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2011

Canadian Zooarchaeology / Zooarchéologie canadienne

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Original citation:

Willerton, I. M., & Stewart, K. M. (2011). Subsistence at Si•čə'nəł: The Willows Beach site and the culture history of southeastern Vancouver Island. *Canadian Zooarchaeology*, 27, 3–22.

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Subsistence at *Si•čə'nət*: The Willows Beach Site and the Culture History of Southeastern Vancouver Island

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ABSTRACT

Archaeological excavations at the Willows Beach site (DcRt-10) on southeastern Vancouver Island have revealed the presence of two distinct culture types – characteristic artifact assemblages generally associated with particular time periods – during the site's 2630–270 BP occupation. Following Croes's theory that culture type change reflects subsistence intensification, Willows Beach faunal assemblages are examined for evidence of change over time. Analysis of faunal remains from dated, stratified units associated with the two culture types suggests that at least some subsistence change occurs commensurate with changes in subsistence artifacts and culture type. Reference is also made to faunal changes at the nearby Esquimalt Lagoon and Maplebank sites. Greater sample sizes are needed to further support this association.

RÉSUMÉ

Les investigations archaéologiques du site Willows Beach (DcRt-10) dans le sud-est de l'Île Vancouver sont démontré la présence de deux *culture types* – des associations caractéristiques des objets généralement liés avec des périodes particulières – distinctes dans l'occupation de ce site entre 2,630–270 BP. Après la théorie de Croes que les changements des *culture types* reflètent l'intensification de la subsistance, des collections fauniques de Willows Beach sont examinées pour vérifier s'il y a des changements temporels. L'analyse des restes fauniques provenant des niveaux des dates connus associés avec les deux *culture types* indique que le changement des culture types à Willows Beach est le résultat d'un changement de la subsistance. La référence est également faite aux sites Esquimalt Lagoon et Maplebank. Des échantillons plus larges sont nécessaires pour soutenir cette association.

The Gulf of Georgia region of the Pacific Northwest has received considerable archaeological attention, much of it focused on the lower Fraser River Delta. Sites there contain evidence of remarkable art and architecture and complex technology for the procurement of sea mammals and diverse fish taxa, including the large annual runs of salmon (e.g., Matson 1981; Matson and Coupland 1995). Less attention has been paid to the archaeology of southern Vancouver Island, which was seen as slower to adopt newer technologies (Mitchell 1971, 1990). However, recent studies are now suggesting that the latter may have undergone a different cultural trajectory from the Fraser Delta region, indicating that further study is warranted (Clark 2000, 2010).

The prehistory of the Gulf of Georgia region has been divided into distinctive, temporally diagnostic artifact assemblages known as culture types, yet the exact significance of changes in these assemblages, particularly in southern Vancouver Island, is not clear. A closer examination of the correlation between changes in faunal assemblages and the artifact-based culture types may shed light on subsistence and technology in this region (see also Willerton 2009). In this paper we examine variation in faunal and artifact-based assemblages from the Willows Beach site (Borden designation DcRt-10), a large stratified shell midden located within Songhees traditional territory in the city of Victoria on southern Vancouver Island (Figure 1).

Willows Beach is located at the southeastern tip of Vancouver Island near the confluence of the Straits of Georgia and Juan de Fuca, a small area distinguished from the greater Gulf of Georgia by a climate milder and drier than that of the surrounding region (Burley 1980; Lepofsky et al. 2005; Suttles 1974, 1990). The Willows Beach site was occupied until 1843 (Suttles 1974, 1990), and its inhabitants had access to abundant natural resources. Located in a low, flat area bounded to the north by the rocky bluff of Cattle Point and to the south by Bowker Creek, which is a source of fresh water, the site faced several small offshore islands. These were frequented by seabirds and would have had open meadows suitable for hunting and gathering on their landward side (Kenny 1974). The terrestrial ecosystems were dominated by Douglas fir (*Pseudotsuga menziesii*), arbutus (*Arbutus menziesii*) and Garry oak (*Quercus garryana*) with a significant amount of semi-open meadow land (Burley 1980; Lepofsky et al. 2005; Mathews 2006; Mitchell 1971; Suttles 1974, 1990).

Black-tailed deer (*Odocoileus hemionus columbianus*) and elk (*Cervus elaphus*) flourish in this habitat, which also supports other mammals such as black bear (*Ursus americanus*), mink (*Mustela vison*), and beaver (*Castor canadensis*), as well as large numbers of birds, mainly waterfowl (Mitchell 1971; Suttles 1990). The marine environment is rich with fauna: pinnipeds, cetaceans, shellfish and fish including all five species of Pacific salmon (Mitchell 1971; Suttles 1974, 1990). This

ecological pattern may have emerged as early as 3800 BP (Beckwith 2004), by which time sea levels in what is now the Victoria area would probably have stabilized at their modern position (James et al. 2009).

Archaeological Background

The prehistory of the Gulf of Georgia region is categorised by archaeologists as a series of temporally-divided culture types, distinguished by artifact assemblages, among other cultural manifestations. Increased regional diversity in culture type assemblages occurred around 2400 cal BP, with types and relative frequencies of artifacts differing between southeastern Vancouver Island and other parts of the Gulf of Georgia region (Clark 2000, 2010). A new culture type (Marpole) with new art and artifacts appeared, focused on the lower Fraser Valley region (e.g., Matson & Coupland 1995). On southern Vancouver Island, changes were more gradual and less drastic, and have been described as the development of a subphase within the Locarno Beach culture type (Clark 2000, 2010).

Researchers have discussed reasons for the increased regional diversity at around 2400 BP. Environmental change has been invoked as one primary cause and has been examined for its effects on local and regional resource availability, which may in turn have led to increased trade, deepening social inequality, and differences in resource distribution (Lepofsky et al. 2005). Croes (1989) has suggested that changes in culture types and artifacts resulted from differing subsistence patterns, probably in

response to population growth. Croes's theory on artifact change and subsistence should be testable archaeologically, using changes in artifactual and faunal assemblages from sites with stratified deposits.

The first scientific excavations at Willows Beach took place in the early 1970s; these and subsequent excavations have revealed artifacts, pits, hearths, burials and fauna, with radiocarbon dates (Table 1) suggesting a long history of occupation (Kenny 1974; Owens & Pawlowski 2007; Wigen 1980; Wilson et al. 2007). These features make Willows Beach potentially valuable for examining changes in faunal assemblages and their possible correlation with artifactual culture types through time.

The excavations by Kenny (1974) at Willows Beach were extensive, and revealed two cultural Zones: A and B (see Methodology below). Artifacts and radiocarbon dates link Zone A to the Gulf of Georgia culture type and Zone B to the late Bowker Creek sub-phase of the Locarno Beach culture type. Each Zone has characteristic artifacts and differing proportions of tools suggesting a distinct culture type (Clark 2000; Kenny 1974). Willows Beach appears to lack a discrete Marpole component, the absence of which has also been noted among other southern Vancouver Island sites (e.g., Clark 2010; G. Keddie, pers. comm.).

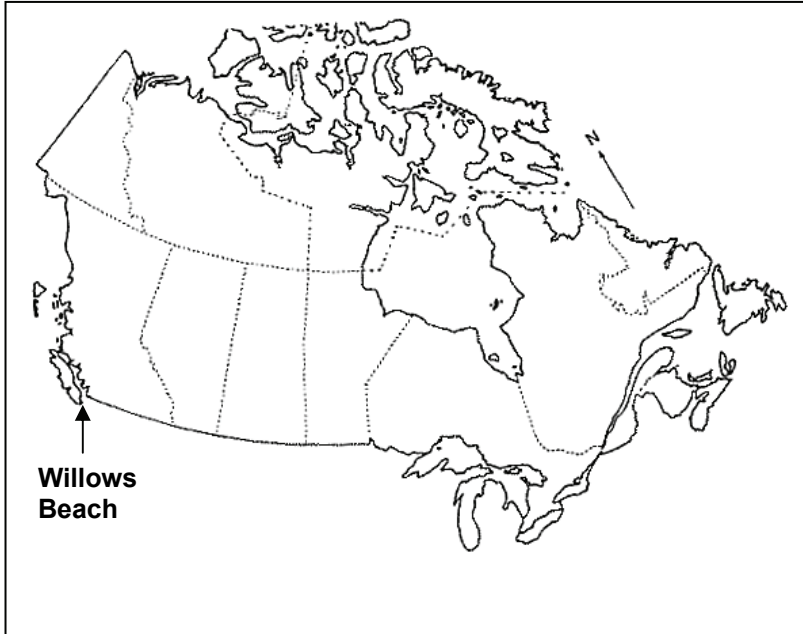


Figure 1. Location of Willows Beach.

	Source (Kenny 1974)	Uncalibrated (Kenny 1974)	Calibrated (BP) using OxCal 4.0.5's IntCal04 Northern Hemisphere atmospheric curve						
			from	to	1 <i>sigma</i>	from	to	2 <i>sigma</i>	median
Zone A	Charcoal, middle of Zone A	270 ± 65 BP	456	-1	68.1	499	-4	95.4	331
Zone B #2	Charcoal, near top of Zone B	2490 ± 85 BP	2720	2466	68.2	2741	2359	95.4	2561
Zone B #1	Charcoal, bottom of Zone B	2630 ± 95 BP	2863	2516	68.2	2955	2367	95.3	2740

Table 1: Dates used in this study (Bronk Ramsey 1995, 2001; Reimer et al. 2004).

Subsistence Practices	Artifacts Recovered	Inferred Practices (Kenny 1974)	Present in Zone A?	Present in Zone B?
Land Mammal Hunting	Flaked stone points	Using arrows, darts or spears	Yes	Yes
Sea Mammal Hunting	Large ground slate points	Using a killing lance	No	Yes
	Unstemmed triangular ground slate points	Using composite-headed harpoon	Yes	No
	Barbed antler harpoon points	Using a non-toggling harpoon	Yes	No
Fishing	Bipoints (unbarbed)	Fishing with composite hooks, leisters, fish gorges, composite toggling harpoons, or herring rakes	Yes	Yes
	Unipoints (unbarbed)	Fishing with composite hooks, leisters, fish gorges, composite toggling harpoons, or herring rakes	Yes	No
	Composite toggling harpoon valves	Harpooning salmon (or sturgeon)	Yes	No
Bird Hunting	Flaked stone points	Using arrows, darts or spears	Yes	Yes
	Unbarbed bone points	Using arrows, darts or spears	Yes	Yes
	Barbed bone points	Using specialized duck spears/ arrows	Yes	No

Table 2. Subsistence activities at DcRt-10 inferred by Ray Kenny from artifact assemblages (Kenny 1974: Table 103, Table 107). Table modified from Kenny (1974) and Willerton (2009).

Zone A at Willows Beach contains more bone and less flaked stone than Zone B (Kenny 1974: Table 100). In addition, certain artifact types are found only in Zone A, such as barbed bone points, composite toggling harpoon valves and unbarbed bone points (Kenny 1974: Tables 103, 107). These artifact types and trends are considered diagnostic of the Gulf of Georgia culture type (Clark 2010; Matson and Coupland 1995; Mitchell 1990), while Zone B contains microblades and a labret, typically more common in the Locarno Beach culture type (Kenny 1974: Table 100; Clark 2010).

Kenny (1974) has inferred subsistence activities at Willows Beach based on the artifact types occurring in Zones A and B (Table 2, adapted from Kenny [1974]: Tables 103, 107). While the sample size is small, the presence solely in Zone A of barbed bone points similar to those used ethnographically for specialized duck spears or arrows (Kenny 1974: Table 107) may indicate increased hunting of waterfowl. Zone A also contains fishing-related artifacts not recovered in Zone B — two composite toggling harpoon valves believed by Kenny to have been used for catching salmon, and six unbarbed bone unipoints, used in making hooks, gorges, leisters, and herring rakes. The presence in Zone A of a large barbed antler point believed to have armed a non-toggling sea mammal harpoon represents some degree of technological change from earlier levels, and could signal intensified sea mammal hunting from Zone B to Zone A (Kenny 1974: Table 107).

Using Kenny's (1974) data on artifacts and function (Table 2) and Croes's (1989) theoretical framework of changing culture types reflecting changes in subsistence patterns, this paper predicts that some of the differences in the Willows Beach Zone A artifact assemblages represent intensification or variation in subsistence practices in the Gulf of Georgia culture type, compared to the artifacts from Zone B, which are associated with the Locarno Beach culture type. These changes should be observable in the Willows Beach faunal assemblages, as discussed below. For a full description of the Willows Beach fauna and its analysis, see Willerton (2009).

Methodology

The Willows Beach site is approximately 1,080 metres long and 40 metres wide, and was first recorded by the province in 1959 (BC Prov. Heritage Register 2000). The faunal material and artifact assemblages described in this study were excavated by Monks and Pollitt (1970) and Kenny (1971, 1974). The Monks and Pollitt excavation took place on the southern part of Willows Beach (Owens & Pawlowski 2007). Three units were excavated: two units were one by four metres in size, while the third was one-and-a-quarter by six metres (Monks & Pollitt 1970).

The Kenny excavation was undertaken on the same property in 1971, adding five 2m x 2m excavation units (Kenny 1974). Six intact strata were noted, grouped into two distinct components: Zone A closest to the surface, and Zone

B below. Both consist of dark sandy shell midden matrix, with the Zone B material generally darker and more compact; deposit depths indicate a greater volume of sediment in Zone B.

The Kenny excavation yielded three radiocarbon dates: 2630 ± 95 BP from the bottom of Zone B, 2490 ± 85 BP from the top of Zone B, and 280 ± 65 from the middle of Zone A (Kenny 1974). OxCal 4.0.5 was used to calibrate these previously uncalibrated dates (see Table 1) (Willerton 2009).

Faunal material from these excavations was screened using a 6-mm screen, meaning that smaller bones (particularly of fish the size of herring and smaller) would fall through the screen. The faunal remains, carefully bagged according to provenience, were stored unanalysed at the Royal British Columbia Museum in Victoria.

To quantify the bones, one of us (Willerton 2009) recorded NISP (Number of Identified SPecimens), and calculated MNI (Minimum Number of Individuals) (Tables 3-5). MNI is of limited usefulness for small assemblages like these, as it overrepresents taxa with low numbers, as seen below with the bird sample. On the other hand, MNI largely underrepresents fish in this study, primarily due to the fact that vertebrae had to be used as the “diagnostic” element, thereby giving unreasonably conservative MNI

numbers for fish taxa. However, MNI counts address the problem of the potential for NISP to represent the same individual multiple times (Lyman 2008; Stahl 1995; Wigen 1980). Therefore, for the purposes of this paper, only the NISP counts will be used in our discussions; MNI counts are recorded for reference.

Specimens were identified by Willerton using the University of Victoria’s zooarchaeology collections. Genus, species and skeletal element were recorded. Based on ethnographic and archaeological evidence, taxa that were apparently not food items are listed but excluded from the analysis: dog (*Canis familiaris*), mice (*Peromyscus* sp.), and the introduced European rat (*Rattus* sp.). All other taxa identified are hereafter referred to as “food fauna.” Crows and/or ravens may have been kept as pets (e.g., Drucker 1951); however, this is poorly documented and they will be treated here as food fauna.

The bones at Willows Beach were generally well preserved, but taphonomic factors were undoubtedly responsible for some loss of elements (e.g., Lyman 2008; Stahl 1995). However, the presence of small, delicate bones in both Zones A and B suggests preservation is similar between the two Zones.

Taxon	Common Name	Zone B		Zone A	
		NISP	MNI	NISP	MNI
<i>Squalus acanthias</i>	Dogfish	28	1	33	2
<i>Raja binoculata</i>	Big skate	–	–	2	1
<i>Hydrolagus colliei</i>	Ratfish	7	2	11	2
<i>Acipenser</i> sp.	Sturgeon	–	–	1	1
<i>Clupea pallasii</i>	Herring	2	1	7	2
<i>Oncorhynchus</i> sp.	Salmon	77	2	135	3
<i>Gadus macrocephalus</i>	Pacific cod	1	1	9	1
<i>Damalichthys vacca</i>	Pile perch	1	1	–	–
<i>Sebastes</i> cf. <i>babcocki</i>	Rockfish (cf. red-banded)	1	–	–	–
<i>Sebastes borealis</i>	Shortraker rockfish	–	–	1	–
<i>Sebastes proriger</i>	Redstripe rockfish	–	–	1	–
<i>Sebastes</i> sp.	Rockfish	24	1	116	4
<i>Hexagrammos decagrammus</i>	Kelp greenling	2	1	5	1
<i>Ophiodon elongatus</i>	Lingcod	2	1	1	1
<i>Hemilepidotus hemilepidotus</i>	Red Irish Lord	2	1	1	1
<i>Scorpaenichthys marmoratus</i>	Cabezon	2	1	14	2
<i>Myoxocephalus polyacanthocephalus</i>	Great sculpin	4	1	25	1
Cottidae	Sculpin, indeterminate	–	–	4	–
<i>Hippoglossus stenolepis</i>	Halibut	1	1	8	1
<i>Lepidopsetta bilineata</i>	Rock sole	–	–	1	1
<i>Platichthys stellatus</i>	Starry flounder	5	1	9	1
Pleuronectiformes	Flatfish, indeterminate	2	–	1	–
Total Identified to Genus or Species		161	16	385	25
Non-Identified Fish		112	–	235	–
Overall Total Fish		273	16	620	25

Table 3. Fish remains at Willows Beach.

Taxon	Common Name	Zone B		Zone A	
		NISP	MNI	NISP	MNI
<i>Dendragapus obscurus</i>	Blue grouse	–	–	1	1
<i>Gallus gallus</i>	Chicken	–	–	1	1
<i>Bonasa umbellus</i>	Ruffed grouse	2	1	–	–
<i>Cygnus buccinator</i>	Trumpeter swan	1	1	–	–
<i>Branta canadensis</i>	Canada goose	3	1	8	1
<i>Anas platyrhynchos</i>	Mallard	2	1	1	1
cf. <i>Anas platyrhynchos</i>	Duck (cf. Mallard)	–	–	1	–
<i>Aythya marila</i>	Greater scaup	4	1	3	1
<i>Aythya affinis</i>	Lesser scaup	1	1	–	–
cf. <i>Aythya</i> sp.	cf. scaup	1	–	–	–
<i>Clangula hyemalis</i>	Long-tailed duck	–	–	1	1
<i>Melanitta perspicillata</i>	Surf scoter	8	2	8	2
<i>Melanitta fusca</i>	White-winged scoter	3	1	9	2
<i>Melanitta</i> sp.	Scoter indet.	1	–	2	–
<i>Mergus merganser</i>	Common merganser	–	–	1	1
<i>Mergus serrator</i>	Red-breasted merganser	–	–	1	1
<i>Oxyura jamaicensis</i>	Ruddy duck	–	–	1	1
cf. <i>Gavia arctica</i>	cf. Arctic loon	–	–	1	1
<i>Gavia pacifica</i>	Pacific loon	1	1	3	2
<i>Gavia immer</i>	Common loon	1	1	–	–

Table 4. Bird remains at Willows Beach.

Taxon	Common Name	Zone B		Zone A	
		NISP	MNI	NISP	MNI
<i>cf. Phoebastria albatrus</i>	Albatross (cf. short-tailed)	1	1	2	1
<i>Puffinus griseus</i>	Sooty shearwater	12	1	2	1
<i>Puffinus tenuirostris</i>	Short-tailed shearwater	1	1	–	–
<i>Aechmophorus occidentalis</i>	Western grebe	–	–	1	1
<i>Ardea herodias</i>	Great blue heron	–	–	1	1
<i>Phalacrocorax auritus</i>	Double-crested cormorant	–	–	3	1
<i>Phalacrocorax pelagicus</i>	Pelagic cormorant	–	–	1	1
<i>Pluvialis squatarola</i>	Black-bellied plover	1	1	–	–
<i>Larus canus</i>	Mew gull	–	–	2	1
<i>Larus delawarensis</i>	Ring-billed gull	1	1	–	–
<i>cf. Larus delawarensis</i>	cf. Ring-billed gull	–	–	2	1
<i>Larus argentatus</i>	Herring gull	1	1	–	–
<i>Larus glaucescens</i>	Glaucous-winged gull	–	–	3	1
<i>Larus sp.</i>	Gull	1	1	4	1
<i>Rissa tridactyla</i>	Black-legged kittiwake	1	1	–	–
<i>Uria aalge</i>	Common murre	–	–	8	2
<i>Cephus columba</i>	Pigeon guillemot	–	–	1	1

Table 4. Bird remains at Willows Beach (continued).

Taxon	Common Name	Zone B		Zone A	
		NISP	MNI	NISP	MNI
<i>Brachyramphus marmoratus</i>	Marbled murrelet	1	1	1	1
<i>Cerorhinca monocerata</i>	Rhinoceros auklet	2	1	–	–
<i>Columba fasciata</i>	Band-tailed pigeon	–	–	2	1
<i>Ceryle alcyon</i>	Belted kingfisher	–	–	2	1
<i>Colaptes auritus</i>	Northern flicker	1	1	–	–
<i>Cyanocitta stelleri</i>	Steller's jay	–	–	1	1
<i>Corvax caurinus</i>	Northwestern crow	24	2	–	–
Total Identified to Genus or Species		75	24	78	33
Non-Identified Birds		62	–	104	–
Overall Total Birds		137	24	182	33

Table 4. Bird remains at Willows Beach (continued).

Results

A total of 2,363 vertebrate specimens from Zone A and Zone B at Willows Beach were identified at least to class, with 43% (1011) identified at least to level of genus. Fish made up 53% of these identified specimens, with salmon and rockfish the most numerous groups (Table 3). Bird specimens made up 15% of the total specimens identified at least to genus, with crows the most numerous species, and ducks the most numerous group (Table 4). Finally, mammal specimens comprised about 32% of those identified at least to genus, with

deer and dog the most well-represented species (Table 5).

Comparison of the NISP between Zone A and Zone B indicates that the Zone A fauna are more abundant and diverse, based on raw counts of species (Tables 3-5). Zone A, however, had a smaller volume of sediment than Zone B. While small sample sizes ensure that most MNI differences are of only one or two individuals, the MNI lists also indicate greater species richness and more individuals in Zone A (Tables 3-5). This diversity may reflect the larger sample size in Zone A.

Taxon	Common Name	Zone B		Zone A	
		NISP	MNI	NISP	MNI
<i>Marmota vancouverensis</i>	Vancouver Island marmot	–	–	1	1
cf. <i>Tamiasciurus hudsonicus</i>	cf. Red squirrel	–	–	1	1
<i>Castor canadensis</i>	Beaver	–	–	2	1
<i>Peromyscus</i> sp.	Mouse	1	1	7	1
<i>Rattus</i> sp.	Rat	–	–	1	1
<i>Canis familiaris</i>	Dog	49	3	61	2
<i>Ursus americanus</i>	Black bear	4	1	3	1
<i>Eumetopias jubata</i>	Steller's sea lion	–	–	3	1
<i>Procyon lotor</i>	Raccoon	1	1	5	1
<i>Mustela vison</i>	Mink	–	–	2	1
<i>Lontra canadensis</i>	River otter	2	1	1	1
<i>Phoca vitulina</i>	Harbour seal	31	2	28	2
<i>Lagenorhynchus obliquidens</i>	Pacific white-sided dolphin	1	1	–	–
<i>Phocoena phocoena</i>	Harbour porpoise	–	–	1	1
<i>Odocoileus hemionus</i>	Black-tailed deer	47	3	48	2
<i>Cervus elaphus</i>	Elk	5	1	17	1
Total Identified to Genus or Species		141	14	181	18
Non-Identified Mammals		282	–	544	–
Overall Total Mammals		423	14	725	18

Table 5. Mammal remains at Willows Beach.

The NISP change of the fish assemblage composition from Zone B to Zone A is significant beyond the 0.0001 level ($\chi^2 = 33.29$, $p < 0.0001$) with the number of fish specimens identified to genus increasing by almost two and a half times. Zone A therefore contains evidence of more intensive fishing than Zone B, with four more fish taxa and evidence of larger individuals of two taxa (salmon and rockfish). Taxa with large proportional increases in numbers of specimens from Zone B to Zone A include especially the medium-large to large rockfish (15.5% to 30.7%), as well as great sculpin (2.5% to 6.5%). As discussed above, small fish, including anchovy and herring, are poorly represented because the bones were not retained in the 6-mm screen. The birds from Zone A are more numerous (29 species) than those of Zone B (21 species), representing about a 20% proportional increase. There is also an increase of about 24% in waterfowl from Zone B to Zone A, particularly among scoters, which could reflect a change in procurement techniques. The NISP and MNI of sea mammals increase from Zone B to Zone A, perhaps suggesting an intensification of sea mammal hunting.

Discussion

Willows Beach

This study predicted that differences in artifacts between the Locarno Beach and Gulf of Georgia levels at Willows Beach were based on changes and/or intensification of subsistence practices, as observable in the Zone A and Zone B faunal assemblages. The appearance of unbarbed bone points (unipoints) and

harpoon valves in Zone A (absent in Zone B) was suggested to correlate with intensification of both fishing and sea mammal hunting (Kenny 1974). Unipoints had a wide range of fishing-related uses, particularly in arming fishhooks, composite harpoons, some spears and herring rakes (Matson & Coupland 1995; Mitchell 1971; Suttles 1974, 1990). The Willows Beach fish assemblage specimens increase almost two and a half times from Zone B to Zone A, particularly in greater numbers of great sculpin and rockfish, and to a lesser extent Pacific cod and halibut. Great sculpin and rockfish frequent diverse (including inshore) habitats, while Pacific cod and halibut are more common inshore in the summer. The ecological behaviour of all four of these groups make them most vulnerable to capture by fishing hooks (Stewart 1977), which may relate to the appearance of unipoints in Zone A. The smaller toggling harpoon valves in Zone A were historically used to harpoon salmon (Stewart 1977), whose remains were more common in that zone.

Barbed bone points, used historically for duck spears or arrows, are absent in Zone B but appear in Zone A at Willows Beach. They appear in Gulf of Georgia levels at other sites. Our faunal data indicate that waterfowl specimens increase from about 59% in Zone B to about 83% in Zone A. In particular, scoters, which belong to the Tribe Mergini (sea ducks), increase in number from Zone B to Zone A. Scoters are especially susceptible to human predation because they often rest in shallow waters in "enormous flocks" (Bellrose 1976) where they are

vulnerable to spears or arrows. While the association between spear points and increased numbers of waterfowl may not be causal, particularly given the small sample size, it nevertheless provides support for the idea that hunters in the Zone A time period used the spear points to hunt waterfowl.

The reasons for increased procurement of scoters and other flocking waterfowl may have been driven by external factors. Sooty shearwaters – birds which migrate from New Zealand to western North America each year – make up over 16% of the Zone A specimens at Willows Beach, but only 2.5% in Zone B. A steeper decline in these birds from early to later levels – involving many more individuals – occurred at the Minard site in Washington state. This decline was tentatively attributed to the practice of culling young shearwaters in New Zealand from about AD 1000 on, which meant that few were left to make the long migrations north (Bovy 2007).

Another possibility is that the decline was caused by increasing surface sea water temperatures off western North America which forced the migrating shearwaters to fly further north to cooler waters. Scoters and other waterfowl may have been taken in greater abundance in the absence of shearwaters.

A large barbed antler harpoon point appears in Zone A; these were used in historic times for hunting large sea mammals (Kenny 1974). Remains of Steller's sea lion and a harbour porpoise were recovered in Zone A, while only one large sea mammal element was found in Zone B. Whether these remains

represent beached individuals or actively hunted animals is not clear. However, the presence of the large antler harpoon suggests – through ethnographic analogy – that the inhabitants actively hunted these animals in the Gulf of Georgia levels.

While the artifact sample sizes are small, the appearance in Zone A of barbed bone points, unipoints, harpoon valves (togglings), and a large harpoon point (non-toggling) suggests new methods and intensification of hunting sea birds, fish, and mammals in the Gulf of Georgia levels at Willows Beach. The faunal assemblage, while also small, contains evidence that intensification of hunting of seabirds, certain fish, and possibly sea lions did occur in Zone A.

Other Sites on the Coast of Southern Vancouver Island

Because the Willows Beach faunal assemblage reported here is not large, it is important to examine whether the faunal trends observed are mirrored at other sites on the coast of southern Vancouver Island. While several sites have been excavated, not all faunal data were available or suitable for comparisons.

Several excavations have been undertaken at the large Esquimalt Lagoon site (DcRu-2), a site containing a large Gulf of Georgia component and a very small Locarno Beach component (e.g., Blacklaws 1979; O'Regan and Owens 1997). Fauna from certain of these excavations have been reported (e.g., Blacklaws 1979; Crockford 1997; O'Regan and Owens 1997), but different reporting techniques mean that

only one report (Crockford 1997) was relevant here. Similar to Willows Beach, the Gulf of Georgia levels of the Esquimalt Lagoon fish assemblage (Crockford 1997: Appendix 2) contained proportional increases in several fish species which are best caught with hooks and line. These included perch, Pacific cod, rockfish, and halibut (Figure 2) (Stewart 1977). The unbarbed bone points which appeared at Willows Beach (and in Gulf of Georgia levels at other sites) may

well have been used to arm hooks for catching these fish.

The Esquimalt Lagoon bird assemblage, as reported in Crockford (1997: Appendix 2), is small compared to the Willows Beach assemblage. However, similar to Willows Beach, the proportion of waterfowl at Esquimalt Lagoon increased by about 10% from the Locarno sub-phase to the Gulf of Georgia culture type levels (Figure 3).

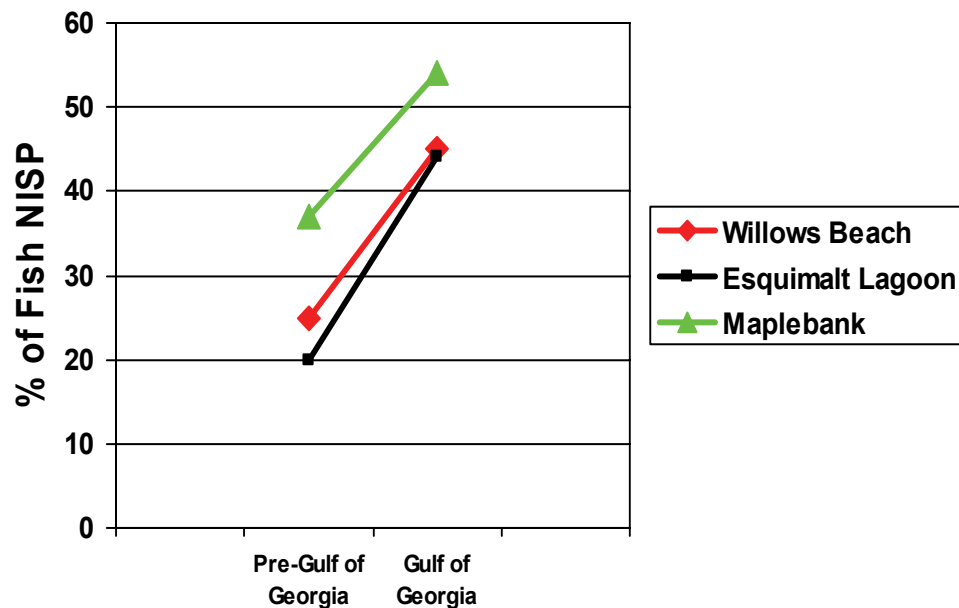


Figure 2. Change in percentage of NISP of fish most efficiently caught with hooks, from pre-Gulf of Georgia levels to Gulf of Georgia levels

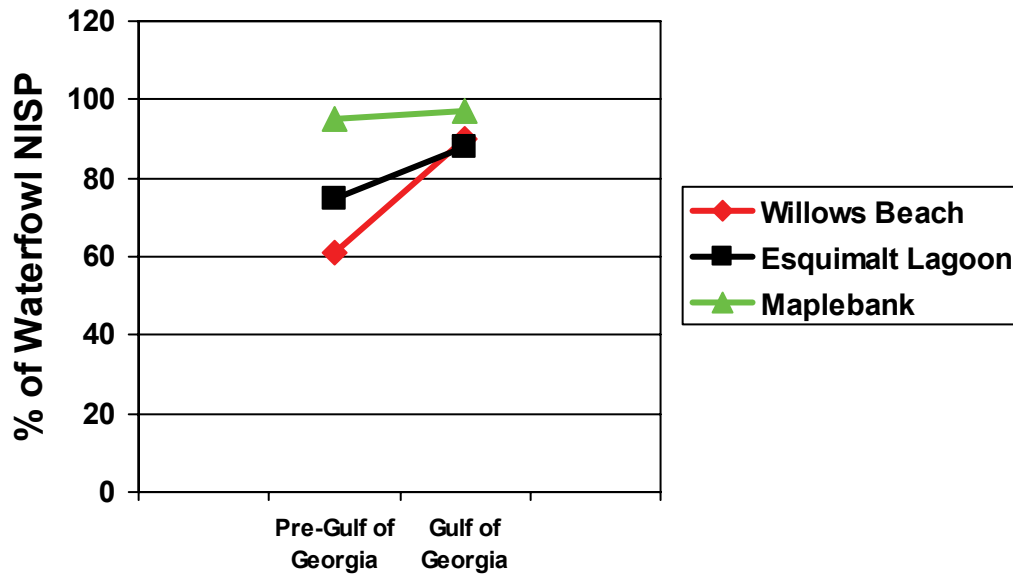


Figure 3. Change in percentage of NISP of waterfowl from pre-Gulf of Georgia levels to Gulf of Georgia levels.

Only two shearwaters were recovered at Esquimalt, and these were from the earlier levels. Finally, very few sea mammals were reported in the Esquimalt Lagoon fauna (4% of the identified mammal specimens), and no differences in exploitation were seen over time (Crockford 1997).

The large and diverse fauna from the Maplebank site (located on Esquimalt Harbour) contained both Locarno Beach and Gulf of Georgia components. Similar to both the Willows Beach and Esquimalt Lagoon assemblages, a proportional increase in fish species which are best caught with hooks was seen from the earlier to later levels. The Maplebank fish fauna also showed a proportional increase in Gulf of Georgia levels of species which can be caught inshore most efficiently with hooks

(Figure 2). These included rockfish, perch and sculpin.

Analysis of the large Maplebank bird assemblage indicated that the proportional increase in waterfowl specimens from the Locarno to Gulf of Georgia levels at Willows Beach also occurred at Maplebank, although with a smaller proportional increase (2%) (Figure 3). Similar to the Willows Beach and Minard sites, the shearwater population also declined steeply in the later levels of the Maplebank site. There were also proportional increases in the much greater sea mammal numbers in the later levels of Maplebank, as was the case at Willows Beach.

In sum, the trends seen in the Willows Beach faunal assemblages of the intensification of hunting of seabirds,

certain fish and possibly sea lions were also seen in the faunal assemblages of the Maplebank and Esquimalt Lagoon sites.

Conclusion

Despite the widespread use of the culture type concept in Northwest Coast archaeology, the exact significance of artifact assemblage changes is not fully understood. Croes (1989) suggested that different culture types are the result of changing subsistence patterns over time, particularly the intensification and diversification of faunal resource harvesting, as human populations grew. At Willows Beach, despite a small sample size, specific artifact types including barbed bone points, unipoints, toggling harpoon valves, and a large barbed antler point appeared in Zone A (Gulf of Georgia culture type), but were absent in Zone B (sub-phase of the Locarno Beach culture type). These artifacts also appeared in Gulf of Georgia levels in other sites. These implements were suggested to be associated with subsistence activities including increased waterfowl hunting, fishing for species most efficiently caught with hooks and lines and/or with small toggling harpoons, and increased sea mammal hunting (Kenny 1974).

The description of the Willows Beach faunal assemblages has indicated that, while small, these assemblages indeed show proportional increases from early (Zone B) to later (Zone A) levels in specimens of waterfowl, fish species best caught with hooks and lines and small harpoons, and sea mammals. These subsistence differences can be interpreted as changes associated with

the transition from the Locarno Beach culture type to the Gulf of Georgia culture type.

Examination of faunal assemblages from two other large southern Vancouver Island coastal sites, Maplebank and Esquimalt Lagoon, provides further support for the faunal trends described from the Locarno Beach levels to the Gulf of Georgia levels at the Willows Beach site.

The Willows Beach faunal assemblages suggest that the Locarno Beach and Gulf of Georgia culture types were the products of different subsistence patterns. This finding may also have broader implications for the understanding of culture types on southern Vancouver Island and perhaps throughout the Gulf of Georgia. In support of such investigation, future research should aim to ensure that often-overlooked faunal assemblages are examined alongside artifact assemblages, and with equal care.

Acknowledgments

I. W. gives profound thanks to Dr. Yin Lam, Dr. Quentin Mackie, Rebecca "Becky" Wigen, and Dr. Gay Frederick for their invaluable advice and feedback during her thesis project. She also thanks Dr. Susan Crockford for faunal identification instruction and assistance, and Martina Steffen and Grant Keddie (Royal B.C. Museum) for their advice and encouragement as well as access to Willows Beach data and faunal material. I. W.'s research was enabled by a Canada Master's Scholarship from the Social Sciences and Humanities Research Council (SSHRC).

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