

Northern Archaic Settlement and Subsistence Patterns at Agiak Lake, Brooks Range, Alaska

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Abstract. While dozens of sites in northern Alaska have been assigned to the Northern Archaic tradition, most are small lithic scatters that represent ephemeral occupations and often contain only a single side-notched biface. In contrast, two sites at Agiak Lake in the central Brooks Range have revealed a range of Northern Archaic tools which are firmly associated with at least 55 stone tent rings dated to 5600–4900 cal. yrs. B.P. The large number of housing features at Agiak Lake offers a unique perspective on Northern Archaic settlement patterns and land use. We examine whether the accumulation of tent rings represents population aggregation or repeated use of the area, and draw on ethnographic data about Arctic caribou hunting groups as a point of comparison. Patterns at Agiak Lake favor repeated long-term use, although small scale aggregations cannot be ruled out.

Introduction

On the shores of Agiak Lake in the central Brooks Range, Alaska lie the remains of two sizeable prehistoric tent ring complexes (sites) dated to roughly 5600–4900 cal. yrs. B.P. and two massive game drive systems composed of hundreds of rock cairns that stretch over kilometers (Alexander 1969; Kunz 1986; McIntosh 2001; Saleeby 1996; Wilson 2006, 2007; Fig. 1). The two complexes are comprised of 40 and 15 stone tent rings—the remnants of what were probably dome-shaped, caribou hide-covered shelters—and represent the largest set of habitation features in northern Alaska from this time period. Associated with the tent rings is a lithic technology indicative of large game (probably caribou) hunting and processing activities, including side-notched bifacial projectile

points, notched pebble tools, unifacial scrapers, and ovate bifacial knives (Fig. 2). The tools and associated radiocarbon dates are consistent with what archaeologists in Alaska have assigned to the Northern Archaic tradition.

While dozens of sites in northern Alaska have been classified as Northern Archaic occupations, most consist of small lithic scatters that represent ephemeral occupations and often contain a single side-notched biface. Only a handful of constructed features have been documented in these sites and in many cases the features cannot be reliably associated with Northern Archaic artifacts or radiocarbon ages. Among the few features documented are a single tent ring at the Tuktu site near Anaktuvuk Pass (Campbell 1961), and two or three house floors from Northern Archaic levels at the Onion Portage site (Anderson 1988:73).

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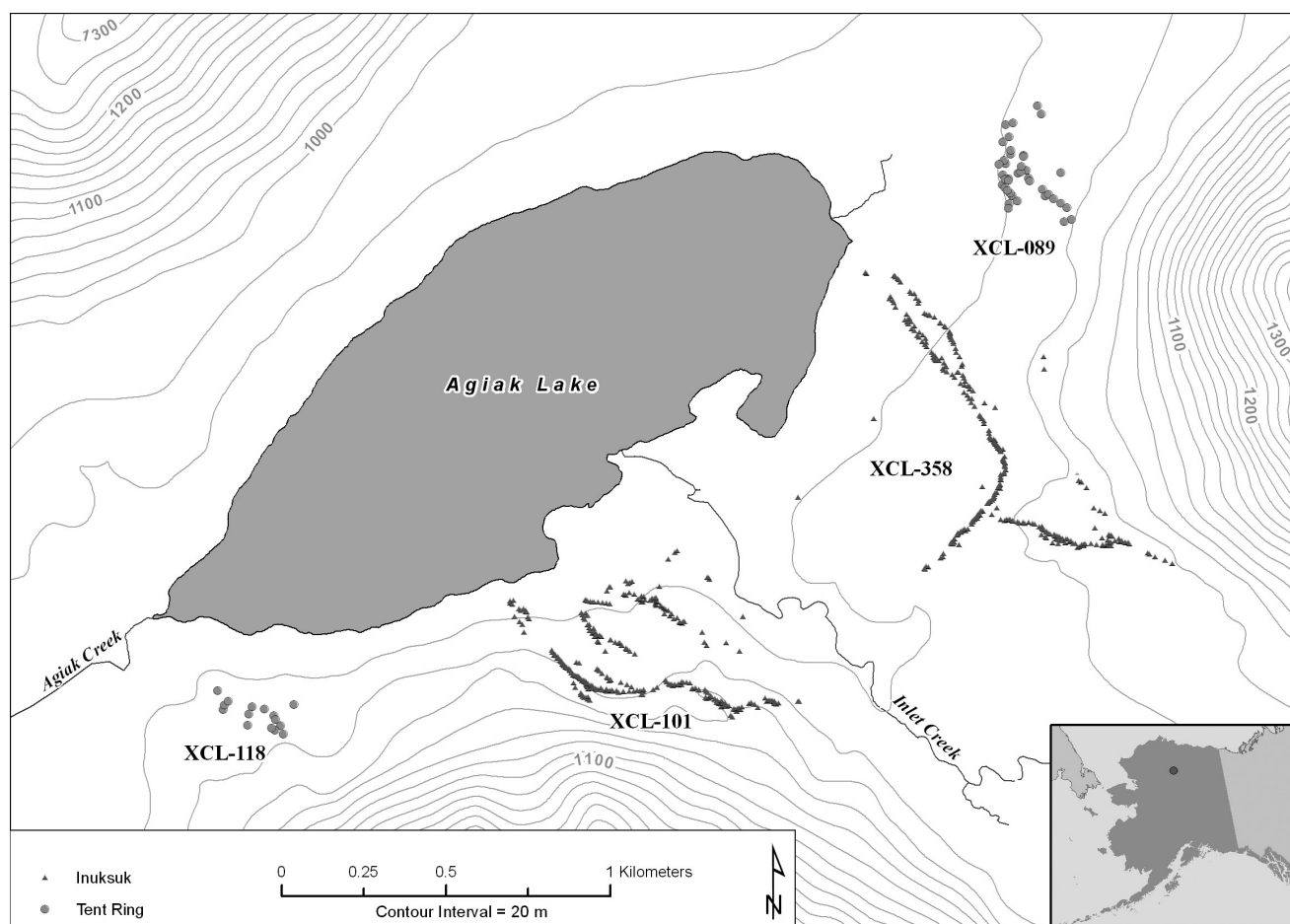


Figure 1. Tent ring (XCL-089 and XCL-118) and driveline (XCL-101 and XCL-358) features at Agiak Lake.

It is this dense and sizable accumulation of housing remains that is an outstanding pattern at Agiak Lake relative to other Northern Archaic sites and in this paper we explore the meaning and significance of the pattern in reference to two scenarios. One interpretation of the tent ring clusters proposes that they reflect an aggregation, a location at which people who are typically more dispersed come together to form a larger-than-average settlement. Hunter-gatherer aggregations are closely associated with behaviors such as communal or cooperative hunting and a high-degree of inter-household communication is necessary for planning and timing aggregations (Driver 1990; Hofman 1994). If aggregation can be demonstrated for Agiak Lake then these behaviors would be indicated for middle Holocene Northern Archaic hunter-gatherers in northern Alaska.

An alternative explanation for the tent ring clusters at Agiak Lake is that they represent an accumulation of structures constructed individually or in small numbers over a period of time and that few were occupied simultaneously. This long-term reoccupation scenario would suggest that Agiak

Lake was a seasonally occupied residential camp and would imply a long-lived pattern of land use and/or a stable configuration of resources or some other “pull factor” that attracted people to this location repeatedly.

In discerning between these alternatives—and they are more accurately considered in terms of a continuum since the options are not mutually exclusive—a key issue is whether many of the structures were occupied simultaneously. In other words, the occupation history of the site is a crucial problem to address before any broader implications about Northern Archaic land use or social organization might be derived from Agiak Lake.

Aggregation and Recurrent Settlement Use among High-Latitude Caribou Hunters

Aggregation

Aggregation sites have been defined as places “in which affiliated groups and individuals [that are

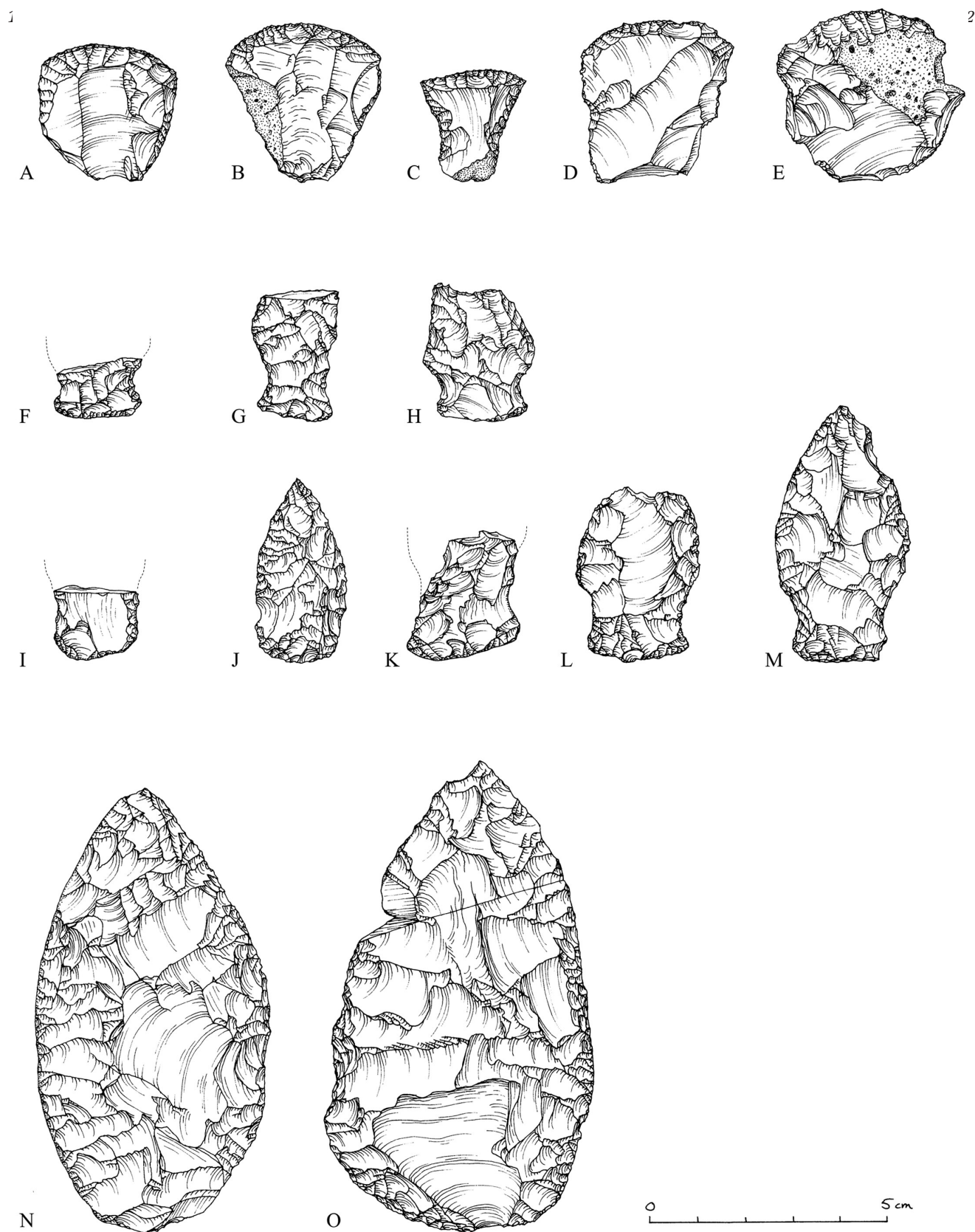


Figure 2. Illustrations of artifacts from both tent ring complexes: scrapers [A (XCL-089, feature D), B (XCL-089, feature AJ), C (XCL-089, feature H), D (XCL-089, feature M), E (XCL-089, feature AM)], notched projectile points [F (XCL-089, feature X), G (XCL-089, feature H), H (XCL-089, feature H), I (XCL-118, feature J), J (XCL-118, feature H), K (XCL-118, feature H), L (XCCL-089, feature X), M (XL-089, feature AL)], and bifacial knives [N (XCL-089, feature X) and O (XCL-089, feature AM)].

otherwise fragmented] come together" (Conkey 1980:612). Thus, a settlement pattern that includes periodic aggregation must also include group fission into smaller social units for part of the year. Defining a site as an aggregation locale is not contingent on a specific threshold number of people, but is a relative measure based on the fusion of otherwise dispersed groups. The purposes of aggregation are varied and include opportunities for "group rituals, rites of passage ceremonies, enculturation of the young, mate-finding opportunities, information sharing, economic cooperation, exchanges, fiestas, and so forth" (Hofman 1994:344). While the significance of the social and ritual aspects of aggregation should not be overlooked, this paper focuses on components of economic cooperation and information exchange.

Based on his substantial ethnographic literature review on northern caribou hunters, Spiess (1979:7) observes that "subarctic and arctic band societies consist of small residence units (microbands) that gather annually, or whenever food is plentiful, into larger groupings (macrobands)." The microband can be loosely equated to an economically independent household or extended family, while the macroband is a collection of related extended families (Burch 1998). Ferring (1984:117) states that an aggregation occurs when two or more subgroups (i.e., microbands) occupy a site simultaneously, leaving spatially discrete remains. The actual size and demographic composition of the band may vary, but the pattern of fission and fusion is characteristic. Thus, the definition of aggregation is quite simple; however, recognizing aggregation patterns in the archaeological record is difficult.

Ethnographic data are a source of information about hunter-gatherer settlement size and population dynamics that can be used to develop

hypotheses about archaeological patterning. We looked at the average number of occupied structures for high latitude foragers as a means to establish a number of concurrently occupied households that could reliably be considered to represent an aggregation (Table 1, 2). We also looked to ethnographic data to calculate an average number of people per structure in order to derive rough estimates of prehistoric populations residing at Agiak Lake (Table 1, 2). Our ethnographic examples are limited to terrestrial-based groups in Arctic environments that emphasized hunting since this most closely approximates the key attributes of the Northern Archaic adaptation in northern Alaska as it is currently understood. Marine or riverine-focused foragers are expected to have operated under different constraints with resulting differences in settlement patterns (Binford 2001; Friesen 1999). Therefore, the examples are restricted to the two groups ethnographically reported to be the most heavily reliant on caribou: the Nunamiut Eskimo of the central Brooks Range and the Caribou Inuit west of Hudson Bay.

Reasons and Seasons for Aggregation

In the Arctic, aggregation was primarily dependent on the availability of food resources. In reference to the Nunamiut of the central Brooks Range, Gubser (1965:172) notes that "the primary reason for the formation of a band was to exploit the seasonal migration of caribou." Based upon a large, cross-cultural survey of traditional communal hunting, Driver (1990:15) lists three reasons for aggregation and cooperative endeavors in the Arctic: 1) to take advantage of seasonally concentrated animals, 2) to utilize animals when fat content was highest, and 3) to obtain high-quality hides for clothing and shelter.

Table 1. High-Latitude Caribou-Hunter Aggregated Settlement Data.

| Group | Context | Source | Tent Rings per Settlement | People per Tent Ring | Settlement Population |
|---------------|--|---|---------------------------------|----------------------------|--------------------------|
| Nunamiut | Yearly Round, mid-twentieth century | Binford (1991a) | 14 | 4.1 | 49.8 |
| Nunamiut | Central base camp, largest aggregation of the year | Campbell (1968) | 10-12 | 4.5 | 50 |
| Caribou Inuit | Inland camps, late-nineteenth and early-twentieth century | Birkett-Smith (1929); Tyrrell (1897) | 10-12 | 4.5 | 47-54 |
| Mean | | | 12 | 4.4 | 50 |

Table 2. High-Latitude Caribou-Hunter Dispersed Settlement Data.

| Group | Source | Tent Rings per Settlement | People per Tent Ring | Settlement Population |
|---------------|-----------------|---------------------------------|----------------------------|--------------------------|
| Nunamiut | Binford (1991a) | 2.8 | 6.6 | 18.7 |
| Caribou Inuit | Tyrrell (1897) | 2.9 | 6.4 | 18.3 |
| Mean | | 2.85 | 6.5 | 18.5 |

Hofman (1994; see also Driver 1990; Friesen 1999) further supports the contention that aggregation is resource-dependent, and postulates that these gatherings were locally and/or seasonally predictable based on the availability of resources:

Seasonally and locally predictable aggregations are most likely to occur in situations where multiple key resources can be found in or near a fixed and predictable setting. Seasonally (temporally) predictable aggregations should occur most often when key resources are predictable but mobile or spatially variable in occurrence, whereas locally (spatially) predictable aggregations will occur when key resources are fixed or when mobile resources are predictable as to place but not necessarily time. (Hofman 1994:351)

Therefore, many human aggregations in high-latitude, interior settings can be seen as the result of more or less seasonally and spatially predictable mobile resources, namely caribou (Arima 1984; Binford 1978; Burch 1998; Driver 1990; Friesen and Stewart 1994; Gubser 1965). In other words, caribou behavior and the timing of migrations affect both the location and the season of human aggregation. For example, caribou migrations through the Brooks Range follow broad patterns of movement and timing. Although caribou can be relied upon to migrate through the Brooks Range each year, the exact timing and route of caribou travel can vary. Despite (and due to) the variable timing and location of migrations, arctic hunters are incredibly skilled at observing and predicting caribou behavior and situating themselves in the paths of the migrating herds. Caribou tend to move through valleys and low passes, coursing natural features and following established caribou trails (LeResche and Linderman 1975). These general caribou behaviors tend to bring caribou back to similar geographic locations, such as Anak-tuvuk Pass or the Chandler Lake valley (Binford 1983; Campbell 1962, 1968; Lent 1966; LeResche and Linderman 1975; Matheus and Omtzigt 2002; Spearman 1979), year after year. Thus, human aggregations in the Brooks Range, based on migrating caribou, are seasonally predictable (during the spring and fall migrations) and tend to occur in

the same general locations (mountain passes and river valleys).

A slightly different reason for human aggregation, also related to caribou, involves coping with the uncertainties of caribou migration routes and timing. If a herd is expected to be large enough to provision an aggregated population, each family will resist the urge to fission into a smaller independent unit. The aggregated group members can then maximize their collective knowledge about caribou behavior and location, and best devise a hunting strategy (Riches 1982). This strategy would minimize individual risk by relying on the skills and knowledge of the most successful hunters. In fact, the large aggregation of families, and corresponding number of individual hunters, may actually have necessitated communal or cooperative hunting. The hunters would have had to organize themselves in order to avoid the confusion that would arise if several unorganized hunters approached the herd separately (Gubser 1965:325; Riches 1982:38).

The last communal caribou hunt in the central Brooks Range took place in 1944 on the shores of Little Chandler Lake in the central Brooks Range, just 20 km north of Agiak Lake (Spearman 1986). The hunt is well documented through oral history and illustrates key aspects of a group caribou hunt. During the fall of 1943, a handful of related families decided to assemble the following fall and conduct a communal caribou drive. After plans had been made, the six family groups separated to hunt and trap through the winter. The following summer, the diffuse groups, totaling 22 people, came together again on the shores of Little Chandler Lake. Preparations for the hunt included the manufacture of caribou-skin kayaks and the erection of a substantial caribou driveline. The hunt involved the entire camp, and included women and children who helped operate the driveline. Although only activated for a few days (only one of which was successful) and cut short due to an accident, the hunt yielded enough food for the families to remain at Little Chandler Lake for more than a month after the hunt. As food stores were depleted, the family groups had to once again go their separate ways to hunt and trap.

The "Last Great Hunt" (Spearman 1986) is discussed here as an example of process and outcome of caribou driveline hunting. The families that participated in the hunt regularly traveled together and spent more than half the year camped with one another. This distinction means that the 22 people at Little Chandler Lake represented the typical minimally dispersed group during a given year. While the group separated during the winter months, this was only a temporary situation. The distinction may be only mathematical, but the point is that communal hunting does not require mass-aggregation of a macroband. A group of only 20 people is enough to effectively harvest caribou in a communal hunt.

Archaeological Patterns for Aggregation

By definition an aggregated settlement is composed of more than one household. A household can be considered the minimal economically independent social unit (Binford 2001; Burch 1998). Each of these households may actually construct and utilize more than one shelter (i.e., tent ring). An aggregated settlement is therefore composed of multiple simultaneously occupied households, with each household possibly possessing multiple tent rings (Balicki 1970; Binford 1991b; Gubser 1965). The key problem for archaeologists is demonstrating the contemporaneity of the archaeological features. Discovering ways to elucidate contemporaneity is therefore a central focus of this discussion.

Aggregated settlements of multiple families tend to show signs of spatial patterning and separation, demonstrating the social need for physical distance (Binford 1983, 1991b; Whitelaw 1991). Regularly spaced clustering of households has been interpreted as an indicator of close social relationships, such as kinship ties or political alliances (Binford 1983, 1991b; Gargett and Hayden 1991; Stark and Young 1981; Whitelaw 1991; Yellen 1977). The amalgamation of distinct social units, such as two or more microbands, usually leads to the maintenance of separate camps at some distance (Binford 1991b; O'Connell 1987; Whitelaw 1991; Yellen 1977). The camps maintain their cohesive social identity while still cooperating and visiting with the larger group. Recognizable spatial patterns may include the circular or linear arrangements of households (Whitelaw 1991; Yellen 1977). The footprints of simultaneously occupied house features are not expected to overlap (Friesen and Stewart 1994; Smith 2003), and there should be no evidence of scavenging of building materials, as might be expected as a result of multiple reoccupations.

Radiocarbon dates from different features within an aggregated settlement are expected to be similar, at least within the probabilistic bounds al-

lowed by radiocarbon dating. Even identical dates, however, would not be sufficiently precise to establish contemporaneity of a face-to-face manner. Likewise, stratigraphy could conceivably bracket the construction and occupation of features to a brief interval, but this would require exceptionally rapid deposition of fine-grained sediments that have remained well preserved. Such contexts are extremely rare in northern Alaska and certainly not achieved at Agiak Lake where sediments encapsulating artifacts and features are thin to non-existent.

Artifact refitting is one additional method that has been used to examine contemporaneity between archaeological features (Hofman 1992; Waguespack 2002). Seeman (1994) and Spiess (1984), for example, have convincingly argued for contemporaneity between discrete artifact scatters in large Paleoindian sites based on cross-mends of lithic artifact fragments and flaking sequences, and in turn, made a case for the sites having resulted from single occupations.

Aggregated Settlement Size and Persons per Tent Ring

A primary task is determining the number of tent rings typically associated with an aggregated settlement and an estimate for the number of people occupying each tent. Information from both the Nunamiut and Caribou Inuit is compiled here. A summary of the information on average tent rings per settlement, people per tent ring, and total settlement population for aggregated settlements is presented in Table 1.

Binford (1991b) recorded the settlement composition and population for several mid-twentieth century Nunamiut campsites in the central Brooks Range. Seven of these campsites were aggregated settlements of 5 to 12 households, ranging in composition from 5 to 19 individual tent rings. Populations ranged from 35 to 71 people per settlement. Campbell (1968) found similar numbers among the Nunamiut.

In a study of late-prehistoric Caribou Inuit sites, Friesen and Stewart (1994) compiled ethnographic and historic accounts of Birket-Smith (1929) and Tyrrell (1897). Ethnographic accounts noted large tent ring settlements, interpreted as aggregation sites, consisting of 10 to 12 tent rings (Friesen and Stewart 1994:344–345, 355). Maximum camp sizes of 54 and 47 people were also recorded. Arima (1984) supports the contention of 50 persons as a maximum aggregation among Caribou Inuit. However, based on their archaeological examinations, Friesen and Stewart (1994:355) note that some late-prehistoric settlement sites may have had up to 15 simultaneously occupied tents, with a total population over 90.

Recurrent Use of Places on the Landscape

While aggregation sites are a component of many hunter-gatherer settlement systems, we cannot assume them to have existed in all hunter-gatherer societies throughout history (Conkey 1980; Ferring 1984; Hofman 1994). Large numbers of settlement features do not necessarily represent aggregation sites (Ferring 1984; Friesen and Stewart 1994). Consideration must be given to the possibility (and likelihood) of site reoccupation by the same or different groups of people over time (Hofman 1994). Smith (2003:165) states that “stable, structured, long-term use patterns are represented by the regular repeated occupation of locales (the general area associated with a patch) and specific locations (the actual place used for occupation) from year to year.”

Reasons and Seasons for Recurrent Use

Interestingly, the economic reasons for one large aggregation, such as seasonally predictable resources, may also compel the periodic reoccupation of an area by a single family or group of families (Binford 1983, 1991b; Burch 1998; Smith 2003). When families tended to return to the same location year after year, it was only because these locations offered reasonably predictable subsistence resources (Smith 2003). Among caribou-hunting populations, the main consideration in determining where families spent the fall was the whereabouts of caribou. Secondary resources, such as Dall sheep, fish, and small game, as well as fuel and fresh water, also influenced the selection of settlement location (Balikci 1970; Binford 2001; Burch 1998, 2006; Campbell 1962, 1968; Gubser 1965).

Burch (1998) noticed a general pattern in northwestern Alaska for the regular reoccupation of specific areas by families or groups of families during the fall and winter. Families were free to live wherever they wanted within their own country, but they tended to return to the same places annually. These fall/winter settlements represented locations regularly occupied by entire families or multi-family groups year after year. Binford (1978, 1980, 1983, 1991a, 1991b) has recorded similar patterns of site reoccupation by Nunamiut families in the central Brooks Range.

Archaeological Patterns of Recurrent Use

In a long-term, single-family reoccupation situation, one might expect little or no intrasite spatial patterning of household features (Whitelaw 1991). Where patterning does occur, it might represent the close spacing of multiple tent rings occupied

by members of the same family (Binford 1991b). It can be estimated that roughly two to five tent rings would be occupied during each occupational event. Reoccupation of a site may mean either reoccupation of existing features (Burch 1998; Friesen and Stewart 1994) or the building of new housing. The creation of new housing may result in overlapping features or scavenging of building material (i.e., tent ring stones) from existing features. These actions would produce “blurred” spatial patterns and partial or poorly preserved tent ring features.

Radiocarbon dates may vary from tent ring to tent ring as they were not contemporaneously occupied, although the resolution of radiocarbon dating is not appropriate for detecting yearly or even decadal variance. Reoccupation occurring over centuries or millennia would be apparent through radiocarbon dating.

Dispersed (Non-Aggregated) Settlement Size and Persons per Tent Ring

Once again, ethnographic data from both the Nunamiut and the Caribou Inuit were used to estimate the settlement size of dispersed families or households. A summary of the information on average tent rings per settlement, people per tent ring, and total settlement population for dispersed settlements is presented in Table 2.

In the same study on Nunamiut settlements mentioned above, Binford (1991a) recorded the settlement size and population for eight dispersed settlements. These settlements were composed of 2 to 3 households and had 2 to 3 tent rings. Population ranged from 13 to 22 people.

For the Caribou Inuit, an estimate of 6.4 people per tent ring, based on seven historic observations (Tyrell 1897), is used to gauge the prehistoric population of tent ring settlements (Friesen and Stewart 1994:355). A total population of 120 people was recorded for the seven settlements. Settlements ranged in size from 1 to 7 tent rings, for an average of roughly 2.9 tent rings per settlement.

Summary of Aggregation and Recurrent Use

Two basic settlement patterns observed in the Arctic ethnographic record have been discussed here: 1) the periodic aggregation (fusion) of several families (microbands) into one cooperative group (macroband) for the purposes of caribou exploitation and 2) the long-term reoccupation by a family or group of a single location, also based on the presence of caribou resources. Of course, these two conditions are not mutually exclusive. Campbell (1968:15–17) described six settlement types traditionally constructed and utilized by the Nu-

namiut, two of which are important here. Type I settlements were residential base camps also described by Binford (1980) in his theoretical discussion of hunter-gatherer economies. These locales were occupied by all or nearly all members of the band during at least part of the year, typically late spring and early fall. Type I settlements would be equivalent to aggregated settlements. Type II settlements, consisting of one or two families, occur during the seasonal disbanding of Type I settlements, usually during the height of winter. Type II settlements, established in areas where willow and caribou or sheep resources were known to exist, may not have been occupied every year, but their locations were well known and eventual reoccupation was common.

Therefore, aggregation should be seen as a mechanism whereby groups that had otherwise fissioned could come together to resolve problems beyond the capabilities of individual families (Hofman 1994:342). The Little Chandler Lake communal hunt is a perfect example of groups coming together to address a mutual problem (in this case an ammunition shortage). Burch (1998) notes the periodic aggregation of several family groups (microbands) at key caribou hunting locales in northwest Alaska for the purposes of communal hunting, while other years, families hunted in isolation. Tulugak Lake, north of Anaktuvuk Pass, was witness to seasonal reoccupations of small family units as well as communal caribou hunts involving multi-family aggregations during ethnohistoric times (Binford 1983, 1991a, 1991b).

Evaluation of Agiak Lake Tent Ring Complexes

There are several archaeologically testable expectations for either aggregation or long-term reoccupation or recurrent use based on the ethnographic data for high-latitude caribou hunters. For an aggregation settlement, one would expect 8 to 12 tent rings occupied simultaneously by up to 75 people. Importantly, and difficult to test, these tent rings would be occupied by more than one subgroup or microband coming together (primarily) for the purpose of communal hunting. Radiocarbon dates from these tent rings, while unable to prove contemporaneity, should not be statistically dissimilar. The simultaneously occupied tent rings would show some degree of spatial patterning or layout reflective of social needs for physical distance. These patterns might be recognizable in the layout of individual tent rings or in the placement of larger tent ring clusters—the result of subgroup segregation within a single settlement. Finally, tent ring features within an aggregated settlement should not overlap or show

evidence of scavenging, as each structure was occupied simultaneously.

A large concentration of tent rings may also represent the long-term reoccupation of a particular location by single families or groups of families as part of their seasonal or decadal round. Archaeological expectations for the long-term reoccupation of an area include only 2 to 5 contemporaneously occupied tent rings. These tent rings provided shelter for 8 to 20 people, members of an economically interdependent social unit. The radiocarbon dates from tent rings resulting from long-term reoccupation would show some statistical dissimilarity, perhaps indicating a minimum number of occupational events. With small group reoccupation of an area, one would expect less noticeable, or non-existent, spatial patterning among the tent rings. There would be no need for regular physical separation between occupied tent rings and those tent rings abandoned decades or centuries earlier. On a similar note, some tent ring overlap or rock scavenging might be expected during successive occupations of a particular location. Archaeologically, this might manifest itself as overlapping or incomplete tent rings.

The Tent Ring Complexes

The tent ring complexes both north and south of Agiak Lake share many similarities. Tent rings at both complexes are composed of a high number of stones; typically each ring is composed of more than 50 stones. The tent rings have similar diameters of 3.5–5.0 m and a roughly continuous ring of stones (Fig. 3). Ring stones at both settlements exhibit similar preservation, weathering, lichen cover, and embeddedness within the vegetation mat (Fig. 4). Lithic artifacts occur within or beneath nearly all tent ring walls. Examination of areas outside the tent rings revealed very few lithic artifacts. The array of lithic artifacts in the assemblages, both formal artifacts and debitage, is quite similar at both complexes, as is the variety of raw materials used.

The geographic settings of the two tent ring complexes are similar. They lie at opposite ends of the lake, separated by 2.5 km (Fig. 1). Both are located near the eastern side of the roughly north-south trending Agiak valley, proximal to the east-west trending inlet creek valley. Both tent ring clusters are located near the base of boulder-strewn mountains on somewhat level plateaus above the surrounding terrain—the remnants of ancient glacial deposits and landslides. The southern complex rests on rougher, less vegetated terrain than the northern tent rings area, which has some vegetated swales and fewer boulders. Both complexes are at similar elevations above the lake surface.

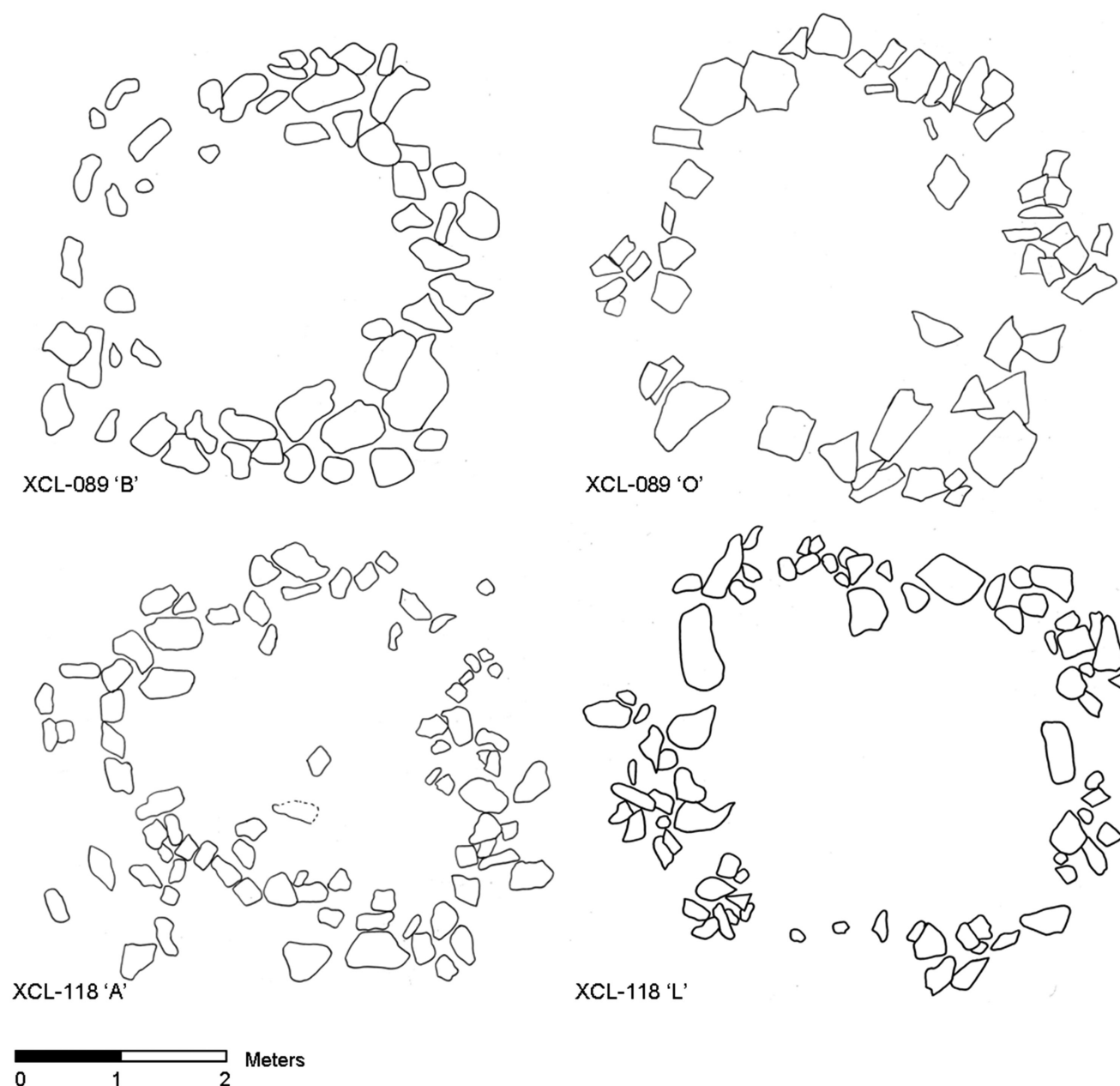


Figure 3. Representative tent ring plan views from XCL-089 and XCL-118 tent ring clusters.

Northern Complex (XCL-089)

The northern tent ring complex encompasses what was previously described as three separate sites: XCL-089, XCL-090, and XCL-091 (Kunz 1986). Subsequent fieldwork in 2001 and 2005 resulted in the discovery of five additional tent rings over a 7 ha area, bringing the total to 40 tent rings (Fig. 5). The spatial distribution of the tent rings on the terrace is such that the entire area previously described as three discrete sites is now considered one, and is referred to as XCL-089.

The 40 tent rings are located on a large west-northwest to east-southeast trending terrace located at the base of a 1540 m peak immediately east of the north end of Agiak Lake. The lake, which is roughly 25 m below the tent ring complex, is approximately 500 m away. The area provides a good view of Agiak Lake to the southwest. The elevation increases closer to the base of the mountain, making it easier to see to the north. The terrace is broad and somewhat hummocky with numerous small rounded ridges and swales. The unvegetated areas are made up of clusters of cobble- and boulder-sized sandstone rocks.

Vegetation in the area consists mainly of grasses, mosses and lichens concentrated in the shallow swales and within the tent ring circles. The nearest willow patch of any size is 400 m away to the south, and even this collection of willow is sparse, containing only small individual shrubs.

Many of the rings are concentrated near the terrace edge, which rises abruptly from the low-lying marshy grasslands that extend north of the lake. Tent rings are typically composed of a large number of rocks which are arranged continuously in, for the most part, complete and neatly arranged circles, although at least one tent ring appears to be a half-circle (its rocks could have been reused or disturbed). Some tent rings have a section of wall that is raised higher than the rest. Non-portable rocks are used as part of some structures, perhaps for holding willow poles in place as part of the superstructure of the tent.

Southern Complex (XCL-118)

The southern tent ring complex is located on the dry and rocky slopes at the base of a mountain at

the southeast end of the Agiak Lake between two U-shaped swales interspersed with willow patches. It is located approximately 230 m away from the lake and occupies an area of roughly 3.75 ha. The lake's outlet creek, Agiak Creek, exits the lake just over 300 m to the northwest. The area offers a good view in all directions except east, where a 1530 m mountain blocks the inlet creek valley from view.

The surface consists of exposed rocks and gravel and exhibits considerably less mineral soil than XCL-089. Vegetation includes lichens, mosses, grasses, low herbaceous plants, and a few dwarf birches. The feature cluster consists of 15 tent rings (nine reported in 1985 and six in 2005) and one cache placed on the rocky slopes (Fig. 4). The rings are similar in location and structure to those from XCL-089: they consisted of large quantities of rocks placed continuously to form circles. Regular spacing of tent rings at the southern complex is less apparent than at XCL-089; however, patterns may still be recognizable. The rings positioned along the small ridge-tops and slight plateaus seem to have somewhat regular spacing of between 12 and 20 m.



Figure 4. Tent ring examples (XCL-089 'B' [this page] and XCL-118 'T' [next page, tape measures 4.0 m]) with Agiak Lake in background.



Figure 4. (continued).

Excavation and Radiocarbon Results

We tested a total of nine tent rings—seven from the northern complex and two from the southern complex—excavating 1.0 m² test units within the perimeter of the ring. The primary goal of testing was to collect organic material suitable for radiocarbon dating. The tested tent rings also produced subsurface lithic material that augmented the in-field analysis of the two tent ring complexes (Table 3).

Five of the nine tested tent rings—four from the northern complex and one from the southern complex—produced evidence of internal features in the center of the rings. The features appeared to be unlined and included fire-cracked rock, burned soil, heat-fractured lithic artifacts and flakes, tiny pieces of calcined bone, and concentrations of charcoal. These elements are all strong indicators of a hearth feature and leave little doubt that at one time the tent rings had internal hearths. The fact that several of the tent rings had carefully placed internal hearths indicates a strong correlation between the hearths

and the tent rings, rather than coincidental overlap of two occupational components. Additionally, the heat-damaged lithic artifacts (which exhibit pot-lid and crenelated fractures) show the burning event to be contemporaneous with or to post-date the deposition of the lithics. The four remaining tested tent rings all produced some evidence of hearths, including heat-fractured flakes, burned soil, and/or fire-cracked rock, but did not produce charcoal samples suitable for dating. It is reasonable to assume the existence of hearths within other tent rings as well, although additional excavation would be necessary to test this hypothesis.

Radiocarbon dates were obtained on five charcoal samples collected in 2005. Samples from the two complexes produced a fairly tight cluster of dates (Table 4). Calibrated at the 1-sigma (68% probability) level, the dates range between 5644 cal. yrs. B.P. and 4885 cal. yrs. B.P. (INTCAL04) (Reimer et al. 2004). Although the older dates come from the northern complex, the one date from the southern complex matches exactly one of the dates obtained at the northern complex.

Placing Agiak Lake on the Aggregation-Recurrent Use Continuum

Several of the ethnographically derived expectations for aggregation and long-term recurrent

use (Table 5) can be tested against the data at Agiak Lake. The spatial arrangement of tent rings was meticulously mapped using differentially corrected data collected with a mapping-grade GPS. The mapping data provide clues to spatial pattern-

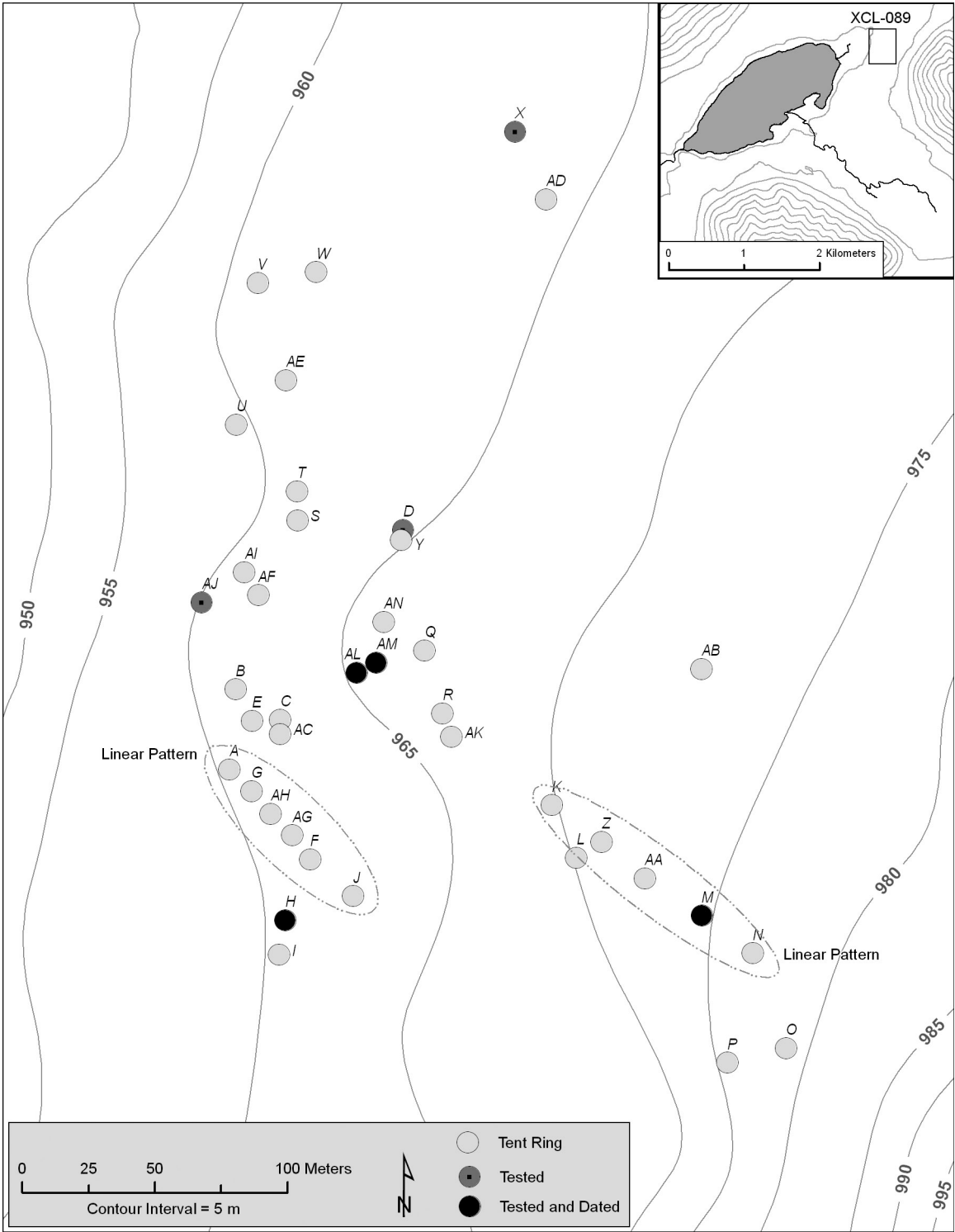


Figure 5. Northern tent ring complex (XCL-089).

Table 3. Northern Archaic Diagnostic Artifacts at Agiak Lake.

| Site No. | Tent Ring | Diagnostic Artifacts | Tested | Dated |
|----------|-----------|--|--------|-------|
| XCL-089 | C | notched projectile point | No | No |
| XCL-089 | D | bifacial knife, notched pebble, notched projectile point | Yes | No |
| XCL-089 | H | notched projectile points (3) | Yes | Yes |
| XCL-089 | K | bifacial knife | No | No |
| XCL-089 | X | bifacial knife, notched projectile points (3) | Yes | No |
| XCL-089 | AL | notched projectile point | Yes | Yes |
| XCL-089 | AM | bifacial knife | Yes | Yes |
| XCL-118 | A | notched pebble | No | No |
| XCL-118 | H | notched projectile points (2) | No | No |
| XCL-118 | J | notched projectile point | Yes | Yes |

Table 4. Radiocarbon Dates from Agiak Lake Tent Ring Settlements.

| Lab No. | Catalog No. | Provenience | Material | Conventional Age (C-14 yrs B.P., 1-sigma) | Calibrated Age ¹ (cal. yrs B.P., 1-Sigma) |
|-------------|-------------|-----------------------|---|---|--|
| Beta-210714 | GAAR14659 | XCL-118; Tent Ring J | Wood charcoal, <i>Salix</i> sp. | 4430±40 | 5259–4884 |
| Beta-210707 | GAAR14564 | XCL-089; Tent Ring H | Wood charcoal, <i>Salix</i> sp. | 4430±40 | 5259–4884 |
| Beta-210710 | GAAR14580 | XCL-089; Tent Ring AM | Wood charcoal, <i>Populus</i> sp./ <i>Salix</i> sp. | 4580±40 | 5441–5079 |
| Beta-210708 | GAAR14621 | XCL-089; Tent Ring M | Wood charcoal, <i>Salix</i> sp. | 4760±40 | 5584–5470 |
| Beta-210709 | GAAR14633 | XCL-089; Tent Ring AL | Wood charcoal, <i>Salix</i> sp. | 4850±40 | 5643–5488 |

¹ Calib Radiocarbon Calibration Program (Stuiver and Reimer 1993); INTCAL04 (Reimer et al. 2004)

ing (and perhaps contemporaneous occupation). A total of five tent rings have been radiocarbon dated, giving clues to duration of use. Features were also examined for evidence of scavenging of tent ring rocks, and for overlap, as might be expected during re-occupation. While no specific evidence of storage features or middens exists, the absence of these features may provide clues to seasonality and site activities.

In general, there is little or obvious spatial patterning within the tent ring complexes at Agiak Lake. Tent rings appear generally distributed across both the northern and southern complexes.

The somewhat random distribution across such a wide area likely reflects recurring re-occupation of the terrace. The scattered distribution might suggest “changing circumstances of occupation—different weather conditions, for example, or different sizes of camp during occupations in different years” (Friesen and Stewart 1994:354).

There are, however, a few examples of apparent of spatial patterning of tent rings at Agiak Lake, as might be expected in an aggregated settlement. Two clusters of tent rings in the northern complex are linearly arranged and regularly spaced at roughly 12 to 20 m intervals (Fig. 5).

Table 5. Archaeologically Testable Expectations for site occupation history.

| Aggregation | Long-term Re-occupation |
|---|---|
| 8-12 contemporaneously occupied tent rings | 2-5 contemporaneously occupied tent rings |
| Roughly similar radiocarbon dates | Wider range of radiocarbon dates |
| Spatial patterning and clustering of tent rings | Less noticeable or random positioning of tent rings |
| No overlap or scavenging of features | Some overlap and scavenging of features |

One cluster consists of six tent rings, while the other line has five tent rings. The two clusters are separated by 80 to 125 m. Some regular spacing was also observed in the western part of the complex, but without any indication of linear or circular arrangement.

While the linear patterning is provocative, both tent ring lines are located atop slight linear rises in the terrain. The linear arrangement of the tent rings may simply be coincidental with the linear topography. Whitelaw (1991) noticed a similar pattern of linear arrangement in the Arctic along rivers and shorelines.

Although the topography may be responsible for the linear arrangement of tent rings, it does not explain the regular spacing. The very regular spacing of tent rings seems less likely to be attributable to successive occupations by single families constructing new tent rings—why would one family construct tent rings year after year with such regular spacing? The 12 to 20 m spacing between tent rings is comparable to the intra-household spacing of tent rings observed in ethnohistoric Nunamiut settlements (Binford 1991b). However, the Nunamiut tent rings tended to be placed somewhat randomly, not in a linear pattern.

Unfortunately, only one tent ring (XCL-089 'M') in a linear cluster has been dated. Therefore, the contemporaneity of the two tent ring clusters, or tent rings within each cluster, is unknown. Two other dated tent rings are roughly aligned with the eastern tent ring cluster and are spaced 85 m to the northwest. One of these tent rings (XCL-089 'AM') dates close enough to XCL-089 'M' (within 1-sigma of each radiocarbon date) that it might be contemporaneous; however, the age of the other inline tent ring (XCL-089 'AL') indicates that it was built several centuries later.

The radiocarbon dates are informative about more than just the linear tent ring clusters. Four radiocarbon dates were acquired from the northern complex and one date was acquired from the southern complex. These dates (calibrated and taken to two-sigma) maximally represent a 700-year occupation span and minimally represent a 485-year time span (Table 3). Minimally the dates represent three separate occupations of Agiak Lake (95% probability of significance)—one at roughly

5550 cal. yrs. B.P. (XCL-089 'AL' and XCL-089 'M'); another around 5300 cal. yrs. B.P. (XCL-089 'AM'); and yet another occupation at 5000 cal. yrs. B.P. (XCL-089 'H' and XCL-118 'J'). Of course, because radiocarbon dating cannot determine exact contemporaneity, the dates may also be the result of five separate occupations. Interestingly, two of the dates, one from the northern complex and the one date from the southern complex, match exactly. While this does not indicate same-year contemporaneous occupation, it does mean that at least two tent rings, one in each complex, were likely occupied within one or two generations of each other.

Overlapping or scavenging of tent ring rocks is not common at Agiak Lake. Only one instance of tent ring overlap (XCL-089 'D' and XCL-089 'Y') was observed at Agiak Lake. While the lack of scavenging does not prove contemporaneous occupation, it does at least indicate a preference for constructing new tent rings and not disturbing old ones during reoccupation of the area.

One puzzling aspect of the tent ring complexes at Agiak Lake is the lack of storage features. Possibly stone caches were not a part of Northern Archaic tradition technology. Perhaps perishable materials, such as drying racks, were used to preserve meat if the hunt took place in spring. Meat obtained in fall hunts could be frozen without the use of stone storage features, thus leaving no archaeological trace. Another possibility is that the areas were occupied on a short-term basis, and no storage facilities were necessary. Finally, it is possible that archaeological surveys did not recognize casually constructed and disassembled storage features, such as shallow caches dug into the ground, after 5,000 years of weathering and cryoturbation.

Based on the ethnographic patterns, radiocarbon data, and spatial arrangement of the features, we are now ready to address the question of Agiak Lake occupation history. In general, the lack of spatial patterning and the wide-ranging radiocarbon dates indicate the long-term reoccupation of Agiak Lake. Taking into account the patterns observed for typical high-latitude hunter-gatherer non-aggregated settlements, the camps would likely have been composed of from 2 to 5 tent

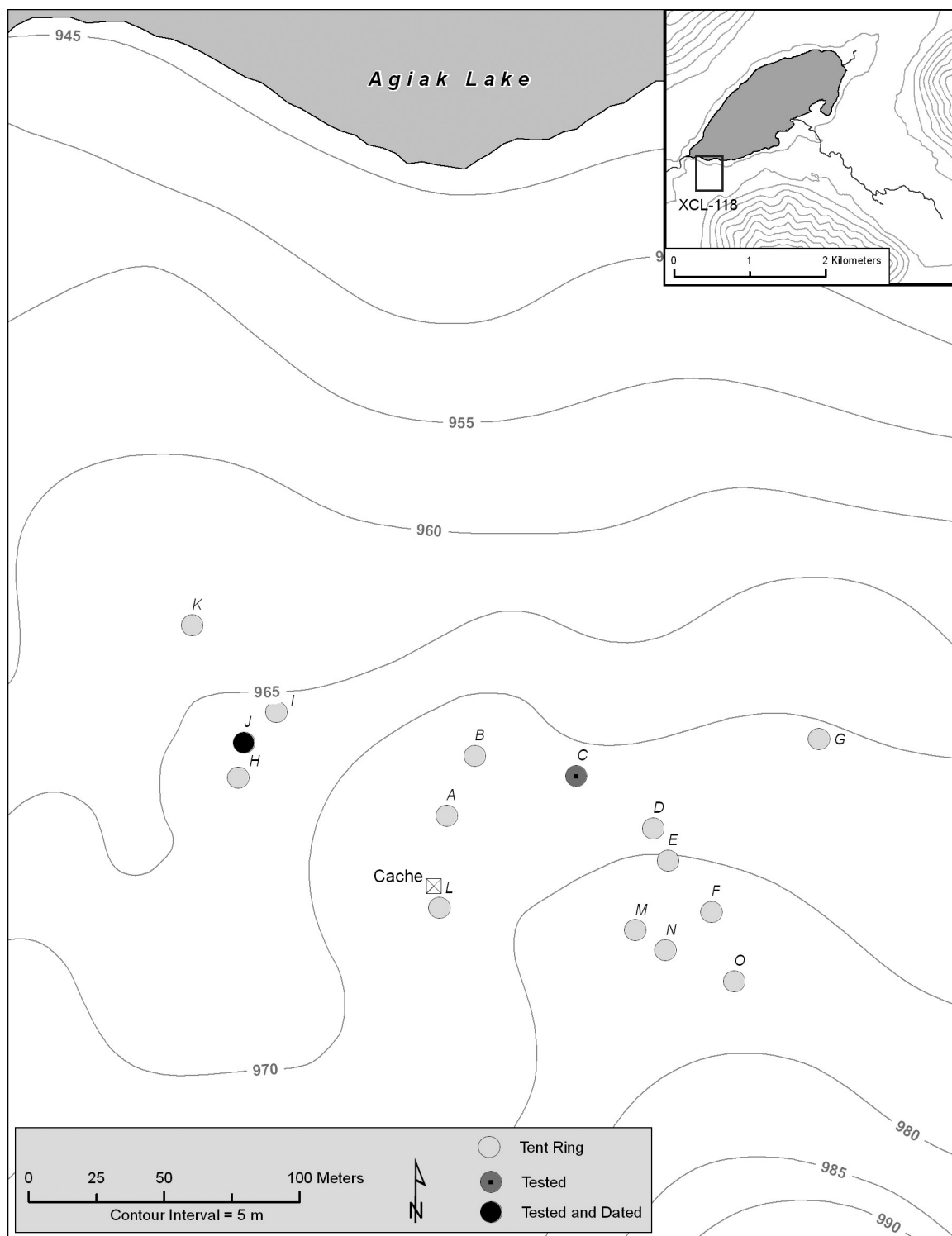


Figure 6. Southern tent ring complex (XCL-118).

rings sheltering 9 to 23 people. If the linearly spaced tent ring clusters were inhabited during separate events, the population would have been 23 to 28, approaching the expected (and ethnographically observed) population of an annually

aggregated settlement. On a larger scale, if the linearly spaced clusters (11 tent rings) were occupied contemporaneously, there may have been as many as 50 people settled at Agiak Lake at one time. In this latter case, the number of contemporaneously

occupied tent rings and the total population point to an aggregated settlement on the shores of Agiak Lake.

It should also be apparent that among high-latitude caribou hunters the population distinction between aggregation and dispersal might have been minimal (Tables 1 and 2). The Little Chandler Lake caribou hunt is a good example of a small group (22 persons) aggregating in order to conduct a communal caribou hunt. Aggregation took place in late summer, while fission of the group took place the previous fall. Thus, the fact that Agiak Lake was subject to repeated reoccupation does not preclude it from being used as a communal hunting locale or as a local gathering place. In high-latitude societies, a gathering of 20 people may be an aggregation if that number is higher than the typical seasonally dispersed population. And these 20 people could effectively coordinate and carry out a communal caribou hunt using drivelines and watercraft.

The presence of two concentrations of tent rings, one on either side of the lake, may indicate a seasonal preference for distinct settlement placement in the same general location (Binford 1983, 1991b; Campbell 1962). The differential placement might have been related to the ease of intercepting the seasonal movement of caribou in the spring versus fall migrations, or the differential availability of willow around the lake. Two dates, one from the northern tent ring complex and one from the southern complex, are identical and may represent nearly contemporaneous occupation episodes. If the two locations were occupied at exactly the same time, the two settlements would certainly represent separate, but cooperative, sub-groups of a single band (Binford 1991b).

Summary of Age and Occupation History

The large number of tent rings at Agiak Lake does not represent a single, large aggregation site, but instead a location occupied repeatedly by Northern Archaic hunters over the course of several centuries. We propose an average simultaneous occupation of 3 to 5 tent rings occupied by up to 20 people as being consistent with ethnographic patterns for high latitude hunter-gatherers and the archaeological patterning at Agiak Lake. These numbers therefore approximate the average group size during a dispersed phase of annual population size for Northern Archaic hunter-gatherers in the central Brooks Range. Fission of the 20-person group (as with the Little Chandler Lake example) may have taken place on a periodic basis, but for much of the year this group lived and traveled together. The inhabitants were families, consisting of men, women, and children, rather than special

task groups organized for logistical forays, such as a hunting party. This kind of settlement is equivalent to Campbell's (1968) Type II settlements—fissioned groups of economically cohesive families.

If we assume an average of 3 to 5 occupied tent rings during each visit to Agiak Lake, we see an overall pattern of roughly one occupation every 40 years over the 500- to 700-year period of Northern Archaic use. Thus, the northern complex may have been occupied 10 or 11 times, while the southern complex may only have been occupied on three occasions. These numbers mean that Agiak Lake, despite the large number of observed tent rings, was subject to low-intensity, long-term use. However, the possibility of high-intensity use and reoccupation by several families during several consecutive seasons still exists. Once again, the identical dates from the two tent ring complexes may indicate nearly contemporaneous or seasonal use.

Although long-term reoccupation of Agiak Lake was the general pattern, some aggregation may have contributed to the formation of the archaeological features, as witnessed by the linearly patterned tent ring clusters in the northern complex. If the two linear clusters of tent rings were occupied simultaneously, there would have been as many as 50 people living in 10 to 14 tent rings.

We described and analyzed spatial, radiocarbon, and ethnographic data to determine the occupation history of the tent ring complexes at Agiak Lake. The archaeological data were placed in the context of ethnographically and ethnohistorically known examples of high-latitude caribou hunting populations. The data show that people of the Northern Archaic tradition repeatedly occupied the area over the course of perhaps 200 to 700 years during the mid-Holocene. These occupations represent low-intensity use by economically cohesive units, such as several related families. The lake was chosen because of the availability of caribou and secondary resources, such as fish and Dall sheep.

Agiak Lake will add to our knowledge of the Northern Archaic tradition and increase our understanding of high-latitude caribou-hunter land-use patterns. The archaeology at Agiak Lake is but one piece of broader Northern Archaic settlement patterns. As other parts of the system, such as short-term hunting locales or raw material quarries, are described, Agiak Lake should stand as a building block to which these pieces can be added.

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