

CHAPTER 9

Projectile Points from the Gulf and San Juan Islands

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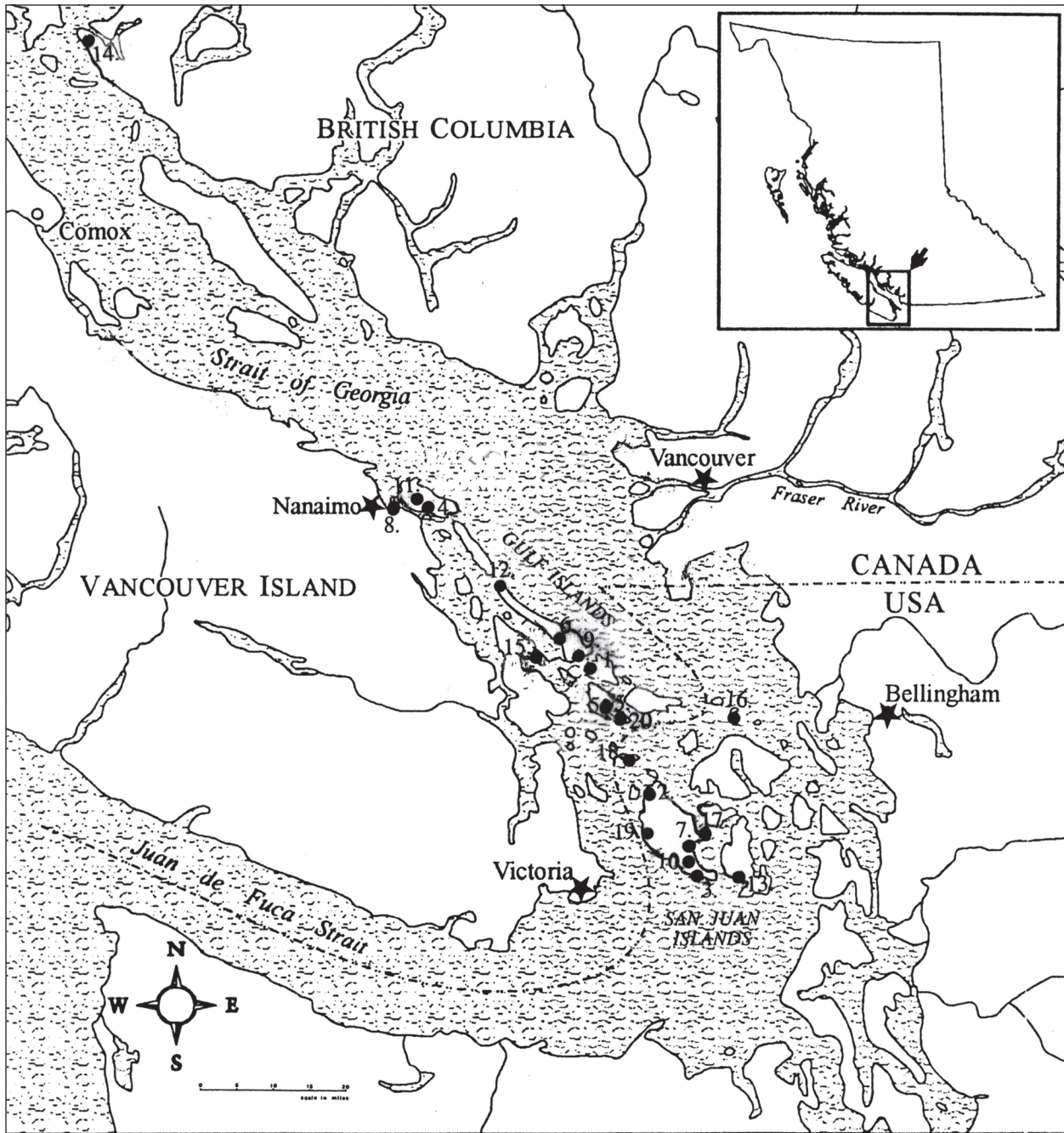
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Nine hundred and thirty classifiable flaked stone points have been recovered from 22 excavated or tested sites in the Gulf and San Juan Islands and from two adjacent sites, Duke Point on Vancouver Island and Bliss Landing on the mainland (Figure 1). These sites have 147 radiocarbon dates that range from 5400 BP to the contact period. The absence of earlier sites may be the result of rapid sea level rise between 5800 and 4500 BP (Williams and Roberts 1988:1664) that would have eroded and drowned earlier shell middens and other shoreline features, although landward features at higher elevations would have been spared. The latter are difficult to discover because of forest growth and absence or scarcity of the shellfish remains that increase site visibility. Those parts of sites with the oldest dates, Helen Point and DeStaffany, are well above the present shoreline. The largest assemblage from a single site is from Helen Point (DfRu-8) on Active Pass in the Gulf Islands with 287 points (Table 1) that constitute 31% of entire sample. Several sites have yielded only one projectile point, and many sites have yielded intermediate frequencies. These variations in frequency can be attributed to culture change through time, differential sampling, and the different activities that took place in the particular parts of the sites excavated. These variables contribute to the difficulty of building a model of chronological change in projectile point types. Uncalibrated radiocarbon dates are used in this chapter.

Arden King (1950) developed the first typology for projectile points in this island region based on points recovered from the Cattle Point site. King was a splitter and classified the collection of 120 points into eleven major types with 36 sub-types.

I'm more of a lumper and in 1954 I reclassified the Cattle Point points and the points from the other excavated San Juan Island sites into five major types and six sub-types (Carlson 1954). Later researchers have used similar types, although Kenady et al. (2002) have recently classified the points from the DeStaffany site into three categories they refer to as "series" following practices used in Plateau archaeology. In the present analysis I sort the points into six major types and ten sub-types (Figures 2, 3, Table 1). Large bifaces, those over 100 mm in length, are not considered to be projectile points and are placed in a class by themselves. Those attributes that have proven most useful in the formulation of types are the following: size—small or medium; shape of the blade—straight "triangular" or convex "leaf" or "foliate"; and treatment of the base—convex, straight, irregular, stemmed, notched or barbed. Examples of all the types are shown in Figure 3 at full size, and silhouettes illustrating the range of variation in form are in Figures 4–16 at half size.

The vast majority of the points are made of coarse gray-black volcanic rock that for years was called basalt or andesite. Bakewell and Irving (1994:30) have recently completed a chemical analysis of this rock and have identified this stone as dacite, a volcanic rock similar to basalt and andesite. Some examples have crystalline inclusions and are probably what King (1950) called porphyry. Other utilized geochemical varieties of local volcanic rocks may someday be identified, but the significant aspect of all of them is that they were difficult to flake and rarely produced artifacts of outstanding quality, although there are some exceptions (See Figure 19a). A few projectile points were flaked from obsidian, chal-



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|--|---------------------------|--------------------------|
| 1. Helen Point DfRu 8 | 7. Argyle Lagoon 45 SJ 2 | 14. Bliss Landing EaSe-2 |
| 2. English Camp 45 SJ 24 & Garrison 45 SJ 25 | 8. Duke Point DgRx-5 | 15. Long Harbour DfRu-44 |
| 3. Cattle Point 45 SJ 1 | 9. Georgeson Bay DfRu-24 | 16. Fossil Bay 45 SJ 105 |
| 4. False Narrows DgRw-4 | 10. DeStaffany 45 SJ 414 | 17. Moore 45 SJ 5 |
| 5. Pender Canal DeRt-1 & DeRt-2 | 11. Gablriola DgRw-199 | 18. Reid Harbor 45 SJ 84 |
| 6. Montague Harbour DfRt-2 | 12. Dionisio Point DgRv-3 | 19. Lime Kiln 45 SJ 99 |
| | 13. Richardson 45 SJ 185 | 20. Poets Cove DeRt-4 |

Figure 1. Map of the San Juan and Gulf Islands showing sites with chipped stone projectile points.

Table 1. Projectile point type distribution San Juan and Gulf Islands.

SITE \ TYPE	Ia	Ib	Ic	II	IIIa	IIIb	IVa	IVb	V	VIa	VIb	VIc	Total
Helen Point DfRu-8	26	34	25	23	110	4	9	1	4	35	13	3	287
English Camp 45-SJ-24	7	1	29		6	1	14	1	5	68	4	2	138
Cattle Point 45-SJ-1	19		15	3	27		5	4	10	33	4	4	124
Poets Cove DeRt-4	32		13	7	8	9	7	4	6	22	2		110
False Narrows DgRw-4	2		5		14		1		3	39	3	2	69
Pender DeRt-2	14		1	3	16	13	2			1	2	2	54
Montague Harbour DfRu-13	4		2	3	10					4	5		28
Argyle Lagoon 45-SJ-2	3	1	2		11		1		4				22
Garrison 45-SJ-25	2		1				1			9	6		19
Pender DeRt-1			3	2	3		4		1				13
Duke Point DgRx-5	3	1	1	2	5	2			2	3		2	21
Georgeson Bay DfRu-24	1		2				1		2	2			8
DeStaffany 45-SJ-414	3				2	1							6
Gabriola Island DgRw-199			1		1	1							3
Dionisio Point DgRv-3	3		3		3	1	4			1			15
Richardson 45-SJ-185	1	1							1				3
Bliss Landing EaSe-2	1		1	1									3
Long Harbour DfRu-44	2												2
Fossil Bay 45-SJ-105	2												2
Moore 45-SJ-5	1												1
Reid Harbor 45-SJ-84	1												1
Lime Kiln 45-SJ-99							1						1
Total Number	127	38	104	44	216	32	50	10	38	217	39	15	930
Percent	14	4	11	5	23	3	5	1	4	23	4	2	100

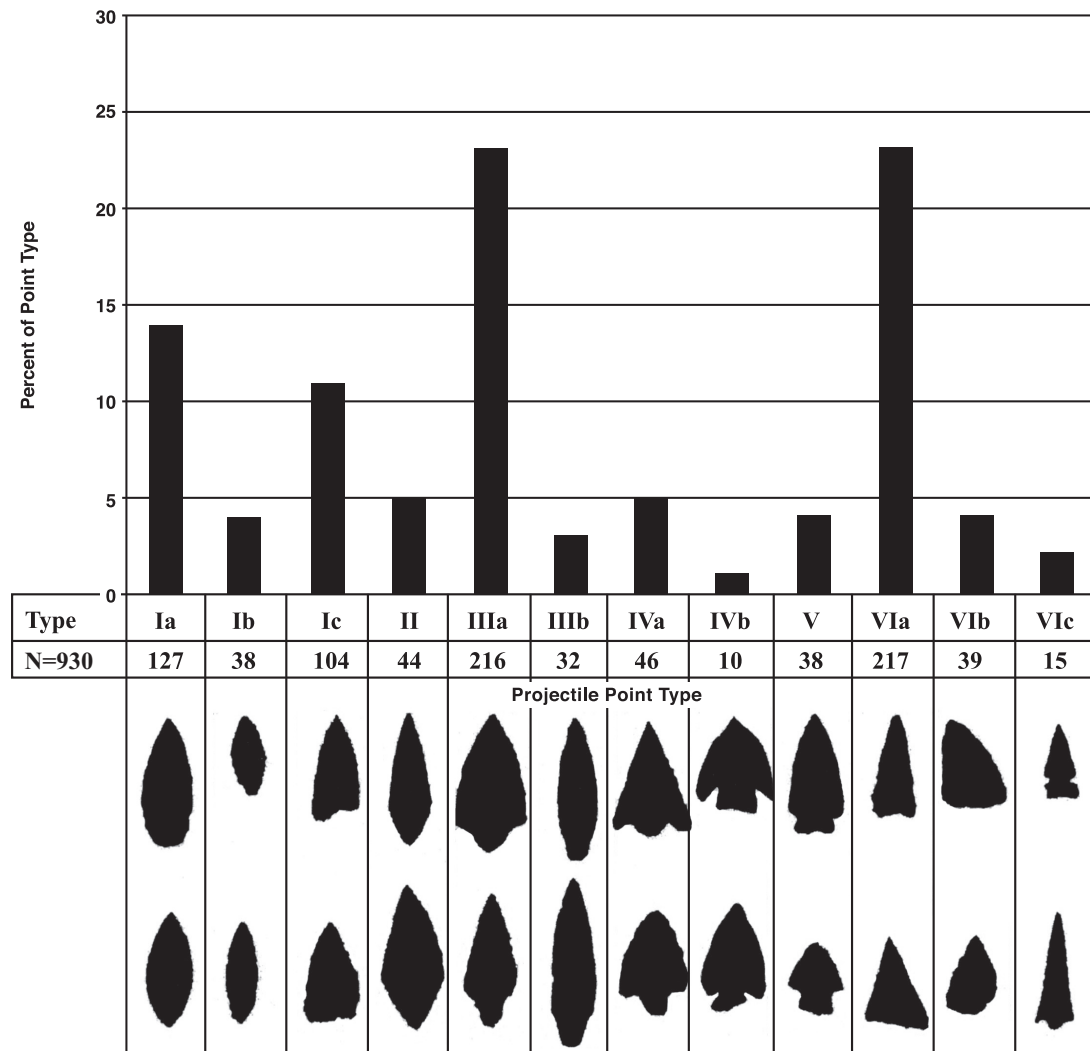


Figure 2. Graph showing percentages of projectile point types in the entire sample of 930 points.

cedony, chert, quartz crystal, and slate. Many of these were probably traded in as finished artifacts, although raw obsidian that came mostly from eastern Oregon with a small amount from Mt. Garibaldi just north of Vancouver was worked locally (Carlson 1994), and nodules of yellow chalcedony are present in the conglomerate that underlies the Helen Point site.

Projectile Point Types

In the discussion of the dating of the different types, the emphasis is on the time period when the type is most common rather than on the entire possible time range of the type since with the kind of settlement pattern and the nature of shell midden strati-

fication some points from earlier or later periods can easily be intruded from earlier or later periods. The overall trends in projectile point form are from leaf-shaped and diamond unstemmed forms to leaf-shaped stemmed and shouldered forms to barbed foliate or triangular forms to foliate and triangular forms with a straight or irregular base accompanied by increased diminution in size and a decrease in frequency after 1100 BP.

Type I Foliate Bifaces without Stems or Barbs

This general type is demonstrably the oldest known type on the coast north of the Strait of Juan de Fuca, but is already accompanied by diamond and

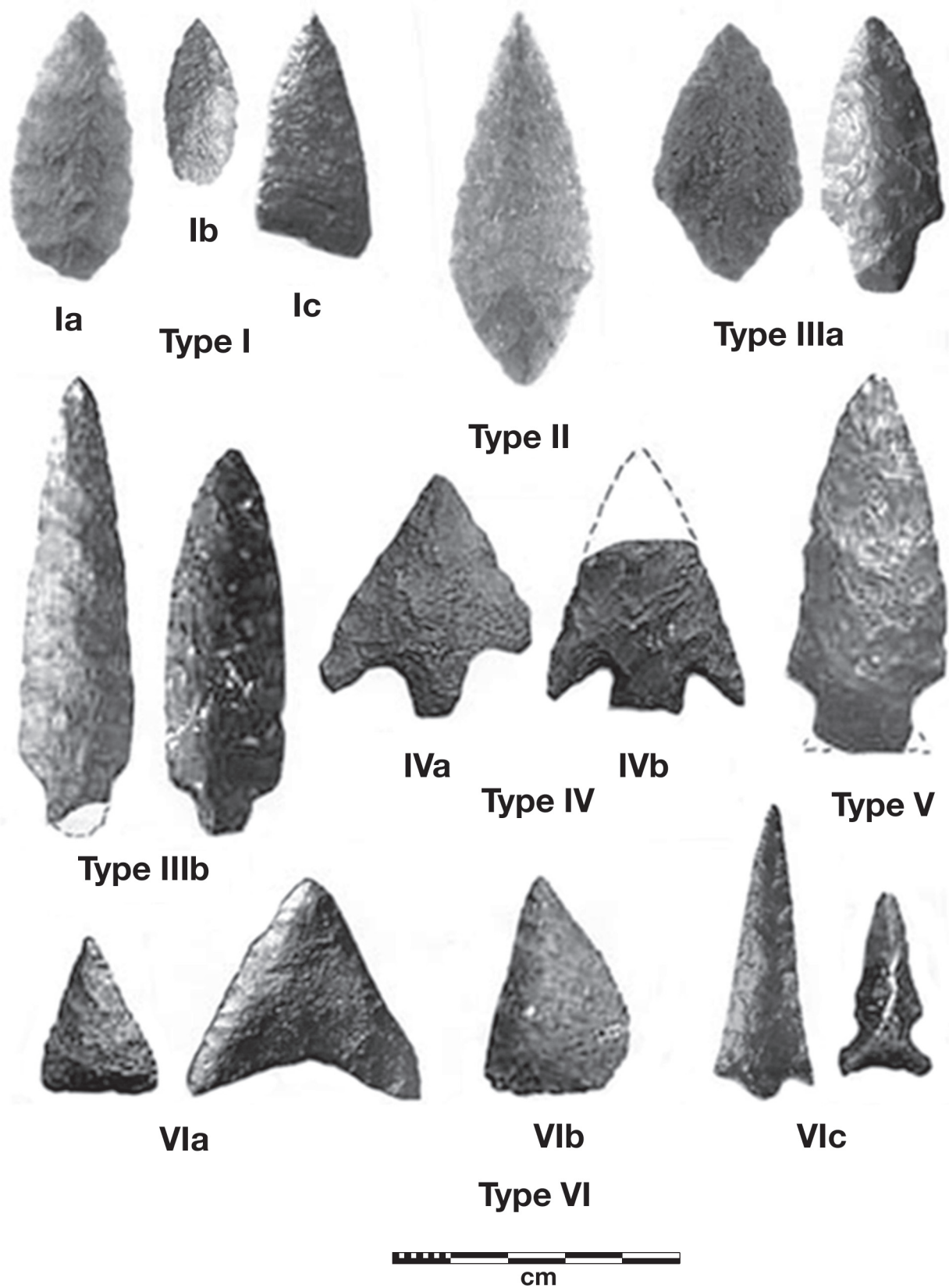


Figure 3. Examples of all the types of projectile points.

contracting stem types by the time of the earliest known components in the Gulf and San Juan Islands at 5400 BP. Some bifaces placed in this type may be stage II preforms for types with stems. Simple foliate points with rounded or pointed bases are the most common sub-type. They vary in size and in treatment of the base and these attributes are used as the basis for the three sub-types. In terms of use they could have functioned as arming tips for arrows, spears, or harpoon heads, or as knives. Types Ia and Ib are sometimes called “Cascade” points.

Type Ia Medium sized Foliate Points, Rounded to Pointed Base. N = 127 (57 measured) **Figure 4.** **Length:** 43 to 83 mm; 29 (51%) are 51 to 65 mm. **Width:** 12 to 40 mm with 33 (58%) from 21 to 27 mm. **W/L Ratio:** 0.23 to 0.67 mm range; 31 (54%) points are 0.36 to 0.46 mm.

Distribution. These points are the third most common type found in this region and occur at 19 sites (See Table 1).

Time Range. These points are found from the Mayne through the Marpole phases (>5000 to 1600 BP) but are not the most common type in these components. Thirteen (76%) of the 17 points of this type recovered in the 1968 SFU excavations

at Helen Point are from levels that date between 3830 ± 60 and 3690 ± 70 BP. The two points from Long Harbour (Johnson 1991) are in Marpole phase deposits dated 2310 ± 60 and 2230 ± 50 BP. There is one point (Figure 4i) of this type with serrated edges from a San Juan phase component at the Moore site but this is the only reported occurrence in this late phase. In the Fraser valley (Schaepe 2003, Fig. 10:22) five points of this type are associated with the floor of the Mauer house dated between 4240 and 4220 BP. At the Saltery Bay site (DkSb-30) on the B.C. mainland northeast of the Gulf Islands a single point of this type was found directly associated with harbour porpoise bones in a hearth dated at 6050 ± 40 BP (Pegg et al. 2007:38).

Discussion. Some of these points are symmetrical and well-finished, but many are roughly finished and asymmetric. This simple leaf-shaped form is the prototype from which most later types on the entire Northwest Coast evolved. About 70% of the points from the Milliken phase in the Fraser Canyon (9000–8000 BP) are of this type and the other 30% are single-shouldered and probably represent a step in the later development of contracting stem points that begin in that locality with the Eayem phase (Carlson 1983:27). The direct association of a point

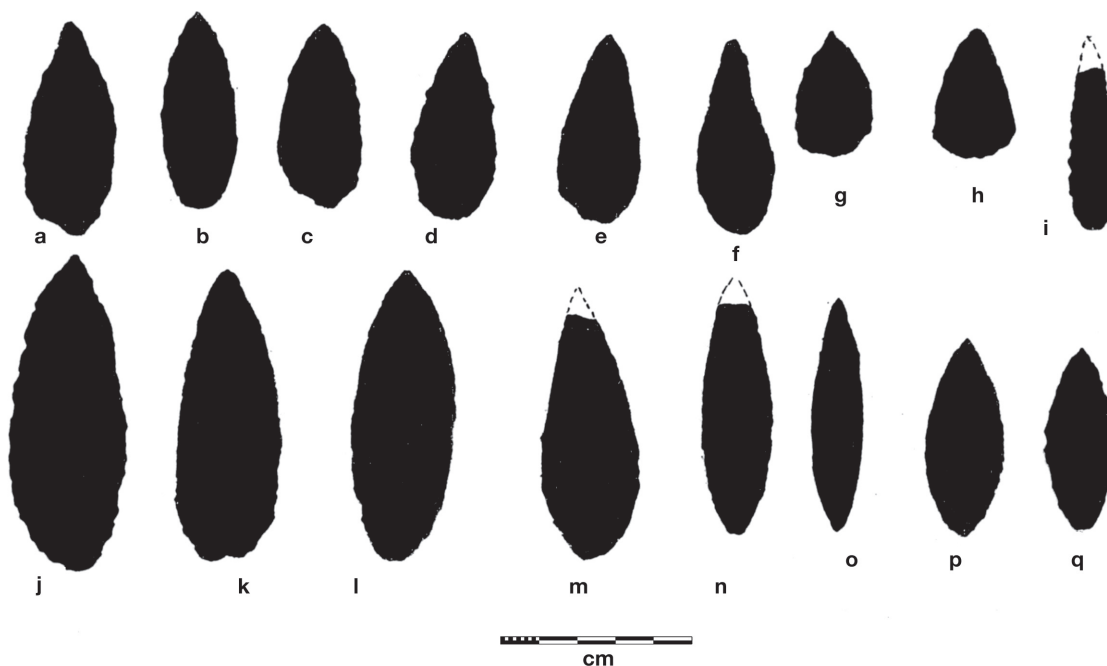


Figure 4. Type Ia points—Foliate points with rounded or pointed base. a, b, j, m, p, q: Helen Point. c, d, e, f, k, n: Pender Canal DeRt-2. g: Garrison. n, o: Cattle Point. i: Moore. l: Duke Point. Half size.

of this type with porpoise bones cited above suggests this type was used for sea hunting. A Type IIIa stemmed point was also found directly associated.

Type Ib Small Foliate Points, Rounded to Pointed Base. N = 38 (38 measured) **Figure 5.** Length: 28 to 42 mm.; 20 (53%) 34 to 39 mm; **Width:** 13 to 22 mm; 22 (58%) are 15-19 mm. **W/L Ratio:** 0.33 to 0.66 mm.

Distribution. Five sites with 34 (89%) points from the Helen Point site (See Table 1).

Time Range. At Helen Point one point of this type occurs in the earliest level dated at 5400 BP, and 21 (72%) of the 29 points from the 1968 SFU excavations come from Mayne phase levels that date between 5420 ± 230 and 3690 ± 70 BP. Single points are found in Marpole phase components at Garrison and Richardson. One point that is almost stemmed (Murray 1982, Fig. 29b) is from Component III at Duke Point that is post-Marpole in age.

Discussion. Many of these points are crudely flaked and some have incipient stems. The separation of this sub-type from Type Ia is justified by its overwhelming presence at Helen Point and because 90% of the points fall temporally in the Mayne phase. The size is small enough to suggest that these are arrow points although it is generally thought that



Figure 5. Type Ib points—small foliates with pointed, rounded, or irregular base. All are from Helen Point. Half size.

the bow and arrow was not introduced until about 1600 BP when small triangular well-made notched points (Type VIc) made their appearance.

Type Ic Medium-sized Foliate Points with Straight/Irregular/Concave Base. N = 101 (52 measured) **Figure 6.** Length: 29 to 64 mm; 26 (50%) 38 to 49 mm; **Width:** 13 to 33 mm; 33 (63%) are between 21 and 27 mm. **W/L Ratio:** 0.30 to 0.84 mm; 24 (46%) are 0.48 to 0.65 mm.

Distribution. Fourteen sites (See Table 1).

Time Range. Unlike the other foliate types, this sub-type is probably restricted to the late Marpole phase. Three points were found in House 2 at Dionisio Point dated 1800–1500 BP (Grier 1999). At Helen Point sixteen(89%) of the eighteen points of this type from the 1968 SFU excavations were found in the top 40 cm of deposit above a date of 1370 ± 85 BP, in levels dated 1120 ± 100 and 1100 ± 90 BP. These dates are consistent with their occurrences at Cattle Point and English Camp.

Discussion. the short ranges in length, width, and proportions suggest that these points all served a similar purpose.

Type II Diamond

Diamond-shaped points are transitional in form between the simple leaf-shaped types and contracting stemmed types. Some of them are definitely finished points whereas others may be stage II preforms for contracting stem points.

N = 44 (35 measured) **Figure 7.** Length: 29 mm to 98 mm; 18 (51%) are 52 and 70 mm; **Width:** 13 to 43 mm; 19 (54%) are 23 to 30 mm. **W/L Ratio:** 0.31 to 0.77 mm.

Distribution. 23 of the points are from Helen Point and the remainder are from 7 other sites (Table 1).

Time Range. The earliest point (Figure 7p) of this type is a crude example from the lowermost levels at Helen Point with a ^{14}C date of 5420 BP. Of the 19 points of this type recovered from the 1968 SFU excavations 16 (84%) of them were found in levels dating between 3950 ± 250 and 3980 ± 130 BP. A quartz crystal point (Figure 7f) from Bliss Landing is from a component dated at 4000 BP. The three points from DeRt-2 date about 4000–3500 BP. The two crude examples from Duke Point may date to 4130 ± 100 BP (Murray

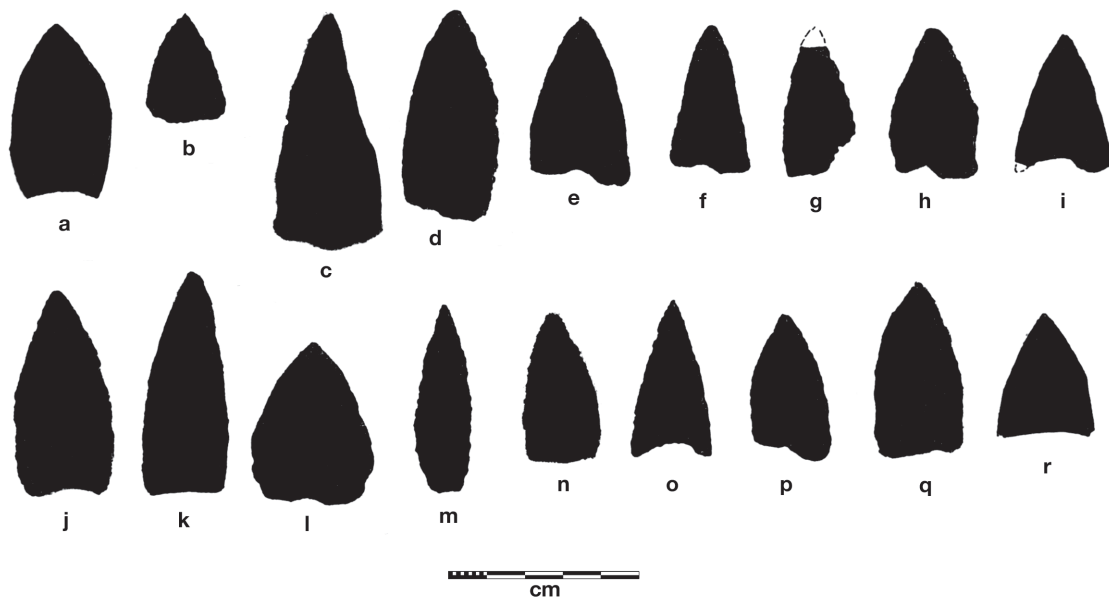


Figure 6. Type Ic points—foliates with straight, irregular, or concave base. a, e, i, r: Cattle Point. b, m, p: Garrison. c, q: False Narrows. d, j: Georgeson Bay. l, f, n: English Camp. g, o: Helen Point. h: Pender Canal DeRt-1. k: Pender Canal DeRt-2. Half size.

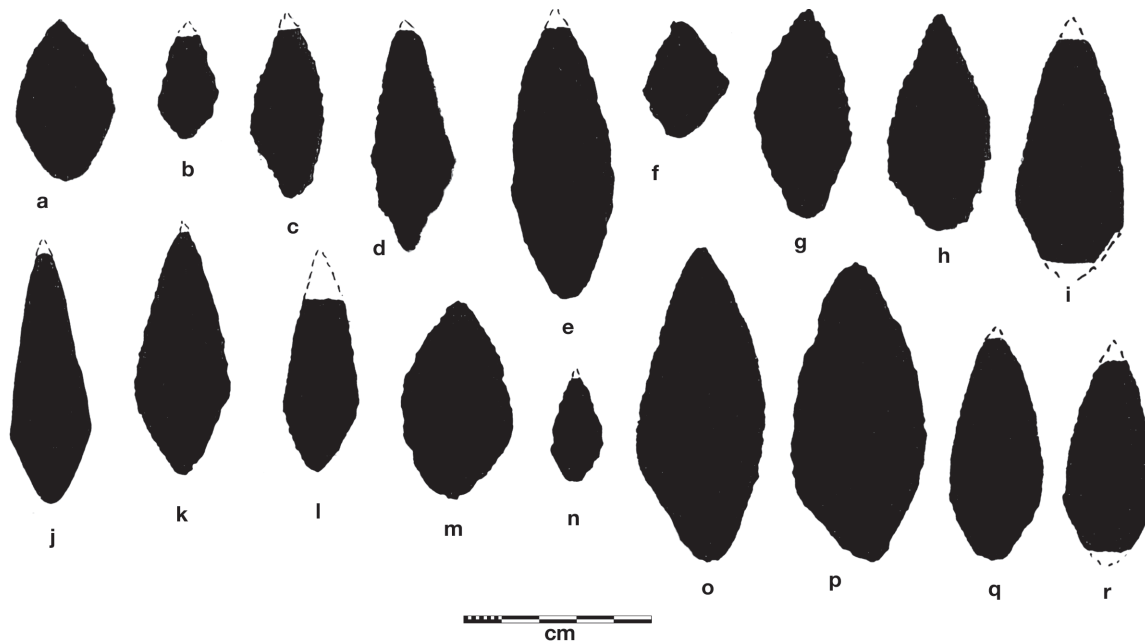


Figure 7. Type II points—diamond. a: Duke Point. b, e, g, h, k, l, m, n, p: Helen Point. f: Bliss Landing. i, o, r: Pender Canal DeRt-2. q: Pender Canal DeRt-2. Half size.

1982:130). Those from Montague Harbour are in the earliest component whose dates are uncertain although the lithic assemblage from that component (Mitchell 1970, Fig. 31) is Mayne phase in composition. Of the two points from DeRt-1, one was found on the beach and is undated and the other is a well-rolled specimen (Figure 7k) found in Marpole phase deposits that had obviously been picked up on the beach. At the Blufftop site on Denman Island Eldridge (1987) illustrates nine points of this type radiocarbon dated to 3500 BP. Overall the type is primarily if not entirely Mayne phase in age (>5000 to 3500 BP).

Discussion. One of the large diamond-shaped bifaces classified as a dagger (Figure 3g) is also from Mayne phase deposits at Helen Point.

Type III Foliate Points, Unbarbed, with a Contracting or Parallel-sided Stem.

Contracting stem points with sloping to straight shoulders and no barbs and generally convex sides are the most common type in the entire sample and have been subdivided into two sub-types. There are 230 examples of which just under half (114) came from the Helen Point site.

Type IIIa Medium-sized Foliate with Contracting/Parallel-sided Stem. N = 216 (179 measured) **Figure 8. Length:** 34 to 90 mm; 94 (53%) are 45 to 63 mm; **Width:** 12 to 50 mm; 100 (56%) are 21 to 30 mm; **W/L Ratio:** 0.28 to 0.85 mm; 95 (52%) are 0.41 to 0.54 mm.

Distribution. Thirteen sites (See Table 1.)

Time Range. This type dates from the Mayne phase through the Marpole phase 5400 to 1500 BP with the highest frequency during the Mayne phase. The earliest point of this type is in the lowermost level of the 1968 SFU excavations at Helen Point with a radiocarbon date of 5400 BP. Highest frequency of this type is at Helen Point in levels dating between 5420 and 3690 BP in which 49 (83%) of the 59 points of this type were found. Four points of this type were associated with Burial 84-46 at Pender (DeRt-2) dated at 3570 ± 140 BP, and the type continues at that site to about 3000 cybp (Figure 18). In the Fraser Valley at the Mauer site (LeClair 1976) there are three points of this type associated with the Mauer House dated 4240-4220 BP (Schaepe 2003) although not di-

rectly with the floor level. At the Saltery Bay site (DkSb-30) on the B.C. mainland northeast of the Gulf Islands a single point of this type was found directly associated with porpoise bones in a hearth dated at 6050 ± 40 BP (Pegg et al. 2007:38) that makes this the earliest dated point of this type in the entire region.

Discussion. There is considerable variability in this type and it is possible that additional sub-types should have been recognized. The most common form is a large broad point with sloping shoulders and a tapering stem (Figure 8a-v). Smaller points with a rectanguloid stem, that is sometimes parallel sided (Figure 8w-dd), could be considered to be a different type but seem to occupy the same time range as the larger broader points. Some of the larger points also have a rectanguloid stem. The shape of the blade of the vast majority of points is excruciate (foliate) although the range actually goes to straight-edged to incurvate. A small number of points (Figure 8ii) are transitional in form between Types Ia and IIIa, and a larger number (Figure 8ff, gg) are transitional in form between the Type II diamond-shaped points and the Type IIIa contracting stem points. Points with incipient stems (Figure 8hh) may be unfinished second stage examples. Several points (Figure 8jj, kk) have incipient barbs and are transitional in form between Type IIIa and the stemmed and barbed forms of Type IV. The association with porpoise bones cited above suggests this type is part of sea hunting equipment.

Type IIIb Lanceolate with Contracting/Parallel-sided Stem. N = 32 (21 measured) **Figure 9. Length:** 53 to 97 mm; 11 (52%) are 63 to 75mm; **Width:** 16 to 30 mm; 12 (57%) are 20 to 23 mm; **W/L Ratio:** 0.22 to 0.35 mm; 16 (76%) are 0.30 to 0.35 mm in width/length ratio and the remaining five (24%) are 0.22 to 0.27 .

Distribution. Seven sites (See Table 1) with the most (13 points) from DeRt-2.

Time Range. Three points of this type (Figure 9a, f, o) were associated with Burial 84-46 at Pender (DeRt-2) dated at 3570 ± 140 BP. The other 11 points from DeRt-2 are from the Main Midden deposit in close proximity to this burial and date between 4000 and 3500 BP. The four examples from Helen Point are in deposits dating between 5420 and 3690 BP. The two points from Duke Point (Murray 1982, Fig. 21a,b) are from Component II

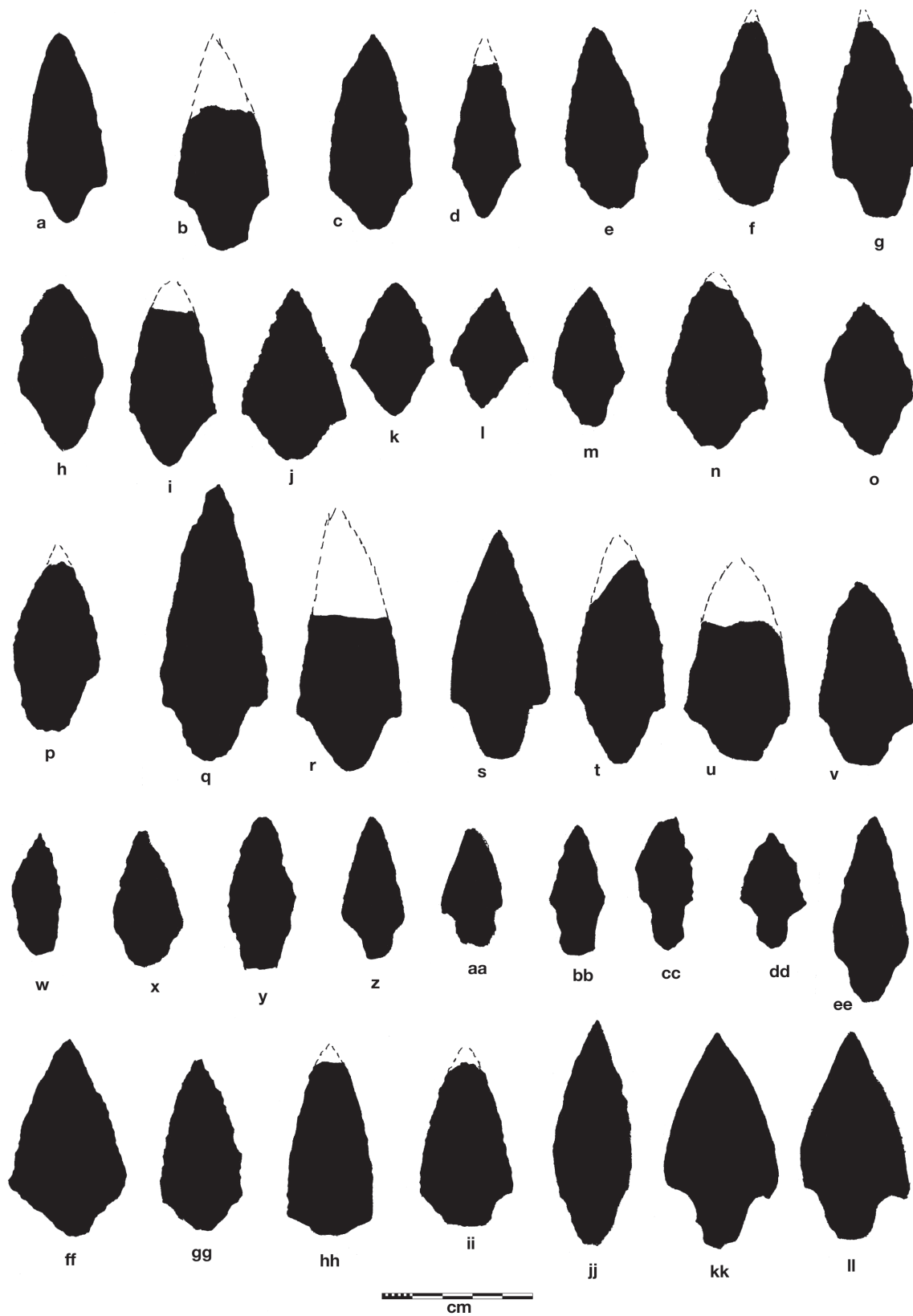


Figure 8. Type IIIa points—contracting stem. a, bb, dd, jj: Cattle Point. z: Argyle Lagoon. ee: Pender Canal DeRt-2. ii: Montague Harbour. Remainder are from Helen Point. Half size.

that recent redating places between 2950 and 2250 BP (Deo et al. 2004). The DeStaffany site dated at 3750 ± 50 and 4750 ± 50 BP yielded one point of this type (Kenady et al. 2002, Fig. 14) (Figure 8h). The one point from English Camp (Stein 2000:55) appears to be associated with the Marpole phase as is the one from Dionisio Point, although for the most part these points mark the transition from the Mayne to the Locarno Beach phase.

Discussion. These points are long and narrow. The ratio of width divided by length must be no larger than 0.35 mm to be classified as lanceolate. These points are distinguished by their lanceolate dimensions and the usual high quality of their manufacture.

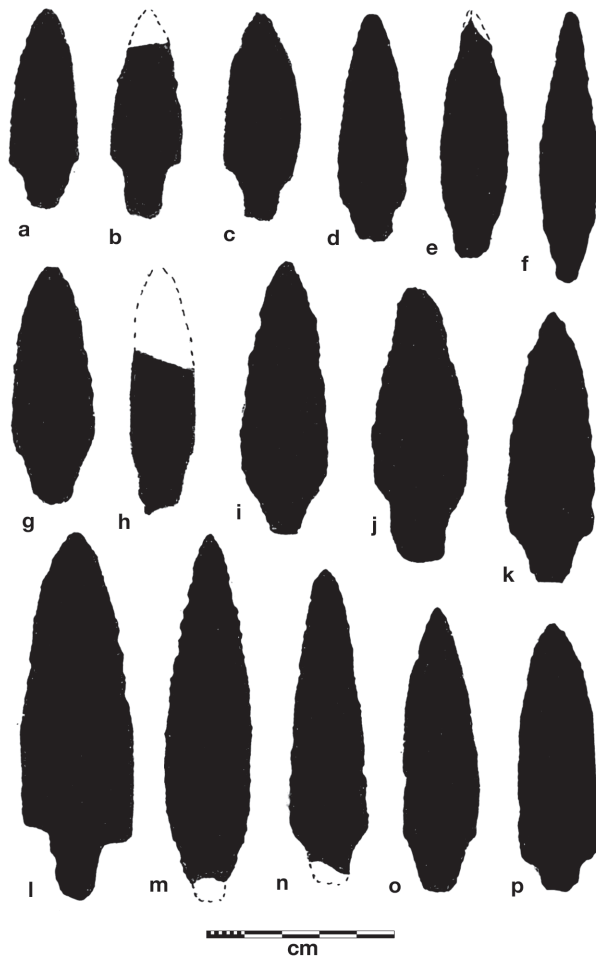


Figure 9. Type IIIb points—lanceolate with contracting to parallel-sided stem. a, d, f, g, i, k, l-p: Pender Canal DeRt-2. j: Duke Point. c: Garbiola. h: DeStaffany. e: Helen Point. Half size.

Type IV Stemmed and Barbed

In this type both sides of the base are indented to form a stem so that when hafted the widest part of the point at the base forms barbs. Two sub-types based on the shape of the stem are present.

Type IVa Barbed with Contracting Stem. N = 50 (29 measured) **Figure 10a-k; Figure 11.** **Length:** 30 to 77 mm; 16 (55%) are from 43 to 58 mm; **Width:** 21 to 50 mm; 16 (55%) are from 32 to 41 mm; **W/L Ratio:** 16 (55%) are 0.60 to 0.76

Distribution. Twelve sites (See Table 1)

Time Range. The points of this type are most common in the Marpole phase, but begin much earlier. The earliest point of this type (Figure 10j) from a dated context is from Pender DeRt-2 from a level dated at 3720 ± 240 BP. A nearly identical point (Figure 17i) is from a disturbed context at the same site. There is only one point of this type from a Locarno Beach phase context, and it is from Georgeson Bay I that has a ^{14}C date of 2820 ± 100 BP (Haggerty and Sendey 1976:66, Fig. 8d). At Helen Point these barbed points are late and occur in levels above 40 cm making them younger than 1370 BP and near two dates of 1100 and 1120 BP. The four points from Dionisio Point date 1800–1500 BP (Grier 1999).

Discussion. The points with excurvate sides (Figure 10i-k) are the older variety and those with straight and incurvate sides (Figure 11) are more recent. The latter may be re-sharpened points. Flaring barbs is an attribute of Marpole phase harpoon points made of antler as well as an attribute of these flaked stone points from Marpole phase assemblages. Earlier bone and antler harpoon points usually have low enclosed barbs.

Type IVb Barbed with Straight to Expanding Stem. N = 10 (4 measured) **Figure 10l-n.** **Length:** 44 to 55 mm; **Width:** 22 to 44 mm. **W/L Ratio:** 0.44 to 0.88 mm.

Distribution. Cattle Point, English Camp, Poets Cove, and Helen Point.

Time Range. Marpole phase and probably Locarno Beach phase.

Discussion. Two of the points from Cattle Point (Figure 10m) are in all attributes except stem shape more similar to Type IVa and might have been better included in that sub-type. The expanding stem of three of the other points was formed

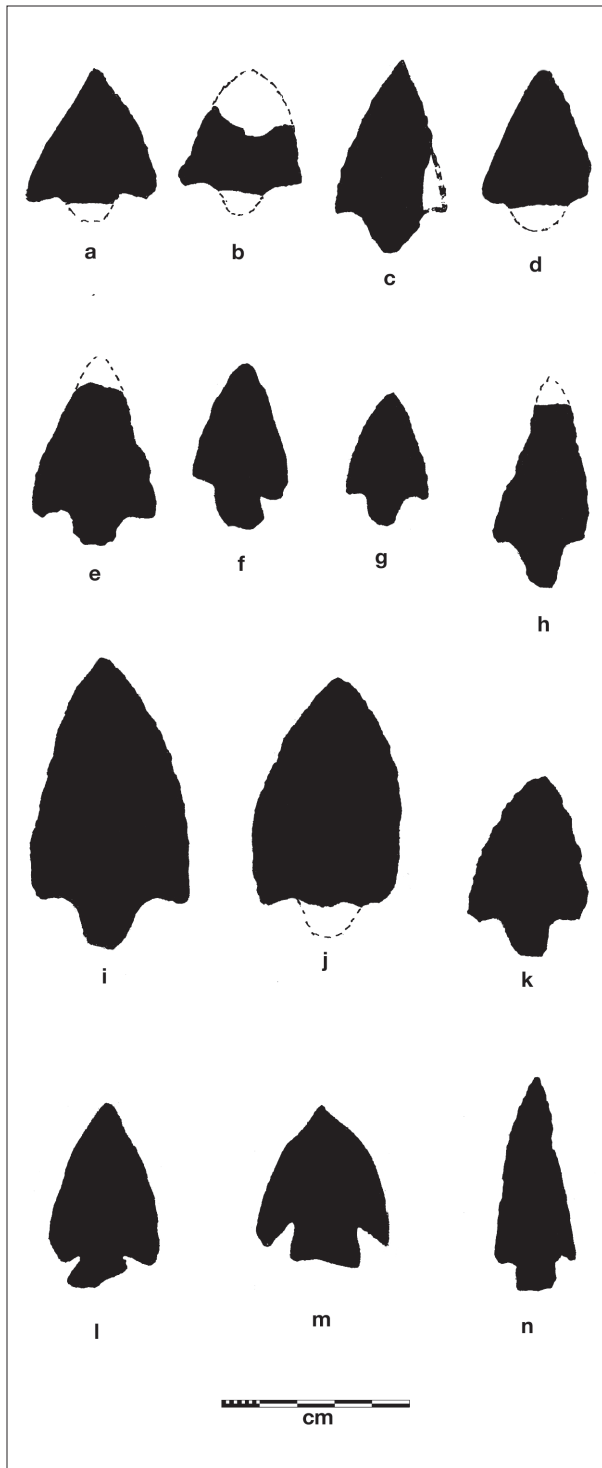


Figure 10. Type IVa points—stemmed and barbed with excurvate sides and contracting stem (a–k), and Type IVb—stemmed and barbed with straight to expanding stem (l–n). a, c, d, n: Helen Point. b: Georgeson Bay. e, g, l: English Camp. f, m: Cattle Point. h, k: Pender Canal DeRt-1. i, j: Pender Canal: DeRt-2. Half size.

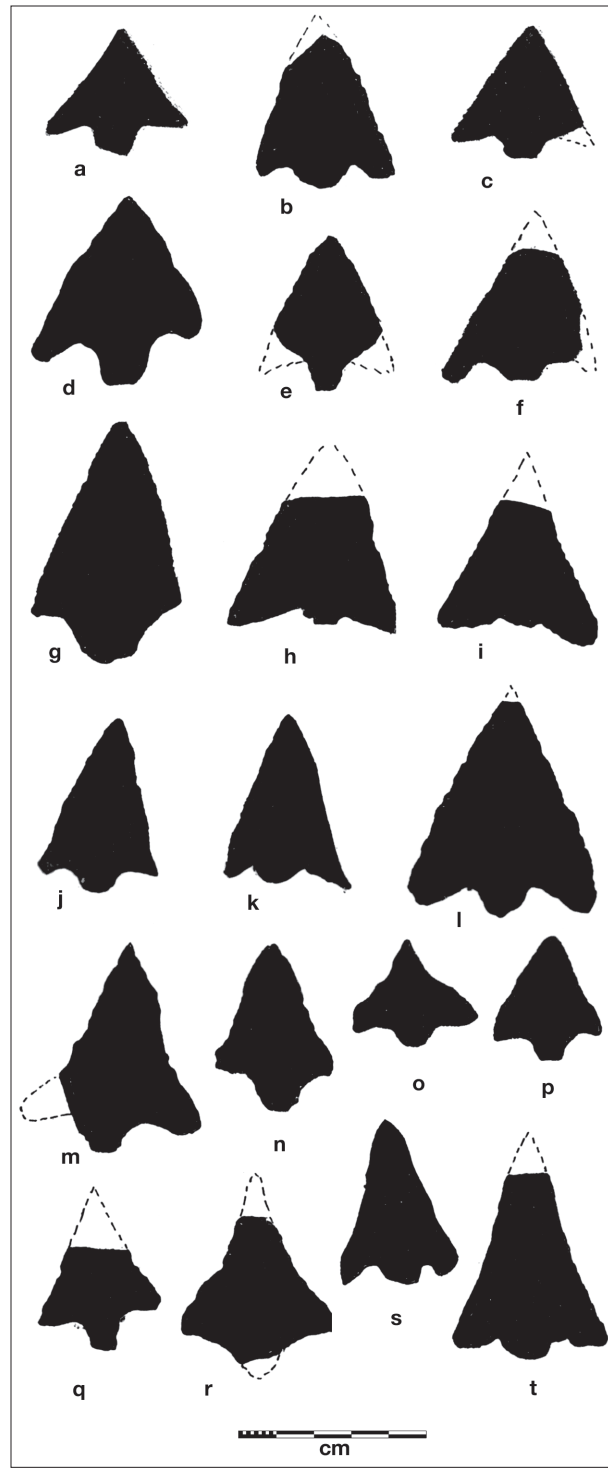


Figure 11. Type IVa points—stemmed and barbed with straight (a–l) or incurving (m–t) sides and contracting stem. a, b, c, f, l, n, p: English Camp. d, m, s: Cattle Point. e, q: Pender Canal DeRt-1. g: Lime Kiln. n, i, e, t: Helen Point. j: Argyle lagoon. k: False Narrows. r: Garrison. Half size.

by corner-notching. The one from Helen Point (Figure 10n) is made of chert and the one from English Camp (Figure 10l) is also of an exotic material (Stein 2000:55). These points are probably trade items from outside the region.

Type V Expanding Stem Points, Not Barbed

There are 32 points of this unbarbed type from ten sites (Table 1). They date to the Marpole phase, but are never the most common type in Marpole assemblages. They are sometimes described as side-notched.

N = 38 (27 measured) **Figure 12.** **Length:** 27 to 74 mm; 15 (56%) 43 to 56 mm; **Width:** 17 to 31 mm; 15 (56%) 22 to 25 mm; **W/L Ratio:** 0.32 to 0.78 mm; 16 (59%) 42 to 49 mm.

Distribution. Ten sites with ten of the 38 points from Cattle Point (See Table 1).

Time Range. These points are probably all Marpole phase, 2400 to 1600 BP, although the two points from Georgeson Bay I (Haggarty and Sendey 1976, Fig. 8a, b) indicate they may first appear in the Locarno Beach phase.

Discussion. Some examples of this type that appear to have been re-sharpened (Figure 12i–k) could be confused with younger side-notched arrow points, although they are of cruder manufacturer and thicker.

Type VI Triangular

Triangular points meaning those with straight rather than curved sides are most abundant late in the sequence. King (1950) first noted this trend in analyzing the Cattle Point material. Points (Type VIb) that are curved on one side and straight on the other seem to occupy much the same chronological position and have been grouped as a separate sub-type. Small corner or side-notched arrow points also have straight sides and are grouped as a further sub-type.

Type VIa Triangular, Un-barbed, Un-notched with Variable Base. **N = 217** (68 measured) **Figures 13, 14.** **Length:** 22 to 62 mm; 35 (51%) 34 to 42 mm; **Width:** 13 to 33 mm; 36 (52%) 19 to 23 mm; **W/L Ratio:** 0.32 to 0.88 mm; 38 (56%) 0.44 to 0.70 mm.

Distribution. Ten sites (See Table 1).

Time Range. Sixty-eight (31%) of the points of this type come from the English Camp site. In the 1950 excavations 46 (21%) of the 93 points are of this type (Carlson 1954:95). Sixteen came from the later excavations where Kornbacher (1992:171–175) reports eight (54.6%) of the projectile points in Ethnozone I, and four (66.7%) in Ethnozone II. These two ethnozones have very much the same range of dates that overlap from 1690 to 160 BP and suggest mixing of deposits of different time periods. The only other types present are contracting and expanding stem foliates (Types IIIa, V) present only in Ethnozone I (Kornbacher 1992, Table 3). At the Garrison site (Carlson 1954, 1960) nine (47%) of the 19 points are this type, and were found in all three stratigraphic units dating between 2100 and 1580 BP. At Helen Point 33 (89%) of the 37 points of this type from the 1968 SFU excavations occur in levels above 40 cm in deposits younger than 1370 BP with dates from 1120 to 649 BP. At Pender DeRt-2 this type is only found in the Late Midden deposit where the nearest radiocarbon date is 1450 ± 130 (RIDDL 270). At Dionisio Point one point dates 1800–1500 BP. Overall, this type dates to the Marpole phase and later.

Discussion. The use to which these bifaces were put is uncertain. A few of them are in the length and width range of arrow points and may have served that purpose, but most are broader than arrow points. Some are similar in size and shape to the ground slate points that served as end blades in composite harpoon heads, although none have been found in direct association with the hafting elements of such heads. Two (Figure 14n, o) may have been hafted as side-blades in a cutting or piercing implement.

Type VIb Leaf-triangular with one Straight and one Convex Side. **N = 39** (28 measured) **Figure 15.** **Length:** 24 to 65 mm; 14 (50%) 36 to 46 mm; **Width:** 17 to 35 mm; 16 (58%) 22 to 27 mm; **W/L Ratio:** 0.43 to 0.80 mm; 14 (50%) 0.55 to 0.70 mm;

Distribution. Eight sites (See Table 1)

Time Range. Late Marpole. At Helen Point these points are all above 40 cm in depth and should date younger than 1370 BP. There are two dates on these late levels 700 ± 110 and 640 ± 90 BP.

Discussion. These bifaces may have been hafted as side blades.

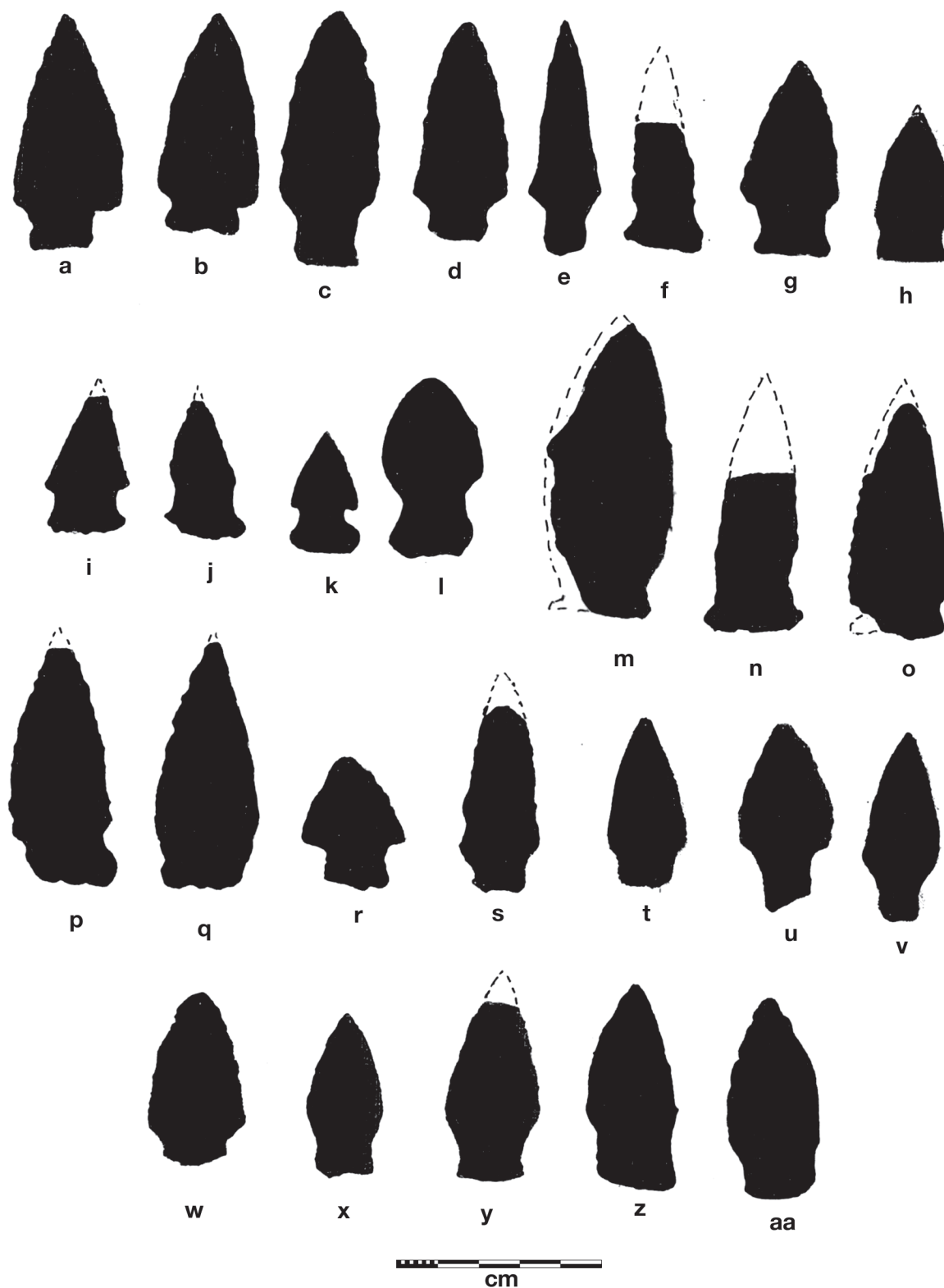


Figure 12. Type V points—straight to expanding stem points with foliate sides and occasional (re-sharpened?) incurvate or straight sides. a: Richardson. b, e, k, e, p, x, z: Cattle Point. c, d, g, j: Argyle Lagoon. f, i, n: Helen Point. h, o, t, u, v, y, aa: English Camp. m, r: Duke Point. q: Pender Canal DeRt 1. s, w: Georgeson Bay. Half size.

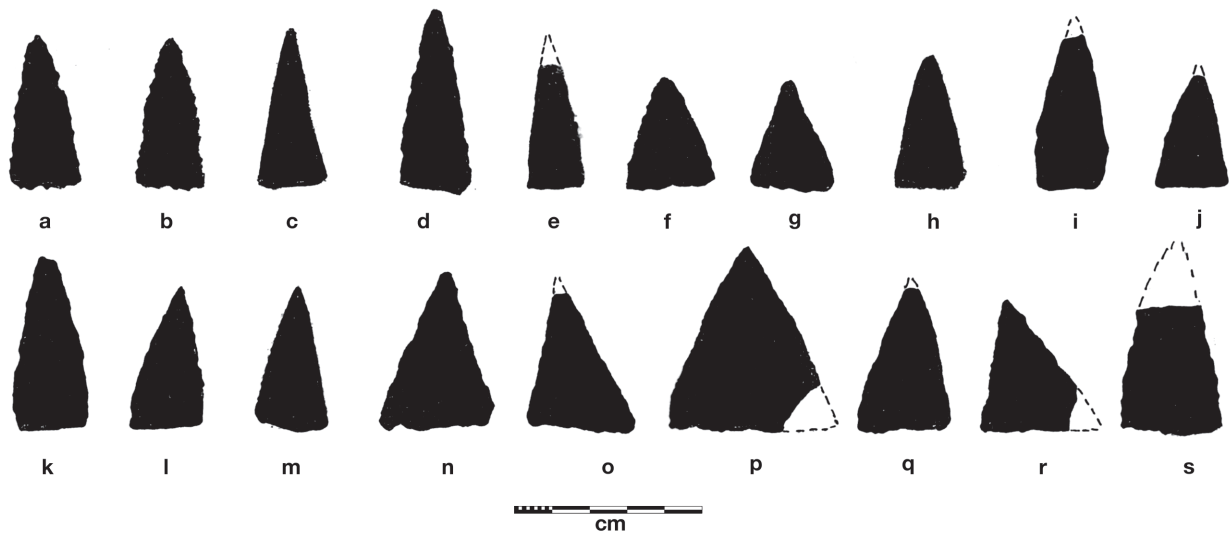


Figure 13. Type VIa points—plain triangular without stems, barbs, or notches, variable base. a, b, d, e, l, p, s: Helen Point. c, f, g, j, k, m, r: English Camp. h: False Narrows. i: Cattle Point. h, o, q: Garrison. Half size.

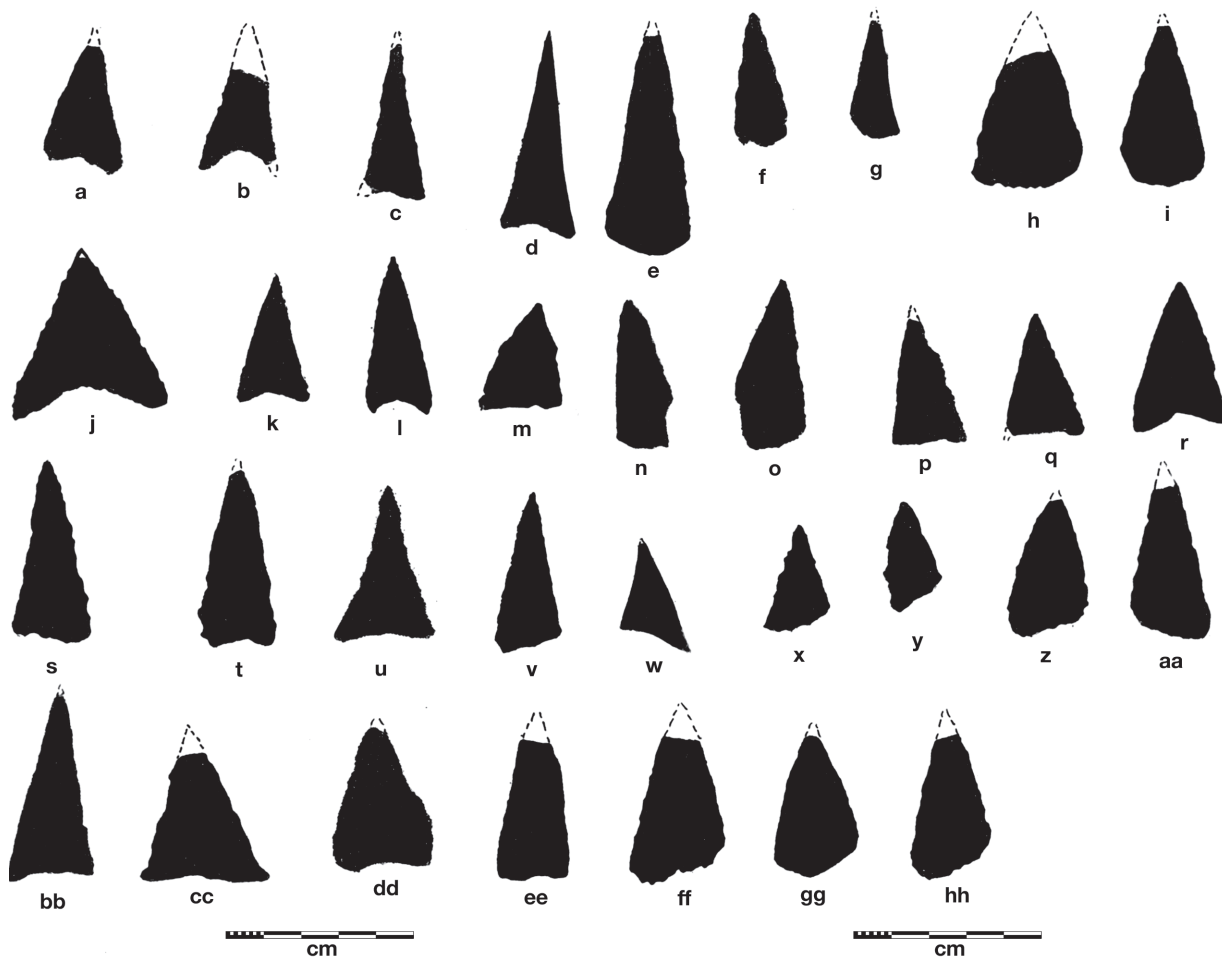


Figure 14. Type VIa points (cont'd). a, c, p: Montague Harbour. b, e, h, j, l, m, o, q, s, v, w, x, z, aa, ff, hh: Helen Point. d, g, k: False Narrows. f, y: Georgeson Bay. i, r: Garrison. n: Duke Point. t, cc: Cattle Point. u, bb, dd, ee, gg: English Camp. Half size.

Type VIc Small Notched Arrow Points. N = 15 (14 measured) **Figure 16.** **Length:** 25 to 51 mm; seven (50%) 31 to 34 mm; **Width:** 11 to 22 mm; 12 (86%) 15 to 20 mm; **W/L Ratio:** 0.33 to 0.61 mm; seven (50%) 0.47 to 0.55 mm;

Distribution. Six sites with one to three points each (See Table 1).

Time Range. These points are post-Marpole in age and date after 1400 BP. The closest site where they are well dated is Belcarra on the

lower Mainland with Belcarra II dated 1620 and 1070 BP (Charlton 1980) that may mark the time of the introduction of the bow and arrow. At Helen point the one example from the 1968 SFU excavations was found in the topmost level.

Discussion. One point (Figure 16a) lacking notches from the Old Beach at Cattle Point is shown with this type as it is probably an unfinished arrow point.

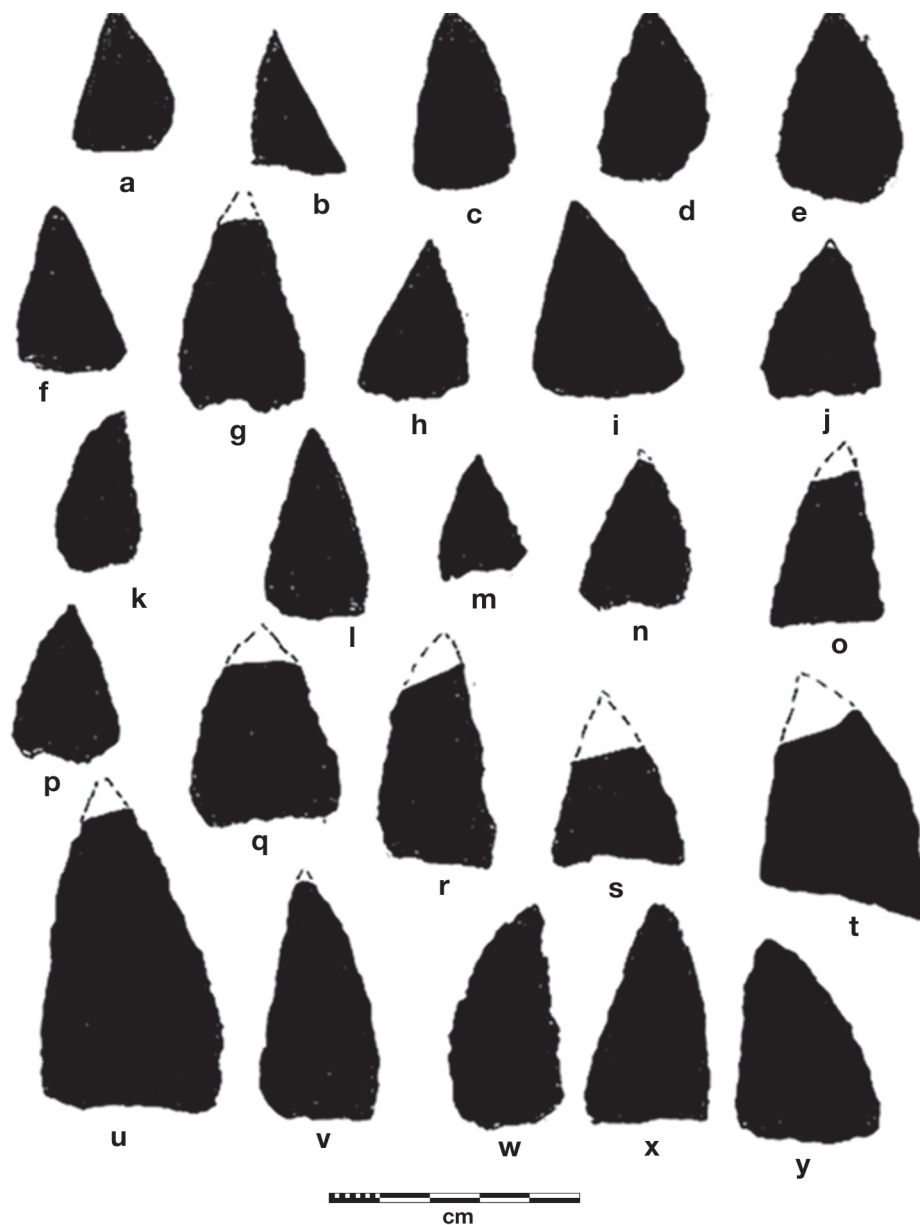


Figure 15. Type VIb—leaf-triangular without stems or notches. a, c, t, v: Garrison. b: False Narrows. d: Cattle Point. e, i, f, j, x, y: English Camp. g, h, m, q, r, u, w: Helen Point. k, l, n, p: Montague Harbour. g, o: Pender Canal DeRt-2. Half size.

Large Bifaces

Large bifaces (Figure 17) have been separated from other bifaces because their size indicates they were more likely used as daggers or knives than as tips for projectiles. Large bifaces are defined as those over 100 mm in length. They are few in number, but are known in southwest B.C. from as early as the Miliken phase (9000–8000 BP) in the Fraser Canyon where one large biface measures 175 mm in length (UBC collections). They occur in the same shapes as Type Ia (foliate with rounded base), Type II (diamond), and Type IIIa (foliate with contracting stem). Pronounced bilateral serration occurs on the edges of one large Marpole phase specimen. These large bifaces have not been included in the point counts.

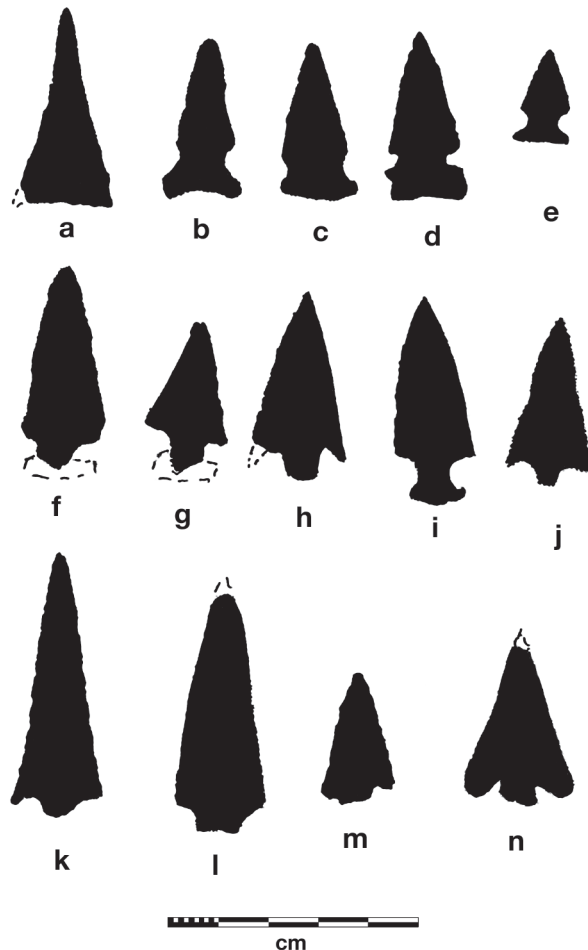


Figure 16. Type VIc points—**notched arrow points.** a, b, d: Cattle Point. c, g, m: Helen Point. e, f: Duke Point. h, i: False Narrows. j, n: English Camp. k, l: Pender Canal DeRt-2. Half size.

N = 12 **Figure 17.** **Length:** 109 to 228 mm. **Width:** 30 to 52 mm. **W/L Ratio:** 0.19 to 0.37 mm with six (67%) between 0.26 and 0.29 mm.

Distribution. Five sites: Pender (DeRt-2), Helen Point, False Narrows, DeStaffany, Montague Harbour (See Figure 1).

Time Range. Mayne through Marpole phases.

Site Summaries

The excavations from which this sample of 918 points was obtained are summarized in this section. Their locations are shown on the map in Figure 1, and the numbers of points from each site are listed in Table 1. Sites from which no chipped stone points were recovered have not been included. All of the sites except DeStaffany incorporate shell middens although four of the sites—the bluff areas of Cattle Point, Argyle Lagoon, Dionisio Point and Helen Point—have extensive basal cultural deposits that lack shell. The non-shell deposits in these sites are best understood as higher elevation landward remnants of sites that may once have had associated shell midden deposits at their beachward edges that were destroyed by rising sea levels. With the stabilization of sea levels and formation of new beaches, humans would then have deposited shell midden debris on top of the older site remnant.

Helen Point (DfRu-8)

This site fronting Active Pass on Mayne Island was first tested in 1966 by Jon Hall (1968) of the University of Victoria (UVic), then again in 1968 by John Sendey for the British Columbia Provincial Museum (BCPM) (McMurdo 1974), and also in 1968 by the Simon Fraser University (SFU) Archaeological Field School directed by Roy Carlson (1970). The points from the latter excavation were used in a chronological chart of point types of the Lower Fraser and Gulf Islands (Carlson 1983, Fig. 1:7). At 5420 ± 230 BP this site has the earliest beginning date of all the sites in the study area and the largest number of points. The Mayne phase deposits, that contain most of the points and thousands of pieces of cores and other debitage, are associated with the burial area of the site at this period, and it is probable that the makers of these points were buried there. It is also probable that these individuals were specialists in the manufacture of flaked stone artifacts and that this



Figure 17. Large bifaces classified as daggers. a, e, f, g: Helen Point (DfRu-8). b, c, d: Pender Canal (DeRt-2). a, b, e: Marpole phase. c, d, f, g: Mayne phase.

site served as a distribution point from which these artifacts were traded to the surrounding region. The site has components of all four cultural phases found in this locality—Mayne, Locarno Beach, Marpole, and San Juan—although the Locarno Beach phase is barely represented in the 1968 SFU excavations that produced the vast majority of the chipped stone points from the site (Carlson 1970).

The stratigraphy (Figure 18) at the SFU excavated part of the site is complex and consists of a lowermost black matrix lacking shell dating between 5420

and 3690 BP containing Mayne phase cultural material including five burials, succeeded by a Marpole phase deposit with varying amounts of shell, followed by a shallow San Juan phase deposit with abundant shell. One hundred and ninety-six projectile points came from this excavation. Whereas the lower half of the deposit, 90 to 150 cm below the surface, was relatively intact, the upper portion contained mixed assemblages of both older and younger materials caused by the excavation of pits and depressions in the older deposits by the aboriginal inhabitants. The

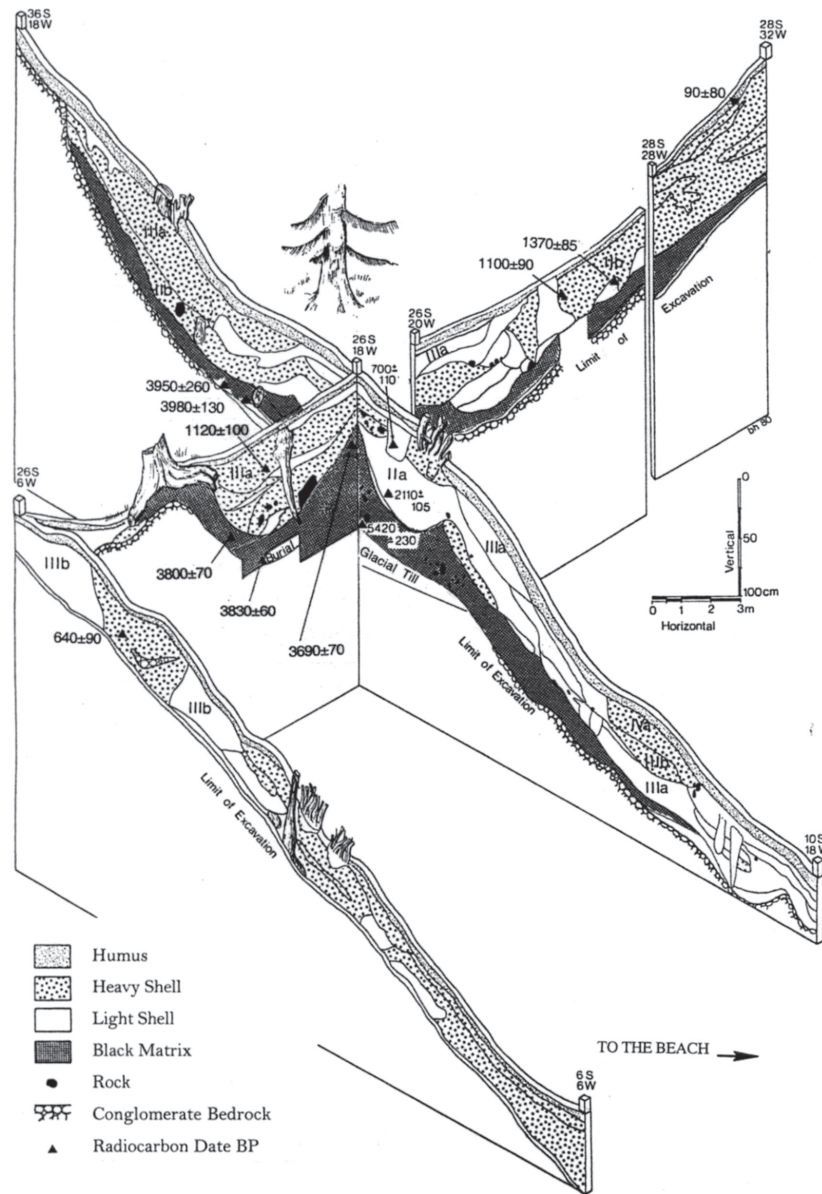


Figure 18. Stratigraphy at the Helen Point site (DfRu-8), the 1968 SFU excavations. Note that the vertical scale is double the horizontal scale.

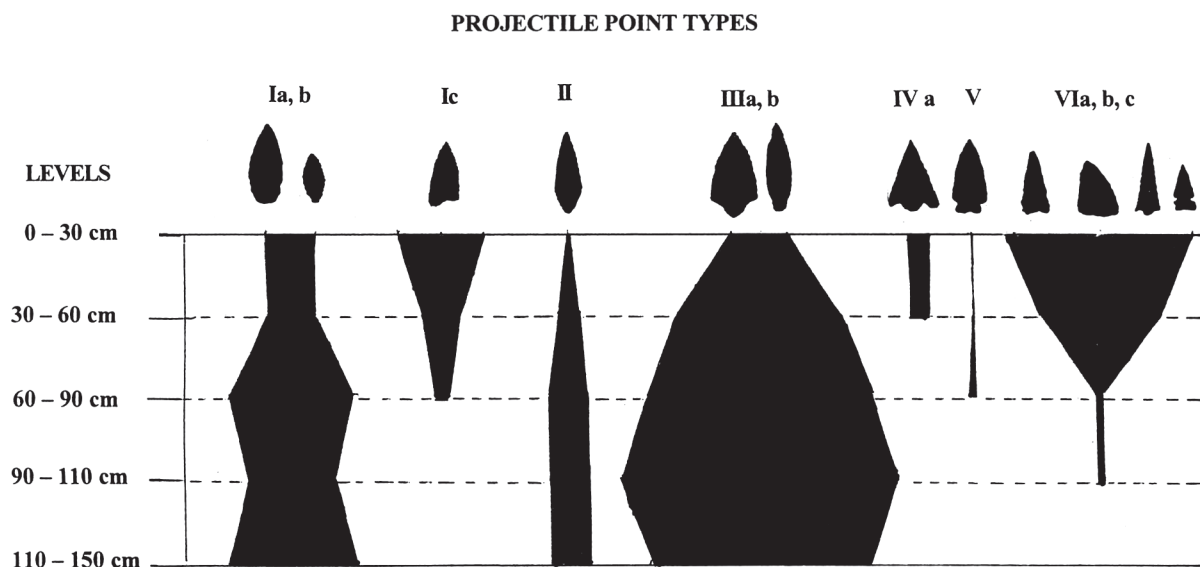


Figure 19. Battleship diagram of the 196 projectile points from the 1968 SFU excavations at Helen Point.

battleship diagram (Figure 19) showing the relative frequency of point types by depth without reference to stratification illustrates this mixing; the early types (Ia, Ib, II, III) continued to be found in upper levels although in diminished frequencies relative to the more recent types (Ic, IV, VI).

English Camp (45-SJ-24)

This site at the northern end of San Juan Island is sometimes known as British Camp and was initially tested by the University of Washington (UW) Field School in 1950 under the direction of A.E. Treganza. Although I participated in the excavation and wrote a description of the artifacts recovered (Carlson 1954), neither the site map and profiles, nor the field notes and catalog were available to me at that time. Further excavations were undertaken by the UW Field School from 1983 to 1989 directed by Julie Stein (1992) that produced 20 ¹⁴C dates ranging from 1500 to 600 BP. Kornbacker (1992) analyzed the projectile points from this excavation. Stein (2000) mentions additional work at the site and illustrates additional projectile points. Both Marpole and post-Marpole components are present.

Cattle Point (45-SJ-1)

This site at the southern end of San Juan Island was excavated by the UW Field School directed

by Arden King (1950) during 1946-47, and by Carroll Burroughs in 1948 (Carlson 1954, 1960). There are four horizontal divisions of this large site (King 1950, Fig. 1)—west bluff, east bluff, rock spur and old beach. Radiocarbon dates on the two bluff areas were obtained later (Robinson and Thompson 1981) on shell samples taken from level bags. These dates, corrected for the marine reservoir effect, plus the artifact types present indicate that the deposits date no earlier than the Locarno Beach phase. The east bluff has the oldest deposits and these overlap in time with those of the west bluff. The bluff and rock spur deposits in general cover the period from about 3000 to 1500 BP and are mostly Marpole phase. The deposits on the old beach are younger and probably cover the period from about 800 BP into the historic period.

Pender Canal (DeRt-1 and DeRt-2)

These two sites, sometimes referred to as the Canal Site, are situated at the south end of North Pender Island, and were partly destroyed by a ship canal dug between North and South Pender in 1911. DeRt-2 was first tested by Wilson Duff and Michael Kew in 1958 for the British Columbia Provincial Museum (BCPM), and DeRt-1 by John McMurdo for SFU in 1971. Later both sites were extensively excavated during 1984-86 by a joint salvage project between the provincial government Heritage Conservation

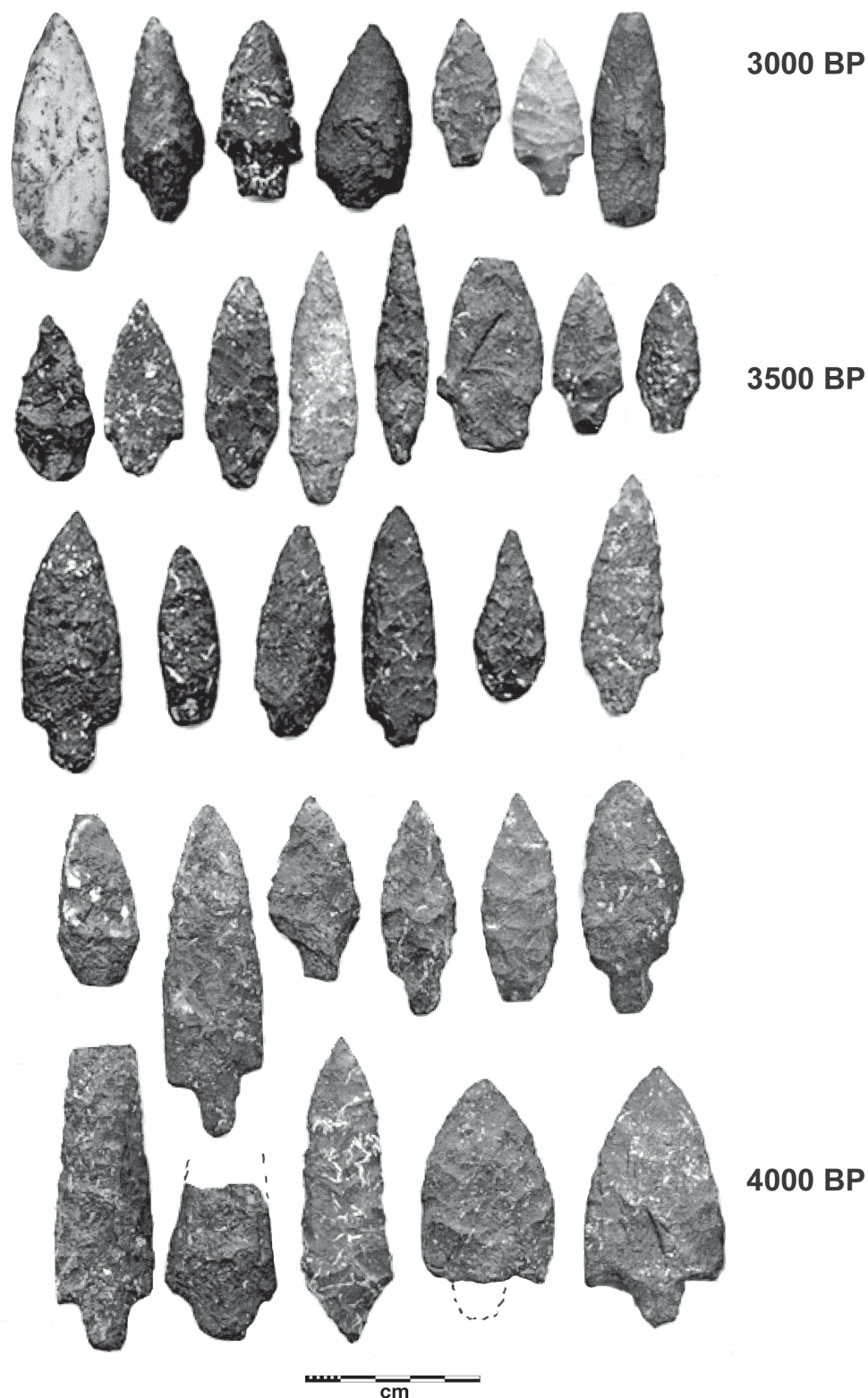


Figure 20. Sequence of projectile points from the main midden deposit at the Pender Canal site (DeRt-2) dated 4000 to 3000 BP. The eight points in the second row from the top were associated with Burial 84-46 radiocarbon dated at 3570 ± 140 BP. The point in the bottom row at the right end was found out of context but is nearly identical to the point next to it found *in situ* near the base of the deposit.

Branch and the SFU Department of Archaeology directed by Roy Carlson (Carlson and Hobler 1993). DeRt-2 is primarily a burial site, is the older of the two with Mayne and Locarno Beach components that date between 5200 and 2500 BP, and a smattering of younger remains sometimes mixed with the older material in the Late Midden deposit, whereas DeRt-1 is a camp site with occupation spanning the Locarno Beach, Marpole and San Juan phases from 2400 BP to late precontact. Some of the projectile points from Pender DeRt-2 are illustrated in Figure 20.

False Narrows (DgRw-4)

This site (Burley 1988) is situated on the southwest shore of Gabriola Island and was excavated in 1966-67 by a BCPM field crew under the direction of John Sendey. The site contains four components of which the earliest belongs to the Marpole phase and immediately predates the single radiocarbon date of 1710 ± 90 BP.

Poets Cove (DeRt-4)

This site is situated on Bedwell Harbour on South Pender Island, and was investigated by I.R. Wilson Consultants (2006) between 2002 and 2005. The objective was to salvage as much information as possible by screening about 2500 m³ of cultural deposits that had already been completely disturbed and left as three large piles of midden debris. Radiocarbon dates range from 600 ± 80 BP to 2920 ± 15 to 4030 ± 70 BP.

Montague Harbour (DfRu-13)

The main excavation at this site on Galiano Island was undertaken by Donald Mitchell (1971), and later work in the underwater section by Norman Easton (1985) of the University of Victoria. The earliest component at the site is the Locarno Beach phase with the earliest date at 2360 ± 160 BP.

Duke Point (DgRx-5)

This site is on the east coast of Vancouver Island near the False Narrows site, and was excavated by a field crew under the direction of Neal Crozier in 1978 (Murray 1982). The site contains three components

of which the earliest is probably Mayne phase. Recent redating gives an initial date of 4700 BP with later dates falling in the Marpole phase (Deo et al. 2004).

Argyle Lagoon (45-SJ-2)

This large site was tested by the UW Field School in 1951 under the direction of Carroll Burroughs (Carlson 1954, 1960). The excavation consisted of a series of disconnected test pits that revealed an upper shell midden and a lower cultural layer lacking shell. Smith (1907:383) noted that this site was 300 meters long by 60 meters wide. Gary Wessen (2005) conducted further excavations at what is probably another part of this same site although numbered 45-SJ-407. Wessen obtained three radiocarbon dates but these seem to date a later occupation since none of the artifact types from the previous excavations were found in his tests.

Georgeson Bay (DfRu-24)

This site is situated on the southern end of Galiano Island directly across Active Pass from the Helen Point site. It was excavated in 1968 by John Sendey (Haggarty and Sendey 1976) for the BCPM. Two components were identified, a Locarno Beach phase component dated at 2820 ± 100 BP and a late Marpole/Gulf of Georgia component dated at 750 ± 90 BP.

DeStaffany (45-SJ-414)

This site, situated on a rocky knoll well above the shoreline on the southwest side of San Juan Island, is a buried concentration of flaked stone debitage with a few formed tools including 45 mostly fragmentary bifaces, and was excavated by Stephen Kenady in 1972 (Kenady, Mierendorf, and Schalk 2002). There are two radiocarbon dates of 3750 ± 50 and 4750 ± 60 BP on soil residues scraped from artifacts (Kenady et al. 2002:9). This site is not a shell midden. Although the authors suggest that the assemblage may be early Holocene and these dates on humus too young, the lanceolate (IIIb), foliate (Ia), and stemmed (IIIa) points found are of types that date about 5000-3500 BP at Pender Canal and Helen Point that suggests that the dates are correct.

Bliss Landing (EaSe-2)

This site is not actually in the islands but on the mainland at the northern end of the Strait of Georgia. It was tested by Owen Beattie (1972) as part of the SFU Salvage '71 project and has two components—a Mayne phase component with one ^{14}C date of 4000 ± 60 BP (SFU 649) and a late component of the Gulf of Georgia pattern. Three classifiable projectile points including one of quartz crystal were associated with the Mayne phase component.

Long Harbour (DfRu-44)

This site was excavated by David Johnstone (1991) as part of thesis research at SFU. The site yielded only four points, two unclassifiable, and two from Marpole phase deposits.

Garrison (45-SJ-25), Lime Kiln (45-SJ-99), and Moore (45-SJ-5)

These sites are on San Juan Island, and were tested by the UW Field School under the direction of Carroll Burroughs in 1949 and 1951 (Carlson 1954, 1960). The Garrison site has three very similar assemblages and two radiocarbon dates, 1580 ± 60 and 2100 ± 100 BP, that place them in the Marpole phase. The other two sites yielded minimal amounts of chipped stone and belong in the post-1500 BP San Juan phase.

Richardson (45-SJ-185)

This site on Lopez Island was tested by two UW students, William Liston and Malcolm Forbes, in 1949 (Carlson 1954, 1960). The artifact inventory indicates that the site belongs in the Marpole phase.

Dionisio Point (DgRv-3)

This site on the north end of Galiano Island, tested by Donald Mitchell (1971), has an early undated component, that lacks shellfish remains, and two younger components. There are three crude points from Dionisio Point II that Mitchell dates at 1200–1400 BP. There are twelve points (Figure 21) from House 2 at Dionisio Point dated 1800–1500 BP (Grier 1999).

Gabriola Island (DgRw-199)

This site is one of several burial sites on Gabriola Island excavated by Joanne Curtin (2002) in the 1980s. It has only two projectile points and these belong to the Marpole phase component.

Fossil Bay (45-SJ-105)

This site was excavated by Robert Kidd (1969). A Marpole phase component and a San Juan phase component were identified with a ^{14}C date of 1514 ± 40 BP presumably dating the San Juan phase component, although it actually falls toward the end of the Marpole time range.

Reid Harbor (45-SJ-84)

Reid Harbor is on Stuart Island and was tested in 1977 by Jerry Bailey (1978). Although one foliate point and no diagnostic artifacts were recovered, nothing inconsistent with the time placement as indicated by the two ^{14}C dates of 2570 ± 140 and 2785 ± 128 BP was found.

Chronology and Conclusions

Arden King (1950) was the first to propose a cultural chronology for this sub-region based on his Cattle Point excavations. I published (Carlson 1960) an alternative scheme based on comparisons with Carl Borden's Fraser Delta sequence, and defined two phases, the Marpole phase and the succeeding San Juan phase while leaving some components such as the Argyle Lagoon assemblage floating in time without phase assignment. The reasons for not using King's phase sequence were that his model, based on the assumption that there was an evolution from a land hunting subsistence base to a fully maritime one, seemed unlikely during the time span indicated, and more importantly, I suspected that his cross-correlation of the different layers in his many disconnected excavation units on the basis of presence/absence and condition of the shellfish remains was highly questionable. The radiocarbon dates obtained much later (Robinson and Thompson 1980) confirmed my doubts.

In 1970 I proposed the Mayne phase as the antecedent to Locarno Beach based on the excavations at Helen Point (Carlson 1970). The term "Charles

phase” or “Charles pattern” has sometimes been used since to group the local components of the Mayne, St. Mungo, and Eayem phases into a geographically wider cultural pattern. It is actually the similarity in the projectile points that is the main artifactual basis for this pattern. Some researchers refer to these phases as “culture types” when in fact that term is better reserved for cultures that are significantly different. In spite of some differences in technology and socio-cultural complexity all of these phases represent the same type of hunting/fishing/gathering culture that continued to exist here until the historic period. Significant socio-cultural complexity indicated by the use of masks and labrets is already present in the late Mayne phase and continues into the succeeding

Locarno Beach and Marpole phases with some diminution in post-Marpole times (Carlson 2005, 2007).

Although I first introduced the Willey and Phillips (1958) phase system to the archaeology of this region (Carlson 1960), and Charles Borden agreed to use it for the Fraser Delta, there are problems with it. These problems stem from the nature of the settlement pattern. The ethnographic settlement pattern of small numbers of winter villages coupled with many hundreds of seasonal resource processing and extraction sites (Suttles 1951) produces varied artifact assemblages that belong to the same culture at the same time period and should not be construed as different cultural phases or complexes (Carlson 1954:10). Large village sites tend to have been oc-

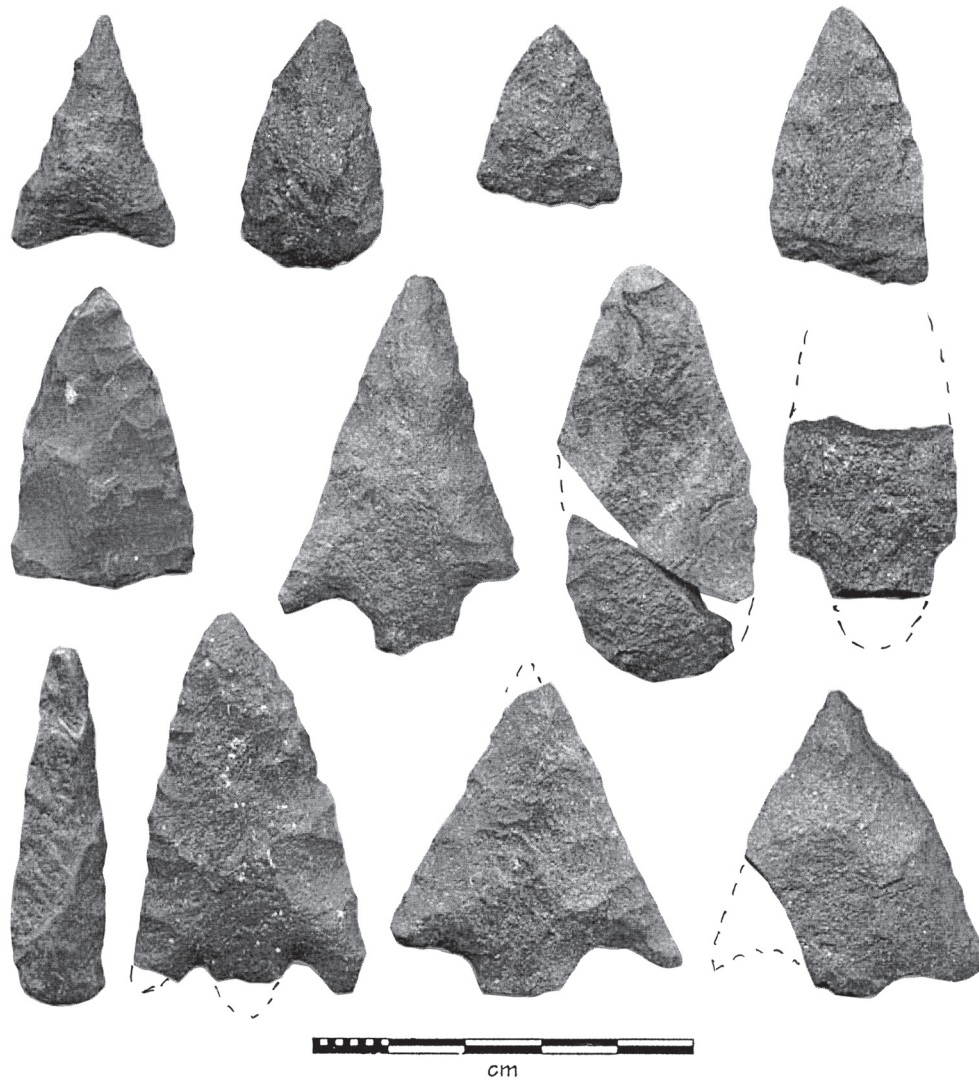


Figure 21. Projectile points from Marpole phase House 2 at Dionisio Point dated 1800–1500 BP. Photo courtesy Colin Grier.

cupied for very long periods of time and discrete occupations are difficult to sort out. Another problem in making chronological sense is the amount of sampling at each site. Those sites with multi-year excavations that have the largest samples of data are Helen Point, Cattle Point, English Camp, and Pender Canal DeRt-1 and -2. Radiocarbon dating helps with the chronological problem, but by no means solves it. There are 147 radiocarbon dates from 16 sites in this region. These dates are graphed in Figures 22 and 23. What is clear from the radiocarbon chronology is that many of the same sites were used either continuously or sporadically over long periods of time.

With the preceding problems in mind it is still possible to construct a model of the sequential development of projectile points in this region (Figure 24). This sequence begins with a set of foliate, diamond, and contracting stem forms (Types Ia, Ib, II, IIIa, IIIb) that persists from about 5000 to 4000 BP to which are added barbed forms (Type IV) in the next 500 year period. At about 2500 BP points with a contracting stem begin to be replaced by unstemmed triangular (Type VIa) and foliate (Type Ic) forms with straight, irregular, or concave bases. Points with an expanding stem (Type V) appear about this same time possibly as a result of external influences. Triangular forms without stems increase in frequency from 2500 BP until about 1000 BP at which time flaked stone points almost disappear and are replaced by arrow points of bone. A few chipped stone arrow points with

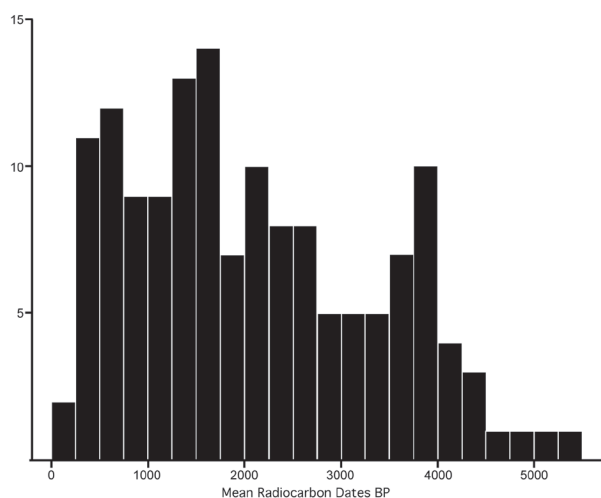


Figure 22. Frequency of radiocarbon dates for the Gulf and San Juan Islands graphed at 250 year intervals.

notches for hafting (Type VIc) are found, but many are of exotic raw materials and perhaps all of them originated outside this region. At the Sequim site on the Olympic Peninsula (Morgan 1999, Figs. 7:1 and 13:6) Component I, which is undated by ^{14}C , contains the same types of points as the 5000 to 4000 BP period in the islands, and Component II dated by ^{14}C at 2540 BP and later contains many stemmed and barbed forms as do Marpole phase assemblages of the same time period.

The time of the greatest variety in projectile point form is the period of the Marpole phase centered about 2000 years ago. This situation seems to be the same for the Lower Fraser at least at the Port Hammond site where Rousseau (2003, Figs. 8:3–8:5) with ^{14}C dates between 2000 and 1500 BP illustrates the same wide variety of point forms.

Although the typology is based on form, the more interesting question is what were these points used for? It might have been better to call all of them bifaces rather than points since some may well have served as knives or multi-purpose cutting implements, although the formal attributes of the vast majority do indicate their primary use as end blades for piercing implements—darts, spears, harpoons, or arrows—and as such are properly referred to as points. Other than the small side and corner notched points used for arrows, most other types of chipped bifaces had gone out of use in this region long before the historic period and as such have no local ethnographic analogs. These points were obviously used in subsistence pursuits, but what kind of subsistence? Faunal analyses (Hansen 1991, 1995) indicate that fish were the number one subsistence item in this watery region, and the isotopic analyses of human bones (Chisholm 1986) indicate that 80 to 100% of the protein in the human diet was obtained from marine resources as far back in time as there is evidence, about 5000 radiocarbon years. It is unlikely that any of the points were parts of fishing equipment.

The structure of the base and the average widths of these points (see type descriptions) give some clues to the size of the shaft or foreshaft to which they were hafted, but since no actual shafts or foreshafts have been recovered it is probable that the haft was made of wood. Many of these points were probably hafted as end blades in atlatl darts used for both sea and land mammal hunting and for warfare. A wooden atlatl dating to 1700 ± 100 BP (Fladmark et al. 1987) was found nearby at the mouth of

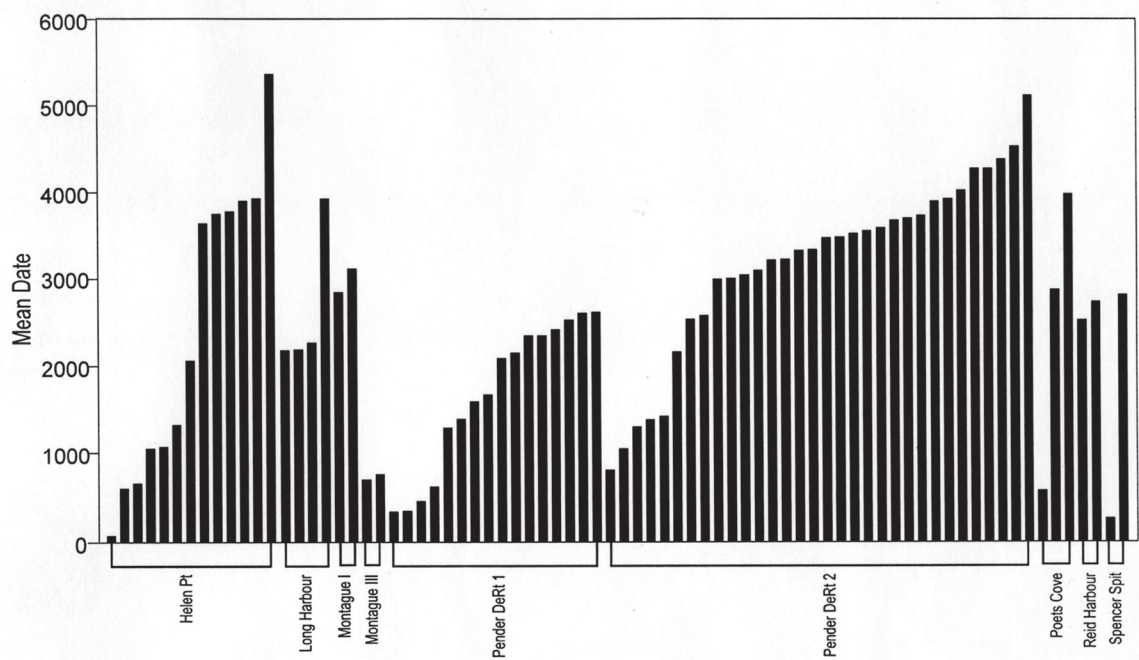
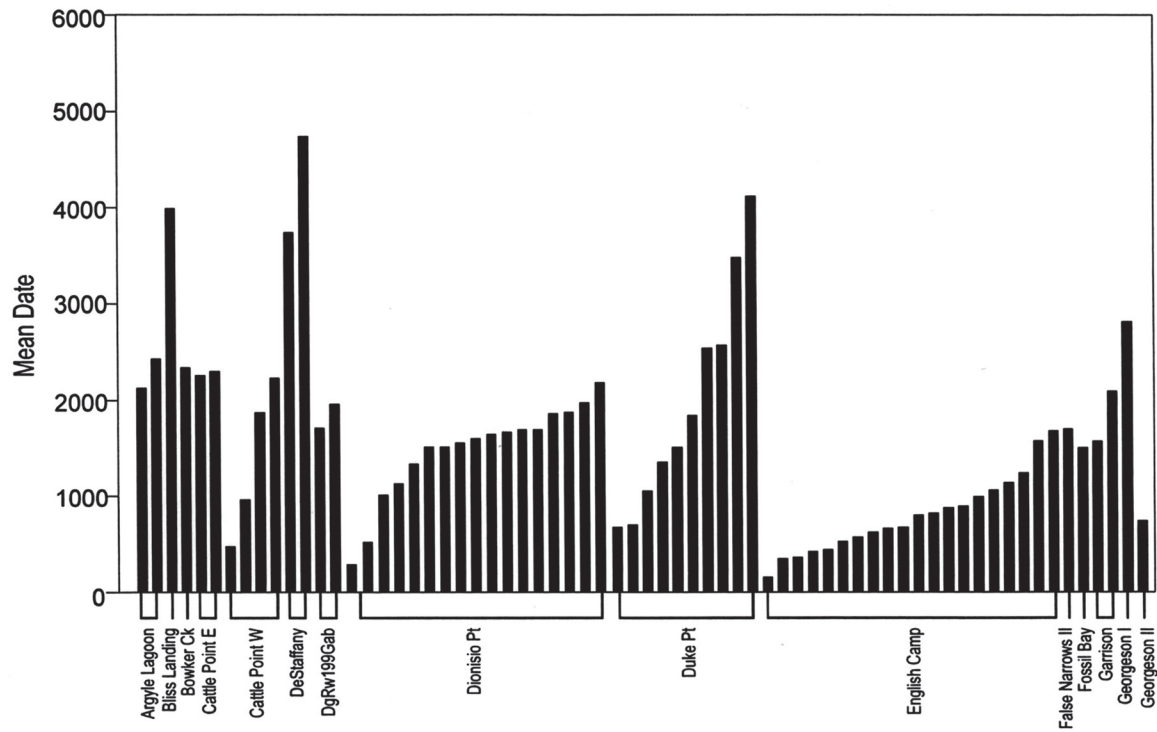


Figure 23. Radiocarbon dates for the Gulf and San Juan Islands by site.

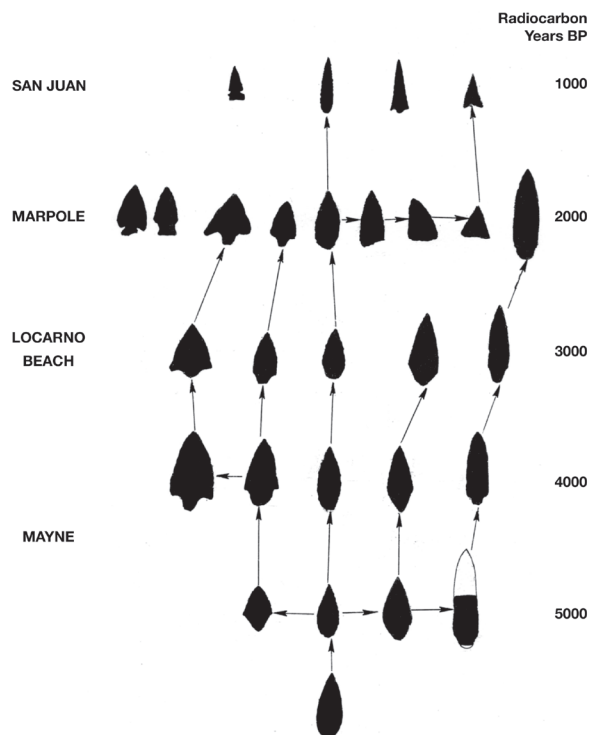


Figure 24. Diagram showing sequential development of projectile point types in the Gulf and San Juan Islands from 5000 BP.

the Skagit River, but evidence for the atlatl in the islands is limited to several bone atlatl hooks from Pender DeRt-2 dating 4000 to 3000 BP. In the Arctic the atlatl is an effective weapon for sea mammal hunting, and in a number of other environments such as the Australian desert for land hunting. Heavily forested coastal environments would not be ideal for effective use of this weapon so perhaps it was used mostly for sea mammals on the Northwest Coast, although there are tidelands and some open prairies. The direct association of porpoise bones with both a leaf-shaped point (Type Ia) and a large stemmed point (Type IIIa) in a hearth dated at 6050 ± 40 BP at the Saltery Bay site (Pegg et al. 2007:38) suggests these points were used for sea hunting, although other artifacts obviously not used for this purpose were also associated.

Changes in projectile point forms are theoretically linked to improvements in existing weapons systems, to the development of new weapons systems, and to changes in style. Such changes can be generated either internally or by external influences. It is reasonably clear that the early use of simple leaf-shaped

points is followed by the development of points with stems and shoulders. This change to stemmed and shouldered forms is so widespread in North America that it clearly represents a more effective method of hafting. Diamond-shaped points, that are never the most common form at any time period, may be the transitional form in the Gulf-San Juan region. The next innovation to appear is barbing—extending the lower corners of the base downwards and indenting the base to form barbs. At some time during the Mayne phase barbs (Type IV) are added to the basal edges of points, but this attribute does not become common until the much later Marpole phase and is not the dominant type in any assemblage. With this attribute the projectile point has more holding power than earlier forms and is less easily dislodged by the prey animal. This innovation may well have been simply an internally generated improvement in an existing weapons system, although barbed points are widespread much earlier in the continental interior and influences from there cannot be ruled out. The shift to triangular blade forms and away from shoulders and stems seems to begin about 2500 BP with the shift from the Locarno Beach to the Marpole phase. New forms with expanding stems formed by either side notching or corner notching also make their appearance. These points lack local prototypes and may be either trade items from the mainland or inspired by such, or both. Two of these points are of chert or chalcedony and were probably not made locally. The final shift to small triangular points with corner or side notches is again so widespread in North America that it rather clearly represents either the introduction of the bow and arrow or a particular kind of bow and arrow.

The final change was the disappearance of flaked stone points altogether except for probable trade items, and their replacement by points of bone, shell, or ground slate that formed the arming tips of the weapons of the late prehistoric and ethnographic periods. Hayden (1989) attributes much of the world-wide shift from flaking to grinding as a response to the need to conserve raw materials, and this factor may have been operative here. Grinding and polishing of large projectile points of slate and antler are present at least as far back in time as the Mayne phase (Carlson 1970), but do not become the primary techniques for making projectile heads until the post-Marpole period. This shift away from a preponderance of tools made by flaking stone to

a preponderance of tools made by grinding and polishing bone, shell, and in some localities slate, occurs throughout the Northwest Coast and takes place later in the Gulf and San Juan Islands than in regions to the north and west.

In general, the sequence of projectile point forms in the Gulf and San Juan Islands is more indicative of cultural and ethnic continuity than of anything else, at least from the earliest dates of about 5000 BP to the time of the appearance of small triangular arrow points about 1500 BP. The actual effect of the adoption of this new technology on warfare and subsistence has never been modeled for this region and awaits future research. In spite of this change there are other indicators of continuity, and the four phases—Mayne, Locarno Beach, Marpole, San Juan—are clearly a cultural tradition ancestral to the Coast Salish peoples who occupied this region at the time of European contact and whose descendants continue to reside here.

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