Chapter 3

A Projectile Point Sequence for Haida Gwaii

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Introduction

In 1891 a chipped stone arrowhead was found by fur trader Alexander Mackenzie in Naden Harbour in the north of Haida Gwaii. When shown to local Haida they remarked that "they had never seen or heard of such a thing before" (Mackenzie and Dawson 1891). Subsequent investigations, including the intensive surveys (Fladmark 1970; Gessler 1972; Hobler 1976) and excavations (Fladmark 1986, 1990; Sutherland 1974) of the late 60s, 70s, and 80s led Fladmark (1989:216) to describe Haida Gwaii stone tool assemblages as "nearly single-mindedly unifacial local lithic traditions". For the period dating after 8000 BP[1] this still holds true with the only excavated bifaces being two obsidian specimens from the Blue Jackets Creek site dating to the late Holocene and suggested to have been traded in from the BC Mainland (Carlson 1994). Recent work, especially in the south of Haida Gwaii, has uncovered abundant evidence for a rich bifacial lithic tradition dating to the Pleistocene-Holocene transition. After 8000 BP, projectile points are manufactured using technologies other than bifacial knapping. Here we describe a projectile point sequence for Haida Gwaii, including late Pleistocene-early Holocene chipped stone points, early to mid-Holocene microblade-armed composite points and late Holocene ground slate and organic points.

[1] All dates are in uncalibrated radiocarbon years before present unless otherwise noted.

Haida Gwaii (Figures 1 and 2) cultural history has been divided into three main cultural constructs based on technological characteristics including the Kinggi Complex, Moresby Tradition and Graham Tradition (Fedje and Christensen 1999; Fladmark 1989). The Kinggi Complex dates from ca. 10,600 to 8750 BP and is characterized by bifacial technology, simple core and flake tools, and an absence of microblades. The complex is derived from a small number of excavated sites in the south of Haida Gwaii and a scattering of surface finds across the archipelago. The Moresby Tradition dates from ca. 8750 to 5000 BP and is characterized by a focus on microblade technology and simple core and flake tools. During the early part (ca. 8750 to 8500 BP) this co-occurs with bifacial technology but after 8000 BP the latter is entirely absent. The Graham Tradition sees a shift from stone to organic tools and is further defined by an absence of microblade technology. In the early part (ca. 5000 to 2000 BP) stone tool technology is moderately abundant but by the later part (ca. 2000 to 200 BP) technology is almost entirely based on organic artifacts, with even ground stone being rare.

Late Pleistocene to Early Holocene—ca. 10,600 to 8700 BP

For the late Pleistocene to early Holocene (ca. 10,600 to 8500 BP) known-age projectile points are primarily bifacially worked foliate types.

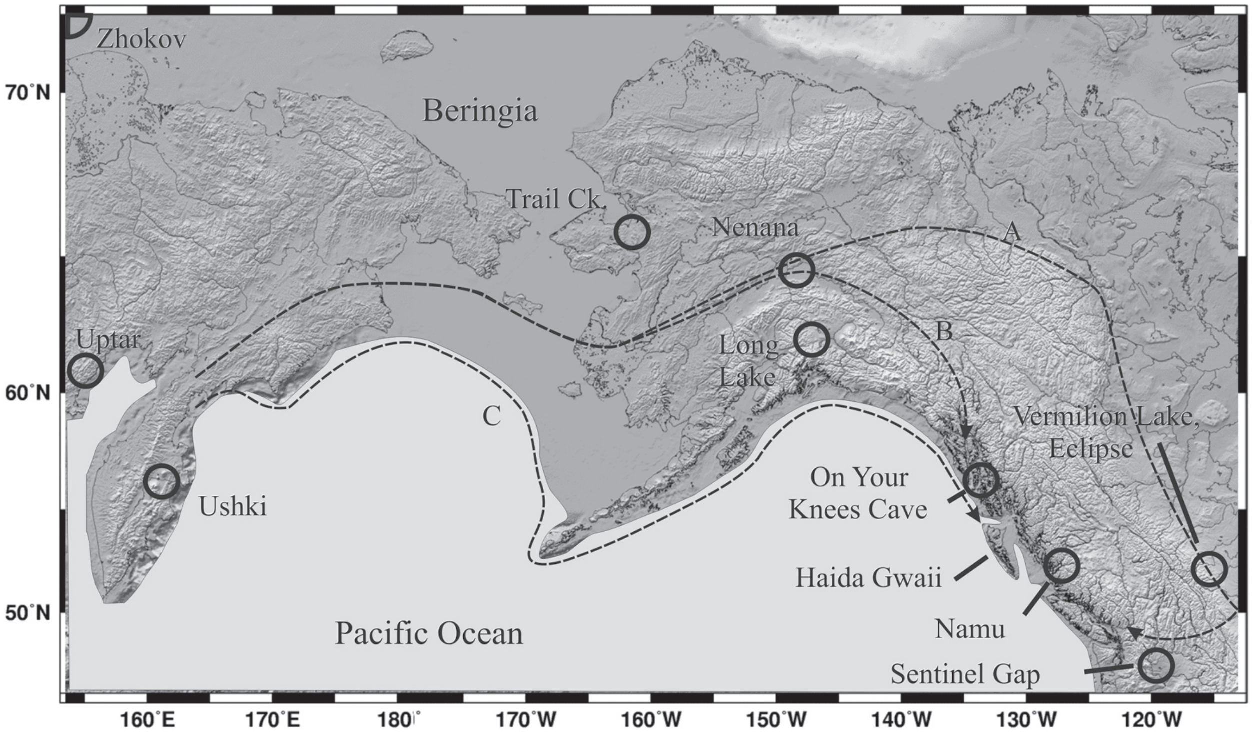

Figure 1. North Pacific and Beringia ('routes' – A: Ice-free Corridor via central Alaska; B: Northwest Coast via Central Alaska; C: Northwest Coast via Beringian coast). Adapted from Smith and Sandwell 1977.

Other specimens with good context include a small unifacial stemmed point and a few bone points or fragments. Overall, sample sizes are small for this time period with securely dated points coming from a handful of sites in the south of the archipelago.

Bifacial Projectile Points

Three styles of bifacially chipped stone projectile points have been identified from radiocarbon dated sites in Haida Gwaii. The following is a basic description of these point styles. Although they appear to follow sequentially in the archaeological record, some differences may simply relate to site function. The three styles, provisionally designated as Taan, Xil, and Xilju, are described below. A much larger sample from a variety of site types will be needed in order to provide secure interpretation.

Taan (Haida – bear)—large, broad-based spear point (ca. 10,200 BP). The bases of two large, foliate points (Figure 3b–c) were recovered from excavations at K1 Cave on the west coast of Moresby Island (Fedje, McLaren, and Wigen 2004; Fedje, Wigen et al. 2004). They exhibit broad bases (haft width >25 mm—Table 1), with moderate to heavy grinding along the entire basal and lower lateral margins. Lateral margins are convex. These spearpoints were manufactured from chert that has a creamy-white to yellowish-brown surface colour. This material is unusual and the source is not definitively known, however, massive chert beds occur within one kilometer of the site (Hesthammer et al. 1991). The cherts from these beds are described as green in colour, weathering to yellowish with brown patches. The K1 points were found in association with abundant bear bones and may derive from bear hunting activities (cf. McLaren et al. 2005). Both date to ca. 10,600 BP (Fedje, McLaren, and Wigen 2004). Specimen 3b was recovered from a level overlain by a date of 10,510 BP and underlain by a date of 10,960 BP while Specimen 3c was bracketed by dates of 10,525 and 10,660 BP. Stem width and evidence of heavy lateral and basal grinding suggest these points were likely set in an end-socketed haft (cf. Galm and Gough, this volume:Fig. 4; Musil 1988).

A complete spearpoint (Figure 3a) was recovered from Gaadu Din 2 cave. The point is similar to the

Figure 2. Haida Gwaii sites mentioned in text.

K1 specimens in that it is of a yellowish-brown chert, is heavily ground on the lateral stem margins and has a broad rounded (unground) base. The point is associated with a date of 10,220 BP.

Xil (Haida – leaf)—large, contracting-stemmed spearpoint (10,000-8900 BP). Relatively large foliate points, with contracting stems lacking significant edge grinding, have been recovered from a number of sites across Haida Gwaii (Figures 3 d–e, 4 a–m). Excavated specimens include 13 from the 9300 to 8900 BP levels at the Richardson Island site and two from Gaadu Din Cave dated to ca. 10,000 BP (Fedje, Magne, and Christensen 2005; Mackie and Fedje 2006). The Richardson points include two complete and 11 base fragments. Several point tips (broad, with pressure retouch forming a sharp tip) and a number of mid-sections were also recovered from excavations but are not illustrated here. Other examples of this foliate style have been collected from intertidal lithic sites dating to ca. 9400 BP based on association with the paleoshoreline (Fedje, Josenhans et al. 2005).

This style is generally willow leaf-shaped in outline (Figure 4). On the complete specimens the maximum width is closer to the tip than to the base although this may reflect curation as the nearly complete specimen from Gaadu Din cave exhibits a much longer blade element than the others. The complete Richardson Island specimens may be resharpened examples of originally much longer points. Support for reshaping broken points comes from refitting of three point bases (Figure 4d–f). In each case bifacial reworking of the broken blade end had begun before they broke again and were discarded. Bases range from pointed to narrow-rounded or squared. Most are 3 to 5 mm wide. The points characteristically exhibit acute stems (25–35°) with straight basal lateral margins and excurvate blade margins. The stems are thin, (Figure 6, 7), very similar in size and shape, and appear designed for a standardized side-socketed haft (cf. Dixon 1999; Grønnow 1994; Musil 1988). Overall size and stem breadth is 2.0–2.5 cm at 3 cm distal of the base and 2.3–2.9 cm at 4 cm distal (Figure 5, Table 1). For several of the Richardson Island specimens this is the juncture of very controlled bifacial thinning flakes defining the stem and the broader billet flaking of the blade. Although these might be classified as bipoints it is noteworthy that few are sharply pointed. Most exhibit straight to narrow-rounded bases (one or more abrupt flake scars) and several exhibit flat bases (primary flake platform remnants).

The points from Gaadu Din (Figure 3d, e) appear intermediate between the Taan and Xil styles. They exhibit some grinding, slightly convex basal lateral margins and a less acute base. These specimens exhibit lateral grinding 30 to 50 mm distal of the base and one exhibits a small amount of organic residue, possibly associated with hafting, 30 to 40 mm distal. Three of the Richardson specimens (Figure 4b, g, i) show light edge grinding or crushing 3–4 cm distal of the base and two (Figure 4c, k) exhibit notches in this same area. No basal grinding was noted although some marginal retouch has been used for final stem shaping. Several specimens exhibit one to three small abrupt flake scars resulting in a 2–3 mm wide 'flattened' base. This is the case for both of the (older) Gaadu Din specimens, possibly indicating a transition from broad, rounded to narrow and

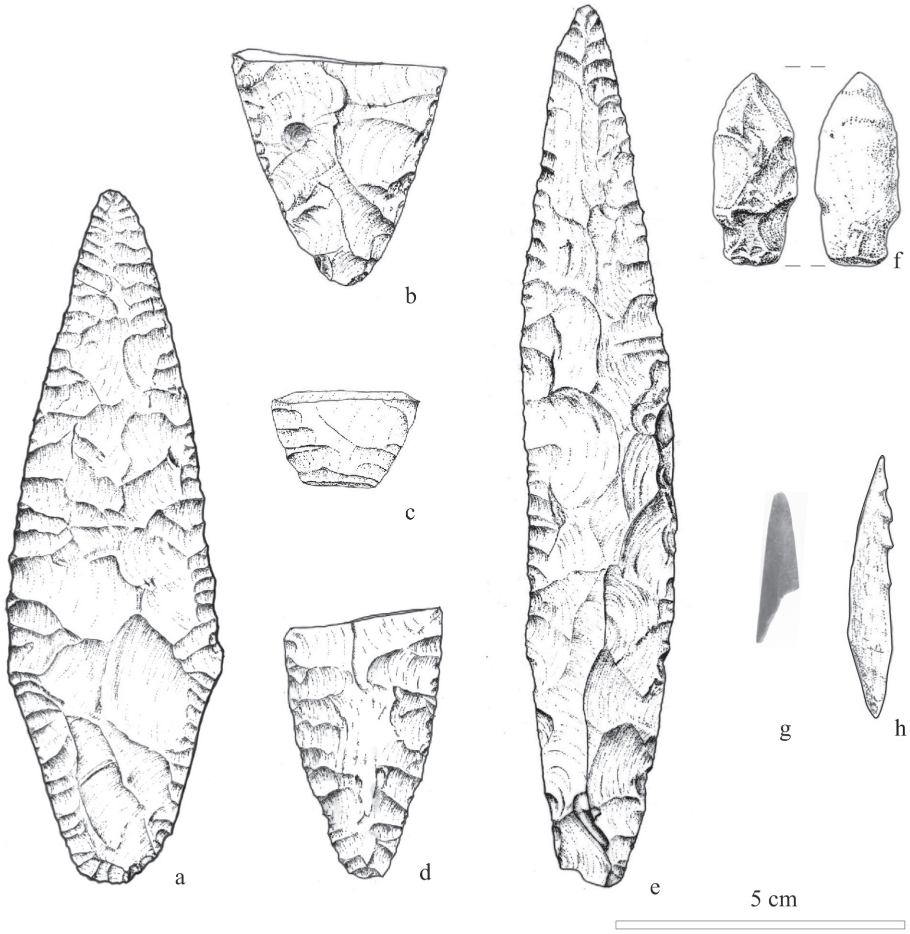

Figure 3. a: Points from Gaadu Din 2 Cave; b–c: K1 Cave; d–e, g: Gaadu Din 2 Cave; f, h: Kilgii Gwaay. Specimen 3a is associated with a date of 10,220 BP; 3b is stratigraphically bracketed by dates of 10,445 and 10,960 BP; 3c is bracketed by dates of 10,520 and 10,630 BP; 3d is undated; 3e dates to 9980 BP; 3f dates to 9450 BP; 3g dates to 10,150 BP; and 3h dates to 9450 BP. Drawings by J.B. McSporran.

pointed bases. Together, these attributes suggest a 3 to 4 cm long stem set into a 4 to 5 cm long bed (side socket) and a 2 to 3 cm wide shaft (cf. Figure 8, Grønnow 1994; Musil 1988).

The term 'contracting-stemmed' follows Bryan (1983), Dixon (1999), Galm and Gough (this volume), and Musil (1988), where a long, tapering base is suggested to have been hafted into a side-socketed (cf. Dixon 1999:Fig. 6.4c; Musil 1994:Fig. 21) or end-socketed (cf. Frison 1978:334; Galm and Gough, this volume:Fig. 4) organic haft. The Xil specimens were likely bound in a side-socketed haft where the sharp margins would not come in contact with the hafting cord. An archaeological analogue for this hafting method can be seen in the mid-Holocene maritime site of Qeqertasussuk in western Greenland where a number of spear-size organic foreshafts with carved side-socket beds have been recovered, including one with a leaf-shaped point still in place (Figure 8; Grønnow 1988, 1994).

Xilju (Haida – little leaf)—small, contracting-stemmed point (8800-8700 BP). This style is similar to Xil but much smaller (Figure 4n–q). It is only known from Richardson Island in a component dating from 8800 to 8700 BP. The assemblage is small (N=4) but distinctive. These points exhibit unground contracting stems. The stems are very acute (11–15°) with straight basal lateral margins and excurvate blade margins (Table 1). Stem margins are long with the shoulders of the only complete specimen being near the tip. As with the Xil specimens, this

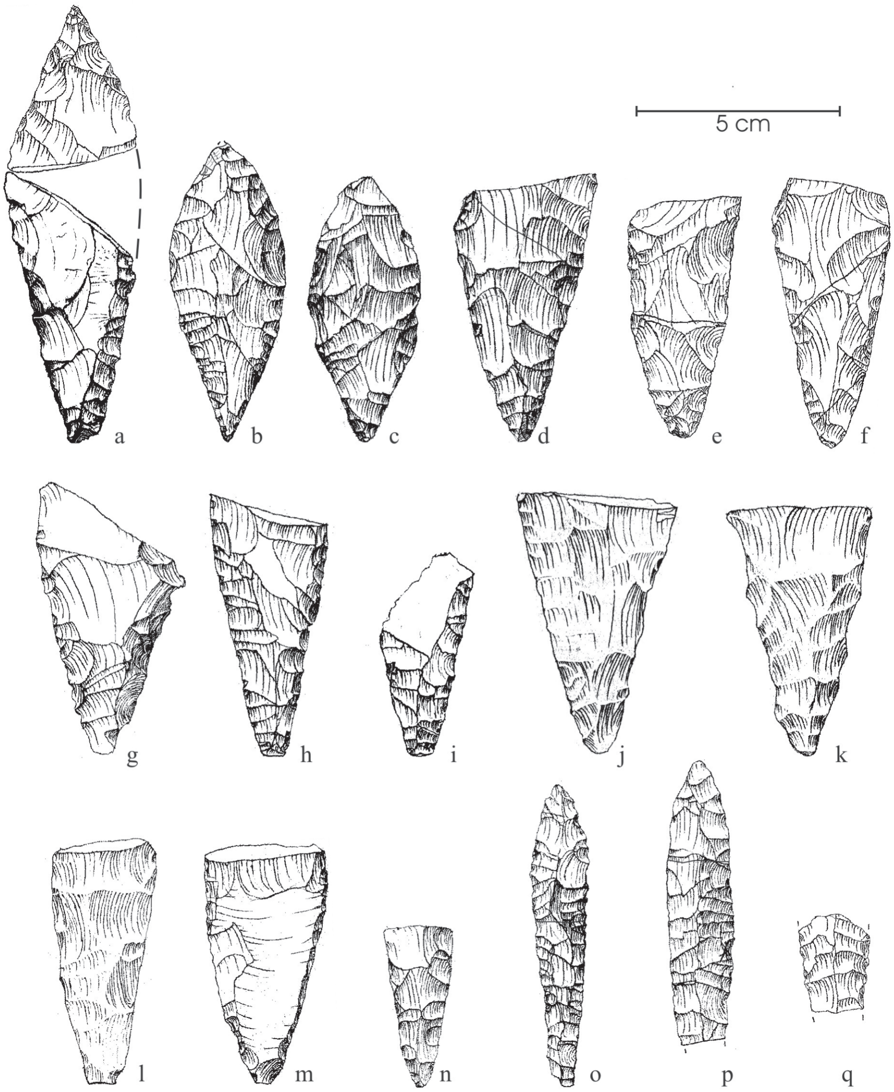

Figure 4. Bifacial points from Richardson Island (a–m: Xil, n–q: Xilju). Specimens a–m date 9300 to 8900 BP and n–q date 8800 to 8700 BP. Drawings by D. McLaren.

may result from resharpening. This is suggested by specimen 4p which, though missing its base, exhibits a long blade element. Stem breadth is 1.1–1.6 cm at 3 cm distal of the base and 1.3–1.8 cm at 4 cm distal suggesting these are likely atlatl points with a shaft/foreshaft diameter of ca. 1–2 cm (cf. Musil 1988). As with Xil, these were likely set in a side-socketed haft and an analogue can be seen in the large suite of atlatl-size 'lance' foreshafts with carved 'blade beds' from the Qeqertasussuk site (Grønnow 1994).

Xilju points are associated with the earliest layers of the Early Moresby Tradition, which exhibits the first known evidence of microblade technology on Haida Gwaii. The small size and fine manufacturing, including a trend towards lamellar pressure flake scars, seems concordant with microblade technology (McLaren and Smith, this volume).

Discussion of Late Pleistocene to Early Holocene Bifacial Points

We distinguish three styles of foliate bifacially chipped stone projectile points for early post-glacial to early Holocene times in Haida Gwaii. Technologically these might be considered to fit to one general type, a foliate contracting-stem point that

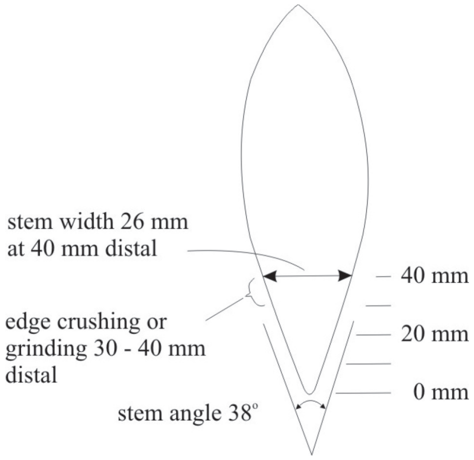

Figure 5. Leaf-shaped point stem measurement method (example).

was present from at least 10,600 BP to 8500 BP. The foliate points do exhibit stylistic differences, however, the degree to which these reflect functional versus temporal distinctions is uncertain.

The bipoint foliate biface is unique as both ends are pointed and either could be re-fashioned after breakage into a tip or a base with only moderate effort. Despite the bipointed form, we attempted to distinguish tips from basal portions using several criteria. Overall our observations are that basal portions have more controlled thinning, lateral smoothing, and consistent width morphology. In a possibly analogous technology from coastal Greenland, hafted bipointed spearpoints have bases thinner, in cross-section, than the blade so as to accommodate the bulk of the haft (Figure 8). This same pattern

Table 1. Stem characteristics for dated Haida Gwaii bifacial projectile points.

Specimen	Type	^{14}C ky BP	Stem			Width in mm at distance (5 to 40 mm) from base							
			side	edges	angle	5	10	15	20	25	30	35	40
Fig. 3a	Taan	10.2	convex	ground	41	15	20	24	27	32	36	38	
Fig. 3b	Taan	10.6	convex	ground[a]	42	13	19	23	28	30	33	35	37
Fig. 3c	Taan	10.6	convex	ground[a]	42	15	22	26	x	x	x	x	x
Fig. 3d	Xil	Est. 10	weakly convex	ground[b]	32	10	14	18	22	24	26	27	28
Fig. 3e	Xil	10.0	weakly convex	ground[b,c]	25	12	15	17	18	21	22	23	24
Fig. 4a	Xil	9.1	straight		30	11	12	14	17	20	23	25	27
Fig. 4b	Xil	9.3	straight	crushed[b]	36	7	11	14	18	22	25	28	29
Fig. 4c	Xil	9.1	straight	notched[b]	31	8	11	16	20	24	25	27	28
Fig. 4d	Xil	8.9	straight		30	8	12	15	18	20	23	26	28
Fig. 4e	Xil	9.1	straight		25	9	13	16	18	21	23	24	25
Fig. 4f	Xil	9.1	straight		26	9	11	13	15	17	19	22	25
Fig. 4g	Xil	9.0	straight	crushed[b]	30	8	12	16	19	21	25	27	29
Fig. 4h	Xil	9.3	straight		25	8	11	13	15	17	19	22	24
Fig. 4i	Xil	9.3	straight	ground[b]	29	9	11	13	15	17	x	x	x
Fig. 4j	Xil	9.1	straight		29	9	12	15	17	20	22	25	28
Fig. 4k	Xil	9.1	straight	notched[b]	27	8	12	14	17	19	21	23	28
Fig. 4l	Xil	8.9	straight		23	10	12	14	16	19	21	22	23
Fig. 4m	Xil	9.1	straight		29	10	12	16	18	22	24	26	28
Fig. 4n	Xilju	8.8	straight		15	6	8	10	12	14	16	17	18
Fig. 4o	Xilju	8.8	straight		11	6	7	8	9	10	11	12	13
Fig. 4p	Xilju	8.8	straight		12	x	x	x	x	x	x	x	x
Fig. 4q	Xilju	8.8	straight		15	x	x	x	x	x	x	x	x
Fig. 8	Greenland	4.0	straight	ground	30	7	10	12	15	18	20	23	25

[a] entire stem margin ground.
[b] stem margin ground, crushed or notched 3–4 cm distal of base.
[c] black organic residue in band 30–40 mm from base.

can be distinguished on the Haida Gwaii specimens (cf. Figures 6, 7). Well-defined shaping is also evident along the basal margins of the Greenland example so that there is a snug fit between the haft bed and the biface. This is also seen on bifaces from Haida Gwaii. Furthermore, Haida Gwaii artifacts have similar width morphology suggestive of shaping to fit a particular haft size (Table 1, Figure 7). With the aid of microscopic examination (10x–30x) light grinding and edge-crushing was found along the basal lateral margins of several of the Haida Gwaii artifacts. Transverse flake scars dulling the basal margins were also noted on a few of the implements. Lastly, Richardson Island, from which the majority of bifaces analyzed originate, is a base camp. Rehafting and a higher percentage of base elements would be expected at a campsite, discarded tips at a kill site. In consideration of these factors we distinguished base from tip portions. However, this is a bipointed industry, and, in a few instances (where there is no grinding, notching or basal flattening) identification as stems is less secure.

The suggested side-socketed hafting method is more shock absorbing than an end-slotted haft (cf. Sentinel Creek, Galm and Gough, this volume). It would be expected to limit spalling and breakage. As well, there would be no need for extensive grinding as the point is held firmly within a confining haft bed by pressure on the face of the stem.

The three styles of projectiles may be functionally different. The association of foliate points with abundant bear remains deep inside K1 and Gaadu Din caves suggests bear hunting activity (McLaren et al. 2005). Ethnographic data from many places in the northern hemisphere reveal that a preferred method of bear hunting was to roust the bear from its den or lair (using dogs or throwing in burning branches) and then have the animal impale itself upon a braced spear just outside the entrance (Hallowell 1926). The stem width of the Taan points suggests use with a large diameter spear shaft (Grønnow 1994; Musil 1988). The Xil stems are somewhat narrower, but

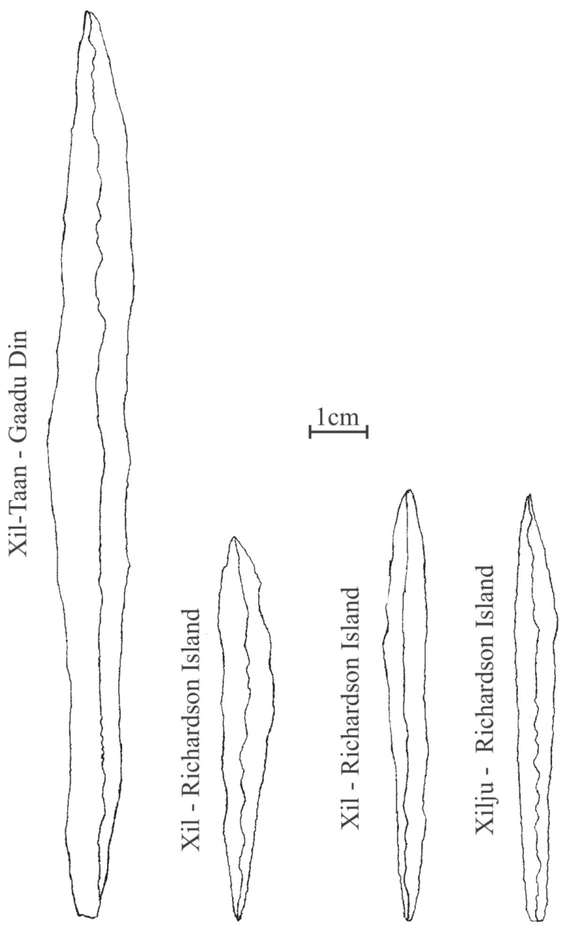

Figure 6. Longitudinal cross-sections of Gaadu Din and Richardson Island points. Drawings by D. McLaren.

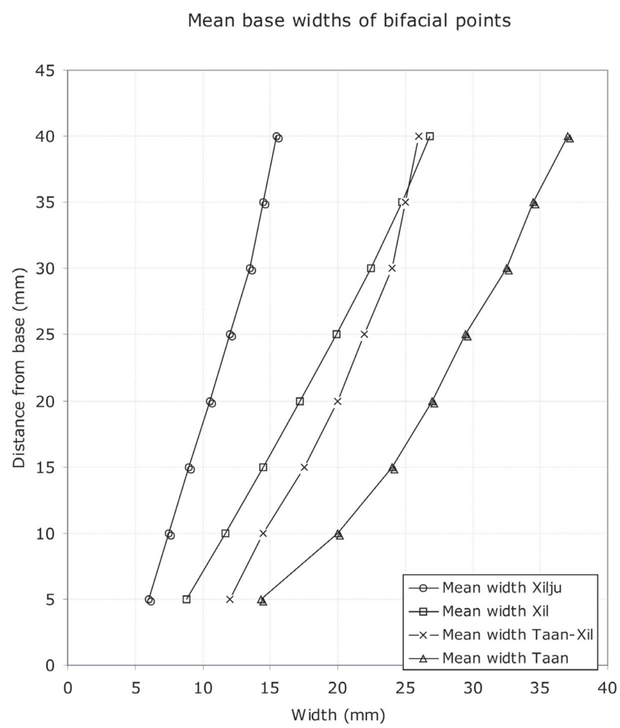

Figure 7. Stem widths for Haida Gwaii points: Taan (n = 3), Xil–Taan (n = 2), Xil (n = 13), Xilju (n = 2).

still of a size consistent with a spear rather than atlatl shaft. Xil and Xilju points show little or no evidence of basal grinding and are foliate with narrow to pointed bases. The distinction between these types is overall size and stem width, with the Xilju specimens being significantly smaller, having a much narrower stem and finished using pressure flaking. The stem width of the Xil type suggests use with a spear while that of Xilju points is consistent with atlatl dart dimensions (Grønnow 1994:220; Hare et al. 2004; Musil 1988; Shott 1993).

Sites with contracting-stemmed points dating to ca. 9000 BP or earlier are rare in the Northwest Coast area. The basal component at Namu produced a single specimen, ground on the stem portion (but less broad), associated with core tools, choppers and simple flake tools, and dated to ca. 9700 to 9000 BP (Carlson 1996). Points similar to the Xil style have been recovered from On Your Knees cave in southeast Alaska where they date from 9200 to 8500 BP (Dixon 2002) as well as from a number of undated sites on the southern BC coast (McLaren and Steffen this volume; McMillan 1996; Wright 1996). Component 3 at Ground Hog Bay 2 in southeast Alaska is of similar age (ca. 9200 BP) but produced only two biface fragments and a few flakes (Ackerman et al. 1979).

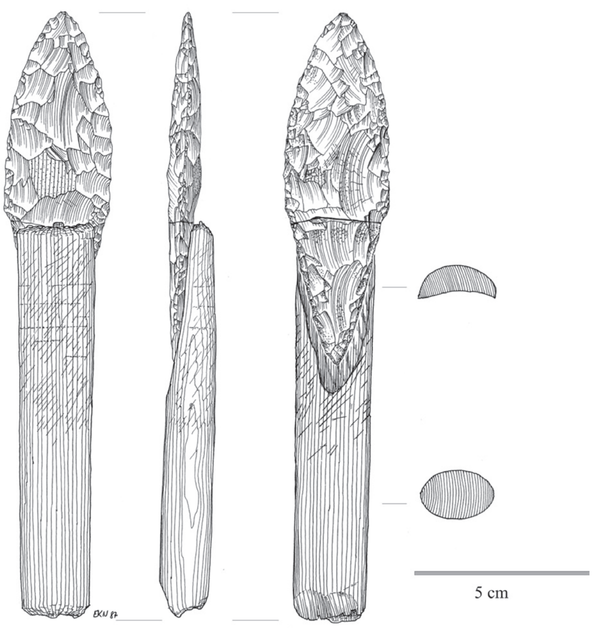

Figure 8. Hafted spear point from mid-Holocene Arctic Small Tool (AST) site of Qeqertasussuk, West Greenland (earliest AST site in eastern Arctic – 4200 BP). Drawing by Eva Koch, reproduced with permission of Bjarne Grønnow.

Farther afield, several contracting-stemmed points with basal grinding were excavated from 10,200 to 9700 BP components at the Vermilion Lakes and Eclipse sites in the Rocky Mountains of western Canada (Fedje 1996, Fedje et al. 1995) and from a ca. 10,200 BP component at Sentinel Gap (Galm and Gough, this volume). The Vermilion and Eclipse components also contained a tool set similar to those from early Haida Gwaii sites (Fedje, Magne, and Christensen 2005), including scraper-planes, choppers and simple flake tools. In interior Alaska foliate points are present as early as 11,200 BP but consensus has yet to be reached as to whether the various technologies documented (i.e., Nenana, Mesa/Sluiceway, Beringian Tradition, Denali, etc.) relate to site functionality or to 'ethnicity' (Dixon 1999; Goebel 1999; Rasic 2003; West 1996; Yesner 1996). At a geographic stretch, the Xil points are very similar to foliate points from the Ushki site in Kamchatka and from the Uptar site near Magadan on the Pacific coast of northeast Asia (Goebel and Slobodin 1999; Slobodin and King 1996). The Ushki points date from ca. 11,300 to 10,100 BP while the Uptar points underlie an 8500 BP tephra.

Points comparable to the Xilju style appear to be uncommon in northwestern North America. This may be an independent development integrating Northwest Coast Microblade Tradition techniques with the pre-existing biface technology. An assemblage with similarities to this style, and potentially of a similar age, seen at Long Lake, near Anchorage Alaska where bifaces with narrow rounded bases are associated with microblade technology (Reger and Bacon 1996). Some surface collected points from southwestern British Columbia are also similar, although the association of microblade technology is uncertain (McLaren and Steffen, this volume). The Xilju points are very similar to the narrow leaf-shaped 'arrow' points from the Uptar and Kheta sites near Magadan (Goebel and Slobodin 1999; Slobodin and King 1996). At both sites these points underlie an 8500 BP tephra. The Kheta specimen is associated with microblade technology. The Uptar specimens are associated with larger foliate points. The dimensions (stem width and overall size) of these points are consistent with those of atlatl points.

Other Projectile Points from the Late Pleistocene to early Holocene

Unifacial Stemmed Point. A small unifacially flaked stemmed point (Figure 3f) was recovered from a 9450 BP component at Kilgii Gwaay (Fedje, Mackie et al. 2005). This point has a relatively narrow (12 mm) squared stem with prominent, though slightly rounded, shoulders. There are no other comparable points known for Haida Gwaii and, as such, it cannot be considered a representative type. The stem width fits within the range of atlatl points. This unifacial point may be opportunistically made on a pointed flake. Beyond Haida Gwaii, some similarities can be seen to the small bifacial shouldered points from On Your Knees Cave (Dixon 2002).

Bone Points. Projectile points made from organic materials are uncommon during Kinggi Complex times, at least in part due to poor preservation at most sites. The tip of a bone point from Gaadu Din cave (Figure 3g) dates to 10,150±25 BP (UCIAMS 31729). A small unilaterally-barbed fixed bone point (Figure 3h) was found at the 9450 BP Kilgii Gwaay site, along with a well developed ground bone and wood industry (Fedje, Christensen et al. 2005). The function of these points is not certain but context (association with a mammalian fauna dominated by bear and sea mammals) implies that these may have been used to arm hunting spears or atlatls. The stem width of the Kilgii Gwaay specimen would suggest the latter. At Richardson Island, organic preservation is extremely poor, but the calcined tips of three bone artifacts have been found in hearth contexts dating to between 9100 BP and 9300 BP. Two of these most closely resemble barb elements, perhaps from a fishhook or a small barbed bone projectile point. The third is so fragmentary that reasonable inferences cannot be drawn.

Early to Mid-Holocene– ca. 8750 to 5000 BP

Artifact assemblages in Haida Gwaii dating to the Moresby Tradition (8750 to 5000 BP) include rare bone points, a few stone points in the earliest part (pre-8000 BP) and composite points as revealed from one slotted bone point and, an abundance of microblades. Radiocarbon dated microblade assemblages have been recovered from excavations at the Richardson Island, Lyell Bay, Arrow Creek, Kasta, Lawn Point and Cohoe Creek sites (Figure 9; Christensen and Stafford 2005; Fedje, Magne, and Christensen 2005; Fladmark 1986). The earliest securely dated evidence of microblade technology in Haida Gwaii is found at the Richardson Island site where microblades appear at 8,750 BP (Fedje, Magne, and Christensen 2005; Mackie and Fedje 2006). Many other sites in the Haida Gwaii archipelago contain microblades in a geological context inferring an early Holocene age (i.e., on raised beaches). Bifacial and microblade technology overlapped in Haida Gwaii from 8750 to 8400 BP. There is currently no evidence for biface technology in Haida Gwaii between 8000 and 3000 BP

Composite Points and Microblades

In early to mid-Holocene archaeological sites in northwestern North America the presence of microblades has been used to infer the use of composite slotted organic projectile points (Carlson 1983a:19). Slotted point technology is an additive approach to projectile point technology (cf. Dixon 1999:157; Giria and Pitul'ko 1994) where microblades are broken into small sections and inset into bilaterally and longitudinally slotted bone, antler, or ivory points.

The premise that some Haida Gwaii microblades were used to arm composite organic points is supported by the recovery of a fragmentary slotted organic point from a 5200 to 5000 BP component at the Cohoe Creek site in northern Haida Gwaii (Christensen and Stafford 2005) (see Figure 10d). The point exhibits a long groove, V-shaped in cross section, cut into both lateral sides of a piece of antler or bone likely to accommodate the insertion of microblade sections. Microblades were not found inset into the artifact but many were found in the same deposit. The point is very fragmented but when reconstructed measures approximately 25.0 cm long, 1.9 cm at its widest, and 0.8 cm at its thickest. The slot begins 4.3 cm from the base and continues the length of the refitted pieces. The distal section is missing.

Discussion of Slotted Point Technology

The slotted point from Cohoe Creek is similar to points recovered from Namu and Trail Creek (Alaska), and shares general technological characteristics with composite points recovered from a number of other sites in Alaska and Northeast Asia. The slotted bone point fragment from Namu is of similar age to the Cohoe Creek specimen (Carlson 1996:101 fig 18) while the Trail Creek specimens date considerably earlier. The slotted point fragments recovered at Trail Creek were associated with microblades, most of which were medial sections. The Namu specimen and those from Trail Creek Cave are oval in cross-section with the slot starting near the tip but differ somewhat in their narrowness.

The slotted points from the Lime Hills and Ilnuk sites (Ackerman 1996) in the Alaskan interior are morphologically different from the Cohoe example. The ~9500 BP points from Lime Hills are quite narrow (Ackerman 1996). At the early Holocene Zhokov site in the Siberian Arctic both unilateral and bilateral bone and antler points with inset medial microblade segments were recovered (Giria and Pitul'ko 1994; Pitul'ko and Kasparov 1996). These slotted points are quite large and commonly have triangular cross sections. The Cohoe Creek slotted point likely functioned as an atlatl dart. Although wider, the Cohoe point is of similar length to a Yukon ice patch example of a slotted composite atlatl point (Hare et al. 2004).

Many of the sites with slotted point technology appear to be associated with ungulate remains, especially caribou. At Trail Creek, Lime Hills, and Ilnuk caribou was the most common animal in the archaeological deposits while at Namu a variety of fauna, including deer, bear and sea-mammals were recovered from the component containing the slotted bone point fragment. The Zhokov fauna includes polar bear and caribou. Caribou was common in the deposits dating to between 5200 and 5000 at Cohoe Creek. It is likely that the slotted points were often used to hunt ungulates or that ungulate bone or antler was particularly suited for the manufacture of slotted points. Undoubtedly, in Haida Gwaii, these composite points were used for hunting a variety of terrestrial and marine mammals (see also Cassidy et al. 2004).

The absence of slotted bone points at microblade sites in Haida Gwaii other than Cohoe Creek is likely a function of preservation. These sites contain no organics other than charcoal, and, in a few cases, tiny fragments of calcined bone. It is interesting that, although we see the continuation of microblade technology into shell-bearing, bone-preserving post-5000 deposits in southern British Columbia and Washington State, slotted points have not been found in these assemblages. At these later sites microblades may have been used primarily for cutting rather than hunting purposes as were, for example, the end-hafted microlithic tools recovered from the Hoko River wet-site (Croes 1995).

Bone Points. A number of bone points including a unilaterally-barbed fixed bone point have been recovered at Cohoe Creek (Figure 10a–c), from deposits dating to ca. 4800 BP (Christensen and Stafford 2005). The absence of organic tools at most Early and Late Moresby Tradition sites is probably a result of preservation biases stemming from the rarity of shell bearing deposits.

Mid-to-Late Holocene– ca. 5000 to 200 BP

Projectile points from the Graham Tradition are predominantly organic. Stone points are rare. They include two lanceolate points, of presumed late Holocene age, and a small number of ground slate points. Two obsidian biface fragments from Bluejackets Creek sourced to Mt. Edziza (Carlson 1994) may be from projectile points.

Bifacial Points

Two undated lanceolate points, and a small number of biface fragments, some of which may be projectile points, have been recovered from surface contexts in Haida Gwaii (Figure 11). A bifacial projectile point found on the surface of Graham Tradition archaeological deposits at the Dead Tree Point site on eastern Graham Island has a lanceolate shape and fine parallel flake scars oriented collaterally (Figure 11a). It is basally thinned and the basal lateral margins are lightly ground. The point was manufactured from a translucent green chert apparently imported from the Mainland (Fladmark 1989:216). A lanceolate, bifacially worked point (Figure 11b) found on the surface at Clonard Bay on the west coast of Graham Island (Acheson 1995) may have been recycled in late prehistoric time. It is very finely worked and exhibits collateral flaking, parallel lateral edges and a straight base with slightly rounded corners. The point has an impact scar on the distal end. Subsequent to flaking the artifact has been ground on both faces.

The lanceolate points from Clonard Bay and Dead Tree Point are reminiscent of the late Paleoindian-like points of Alaskan Denali-age components (Ackerman 1996; Holmes 1996:316; Kunz and Reanier 1996). There are also similarities to 'Northern Archaic' (Donahue 1975) points from northern B.C. such as ca. 3500 BP lanceolate points from the Skeena River and southern Yukon areas (Allaire 1979; Hare et al. 2004:265). In reference to the Clonard Bay point, it is noteworthy that a large lanceolate biface from Prince Rupert dating to ca. 4500 BP is both flaked and ground (Ames 2005; Fladmark et al. 1990). For both specimens, their context as surface finds within a few metres elevation of the modern shore supports a late Holocene age.

Ground Slate Points

Ground slate points (Figure 11d, e) are rare in Haida Gwaii (Fladmark 1989; Fladmark et al. 1990). Slate points from Blue Jackets Creek (Severs 1974) are said to be thin and triangular with sharp lateral edges. A ground slate point from Zone II at Skoglund's Landing is basically foliate in plan with a diamond-shaped cross section (Fladmark 1989). A surface collected specimen from a site on the west coast of Graham Island is an elongate triangle with

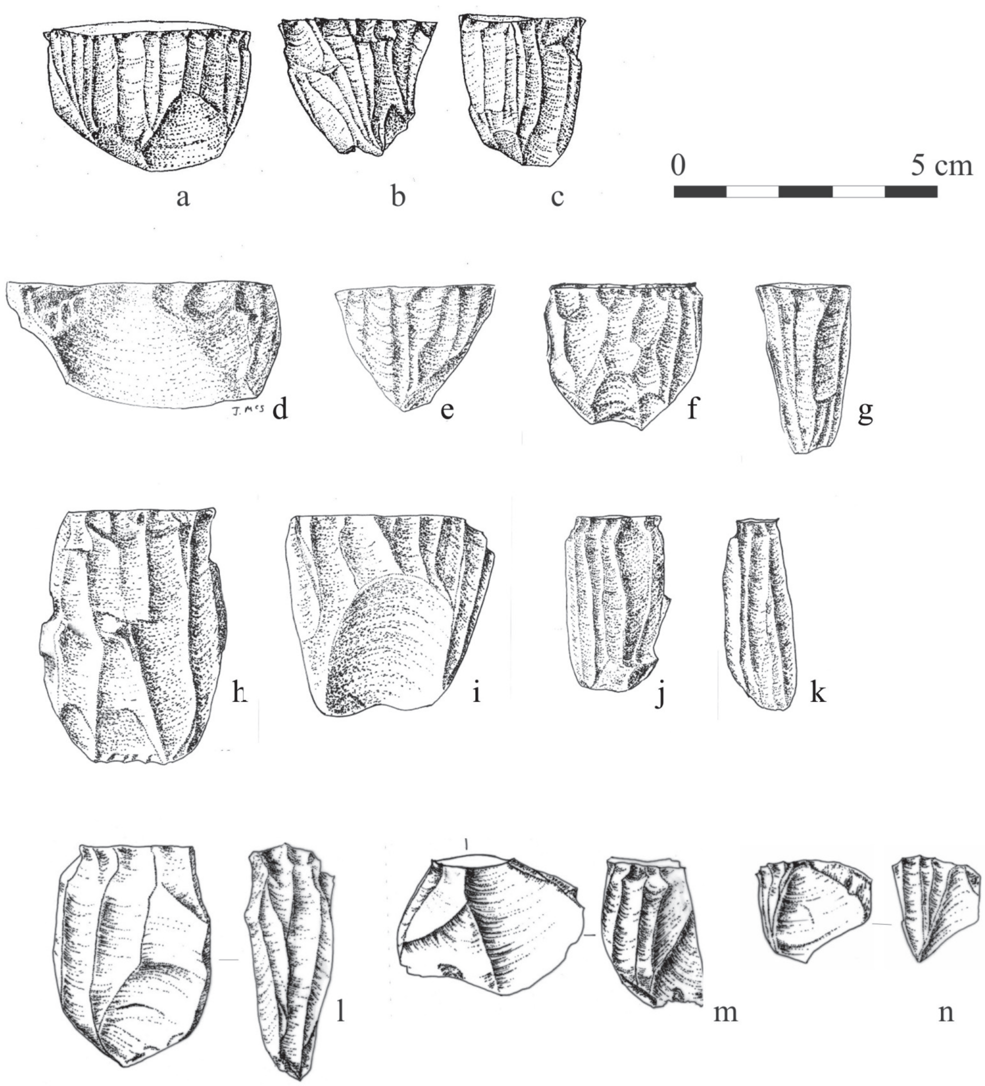

Figure 9. a–c: Microblade cores from Richardson Island—dating from 8750 to 8500 BP. d–k: Arrow Creek—dating from 8000 to 7000 BP; and l–n: Cohoe Creek—dating from 6000 to 5000 BP. Drawings by J.B. McSporran.

cleanly faceted, sharp lateral edges and a hexagonal cross-section

Organic Points

With the accumulation of large shell middens in the Graham Tradition preservation is favourable for bone, antler, shell and wood projectiles (Figure 11c, f–o). In the Early Graham tradition (5000 to 2000 BP), medium sized bilaterally-barbed harpoon heads with basal line guards are the most common type, known from Bluejackets Creek, Kiusta and Honna River. Less common are unilaterally barbed harpoons with line guards. The medial section of a bone point with a single, low, enclosed barb is known from Cohoe Creek (Christensen and Stafford 2005). Fixed points appear to be rare. Composite harpoon valves are reported from Blue Jackets Creek (Sutherland 1974) but are neither enumerated nor illustrated. The majority of known Early Graham specimens are made from land mammal bone or antler, and rarely on sea mammal bone.

In the Late Graham Tradition (2000 BP to contact), bilaterally barbed harpoons are absent,

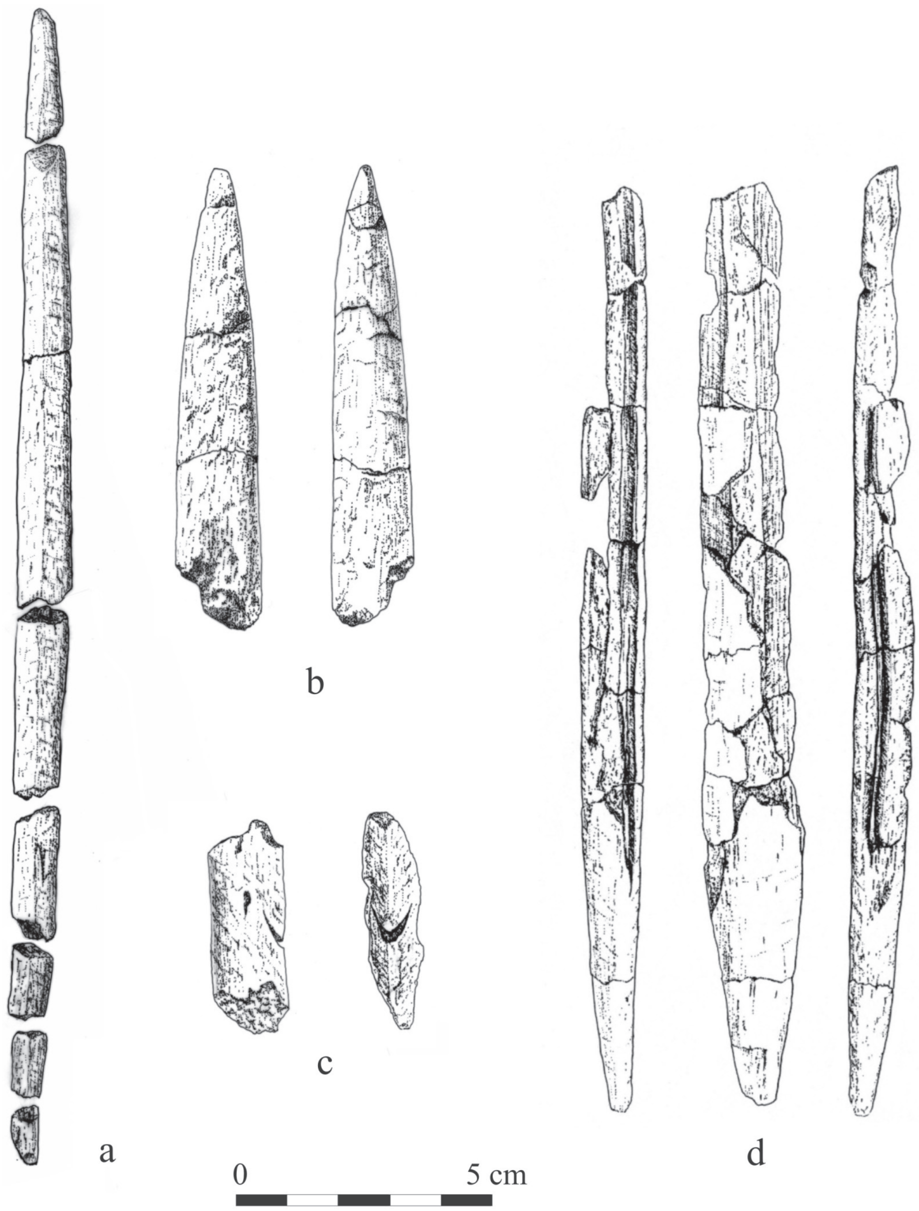

Figure 10. Bone points fragments (a–c) and slotted bone point (d) from Cohoe Creek. Drawings by J.B. McSporran.

replaced by unilateral ones. Also present are composite toggling harpoon valves (Acheson 1998; Orchard 2003). Specimens examined included the self-armed variety and valves with no obvious point bed, perhaps to be paired with their self armed counterparts (Figure 11m, n). One partial mussel shell point (Figure 11c) is known (Acheson 1998), probably the arming blade of a composite harpoon. Again, fixed bone projectile points are rare to absent, excepting points most readily explained as fishhook barbs. The majority of Late Graham points are made on sea mammal or land mammal bone. Ground stone points are rare in the Late Graham tradition and ground stone in general is an uncommon artifact type. Wooden points from Haida Gwaii are rarely preserved but include a unilateral harpoon from Bag Harbour in southeastern Moresby Island (Figure 11i) and a long atlatl point (Figure 11j) from Skidegate on southeastern Graham Island. Both were recovered from intertidal waterlogged components.

Temporal variation within the Graham Tradition is difficult to interpret because all the excavated Early Graham sites are towards the north of the archipelago, while the most significant Late Graham sites are near the southern end. Hence, regional variation could be masquerading as temporal variation. This highlights another difficulty: most of the excavated early Graham Tradition sites, such as Bluejackets Creek, Honna River and Kiusta, remain, at best, only partially reported (Gessler 1974, 1980; MacDonald and Inglis 1980; Severs 1974).

Haida Gwaii Projectile Points in a Regional Context

Bifacial projectile points are a common feature of sites in Haida Gwaii before about 8500 BP, but rare after about 8000 BP. Surrounding areas do not have as well-known an early Holocene record and so regional comparisons are difficult. Northern Northwest Coast well-dated early Holocene sites (10,000 to 8000 BP) with projectile points, outside of Haida Gwaii, include only On Your Knees Cave and Namu. After the early Holocene, biface technology is present outside of Haida Gwaii. Mid-Holocene (7000 to 4000 BP) components with bifacial technology are known from Prince Rupert Harbour and the lower Skeena (Allaire 1979; Ames 2005; Coupland 1988), the central coast of B.C. (e.g., Carlson 1996; Mitchel 1988) as well as on north and west Vancouver Island, (e.g., Arcas 1991; C. Carlson 1979, 2003; Maxwell 2005; McMillan 1998; McMillan and St. Claire 2005). In the late Holocene, bifacial technology generally declines in all areas though flaked stone technology continues to be present. Hobler (1990:304), in discussing trends in Central Coast archaeology, suggests that outer coast sites seem to lose flaked stone technology earlier than inner coast sites.

The absence of bifaces on Haida Gwaii, once thought to be total, and now known to be a case of "extirpation", requires explanation. One clue comes from the raw material being used. With very few exceptions, all lithic technology (bifacial, unifacial, and prepared core) on Haida Gwaii is made on locally available raw materials. A wide variety of argillites, siliceous argillites and rhyolites are available, at least in Gwaii Haanas. By contrast, the earliest components known in Southeast Alaska and at Namu prominently include exotic materials, principally obsidian, suggesting a very wide acquisition or distribution network was in place very early. For example, at On Your Knees Cave, obsidian from moderately distant (Suemez Island) and distant (Mt. Edziza) sources is present in the earliest deposits, ca. 9200 BP (Lee 2001). Similarly, at Namu, Mt. Edziza and Chilcotin obsidians appear on the coast by around 9000 BP (Carlson 1994; Hutchings 1996). Haida Gwaii appears to not be part of this interaction network. Although the evidence is limited, even the materials known from late Pleistocene sites—when lowered sea levels may have made interaction with the coast easier—are from apparently local sources.

At Kilgii Gwaay (9450 BP), exotic materials are absent. The assemblage (n>5000) is composed mostly of a siliceous argillite available 10 km away and small amounts of chalcedony (agate), widely available in Gwaii Haanas. At Richardson Island (9300–8500 BP), a detailed geochemical analysis (Smith 2004) showed considerable diversity in raw material types, but, again, despite this variety and the very large number of lithics recovered (n>50,000), there are no pieces that could not have been locally sourced. Indeed, based on both definitive sources and an assessment of the surficial geology, Smith (2004) suggests that the vast majority of the Richardson raw material would have been available within a 5 or 10 km radius of the site.

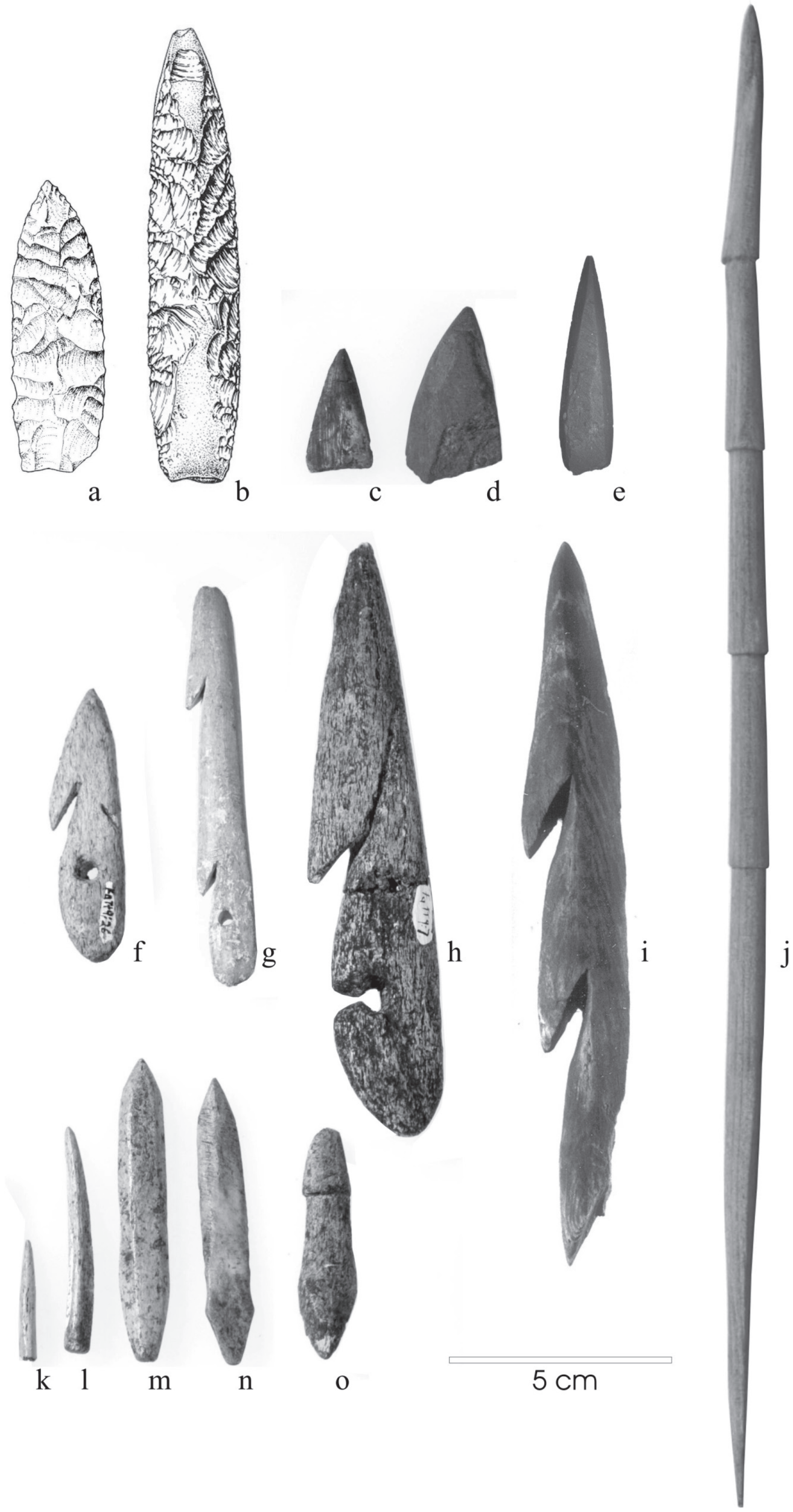

Figure 11. a, b: Bifaces from Deadtree Point and Clonard Bay; c: ground mussel shell point from Cape Freeman; d, e: ground slate points from Louscoone Inlet and Port Louis; f, h: bone toggling harpoons from Louscoone Point; g: bone toggling harpoons from Massett; i: wood harpoon from Bag Harbour; j: wood point from Skidegate; k–l: bone points; m, n: composite bone points from Louscoone Point; and o: toggling harpoon valve from Louscoone Point. Drawings by Joanne McSporran and Brian Seymour. Photos by Kim Martin and D. Fedje.

It appears that the insular nature of the Haida Gwaii archaeological record is established very early on. In fact, whereas on the mainland coast regional interaction appears to decline through time, Haida Gwaii appears quite isolated until the late Holocene, when influences from the mainland and, perhaps, Vancouver Island, are seen in the Late Graham tradition. Bifacial technology appears to disappear from Haida Gwaii around 8000 BP. As noted above, the only bifaces known to date after this time are two imported obsidian specimens from late Holocene Blue Jackets' Creek and surface finds, of probable late Holocene age, from Dead Tree Point and Clonard Bay (both also suggested to be imported from the Mainland).

This impression needs to be reconciled with the major technological innovation in projectile point technology: the introduction of microblade technology. The adoption of microblades is best documented at Richardson Island, where they first appear in a layer dated to 8730 ± 25 BP (UCIAMS 21979). Biface numbers decline, but continue through the rest of the excavated early Holocene sequence, i.e., for the next three centuries or so, as bone points are present very early and from the middle Holocene onwards, they can be considered evidence of continuity, rather than change.

The addition to, rather than replacement of, bifacial technology argues against simple explanations of ethnic replacement. Rather, it casts the problem into more adaptive terms. Both Magne (2004) and Smith (2004) agree that the introduction of microblades appears to be built upon existing technologies and raw materials. The former suggests that a distinctive unifacial core and scraper technology provides a pre-existing lithic reduction strategy—in essence a preadapted template—from which microblade technology is not so radical a development as it might otherwise seem. McLaren and Smith (this volume), note that a trend in the otherwise fairly unpatterned Richardson Island bifacial production is towards increasing lamellar flake scars. Being similar to microblades in both function (fairly standardized, small, long and narrow flakes) and reduction strategy (finely targetted pressure flaking) this is seen as further circumstantial evidence for *in situ* development of microblade technology (Smith 2004). Smith's analysis of the raw material concludes that microblades are first implemented on raw material types previously used for other reduction strategies, and that a period of wide raw material innovation ensues, followed by a focus on key raw materials previously absent in the Kinggi complex layers. She interprets this as a period of experimentation: a technological *idea* is fitted to local circumstances, in contrast to the sudden appearance of a well-developed techno-complex.

This gradual process is coincident with a major environmental change: after two millennia of unidirectional sea level change, sea level stops rising some time around 8800 BP. Soon after, microblades appear. These two events—the two major Holocene events in the environmental and technological domains, respectively—may be linked. With sea level stabilization came new adaptive challenges as a people accustomed to a dynamic environment were confronted with stability (Mackie and Fedje 2006; Magne 2004). One possibility is that with stable sea levels came a reduction in readily available lithic raw material as intertidal exposures stabilized, and the profligate days of the Kinggi complex came to an end. Microblade technology does have the advantage of conservation in lithic raw material, although many previously available raw material types at Richardson Island continue. Excavation of 8500 to 7500 BP layers would be very helpful, to trace the suggested decline of bifacial technology and, if stratigraphic resolution was high enough, to observe consolidation of raw material acquisition patterns. Such layers may exist at Richardson Island, areas of which were occupied in the middle Holocene. It may be significant that the link between changing sea levels and microblades is double-ended: when sea levels start to drop around 5000 BP, microblades appear to fall out of use, perhaps because raw materials become more abundant once again against a shifting shoreline.

Another factor that could have bearing upon shifts in hunting technology (i.e., from spear to atlatl) is change in the biological environment. Until 10,000 BP Haida Gwaii was characterized by relatively open landscapes, first tundra and then parklands (Lacourse and Mathewes 2005; Lacourse et al. 2003, 2005). After that time the forests began to close in and, with environmental warming between 10,000 and 9000 BP, migrate to high elevations. This would have significantly reduced bear and large ungulate habitat with the result that the need for heavy spears (cf. Hallowell 1926) may have dropped off and perhaps encouraged a greater reliance on atlatl technology (i.e., the shift from Xil spear points to Xilju and microblade-armed composite dart points). This is not to say that atlatls were not used prior to ca. 9000 BP—they could have been armed with bone points such as those found at Kilgii Gwaay and Gaadu Din cave—cf. Hare et al. 2004) or simply not yet be represented in the small sample of early points recovered to-date. The apparent absence of post-9500 BP bears at K1 and Gaadu Din caves may reflect a significantly reduced black bear population as well as the regional extirpation of brown bear (Fedje and Sumpter 2005). Alternatively, the absence of post-10,000 BP bears in the caves may reflect forest development and a commensurate shift to the modern practice of hibernating in excavated dens (e.g. under large trees).

In the later Holocene perhaps the most notable aspect of Haida Gwaii projectile technology is the relative lack of interest in ground stone. Slate and other suitable raw materials are abundant, however people appeared to focus on ground bone, antler and wood for their projectiles. This period is best documented for the extreme southern regions of the archipelago and so it is perhaps unsurprising that this preference closely echoes the West Coast Culture Type of Vancouver Island (McMillan 1998; Mitchell 1990), especially its most northerly known expressions at Yuquot (Dewhirst 1980) and Hesquiaht Harbour (Haggarty 1982). Better analysis of Graham Island late tradition deposits might show parallels with mainland North Coastal trends. On the other hand, the lack of abundant ground stone in the surface collected and, to the extent knowable, unreported excavation assemblages, suggests that ground stone was never an important projectile point technology on Haida Gwaii.

With regards to harpoons, the change from early bilaterally barbed styles to more recent unilateral styles echoes a coast-wide pattern identified by McMurdo (1972). Throughout the Graham Tradition, the barb style tends to be high and extended, and most points have only one or two barbs. Early examples tend to have line guards while later ones have line holes, or are composite, a trend which bears some similarity to those in Prince Rupert Harbour (McDonald and Inglis 1980). The self-armed composite toggling harpoons known from Gwaii Haanas may reflect Kunghit Haida interaction with the West Coast Culture Type of Vancouver Island, in which these are a typical artifact type, as discussed by Mackie and Acheson (2005). Since no sites are known from the West Coast of Vancouver Island that predate 5500 BP, it is difficult to comment on long-term pan-outer coast trends in bifacial technology. By 4500 BP at Yuquot bifacial technology is absent, and the later convergence upon a nearly-exclusively bone and wood tool-kit suggests some long term ties with Haida Gwaii which are perhaps greater than either area had with adjacent mainland areas. Such ties may have originated in the early Holocene but demonstration of this awaits discovery and excavation of relevant sites on northwestern Vancouver Island.

One point of interest is the low diversity of large land mammals on Haida Gwaii to serve as raw material for projectile technology. Rahemtulla (2003) suggests that land mammals are a crucial component of a maritime adaption because of the unique properties of their bone: hard, stiff, yet flexible and amenable to controlled shaping. With caribou limited to more northern environments, for much of the archipelago the only land mammal bone available was from black bear, which are not an abundant source of antler. The paucity of ground stone is, therefore, all the more remarkable considering the inherent difficulties in hunting black bears, and their relatively low population numbers as apex predators. Again, resolution of this important question will require more archaeological work, such as technological analysis of such important assemblages as Blue Jackets Creek and Kiusta, and excavation at southern early Graham tradition sites and northern late Graham tradition sites to resolve current geographic and temporal confounds. In the south, the early Graham Tradition sites may be on poorly developed terraces intermediate between modern and early Holocene sea levels. With sea level regression, these sites are likely smeared more thinly as people moved downslope and this may account for their lower visibility: shell preservation in a thinner site is likely to be much poorer than at sites associated with more stable or more recent sea levels. Despite visibility issues, due to the massive quantities of California mussel in Haida Gwaii middens, a greater attention to worked mussel shell could also enhance knowledge of worked shell projectile arming.

Conclusions

Data on projectile points for Haida Gwaii remain slim and, as such, present interpretations are preliminary and of only general utility. There are significant shifts in technology from bifacial to composite (ca. 8750 BP) to organic (ca. 5000 BP) but much of the associated tool kit shows little change until very late in this history. The ultimate source of the technology seen at early Haida Gwaii sites is likely western Beringia but it remains unclear whether this was directly via the paleo-Beringian coast (cf. Dixon 2001) or step-wise via inland Beringia and southeast Alaska (Carlson 1996, 2003). The oldest dated projectile points in Haida Gwaii are only 10,600 radiocarbon years old, about 1000 years younger than early Alaskan sites (Goebel 1999, Holmes 2001, Rasic 2003). Similarities between Nenana and early Haida Gwaii technologies (e.g., foliate points, large core tools and a focus on expedient flake tools) raise the possibility that both derive from the same ancient western Beringian technology. Similarly, the shift to microblade technology in Haida Gwaii appears to mirror that seen in northeast Asia and central Alaska although considerably later in time.

Overall, technological change in Haida Gwaii appears to be additive, with change being gradual rather than rapid. The shifts from foliate bifacial to microblade composite and to organic projectiles are significant but appear to occur over a period of centuries, thus suggesting diffusion or *in situ* development rather than significant demographic change. The high-resolution deposits at Richardson allow very detailed temporal distinctions to be made and so the process of technological innovation is better understood at this site than most (Fedje, Magne, and Christensen 2005; Magne 2004; Smith 2004). The changes in projectile point attributes during the early period are linear and relatively subtle and likely, at least in part, reflect differences in site function and raw material availability. For example, the Haida Gwaii spears may have been largely used for hunting bear at den entrances (cf. Hallowell 1926; McLaren et al. 2005) and the smaller Xilju and microblade composite darts for open-air hunting.

Site visibility remains a significant issue in obtaining representative samples of technology for early Haida Gwaii. Karst cave research shows that people were in the archipelago at a very early time but only hint at one aspect of adaptation. Survival of coastal archaeological sites on 12,000 to 11,000 BP ocean shorelines, except as reworked underwater lag deposits, is unlikely. Investigation of other inland landforms (lakes, river terraces, etc.), especially where ancient shorelines have not shifted large distances (cf. Davis et al. 2004; Rick et al. 2001, 2005), may ultimately lead to a more complete understanding of early adaptations, including time-diagnostic changes in projectile point form. Understanding later trends would involve investigation of the crucial 8500 to 7500 BP period, as well as a geographic gap-filling strategy for the Graham Tradition.

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