CHAPTER 3

Ancient Landscapes and Archaeology in Haida Gwaii and Hecate Strait

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Introduction

Reconstruction of ancient landscapes in the Haida Gwaii and Hecate Strait area has aided in the discovery and interpretation of several early post-glacial archaeological and paleontological sites. This chapter will provide a brief overview of the history of environmental change and results of archaeological investigations at two key sites, Richardson Island and Kilgii Gwaay, found on these early landscapes.

Paleoenvironments

The paleoenvironmental record for Haida Gwaii and Hecate Strait (Figure 3:1) exhibits a remarkably dynamic history. The following summary covers the sea level, vegetation and climate, and paleontological history of this region.

Sea Level

Haida Gwaii and Hecate Strait have been subject to rapid and substantial changes in relative sea level from Glacial through to mid-Holocene time (Figure 3:2). These changes have significant consequences to discovery and interpretation of the early archaeological record in the area. Intensive investigation into regional sea level history over the last decade has resulted in a detailed record for Haida Gwaii and additional data for the east Hecate area. This information has been used to model ancient shoreline positions, identify archaeological and paleoecological targets for "on-ground" investigation, and aid interpretation of early Holocene archaeological sites (Fedje and Christensen 1999; Josenhans et al. 1997; Fedje and Josenhans 2000; Fedje et al. 2001).

Climate and Vegetation History

Palynological research demonstrates that the climate and vegetation history of Haida Gwaii were subject to significant change at the same time that shoreline positions were shifting rapidly (Lacourse and Mathewes n.d.; Pellatt and Mathewes 1994, 1997; Mathewes 1989, Fedje 1993). This work shows that from at least 15,000 [cal 18,000] BP until ca. 12,200 [cal 14,400] BP Haida Gwaii climate was cool and vegetation was coastal tundra. After 12,200 [cal 14,400] BP and until ca. 11,000 [cal 13,000] BP the climate was warm and relatively dry, and the landscape was dominated by pine parkland. During Younger Dryas times (ca. 11,000 [cal 13,000] to 10,200 [cal 11,500] BP) there was significant climatic cooling and lowland vegetation communities shifted to open, mixed forests variously composed of alder, pine, mountain hemlock and spruce. Closed temperate forests dominated by spruce and hemlock developed

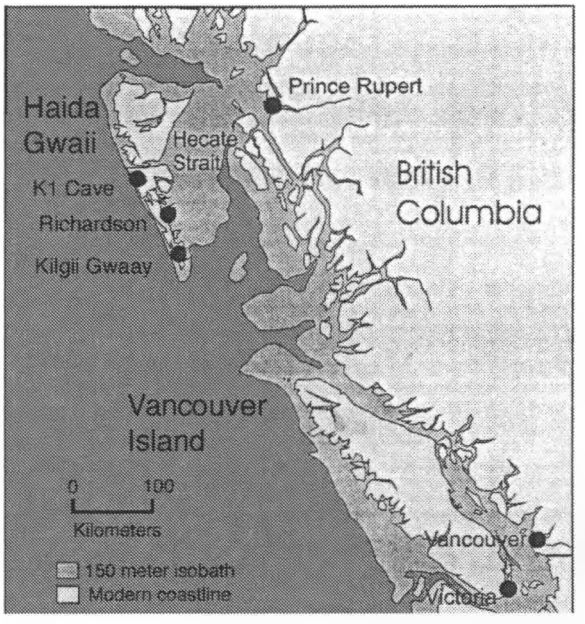

Figure 3:1. **The British Columbia Coast with the 150 m Isobath.**

after ca. 10,200 [cal 11,500] only to be replaced by open mixed forests during the early Holocene climatic optimum (ca. 10,000 [cal 11,400] to 6500 [cal 7500] BP). After this time climatic deterioration commenced and the modern hypemaritime forests of Haida Gwaii, characterized by spruce, hemlock and western red cedar, were established by ca. 3500 [cal 3800] BP.

Paleontology

The late Wisconsin and early Holocene paleontological record for the northern Northwest Coast has developed from being virtually nonexistent a decade ago to one that is substantial and rapidly expanding. In southeast Alaska,

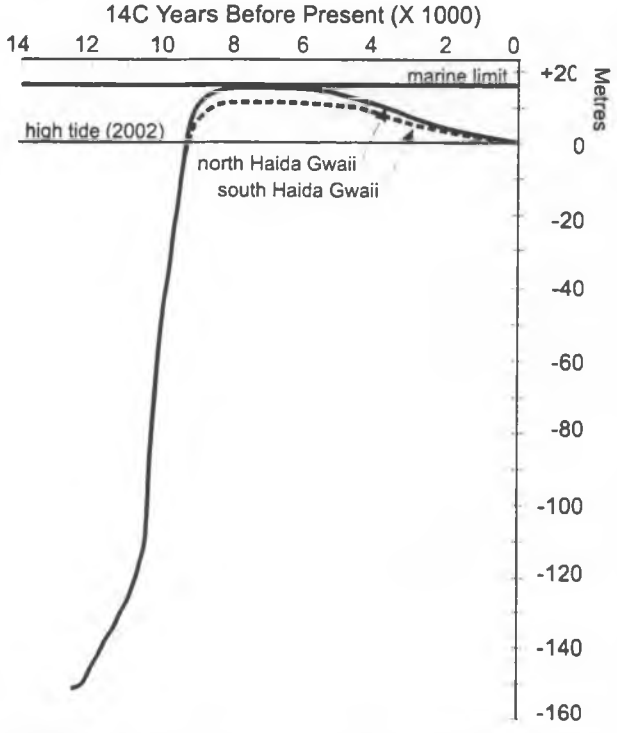

Figure 3:2. **Relative Sea Levels, Haida Gwaii.**

Heaton and colleagues (Heaton and Grady 2003) have demonstrated evidence for the presence of an arctic fauna, including ringed seal and arctic fox, during the glacial maximum, and an early post-glacial fauna, including arctic fox, caribou and grizzly bear, by 12,000 [cal 14,000] BP. In Haida Gwaii there is similar change in the paleontological record. Ten years ago the oldest known faunal assemblage was from an archaeological site dating to ca. 6000 [cal 6800] BP (Ham 1990). Recent work, especially that at Kilgii Gwaay (see below) and K1 Cave (Figure 3:3) has extended the record to ca. 14,500 [cal 18,200] BP. Most of this record derives from the 9400 [cal 10,600] BP faunal assemblage from Kilgii Gwaay (Fedje et al. 2001), although the recent work at K1 Cave on the west coast of Moresby Island has identified an assemblage of bears (MNI = 7) with several dating from ca. 10,500 to 11,500 [cal 12,200 – 13,500] BP and one dating to 14,500 [cal 17,500] BP (Table 3: 1 from Ramsey et al. n.d.). Analyses of the 2002 collections are incomplete, but do indicate the presence of additional species including brown bear and caribou. These data suggest that there may have been substantial refugia on the Northwest Coast during the glacial maximum and support the opening of a biologically productive coastal corridor before 12,000 [cal 14,000] BP.

Environmental Synthesis and Modeling

The environmental history of Haida Gwaii and Hecate Strait poses significant challenges to discovering the locations of the early post-glacial archaeological record. Prior to 12,000 [cal 14,000] BP the western margin of the Continental Shelf was emergent and dominated by broad low relief, open tundra with large lakes, meandering rivers and low-slope ocean shorelines (Figure 3:4). In Haida Gwaii and western Hecate Strait these low elevation plains are now deeply drowned whereas in the area of eastern Hecate Strait and the outermost Mainland coast the ancient shorelines are stranded in the forest.

Survey of the ancient coastline of Haida Gwaii is fraught with challenges, however, *in situ* geological and botanical evidence of the ancient landscape has been obtained along with surficial evidence of human occupation (Fedje and Josenhans 2000; Fedje et al. 2001). Models derived from the integration of paleoenvironmental data and terrain models (topographic digital elevation models) have proven key to locating and interpreting early Holocene archaeological sites as well as the aforementioned early post-glacial paleoenvironmental sites. In conjunction with the palynological evidence the presence of black bear by ca. 12,000 [cal 14,000] BP in Haida Gwaii and southeast Alaska provides strong evidence that a biological corridor was available by that time. Significantly, bears are omnivores with many of the same environmental needs as humans. Their distribution is supportive of the early post-glacial viability of the landscape to people.

Archaeology

The potential contribution of Haida Gwaii to a more complete understanding of the early human occupation of the Northwest Coast was recognized more than three decades ago (Fladmark 1969; Hobler 1978). Investigations in the

Figure 3:3. **Duncan McLaren in K1 Cave, Series 11 Passage (2002).**

late 1960s and early 1970s provided a broad array of evidence suggesting that the prehistoric record extended to at least 9000 [cal 10,200] BP. Over the last decade significant new information in support of this potential has been obtained by a number of investigations only a few of which will be summarized here.

Prior to the 1990s the prehistory of Haida Gwaii was suggested to have considerable antiquity but firm evidence extended no earlier than ca. 7500 [cal 8400] BP. In the 1970s Phil Hobler (1978) located several intertidal lithic sites hypothesized to date before 8500 [cal 9500] BP as well as sites associated with a raised beach. From recent archaeological work (see below) and the local sea level history the intertidal sites are now known to date to ca. 9500 [cal 10,800] BP and the raised beach sites from ca. 9000 [cal 10,200] to 5000 [cal 5700] BP (Fedje and Josenhans 2000). Fladmark (1989) identified a number of raised beach sites with components dating from ca. 7500 to 5000 [cal 8400-5700] BP as well as low elevation components associated with rapidly rising sea levels. The sea level record suggests the latter should date between 9400 and 9300 [cal 10,600-10,500] BP (Fedje and Josenhans 2000, Fedje et al. 2001).

Table 3:1. K1 Cave Radiocarbon Dates.

Lab# (CAMS)	Provenience	Material	Elev. m	^{14}C age	Calendar years ago: -1 sigma, mean, + 1 sigma	Context
75558	K Series 6b	Dog bone	32	2,350±40	2355, 2349, 2341	surface
75559	K Series 7a	Bear bone	32	11,150±50	13172, 13144, 13014	surface
75746	K Series 7h	Bear femur	32	14,540±70	17679, 17411, 17158	surface
79488	K Series 8a	Bear tibia	48	9,376±50	10684, 10628, 10505	surface
79687	K Series 11	charcoal	20	10,380±80	12622, 12328, 11960	strat. section
79489	K Series11b	Bear ulna	20	11,250±70	13372, 13166, 13052	strat. section
79490	K Series 11f	Bear ulna	20	10,450±60	12790, 12498, 12166	strat. section

Results of excavations at two early Holocene archaeological sites, Richardson Island and Kilgii Gwaay, are briefly presented in the following paragraphs. Both sites give evidence of the earliest known Holocene maritime adaptation on Haida Gwaii and, in conjunction with paleoenvironmental data, portend the discovery of significantly earlier records.

Richardson Island

The Richardson Island site is situated on a raised marine terrace on the west coast of Richardson Island in southeastern Haida Gwaii. The site was occupied at a time when sea levels were rising rapidly to the early Holocene marine transgression maximum of 15 to 16 m above modern levels.

History of Research

The Richardson Island site was first identified in 1993 with the discovery of a large intertidal lithic scatter on the west side of the island (Mackie and Wilson 1994) that was later determined to be a secondary deposit of material from a raised beach site situated some 100 meters inland at an elevation of ca. 15 to 18m above high tide (Fedje and Christensen 1999). In 1995 and 1997 two one metre square units were excavated by Parks Canada and Haida archaeologists. In total, over four metres of well-stratified cultural deposits were excavated during these preliminary investigations. In 2001 the site was revisited by a team led by Quentin Mackie and a larger area of excavation initiated. This was the first year of a three-year University of Victoria research program funded by SSHRC.

Stratigraphy and Dating

The early Holocene Richardson Island archaeological record was recovered from regosolic stratified marine berm gravels. Abundant charcoal and lithic artifacts characterize ancient land surfaces. A minimum of 23 separate occupation layers was identified. The lowest paleosol rests on the surface of a diamicton (debris-flow) within which is incorporated charcoal dating to ca. 9600 [cal 11,100] BP. The paleosol underlies an occupation layer dated to 9300 [cal 10,600] BP and, as with all overlying paleosols contains abundant lithic artifacts. Overlying paleosols are separated by layers of fine gravel ranging from 2 to 50 cm in thickness (Figure 3:5) Imbrication within the gravel layers and the strike (landward incline) of the layers themselves suggest these materials were

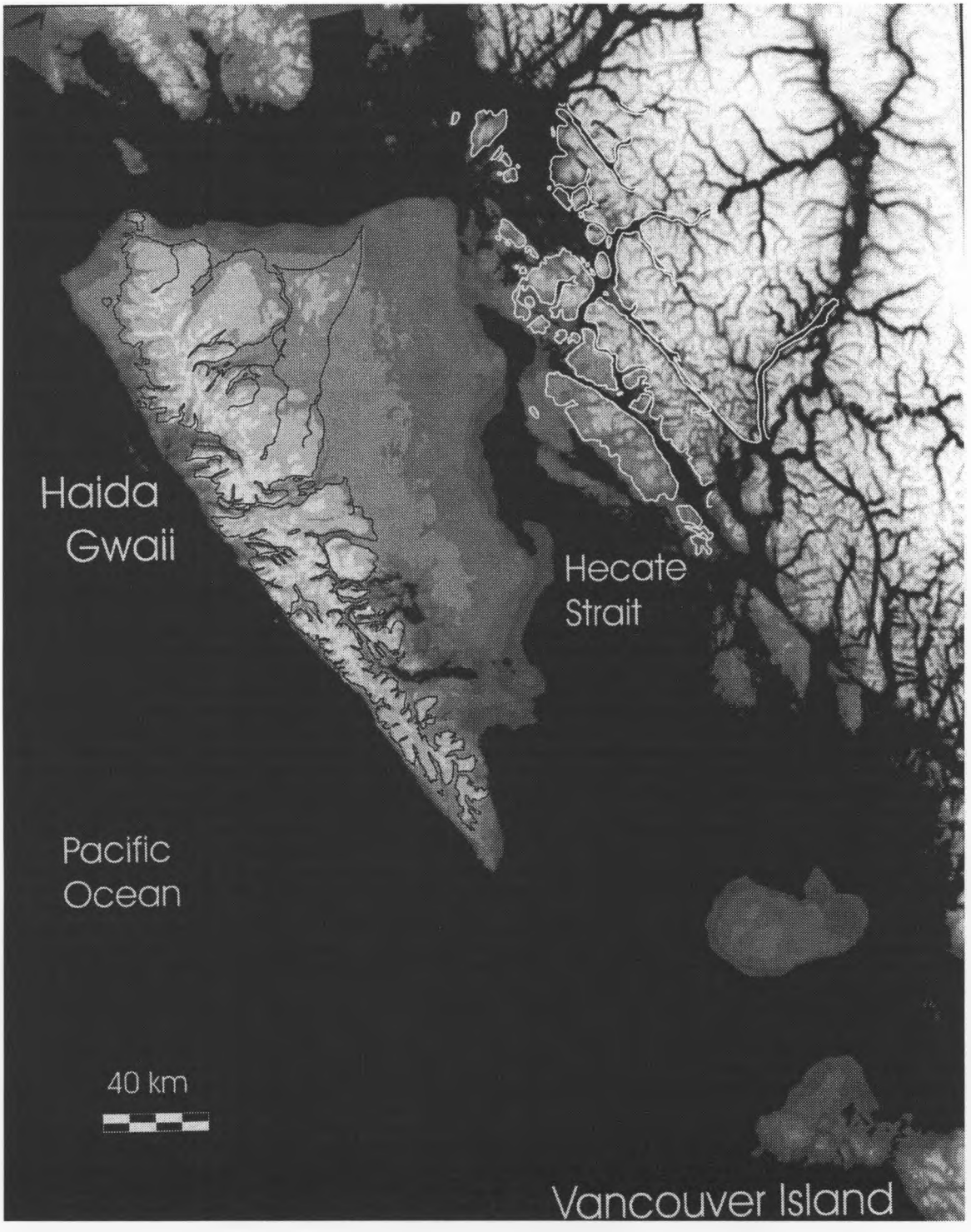

Figure 3:4. **The Northern Coast of British Columbia ca. 12,000 [cal 14,000] BP. The modern shore of Haida Gwaii is outlined in black, and western Hecate Strait is outlined in white (Image prepared by G. MacMillan and D. Fedje).**

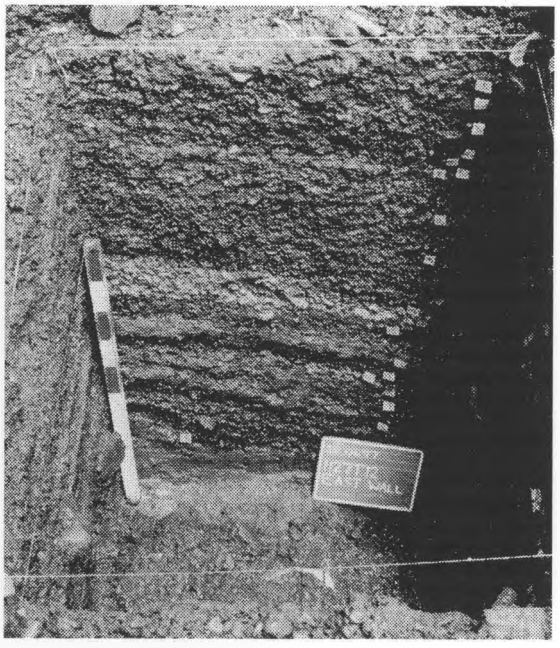

Figure 3:5. **Excavation Unit 12, Richardson Island.**

deposited as berm overwash during major storm events or tsunamis. Continuous rising of sea level until ca. 8900 [cal 10,000] BP (Fedje and Josenhans 2000) permitted berm aggradation to continue for approximately 500 years and provides an exceptionally high-resolution record. The berm sequence is approximately four metres thick and capped by ca. 50 cm of alluvial gravel and recent (post-8000 [cal 9000] BP) debris-flow deposits.

Table 3:2. Richardson Island Radiocarbon Dates.

Lab# (CAMS)	Proveninence	Material	Datum m aht	Depth cm	14C Age	±	Calendar years ago -1sigma, mean, +1 sigma	Comment
Stratigraphic exposure 1								
16199	1127T6	charcoal	18	50	8490	70	9534, 9509, 9441	raised beach
16200	1127T6	charcoal	18	100	8690	70	9817, 9627, 9549	raised beach
16202	1127T6	charcoal	18	300	9010	60	10221, 10201, 10159	raised beach
Stratigraphic exposure 2								
26270	1127T11	charcoal	18	348	9220	60	10492, 10316, 10243	raised beach
Excavation Unit 10								
26262	1127T10J	charcoal	18	61	8470	60	9530, 9490, 9435	raised beach
26263	1127T10N	charcoal	18	108	8640	50	9676, 9551, 9542	raised beach
26264	1127T10N	charcoal	18	251	8850	60	10151, 10091, 9781	raised beach
26265	1127T10S	charcoal	18	325	8700	60	9885, 9662, 9552	raised beach
26266	1127T10S	charcoal	18	329	8980	60	10215, 10185, 9977	raised beach
26267	1127T10S	charcoal	18	347	8960	60	10210, 10176, 9922	raised beach
26268	1127T10S	charcoal	18	354	9080	60	10241, 10222, 10193	raised beach
26269	1127T10S	charcoal	18	374	9160	60	10400, 10352, 10236	raised beach
Excavation Unit 12								
39875	1127T12T	charcoal	18	404	9290	50	10558, 10438, 10294	raised beach
39876	1127T12T	charcoal	18	421	9290	50	10558, 10438, 10294	raised beach
39877	1127T12R	charcoal	18	434	9590	50	11112, 10823, 10751	diamicton

*m(aht) -meters above high tide. All dates are corrected for isotopic fractionation (13C/12C).

Fourteen radiocarbon dates were obtained from the cultural deposits as well as one date on the underlying diamicton (Table 3:2). The dates are stratigraphically consistent at one sigma with the exception of CAMS26265, which is out of sequence by two sigma.

Material Culture

Vertebrate remains recovered from this site are limited to a few grams of calcined bone, most of which are fish. The bones of rockfish, bird and, tentatively, caribou have been identified.

The lithic assemblage includes ca. 8300 artifacts collected in 1995 and 1997 and ca. 5000 artifacts recovered in 2001 (analysis of the 2001 assemblage is not complete at this time). All of the artifacts recovered appear to be of locally derived material. Preliminary analysis suggests two components are present at the site (Fedje and Christensen 1999; Fedje et al. n.d.). The earliest component is assigned to the Kinggi Complex and dates from 9300 to 9000 [cal 10,600 to 10,250] BP). This component is characterized by a non-microblade assemblage with abundant evidence of biface technology, simple flake tools and large unifacially worked tools (Figure 3:6). The later Early Moresby Tradition component dates from ca. 9000 to 8500 [cal 10,250 to 9600] BP and exhibits abundant evidence of North Coast Microblade Tradition technology in association with declining representation of biface technology. This component contains the same range of simple flake and large unifacial tools as seen in the Kinggi component.

Kilgii Gwaay

The Kilgii Gwaay site is situated in the modern intertidal zone of a small embayment on the south side of Ellen Island (Figure 3:7) in southernmost Haida Gwaii (Fedje et al. 2001). During late-glacial and very earliest Holocene time the landform encompassing Kilgii Gwaay was in an inland forested setting. By ca. 9500 BP [cal 10,750 BP] sea level had risen such that Kilgii Gwaay was adjacent to the ocean shore. About 100 years later still-rising seas flooded the site. Evidence of human occupation is present on the east and west sides of an ancient pond, now capped by shell hash, which would have become a shallow lagoon during the time of site use.

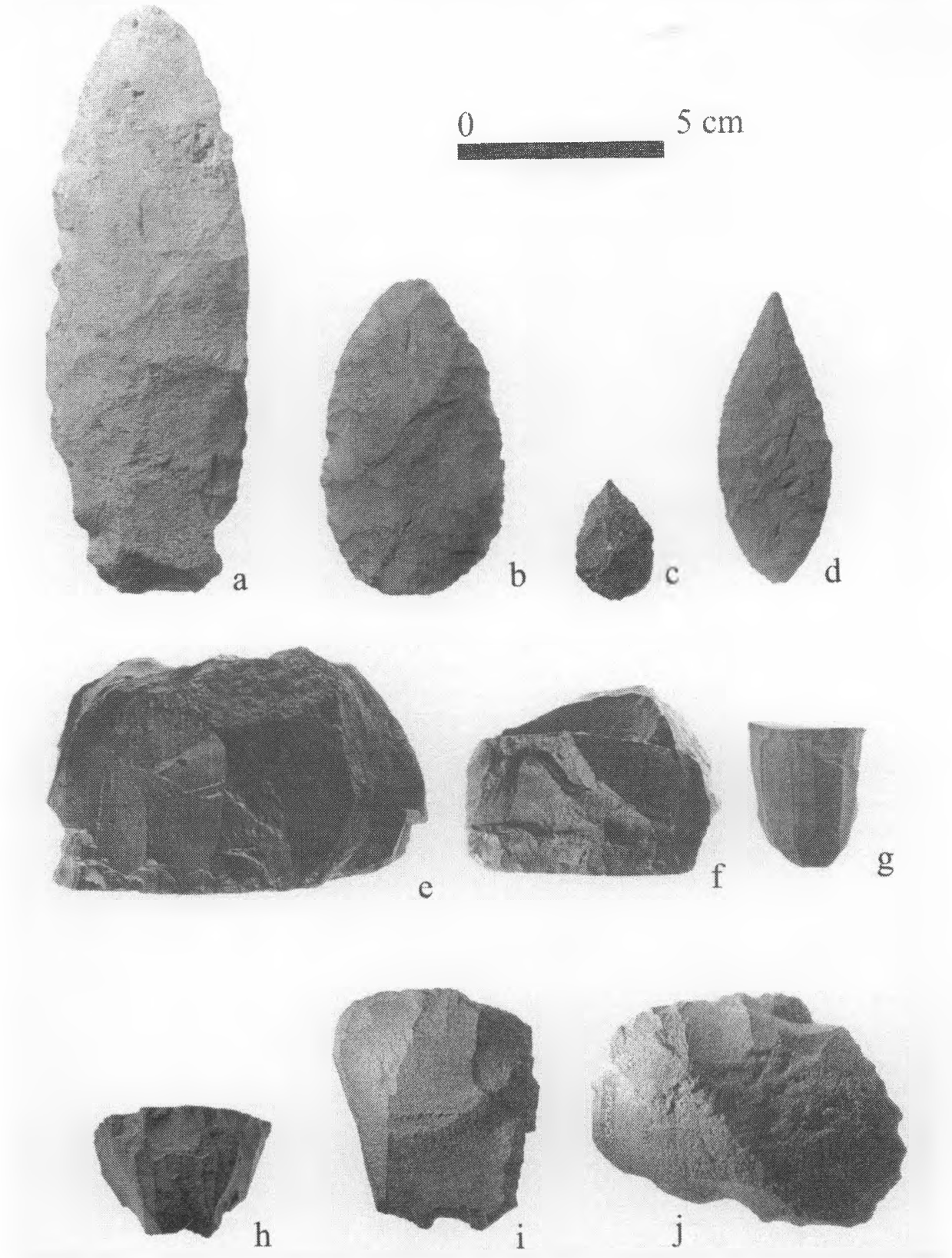

Figure 3:6. **Bifaces (a-d). Scraperplanes (e,f) and Microblade Cores (g,h) from Richardson Island, and Unifaces (i,j) from Kilgii Gwaay. Photo: J. McSporran.**

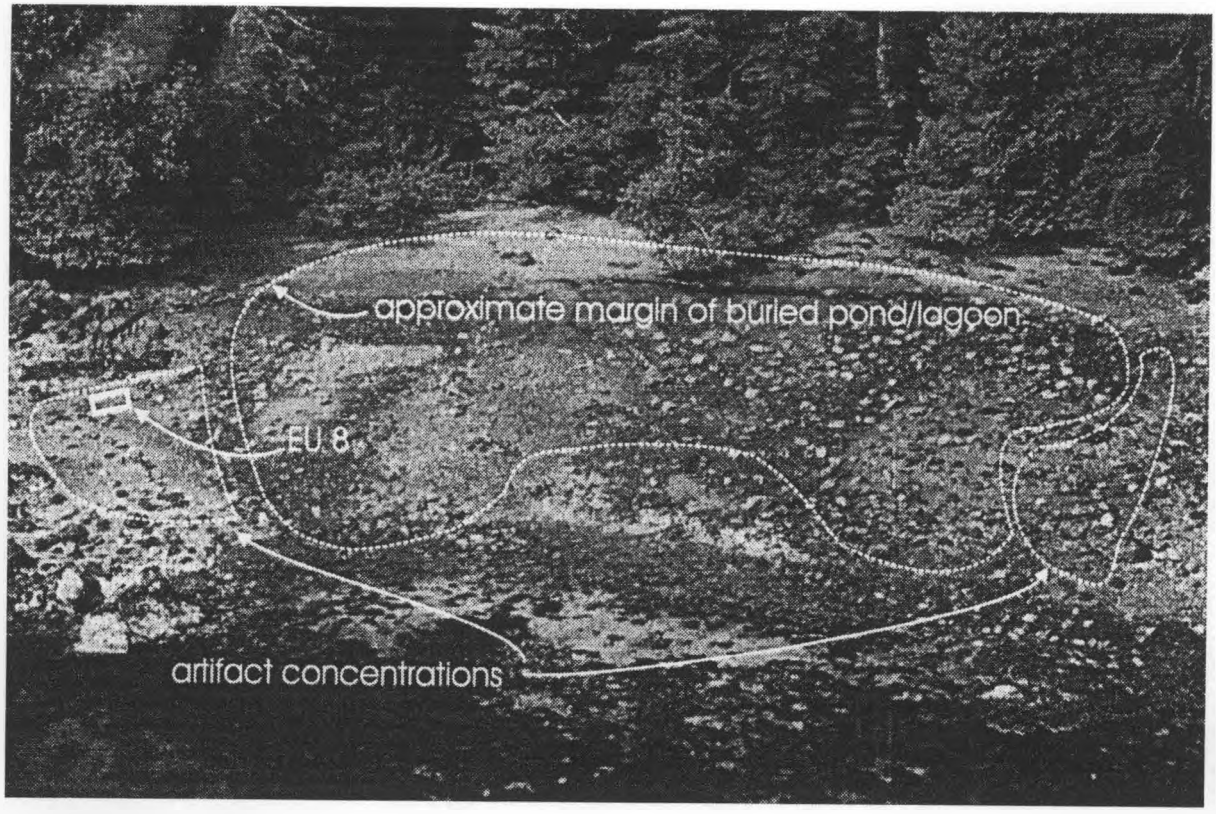

Figure 3:7. **The Kilgii Gwaay Site.**

Table 3:3. Kilgii Gwaay Radiocarbon Dates.

Lab# (CAMS)	Provenience	Material	Datum m bht	Depth cm	14C age BP	Calendar years ago -1 sigma, mean, + 1 sigma	Comment
Test Unit 3							
70704	1325T3	bone	2	45	9460 ± 50	11036, 10690, 10583	Bone, shell layer
Excavation Unit 8B							
76666	1325T8B	charcoal	2	24	9430 ± 50	10733, 10641, 10578	Bone, shell layer
77248	1325T8B	charcoal	2	24	9410 ± 50	10725, 10610, 10560	Bone, shell layer
76667	1325T8B	shell	2	24	9440 ± 50	10737, 10642, 10579	Bone, shell layer
79681	1325T8B	shell	2	31	9420 ± 50	10729, 10640, 10562	Bone, shell layer
79682	1325T8B	charcoal	2	31	9260 ± 40	10500, 10444, 10289	Bone, shell layer
76668	1325T8B	charcoal	2	40	9230 ± 50	10491, 10314, 10248	Bone, shell layer
76669	1325T8B	Shell	2	40	9540 ± 40	11068, 10995, 10697	Bone, shell layer
79683	1325T8B	Shell	2	40	9440 ± 40	10734, 10642, 10581	Bone, shell layer
79684	1325T8B	charcoal	2	40	9340 ± 40	10636, 10557, 10431	Bone, shell layer
76670	1325T8B	charcoal	2	52	9850 ± 40	11233, 11226, 11198	Paleosol below bone, shell layer
Excavation Unit 8A							
77720	1325T8A	Shell	2	50	650 ± 40	658, 578, 559	Marine gravel
Excavation Unit 8C							
77719	1325T8C	Shell	2	50	440 ± 40	517, 507, 479	Marine gravel
Pollen Core 2							
79685	1325TC2	Shell	2	120	8670 ± 40	9692, 9575, 9549	Base of shell hash
79686	1325TC2	Seed	2	307	12420 ± 60	15371, 14345, 14220	Lower pond sediment

History of Research

In 1991 the Haida archaeologist, Captain Gold, found Kilgii Gwaay and collected some 1500 lithic artifacts from the surface. The site was visited several times in the following years but it was not until 2000 when a fuel storage facility was proposed for the area that more detailed investigations were initiated. In 2000 the site was mapped and two 50 cm-square test units excavated to determine whether buried cultural deposits were present. A small collection of stone tools, faunal remains and waterlogged wood was recovered. A splinter of bone was dated to 9460 [cal 10,700] BP and a surprisingly diverse fauna identified. In 2001 and 2002 further work was undertaken, including surface collection, block excavation and sediment coring.

Stratigraphy and Dating

At Kilgii Gwaay the archaeological record is present in both surface and subsurface contexts. Excavations and subsequent analyses indicate that the subsurface archaeological record includes both *in situ* and disturbed (context compromised by burrowing shellfish or erosion) cultural material. Where intact, basal deposits at Kilgii Gwaay include glacial clays and diamicton that are overlying early post-glacial organic-rich sediment. The organic sediment includes paleosols

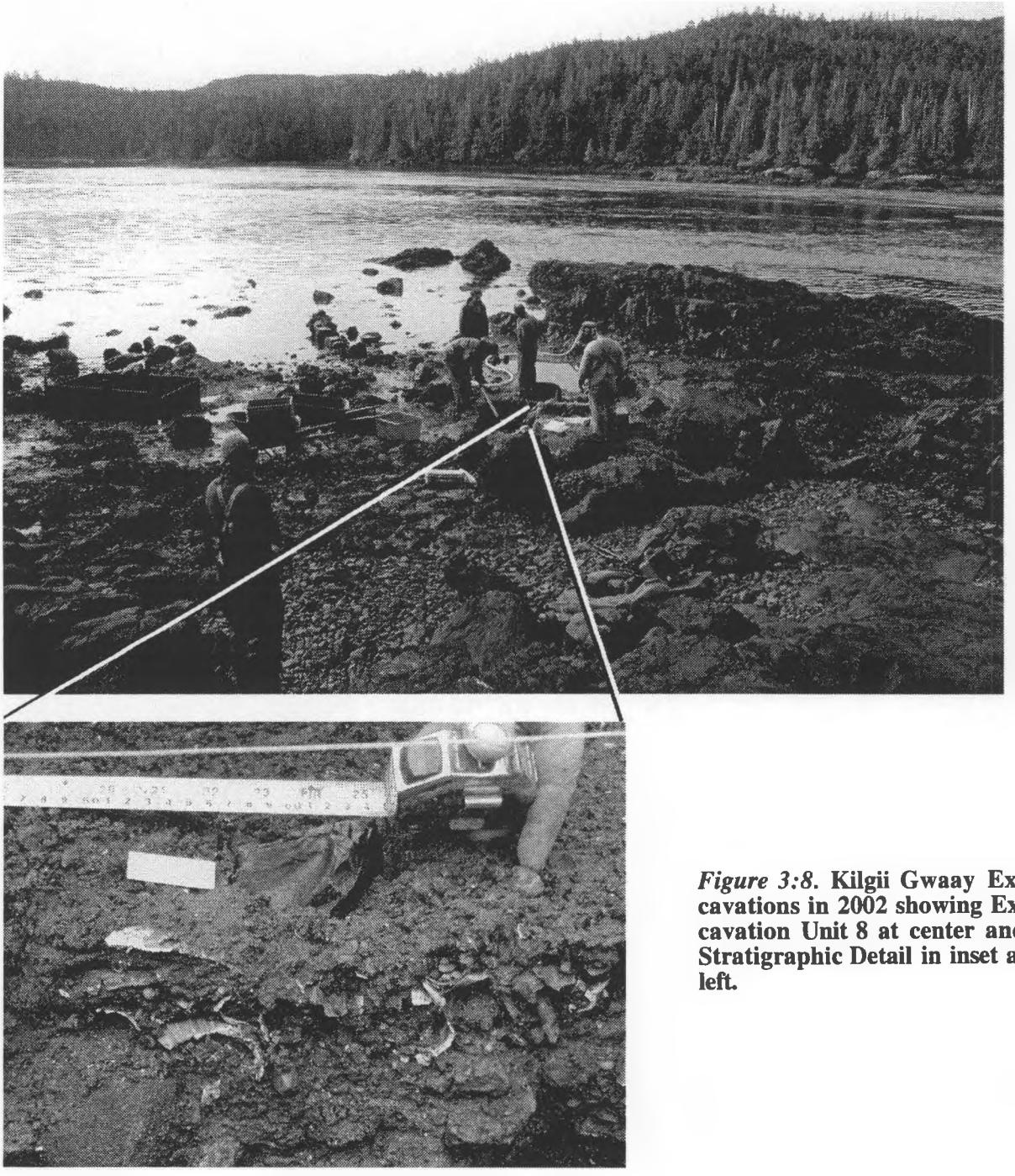

Figure 3:8. **Kilgii Gwaay Excavations in 2002 showing Excavation Unit 8 at center and Stratigraphic Detail in inset at left.**

in formerly terrestrial context, and peat and gyytja (highly organic lacustrine sedi-ment) in the area of the ancient pond. The paleosol was observed to be overlain by cultural deposits containing lithic artifacts, faunal remains and waterlogged plant material in most areas of the site tested; however, these appear to be *in situ* in only a few small areas. Preservation of organic material is variable among the areas excavated. The cultural deposits were best preserved in Excavation Unit 8, a 1 by 2 m excavation block at the western edge of the site. In Unit 8 *in situ* shell-rich cultural deposits are directly underlain by shell-free cultural deposits (Figure 3:8). Excavations at the edge of the ancient pond encountered abundant cultural material including waterlogged wood.

Material Culture

Archaeological material recovered from preliminary work at Kilgii Gwaay includes lithic artifacts Figure 3:6 i,j), vertebrate and invertebrate fauna, and waterlogged wood.

Faunal remains recovered in 2001 include abundant intertidal shellfish, dominated by California mussel, as well as a broad variety of vertebrates (Table 3:4). The vertebrate fauna include a number of specimens (n = 94) with evidence of cultural modification including chopping scars, cut marks, splintering and burning. The assemblage is dominated by maritime species.

The botanical assemblage includes a small number of pieces of waterlogged wood with evidence of cultural modification. These include specimens with evidence of chopping and whittling.

Table 3:4. Kilgii Gwaii Fauna.

Mammals	NISP	Birds	NISP
Black bear *Ursus americana*	54	Red-necked grebe *Podiceps grisegena*	1
River otter *Lontra canadensis*	3	Medium grebe Podicipedidae	2
Sea otter *Enhydra lutris*	10	Snow goose *Anser caerulescens*	1
Sea lion Otaariidae	2	Small scoter *Melanitta sp.*	1
Harbour seal *Phoca vitulina*	36	Medium duck Anatidae	3
Fish		Common murre *Uria aalge*	2
Skate *Raja sp.*	5	Pigeon guillemot *Cepphus columba*	1
Dogfish *Squalus acanthias*	27	Rhinoceras auklet *Cerorhinca monocerata*	8
Pacific herring *Clupea pallasii*	1	Cassin's auklet *Ptychoramphus aleuticus*	30
Salmon *Oncorhynchus sp.*	1	Medium alcid Alcidae	4
Rockfish *Sebastes sp.*	473	Small alcid Alcidae	5
Greenling *Hexagrammos sp.*	8	Common raven *Corvus corax*	1
Striped seaperch *Embiotoca lateralis*	1	Cackling Canada goose *Branta canadensis minima*	1
Halibut *Hippoglossus stenolepis*	3	Double-crested cormorant *Phalacrocorax auritus*	2
Cabezon *Scorpaenichthys elongatus*	15	Albatross cf. short-tailed *Diomedea cf. albatrus*	16
Sculpin sp. Cottidae	3		
Irish lord sp. *Hemilepidotus sp.*	1		
Lingcod *Ophiodon elongatus*	31		

Lithic artifacts from 2001 excavated contexts at Kilgii Gwaay (n = 1853) are dominated by secondary core reduction detritus but include a number of flakes and unifacially modified tools as well as a few pieces of biface reduction debitage. No bifacial tools were recovered and there was no evidence of microblade technology. All material appears to be of local provenance with more than 95% closely similar to the high quality basalts available at Benjamin Point, a few kilometres to the northeast. Comprehensive analysis of the lithic assemblage is being conducted under the auspices of an anthropology M.A. at the University of Victoria.

Summary and Future Directions

Although only a few very early Holocene archaeological sites have been excavated in Haida Gwaii the material record from these sites and the identification of a large number of other sites of similar age indicates that human presence was well established by 9500 [cal 10,800] BP. Sea level research has shown that any earlier coastal occupation sites will be drowned with significant logistical challenges to discovery and investigation. It is unlikely that the 9500 [cal 10,800] BP sites represent the initial occupation of the area and the discovery of a stone tool on a deeply drowned ancient landscape in Werner Bay (Fedje and Josenhans 2000) hints at human presence by ca. 10,000 [cal 11,400] BP.

Richardson Island and Kilgii Gwaay support the idea of a very long history of maritime adaptation in Haida Gwaii. These sites were occupied during a time of rapid environmental change and the inhabitants clearly possessed a broad array of technological skills enabling them to adapt to this change and succeed in the physically challenging environment of this isolated island archipelago. Both the archaeological record from these sites and the evidence for a substantial, archipelago-wide, distribution of sites of similar age suggests these people were not newcomers and by extension, the likelihood that sites predating the ca. 9500 [cal 10,800] BP limit of the current record will eventually be discovered.

The paleoenvironmental record helps us understand why the archaeological record is currently limited to Holocene time,

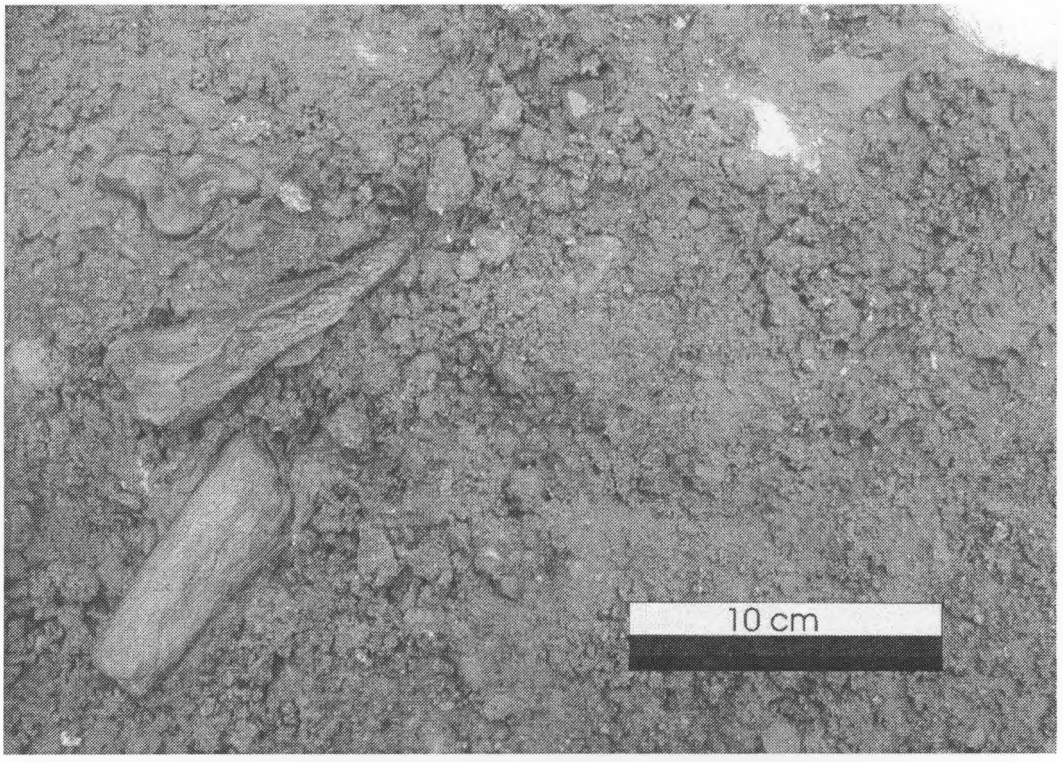

Figure 3:9. **Detail of Activity Area in Excavation Unit 8 at Kilgii Gwaay.**

and provides direction for investigations to determine whether the human history of the Northwest Coast extends to early post-glacial time. One approach we have initiated in order to mitigate these challenges is the development of a more intensive program of karst investigation. There are extensive limestone deposits with associated karst in Haida Gwaii and a number of potentially significant cave systems have been identified within the last few years. Caves and associated features are a common focus for animals and people, either for hunting or shelter, and it is likely that these would have had even greater importance in early post-glacial time when terrestrial fauna such as bear and caribou may have been more abundant, and intertidal and anadromous resources potentially less so. Another approach is our ongoing research into east Hecate Strait paleoecology (Fedje and Mackie 2001), in order to detail local sea level histories and permit modeling of paleoshorelines. It is hoped that these data will help focus archaeological survey of ancient coastal landscapes distant from the modern shore.

In sum, although it can be demonstrated that the coastal margin along the Northwest Coast was biologically productive and suitable for human occupation and movement prior to 12,000 [cal 14,000] BP, the archaeological record currently extends no earlier than about 10,300 [cal 11,600] BP (Dixon 1999). In Haida Gwaii the record of human history has been pushed back at least two millennia in the past decade (to 9500 [cal 10,800] BP and possibly 10,000 [cal 11,400] BP) and it is anticipated that this history can be extended further by continuing to employ paleoenvironmental reconstruction as a key tool in archaeological investigation.

Acknowledgements

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