispersal (mean = 1.59) is slightly greater than horizontal dispersal (mean = 1.44): 72.1% of the reconstructed sets are from the same horizontal provenience unit (quadrant), and none shows greater dispersal value than 5. By contrast, 63.6% of the reconstructed fragments are from the same vertical provenience unit (level) as the other members of the set, and the maximum dispersal value is 7. These results seem to indicate that the broken bones were fragmented *in situ*, probably as a result of trampling or the fall of ceiling slabs, rather than as part of the mortuary ritual prior to deposition in the feature.

The few very dispersed sets are of interest for what they can tell us of post depositional disturbance at the site. These sets are of three types. Type 1 sets (n=6) contain fragments from deep levels of EU 6 and superficial levels of adjacent EU 2, EU 7, or both. Type 2 sets (n=5) are comprised of fragments from deep levels of EUs 1 and 3 and superficial levels of EUs 2 and 6. Type 3 sets (n=3) contain fragments from the upper four levels of EUs 2, 4, 7, and 8. The type 2 sets can probably be attributed to disturbance caused by the pothunter's pit that was visible in EU 1 at the beginning of the 1989 field season. The type 1 sets may have resulted from similar disturbance, although no traces of a pit were visible. Alternately, Skinner's removal of a large boulder from this area of the feature in 1987 may have disturbed the subsurface deposits of EU 6 and scattered fragments across adjacent units. The type 3 sets are more enigmatic, but since their constituents come from the innermost recesses of the feature, and are concentrated in the upper levels of the deposits, animal disturbance must be considered a possibility.

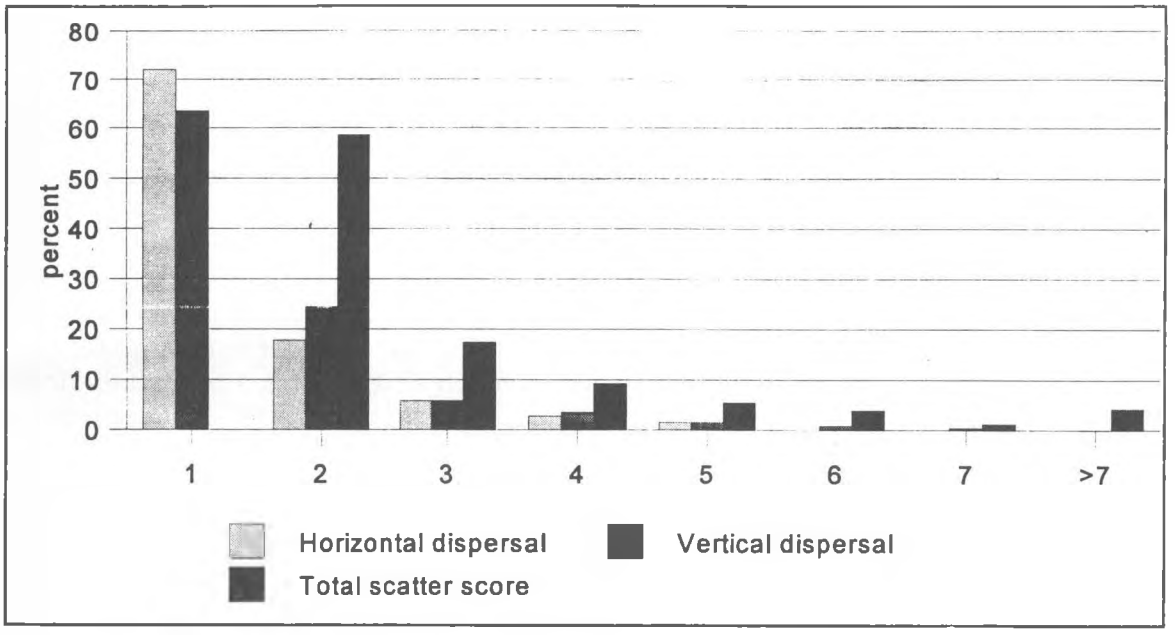

Figure 9.12 Dispersal scores of reconstructed fragments, DgRw 199-F9.

Demography

From the skeletal material he collected in 1987, Skinner estimated that a minimum of six individuals were interred at 199-F9, based on the presence of five mature distal left humeri and a single immature ulna shaft (Skinner 1991:56). This estimate was re-evaluated following analysis of the human remains excavated during the 1989 and 1992 field seasons, and a revised MNI of 18 was reached, comprised of 15 adults, 1 child, and 2 infants.

The estimate of 15 adults is derived from a count of mature mandibular mid-symphysis fragments with genial tubercles present. Due to the disarticulated and highly fragmented state of the human remains from this site, it is difficult to assess adult age or sex with any degree of confidence, other than to note that both sexes and all age classes from young adult to old adult appear to be represented. Pelvic bones, which convey the most unequivocal evidence of sex, are particularly poorly preserved in this collection, and only three were complete enough to sex. The cranial remains are better preserved, but afford less reliable sex estimates, particularly for populations such as this whose patterns of growth and development are not well understood. Of the 11 partial skulls for which tentative sex assignments could be made, seven (64%) appear to be male and four (36%) female. These estimates are based entirely on general impressions of size and robusticity of a relatively few cranial features (supraorbital ridges, mastoid processes, external occipital protuberance, zygomatic root, etc.), and should be accepted with caution. Tentative sex assignments were also given to 220 additional cranial fragments and post cranial elements whose size and robusticity were at the extremes of dimorphism for the sample: 129 of these (58.6%) were judged to be female and 91 (41.4%) male.

Adult age determinations are difficult even for relatively complete skeletons, due to the absence of unequivocal, chronologically specific bone changes once growth plates have fused and dental development and eruption are complete. Macroscopic methods of age determination rely primarily on degenerative changes in joints (osteoarthritis) and teeth (attrition), which in turn are affected by idiosyncratic variables such as general health, occupation, activity levels, and diet, in addition to chronological age. For a collection comprised mainly of disarticulated bone fragments and isolated teeth, only general impressions of age-at-death are possible. At 199-F9, the preponderance of heavily-worn teeth and the frequency of degenerative joint disease suggest that the collection is biased towards middle-aged and older adults. At least one young adult is present, however, as evidenced by the presence of a nearly complete innominate with recently fused iliac crest and incompletely fused ischial epiphysis, suggestive of an age-at-death of approxi-

mately 18-23 years (Stewart 1979). The presence of dorsal pubic pitting and a preauricular sulcus of the GP ("groove of pregnancy") type indicate that this individual was a young female who had already experienced at least one pregnancy (Houghton 1974; Kelley 1979; Stewart 1970).

The child is represented by a nearly complete mandible, four cervical and three thoracic vertebrae, two complete and eight incomplete long bones, and assorted pectoral, pelvic, and foot fragments. Since none of the elements is duplicated, and all are comparable in size and development, an MNI of one is suggested. Dental development and long bone lengths (Buikstra and Ubelaker 1994) are consistent with an age of 6-8 years.

A minimum of two infants less than one year of age are represented in the collection, based on the presence of numerous duplicated skeletal elements, including occipital, right and left frontals, right alisphenoid, right humerus, and left ulna. Age estimates of newborn to 3 months for Infant #1, and three to six months for Infant #2, were derived from long bone lengths and dental development, using the standards reported in Buikstra and Ubelaker (1994).

Subadults are generally under-represented in the assemblage, but the most striking feature of the demographic profile at 199-F9 is the total absence of adolescents. All of the immature remains identified in the collection are consistent with one of the three individuals described above, and none were found that could be attributed to an older subadult. Given that adolescent long bones are more similar in size, diameter, and cortical texture to adult bones than are those of very young individuals, is it possible that adolescent remains are present in the collection but miscatalogued as adult? This possibility cannot be entirely discounted, but the total absence of metaphyseal and epiphyseal fragments with the characteristic billowy surfaces of unfused growth plates (except those attributed to the child), and the lack of dental remains of the requisite developmental stage argues that the absence of adolescents is a real phenomenon.

Although immature remains were recovered from all excavation units, except EU 5, which yielded very few human remains, both infant and child remains tend to cluster in the southwest corner of the feature (Figure 9.13). The infant distribution is more diffuse than that of the child, perhaps because two individuals are represented.

There is an apparent correlation between age and mortuary treatment at 199-F9. The majority (66%) of the subadult remains are unburnt, and even those fragments which have been exposed to fire are rarely thoroughly burnt, or calcined (6.9%); this is in strong contrast to the adult remains from the same feature (26.1% unburnt, 31.6% calcined). Within the subadult category there is also a positive correlation between age and burning: only 24.8% of infant remains are burnt to some degree, compared with 40.7% of child remains. Burning in subadults tends to affect the face and teeth, the extremities (hands and feet), ribs, and vertebrae, while the cranial vault, limb bones, shoulder and pelvic girdle are generally unaffected. Among adults, there are no apparent differences in the burning patterns of males and females, although the number of fragments identified to sex may be too small to detect any real differences that might exist.

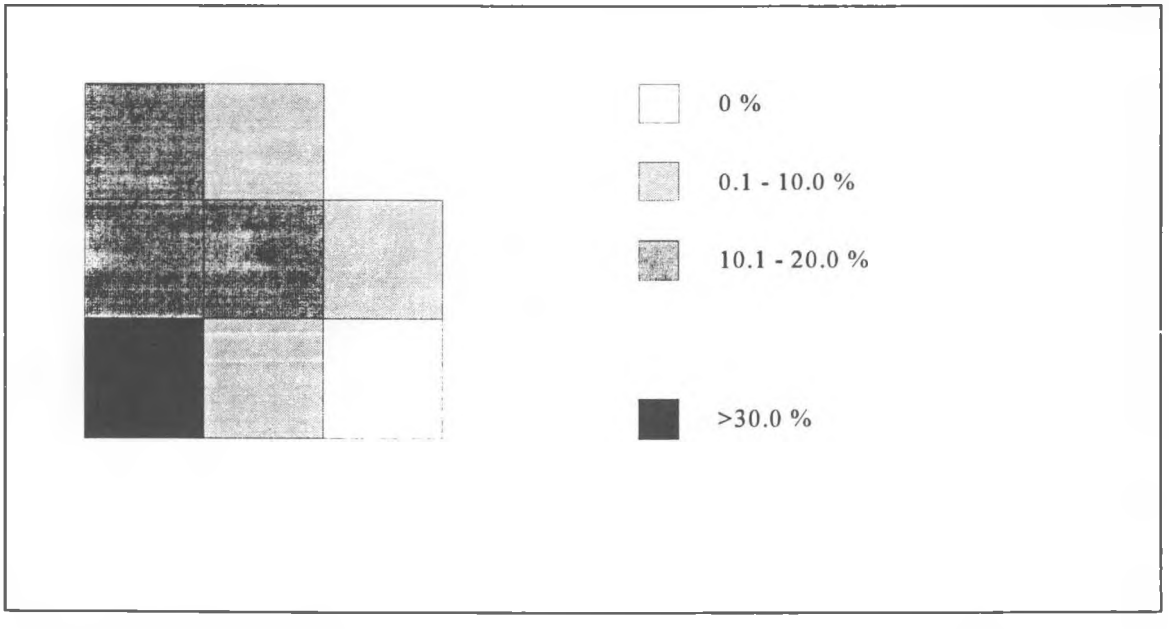

Figure 9.13 Horizontal distribution of subadult remains, DgRw 199-F9.

Demographic patterns in the five excavated burial features are compared in Appendix C, Tables C.3 and C.4.

Anomalies and Pathologies

The most prevalent pathological condition identified in this assemblage is **degenerative joint disease**, or osteoarthritis, which affects most of the major joints of the skeleton to a greater or lesser degree. Moderate to severe expressions were recorded in 21 cervical vertebrae (27% of sample), 66 thoracic vertebrae (41% of sample), and 23 lumbar vertebrae (31% of sample), which seems indicative of heavy loading stress on the vertebral column. Further evidence of vertebral stress was found in the high frequency of subluxation of cervical (n=13) and thoracic (n=11) vertebrae, and in the nearly universal occurrence of bony spurs on the vertebral laminae, resulting from ossification of the *ligamentum flavum*. Surprisingly few examples of Schmorl's nodes were seen (1 cervical, 2 thoracic, 2 lumbar), probably due to the poor preservation of vertebral centra.

In the appendicular skeleton, moderate to severe osteoarthritis is most common in the elbow (particularly the distal humerus) and wrist (especially the lunate), followed by the shoulder (proximal humerus), hand (proximal interphalangeal joint), knee (patella), and foot. Most of the degenerative joint disease in the foot occurs secondary to traumatic fractures of the affected joint (see below). Two mandibles and one temporal bone exhibit moderate to severe osteoarthritis of the temporomandibular joint.

Evidence of acute **trauma** was observed in 19 skeletal elements from 199-F9, including 18 bone fractures and 1 chronic dislocation; an additional 8 specimens exhibit evidence of chronic fatigue fractures (Table 9.4). All of the acute fractures are healed or healing, and none shows evidence of infection or other long-term sequelae apart from osteoarthritis. The infracranial examples can all be attributed to accidental injuries resulting from falls or other mishaps of a strenuous lifestyle, but the depressed cranial fracture and the mandibular fracture are probably the result of deliberate interpersonal violence (Ortner and Putschar 1981:79). Given the severity of degenerative joint disease in the vertebral column (see above), the observed frequency of compression fracture (n=1) almost certainly underestimates the true population frequency, no doubt due to the poor preservation of vertebral centra in general. The only affected thoracic vertebra exhibits an unusual midsagittal linear fracture of the inferior centrum with no compression or collapse; similar fractures were observed in the prehistoric population from the Tsawwassen site (Curtin 1991a), and in a larger skeletal sample from the Gulf of Georgia region (Beattie 1980: 243), but their etiology is unclear.

Fatigue fractures of the *pars interarticularis* (also known as spondylolysis) were observed on eight lumbar vertebra specimens: a centrum/superior arch; three complete inferior arches; one right inferior arch fragment; two right superior arch fragments; and one left superior arch fragment. The minimum number of individuals represented by these remains is four, yielding an calculated population frequency of 27% based on the estimated 15 adults represented in the assemblage. This is considerably higher than the estimated prevalence at 199-F1 (4/95 adults, or 4% affected), but lower than reported estimates at other sites in the Gulf of Georgia, including Tsawwassen (Curtin 1991a) and Birch Bay (Lundy 1981). Spondylolysis appears to develop in response to chronic stress to the lower back, as a result of heavy lifting, hyperflexion, or hyperextension (Merbs 1989).

One final form of trauma tentatively identified in the collection from 199-F9 is the culturally-imposed chronic low-grade trauma of **artificial cranial deformation**. None of the adult crania appear to be deformed, but both of the infants display flattening and focal resorption of the outer table in the vicinity of the frontal bosses and the external occipital protuberance, the two regions of the skull most directly affected by the pressures imposed in anteroposterior deformation.

Three additional types of **cultural modification** were noted, all affecting the teeth. A thin, shallow, linear groove was observed on the occlusal surface of a heavily worn upper right central incisor, running obliquely from distobuccal to mesiolingual; like the grooved premolar from 199-F1, this is attributed to the processing of plant fibres or animal sinews with the teeth. Shallow, polished grooves also occur in the interproximal cervical regions of three mandibular teeth, all from the same jaw. The affected teeth are the right canine (distal groove), right first premolar (mesial and distal grooves), and right second premolar (mesial groove). Interproximal grooves have been identified in skeletal material from a wide variety of archaeological contexts throughout the world, and are generally thought to have been produced by toothpick-like abrasion to remove impacted food particles (Ubelaker et al. 1969). This is a plausible explanation for the Gabriola example, given the severe dental crowding and malpositioning of the affected teeth.

The third type of dental modification is lingual surface abrasion of the anterior mandibular dentition, recorded in two jaws, including the one with interproximal grooves. The affected teeth in this jaw are

Table 9.4 Skeletal fractures, DgRw 199-F9.

Element	Portion	Description
skull	R. frontal	healed depressed cranial fracture
mandible	L. corpus	healed oblique fracture, anteroinferior margin
rib #3-9	sternal shaft	healing fracture with inferodorsal displacement
thoracic vertebra	centrum	midsagittal linear fracture of inferior surface
lumbar vertebra	centrum	severe compression fracture
lumbar vertebra	transverse process	oblique fracture with inferior displacement
lumbar vertebra	super. articular facet	medial margin fracture with slight displacement
lumbar vertebra	centrum/superior arch	complete bilateral spondylolysis
lumbar vertebra	inferior arch	complete bilateral spondylolysis
lumbar vertebra	inferior arch	complete bilateral spondylolysis
lumbar vertebra	inferior arch	complete bilateral spondylolysis
lumbar vertebra	R inferior arch frag.	spondylolysis of right arch
lumbar vertebra	R superior arch frag	spondylolysis of right arch
lumbar vertebra	R superior arch frag	spondylolysis of right arch
lumbar vertebra	L superior arch frag	spondylolysis of left arch
prox. hand phalanx	dist. articular surface	chronic dislocation, proximal interphalangeal joint
middle hand phalanx	prox. articular surface	inferior articular surface depressed
R. cuboid	dist. articular surface	crushing fracture of MT-4 and MT-5 facets
L. cuboid	dist. articular surface	crushing fracture of MT-4 and MT-5 facets
metatarsal #2	prox. articular surface	fracture of superolateral corner
prox. foot phalanx #1	prox. articular surface	avulsion fracture of inferomedial corner
prox. foot phalanx #1	prox. articular surface	avulsion fracture of inferolateral corner
prox. foot phalanx #2-5	prox. articular surface	depressed fracture of central articular surface
middle foot phalanx	prox. articular surface	avulsion fracture mid-superior margin
middle foot phalanx	prox. articular surface	avulsion fracture mid-superior margin
middle foot phalanx	prox. articular surface	oblique fracture of base
distal foot phalanx #1	prox. articular surface	depressed fracture of central articular surface

the two lateral incisors, which exhibit a high degree of polish on their lingual surfaces. Two teeth are also affected in the second jaw: the left central incisor, with strong lingual polish; and the right lateral incisor,with pronounced attrition of the lingual surface, including nearly total enamel loss. This abrasion is unlikely to have resulted from normal mastication, and is attributed to an undetermined task related function.

Several **developmental anomalies** affecting both the skeleton and the teeth were recorded in the assemblage from 199-F9. One of the skulls (C7:1) exhibits moderate asymmetry of the facial skeleton with the left half of the maxilla noticeably shorter than the right. The left side of the bony palate is depressed, resulting in a 4.5 mm difference in elevation at the maxillopalatine suture, and the vomer and perpendicular plate of the ethmoid are deflected to the right. Asymmetry of the muscle insertions on the inferior occipital and sphenoid is pronounced. A tentative diagnosis of congenital dysplasia secondary to hemifacial microsomia is suggested (Barnes 1994) but cannot be confirmed in the absence of the articulating mandible. This skull is unburnt except for localized charring of the anterior surface of the left maxilla.

Other anomalies of the axial skeleton include a sternal aperture, and four examples of vertebral border shifts. The first is a cranial shift at the cervicothoracic border: a 7th cervical vertebra with an elongated left costal process, or cervical rib. There are also two examples of caudal shift at the thoracolumbar border, expressed as lumbar ribs. The fourth example also occurs at the thoracolumbar border: a vertebra displaying an amalgam of T-12 and L-1 characteristics. The direction of the border shift in this case is unknown in the absence of the adjoining vertebrae.

Few developmental anomalies were noted in the appendicular skeleton, and they are limited to the foot: two instances of fusion of the fifth middle and distal phalanges, and one possible case of polydactyly, presenting as a large osseous spur projecting from the superolateral margin of the base of a left second metatarsal.

Developmental anomalies of the dentition include an incisally notched permanent left central incisor in the child's mandible (F9:3687); agenesis of the right central incisor in the same mandible; bilateral agenesis of the third molars in an adult mandible (C5/7:6); an unerupted transversely-oriented mesiodens in an adult maxilla (C6:8); and a fused/ geminated right lateral incisor in an adult mandible (C5/7:9).

Periosteal reactions suggestive of **infectious disease** are considerably less common and less severe than at 199-F1. Affected elements include one clavicle, one scapula, one ulna, two metacarpals, two phalanges, two fibula shaft fragments, six tibia shaft fragments, and 10 unidentified long bone shaft fragments. These remains are all consistent with a single individual, an adult male. All specimens exhibit mild to moderate sclerotic periostosis, and while no focal cavitations or gummatous lesions were observed, radiographic examination of the ulna and clavicle revealed a significant amount of endostosis. Another tibia from a second individual has a sabre-shaped morphology, but periostosis is not marked in this element. While these manifestations are not diagnostic of treponemal disease they are very similar to the milder lesions observed in material from 199-F1, where treponemal disease was confirmed.

Mortuary Practices

Despite the radiocarbon dates indicating substantial antiquity for the remains interred at 199-F9, Skinner eventually concluded that they (and all of the other cave and crevice burials along the False Narrows bluffs) had been placed in the rock feature relatively recently, in late prehistoric times (Skinner 1991: 48). The rationale for this conclusion seems to have been based on the widely held assumption that all cave burials on the Northwest Coast are late prehistoric or protohistoric in age. Although the high degree of fragmentation introduced some uncertainty, Skinner also felt that the remains he collected represented fairly discrete individuals, leading him to conclude that the bones in 199-F9 had been burnt *in situ*. The proposed scenario, then, appears to be that ancient bones were collected from their original burial place (presumably in a shell midden context) some thousands of years later, and placed as discrete secondary bundle burials within this cave feature, where they were subsequently burnt.

This scenario can be challenged on several levels. First of all, the discovery of several intact, articulated, primary burials in the False Narrows bluffs burial complex (Chapter 4) effectively disproves the thesis that the bluffs burials are all secondary redeposited remains. Secondly, the pattern of burning and fracturing apparent in the skeletal remains is one that is typical of the cremation of fleshed or green bones, not ancient dried bone. Finally, there is no evidence of extensive or intensive burning on the rocks forming the feature, nor were any fire altered rocks or ash layers encountered during the excavations, and only minimal amounts of charcoal were found. This suggests that the bones were not burned *in situ*, but that intact bodies were burned elsewhere, and the cremated bones collected and redeposited in the feature.

There is some support for Skinner's suggestion that the bones were deposited as discrete individuals, however. During the excavations particular note was taken of any elements that appeared to be in articulated anatomical relationship with other elements. Only three such instances were noted: a tibia and fibula in EU 2, level 1; three unburnt cervical vertebrae in EU 2, level 3; and an unburnt, badly weathered skull with two cervical vertebrae in EU 3, level 5. However, other groups of bones, attributed to the same individual on the basis of colour, size, robusticity, and anatomical traits, were found in close proximity to each other, although not in anatomical order. These include nine sets of vertebrae (each set consisting of 2-14 elements), six pairs of long bones, three pairs of hand bones, and one set of 25 foot bones. These findings support the cremation/disposal of single individuals rather than the mass cremation and deposition of the commingled bones of several people. The presence of cutmarks on some limb bones suggests that at least some of the bodies were dismembered prior to interment.

This vertical distribution of burnt and unburnt remains is suggestive of three phases of deposition at 199-F9, with the initial, possibly primary, interment of unburnt remains followed by predominantly cremated bones, concluding with additional unburnt remains, perhaps interspersed with cremations. A considerable amount of intermingling of remains from the three phases has undoubtedly occurred as a result of post-depositional taphonomic processes, including root and rodent disturbance, recent pits dug by pot-hunters, and the migration of small fragments downwards through crevices between rocks and boulders.

The low frequency of artifacts in general and total absence of items indicative of wealth or status seem to suggest that the individuals interred here were of relatively low rank in the social structure. The lack of shellfish and relatively low proportion of fish remains may also connote low rank, assuming that less elaborate mortuary ritual (including feeding the dead) accompanied their interment.

Chapter 10

Comparative Analysis and Conclusions

In Chapter 1 three hypotheses were advanced to account for the variability observed in prehistoric mortuary practices on Gabriola Island, as expressed by the False Narrows midden burials and the inland bluffs cave/crevice burials: that the two samples represent different biological populations; that they represent diachronic changes in burial practices within the same population; or that they represent different social groups within the same biological population. In this chapter, each of these hypotheses is evaluated in turn.

Hypothesis I: Population Variation

That the two burial samples represent different biological populations was initially considered the least likely of the three hypotheses, given the small geographic distance separating the midden and bluffs sites. Logically, one would expect a strong correlation between geographic proximity and the likelihood of intermarriage between two groups, and, as Wright (1931, 1978) has shown, very little gene flow is necessary to break down genetic boundaries between groups. In the ethnographic period there was a significant amount of mobility and intermarriage between different groups of Coast Salish, which served to expand the web of kinship ties and allow individuals access to resources beyond the exclusive territory of their local group. Osteological analysis of human skeletal material dating to the protohistoric and early historic period has provided corroboratory evidence for this pattern of mobility, revealing little biological differentiation within ethnolinguistic divisions, but such biological distance as is evident is strongly correlated with geographic distance (Cybulski 1975). However, as Barnett (1938:122) cautions, it is unclear how common this pattern of mobility was in the prehistoric period. The possibility exists that it was largely a post-Contact phenomenon in response to devastating population reduction and the consequent disruption of traditional culture patterns. One therefore cannot dismiss *a priori* the possibility that two distinct local groups with somewhat overlapping territories/ catchment areas are represented in the two prehistoric burial contexts on Gabriola Island. Analysis of biological distance between the two samples using non-metric dental and skeletal traits was employed to address this question.

Observed frequencies of the selected dental and infracranial traits in the False Narrows midden burials (DgRw 4) and the inland cave/crevice burials (199-F1 and 199-F9 combined) are presented in Tables 10.1 and 10.2 respectively. The MMD statistic and associated Chi Squares were calculated for each data set separately, according to the methods described in Chapter 3; the resulting values are shown in Table 10.3. The two data sets yielded similar results: both distance scores are essentially zero (negative results, while mathematically possible, are generally interpreted as equivalent to zero), indicating that the two samples cannot be distinguished at least with respect to the traits selected for this analysis. Based on these results, the two burial samples appear to have been drawn from the same biological population. However, as Saunders (1989) has cautioned, absence of distinctions in biodistance analyses is not necessarily indicative of genetic homogeneity, since nonmetric traits are phenotypic observations whose expression may be affected by environmental influences. Such cautions are especially warranted in cases like the present analysis, where sample sizes are very small and relatively few traits are considered.

Table 10.1 Dental discrete trait frequencies.

Trait	DgRw 4			DgRw 199		
	n	k	p	n	k	p
Mesiodens	33	2	0.06	26	2	0.08
UI1 winging	20	2	0.10	14	2	0.14
UM2 two roots	26	5	0.19	17	3	0.18
UM3 reduction	31	3	0.10	17	2	0.12
LI1 agenesis	37	4	0.11	71	5	0.07
LM1 three roots	36	4	0.11	70	3	0.08
LM1 enamel extension	35	24	0.69	35	24	0.69
LM1 cusp 7	13	1	0.08	10	1	0.10
LM2 protostylid	20	2	0.10	11	1	0.09
LM2 cusp 6	19	11	0.58	12	5	0.42
LM3 reduction	38	3	0.08	59	8	0.14

Table 10.2 Infracranial discrete trait frequencies.

Trait	DgRw 4			DgRw 199		
	n	k	p	n	k	p
Circumflex sulcus - L	17	16	0.94	24	19	0.79
Septal aperture - L	25	6	0.24	40	8	0.20
Supratrochlear spur - L	27	2	0.07	48	2	0.04
Trochlear notch bipartite - L	22	17	0.77	40	21	0.53
Third trochanter - R	17	4	0.24	17	6	0.35
Vastus notch - R	15	3	0.20	43	12	0.28
Tibia distal notch - R	20	4	0.20	32	15	0.47
Os trigonum - R	16	2	0.13	20	3	0.15
Calcaneal facets separate - R	22	15	0.68	42	24	0.57
Bipartite anterior facet - R	20	2	0.10	35	6	0.17
Cuboid medial facet double - R	10	2	0.20	28	5	0.18
MT-1 prox. facet double - R	15	2	0.13	20	2	0.10
Atlas double condylar facet - L	20	4	0.20	45	3	0.07
Atlas bridging - L	18	4	0.22	35	3	0.09
Axis f. transversarium open - L	17	1	0.06	28	2	0.07
LV-5 spina bifida	20	2	0.10	27	1	0.04
Transitional lumbosacral vert	18	4	0.22	19	4	0.21
Sacral access facet - L	11	3	0.27	16	6	0.38

Table 10.3 Mean measures of divergence and calculated significance.

Data Set	MMD	ΣX^2	DF	Probability
Dental Traits	-0.0669	3.89	11	> .975
Infracranial Traits	-0.0178	16.68	18	> 0.50

Hypothesis II: Chronological Variation

In the past diachronic change has been the most popular explanation offered to account for mortuary variation in the Northwest Coast culture area, although often based on less than rigorous evidence for the actual antiquity of the remains in question. The False Narrows burial assemblage is a case in point. Although often cited as a classic example of middle Marpole burial practices, there are no absolute dates on the burials themselves, and just two radiocarbon dates have been obtained on the site as a whole, only one of which has previously been reported in the archaeological literature. A date of 1670 ± 90 BP (calibrated age AD 240 ± 90 years) was obtained on a charcoal sample collected from "undisturbed context" in the False Narrows II (FN II) component deposits of excavation Unit 6 (Burley 1989: 33). The chronology of the remaining three site components was determined from a combination of considerations, including diagnostic artifacts, stratigraphic position relative to FN II, and location with respect to other physiographic features.

The earliest component, FN 1, restricted in location to the upper bench on the inland periphery of the site (excavation units 1, 2, and 3), was assigned a mid-Marpole time range of approximately 100 BC to AD 100. Despite considerable variation in depth of interment (ranging from 11-190 cm BS), all of the burials recovered from Unit 1 (a revised total of 46 individuals) were attributed to this component, as were two burials from Unit 5, also located on the upper terrace (no burials were encountered in Units 2 or 3). The remaining three archaeological components were identified in Unit 6, which was located on a lower bench adjacent to the shoreline. The basal deposits of this unit were attributed to a transitional late Marpole/early Gulf of Georgia component (FN II), the middle deposits to a late prehistoric Gulf of Georgia component (FN III), and the upper plough zone to a mixed historic/late prehistoric component (FN IV). Of the 13 burials (revised total) recovered from Unit 6, four were attributed to the FN II component and nine to FN III. Three additional burials were recovered from a backhoe trench and were not assigned to a specific component.

Some time after excavations at False Narrows had ceased, a burial with elaborate artifact associations was exposed by pothunters in the vicinity of Unit 1 and salvaged by a party of archaeologists. Like the other interments from this area of the site, Burial 52 was assigned to the mid-Marpole FN I component (Burley 1989: 55). However, a later radiocarbon assay of a whale bone artifact associated with the skeleton produced a date more consistent with the FN II component: 1640 ± 50 BP (Burley 1992 personal communication). This result calls into question the chronological placement of the other FN I burials, particularly those very shallow interments (<50 cm BS) which comprise more than two-thirds of the sample for which depth below surface was recorded. The problem is unlikely to be resolved without recourse to additional radiocarbon dates, since the archaeological context of Burial 52, due to the circumstances of its discovery, is so uncertain that cannot be directly correlated with the other Unit 1 burials in terms of either depositional strata or depth of interment. Unfortunately, permission to directly date human bone samples from the site was withdrawn by the Nanaimo First Nation before the analysis was complete, so the question of whether the False Narrows burials represent a "classic" mid-Marpole mortuary assemblage, as has long been thought, or a later Marpole or even an early Gulf of Georgia assemblage is open to debate. Grave goods are of little utility in addressing the problem, since the majority of the burials (71%) had no associated artifacts, and even when present they are dominated by shell beads, once thought to be a Marpole "marker" but now known to occur in both older and younger burial contexts (see discussion in Chapter 2).

Better evidence is available for the chronology of the cave/crevice burials from Gabriola Island. A total of 17 radiocarbon dates have now been obtained on these burial features (Figure 10.1), and with the exception of two questionable dates from 199-F1 (on a wood sample of unknown source and a mandible fragment with root contamination), which coincidentally provide the youngest estimates for the entire study area, the dates obtained all fall within the Marpole and Locarno periods of south coast prehistory, covering a time span of nearly 2,000 years from approximately 1500-3300 BP. If one chooses to accept the two problematic dates, and also takes into consideration the previously-recorded historic cave burial DhRx 29 (see Chapter 2), which was not included in this analysis, the pattern of cave/crevice disposal on Gabriola Island can be seen to continue through the Gulf of Georgia period and into the historic era.

Although the two False Narrows dates fall near the younger end of the range of dates from the bluffs burial features (see Figure 10.1), which might suggest a chronological component to mortuary variability, when burial practices are viewed from a broader regional perspective the custom of midden

interment is clearly coeval with cave disposal: the midden interments at Duke Point, radiocarbon dated at 3490 ±125 BP, are contemporaneous with or perhaps slightly older than the earliest cave/crevice burials from 199-F1, dated at 3240 ± 50, while the late Marpole/early Gulf of Georgia burials from False Narrows and Departure Bay are contemporaneous with the most recent of the dated cave/crevice burial features. One cannot therefore invoke diachronic change to explain the different burial practices on Gabriola Island.

Hypothesis III: Social Differentiation

Although analysis of variation in the presence, number, and type of grave inclusions is a common avenue for exploring social status differences in archaeological remains, this approach has not seen widespread application on the Northwest Coast, apart from Burley's examination of ranking in the False Narrows burial assemblage (1989:59-62), and Burley and Knüsel's (1989) broader study of burial patterns in the Gulf of Georgia region, which drew heavily on the False Narrows sample. The severe impact of post-depositional disturbance on the integrity of the cave/crevice burial features limits the degree to which their grave inclusions can be compared with the False Narrows sample. Not only does the disarticulated condition of the skeletons make it impossible to associate artifacts with specific individuals, but the extensive evidence for pothunting at several of the burial features precludes quantitative analysis of grave goods since it cannot be determined to what extent the original complement of artifacts has been depleted by relic collectors. Therefore grave inclusions from the two burial contexts can only be compared qualitatively, in terms of artifact types.

In his 1989 monograph, Burley distinguished between utilitarian artifacts, wealth, and ritual objects, which correspond roughly to Binford's (1972) technomic, socio-technic and ideo-technic categories. Distinctions between the three categories are not always clear-cut and rely to a certain extent on subjective interpretation. For example, a zoomorphic pendant may indicate either wealth or spirit power, or both; decorated tools, while utilitarian, may also symbolize the harnessing or channeling of the owner's power (Burley 1980: 68; Stryd 1982: 181). Given the strong correlations between wealth, rank, and spirit power in traditional (and presumably prehistoric) Salish culture, these ambiguities are not unexpected. In Table 10.4 I have followed Burley's (1989: 59-62) categorization of the False Narrows burial artifacts, while acknowledging the possibility of alternate interpretations, particularly with reference to the "ritual" objects (zoomorphic "beetle" pendant, whale bone armlets, incised elk tines) associated with Burial 52, which Burley considered the richest burial, and consequently highest ranked individual in the assemblage.

Burial 52 is problematic for several reasons. It was not recovered during controlled excavations at the site, but was collected after the 1967 field season from a pothunter's pit near Unit 1, which yielded most of the allegedly middle Marpole burials. Because of the circumstances of its discovery the archaeological context of the burial is unclear, and the bones themselves have since been mislaid (Gordon's 1974 thesis contains no reference to this individual) so even the basic demographic description (adolescent male) cannot be confirmed. Burley's explanation of the meaning of the associated grave goods has undergone substantial revision over the years, from a warrior's armour (1980: 67) to a dance costume (1989: 60); in the former interpretation, wealth and status were seen as deriving from the physical power of the warrior; in the latter, from the ritual knowledge conveyed by a number of spirit helpers (whale, elk, beetle).

I would argue that even if the enigmatic artifacts represent a dance costume, it does not necessarily follow that the individual with which they were interred was either wealthy or powerful. An equally plausible scenario, particularly in view of the putative subadult age of Burial 52, is of an individual who died during initiation into one of the dance societies, and was subsequently buried in his dance costume. There are ethnographic accounts of the physical ordeals imposed on initiates, in which they were repeatedly beaten, smothered, and choked into unconsciousness in an attempt to call forth a spirit helper and bring out his song of power (Barnett 1938: 137). Burial 52 may therefore represent not a wealthy, powerful, high ranking individual, but a novice who died while attempting to attain the spirit power that would have aided in the acquisition of these qualities. Since traditionally a novice's first dance costume would not be re-used after induction (G. Manson 1992, personal communication), the burial of a deceased initiate in his dance costume may not be anomalous.

As Table 10.4 illustrates, all three artifact categories (wealth, ritual, and utilitarian) are found in both midden and cave/crevice burial contexts. Artifact types within categories vary somewhat, perhaps as a reflection of broader time span of the cave/crevice sites, but at least with reference to the wealth and ritual categories, the numbers of different artifact types found with burials are roughly equivalent, taking into

Table 10.4 Grave inclusions: False Narrows midden (FN) and bluffs cave/crevice sites (CC).

ARTIFACT TYPE	FN	CC	ARTIFACT TYPE	FN	CC
wealth			**utilitarian**		
dentalia	p	p	chipped stone projectile point	(site)	p
shell disc bead	p		ground slate projectile point	p	p
teredo bead	p		bone point	(site)	p
shell pendant	p	p	slate knife	(site)	p
copper pendant	p	p	bone unipoint	(site)	p
stone pendant		p	hammerstone	(site)	p
ground stone disc bead	p		unilaterally barbed point	(site)	p
stone barrel bead		p	unilaterally barbed harpoon	p	p
perforated stone oval		p	harpoon foreshaft		p
shell nose ornament		p	obsidian microblade	(site)	p
ritual			pièce esquillée	(site)	p
scallop shell rattle	p	p	abrader	(site)	p
mica	p		atlatl weight		p
chipped stone lanceolate biface	p		bark shredder		p
zoomorphic (beetle) pendant	p*		nephrite celt	p	p
incised elk tines	p*		bone splinter awl	(site)	p
whale bone armlet	p*		shell adze blade	(site)	p
antler spoon		p	worked rib	(site)	p
worked canid jaw		p			
carved art object		p			

* associated with Burial 52

account the ambiguous nature of the Burial 52 associations. Within the utilitarian category, however, a much greater variety of artifact types were found in the cave/crevice burial features than with the midden burials, although many of these implements were also found at False Narrows in non-burial contexts. To some extent this difference may reflect the disparate nature of the sites. At False Narrows, the burials were interred in midden mounds comprised of food remains and other occupational debris in which lost or discarded tools are a natural constituent; the difficulty in determining whether utilitarian implements were deliberately placed in a grave or were accidental inclusions in the surrounding grave fill could result in the rejection of all but the most obvious utilitarian artifact associations. With the exception of the rockshelter at 204-F1, however, all of the cave/crevice features examined in detail appear to be single purpose burial sites, and all of the artifacts found therein were consequently interpreted as grave goods.

The sites are similar not only in the range of artifact categories included as grave goods, but in the fact that each apparently includes individuals from different ranks of society. As was noted earlier, the majority of the False Narrows burials have no associated artifacts, while a minority contain abundant and elaborate grave goods; significantly, the "rich" burials include individuals of both sexes and children as well as adults (Burley 1989: 62). Similar variability is apparent in artifact distributions and demographic profiles within the cave/crevice burial complex, although here the unit of comparison is of necessity the burial feature rather than the individual burial: some (e.g., 204-F2) contain no grave goods; some (e.g., 199-F9) have a few utilitarian items; and some (e.g., 199-F1) contain a wide range of items from all three artifact

categories. As was the case at False Narrows, this variability in artifact associations does not appear to be correlated with age or sex, since each burial feature contains a demographic cross-section of the population.

The artifactual evidence, therefore, does not support a conclusion that the two burial assemblages represent different social classes within the same population, since both appear to be subdivided internally along lines of rank and wealth.

Alternate Hypothesis: Manner Of Death

It is apparent from the above that neither temporal, biological, nor social differentiation can adequately explain the diversity in mortuary patterns on Gabriola Island. However, physical examination of the skeletal remains themselves revealed some intriguing differences between the two assemblages, the most striking of which is in the prevalence and nature of pathological conditions. Detailed evidence for pathology in the five excavated cave/crevice burial features was presented in Chapters 5-9. To summarize: a minimum of six individuals (one from 204-F1, five from 199-F1) suffered unhealed cranial fractures indicative of *peri mortem* trauma that probably resulted in death; this number represents 4.1% of the estimated MNI of 147 individuals in the total cave/crevice sample, or 12.8% of the 47 adult and adolescent crania for which this variable could be recorded. At least 18-19 individuals (17 from 199-F1, one from 199-F9, and one possible case from 204-F2), or 13% of the total sample, exhibit periosteal, dental, or cranial lesions suggestive of active and often severe treponemal infection.

In contrast, the sixty-four individuals (32 observable skulls) from the False Narrows midden sample exhibit no evidence of *peri mortem* cranial trauma, although well-healed cranial fractures were observed in five individuals, four adult males and one adult female. Neither do the False Narrows skeletons exhibit the key signs of treponemal infection: *caries sicca* of the cranial vault, Moon's molars, or Hutchinson's incisors, and while periosteal new bone deposits were observed on the long bones of eight individuals (Table 10.5), none exhibits the gross periosteal expansion, focal superficial cavitations, or endosteal deposition that characterize these lesions in the cave/crevice sample. In two of the cases from False Narrows (Burials 4d and 4e) the localized periosteal lesions are more typical of chronic leg ulcers (Hackett 1976: 434-435); in two other cases (Burials 4-66 and 44a) the periosteal deposits are accompanied by thinning and rarefaction of the underlying cortical bone, suggesting a disease process unlike treponemal infection. The remaining four individuals exhibit what is often termed "non-specific periostitis", and while these manifestations may occur in early or quiescent stages of treponemal disease, they may also result from other infectious diseases (Ortner and Putschar 1981; Hackett 1976).

These data suggest to me that the manner or cause of death (including violence and infectious disease) may have been a discriminating factor in the selection of mortuary treatment on Gabriola Island. There is strong ethnographic evidence that the circumstances surrounding death can be an important variable in determining appropriate mortuary rites. Ucko noted that among those singled out for special treatment in some African tribes were: "...lepers, those killed by lightning, those who die in childbirth, those who have died violently in battle, those who have drowned, those who are said to have died of smallpox or dropsy,...[and] the suicide." (1969: 271). Binford's (1972) survey of mortuary practices in 40 groups drawn from Murdock's (1957) World Ethnographic Sample found that in 20% of the examples (n=8) cause of death was one of the distinctions symbolized in mortuary ritual. Shay (1985) obtained similar results from a survey of the Human Relations Area Files: in 30 of the 53 groups examined (57%) cause of death was one factor governing burial treatment. Although I could find no specific references in Nanaimo or Coast Salish ethnography to such a correlation, this is not surprising considering the cursory nature of the available data, and the strongly normative approach adopted by many of the early ethnographers.

As Saxe (1970) notes, illness may be treated as a form of non-volitional social deviancy in non-Western cultures, and when people die of their illnesses, or in other proscribed ways, the "deviant" social persona, defined by the cause or manner of death, is usually the one selected for expression in mortuary ritual. One of the methods frequently employed to distinguish socially marginal individuals in the mortuary domain is by segregating their graves spatially from those of the rest of the community (Binford 1972; Hertz 1960; Shay 1985; Charles 1995). The atypical location of the cave/crevice burial features is thus consistent with distinctions based on manner of death in cross-cultural comparisons.

The prevalence of burning in the cave/crevice burial features is another characteristic that distinguishes the two burial samples. Burning/cremation was not originally recorded for any of the False Narrows burials, and my reexamination of the skeletons uncovered only three examples: Burial 4/4d, a young adult

Table 10.5 Periosteal lesions, False Narrows midden burial sample.

Burial	Age	Sex	Bones Affected	Description
4-66	adult	F	distal femur, L tibia	thin plaque to irregular spongy deposits
4/4d	30-35	F	R fibula shaft	localized spindle-shaped swelling
4e	40-45	F	distal tibia shaft	localized spindle-shaped swelling
23a	45-55	M	femoral shafts	thin sclerotic plaque
36	40-50	M	humerus, femur, tibia, fibula	thin flat plaque of porous bone
37	25-35	F	femur, tibia, fibula, patella, sacrum, calcaneus	spongy patches to sclerotic striae to thick sclerotic plaque
44a	40-50	M	R ulna, L tibia, distal fibula	sclerotic nodules to plaque
4a	infant	?	all limb bones	shell of porous woven bone; dense, ivory-like patches on femoral shaft

female with slightly burnt right tibia and femur; Burial 5, a young adult male with a burnt right tarsal; and a slightly burnt child's thoracic vertebra, not associated with a designated burial. Evidence for burning is variable in the cave/crevice features examined in detail. The three smaller burial features exhibit the lowest frequencies, with from 0 (204-F6) to 10% (204-F2) of recovered bone fragments affected, but it is substantially more common at the two larger burial features, 199-F9 (77.5%) and 199-F1 (85.1%). Although it is difficult to extrapolate from burnt bone fragments to numbers of bodies cremated, at a rough estimate at least half and perhaps all of the bodies from the cave/crevice features were exposed to fire to some extent.

In general burnt human remains are rare in prehistoric midden sites in the Gulf of Georgia culture area, although sporadic occurrences have been reported from at least eight sites in the region: Whalen Farm (Thom 1992), Beach Grove (Lawhead 1980), and Tsawwassen (Knüsel and Oliver 1988), all on Roberts peninsula; Montague Harbour (Mitchell 1971), Long Harbour (Johnstone 1991), and Pender Canal (Weeks 1985, 1986) on the Gulf Islands; and Somenos Creek (Brown 1996) and Departure Bay (Arcas 1994a) on Vancouver Island. Affected individuals have been attributed to Locarno, Marpole and Gulf of Georgia components. Based on this small sample, there appears to have been considerable variability in the circumstances, intensity, and thoroughness of burning. The examples from Montague Harbour, Long Harbour, and Departure Bay are very similar, consisting of very incomplete, scattered fragments of charred or calcined bone, in each case consistent with a single individual. Other examples (Beach Grove, Somenos Creek, and possibly Whalen Farm and Tsawwassen) appear to be primary inhumations that were burnt *in situ*. Grave goods consisting of burnt dentalia beads were reported with one of the two affected burials from Beach Grove (Lawhead 1980), and a complex mortuary sequence was reconstructed at Somenos Creek, involving primary interment in a pit, burning of the body *in situ*, filling the grave, and erection of a cairn over top (Brown 1996). The Pender Canal burials have yet to be fully described, but preliminary reports by Weeks (1985, 1986) include references to at least two burnt/cremated burials.

Although rarely found in prehistoric midden burials, evidence of burning was apparently much more common in yet another mortuary context, the large earthen burial mounds/cairns that first appear during the late prehistoric (Gulf of Georgia) period. Most of the excavated examples of these features were explored in the late 19th and early 20th centuries, and details or their structure and contents are often sketchy, but extant reports comment specifically on the prevalence of burning: "...many, if not all, of the human remains found in the prehistoric mounds of British Columbia were cremated, although some were only partially burned." (Pickford 1947: 239); "Ashes and charcoal were found over the skeletons, all of which were charred." (Smith and Fowke 1901: 62).

It is sometimes difficult to determine whether burning was the result of purposeful cremation, intended to reduce the skeleton to fragments before final disposal; whether it was incidental to other aspects of

mortuary ritual, such as the burning of food offerings or burial goods at the grave-side; or the result of accidental exposure to fires constructed for other purposes, such as food preparation. The latter explanation was invoked for both the Montague Harbour and Tsawwassen examples, based on patterns of burning on the skeletal elements themselves, but given the evidence for primary interment and *in situ* burning at other sites, mortuary ritual seems clearly indicated. Certainly the evidence from the mound/cairn burials, and the frequent association of hearths with burials at midden sites such as Tsawwassen (Curtin 1999) and Pender Canal (Carlson and Hobler 1993), suggests that fire played an important role in mortuary ritual.

In the cave/crevice burial features on Gabriola Island, burning is not only very prevalent, but in some cases appears to be directly correlated with observed pathological conditions. Four of the five crania from 199-F1 with *peri mortem* fractures appear to be unburnt except for localized oval areas of discolouration or charring adjacent to the injury. The cranium with *caries sicca* also exhibits focal charring on the occipital bone, the site of the most recent, active lesions. Another skull with a possible mastoid inflammation is charred on the affected temporal bone, and four additional skulls with no apparent pathology exhibit very localized oval patches of charring on the parietals. No such patterning is apparent on the pathological long bones: many appear to be completely untouched by fire, while others are calcined and highly fragmented.

Discussion

Taken together, the demographic, radiometric, artifactual, skeletal, and physical evidence suggest that the individuals selected for interment in the cave/crevice burial features were a demographic cross-section of the local population, representing both sexes, all age classes, and various ranks of society, but sharing one important characteristic: their cause of death somehow necessitated that special distinctions be made in burial treatment. Not only were they interred in a location physically separate from the traditional midden burial area, but their spiritual severance from the community necessitated a more elaborate mortuary ritual than usual involving widespread use of fire. Direct association of charring with specific cranial lesions suggests that the burning involved a ritual cleansing or purification, or perhaps a spiritual healing process, but given the presence of grave goods indicative of wealth and status it appears that the individuals who died thus were not viewed as socially deviant.

Although treponemal disease and *peri mortem* trauma were the focus of this investigation, it is certainly likely that other culturally significant causes of death not as readily evident on the skeletal remains were also represented in the cave/crevice assemblage. It must also be emphasized that evidence of healed cranial trauma or mild or inactive treponemal infection would still be expected to occur in the traditional midden mortuary setting, so long as these afflictions were not regarded as causing the death of the individual in question.

Of direct relevance to this interpretation of the data from Gabriola Island is the multiple burial of 10 individuals recovered from the Duke Point midden (DgRx 5) in 1978 (see Section 2.4), in which Cybulski (1991b) has diagnosed treponemal infections (venereal, congenital, and endemic syphilis) affecting at least six and possibly all ten individuals. The close proximity of this site to Gabriola Island, its midden context, and the diagnosed pathology make it potentially of great significance to the interpretation of the cave/crevice burial features, particularly given Cybulski's insinuation (based on their burial in a mass grave) that they were deliberately killed to prevent further transmission of the disease (Cybulski 1991b: 17). If his interpretation is correct, the prevalence of *peri mortem* trauma and treponemal lesions in the cave/crevice burial features would take on a radically different significance.

Unfortunately, the Duke Point skeletal collection could not be reexamined for comparison with the Gabriola Island material since its current location is unknown. Therefore any evaluation of Cybulski's diagnosis and conclusions must be wholly dependant on his written description of the remains and the photographs and radiographs included in this report. As Cybulski acknowledges, most of the reported osseous changes are suggestive but not pathognomic of treponemal disease; however one individual (Person 5, a young adult male) does exhibit the periosteal thickening and focal cavitations considered by Hackett to be diagnostic of treponemal infection. Cybulski's extension of this diagnosis to the remaining individuals (even to those with no skeletal pathology, or with a dental anomaly not previously identified with treponemal disease) appears largely influenced by their interment in a common grave, but his reasoning on this point seems tautological: i.e., he argues that they must have all suffered from the same disease because they were all buried together, but then hints that they were killed and buried together because they all had the same disease.

There is little doubt that individuals buried together in mass graves died at the same time and likely of the same cause, as a result of some catastrophic event such as a village raid, an epidemic disease (smallpox being a case in point), an accident such as a capsized canoe, a natural disaster such as a mudslide, or perhaps even, as Cybulski implies, as a deliberate social sanction intended to cleanse the community of "deviants". However, central to his interpretation is the assumption that the pathological conditions affecting these ten individuals would have been identified as the same disease by the local community. Yet the three diseases Cybulski identified have conspicuously different modes of transmission, are marked by sequential stages of involvement each characterized by different physical manifestations, and separated by periods of latency that may last several years, during which time the infected individual exhibits no signs or symptoms of disease. Moreover venereal syphilis in particular is noted for the wide range of possible manifestations: "Of all diseases it is the most subtle. It is a master of disguise. There is no symptom which it cannot cause, no syndrome for which it may not be responsible" (Boyd 1943: 174). To my mind, Cybulski's interpretation of the Duke Point mass burial presupposes an unlikely degree of biomedical and clinical sophistication on the part of the local populace, including a very modern understanding of the principles of contagion.

There is also the issue of the grave goods associated with the two children from the Duke Point mass burial. If, as Cybulski supposes, these ten individuals were regarded as deviants to be killed for the good of the community, it seems unlikely that the children would have been buried with symbols of wealth/status. Following Shay's (1985) reasoning, negatively-evaluated deviants within the community would be expected to evince "shallow" social personae in their mortuary treatment, so inclusions of wealth would be unlikely under these circumstances. If, however, they died together as a result of a natural disaster or cataclysmic accident, there is no reason to invoke a common disease process to account for the observed skeletal lesions, and the presence of one or more individuals with treponemal disease in a midden burial context does not contradict the interpretation of the cave/crevice burials.

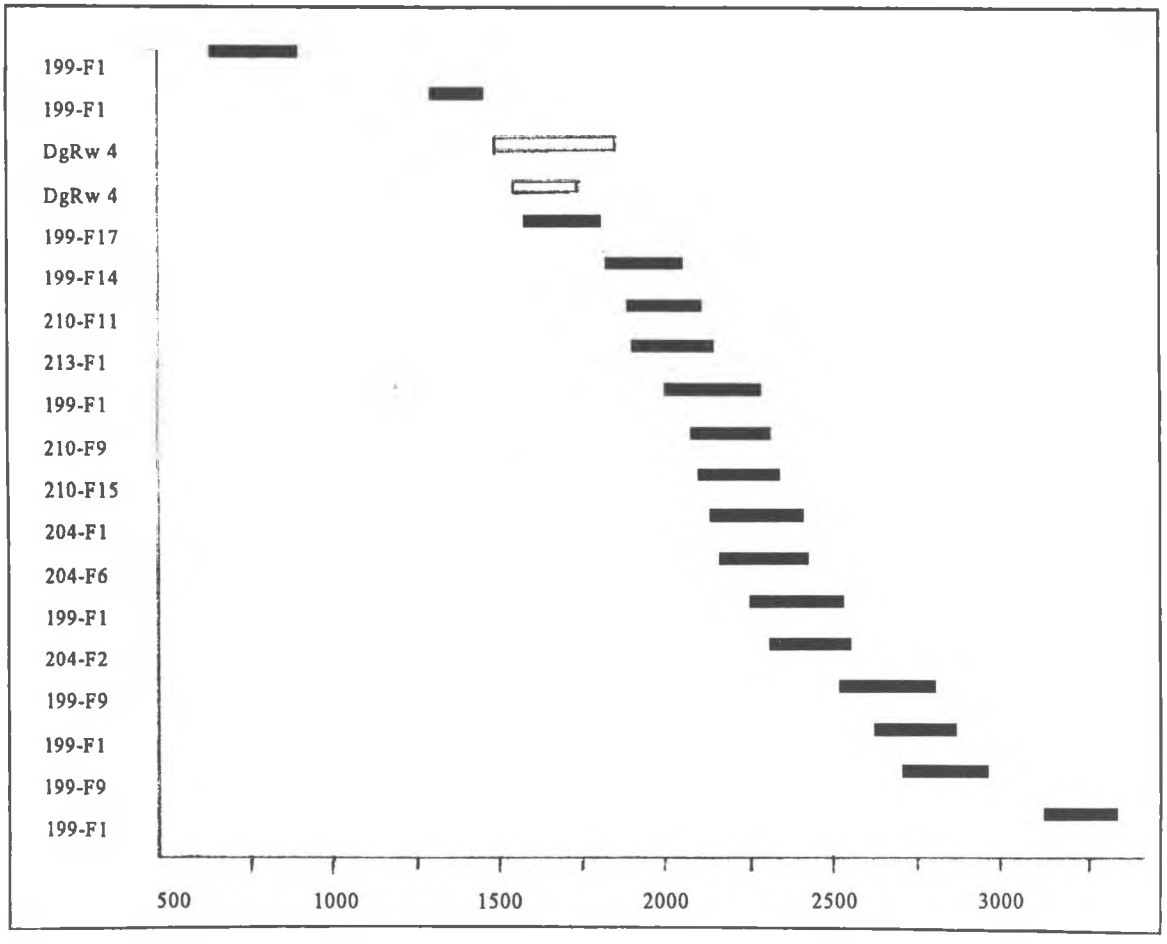

Figure 10.1 Uncalibrated radiocarbon dates (2 sigma range): cave/crevice burials (black bars); DgRw midden (open bars).

Summary

This report presents the results of an investigation of prehistoric mortuary variability on Gabriola Island, comparing demographic, biological, and archaeological attributes of an existing sample of midden burials from the False Narrows site (DgRw 4) with a recently discovered burial complex located inland from False Narrows, amid fallen sandstone and conglomerate boulders at the base of a series of steep bluffs. Preliminary field work included intensive survey of a 3-km stretch of the bluffs, which resulted in the discovery of 44 previously unrecorded burial features, bringing the total inventory of known features in the area to 49. Many other features may still be undiscovered, obscured by fallen blocks or sedimentation, or deliberately concealed by stone walls constructed to seal the entrances. Five burial features were later examined in detail, and the human skeletal material collected from these sites comprise the basic data set for comparison with the False Narrows midden sample.

It was initially estimated that at least 84 individuals had been interred along the inland bluffs of Gabriola Island, based on skeletal elements visible on the surface of the burial features at the time of the survey. The results of the excavations demonstrated, however, that surface remains were a poor indicator of the contents of these features. The five excavated features were found to contain the remains of at least 147 individuals, or more than ten times as many as first estimated. Extrapolating from this figure, it is possible that as many as a thousand people were interred in the caves and crevices along the Gabriola Island bluffs.

Radiometric analysis did not support early conjectures that the cave/crevice burials were late prehistoric or historic in age. Bone samples collected from 11 of the features yielded radiocarbon dates ranging from approximately 1500 to 3300 years BP, which coincides with the Locarno and Marpole periods of south coast prehistory. These dates are also compatible with the artifacts found associated with the burials. Skinner's (1991) suggestion that the bones may have been removed from their original primary context sometime in the late prehistoric period and redeposited in the cave/crevice features where they were subsequently burned is also not supported by the current analysis. Several of the cave features contain intact, articulated skeletons, indicative of undisturbed primary burial context, while the patterns of burning on other remains are not consistent with the cremation of dry, defleshed bone. Although the skeletal material in the excavated features was, with few exceptions, completely disarticulated, patterns of dispersal of reconstructed skeletal elements, and of skeletal elements from the same individual, where identifiable, suggest that burials were interred individually rather than *en masse*. Apparent cutmarks on a few elements offer tentative evidence of partial dismemberment of some individuals prior to interment. Faunal remains, predominantly shellfish and fish but also including some avian and mammalian species, accompanied the human skeletal material; for the most part these are interpreted as food offerings provided for the dead, although some specimens represent natural carnivore accumulations.

The incompleteness, disarticulation, high degree of fragmentation, and generally poor preservation of the human skeletal remains from the cave/crevice features, in conjunction with significant post depositional disturbance of the primary burial context, resulting from both natural (slumpage, ceiling collapse, root intrusion, rodent burrowing, carnivore scavenging) and human agency (pothunting, tourism), placed severe limitations on the information that could be recovered, and the confidence with which conclusions could be drawn. With these caveats in mind, the comparison of the cave/crevice burials with those from the False Narrows midden did not support any of the three initial hypotheses suggested to account for the differing burial treatments. Both midden and cave/crevice interments occur contemporaneously in the Nanaimo area for a period of at least 2,000 years and perhaps longer. Biodistance analysis employing both dental and skeletal discrete traits revealed virtually no variation between the two samples. Each sample includes individuals of both sexes and all age classes, indicating that demographic parameters were not a key factor in mortuary differentiation, while artifact associations suggest that each sample comprises a cross-section of status/rank positions within the community.

The most striking differences between the two burial samples were in the high prevalence of specific pathologies and the frequency of burning seen in the cave/crevice sample. This evidence suggests that cause of death, including but not necessarily limited to *peri mortem* trauma and treponemal disease (possibly venereal syphilis), was the principal dimension selecting for inclusion in the cave/crevice burial sample. This interpretation is not contradicted by the evidence for treponemal disease in midden interments from the Duke Point site, assuming that those individuals, while perhaps suffering from treponemal disease, died from

an unrelated cause. Intensity of burning appears extremely variable both between and within burial features: some elements seem to be completely unaffected, others exhibit localized patches of discolouration or charring, while still others appear to have been thoroughly consumed by fire. The high degree of fragmentation and disarticulation makes it impossible to assess burning patterns within individual skeletons, but the direct association of burning with some of the more obvious pathologies hints that it functioned within the realm of mortuary ritual and may also be correlated with cause of death.

Suggestions For Future Research

The current study has demonstrated a greater range of prehistoric burial practices in the Gulf of Georgia region than was previously suspected. Determination of the geographic and temporal boundaries of the cave/crevice mortuary variant would be a valuable focus of future research. At present the documented evidence for this variant is limited to the Marpole/Locarno periods on Gabriola Island, but considering that the physiographic feature with which these burials are associated (the bluff/escarpment system) extends southward through the Gulf Island chain, there is a strong possibility that similar undocumented burial features occur elsewhere in the Gulf of Georgia region. At least two rockshelter burial sites have been previously reported on Valdes Island, immediately southeast of Gabriola (Cassidy et al. 1974), and there are also hints of the practice further to the north: a rockshelter burial site on Denman Island in Pentlatch territory (Eldridge 1987b), and some rock crevice interments apparently associated with historic box burials on Berry Island, in Kwakiutl territory (Curtin 1990a). Given that past regional site inventory surveys have tended to focus on shoreline midden sites, the potential for as yet undiscovered inland sites, particularly well-concealed burial features, may be especially high.

The geographical and temporal distribution of prehistoric treponemal disease on the Northwest Coast is also an intriguing problem in need of further investigation. Currently the best evidence for the disease comes from the two Nanaimo area sites discussed in this report, Gabriola Island and Duke Point (Cybulski 1991b), which are close both geographically and chronologically, each dating to the Locarno period of prehistory. Isolated cases have also been tentatively identified from undated contexts at Nanaimo Harbour (Wilson 1990b) and Crescent Beach (Conaty and Curtin 1984), but outside of the Gulf of Georgia region, the only reported prehistoric evidence consists of *caries sicca* lesions in a 2,300-year-old skeleton from Prince Rupert Harbour on the north coast (Cybulski 1990). Based on this evidence, the disease appears to have been relatively restricted in both space and time, but examination of larger skeletal samples from the Marpole period cave/crevice burial features, as well as from other areas of the Northwest Coast, is necessary to confirm this impression.

The Gabriola Island cave/crevice burial sites do not occur in isolation, but are found in close proximity to a petroglyph site (DgRw 198) and at least two extensive inland shell middens, DgRw 196 (now virtually destroyed) and DgRw 209 (apparently virtually intact). Possible cultural/chronological associations between these sites might be a profitable avenue for future archaeological investigation.

Although the current study focused on differences in mortuary treatment between the midden and cave/crevice assemblages, variability within the cave/crevice complex is also pronounced, including both primary and secondary interments, burnt and unburnt remains, "rich" and unelaborated burials. Future research might focus on the explanation of this internal variation. The question of whether individual burial features represent family or clan groupings or perhaps chronological sequences of interment might be also be explored if appropriately large samples were available for study.

The Gabriola Island data may also be relevant to broader questions of the role of rock features in mortuary practices in general. The association of human burials with constructed rock features of variable size and structural complexity has a long history in the Gulf of Georgia region (Thom 1995). Some of the recorded variants include grave pits lined and capped with layers of cobbles, simple interments partially covered with a rock slab, box burials capped with a single boulder, cobble or boulder cairns of various size, and in the most elaborate examples, cairns surrounded by concentric rock alignments and covered with earthen mounds. The time depth of rock associated burials may be as great as 4,000 years, but the most complex cairn/mound features appear to have a more restricted temporal distribution, from about 1500 - 500 years BP (Thom 1995: 70). Whether the placement of the Gabriola Island burials within natural rock features was symbolically analogous to placement within constructed rock features can only be a matter for conjecture at this point, but the Gabriola Island cave/crevice burials do share one additional, potentially significant attribute with the later mound/cairn burials: high prevalence of associated burning. Few of the human

remains from the mound/cairn sites have been studied in detail; they certainly warrant closer examination.

The study of human remains from archaeological contexts continues to provide information on aspects of previous lifeways that are generally inaccessible through other lines of enquiry. On the Northwest Coast, the full potential of mortuary analysis has not yet been fully realized, but the present study has shown that even previously-studied collections can yield new and important insights on the problems of prehistory.

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Appendix A Faunal Catalogues

Table A.1 Vertebrate fauna (NISP) from excavation units, DgRw 204-F1.

Taxon	EU 1	EU 2	EU 3	N Ext	S Ext	E Ext	Total
FISH							
Clupea harengus pallasi (herring)	51	139	129	101	15	18	453
Squalus acanthas (dogfish)	7	14	17	11	10	23	82
Onchorynchus sp. (salmon)	12	12	9	8	6	12	59
SCORPAENIFORMES (mail-cheeked fishes)	2	3	2			4	11
Hexagrammidae (lingcod & greenling family)	4	8	1	1	3		17
Ophidon elongatus (lingcod)			1				1
Scorpaenidae (scorpion & rockfish family)	1	7		1		2	11
Sebastes sp. (rockfish)	1	13	2	2			18
SCORPAENIFORMES/PERCIFORMES		6					6
PERCIFORMES (spiny-rayed fishes)		2					2
Embiotocidae (surfperch family)			2	1			3
Gadidae (cod family)	3	4			1		8
Unidentified fish	22	95	5	23	4	3	152
Total Fish	**103**	**303**	**168**	**148**	**39**	**62**	**823**
BIRD							
Anserinae (geese subfamily)		1	5				6
Anatinae (duck subfamily)	2	1	1				4
Podicipedidae (grebe family)			1				1
GALLIFORMES (fowl-like birds)				1			1
Tetraoninae (grouse subfamily)	1			3	1		5
PASSERIFORMES (perching birds)	2			2	2		6
Bombycillidae/Tyrannidae (waxwing and flycatcher families)		1					1
Turdinae/Icteridae (thrush and blackbird families)	6	1	1	5		1	14
Unidentified bird	7	12	13	8	2	4	46
Total Bird	**18**	**16**	**21**	**19**	**5**	**5**	**84**
MAMMAL							
ARTIODACTYLA (even-toed ungulate)			2	1			3
Odocoileus sp. (deer)	7	4	9	12	1	1	34
Canis sp. (dog/coyote/wolf)	69	18	6	12	27	2	134
Procyon lotor (raccoon)			2				2
RODENTIA		3		1			4
Tamiasciurus sp. (squirrel)				1			1
MYOMORPHA	1			4			5
Muridae (rat & mouse family)		2					2
Microtus sp. (vole)	1	6	1	8			16
Mus musculus (house mouse)			1				1
Unidentified mammal	74	79	136	35	228	134	686
Total Mammal	**152**	**112**	**157**	**74**	**256**	**137**	**888**
TOTAL FAUNA	**273**	**431**	**346**	**241**	**300**	**204**	**1,795**

Table A.2 Vertebrate fauna (NISP) from matrix samples, DgRw 204-F1.

Taxon \ Layer	A	B	C	D	E	F	Total
FISH							
Clupea harengus pallasi (herring)	193	22	6				221
Squalus acanthas (dogfish)			2	1			3
Onchorynchus sp. (salmon)	4						4
Porichthys sp. (midshipman)		1	3	1			5
Hexagrammidae (lingcod & greenling family)		1					1
Scorpaenidae (scorpion & rockfish family)				1			1
Sebastes sp. (rockfish)	2						2
Cottidae (sculpin family)	3	1	3				7
Embiotocidae (surfperch family)		1	5				6
Pholididae/Stichaeidae (gunnel/prickleback)		25					25
PLEURONECTIFORMES (flatfishes)		1	2				3
Unidentified fish	122	96	234	2		1	455
Total Fish	**324**	**148**	**255**	**5**	**0**	**1**	**733**
BIRD							
Turdinae (thrush subfamily)	1						1
Unidentified bird		1					1
Total Bird	**1**	**1**					**2**
MAMMAL							
Muridae (rat & mouse family)	1	2		2			5
Microtus sp. (vole)		1	2		1		4
Unidentified mammal	65	4	11	18	1	12	111
Total Mammal	**66**	**7**	**13**	**20**	**2**	**12**	**120**
TOTAL FAUNA	**391**	**156**	**268**	**25**	**2**	**13**	**855**

Table A.3 Comparison of vertebrate fauna (NISP) by sample type, DgRw 204-F1.

Taxon	Excavation Units	Matrix Samples	Total
FISH			
Clupea harengus (herring)	453	221	674
Squalus acanthas (dogfish)	82	3	85
Onchorynchus sp. (salmon)	59	4	63
Porichthys sp. (midshipman)		5	5
SCORPAENIFORMES (mail-cheeked fishes)	11		11
Hexagrammidae (lingcod & greenling family)	14	1	15
Ophiodon sp. (lingcod)	1		1
Scorpaenidae (scorpion & rockfish family)	11	1	12
Sebastes sp. (rockfish)	21	2	23
Cottidae (sculpin family)		7	7
Gadidae (cod family)	8		8
SCORPAENIFORMES/PERCIFORMES	6		6
PERCIFORMES (spiny-rayed fishes)	2		2
Embiotocidae (surfperch family)	3	6	9
Pholididae/Stichaeidae (gunnel/prickleback)		25	25

Table A.3 continued.

Taxon	Excavation Units	Matrix Samples	Total
PLEURONECTIFORMES (flatfishes)		3	3
Unidentified fish	152	455	607
Total Fish	**823**	**733**	**1,556**
BIRD			
Podicipedidae (grebe family)	1		1
Anserinae (geese subfamily	6		6
Anatinae (duck subfamily)	6		6
GALLIFORMES (fowl-like birds)	1		1
Tetraoninae (grouse subfamily)	5		5
PASSERIFORMES (perching birds)	6		6
Bombycillidae/Tyrannidae (waxwing/flycatcher)	1		1
Turdinae/Icteridae (thrush/blackbird family)	14		14
Turdinae (thrush subfamily)		1	1
Unidentified bird	44	1	45
Total Bird	**84**	**2**	**86**
MAMMAL			
ARTIODACTYLA (even-toed ungulate)	3		3
Odocoileus sp. (deer)	34		34
Canis sp. (dog/coyote/wolf)	134		134
Procyon lotor (raccoon)	2		2
RODENTIA	4		4
Tamiasciurus sp. (squirrel)	1		1
MYOMORPHA	5		5
Muridae (rat and mice family)	2	5	7
Microtus sp. (vole)	16	4	20
Mus musculus (house mouse)	1		1
Unidentified mammal	686	111	797
Total Mammal	**888**	**120**	**1,008**
TOTAL FAUNA	**1795**	**855**	**2,650**

Table A.4 DgRw 204-F1 shell analysis results, EU 2 matrix samples.

	Sample Weight (g)	Shell Weight (g)	% Shell by weight	% Mussel	% Clam	% Barnacle	% Other*
Layer A	2917	**	**	**	**	**	**
Layer B	2396	734.8	30.67	70.1	17.8	9.4	2.7
Layer C	3897	45.4	1.17	29.3	60.1	9.5	1.1
Layer D	3943	46.2	1.17	58.7	27.9	12.8	0.6
Layer E	3121	121.9	3.91	41.3	41.7	8.9	8.1
Layer F	3641	< 0.1	0.00	0	0	0	0
Total	**19915**	**948.4**	**4.76**	**63.9**	**23.4**	**9.5**	**3.2**

* Other = limpet, periwinkle, crab, whelk, sea urchin.** Layer 1 shell sample lost in transit to analyst.

Table A.5 Vertebrate fauna (NISP) from excavation units, DgRw 204-F2.

Taxon	EU 1	EU 2	EU 3	EU 4	Total
FISH					
Clupea harengus pallasi (herring)	1	5			6
Onchorynchus sp. (salmon)	5	9	1		15
Unidentified fish		4			4
Total Fish	**6**	**18**	**1**		**25**
REPTILE					
Colubridae (harmless snake family)	**2**	**26**	**1**	**2**	**31**
BIRD					
ANSERIFORMES (waterfowl)		1			1
Tetraoninae (grouse subfamily)		1	1		2
PASSERIFORMES (perching birds)	1	2			3
Turdinae/Icteridae (thrush/blackbird)		3			3
Unidentified bird	1	1	1		3
Total Bird	**2**	**8**	**2**		**12**
MAMMAL					
Odocoileus sp. (deer)	1	1			2
CARNIVORA		1			1
Mustelidae (weasel family)		1	1		2
Procyon lotor (raccoon)		3			3
RODENTIA		2			2
Tamiasciurus sp. (squirrel)		5		1	6
Muridae (rat & mouse family)		1			1
Microtus sp. (vole)		1			1
Unidentified mammal	9	16	3	2	30
Total Mammal	**10**	**31**	**4**	**3**	**48**
TOTAL FAUNA	**20**	**83**	**8**	**5**	**116**

Table A.6 Vertebrate fauna (NISP) from excavation units, DgRw 204-F6.

Taxon	EU 1	EU 2	EU 3	EU 4	W Ext	Total
BIRD						
Tetraoninae (grouse subfamily)	**1**			**1**		**2**
MAMMAL						
Odocoileus sp. (deer)	1	1			1	3
Canis sp. (dog/coyote/wolf)	1		1			2
Total Mammal	**2**	**1**	**1**		**1**	**5**
TOTAL FAUNA	**3**	**1**	**1**	**1**	**1**	**7**

Table A.7 Vertebrate fauna (NISP) from excavation units, DgRw 199-F1.

Taxon \ Excavation Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
FISH																	
Clupea harengus (herring)			1						1		3				1		6
Squalus sp. (dogfish)			1										1		2		4
Oncorhynchus sp. (salmon)									4	1			2				7
GADIFORMES (cods, hakes)		1	3														4
Gadidae (cod family)			3	3													6
Porichthys sp. (midshipman)		1	4	3					1		1	1					11
SCORPAENIFORMES (mail-cheeked fishes)	2	13	24	12					8		2	4	1				66
Hexagrammidae (lingcod & greenling family)		1	9	4						3	4	10	5		1		37
Hexagrammos sp. (greenling)									1								1
Scorpaenidae (scorpion & rockfish family)	2	2							1								5
Sebastes sp. (rockfish)	12	7	74	36	2	2	2	9	29	12	6	6			14	1	212
Cottidae (sculpins)	3	8	33	19		5	4	7	37	6	4	4	1		4	1	136
Enophyrs bison (buffalo sculpin)							1										1
Scorpaenichthys marmoratus (cabezon)			8	17			2		5				1		3		36
SCORPAENIFORMES/ PERCIFORMES	1	2	2	1					2								8
PERCIFORMES (spiny-rayed)	1		2	1					2								6
Embiotocidae (surfperch family)	5	7	41	21	1	4	2	5	19	2	6		5		5	1	124
Pholididae (gunnel family)			2														2
Pholididae/Stichaeida (gunnel/ prickleback)		1	227	3				1	3								235
PLEURONECTIFORMES (flatfishes)	2	11	40	47	2	3	3	8	21	8	4		6		3		158
Unidentified fish	98	324	2,480	484	10	31	39	67	4,956	64	54	36	17	0	107	24	8791
Total Fish	**126**	**378**	**2,954**	**651**	**15**	**45**	**53**	**97**	**5,090**	**96**	**84**	**61**	**39**	**0**	**140**	**27**	**9,856**
AMPHIBIAN																	
Bufo/Rana sp. (toad/frog)									8								8
REPTILE																	
Colubridae (snake)							2										2
BIRD																	
Podicipedidae (grebe family)				1												2	3
ANSERIFORMES (waterfowl)			1	4				1	1								7
Anserinae (geese subfamily)													1				1
Anatinae (duck subfamily)				1	1			1					5		1		9
Anatini (surface-feeding ducks)															2		2

Table A.7 continued.

Taxon \ Excavation Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Falconidae (falcon family)				1								1					2
GALLIFORMES (fowl)									2								2
Gallus gallus (chicken)				1							1						2
Tetraoninae (grouse subfamily)		1	1	1			3		2	1		3	6		1		19
Larinae (gull subfamily)				1													1
Columba sp. (pigeon)		1															1
PASSERIFORMES (perching birds)		2	1	2								1					6
Corvus sp. (crow)			2														2
Corvus corax (raven)			1														1
Fringillidae (finch family)			2														2
Icterinae (blackbird family)																1	1
Turdinae (thrush subfamily)			2									1					3
Unidentified bird	9	1	21	9	5	1	3	6	12	2	2	0	6	0	7	1	85
Total Bird	**9**	**5**	**31**	**21**	**6**	**1**	**6**	**8**	**17**	**3**	**3**	**6**	**18**	**0**	**11**	**4**	**149**
MAMMAL																	
ARTIODACTYLA (even-toed ungulate)									1								1
Cervidae (deer family)			1								1						2
Odocoileus sp. (deer)		1	3	8				3	2				2				19
CARNIVORA	3		1						2			1	2	1	1		11
Canis sp. (dog/coyote/wolf)			2	4					1		1		1		3		12
Procyon lotor (raccoon)		1	2	3		1	1					1		1			10
Leporidae (rabbit/hare family)								1									1
Tamiasciurus sp. (squirrel)															3		3
MYOMORPHA		1	1						1								3
Muridae (rat & mice family)		4	9	10				2	2			1	6		4		38
Microtus sp. (vole)	1		11	5				5		1			2		3		28
Peromyscus sp. (white-foot & pygmy mice)		1											1		1		3
Unidentified mammal	21	33	78	79	6	7	9	10	112	9	9	6	11	1	13	5	409
Total Mammal	**25**	**41**	**108**	**109**	**6**	**8**	**10**	**21**	**121**	**10**	**11**	**9**	**25**	**3**	**28**	**5**	**540**
TOTAL FAUNA	**160**	**424**	**3,093**	**781**	**27**	**54**	**71**	**126**	**5,236**	**109**	**98**	**76**	**82**	**3**	**179**	**36**	**10,555**

Table A.8 Vertebrate fauna (NISP) from Matrix Sample 3, DgRw 199-F1.

Taxon \ Level	1	2	3	4	5	6	7	Total
FISH								
Clupea harengus (herring)	6	2	2		4	1	3	**18**
Gadidae (cod family)					2	1		**3**
Gadus macrocephalus (Pacific cod)			1					**1**
Porichthys sp. (midshipman)	13	7	2	2			2	**26**
SCORPAENIFORMES (mail-cheeked fishes)	3	1	2	3	4	3		**16**
Hexagrammidae (lingcod & greenling family)	3		1	1	2			**7**
Scorpaenidae (scorpion & rockfish family)			2					**2**
Sebastes sp. (rockfish)	13	4	2	1	2	2	1	**25**
Cottidae (sculpin family)	28	13	21	21	11	3	5	**102**
Hemilepidotus sp. (Irish Lord)					1			**1**
Scorpaenichthys marmoratus (cabezon)	1	8		8	3	1		**21**
SCORPAENIFORMES/ PERCIFORMES			1					**1**
PERCIFORMES (spiny-rayed fish)	1							**1**
Embiotocidae (surfperches family)	4	5	5	6	2			**22**
Pholididae/Stichaeidae (gunnel/prickleback families)	44	15	28	46	33	12	5	**183**
PLEURONECTIFORMES (flatfishes)	11	7	14	4	3	4	2	**45**
Unidentified fish	2,316	1,637	1,464	1,742	1,555	884	227	**9,825**
Total Fish	**2,443**	**1,699**	**1,545**	**1,834**	**1,622**	**911**	**245**	**10,299**
REPTILE								
Colubridae (harmless snake family)			1	1				**2**
BIRD								
ANSERIFORMES (waterfowl)						1		**1**
Aythyini (bay duck tribe)		1						**1**
PASSERIFORMES (perching birds)			1					**1**
Unidentified bird	1	2	1		3	4		**11**
Total Bird	**1**	**3**	**2**	**0**	**3**	**5**	**0**	**14**
MAMMAL								
Muridae (rat and mice family)	4		7	3	1		2	**17**
Microtus sp. (vole)	1	1		1	2		3	**8**
Unidentified mammal	272	74	516	156	42	24	16	**1,100**
Total Mammal	**277**	**75**	**523**	**160**	**45**	**24**	**21**	**1,125**
TOTAL FAUNA	**2,721**	**1,777**	**2,071**	**1,995**	**1,670**	**940**	**266**	**11,440**

Table A.9 Vertebrate fauna (NISP) from Matrix Sample 9, DgRw 199-F1.

Taxon \ Level	1	2	3	4	5	6	7	8	Total
FISH									
Clupea harengus (herring)	5	8	3	1	1			4	**22**
Porichthys sp. (midshipman)	1	1		1	1				**4**
Gobiesox maeandricus (Northern clingfish)								1	**1**
SCORPAENIFORMES (mail-cheeked fishes)						1			**1**
Hexagrammidae (lingcod & greenling family)								1	**1**
Scorpaenidae (scorpion/rockfish family)		1							**1**
Sebastes sp. (rockfish)						1	2	1	**4**
Cottidae (sculpin family)	1	7	2	2	5	7	3	5	**32**
Hemilepidotus sp. (Irish Lord)				1					**1**
Scorpaenichthys marmoratus (cabezon)	3	1	1						**5**
Embiotocidae (surfperches family)	2	1	1	1	1			1	**7**
Pholididae (gunnel family)								1	**1**
Pholididae/Stichaeidae (gunnel/prickle-back family)	7	2	3	9	5	11	5	10	**52**
PLEURONECTIFORMES (flatfishes)			1	1	2	2	1	1	**8**
Unidentified fish	767	705	212	246	304	814	206	377	**3,631**
Total Fish	**786**	**726**	**223**	**262**	**319**	**836**	**217**	**402**	**3,771**
REPTILE									
Colubridae (harmless snake family)								**1**	**1**
BIRD									
ANSERIFORMES (waterfowl)			1						**1**
PASSERIFORMES (perching birds)			1		1				**2**
Unidentified bird	2	1	2	1	1			1	**8**
Total Bird	**2**	**1**	**4**	**1**	**2**	**0**	**0**	**1**	**11**
MAMMAL									
ARTIODACTYLA (even- toed ungulates)						1			**1**
CARNIVORA			1						**1**
Muridae (rat and mice family)	3	1	11	4	3	1		2	**25**
Microtus sp. (vole)		1							**1**
Peromyscus sp. (white-foot & pygmy mice)		1							**1**
Unidentified mammal	285	139	42	34	35	15	6	10	**566**
Total Mammal	**288**	**142**	**54**	**38**	**38**	**17**	**6**	**12**	**595**
TOTAL FAUNA	**1,076**	**869**	**281**	**301**	**359**	**853**	**223**	**416**	**4,378**

Table A.10 Comparison of vertebrate fauna (NISP) by sample type, DgRw 199-F1.

Taxon	EUs	MS-3	MS-9	Total
FISH				
Clupea harengus (herring)	6	18	22	46
Squalus sp. (dogfish)	4			4
Oncorhynchus sp. (salmon)	7			7

TableA.10 continued.

Taxon	EUs	MS-3	MS-9	Total
GADIFORMES (cods, hakes)	4			4
Gadidae (cod family)	6	3		9
Gadus macrocephalus (Pacific cod)		1		1
Porichthys sp. (midshipman)	11	26	4	41
Gobiesox maeandricus (Northern clingfish)			1	1
SCORPAENIFORMES (mail-cheeked fishes)	66	16	1	83
Hexagrammidae (lingcod & greenling family)	37	7	1	45
Hexagrammos sp. (greenling)	1			1
Scorpaenidae (scorpion & rockfish family)	5	2	1	8
Sebastes sp. (rockfish)	212	25	4	241
Cottidae (sculpin family)	136	102	32	270
Hemilepidotus sp. (Irish Lord)		1	1	2
Enophrys bison (buffalo sculpin)	1			1
Scorpaenichthys marmoratus (cabezon)	36	21	5	62
SCORPAENIFORMES/PERCIFORMES	8	1		9
PERCIFORMES (spiny-rayed fishes)	6	1		7
Embiotocidae (surfperches family)	124	22	7	153
Pholididae (gunnel family)	2		1	3
Pholididae/Stichaeidae (gunnel/prickleback family)	235	183	52	470
PLEURONECTIFORMES (flatfishes)	158	45	8	211
Unidentified fish	8,791	9,825	3,631	22,247
Total Fish	**9,856**	**10,299**	**3,771**	**23,926**
AMPHIBIAN				
Bufo/Rana sp. (toad/frog)	8	0	0	8
REPTILE				
Colubridae (harmless snake family)	2	2	1	5
BIRD				
Podicipedidae (grebe family)	3			3
ANSERIFORMES (waterfowl)	7	1	1	9
Anserinae (geese subfamily)	1			1
Anatinae (duck subfamily)	9			9
Anatini (surface-feeding duck tribe)	2			2
Aythyini (bay duck tribe)		1		1
Falconidae (falcon family)	2			2
GALLIFORMES (fowl-like birds)	2			2
Gallus gallus (chicken)	2			2
Tetraoninae (grouse sub-family)	19			19
Larinae (gull subfamily)	1			1
Columba sp. (pigeon)	1			1
PASSERIFORMES (perching birds)	6	1	2	9
Corvus sp. (crow)	2			2
Corvus corax (raven)	1			1
Fringillidae (finch family)	2			2
Icterinae (blackbird family)	1			1
Turdinae (thrush subfamily)	3			3
Unidentified bird	85	11	8	104

TableA.10 continued.

Taxon	EUs	MS-3	MS-9	Total
Total Bird	**149**	**14**	**11**	**174**
MAMMAL				
ARTIODACTYLA (even-toed ungulates)	1		1	2
Cervidae (deer family)	2			2
Odocoileus sp. (deer)	19			19
CARNIVORA	11		1	12
Canis sp. (dog/coyote/wolf)	12			12
Procyon lotor (raccoon)	10			10
Leporidae (hare/rabbit family)	1			1
Tamiasciurus sp. (squirrel)	3			3
MYOMORPHA	3			3
Muridae (rat and mice family)	38	17	25	80
Microtus sp. (vole)	28	8	1	37
Peromyscus sp. (white-foot & pygmy mice)	3		1	4
Unidentified mammal	409	1,100	566	2,075
Total Mammal	**540**	**1125**	**595**	**2,260**
TOTAL FAUNA	**10,555**	**11,440**	**4,378**	**26,373**

Table A.11 Vertical distribution of vertebrate fauna (NISP), DgRw 199-F1.

Level	EUs	%	MS-3	%	MS-9	%	Total	%
Surface	14	0.13	0	0.00	0	0.00	**14**	0.05
Level 1	1,045	9.90	2,721	23.79	1,076	24.58	**4,842**	18.36
Level 2	3,443	32.62	1,777	15.53	869	19.85	**6,089**	23.09
Level 3	535	5.07	2,071	18.10	281	6.42	**2,887**	10.95
Level 4	711	6.74	1,995	17.44	301	6.88	**3,007**	11.40
Level 5	2,122	20.10	1,670	14.60	359	8.20	**4,151**	15.74
Level 6	2,503	23.71	940	8.22	853	19.48	**4,296**	16.29
Level 7	104	0.99	266	2.33	223	5.09	**593**	2.25
Level 8	73	0.69	0	0.00	416	9.50	**489**	1.85
Level 9	5	0.05	0	0.00	0	0.00	**5**	0.02
Total	**10,555**	**100.00**	**11,440**	**100.00**	**4,378**	**100.00**	**26,373**	100.00

Table A.12 MS-3 shell analysis results, DgRw 199-F1.

	Sample Weight (g)	Shell Weight (g)	% Shell by weight	% Mussel	% Clam	% Barnacle	% Other*
Level 1	3,313	105.5	3.18	55.0	21.9	18.5	4.6
Level 2	1,452	96.3	6.63	28.9	56.4	13.3	1.4
Level 3	3,138	689.0	21.96	54.1	24.2	19.7	2.0
Level 4	3,374	1,595.3	47.28	64.3	19.2	14.9	1.6
Level 5	2,690	1,589.1	59.07	55.9	22.0	17.7	4.4
Level 6	2,719	1,362.3	50.10	57.8	18.9	22.4	0.9
Level 7	2,576	142.9	5.55	58.2	20.9	20.4	0.5
Total	**19,262**	**5,580.4**	**28.97**	**58.1**	**21.3**	**18.3**	**2.3**

* Other = Oregon land snail, limpet, periwinkle, crab, whelk.

Table A.13 MS-9 shell analysis results, DgRw 199-F1.

	Sample Weight (g)	Shell Weight (g)	% Shell by weight	% Mussel	% Clam	% Barnacle	% Other*
Level 1	4,324	111	2.57	1.1	96.2	1.4	1.3
Level 2	3,522	89.3	2.54	2.5	95.5	1.6	0.4
Level 3	2,591	64.4	2.49	25.0	47.2	16.3	11.5
Level 4	3,146	135.2	4.30	42.0	42.7	8.8	6.5
Level 5	3,035	252.2	8.31	39.7	45.4	9.5	5.4
Level 6	3,226	827.0	25.64	54.1	26.1	16.8	3.0
Level 7	3,108	879.9	28.31	56.7	23.8	18.0	1.5
Level 8	2,315	890.9	38.48	55.6	20.9	21.3	2.2
Total	**25,267**	**3,249.9**	**12.86**	**49.8**	**31.0**	**16.5**	**2.7**

* Other = Oregon land snail, limpet, periwinkle, whelk.

Table A.14 Vertebrate fauna (NISP) from excavation units, DgRw 199-F9.

Taxon \ Excavation Unit	1	2	3	4	5	6	7	8	Total
FISH									
SCORPAENIFORMES (mail-cheeked fishes)				3					3
Ophiodon sp. (lingcod)							1		1
Scorpaenidae (scorpion/rockfish)		1							1
Sebastes sp. (rockfish)			6	1					7
Enophrys bison (buffalo sculpin)				4					4
Unidentified fish		1	17	15			2	1	36
Total Fish		**2**	**23**	**23**			**3**	**1**	**52**
BIRD									
Podicipedidae (grebe family)				1					1
Ardeidae (heron family)				1					1
ANSERIFORMES (waterfowl)						1	1		2
Anatini (surface-feeding duck tribe)				7					7
Aythyini (bay duck tribe)				3					3
Tetraoninae (grouse subfamily)				1		1		3	5
Columba sp. (pigeon)				1					1
Picidae (woodpecker family)				6					6
PASSERIFORMES (perching birds)				1					1
Corvidae (crow family)				2					2
Turdinae (thrush subfamily)			1	4				1	6
Unidentified bird			2	13				2	17
Total Bird			**3**	**40**		**2**	**1**	**6**	**52**
MAMMAL									
ARTIODACTYLA (even-toed ungulate)				1		1			2
Odocoileus sp. (deer)		4		2				6	12
Vespertilionidae (plainnose bat)				1					1
Procyon lotor (raccoon)				2				9	11
Leporidae (hare/rabbit family)		1							1
Oryctolagus sp. (domestic rabbit)				4		7	3		14

Table A.14 continued.

MYOMORPHA				1					1
Muridae (rat and mice family)				6					6
Microtus sp. (vole)				2					2
Peromyscus sp. (white-foot & pygmy mice)				1					1
Unidentified mammal		3	1	11	1	12	3	12	43
TOTAL MAMMAL		**8**	**1**	**31**	**1**	**20**	**6**	**27**	**94**
TOTAL FAUNA		**10**	**27**	**94**	**1**	**22**	**10**	**34**	**198**

Table A.15 Vertebrate fauna (NISP) from matrix samples, DgRw 199-F9

Taxon \ Level	1	2	3	4	5	6	Total
FISH							
Clupea harengus (herring)	1		1				2
Porichthys sp. (midshipman)	1						1
SCORPAENIFORMES (mailcheeked fishes)				1			1
Cottidae (sculpin family)			1	2			3
Scorpaenichthys marmoratus (cabezon)			2	3		1	6
Pholididae/Stichaeidae (gunnel/prickle-back)	4						4
PLEURONECTIFORMES (flatfishes)		1		2			3
Unidentified fish	26	11	10	37	1	6	91
Total Fish	**32**	**12**	**14**	**45**	**1**	**7**	**111**
BIRD							
PASSERIFORMES (perching birds)	1					1	2
Unidentified bird		3		7	1		11
Total Bird	**1**	**3**		**7**	**1**	**1**	**13**
REPTILE							
Colubridae (harmless snake family)				**2**		**1**	**3**
MAMMAL							
CARNIVORA	1						1
Leporidae (hare/rabbit family)	2						2
MYOMORPHA	1			1			2
Muridae (rat and mice family)	2		1	4		3	10
Microtus sp. (vole)		1	1	4			6
Peromyscus sp. (white-foot & pygmy mice)				1			1
Unidentified mammal	20	24	42	86	42	24	238
Total Mammal	**26**	**25**	**44**	**96**	**42**	**27**	**260**
TOTAL FAUNA	**59**	**40**	**58**	**150**	**44**	**36**	**387**

Table A.16. Comparison of vertebrate fauna, (NISP) by sample type, DgRw 199-F9.

Taxon \ Sample Type	Excavation Units	Matrix Samples	Total
FISH			
Clupea harengus (herring)		2	2
Porichthys sp. (midshipman)		1	1
SCORPAENIFORMES (mail-cheeked fishes)	3	1	4
Ophiodon sp. (lingcod)	1		1
Scorpaenidae (scorpion & rockfish families)	1		1
Sebastes sp. (rockfish)	7		7
Cottidae (sculpin family)		3	3
Enophrys bison (buffalo sculpin)	4		4
Scorpaenichthys marmoratus (cabezon)		6	6
Pholididae/Stichaeidae (gunnel/prickleback)		4	4
PLEURONECTIFORMES (flatfishes)		3	3
Unidentified fish	36	91	127
Total Fish	**52**	**111**	**163**
BIRD			
Podicipedidae (grebe family)	1		1
Ardeidae (heron family)	1		1
ANSERIFORMES (waterfowl)	2		2
Anatini (surface-feeding duck tribe)	7		7
Aythyini (bay duck tribe),	3		3
Tetraoninae (grouse subfamily)	5		5
Columba sp. (pigeon)	1		1
Picidae (woodpecker family)	6		6
PASSERIFORMES (perching birds)	1	2	3
Corvidae (crow family)	2		2
Turdinae (thrush subfamily)	6		6
Unidentified bird	17	11	28
Total Bird	**52**	**13**	**65**
REPTILE			
Colubridae (harmless snake family)		**3**	**3**
MAMMAL			
ARTIODACTYLA (even-toed ungulate)	2		2
Odocoileus sp. (deer)	12		12
Vespertilionidae (plainnose bat)	1		1
CARNIVORA		1	1
Procyon lotor (raccoon)	11		11

Table A.16 continued.

Taxon \ Sample Type	Excavation Units	Matrix Samples	Total
Leporidae (hare/rabbit family)	1	2	3
Oryctolagus sp. (domestic rabbit)	14		14
MYOMORPHA	1	2	3
Muridae (rat and mice family)	6	10	16
Microtus sp. (vole)	2	6	8
Peromyscus sp. (white-foot & pygmy mice)	1	1	2
Unidentified mammal	43	238	281
Total Mammal	**94**	**260**	**354**
TOTAL FAUNA	**198**	**387**	**585**

Table A.17 Vertical distribution of vertebrate fauna (NISP), DgRw 199-F9.

Level	EUs	%	MS	%	Total	%
Surface	12	6.1	0	0.0	12	2.1
Level 1	44	22.2	59	15.2	103	17.6
Level 2	56	28.3	40	10.3	96	16.4
Level 3	37	18.7	58	15.0	95	16.2
Level 4	33	16.7	150	38.8	183	31.3
Level 5	13	6.6	44	11.4	57	9.7
Level 6	3	1.5	36	9.3	39	6.7
Total	**198**	**100.0**	**387**	**100.0**	**585**	**100.0**

Table A.18 MS-6 shell analysis results, DgRw 199-F9.

	Sample Weight (g)	Shell Weight (g)	% Shell by weight	% Mussel	% Clam	% Barnacle	% Other*
Level 1	3779	1.8	0.05	0	16.7	0	83.3
Level 2	2806	1.7	0.06	0	35.3	0	64.7*
Level 3	3947	0.9	0.02	0	66.7	0	33.3
Level 4	4061	2.1	0.05	0	66.7	0	33.3
Level 5	4394	0.1	0.00	0	0	0	100
Level 6	4827	0.0	0.00	0	0	0	0
TOTAL	**23814**	**6.6**	**0.03**	**0.0**	**43.9**	**0.0**	**56.1**

* Other = all Oregon land snail (*Allogona* sp.) except level 2, with 5.4% crab shell by weight.

Appendix B Artifact Descriptions

Artifacts are defined as portable objects made or modified by humans (Renfrew and Bahn 1991: 41). Summary descriptions of the artifacts recovered from the cave and crevice burials along the False Narrows bluffs are presented below, according to material and method of manufacture. Where provided, dimensions are respectively: maximum length by maximum width by maximum thickness, measured in millimetres. Measurements in parentheses indicate that the artifact was incomplete in that dimension.

DgRw 199 Feature 1

A total of 145 artifacts or artifact fragments were recovered from DgRw 199-F1 in the course of two field projects in 1987 and 1992. Artifact numbers prefixed with an "F" were collected by Skinner in 1987; they were also assigned a sequential number consistent with the artifacts collected in 1992. In several instances, artifacts were broken and highly fragmented, so that the number of catalogued items is greater than the total number of artifacts represented. Where possible, broken artifacts were reconstructed.

Flaked Stone Artifacts (n=15)

Detritus (n=7)

Included in this category are all unmodified waste flakes and fragments originating as by-products of stone tool manufacture. The specimens from 199-F1 appear to be randomly distributed throughout the burial cave. They include five platform-bearing flakes (four complete, one proximal half), one piece of flake shatter, and a wedge-shaped block shatter with cortex cover. The flakes are relatively large, but none has cortex, indicating intermediate stages of lithic reduction. A variety of raw materials were used: basalt (n=3), quartzite (n=2), greywacke, and quartz porphyry.

Type	Length	Width	Thick
PB flakes-mean	24.4	22.1	5.0
-range	12.2-35.6	15.9-34.7	2.1-7.4
Flake Shatter	(30.2)	(18.0)	7.0
Block Shatter	(42.1)	(39.6)	(15.3)

Microblades (n=5) [Figure B.3: s-v, x]Microblades are defined as small, thin, narrow (< 10 mm) flakes with more or less parallel edges and triangular or trapezoidal cross-sections (Loy and Powell 1977). Although once thought to be a relatively recent introduction in the Fraser Delta cultural sequence (Borden 1970: 107), microblades are now known from a number of earlier Locarno Beach components, including Montague Harbour I (Mitchell 1971), Bowker Creek (Mitchell 1979b), Georgeson Bay I (Haggarty and Sendey 1976), and Millard Creek (Capes 1977).

The microblades from 199-F1 include two complete specimens (#49, #128), two large proximal fragments (#109, #125), and one medial section (#4). Two are slightly asymmetrical with expanding lateral margins; all have two dorsal arres and trapezoidal cross-sections. Three are made of banded black obsidian, and two of smoky grey obsidian. All were recovered from the west end of the burial feature (the "fissure", and EUs 10, 12, and 14). One of the microblades is unmodified, but the rest exhibit use-chipping along one or both lateral margins; one (#49) also has a small retouched notch on one lateral margin.

Cat #	Length	Width	Thick	Provenience
49	26.5	9.0	1.1	EU 10 level 2
128	25.8	8.3	0.8	EU 14 level 3
109	(17.6)	6.6	1.7	EU 12 level 4
125	(15.8)	5.4	0.8	EU 12 lev 5-8
4	(18.2)	6.7	1.3	fissure

Points (n=2) [Figure B.1: a, c]

Two flaked stone points were recovered from 199-F1. The first (#81) is a small, nearly complete tear-shaped biface of dark grey chert, from EU level 3 (Figure B.1a). The basal end exhibits a hinged fracture scar, obscuring evidence of the hafting style. Blade margins are contracting-excurvate. Dimensions (33.3) x 16.5 x 5.3.

The second point (#101) was collected from the surface of EU 12. It is a complete stemmed biface of medium-grained basalt with an asymmetric contracting-excurvate blade and slightly oblique base (Figure B.1c). One surface is coated with a mineral precipitate. Dimensions 55.4 x 20.7 x 6.8.

Utilized flake (n=1)

This category includes lithic detritus that has been modified as a by-product of task use. The single example in this assemblage (#100), from EU 11 Level 7, is a medium-grained basalt platform-bearing flake with cortex on the striking platform and along one lateral margin. The opposite lateral margin and the distal margin exhibit irregular bifacial micro chipping produced by use wear, possibly from slicing a soft wood or meat (G. Howe, personal communication). Dimensions 22.8 x 45.6 x 8.4.

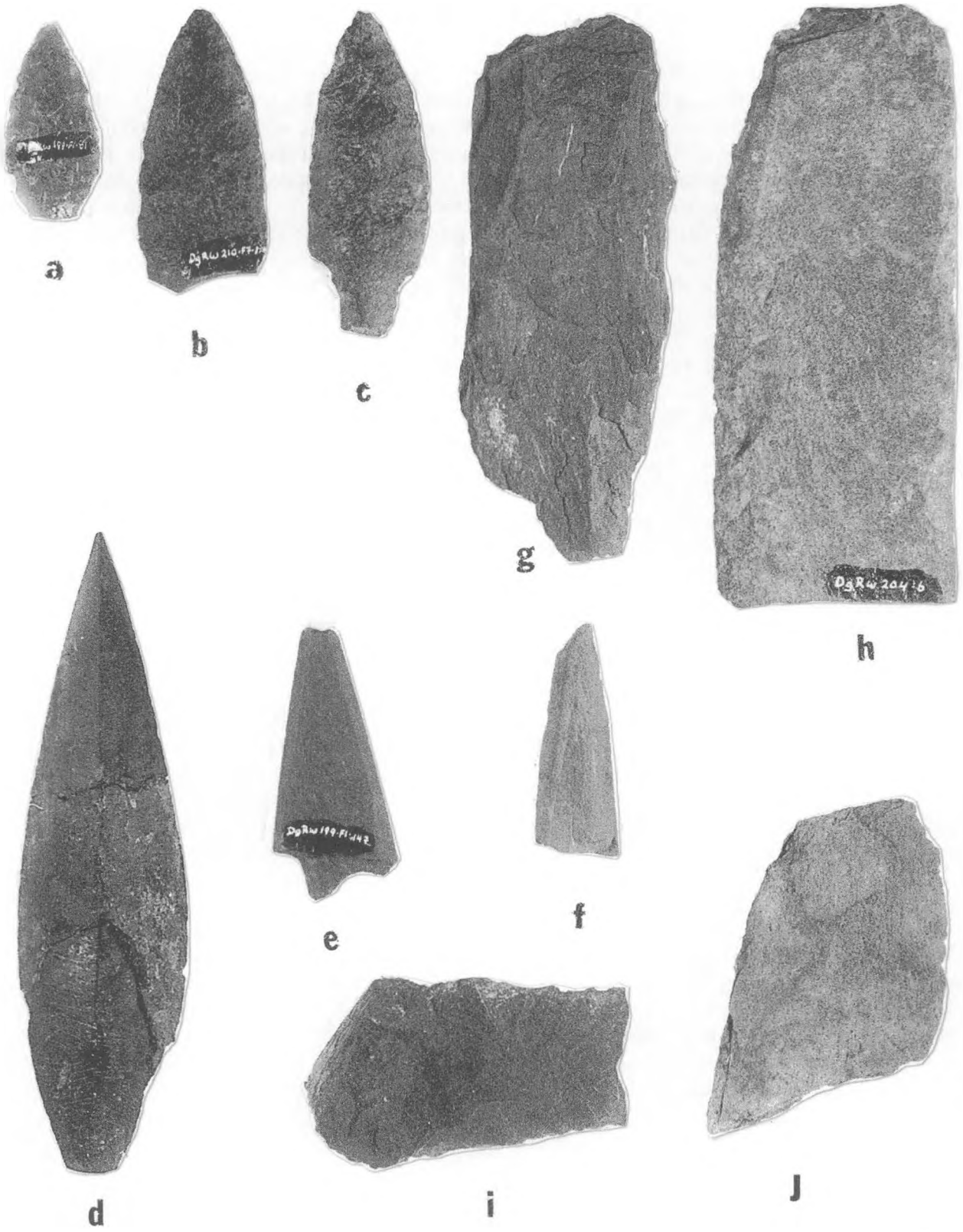

Figure B.1 Chipped and ground stone artifacts: a-c chipped stone projectile points; d-f ground stone projectile points; g,j: ground slate fragments; h: chipped slate knife/preform; i: ground slate knife fragment (actual size).

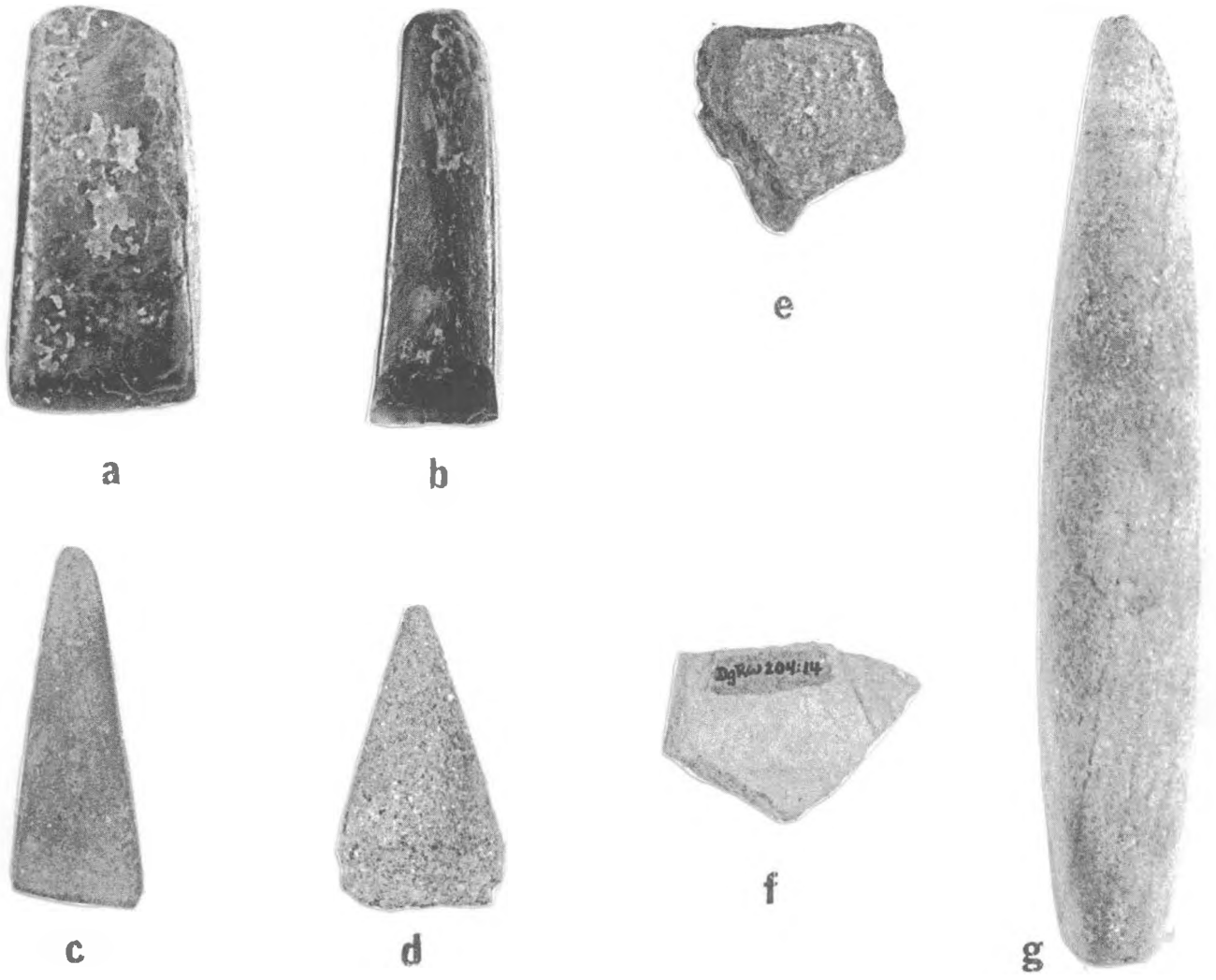

Figure B.2 Ground/pecked stone artifacts: a-b: celt/adze blades; c-d,f: shaped abrader fragments; e: polished sandstone fragment; g: atlatl weight (actual size).

Ground Stone Artifacts (n=25)

Celt/Adze blade (n=2) [Figure B.2: a, c]

Celts are hafted cutting tools, used primarily in woodworking. The two examples from this site have single bevelled bit elements with smoothly tapered ventral surfaces and straight working edges. Lateral margins are ground flat (#24) or slightly bevelled (#3). In both specimens, maximum width is attained at the bit end. Polls are asymmetrically rounded, gently curved on #24, and more strongly curved on #3. The bit on #3 has been re-sharpened. Both tools are made of nephrite/serpenti

Cat #	Length	Width	Thick	Provenience
3	58.2	18.8	11.3	Fissure
24	56.0	26.4	13.9	EU 7 level 7

Slate knife (n=1) [Figure B.1: i]

Ground slate knives are thought to have been used primarily in food preparation, particularly in the processing of fish. The single example (#28), from EU 8 level 3, is a fragment of a thin slate knife, with both surfaces ground smooth to an even thickness. Only a small portion of the original cutting edge is preserved; it exhibits moderate use polish and micro chipping. Borden (1970: 103) considered thin slate knives to be diagnostic of the Marpole phase, and thicker, heavier knives to be typical of the earlier Locarno phase. Thin slate knives are now known from both earlier and later contexts, although they are most abundant in Marpole components (Burley 1980: 22). Dimensions (49.1) x (37.6) x 2.4.

Slate point (n=1) [Figure B.1: e]

This incomplete specimen (#147) is missing both its tip and proximal end, so its original shape and

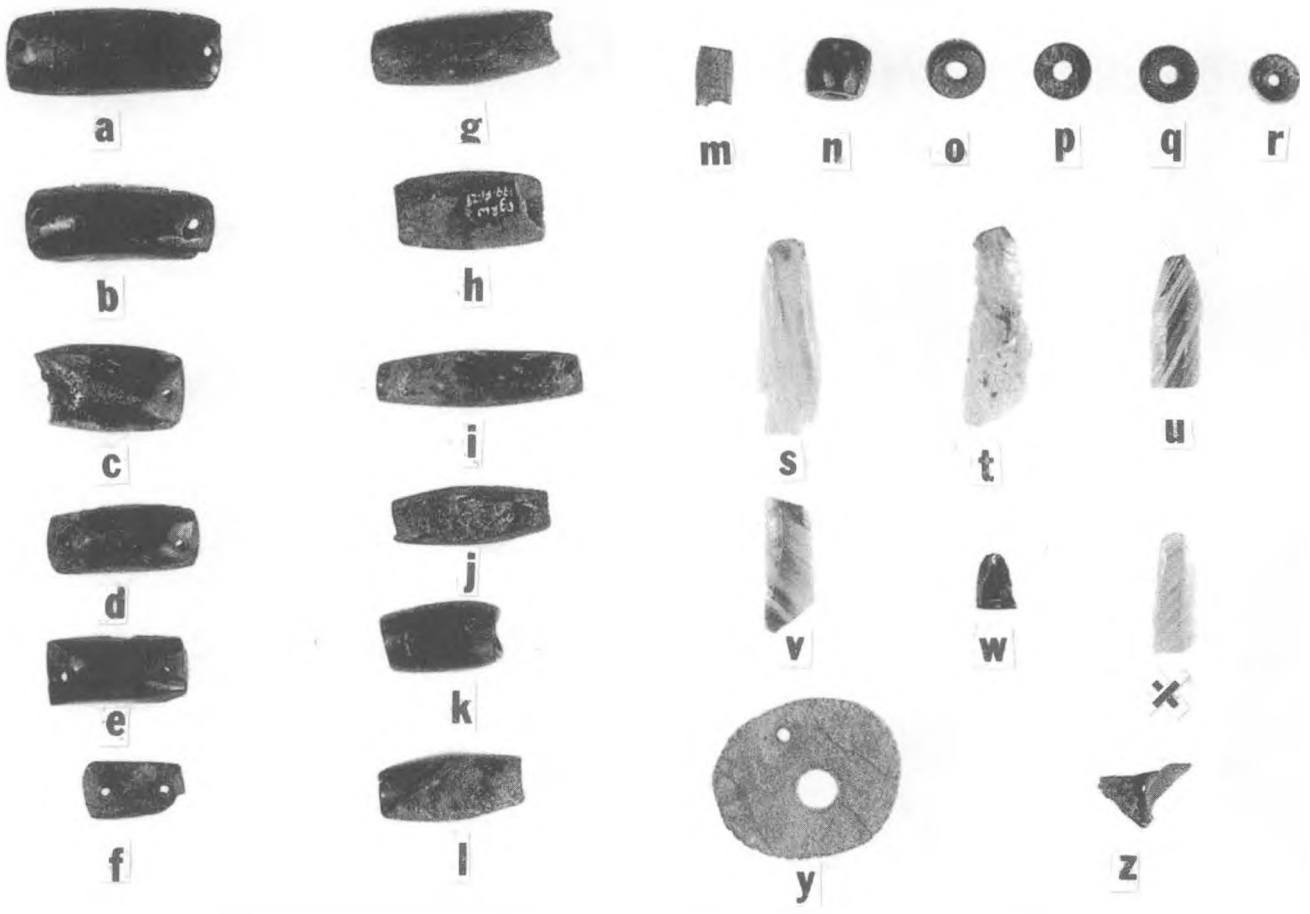

Figure B-3 Miscellaneous stone and copper artifacts: a-f: bilaterally drilled oval ornaments: g-m: barrel beads: n,r: thick faceted bead; o-q: disc beads; s-x: obsidian microblades; y: drilled pendant or "button"; z: perforated copper ornament (actual size).

hafting style are unknown. The recovered portion has straight blade margins with double bevelled edges producing a flattened hexagonal cross-section. It was found in EU 15 level 7. Dimensions (42.7) x (21.6) x 3.3.

Drilled oval ornaments (n=6) [Figure B.3: a-f]

These unusual objects are oval to subrectangular in outline, with flat ventral surface and domed dorsal surface, producing a plano-convex cross-section. The smallest specimen is flatter in section than the others. They resemble barrel bead blanks that have been sectioned longitudinally and biconically drilled at either end perpendicular to their longitudinal axis. All six examples are made of finely ground and polished soapstone (or coal?), and all have been burnt, leaving them slightly damaged and friable. Five of the six specimens are complete, and one is about two-thirds complete. Three show evidence of redrilling when drill holes originating on opposite surfaces did not meet.

Two similar artifacts were recovered from the Pender Canal site (DeRt 2), but they are not documented from other sites in the area (Dahm 1994: 56).

Cat #	Length	Width	Thick	Provenience
72	20.0	9.2	5.0	EU 11 level 1
102	24.8	10.3	5.6	EU 12 level 1
103	(20.1)	11.7	5.3	EU 12 level 2
108	13.3	7.9	2.5	EU 12 level 3
127	28.3	11.6	5.4	EU 14 level 3
129	18.5	9.2	4.7	EU 14 level 4

Pendant (n=1) [Figure B.3: y]

This object (#2; F77) was described as a "button" by Skinner, who collected it in 1987 from the "fissure" area of the burial feature, but it most likely served as a pendant. It is a flattened, slightly concave oval of fine siltstone with a shallowly notched margin on the concave surface, and two drilled holes. The larger biconically drilled hole is located near the centre of

the artifact; it has a maximum diameter of 5.4 mm. A smaller hole (maximum diameter 4.2 mm) located near the margin was drilled from the convex surface, and barely pierces the concave side. Dimensions 25.4 x 21.4 x 1.9.

Stone beads (n=12) [Figure B.3: g-r]

Ground stone beads of various sizes and shapes are known from a number of archaeological sites in the Gulf of Georgia region, dating approximately from 3500-1500 BP (Dahm 1994: 62-67). Four types of ground stone beads were found at 199-F1: symmetrical, round, highly polished disc beads (n=3, Figure B.3: o-q); thicker asymmetrical irregularly faceted beads (n=2, Figure B.3: n, r); small tubular/barrel beads (n=1, Figure B.3: m), and large barrel beads (n=6, Figure B.3: g-l). All have been biconically drilled, and all are made of soapstone (or coal?) except the small tubular bead which is mudstone. Two of the disc beads and all of the large barrel beads have been burned, perhaps during the cremation of their wearer. The barrel beads are oval in shape and are thicker through the middle than at either end. One of these has been reconstructed from two fragments recovered from different excavation units. The disc and thick asymmetric beads are all from the east chamber, and the barrel beads cluster in the west chamber.

Cat. #	Diam.	Thick	Hole	Provenience
Disc				
11	7.9	4.0	2.8	EU 3 level 4
13	7.8	3.4	2.2	EU 3 level 4
17	7.7	3.4	2.9	EU 4 level 2
Thick				
14	8.5	6.6	2.9	EU 3 level 4
22	6.8	4.7	2.7	EU 7 level 4
Barrel				
59	5.2	(8.0)	3.1	EU 10 level 4
32	7.7	26.8	3.2	EU 9 level 3
33	9.4	16.0	5.1	EU 9 level 3
35	9.0	19.1	3.6	EU 9 level 4
36	9.9	24.1	4.5	EU 9 level 4
45	8.0	20.9	2.8	EU 9 level 5
29/58	10.4	19.4	4.2	EU 8 level 3/ EU 10 level 4

Miscellaneous ground stone (n=2)

This category includes two broken fragments of artifacts, each with one surface that is ground and polished. The smaller of the two (#146) is a block of nephrite [(17.8) x (10.7) x (8.9)] with one ground convex surface. The other (#73) is a rectangular block of coarse red sandstone [(30.4) x (27.3) x (12.8)] with one surface ground flat and polished to a high sheen (Figure B.2: e). The size, shape, and function of the original artifacts is unknown.

Pecked and Ground Stone Artifacts (n=5)

Abraders (n=3) [Figure B.2: c-d]

Abraders are used in the production and rejuvenation of bone, antler, shell, and ground stone tools. Two of the examples from 199-F1 are small, carefully-shaped triangular abraders with smoothly ground margins and surfaces. One (#142) is made of very fine-grained sandstone, and has a rectangular cross-section and asymmetrical outline (Figure B.2: c). The other (#150), of coarse sandstone, has a flat ventral surface, vertical sides, and a faint median dorsal ridge, producing a flat pentagonal cross-section. This specimen is broken at the base, but retains traces of a circumferential groove, perhaps used for suspension from a cord or thong (Figure B.2: d). The third abrasive stone (#30), from EU 8 level 7, is an unshaped fist-sized sandstone cobble with one surface worn smooth; this may have been used as a planing tool in woodworking.

Cat #	Length	Width	Thick	Provenience
142	49.6	19.1	4.8	EU 13 level 6
150	(42.9)	23.5	9.1	EU 16 level 5
30	120.7	65.8	45.1	EU 8 level 7

Atlatl weight (n=1) [Figure B.2: g]

This nearly complete, boat-shaped artifact (#5, [F80]) is made of fine-grained laminated sandstone. It has an elongated outline with a flat to slightly convex base, tapered ends, and a hemispherical cross-section. One end is bluntly rounded and more steeply domed; both the top surface and lateral margins taper gently towards the other narrower end. The narrow end is broken near the tip; a 6.6 mm wide U-shaped notch scores the top of the artifact just above the fractured end. Dimensions 134.4 x 22.5 x 19.8.

Atlatl weights provided balance and weight to throwing boards, improving the accuracy of the hunter's aim. Such weights are known from sites in southwestern British Columbia dating from 3000 to 1500 years ago (Keddie 1988). Throwing boards gradually disappeared from the archaeological record after the introduction of the bow and arrow, which occurred sometime between 2500 and 2000 years ago, although the two co-existed for a period of time.

This specimen most closely resembles Butler and Osborne's (1959: 217) Type II atlatl weight, except that only one end is notched rather than both. Butler and Osborne suggest that Type II weights may be part of a continent-wide boatstone tradition. In the northwest, this style of weight is best known from the Columbia River and south-eastern Oregon, where they are found in burial, cremation, and habitation sites.

Hammerstone (n=1)

An otherwise unmodified flat oval cobble is battered at both ends and along the periphery of the narrowest margin, as a result of use as a hammerstone. The remainder of the rock is smoothly polished, as if water-rolled. Dimensions 126.4 x 85.0 x 42.3.

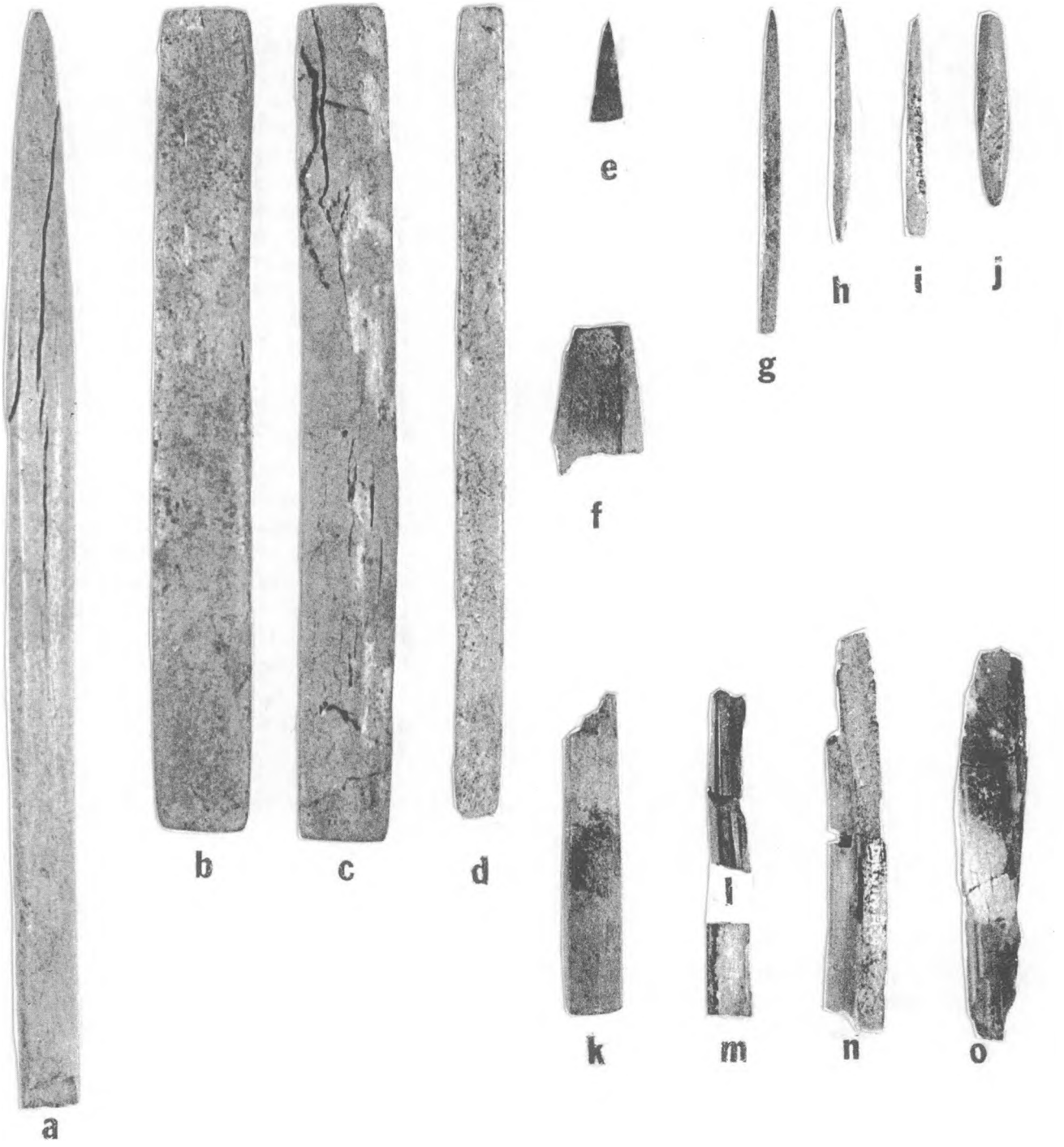

Figure B-4 Bone artifacts: a: harpoon foreshaft; b-d: worked mammal ribs; e: splinter awl tip; f: faceted point fragment; g-j: unipoints; k: worked bone fragment; l-o: fragments of unidentified bone objects (actual size).

Bone Artifacts (n=14 [25 pieces])

Awl fragment (n=1) [Figure B.4: e]

The tip of a long bone splinter awl was collected from EU 13 level 6. It has a rectangular cross-section, flat ground margins, and a double tapered tip with use polish. Dimensions (14.7) x (5.6) x 2.3.

Canid jaw (n=1)

This edentulous right maxilla (#1 [F76]) came from the fissure area during Skinner's 1987 project. The entire superior surface has been ground down to, and parallel with, the palatal surface, exposing the molar alveolar sockets (Skinner 1991: 52, Fig. 8). Portions of the ground surface are finely polished. No function is suggested. Dimensions 64.0 x 30.1 x 12.7.

Harpoon foreshaft (n=1) [Figure B.4: a]

A long cylinder of finely polished bone (#44) probably functioned as a foreshaft for a composite harpoon. The broken proximal end has an oval cross-section; the distal end is flattened on opposite surfaces, with rounded sides, and tapers to a blunt point. Dimensions (158.3) x 10.2 x 8.7; from EU 9 level 5.

Unipoints (n=3) [Figure B.4: g-i]

One broken and two complete bone unipoints were recovered from EU 16. These artifacts were used as arming points and barbs on a wide range of composite fishing tools (Ham 1982: 237). The largest (#149) is a finely-worked, symmetrical artifact with a rectangular cross-section, quadri-tapered end, and double bevelled base. The second complete unipoint (#153) is asymmetrical in shape, with a slightly rounded tip and a wedge-shaped base. The incomplete specimen (#154) is a badly weathered distal fragment with sub-circular cross-section and tapered end.

Cat #	Length	Width	Thick	Provenience
149	46.6	4.0	3.0	EU 16 level 4
153	33.6	3.4	2.7	EU 16 level 7
154	(31.2)	3.6	3.1	EU 16 level 8

Faceted point fragment (n=1) [Figure B.4: f]

A medial section of a faceted bone point was recovered from EU 9 level 6. The recovered portion has double bevelled, expanding margins and a hexagonal cross-section. The medullary canal is exposed on one surface. The artifact is charred black on one side, and discoloured on the other. Dimensions (21.7) x (14.9) x (6.5).

Unidentified bone object (n=1) [Figure B.4: l-o]

Twelve fragments of an unusual bone artifact were collected from the west chamber of the burial cave. Six of the pieces were found to articulate with other fragments, but the overall shape of the complete artifact is still unclear. It appears to have had a slender, elongated outline, with faceted margins, and longitudinal grooves or channels on at least two surfaces. All of the recovered fragments have been finely ground and polished, and all are burnt black to blue-grey in colour. The pieces are quite small, averaging 24.3 mm in length (range 11.5 - 48.2 mm). The majority (83%) were collected from the northeast quadrant of EU 9, predominantly from levels 4 and 5.

Miscellaneous worked bone (n=5)

Two long bone and two skull fragments have been minimally modified by sectioning, grinding, and/or polishing, but have not been shaped into formed tools. The worked long bones include an otherwise unmodified bird bone fragment with smoothly polished margins, and a small fragment of mammal bone with one surface ground flat. Two small, rectangular pieces of mammal skull have at least one sectioned margin; the remaining margins although not clearly cut, are smoothed and polished.

Whalebone bark shredder (n=1)

An incomplete bark shredder (#6, [F81]) was found in the fissure area of the burial cave, in direct association with an obsidian microblade (Skinner 1991: 54, Fig. 13). It is slightly curved antero-posteriorly, with bevelled, expanding lateral margins, a bevelled, finely serrated working edge, and a prominently shouldered handle. The proximal margin of the handle is notched in midline, and shaped like the tail flukes of a whale. A biconically drilled, 5 mm perforation marks the base of the handle. Dimensions 335 x (70) x 8.

Antler Artifacts (n=6 [51 pieces])

Carved art object (n=1 [6 pieces]) [Figure B.5]

This fragmentary object consists of six small, highly polished pieces of burnt antler, five of which articulate to form a triangular slab, one surface of which is carved with an elaborate curvilinear design. One lateral margin is marked bifacially by a shallow notch creating a short, blunt barb-like projection which is incorporated into the carved design; unfortunately only a small segment of this margin was recovered so the presence of other notches/barbs cannot be determined. The two other surfaces are highly polished but otherwise unmodified except for a deep, 11.1 mm long incised groove on the opposite side of the projection. The artifact is too incomplete to identify the figure(s)

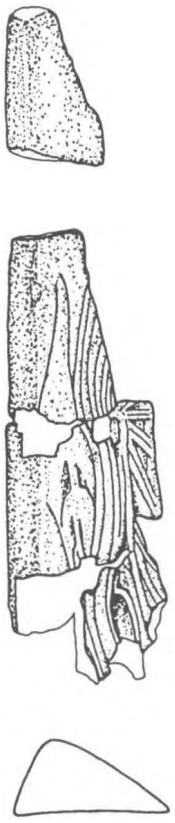

Figure B-5 Carved antler object (actual size).

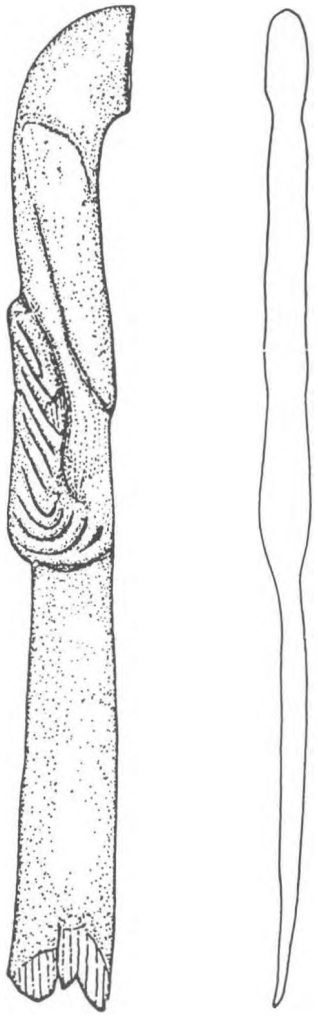

Figure B-6 Antler spoon fragment (actual size).

represented, but the design is reminiscent of one depicted on wooden board and box fragments recovered from a Skamel phase (ca. 1500-2000 B.P.) pithouse at the Esilao site (DjRi 5) in the Fraser Canyon (Borden 1983: 156, Fig. 8:28). The six pieces were found scattered through the burial feature, from relatively deep levels of EUs 9 and 10, to the upper five centimetres of EUs 3 and 4. Dimensions (61.6) x (18.7) x (10.4).

The presence of the barb/projection raises the possibility that this object may have been an elaborately carved harpoon or spear point, perhaps used only on ceremonial occasions. If so, it is very different from the other such objects described in the literature (Borden 1983: 144, Fig. 8:16c; Carlson 1983: 199, Fig. 11:1b; Smith 1903: 183, Fig. 52). Typically these artifacts have elaborate zoomorphic designs carved in the round on the haft element only. The artifact from 199-F1 differs both in shape (triangular slab), and in the area decorated (single surface, shaft/barb) from the examples reported elsewhere, and may be a unique example of early Northwest Coast art.

Spoon (?) fragment (n=1 [2 pieces]) [Figure B.6]

The spoon (#156) is represented by two articulating pieces, recovered from EU 13 level 4, which together form portions of the handle and bowl. The handle is roughly lenticular in cross section, and both surfaces are carved with the same figure, in mirror image, producing a rather flattened carving in the round. The recovered portion depicts the tail and posterior body of a zoomorphic figure, probably a wolf (R. Carlson, personal communication). The proximal end of the handle begins to curve abruptly to one side just below the fractured edge. The unadorned bowl fragment tapers gradually away from the handle, becoming increasingly concave distally. The distal end and one lateral margin of the bowl are missing. Dimensions (133.2) x (14.2) x (6.9).

Carved antler spoons are known from other archaeological sites in the region that are roughly contemporaneous with 199-F1. Four decorated wapiti antler spoons featuring geometric, anthropomorphic, and zoomorphic designs were found in a cache at

Musqueam Northeast (DhRt 4) that was dated between 600 and 700 B.C. (Borden and Archer 1975). Perhaps more relevant to Gabriola Island are the specimens recovered from mortuary contexts on Pender Island (Carlson 1991: 122-125) that are coeval with or slightly older than the earliest date of DgRw 199-F1. The Pender Island spoons are more elaborately carved than the Gabriola specimen, but they probably served a similar function, the ritual feeding of the dead.

Unilaterally barbed point (n=1) [Figure B.7: a]

Artifact #27 is a long, slender, unilaterally barbed antler point that has been decorated with incised parallel lines down the long axis of the shaft. It is badly weathered with the much of the outer surface exfoliated, but the incised lines appear to be present around the entire circumference of the shaft. It has three extended, triangular barbs and a tapered base with no modifications for line attachment, suggesting that it was a fixed point. There is evidence of post depositional distortion resulting in a slight lateral curvature and a more pronounced antero-posterior curvature, particularly near the distal end. Dimensions 235.o x 13.4 x 8.3; from EUs 7 and 8, level 6.

Unilaterally barbed harpoon fragment (n=1? [41 pieces]) [Figure B.7: b-q]

At least 41 fragments of what is probably the same unilaterally barbed antler harpoon were recovered from the west chamber of 199-F1. The majority (78%) were found in a 1 x 1 m area encompassing the south half of EU 12 and the north half of EU 11. The pieces are generally small (average length 20.0 mm, range 8.3 - 40.9 mm), cylindrical to semi-cylindrical in shape, and moderately burnt. Thirteen pieces were found to articulate with other fragments to form four slightly larger segments of the artifact. Twenty-seven of the fragments are incised with circumferential bands of short, parallel, vertical lines, enclosed by pairs of encircling horizontal lines. The remaining pieces attributed to this artifact are five barb and/or notch fragments, a point tip, a line guard fragment, and seven undecorated shaft fragments.

A unilaterally barbed harpoon decorated with the same geometric pattern was collected by H.I. Smith from a midden in North Saanich on Vancouver Island (Smith 1907: 353, Fig. 141a). Designs incorporating similar arrangements of vertical and encircling lines are also found on other artifacts (e.g., the small siltstone pestle from Whalen II), and persist into the Late Period of prehistory (Borden 1983: 159). Other geometric motifs are found on decorated harpoons from mainland sites including Port Hammond and Eburne (Smith 1903: 182, Fig.90).

Miscellaneous worked antler (n=2)

Two burnt cylindrical fragments of worked antler are probably from points similar to the ones described above, but lack evidence of barbs, notches, hafting style or decoration. One (#21), from EU 6 level 2, is burnt a deep grey; the other (#71), from EU 10 level 7, is discoloured to an orangey hue.

Shell Artifacts (n=22)

Dentalium shell beads (n=13) [Figures B.8: i-m; B.9)

At least nine species of scaphopod molluscs produce the characteristic tusk-shaped shell commonly referred to as dentalium (Barton 1994: 133). None are locally available around Gabriola Island, so the dentalium artifacts found there were probably obtained through trade. The nearest source would have been the west coast of Vancouver Island, although the Queen Charlotte Islands and Northern California may have also contributed dentalium to trade networks, at least in the protohistoric and historic periods (Barton 1994: 134).

The specimens from 199-F1 include 7 complete tubular beads, with both ends cut and polished; 3 incomplete beads, with one broken and one worked end; and 3 fragments with both ends broken. Average length of the complete beads is 14.3 mm (range 11.2 - 17.5 mm), with a mean maximum diameter of 3.6 mm (range 3.2 - 4.2 mm). One of the incomplete specimens has been carved with five rows of a geometric zigzag pattern (Figure B.9); interestingly, this bead fragment is larger than any of the complete beads (22.3 mm). All of the dentalium artifacts were recovered from the west chamber of the burial cave, from adjacent excavation units (EUs 11, 13, and 15).

Although Barnett (1955) reported that dentalia were not used by the ethnographic Coast Salish, they are well known from archaeological sites in the region, where they are most often found in mortuary contexts. The nearby False Narrows midden (DgRw 4) yielded nearly four thousand beads and fragments, including one that was carved in a continuous spiral design (Burley 1989: 129). Carved dentalia are less common, and presumably of greater value, than undecorated shells. Several dentalia with carved patterns similar to the one from DgRw 199-F1 were found associated with a 1500-year-old burial from the Tsawwassen site (DgRs 2), on the mainland (Curtin 1991a: 191). The zigzag motif is not limited to dentalia, however: Smith (1903:181) illustrates two geometrically carved bone objects from Port Hammond with similar patterns.

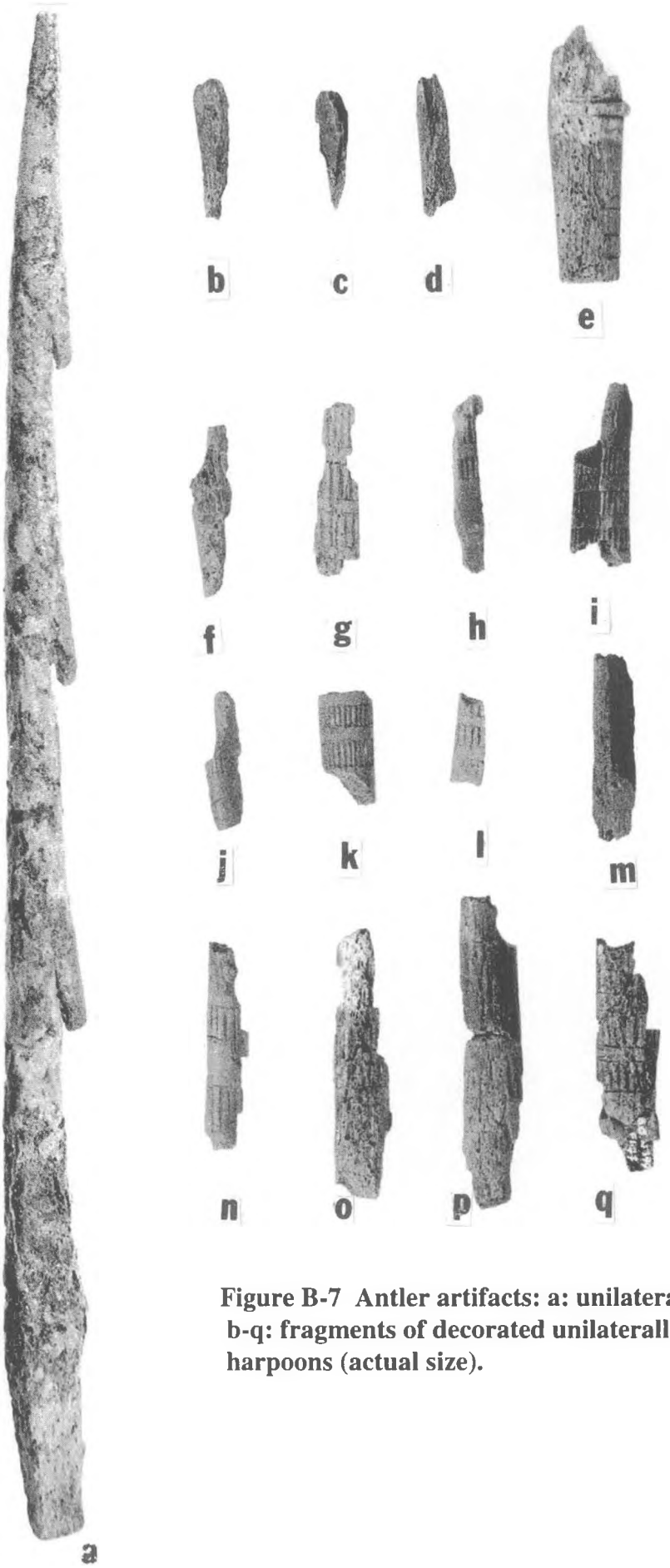

Figure B-7 Antler artifacts: a: unilaterally barbed point; b-q: fragments of decorated unilaterally barbed points or harpoons (actual size).

Pendants (n=3) [Figure B.8: e, f, h]

Three worked rectangular pieces of shell with drilled perforations are interpreted as pendants. The smallest (#53), made of thin clam shell, has a flat proximal end, slightly expanding lateral margins, and an irregularly notched inferior margin (Figure B.8: h). A 1.7 mm perforation located near the centre of the artifact was drilled unifacially from the outer surface.

An incomplete sea mussel ornament (#148) is broken along one edge (Figure B.8: f). The three intact margins and the outer surface have been ground flat. Two 2.5 mm perforations have been drilled unifacially from the outer surface along one of the long margins of the artifact; apparently one of the holes was too close to the edge to support its weight, necessitating the drilling of another.

The third pendant (#151), also made of sea mussel, has been reconstructed from two small pieces, but part of the inferior margin is still missing (Figure B.8: e). It is roughly rectangular in shape with margins and dorsal surface ground flat and a 2.3 mm perforation drilled unifacially from the outer surface. This artifact also has two shallow oval depressions ground on the outer surface near the proximal margin, one on either side of the perforation. All three pendants came from the west chamber of the burial cave.

Cat #	Length	Width	Thick	Provenience
53	19.1	13.5	1.0	EU 10 level 4
148	12.0	(26.7)	1.8	EU 15N lev 5
151	13.1	20.3	1.6	EU 16 level 5

Scallop shell fragments (n=3) [Figure B.8: c-d]

Three lateral valve fragments of weather vane scallop (*Pecten caurinus*) were recovered from 199-F1, two from the east chamber (EUs 1 and 3) and one from the west chamber (EU 10). Traditionally, scallop shells were perforated near the hinge, strung together on a wooden hoop, and used as rattles (Suttles 1990: 29), often forming part of the *sxwayxwey* dancer's paraphernalia (Suttles 1974: 225, 409). Although none of the three specimens from 199-F1 is a perforated hinge fragment, their lateral margins appear smoothed and rounded, possibly ground. They are clearly artifacts and not merely food remains. Pecten shell rattles are not common in prehistoric archaeological sites, but where found (e.g., False Narrows [DgRw 4] burial 23a-67), are generally interpreted as evidence of wealth or ritual (Burley 1989: 61).

Shell ornament (n=1) [Figure B.8: n]

An unusual ornament of unidentified shell (possibly abalone) was recovered from EU 14. Roughly hemispherical in shape, it has been carefully worked on both surfaces, and all margins are ground smooth. A key-hole shaped perforation extends from the flat margin to the centre of the artifact. A shallow groove runs obliquely across the centre of the outer surface, and margin of one of the "arms" has two shallow notches. It is unclear how this artifact would be used, although it has been suggested (G. Howe, personal communication) that it may have served as a nose ornament. Dimensions 15.7 x 22.0 x 1.6.

Miscellaneous worked shell (n=2)

Two small shell fragments (California mussel and clam) have ground and/or sectioned edges, but no discernible predetermined shape or inferable function. They may be portions of larger, broken tools or merely waste fragments from tool manufacture. The clam fragment is badly weathered, which may obscure other modifications.

Wood Artifacts (n=1)

Pointed wood object (n=1)

A worked piece of cedar, very similar to the wooden objects found in a cache at DgRw 213 (see Chapter 4), was collected from the surface of EU 10. It has double bevelled, expanding-parallel margins, and slightly convex upper and lower surfaces, producing a roughly lenticular cross-section. Both sides and surfaces are ground smooth, and taper gently to the faceted, bluntly pointed tip. Dimensions (63.5) x 12.5 x 4.7.

Copper Artifacts (n=1)

Drilled ornament (n=1) [Figure B.3: z]

A small, thin, rectangular piece of sheet copper (#105) has a single 1.2 mm perforation near the middle of one of the long margins. It may have formed one element of a composite ornament, such as a nosering or earring, or have been sewn to an item of clothing. The object is now bent and crumpled, but the original dimensions are estimated to have been about 15 x 8 x 0.4 mm; from EU 12 level 3.

Copper ornaments are not common in archaeological sites from the region, but a few ornaments and fragments were recovered from the False Narrows site (DgRw 4) on Gabriola Island (Burley 1989: 130), and a possible copper pendant from DgRx 11, near Nanaimo (Murray 1982: 306).

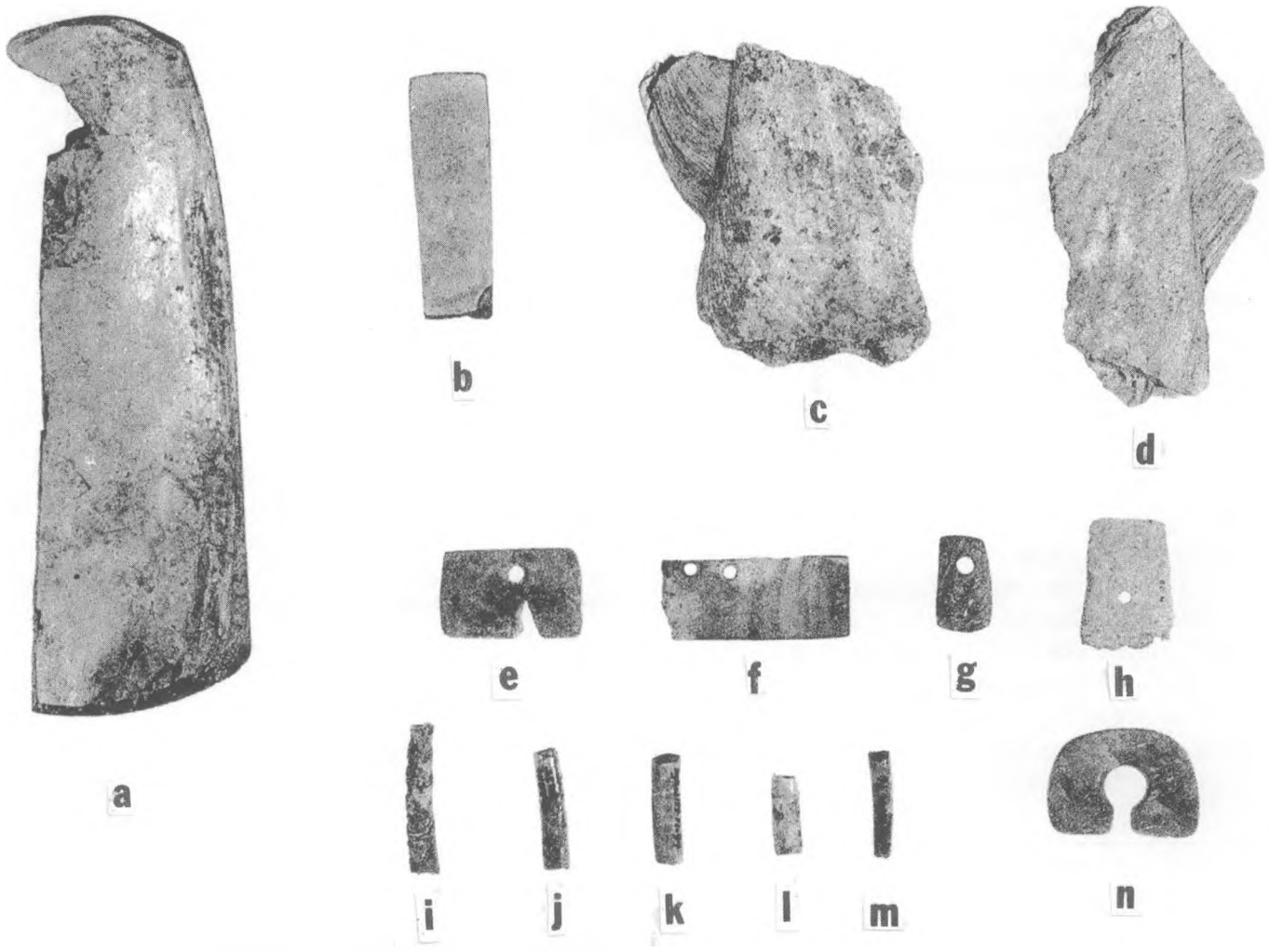

Figure B-8 Shell artifacts: a-b: adze blades; c-d: worked scallop shell fragments; e-h: drilled shell ornaments; i-m: dentalia beads; n: possible nose ornament (actual size).

DgRw 199 Feature 9

The artifact inventory from DgRw 199-F9 consists of eight items: one ground slate point fragment, one flaked core, and six pieces of flaking detritus.

Flaked Stone Artifacts (n=7)

Flaked core (n=1)

Cores are remnant blocks of stone from which flakes have been removed for tool manufacture. The single example from F9 is a water-rolled greywacke cobble fragment with small areas of polished cortex present on two faces. At least seven flake scars are pre sent, but there is no discernible pattern to their detachment. Dimensions 90.7 x 85.4 x 52.4; from EU 3 level 7.

Lithic detritus (n= 6)

Six large unmodified platform-bearing flakes were recovered from F9. Four of the six retain remnants of outer cortex, indicative of early stages of lithic reduction. Two flakes with cortex-covered striking platforms and dorsal surfaces are probably primary decortication flakes. Raw materials include coarse-grained basalt (n=3), light green felsite, reddish grit-stone, and greywacke.

Cat #	Length	Width	Thick	Provenience
1	26.8	17.7	4.2	EU 1 level 5
2	32.3	36.8	9.5	EU 1 level 6
3	51.7	27.4	12.2	EU 2 level 2
6	63.7	57.6	15.4	EU 5 level 4
7	48.0	38.1	16.6	EU 5 level 5
8	(25.4)	(31.0)	3.4	EU 6 level 3

Ground Stone Artifacts (n=1)

Ground slate point fragment (n=1) [Figure B.1: f]

This fragment (#4) appears to be from a thick faceted ground slate point that has been split transversely so that only one worked surface is present. It has an elongated triangular shape with a flat surface and steeply bevelled margins. Dimensions (40.6) x (14.3) x (3.6); from EU 3 level 7.

DgRw 204 Feature 1

A total of 57 artifacts were recovered from DgRw 204-F1: 50 made of stone, 4 of shell, and 3 of bone. Only those recovered from the upper four levels of the deposit are potentially associated with the human remains; the remainder date to an earlier transitory use of the cave as a temporary shelter.

Flaked Stone Artifacts (n=45)

Cobble chopper (n=1)

A fist-sized wedge-shaped greywacke cobble has been modified into a chopping tool by unifacial removal of three flakes from the narrow end, producing a steep (ca. 80° angle) working edge measuring 45 mm. The remainder of the surface is cortex. Dimensions 78.0 x 87.7 x 37.3; from EU 2 level 13.

Detritus (n=40)

The largest class of artifacts from DgRw 204-F1, lithic detritus includes 13 platform-bearing flakes, 24 pieces of flake shatter, and 3 pieces of block shatter. Most are relatively large in size, and retain remnants of cortex on striking platforms and/or dorsal surfaces, indicative of the early stages of lithic reduction, or perhaps the testing of cobbles for flaking suitability. The most common raw material is medium to coarse-grained basalt, but granite diorite, shale, slate, greywacke, and several unidentified coarse-grained rocks with crystalline inclusions were also used.

Lithic detritus has a non-random distribution at the site: the majority (65%) were recovered from EU 3, and none was found in the inner, eastern recess of the rockshelter where the human remains were concentrated. The vertical distribution confirms the lack of association with the human remains: 75% of the detritus came from the deeper, pre-burial deposits.

Type	Length	Width	Thick
PB flake-mean	29.4	29.0	7.7
-range	14.7-72.7	12.9-65.5	1.4-18.1
Shatter-mean	(23.8)	(16.8)	(3.9)
-range	10.4-42.2	5.1-41.6	0.8-10.1
Block-mean	35.3	23.0	15.1
-range	23.2-46.8	11.8-37.7	10.3-18.8

Flaked slate knife (n=1) [Figure B.1: h]

A rectangular piece of slate has bifacial retouch along one long, slightly convex margin; the opposite margin has been intentionally blunted by grinding. This is interpreted as a flaked knife, but the absence of use wear along the prepared edge raises the possibility that it is a blank or preform for a ground slate knife. Dimensions 41.5 x 101.5 x 8.6; from EU 1E, level 4.

Obsidian microlith (n=1) [Figure B.3: w]

This artifact resembles the proximal end of a microblade, but too little is present to be certain of the original shape. It is made of opaque black obsidian, and has two dorsal arres and a trapezoidal cross-section. There is no evidence of retouch or use wear along the extant margins. Dimensions (7.8) x 5.7 x 1.6; from EU 2, level 4.

Pièce esquillée (n=1)

Used for splitting bone and antler, these artifacts are characterized by bipolar battering and flaking, producing a double wedge shape (Loy and Powell 1977). This example is a rectangular piece of medium-grained basalt with battering on both sides of the dorsal face, and a small area of retouch on the ventral distal margin. The proximal end is cortex-covered. Dimensions 26.0 x 31.3 x 8.6; from EU 2N, level 4.

Retouched flake (n=1)

A large flake of heat-treated shale has been modified by continuous bifacial retouch along the entire 49 mm long distal margin, and exhibits use polish of the same edge. Dimensions (55.6) x (71.5) x (10.9); from EU 3N level 4.

Ground Stone Artifacts (n=3)

Slate point (n=1) [Figure B.1: d]

A virtually complete thin, leaf-shaped projectile point was reconstructed from three fragments found at opposite ends of the burial feature: EU 1S level 2; EU 3 level 2; and EU 3N level 3. Both faces of this finely-worked tool have a median longitudinal ridge which tapers gently towards the lateral margins, producing a double tapered, diamond-shaped cross-section. The base is narrow and ground to a blunt convex curve. Dimensions 111.1 x 29.2 x 4.9.

Miscellaneous ground slate fragments (n=2) [Figure B.1: g, j]

Two rectangular pieces of slate may represent

fragments of a larger artifact such as a knife. Both exhibit grinding along one extant margin, and irregular discontinuous flaking along another margin; in both cases ventral and dorsal surfaces are unmodified.

Cat #	Length	Width	Thick	Provenience
53	(55.9)	(32.5)	(4.0)	EU 3N level 1
58	(36.2)	(93.3)	(5.6)	EU 3N level 4

Pecked And Ground Stone Artifacts (n=1)

Abraders (n=1) [Figure B.2: f]

A fragment of a probable shaped abrader (#14) was recovered from EU 2 level 13. The shape of the complete artifact is indeterminable, but the small section of original margin that was preserved is ground to a smoothly convex edge. Both surfaces are lightly ground and shallowly indented, and one exhibits a narrow linear groove. Dimensions (34.2) x (27.3) x 7.0.

Bone Artifacts (n=3)

Worked ribs (n=2) [Figure B.4: b, d]

Two carefully worked rectangular sections of mammal rib were recovered from F1. They are approximately the same length, but one is twice as wide as the other. Both are ground and polished on all surfaces and margins; the larger has two blunt ends, the smaller one blunt end and one slightly bevelled. They were found in EU 1SE, at the base of a chimney-like crevice connecting F1 with F6, where a similar artifact was recovered (see below). It seems likely that these two items were originally deposited in F6, but worked their way down the chimney to be redeposited in F1. Burley (1989: 115) describes 5 worked ribs recovered from the False Narrows site, but his specimens are somewhat shorter, wider, and thicker than these. These artifacts have no apparent utilitarian function, although Smith (1903: 165) suggested that similar bone objects from Port Hammond may have served as net gauges.

Cat #	Length	Width	Thick	Provenience
4	118.0	8.1	3.3	EU 1SE level 1
5	119.2	16.4	3.9	EU 1SE level 1

Bone unipoint fragment (n=1) [Figure B.4: j]

The basal end of an incomplete bone unipoint (#45) was collected from EU 3 level 12. It has an asymmetric hexagonal cross-section and a blunt faceted proximal end. Unipoints are often used as components in composite fishing tools; this specimen may have functioned as a barb from a leister or fish gorge. Dimensions (27.8) x 5.5 x 3.9).

Shell Artifacts (n=4)

Celts/Adze blades (n=2) [Figure B.8: a, b]

These two artifacts are both made from sea mussel shell (*Mytilus californianus*). The larger (#2) is broken longitudinally with one lateral margin missing but most of the poll intact (Figure B.8: a). It has been carefully shaped with all extant margins and the distal third of the dorsal surface ground smooth. Although incomplete, it appears to have had expanding lateral margins, so the greatest width would have fallen at the bit end. The bit has a steep single bevel (ca. 60°) with a convex outline; the poll is also concave, and exhibits evidence of battering.

The smaller, complete adze blade (#9) is rectangular in shape with all edges ground smooth (Figure B.8: b). The poll end is slightly convex and the sides are straight and gently converging so its narrowest width is at the bit end. The bit is single bevelled with a 40° edge angle; its outline is incomplete due to use chipping of the dorsal surface.

Cat #	Length	Width	Thick	Provenience
2	98.2	(30.7)	3.0	EU 1 level 1
9	35.1	11.2	2.3	EU 2 level 3

Shell ornament (n=1) [Figure B.8: g]

This artifact is a small, thin, rectangular piece of iridescent shell (abalone?) with all four margins ground smooth and a 2.4 mm perforation at one end. It is probably too small and light to have served as a pendant, but may have been one element of a composite ornament, such as a headdress, earring, nose ring, or decorated clothing fringe. Dimensions 14.0 x 8.1 x 0.6; from EU 2 level 4.

Miscellaneous worked shell (n=1)

This small amorphous piece of clam shell has no discernible shape or identifiable function, but its margins appear to have been ground smooth rather than broken. Dimensions 27.1 x 12.7 x 1.6; from EU 2 level 5.

DgRw 204 Feature 6

Only two artifacts were recovered from this burial feature, although it is probable that at least two, and possibly more of the artifacts found in 204-F1 were originally deposited in Feature 6 (see above).

Bone Artifacts (n=2)

Worked rib (n=1) [Figure B.4: c]

This artifact (#59) is virtually identical to one (#5) recovered from DgRw 204-F1, although in much more fragile condition, with exfoliating outer surface. It is a section of mammal rib that has been ground and polished on all margins and surfaces. The cut ends are both blunt. Dimensions 121.1 x 15.8 x 4.0; from EU 4 level 2.

Shaped bone fragment (n=1) [Figure B.4: k]

A rectangular piece of bone with one cut and polished end and the other end snapped off, this shaped artifact fragment has been ground and polished on all surfaces, and is moderately charred from exposure to fire. The four surfaces are flat to lightly faceted, producing a rectangular to pentagonal cross section. The completed shape and function of the original artifact are unknown. Dimensions (45.7) x 10.0 x 7.6; from EU 4 level 4.

DgRw 204 Miscellaneous

Antler tine wedge (n=1)

Antler wedges are heavy splitting tools used primarily for woodworking. This complete antler tine wedge was collected from a crevice approximately 20 m northwest of DgRw 204-F5, but does not appear to be directly associated with a burial (illustrated in Curtin 1991b: 82, Figure 13). It has a single tapered edge, convex tip with use chipping, and a battered, slightly splintered poll. Dimensions 103.5 x 29.6 x 30.4.

DgRw 210 Feature 7

Flaked point fragment (n=1) [Figure B.1: b]

Although this burial feature was not excavated, a projectile point fragment was collected from the surface when the site was revisited in 1992. It consists of the tip and medial section of a well-made basalt point with slightly asymmetrical contracting-excurvate blade margins. The proximal end is broken off, obscuring evidence of the hafting mechanism. A small area of cortex is present on one lateral margin near the fractured end, suggesting that the point may have broken during manufacture. Dimensions (48.3) x 22.2 x 6.5.

Appendix C Osteological Data Comparisons

Table C.1 Frequency of identified skeletal elements (percent) in excavated burial features.

Element	199-F1	199-F9	204-F1	204-F2	204-F6
Skull	8.36	6.23	1.98	4.12	0.17
Mandible	0.61	0.68	0.76	0.34	0.17
Loose tooth	0.87	1.32	5.95	2.75	1.17
Hyoid	0.02	0.06	0.15	0.17	0.00
Throat cartilage	0.02	0.02	0.00	0.00	0.00
Cervical vertebra	0.82	1.41	3.51	4.47	0.84
Thoracic vertebra	1.05	2.17	3.21	1.72	2.35
Lumbar vertebra	0.52	0.97	1.68	1.37	1.34
Misc. vertebra	1.72	2.23	1.53	2.92	1.85
Ribs	4.37	7.55	4.27	7.73	2.18
Sternum	0.09	0.18	0.46	0.00	0.00
Clavicle	0.16	0.26	0.92	1.03	1.01
Scapula	0.45	0.68	1.83	1.55	1.17
Humerus	0.49	1.05	1.37	1.03	1.34
Radius	0.20	0.36	1.07	1.20	0.67
Ulna	0.27	0.49	0.92	1.03	0.84
Carpal	0.41	0.69	1.37	3.78	0.00
Metacarpal	0.39	0.81	3.36	2.92	0.17
Hand phalanx	1.18	1.97	6.26	7.90	1.51
Innominate	0.95	1.67	1.22	1.37	1.51
Sacrum	0.25	0.38	0.00	0.69	0.84
Femur	0.63	1.81	1.37	0.86	2.18
Tibia	0.34	1.01	1.68	0.69	1.85
Fibula	0.23	1.03	0.61	0.86	2.01
Patella	0.08	0.21	0.46	0.69	0.00
Tarsal	0.58	1.08	3.21	3.09	2.35
Metatarsal	0.54	0.89	4.58	3.44	1.68
Foot phalanx	0.64	0.90	2.75	3.44	1.01
Humerus/femur/tibia	10.18	3.95	0.76	0.00	0.00
Radius/ulna/fibula	4.94	1.97	0.92	0.00	0.34
Miscellaneous long bone	6.16	5.69	1.37	1.72	3.69
Miscellaneous hand/foot	0.80	0.32	0.76	1.37	1.51
Unidentified fragment	51.68	49.95	39.69	35.74	64.26
Total	100.00	100.00	100.00	100.00	100.00

Table C.2 Comparison of reconstruction statistics for excavated burial features.

	199-F1	199-F9	204-F1	204-F2	204-F6
% Reconstructed	7.50	9.79	7.33	6.36	8.89
Mean HD Score	1.34	1.44	2.12	1.67	1.56
Mean VD Score	1.52	1.59	1.64	1.42	4.25
Mean TS Score	2.85	3.02	3.76	3.08	5.81

Table C.3 Comparison of age profiles of excavated burial features.

Age Class	199 F1		199 F9		204 F1		204 F2		204 F6	
	n	%	n	%	n	%	n	%	n	%
Infant	14	11.9	2	11.1	1	20.0	1	33.3	0	0.0
Child	7	5.9	1	5.6	0	0.0	0	0.0	0	0.0
Adolescent	2	1.7	0	0.0	1	20.0	0	0.0	1	33.3
Adult	95	80.5	15	83.3	3	60.0	2	66.7	2	66.7
Total MNI	**118**	**100.0**	**18**	**100.0**	**5**	**100.0**	**3**	**100.0**	**3**	**100.0**

Table C.4 Comparison of adolescent/adult sex estimates for excavated burial features.

Sex	199 F1[1]		199 F9[2]		204 F1		204 F2		204 F6	
	n	%	n	%	n	%	n	%	n	%
Male	37	38.1	7	46.7	1	25.0	1	50.0	1	33.3
Female	30	30.9	4	26.7	1	25.0	1	50.0	2	66.7
Unknown	30	30.9	4	26.7	2	50.0	0	0.0	0	0.0
TOTAL	**97**	**100.0**	**15**	**100.0**	**4**	**100.0**	**2**	**100.0**	**3**	**100.0**

[1] Sex estimates based on mandibular morphology. [2] Sex estimates based on cranial morphology.

Table C.5 Comparison of burning patterns for excavated burial features.

Burning By Age Class	199-F1	199-F9	204-F1	204-F2	204-F6
Immature: % burnt	34.6	33.9	0.0	2.2	0.0
Immature: % of burnt bone that is calcined	18.7	6.9	--	0.0	--
Adult: % burnt	86.6	73.9	0.8	11.8	0.0
Adult: % of burnt bone that is calcined	38.7	31.6	33.3	0.0	--
Total: % burnt	85.1	77.5	1.1	10.3	0.0
Total: % of burnt bone that is calcined	44.3	46.0	14.3	0.0	--

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