FERNDALE IN PREHISTORY:

Archaeological Investigations in the Lower and Middle Nooksack Valley

GARLAND F. GRABERT

Occasional Paper #19
Center for Pacific Northwest Studies
Western Washington University

FERNDALE IN PREHISTORY:

Archaeological Investigations in the Lower and Middle Nooksack Valley

GARLAND F. GRABERT

Occasional Paper #19
Center for Pacific Northwest Studies
Western Washington University

Printed at Western Washington University
Bellingham, WA 98225
October 1983

PREFACE

Although numbered nineteenth in our series of Occasional Papers this is, in fact, our twentieth publication since we began our publishing activities a decade ago. It is also the first devoted to an archaeological topic, although papers by anthropologists have appeared in earlier volumes.

Dr. Garland Grabert, Professor of Anthropology at Western Washington University since 1967, has established for himself a notable reputation in the field of Pacific Northwest archaeology. His reports on archaeological digs in various parts of western and central Washington are well-known to scholars of the discipline. It is with genuine pleasure, therefore, that we welcome this contribution--one that adds something to the science of archaeology, but also a new dimension to the study of the local history of Whatcom County—to our series.

Our sole regret is that it could not have been published earlier; financial exigencies and a lengthy backlog of other research papers prevented this. However, it is our hope that being included in the Center's Occasional Papers series the volume will reach a rather different and perhaps much wider audience than it would by being included in a specialist series.

James W. Scott
Director

FOREWORD

During the eleven years that have elapsed since the original field work on this site was done numerous archaeological data and publications have appeared that make it necessary to partially revise the original manuscript. Several models have since been proposed which in some measure explain the development of historic Northwest Coast Culture. The chronology of the earlier periods, first well defined in the Fraser Canyon by Borden, has been in large measure extended to the Fraser Delta and the immediate region around it. A clearer picture of central Northwest Coast Culture origins emerges. It is by no means complete. What we can now do is to ask ever more sophisticated questions of the data. The answers also are expectably more sophisticated.

Much of the increased understanding is due to the present generation of advanced students and the recognition of the importance of regional prehistory. The established workers of two or three decades ago are by no means to be ignored; to them goes much of the credit for pioneering research and the esablishment of frameworks for understanding. From the early 1950s onward we can also trace the development of increasingly appropriate and productive research designs.

There is increased public awareness of the value of archaeological sites. Rarely are they considered only as topographic oddities, related only remotely to prehistoric Native American settlements. More and more there is recognition of their value as landmarks of the past, places where the business of living went on, and as an integral part of a cultural heritage. Their content, structure and space-time relationships form part of a dimly-seen history whose interpretation demands the ultimate in precision in dissection and analysis. Even more is there a need for preservation rather than indiscriminate digging. Problems of prehistory that we cannot foresee may well arise, and the value of these irreplaceable cultural resources cannot even begin to be appreciated until they are gone.

This monograph represents a descriptive statement, placing the site and its environment on the record. It also attempts to provide a preliminary effort at placing the site and adjacent ones into a regional perspective of cultural development.

G. F. G.

ACKNOWLEDGMENTS

Special thanks are due Mr. Robert G. Smith, Ferndale, Washington, for his permission to excavate the site. His interest and concern are gratefully remembered. The students who worked at the site during the spring and summer of 1972 are too numerous to list here. However, those whose special contributions should be mentioned were Paul and Kim Schwarzmann, Linda Strickland, Dan and Jean Vaughan, and John and Sue Wiggs. Robert Brummel and Gene Griffin ably assisted with the faunal analyses and the tabulation of artifacts. Last but not the least, funds for radiocarbon assays from this and another site were provided by the Bureau for Faculty Research at Western Washington University. To all these persons and offices, as well as many others, I owe much for making this report possible.

CONTENTS

FIGURES

TABLES

INTRODUCTION

The site described in this report lies at the northeastern city limits of the town of Ferndale, Washington. It is presently about six and one-half miles from Bellingham and Lummi Bays. Situated about 50 meters from the present Nooksack River channel, it lies on a low ridge on the active flood plain. The elevation is 9.6 meters above sea level and near the foot of a terrace at the 14-15 meter elevation (Figures 1 and 2). Immediately to the north and south of the small habitation area are flood channels. The one to the north is partially filled and tiled to permit cultivation. The habitation area occupies no more than about 35 meters east-westerly by about 20 meters in north-south dimension.

A riverine environment in the Coast Forest Biotic Zone of Washington provided a large and varied seasonal floral resource base for the inhabitants. Hunting and fishing may also have been an attraction. Since we do not know what the configuration of the river was prior to channel stabilization, it is difficult to state what methods of fishing were used or the effectiveness of the location as a fishery.

In a matter of two score or so miles, environments from the littoral and estuarine to the Mountain Forest Zones could be traversed. To the northeast the Fraser Canyon was accessible via the Sumas River valley. Easy passes through the Chuckanut Mountains allowed land travel to the Skagit Delta, Puget Sound and points farther south. This says nothing about the accessibility of southern points by water. Farther inland the valley of the South Fork of the Nooksack River and the Samish River provided access to the Skagit Valley from Burlington to modern Sedro Woolley to the east.

The higher terrace at the site still bears stands of Western Red Cedar (Thuja plicata), some Hemlocks (Tsuga heterophylla), and Douglas Fir (Psuedotsuga menziessi). Little of the original timber cover on the active flood plain remains. River banks are presently bordered by a gallery of Maples (Acer macrophyllum), Alder (Alnus species), and Northern Black Cottonwood (Populus trichocarpa). The major part of the active flood plain is now in cultivation or in pasture, but occasional bog ponds attest to the essentially swampy nature in prehistoric and early historic times. Flora present at the site today consists of briars, alders, and a variety of grasses and nettles. Some cedars had been present in the midden area and, in fact, postdated the midden deposition.

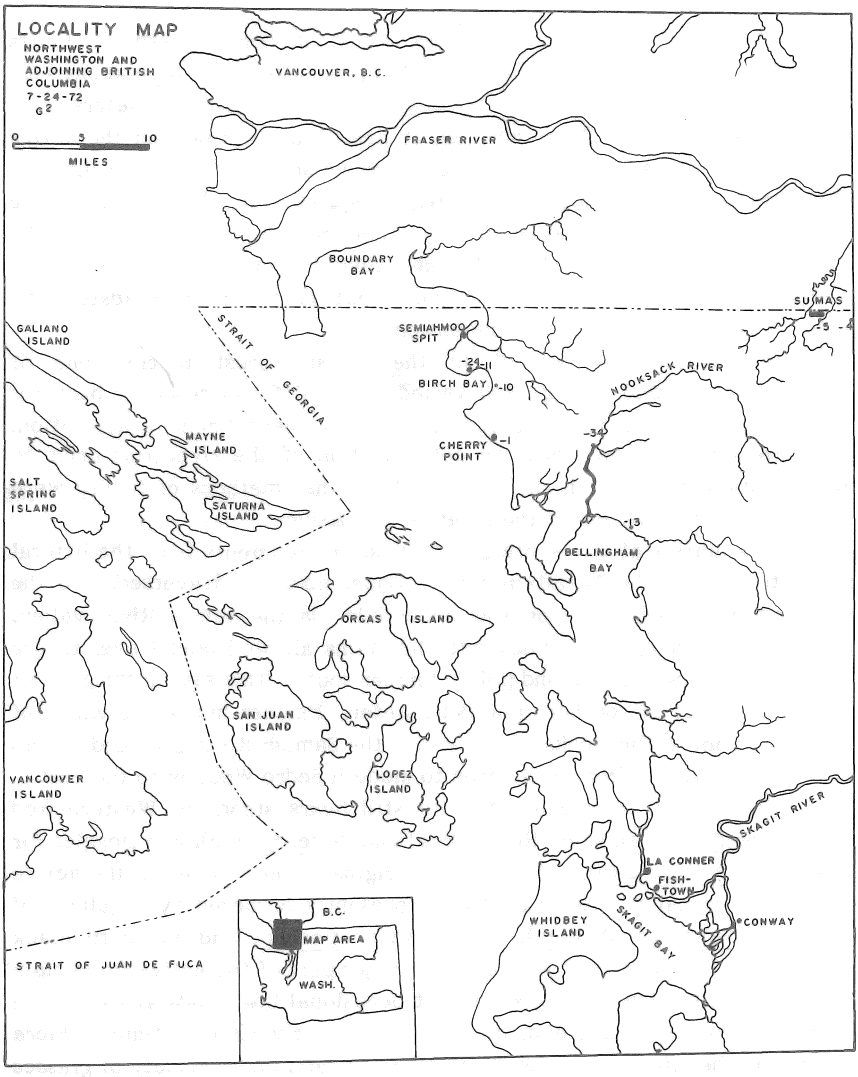

Figure 1. Regional Map showing location of 45WH34 with respect to other sites of the region.

Figure 2. General view of site 45WH34 to south. The Nooksack River lies behind the gallery growth some 50 meters behind the excavations. In the foreground is the northern drain channel, now filled for cultivation.

Superficial soil of the flood plain is of alluvial sand and silt. The pebble component is practically zero in the vicinity of the site itself, indicating that the stream has had a long period of relatively low flood-stage velocity. The forest soil of the higher terrace is based on an outwash sand of the Sumas glacial stade (Easterbrook, 1966). To the west lies the Mountain View Upland with relief up to about 100 meters. One to two miles to the south rise other outwash terraces and the drift-mantled hills north of Bellingham, Washington. Northward, low outwash ridges and a large area of very slight relief stretches almost to the International Boundary where the Abbotsford Upland provides sources for Dakota Creek. Mountain View Upland and the low areas around Custer drain into California Creek. Both these drain into Drayton Harbor. Between this site and Drayton Harbor is the locale of a large "prairie" of early historic times (Suttles, 1951).

Examination of the farm and its environs to locate the sources of large bipoints, ground serpentine adzes and a few flake tools found by the landowner revealed loci of flakes, cores and cobble tools along the higher terrace for about 3/4 mile. The landowner showed the writer a large fragment of a white clay trade pipe found about one-half mile upstream from 45-WH-34, where abundant fishbone was also plowed up. This locus may be the site of the historic Lummi village site of Skalexan (Stern, 1934:115-120; Suttles, 1951:35), believed to be the most inland village of these people. Further examination of the flood plain revealed the low ridge of 45-WH-34 where shell bits and fire spalls were found among roots of wind-fallen trees and stumps. Assessment of the site's size suggested that cross-trenching might be the most profitable technique of sampling.

Finding of lanceolate bipoints with large flake implements and elements of ground stone from the site surface made the site a desirable one to test. Several such others are known in the area of Ferndale, but all have been essentially destroyed by cultivation, and stratification is lacking in the remaining deposits. Other interesting points about the site are the presence of marine mollusc shells and sizeable beach cobbles in the cultural deposits, where the local alluvium contains only a few small pebbles. Since the site is at some distance from salt water today and has presumably been so for some time, transport of the stones from coastal sources is necessary. Till gravels, of course, do occur in some localities of the area, but would still require transportation for several miles at least. Finding of barnacle attachments on many of the pebbles and cobbles demonstrates that most, if not all, were brought from beach areas of the Straits and the Bays.

WORKING HYPOTHESES

Since the terraces at about 14-15 meters and higher are continuous to Lummi Bay, and around the north side of the Mountain View Upland to Birch Bay where cobble tool components are found at these higher terrace levels, further exploration of more inland environments was thought desirable. Inland localities, if found, should aid in defining settlement and resource procurement areas of the region. It might be possible to expand the knowledge of seasonal use of the inland and coastal micro-environments. Ultimately, it should be possible to use an expanded base of site data to demonstrate the validity (or not) of the hypotheses expressed by Larsen (1971) and by Grabert and Larsen (1975). In part, some of the terraces, especially the 14-15 meter one, are the result of dissection of Sumas Stade outwash by the Nooksack River (Easterbrook, 1966). Larsen and the author of this paper feel that these terraces may well represent evidence for sea-level stillstands in the Holocene, although fluvial agencies also operated in their formation and dissection.

If regional sea levels stabilized between 6,000-5,000 years ago (Matthews, Fyles, and Nasmith, 1970; Larsen, 1971), 45-WH-34 and the nearby components might provide data reflecting this natural process. They might also provide cultural data relevant to any adaptive or readjustment processes by the region's inhabitants. This adaptation might have involved site usage changing from an essentially estuarine or coastal situation to an inland one, where different resources might have been collected. If this assumption is correct, then it might be possible to demonstrate a cultural continuity between the higher terrace components and basal strata of 45-WH-34. While this would be an idealized situation, the best one could hope for would be a suggestion of cultural continuity and adaptation to the habitable flood plain.

Vashon Stade outwash and that of the later Sumas State (Easterbrook, 1966) formed the deposits lying between the present Nooksack flood plain and the glacially-stripped upland areas. Sumas Stade outwash alluvium with a large sand component, formed the terrace that ranges between about 10-15 meters in elevation. Eustatic sea level changes and isostasy of different rates appear to have changed the Nooksack from an estuary near the present coast to a swampy, but active, meander plain to the present flood plain. This sequence of topographic changes would have operated to locally modify the general palynological scheme advanced by Hansen (1947), which has since been elaborated by Heusser and Florer (1973).

Based on the data of the latter works, it appears that a true tundra was either non-existent or of small breadth in the region and that the pinus monticola-pinus contorta assemblage might have been missing or displaced from immediate environs of the site. Instead, one might assume that sedges and grasses dominated in the early Holocene, and that the betula-alnus assemblage may have been the immediate successor. Precisely when the cedar-spruce-hemlock group might have replaced the earlier arboreal growth is uncertain, but it seems likely it should have been established when the essentially modern riparian regime was established. This could have happened around six thousand years ago if the workers cited above are correct (Matthews, Fyles, and Nasmith, 1970; Larsen, 1971).

While some palynological work has been done in the region, it still does not allow definite localized floral sequences to be established. Generalizations are just that, and point out only the broadest of plant distributions.

As to the effects of the Hypsothermal Interval, we might again rely on the limited amount of palynological research of the region and note that Mitchell (1971) has developed a climatic sequence that appears to fit the Gulf Islands fairly well. Since the Gulf Islands of which he wrote lie in the rain shadow of Vancouver Island, some miles west of the mainland area with which we deal, we cannot apply his model to the locality of 45-WH-34 without qualifications. It does appear likely, though, that some effects of the Hypothermal would have been felt on the mainland and would have altered or possibly delayed the succession of dominant arboreal species.

HISTORIC USE OF THE LOCALITY

The general site locality is reputed to be the territory of the Lummi. Materials yielded from this site are not indicative of historic Indian occupation, though. I have noted the clay trade pipe found on another site a short distance upstream, indicative of historic period use of the locality. Ethnographers have indicated reasons for inland locations of Lummi sites, so that some assumptions have been made by the writer. These assumptions are based on the historic local environment and artifact associations. What resources were utilized with early techniques of exploitation are difficult to infer from the present environment. The river is now revetted in places, and its channel straightened in others so that its course and the old flood plain environment are distinctly altered and controlled today.

Seasonal fishing is strongly implied by the site location and some of the remains. Location of the site just across the river from the mouth of Tenmile Creek, which drains Barrett Lake and smaller lakes, suggests a fishtrap location near the habitation component. The historic locations of Nooksack people's fishtraps on Fishtrap Creek, a few miles upstream near Lynden, further strengthens the impression of seasonal fishing use of this site. Artifacts discussed later also point toward seasonal fishing at 45-WH-34. Other information suggests that the locality was a source of cedar timber, and possibly land mammal hunting and berry picking on nearby prairie areas.

A site across the river at the mouth of Tenmile Creek has yielded a seated human figure bowl, adzes, and several other items. The bowl is described by Duff (1956:32). Others, unpublished, have also been found in the vicinity. Scattered finds of broken adzes and mauls in the area support the idea that logging was also one of the pursuits of the seasonal inhabitants.

Numerous small bog lakes were once the source of tules. Many of these small lakes are now filled and cultivated. Those remaining demonstrate the abundance of basket and matting materials from these sources. Cedar root for basketry was also collected, and probably edible and medicinal plants as well.

THE SITE AND EXCAVATIONS

A three-meter grid system was used for horizontal and vertical control and a reference datum established on a nearby bridge pier (Figure 3). The zero-stake was later referenced to a USGS Bench mark in nearby Ferndale. This elevation was determined to be 9.6 meters above sea level.

Ten two-by-two meter cuts were opened forming a segmented east-west trench crossed by a shorter north-south trench. A single cut was opened farther south to locate the southern end of the cultural deposit near a flood channel (Figure 3). Somewhat over 60 cubic meters of fill was removed during the season. Numerous small features were recorded in individual cuts, but analysis resolves these into several fewer. The general stratification involved a silty alluvial soil atop several sizeable shell deposits. At the west end of the main trench shell was much sparser and confined to lenses or finely-crushed thin layers. In Cut S1-W3, S1-W3, S1-W4, and in the north-south trench, shell was more abundant and several deep pits containing burnt shell and accumulations of heat spalls were located. One of these pits reached a depth of approximately 140 centimeters. Fill in the areas of Cuts S1-W5-W6, and W7 was more humic, with flood silt bands and only infrequent shell patches. Beneath this sequence of shell-bearing layers was a dark charcoal-stained earth with an occasional band of darker-stained soil. Four of these bands could be seen in Cut S1-W2, of which the upper two bore traces of decayed shell, mostly of blue mussel (Mytilus edulis). Beneath the deeper occupational strata lay a coarse alluvial sand (Figure 4).

Fill in Cuts S1-W5-W6 and the edge of a deep pit in S1-W7 (Figure 3) suggests a pit dwelling. Two charcoal samples from the edge of the pit gave assays of 1,200 + 100 years B.P., A.D. 920 (RL 275), and 1030 + 100 B.P. (A.D. 920; RL-274). The latter sample appears to be from a piece of the structure, a charred pole remnant, and the former is from solid charcoal. If this is indeed a pit-dwelling, it has some apparent affinity to sites in and near Lynden, some 5-6 miles upstream (Emmons, 1952) and near Birch Bay. These dwellings appear to be a rarity in the coastal and near inland areas of the Fraser Delta.

All in all, the stratification of the site presents a number of problems. Only the latest and the very earliest deposits provide a clear picture of the order of cultural events. Those lying between are the results of nearly three thousand years of mixing and alteration from reoccupation. The deepest of the layers in S1-W2 (Figure 5, Stratum 1a) yielded charcoal

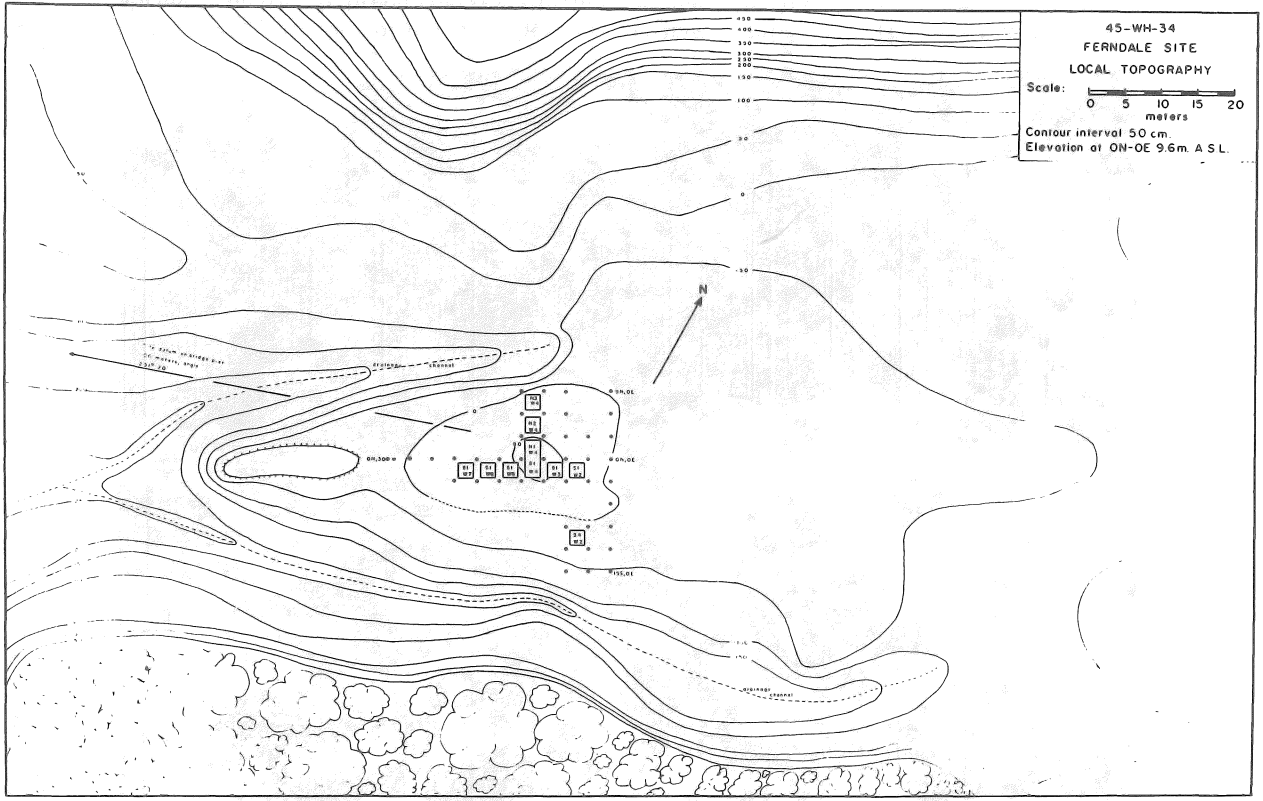

Figure 3. Topography of the site.

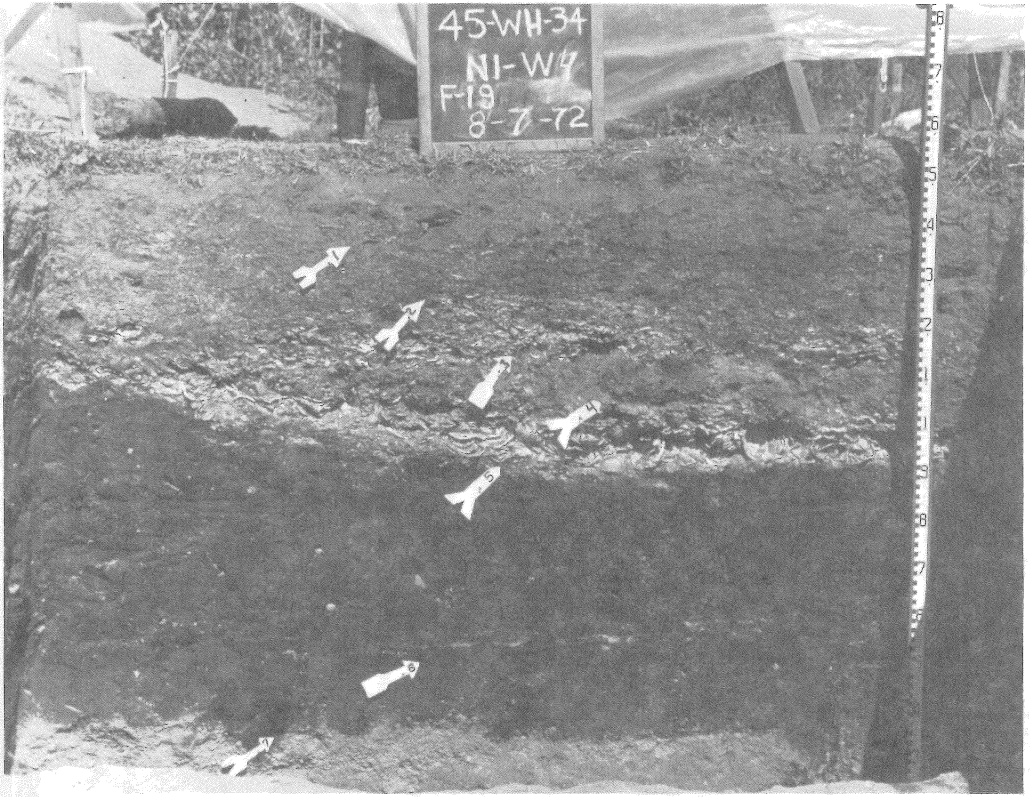

Figure 4. General stratification of the site where disturbance is minimal. The lowermost arrow points to the abrupt transition between coarser alluvium and the silty fluvial and cultural deposits. The second arrow from the bottom indicates the zone from which the 4180 B. P. C14 data was obtained.

giving an assay of 4,180 + 120 years B.P., 2,230 B.C. (RL 249). Correcting this figure to the bristle-cone pine correlation gives an approximate date range from 4,600 to 4,900 years.

Because of the disturbed stratification, I have elected to try to discern and describe an order of events in the zonation (Figure 5), realizing that this can only be an approximation for the middle of the sequence. Features of the site consisted of the pit dwelling (not visible from the surface) and several cooking and disposal pits. The housepit seems to have been used sporadically over two or more hundreds of years, abandoned and then possibly re-used for a brief interval. Post-house pit occupation appears not to have been frequent nor long protracted. Table 1 presents interpretations of the cultural periods and site utilization during these periods.

Period I to Period II events involve only a seris of sporadic and probably short occupations. Seasonality is presumed, with periods of abandonment. Provisionally four occuption levels are seen in Period I. The last two bear traces of decayed blue mussel shell. Period II to Period III seems to have been protracted in occupation with possibly brief abandonments. During this interval a number of features can be traced, features that were intrusive into the earlier strata. The Ferndale II assemblage derives from the earlier layers.

Period III to Period IV probably saw a great deal more subsurface disturbance. Ultimately the fire pits were filled with refuse of the period and were later intersected by features of the Period IV-Period V time range, which included latterly, the pit dwelling. Between these times of occupance, flood silting and the growth of dense marsh-type vegetation occurred. On reoccupance, artifacts of earlier periods were disinterred and scattered about the contemporary surface, some of them coming to rest in depressions of the current ground level.

Food processing and preparation and daily fishing and hunting activities left their spread of debris also. From the time of Period II to Period VI accumulation and reworking was constant, so the one must make tentative inferences about the order of superposition and inversion of layers of earth now visible.

Most of the pit-dwelling feature lies exposed in Cuts S1-W5, S1-W6, and S1-W7 with some eastward extension into S1-W4. In S1-W7 the edge or walls can be clearly seen. It seems likely that the housepit ended at the extreme west edge of Cut S1-W4. Its southern and northern extent is unknown. Because of land slope to the south toward the drain channel

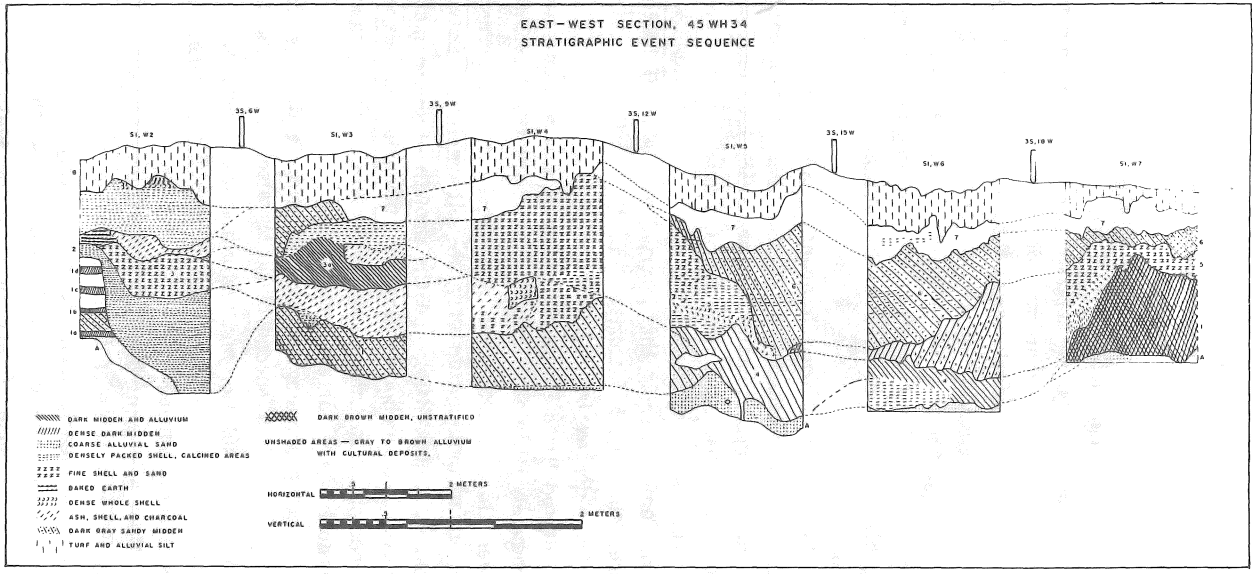

Figure 5. East-West stratigraphic section of the site.

Table 1. Proposed Culture Sequence at 45-WH-34

	Date or Period	Contents	Activity
VI.	Late Prehistoric	Fire-broken rock, fish vertebrae, some bone and antler artifacts, little chopped stone.	Timber cutting and rough working/fishing. Apparently an open camp, with filling of the vestiges of the housepit. Flooding and surface activities probably moved shell and superficial materials into pit.
V.	Pithouse occupation between 1,000 and 1,300 years ago.	Some debris, probably faunal remains and broken woodworking tools spread over the contemporary land surface. Some silt bands suggest slack water deposits from flooding.	Winter residence is suggested by the semi-permanent dwelling. Excavation of the dwelling heaved up artifacts of Whalen II and Marpole similarities and even penetrated the deepest occupation levels.
IV.	Marpole Phase and Whalen II contemporaneity	Harpoons, pendants, fish spears, and barbs, some smaller stemmed points of basalt.	Fishing and perhaps other seasonal occupation. Decorative items suggest ceremonial, perhaps winter season occupation.
III.	Locarno Beach Phase and probable Mayne Phase contemporaneity	Gulf Island artifacts, bipoints of basalt, more stemmed points, some suggesting a variant of side-notching.	Deeper shell deposits fishbone and animal bone and some antler wedges suggest a variety of activities discussed in text.
II.	Ferndale II Period (Fig. 10) (Mayne Phase contemporaneity?)	Lanceolate bipoints (?), flake tools, cores, perhaps choppers.	Hunting, plant collection, fishing, few traces of shellfish use, and none in the very deepest strata. One C-14 assay, ca. 4200 B.P.
I.	Ferndale I Period (Fig. 11)	Cores, choppers and flake tools on terrace.	Uncertain activities, possibly as in Ferndale II.

Table 2. General Stratigraphic Events at 45-WH-34 (See also Fig. 5)

Event Zone	Depositional Agency	Cultural Components and Events
Zone 8	Flood siltation, A-horizon formation, forest duff.	Mixed deposits from windfall upheaval, and root penetration.
Zone 7	Earlier siltation and humus formation, spoil from a few cultural features.	Possibly two fire pits, one in S1-W3, and S1-W4. Mixture of period artifacts.
Zone 6	Only one major feature, derived from garbage fill of a remnant pit, flood silt.	Artifacts of mainly the late prehistoric period, bone and antler. Lithic items may have derived from slump of Zone 5 walls.
Zone 5	Upper housepit fill, debris and alluvium accumulated during abandonment.	This event seems to postdate the major occupation of the pit-dwelling between 1,210 and 1,030 years ago.
Zone 4	Zone 4 appears to be the larger housepit fill.	This period may be related to pre-stselax^{W}. Bone and antler materials derived from Marpole age deposits the dwelling intruded.
Zone 3a	Shell and ash accumulation. Some alluvaition also noted.	Marpole to Lacarno Beach age deposition, some lanceolate points and bone and antler objects.
Zone 3	Shell and ash accumulation, in pit earlier than than of 3 a.	Culturally similar to 3a.
Zone 2	Deepest firepit, depth to 140 cm; very little alluviation noted.	Locarno Beach and earlier Phases.
Zone 1d, 1c	Bands of shell, ash, and charcoal, some alluvium.	Mayne Phase similarities. Flake and core tools, bipoints, little bone.
Zone 1b	Charcoal and alluvial band with no shell remains visible.	Flake tools only. Termed Ferndale II period.
Zone 1a	Charcoal band, no shell.	Cultural layer with only flake and core tools. Possibly derivative of Ferndale I on high terrace; ca. 4,180 years +.
Zone A	Coarse alluvial sand, Sumas outwash, reworked; steeper river gradient?	No cultural deposits observed.

(Figure 2), it is likely that little of the dwelling remains there, as it has been eroded away during formation of the flood channel. There may be as much as two to two and one-half meters extension to the north of the S1 Cut Series (Figure 3). Intrusive shell pits in S1-W4 and N1-W4 may be contemporaneous with the dwelling. The shell pit in Cut S1-W2, shown as Layer 2 in Figure 5, seems rather earlier.

Table 2 shows the Event Zone sequence as interpreted from the stratification, relations of artifact contact and the suite of radio-carbon assays. Zone 2 (Figure 5) indicates that this shell pit feature intrudes Zone 1. Mayne Phase-like and Gulf Islands artifacts from this general zonal set suggest that the pit was used and abandoned about the end of the second millenium B.C.

While no direct comparison with Borden's Fraser Delta sequence in a quantitative sense is yet possible, some impressions appear. And in terms of the radiocarbon chronology contemporaneity with certain of his culture phases can also be shown. Table 3 shows some of the provisional comparisons based on the chronology of the Ferndale site and its stratified contents. The implications of the similarities are discussed in a later section; at this point only the rough comparison is drawn.

Table 3. Comparison of the Borden (1970) Sequence with 45-WH-34

Borden Phases	Time Period	45-WH-34
Stselax^{W}	A.D. 1200-1800	Zones 5, 6, 7, and 8.
Pre-Stselax^{W}	A.D. 700-1200	Zone 4 and possibly strata outside housepit.
Marpole	400 B.C. to A.D. 300	Zone 3a and possibly some of the comparable strata in cuts not shown in Figure 5.
Locarno Beach	1200-400 B.C.	Zone 3, and strata in cuts not shown in Figure 5.
Mayne Phase (Gulf Islands and earlier) (Mitchell 1970)	2800 to 1200 B.C.	Zones 1b-1d.
Mayne Phase (perhaps	Prior to Mayne date.	Zone 1a. Possibly some or all of Ferndale I assemblage.

The materials assigned to the Ferndale I assemblage are as yet uncertainly placed in time. These materials are sparse, but seem to be associated sequentially, rather than contemporaneously with the deeper stratified materials from the main site locus (Table 2). These artifacts are limited to flake, core, and chopper implements. While the more obvious chipped stone artifacts may have been casually picked up prior to our sampling, their distribution along nearly 3/4 mile of the terrace in the immediate vicinity, and within a radius of three miles or so in similar terrace contexts where selective collecting was less likely, justifies the tentative creation of an earlier assemblage. Their formal characteristics and find sites bear strong similarities to the locations of the Birch Bay I chopper sites, so that a direct relationship between the two assemblages seems justified also.

THE ARTIFACTS

Classification and distribution plotting of the artifacts was made difficult because of disturbance of repeated reoccupation. Perhaps most surprising was the large lithic artifact proportion. An abundance of decorative bone items also was unusual in such a small site. I have not attempted an exhaustive classification or attribute-descriptive system. Materials are discussed in associational and feature context, so that some chronological ordering may be done. Descriptive statements are given and the feature-strata-artifact associations are presented in Tables 4 through 19.

I. LITHIC ARTIFACTS

A. Chipped Stone

1. Projectile Points-Knives (Figure 6; Table 4; Table 19)

Form a: Lanceolate bipoints

N = 8

Materials: All are of basalt

Size Range: Length 4.4 to 6.5 cm; Width 1.4 to 2.0 cm; Thickness 0.6 to 1.0 cm; Weight 4.5 to 12.4 gm.

These specimens are characteristically bipointed lacking a hafting shoulder. Two of the eight show basal edge grinding. Three specimens are rather thick with thicknesses from 0.94 to 1.0 cm. These three examples are also quite asymmetrical lenticular in cross-section.

Form b Lot 1: Lanecolate with a rounded to straight base.

N = 4

Materials: Basalt

Dimensional Range: Length 6.3 to 8.2 cm; Width 2.0 to 2.8 cm; Thickness 0.5 to 0.9 cm; Weight 10.5 to 28.1 gm.

Form b Lot 2: Smaller size range.

N = 5

Materials: Basalt

Dimensional Range: Length 3.4 to 4.65 cm; Width 1.8 to 2.1 cm; Thickness 0.5 to 0.8 cm; Weight 3.5 to 7.5 gm.

Form c: Lanceolate with stemmed or notched bases

N = 7

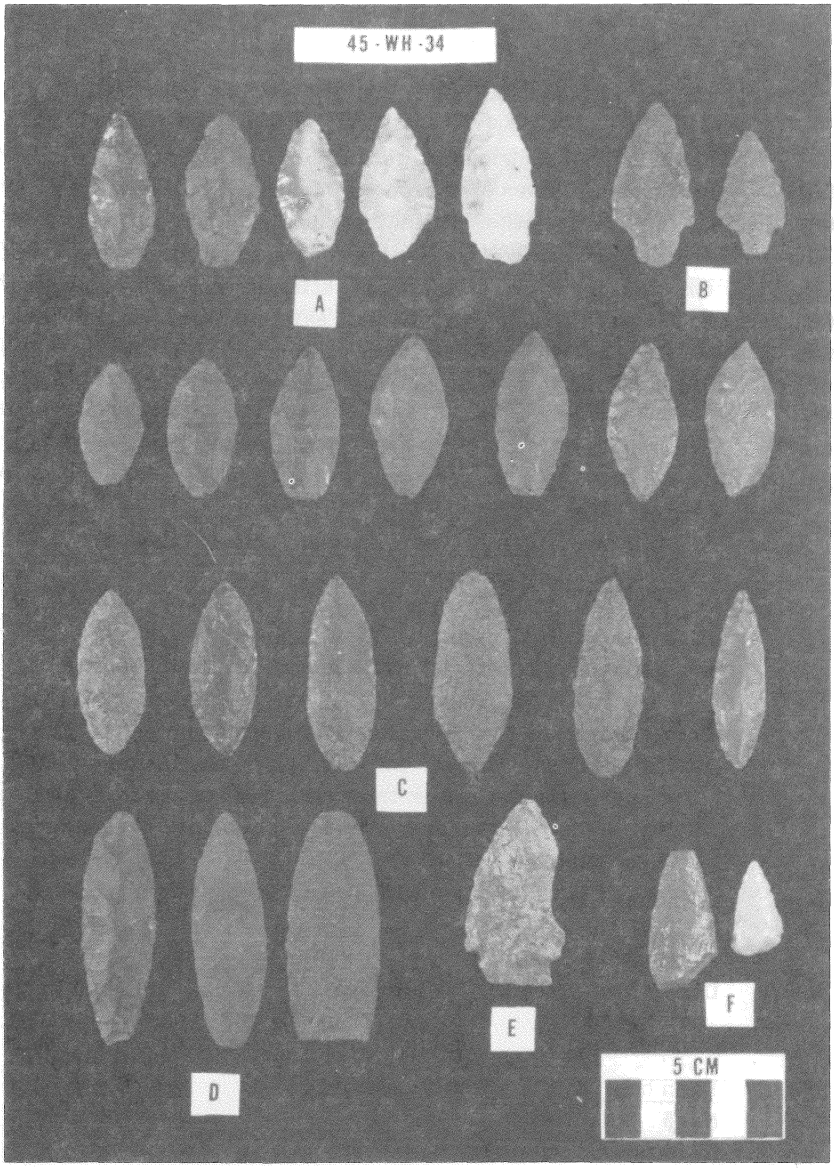

Figure 6. Representative projectile points from 45WH34. Group A is the form termed Form B, Lot 2 in the text; Group B is Form D in text; Group C is Form A, lanceolate bipoints; Group D is Form B, lot 1; the single specimen E is a broken representative of Form C. F is typical of the broken specimens.

Table 4. Distribution of Projectile Points Site 45-WH-34

CUT	0-20	20-40	40-60	60-80	80-100	100 +	Total
S1-W2						0	
S1-W3		2	2			1	5
S1-W4			1		2		3
S1-W5		1		4	1	1	7
S1-W6	1	1	3		2	2	9
S1-W7	1						1
NO-W4		1					1
N1-W4	1						1
N2-W4	1	3	4				8
N3-W4	2						2
S4-W2							
Totals	6	6	10	4	5	4	37

Materials: Four of basalt, two of agate; one of a light-colored chert.

Dimensional Range: Length 3.9 to 5.6 cm; Width 1.8 to 2.2 cm; Thickness 0.5 to 0.8 cm; Weight 4.15 to 10.8 gm.

Form d: Triangular with stems and shoulders. Shoulders variable in abruptness.

N = 3

Materials: Two of basalt, one of chert (broken).

Dimensional Range: Length 3.6 to 5.1 cm; Width 2.0 to 2.7 cm; Thickness 0.5 to 0.7 cm; Weight 4.3 to 8.95 gm.

Fragmentary Specimens: There are 10 specimens in this category. They appear to be pieces of lanceolate bipoints or other lanceolate forms with straight to rounded bases. One may be a large side-notched form. Materials are basalt, chert, chalcedony and jasper.

Unstratified Items: There are 9 specimens of uncertain provenience (Table 19).

Projectile points maximize in Cuts S1-W5-W6-W7, and in N2-W4. They also tend to maximize at depths of 40 to 60 centimeters in the north trench segment where the event series is shallower and less disrupted by cooking and dwelling pits. The events of strata 1 through 2 may have borne the most of the projectile points. Given that, the deeper spoil from the housepit would have been highest on the berm formed by this spoil; its content on slumping after abandonment of the dwelling would have resulted in an originally deeper point distribution being dispersed and out of context at the deeper to moderate depths of housepit fill. This can be traced in the Cuts S1-W4-W5-W6 above.

2. Formed Scrapers (Figure 7, Table 5)

Form a. Large used flake scrape implements.
N = 14
Materials Found: Mainly basalt
Size range: Length 4.45 to 8.7 cm; Width 4.2 to 4.8 cm; Thickness 1.45 to 1.7 cm; Weight 30.3 to 75.7 g.

Form a scrapers are characterized by a minimum of edge retouch, and that mostly by use. Their distribution is unusual if one excludes the specimen from S4-W3. They tend to lie deeper at the east end of the E-W trench, mainly originating from Event Zone 1 and possibly 2. To the north of the main trench they lie higher, but in that area the shell strata are thinner, and the sequence of stratigraphic events is incomeplete. To the west end the disturbance of the pit house, Events 4 and 5, they lie at variable depths indicating inversion of the depositional sequence.

Form b: End Scrapers
N = 11
Materials: Mainly basalt
Dimensional Range: Length 3.9 to 5.6 cm; Width1.8 to 2.85 cm; Thickness 1.42 cm; Weight 6.7 to 21.8 gm.

Form c: Side and end scrapers
N = 4
Materials: 3 basalt and 1 quartzite
Size Range: Length 1.9 to 5.55 cm; Width 1.6 to 3.8 cm; Thickness 0.3 to 0.65 cm; Weight 1.1 to 45.8 gm.

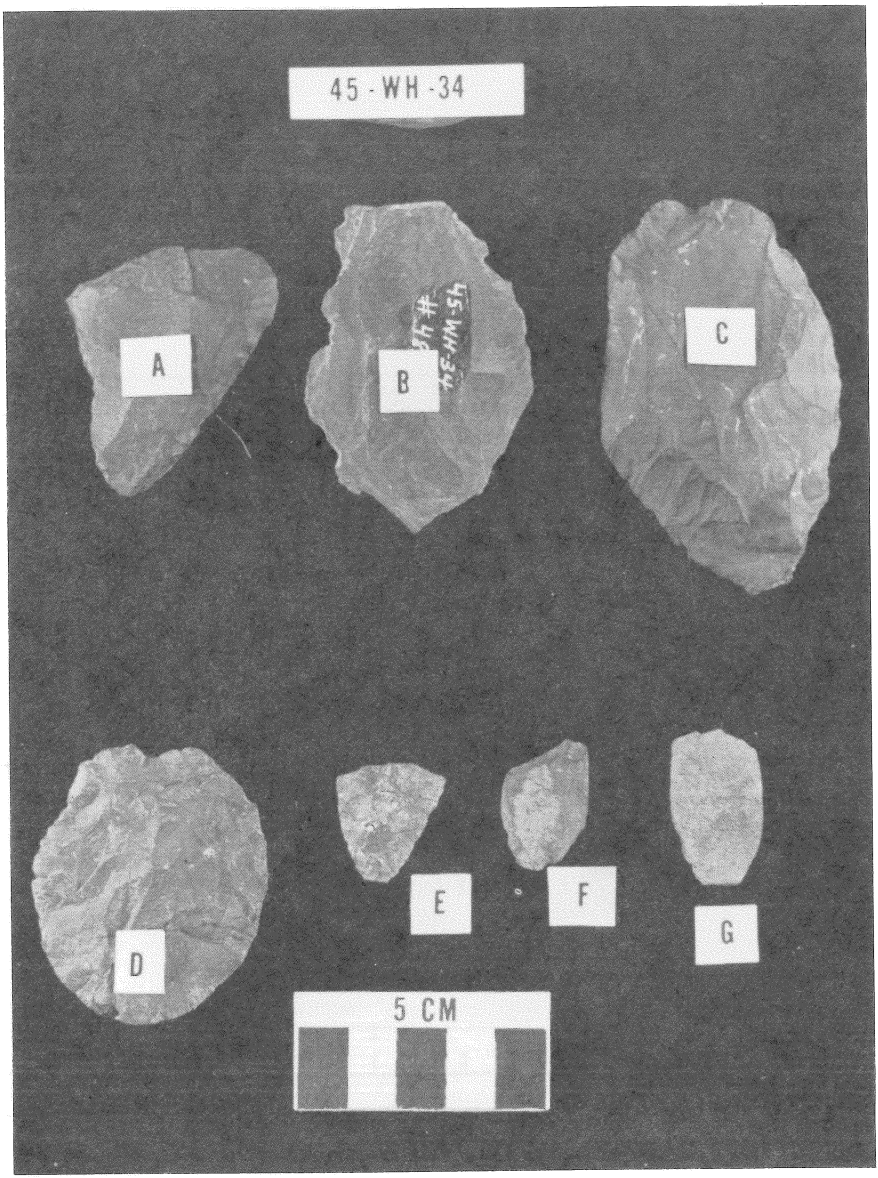

Figure 7. Scrapers typical of Zones 1, 2, and 3.

Table 5. Scraper Implement Distributions

Cut	Levels		Large Used Flake Form A					
	+20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2						1		1
S1-W3								
S1-W4							1	1
S1-W5						1		1
S1-W6				2		1		3
S1-W7	1							1
N0-W4			1					1
N1-W4								
N2-W4		1		1	1			3
N3-W4		1	1					2
S4-W2	1							1
Totals	2	2	2	3	1	3	1	14
				End Scrapers Form B				
S1-W2		1		1				2
S1-W3			1					1
S1-W4								
S1-W5								
S1-W6				1				1
S1-W7				1				1
N0-W4		1						1
N1-W4		1	1					2
N2-W4			1					1
N3-W4								2
Totals		5	3	3				11
				Side/End Scrapers Form C				
S1-W2								
S1-W3								
S1-W4								
S1-W5					1			1
S1-W6				1				1
S1-W7						1		1
N0-W4								
N1-W4								
N2-W4								
N3-W4		1						1
Totals		1		1	1	1		4

Table 5 (continued)

Cut	Levels							
	Small Used Flakes Form D							
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2								
S1-W3						1		1
S1-W4								
S1-W5			1			1		2
S1-W6			1	1				2
S1-W7		2			1	2		5
N0-W4								
N1-W4		1						1
N2-W4								
N3-W4		1						1
S4-W2								
Totals		4	2	1	1	4		12
	Thick Flake Scrapers Form E							
S1-W2								
S1-W3								
S1-W4								
S1-W5								
S1-W6							1	1
S1-W7				1				1
N0-W4								
N1-W4								
N2-W4		2						2
N3-W4		1						1
Totals		3		1			1	5
	Side Scrapers Form F							
S1-W2								
S1-W3						1	1	2
S1-W4								
S1-W5							1	1
S1-W6				1	1			2
S1-W7								
N0-W4								
N1-W4								
N2-W4								
N3-W4		1	1					2
Totals		1	1	1	1	1	2	7

Table 5 (continued)

Cut	Levels							
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
				Spall Scrapers Form G				
S1-W2								
S1-W3							1	1
S1-W4								
S1-W5								
S1-W6								
S1-W7				1	1			2
N0-W4								
N1-W4								
N2-W4								
N3-W4			1					1
S4-W2								
Totals			1	1	1		1	4
				Chopper Scrapers Form H				
S1-W2			1					1
S1-W3								
S1-W4								
S1-W5								
S1-W6					1			1
S1-W7								
N0-W4								
N1-W4								
N2-W4								
N3-W4			1					1
S4-W2								
Totals			2		1			3

Form d: Small utilized flake scrapers
N = 12
Materials: 11 basalt, 1 quartzite
Size Range: Length 2.0 to 4.4 cm; Width 1.7 to 3.1 cm; Thickness 0.34 to 0.85 cm; Weight 0.5 to 10.4 gm.

Form e: Thick flake scrapers
N = 5
Materials: all basalt
Dimensional Range: Length 4.0 to 7.2 cm; Width 3.5 to 3.6 cm; Thickness 1.3 to 2.25 cm; Weight 20.2 to 55.95 gm.

Form f: Side scrapers
N = 7
Materials: 6 basalt, 1 quartzite
Dimensional Range: Length 3.9 to 10.1 cm; Width 5.7 to 7.2 cm; Thickness 0.8 to 1.2 cm; Weight 24.3 to 100 gm.

Form g: Spall scrapers
N = 5
Materials: All are of basalt
Dimensional Range: Length 3.5 to 9.3 cm; Width 2.8 to 8.6 cm; Thickness 0.7 to 1.2 cm; Weight 8.37 to 134.5 gm.

Form h: Chopper scrapers
N = 3
Material: Basalt
Dimensional Range: Length 8.39 to 9.7 cm; Width 5.9 to 6.8 cm; Thickness 2.6 to 2.9 cm; Weight 106.6 to 180.9 gm.

3. Cores

Among the numerous categories of lithic artifact is a series of cores classified and described as follows and in Table 6.

Large Cobble Cores:

These items possess randomly-oriented flake scars forming a series of striking platforms. They may also be termed polyhedral cores.
N = 5

Table 6. Core Distribution

Cut	Levels				Large Cobble Cores			
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2		1						1
S1-W3			1					1
S1-W4							1	1
S1-W5					1			1
S1-W6								
S1-W7								
N0-W4								
N1-W4								
N2-W4				1				1
N3-W4								
S4-W2								
Totals		1	1	1	1		1	5
					Core Renewal Flakes			
S1-W2								
S1-W3								
S1-W4					1			1
S1-W5					4			4
S1-W6								
S1-W7		1	1					2
N0-W4								
N1-W4								
N2-W4								
N3-W4			1					1
Totals		1	2		5			8
					Random Pebble Cores			
					50% + cortex: A			
S1-W2						1		1
S1-W3								
S1-W4				1				1
S1-W5							1	1
S1-W6					1		1	2
S1-W7			1			1		2
N0-W4		1						1
N1-W4								
N2-W4				2		1		3
N3-W4								
S4-W2	1							1
Totals	1	1	1	3	1	3	2	12

Table 6 (continued)

Cut	Levels				Random Pebble Cores less than 50% cortex: B			
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2								
S1-W3								
S1-W4			1					1
S1-W5								
S1-W6			1					1
S1-W7		1		2	1			4
N0-W4								
N1-W4								
N2-W4								
N3-W4			1					1
S4-W2								
Totals		1	3	2	1			7

Materials: 4 basalt and 1 quartzite

Dimensional Range: Length 7.7 to 17.3 cm; Width 5.75 to 11.1 cm; Thickness 5.84 to 6.5 cm; Weight 239.6 to 1,000 gm.

Core Renewal Flakes:

These flakes appear to have derived from striking platform renewal on cores such as the above forms.

N = 8

Materials: Basalt

Dimensional Range: Length 3.9 to 5.84 cm; Width 2.35 to 4.25 cm; Thickness 2.3 to 2.6 cm; Weight 19.36 to 51.8 gm.

Randomly Chipped Pebble Cores: A

These cores are similar to those termed large cobble cores, except they have more than 50% of the original surface of the pebble or cobble remaining.

N = 12

Materials: 10 basalt, 2 chert

Dimensional Range: Length 4.5 to 7.6 cm; Width 3 to 5 cm; Thickness 2.3 to 3.8 cm; Weight 36.4 to 155.4 gm.

Randomly Chipped Pebble Cores: B

These specimens have less than 50% of the surface or cortex remaining.

N = 8

Materials: 6 basalt, 1 jasper

Dimensional Range: Length 3.5 to 6.4 cm; Width 2.81 to 3.8 cm; Thickness 1.44 to 2.5 cm; Weight 20.5 to 60.35 gm.

4. Graver/Burins

Scraper/Gravers

Form a: Edge retouch present accompanied by an incising spur (Table 7).

N = 4

Materials: Basalt

Form b: Assymetrical form with a slender graving spur

N = 5

Materials: Basalt

Dimensional Range: Length 2.82 to 6.7 cm; Width 2.31 to 3.3 cm; Thickness 0.7 to 1.1 cm; Weight 4.68 to 24.5 gm.

Form c: Graver Burins

N = 5

Material: Basalt. One specimen shows deep weathering.

Dimensional Range: Length 2.5 to 4.6 cm; Width 1.7 to 3.4 cm; Thickness 019 to 2.0 cm; Weight 4.3 to 34.5 gm.

Spoke-Shave Tools:

Randomly-shaped flakes with one or more concave edges showing use retouch have been classified as spoke-shaves. Table 8 shows their stratigraphic distribution.

N = 8

Materials: 7 basalt, 1 rhyolite.

Dimensional Range: Length 3.2 to 6.15 cm; Width 2.3 to 3.6 cm; Thickness 0.5 to 0.65 cm; Weight 3.6 to 66.3 gm.

5. Knives, Form a:

These artifacts have edge retouch forming a somewhat serrate edge along one side only. The edge may be somewhat convex, but is construed as only a single working edge.

Table 7. Distribution of Graver/Burins

Cut	Levels				Form A, Scraper-Gravers			
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2								
S1-W3					1			1
S1-W4								
S1-W5			1					1
S1-W6								
S1-W7					1			1
N0-W4					1			1
N1-W4								
N2-W4		1						1
N3-W4								
S4-W2								
Totals		1	1		2			4
					Form B, Asymmetrical Graver/Burin			
S1-W2						1		1
S1-W3								
S1-W4								
S1-W5				1				1
S1-W6								
S1-W7			1	1				2
N0-W4								
N2-W4			1					1
N3-W4								
S4-W2								
Totals			2	2		1		5
					Form C			
S1-W2								
S1-W3								
S1-W4								
S1-W5								
S1-W7		1	1					2
N0-W4								
N1-W4								
N2-W4		1						1
N3-W4		1	1					2
Totals		3	2					5

Table 8. Spokeshave Distribution

Cut	Levels							
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2								
S1-W3								
S1-W4								
S1-W5						2		2
S1-W6				2			1	3
S1-W7								
N0-W4					1			1
N1-W4								
N2-W4		1						1
N3-W4		1						1
S4-W2								
Totals		2		2	1	2	1	8

N = 3

Material: Basalt

Size Range: Length 2.15 to 4.4 cm; Width 2.5 to 3.4 cm; Thickness 0.4 to 1.0 cm; Weight 2.19 to 4.4 gm.

Form a comment: The three Form a specimens came from two cuts. Two were from N2-W4, and one from Cut S1-W6. The latter came from the 80-100 cm zone. The former two came from depths between 15 and 40 cm. All three came from distinctly disturbed contexts, apparently not of historic times.

Knives, Form b:

These knives possess two edges converging at an acute angle.

Edge lengths may or may not be equal.

N = 2

Material: Basalt

Dimensional Range: Length 4.0 to 8.25 cm; Width 2.0 to 4.8 cm; Thickness 0.5 to 0.95 cm; Weight 4.7 to 86.1 gm.

While these two items are disparate in size, their formal characteristics provide reason for classing them together. No. 257 has converging edges flaked from opposite sides forming a rhomboidal cross-section. No. 428 is the larger; it is a thick spall flake with percussion retouch.

6. Choppers: (Table 9)

Form a, Convex edged

N = 8

Materials: 5 basalt, 1 each rhyolite, indurated sandstone, and quartzite.

Dimensional Range: Length 6.9 to 9.7 cm; Width 8.2 to 9.9 cm; Thickness 4.2 to 4.7 cm; Weight 127 to 904 gm.

Choppers, Form b

Straight-edged pebble or cobble chopper, chipped along longitudinal edge.

N = 1

Materials: Quartzite

Dimensional Range: Length 7.5 cm; Width 8.6 cm; Thickness 6.2 cm; Weight 500 gm.

Choppers, Form c

Symmetrically converging edge

N = 5

Materials: Basalt

Dimensional Ranges: Length 6.7 to 10.3 cm; Width 6.7 to 10.9 cm; Thickness 2.9 to 5.2 cm; Weight 165.4 to 625 gm.

Choppers, Form d

Assymmetrically converging edges

N = 4

Material: Basalt

Dimensional Range: Length 7.5 cm to 11 cm; Width 6.0 to 7.5 cm; Thickness 3 to 4 cm; Weight 255 to 453 gm.

Provenience: Cut S1-W4 produced one from the 60-80 cm level; Cut S1-W5 yielded two, one from the 80-100 cm level, and the other 100+ level. The fourth came from Cut S1-W7, the 80-100 cm level.

Table 9. Cobble Implement Distribution

Cut	Levels				Form A			
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2							2	2
S1-W3			1					1
S1-W4								
S1-W5								
S1-W6							1	1
S1-W7						1		1
N0-W4								
N1-W4								
N2-W4		2		1				3
N3-W4								
S4-W2								
Totals		2	1	1		1	3	8
					Form C			
S1-W2								
S1-W3								
S1-W4								
S1-W5					1			1
S1-W6			1		1			2
S1-W7					1	1		2
N0-W4								
N1-W4								
N2-W4								
N3-W4								
S4-W2								
Totals			1		3	1		5

7. Cobble Tools:

Double Pointed Cobble Implement: Form e:

N = 1

Material: Basalt

Size: Length 8.9 cm; Width 7 cm; Thickness 3.3 cm; Weight 244 gm.

Provenience: This specimen came from Cut S1-W6 from the 20-40 cm level.

Scraper-Plane Tool: Form f:

N = 2

Materials: Basalt. One specimen is badly weathered and fire checked.

Provenience: This specimen came from Cut S1-W5, 100+ cm and the other from N2-W4, the 60-80 cm level.

Pebble Remnant Tool:

N = 5. Specimens may have been hammer stones or exhausted cores.

Material: Basalt

Dimensional Range: Length 6.5 to 14 cm; Width 6.2 to 11.3 cm; Thickness 3.1 to 5.2 cm; Weight 125.7 to 700 gm.

Proveniences: Specimens were found in Cut N2-W4, 40-60 cm; S1-W7, 60-80 cm; S1-W5 at 80-100 and 100+ levels, and in S1-W3 at 110 cm level.

Hammerstones, Form h

N = 2

Materials: 1 basalt, 1 granite

Dimensions: Lengths 7.6 and 8.1 cm; Widths 2.37 and 5 cm; Thicknesses 2.2 and 2.4 cm; Weights 63.5 and 143.2 gm.

Proveniences: One came from Cut S1-W7, 20-40 cm; the other from the same level of Cut N3-W4.

8. Microblades and Microcores:

Microblades. The yield of these small artifacts was small, consisting of two specimens. It was not increased by study of the debitage content of the level bags. Both specimens

were snapped-off segments. One is of basalt and the other of cryptocrystalline rock.

Dimensions: Lengths 1.1 and 1.4 cm; Widths 0.7 and 0.6 cm; Thicknesses 0.2 and 0.3 cm; Weights 0.5 and 1.0 gm, respectively.

Proveniences: One came from the 100+ level of Cut S1-W3 and is evidently associated with Event Zone 1, probably layer 1a or equivalent. The second came from S1-W7, and appears to have been displaced into the housepit spoil, possibly from later Zone 1.

Microcores: The specimen is an exhausted core displaying both platform edge grinding and several flake scars. Scars seem smaller than the norm for the region. Material is basalt. The dimensions of the core are 2.5 cm in length, 1.5 cm wide, and 1.2 cm thick.

Provenience: From Cut S1-W7 at a depth of 77 cm, and apparently in an undisturbed portion of later Zone 1.

9. Waste Flakes:

These flakes were field inventoried on the assumption that they were modified. Later examination showed that they had not been reworked. Of 16 specimens, three were of obsidian, and 13 of basalt. Their stratigraphic distribution is shown in Table 10.

Table 10. Distribution of Catalogued Waste Flakes

Cut	Levels							
	20-0	0-20	20-40	40-70	70-80	80-100	100+	Totals
S1-W3							1	1
S1-W4			1			1		2
S1-W5						2	1	3
S1-W6				1		2	1	4
S1-W7				2	3			5
N0-W4				1				1
Totals			1	4	3	5	3	16

II. GROUND STONE

A. Ground Slate:

Ground slate items were sparse, consisting of three specimens. One came from the pre-shell zone in Cut S1-W2 and is evidently associated with a late deposit of Event Series 1. If this is true it may have also been related to some of the earlier shell deposits in other parts of the exposure (Figures 4 and 5). This artifact, No. 138, has one smoothly-ground surface and a remnant of an arcuate edge.

A specimen, No. 212, from S1-W6 appears to be a part of an unfinished decorative object. It is roughly trianguloid in outline. Stratigraphic origin is uncertain. Its appearance in housepit fill suggests reworking from one of the earlier deposits.

Specimen 485 came from Cut S4-W2 near the southern edge of the site deposits. It was ground, and the edges later chipped. It is oval in outline. While it came from a depth of 64 centimeters, its location near the edge of the cultural debris suggests that it probably is no earlier than Event Zone 5 or 6.

B. Ground Incised Pebble

A small fragment of a slate pebble was recovered from Cut S1-W7 at about 70 centimeter depth. It is evidently associated with Event Zone 5, since it came from the housepit fill near the east edge of the cut. A short series of X's can be traced along one highly polished surface.

C. Abrading Stones:

Excavations at 45-WH-34 yielded 17 sandstone abraders. All but two are fragmentary. Two seem nearly complete. There is a range of grit size represented in the sample, suggesting selection of grit to fit the task, from rough work to nearly polishing capabilities.

One specimen, No. 446, with a beveled edge suggests use as a sandstone saw in nephrite working. Largest of the specimens is No. 443 which is 16.2 by 12.7 by 2.65 centimeters. The smallest is No. 437, measuring 3 by 2.15 by 0.55 centimeters.

The stratigraphic disposition is variable (Table 11). Distribution indicates that most occurred in housepit fill, with some possibly deriving from the earlier stratigraphic contexts. In the main, though, they appear to be of later prehistoric occurrence.

Table 11. Abrader Distribution

Cut	Levels							
	0-20	20-40	40-60	60-80	80-100	100-120	120+	Totals
N1-W4	1							1
N2-W4	1		2					3
N3-W4	2							2
S1-W4							2	2
S1-W5					1			1
S1-W6		1		2			1	4
S1-W7				3		1		4
Totals	4	1	2	5	1	1	3	17

D. Sandstone Spindle Whorl:

This object was found broken in seven pieces. Assembled, it is still only a segment of the whorl. It came from Cut S1-W5 at a depth of 100 centimeters. On assembling the matching pieces, it was found that one edge possessed a neatly-ground and notched surface, with a clearly defined arc. One edge has a series of radial incisions, with several others tangential to the edge and a trace of a groove concentric with the edge. Extrapolation of the arc suggests a radius of about 11 centimeters. The thickness is one centimeter. The specimen is associated with the later fill of the housepit and is probably related to event Zone 6 (Figure 5). Although the whorl may have derived from a pre-housepit context, it seems more likely to have been contemporaneous with the housepit occupation or perhaps a little later.

III. ANTLER AND BONE ARTIFACTS:

A. Antler Harpoons (Figure 8)

Several unilaterally barbed harpoons bear strong resemblances to the forms Borden (1970: Fig. 31j-k) has assigned to the Marpole Phase of the Fraser Delta culture sequence. Those from this site also compare with two specimens from the 45-WH-11 midden site at Birch Bay.

N = 6

Size: The complete specimen is 12.4 cm in length; 2.3 cm wide at the widest which occurs at the line guard; and ca. 1 cm thick. The complete specimen is tapered to fit a foreshaft socket.

Incomplete specimens consist of basal segments, and portions including barbs. While there is some variation among the basal segments in form, they tend to be of similar size, and to have provision for attachment to a shaft.

Table 12 provides a stratigraphic distribution of the specimens. The specimens from S1-W7 almost certainly came from the housepit spoil and were redeposited on abandonment of the structure.

Table 12. Marpole Form Harpoon Distribution

Cut	Levels						
	0-20	20-40	40-60	70-80	80-100	100+	Totals
S1-W5				2			2
S1-W6				1			1
S1-W7					1 (HP fill)		1
N0-W4		1					1
N2-W4		1					1
Totals		2		3	11		6

B. Antler Tine Tips:

Because these artifacts display varying degrees of tip wear they have been classified as flaking implements.

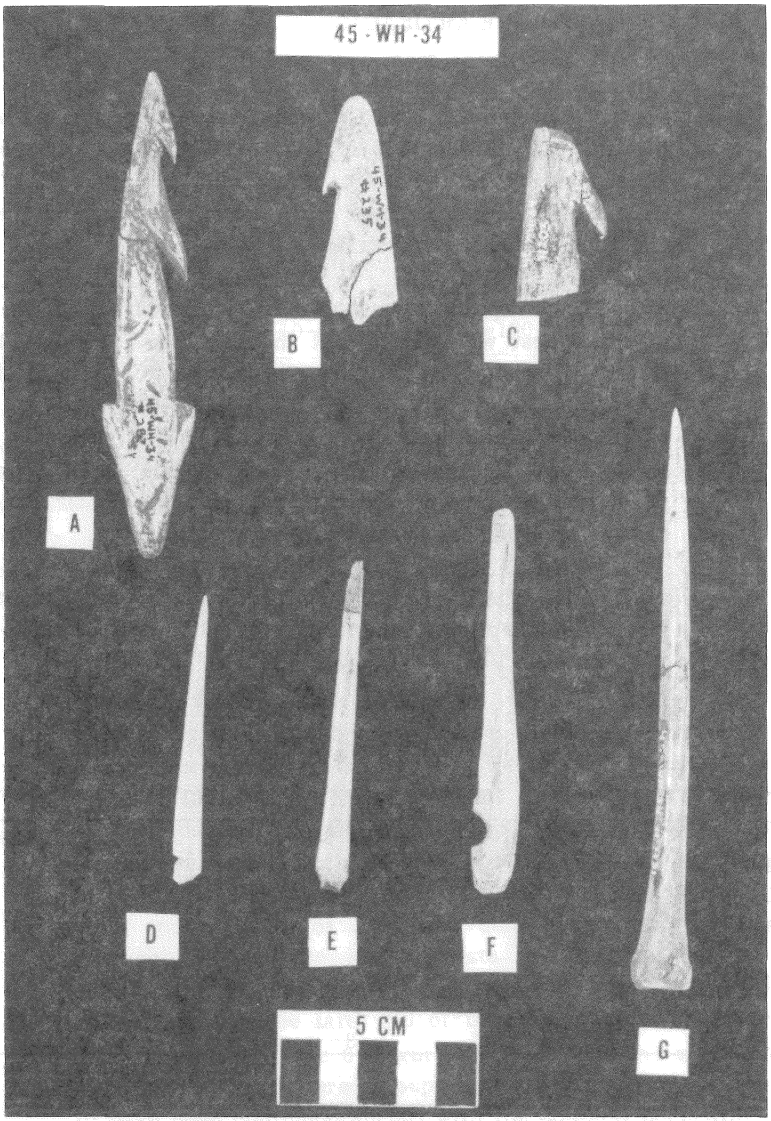

Figure 8. Bone and antler artifacts typical of the shell deposits and reworked non-shell layers of event zones 3 and 4. Harpoons generally followed this pattern, which is resemblant of forms found in the Marpole Phase of the Fraser Delta.

N = 6

Dimensional Range: Length 4 to 11.5 cm; width 1.7 to 2.15 cm; Thickness 1.5 to 1.85 cm; Weight 7.5 to 36.9 gm.

Comments: Specimen No. 258 shows cutting and chipping of the tip. It is cut away and snapped at the basal portion. There is indication of reworking for continued use. Specimen No. 632 also has the tip chipped away.

Proveniences: From S1-W3, 40-60 cm; 1 from S1-W5, 100+ cm; S1-W6 yielded one each from levels 60-80 and 80-100 cm; N1-W4 produced one from the superficial level; and one came from N3-W4 at the 20-40 cm level.

C. Antler Punches or Awls:

These artifacts consist of antler tips with grinding to small and narrow points of varying acuteness. Some show use chipping; all display grinding and use polish. No. 503 is the sharpest of the tools.

N = 4

Dimensional Range: Length 6.1 to 10.7 cm; Width 1.3 to 1.8 cm; Thickness 1.0 to 1.65 cm; Weight 5.6 to 24.5 gm.

Proveniences: One came from S1-W6, 100+ cm level; one from S1-W7, 40 cm level; one each came from the 0-20 cm levels of N1-W4 and N3-W4.

D. Antler Wedges (Table 13):

Antler Wedges were numerous, with both bifacially and unifacially ground types occurring. Most are incomplete, although tips were preserved well enough to identify. Two of the complete specimens reach the maximum dimensions, and tend to bias the mean size figures.

N = 19

Dimensional Range: Length 3.2 to 30.4 cm; Width 1.44 to 6.8 cm; Thickness 0.9 to 6.2 cm; Weight 2.3 to 417 gm.

E. Worked Antler Fragments

These artifacts show only minimal working, and are apparently discarded scraps.

Table 13. Distribution of Antler Wedges

Cut	Levels						
	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2				1			1
S1-W3				1	2	1	4
S1-W4							
S1-W5	1					1	2
S1-W6			4			2	6
S1-W7	1				1		2
N0-W4							
N1-W4			1				1
N2-W4	1		1				1
N3-W4		1					1
S4-W2							
Totals	3	1	6	2	3	4	19

m: miscellaneous t: antler tine tip

Antler Tips:
N = 12
Dimensional Range: Length 2.1 to 11 cm; Width 1.1 to 2.8 cm; Thickness 0.9 to 2.7 cm; Weight 3.1 to 34.6 gm.

Antler Scraps:
N = 16
Dimensional Range: Length 4.5 to 15.1 cm; Width 2.3 to 3.3 cm; Thickness 1.4 to 4.1 cm; Weight 6.4 to 93 gm.

Comment: One of the latter specimens may be a fragment of a wedge, and another, a portion of an antler haft for a chisel or small celt.

Antler fragment distribution is displayed in Table 14.

F. Bone Splinter Awls:

These are bone splinters with only the ends modified to allow use as piercing awls or bodkins. Polish and grinding occur only on the tips.

N = 7
Dimensional Range: Length 3.7 to 9.6 cm; Width 1.15 to 2.0 cm; Thickness 0.4 to 1.3 cm; Weight 1.22 to 5.8 gm.

Table 14. Distribution of Antler Scrap

Cut	Levels						
	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2					1m	2m	3m
S1-W3			1m				1m
S1-W4		1t 1m	1t	1t	1m		2m 3t
S1-W5		2t	1m		1m		2m 2t
S1-W6				1t 1m		2m 1t	3m 2t
S1-W7	1m	1m					2m
N0-W4		1m			1t		1m 1t
N1-W4		1t					1t
N2-W4	1t						1t
N3-W4	2t	2m					2m 2t
S4-W2							
Totals	1m 3t	5m 4t	2m 1t	1m 2t	3m 1t	4m 1t	16m 12t

G. Bone Needles:

These specimens show basal grooving with one showing traces of the eye. Evidently these were discards after eye breakage.

N = 4

Dimensional Range: Length 5.7 to 8.3 cm; Width 0.6 to 0.75 cm; Thickness 0.4 to 0.5 cm; Weight 1.6 to 3.3 gm.

H. Formed Bone Awls:

These specimens possess a larger degree of overall shaping.

N = 13

Dimensional Range: Length 2.8 to 14.5 cm; Width 0.75 to 0.95 cm; Thickness 0.54 to 0.8 cm; Weight 0.3 to 9.7 gm.

I. Bone Punch Tip Fragments:

N = 11

Lengths range from 1.42 to 4.34 cm.

J. Bone Herring Rake Teeth:

These small artifacts possess sharp tips, with a base ground to a thin wedge section for mounting in wood shafts.

Table 15. Distribution of Splinter Awls and Needles, Awls, and Tip Fragments

Cut	Levels						
	0-20	20-40	40-60	60-80	80-100	100+	Totals
				Splinter Awl			
S1-W2							
S1-W3	1						1
S1-W4							
S1-W5						1	1
S1-W6						1	1
S1-W7	1	1	1				3
N0-W4			1				1
N1-W4							
N2-W4							
N3-W4							
S4-W2							
Totals	1	2	2			2	7
					Needles		
N1-W4		1	1				2
N2-W4			1				1
N3-W4		1					1
Totals		2	2				4
					Awls		
S1-W5				1		2	3
S1-W6		1	2	1		1	5
S1-W7	1			1			2
N1-W4		1	1				2
N3-W4		1					1
Totals	1	3	3	3		3	13
					Tip Fragments		
S1-W3			1			1	2
S1-W4	1						1
S1-W5	1	2			1		4
S1-W6			1	1			2
S1-W7			1				1
N2-W4			1				1
Totals	2	2	4	1	1	1	11

N = 4

Dimensional Range: Length 2.1 to 3.1 cm; Width 0.3 to 0.4 cm; Thickness 0.2 cm; Weight less than 3 grams, mean ca. 3.75 gm.

Provenience: These four came from only two cuts and all in the 20-40 cm levels. One came from Cut S1-W5, and three from Cut N1-W4.

K. Bone Harpoon Arming Points:

Because of size and configuration, these bone points are presumed to be arming points for small leisters or fishing harpoons of the composite variety. Possibly some are barbs for larger fish hooks.

N = 4

Dimensional Range: Length 2.95 to 3.4 cm; Width 0.36 to 0.55 cm; Thickness 0.35 to 0.49 cm; Mean Weight

Proveniences: One arming point was found in each of four cuts; S1-W2, 0-20 cm level; S1-W4, 0-20 cm level; S1-W5, 20-40 cm level; and S1-W7, 20-40 cm level.

L. Fish Spear or Leister Fragments

These items consist of body segments of fish spears or leisters. Portions of one or more barbs are visible.

N = 4

Dimensional Range: Length 2.35 to 8.44 cm; Width 0.4 to 1.17 cm; Thickness 0.3 to 0.65 cm; Weight 0.42 to 6.5 gm.

Proveniences: These specimens occurred one each in Cut S1-W3, 40-60 cm level; Cut S1-W5, 20-40 cm; Unstratified in Cut S1-W6 and from the 60-80 cm level in Cut N2-W4.

M. Triangular Bone Object (Incomplete Point?)

The tip and basal end of this thin triangular bone object are partially broken away. The taper of the unsharpened edges is quite abrupt. Only one specimen of this form was recovered. It came from Cut S1-W7 in the 0-20 cm level.

Length is 3.2 cm; Width is 1.2 cm at the broadest end, and the Thickness is 0.35 cm; Weight is 1.2 gm.

N. Bone Wedges, Chisel Tips or Gouges:

These fragments of bone implements consist of bifacially ground bone bars, tapering acutely and rather abruptly to a chisel or gouge profile, with outer edges having a rounded to slightly bevelled outline. Some may be broken harpoon tips or bone knife fragments.

N = 8

Dimensional Range: Length 2.7 to 8.5 cm; Width 1. to 1.35 cm; Thickness 0.2 to 0.6 cm; Weight 0.3 to 0.9 gm.

Proveniences: Two came from Cut S1-W3 in 20-40 and 40-60 cm levels. S1-W4 yielded 1 from the 80-100 cm level; S1-W5 also produced one from a depth slightly below 100 cm. S1-W6 yielded two from the 60-80 and 80-100 cm levels. NO-W4 had one in the 80-100 cm level; and N1-W4 one in the 20-40 cm level.

O. Bone Mat Creaser:

This single specimen is a fragmentary part of a large mammal ulna. Size and form indicate it is from an elk. It is 9.8 cm long, 3.5 cm wide, and 0.56 cm thick. It came from Cut S1-W3 at the 20-40 cm level.

P. Rib Bone Objects:

These three modified ribs are worked off at one end to a blunt tip, possibly for further reworking into knives, bark-peeling tools, or for some similar use.

Lengths range from 6.2 to 11 cm; Widths 0.95 to 1.27 cm; and Thicknesses 0.5 to 0.67 cm.

The objects came from three cuts; one from a superficial layer of Cut S1-W6, one from S1-W4 at the 100+ level, and one from S1-W7 in the 20-40 cm level.

All three items seem to be associated with the terminal period of habitation, possibly contemporaneous with the housepit and probably somewhat later.

Q. Bone Spatulae:

There are two of these artifacts. They are ground to a thin section, tapering slightly in width and thickness to a blunted point. Sizes ranged from 3.66 to 15 cm in length, 1.67 to 2 cm in width, and 0.35 to 0.5 cm in thickness.

They were found in Cut S1-W6 at the 40-60 cm levels. One seems associated with Event Zone 5 and the other with Event Zone 6.

R. Bone Pendants (Figure 9):

Fourteen pendants were recovered in excavations. They are made quite simply and are plaque-like sections of bone. Incising is minimum, with only three possessing serrated edges. Possibly they were incomplete. For example, No. 26 has edge serration with the suspension hole incompletely drilled. No. 74 has both long edges and the bottom edge serrated. No. 551 has a single notch on either side of the suspension hole, and the bottom edge is also serrated.

Dimensional Range: Length 1.5 to 7.0 cm; Width 1.2 to 2.1 cm; Thickness 0.2 to 0.4 cm.

Proveniences are shown on Table 16.

S. Tooth Pendants (Figure 9):

There are eight of these modified teeth, with grooving of the root portion for suspension. Three appear to be bear canines, with the remainder made of elk incisors. Their proveniences are shown in Table 16.

Dimensional Range: Length 2.6 to 5.85 cm; Width 1.15 to 1.7 cm; Thickness 0.6 to 0.9 cm.

T. Bone Beads:

These objects are tubular bone segments showing cutting and snapping out of parts of the shaft, and final polish. Their short lengths make it unlikely that they were parts of whistles or drinking tubes.

N = 2

Dimensions: Lengths 2.0 and 2.46; Maximum diameters both 0.9 cm.

Proveniences: One came from Cut S1-W4 in the 0-20 cm level and one from Cut S1-W7 in the

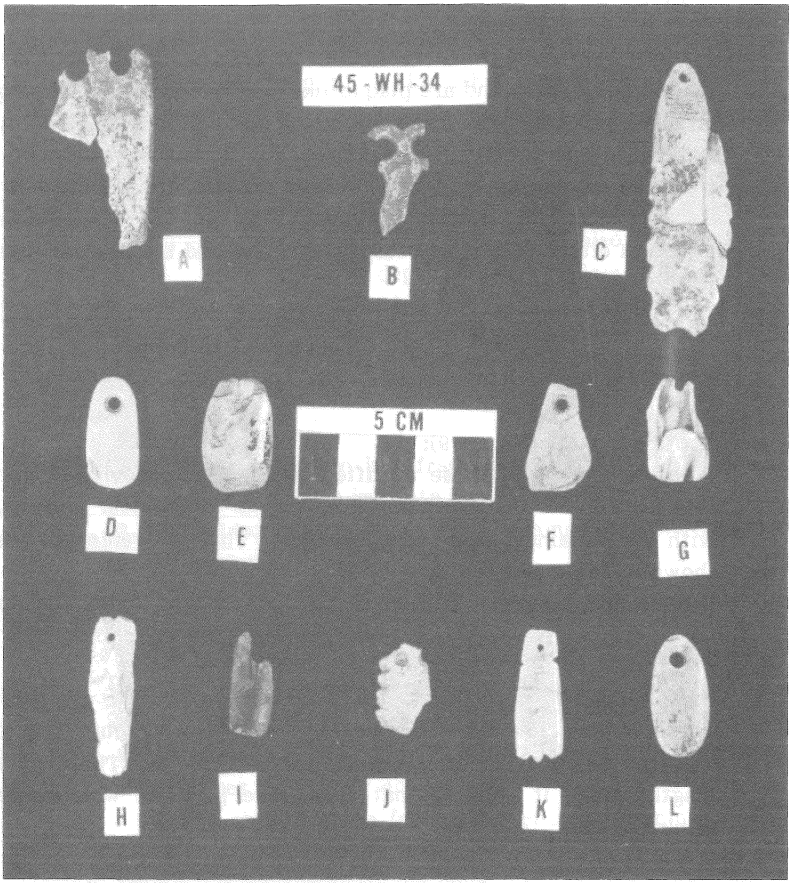

Figure 9. Bone pendants and other ornamental items from 45WH34. Most are attributable to event zones 3, 4, and 5.

superficial level. Both appear to be from very late prehistoric occupation, probably post-dating the housepit C-14 dates. They have been placed in the Zone 7 series.

Table 16. Distribution of Pendants

Cut	Levels							
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2			1b					1b
S1-W3				1t		1b 1t		1b 2t
S1-W4					2b			2b
S1-W5	1b		1b				1b 1t	3b 1t
S1-W6			1b	1t	1t	1b	1b 1t	3b 3t
S1-W7			1b					1b
N0-W4								
N1-W4								
N2-W4				1b	1t			1b 1t
N3-W4			1b 1t	1b				2b 1t
Totals	1b		5b 1t	2b 2t	2b 2t	2b 1t	2b 2t	14b 8t

b = bone pendant
t = tooth pendant

U. Carved and Incised Bone Objects (Figure 9):

These objects are generally small and incomplete. Certain similarities are seen to Gulf Island Complex artifacts (Duff 1956) of Locarno Beach Phase styles. Most seem to have been used as decorative attachments to garments or regalia, or as jewelry. One is a section of elk mandible with incised lines on the lingual surface. Extensive upheaval from earlier strata is highly probable, by both human and natural action.

N = 12

Dimensional Range: Ca 2 to 5.2 cm; Width 1.9 to 2.9 cm; Thickness 0.8 to 2.3 cm; Weight 1.4 to 10.6 gm.

Distribution of these objects is shown in Table 17.

Table 17. Distribution of Carved Bone Objects

Cut	Levels						
	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2			1				1
S1-W5		1					1
S1-W6		1		1	1		3
S1-W7		1					1
N1-W4	1	2		1			4
N3-W4	1	2	1				4
Totals	2	7	2	2	1		14

V. Worked Bone Scraps:

These manufacturing waste scraps and remnants of complete artifacts were mainly distributed along the East-West trench to considerable depths. North of this area they were shallower.

Dimensional Range: Lengths 1.4 to 25.0 cm; Widths 0.6 to 5.21 cm; Thicknesses 0.5 to 2.37 cm; Weights 0.5 to 82 gm.

Their stratigraphic distribution is shown in Table 18.

Comments: Eighty-four of the worked bone scraps came from levels of less than 60 cm, and from features or Event Zones demonstrably late in the cultural sequence. Where they come from levels deeper than this, they appear to relate mainly to Event Zones of later prehistoric time also. Deeper levels of S1-W4, S1-W5, and the eastern part of S1-W7 are pithouse fill deriving from spoil redeposited in the depression. Inversion of stratification and reworking of earlier deposits make interpretations uncertain, but it is possible to make some tentative assignments of artifacts and Event Zones.

Table 18. Site Distribution of Worked Bone Scrap

Cuts	Levels							
	20-0	0-20	20-40	40-60	60-80	80-100	100+	Totals
S1-W2		1	4	2	2	1		10
S1-W3				1	2	2	3	8
S1-W4		2	2	1	2	1		8
S1-W5	1	2	4		3	6	3	19
S1-W6	1		2	7	5	4	8	27
S1-W7		2	8	3	5	2		20
N0-W4			1	1			1	3
N1-W4	1		8	1			1	10
N2-W4		3	1	2				6
N3-W4		4	15	3				22
S4-W2				1				1
Totals	3	14	45	22	19	16	15	134

IV. MISCELLANEOUS

A. Red Ochre and Other Pigments:

Nineteen specimens came from depths ranging from turf level to 125 cm. They range in size from small pea sizes (4-5 mm) to 17-20 mm. None came from the Event Series 1a-1d.

B. Baked Clay Objects:

Four specimens of baked clay appear to be fortuitous, with firing resulting from bits of mud attached to cooking stones or firewood. No. 171, however, appears to have been intentionally wrapped around a reed or plant stem and then baked.

Proveniences: All occurred in housepit fill. One specimen came from S1-W5 at the 40-60 cm level; one from 125 cm in Cut S1-W4, and two from S1-W6, levels 20-40 and 40-60 cm.

C. Faunal Specimens:

These items consist of one beaver incisor with no signs of modification, a fish gill plate, a specimen of native oyster shell, and a small land snail shell.

D. Human Tooth:

One human molar was found in a shell lens in the superficial zone.

E. Floral Specimens:

Ten specimens were recovered. One is a lump of well-preserved charcoal saved for wood identification, as was a second specimen of charred bark. A rolled and somewhat charred piece of wild cherry bark was found. The remainder of the samples consisted of clumps of charred berries from S1-W2. These came from Event Zones 2, 3, and 4 in ash and shell concentrations. These berries appear to be of the native blackberry.

ARTIFACT DISTRIBUTION AND STRATIGRAPHY

While stratification of the site is difficult to unravel, a detailed examination appeared in order. Given beginning and approximate "end points" defined by radiocarbon assays, the sequence of human occupation could be placed in a relatively well-defined temporal framework. The occupational history created a series of simple debris layers upwards of 1.5 meters thick which were mixed with the alluvium of some 4,000 years accumulation. These strata were intruded at times and inverted in local areas by continued excavation of firepits, wastepits, and ultimately a large dwelling depression.

In ordering the sequence I have divided the strata into seven major events which cannot, of course, reflect adequately all that went on there. This Event Series simply provides a sequential morphology of the site and a scheme of relating objects to the activity surface at arbitrary moments in time. Recognizing that these "moments" may involve decades, if not centuries, the concept approaches the Phase concept of Willey and Phillips (1958).

Beginning with end points of ca. 2200 B.C. (uncorrected for calendric years) and about A.D. 900-1000, the task remained to assign materials to the various periods. Most items could reasonably be expected to fit the given time span. A few are clearly stratigraphically later. These items of later deposition are not numerous. They appear to be the result of late and even more sporadic site utilization.

The event sequence shown in Table 2 was developed to allow comparison with the well-defined sequence for the Fraser Delta (Borden 1970). Further comparisons are made to the Gulf Islands region as far as comparative information exists.

Table 19 shows distribution of lithic projectile points, flake scrapers, chopper tools, hammerstones, scraper-planes, and pebble-remnant tools. Results of the tabulation indicate a strong bias toward highest frequencies in the uppermost event zones. This would be disturbing were it not for the clear evidence of upheaval during the occupational sequence. The projectile point distribution is particularly interesting in that none appear in the earlier and undisturbed areas where Event Zones 1 through 4 were still intact. However, since the undisturbed area of earlier strata is quite small, the chance of finding much in situ there is correspondingly small.

Antler harpoons and fragments also show a similar distribution. One came from Event Zone 8; three from Event Zone 6, and one from Event

Table 19. Stratigraphic Distribution of Selected Artifact Classes

Projectile Points

Event Zone	FORM A	FORM B Lot 1	FORM B Lot 2	FORM C	FORM D	Totals
8	1	2	1	3	0	7
7	2	2	0	1	0	5
6	0	0	0	0	1	1
5	1	0	2	1	0	4
4	0	0	0	0	0	0
3	0	0	0		0	0
3a				1	0	1
2	0	0	0	0	0	0
1	0	0	0	0	0	0
Uncertain Stratification	4	0	2	1	2	9
Totals	8	4	5	7	3	27

Chipped Stone Scrapers

Event Zone	GROUP A	GROUP B	GROUP C	GROUP D	Totals
8	1	4	1	3	9
7	1	3	0	2	6
6	2	1	1	1	5
5	3	1	1	3	8
4	0	0	0	0	0
3	0	0	0	0	0
2	0	0	0	0	0
1	2	0	1	2	5
Unstratified	5	2		1	8

	GROUP E	GROUP F	GROUP G	GROUP H	Totals
8	3	1	1	0	5
7	0	0	0	1	1
6	0	2	0	1	3
5	0	0	1	1	2
4	1	1	0	0	2
3	0	1	0	0	1
2	0	0	0	0	0
1	1	2	2	0	5
Unstratified	0	0	1	0	1
				Total	16

Table 19 (Continued)

Event Zone	Chopper Tools	Convex Edge	Straight Edge	Totals
8		4	0	4
7		1	0	1
6		0	0	0
5		1	0	1
4		0	0	0
3		0	0	0
2a		1	0	1
1		1	1	2
Totals		8	1	9

Event Zone	Symmetric Conv. Edge	Asymmetric Conver. Edge	Double Point	Totals
8	1	0	0	1
7	0	0	1	1
6	3	1	0	4
5	0	2	0	2
4	0	0	0	0
3	0	0	0	0
2	0	0	0	0
1	1	1	0	2
Totals	5	4	1	10

Event Zone	Scraper Plane	Pebble Remnant	Hammerstone	Totals
8	0	0	1	1
7	1	1	1	3
6	0	0	0	0
5	0	1	0	1
4	1	1	0	2
3	0	0	0	0
2	0	0	0	0
1	0	2	0	2
Totals	2	5	2	9

Chopper Tools, Totals by Zone

Event Zone	Quantity
8	6
7	5
6	4
5	4
4	2
3	0
2a	1
1	6
Total	28

Zone 1 (where it seems anomalous), and one is from an unstratified context.

Microblades, of which there are only two, came from deeper zones; one from 3A and one from Zone 1. Both are fragmentary and of basalt. The single microcore came from Zone 1, and was also of basalt. Microcores and blades of basalt are less frequent than quartz in this area. Several hundred microblades and cores were found at the Semiahmoo Spit site (45-WH-17), all of quartz. These latter were found in contexts related to a Locarno Beach-type occupation of that site. A single C14 date for a pre-Locarno Beach occupation has been received and ranges up to 4,100 years in age. A comparable, if not somewhat greater age, can be assigned to the speciments from 45-WH-34. There is a suggestion of Mayne Phase —similar and possibly elements of a pre-Mayne Phase assemblage with microblades in this site.

Possible Locarno Beach Phase (Borden 1970) similarities are seen also in the numerous bone pendants. Table 19, however, suggests that they may mostly date to a Marpole-like assemblage revealed in slumping of the housepit. Taken alone, the pendants do not provide enough evidence to posit a lengthy Locarno Beach Phase occupation. Nonetheless, there is a suggestion of the Locarno Beach Phase present in the materials, and much better evidence from the Birch Point site (Gaston 1975) where a date for a Locarno Beach type assemblage is approximately 3500 years B.P. At any rate it is possible to show a fairly continuous occupation of the Ferndale site from the materials and features exposed.

The ground slate items are not diagnostic. Nor can the sandstone spindle whorl be definitely assigned to any of the named Fraser Delta cultural phases. Its depth in Cut S1-W5 suggests it came originally from Event Zone 6 or possibly 5. The degree of fragmentation might indicate it has been redeposited not once, but several times. As a matter of interest, Drucker (1943:123-124) observed that stone spindle whorls were more characteristic of the Milbanke-Queen Charlotte Sound aspect of the Northern Northwest coast. Those of the Fraser Delta-Vancouver Island area tend to be made of bone.

The abundance of simply-made lithic implements, many of which can be assigned to the earlier three of the Event Zones, suggest site activities not requiring more elaborate implements. On the other hand, one might take a more simplistic stand and assume the earlier assemblages represent a technologically simpler society. The writer prefers to use the former assumption, believing that the site was used for tasks not requiring a broad

range of tools, and noting also that the earlier zones tentatively suggest a rather small community or work group in action only seasonally. Presence of a few lithic points similar to those of the Mayne Phase suggests that this was not a "crude" technology.

The nature of the community constructing and apparently wintering in the pit dwelling is not clear. This single dwelling, with several clusters known to have been located in the vicinity of Lynden and Nooksack, and a recently discovered one overlooking the Strait of Georgia at Birch Point (Gaston 1975) provides a new problem focus for the regional archaeology. Were these people ancestral Thompson Indians who reputedly used a part of Whatcom County (Collins 1974) as a hunting territory? Was their presence in the higher country of eastern Whatcom County a stimulus to adopt the semi-subterranean house provided the Nooksack peoples? Does the presence of pit dwellings along the Nooksack River system, as far as the coast near Birch Bay, indicate migration, intermarriage, or protracted visits? Perhaps all of these compose the answer. At any rate, these questions must be raised by the evidence.

SUMMARY

The site is a relatively small one with complex stratification. Situated on the active flood plain of the Nooksack River, it appears to have been mainly seasonally used. Its most recent occupation residents dug and used at least one modestly-sized pit dwelling. These people also used a modicum of salt water molluscs and gastropods in their diet. Stones used for cooking and for fire containment showed, in a number of cases, remnants of barnacle attachments, showing their intertidal origin. Salt water now lies some 6-1/2 miles from the site.

A series of components was observed. Somewhat earlier than the semisubterranean house, there occur several dense shell concentrations. Some of these lie in firepits, others appear to have been discarded to form small heaps. Numerous bone and antler artifacts occur in both primary and secondary deposition. These objects indicate late prehistoric and Marpole Phase affinities, as well as some of earlier aspect.

The number of chipped stone projectile points suggests use during some periods as a hunting camp site. Situated slightly south of an historically known "Prairie" near Custer, one of several in the western part of the county, this locality would have provided access to the large cleared areas and to the river for canoe travel to the coastal village sites. This site locus and others nearby could have been used for a variety of purposes for millenia. Chosen for its criteria of accessibility and resources, it may well have been favored by many small work groups of coastal dwellers. Nor can we overlook its use by upstream peoples as well.

Occupancy appears to be fairly continuous, albeit seasonal, from the early part of the third millenium B.C. to about 1,000 years ago. Mechanical sediment analysis indicates that the erliest cultural component lies slightly above an abrupt transition from coarse redeposited Sumas outwash sand to finer sands with a much larger silt component. This evidence suggests that the river changed its burden capacity, possibly as a result of gradient decrease. If so, this gives a clue to the approximate date, and to environmnental changes preceding residential use of this flood plain site. As noted in the section on working hypotheses, the gradient change may relate to sea level stabilization or reduction in amplitude of oscillation somewhat more than 5,000 years ago (Matthews, Fyles, and Nasmith 1970).

Earlier lithic assemblages are mainly composed of choppers, cores, and flake tools (Figures 10 and 11). Only a very few bifaces or bipoints

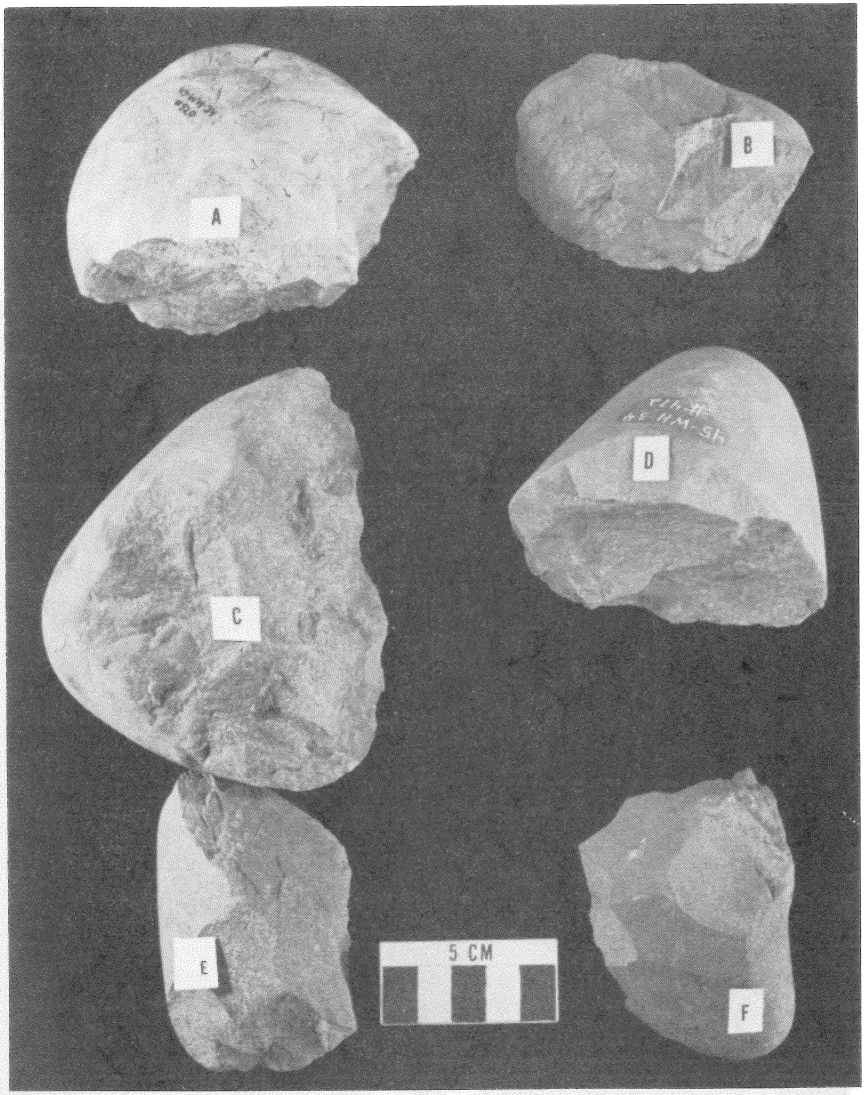

Figure 10. Artifacts of the Ferndale II Assemblage. This assemblage was limited to flake tools, choppers and cores. Only one lanceolate bipoint can be definitely attributed to zone I strata, but others seem to have derived from intrusive pits into that zone.

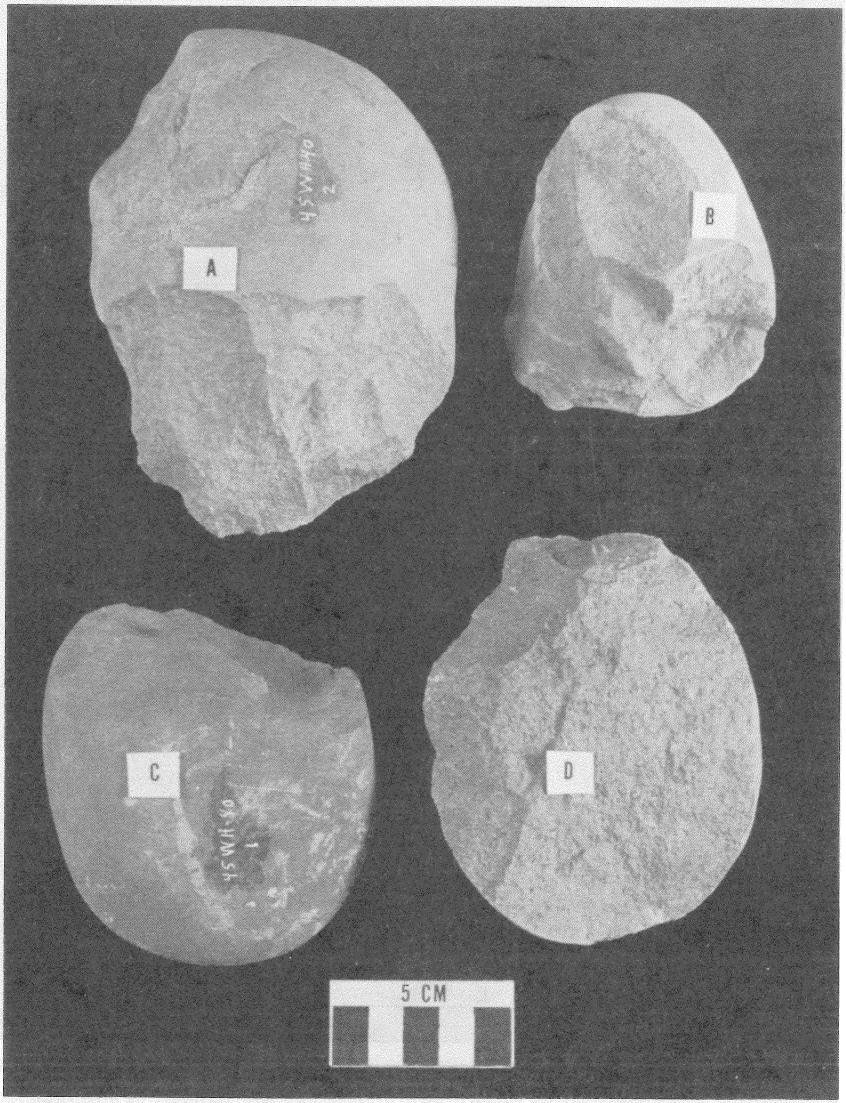

Figure 11. Ferndale I Assemblage. These objects are typical of the flake and core implements found on the 14 meter terrace, some 40-50 meters from the stratified site (Figure 2).

came from or even might have come from these levels. What I have termed the Ferndale I Assemblage lies outside the stratified site area on a higher terrace. There is a possibility that the Ferndale I materials may be contemporaneous with the stratified items from the flood plain. However, the finding of similar sites on the same terrace level for several miles along both sides of the Nooksack strongly suggests a different and earlier component also used the same kind of environment.

What may be considered typically coastal characteristics of occupation here appear in an inland context. This suggests that there was periodically intense use of the location by coastal people as part of the seasonally-dispersed task pattern. For a period the locus also was a semi-permanent village, probably during the winter season.

While originally thought to possess a historic period component, no evidence for this was found. Some three-fourths mile upstream a buried site component does appear to have been used in historic times.

In short, several different site uses can be inferred. Tentatively one can identify three major activity patterns; most recent is the pithouse community; earlier occur components with abundant shell remains, with evidence for fishing and timber cutting, possibly gathering of vegetal foods and manufacturing materials. Earlier still occurs a less definite activity orientation. While there are scraping and cutting tools, and a fragmentary bipoint, it would be stretching the evidence to say the site was used only for a hunting camp. Probably many of the activities inferrable in the middle components, can be proposed for the earliest habitation period.

CONCLUSIONS AND DISCUSSION*

The results of this site investigation were somewhat surprising in the range and breadth of data. On one hand a dateable pit dwelling was revealed which raises some questions about the nature of Coast-Interior interaction, and at the same time it adds some light to proposals made in the 11 yers since the site was excavated. There is a suggestion from the data that small enclaves of Interior Salish may have settled in the near-coastal region late in the first millenium A.D. Finding a second such dwelling in the area of Birch Point and considering those recorded near Lynden some 30 years ago may suggest that a congeries of Interior-related communities existed in a kind of symbiotic relationship with the coastal tribes.

Much of the site use during the period 500 B.C. to A.D. 500 seems to have been by coastal peoples. There is also some evidence that this may extend into the second millenium B.C. Shellfish, barnacle-marked rocks and the artifacts suggest transport from the coast to the immediate hinterland. Occupation of this time period seems to have occurred in late summer. Charred berry remains in several fire-pits provide one clue to the seasonality of use.

In addition the abundance and clustering of fish bone (salmon) also indicates summer use. The total weight of fish bone from cuts S1-W2 and N2-W4 was 567 and 982 grams respectively. Mean weight of fishbone for the remaining 9 cuts was 165 grams. These bones occurred mainly in Event Zones 3, 4, and 5, and it is to this larger time interval that we may perhaps attribute most of the fishing activity (Table 2).

At this point in analysis it is not possible to ascertain what coastal community used this site as a seasonal activity focus. It seems likely that segments of several larger communities may have been involved. At a later period, ca. A.D. 600-1000, people living in Interior-style dwellings used the site. The several other undated settlement sites of this sort may have been roughly co-eval. This suggests some intensity of Coastal-Interior relationships. Whether the Interior groups potentially represented by the pit-dwellings became assimilated into coastal communities is not answerable with these data.

---

*Because of the numerous developments in the field since 1974, this section has been extensively rewritten.

From the beginning of occupation of the Nooksack flood plain in this locality nearly 5000 years ago (approximate dendrocalibrated date), the site continued to be used for some 4 millenia. It was then essentially abandoned. For some centuries before abandonment, there is a suggestion of cultural changes, or at least some changes in habitation structures.

Among the several subsistence-maintenance activities carried on here were the cutting of timber and probably processing into rough planks. Possibly even canoes may have been roughed out at the site, if not completely finished. Cedar root for basketry was abundant, as well as large land mammals and accessibility to salmon. Without knowing much about the river's configuration in prehistoric times, we can say little about the location of local fisheries except for the mouth of Ten Mile Creek located almost directly across the Nooksack from the site. This creek may have been the location of a fish trap or a netting and spearing location. Artifacts found at the mouth of the creek suggest that a small site may have once existed there as well as at 45 WH 34, and that certain ceremonial matters may have occurred.

Among the earliest cultural strata, Zones Ic and Id contain traces of blue mussel shell. Associated cobble and flake artifacts compose the Ferndale II assemblage which I now believe to be of late Olcott/Old Cordilleran affinities, and possibly transitional to Carlson's (1970) Mayne Phase. The Ferndale I assemblage, presumably earlier than Ferndale II, bears similarities to those from sites at Birch Bay and Aldergrove Road. Similar though smaller site assemblages can be documented from the county and the larger area of Puget Sound. These assemblages occur in weathered till soils and surfaces, with deep weathering rinds suggesting greater age. But at the same time, these criteria do not allow of firm chronological placement. However, with additional sources of data it is becoming possible to extend regional comparisons in a slightly firmer chronological order.

It seems likely, now that several additional regional sites have been examined, particularly 45 WH 24L and 45 WH 64 (Gaston and Grabert 1976), that what I have termed Ferndale I and II can be assigned to the Olcott Complex of Butler (1960) and Kidd (1964). The expanded artifact assemblages found in the Birch Bay sites during subsequent examinations indicate that the Olcott term may be safely applied to several of the local and regional assemblages. In fact, dating of the early components at Glenrose Cannery near Vancouver, B.C. (Matson, 1976:18) to about 8 millenia ago seems to substantiate the usually assumed time span for the Olcott Complex. Lithic tool assemblages of the Ferndale I and II

components resemble in some detail those of early Birch Bay and the Glenrose Cannery site. While Matson has termed the early cultural manifestations at that site "Old Cordilleran" after Butler's designation (1960:) there are few, if any, reasons to deny their relationships with the Birch Bay and Ferndale sites.

Many questions about pebble/cobble tool function still remain unresolved. The more obvious woodworking and hunting implements of bone, antler and ground stone are lacking from these earlier components. Even those this is true, we need not discount the practices of this early period, of littoral collecting, salmon fishing, and at least a modicum of woodworking. Cultural emphases were no doubt different, food storage techniques perhaps less efficient, and the techniques of exploitation not what they were at about the beginning of the Christian Era. Nevertheless there were some early communities that maintained themselves in the region as seen in the presently growing body of evidence. Poor preservation of organically based artifacts has made the task of inference and induction more difficult. In a few sites, though, as at Hoko River there is much better organic preservation.

Indeed, although lying farther afield, we may cite Croes's work at the Hoko River "wet" site and a nearby rock shelter (Croes and Blinman 1980) as indicative of a well developed subsistence strategy involving river mouth salmon fishery, and a deeper water fishing technology. Included in the repertoir of the Hoko River dwellers near Neah Bay on the Strait of Juan de Fuca were also well-developed basketry and cordage techniques. The Hoko River sites have also yielded information clarifying certain of the uses of microlithic tools (Flenniken 1980:290-306). These quartz blades found set in wooden hafts were elegantly adapted to the lack of certain other stone materials in the region and a highly effective means of dressing salmon for smoking or drying. The presence of these small tools and the apparently related microblades proper can be thoroughly documented at Ferndale, near Lynden (Spear 1977:72-77) and at many other sites in the region and in the San Juan Islands. While the ground slate "ulo" knife for fish dressing is usually assumed to be the rule for the Northwest Coast peoples generally, it seems to have been preceded by and in some cases existed contemporaneously with the more regularized microblade technique. Both seem to have fallen into disuse near the middle of the first millenium A.D.

There are also only partial resolutions to questions of site utilization where the full range of domestic equipment is not preserved. The sparse

distribution of lithic projectile points and obvious wood-working tools of ground stone and antler might be construed to mean that large game hunting, wood working and food storage means were not present in the earliest periods of the Ferndale site and others like it. If one also assumes that this site and its congeners represent only one of several facets of the seasonal food quest then sites with abundances of projectile points such as 45 WH 13 on Bellingham Bay may represent activities at other seasons and places, and involve the same or related working groups, however composed and organized.

Birch Point investigations and others nearby at Birch Bay (Gaston 1975; Gaston and Grabert 1977) have located potential longer-term occupations than purely the short season activity sites. At Birch Point a protracted occupancy ranged from the early Locarno Beach to well into the Marpole Phase, perhaps even to the historic period. A date in the mid-second millenium B.C. indicates the approximate beginning of habitation there, with an assemblage consisting of large stemmed and bipointed lanceolate points, large slab abraders, steatite beads, and several small hafted and unhafted celts. Pebble chopper sites investigated at Birch Bay Village also yielded several of these lanceolate bipoints, though from an undated context. Larsen (1971) had earlier located a high-tide submerged hearth feature beneath a shell midden which contained a large stemmed point formally similar to those from 45 WH 24L.

In sum, the presence of a widely dispersed and well-developed Locarno Beach phase can be attested for the immediate region as well as the Fraser Delta and the Gulf Islands. The investigations at Ferndale, while showing some degree of inland orientation of the communities represented in this cultural phase, do not imply a much farther inland incursion or resource utilization by the people who composed those Locarno Beach communities. Some small part of the technology suggests the ways in which things were used. By inference some of these uses may be applied to sites such as Ferndale.

Site locations in the Whatcom County area of which the Ferndale site is but one locus indicate that the historic subsistence strategy of this part of the Northwest Coast is of long standing. Not that it did not undergo changes, both in the procurement technology and the emphases on particular kinds of resources, for at least two and probably three major tool traditions appear to have been adapted to the salmon fishing and storage technology. While the tool traditions were somewhat different, the uses were similar, representing at a minimum stylistic changes and at most

adoption of more effective means for resource exploitation.

That I assume the traditional subsistence strategy of the region to be of long standing does not mean I believe it to have been unchanging. To the contrary, there is every evidence that not only did there occur tactical shifts in the geography of resource procurement, but these occurred in the resource emphases and social organization as well. Additional factors may have intervened during the period in which we can see the development of Northwest Coast Culture. One of the effects of these factors appears to have been a shift from a relatively loose band organization to a rather more formalized and sometimes elaborate social system. Among the manifestations of these changes are probably increased emphasis on territoriality, leadership roles, ceremonies and formalization of institutions such as the potlatch. Demographic manifestations appear to have been toward more nucleated communities, probably a somewhat denser population and occasional reorientation of social and economic networks.

Recent works by Ames (1981) and Burley (1980) examine the evidence for development of social ranking by the former, and the patterns of food storage, salmon exploitation and storage techniques bearing on the increasing complexity of the regional manifestation of Northwest Coast Culture, in the work of Burley.

In a cogent, well-reasoned paper Ames has addressed the problem of the evolution of social ranking in the Northwest Coast. The hierarchical organization of these cultures has frequently been discussed. Ames's model is based in a systems approach (1981:792, 797). He identifies this model as that of "...a resilient system forced into a new domain of attraction, either as a stable or a resilient system" (Ames 1981: 792). Essentially he uses a modification of the Carneiro idea (1970) in which it is seen that of the several constraints placed upon a cultural system, cultural and ecological are the most important. In the case of the Northwest Coast Ames identifies the circumscription of resources and specialization in resource acquisition and use as the most important factors in growth of a hierarchical social system. These were the major factors; the concomitant, both in the sense of dependent and resultant, socio-cultural processes "...were population growth and promotion" (Ames 1981: 798).

Ames's model bears some resemblance to and elaborates much more upon the theme of resource circumscription than that proposed by the author and Larsen (1975:231-232). In the latter case the development of more complex social institutions and the formalization of social ranking was seen as much more of a northern Northwest Coast phenomenon than in

the central portion of the Northwest Coast Culture area. Burley and Ames models are much more analytic in that they address the questions of ranking, social complexities and technological improvements more directly, whereas Larsen and I were concerned mainly to investigate certain environmental changes in the Holocene period.

A detailed definition of Ames's (1980) use of the term "promotion" could be lengthy. Suffice to say it is most briefly described as the process whereby persons or groups of people forming part of the larger community become possessors and the major practitioners of rituals, ceremonies and the symbolic manifestations of these. These are the legitimizing symbols of actual monopolies on certain rosources and the areas in which they are found. Among the most important resource areas would include those of good salmon fisheries and mollusc beds. In Marpole times these symbols may have consisted of the frequently found zoomorphic and anthropomorphic stone vessels and figurines. Similar, but perhaps analogous such items occur in the Locarno Beach Phase as much as a millenium earlier than the Marpole Manifestations, i.e. in the latter half of the second millenium B.C. Small bone items of personal nature may have servd a similar purpose as insignia in the Locarno Beach Phase with individual or group possession of the larger stone items a development toward formalized clan or lineage structure in the later period.

The model Ames has constructed and the data he uses have much explanatory value to recommend them. However, he believes that the major data gap is in the substantiation of regional exchange (Ames 1980:800). There is growing evidence in the Whatcom County and adjacent areas for appreciable quantities of serpentine tools. Most of this material is evidently derived from the middle reaches of the Fraser River. Steatite (soapstone) is another commodity that was frequently used in figurine and bowl manufacture. Some known sources of this material are in the Marblemount-Newhalem areas of the Skagit River. No doubt other sources are known or can be found.

I have proposed (Grabert MS, n.d.) that exchanges took place frequently at cultural or group interfaces, in effect at "frontiers." These frontiers could be spatial, social or both. Exchanges consisted not only of goods, but included information, services, sometimes persons by way of intermarriage, and persons moving to new communities. This model was devised to help understand the role of sites such as 45 WH 34, which we may view not simply as a place where a variety of resources could be gathered by an "owning" group, but a place also where contacts were made

and information exchanged. Such sites as this could also have functioned in the "promotion" process by reiterating or re-affirming through use the legitimate rights of one community or lineage over others. Access by members of groups lacking access rights would have been conditional upon permission of the legitimate owners. Such rights-of-use would have tended also to set up obligations and expectaions of future permission to use. Reciprocity, evinced by owners of one site being permitted to use other and non-owned sites outside their nominal territory, would also have functioned in creating a broader network of exchange relationships.

Unfortunately, this site and only one other located on the Nooksack and its drainage can be shown to possess strong coastal relationships, as well as those with more inland groups. The other sites near Lynden and its vicinity have shown little that unequivocably tie the coast and interior together in some sort of reciprocity network. However, we must consider that the distribution of stone bowls, soapstone and serpentine for axes constitute a manifestation of such a network. 45 WH 34 for at least some of its protracted existence shows clear coastal relationships in its barnacle-marked beach cobbles and varieties of molluscan shells. Its earliest strata show little but traces of blue mussel shells that might be construed as evidence of coastal contacts. In the final few centuries of habitation, the ties seem more to the interior as evinced in the dated pithouse strata.

Viewed from the perspective of Ames's model based in circumscription of resources and their non-homogeneous geographic distribution 45 WH 34 is a unique prehistoric site. It is small. It was extensively used for a long period. Certain necessities for food and other resource preparation had to be imported. It possessed reasonably easy and immediate access to a variety of resources. It contains a variety of utilitarian artifacts as well as a fair number of objects of "socio-technic" nature (Binford 1972: 24-25). In addition, a small site directly across the river has yielded a stone figurine of the seated anthropomorphic type. The figurines seem to appear prominently in the Marpole Phase.

While Ames proposed a model for the growth of social hierarchy in the Northwest Coast region, Burley (1980) focused his attention upon the development of the salmon-fishing and processing strategy that when intensified made the fisheries one of the highly desired resources. Intensification of salmon fisheries with their circumscription of accessibility and processing locations may have led to these becoming one of the proprietary resources documented in the historic period.

He proposed that the intensification of salmon fishing and storage

preparation had its origins near the mouth of the Fraser Canyon (1980: 73-74). Burley adds substantiative data to the model originally offered by Borden. By means of the storage-preservation model, Burley also offers an explanation of an increase in sedentism, intensified procurement strategy and technology for salmon taking, as well as drying (more feasible in the drier Fraser Canyon area). As explanation of this intensified focus, he offers the lesser diversity of inland resources, and the distinctly seasonal nature of salmon runs as contrasted to the more readily available intertidal resources that provided the quasi-stored food facility for the coastal communities. While stimulating development of improved storage processes for salmon, the location and abundance also stimulated exchange and social differentiation of social groups with rights as against those groups that lacked direct access to salmon runs. Here Burley's model converges upon that of Ames.

At this point also Burley cites location as a factor of the Fraser Canyon groups in control of exchange in coast-exotic stone materials. This is a second factor he uses to model the increased social complexity that was a factor in their development of rank differentiation. Such rank differentials could arise from a variety of sources, access to resources, control of exchange in these and other resources as well as the possible prestige accruing from development of new techniques and wealth.

While the investigations conducted have provided only modest verification of cultural continuity between Locarno Beach and Marpole Phases, the site location in a resource-abundant locale, seems to enhance the probability that it was continuously used. There is no abundance of exotic materials, however. Only a very few specimens are made of materials not obtainable in the immediate region. What appears is mainly utilitarian. Personal adornment items are of local materials. The major exotic material consists of serpentine celts found by the land-owner prior to excavation. The serpentine celts, while no doubt of local manufacture, are made of imported raw material.

Since the excavations at the Ferndale site, we have begun the practice of specific gravity measurements on celts (adzes, axes) from the region and determined that all in the local collections from site excavations are of serpentine. This has been done for specimens from Birch Bay, Sumas and a few other county areas. There is thus some fairly strong support for Burley's (1980:74) suggestion that the Nooksack river system was one of several (possibly a principal) downriver exchange routes for this raw material.

It is unfortunate that we have no radiocarbon dates that fall in the relevant time range of 2000-3000 years ago for the Ferndale site. We have only a set of beginning and ending points for habitation and site use. The abundance of Locarno Beach and Marpole artifacts of several classes attests to site use in those periods--the more or less firm chronology is lacking for the middle range. This point is raised because there is evidence for some apparently specialized net fishing at Cherry Point as evinced by an abundance of perforated net weights and large anchor stones dated between 2400 and 3000 years ago. To show a continuous spatial and time distribution from the Hope area sites via Ferndale to coastal fishing stations could aid in substantiating the Burley model in increasing salmon fishing specialization and improvements in the fishing technology.

The Ferndale site then, represents one of probably several local sites used for short terms during a resource collection season, but which were also intensively used over long periods. It is not one of long duration of habitation, except for the last centuries of its use. Small size and lack of obvious dwelling features could have led to its being passed over for some larger site with obvious significance. Its contribution to understanding of prehistoric subsistence and territorial uses and the models of Ames and Burley cannot yet be fully assessed. That it is contributory is not to be gainsaid.

This monograph is both descriptive and an interpretation of a well-stratified site of long duration. It places the several differentiable tool assemblages into a chronological framework representative of the regional cultural series. Based in the hypothesis that the archaeological residues represent only a segment of the total subsistence strategy at any one time period, one concludes that while tool traditions may have changed and their stylistic expressions, over time the basic subsistence strategy changes a lesser rate and over a lesser range. Thus we can say that a tradition is also expressed here.

Some evidence for environmental changes can be discerned and these had their probable effects upon the subsistence strategy. Like Burley, I seek expressions of changes in exploitation efficiency in the archaeological record. These may well be reflected in the decorative objectives and the range of fishing techniques expressed here and elsewhere in the region. Those objects found at the Ferndale site which may be construed as composing social insignia, or as Binford terms, "socio-technic" nature (1972: 24-25), may be expressions of differential status used by the persons nominally considered owners of the site, or having the principal

rights-of-usufruct there. As proposed by Burley, the ideational changes in Northwest Coast Culture, and especially for the region discussed here, appear to have grown out of improvements in resource exploitation, storage techniques and distribution of the produce. Optimization of the social order toward improved redistribution and subsistence techniques congruent with microenvironmental changes played a part in the result we see historically as Northwest Coast Culture.

REFERENCES CITED

Ames, Kenneth M.

1981 The Evolution of Social Ranking on the Northwest Coast of North America. American Antiquity, Vol 46, No. 4.

Binford, Lewis

1972 An archaeological perspective. Seminar Press, New York and London.

Borden, Charles E.

1970 Culture history of the Fraser-Delta region: an outline. In B. C. Studies, Nos. 6-7 Fall-Winter; Roy L. Carlson, editor. Vancouver, B.C.

Burley, David V.

1980 Marpole, Anthropological Considerations of a Prehistoric Culture Type. Department of Archaeology, Simon Fraser University, Publication Number 8. Burnaby, B.C.

Butler, B. Robert

1961 The Old Cordilleran Culture in the Pacific Northwest. Occasional Papers of the Idaho State College Museum, Number 5. Pocatello, Idaho.

Carlson, Roy L.

1970 Excavations at Helen Point on Mayne Island. In B. C. Studies Nos. 6-7, Fall-Winter, edited by Roy L. Carlson. Vancouver, B.C.

Carneiro, R. L.

1970 A Theory of the Origin of the State. Science, 169, 733-738.

Croes, Dale R. and Erick R. Blinman, editors.

1980 Hoko River: A 2500 Year Old Fishing Camp on the Northwest Coast of North America. Washington State University Laboratory of Anthropology, Reports of Investigations No. 58. Pullman, WA.

Drucker, Philip

1943 Archaeological survey on the northern northwest coast. Anthropological Papers No. 20. Bureau of American Ethnology Bulletin 133.

Duff, Wilson

1956 Prehistoric stone sculpture of the Fraser River and the Gulf of Georgia. Anthropology in British Columbia, No. 5. Victoria, B.C.

Easterbrook, Don J.

1966 Glaciomarine environments and the Fraser glaciation in northwest Washington. Guidebook for the first annual field conference, Pacific Coast Section, Friends of the Pleistocene, Bellingham, Washington.

Emmons, R. V.

1952 An archaeological survey in the lower Nooksack Valley. Anthropology in British Columbia= 3:49-56. Victoria, B.C.

Flenniken, Jeffrey.

1980 Systems Analysis of the Lithic Artifacts. In Dale R. Croes and Eric Blinman, editors, Hoko River A 2500 Year Old Fishing Camp on the Northwest Coast of North America. Washington State University Laboratory of Anthropology Reports of Investigations, No. 58. Pullman, WA.

Gaston, Jenna

1975 The extension of the Fraser Delta cultural sequence into northwestern Washington. Unpublished M.A. thesis, Department of Sociology/Anthropology, Western Washington State College, Bellingham, WA.

Gaston, J. and G. F. Grabert

1976 Salvage Archaeology at Birch Bay Washington. Department of Sociology/Anthropology, Western Washington State College. Reports in Archaeology No. 5, B ellingham.

Grabert, G. F. and Curtis E. Larsen

1975 Marine transgressions and cultural adaptation: preliminary tests of an environmental model. In Prehistoric Maritime Adaptations of the Circumpolar Zone, edited by William Fitzhugh, Mouton, The Hague.

Hansen, Henry P.

1947 Postglacial forest succession, climate and chronology in the Pacific Northwest. Transactions of the American Philosophical Society, n.s., 37: part 1.

Heusser, Calvin J., and Linda E. Florer

1973 Correlation of marine and continental quaternary pollen records from the Northeast Pacific and Western Washington. Quaternary Research, Vol. 3, No. 4. New York.

Kidd, Robert Stuart

1964 A Synthesis of Western Washington Prehistory From the Perspective of Three Occupation Sites. Unpublished M.A. Thesis, University of Washington, Seattle.

Larsen, Curtis E.

1971 An investigation into the relationship of change in relative sea level to social change in the prehistory of Birch Bay, Washington. Unpublished M.A. thesis, Department of Sociology/Anthropology, Western Washington State College, Bellingham, WA.

Matson, R. G.

1976 The Glenrose Cannery Site. National Museum of Man, Mercury Series, Archaeological Survey of Canada, Paper No. 52. Ottawa.

Matthews, W. H., J. G. Fyles, and H. W. Nasmith

1970 Postglacial crustal movements in southwestern British Columbia and adjacent Washington State. Canadian Journal of Earth Sciences, Vol. 7, 4:690-702.

Mitchell, Donald H.

1970 Archaeology of the Gulf of Georgia area, a natural region and its culture types. Syesis, Vol. 4, Supplement 1. Victoria, B.C.

Spear, Robert L.

1977 A Prehistoric Site Cluster in Western Whatcom County, Washington. Unpublished M.A. Thesis, Department of Anthropology, Western Washington University, Bellingham.

Stern, Bernard J.

1934 The Lummi Indians of Northwest Washington. Columbia University Press, New York.

Suttles, Wayne Prescott

1951 Economic life of the Coast Salish of Haro and Rosario Straits. Unpublished Ph.D. dissertation, University of Washington, Seattle.

Willey, Gordon R., and Phillip Phillips.

1958 Method and theory in American archaeology. University of Chicago Press.