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Berkeley Rockshelter Lithics: Prehistoric Use of Mount Rainier National Park

Rockshelters, shaped by weathering and erosion, are shallow caves that can be found at the base of rock formations. They are often sites of excellent preservation for archeological artifacts. Much of the archeological information gathered in Mount Rainier NP has been gleaned from lithic assemblages found in rockshelters that, through archeological analysis, indicate what activities people carried out in the shelters.

The Berkeley Rockshelter, located in the northeast quadrant of Mount Rainier NP, consists of two shallow cave areas located about 20 m apart. Together, they yielded almost 2,000 stone artifacts. This lithic assemblage has been studied to explore the most probable usage of the Berkeley Rockshelter site during the Late Holocene time period. This study suggests that prehistoric hunters mended their broken hunting equipment at the rockshelter, which functioned as a short-term camp during hunting expeditions.



Pumice abrader from the Berkeley Rock Shelter.

Subsistence Systems in the Pacific Northwest

The archeological record at Mount Rainier NP and the surrounding Columbia Plateau region—which extends through parts of modern-day Oregon and Washington—indicates that prehistoric peoples have been hunting and gathering resources at Mount Rainier and its surrounding landscape from as early as 10,000 years ago.

As the climate warmed and the glaciers receded, the ways that groups utilized this environment changed. Prehistoric communities expanded hunting and gathering activities to the mid-to-upper elevation landscapes of Mount Rainier, spaces previously inaccessible due to the permanent presence of snow and ice. The park's documented prehistoric archeological sites from the slopes of the mountain include evidence of long-term base camps, short-term hunting camps, kill sites, butchering sites, food storage spaces, and places where raw materials for stone tools were extracted.

Mount Rainier NP remains a place important to traditionally associated peoples. Individuals belonging to six local tribes—the Nisqually Indian Tribe, Puyallup Tribe of the Puyallup Reservation, Squaxin Island Tribe of the Squaxin Island Reservation, Muckleshoot Indian Tribe, Confederated Tribes and Bands of the Yakama Nation, and Cowlitz Indian Tribe—continue to hunt; and to gather berries, medicinal plants, and other resources in the park. These tribes believe that they are descended from the groups of prehistoric hunter-gatherers who traversed the landscape 10,000 years ago (National Park Service 2014).

Foragers versus Collectors

Archeologists have suggested that during the Early and Middle Holocene (8,000 BC to 2,000 BC) Epoch, populations of the Pacific Northwest were foragers (Burtchard 1998, 2007). Foragers do not customarily cache food stores. They usually range from their residential bases to hunt and gather food on a daily basis, and usually return to their residential bases each evening. Foraging community groups are relatively small, and often relocate their residential bases frequently, moving closer to different resources depending on their needs. Large base camps occupied for long periods of time contain evidence for a wide range of activities including tool repair, and food preparation and consumption.

However, by the Late Holocene (1500 BC to European contact), foraging life styles had become less viable for survival. As population increased over time after the colonization of North America, individual group territories decreased. Large herd animals, like caribou, were replaced by more solitary prey, such as deer and moose, after forest ecosystems encroached upon open landscapes. Group mobility declined, and prehistoric hunter-gatherers tended to favor collecting instead of foraging for subsistence.

Collectors, in contrast to foragers, preserve and store food. They are semi-sedentary, meaning communities do not relocate their residential bases as frequently as foragers. In addition to large group foraging for nearby resources, small task groups procured specific

resources that the community needed, and often traveled long distances to do so. Collectors usually banded together in larger groups, and their communities were more firmly structured and organized.

Three radiocarbon dates indicating intermittent occupation from about AD 1 to AD 1660 (Table 1) place the Berkeley Rockshelter firmly in the Late Holocene. As such, our assumption is that the individuals using the Berkeley Rockshelter were collectors.

Signatures of Collecting in the Archeological Record

This study explores how the lithic assemblages from the Berkeley Rockshelter site reflect activities of Late Holocene groups. Archeologists have identified five site types that support a collecting subsistence model (Binford 1980). Each site type represents a distinct purpose within the collecting system and they typically leave behind distinct collections of archeological materials. They are:

1. *Residential base*: the primary hub of activities where groups lived for relatively long periods of time. In the archeological record residential bases are characterized by a high number and variety of artifacts reflecting a wide range of activities.
2. *Field camp*: a place where task groups from the residential base temporarily resided to collect specific resources. Artifact assemblages at field camps typically reflect a more limited range of activities than base camps.
3. *Location*: a site where resources were acquired, such as kill site or a berry picking locale. Locations typically have small lithic assemblages as the sites are infrequently occupied by collectors.
4. *Station*: a lookout for monitoring the movement of animals during the hunt. Similar to a location, a station usually has limited lithic assemblages, though a *station* may be differentiated from a *location* by its strategic setting within the landscape.
5. *Cache*: a site where resources acquired by task groups were temporarily stored. The archeological remnants of a cache will vary depending on season and location, but will look purposefully buried or stored. This site type can be an isolated location on the landscape, but it can also occur in association with any of the other site types. Evidence for a cache might be the remains of a storage facility, such as a rock or clay lined pit.

Berkeley Rockshelter as a Case Study

Which site type was the Berkeley Rockshelter? To answer this question, we analyzed the site's lithic assemblage. We used a lithic technology approach, which enables archeologists to reconstruct sequences of tool production and consumption (Flenniken 1981; Sheets 1975), in addition to projectile point analysis.

Based on our analysis of the archeological evidence, we suggest that the Berkeley Rockshelter was not a *location* or a *station* because of the variety and quantity of lithic artifacts associated with the site. The Berkeley Rockshelter contained a diversity of tool types and a sizeable amount of flaked stone debitage, which are flakes made during the process of shaping stone into tools, called lithic reduction. This is inconsistent with what we would expect to see in the archeological record of a *location* or *station*, and those site types can be eliminated from consideration. The excavations at the shelter revealed no evidence of a storage feature that would be consistent with a *cache*.

Hence, our analysis focused on determining whether the Berkeley Rockshelter was a *residential base* or *field camp*. At a *residential base*, we would expect the archeological data to reflect a relatively long-term seasonal occupation. If the site is a *residential base*, the archeological record should include evidence for the processing and manufacturing of goods used by men, women, and children for daily activities. In contrast, we would expect a *field camp* to contain artifacts from only some of these activities. Additionally, activities would likely be focused on a specific range of tasks (i.e. related to hunting deer, elk, or goat; or other specific resource procurement activities, such as collecting huckleberries).

The Berkeley Rockshelter Lithic Assemblage

The Berkeley Rockshelter lithic assemblage includes 1,071 technologically undiagnostic flakes, 585 technologically diagnostic flakes, and 53 stone tools for a total of 1,709 artifacts (Table 2). While technologically undiagnostic flakes, such as chunks, shatter, and flake fragments, can be analyzed to inform archeological interpretation of lithic usage at sites, we focused on the technologically diagnostic flakes and stone tools for our analysis. These diagnostic artifacts constitute about 37% of the total artifact collection.

Technologically Diagnostic Flakes at Berkeley Rockshelter

Though there are many different ways to analyze lithic debitage, we used the six-stage sequential system of core reduction developed by Flenniken (Andrews, et al. 2008; Flenniken 1981, 1984, 1989; Flenniken, et al. 1993; Lohse and Schou 2008) to classify the debitage and stages of tool production occurred at the Berkeley Rockshelter. The stages are:

1. *Primary decortication*: the first flakes removed from the raw stone material. The resulting flakes can be relatively large in size and have weathered surfaces covering one of their entire sides. The weathered outer surface of raw lithic material is called the cortex, hence its removal is referred to as *decortication*. Only three *primary decortication* flakes were found at Berkeley Rockshelter (Table 3).
2. *Secondary decortication*: flakes removed to further prepare the raw material to be made

into tools. Secondary flakes are similar to primary flakes in size and shape, though they exhibit less surface weathering on one of their sides. Nine *secondary decortication* flakes were found at Berkeley Rockshelter.

3. *Early core reduction*: usually removed after most of the rough, weathered surface material has been discarded. These flakes are sometimes repurposed as utilized flakes, for immediate use, or are used as pre-forms for projectile points, that are refined for use at a later time. Eleven *early core reduction* flakes were found at Berkeley Rockshelter.
4. *Late core reduction*: these flakes are similar in purpose to *early core reduction* flakes, but they are usually smaller in size, thinner, and more regular in shape. Eight *late core reduction* flakes were found at Berkeley Rockshelter.
5. *Percussion bifacial thinning*: these flakes further refine the core by removing many of the remaining irregular features and shaping the tool bifacially, on both sides of the tool. The archeological remnants of this stage are varied, based on what types of specific shaping was applied to the tool. Forty-five *percussion bifacial thinning* flakes were found at Berkeley Rockshelter.
6. *Pressure bifacial thinning*: the final precise pressure-flaking that completes the tool's shaping, including creating notches for hafting projectile points. Pressure flaking removes small flakes by pressing bone or antler along the edges to shape a point or some other formal tool. Notch flakes in the archeological record are extremely small and thin, and are often circular or V-shaped. The vast majority of the diagnostic flakes found at Berkeley Rockshelter, 509 flakes, were *pressure bifacial thinning* flakes.

The data reflects that flakes from Stages 1 through 4 are not prevalent at the Berkeley Rockshelter site, collectively representing only 5.3% of the diagnostic flakes (Table 3). This indicates that earlier, primary processing activities of these materials occurred at a different location.

In contrast, flakes reflecting bifacial thinning activities (Stages 5 and 6) are comparatively well represented. Stage 5 debitage comprises 7.7% of the diagnostic sample, indicating that *percussion bifacial thinning* activities were a limited, although significant focus of reduction at the site. Stage 6 *pressure bifacial thinning* flakes represent the clear majority (87%) of the diagnostic sample.

The debitage data indicates that the final shaping of formal tools, like projectile points, was the primary focus of tool production at Berkeley Rockshelter. This information, combined with the lithic tool analysis below, helps determine what types of prehistoric activities occurred at the site, and thus the most probable site type for Berkeley Rockshelter.

Lithic Tools at Berkeley Rockshelter

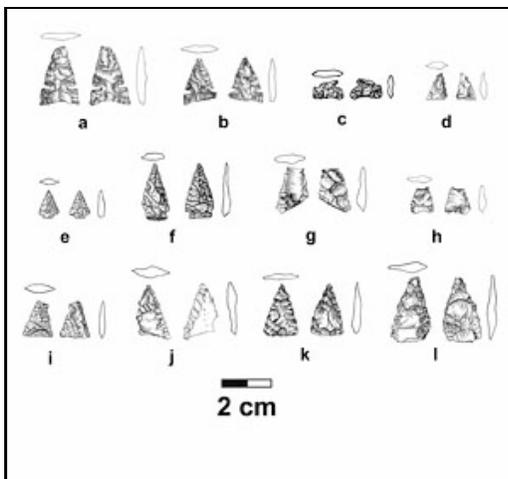
There are 53 tools in the Berkeley Rockshelter assemblage (Table 4). For archeological analysis, the tools were separated into formal implements, like projectile points, and informal implements, like utilized flakes.

Among the formal tools, 22 are projectile points (Table 4). Based on their size and form, they were most likely used to tip arrow shafts. Bifacial tools are the next most prevalent tool type, including eight bifacial scrapers and five biface fragments. Of note, all of the bifaces are expedient in form, meaning they were most likely made for immediate usage at the site. These tools would have been used for scraping and cutting materials such as animal hides for clothing and wood or bone for making and shaping arrow shafts, bone projectile points, or handles for other tools.

The sample also contains a number of different types of scrapers: two unifacial scrapers, two small "thumb" scrapers, two flake cores, and two scalar cores. These items were probably used primarily for cutting and scraping wood, but the scalar cores also could have been used to scrape animal hides. Three of the scrapers have convex scraping edges that indicate they may have been used to shape arrow shafts. A single cylindrical pumice abradar was also recovered, and could have been used to sand arrow shafts. Alternatively, the groove could have been created by filing bone fragments or splinters to make bone projectile points or needles.

Informal tools found at Berkeley Rockshelter include nine utilized flake scrapers, four of which have may have been used as spoke shaves for shaping arrow shafts.

Because of the abundance of Stage 6 flakes (87% of the debitage assemblage) and the high proportion of projectile points (41.5% of the lithic tools), it is likely that the mending and final



Projectile points from Berkeley Rock Shelter excavations. (a & b are Plateau Side-Notched Points; k & l are projectile point preforms; facial flaking is evident on a,g,i & j.) [Click for larger view.](#)

forming of hunting equipment took place at Berkeley Rockshelter. As such, the remainder of our discussion primarily focuses on the projectile points found at the site.

Projectile Point Analysis

Because of the location of the Berkeley Rockshelter site at Mount Rainier and its connection to the Columbia Plateau region, the projectile points were compared to Columbia Plateau projectile point types (Lohse 1985, Lohse and Schou 2008). Based on their shape and distinct hafting notches, the Berkeley points fit best the Plateau Side-notched point type, which dates to 1500-200 BP (Lohse and Schou 2008:206). The radiocarbon dates for the Berkeley Rockshelter are consistent with this date range.

Pre-forms

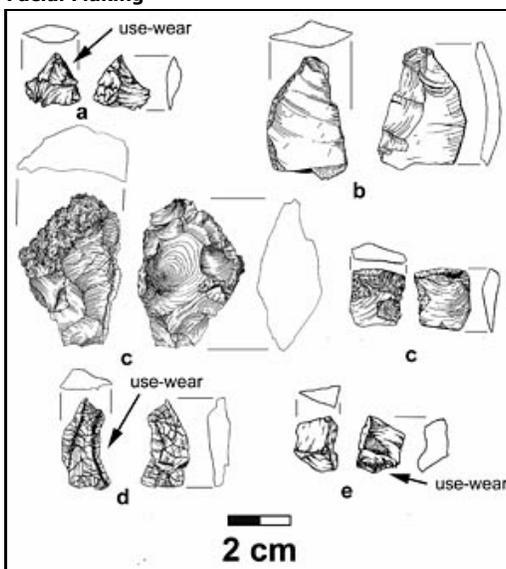
The Berkeley Rockshelter lithic assemblage contained two pre-forms for making projectile points. Pre-forms are artifacts that were reduced to the basic triangular shape of a projectile point, but were yet to be finished and notched.

These items were probably carried on hunting trips in place of the delicate finished notched points, which were more likely to break before being hafted. Pre-forms also would have been lighter to carry than larger, bulkier pieces of raw material from which projectile points could be made. Hence, they represent an efficient way to carry non-hafted points on hunting trips. Pre-forms most likely were shaped at longer-term residential sites, and were then taken on hunting forays to replace points beyond repair that were broken during the hunt.

Impact Fractures: Bending Breaks and Facial Flaking

Many of the projectile points seem to have been broken by impact fractures, which indicate that the projectile points were shot. If prehistoric hunters missed their targets and hit rocks, trees, or other landscape features instead, the projectile point might have broken. Also, some of the points may have fractured because they hit a bone of the animals successfully shot.

Hunters probably spent much time trying to retrieve arrows that had been shot. Experimental research has shown that the shafts, not the stone points, were the most valuable part of the arrow. Making straight arrow shafts and fletching them so that they can be accurately fired takes far more effort and time than flaking stone points. After recovering the arrows in the field, hunters carried them back to their camp. There, they discarded the broken projectile points and hafted new projectile points onto the re-used arrow shafts.



Utilized flakes from Berkeley Rock Shelter excavations. (d & e may be spoke shaves.) [Click for larger view.](#)

Experimental research (Kelterborn 2001; Titmus and Woods 1986) has determined that specific types of fractures occur to projectile points that have been shot and struck an unyielding surface. One of the fracture patterns is the "bending break," a transverse fracture across the projectile point, usually at a weak point such as the tip, or base near the notches. This fracture pattern can be seen on many of the Berkeley projectile points.

Another type of impact fracture, facial flaking, is found on some of the Berkeley Rockshelter projectile points (Kelterborn 2001). Facial flaking is formed when the projectile point is subjected to a substantial force originating at the tip of the point. It creates a unique type of flake scar that is distinctly different from the pressure flaking scars seen on most of the artifacts. Four projectile points from Berkeley Rockshelter seem to reflect facial flaking.

Conclusion: Lithic Technology and Site Usage at Berkeley Rockshelter

The debitage and projectile point data indicates that late-stage tool production, mainly to shape and rework projectile points, was a prominent activity at the Berkeley Rockshelter during the Late Holocene. The abundance of *pressure bifacial thinning* flakes and the quantity and types of projectile points, including pre-forms and points with impact fractures, suggests that pre-forms were brought to the site and fashioned into projectile points while broken projectile points were discarded. This indicates that hunters occupied the Berkeley Rockshelter in short-term capacities, during which the main activity was mending hunting equipment.

As such, the Berkeley Rockshelter site's archeological record does not reflect the wide range of activities we would expect to see at a *residential base*, including evidence for food procurement and tools for activities like food processing and other daily productive tasks carried out by groups of families with men, women, and children. Based on the data, the

Berkeley Rockshelter was most likely a *field camp* used by small groups of hunters on forays a long way from their *residential bases*. The recovery of large mammal bones found at the site indicates that the hunters were, indeed, successful.

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*by Kipp Godfrey and Bradford Andrews
edited by Leah Burgin, NPS Archeology Program Intern*

Table 1: Berkeley Rockshelter Radiocarbon Dates

Approximate Depth	Date Range B.P.
0-10 cm	290 +/- 120 (1,660 CE)
39 cm	1,070 +/- 90 (880 CE)
Lowest charcoal lens	1970 +/- 80 (20 BCE)

Table 2: Berkeley Rockshelter Artifact Classes

Artifact categories	N (%)
Undiagnostic Flakes	1,071
Diagnostic Flakes	585
Tools	53
Total	1,709

Table 3: Berkeley Rockshelter Technologically Diagnostic Flakes

Classification	N (%)
Stage 1	3 (0.5%)
Stage 2	9 (1.5%)
Stage 3	11 (1.8%)
Stage 4	8 (1.5%)
Stage 5	45 (7.7%)
Stage 6	509 (87.0%)
Total	585 (100%)

Table 4: Berkeley Rockshelter Tool Types

Formal Tool Types	N (%)
Projectile points	22 (41.5%)
Bifacial scrapers	8 (15.1%)

Biface fragments	5 (9.4%)
Unifacial scrapers	2 (3.8%)
"Thumb" scrapers	2 (3.8%)
Flake cores	2 (3.8%)
Scalar flake cores	2 (3.8%)
Pumice abrader	1 (1.9%)
Informal Tool Types	
Utilized flake scrapers	3 (5.7%)
Utilized flakes	6 (11.3%)
Total	53 (100%)

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