Reports

Redating the Hot Springs Village Site in Port Moller, Alaska

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Abstract: In a symposium in honor of Hiroaki and Atsuko Okada held at the Annual Meeting of the Alaska Anthropological Association in 2002, Don Dumond noted that many of the radiocarbon dates from the Hot Springs site appeared to be 1000 years too old when compared with dates run in different seasons of the project. Since that time, an intensive re-dating project was instigated on the Hot Springs materials using charcoal and caribou antler curated in the collection. Nineteen new samples were submitted from contexts throughout the site and the results show that Dumond was indeed correct. The result is that 29 dates from the original excavations at the site must be discarded. A new Hot Springs chronological framework is presented here.

Keywords: Hot Springs Site, Radiocarbon dating, Aleutian Archaeology, Alaska Peninsula

INTRODUCTION

The Hot Springs Village site, on the west side of Port Moller on the Alaska Peninsula, has been well known for many years (Figure 1). First investigated by Dall (1877) and Weyer in the 1920s (1930), it became known for its preservation of organic remains, the size of the village, and the depth of the deposits. In 1960 a group of archaeologists on a joint expedition between Meiji University in Japan and the University of Wisconsin conducted further investigations at the site, some of which were reported in English by Workman a few years later (1966). Between 1972 and 1984, six seasons of excavations were conducted by a group of scholars from Japan under the direction of Hiroaki and Atsuko Okada from Sapporo. The results of those excavations, described in a number of preliminary reports (Kotani 1980; A. Okada 1989; H. Okada 1984; Okada and Okada 1974a, 1974b, 1989; Okada et al. 1976, 1979, 1984, 1986; Okada and Yamaguchi 1975, 1976), have tantalized archaeologists, anthropologists, and others for many years. Whale bone masks, sculptures of humans carved in bone and ivory, thousands of artifacts representing nearly the entire gamut of North Pacific and southern Bering Sea styles, elaborate burial ceremonialism, and one of the largest groups of houses in the region, identified the Hot Springs site as critically important to the heritage of Alaska. These preliminary reports have been used by many scholars including Dumond (1974, 1987a, 1987b, 1987c, 1992, 1998; Dumond and Bland 1995; Dumond et al. 1975, 1976), Johnson (1988), Maschner (1998, 1999a, 1999b, 2000), McCartney (1969, 1974, 1984, 1988, 1992), Workman (1989; Workman and McCartney 1998), Yesner 1985, 1998) and others (cf. Yamura 1977) in attempts to detail and describe the greater regional prehistory.

Hot Springs Village consists of over 200 house depressions spread along two sides of a hot springs that flows into Port Moller. The site area can be divided into four zones based on the distribution of houses and shell midden deposits. There is a small group of houses on the north shore of the peninsula, a large midden on the southwest shore of the peninsula, a large group of houses to the west of the springs and along the east edge of the springs, and then a line of houses and midden along the east edge of the site on top of the high bluff overlooking Port Moller (Figure 1).

The earliest excavations by Weyer were located on the eastern bluff edge and amongst the northern houses on the west side of the spring. The excavations of the joint Meiji – University of Wisconsin Project were primarily in the midden deposits along the shore in the south-

[1]I expected Hiroaki and Atsuko Okada to be co-authors on this paper. I had discussed the redating of the site and the new chronology with the Okadas during my last visit to Sapporo and Hiroaki Okada was in complete agreement with the new interpretation. But when this paper was written, Hiroaki was too ill to comment on the final draft and Atsuko was uncomfortable having their names attached without Hiroaki having read the paper. She encouraged me to publish this paper without them.

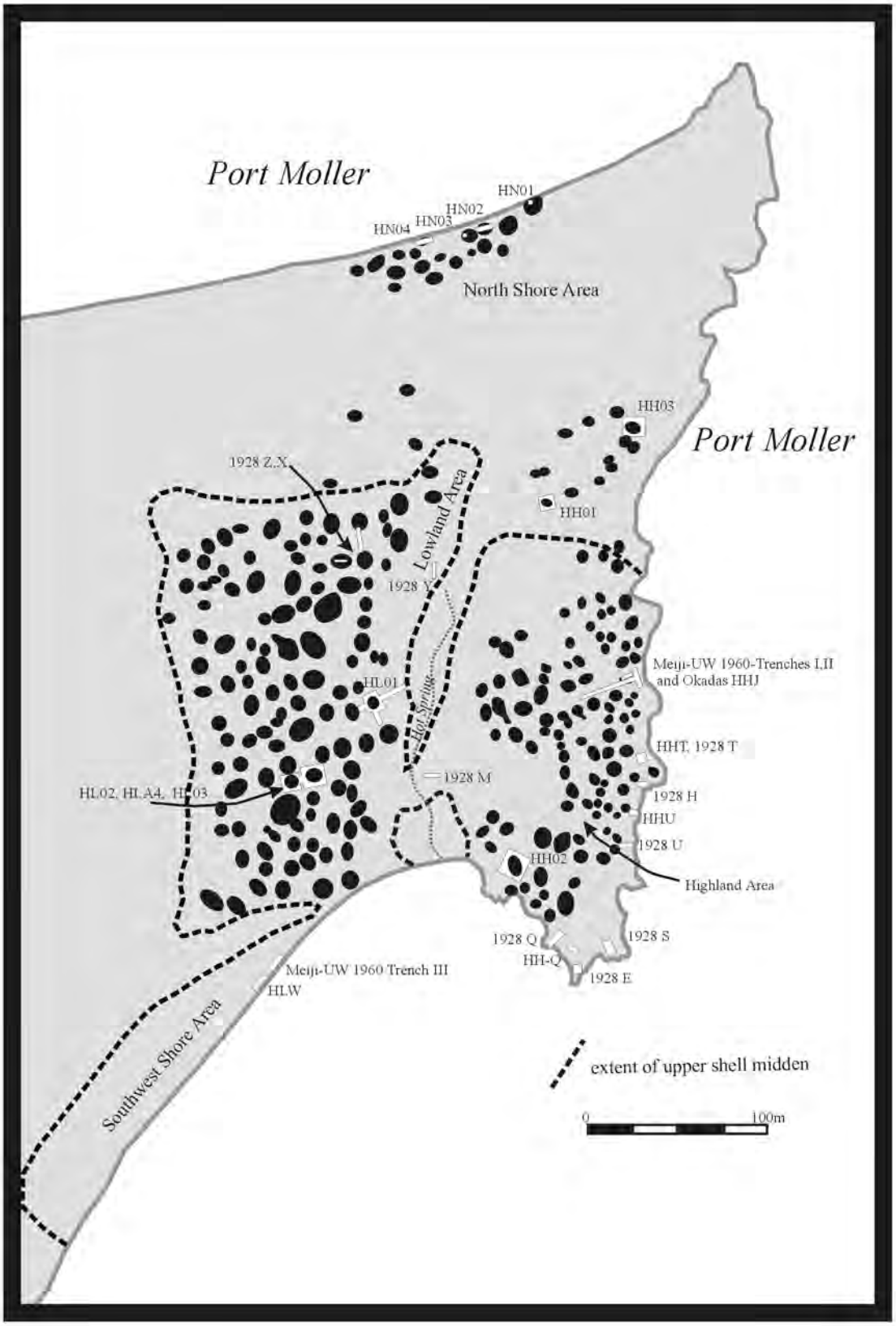


Figure 1: Map of the Hot Springs Site showing the locations of excavation units.

west part of the site. The Okadas excavated a number of large units across the site with the middens and the house floors as the primary research foci. Their most important excavations were along the bluff edge (Units J, T, Q, U, and HHO3), in houses just east of the spring but moving up toward the bluff (Units HH01 and HH02), and in the large group of houses west of the spring (Units HL01, HL02, and HL03). They undertook smaller excavations along the north coast (Units HN02 and HN04) and along the southwest shore (Unit HLW).

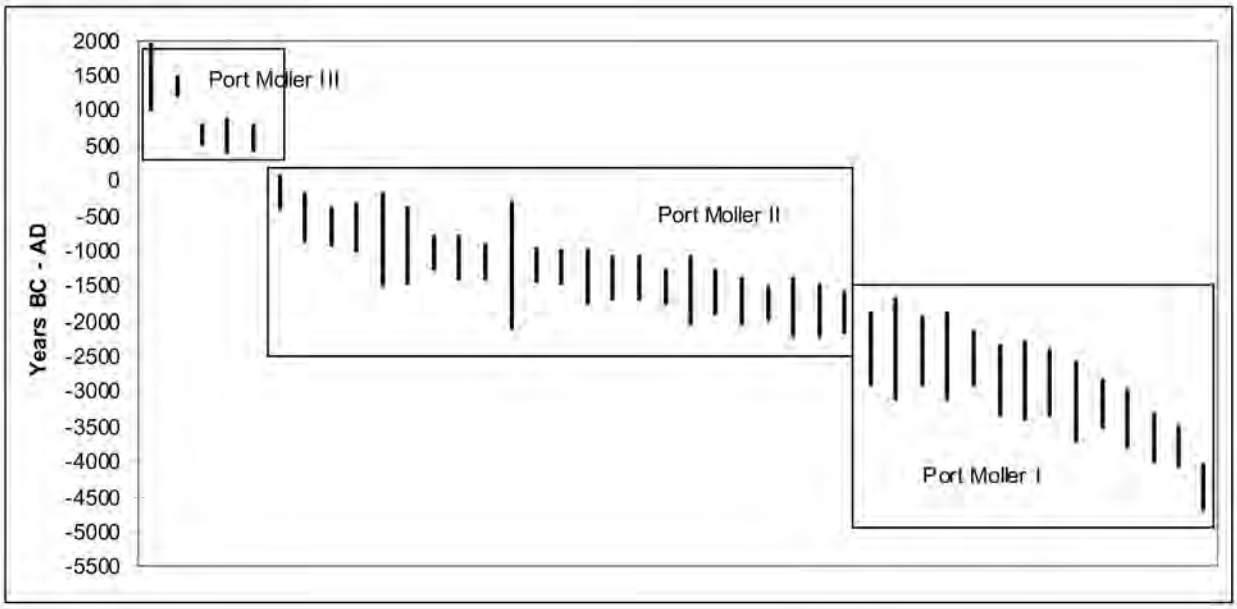


Figure 2: Calibrated ranges of radiocarbon dates on samples from the Hot Springs Site run between 1960 and 1986 and the chronology as reported by Okada and Okada (1989:4).

The 1960 excavation generated two radiocarbon dates, both in the early first millennium BC, but with large errors. During the six field seasons the Okadas worked at Hot Springs, 42 radiocarbon dates were run on a variety of deposits. These dates spanned a 4500 year range from approximately 5000 years ago to 600 years ago (Table 1), with only two small breaks in occupation, one at approximately 500 BC, and another about AD 800. These dates resulted in the development of a occupation sequence broken into three phases termed Port Moller I, II, and III (Figure 2).

Stratigraphically the site is quite complicated but two broad deposits were identified. An 'upper shell layer' was distributed across most of the site (see outline on Figure 1). This shell layer is composed primarily of cockles (*Clinocardium nutteli*) and other species from muddy or sandy intertidal regimes. This deposit appeared to date from the beginning of the first millennium AD to approximately AD 1100. While rather consistent across the site, these upper stratigraphic layers were occasionally disturbed by house construction, burials, and other features.

The lower deposits were dominated by crushed mussel shell (M*ytelus edulus*) and other species more common in a rocky intertidal environment. These deposits were deep and complicated, being truncated and mixed by numerous intersecting house floors, storage pits, burials, and other features. With radiocarbon dates spanning nearly 3000 years, the Okadas paid close attention to the details of the stratigraphic layers in these deposits, often using the characteristics of the deposits to compare excavation units and levels between units (Figure 3).

DATING

While extensive, the radiocarbon dates often proved problematic to the interpretation of the Hot Springs site because so many of them were out of stratigraphic sequence, often with contemporaneous deposits spanning more than 1300 years. Further, many of the dates appeared too old when compared with finds in other parts of the region. The Hot Springs artifacts were difficult to use in comparisons with other regions because many of the artifact types appeared to have temporal distributions of 2000-3000 years, making it impossible to document anything more than the most rudimentary changes through time, with many artifact types spanning all three phases of occupation. The problem of many out-of-sequence dates was irresolvable and largely set aside until 2002 when, at the Alaska Anthropological Association meeting in Anchorage in a symposium in honor of the long history of Alaska research conducted by the Okadas, Don Dumond made the following observation:

> "The field season of 1982 produced an unusual number of early radiocarbon dates from the Hot Springs site. Of 32 determinations from the site obtained over six field seasons, 13 are in excess of 4000 C-14 years. Nine of these were from 1982 excavations, out of a total of 15 determinations received that year from the Gakushuin laboratory. This brings me to one final point, one that seemed to jump out of my manipulation of the dates, and …also rather aside from what were the very competent ex-

Table 1: Radiocarbon dates on samples from the Hot Springs Site run between 1960 and 1986.

^{14}C AGE B.P.	LAB ID	CALIBRATED LOWER	CALIBRATED HIGHER	UNIT
610±90	Tk 125	1220	1460	HH01
540±190	GaK 11041	1000	1950	HHU2 House G
1390±70	Tk 124	530	780	HL01
1410±100	GaK 12089	420	870	HL03 upper
1440±75	Gak 5414	430	770	HH02
2110±100	GaK 12088	-390	70	HL02 upper
2450±130	GaK 11038	-850	-200	HH03
2530±110	GaK 12090	-900	-390	HL03 lower
2580±130	GaK 11035	-1000	-350	HHU2 7c
2680±250	I 1507	-1500	-200	TRENCH 1 1960
2780±100	GaK 11042	-1260	-790	HHU2 House B
2790±180	Gak 11031	-1450	-400	HHU2 5-1
2840±120	GaK 12091	-1400	-800	HL02 lower
2930±90	N 3236	-1390	-900	Q-7 layer 5
2960±320	I 1508	-2100	-300	TRENCH II J-O
3000±90	N 3244	-1440	-970	U-7 layer 7b
3030±90	N 3239	-1460	-1000	Q-7 layer 4-12
3140±140	GaK 9848	-1750	-1000	HN02 Floor 1 lamp
3160±90	N 3240	-1700	-1100	Q7 layer 4-16
3160±90	N 3246	-1700	-1100	U7 layer 8c
3240±80	N 3242	-1740	-1310	T-7 3a
3270±100	N 3243	-1900	-1300	T-7 5a
3280±160	GaK 9849	-2050	-1100	HN02 Floor 1 shell
3380±130	GaK 9847	-2050	-1400	HN04
3430±95	Gak 5415	-1980	-1510	T-4 Lev 6
3450±150	GaK 11040	-2200	-1400	HHU2 House E
3520±95	Gak 5416	-2150	-1600	T-4 lev 7
3540±120	N 3241	-2200	-1500	Q-7 HOUSE B layer 7
3870±140	Gak 11032	-2900	-1900	HHU2 5-4
3890±120	N 3237	-2900	-1950	Q7 layer 4-3
3940±230	GaK 11033	-3100	-1700	HHU2 6b?
4020±130	GaK 9846	-2900	-2150	HN04
4020±180	GaK 11034	-3100	-1900	HHU2 7a
4200±130	GaK 11036	-3350	-2400	HHU2 8b
4210±160	GaK 11045	-3350	-2350	HHU2 HOUSE C 8a
4260±170	GaK 11044	-3400	-2300	HHU2 HOUSE B
4430±130	GaK 11039	-3500	-2850	HH03
4450±180	GaK 11043	-3700	-2600	HHU2
4710±130	N 3238	-3800	-3000	Q7 layer 4-6
4920±130	GaK 11037	-4000	-3350	HHU2 9b
4990±120	Gak 5417	-4050	-3500	J-4 Lev 7+M162
5560± 100	N 3245	-4700	-4050	U-7 Lev 7

cavations by the Okadas and their associates. That is, the set of determinations from 1982 in particular seem older and out of phase with determinations obtained in most of the other years, although for five of the six years all radiocarbon dates were from the same laboratory, Gakushuin laboratory. ...the two year's excavations and dates in Unit T are completely in phase with one another. Comparable to them are the two determinations received from unit U-7, excavated the same year as unit T-7. Those two earlier-obtained U-7 determinations, however, appear out of phase with the bulk of the series of dates from the expansion of U-7 designated HHU2. As a whole the 1982 dates read just about a thousand years older than the determinations of 1977. Was there a systematic laboratory error in that year?" (Dumond 2002).

This important observation required a rethinking of the archaeological sequence and dating at Hot Springs, a problem the Okadas had been concerned with for many years. In the context of assisting the Okadas in the completion of their final report and in the packing of the Hot Springs materials for their ultimate return to Alaska, a

number of charcoal samples were found in the artifact collection. Further, a large number of caribou (*Rangifer tarandus*) antler artifacts and fragments were identified in the collection. These two sources were perfect for running a new series of dates using the AMS method.

In 2002, ten new samples were submitted to Beta Analytic, eight of which were on the same stratigraphic deposits originally dated by the Okadas. Of the dates in the same stratigraphic levels, one was very close to the original date while the other seven ranged from 610 to 1590 years younger than the original dates, an average distance of 1032 years, just as Dumond had argued.[2]

Table 2: Dates on the same stratigraphic levels showing the difference between the original Gakushuin dates and the newly run dates.

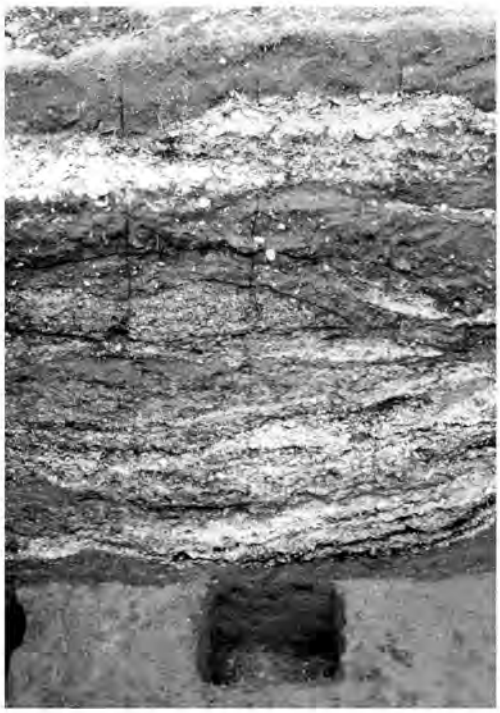
2002 Date	Original Date	Difference
1300±40	1410± 100	110
3590±90	4200 ± 130	610
1230±40	2110± 100	880
3230±40	4210 ± 160	980
1520±40	2530± 110	1010
3410±80	4430± 130	1020
2880±60	4020± 130	1140
1790±60	3380± 130	1590

Mean difference (w/o case 1) =1032 years[3]

What could have happened at the Gakushuin Laboratory? It is unclear and Maschner received no response to a letter sent to the laboratory. There may have been problems with pretreatment of samples, which is especially of concern with midden samples that might be contaminated by sea mammal oils and other sources of marine carbon. But this certainly does not explain all of the error since many of the differences are two to three times the reservoir effect estimated by Dumond and Griffin for the region at 460±41 (2002).

Another problem is contamination from coal and other sources, especially in the 1970-80s when bulk samples of charcoal were analyzed prior to the development of AMS dating. In the samples sent to Beta Analytic in 2002, one sample was determined by that lab to be clearly not charcoal, although it was collected as a charcoal sample during the original excavation. In 2003, another sample from that same unit U, level 4b, was submitted to Beta Analytic and I inspected the sample prior to sending it in and determined it was charcoal. A date of >47360 BP shows quite clearly that it was not charcoal. This should come as no surprise since the site is very near a number of large and exposed coal deposits and the Okadas state that coal is found on the beach in front of the site, a situation noted by Weyer 80 years earlier (1930:276).

Figure 3: Stratigraphic profile from Unit U, showing the sequence of the highland areas near the bluff edge. Note the 'upper shell layer' in Level 2.



I: dark brown soil directly below the root mat.

II: consolidated shell layer, the 'upper shell layer' in reports.

III: dark brown soil with cultural materials. Small gravel throughout the upper part possibly representing a disconformity between occupations. Red ochre in the middle of the level.

IV, V, VI: alternating layers of mussel, clam, fish bone, charcoal, and loamy soil. Abundant stone and bone artifacts.

VII: secondary deposits of loamy soil with stone artifacts and debris.

VIII: sterile soils.

In 2003 three samples were submitted with the goal of dating the upper deposits to demonstrate that the Okadas were correct in the definition of the 'upper shell layer.' Samples were submitted from the upper deposits of units U and Q, which had a clearly defined upper shell layer, and also from the upper level of HH03, which did not have this deposit. Both samples from U and Q came back

[2]A level by level comparison of the dates for each excavation unit is presented in the Appendix.

[3]The new 2003 dates fall out much the same way, with the new date on the lower part of HL03 1,010 years younger. The only one that is the opposite is a new date on HH03, which is 780 years older than the date received by Gakushuin by the Okadas. It is possible that I still haven't dated the upper part of HH03, but the charcoal sample sent in was labeled from the upper deposits, of course, the coal problem must always be considered as well.

in the late first millennium AD, just as predicted by the Okadas. The sample from HH03 without an upper shell layer is from the first millennium BC, demonstrating that the Okadas were quite correct in that the eastern highland area was the early occupation, but it is overlain by a thick deposit of midden from the later occupations.

Samples from HH02, just to the east of the springs but west of the thick midden deposits of the highland, were also redated in both 2002 and 2003 and found to be in the later occupation. HL02 and HL03 to the west of the springs in the lowland area were redated and found to be in the later occupations of the site as well.

Thus, regardless of cause of the initial date errors, the effect is the same in that 23 of the original dates, all run by the Gakushuin laboratory 1980, 1982 and 1984, must be discarded as in serious error. Further, two earlier dates in Unit Q, and one in Unit U are out of sequence being 1000-2500 years too old for their stratigraphic context and in comparison to other dates in the unit. Since these three dates are in the same stratigraphic context as the >47360 BP date from unit U, I assume that these two were also contaminated in some way, perhaps as a mixture of charcoal and coal. The date of 4990±120 in unit J is considered to date deposits below the cultural layers by Atsuko Okada and thus does not date the occupation of the site. The two dates received by the original Meiji University-University of Wisconsin Project are probably fine, but their calibrated ranges span between 1300 and 1700 years, making them unsuitable for further analysis. Therefore, 29 of the original dates are considered in error, not usable, or not cultural, leaving 15 of the original dates for chronological analysis. In summary:

- GaK 9846-9851 (1980), GaK 11031-11045 (1982), GaK 12088-12091 (1984) – **All in error**.
- GaK 5414-5417: **Good** but 4990±120; (Gak-5417) **Not cultural** (A. Okada, personal communication).
- N 3236 - 3246 probably good but N-3237, N-3238, N-3245 **Out of sequence**.
- Tk 124-125: **Probably good**.
- "I" dates from 1960: **Probably good but 1300-1700 year calibrated range makes them unusable.**

In total, 19 new samples were submitted to Beta Analytic for standard radiocarbon analysis, AMS dating on charcoal, or AMS on caribou antler. Of these, one was returned as not charcoal and another returned a date of >47360 years, which means it was not charcoal either. The remaining 17 samples, when combined with the 15 usable samples from the original project, allow us to revise the Hot Springs chronology as follows (all calibrated dates).

In their initial formulation of the chronology, Okada and Okada (1989) used the designations Port Moller I, II, and III. Now that the chronology is substantially altered because of the new dates, and because there have recently been projects in the Port Moller – Nelson Lagoon area that found sites dating to the periods when Hot Springs is not occupied, it seems more efficient to use the term Hot Springs in the chronology to avoid confusion with the broader regional prehistory (Figure 4). A complete list of all of the dates that are now considered to be usable in constructing a chronology of the Hot springs site are shown in Table 3.

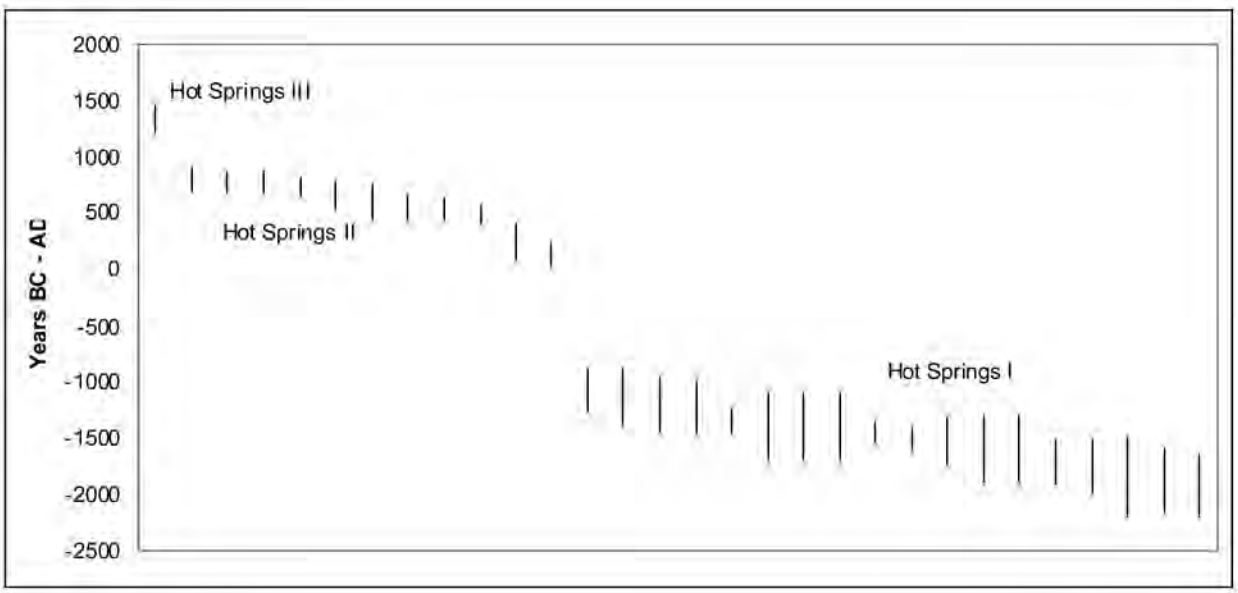


Figure 4: Calibrated ranges of all usable original dates and all new dates.

SPATIAL AND CHRONOLOGICAL CONTEXTS

This sequence can be investigated spatially across the site as well. Hot Springs 1 is only found along the bluff edge on the eastern margin of the site. This is the area of greatest stratigraphic depth and represents an intensive occupation. Why the site was abandoned around 1000 BC is open to investigation and the subject of a future paper, but possibilities include climate change as described by the Okadas (1989), the eruption of Mt. Dana just to the south reportedly between 1000 and 100 BC, changing sea levels, or any number of complex factors. Regardless, when the site is again reoccupied around AD 100, the residents first occupy the northern shore in a few houses and the southwestern shore where they created a stratified midden deposit. The primary occupation of the site does not appear to have occurred until after AD 500, when the majority of the surface houses were constructed. This occupation terminated around AD 850. There is a single date with a range of approximately AD 1300 to 1400. Based on house construction and other features, I believe this to be accurate, and was probably representative of just a few houses (I will return to this below).

Regionally, the new dates and chronology from the Hot Springs site reconciles many of the problems that have plagued archaeologists in the region when attempting to construct a regional sequence. The deposits that date prior to 1600 BC are contemporaneous with the later part of the Moffet Phase[4] on the lower Alaska Peninsula. This is a poorly defined phase of rather generic looking artifacts. But the dating of the occupation at Hot Springs is accurate because, except for an early date in Unit U that is slightly out of sequence (probably is so because of house construction disturbance), the other three early dates are at the bottom of units T, Q, and HH03 are in perfect context. A series of calibrated dates between 1600 and 1300 BC are on deposits that have many of the same features and artifacts as the Russell Creek phase further down the peninsula and are certainly related. These artifacts and features are not found earlier than 1600 BC, nor later than 1300 BC in either area (Maschner and Jordan 2002). Following the Russell Creek Phase on the lower peninsula is the Kinzarof Phase dating between 1300 and 400 BC. The dates from later part of Early Hot Springs coincide with the early Kinzarof Phase. Again, this phase is characterized by rather generic artifacts but important similarities between the two areas are evident in artifact form and distribution. Thus, based on stone end blades, hearths, and the bone technology, the Hot Springs 1 could probably be divided into three occupations along the lines summarized in Table 4.

The major abandonment of Hot Springs is contemporaneous with the occupation of the Adamagan site on the lower Peninsula in Morzhovoi Bay, which represents the later part of the Kinzarof Phase and the entire Adamagan Phase. Hot Springs 2 begins around AD 100, coeval with the Ram's Creek Phase further southwest. This part of the occupation, which might be called Hot Springs 2a, is of limited spatial distribution at the site. Hot Springs 2b, the largest occupation of the site, is equal to the Frosty Creek Phase on the lower Peninsula. The artifacts found throughout Hot Springs 2 are quite similar to those found elsewhere in the region in the same time period.

Between AD 1100 and 1250, and then again after AD 1475, the use of the large, nucleus-satellite houses on the Alaska Peninsula is common (Hoffman 2002; Maschner 1999a; Maschner 2004; Maschner and Hoffman 2003 [on the lower Peninsula the Cape Glazenap and Morzhovoi Phases respectively]). This house form is large, 8-20 meters in length, has internal storage facilities, side rooms, and is found in groups from 5-7 houses early, and 10-30 houses after AD 1475. These are found throughout the lower Peninsula area, Sanak Island, the Shumagin Islands, on the rivers of Nelson Lagoon just to the west of Hot Springs, and at Bear Lake just to the northeast of Hot Springs. The fact that the Hot Springs site is completely surrounded by sites with this house form, but that none of these houses are found at Hot Springs, indicates that the site was indeed abandoned during these periods.

But between these two phases on the western peninsula is the Izembek Phase. Dating between AD 1250 and 1475, this period saw a regional population decline, a return to small villages of 1-4 houses, a return to smaller houses of 6-8 meters in diameter, and the use of external storage pits. The single late date representing Hot Springs 3 falls into this time range. The excavated house, HH01, looks very much like houses I have tested during this phase with occasional internal storage pits, no side rooms, and a circular outline about 8m in diameter. While the type artifact of the later phases is the Izembek Point, which was

[4]Maschner and Jordan have recently reworked the chronological sequence, including the names of several of the phases, to make them more consistent with McCartney's early researches (1974), and new data from the region. The complete sequence is described in Maschner (2004) and will be the subject of a forthcoming report by Maschner and Jordan

Table 3: All new dates (Beta Analytic series) and old dates that are considered reliable.

^{14}C AGE B.P.	LAB ID	CALIBRATED LOWER	CALIBRATED HIGHER	UNIT
610±90	Tk-125	1460	1220	HH01
1230±40	BETA 167536	900	680	HL02 upper
1270±40	BETA 184116	670	870	HHQ 2-1
1270±40	BETA 184114	670	870	HH02 upper
1300±40	BETA 167528	810	650	HL03 upper
1390±70	Tk-124	780	530	HL01
1440±75	Gak-5414	770	430	HH02
1500±50	BETA 184117	430	650	HHU2-2a
1520±40	BETA 167532	640	430	HL03 lower
1590±40	BETA 184113	400	560	HL01 upper
1790±60	BETA 167529	400	80	HN04 upper
1890±40	BETA 167540	240	20	HLW4
2880±60	BETA 167533	-1260	-890	HN04 3-4
2930±90	N-3236	-1390	-900	Q-7 layer 2-5
3000±90	N-3244	-1440	-970	U-7 layer 7b
3030±90	N-3239	-1460	-1000	Q-7 layer 4-12
3100±40	BETA 167534	-1450	-1250	HHQ7 4-5
3150±90	BETA 167537	-1700	-1100	U7 8C
3160±90	N-3240	-1700	-1100	Q7 layer 4-16
3160±90	N-3246	-1700	-1100	U7 layer 8c
3200±60	BETA 184115	-1540	-1360	HH03 above floor
3230±40	BETA 167531	-1610	-1410	HHU2 House C
3240±80	N-3242	-1740	-1310	T-7 3a
3270±100	N-3243	-1900	-1300	T-7 5a
3320±110	BETA 167535	-1900	-1300	HHQ7 6-1
3410±80	BETA 167530	-1920	-1510	HH03 unit D Floor
3430±95	Gak-5415	-1980	-1510	T-4 Lev 6
3540±120	N-3241	-2200	-1500	Q-7 HOUSE B layer 7
3520±95	Gak-5416	-2150	-1600	T-4 lev 7
3590±90	BETA 167538	-2200	-1650	U7 8B

Table 4: A revised chronology of the Hot Springs site based on radiocarbon determinations, stratigraphy, artifacts, houses floors, and comparisons with the greater regional prehistory.

- **Hot Springs 1: 2000 - 1000 BC.**
  - Hot Springs 1a: 200-1600 BC
  - Hot Springs 1b: 1600-1300 BC
  - Hot Springs 1c: 1300-1000 BC
- **Hot Springs 2: AD 100 - 800.**
  - Hot Springs 2a: AD 100-300
  - Hot Springs 2b: AD 500-850
- **Hot Springs 3: AD 1300-1400.**

not found in the Hot Springs excavations, I argue that a limited reuse of the Hot Springs Village occurred during the years of the Izembek Phase on the lower Alaska Peninsula.

Based on comparisons with the rest of the western Alaska Peninsula, and a detailed investigation of the artifact assemblage, a new Hot Springs chronological framework is constructed (Table 4).

CONCLUSIONS

It is unclear as to why so many of the radiocarbon dates from the Gakushuin Lab were so far in error.[5] While this may never be resolved, the advent of AMS dating has allowed us to reconcile these problems and make corrections in the chronology. As a warning to many of us working on the region, the use of natural coal by the inhabitants must now be considered an important problem and one that could affect radiocarbon dates in other areas as well.

In an unpublished manuscript on the Aleutian region, William and Karen Workman (n.d.) argued that the Hot Springs Village site is one of the most important sites in the western arctic. With the new dating of this site and a reworking of the chronological sequence, this statement is even more accurate than it was when first conceived. In a series of forthcoming papers and a monograph on the site, I will show that the temporal distributions of many stone tools, harpoons, anthropomorphic figurines, zoomorphic representations, and household features have broad implications for the prehistory of the entire Bering Sea region.

ACKNOWLEDGEMENTS

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[5]It should also be noted that the two earliest dates in the Yukon Delta region (Okada et al. 1982:9) were also run by the Gakushuin lab and may be too old as well.

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APPENDIX

Now I should discuss each excavation in some detail. Unit T is the simplest as none of the dates in question come from this excavation. It has fairly straightforward stratigraphy and the dates fall in sequence (Table 5).

Table 5: Date Sequence in Unit T.

	T-4 (1974)	T-7 (1977)	FINAL UNIT T
Level 2			
Level 3		3240 ± 80	3240 ± 80
Level 4			
Level 5		3270 ± 100	3270 ± 100
Level 6	3430 ± 95		3430 ± 95
Level 7	3520 ± 95		3520 ± 95

Unit Q is more complicated because two of the dates must be discarded as in error, probably contaminated by coal. Those marked by an * are considered too old and out of sequence (Table 6).

Table 6: Date Sequence in Unit Q.

	Q7 and HHQ (N dates 1977)	Q7 and HHQ (Beta 2002-2003)	FINAL UNIT Q
Q-7 2-1		1270 ± 40	1270 ± 40
Q-7 2-5	2930±90		2930±90
Q7 layer 4-3	3890±120*		
Q7 4-5		3100±40	3100±40
Q7 layer 4-6	4710±130*		
Q-7 4-12	3030±90		3030±90
Q7 4-16	3160±90		3160±90
Q7 6-1		3320±110	3320±110
Q-7 HOUSE B 7	3540±120		3540±120

Unit U, one of the most important in the Okadas' excavations, has many Gakushuin dates. Those marked by an * are considered too old and out of sequence. Here, a single date from the 1977 run is discarded as being too old and perhaps contaminated. The entire run of 1982 dates must be discarded in bulk. These are the dates that formed the basis of Dumond's quote presented above. The single 2003 date of >47360 is also discarded for the reasons described above (Table 7).

Table 7: Date Sequence in Unit U.

	U-7 (1977)	HHU2 (GAK 1982)	U-7 and HHU2 (2002-2003)	FINAL UNIT U
Level 2-a			1500 ± 50	1500 ± 50
Level 4-b			>47360*	
Level 5-1		2790 ± 180*		
HOUSE E		3450±150*		
Level 5-4		3870 ± 140*		
Level 6-3		3940 ± 230*		
Level 7a	5560±100*	4020 ± 180*		
House G		540 ± 190*		
Level 7b	3000 ± 90			3000 ± 90
Level 7c		2580 ± 130*		
Burials 2&3		4450 ± 180*		
House B		4260 ± 170,* 2780 ± 100*		
Level 8b		4200 ± 130*	3590±90	3590±90
Level 8c	3160 ± 90		3150±90	3150±90
				3160 ± 90
House C		4210 ± 160*	3230±40	3230±40
Level 9b		4920 ± 130*		

The highland excavations reveal three occupations. HH01 is the only dated structure in the 2nd millennium AD, and, based on similarities with the Izembek Phase (AD 1250-1475 in Maschner 2004), this date is probably correct. HH02 has two dates firmly in the 1st millennium AD, and since there was very little stratigraphy or deposition here, it is unlikely that there are earlier deposits at this location (or they were destroyed by the later construction). HH03 is more problematic. The 'under house' date came out 1000 years too old, but the 'on floor' date turns out to be 800 years too young, even though I expected it to be 1000 years too old, but firmly in the 1st millennium AD. Is it possible that both of the dates from Beta Analytic in 2002-2003 are from an older occupation and there is still a poorly dated later occupation at this same house? Of course. But based on the stratigraphic profiles and artifacts, this does not appear to be the case (Table 8). Those marked by an * are considered too old or out of sequence.

Table 8: Date Sequence in Units HH01, HH02, and HH03.

	HH01 (Tk Date)	**HH01 (Beta 2002-2003)**	**HH01 Final**
	610±90	None	610±90
	HH02 (Gak 5414)	**HH02 (Beta 2002-2003)**	**HH02 Final**
		1270 ± 40	1270 ± 40
	1440±75		1440±75
	HH03 (GAK 80)	**HH03 (Beta 2002-2003)**	**HH03 Final**
on floor	2450±130*	3180 ± 60	3180 ± 60
under house	4430±130*	3410±80	3410±80

The lowland house excavations are much simpler and less complicated stratigraphically, but all of the Gakushuin dates from 1984 had to be discarded (Table 9). Those marked by an * are considered too old and out of sequence.

Table 9: Date Sequence in Units HL01, HL02, and HL03.

	HL01 (Tk date)	**HL01 (Beta 2002-2003)**	**HL01 Final**
	1390±70	1590 ± 40	1590 ± 40, 1390±70
	HL02 (GAK 84)	**HL02 (Beta 2002-2003)**	**HL02 Final**
upper	2110±100*	1230±40	1230±40
lower	2840±120*	None	
	HL03 (GAK 84)	**HL03 (Beta 2002-2003)**	**HL03 Final**
upper	1410±100*	1300±40	1300±40
lower	2530±110*	1520±40	1520±40

Five other excavation units bear mention in this discussion. The 2002 date on unit HLW4 is the only date from this excavation and dates at least a part of the occupation from the southwest shore of the site. HN04 was redated to over 1200 years younger than the dates from Gakushuin 1982. Since HN04 and HN02 have basically the same stratigraphy, they can probably be considered to have similar dates. Trenches I and II from the 1960 excavations are in the bluff edge area of site and probably had a similar stratigraphy to excavation units T, Q, and U. These dates fall at the end of the expected time frame, but their large standard deviations place them anywhere in a 1300-1700 year range. They should probably be ignored in favor of the better dates from the same area. According to the Okadas, there were some problems with the Unit J excavation, and the single date from that unit was earlier than the occupation. No further dates were run on unit J (Table 10). Those marked by an * are considered too old, out of sequence, or have extremely large errors.

TABLE 10: Date Sequence in Units HLW4, HN, and the 1960 excavations.

	HLW4	**HLW4 (Beta 2002)**
	None	1890±40
	HN02 (GAK 82)	**HN02 (Beta 2002)**
	3140±140*	None
	3280±160*	None
	HN04 (GAK 82)+C124	**HN04 (Beta 2002)**
Upper	3380±130*	1790±60
Lower	4020±130*	2880±60
	TRENCH I and II 1960	**Beta 2002-2003**
TRENCH I 1960	2680±250*	None
TRENCH II J-O	2960±320*	None
	J-4	**Beta 2002-2003**
J-4 Lev 7+M162	4990±120*	None