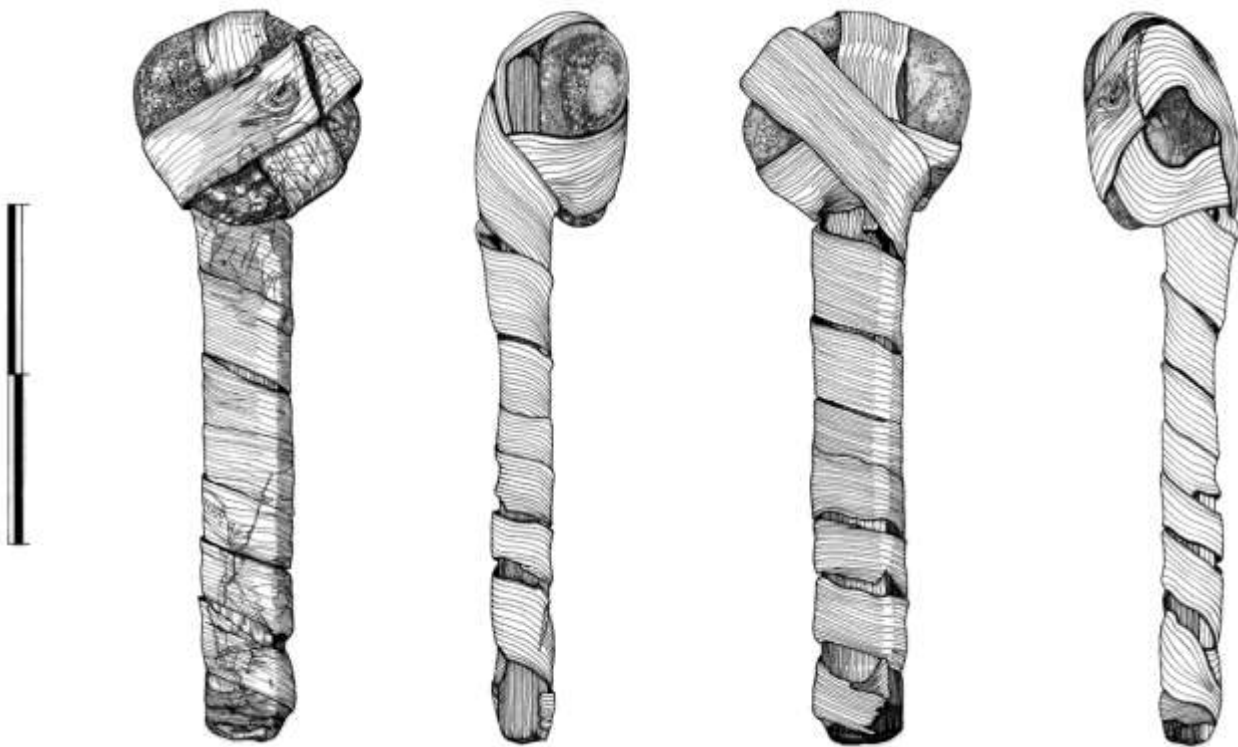


Qwu?gwes

The Qwu?gwes Archaeological Site and Fish Trap (45TN240), and Tested Homestead (45TN396)

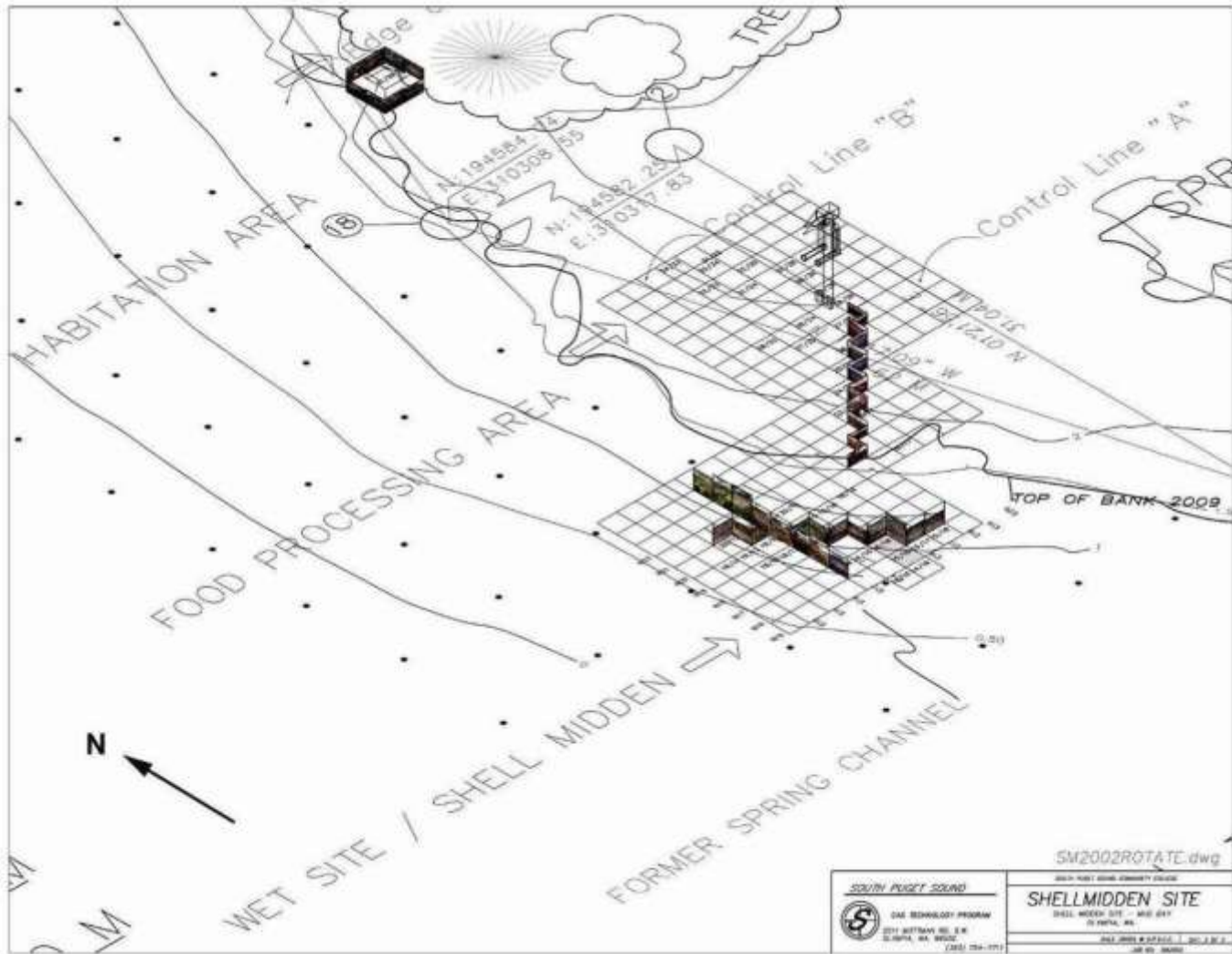
*Eleven-Year South Puget Sound Community College Summer Field School
Investigations with the Squaxin Island Tribe
—DRAFT Final Report—4-1-2013*



Four sides of Qwu?gwes toy war club showing the considerable skill in creating this expedient toy (scale = cm, so very small); the handle is split cedar wood, the wrapping is a cherry bark strip and the head is a green sedimentary pebble (Illustration by Candra Zhang, 2009).

*Edited by Dale R. Croes, P.I., South Puget Sound Community College,
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Frontispiece: 3-D map of three major site areas investigated at Qwu?gwes with 1x1 m squares numbered and samples of continuous stratigraphic series in the three major areas investigated. The placement of the Welcome Pole, given to the Munro Family by the Squaxin Island Tribe, is depicted over site area (3-D stratagram created by Professor Michael Martin and student Mickey Nelson, Computer Aided Design Department, South Puget Sound Community College).

EXECUTIVE SUMMARY

South Puget Sound Community College (SPSCC), through its Field Course in Archaeology (Anthropology 280), carried out archaeological data recovery excavations of the Qwu?gwes site (45TN240), an ancient shell midden and intertidal wet site on Mud Bay, lower Eld Inlet, Washington. An associated fish trap complex was mapped by SPSCC Computer Aided Design (CAD) classes. An historic homestead was also tested (45TN396). This work occurred during eleven, 8-week summer field classes between 1999 and 2009. The program was coordinated with the Squaxin Island Tribe, whose ancestry and traditional territory include the Qwu?gwes heritage site. An equal partnership was pursued in which both archaeological and tribal participants were involved in the permit applications, field and research strategies, and public presentations (tribal museum exhibits, conferences, and publications). The effort was part of the college educational training program, involving numerous students, faculty members, tribal members, and the public. This report contains information on the objectives, background, setting, research goals and methods, and findings.

Objectives and Background

The educational objectives of eleven South Puget Sound Community College field schools and the resulting follow-up research in classes provided a great deal of (a) training for hundreds of students, often culminating in preliminary research and paper presentations, with many students beginning successful professional careers in archaeology; (b) professional research and publications by faculty and professional researchers, Squaxin Island Tribe co-managers, museum staff and Elders; and (c) frequent public visitations and educational presentations, including annual regional newspaper and Seattle television news coverage, encouraged largely through the generous hosting by property owners Karen and Ralph Munro. This report represents the research, academic papers, publications, and conference symposia presentations by students, faculty, and Tribal members and the ongoing synthesis of this unique and first-ever extensive site excavation in south Puget Sound. The results of this educationally-based endeavor provide this first archaeological glimpse of the rich and ancient heritage of the Squaxin Island Tribe Peoples.

Significantly the Qwu?gwes Archaeological Project includes a waterlogged/wet preserved section containing examples of ancient wood and fiber material culture, including basketry, nets, cordage, wooden fish traps, and abundant woodchips and basketry construction debitage. The site also contains a distinct record of shellfish and fisheries used in this southern region of Puget Sound.

Research Goals and Methods

This project has always been an educational training effort, not a rescue excavation. Less than 2.3% (35 cubic meters) of the site has been excavated during the past 11 summer seasons of investigation. The 55, 1x1 meter units excavated and analyzed clearly revealed examples of three site use areas: (1) a seasonally used shelter/*Habitation Area*; (2) a shellfish and other *Food Processing Area* where large quantities of butter clams, Olympia oysters, and other shellfish were processed and dried for storage/trade; and (3) an inter-tidal discard *Wet Site Shell Midden area* containing preserved wood and fiber artifacts in its lower half. Much of the data compared among these three site areas is designated in italics above and on frontispiece map (ii).

Evidence indicates a disastrous earthquake took place at the Qwu?gwes location approximately 1000 to 1100 years ago, when the area dropped 3 m (9 ft.), creating a drowned forest due to the flow of Puget Sound into what is now Mud Bay and establishing a new shoreline. Following erosion of the drowned forest along this shore, the site became seasonally occupied as a food processing camp between ca. 700 and 150 14C yr B.P. A second earthquake approximately 400 years ago appears to have been less dramatic, resulting in a gradual subsidence, and affecting the shellfish use at the site during this period.

Findings

This study describes and compares 173,317 cataloged elements of cultural remains that are the result of human activity, or artifacts that are classified into three categories: debris, debitage and discrete artifacts.

Debris, the most abundant artifact category (94% of all cultural remains), includes the by-products of food consumption and processing, and the fauna, flora, and thermally altered rocks (TAR). Sampled from Qwu?gwes excavations were 109,759 valved specimens of invertebrate shellfish fauna (the most concentrated food debris at the site), 20,658 specimens of fish, mammal, and bird vertebrate fauna, 3,759 elements of mainly nuts (especially acorns) and seed macroflora, and 28,397 thermally altered rock (TAR), a cultural debris by-product of the active shellfish processing (steaming ovens) at this camp.

The shellfish invertebrate faunal remains or artifactual debris (59% of cultural remains) were mostly bivalve shellfish, dominated by five species: Olympia oyster (*Ostrea conchaphila*; 42%), butter clam (*Saxidomus giganteus*; 13%), Pacific blue mussel (*Mytilus edulis*; 3%), native littleneck (*Protothaca staminea*; 0.8%), and horse clam (*Tresus capax*; 0.3%). When the meat weight and dietary contribution of each species is considered, it becomes clear that butter clams and horse clams were of greater significance than the more numerous Olympia oyster.

Ethnographically butter clams are preferred for drying, storage, and trade. Analysis of butter

clam cross-sections indicates the primary season of collection was in the late spring/summer, and the age of harvest (death) has a tight range, with 75% of the sample within the range of 7 to 13 years of age. This focus on this age range for butter clams no doubt represents strict management of this key resource being processed at the Qwu?gwes camp.

Vertebrate faunal elements or artifactual debris were recorded from the excavated units as well as from intertidal surface erosion. The excavated units included 14,375 fish elements (72.5% of the assemblage), 4,891 mammal elements (24.7%), 309 bird elements (1.6%), 20 unidentified bird or small mammal elements, (0.1%), and 17 snake elements (0.09%). Clearly fish bones are the bulk of the assemblage, and salmon is the most abundant fish resource (averaging 95% of fish NISP). Mule deer is the most abundant mammal resource (51% of mammal NISP), followed by elk (10% of mammal NISP). Salmon are most abundant in Eld Inlet during the fall season, suggesting an autumn use of the Qwu?gwes camp and fish trap complex. The Qwu?gwes faunal assemblage shares commonalities with nine other sites reported in the Salish Sea region (Puget Sound, Gulf of Georgia, Georgia Strait, and Strait of Juan de Fuca), in particular, those typically found in riverine settings. For example, most of these sites show salmon, deer, and elk as the most abundant fauna. Perhaps the most distinctive aspect of Qwu?gwes compared to these other sites is the great variety of taxa present. It appears that the residents of the Qwu?gwes site hunted and fished for an unusually wide variety of taxa.

Macroflora remains (especially nuts and seeds) from the waterlogged intertidal shell-midden levels contribute only 2% of the cultural debris recovered. Acorn shells (*Quercus garryana*) are the most abundant plant food remains (1,660, 44%) and hazelnuts are the second most abundant (312, 8%). Berry seeds are not common. Hazelnuts are evenly distributed across the site and appear to be snack foods. Acorns are concentrated in different discard areas and appear to contribute more to the carbohydrate intake.

Cellular analysis of charcoal remains from the food processing, habitation, and intertidal shell-midden areas show a wide variety of fuelwoods being used, with a distinct focus on bitter cherry wood (*Prunus emarginata*), a fuelwood known for its ethnographic use in smoking salmon and shellfish.

The abundant Qwu?gwes thermally altered rock (TAR) artifactual debris (16% of all cultural remains) appears to be used as heated platforms in steaming ovens to cook, open, and shuck the abundant shellfish resources processed at Qwu?gwes. These steaming ovens represent the main features found in the food processing area of the site.

Debitage, the next most frequent artifact class (6% of all cultural remains), represents the by-product of manufacturing artifacts, including 1,217 lithic flakes, and from the waterlogged portion of the site, 6,375 woodchips, 2,533 basketry waste elements (by-products of basket

making or repair), and 272 cherry bark curl remnants. Clearly woodworking and basketry making and repairing were important activities at the Qwu?gwes camp, with less active lithic tool production, most of which appears to be the re-sharpening of stone artifacts and the production of expedient flake tools.

Discrete artifacts, numbering 347 items (0.2% of all artifacts), are the end products of manufacturing and were often used until broken and discarded. Twenty nine basketry and 64 cordage artifacts, including large piles of fiber gill nets, were found in the intertidal waterlogged areas of the shell-midden. The basketry and cordage are complex artifacts with styles that are compared to all other ancient wet site basketry collections on the Northwest Coast, providing a solid basis for hypothesizing an ancient Coast Salish ethnicity.

Other discrete artifacts that were recovered include 50 bifacially flaked stone projectile points, 80 blade-like flakes, 36 stone scrapers, and 5 ground stone artifacts. The defined projectile point types were compared with designs found throughout Puget Sound, the Gulf of Georgia, Strait of Juan de Fuca, and south into the lower Columbia River. The projectile point types clearly showed a relationship to those found in regions north and west of the site but much less similarity to those found to the south (lower Columbia River basin). Blade-like flakes and scrapers reflected the preparation of foods and hides, and ground stone artifacts, such as nephrite adze bits, reflected the active woodworking at Qwu?gwes.

Eighty-three bone artifacts represent a wide variety of discrete artifact types and are statistically compared with those from throughout the Central Northwest Coast to see how the Qwu?gwes bone (and stone) artifacts link with traditional archaeological phases defined for this central region. They fit well within the Late/Gulf phase cluster.

From the overall temporal analysis of the site, two distinct periods of intense activity appear to have occurred at Qwu?gwes. The earlier period focused on a wide variety of food processing, including fish and mammals. Geomorphological and excavation evidence suggest that during a proposed earthquake subsidence event that created considerable intertidal degradation (estimated to occur between 300-500 BP), the site may have experienced a shift in processing goals and possibly fewer people using it. Following this period of environmental turmoil, faunal data suggest the residents shifted focus to include more shellfish collection. This was perhaps due to lower abundance of local salmon, possibly caused by the silting in of spawning grounds. Pronounced silting could have been caused by major ancient wildfires recorded in this region and/or the 1700 AD earthquake. It may also indicate that salmon were being harvested and processed at a different location such as the associated fish trap complex. These potential environmental episodes appear to represent the final phase of subsistence intensification at Qwu?gwes prior to non-Indian contact and expansion at approximately 150 BP.

In summary, the eleven year project has been an equal partnership between South Puget Sound Community College and the Squaxin Island Tribe, a mutual effort for which all participants take great pride. The eleven years of work included field classes involving many college students, Tribal members, Elders, and Spiritual Leaders, enhanced the learning experience among all groups and developed a culture of respect for both the history and traditions of the Squaxin Island Tribe as well as the scientific demands of archaeological research. While there is further work to be continued at the Qwu?gwes site, significant research and synthesis has resulted in the first careful investigation of ancient Squaxin in the South Sound. For these accomplishments and more, all of those involved in the work over the past eleven years are both proud and pleased to submit this final report that documents the accomplishments of more than a decade.

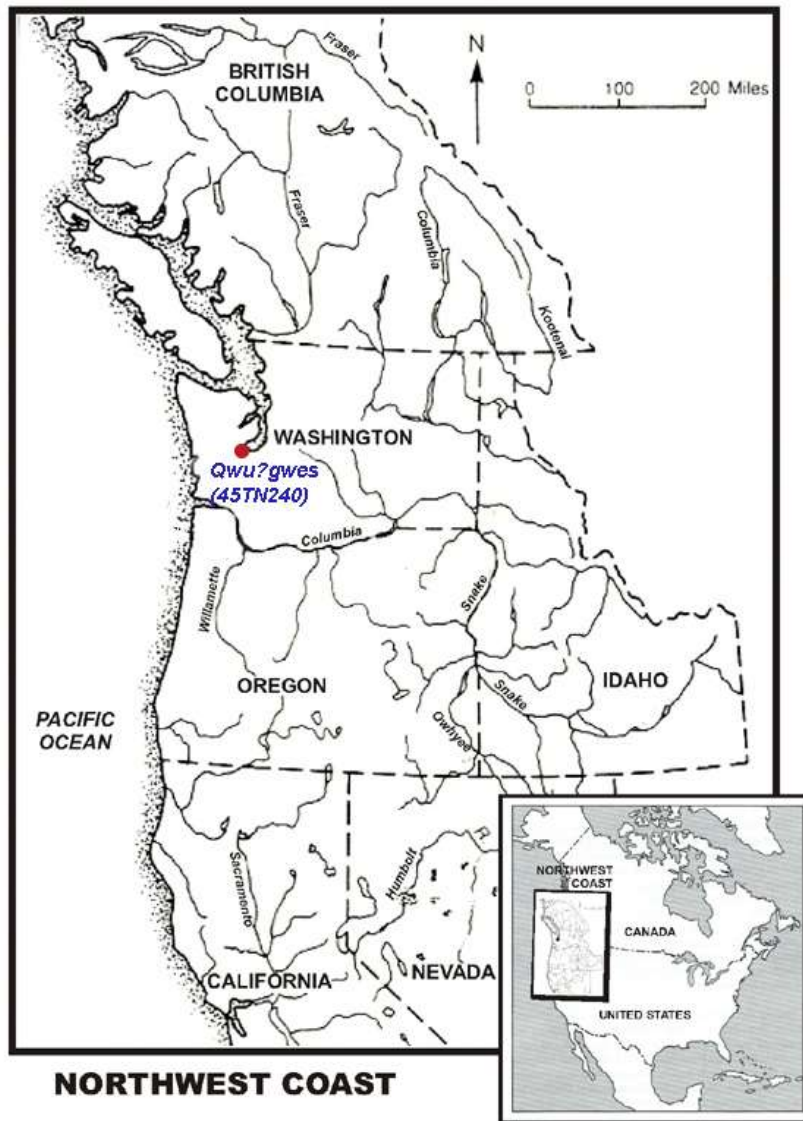


Figure 1. Location of Qwu?gwes on the Northwest Coast of North America. For view of site in Puget Sound see Figure 4.

XVI. QWU?GWES WOOD AND FIBER ARTIFACTS

Abstract: This section discusses the well-preserved wood and fiber debitage and discrete artifacts. As a wet site, Qwu?gves preserves the major component of material culture used by Northwest Coast Indians—wood and fiber items. In this section the debitage and discrete artifacts of Qwu?gves are discussed: ancient basketry, cordage, cherry bark binding elements and woodworking. For each of these major artifact categories, it was decided to discuss both the debitage and discrete artifacts together since debitage, especially basketry waste elements and woodchips, represent the construction of the discrete fiber and wood artifacts.

XVIa. Basketry

By Dale Croes and Olivia Ness; Edited by SIT, CRD

Basketry artifacts are complex in style and technique and have proven to be the most sensitive in regional wet site and museum comparisons in proposing who, ethnically, the site occupants represents—Qwu?gves links well with other Coast Salish sites dating back at least 3,000 years and also has some unique, never before seen, basketry attributes and types. Basketry waste elements debitage are abundant (over 2,500 recorded at the site, compared to approximately 1,200 pieces of lithic debitage reported below), which were clearly cut and discarded during manufacturing or repairs of basketry. In comparison to basketry debitage from other sites, Qwu?gves emphasized splint bough elements used in the common pack basket constructions. Also, a distinct emphasis on maple bark in basketry is explored, including experiments in gathering.

Qwu?gves has two forms of identifiable basketry, baskets and mats. The primary type is the open twined clam/pack baskets, and the main mat form is associated flat bark plaited tumpline straps—both functionally well associated with carrying loads of resources, especially shellfish, to and from this major processing camp. All basketry attributes are analyzed, including construction materials, base, and body construction techniques, selvage/rim techniques, extensions (often handles) on the basketry, and shapes used. The basket classes/types are reconstructed and defined by these attributes. SIT, CRD provides a description of each major basketry artifact. The functional analysis of these basketry types in this site context follows, revealing a distinct form of storage basket with a set of staggered handles consisting of three loops each.

Comparison of the analyzed Qwu?gves basketry to all other Northwest Coast wet sites shows how they statistically (including through cladistic analyses) fit into the style and time sequences found throughout Puget Sound and the Gulf of Georgia for at least 3000 years, revealing a Coast Salish affinity for at least that long, and distinct from a West Coast style trend. Statistical,

comparisons with over 2,800 museum baskets tend to cluster the ancient basketry with suggested affiliations, especially Coast Salish, into the contact periods.

Background and 1792 Record of Squaxin Basketry at the End of Eld Inlet

Curiously, from western scientific records, Qwu?gwes may be close to the place where Squaxin Island Tribe basketry was first reported. On May 26, 1792, Lieutenant Peter Puget, of the scientific expedition of Captain George Vancouver, visited a resource camp at the end of Eld Inlet: *The Women appeared employed in the Domestic Duties such as curing Clams & Fish, making Baskets, of various Colours & as neatly woven that they are perfectly watertight* (Puget 1792; see full account, Appendix A.1). The archaeological record of Qwu?gwes extends back another 500 years, to approximately 700 years ago, and it documents active and on-going basket weaving occurring at this location, producing a number of well-constructed, though broken and discarded, baskets and mats (see example, Figure 149).



Figure 149. Example of common open weave splint basketry, (N19E12a, 50-55, 2007), being carefully lifted from the site.

Basketry Waste Elements

The direct evidence of active basket making or repair at Qwu?gwes includes over 2,500 basketry waste elements created in the process of repair, re-construction and trimming basketry items over time at the site. The basketry construction debris that has been measured consists of bark strips,

cedar bough and root splints (N = 2,549). The vertical and horizontal distribution patterns of basketry construction debris at Qwu?gwes, and the actual measurements of these elements, has aided in understanding the magnitude, emphasis and kind of basketry construction taking place over time at the site. Variations in width and thickness have been documented and aid in understanding the variety of basketry being made or materials used for repair. The examples of basketry waste materials include strips and edge clippings that were clearly cut and discarded during manufacturing or repairs of basketry and possibly cordage.

In site distribution, basketry waste elements are limited to the intertidal shell-midden wet site area and below the capillary fringe/water-table, so from approximately 45 cm to 85 cm below surface (Figure 150). The distribution concentrated along what is thought to be an ancient channel that passed through the site, providing a concentration along the base fill of this channel-like formation (Figure 151; see IX. Site Structure, Stratigraphy and Micro-Geomorphology, Figures 22-23, 25). The vertical distribution shows a very high concentration at 50-55 cm, just below the water-table, and the debris reduces significantly in the next level, 55-60, to rebound again, but not as sharply, and diminishes as one continues down toward the culturally sterile layers (Figure 150). Similar vertical distribution patterns seen with discrete artifacts, debitage and debris at the site have been and will continue to be explored, possibly indicating a less active use of the site for a period reflected here in the 55-60 cm level.

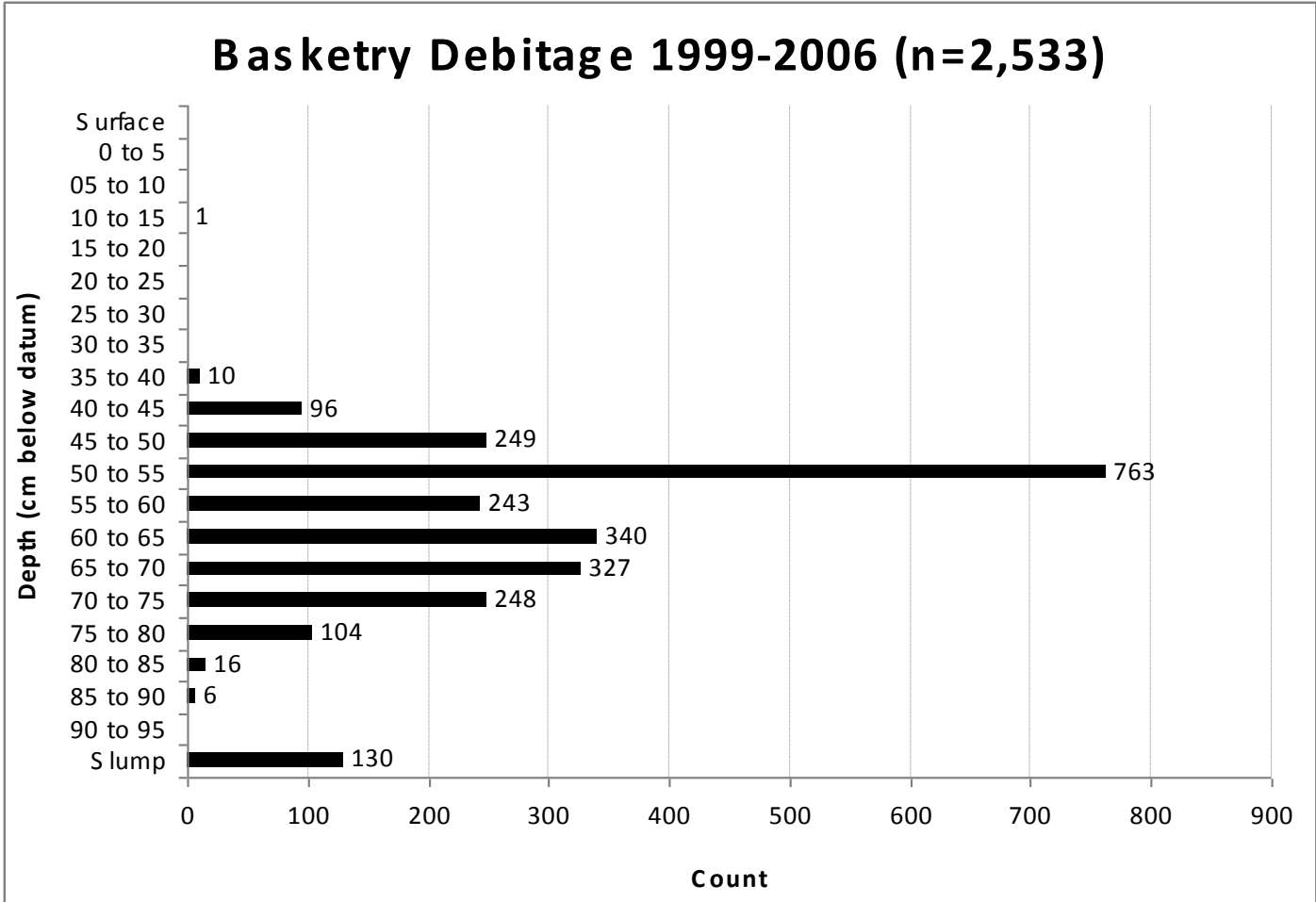


Figure 150. Vertical distribution of basketry waste elements in the Qwu?gwes wet site. The water table is at about 40 cm, so examples are only found below that level. A particularly high density is seen at 50-55 cm and then it reduces significantly at 55-60 and becomes more common until the sterile layers are reached at about 75-80 cm.

Basketry Debitage Count by Unit, 1999-2006

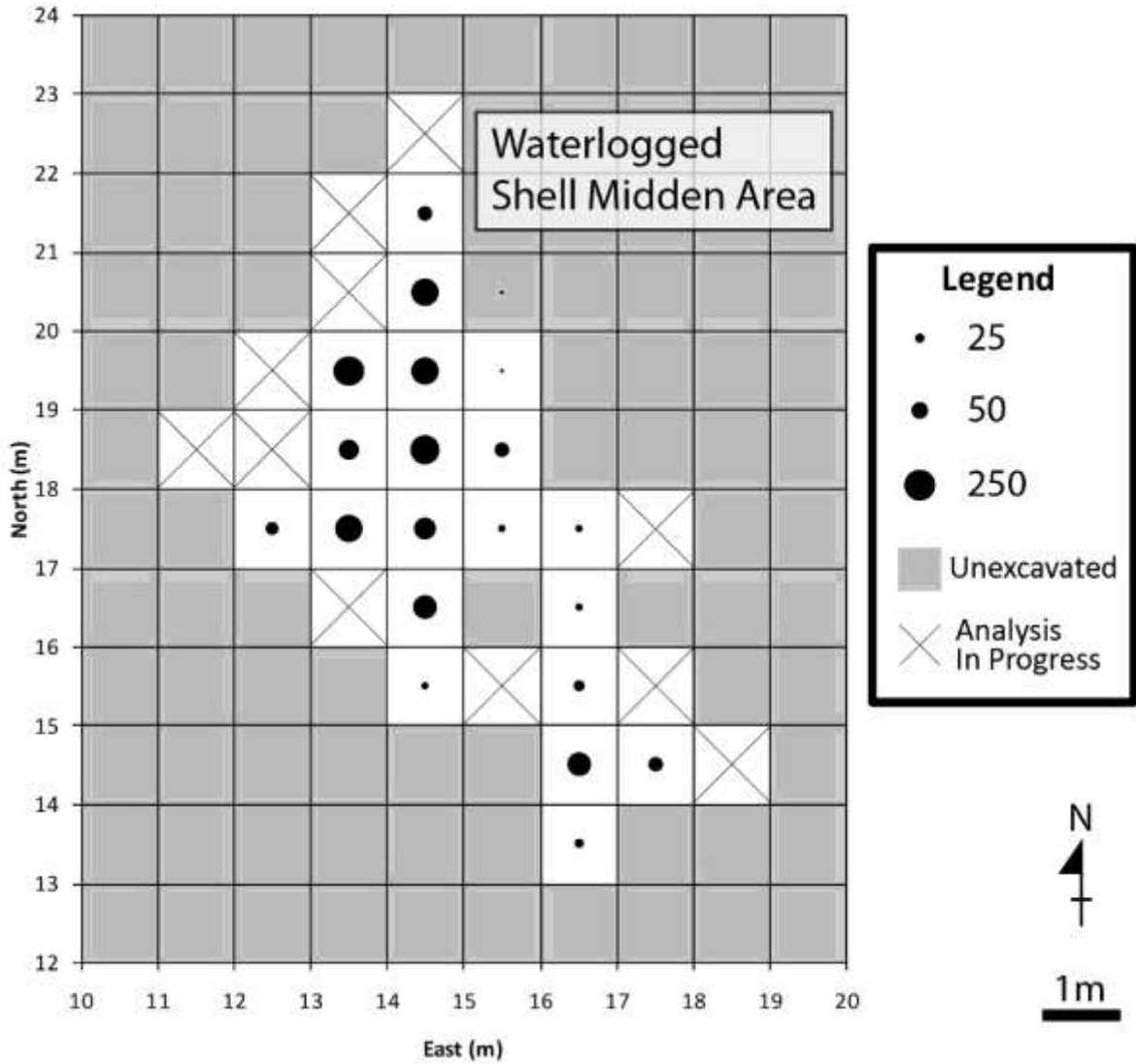


Figure 151. Horizontal distribution of basketry waste elements in the Qwu?gwes wet site (n=2,545). Circles are gauged to reflect the numbers found in each square. The densities appear to follow an ancient channel-like formation through the site from north to south (see Figures 22-23, 25, above).

Comparisons of Basketry Waste Elements from other Northwest Coast Wet Sites

For comparisons with Qwu?gwes, only two other Northwest Coast wet sites that have basketry waste elements reported are discussed, the Hoko River site (45CA213; located approximately 19 miles east of the northwest tip of the Olympic Peninsula; Croes 1995), and Sunken Village (35MU4) on the confluence of the Willamette and Columbia Rivers in Portland, Oregon (Croes, Fagan and Zehendner 2009; Figure 152, for locations see map Figure 183). The large quantities

of waste materials at Qwu?gwes (n=2,549) and Hoko (n=1,495) suggest that basketry manufacturing was a common activity among the inhabitants of these sites. In contrast, the Sunken Village site (n=53) has revealed a much smaller amount of basketry waste materials consisting of thinned strips of bark and splints that are edge clippings discarded during manufacturing or repair of basketry items.

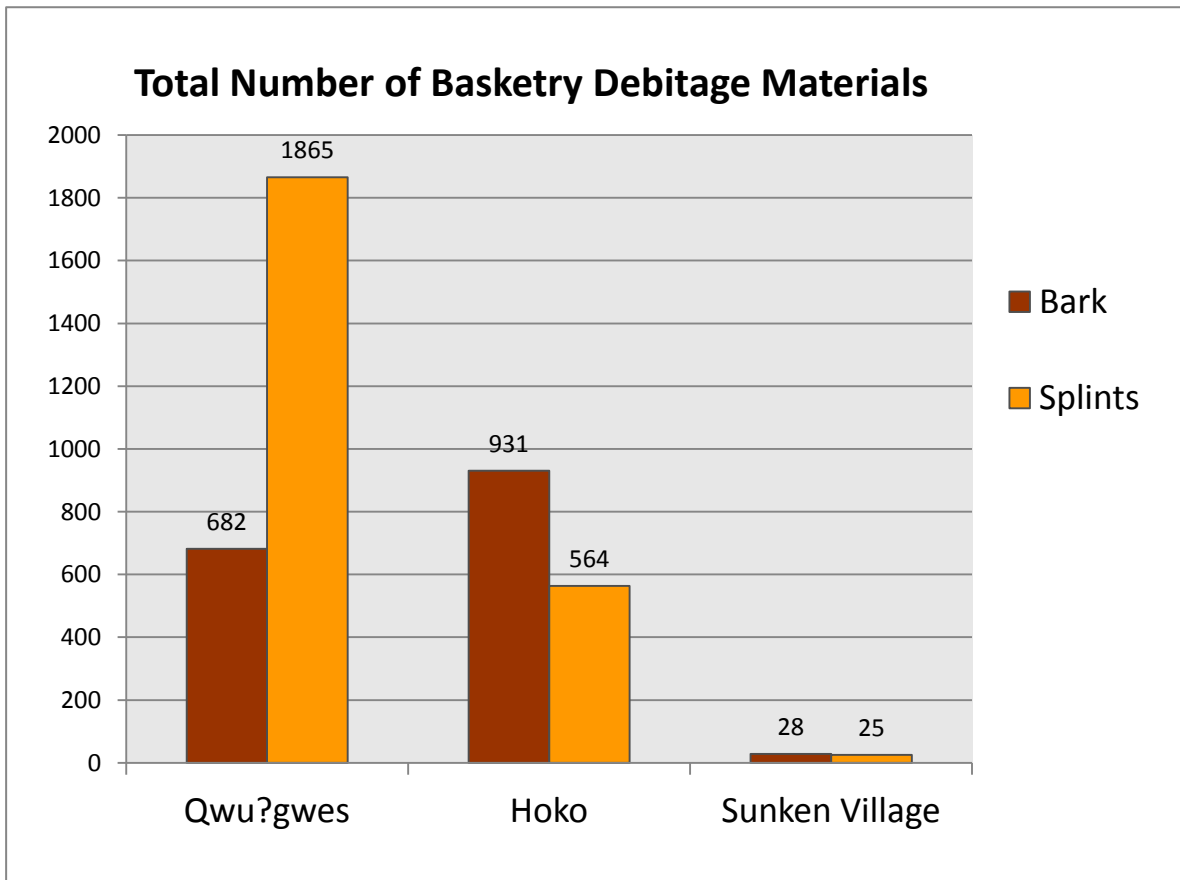


Figure 152. Quantities of basketry waste elements recorded at Northwest Coast wet sites—note the varying emphases on bark versus splint elements at Qwu?gwes and Hoko River sites.

Possible explanations for the differences between the large quantities of basketry waste elements recovered at Qwu?gwes and Hoko River, and lack thereof at Sunken Village, is that the debitage at the Sunken Village site, consisting of abundant lithic and woodworking debitage, was largely the result of male activities that took place while they were guarding acorn provisions during winter months, not from women at the site making basketry (Croes, Fagan and Zehendner 2009). Also, the small finds at Sunken Village may reflect the limited, three-week excavation at 35MU4 compared to several full summers of basketry waste materials excavated from Qwu?gwes and Hoko River wet sites. Nevertheless, the density of basketry waste elements per eight week summer field schools at Qwu?gwes and Hoko is still far higher than that seen at Sunken Village.

Basketry waste materials emphases differ between Qwu?gwes and Hoko River, with a major emphasis on splint (bough or root) material at Qwu?gwes (73%) and a heavier emphasis on bark at Hoko River (62%) (Figure 152). These proportions tend to reflect the kinds of basketry production emphasized at these two wet sites. Both sites are major resource camps, and the plant used to derive splint boughs, roots, and bark, at both sites is commonly western red cedar (*Thuja plicata*); therefore, the difference in emphases probably reflects a difference in cultural preference.

The low number of basketry waste elements recorded from Sunken Village reflects a relatively equal use of splints (47%) and bark (53%).

In comparing preliminary measurements, Qwu?gwes and Hoko River are analyzed since they have sizable collections.

Width. The average width of bark basketry waste strips at Qwu?gwes is 0.7 cm (SD=0.41 cm, N=681) and the Hoko River examples are about the same dimensions, with a mean width of 0.7 cm (SD=0.5 cm, N=927).

Similarly, the Qwu?gwes splint bough/root elements, with a mean width of 0.42 cm (SD=0.32 cm, N=1,868) were similar to the Hoko River examples, with a slightly wider mean of 0.7 cm (SD=0.5 cm, N=542).

Thickness. Measurements of Qwu?gwes bark strip thickness (Mean=0.16 cm, SD=0.43 cm, N=681) indicate that they are thicker and have a much wider standard deviation than those from Hoko River (Mean=0.10 cm, SD=0.06 cm, N=927). One possible reason for the difference in thickness may be that two main barks were used at Qwu?gwes, bigleaf maple bark (*Acer macrophyllum*) and cedar bark, whereas Hoko River appears to have employed mainly cedar bark.

The mean thickness of Qwu?gwes cedar splint bough/roots average 0.14 cm (SD=0.14 cm, N=1,868), similar to splints at Hoko River with a mean of 0.11 cm (SD=0.06 cm, N=542).

Length. At Qwu?gwes the length of bark strips average 5.12 cm (SD=3.08 cm, N=682) compared with Hoko River where the mean length was 9.1 cm (SD=6.6 cm, N=927). Only 8 percent of the bark at Hoko was over 15.0 cm in length, with .001 percent at Qwu?gwes. This leaves essentially 100 percent of the materials recovered at Qwu?gwes falling in the category of being too small to be considered useable for making whole baskets, indicating that these pieces were most likely remnants that were trimmed off during the final steps of repair and production. Evidence often shows clean cutting of ends, a sign of trimming.

The length of Qwu?gwes splints basketry waste elements average 5.56 cm (SD=4.92 cm, N=1,865) compared with similar average lengths at Hoko River where the mean length was 5.0 cm (SD=4.1 cm, N=542; Paden 1980a:228). Only .001% of all Qwu?gwes splints are over 25 cm long, the length that could be considered useful for making very small baskets.

In summary, the following conclusions were derived from an analysis of basketry construction/waste materials from the Qwu?gwes wet site compared to Hoko River and Sunken Village wet sites:

1. The presence of detritus of both splints and bark in considerable numbers suggested that the basketry made of several materials were manufactured or repaired at Qwu?gwes.
2. Splints and bark elements were intentionally thinned and correspond with thicknesses found in basketry items (see basketry analysis, below).
3. Almost all of the lengths of basketry waste materials would have been too small to be usable in the manufacture of the basketry items themselves. Therefore, most of these elements probably were pieces (1) trimmed from larger-sized elements that were used for basketry manufacture, (2) trimmed from the finished ends of basketry items, or (3) remnants of repair work.
4. The use of bigleaf maple bark at Qwu?gwes possibly demonstrated harvesting outside of regular gathering seasons. Hardwood bark can be gathered when cedar bark is not harvestable.
5. Qwu?gwes was a resource processing site, so it is reasonable to assume the majority of weaving and repair was centered around carrying loads of resources resulting from collecting/processing clams, fish, and/or game. These activities are labor intensive, requiring the basketry to undergo extreme stress in use. This fact would require frequent repairs and replacements.

Discrete Basketry Artifacts Recovered

Basketry items—which include both baskets and mat forms—were well-preserved in the Qwu?gwes intertidal shell-midden wet area deposits, though often fragmented and discarded. These were complex artifacts exhibiting several diagnostic attributes (modes) and different basketry forms (types). The basketry materials, construction techniques, shapes and types used at this wet site are examined here and compared with those of other Northwest Coast wet sites. Since basketry is a complex artifact category, it is particularly useful for comparative studies, revealing relationships among wet sites in different localities through time and space (Croes 1977, 1995, 2005, Croes, Fagan and Zehendner 2009). In addition to these technological and stylistic characterizations and comparisons, the functional interpretations of basketry objects from Qwu?gwes is discussed. Also, an attempt is made to delineate their role in the overall activities of the early Squi-Aitl peoples.

In all, 26 fragmented basketry items were recorded from the Qwu?gwes wet site, mostly in the wet channel found running through the site (Figure 152.1). Seven main categories of basketry have been delineated, listed in order of frequencies: (1) open-twined small to large “pack” baskets of cedar splints (N=8, though some of these are very fragmented) (2) bark checker weave matting, sometimes with grass-like element overlay decoration (N=6), (3) twill on bias, bark bands, possibly from tumpline straps (N=5), (4) fine twill weave bark basketry with grass-like element overlay creating design (N=1), (5) fine twill weave splint basketry (N=1) and (6) plain twined basketry (N=2). We also find isolated rim fragments (N=3) and isolated basket handles (N=1).

Basket Count by Unit, 1999 -2009

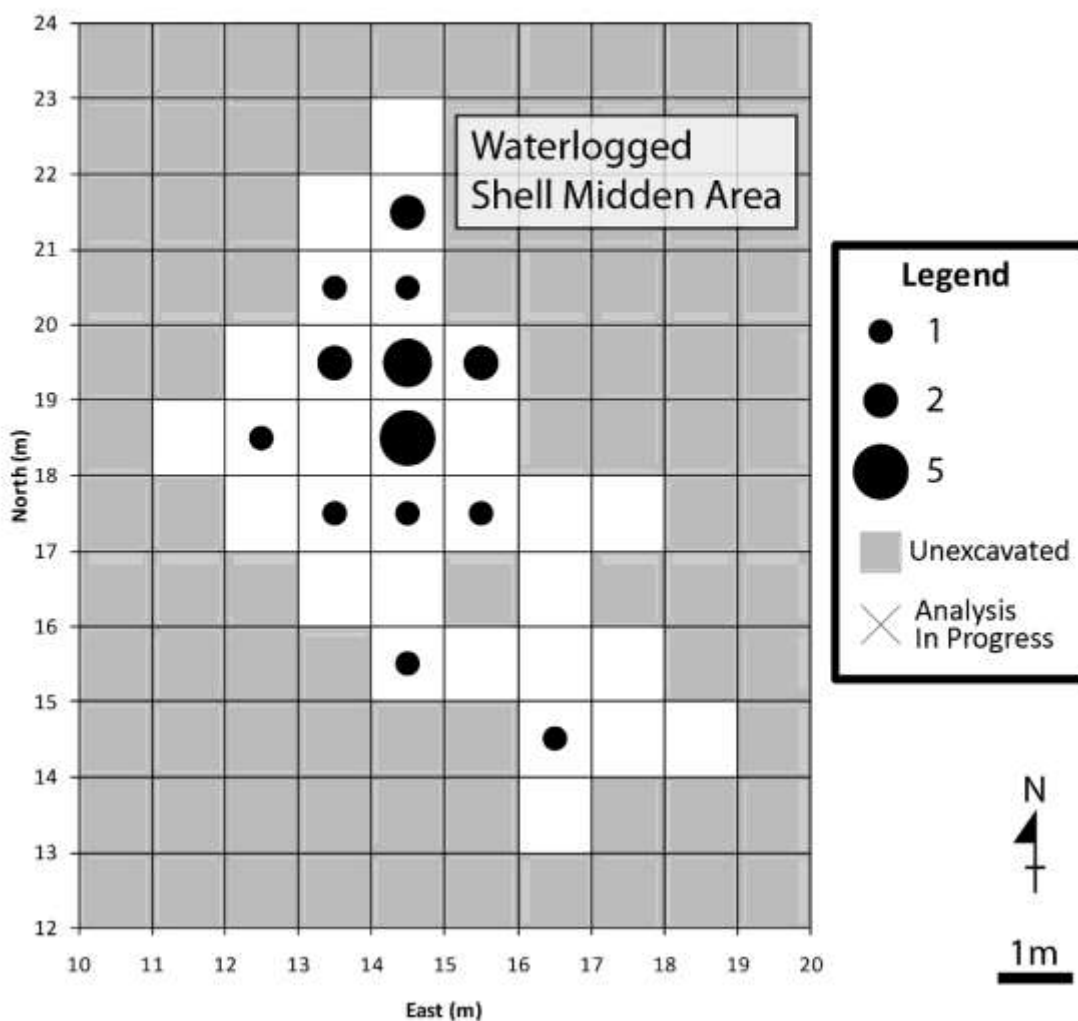


Figure 152.1. Horizontal distribution of discrete basketry artifacts in the Qwu?gwes wet site (n=26). Circles are gauged to reflect the numbers found in each square. The densities appear to follow an ancient channel-like formation through the site from north to south (see Figures 22-23, 25 above).

Qwu?gwes Basketry Attributes (Modes)





The attributes (modes) of Qwu?gwes basketry is considered first, followed by descriptions of basket types and how they were distributed in the site. Functional considerations follow the basketry classification. In each case, comparisons of Qwu?gwes basketry attributes (modes), types, and functional categories is compared with those from other Northwest Coast wet sites.

Tribal traditional knowledge has been invaluable in interpreting the basketry discovered at the site, and these insights are included in the text.

Construction Materials

Split inner bark, boughs, and roots were used in making Qwu?gwes basketry (Table 22). The identification of the plant species used in making basketry was accomplished by visual identification by basketry makers from the Squaxin Tribe and through cell-structure microanalysis (see XVc. Cellular Identification of Wood/Fiber Artifacts).

Table 22. Basketry materials defined.

<u>Plant</u>	<u>Plant Part</u>	<u>Modification; X-Sec.</u>	<u>Name</u>
1. <i>Thuja plicata</i>	+ root	+ curvilinear split splints	 Cedar Root Splints
2. <i>Thuja plicata</i>	+ boughs (limbs)	+ flat split splints	 Cedar Bough Splints
3. <i>Thuja plicata</i>	+ inner cortex of bark	+ split ribbon strips	 Cedar bark Strips
4. <i>Acer macrophyllum</i>	+ inner cortex of bark	+ split ribbon strips	 Bigleaf Maple bark Strips

The inner bark of both cedar (*Thuja plicata*) and bigleaf (or broadleaf) maple (*Acer macrophyllum*) was commonly used for making plaited baskets, matting and tumpline-like belts (n=11, 42%). All examples have not been identified as to whether they are softwood inner bark (cedar) or hardwood inner bark (maple), but further research will indicate their identifications.

The most common basketry material, especially for baskets, at Qwu?gwes was splint-conifer cedar bough or root (n=15, 58%). The abundant and sturdy burden baskets, often referred to as clam baskets, that are found at the site consist of a body weave of splint warps (vertical elements) of cedar boughs, and typically open twined wefts (horizontal elements) of either splint

cedar root or boughs. The bottoms, where preserved, are in a twill weave of splint cedar boughs. This construction created a strong combination of materials.

In general, comparison to construction materials found most often at other Northwest Coast wet sites, Qwu?gwes exhibits an emphasis on splint basketry construction materials (in both the basketry waste elements (73%) and basketry items (58%), followed by bark construction materials (basketry waste elements (27%) and basketry items (42%) (Figure 153). As seen in approximately 700 year old, northern Lushootseed area wet sites at Fishtown and Conway, the general emphasis is on splints basketry (Figure 153) and reflects in overall site similarities seen in analyses of all attributes, below (Figure 184, below).

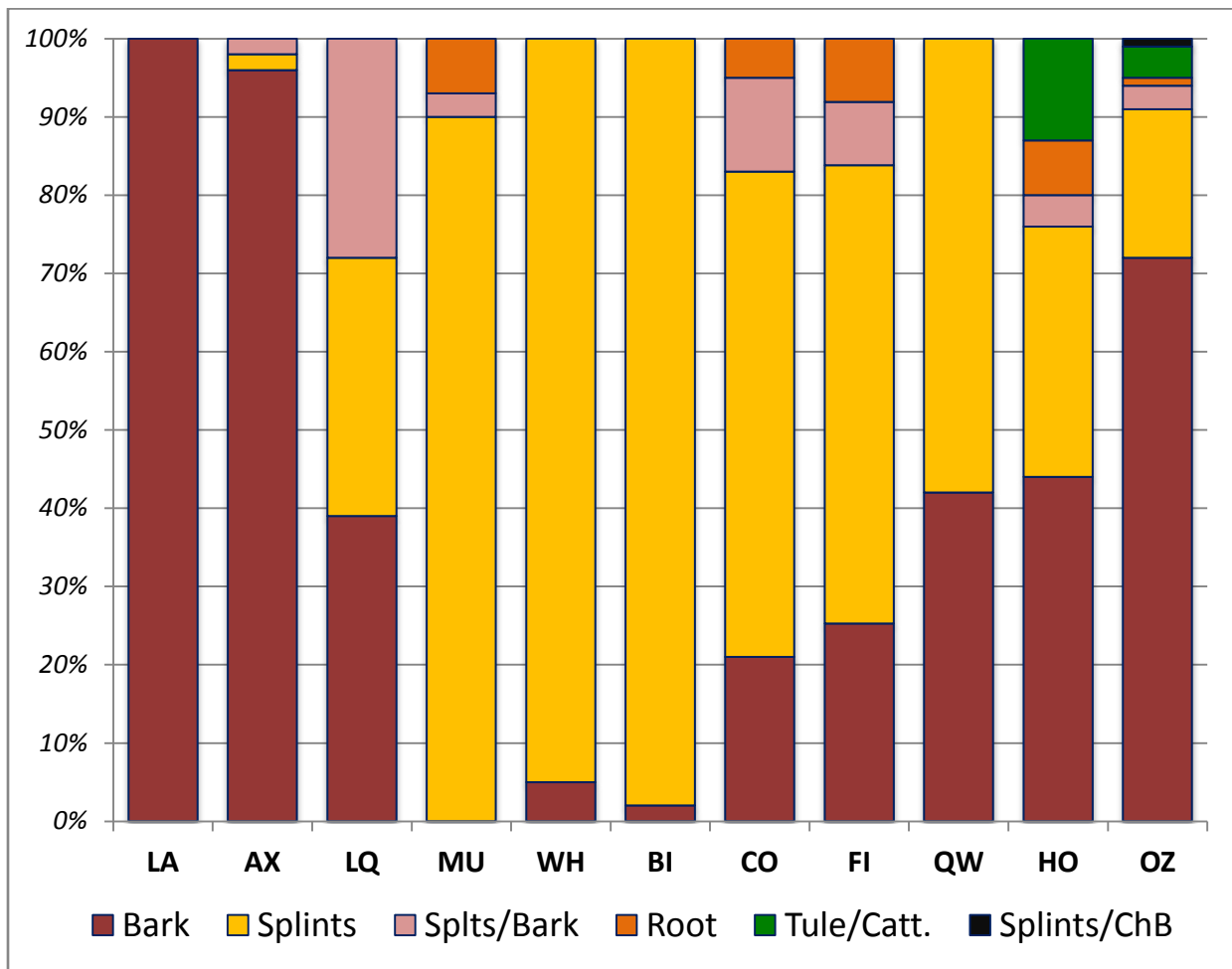


Figure 153. Northwest Coast wet site basketry construction material emphases: LA=Lachane (N=27), AX=Aexti (N=46), LQ=Little Qualicum River (N=18), MU=Musqueam NE (N=130), WH=Water Hazard (N=102), BI=Biederbost (N=41), CO=Conway (N=42), FI=Fishtown (N=12), QW=Qwu?gwes (N=26), HO=Hoko River (N=202), and OZ=Ozette Village (N=446) (see map, Figure 183, below).

Construction Techniques

Several different basketry construction techniques were noted (Figures 154-155). These techniques can be divided into two categories of weave: plaiting and twining. Plaiting is often defined as an interweaving of *single* weft elements on alternate sides of the warp elements and twining as interweaving by twisting or turning of *two* weft elements on either side of the warp elements (Croes 1977:49). The terms weft and warp are typically defined as follows: weft—the horizontal engaging element of the weave and warp—the vertical engaged element of the weave (for more detailed definitions of weave techniques, see Croes 1977:49-64).

Twining:

Open twining—Nine baskets body weaves are in open twining at Qwu?gwes, certainly a common weave for the “clam” burden baskets at the site (Figure 154).

Plain twining—Two examples of what appear to be basket fragments have close spaced twining weaves (Figure 154).

Plaiting:

Checker—Five examples of fragmented matting and/or flat bags are made with the one-over-one-under plaiting technique (Figure 155).

Twill—Two examples of twill weave, 2 over 2 weave, are recorded from Qwu?gwes as body weaves, one of bark and one of splints, and two as a basket bottom weaves made in splints.

Twill on bias—This technique is recorded for five bigleaf (or broadleaf) maple inner bark (*Acer macrophyllum*) bands, and, though the ends are often fragmented, these bands originally may have been from belts or tumplines straps that would have been attached to loop handles on “clam” burden baskets for packing (Figure 155).

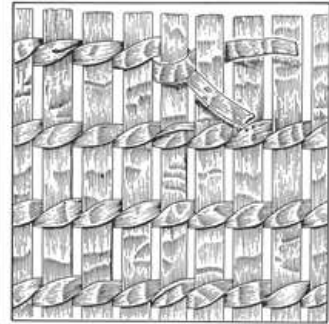
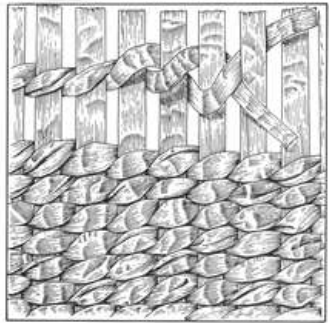
	No. of Weft Elements (per row)	Arrangement of Weft	Row Placement	Orientation of Weft/Warp to Basketry Plane	Name and Illustration
1.	2	+ The weft is twined one element in front, and one element behind each warp.	+ open spacing	+ horizontal/vertical	<p data-bbox="1472 456 1633 479">Open Twining</p> 
2.	2	+ The weft is twined one element in front, and one element behind each warp.	+ close spacing	+ horizontal/vertical	<p data-bbox="1472 894 1633 917">Plain Twining</p> 

Figure 154. Definitions of Qwu?gwes basketry twining techniques


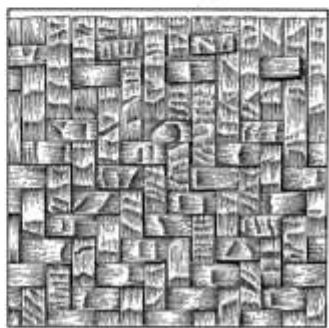
	No. of Weft Elements (per row)	Arrangement of Weft	Row Placement	Orientation of Weft/Warp to Basketry Plane	Name and Illustration
1.	1	+ The weft element is plaited in front of one warp element and behind the next warp element.	+ close spacing	+ horizontal/ vertical	<p data-bbox="1543 430 1648 462">Checker</p> 
2.	1	+ The weft element is plaited in front of two warp elements and behind the next two warp elements, etc.; the weft is staggered one warp element in each row.	+ close spacing	+ horizontal/ vertical	<p data-bbox="1533 868 1659 901">Twill 2/2</p> 

Figure 155. Definitions of Qwu?gwes basketry plaiting techniques

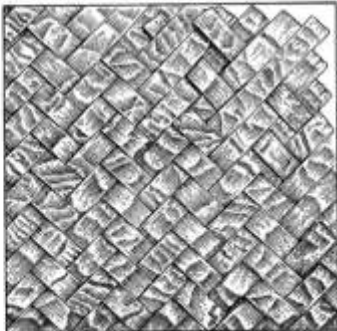
	No. of Weft Elements (per row)	Arrangement of Weft	Row Placement	Orientation of Weft/Warp to Basketry Plane	Name and Illustration
3.	1	+ The weft element is plaited in front of two warp elements and behind the next two warp elements, etc.; the weft is staggered one warp element in each row.	+ close spacing	+ oblique/oblique	→ Twill on Bias 

Figure 155. (Cont.) Definitions of *Qwu?gwe*s basketry plaiting techniques.

Gauge of Weave

The distribution of stitches per 2.5 cm (approx. 1 inch), corresponding to the major techniques of twining and plaiting, involves a range of plaiting gauge from course to fine: 2 to 7.5 stitches per 2.5 cm (M=4.81, SD=1.49, N=12), and a range of twining gauge from course to fine: 2 to 7 per 2.5 cm (M=3.58, SD=1.38, N=12) (course, medium, and fine gauge is based on Ozette plaiting and twining gauge of weave categories: Croes 1977:146).

Selvage Techniques

Qwu?gwe basketry revealed a number of techniques that were used for finishing basket rims and mat edges (Figure 156). Tuck and wrap rims were common on the “clam” burden baskets, with three having a double row of rim construction (see Figures 157-159, below), and two baskets had elaborate top hitching creating a sturdy and braid-like appearance along the top of the rim (Figures 160-161, below). The matting bands that appear to be from tumplines had a bent back edge selvage.

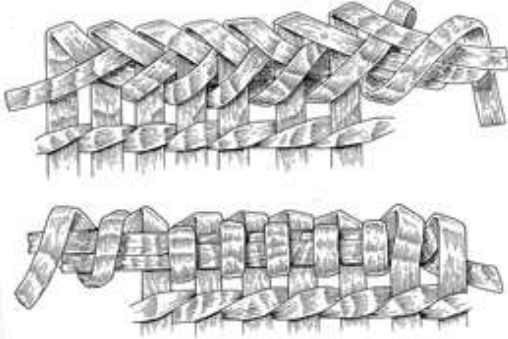

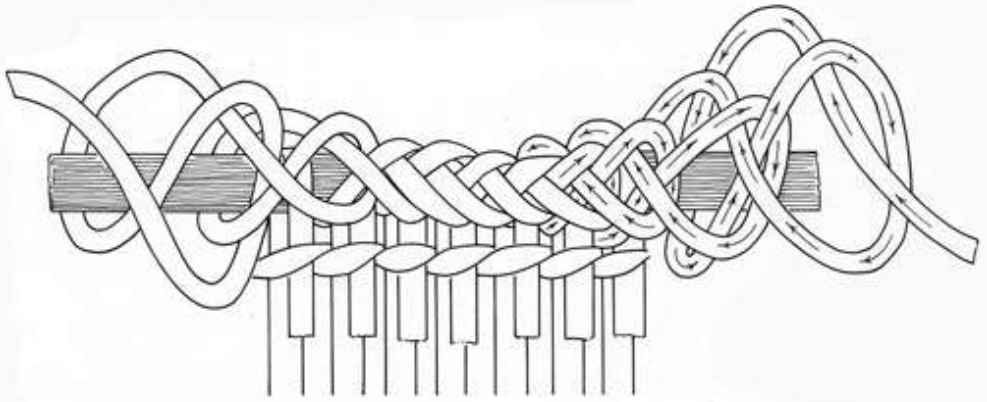
Warp Arrangement	Weft Arrangement	Name, Associate Basketry Forms, and Illustration
<p>1. Warp elements bent down approximately 90° to right or left over only the adjacent up-right warp and behind all other warps</p>	<p>+ single weft element wraps over bent down warp elements, across one up-right warp element, and back behind the rim again in a coiling fashion</p>	<p>→ TUCK AND WRAP (B)</p> 
<p>2. No definite warp</p>	<p>+ on bias (oblique) weft elements bent 90° back into the main body of the weave</p>	<p>→ BENT BACK (M)</p> 
<p>3. Warp elements bent down over thick reinforcement element</p>	<p>+ single weft element hitched back through itself and around horizontal reinforcement element</p>	<p>→ TOP HITCH (B)</p> 

Figure 156. *Qwu?gwe*s selvage techniques. The hitched basket (B) technique is sometimes in two rows along the top edge. The bent back edge is shown with checker on bias weave, though the *Qwu?gwe*s examples are twill on bias weave (the edge effect would be the same).



Figure 157. Example of double row Tuck-and-Wrap rim construction on *Qwu?gwes* basket (N19E12, 50-55; 2007; see illustration below).



Figure 158. Drawing of double row Tuck-and-Wrap rim construction showing how every other warp is bent and wrapped into alternating upper row and lower row by the single strand wrapping elements. Note the design created by leaving the bark on certain warp elements. See back side in Figure 159, below (Illustration by Candra Zhang, 2009 of N19E12, 50-55, in photograph above).

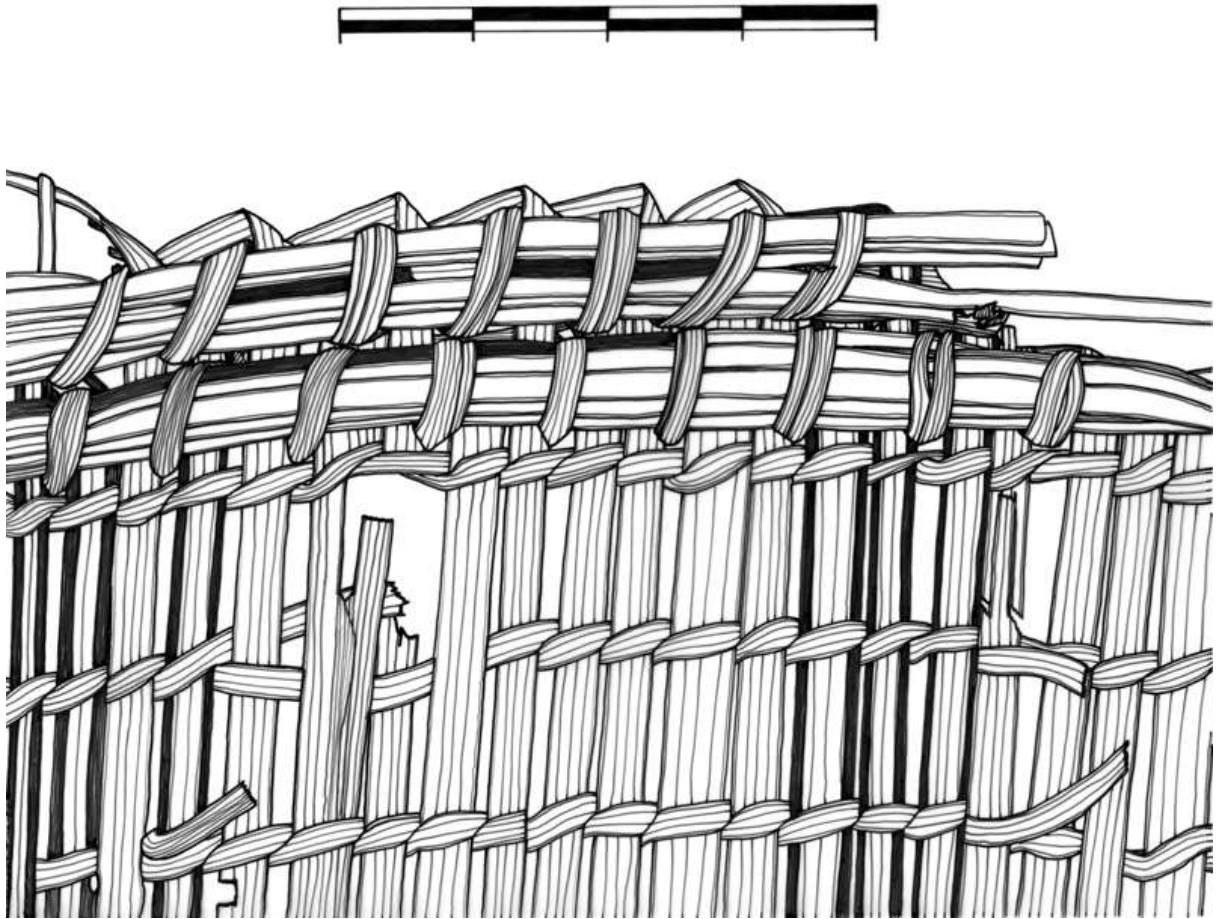


Figure 159. Drawing of back side of double row Tuck-and-Wrap rim construction on basket N19E12, 50-55 (photograph and drawing of front side and some back side areas above; Illustration by Candra Zhang, 2009).



Figure 160. Example of Top Hitch rim construction on *Qwu?gwe*s basket (N19E14a, 50-55; 2001).

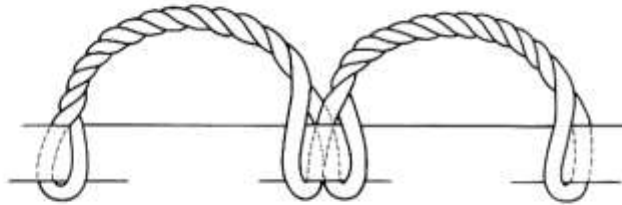


Figure 161. Second example of Top Hitch rim construction on *Qwu?gwe*s basket (N21E13, 35-40; 2009).

Extensions onto Basketry Items

Some Qwu?gwe “clam” pack baskets have 2-strand cedar bough handle attachments, including opposite two and three loop examples (Figure 162, also see some examples of looped handles in Figures 160-161, above). Though often fragmented and hard to reconstruct, the pattern seems to show opposite 2 loop handles with the center attachments having two strands attached below the rim (Figure 163-166, below) and another more continuous handle series with three loops having two strands attached below the rim in middle attachments with a space between the series of three loops (see examples Figures 164-166, below).

1. Double looped two strand cordage handles with two strands of cordage attached to the basket edge beneath the rim in center attachments: DOUBLE LOOPED HANDLES



2. Triple looped two strand cordage handles with two strands of cordage attached to the basket edge beneath the rim in center attachments: TRIPLE LOOPED HANDLES

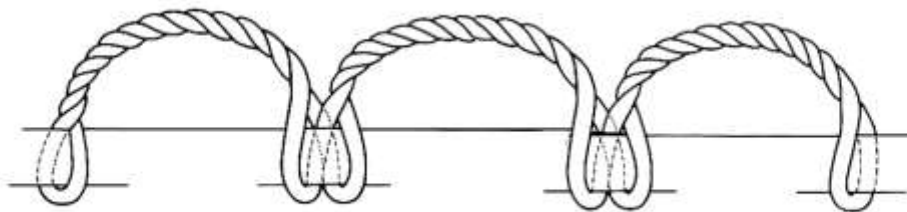


Figure 162. Examples of technique to attach looped handles, sometimes in sets of 3 loops and a space, and opposite double looped handles opposite each other (Figure 163, below).



Figure 162. Example of a double looped handles with two loops under the rim in the center (N19E14a, 50-55; 2001).

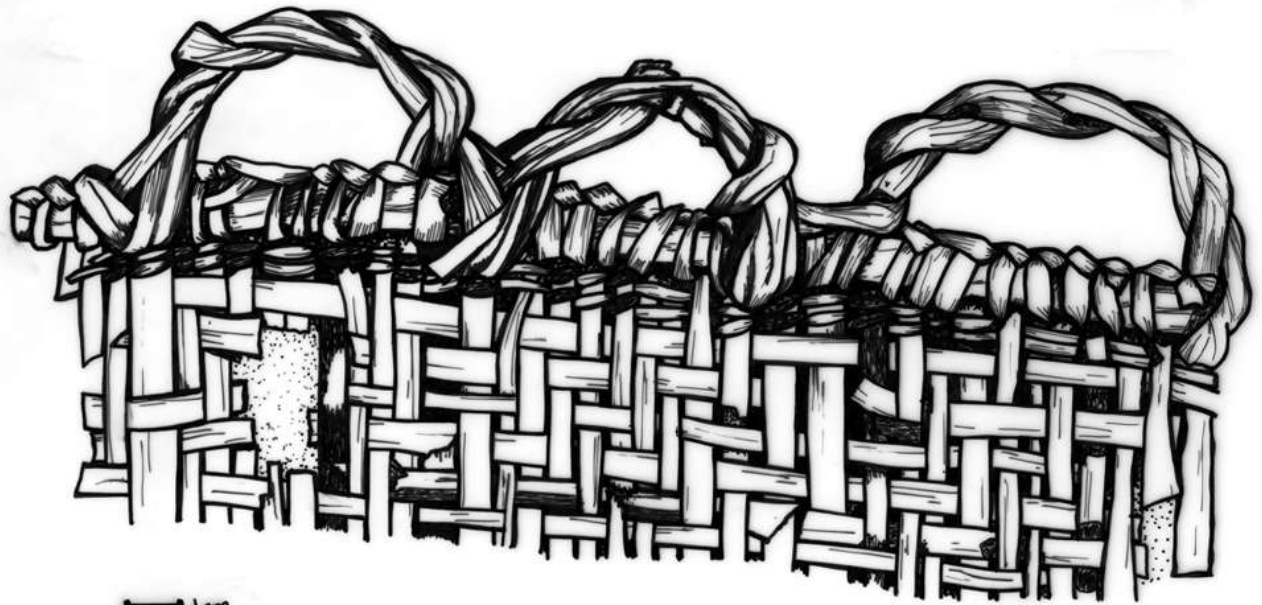


Figure 164. Example of three loop series with 2 strands under rim in center attachments (N21E13 25 2009). Illustration by Adrienne Frie, 2009.



Figure 165. Close up of 2 strands of looped handles under trim between center loops (N21E13 25 2009).



Figure 166. Two series of three loop handles with a space in between. A third series continues outside of picture in lower left (N21E13 25 2009).









Shapes

Baskets. Two main shapes are recognized, with the most frequent being a sub-rectangular, inverted, truncated cone. This shape has a narrow rectangular base and rounded corners (areas of expanded weave create the expansion). This shape distributes weight higher on the back of the carrier, since the basket expands from bottom to top. A second shape comes from one fragmented basket that appears to have an expanding, rounded cube structure (Figure 167).

Mats. Though many fragments of checker weave matting were found at Qwu?gwes, few examples of edge selvages were found helping to define them as mats or flat bags, nor did the fragments help to identify their shapes.

A number of twill-on-bias bands were found, some with braided end line extensions. It was concluded that they were likely from “tumpline strap shapes,” although they could also be tie down braids used for corks on the bark nets (SIT, CRD 2009) (Figure 167).

Qwu?gwes Basket Shapes Defined

	<u>Shape of Base</u>	<u>Side Profile</u>	<u>Shape of Mouth</u>	<u>Illustration</u>	<u>Name of Shape</u>
1.		+ 	+ 	→ 	Sub-rectangular, Inverted, Truncated Cone
2.		+ 	+ 	→ 	Expanding, Rounded Cube

Qwu?gwes Mat Shapes Defined


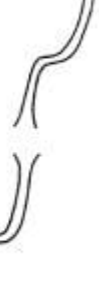
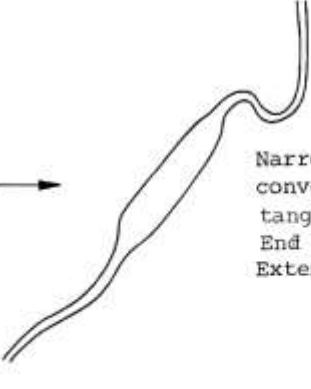
	<u>Edge Profile</u>	<u>End Profile</u>	<u>Illustration</u>	<u>Name of Shape</u>
1.	--Tumpline Strap Shape 	+ 	→ 	Narrow Bi-convex Rectangle with End Line Extensions

Figure 167. Qwu?gwes basket and mat shapes defined.

Reconstructed Qwu?gwes Basketry Classes/Types

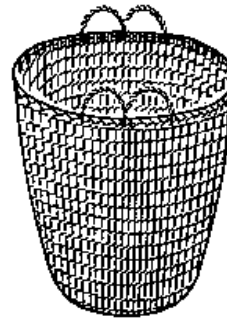
As at most Northwest Coast wet sites, the recovery of complete, intact basketry objects at Qwu?gwes was infrequent. In order to reconstruct the original basketry classes, therefore, it was necessary to carefully consider all of the basketry fragments as well as the complete, or almost complete, examples. Thus, the general construction materials and techniques used in most of the recovered fragmentary items were recorded. The more complete examples provided important data concerning base and body construction techniques, shapes, sizes, ornamentation techniques, selvage construction, and basketry attachments.

Data compiled from both fragmentary and complete specimens have been used to formulate Stylistic/Technological (S/T) basketry classes (types; Figure 168). These S/T types are paradigmatically defined by a combination of: (1) construction material, (2) shape, (3) base-construction techniques, (4) body-construction techniques, and (5) basketry attachments. This framework is similar to that used to define basketry classes from other Northwest Coast wet sites (Croes 1977, 1995).

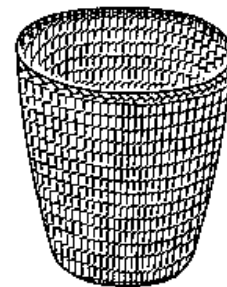
Each class may include fragmented examples missing certain attributes (modes). However, these examples are placed into assigned classes since it is hypothesized that they probably had the suggested modes when complete. Therefore, these classes are considered “reconstructions” of the data and their redundancies. Basketry fragments that did not have enough remaining to reconstruct original shapes are included at the end of the classification as Qwu?gwes fragment types.

A. Qwu?gwes Basket Types Defined

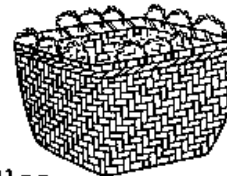
QW-B1. MATERIAL: cedar splints
SHAPE: ovate, inverted, truncated cone
BASE CONSTRUCTION: twill 2/2
BODY CONSTRUCTION: open twining
EXTENSIONS: Opposing double looped handles



QW-B2. MATERIAL: cedar splints
SHAPE: ovate, inverted, truncated cone
BASE CONSTRUCTION: twill 2/2
BODY CONSTRUCTION: open twining
EXTENSIONS: none



QW-B3. MATERIAL: cedar splints
SHAPE: expanding, rounded cube
BASE CONSTRUCTION: twill 2/2
BODY CONSTRUCTION: twill 2/2
EXTENSIONS: continuous, 3 loop series,
2 strand under, looped handles



B. Qwu?gwes Mat Types Defined

QW-M1. MATERIAL: maple bark
SHAPE: narrow biconvex rectangle with end
line extensions
BODY CONSTRUCTION: twill on bias
EDGE/END: bent back/braid line
extensions
SIZE: small

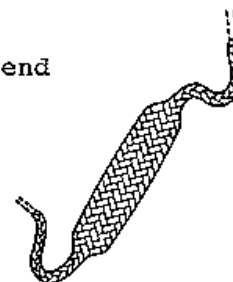


Figure 168. Reconstruction and frequencies of occurrence of Qwu?gwes basketry stylistic/technological classes.

C. Qwu?gwes Fragment Types Defined

QW-F1. MATERIAL: bark
SHAPE: indeterminate
BODY CONSTRUCTION: checker
SELVAGE: ?



QW-F2. MATERIAL: bark
SHAPE: indeterminate
BODY CONSTRUCTION: twill
SELVAGE: ?



QW-F3. MATERIAL: splints
SHAPE: indeterminate
BODY CONSTRUCTION: plain twining
SELVAGE: double row tuck-and-wrap



Figure 168. (Cont.) Reconstruction and frequencies of occurrence of Qwu?gwes basketry stylistic/technological classes

Squaxin Island Tribe CRD Individual Basketry Descriptions

SIT, CRD staff examined every numbered piece of basketry, including the larger examples. The splint basketry and baskets were made from cedar splint, and were the most prevalent basketry at this resource camp. Many examples were small pieces, either woven or braided. Several pieces were broken, creating numerous pieces, and, if they remained intact, the weaving numbers would have been considerably lower. The following paragraph describes each piece of specific basketry in detail. Since the preceding discussion is more a general classification and characterization of Qwu?gwes basketry attributes and types, a cultural description of each major piece of basketry by the Squaxin Island Tribe Cultural Resources Department was also needed. The charts characterize all of the pieces, while the written descriptions attempt to present a clearer understanding of the woven basketry materials.

N19E12, 50-55; 8-9-07

The weave was two sizes; the end weave was a fold over design. In some areas the end weave was very clear but at different lengths. This piece was definitely woven to fit a particular item and was a custom weave.

N19E12, 50-55; 8-9-07

Scattered material in pieces, very little intact in this sample. Three pieces, using thick bark, demonstrate a hook weave where thin rope can possibly go through and bind hook weaves together, the hook weave is embraced with slip knots. Possibilities: End of mat could be hung from this piece.

N19E14, 80-85; 8-13-02

This sample represents a utilitarian basket made of cedar splint with the majority of the pieces are remnants. Only 2 places show the weave. A few pieces have bark are attached, leading one to believe that places on this basket had bark left on to create a design on the basket. Several pieces are not attached to the basket and may not be a part of it.

N19E12a, 50-55; 8-8-07 (see Figure 170, below)

This sample is an extremely large woven piece, probably a basket fish trap. The rim is approximately 6 feet at the opening with a woven strap handle made of double strand rope cordage. The strap is approximately 1 foot long. Made of cedar bough, over 90% of the warps are split cedar bough using the center pieces of the bough. One side of fish trap (side A) demonstrates a design using the outer bark remaining on splint cedar bough to create a dark colored element. The darker colored warps are not consistently spaced, indicating a design was being incorporated into the fish trap. In addition, the wefts were of alternating design using split cedar bough with and without bark. From the rim of the fish trap, the first eight rows of weft were woven with one with bark and one plain weft. The 8th, 9th, and 10th rows were all plain wefts with no bark present. The inside of the fish trap basket demonstrated intact wefts with and without bark weave, making an ideal camouflage while fishing in the water.

The other side (side B) of fish trap demonstrates the weave was identical to side A. At the 6th row a repair is present, using 2 cedar bark strips as the twined weft. The cedar bark repair is random and not consistent (Figure 170 (right), below). It is repairing a spot in the fish trap which had broken, making it a useless trap for holding small fish.

N19E14a, 50-55; 8-7-01 (see Figures 160, 163, above)

This sample is a cedar bough basket with fine woven warps and wefts. Over 95% of the warps are from strips of inner cedar bough. The rim is made of braiding and has looped handles, sometimes called “basket ears by weavers.” The warps are made of cedar bough and demonstrate plain and barked pieces in a random color contrast pattern. These random patterns could be a design chosen by the weaver.

N19E14b, 50-55; 8-8-01 (see Figure 169 (right), below)

This sample is a partial basket piece. Made of cedar bough, the artifact is such a small piece of basketry, the design is hard to locate since most of the outer bark has deteriorated. This piece has looped handles with the rim coiled using all bark pieces. The wefts are barked and plain,

woven over warps. The warps demonstrate the following sequence: 1 bark, 2 plain, 2 bark, 1 plain, 1 bark, 3 plain, 1 bark 8 plain, 1 bark, 8 plain, then 1 bark. This pattern is definitely a design and not random.

Summary

Most baskets are constructed of cedar bough and utilitarian in style. This conclusion is reasonable since Qwu?gwes is a resource camp, and basketry has to hold up to excessive use and weight. The designs are unique and simple in nature, meaning the ancient basketry was not yet influenced by euro-demand for tourist style basketry designs/patterns but demonstrate family identification and culture.

The overwhelming majority of the pieces of basketry and braiding are hard to identify or interpret since they are small pieces and could be used in multiple ways.

The braided material does, however, demonstrate the need to tie or bind, using what is brought to the resource site or possibly using material such as maple bough bark when other barks, especially cedar, are out of season and not available for harvest.

Functional Analysis of Qwu?gwes Basketry Stylistic/Technological (S/T) Types

The reconstructed S/T basketry classification system (Figure 168) is used to discuss the general functional characteristics of basketry recovered at Qwu?gwes, and detailed for individual examples by SIT, CRD above. In the analysis that follows, the different classes have been grouped into functional “sets” (see Croes 1977:261). These sets are organized according to how the classes appear (1) to correlate technologically, and (2) in regard to the total site context in terms of both associated artifacts and a site’s overall functional context. Where appropriate, general ethnographic analogies and comparisons with similar basket classes are made.

Functional Set I /QW-B1, QW-B2/

The S/T classes in this functional set are the most common basket and basketry class at Qwu?gwes (N=8, 31% of all basketry items and 88% of items considered baskets). These are defined as small to extra large, open-twined, splint bough/root, clam/utility baskets with an inverted, sub-rectangular, truncated cone shape (Figures 169-172).

Though often only fragmentary pieces have been excavated, enough examples have been recovered to determine their surface area in square decimeters and, therefore, general size categories: small, intermediate, large and extra large (see size categories established by Croes 1977:160-172). The mean size of this Functional Set I is 27 square decimeters—which is considered intermediate in size (SD=32, N=8). They range from very small (3.13 square

decimeters, N18E13; 65-70; Figure 169), intermediate (31.82 square decimeters, N19E14, 50-55 and N19E12b, 50-55; Figures 169 and 171) to extra large (102 square decimeters, N19E12a; 50-55; Figure 170). Even in fragmentary form they average intermediate in size, 27 square decimeters, though present a wide standard deviation (32 square decimeters)).



Figure 169. (Left) small size Functional set I open twined, splint cedar basket with remnants of twill weave base(N18E13; 65-70) (Right) intermediate size Functional Set I basket with double looped handles and full round (N19E14b; 50-55).



Figure 170. (Left) Extra large size Functional set I open twined, splint cedar basket trap or basket being excavated (N19E12a; 50-55) (Right) intermediate size Functional set I basket (N19E12b; 50-55) found adhering to other side of extra large example—note bark twined repair on other side of this basket (N19E12a, 50-55).

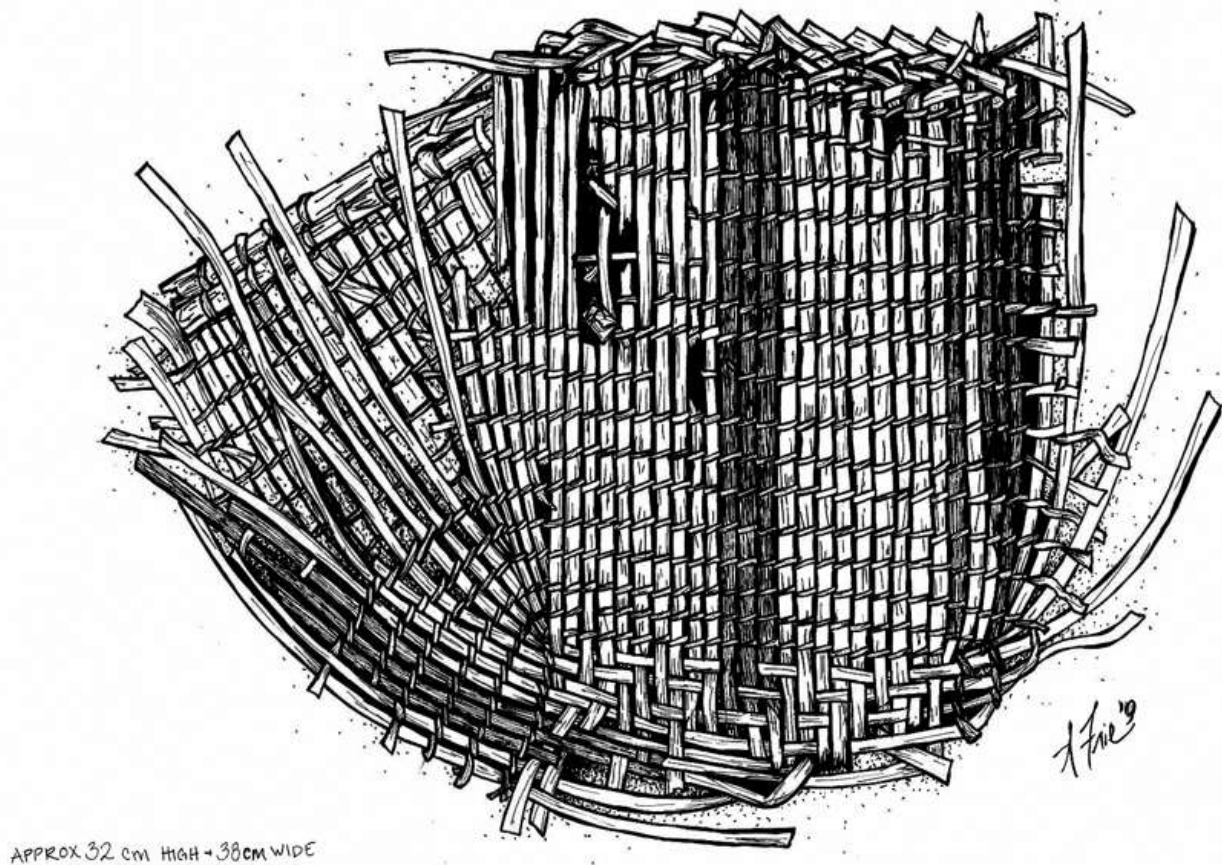


Figure 171. Drawing of well-made intermediate sized, open twined basket found underneath the large basket as shown in Figure 170, above. (N19E12b; 50-55; Illustration by Adrienne Frie, 2009).

The width and thickness of the warp elements of the baskets in Functional Set I were measured to determine the average splint dimensions sought by the basket makers (probably splint from cedar boughs in all cases). These were also compared to the overall splints basketry waste elements to see how similar the finished basket warps were to discarded elements. The largest QW-B1 basket trap or basket (N19E12a, 50-55, Figure 170) had a mean warp thickness of 0.14 cm (SD=0.07, N=93) and width of 0.63 cm (SD=0.13, N=93). The intermediate sized QW-B1 basket (N19E14b, 50-55, Figure 169, right) had a mean warp thickness of 0.14 cm (SD=0.16, N=35) and width of 0.47 (SD=0.16, N=35). The intermediate sized QW-B2 basket (N19E12b, 50-55, Figures 170, right, and 171) had a mean warp thickness of 0.13 cm (SD=0.12, N=36) and width of 0.46 cm (SD=0.12, N=36). The thickness of the splints from all three baskets, the aspect most under the basket-maker's control, was very consistent (0.13-0.14 cm thick). The width varied most, with the basket-maker selecting wider bough for the very large basket: 0.63 cm wide; and the intermediate baskets made with 0.45-0.47 cm wide splint boughs. Using an F test (variance ratio test), a comparison of the standard deviations of these basket warps' thicknesses and widths and found no significance difference when compared to the standard deviations of these measurement on basketry splint waste elements.

Open twined body weave gauge on these types of baskets ranged from a medium 4 stitches per 2.5 cm (N19E12b, 50-55, Figure 170, right, and 171) to a course gauge 1.5—2 stitches per 2.5 (N19E12a, 50-55, Figure 170). This weave allowed drainage of wet contents, such as clams, but its main propose was to hold and wash clean clams after digging (SIT, CRD 2005). This weave also provided air circulation for storage.

The very large, open twined example (N19E12a, 50-55, Figures 149, 170, above) may be a fish trap from its base weave, though it is unfortunately fragmented. Many of the warp elements coming down the sides of this basketry piece do not show signs of weaving into a base, so could have been narrowed as part of the end of a trap. A general example of this kind of open twined fish trap is illustrated by Hilary Stewart in her book on *Indian Fishing, Early Methods on the Northwest Coast* (Figure 172). Though not exactly how the Qwu?gwes people would use the artifact, it does show the course open twined weave and possibly how a Qwu?gwes trap could be set up in the tidal fish trap door near the site (see XXI. Fish Trap).

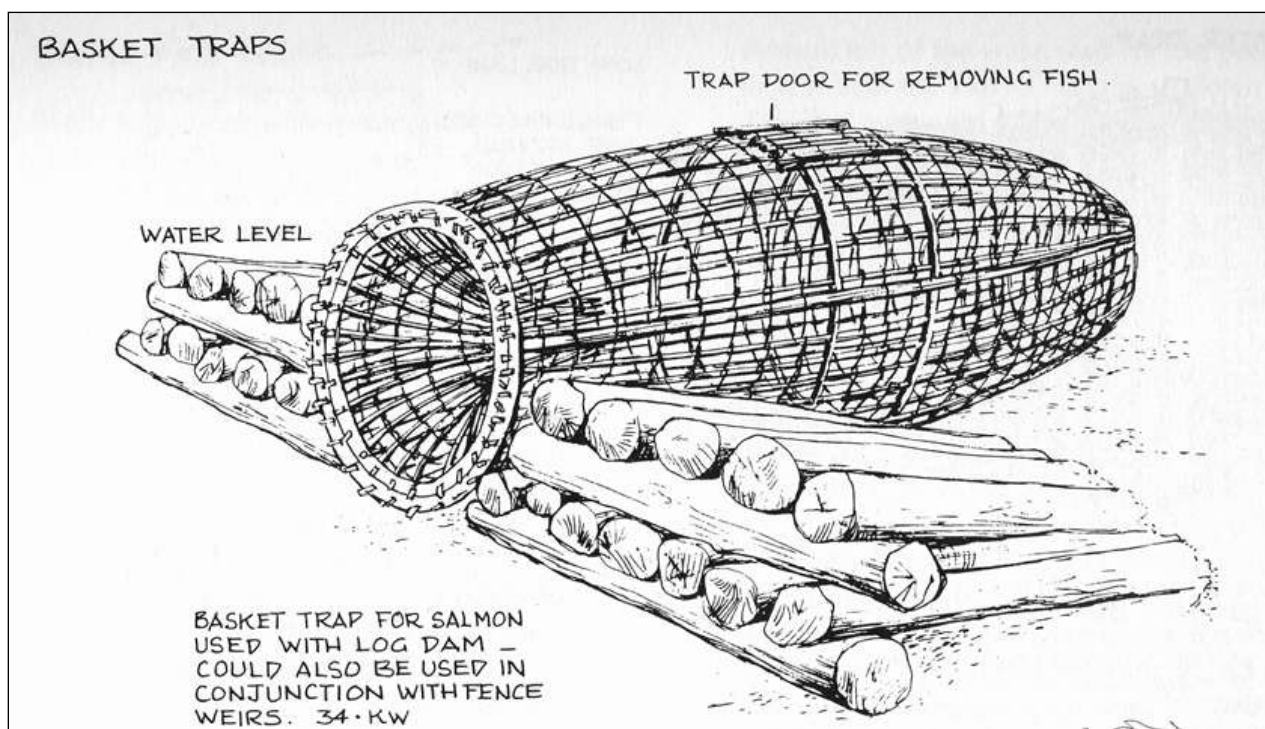


Figure 172. One example of how a large open-twined basket trap can be set up. One like the Qwu?gwes example may be placed in the door of the fish trap near the site. Reprinted with permission of the artist, Hilary Stewart from *Indian Fishing, Early Methods on the Northwest Coast*. Vancouver/Toronto: J.J. Douglas Ltd., Vancouver © Hillary Stewart 1977:117).

The QW-B1 basket class is very similar to the Lushootseed wet site open twined cedar splint pack baskets from Fishtown and Conway, including the double looped opposing handles on some, demonstrating a closer association of basketry types and styles for these approximately

500-1000 year old sites in this language area. Although they are approximately 200 kilometers apart, the statistical (cladistic) analyses of basketry shows these three sites are ancestrally related (Figure 184, below).

Ethnographically these artifacts are recorded as utility and/or pack baskets as well as food storage baskets in Coast Salishan territories. Reverend Myron Eells mentioned this general class of basket in 1887:

Baskets made of cedar limb split, the bark usually taken off, are woven. They hold commonly from a half bushel to a bushel. Those whose capacity is only a half bushel are ordinarily used for rough work, such as carrying fish, potatoes, clams, muscles [sic], and roots. The upper loops are made also of cedar twigs twisted, and in these the carrying strap is fastened (1887:627).

Another reference concerning the use of this kind of basket states that: “the loosely twined baskets were used by the Nisqually for storing dried foods. Often these baskets were lined with maple leaves” (Haeberlin and Gunther 1930:33). Further, “the open baskets every woman makes for herself. She needs large numbers of them for daily household use and for storing food” (Gunther 1927:222). Gunther also provides an accurate description of how these baskets were made.

Early photographs depict these Coast Salish pack baskets. One by Edward Curtis shows a large number of this type of basket in a picture entitled “Puget Sound Still Life” (Figure 173). Another photograph shows a young “Squaxin” girl in a field with this type of basket being used to gather hops (Figure 174).



Figure 173. Edward Curtis photographs of a Salish canoe with several QW-B1 and B2 type pack baskets (1907-1930).



Figure 174. This photograph labeled “young Squaxin girl holds a cedar basket used for gathering plants. Photo courtesy of the Squaxin Island tribe” is from the City of Tumwater web site: <http://www.ci.tumwater.wa.us/researchindianspg4.htm> . Note the looped handles and broken area in bottom left.

Functional Set II /QW-B3/

This badly fragmented basket was found in 2009 (Figure 175), representing the first of its kind at the site and demonstrates how new discoveries are made after 11 seasons. QW-B3 has a twill weave base (3-4 stitches per 2.5 cm, medium gauge) and twill body weave (5-6 stitches per 2.5 cm, fine gauge) (Figure 176). The twill warp and weft elements average a thin 0.11 cm thick (SD=0.38, N=30) and width of 0.46 cm (SD=0.13, N=30).

Enough of the basket (a little over ½) is preserved to reconstruct the shape proving to be an expanding rounded cube shape that would have stood 30 cm high (from base twining to rim). The top has an elaborate top hitch edge and is encircled by a series of three looped, two strand cedar bough cordage handles, with a space between the three loops and with two elements attaching under the rim on inside loops and one element on the outer edges of the three loops (see Figures 164, 166, above).

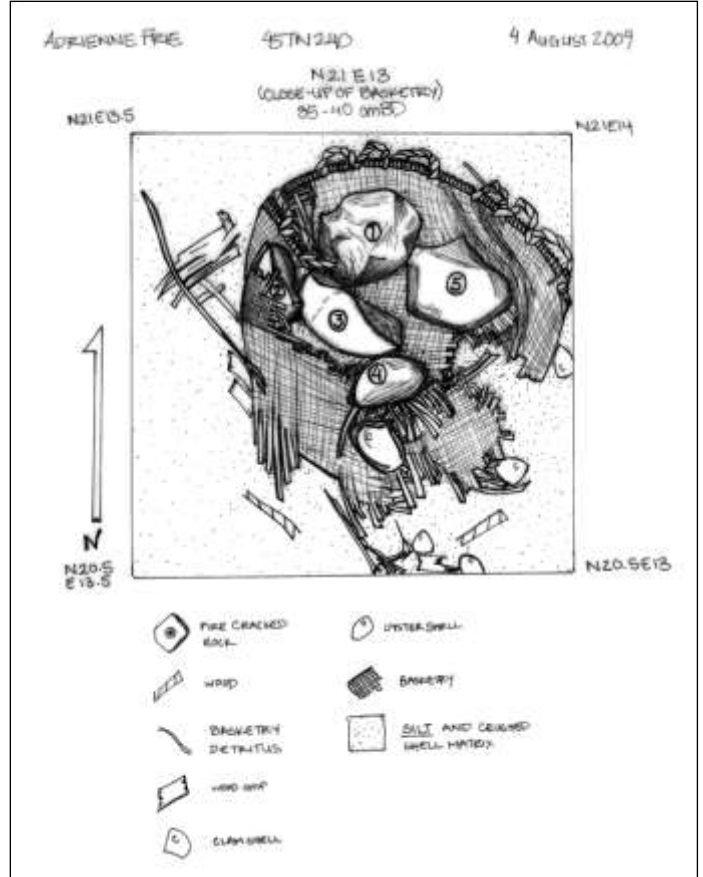
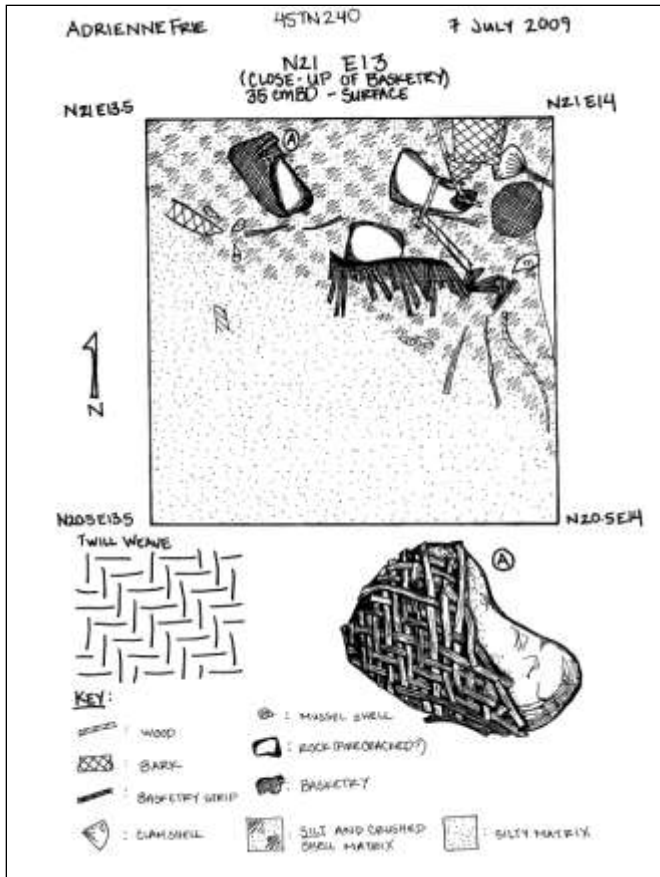


Figure 175. Plat map drawings of this twill weave basket as first encountered (left) and fully exposed (right) in 2009 excavations. Note the steaming rocks found in this fragmented basket, which may have been re-used as a mat to hold these stones (Illustrations by Adrienne Frie, 2009).

This intermediate sized basket was about 50% intact and appears to have been used more as a mat after it broke likely it held steaming rocks when discarded (Figures 175-176).



Figure 176. (Left) Functional Set II cedar splint, twill weave basket in situ with steaming rocks still in it; (Right) basket after removal and cleaning, note course gauge twill base weave in center and three looped staggered series of handles around rim (N21E13, 35-40; also see Figures 162, 164, 166 of handles and rim construction above).

This basket has some design left on its surface created by leaving bark on the outside of some of the warp elements.

A basket close to this type has only been found at the Ozette Village wet site, but often with continuous, two-strand, one under, cedar bough cordage looped handles (Croes 1977:309-321—Type OB29). This design was the single most common basket type at Ozette (N=46, 19% of the baskets). Usually these Ozette baskets were empty when found, though one (64/IV/41) was found upside down by a hearth in the plank house and contained twelve “boiling stones” (Croes 1977:316). Ethnographically, these baskets are poorly documented; however, one is described and illustrated in Otis Mason’s 1902 book on North American Indian baskets. He calls it a large fish basket, and on the border “is a scallop formed by a two-strand rope which passes underneath the border, back and through itself. Collected by G.T. Emmons (see Plate 152)” (Mason 1902:420). Mason also describes a similar basket of this class from the Clallam Indians (Croes 1977:320).

At Ozette, it was concluded that these numerous baskets served as food storage baskets in the house, to store the large winter supply of dried foods (fish and shellfish) (Croes 1977:321).

The main difference between Ozette OB29 and Qwu?gwes QW-B3 type baskets is the elaborate rim on the Qwu?gwes example as well as the 3 looped and space series of handles. In general, the Qwu?gwes example was also of finer gauge of weave with splint cedar boughs. Probably the spaced handle attachment, which is seen in different forms in ancient Salishan wet sites for 3,000 years, is distinctive of this style at Qwu?gwes. More basketry would need to be found to verify a style pattern at the site.

Functional Set III /QW-F1, QW-F2/

Six examples of plaited bark, both checker weave and twill (n=1), have been found, sometimes in large pieces (Figure 141, above, and 177-178); however, few have signs of edging so it is difficult to determine if they are mats or flat bags. Two have distinct light color overlay elements for design (Figures 177 and 178). Therefore, some of these finds are probably more than general matting. Also, the examples with overlay decoration are made of bigleaf (or broadleaf) maple bark (*Acer macrophyllum*), with a fine gauge plaiting (6-8 stitches per 2.5 cm).



Figure 177. Fine gauge twill weave fragment found on a butter clam shell with overlay grass-like material for design (arrows); (N20E14, 60-65).

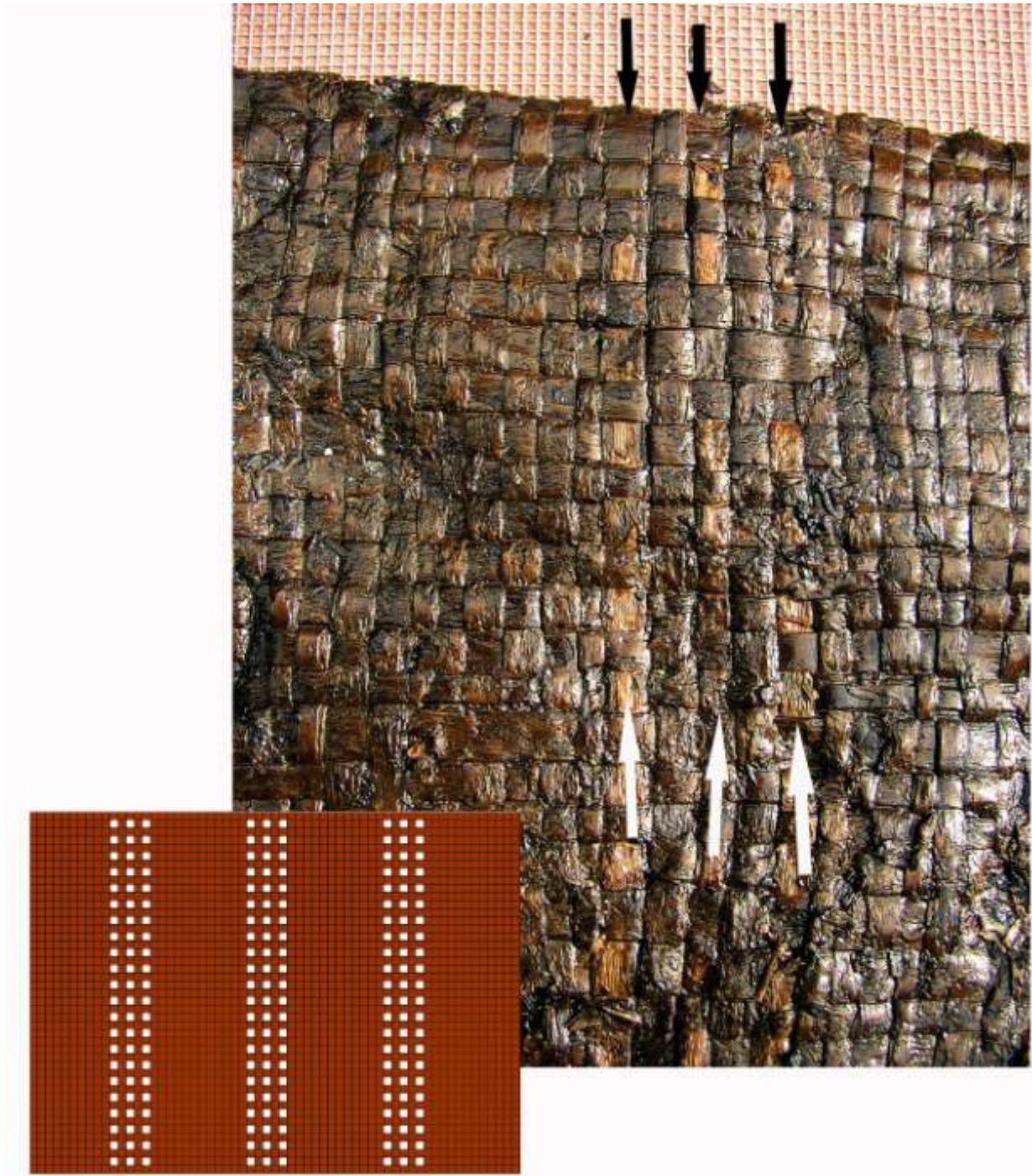


Figure 178. Example of fine gauge checker weave “matting” with grass-like overlay design (arrows show overlay areas). Reconstructed pattern on whole piece shown as inset.

In comparison to other Northwest Coast wet sites, only Qwu?gwes and the large village site of Ozette have designs recorded on their baskets with overlay elements, which probably reflects the high quality of basketry at the Qwu?gwes resource camp site.

Functional Set IV /QW-M1/

Four examples of twill-on-bias flat woven bands, one with a braid extension, have been recovered at Qwu?gwes (Figures 179-180, and 129, above).



Figure 179. Example of a twill-on-bias band that narrows into a 3-strand braid end strap (N20E15, 50-60; Eva Marie Fuschillo photograph).

These bands are made of bark from young bigleaf (or broadleaf) maple (*Acer macrophyllum*), with a fine twill-on-bias weave with a bent-back edging (Figure 180). The band is narrowed at the ends into a layered, three strand braid that probably functioned as the tying strap (Figure 179). The relatively high frequency of these potential tumpline bands correlates well with the high frequency of “clam” pack baskets (Functional Set I).



Figure 180. Example of twill-on-bias maple bark band with bent back edges (N16E14, 45-50, 2006; scale cm; also see this example in Figure 129, above).

Similar bands have been found at the ancient fishing camp of the Hoko River wet site (Croes 1995:138) but without braid extensions found, so they were difficult to document as tumpline bands. The ancient Ozette Village wet site has 46, mostly twill-on-bias, bands recorded, with 6 having braid strap extensions (Croes 1977: 462-468; well illustrated in Figure 113). Their frequency at this village site shows the importance of these carrying straps for domestic transport.

Ethnographically tumplines are frequently mentioned, and, in 1887 Reverend Eells described their use in the carrying of large loads by the Twana, Chemakum and Klallam tribes:

The way they usually prefer to do this is to take the carrying strap, tie the ends, which are several feet long, around the load, when it is of wood, mats, and such articles, or into the handles of baskets filled with potatoes, fish, apples, and other small objects. They then place the load on the back, and the flat part of the strap around the forehead. Formerly these straps were made of some tough bark, such as that of alder, braided. Now they use straps woven of strings and rags (1887:643).

Interestingly, he mentions a hardwood bark as the basketry element used to make these tumpline straps.

Haerberlin interviewed Elders of the Lushootseed speaking Puget Sound tribes in 1916-1917, and under basketry wrote, “carrying straps were braided of maple bark and overlaid with bear grass” (Haerberlin and Gunther 1930:33).

A similar tumpline with a twill-on-bias weave was recorded at the University of Washington Thomas Burke Memorial Museum attached to an elaborately woven Skokomish twined flat bag, and the material for the tumpline was identified as maple bark (Figure 181). This tumpline had a design on the body created by bear grass overlay. The braided straps had layered elements similar to many of the Qwu?gwes braids (left, Figure 181).



Figure 181. Elaborate and decorated tumpline band recorded on a Skokomish twined flat bag. The body was decorated with bear grass overlay, and the band and braid extensions were identified as maple bark. The braid elements are layered similar to many of those found at Qwu?gwes (U.W. Thomas Burke Ethnographic Collection, Basket item #118).

Rhonda Foster, Director, and Margaret Henry, Cultural Resources Department, Squaxin Island Tribe are conducting controlled experiments with the use of maple bark and have suggested some intriguing preliminary results. From September through November 2010 they visited a number of sites where stands of maple trees grew and attempted to peel the inner and outer bark from different sized trees. The larger, older Big-leaf maple trees were always difficult to pull the bark from, and it did not release (Figure 181.1). The younger, smaller diameter trees could easily be pulled, even in the freezing conditions of November (Figure 181.1). This difference contrasts with cedar bark which cannot be pulled from the mid-Fall through early-spring. Their experiments are ongoing and will be reported in the future.



Figure 181.1. (left) big-leaf maple tree of larger diameter did not release its bark for pulling. (Center and right) smaller diameter, young maple could be pulled even in freezing temperatures.

Functional Set V /QW-F3/

Two examples of plain twining basketry fragments have been recorded, with one having a double tuck-and-wrap rim construction and a 2-strand cordage handle attached on one end (Figure 182). With only small fragments, it is difficult to determine if these are from baskets with a complete plain twined body weave or if these are rows of plain twining were only along the top edge of a basket with open twining for the rest of the body weave, as seen in museum collections of Salishan baskets (Croes 1977:324 for example of one from Ozette). The example found with a rim may also have some remnants of a design in the plain twining (Figure 182).



Figure 182. Fragment of plain twined basketry (N20E13, 50-55; 2006, cm scale). This no doubt is from a basket since it has a fragmented handle attached under the rim on one side. This example also is the third example of double row Tuck-and-Wrap rim construction on a Qwu?gwes basket (see Figures 157-158, above). Note the burnt edge on lower left area (photograph by Eva Marie Fuschillo).

Comparison of Basketry from other Northwest Coast Wet Sites

By Olivia Ness and Dale Croes; Edited by SIT, CRD

Qwu?gwes ancient basketry was compared to recovered basketry from other Northwest Coast Wet Sites (Figure 183) using cladistic analysis as noted previously by Croes, Kelly and Collard (2005). In addition, data was added from ethnographic museum collections, mostly obtained from Joan Megan Jones' M.A. and Ph.D. thesis and dissertation (1968, 1976) to determine if there was continuity of basketry style and technique from ancient times into post-contact times.

Cladistics defines phylogenetic relationship in terms of relative recency of common ancestry. A pair of taxa is deemed to be more closely related to one another than either is to a third taxon if they share a common ancestor that is not also shared by the third taxon. This exclusive common ancestry is indicated by evolutionary, novel or derived character states. Ultimately, cladistic analysis seeks to find a special similarity rather than overall similarities. Basketry is an ideal artifact for this type of analysis since it is particularly culturally sensitive and the knowledge

behind it is often guarded. With a growing ancient Northwest Coast basketry database, several basketry attribute (mode) presence/absence comparative analyses have been conducted (Croes, Kelly and Collard 2005).

In terms of degrees of similarity, Qwu?gwe is statistically clustered closely with two other recent (within last 1000 years) Lushootseed (Coast Salish) language area wet sites, Fishtown and Conway, and with an early wet site, Biederbost, dating to 2,000 years ago (see Figures 183 and 184, area C; Croes and Foster 2004, Croes, Kelly and Collard 2005). Fishtown and Conway wet sites are about 200 kilometers north of Qwu?gwe on the Skagit River Delta (Figure 183). The best ancestral clusterings separate between two 3,000 year old series in ancient Coast Salish sites (cluster C) and Wakashan sites (cluster A; which is polar opposites for 3,000 years, Figure 184).

The hypothetical stylistic/ethnic continuity pattern, based on the basketry analyses is graphically depicted in Figure 185 based on previous and current wet site data.

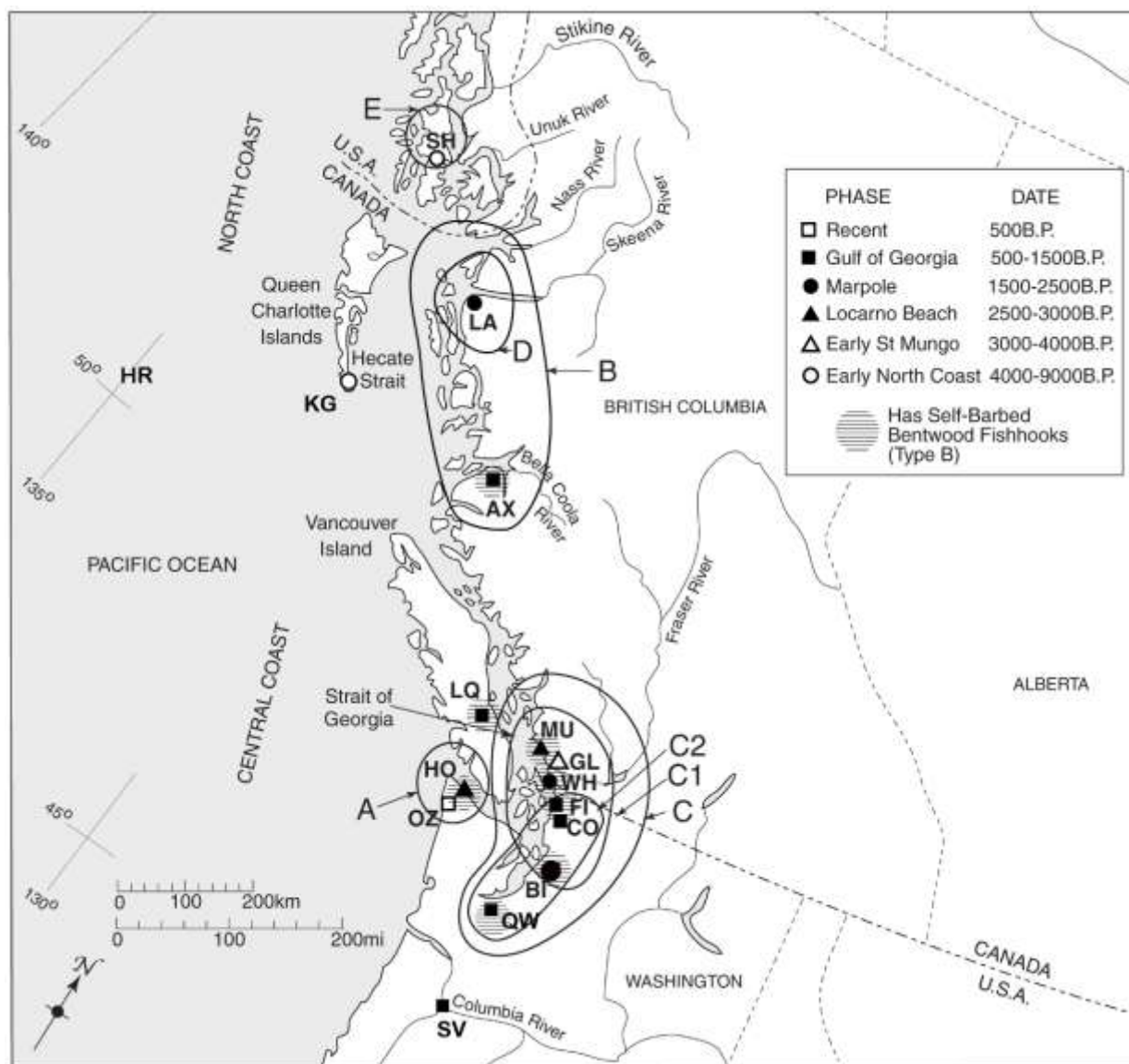


Figure 183. Northwest Coast wet sites distributions showing major areas A and C of ancient basketry style continuity (see Croes, Kelly and Collard 2005 for details of basketry style continuity and also compare with our cladogram, Figure 184, below). Site key: SH=Silver Hole (49CCRG433), LA=Lachane (GbTo-33), Ax=Axeti (FaSu-1), LQ=Little Qualicum (DiSc-1), MU=Musqueam NE (DhRt-4), GL=Glenrose Cannery (Dg Rr-6) WH=Water Hazard (DgRs-30), FI=Fishtown (45SK99), CO=Conway (45SK59b), BI=Biederbost (45SN100), QW=Qwu?gwes (45TN240), SV=Sunken Village (35MU4), HO=Hoko (45CA213), and OZ=Ozette (45CA24). (Map adapted from original by Susan Matson).

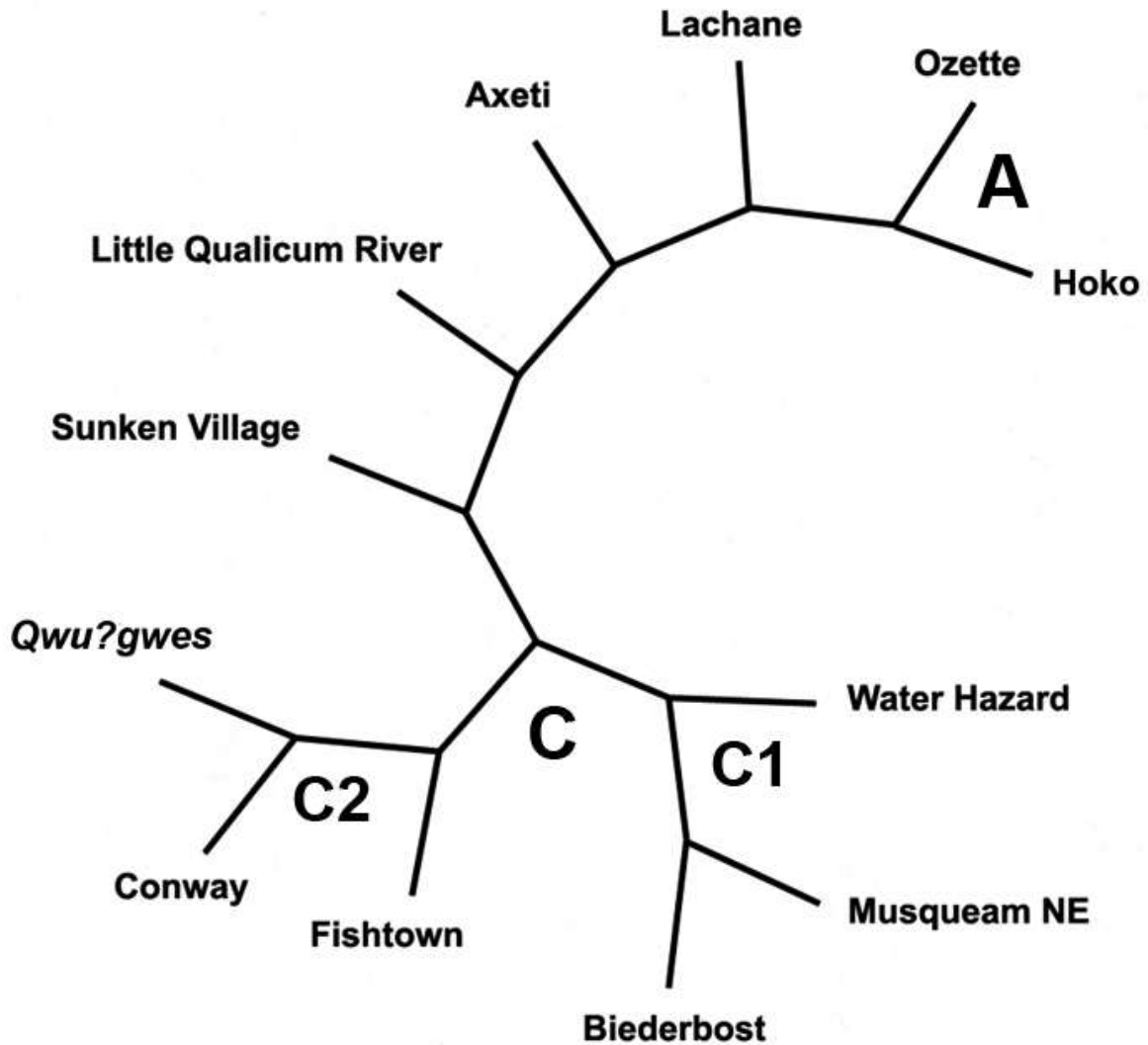


Figure 184. Unrooted cladogram derived from Northwest Coast wet site basketry attributes. The Qwu?gwes Site is an end branch within the best ancestral series shown is the bottom series of sites (Coast Salish basketry for 3,000 years, area C in map, Figure 183) and the top branch (Wakashan basketry for 3,000 years, area A in map, Figure 183). For details and discussion of all the sites, see Croes, Kelly and Collard 2005:137-149.

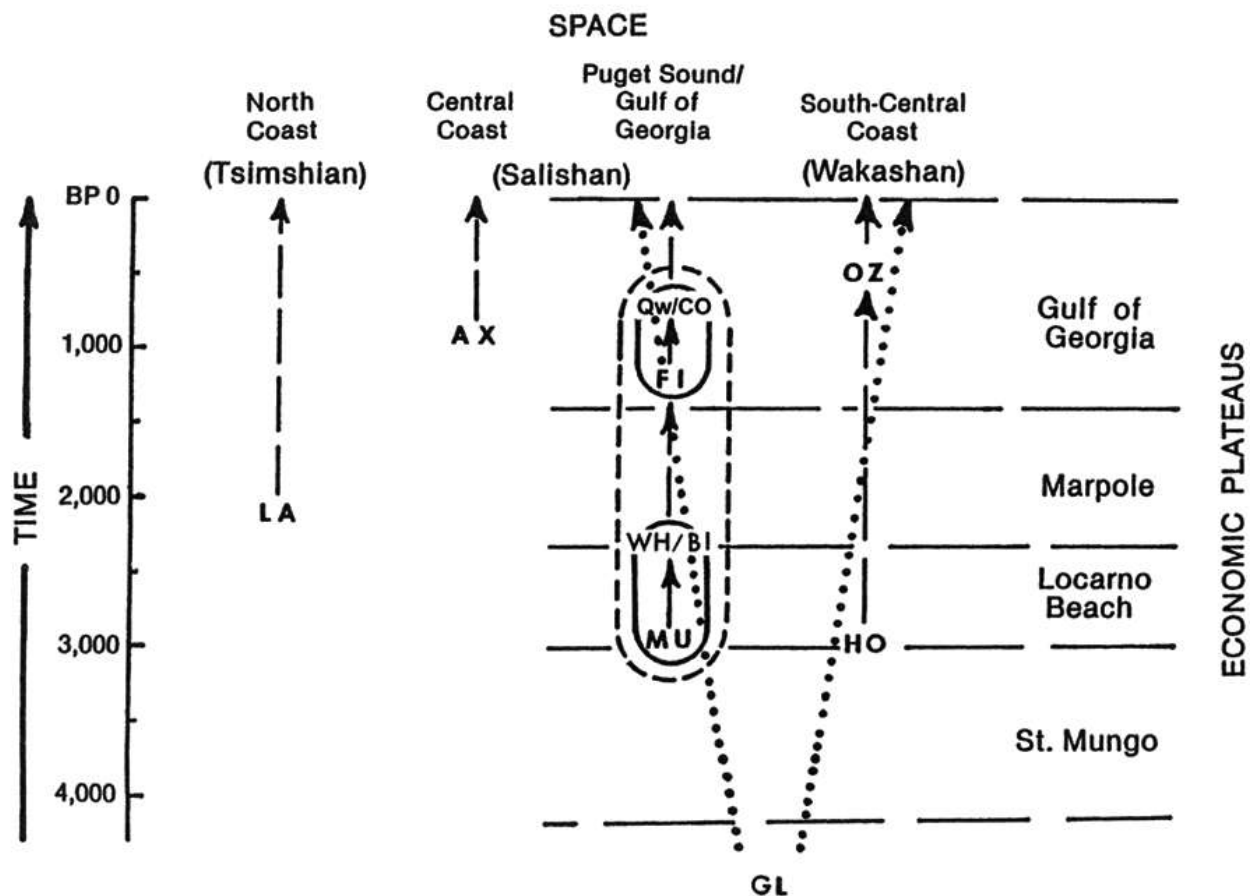


Figure 185. Hypothetical stylistic/ethnic continuity patterns, based on basketry cladistic analyses. Site designations in Figure 183, above.

Next, the ancient wet site basketry was compared to those recorded from the Burke Museum collections in a dissertation by Joan Megan Jones, identifying basketry attributes spanning twelve decades and ten cultures along the Northwest Coast of North America (Jones 1976). In an attempt to focus on relatively frequent attributes, therefore demonstrating distinct cultural styles, only included are weave attributes of a given culture that have a frequency greater than five spanning all twelve decades. It should be noted that Jones' data includes 2,840 baskets, therefore making our exclusion of specimens with a frequency of five or less a relatively marginal proportion. Additionally, Jones' ethnographic data was split into two temporal blocks (1820-1879 and 1880-1939) per culture. In the decades that this data spanned, many changes took place in Northwest Coast Native life. Basketry forms, no doubt, reflected these vast and largely post-contact transformations. Basketry became less of a necessity for daily functions and more of a commodity to be traded with settlers and tourists in exchange for money or credit, a new necessity. Between the 1880s and the 1930s, this trade flourished which in turn sparked innovation from weavers as well as an emphasis on design as opposed to function (Wray, in

press 2012). Despite these changes, we hope to demonstrate a continuity of transmitted cultural knowledge from the very ancient sites through to both the early and late ethnographic eras.

Furthermore, it was decided to concentrate on base and body weaves since these attributes appear to be the most flexible in terms of innovations through time and space, and possibly best represent cultural evolution that is less affected by function.

The cladistic analysis of ancient and museum basket, using body and base weaves, resulted in 22 possible unrooted cladograms (using the software program PAUP with the following commands: *parsimony* as the criterion, the Silver Hole wet site as the *outgroup*—being the oldest site dating to approximately 6000 BP, and *random* as the addition sequence under the *heuristic search*). Each of these cladograms is an equally valid outcome possibility based on the base and body weaves compared.

Next, a *strict consensus* tree generated from all 22 cladograms was generated (Figure 186). Like all of the cladograms, this one shows a relatively good affiliation of ancient Northwest Coast basketry with their counterparts in the museum collections. The 6,000 year old Silver Hole basket from the Prince of Wales Island links with Tlingit and Haida museum baskets (area E in the map, Figure 183). The 3,000 year old Hoko River basketry links in with a branch leading to Nootkan Museum baskets (area A in the map, Figure 183). The one unexpected divide is between the ancient and museum Salishan basketry. Most of the ancient Salishan basketry (Musqueam NE, Biederbost, Water Hazard and Conway) is displayed in a fanning cluster in the center of the cladogram which links across to the other two ancient Salishan sites (Qwu?gwes and Fishtown, area C in the map, Figure 183).

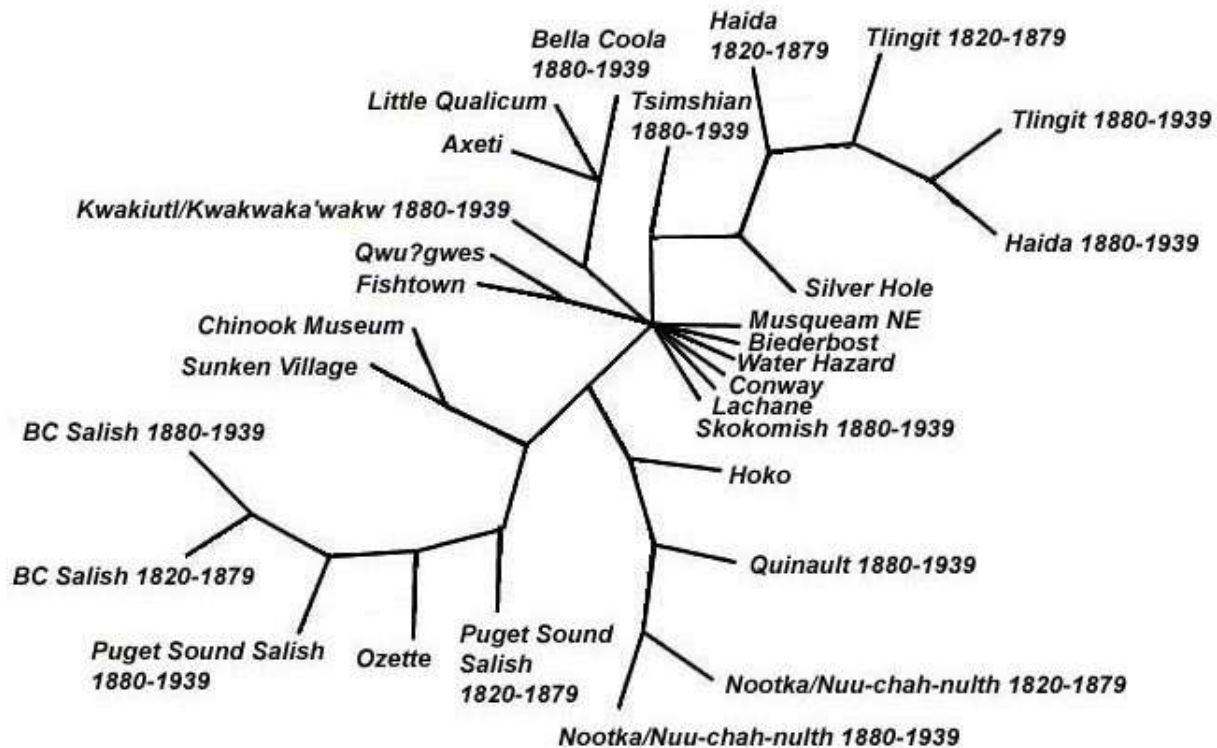


Figure 186. Unrooted Cladogram derived from Northwest Coast wet site and ethnographic museum collection basketry body and base weave attributes.

The museum's Salishan basketry clusters together on the lower left and consistently includes the ancient Ozette baskets (a distinctly Makah/Nuu-chah-nulth/Nootkan late wet site, area A in the map, which typically links to Hoko River, Figure 184). In trying to understand this ancient and museum Salishan split, it is noted that *coiled* or sewn baskets are not seen in the ancient Salishan wet sites, although they are present in the late Ozette Village wet site (dated to about 300 years old) and have been characterized as an introduced form of basketry from further east, out of late Salishan areas by Croes (1977, 2001, 2003). In fact, the separation of ancient Salishan wet sites and museum Salishan basketry could very well be the result of a late innovation and introduction of coil basketry from further east, upriver, Plateau Salishan regions. Coil basketry has also been recorded in private collections from Sunken Village as well as Chinookan museum collections, which may explain why this cluster consistently branches out from the same internal node as the Salishan museum cluster.

The fanning cluster of ancient Salishan basketry also includes Skokomish museum collections (a Salishan tribe) and Lachane, a non-Salishan, Tsimshian area ancient site. In previous studies that have additionally included basketry shape and construction material, Lachane has been strongly associated with ethnographic Tsimshian museum baskets (Croes 1989, 1995:132, 2001). The

absence of shape and construction material attributes in the test may be the cause for a split between Lachane and Tsimshian museum basketry, although they are in close proximity in the branching. Additionally, there is a cluster including the ancient Axeti and Little Qualicum along with the Bella Coola and Kwakiutl museum basketry. Although Little Qualicum is farther south than the others, this area is known historically as transitional between Wakashan and Salishan areas (Barnett 1955: 26, Bernick 1983: 154-155, Boas 1888: 201, 1890: 840, Croes 1995:131). Axeti, in Bella Coola territory, is also in a cultural area completely surrounded and no doubt influenced by Wakashan cultures, and, therefore, this overall clustering may be due to this transitory condition.

Therefore, based on the comparison of base and body weave techniques (which are proposed to be more closely linked to innovation as opposed to function), it can fairly stated that the ancient Northwest Coast wet site baskets generally link through millenniums to their ethnographic counterparts. The analysis also indicates that this conclusion demonstrated some of the analytical power of basketry in observing cultural evolution and the guarding of cultural styles in different Northwest Coast regions for thousands of years.

XVIb. Cordage/Nets

By Dale Croes and Mark Williams; Edited by SIT, CRD

Abstract: Cordage is often abundant in Northwest Coast wet sites, and represents almost half of all discrete artifacts (including stone, bone and shell artifacts) found at Qwu?gwes. Two main forms of cordage are analyzed from Qwu?gwes—lines and nets. A third form, cherry bark binding strips, is discussed in section XVIc. Cherry Bark Binding Elements. The Qwu?gwes cordage study follows an organization similar to the basketry chapter, starting with the analysis of attributes/modes, then types, followed by a regional comparison of Qwu?gwes cordage with those from other Northwest Coast wet sites. Attribute/mode analysis includes construction materials, techniques (twisted and braided), number of strands, lay (S-Z), diameter gauge and knotting techniques. Cordage types are defined by a combination of these attributes. Vertical and horizontal distribution of cordage artifacts in the waterlogged/wet intertidal shell midden is explored. The regional comparison of Qwu?gwes cordage with the 11 other major Northwest Coast wet sites does not demonstrate as sensitive a linkage pattern as did complex basketry; however, a similar trend is noted in the cladistic analysis. Qwu?gwes cordage includes functional forms of lines and nets. A large section of gill net was found early in the testing, and from visible square knots and web gauge, at least 50 square feet of net is represented. This net was constructed with equal S and Z lay strings, and made with bigleaf maple bark. Nets of all forms and materials have been found from other Northwest Coast wet sites dating back to as early as 5,000 years BP.

Comparative Background and Definition of Cordage Artifacts

As has been the case at other Northwest Coast wet sites, a large number of cordage artifacts (N=264, including a large section of gill net recorded as a single cordage example, see net analysis below) are recorded for the Qwu?gwes wet site area. At Qwu?gwes, this find represents 49% of all discrete artifacts recovered, far greater than the 12% recorded for the Ozette Village wet site collection. Some other wet sites, however, have recorded high percentages as well—e.g., 63% for Little Qualicum River (Bernick 1983), 61% for Hoko River (Croes 1995:143) and 56% at Axeti (Hobler 1970).

Cordage is defined as “any line, commonly categorized as a rope, cord or string, that is twisted, braided or a plain thin strip of bark, limb, twig or root” (Croes 1980a:4). Any artifact that meets this criterion is considered to be cordage. At Qwu?gwes, this definition includes the general categories of rope, cord, and string, as well as the cordage forms of lines, nets, and binding elements.

Qwu?gwes Cordage Attribute (Mode) Analysis

Qwu?gwes cordage exhibits a variety of different materials, techniques, strands, gauges and knotting techniques. Qwu?gwes cordage attributes (or modes) and their combinations into cordage classes (or types) are considered here, and compared with similar cordage modes and types from other Northwest Coast wet sites. The functional context of cordage also is discussed.

Construction Materials

Qwu?gwes cordage consists of twisted cedar boughs (*Thuja plicata*), thin split cedar bark, either twisted or used in flat strips (*Thuja plicata*), thin split bigleaf maple bark, either twisted or used in flat strips (*Acer macrophyllum*), and flat cherry bark strips (*Prunus emarginata*). These materials are common to all Northwest Coast wet sites, though Qwu?gwes is distinct in the use of bigleaf (or broadleaf) maple bark cordage elements (*Acer macrophyllum*) (see XVc. Cellular Identification of Wood/Fiber Artifacts).

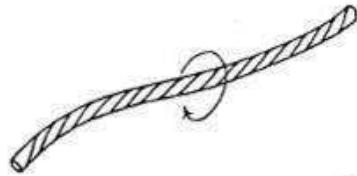
Construction Techniques

Qwu?gwes cordage was produced by (1) twisting or plying, (2) braiding elements together, or (3) using strap cordage (Figure 187).

Number of Strands

Twisting

1:



2:



Braiding

3:



Strap

1:

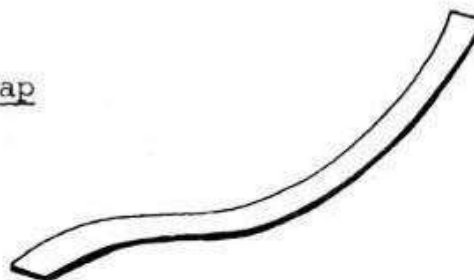


Figure 187. Construction techniques and number of strands in Qwu?gwes cordage.

Twisted cordage elements (mostly bark and cedar bough) often are twisted to the left (L) and plied together with a right (R) lay or twist (Figure 188). This forms a Z lay. Surprisingly many of the strings found in the large section of net (N15-17E16, 45-55), in fact 54%, are recorded as having an S lay—single elements twisted to the right and plied together to the left (see net analysis below).

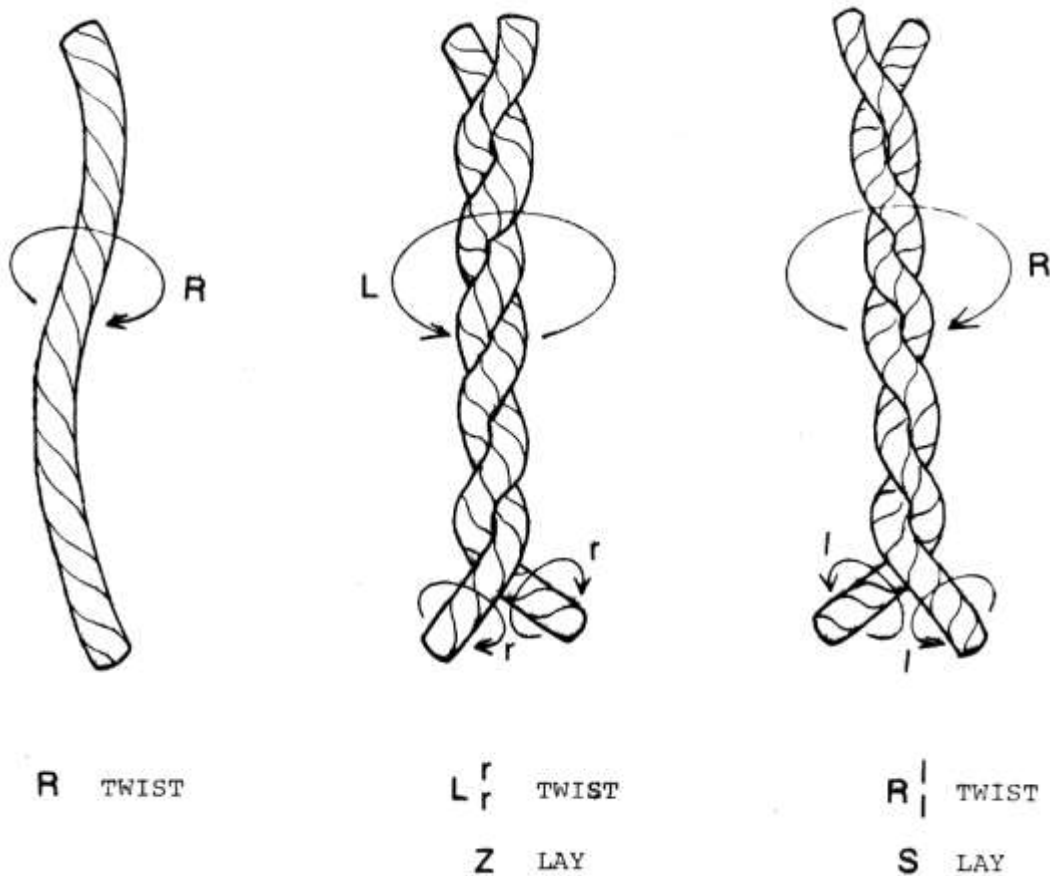


Figure 188. Direction of twist and lay.

Gauge Diameter

The measurements of twisted cordage gauge in the Qwu?gwes collection are based on the system established for the Ozette collection (Croes 1980a:18-25). At Qwu?gwes, an equal frequency of the twisted cordage falls into the string-gauge range (0.1-0.5 cm) and cord gauge range (0.51-1.3 cm; both are 43%, N=16), with 11% as rope gauge (0.31-2.3 cm; N=4) and one, that may be from a basket handle, as heavy rope gauge (2.31-5.5 cm).

Qwu?gwes braid cordage gauge, based on width measurements, also has been measured using the system established for the Ozette collection (Croes 1980a:18-25). These artifacts are all made of bigleaf (or broadleaf) maple bark (*Acer macrophyllum*). Only one string gauge example was reported (0.4 cm wide; 5%), with the majority as cord gauge (0.7-1.3 cm wide, 60%, N=14) and some in the rope gauge (1.4-2.1 cm wide, 35%, N=4). Braid thickness ranged from 0.26 to 0.65 cm thick (M=0.38 cm, SD=0.10 cm, N=14).

Strap cordage consists mostly of the abundant cherry bark binding elements (N=257; see XVIc. Cherry Bark Binding Elements), with one example of cedar bark strap cordage recorded. These strap elements are often used in binding of composite tools (harpoons, arrows, etc.). The large

quantities of cherry bark strips, the largest number of any other wet site (see XVIc. Cherry Bark Binding Elements), suggests that these binding materials are being harvested and processed for later use or for trade. Qwu?gwes cherry bark strips averaged 0.73 cm wide (SD=0.77 cm, N=203).

Knots and Whips

Two knot types and one whip technique were noted at Qwu?gwes. Knots were a compilation of a piece of cordage line, or of two or more by tying. Whips were a binding or tying of a cordage end to prevent unwinding of the end. Five examples of left-over-right overhand knots were recorded, of which three were whippings, at the end of two strand cedar bough cordage. The vast majority of knots were square knots recorded on 2-strand bark strings used to construct nets (see net analysis, below).

Stylistic/Technological (S/T) Cordage Type Classification

Attributes (modes) for Qwu?gwes cordage—including construction materials, construction techniques (including the number of strands and lay/twist), and gauge size—have been combined to form a paradigmatic classification of cordage types. The main purpose of this stylistic/technological classification is to illustrate the range of cordage types and also create explicit class units for comparison with the same class unit types found at other Northwest Coast wet sites (Figure 189).

Definition

Illustrated Reconstruction
and Frequency of Occurrence

QW-C1
(OC1) MATERIAL: cedar bough
CONSTRUCTION TECHNIQUE: twist
NO. OF STRANDS: 1
LAY/TWIST: -/L
GAUGE SIZES (DIAMETER):
a. String n= 3, 1%
b. Cord: n= 8, 3%



(n=11, 4%)

QW-C2
(OC2) MATERIAL: cedar bough
CONSTRUCTION TECHNIQUE: twist
NO. OF STRANDS: 2
LAY/TWIST: Z/R
GAUGE SIZES (DIAMETER):
a. String: n= 1, -
b. Cord: n= 4, 2%
c. Rope: n= 4, 2%
d. Heavy-gauge
Rope: n= 1, -



(n=10, 4%)

QW-C3
(OC9) MATERIAL: bark
CONSTRUCTION TECHNIQUE: twist
NO. OF STRANDS: 2
LAY/TWIST: Z/R
GAUGE SIZES (DIAMETER):
a. String: n= 2, 1%
b. Cord: n= 3, 1%



(n= 5, 2%)

QW-C4
(OC10) MATERIAL: bark
CONSTRUCTION TECHNIQUE: twist
NO. OF STRANDS: 2
LAY/TWIST: S/L
GAUGE SIZES (DIAMETER):
a. String: n=8, 3%
b. Cord: n=1, -



(n= 9, 3%)

QW-C5
(OC13) MATERIAL: bark
CONSTRUCTION TECHNIQUE: braid
NO. OF STRANDS: 3
LAY/TWIST: not applicable
GAUGE SIZES (WIDTH):
a. String: n=1, -
b. Cord: n=14, 5%
c. Rope: n= 4, 2%



(n=19, 7%)

Figure 189. Stylistic/technological classification of *Qwu?gwe*s cordage types. Ozette cordage class (OC) designations are recorded in parentheses under the *Qwu?gwe*s designations (see Croes 1980a for complete Ozette class listing).

Definition

Illustrated Reconstruction
and Frequency of Occurrence

QW-C6 MATERIAL: cedar bark
(OC15) CONSTRUCTION TECHNIQUE: strap
construction

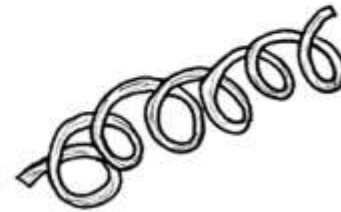
NO. OF STRANDS: 1
LAY/TWIST: not applicable
GAUGE SIZES (WIDTH):
a. String: n= 1, -



(n= 1, -%)

QW-C7 MATERIAL: cherry bark
(OC25) CONSTRUCTION TECHNIQUE: strap
cordage

NO. OF STRANDS: 1
LAY/TWIST: not applicable
GAUGE SIZES (WIDTH):
a. String: n=103, 40%
b. Cord: n=81, 31%
c. Rope: n=10, 4%
d. Heavy-gauge
Rope: n= 9 7%



(n= 203, 79%)

TOTAL: 258

Figure 189 (Cont.). Stylistic/technological classification of Qwu?gwes cordage types. Ozette cordage class (OC) designations are recorded in parentheses under the Qwu?gwes designations (see Croes 1980a for complete Ozette class listing).

Spatial and Stylistic Analysis—Comparisons to other Northwest Coast Wet Site Cordage
By Mark Williams; Edited by SIT, CRD

The purpose of this section is to examine how cordage at Qwu?gwes integrates with the overall pattern of information exchange in pre-contact Northwest Coast native communities. The Qwu?gwes cordage assemblage is compared to cordage from other sites, and the regional distribution of cordage classes is compared to that of other discrete artifacts including basketry and stone, bone and shell artifacts for other Northwest Coast sites.

Background and Problem Domain

Perishable materials such as wood and fiber artifacts represent 90% of the material culture of Pacific Northwest populations prior to European contact (Croes 2005). Cordage is especially valuable for comparative studies of Northwest Coast wet sites because it is so abundant,

complex, and sensitive to analysis (Croes 1980). Cordage artifacts recovered from wet sites have important information about how knowledge was passed down from generation to generation within and among groups. The pattern of similarities and differences in how cordage was constructed at different sites can explain the relationships between the people who left these artifacts behind.

Cordage is a technology that was (and is) central to life on the Northwest Coast. According to Rhonda Foster, director of CRM for the Squaxin Island Tribe and basket maker, “without proper cordage you might as well not weave” (Foster, personal communications 2008). “Cordage is a tool for making patterns, much like a paintbrush. Its role is functional; cordage must be strong above all else. At the same time, cordage itself is largely invisible in the finished product. It must fit in with what the weaver is working on, so that the eye goes to the weave itself and not the materials” (Foster, personal communications, August 10, 2008).

No culture is static; every human community is under constant pressure to adapt to changing situations, from sources both within and without. The archaeological record allows us to trace the continuous path of small changes that lead from the past to the present. Tools may change over time, but their ultimate purpose is still the same. Much like a story that changes slightly as it is passed from person to person, the exact details may change slightly with each retelling, but the central idea remains. Cultural knowledge is spread in the same way, undergoing evolutionary changes as information flows between groups separated by space and time.

How does this flow of new information take place? According to the costly information hypothesis proposed by Bettinger (2008), there are two kinds of learning strategies: individual learning and social transmission. Individual learning is the creation of novel ideas or technologies, often at a high cost of time and effort. Social transmission is the spread of existing ideas or technologies through social networks, usually at a much lower cost. Successful human social groups generally tend to contain a stable mix of innovators and replicators so that ideas spread in the most efficient manner.

Social transmission can occur either horizontally or vertically, and this pattern is determined by the nature of social interaction. Horizontal transmission concerns ideas that are shared freely and widely. They spread rapidly across disparate groups, and on an archaeological scale, different functional ideas (such as tool technologies) are separated only by time. This is the *diffusion* model exhibited by projectile points (see XVIIc. Projectile Points).

Vertical transmission concerns ideas that are kept private or even highly secret. They are stylistic ideas (such as weaving patterns) that carry strong associations of personal and/or cultural identity, and do not spread far beyond members of specific groups. Archaeologically, this transmission is reflected in a distinct styles associated with particular geographic areas

which can remain largely unchanged over vast periods of time. Vertical transmission is the regional model exhibited by basketry (Croes, et al. 2005).

The knowledge necessary for cordage construction is but one element in a conceptual toolkit passed down from generation to generation within the weaving community. To truly be considered a traditional weaver or basket-maker, an individual must master all the steps involved in the construction process, from harvesting the raw materials to appropriate use of the finished product. Therefore, the regional distribution of cordage classes in the archaeological record should most similarly resemble that of other woven technologies such as basketry, reflecting a vertical transmission history characteristic of stylistic variation, despite the primarily functional role of the cordage itself.

Sample: Cordage at Qwu?gwes

Since 1999, excavators at Qwu?gwes have recovered 64 discrete cordage elements (in addition to 272 elements of cherry bark binding debitage) which are cataloged according to the categories defined by the Ozette Cordage Classification, as detailed above (Figure 189). The Ozette Classification system organizes cordage artifacts into 26 distinct types, based on the combinations of four stylistic features: construction material, construction technique, number of strands, and lay/twist (S or Z weave) (Croes 1980). Purely functional features such as gauge size, length, form, and knotting technique were not used as part of the classification, as they reflect the structural necessities of the finished product, as opposed to fundamental elements of the underlying technology.

The spatial distribution of cordage at Qwu?gwes is largely dictated by the taphonomy of the site (the nets are considered separately below). Of the 64 cordage elements recovered, all were recovered from the waterlogged levels of the midden area. The greatest concentration of cordage was found in unit N20E13, as illustrated below in Figure 190. The majority of cordage elements fell within the proposed deposition channel bounded by gridlines E13 and E15.

Cordage Count by Unit, 1999-2009

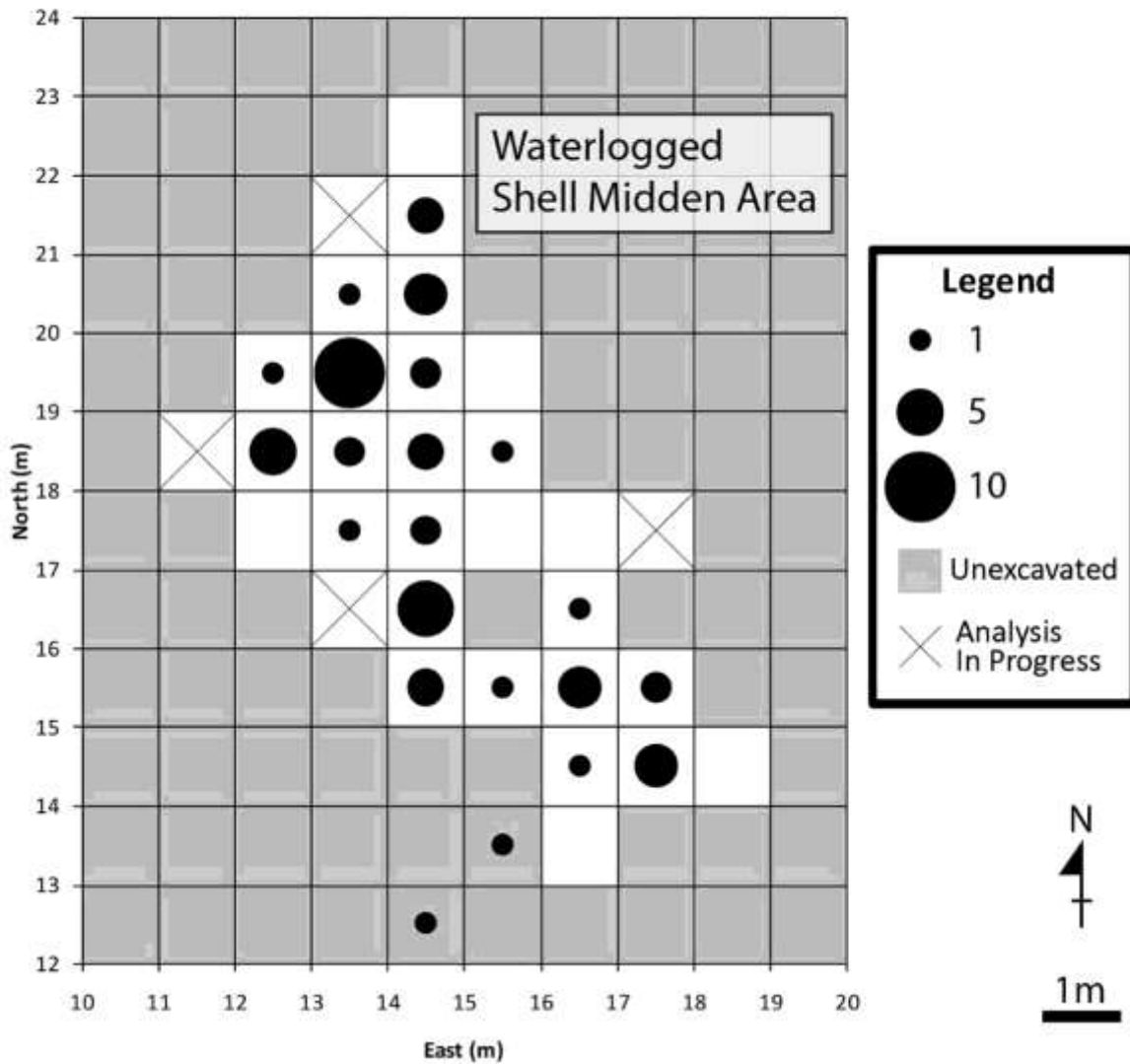


Figure 190. Horizontal distribution of cordage artifacts. Circle diameter denotes concentration of cordage elements within each unit.

The anaerobic conditions in the waterlogged midden begin at roughly 40 cm below datum; above this depth cordage is simply not preserved well. The greatest concentration of cordage occurs in the 50-55 cm level (Figure 191).

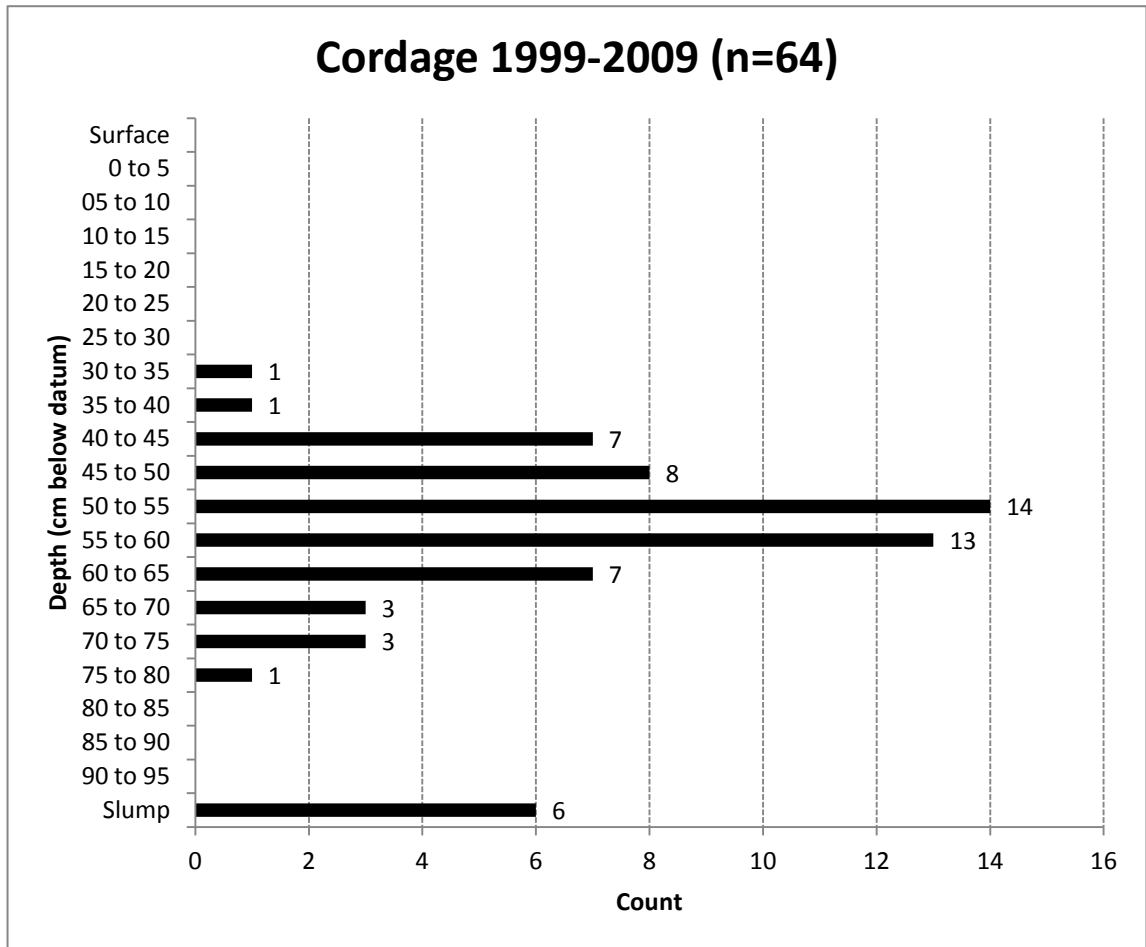


Figure 191. Vertical distribution of cordage artifacts

These vertical and horizontal patterns are consistent with the other perishable wood and fiber artifacts recovered from the site. After reviewing the results of the intra-site spatial analysis, the cordage assemblage was determined to be a valid representative sample of the entire site and thus appropriate data to use for preliminary inter-site regional comparisons.

Methods: Cladistic Analysis

To determine the relationship between Qwu?gwes and other Northwest Coast wet sites with wood and fiber artifacts, cladistic analysis on cordage data from twelve sites was applied: Axeti [FaSu-1], Biederbost [45SN100], Conway [45SK59b], Fishtown [45SK99], Hoko River Wet/Dry Site [45CA213], Lachane [GbTo-33], Little Qualicum River [DiSc-1], Musqueam NE [DhRt-4], Wapato Creek Fish Weir [45PI47], Ozette Wet Site [45CA24] (Croes 1980), Water Hazard [DgRs-30] (Croes 1995), Sunken Village [35MU4] (Croes 2008), and Qwu?gwes [45TN240] (this volume).

To quantify the transfer of information, the presence/absence of each class was catalogued, as defined by the Ozette Cordage Classification. The data were condensed to presence/absence in order to focus on whether or not a particular technology was encountered at each site, rather than the relative prevalence of those technologies. Cladistic analysis was performed using PAUP 4.0 to generate an un-rooted consensus tree comparing the degree of similarity, following the methods described in XVIa. Basketry.

Results

The cladogram showed in Figure 192 groups the sites into three main clusters: Ozette and Hoko River [A]; Lachane and Axeti [B]; Musqueam, Little Qualicum, Water Hazard, Biederbost, Conway, Fishtown, Qw?gwes and Wapato Creek [C]. Although Sunken Village is technically on the B branch of the cladogram, its placement there may be due to a lack of a comparable analysis in the Columbia River region. Only 14 cordage elements were recovered from Sunken Village, falling into just 4 Ozette Classification categories. Furthermore, cordage has been described as not necessarily representative of the main categories of artifacts at Sunken Village (Croes, Fagan and Zehendner 2009). For these reasons, the Sunken Village cladistic data is considered an outlier in this case.

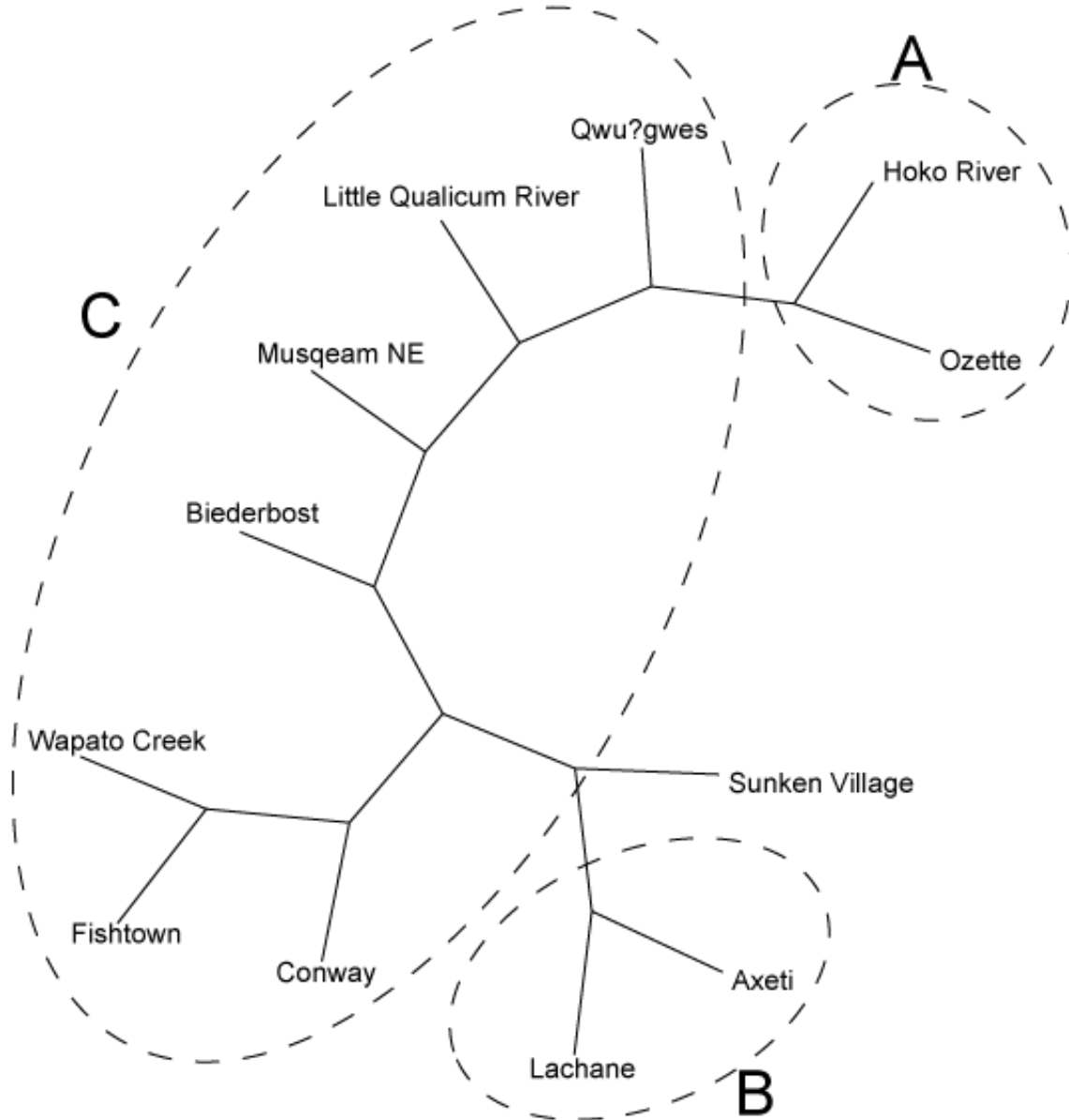


Figure 192. Unrooted consensus cladogram derived from Northwest Coast cordage artifact categories.

The remainder of the cladogram broadly corresponds to recognized geographical and linguistic boundaries that define the distribution of Northwest Coast wet sites, and, as illustrated by the map in Figure 183 in XVIa. Basketry. Branch A corresponds to the Central West Coast; Branch B corresponds to the Northern Coast; Branch C corresponds to the Gulf of Georgia/Puget Sound (Figure 183, above). The clusters do not necessarily correspond to the temporal phases that characterize the Pacific Northwest archaeological record. Group A contains sites from both

Recent [500 B.P.] and Locarno Beach [2500-3000 B.P.] phases; Group B contains sites from Gulf of Georgia [500-1500 B.P.] and Marpole [1500-2500 B.P.] phases; Group C contains sites from Gulf of Georgia [500-1500 B.P.], Marpole [1500-2500 B.P.], and Locarno Beach [2500-3000 B.P.] phases.

Discussion

These data suggest that cordage knowledge was spread via vertical transmission, similar to basketry (XVIa. Basketry), and dissimilar to bone/antler and stone artifacts (XVIII. Bone/Antler Artifacts). Information moved with individuals, or as Rhonda Foster said, “what you’re taught stays strong inside you; at the same time, you see other family rules for weaving” (personal communications, August 10, 2008). There was long-term population persistence at sites with similar cordage styles. “No one is right, each family weaver is strong, and happy with what they are taught, knowing their ancestors are with them” (Foster, personal correspondence, August 10, 2008). Cordage knowledge is held privately, not to the same degree of secrecy surrounding basketry patterns, but rather through simple modesty. Cordage is a tool that should be invisible in the finished product. The best cordage is the kind that does its job unnoticed. “They [cordage makers] don't get big headed; they don't say, 'I'm the best and greatest' ” (Foster, personal correspondence, August 10, 2008).

Cordage Functional Forms

By Dale Croes; Edited by SIT, CRD

The functional forms of Qwu?gwes cordage include lines, nets and cherry bark binding elements. A wide variety of lines are seen at Qwu?gwes (see Figure 189, above), a large section of net was recovered, and a very large amount of cherry bark binding were found at Qwu?gwes, especially when compared to other Northwest Coast wet site counts (see XVc. Cherry Bark Binding Elements).

Lines

One-strand cedar bough twisted withes (QW-C1; N=11) have not been found in any direct functional association at the site. Some uses for the quickly made and flexible single strand lines could be to construct pole-framed structures and drying racks at the site.

Two strand cedar bough cords and ropes (OW-C2; N=10) also were not found in functional contexts, but would have many uses for marine peoples, including as headlines for nets (see below). Three of these have been found with overhand whipping tied ends (Figure 193).



Figure 193. Two-strand cedar bough rope (N15E17, 50-55, 2000) with overhand knot whipping at end.

The mostly string gauge two-strand bark lines (QW-C3, QW-C4) are both S and Z laid, similar to what was recorded for the large section of net found (see below). These ropes are often found with square knots, which is the common net knot, so probably represent fragments of strings from nets at the site.

The typical cord gauge three-strand braid lines were frequently found, and almost all were made with layered bigleaf (or broadleaf) maple bark (*Acer macrophyllum*) (Figure 194). These lines may be remnants of extension straps for basketry tumpline bands (see QW-M1) or lines used for a number of purposes, including possibly to tie corks to the headline of nets.



Figure 194. Example of 3 strand braid bark cord (N18E14, 75-80) and illustration of this artifact on the opposite side (drawing by Candra Zhang, 2003).

Nets

In a 1x1 meter test excavation in 1999 (N15E16, in a location expected to have waterlogged deposits through auguring) wet layers at about 45-50 cm were reached and 2-strand twisted strings that quickly turned into an entire fiber net were found (Figures 195, 197). This discovery pointed to the fact that the site had preserved perishable artifacts, and the task of recovering a sizable section of fiber net was faced. Rhonda Foster, a basket maker, immediately recognized the fiber to be from inner bark, and, as a fisherperson, she observed the web size and identified the probable function as a small salmon species gill net.

In a wet site logistical sense, it was clear that this net would be a fragile artifact to excavate and used appropriate hydraulic techniques to carefully recover as large sections of net as possible. The excavation was successful and brought several large sections of the net back to the laboratory for conservation (Figures 195, 197).



Figure 195. Bark gill net being first exposed in midden in 1999 test and section after being cleaned in lab for preservation (N15E16, 45-50).

Future years of excavation showed that this section of net mostly extended north into two other 1 x 1 meter squares (N16E16 and N17E16; Figure 196; see map of the net squares Figure 5). These net sections were recovered in large pieces from these three squares, and the only way to quantify the discovery in terms of net size was to count the visible net square knots, calculate web size and determine a minimum square feet or meters of net this would represent. Visible net

knot counts equaled 1,601 knots distributed in the three main 1 x 1 meter squares (Figure 196, map Figure 5).

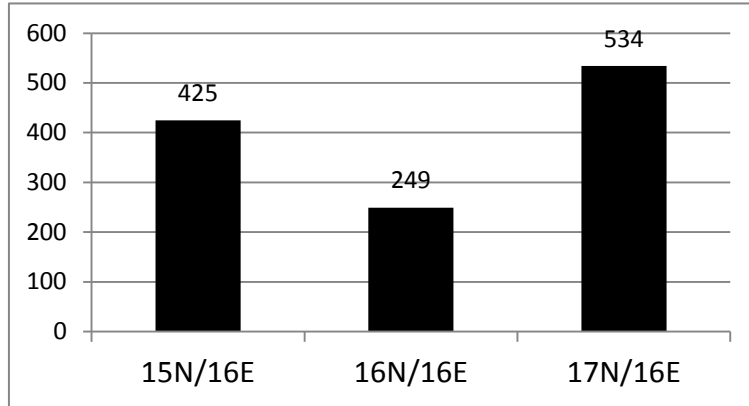


Figure 196. Distribution of knot counts in the three main 1 x 1 meter squares that had the main net sections at 45-50 cm (n=1,208)(see map, Figure 5, above). An additional 393 net knots were found in adjacent squares.

To calculate the minimum amount of net recovered (minimum since no doubt at least as many net knots were inside the piles of net sections recovered, see example, Figure 197), it was calculated that a net web represented approximately 58 square cm/9 square inches. Since knots were shared between webs, each web would be represented by 2 knots; with 1601 knots visible, this calculation would represent at least 800 webs x 58 sq. cm/9 sq. inches which equaling approximately 46,400 square cm/7,200 square inches or at least 4.5 sq. m/50 square feet. Again, this represented only with visible knots on the surface of large piled sections of net, so no doubt a minimum size and much more would be represented by these net piles (McCullough, McCullough, and Valley 2005).



Figure 197. Example of a net section showing the density and how net knots would only be visible on the surface, but no doubt abundant under the surface layer. Note both S and Z laid string (N15E16, 45-50; 1999).

The identification of the artifact as a net is primarily visual, where a series of knots were established to create a consistent web (Figure 195). As with all other reported Northwest Coast wet site ancient nets, the Qwu?gwes net was made of string gauge cordage (mean diameter: 0.334 cm, SD=.056, N=44), tied into a net with square knots (sometimes called reef knots and/or, if collapsed, lark's head knots; Figure 198). The square knot was a no-slip knot, and therefore very practical for nets. Also square knots in western nets typically were said to be tied by hand, without using a netting needle (Ashley 1944:64-65).

The cordage was twisted using 2 strands, and the cordage's single elements were twisted either (a) to the left (L, or clock-wise) and plied together with a right directed twist (R, or counter-clockwise) forming a Z lay, or (b) twisted to the right (R, or counter-clockwise) and plied together with left directed twist (L, or clockwise) forming a S lay (Figures 188, 198). At

Qwu?gwes, the net string lay, Z or S, was almost equal in count (Figure 199) which is unusual in that most other Qwu?gwes cordage was consistently Z lay, also the main cordage lay recorded for twisted 2+ strand cordage at most other Northwest Coast wet sites (Table 23, below) (Croes 1980). One hypothesis concerning this use of both Z and S laid string to make the net came from Squaxin Tribal Fisherman and Chair, David Lopeman, suggesting that this pattern may be a technique for keeping the net square while under construction; therefore, one string would be Z laid and one S laid in constructing the web (Lopeman, Personal Communication 2006).

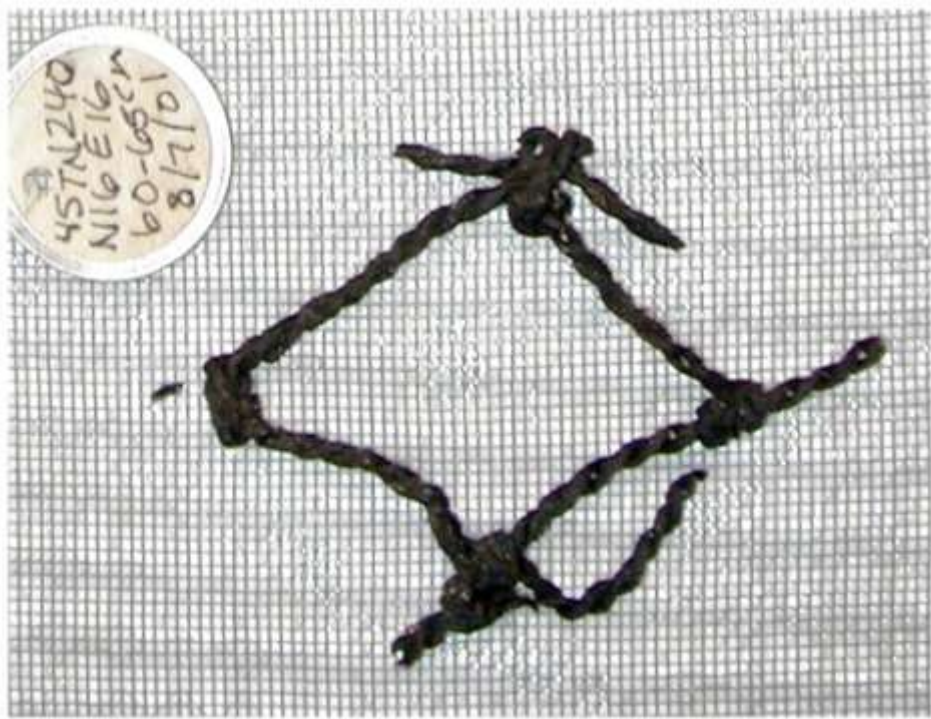
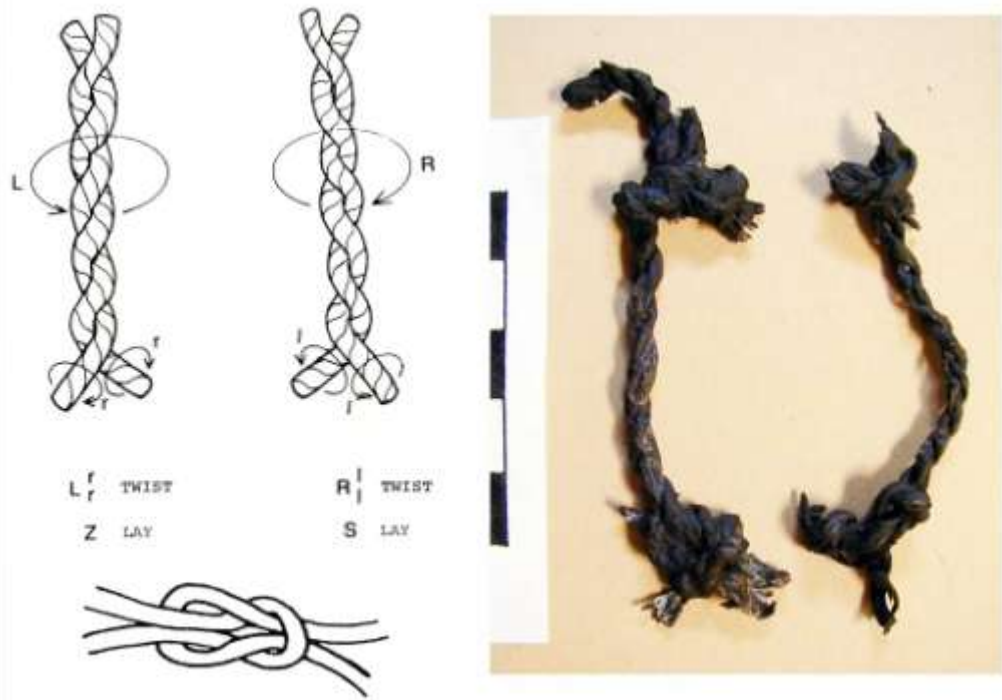


Figure 198. Example of net string lay, square knots and web.

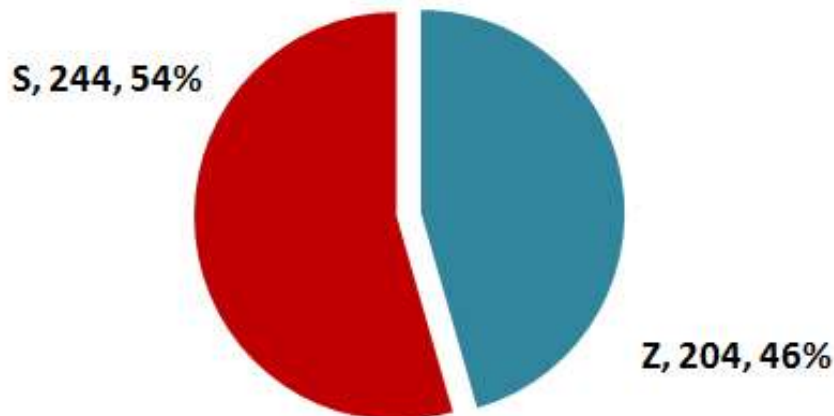


Figure 199. Nearly equal net string lay of S and Z twists in Qwu?gwes net (N15-17E16, 45-50).

Rhonda Foster, Director, Squaxin Island Tribe Cultural Resources Department, made these cultural observations about this large section of net found:

The net was made from bark, to fish for the smaller salmon species in our traditional areas. It measured as a 5 inch stretch mesh, which was measured in three separate locations the day of the discovery while wet. It was used to catch coho, blueback, and steelhead. There are several ways to fish this gillnet, the two basic ways are using a landline, and drifting. When we started removing the gillnet in layers, it was immediately evident to me that there was something out of the ordinary. Hundreds of salmon jaws were still in the net. No fisher person in their right mind would leave salmon in a gillnet even today. For one person to hand make a cedar gillnet would take over 8 months. Salmon left in the net would rot the net out very rapidly. Something happened that was not normal, possibilities are:

- *Major disaster which covered up the gill net, or required our ancestors to leave,*
- *The net was being fished, got caught on a snag underwater which would require the fisherman to cut the net, leaving a portion of the net underwater, and unreachable,*
- *It's normal for a juvenile to ask an elder if there is any abandoned gillnets nobody wants. Every fishing person can remember their solo fishing experience. Some juveniles although participating in many fishing's, maybe became overwhelmed when catching more salmon than anticipated.*

Most fishermen could read a run, determine the amount of net to let out, and harvest only what the family could process. I've witnessed teenagers who get in over their head, sink a boat, sink a net, and lose a lot of equipment (Foster and Croes 2004:131).

In 2008 a piece of a small gauge net was found at Qwu?gwes that appeared to be a dip net size (approximately 2 cm between knots; Figure 200). The web was made of 2-strand twisted bark strings that were S laid and made with square knots. This artifact shows a range of net making and use from the site.



Figure 200. Example of a smaller gauge net, possibly a dip net fragment (N21E13, 25-30; 2008).

Comparison to Other Wet Site Nets

Nets have been found from many other Northwest Coast wet sites. The oldest net so far dates to approximately 5,000 years old (C14 dating) from the Lanaak wet site (49XPA78) on southern Baranof Island, Southeastern Alaska (Table 23, Bernick 1999 supporting the fact that netting is a very ancient technology along the Northwest Coast. The uses also vary from smaller mesh dip nets to larger web gill nets (Table 23).

Table 23. Currently recorded Northwest Coast wet site net summary, oldest to youngest.

Wet Site	Approximate Date	Construction Material	Ply Direction	Mesh Size	Proposed Use
Lanaak, Baranof Island, SE Alaska (49XPA78)	5,000 B.P.	<i>Picea sitchensis</i> : Sitka Spruce Root	None-Single Filament	3.5-5.0 cm	Dip Net
Hoko River (45CA213) NW Olympic Peninsula	3,000 B.P.	<i>Picea sitchensis</i> : Sitka Spruce Splint Limbs	None-Single Filament	10 cm	Gill Net
Musqueam Northeast (DhRt4) Fraser Delta	3,000 B.P.	<i>Thuja plicata</i> : Western Red Cedar Inner Bark	Z-ply	15 cm	Gill Net
Water Hazard (DgRs30) Fraser Delta	2,000 B.P.	<i>Thuja plicata</i> : Western Red Cedar Inner Bark	S-ply	8.9 cm	Gill Net
Qwu?gwes (45TN240) Southern Puget Sound	500 B.P.	<i>Thuja plicata</i> : Western Red Cedar Inner Bark and bigleaf (or broadleaf) maple bark (<i>Acer macrophyllum</i>)	S & Z-ply	8.4 cm	Gill Net And Dip Net
Ozette Village (45CA24) NW Olympic Peninsula	300 B.P.	<i>Picea sitchensis</i> : Sitka Spruce Root	Z-ply	3.8 cm	Dip Net

XVIc. Cherry Bark Binding Elements

By Jason Channel and Nola Nahirnick; Edited by SIT, CRD

Abstract: Qwu?gwes had more cherry bark binding elements recorded than all other Northwest Coast wet sites combined. Probably the best explanation for this high frequency is that Qwu?gwes was a cherry bark harvesting location. Cherry bark is the outer shiny layer on the trees and branches, and Ed Carriere, Squamish elder and master basketweaver, demonstrated how to “spiral off” long narrow strips of the bark. This shiny outer bark is slightly elastic and does not shrink or swell in water, so is known as an excellent binding element for harpoons, arrows and composite tools. Ethnographically, it is also reported to have several medicinal qualities and is an excellent decorative element when added to the surface of basketry. British Columbia museums (UBC, SFU, and RBCM) each reported 500-1000 Northwest Coast artifacts using cherry bark, many of them as elements of decoration on their basketry collections. Archaeological examples, including a burial cave at Hesquiat Harbor, B.C., demonstrate cherry bark as bindings for harpoons and arrows, anchor stones, fishhooks, and decorative and wrapping elements in basketry. Qwu?gwes provided a unique, small toy war club where the pebble head and cedar stick handle were carefully wrapped with cherry bark binding (see XIXa. Toy War Club and Figures 208, 296-298)

Background and Identification

The source of cherry bark at Qwu?gwes, the bitter cherry tree, *Prunus emarginata*, is member of the rose family, and indigenous to much of western North America. Bitter Cherry is found in moist areas of deciduous forest and open woods, often along watercourses near Qwu?gwes. It prefers low to middle elevations.

Bitter cherry products were commonly used by Northwest Coast people, both coastal and inland. The most common use was as a binding material (Rhonda Foster, personal communications 2006), but it was also used for medicine, basketry, and a fuel source. The bark is resistant to decay and does not expand or contract when wet or dry, making it waterproof. Fresh bark is slightly elastic, allowing for a tight secure bind. When whipped for making tools, it makes a smooth union. The wood has been used for fuel and tool handles. The bark also dyes readily to black, and stores indefinitely in a dry place.

Botanical Information: *Kingdom: Plantae, Phylum: Anthophyta, Class: Dicotyledoneae, Order: Rosales, Family: Rosaceae, Genus: Prunus, Species: emarginata*

Prunus emarginata is a deciduous tree, generally growing from 1-6 meters high, although with abundant moisture and good soil, it can grow up to 15 meters in some areas. Longevity of bitter cherry has not been fully determined, yet many sources consider it a relatively short-lived tree,

reaching 30–40 years (Kramer and Johnson 1987, Oakely and Franklin 1998, Taylor and Taylor 1981).

The tree flowers in May, and the seeds ripen during the summer months. The soft, honey-scented flowers are hermaphrodite and are pollinated by insects. The fruit is 8-15 mm in diameter with a thick flesh and contain one large seed (often found in the Qwu?gwes intertidal shell-midden waterlogged/wet area, see XVb. Macroflora Overview).

Bitter cherry is particularly abundant after a fire. It is generally shade intolerant and is often found in areas of past disturbance. Native Peoples deliberate burning of areas may have also allowed for the proliferation of bitter cherry and may provide a reason to anticipate finding evidence of a number of resources in common areas (such as camas and oak/acorns (See XVa. Acorns and Hazelnuts).

Harvesting Methods

Harvesting the bark from Bitter Cherry requires a careful selection process. Haeberlin, writing in 1928, explains why Northwest Coast people valued the bitter cherry: “*Prunus emarginata* is selected because of its light color, smoothness, and gloss” (1928:146). The best trees to take bark from are smooth skinned, between 5-15 cm in diameter and often grow in areas of plentiful sunshine. Trees growing in shadier areas tend to have more lichen. The increase in lichen creates scarring on the bark. As the trees mature, the bark thickens and becomes less suitable for use, both for binding and for basket work (Haeberlin 1928:146-147).

Suquamish Tribal Elder, Ed Carriere, a master basket weaver, explained gathering methods to Squaxin Island Tribal member and Qwu?gwes student researcher, Jolene Grover. The following is a short synopsis of this traditional knowledge:

Cherry Bark may be gathered in the spring and early summer. Younger trees release their bark easier. There are two methods of gathering the bark, and there are two types of bark on this tree. The first gathering method involves making a three-sided box cut and carefully pulling the bark from the tree in a spiral. A slow constant pressure up (or down) while pulling will help to ensure that the bark strip will not thin out to an end (Figure 201).



Figure 201. Example of spiral removal of cherry bark from outside of cherry tree as demonstrated by Ed Carrier (2005).

The second method involves making a vertical cut down the length of the tree and peeling the bark back (like taking off a jacket). The shorter pieces obtained this way would more likely be used in basketry as just a smaller amount of the material would be used for decorating.

After harvesting, the bark is scraped with a blade to reveal the reddish hues. Thick bark would be thinned. Once prepared in this way and kept in a dry location, it will keep indefinitely.

Re-wetting is required when working with the bark. The inner bark can also be harvested and used. It is removed from the tree in much the same way as the outer bark of the cedar is removed. The tree will survive a harvest of the outer bark but will be seriously injured from removal of the inner layers. The inner bark is best harvested from fallen trees. (Ed Carriere Personal Communications, as recorded by Jolene Grover 2005).

The first spiral cut method described by Carrier is most used when binding material was desired. Frans Boas also described this method for the Kwakwakawakw in 1909: “It is peeled in spiral lines around the tree, a cut slanting upward being first made. It is kept wound on reels” (1966:382). Both of these methods necessitate “ringing” the outer bark of the tree. The tree survives since trees transfer nutrients and water from the roots to the leaves along the inner bark.

Ethnography

Nancy Turner, Ethnobotanist, reports that Coast Salish used cherry bark for both medicine and technology:

An infusion of cherry and crabapple bark was used as a tonic for colds and various other ailments. A concoction of cherry roots, mixed with roots of the gooseberry bush, was considered to make children intelligent and obedient. Both hunting and fishing in Coast Salish territory benefited from the use of bitter cherry. It was used to bind harpoon, spear and other hunting implements and for the manufacture of nets and fishing line. Decorative effect was produced when the shiny, reddish hues of the cherry bark were incorporated into cedar basket making, (using the imbrication technique) (Turner 1971:87).

Turner also makes mention of the Coast Salish people using bitter cherry as fuel and as the hearth and drill for making friction fires.

Erna Gunther, an ethnobotanist, lists many medicinal uses for bitter cherry in western Washington:

The Lummi chew the bark to facilitate childbirth. The Lummi and the Skokomish would take an infusion of the rotten wood to act as a contraceptive. The Quinault boil the bark and drink the resultant liquid for a laxative. Upper Skagit and Skokomish also boil the bark and drink the liquid, but for a cold. These two groups also mixed rotten cherry wood with water for a contraceptive. Non-medicinal uses include the Snohomish using the bark in imbricated designs on baskets and the Quinault using the bark for tying the prongs of fish spears. (Gunther 1973:37).

Consequently, *Prunus emarginata* has an extensive use pattern in the ethnographic record among Pacific Northwest peoples. There is little doubt that it was a valued plant for the unique properties of its bark as well as a medicine and fuel wood (see XVa. Cellular Identification of Wood/Fiber Artifacts and Fuelwoods) and to a lesser extent as a food. The intense bitterness of the fruit would seem to have precluded it as a main food source, yet the Thompson, Shuswap, Klamath, Quileute, and Hoh, all have references of eating the berries or using them for preserves, which may indicate the berry was used as an extender in dried fruit of other berries.

Museum Examples

To get a sense of the importance of cherry bark to Central Northwest Coast peoples, museum data bases were examined in both the archaeological and ethnographic collections. The Royal British Columbia Museum (RBCM) in Victoria, British Columbia, Canada was visited, knowing that they have an extensive Northwest Coast collection in archaeology and ethnology. The search of the archaeological database returned 29 items identified as using cherry bark, mostly from a burial cave, the Hesquiat Site (DiSo9 (17 items) & DiSo10 (1 item)) on western Vancouver Island, British Columbia, Canada. These cherry bark artifacts are described in a publication by Bernick (1998).

The ethnographic collections database at the RBCM was considerably more forthcoming with references to bitter cherry. Items totaling 529 are recorded that contain some element made from *Prunus emarginata*. The largest concentrations of these are baskets or basket elements: 389 items (74%). A number of the items were made for trade with the European market. Such items as basketry vases, rattles, cups & saucers and suitcases were not known to be part of ancient aboriginal lifestyles. A harpoon and harpoon head was listed, a sinker, 3 mats, 3 bailers, 4 arrows, and 1 lure.

The Museum of Anthropology at University of British Columbia (UBC), Vancouver, B.C., Canada, has approximately 6,000 items in its collections. When the Canadian Heritage Information Network (CHIN) was maintaining a searchable archaeological database of collections, Simon Fraser University, Burnaby, B.C., Canada recorded 608 artifacts with cherry bark components and UBC reported 952.

Cherry Bark in an Archaeological Context

Since it is a perishable fiber, finding evidence of bitter cherry in the archaeological record provides some challenges. Ozette Village wet site demonstrated that as much as 90% of the material culture is made of wood and fiber in a Northwest community, and only 10% is stone, bone, and shell artifacts observed in a typical shell-midden without waterlogging (Croes 1976). This reinforces the need for a concentrated effort to explore possible wet sites to expand knowledge of Northwest Coast peoples. When digging in a wet site, cherry bark can be readily identified by its characteristic flatness, shine, and tightly curled nature (Figure 202). Despite the changes that occur to organics when buried, cherry bark retains its reddish hues even when buried for hundreds of years in a waterlogged anaerobic environment.



Figure 202. Example of Qwu?gwes tight curled cherry bark strips, left excavated in 2000 (N18E14, 45-50) and right from 2007 (N19E13, 40-45).

Coiled strips of cherry bark have been found in all extensively excavated Northwest Coast wet sites (Figure 203). At Qwu?gwes, and other Northwest Coast wet sites, these curls often occur independently, probably examples of discarded surplus from the ends of strips, unwound from artifacts, or stored for later use. Qwu?gwes has more cherry bark curls than all other Northwest Coast wet sites combined, even the extensively excavated Ozette Village Wet Site (Figure 203). However, few cherry bark curls were used as binding of artifacts found at Qwu?gwes. Therefore, it is believed that this site may have been a source for this raw material, similar to a quarry, where it was harvested for later use or traded elsewhere. More likely, the presences of cherry bark demonstrates that Qwu?gwes is a processing site where large amounts of surplus were collected.

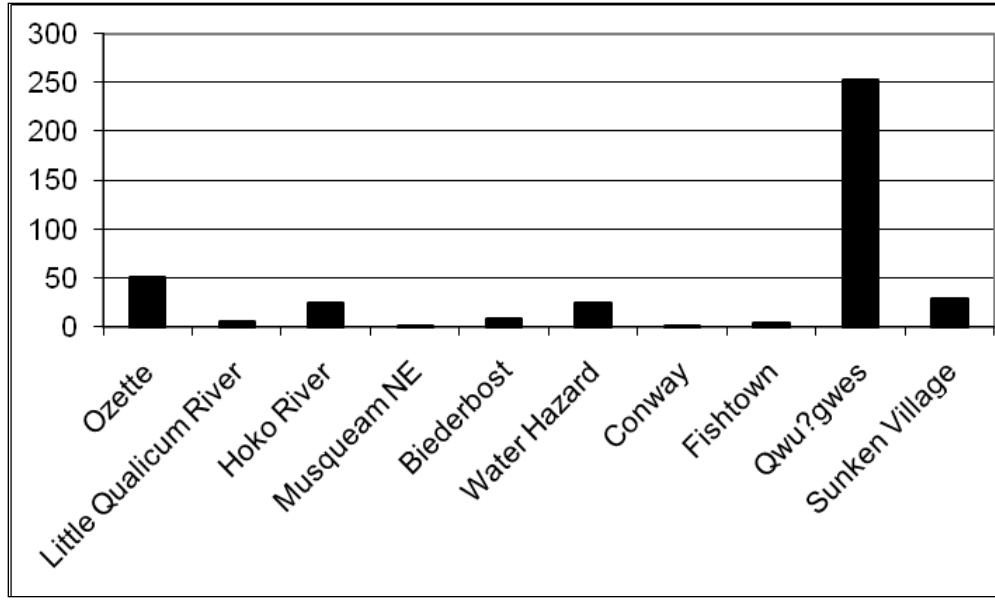


Figure 203. Number of examples of *Prunus emarginata* strips from reported Northwest Coast wet sites. *Qwu?gwes* has a noticeable large occurrence – possibly collected for later use or trade.

Qwu?gwes Site Distribution

Once the waterlogged levels are reached in the wet area of the intertidal shell-midden cherry bark curls appear and increase to their highest abundance, (as do many wood and fiber artifacts,) at 50-60 cm and then decline, with a renewed peak at 70-75 cm (Figure 204). In horizontal distribution the cherry bark tends to concentrate in the channel-like feature running through the site (Figure 205).

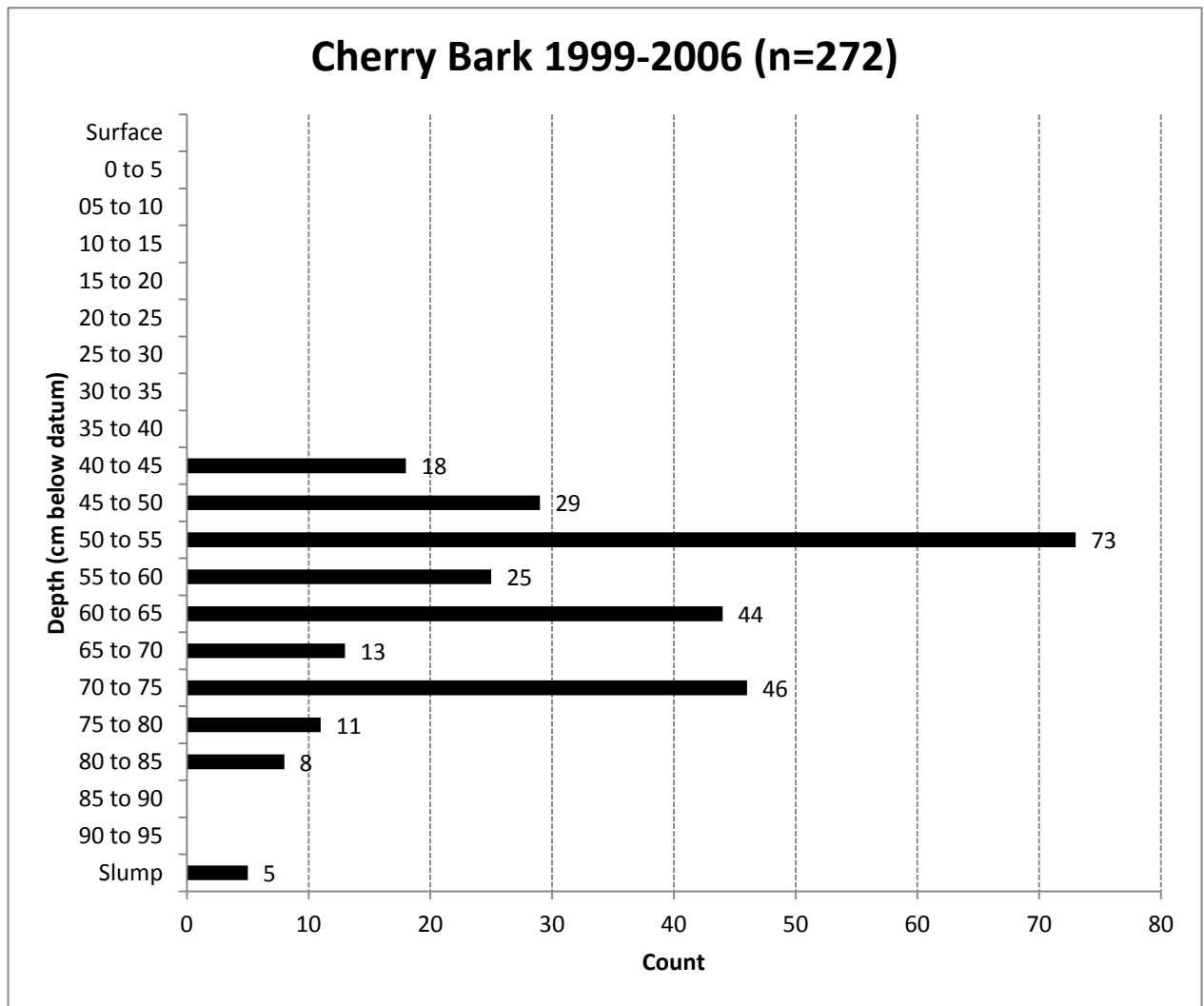


Figure 204. Vertical distribution of cherry bark elements in the intertidal shell-midden waterlogged/wet area of Qwu?gwes.

Cherry Bark Count by Unit, 1999-2006

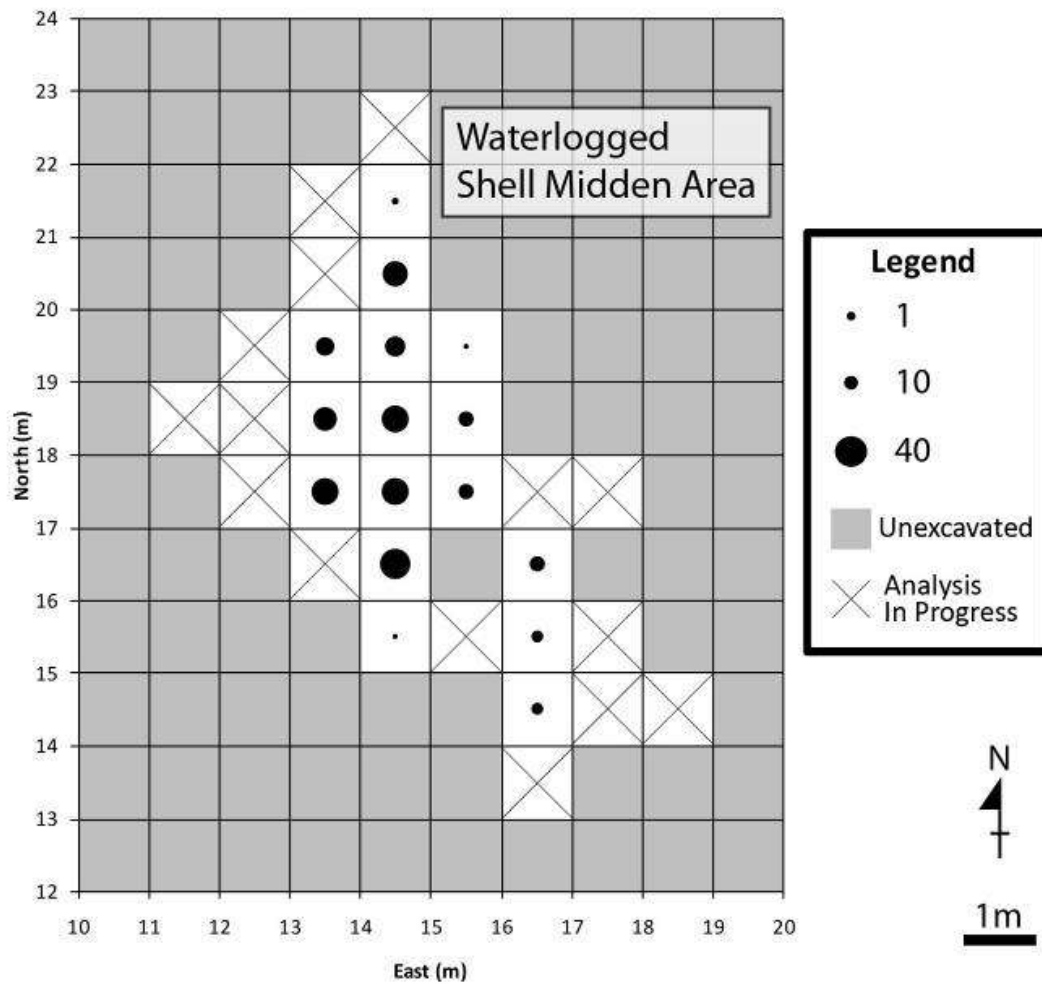


Figure 205. Horizontal distribution of cherry bark elements in the intertidal shell-midden waterlogged/wet areas of Qwu?ges.

Comparing Cherry Bark Elements from Archaeological Sites

Only two Northwest Coast wet sites (Qwu?gwes and Sunken Village) have recorded the length, widths and thicknesses of their cherry bark strips (Table 24). When comparing measurements from cherry bark curls from Qwu?gwes and Sunken Village, the length and thickness are similar.

Table 24. Length, Thickness, and width measurements of the Qwu?gwes and Sunken Village cherry bark Strips.

Qwu?gwes	Sunken Village
<u>LENGTH</u>	<u>LENGTH</u>
M=8.91	M=7.12
SD=6.22	SD=4.38
N=171	N=29
<u>THICKNESS</u>	<u>THICKNESS</u>
M=0.08	M=0.08
SD=0.03	SD=0.02
N=203	N=29
<u>WIDTH</u>	<u>WIDTH</u>
M= 0.73	M=0.51
SD=0.77	SD=0.24
N=203	N=29

The lengths are noticeably similar and from relatively short pieces (averaging 7-9 cm), which could indicate that these pieces were considered too short to keep as a binding element and discarded. Qwu?gwes does have some very long examples, with 14 over 15 cm long (certainly usable lengths for binding shafts, etc.) and one each over 40 cm and 50 cm long, which may have been lost, since they seem to be very good examples of usable cherry bark elements (see examples, Figure 206).



Figure 206. Examples of long strips of cherry bark recovered at Qwu?gwes (left: 2000, right 2003).

Thickness of the cherry bark between the two sites is very similar in mean and standard deviation; however, this similarity is expected since it indicates the natural thickness of the single layer of bark peeled from a cherry tree.

The width is more likely to be culturally selected, which is borne out by the variation between Qwu?gwes and Sunken Village, with Sunken Village having a tighter standard deviation and smaller width than the typical Qwu?gwes examples. Six examples from Qwu?gwes are peeled as wide elements, over 3 cm wide, and curled into two sided spirals, very similar to wide cherry bark and how it is stored by Squaxin Island Tribe members today (Figure 207).



Figure 207. Example of Qwu?gwes wide cherry bark stored in double spirals (right, N18E14, 70-75) and modern example (left) from Squaxin Island Tribal member.

Biederbost, Conway, Hoko River, Ozette Village, and Qwu?gwes wet sites have examples of cherry bark in a functional context. Therefore a description of their uses at those sites may help suggest other uses at Qwu?gwes. Ancient cherry bark strips have been found binding fishhook shanks at Hoko River (Croes 1995:88) and otherwise unmodified anchor stones at Conway (Munsell 1976:121), Hoko River (Croes 1995:177-180) and Biederbost (Nordquist 1961:3-4, 1976:200). The most common use at Ozette Village was in the construction of the whale harpoon equipment (Croes 1980:149). This was an unlikely function at the southern Puget Sound Qwu?gwes site, although harpoons for seal hunting may have been made and used there

(see stone harpoon blades found, XIXd. Bifacially Flaked “Harpoon” Blade and XIXe. Ground Slate “Harpoon” Blade).

Other uses observed at Ozette Village include bindings for projectile or spear points, bindings for anchor stones, wrappings in lattice work, imbrications on coil basketry, and weft wrappings in open wrapped west coast burden baskets (Croes 1980:147-150).

A small toy war club, less than 5 cm long was found at Qwu?gwes. The club was constructed using a pebble wrapped onto the end of a cedar stick using cherry bark for binding (Figure 208). This toy will be discussed separately (see XIXa. Toy War Club, and Figures 296-298).



Figure 208. Example of cherry bark binding on a miniature toy war club from Qwu?gwes wet site (mm scale; N19E12, 40-45, 2007).

Cherry bark was found extensively at the site, and tribal members knew that cherry bark was very supple when wet, but shrinks and becomes stiff and strong, making it an excellent material for reinforcing the edges of baskets and to tie cork lines to the gill nets. It would be easy to assume that the cherry bark all came from the immediate area of Qwu?gwes. However, many Tribal families know the ancient cherry bark gathering places, and these were at other areas too (SIT, CRD 2009).

The importance of cherry bark as a raw fiber material has not been as adequately recognized in Northwest Coast archaeology as it should be. Hopefully this overview of cherry bark artifacts at Qwu?gwes and other Northwest Coast wet sites, and museum collections, sheds some light on the importance of this raw material along the Northwest Coast and through, no doubt, a vast time period.

XVIId. Woodworking Debitage, Experimental Archaeology, and Qwu?gwes Woodworking Tools: Ground Stone Adzes and Antler Hafts and Wedges

By Tyler Graham; Edited by SIT, CRD

Abstract: By far the most abundant Qwu?gwes artifactualdebitage is woodchips (6,375, 61% of alldebitage recovered, including lithic or fiberdebitage). Certainly this number reflects considerable wood working at this camp, and, when comparing the types of wood chips found at Qwu?gwes to other Northwest Coast wet sites, this site reflects, more than any other site, the full range of woodworking. These activities include preparing rough logs to light adzing or carving with knives or chisels.

Throughout the site's basal channel feature in the waterlogged intertidal shell-midden area, very large yellow woodchips were recorded, reflecting removal of the outer sapwood of a log down to the solid heartwood.

Experimental archaeology, including the replication of the ancient nephrite ground stone adze and antler wedges, provides a means to better assess woodworking tools, techniques and the woodchipdebitage produced at Qwu?gwes.

Woodworking Debitage—Woodchips

This section presents the analysis conducted on woodchips from the Qwu?gwes site focusing on size and shape of the chips, then compares them to other wet sites in the region. Following that analysis is the experimental archaeology conducted, in an attempt to replicate the woodchips found at the site.

To date 6,375 woodchips from the waterlogged shell-midden at Qwu?gwes have been counted, of which 1,192 have been analyzed. The analyzed woodchips have been measured by length, width, and thickness. Measurements were also taken of the angle-in and angle-out. Angle-in is where the adze blade cuts into the wood. As the motion of the adze carries through after making the cut, it peels wood away, creating the angle-out which is where the peel ends. The woodchip profiles are related to the method of carving and possibly to the species of tree being worked. A flat profile tends to be a product of shaving or planing. A triangular woodchip profile is produced by heavier shaving or light adzing. Trapezoidal woodchip profiles result from heavy adzing, chopping or carving. The parallelogram profile is possibly produced by angle adzing or chisel reduction (Gleeson 2005). Woodchips were also analyzed for feathering, which occurs at the point of blade entry, and for faceting, which is scarring evidence from woodchips being removed. These terms, pertaining to woodchip shapes, are illustrated in Figure 209.

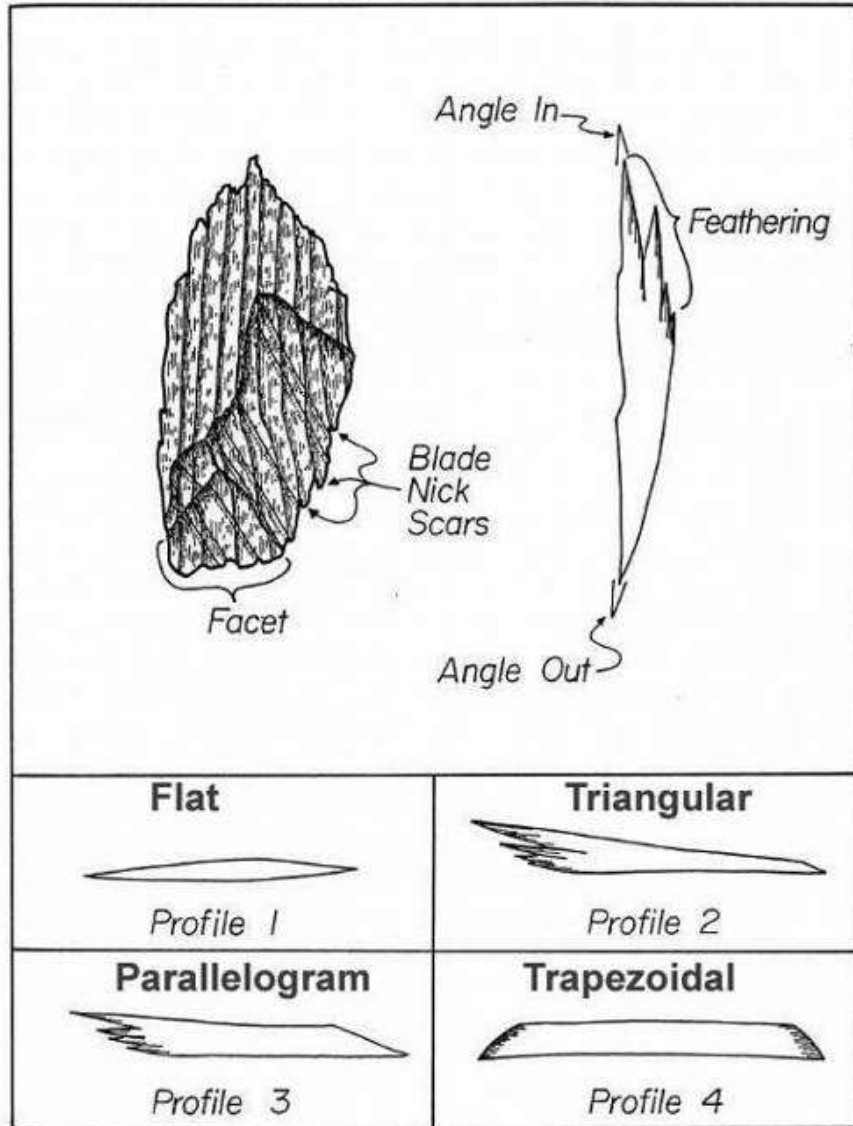


Figure 209. Woodchip nomenclature as illustrated by Gleeson (2005:218).

Woodchip Distribution

The majority of woodchips recorded have been from the Northern area of the intertidal midden with the largest grouping occurring in N20E13 (Figure 210). The woodchips distribute along an erosional feature in the midden that parallels the beach creating a depression, which appears to be a channel that may have served as a convenient dumping area (see IX. Site Structure, Stratigraphy and Micro-Geomorphology, Figures 22-23, 25). There is a large difference in the distribution across the midden indicating that woodworking either took place on the beach in a specific area, or woodchips were dumped in a specific location. However, it must be taken into account that these counts do not reflect all the excavated woodchips. There are woodchips from 1999 to 2001 field seasons that have not been included and may add up to 1,500 woodchips in the southern section of the midden.

Woodchip Count by Unit, 1999-2006

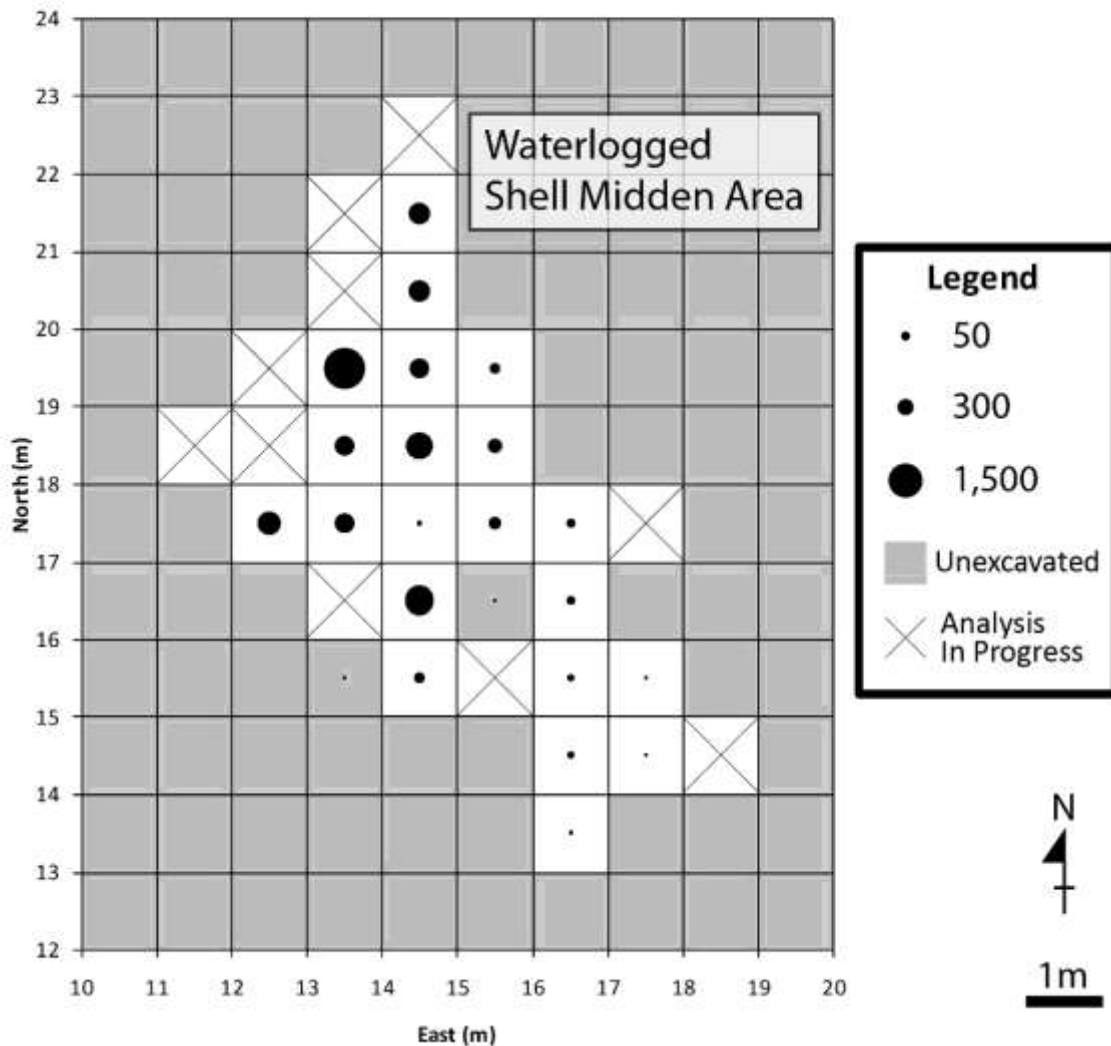


Figure 210. Horizontal distribution of woodchips at Qwu?gwe.

The vertical distribution of woodchips appears to follow the pattern seen with basketry waste elements, macroflora, as well as stone, bone/antler and shell artifacts (Figure 211). A peak at 50-55 cm is reached, which may reflect an intensification of activities at the location at that time. From this peak, there is a gradual decline in numbers, with a little increase at 70-75 cm, which also parallels some more dramatic increases in this level of other artifact categories.

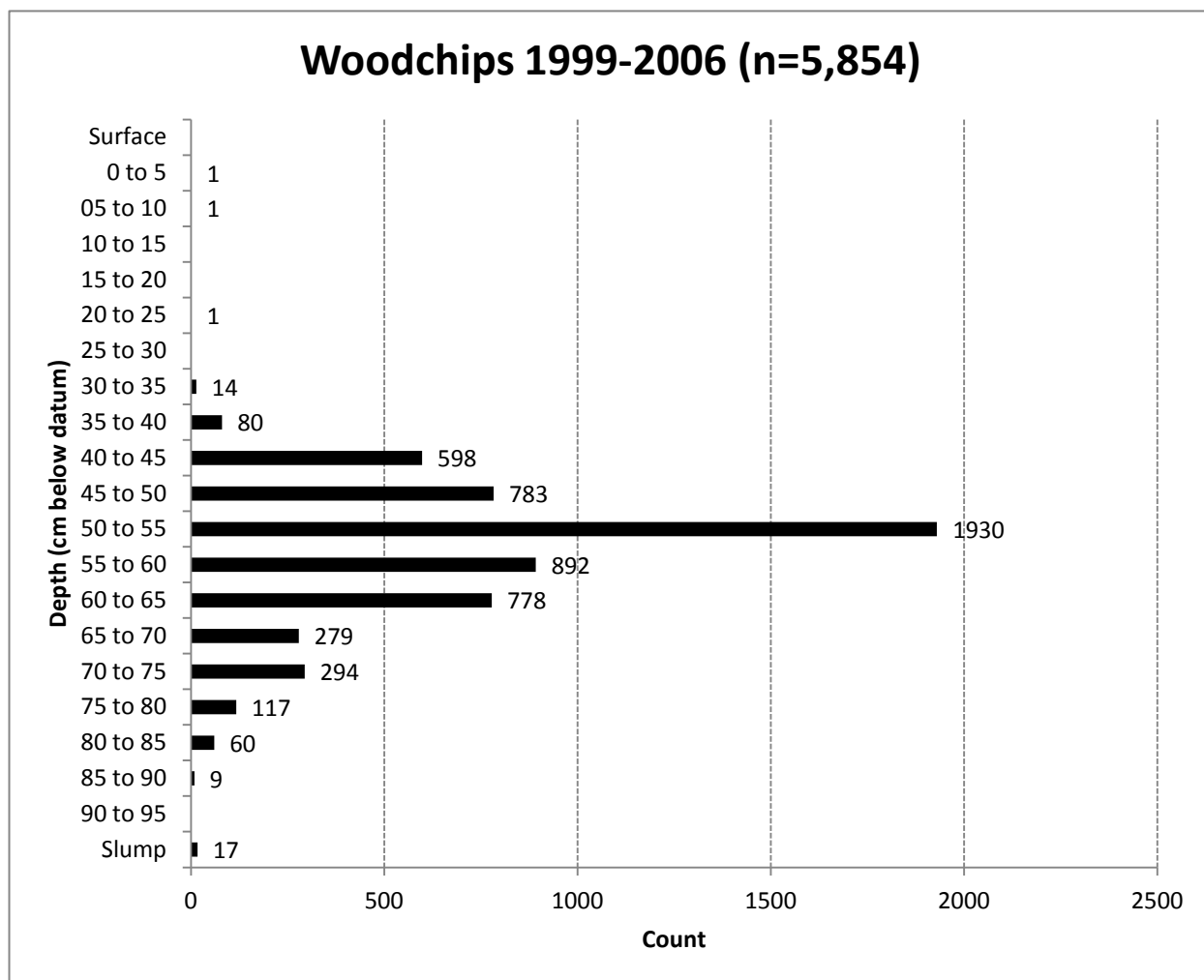


Figure 211. Vertical distribution of wood chips in intertidal shell-midden waterlogged/wet area.

Comparison of woodchip morphology with other Northwest Coast Wet Sites

The woodchips from Qwu?gwes were compared to three other sites with woodchips analyzed from waterlogged components: Hoko River, Ozette Village House 1 and Sunken Village. Comparisons of woodchip profiles of the four reported wet sites show interesting differences (Figure 212). At the Hoko River site, the majority of woodchips analyzed were found to be triangular. At the Ozette Village House 1, the majority were flat. Woodchips analyzed from the Sunken Village site were mostly trapezoidal in profile.

Woodchip analysis at Qwu?gwes shows a majority of woodchips are parallelogram in profile. Unlike the other sites, there is a relatively even occurrence of Gleeson’s woodchip profiles. This indicates that the full process of woodcarving took place at Qwu?gwes from preparing rough logs with heavy adzing to finish work done by light adzing or carving with chisel or knife. They break down into Parallelogram (27.24%) followed by Trapezoidal (26.15%), Triangular (20.61%), Flat (16.71%) and Box (1.87%). The Box profile was recently identified through experimental archaeology and is not used in inter-site comparisons because it was not recorded in other sites.

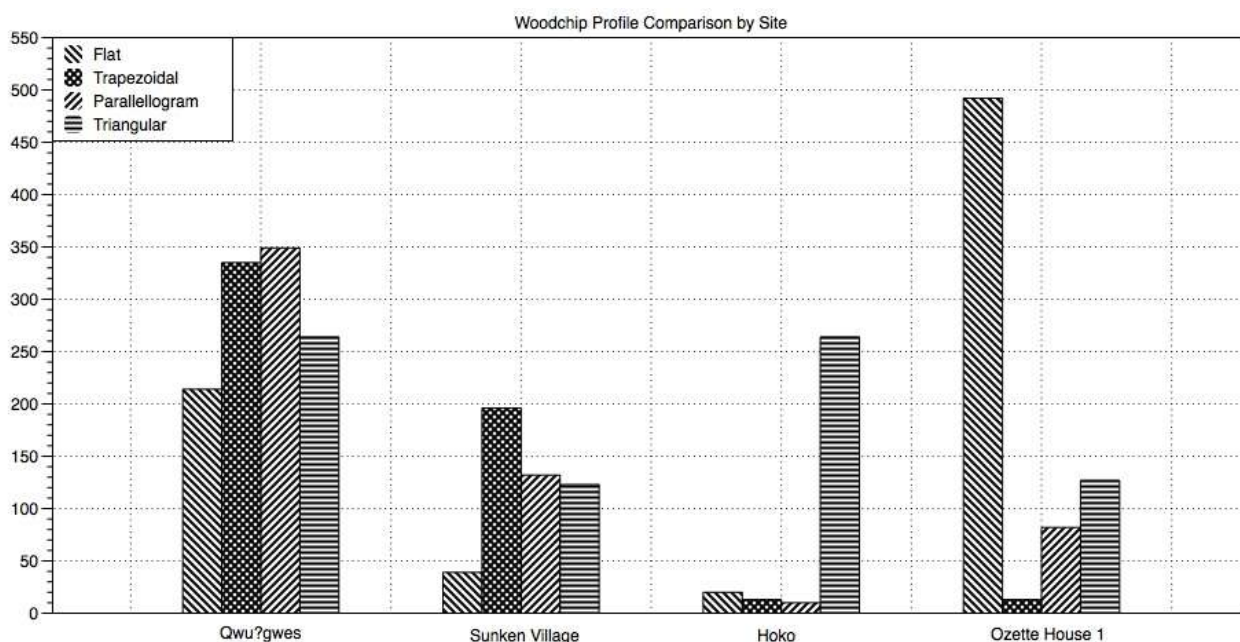


Figure 212. Comparison of woodchip profiles from reported Wet Sites on the Northwest Coast.

The charts in Table 24.1 and Figures 213-217 illustrate the comparisons of the mean, standard deviation for angle-in, angle-out, length, width, and thickness between the Qwu?gwes, Hoko River (N=382), Ozette House 1 (N=1150), and Sunken Village (N=490) wet sites. Measurements of width and thickness show similarities across the sites. The similarities in thickness most likely relate to the mechanics of how an adze is used. Woodchips are removed with an adze in a swinging motion that comes in contact with the wood in almost a glancing blow. It is just enough to make a small cut in the wood with the follow-through of the swing driving the blade along the grain of the wood peeling the woodchip off. The proper use of an adze should limit its ability to produce thick woodchips.

Table 24.1 Mean and Standard Deviation of Woodchips from Qwu?gwes, Sunken Village, Hoko River and Ozette Village Wet Sites.(Angle In and Out in Degrees; Width, Length and Thickness in CM).

Attribute	Qwu?gwes		Sunken V.		Hoko		Ozette	
	M	SD	M	SD	M	SD	M	SD
Angle In	20.66	18.85	22.99	14.69	19.00	11.00	15.30	11.90
Angle Out	24.34	23.88	29.82	26.52	15.00	7.50	16.00	13.90
Width	0.83	0.46	1.10	0.50	1.10	0.50	1.10	0.50
Length	2.90	1.60	3.50	2.20	4.10	2.60	2.90	1.10
Thickness	0.26	0.20	0.40	0.20	0.19	0.10	0.40	0.15

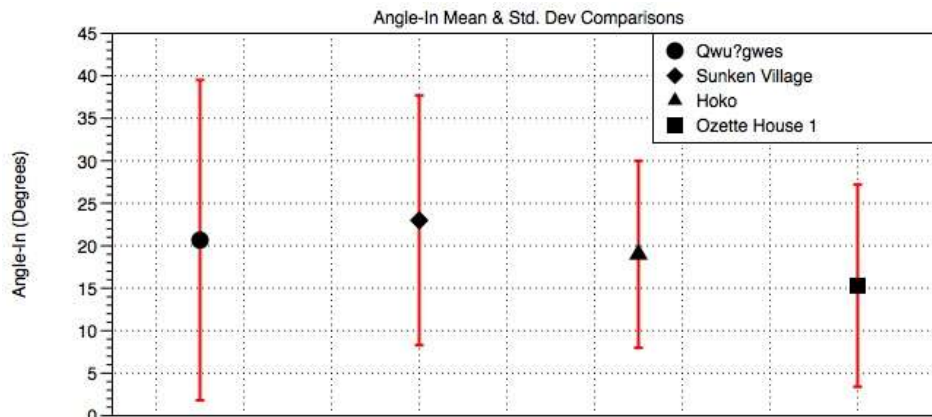


Figure 213. Woodchip Angle-In at Qwu?gwes and other reported wet sites.

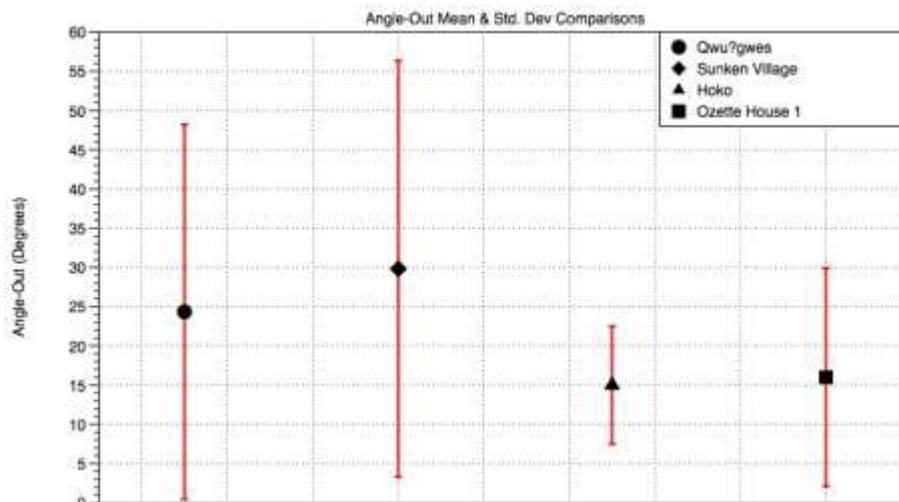


Figure 214. Woodchip Angle-Out at Qwu?gwes and other reported wet sites.

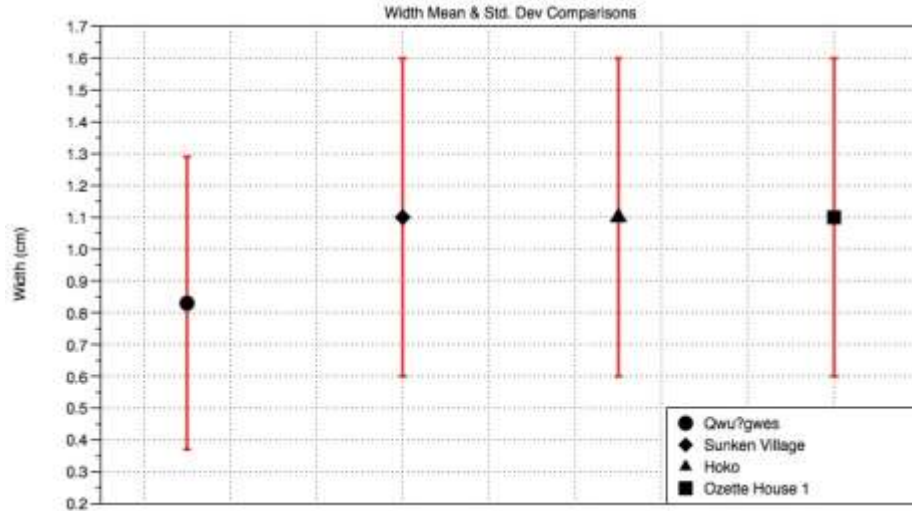


Figure 215. Woodchip Width measurements at Qwu?gwes and other reported wet sites.

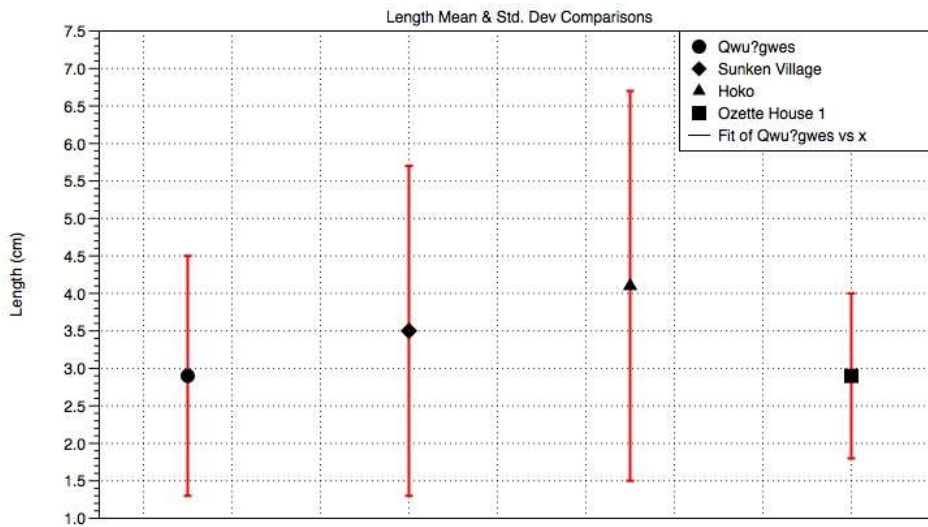


Figure 216. Woodchip Length measurements at Qwu?gwes and other reported wet sites.

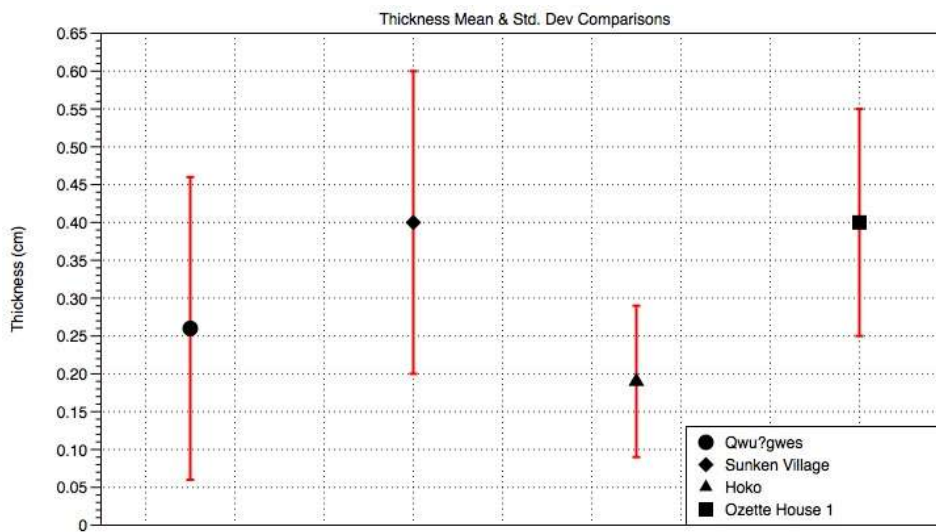


Figure 217. Woodchip Thickness measurements at Qwu?gwes and other reported wet sites.


Scatterings of large yellow woodchips ranging from about 5cm to over 45cm in length have been located in seven of the squares in the waterlogged portion of the intertidal shell-midden (see examples, Figures 386 and 402, below). All of these woodchips that have been examined show that they are from the outermost layers of the trees. Squares N19E13, N20E13, and N21E13 (see Figure 402, below) are adjacent to each other with the woodchips at 50-55 cm, 40-45 cm, and 30-35 cm respectively. Provided they are from the same tree, which is likely as they are a thin layer of woodchips spread out over a large area indicating a tree being processed at that spot as opposed to a pile of chips being dumped, this data indicate a slope down the channel. Those squares are the only contiguous squares with the large woodchips. Kathleen Hawes has identified two different species in these woodchips, Western red cedar (*Thuja plicata*) located in N21E13, 30-35 cm (see Figure 402, below) and Western hemlock (*Tsuga heterophylla*) N16E14, 55-60 cm. The cedar woodchips are the sapwood of the tree just underneath the bark. Bark is still evident on some of the hemlock woodchips. The large size of the woodchips, and consisting of the outer layers of wood, indicate that the midden was an area used for the beginning stages of processing trees. Two of the hemlock woodchips came from a tree that was approximately 4 inches in diameter at the point they were removed. The cedar tree was about 35 inches in diameter at the point one of the woodchips was removed. Diameter was calculated by taking a woodchip that had the outermost layer of sapwood. Assuming it was from a uniformly round tree, the woodchip was held vertically and a string run following the curve and projecting past the sides of the woodchip. A ruler was placed on either side of at a perpendicular angle to the projected circumference. This created straight lines that intersected at the hypothetical center of the tree, yielding the radius.

The hemlock woodchips had thicknesses of 0.34 and 0.50 inches which would reduce the diameter to between 3.32 and 3 inches. Postholes discovered in N31E22, 60-65cm and N27E23, 60-65cm and 70-75cm measure between 2.3 and 4.3 inches in diameter raising the possibility of the hemlock being used for posts.

Experimental Archaeology - Replicating Woodchips

Experimental archaeology was used to attempt and replicate ancient woodchips. Four adze blades have been made from nephrite using, in the interest of time, an electric grinder with both diamond and silicon carbide grinding wheels (Table 25). Adze bit #1 was made by Tyler Graham who had no woodworking experience at the time. Bit #2 was designed by Michael Ogden, a Squaxin Island Tribal member and apprentice canoe builder. Bits #3 and #4 were based on measurements of ancient adze bits found at Qwu?gwes (Table 25). The angles were measured from the tip of the blade.

Table 25. Adze bits with table of corresponding angles.



Adze	Top Angle (degrees)	Bottom Angle (degrees)
4	40	18
3	27	15
2	39	15
1	29	26

Working with experts in wood working allowed an understanding of how the adzes functioned and why (Figure 218). Squaxin Master Carvers Andrea and Steve Sigo along with Canoe carving apprentice Michael Ogden examined bit #1 and decided that it was not properly shaped for adzing . The bottom of the blade was angled too steeply; moreover, it didn't gently curve into the body of the bit causing the blade, when used in an adzing motion to strike, not at the tip of the blade, but on the flat angled surface (Sigo, Personal Communications 2007). When used as a "D" or elbow adze, this motion caused the blade to hit on the flat length of the bottom angle rather than at the blade point, which does the cutting. For bit #1 to work, the blade had to be held at a steeper angle to the wood which changed the motion from adzing to chopping and would mark the wood with chopping marks. Working with Squaxin carvers promoted understanding of how the adzes should be formed and why.



Figure 218. Replicated blade on elbow adze.

When adzing Western red cedar (*Thuja Plicata*) it was noticed that not all the woodchips fit Gleeson's Woodchip Profiles. It was first noticed in the heartwood of an old growth piece of cedar which produced woodchips that showed noticeable splitwood characteristics. Splitwood characteristics are traits associated with wood that has been split with wedges; it is uniform in thickness or width on one or more sides and has sheer sides as opposed to tapering to an edge as with woodchips.

A small sample from a piece of cedar that had both the sapwood and heartwood was tested. Splitwood characteristics were observed in the sapwood but to a lesser extent than in the heartwood (Table 26). Some of the heartwood with splitwood characteristics produced angle-ins and angle-outs over 80 degrees which did not fit into Gleeson's woodchip profiles. A 5th profile, named box, has been added to the possible profiles to account for the shape of these woodchips (Figure 219). Thus far research, has been limited to Western red cedar and Pacific yew, with splitwood characteristics and box profile being observed only in the cedar. Both pieces of cedar had been harvested more than a year earlier and this fact may have had an effect on the woodchips, but up to this point in the research, a freshly downed piece of cedar has not been found to compare against our initial results.



Figure 219. Large Cedar Woodchip with Splitwood Characteristics.

Table 26. Splitwood characteristics from adzing.

Adze	Wood	N =	Percentage with Splitwood Characteristics
2	W. Red Cedar Heartwood	48	65.96%
3	W. Red Cedar Heartwood	17	64.71%
3	W. Red Cedar Sapwood	13	38.46%

Measuring the replicated woodchips has shown a significant correlation between the adzes used and woodchips excavated from Qwu?gwes (Figures 220-222, below). Comparisons of the histograms show the same general patterns.

Length measurements peak in 20 to 25 mm range with the majority of woodchips clustering between 10 mm and 45 mm (Figure 220). In the experimental sample, there is a larger representation of woodchips in the 10 to 15 mm range which could be explained by the sampling technique. Woodchips at Qwu?gwes were pulled out of screens, with the finest mesh being 1/8 of an inch, which can allow smaller woodchips to slip through, while the experimental sample was swept into a dustpan and deposited on a tray allowing for the retention of smaller woodchips.

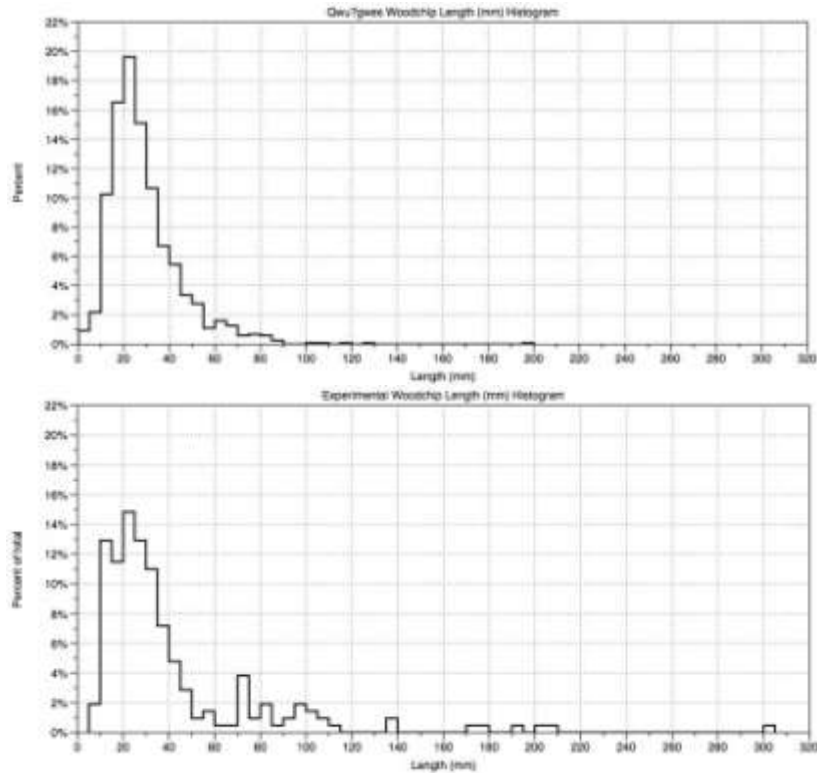


Figure 220. Comparison of Qwu?gwee and Experimental Lengths

Width measurements both peak at the 6 to 8 mm range, but the experimental widths group in a larger range of 2 to 20 mm as opposed to 2 to 16 mm in the Qwu?gwee sample (Figure 221). Adze blade number 2 was wider than any of the blades found at Qwu?gwee and could be cutting wider woodchips distorting the measurement range of observed woodchips. Future experimental work will investigate relationships of blade width and woodchip measurements.

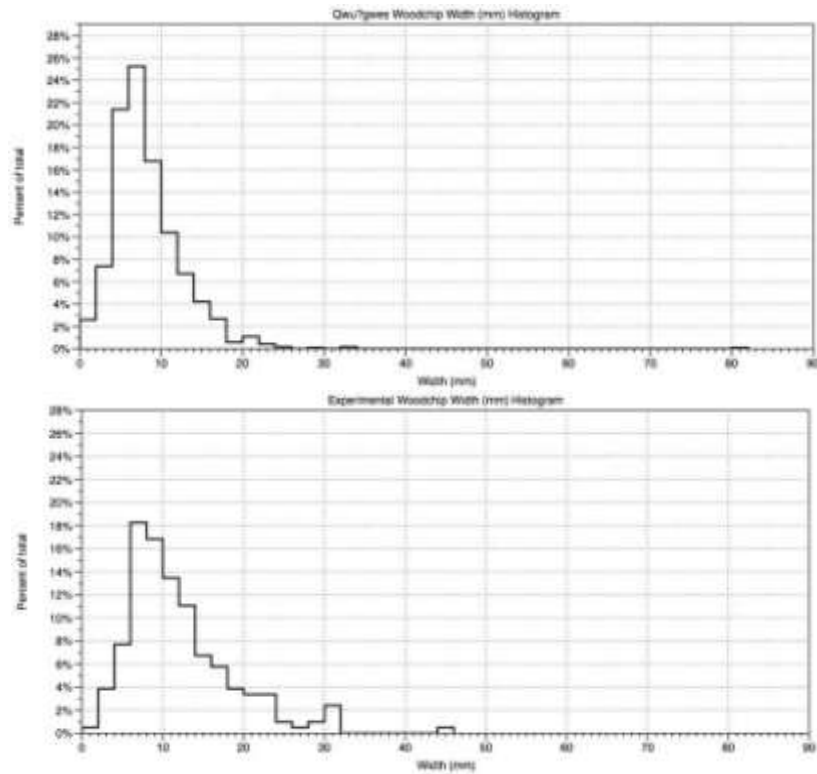


Figure 221. Comparison of Qwu?gves and Experimental Widths.

As with the comparisons between sites, the thickness shows the greatest similarity, with the most frequent occurring in 1 to 2 mm (Figure 222). The experimental woodchips show a greater frequency of 0 to 1 mm which again is attributable to the collection methods used.

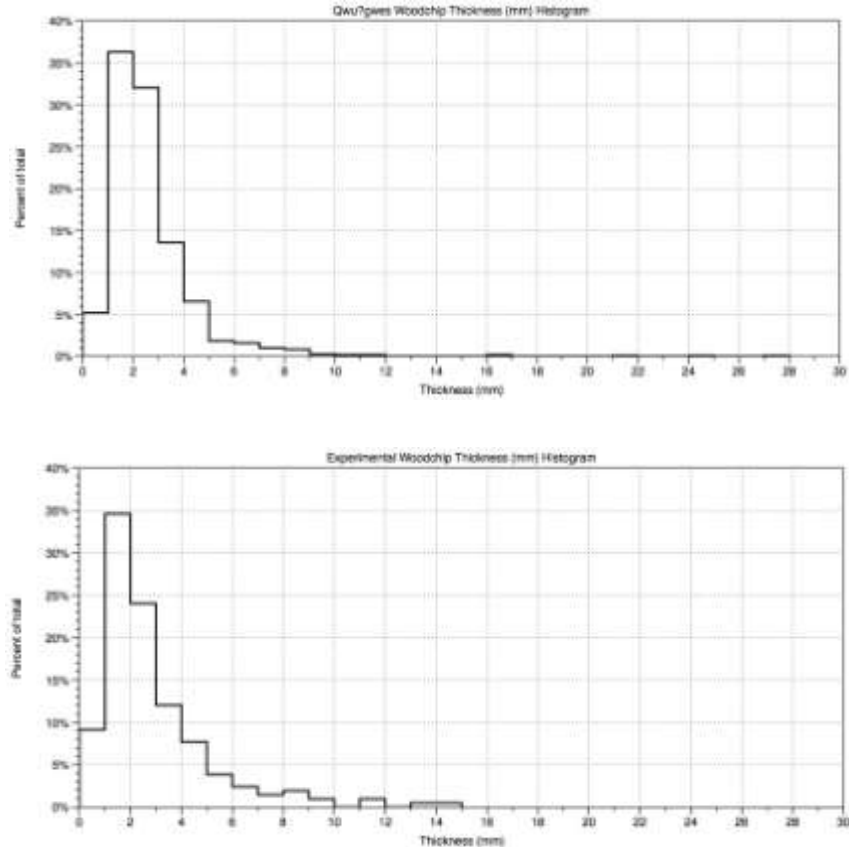


Figure 222. *Qwu?gves and Experimental Woodchip Thickness Comparisons.*

The high standard deviations of the replicated woodchips may be from having a sample that is a more complete representation of adzing activities than those that were excavated from the midden. The steep angle in on the cedar could result from an increase in woodchips showing splitwood characteristics as the angle in drops when sapwood is introduced, which tends to produce more typical woodchips than heartwood. It also may not be accurately reflected in the archaeological record as evidence of adzing may have become obscured, leading to their classification as strictly splitwood, rather than woodchips with splitwood characteristics.

Qwu?gves Wood Working Tools: Stone Adze Blades, Antler Wedges and Hafts, and Sandstone Abraders—Artifacts and Experiments

Ground Stone Adzes

Three adze blades and the fragment of a fourth have been found at Qwu?gves (Figure 223). An adze blade from a “D” or elbow adze is designed to cut wood with a glancing blow. The initial strike makes a small cut, relative to the amount of wood being moved, and the follow through motion of the swing peels the wood off, creating a woodchip. Because there is relatively little resistance, compared to chopping, an adze blade is able to have a finer and sharper point than an axe would. The cutting point of an adze blade must be offset towards the side that comes in

contact with the wood. Doing so allows a shallower angle on the bottom letting the adze function as described earlier. The smallest of the blades has a tip that is aligned closer to the center of the blade and a steep angle on the bottom side (Figure 223, right, N19E14, 35-40). The first experimental adze blade is closer in shape to this one, and experiments have shown that it is not suited for elbow or “D” adzes. This ancient adze blade may have been used as a straight adze or a chisel.



Figure 223. Nephrite Adze blades excavated at *Qwu?gwes* (l to r: N52E26, 50-55, 1999; N26E24, 50-55, 2004; N19E14, 35-40, 2001). Top Down view with profile views in order of appearance (Photos by Eva Marie Fuschillo).

Adze pre-forms were separated from the parent rock by sawing notches into the rock then striking on an anvil stone breaking the preform off (Stewart 1996). The middle adze blade has scarring from this process (Figure 223, N26E24, 50-55). No notching is evident on the other adze blades, but the sides have been tapered by grinding, suggesting that notching was pre-formed and ground completely off afterwards.

All of the blades have been identified as nephrite, a type of jade. Known nephrite deposits in Washington are in northern areas of the state, near Concrete, Darrington, and Mt. Vernon (Ralph and Chau 2009; WSMC 2004). Black nephrite cobbles have been found in the North Cascade Mountains of Washington (Aylor, Personal Communications 2009). Jeff Aylor, who is a local jade collector, reported nephrite finds on beaches around the Olympic Peninsula and on islands throughout Puget Sound, with boulders of up to 18 pounds being found as far south as Everett (Personal Communications 2009). Sourcing the origin of the adze blade material would be difficult as the glaciers that carved out Puget Sound have moved material throughout the region.

Antler Wedges and Hafts – Artifacts and Experiments (see detailed analysis of antler wedges in XVIII Bone and Antler Artifacts)

Student researcher Adam Harris replicated an elk antler wedge (Figure 224). He used an elbow adze to girdle the antler before breaking the antler pre-form off of the main body. Grinding was done by hand on sandstone and by machine with a grinder.



Figure 224. *Experimental Antler Wedge. Note damage to tip.*

Ancient wedges from Qwu?gwes had blunted and rounded tips (Figure 225). The replicated wedge has some rounding at the tip, but was tapered to a point. The blunting of the tip makes it thicker and more resistant to breaking. After some limited use of the replicated wedge, the finely pointed tip started to crush and break (Figure 224).



Figure 225. Two ancient antler wedges (top: N52E25, 35-40, bottom: N27E25, 25-30). 1st in profile view 2nd in top down view.

Wedges were girdled through the trabecular bone at the proximal end, then broken off from the body of the antler. This left a distinctive taper on the basal side of wedges that have not seen much use (see Figure 269, below). As the wedge is used, the marks from the girdle wear away to a bump from being pounded with a hand maul. Eventually, if the wedge does not break, evidence of girdling is completely obliterated by pounding.

The replicated wedge was girdled using an adze. The characteristics of an adze blade, as described previously, make it an unsuitable tool for carving antler. Certain woods, once they dry, become very hard, such as Pacific Yew (*Taxus brevifolia*) and can dull an adze blade in a short period of time. Bone is harder than Pacific Yew, and during experiments required more of

a chopping motion to remove material as an adzing motion did not carry enough force to remove bone. Chopping is a direct or slightly angled blow at the material and may involve prying or twisting to free a blade that becomes imbedded; therefore, a more robust blade with wider angles is needed beyond what an adze blade can exhibit. After being used to chop the antler, the cutting point of the adze blade was thoroughly scarred with small nicks and chips. The damage to the blade would reflect on any wood being carved until the time was spent to re-sharpen the blade to remove all the damage and scarring. Evidence on ancient antler supports that an adze was not used to girdle, but a cutting tool of some sort was. The ancient antler has cut marks circling the artifact, while the experimental adze has created chopping marks on the antler (Figure 226).

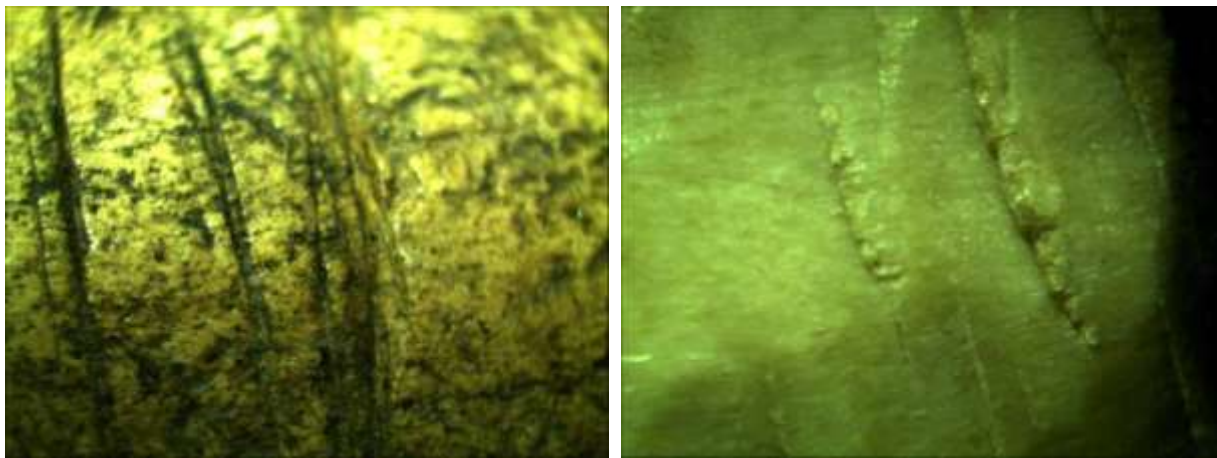


Figure 226. (Left) Start of girdling on antler from Qwu?gwes. There appears to be a cutting motion, in line with the cut marks; 15x magnification. (Right) Adze marks from girdling on experimental wedge. Chopping motion perpendicular to cut marks, leaving overhangs; 15x magnification.

An antler adze haft was excavated at the site; most of details of the haft are covered in XVIII. Bone/Antler Artifacts (also see Figure 271, below). This haft probably started out as a wedge; a taper has been ground into the antler that is 10° as measured from the proximal end which is identical to two of the Qwu?gwes wedges that were measured. What is most indicative is that the taper does not serve any known purpose in the hafting of a blade. The proximal end of the antler has a rectangular shaped hole in it for mounting a blade, with a round hole on the distal end for mounting to the handle (Figure 227). The taper on the haft is on the proximal end as well, which would place the thickest part of the haft closest to the blade tip with the taper towards the handle. This theoretically creates an obstacle that would hinder the smooth glancing blow from a “D” or elbow adze, though it would probably be functional on a straight adze or chisel. Experimental testing with a replicated haft will need to be performed to confirm or disprove this.

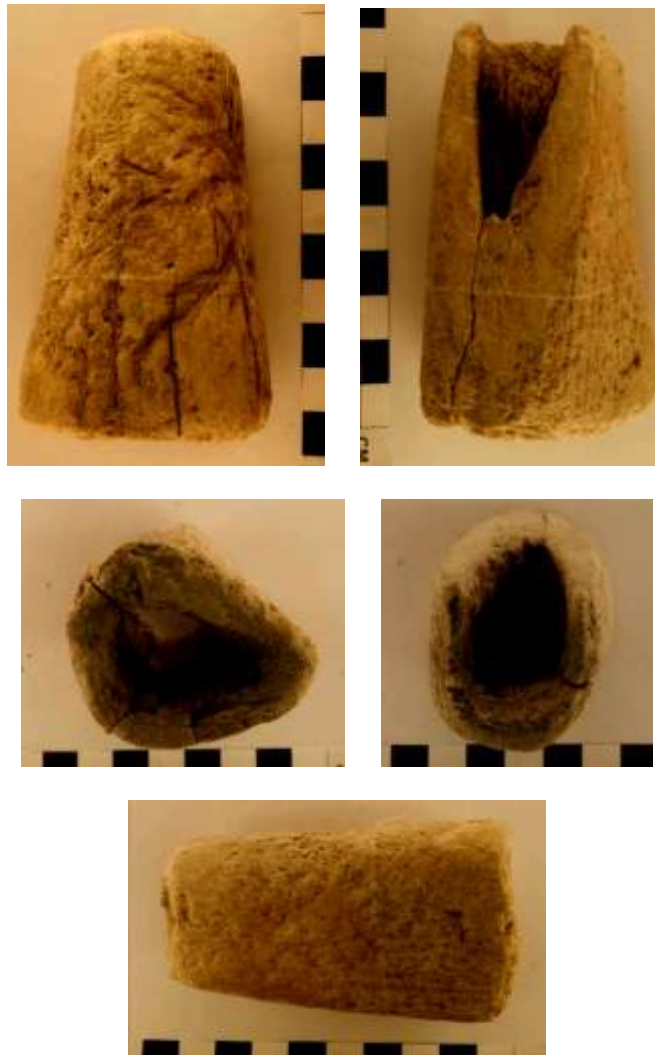


Figure 227. Antler Haft (N35E03, surface, 1999). Clockwise from top left. Unworked top; ground underside; proximal end, note rectangular hole; distal end, round hole is distorted in photo because of grinding; side view with ground side at bottom and proximal to right.

Abraders—Artifacts and Experiments

Adzes and antler wedges were both ground to shape, requiring the use of an abrasive tool to produce these tools. Three fragments of sandstone abraders have been found at Qwu?gwe (Figure 228). The first abradar came from a water worn cobble and was flattened on one side to make a useful surface with a grain size of 200 μm . The second abradar appears to have come directly from bedrock, as there is no evidence of rounding by water. It has a grain size of 167 μm and, on one surface, has a slight rounding and wear on the crystals from grinding. The last abradar also shows no evidence of water wear. It is the thinnest abradar and has the finest grain of 143 μm , suggesting it may have been used as a fine stone for sharpening. The grains are much finer than what has been used in our beginning stages of experimental grinding (250 μm) indicating that these abradars may have been used in the later stages of grinding. There is no

evidence of grooves being worn into the abraders which would show they were used for grinding points. While this fact does not rule out that they were used to grind points such as awls and needles, it is suggestive that they were used for grinding larger objects such as adze blades and wedges.



Figure 228. Sandstone abraders from Qwu?gwes (l to r: N22E14, 60-65; N15E16; N17E16).

The immediate area surrounding Qwu?gwes is basaltic bedrock or glacial outwash, indicating the source of the abraders is located off site. The nearest sedimentary rock formations occur in the area of McCleary, Washington, though available data did not indicate the type of sedimentary rock (Heg 2009).