Chapter 2

Dating Deposits at Keatley Creek

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This chapter presents and discusses the radiocarbon dates from Keatley Creek. Assessing the relative contemporaneity of floor deposits in different housepits was critical for understanding the overall social and economic structure of the site. Therefore considerable emphasis was given to dating floor deposits and assessing the degree to which they had been disturbed or mixed. During the initial field season at Keatley Creek, in order to determine the relative dates of deposits, it was necessary to rely on the time-diagnostic artifact types that Richards and Rousseau (1987) had identified in their comprehensive synthesis of Canadian Plateau archaeology. These included a number of different types of projectile point styles (Vol. I, Chap. 3), maul styles, the introduction of pipes during the Kamloops horizon (ca. 1,200 BP), and the preponderance of key shaped scrapers in the Plateau horizon (2,400–1,200 BP). In general, except for obviously mixed deposits such as roofs, these artifact styles occurred in stratagraphic relationships consistent with the sequence proposed by Richards and Rousseau (see Vol. I, Chap. 3). We used the relative dates provided by this method of dating to assess the suitability of various housepits for more extended excavations and to determine the general length of time each housepit had been in use as indicated by the horizons represented in house rim middens.

Since the goal of the project was to compare contemporaneous floor assemblages from housepits of varying sizes, we tried to determine which housepit floors were occupied in Kamloops horizon times and which were earlier. No housepit deposits that we excavated yielded multinotch points which only appear during the middle of the Kamloops horizon. Therefore, it seemed that all deposits with Kamloops (side-notched) points must have come from the early part of the Kamloops horizon. Since most of the large housepits that we tested (including those with the most easily defined floors) contained side-notched Kamloops points in their floor deposits (Vol. I, Chap. 3), it was most logical to look for medium and small sized housepits that also dated from the early Kamloops horizon. As it turned out, finding small housepits from this time period was more difficult than anticipated, although a number of tested small houses yielded very few artifacts, none of which was diagnostic. These houses may well have been from the early Kamloops period.

Several series of radiocarbon samples were subsequently analyzed in the hope of providing more precise parameters for the occupation of the Keatley Creek structures. Most of these analyses were carried out at the Simon Fraser University radiocarbon lab and all dates are presented in Table 1. All samples were on wood charcoal and all dates are uncalibrated. The first dates to be run basically conformed to all of our expectations, in some cases, even to remarkable degrees. I would like to discuss these individually.

The most remarkable dates were the first ones derived from the burned roof beams lying on the floors of HP 3 and 7. On the basis of the side-notched Kamloops points associated with these floors, I

Table 1. Radiocarbon Dates from Keatley Creek

Lab. sample No.	Provenience and Material	Uncorrected Age BP
1987 Series		
SFU 1001	HP 3, SQ AA, SS 13, Stratum III (floor) Wood charcoal on floor containing Kamloops points	1,080 ± 70
SFU 1002	HP 7, SQ W, SS 2, Stratum V (roof) Charred roof beam in contact with floor containing Kamloops points	1,080 ± 70
SFU —	HP 7, SQ N, Stratum XIIId (rim) Wood charcoal below Kamloops levels	1,590 ± 70
SFU —	HP 7, SQ N, Stratum XIIIe (rim) Wood charcoal below Kamloops levels	2,080 ± 50
SFU —	HP 7, SQ O, Stratum XIIIf (rim) Wood charcoal	980 ± 60
SFU —	HP 7, SQ N, Stratum XIII (rim base) Wood charcoal	2,620 ± 50
SFU —	HP 5, SQ F, Stratum X (pre-rim paleosol) Wood charcoal associated with microblades and Middle Prehistoric points	2,160 ± 70
SFU 1009	HP 7, SQ M, Stratum XIIIb (rim) Wood charcoal associated with Kamloops points	6,470 ± 90
Beta 25181	HP 7, SQ N, Stratum XIII (rim-base) Same sample as HP 7, SQ N, Stratum XIII (rim base)	2,140 ± 110
1988 Series		
SFU 633	HP 1, SQ D, test trench level 4 (floor) Charcoal on floor containing Kamloops points	1,970 ± 60
SFU 641	HP 105, SQ B, test trench level 6 (floor) Unburned wood	270 ± 55
SFU 642	HP 105, SQ C, Feature 1, Stratum IX (pit) Wood charcoal	2,170 ± 60
1989 Series		
SFU 720	HP 7, SQ QQ, SS 3, Stratum V (roof) Charred roof beam in contact with last floor containing Kamloops points	900 ± 65
SFU 721	HP 12, SQ B, SS 11, Stratum III (floor) Charred roof beam in contact with floor	1,550 ± 60
SFU 722	HP 3, SQ II, SS 14, Stratum IIc (roof) Charred plank fragments in contact with floor containing Kamloops points	1,330 ± 60
SFU 723	HP 90, SQ C, SS 9, Stratum IV (roof) Charred wood (roof beam) in contact with floor	1,410 ± 60
SFU 724	HP 7, SQ PP, SS 6, Stratum II level 2 Wood charcoal in occupation deposits under last floor	740 ± 70
SFU 796	HP 7, SQ QQ, SS 3, Stratum V (roof) 14 year-old Populus branch in contact with last floor containing Kamloops points	1,000 ± 85
1995–1998 Series		
CAMS 32253	HP 104, SqA, ssq 7, Stratum VII (floor) level 1, charred basket fragment on floor	250 ± 60
CAMS 35105	HP 7, Feature P-31 Dog bone (full skeleton) in the bottom of a storage pit	2,160 ± 60
Beta 106611	HP 106 Test trench floor/roof contact Pinebark used in roofing	220 ± 70
Beta 125907	HP 109 SqB ssq3, Stratum III (upper floor), charred 200 ± 50 roof beams lying directly on the floor	220 ± 50

expected the floors to be relatively contemporaneous. It was therefore very gratifying to obtain exactly the same date from both housepit floors: 1,080 BP (SFU#1001, 1002).

The first series of dates also included five samples from HP 7 rim deposits (Stratum XIII—Fig. 1). Three of these dates conform to what we generally expected; two did not. The uppermost sample (from Stratum XIIIb—SFU#1009) was the most anomalous with a date of 6,470 BP—clearly far too old for the deposit as a whole or for the Kamloops points with which it was associated. The most reasonable explanation is that old charcoal was somehow incorporated into the rim deposits (e.g., by the re-excavation of storage pits from the Middle Prehistoric deposits that exist under parts of the HP 7 floor, and the subsequent discard of Middle Prehistoric deposits including charcoal onto the rim). Other sources of contamination may also be possible. The other anamolous date came from Stratum XIIIf which is a rim zone with poorly defined stratigraphy that is adjacent to the interior wall of the house. In Volume I Chapter 17, the unstable nature of this wall is emphasized, and in the field, the unconsolidated nature of the deposits forming the wall led to the interpretation that slumping and sloughing off had probably occurred in many places. Large blocks of stone placed against the wall also seemed to be measures aimed at limiting the sloughing off of wall deposits. Thus, parts of Stratum XIIIf appear to have been actively reworked during the occupation of the housepit and it is perhaps not surprising that later materials could have been incorporated in what otherwise seemed to be early rim deposits. In fact, a complete Kamloops horizon-style maul (Vol. II, Chap. 13; Vol. III, Chap. 5) was found in

the XIIIf deposits at the base of the wall, apparently either buried by rim material sloughing off or perhaps cached by digging a small lateral hole into the wall deposits. Given all these observations, it is perhaps not surprising that our sample from Stratum XIIIf near the wall yielded a date of 980 BP with a standard deviation that overlaps the time range represented by the date of 1,080 BP from the floor.

The three remaining dates from the HP 7 rim are all consistent with each other and generally correspond to the range of dates that were expected from the rims. From the uppermost levels to the bottom of the rim, these were: 1,590 BP (Stratum XIIId); 2,080 BP (Stratum XIIIe); and 2,620 BP (from the bottom of XIII). These samples were all derived from levels below the zone where Kamloops points were recovered (Vol. I, Chap. 3). I therefore had every reason to expect them to be of Plateau or even earlier age. Because I wished to obtain an external check on some of the more important samples that we were analyzing, I submitted a portion of the same sample from the bottom of Stratum XIII to Beta Analytic for dating. The result was considerably younger than the SFU results (2,140 BP; Beta 25,181) and is clearly inconsistent with the Shuswap points that occur in the bottom levels of the rim midden. Thus, I have chosen the SFU date from this sample as more realistic. This series of dates indicate that HP 7 was established in its present approximate size and form about 2,600 years ago towards the end of the Shuswap horizon. This series of dates conforms quite well with the occurrence of Shuswap horizon style projectile points (2,400–3,500 BP) in the lower parts of the rim accumulations, and the much more extensive series of Plateau horizon projectile points (2,400–1,200 BP) throughout the bulk of the rim deposits that we excavated. A subsequent date of 2,160 (CAMS 35105) from a dog buried in a large storage pit (P-31) near the house wall (Vol. II, Chap. 10), also indicates that HP 7 had expanded in size to its full extent within a few hundred years of initial construction.

The remaining sample that was submitted in the first series of analyses was a charcoal sample from deposits containing a rich collection of Middle Prehistoric microblades and points which should date to before 3,500 BP. These deposits occurred under the lowest rim midden accumulations in HP 5. Aside from a few flecks of charcoal and very small fragments of calcined bone, there was no organic matter in these deposits, except for the sample of charcoal that we submitted. This situation indicated that it was unlikely for the charcoal that we recovered to be contemporaneous with the artifacts in these deposits; however, since this was the only sample from the Middle Prehistoric Period deposits that we had, I thought it might be worth dating. Not surprisingly, the date that was obtained was much younger than expected (2,160 BP). It is clear that the charcoal in these deposits probably represents a root burn or similar contamination since there was absolutely no other evidence of post-depositional disturbance of these deposits. In fact, I visited the Keatley Creek site four months after the Tiffin Creek fire had burned off all vegetation at the site in 1994. I recorded many examples of tree roots that had burned many meters underground, and in fact, there were still some smouldering roots underground even four months after the fire had been officially extinguished! Similar underground burning of roots must have also typified prehistoric brush fires and the burning of housepit roofs prior to reroofing events. Natural brushfires in the area occur in about seven year cycles.

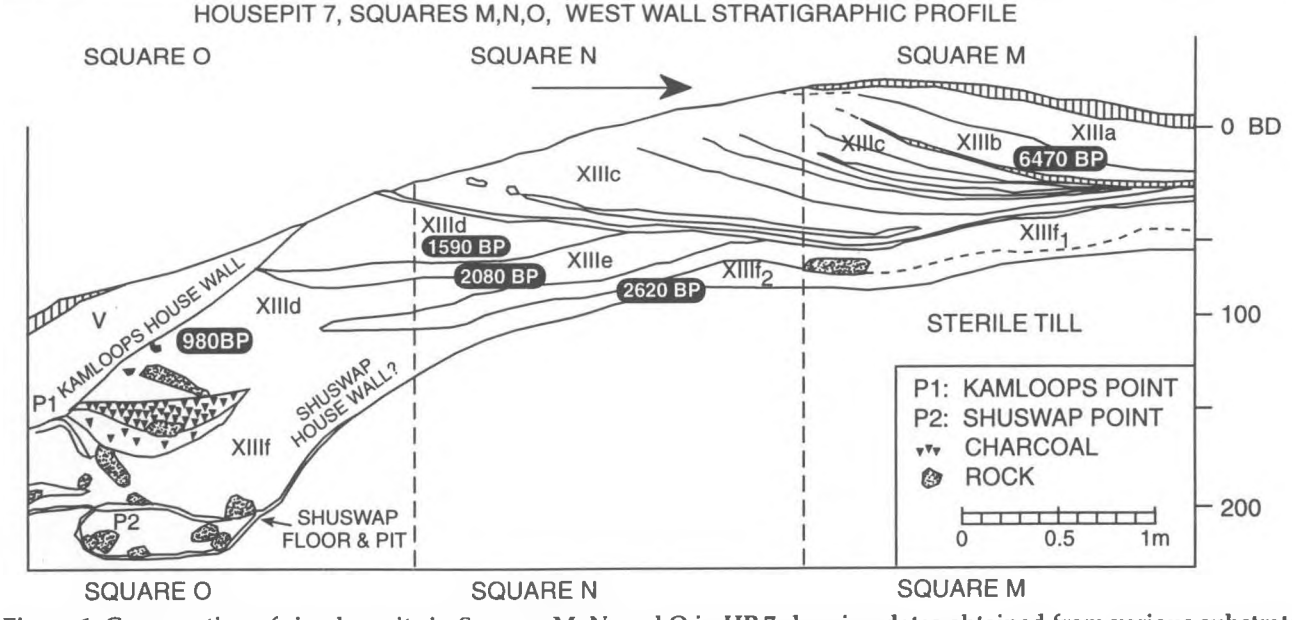

Figure 1. Cross section of rim deposits in Squares M, N, and O in HP 7 showing dates obtained from various substrata.

A second series of samples were analyzed for dating after the second season of excavations, primarily from other housepits being tested. Two of these samples came from HP 105, a structure on the highest terrace above the site which I suspect may have been used for ritual purposes. The structure had been heavily disturbed by clandestine excavators many years previously. Our test excavations encountered only a small portion of a floor that was relatively close to the surface and which was unusual in terms of the amount of fish spines and ribs associated with it. A charcoal sample from this floor yielded an unexpectedly recent date of 270 BP (SFU#641). Subsequent dating of bark used in the roof of the immediately adjacent housepit (HP 106) yielded a similar result of 220 ± 70 BP, while a date on a charred piece of basket on the floor of another nearby housepit (HP 104) fell in the same range (250 ± 60 BP). The only housepit (HP 109) on the next terrace down also provided a protohistoric date from its upper floor level (200 ± 50), although its lower floor level was clearly much older (see Vol. III, Chap. 10.18). These dates are the best evidence that currently exists for an occupation of the site after its major abandonment around 1,100 BP, and this occurrence is a very minor one that was probably short-lived and was probably confined to this peripheral location. The recovery of a single Kamloops side-notched point along one of the trails leading into the mountains from this upper terrace is also consistent with a small, short re-occupation of the site around this time.

A second date from HP 105 came from the fill of a large storage pit near the center of the structure, undoubtedly associated with an earlier floor. An unusually broad bone point and 72 bone buttons were found in this pit. Mike Rousseau (personal communication) suggested that the bone buttons were most characteristic of Plateau horizon assemblages. The dating of this pit at 2,170 BP supports his assessment.

A third sample in this series was submitted from the floor deposits of HP 1 (SFU#633). Given the presence of Kamloops points in the floor deposits, I expected a date of around 1,100 BP. The actual date was 1,970 BP which is clearly too early. Given the test trench nature of these excavations, either the sample was not chosen carefully enough in terms of context, or the inhabitants of this housepit were recycling roof beams, similar to practices in prehistoric Southwestern U.S. structures. I will return to this topic shortly.

A fourth sample in this series was obtained from a small fishing site (EdRl 195) along the Fraser River near Keatley Creek. The excavations were carried out by Diana Alexander and focused on the cache pits at the site. A single sample yielded a date of 2,840 BP (SFU#643), which is generally consistent with material found at the site.

A third series of samples was submitted for radiocarbon analysis after more extensive excavations in HP's 3, 7, 12, and 90. I wished to determine whether the initial dates from HP's 3 and 7 were representative, and I also wished to find out to what extent the smaller housepits (12 and 90) were contemporaneous with the larger ones since the diagnostic point styles associated with these structures seemed somewhat earlier than the typical Kamloops style points in the floors of larger houses. Almost all of the results from this series of analyses seem aberrant. With one exception, all materials submitted were taken from burned beams laying immediately on top of the floor deposits. Thus, we have good reason to view these beams as having formed part of the roof of the last occupation of each housepit. Since the earlier date from HP 3 (1,080 ± 70 BP) was taken from an identical context, the substantially earlier date of 1,330 ± 60 BP (SFU#722) seems inconsistent. If the Richards and Rousseau (1987) synthesis is to be viewed as the best approximation for the appearance of Kamloops points which they place at 1,200 BP, the date of 1,330 BP for the floor deposits of HP 3 is clearly too early since these deposits contain typical Kamloops points in abundance. Since this date was on a wood plank, it may represent an item that was curated over more than a century.

Similarly, the date of 1,550 BP (SFU#721) for the roof of HP 12 seems far too early for the transitional (Plateau to Kamloops style) or very late Plateau style of points associated with its floor. I had expected a dating much closer to 1,300 BP. The date derived from the HP 90 sample (1,410 BP; SFU#723) is closer to the late Plateau age indicated by the point styles associated with that structure.

The two most problematical dates in this series were from HP 7 samples. The date of 1,080 ± 70 BP from our first season of work in HP 7 was from a roof beam lying directly on the floor. The date that we obtained from the last series of samples analyzed was also from a roof beam lying directly on the floor, but gave an age of 900 ± 65 BP which fails to overlap the original date at one standard deviation. To complicate matters even more, I submitted another sample of charcoal from a buried wedge of floor that clearly preceeded the floor associated with both of the above dates. The date from this buried, prior floor (740 ± 70 BP; SFU#724) came out to be significantly younger than either of the later floor dates. This was clearly the reverse of any normal sequence. Moreover, the date is totally aberrant in terms of all other dates associated with roofs or floors throughout the site. It is too young by at least 2–300 years.

How can the anomalies present in this last series of dates be accounted for? There is no clear or obvious solution. It is clear, however, that some of them such as this last date and the date for HP 3 conflict with the

vast bulk other evidence from the site and other Plateau sites. There are three relatively plausible explanations for these anomalies. The first is that the younger dates are all accurate and that the older dates for the same deposits are derived from "old wood" that has been recycled over the centuries for rebuilding sequential roofs. Such re-use of wood beams in roof construction (sometimes more than once) has been well documented for pueblos in the Southwestern United States (Ahlstrom et al. 1991). It seems reasonable to assume that similar processes occurred at Keatley Creek especially given the effort involved in procuring roof timbers and the probable need to bring them from some distance. Some skewing might also be expected from medium sized timbers due to the growing time represented from the first to the last growth rings. However, most of the burned secondary timbers were under 15 cm in diameter and probably did not represent growth period of more than 20–30 years. While the recycling explanation undoubtedly accounts for some of the spread in dates associated with a given roof, it seems unlikely to explain spreads on the order of 1–300 years. In the first place, the beams that lay on the floors were not the large support posts or joists, but smaller secondary beams that would be unlikely to last over very long periods. In the second place, if most of these secondary beams were burned prior to each re-roofing event, it seems unlikely that many beams would be used for more than a few re-roofings. Given an average life span of a roof of about twenty years (Vol. I, Chap. 17), it seems unlikely that many if any secondary roof beams would be used more than 60 years maximum, although it is conceivable that labor intensive items such as planks could have been curated for a number of generations or even centuries, such as the plank fragments in HP 3 that yielded unexpectedly old dates (SFU#722). In the case of small housepits (e.g., HP's 12 and 90) with evidence of only single, short term occupations (less than a century), this explanation probably does not account for unexpectedly old dates.

A second explanation for some of the dates that seem too young, such as the 740 BP date from the early floor of HP 7, is that these charcoal samples may represent root burns instead of wood that was used culturally at the time of occupation. Given the strong pattern of substantial beams lying on floors, this, too, seems implausible except in the case of the date from HP 5.

A third explanation involves variability in preparation and processing techniques between laboratories and individuals. Such variability has been documented and discussed by Shott (1992), and even more remarkable anecdotal examples of split samples sent to different laboratories resulting in widely divergent dates are legion at conferences throughout North America. During the period when the last series of dates was run at the Simon Fraser University laboratory, a number of personnel changes may explain some of the unexpected results. In fact, when I expressed my concern about the anomalous dates from HP 7 to the director of the SFU laboratory, he offered to run another very carefully chosen sample as a check on the earlier results. I chose a branch segment from a 14-year-old *Populus* pole that had formed part of the roof and collapsed down onto the final occupation floor together with other roof collapse debris. I reasoned that such a small, softwood pole would minimize skewing effects from long growth periods and would be the least likely roof element to be recycled from previous roof structures both because of its size and greater susceptibility to decay. The resulting date of 1,000 ± 85 BP clearly indicates that the aberrantly young date from the floor of HP 7 is inaccurate for whichever of the above possible reasons.

Given the preceeding problems using radiocarbon dating at Keatley Creek, it seemed that there was little more to be gained in submitting further samples for absolute dates except in very well controlled situations or in cases where time-diagnostic artifacts were missing from specific assemblages of interest. In order to counterbalance the various factors creating inconsistencies among samples from the same deposits, a much larger, probabilistic sampling program would be required (per Shott 1992). Such an expanded program of testing was too ambitious for our available resources. Therefore, few further samples have been submitted for absolute dating. In most cases, we have found the use of time-sensative diagnostic tool types to be of almost equal value as the absolute radiocarbon dates for the purposes of determining the relative age of assemblages at Keatley Creek and determining relative contemporaneity.

Informally, a number of archaeologists have remarked that the floor assemblages that we have excavated must be temporally mixed since some of them contain more than one style of projectile points, such as the co-occurrence of Plateau and Kamloops points in the floor deposits of HP's 3 and 7. This is an issue I address in more detail in the next chapter. However, to summarize the arguments over this issue, it can be stated that there is overwhelming evidence of the relative integrity of the floor deposits. That some minor mixing undoubtedly has taken place due to insect burrows or inability to clearly distinguish floor from roof deposits in the field is certainly true. However, the extent of such mixing appears to have had a negligible impact on the overall distribution of stone debitage and artifacts, bone debris and artifacts, botanical remains, anthropogenic enrichment of chemicals on the floors, and pedological fabric characteristics. If older Plateau points occur in deposits

predominantly characterized by Kamloops points, such occurrences can more economically be explained either in terms of the well-documented reuse of older point types by later individuals in Kamloops times, or by the persistence of older hunting technologies alongside newer technologies for several hundred years, a feature well documented on the Columbia Plateau, the Great Basin, the Northwest Coast, and elsewhere in North America. In fact, excavations of two longhouses on the Northwest Coast clearly show newer technologies existing side-by-side with older technologies, with use of the older and newer technologies being determined by relative status within the houses (Chatters 1989; Ames, personal communication, September 1995). A similar situation appears to occur in HP 7 at Keatley Creek where twice as many points of the older atlatl technology were recovered from domestic areas in the lower ranking half of the house as from the higher ranked half of the house (Vol. I, Chap. 3; Spafford 1991).

Thus, in sum, the radiocarbon analysis program at Keatley Creek has provided some important temporal reference points for the interpretation of the various deposits and structures that have been excavated. However, this analysis program has not been without problems and contradictions that probably stem from a number of sources including: root burns, the sloughing off of rim midden materials against inside walls, redeposition of old carbon in later midden contexts, the recycling of construction beams from one roofing events to succeeding ones, the length of growth represented by large structural beams, inaccurate identification of provenience for samples, and variability between laboratories and preparation or processing procedures. My assessment of all the available evidence from the radiocarbon dating program, the comparative dates from the Richards and Rousseau synthesis, the time-diagnostic artifact occurrences, and the stratigraphic relationships yields the following temporal interpretations for some of the most important structures in our analysis.

HP 1 floor: early Kamloops horizon, contemporaneous with HP 7 floor; rim also largely contemporaneous with HP 7 rim.

HP 3 floor and rim: the same as HP 7.

HP 5 floor and rim: the same as HP 7.

HP 7 floor: early Kamloops horizon, ca. 1,000–1,100 BP; rim: initial construction ca. 2,600 BP, expansion to full size by 2,160 BP, and continuous use until final abandonment of the last floor.

HP 9 initial floor: probably middle or late Plateau horizon time period, last occupation, early Kamloops horizon, probably 1,100–1,200 BP. Each occupation may have been short-lived and discontinuous.

HP 12 floor and rim: a single, late Plateau occupation probably ca. 1,200–1,300 BP.

HP 90 floor and rim: a single late Plateau occupation, probably ca. 1,300 BP.

HP's 104, 105, 106, 109 all single, relatively short occupations ca. 250 BP.

On the basis of the terminal dates in all major housepits that cluster around 1,000–1,100 BP, I view this period as the most likely time of abandonment of the Classic Lillooet occupation at Keatley Creek. This is completely consistent with the radiocarbon dating results obtained at other major Classic Lillooet sites such as the neighboring Bell site and the Bridge River site (see Stryd 1978; Hayden and Ryder 1991). This interpretation reinforces the notion that the abandonment of the large Classic Lillooet settlements took place over a relatively short period of time and that a catastrophic damming of the Fraser River may well have been the precipitating factor behind this abandonment.

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