

JOMON SUBSISTENCE-SETTLEMENT SYSTEMS AT THE SANNAI MARUYAMA SITE

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ABSTRACT

The recent discovery of a large Jomon settlement at the Sannai Maruyama site in northern Japan provides us with a unique opportunity to investigate the residential mobility and cultural complexity of prehistoric Jomon hunter-gatherers. Salvage excavation of the site, which preceded the construction of a baseball stadium, revealed an extraordinarily large settlement from the Early to Middle Jomon periods (c. 5900-4300 BP). The site consists of more than 700 pit-dwellings as well as various other types of features. This paper discusses structural complexity of the Sannai Maruyama site, and suggests possible approaches that can enhance our understanding of the site in the context of complex hunter-gatherer studies.

Sannai Maruyama is a large settlement site located in Aomori Prefecture in the northern part of Honshu Island, Japan (Figure 1). The site dates primarily to the Early and Middle Jomon periods (Okada 1995a). Radiocarbon dates indicate that the site was occupied from approximately 5050 to 3900 uncalibrated bp, or 5900 to 4300 cal BP (Tsuji 1999; see also Imamura 1999). Salvage excavations at the site from 1992 to 1994, which preceded the planned construction of a baseball stadium, revealed that the entire "Stadium Area" was underlain by a large Jomon settlement consisting of hundreds of pit-dwellings. Because of the importance of this settlement, in 1994 the Governor of Aomori Prefecture decided that the site should be preserved, and halted construction of the baseball stadium (Habu and Fawcett 1999; Okada and Habu 1995). Subsequent test excavations revealed that the actual site boundaries extend outside the Stadium Area (Hata 1998; Okada 1998). In 1997, Sannai Maruyama was designated as a National Historical Site

(*kunishiseki*). Currently, it is one of the major tourist attractions in Aomori Prefecture (Habu and Fawcett 1999).

Since 1994, when the importance of Sannai Maruyama was widely reported by the mass media for the first time, the site has attracted the attention of many scholars (e.g., Kidder 1998). In particular, from the perspective of hunter-gatherer archaeology, the Sannai Maruyama site provides an excellent opportunity to examine various aspects of hunter-gatherer cultural complexity, including sedentism, subsistence intensification and the emergence of social inequality. Before the excavation of Sannai Maruyama,

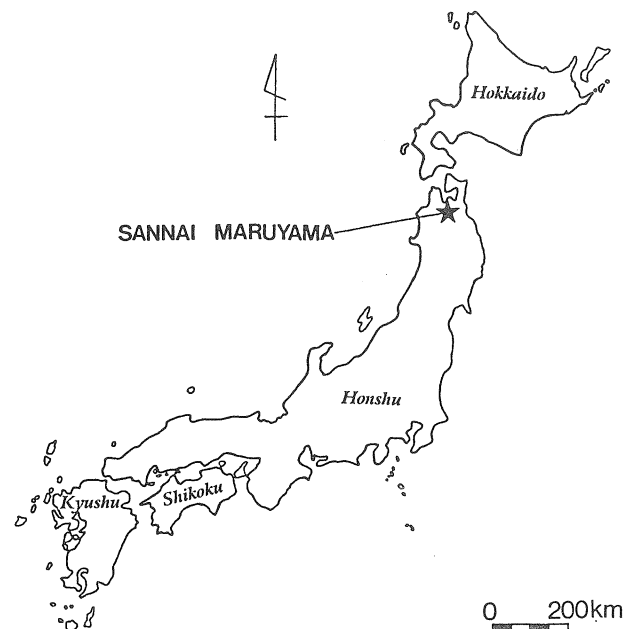


Figure 1: Location of the Sannai Maruyama site.

scholars had already noted that the Jomon culture shares a number of characteristics with so-called "complex hunter-gatherers" (Price and Brown 1985). The excavation of the Sannai Maruyama site further stimulated the ongoing debate on the nature of Jomon cultural complexity (Umehara and Yasuda 1995; Okada and Koyama 1996).

While we believe that the overall importance of the Sannai Maruyama excavations should be widely acknowledged, we suggest that the complexity of site structure should not be overlooked. In particular, since we can observe significant changes through time in intra-site settlement patterns, interpreting site function as a whole without specifying a particular phase would contribute very little to our understanding of the site. We also suggest that currently available faunal and floral data can be misleading unless we pay close attention to the methods of sample collection and data quantification that were adopted. We believe that these issues are particularly important when we examine the degree of sedentism of Sannai Maruyama residents.

The purpose of this paper is to: (1) review currently available data on the Sannai Maruyama site, and (2) to re-examine current debates on the degree of sedentism of the Sannai Maruyama residents. The first section outlines the results of previous excavations at Sannai Maruyama conducted by the Board of Education of Aomori Prefecture and others. Through the course of the overview, various explanations suggested by Japanese scholars concerning the subsistence strategies and residential mobility of the site residents are reviewed. The second section of the paper discusses the structural complexity of the site data, and suggests the necessity to further investigate characteristics of the subsistence-settlement systems at the Sannai Maruyama site. Finally, the third section discusses alternative approaches that can be adopted to supplement currently available data, and presents part of the preliminary results of our research project.

THE SANNAI MARUYAMA SITE

In order to understand the current status of the study of the Sannai Maruyama site, it is necessary to review the history of research and excavations at the site. According to Okada (1995a, 1995b), who was head of the rescue excavation at the Stadium Area and is currently directing test excavations and laboratory research of excavated materials, the oldest record of the Sannai Maruyama site dates to the early 17th century. As early as 1623, the essayist Ansai Yamazaki wrote in his "Eiroku Diary" that a large number of artefacts had been recovered from the site. Later, in 1799, Masumi Sugae published, in a travelogue, drawings of potsherds and clay figurines recovered from the site, and discussed the nature of these artefacts (Okada 1995b). From these records, it is apparent that local residents have known the site's existence

for the past several hundred years. From the 1960s to the early 1980s, several small-scale excavations of the site were conducted by the Board of Education of Aomori Prefecture and others. However, until recently, the extraordinarily large size of this archaeological site was not recognized.

Figure 2 illustrates the area currently designated as the Sannai Maruyama National Historical Site. The shaded portions in the figure indicate areas excavated by the Board of Education of Aomori Prefecture and the Board of Education of Aomori City since 1976. The two areas shaded with oblique lines (the West Parking Lot Area and the Chikano Area) indicate areas excavated during the 1970s. Of these, the Chikano Area, on the lower right-hand corner of the figure, was originally identified as a separate site (Board of Education of Aomori Prefecture 1977) but is currently considered to be part of the Sannai Maruyama settlement. The coarse dots indicate areas excavated as cultural resource management (CRM) projects from 1992 to 1994 (Archaeological Center of Aomori Prefecture 1994a, 1994b, 1995; Board of Education of Aomori City 1994, 1996; Cultural Affairs Section of the Agency of Education of Aomori Prefecture 1996; Preservation Office of the Sannai Maruyama Site 1998a, 1998b, 1998c, 1998d). Among these, the large, circular area at the center of the figure is the Stadium Area, where the construction of a baseball stadium was originally planned. Figure 3 illustrates the distribution of features recovered within the Stadium Area. Finally, the areas shaded with fine dots or marked in black (Excavation Areas Nos. 1-16 in Figure 2) represent a series of test excavations conducted after the preservation of the site was declared (i.e., during and after 1995) (Preservation Office of the Sannai Maruyama Site 1996, 1998a, 1998e, 1998f, 1999a, 2000).

Features identified at the Sannai Maruyama site to date include: more than 700 pit-dwellings; 11 long-houses; the remains of 120 of so-called "raised floor buildings"; more than 380 grave pits for adults; approximately 800 burial jars for infants or children; 17 stone circles; three clusters of clay mining pits; two roads constructed with tamped earth; two water-logged middens formed in the lower, swampy part of the site; and three artificial mounds, which consist primarily of dumped garbage such as potsherds, lithic tools, and backdirt from houses and other features (Okada, personal communication). The total number of pit-dwellings, more than 700, is the largest yet recorded at a single Jomon site.

Some of the features listed above may require additional explanation. None of the "burial pits for adults" or "burial jars for children" actually contains human skeletal remains. The functions of these features were suggested on the basis of similar features associated with skeletal remains in other sites in Aomori Prefecture. A "raised-floor building" refers to a set of six post-molds that are placed in a rectangular

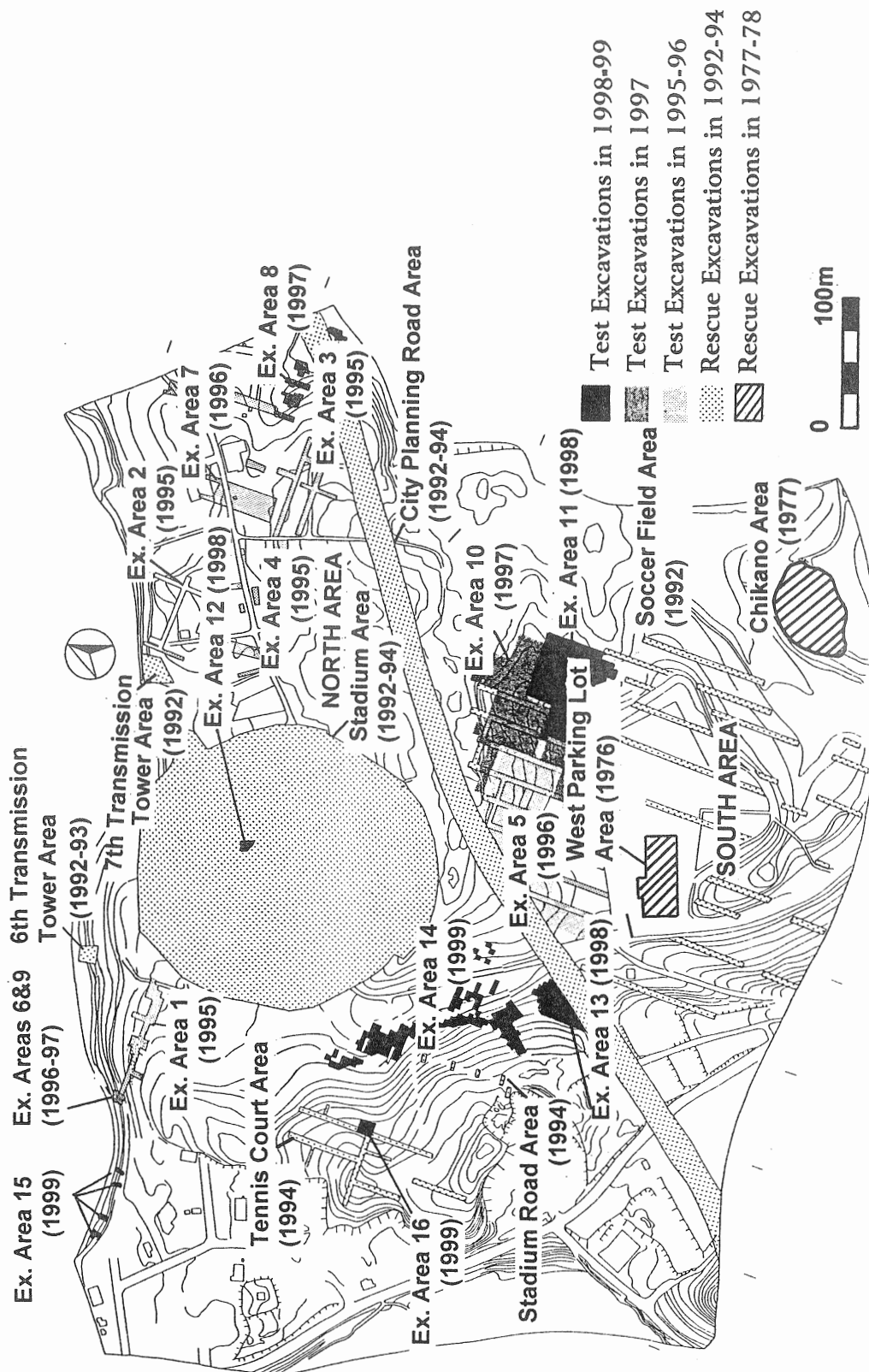


Figure 2. Excavation areas at the Sannai Maruyama site.

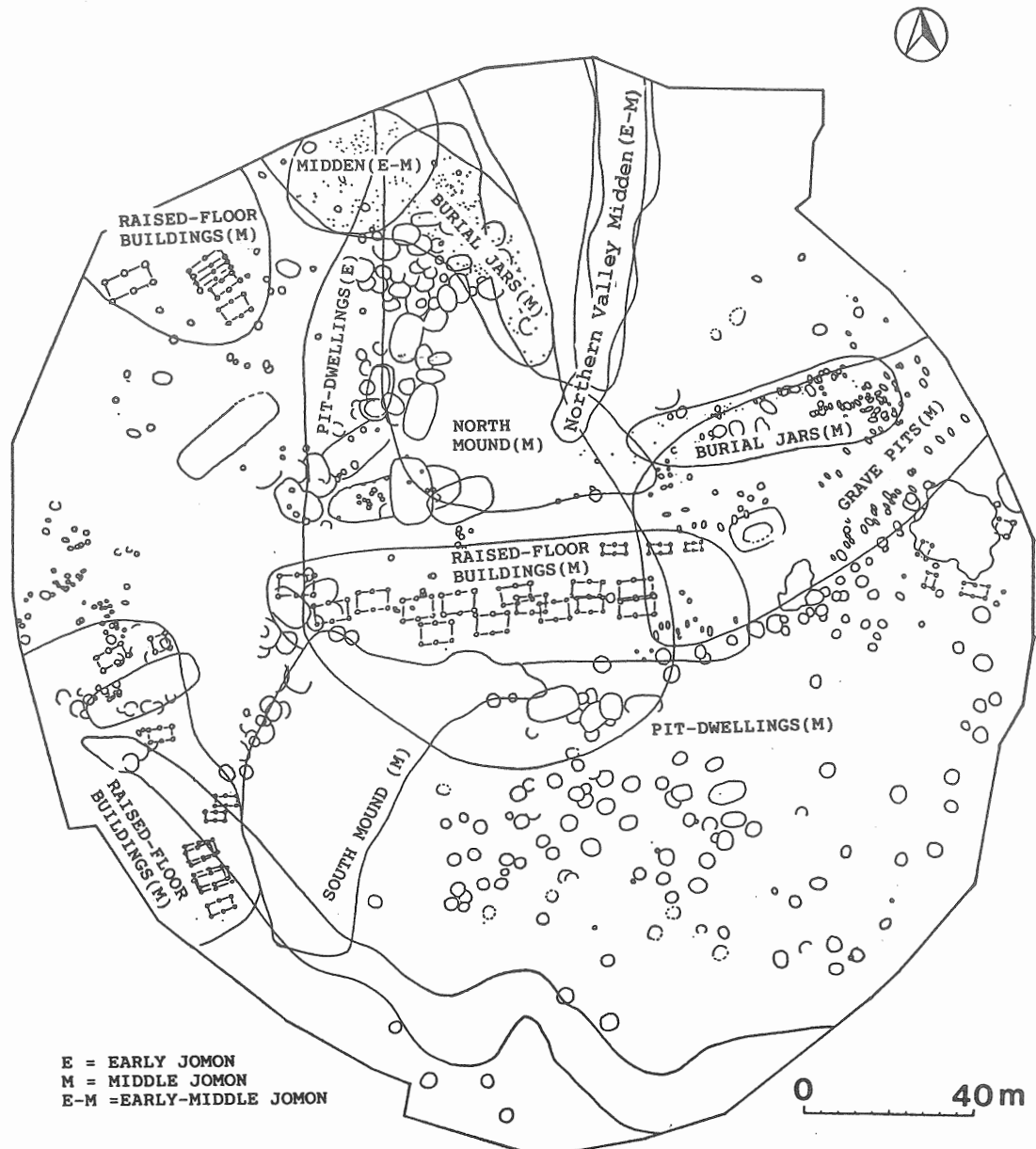


Figure 3: Distribution of features at the Stadium Area.

plan. Since there is no clear evidence of a floor associated with any of these features, most archaeologists assume that the floors were constructed above the ground surface and supported by posts driven into the ground (see Miyamoto 1995). One of these features consists of a set of six extremely large post-molds. The diameter of each post-mold measures about 1.8 m, and the average depth more than 2 m. At the bottom of each post-mold was the base of a large post made of chestnut wood, the diameter of which measures 75-95 cm

(Okada 1995a). Because of their large size, scholars have suggested that these posts were capable of supporting a heavy superstructure (see Miyamoto 1995), possibly a tower.

The artefact assemblage excavated from the Sannai Maruyama site is also probably the largest from any Jomon site. From the Stadium Area alone, more than 40,000 boxes of archaeological remains were excavated (Okada 1995b). The majority of the excavated artefacts are potsherds. In addition, approximately 1500 clay figurines or figurine

fragments (Ogasawara and Katsuragi 1999), as well as a large number of lithic tools, including arrowheads, stemmed scrapers, grinding stones and stone mortars, were recovered. Artefacts made from organic materials, such as bone and wood, were also abundant (Archaeological Center of Aomori Prefecture 1995), although the recovery of these remains was limited primarily to the water-logged middens. Organic remains identified from the site include various types of bone tools, wood containers, lacquer ware, basketry, cordage and textiles (Okada 1995a; Ozeki 1996).

Among the excavated materials, the presence of exotic materials has particularly attracted the attention of many researchers. These materials include jade, amber, asphalt and obsidian (Okada 1995a). The presence of these materials at Sannai Maruyama suggests an extensive exchange network operating during the Jomon period. Furthermore, scholars have suggested that the relative abundance of valuable goods such as jade and amber may reflect a special function of the site, either ceremonial or economic (e.g., Okada 1995a).

According to Nishimoto (1995), the faunal assemblage of the Sannai Maruyama site is characterized by an abundance of fish, birds and small terrestrial mammals. His quantitative analysis of faunal remains from the Sixth Transmission Tower Area (see the north edge on Figure 2) indicates that *Lepus brachyurus* (rabbit) and *Tetraodon leucogenys* (flying squirrels) form more than 50% of the terrestrial mammal assemblage based on the minimum number of individuals (MNI) (Nishimoto 1998). *Cervus nippon* (Sika deer) and *Sus scrofa* (wild boar), which are the two most commonly reported terrestrial mammals from other Jomon sites, were extremely scarce, representing only 1.7% each. Nishimoto (1995) suggests that the scarcity of deer and boar at Sannai Maruyama reflects over-exploitation of these two species in the vicinity of the site.

Toizumi (1998) presents a detailed analysis of fish remains from the Sixth Transmission Tower Area based on both the MNI and the total number of vertebrae. His MNI determinations indicate that, among fish remains retrieved with a 4 mm mesh screen and those collected by excavators during the fieldwork, *Seriola* (yellow tail) accounts for approximately 30% of the total identified specimens. *Peuronectidae* (flatfish) and *Tetraodontidae* (blowfish) are also abundant, forming approximately 10% each. In addition, *Scomber* (mackerel), *Scorpaenidae* (scorpion fish), *Clupea* (herring), *Embiotocidae* (surf perch) and *Monacanthidae* (file fish) are also quite common, representing approximately 5% each. In terms of the total numbers of vertebrae, the common presence of *Chondrichthyes*, the majority of which are probably from several species of sharks, is also noticeable. Using these quantitative data, Toizumi (1998) discusses various aspects of fishing by the site's residents,

including fishing zones, technology, butchering, trade/exchange and seasonality. With regard to seasonality, he recorded the presence of taxa from all four seasons, although those from spring to fall are particularly abundant. Based on this evidence, he suggests that the site was occupied throughout the year (Toizumi 1998:86).

Floral remains identified from Sannai Maruyama include *Castanea* (chestnut), *Juglans* (walnut), *Rubus* (raspberry), *Sambucus* (elderberry), *Morus* (mulberry) and *Vitis* (wild grape) (Minaki 1995; Tsuji 1997). The majority of the seeds are non-carbonized. Several cultigens such as *Lagenaria* (bottle gourd), *Leguminosae* (bean) and *Arctium* (burdock) have also been identified (Minaki 1995; Tsuji 1996), although the amount of these cultigens is extremely small. Minaki (1995) notes that the majority of *Juglans* remains are husks, most of which are fragments and which often have traces of processing in the form of hammering marks. Analyses of both macro floral remains and pollen indicate an abundance of *Castanea* (Tsuji 1997). Based on the results of DNA analyses of chestnut remains from the site, Sato (1997, 1998) suggests the cultivation of chestnut trees by the site residents. An abundance of berries, particularly *Sambucus* and *Morus*, has been interpreted as an indication of the brewing of fruit wine by the site residents (Minaki 1995; Tsuji 1997). The common presence of chrysalides of *Drosophilidae* (fruit fly) in the concentration of these plant seeds (Mori 1998a, 1998b, 1999), which indicates that the fruits were in the process of fermentation when they were discarded, also seems to support the fruit wine hypothesis. Finally, microscopic analysis of the clay of Middle Jomon potsherds excavated from the site revealed the presence of *Echinochloa crusgalli* (barnyard grass) phytoliths (Okada *et al.* 1997), although its relative importance in the diet of the Sannai Maruyama people has been questioned (Yasuda 1995).

One aspect of the Sannai Maruyama site that has fostered considerable debate is its size. Since the site was occupied for more than 1500 years, it is very unlikely that all 700 pit-dwellings were inhabited contemporaneously. Chronological studies of pottery excavated from Sannai Maruyama indicate that the occupation of the site can be divided into 12 phases: the Lower Ento a, b, c, d (Early Jomon), Upper Ento a, b, c, d, e, Enokibayashi, Saibana and Daigi 10 (Middle Jomon) phases. However, since not all the pit-dwellings are associated with chronologically diagnostic pottery, it is not possible to identify the exact number of pit-dwellings from each phase. Okada (1995b) suggests that the number of simultaneously occupied pit-dwellings was usually between 40 and 50 and as many as 100. He also estimates the average number of people who lived in each pit-dwelling to have been four to five, thus suggesting that the site population ranged between 200 and 500. Several other researchers agree that 500 seems

to be a reasonable estimate for the Sannai Maruyama population (e.g., Asahi Shinbunsha 1994 but *contra* Yamada 1997).

STRUCTURAL COMPLEXITY OF THE SANNAI MARUYAMA SITE

The general impression of the site emerging from the above description is that of a large settlement occupied by a group of extremely "affluent foragers" for over 1500 years. Because of its large size, many researchers have suggested that the residents of the Sannai Maruyama site were fully sedentary, occupying the site throughout the year (e.g., Okada 1995a, 1995b). Toizumi's (1998) faunal analysis discussed above would appear to support this interpretation.

Detailed examination of currently available data, however, suggests that the interpretation of the site may not be as straightforward as one may think. First, there are significant changes in intra-site feature distribution patterns through time (Okada 1998). Specifically, pit-dwellings and other features from the Early Jomon period are located primarily within the central and northern parts of the Stadium Area (see Figure 3). By the first half of the Middle Jomon period, however, they are located throughout the entire Stadium Area. The size of the settlement, measured by both the number of associated pit-dwellings and the areal extent of features, increased significantly towards the latter half of the Middle Jomon period when it spread outside of the Stadium Area. Finally, the size of the settlement shrunk dramatically at the end of the Middle Jomon period, with only a few pit-dwellings present (Okada 1998).

Figure 4 indicates changes in the minimum number of pit-dwellings from each phase. The original data for the figure were presented by the Preservation Office of Sannai Maruyama Site (1999b). When possible, a specific phase was assigned to each pit-dwelling on the basis of typological classification of associated pottery. Unfortunately, less than half of the 700 pit-dwellings were available for this analysis, since associated artefacts from the other pit-dwellings are either not diagnostic enough, or they are not yet catalogued. Accordingly, the number of pit-dwellings for each phase does not represent the maximum number of pit-dwellings from the phase. Nor does it represent the minimum number of simultaneously occupied pit-dwellings, since many of the pit-dwellings from the same phase overlap. In other words, the absolute numbers of pit-dwellings in the figure do not represent absolute population levels. Rather, they should be seen as a possible reflection of general trends in the increase and decrease in site population. For example, a rapid increase in the number of pit-dwellings from the Upper Ento c to d phases is noticeable. It is also interesting to note that the line graph does not form a smooth and gradually increasing curve but instead it is characterized by several decreases followed by sharp

increases. This may imply that the population of the Sannai Maruyama settlement fluctuated significantly through time.

A further source of complication is that the preservation condition of faunal and floral remains within the site is quite uneven. The recovery of faunal and floral remains was limited primarily to the water-logged middens dated mainly to the Early Jomon period (Okada 1995a). However, as described above, based on the number of associated pit-dwellings and the distribution of features, the maximum population appears to have occurred during the latter half of the Middle Jomon period (during and after the Upper Ento d phase). In other words, results of faunal and floral remains analysis should not be considered as wholly representative when we discuss subsistence strategies of the site residents during the Middle Jomon period. This, of course, does not mean that faunal and floral analyses are of no use in the examination of subsistence strategies adopted by site residents. They are invaluable sources of information as long as we keep in mind which time period they are associated with.

Another factor that makes the interpretation of Sannai Maruyama data difficult is the issue of sampling and quantification methods. Since the site was originally excavated in the context of a salvage project, sampling methods for minute archaeological remains, such as fish bones, plant seeds and lithic flakes and chips, were not

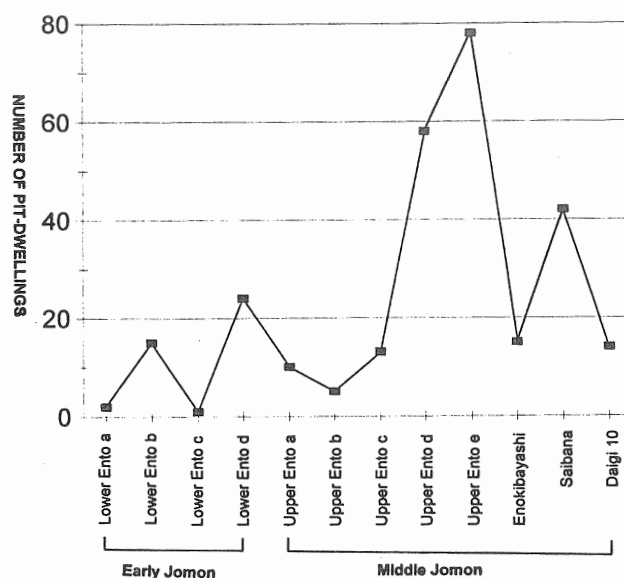


Figure 4: Changes in the number of pit-dwellings at the Sannai Maruyama site.

necessarily planned in advance. It should also be noted that the concept of sampling in Japanese archaeology is very different from that in Anglo-American archaeology. In Japan, there is a long tradition of archaeology as history, in which the uniqueness, as well as contingency, of various historical events is emphasized (Habu 1989). Accordingly, many Japanese archaeologists reject the idea of random or systematic sampling, and suggest that complete excavation is the only acceptable method of archaeological excavation. While this principle made a positive contribution to the development of large-scale CRM excavations throughout the Japanese archipelago in the past several decades, sampling strategies for small-sized remains in Japanese archaeology are often not as systematic as those in Anglo-American archaeology (for a discussion of sampling in Jomon sites, see also Excavation Team of the Isarago Site 1981).

In the case of Sannai Maruyama, efforts to recover faunal and floral remains were concentrated primarily on the Early Jomon water-logged middens, where the preservation condition of organic materials was excellent. The excavation of the Sixth Transmission Tower Area (Preservation Office of Aomori Prefecture 1998a, 1998b) is a prime example of this. Although this excavation area was extremely small in size (only 169 m²), it covered part of a large midden that was located along the north edge of the site. In particular, the lowest two layers from the Early Jomon period, Layers VIa and VIb, were extremely rich in organic materials, including large amounts of plant seeds and fish bones. Since Early and Middle Jomon sediments in this area were quite deep, by the time the excavation reached Layers VIa and VIb, the total size of the excavation was only 70 m². Because of the richness of organic materials, the excavation team of the Board of Education of Aomori Prefecture collected all sediments from these two layers, of which approximately 40% were water-screened. Of the 70 m², soil samples from one 2 x 2 m unit (Unit VII F-74-4) were screened using 4, 2 and 1 mm mesh sizes. The rest of the soil samples were water-screened only with a 4 mm mesh screen. In addition, eight soil samples, which ranged between 250 and 1900 m³, were taken from a vertical cross-section, which the excavators called the "Standard Column" (Tsuji and Toizumi 1998).

As a result of this complex sampling method, quantification of faunal and floral remains from this excavation became an extremely challenging task. In the case of macro floral remains, Minaki, Saito and Tsuji (1998) and Minaki, Tsuji and Sumita (1998) listed the total numbers of all the floral remains identified in each unit, but they did not present quantitative analyses of these data. For fish remains, Toizumi (1998) identified a total of 43,909 specimens collected either in the field or through water-separation using a 4 mm mesh screen. Samples from 2 mm and 1 mm

mesh screens from Unit VII F-74-4 are yet to be reported. The results of Toizumi's analyses described in the previous section were primarily based on the specimens retrieved through a 4 mm mesh screen, together with a small number of large specimens collected in the field. While Toizumi's discussion is extremely insightful, the relative proportion of different taxa obtained through a 4 mm mesh screen may not reflect actual characteristics of the fish assemblage, since remains of certain taxa, such as *Sardinops* (sardine) and *Engraulis* (anchovy), are often smaller than 4 mm.

By raising these issues, the authors do not intend to criticize the approaches adopted by these scholars. Since the site was originally excavated in the context of large-scale CRM projects, restrictions in their sampling methods were inevitable. Nevertheless, we suggest that the potential bias in the representation of quantitative data should not be ignored, and that alternative strategies to supplement the results of these previous analyses should be adopted.

Finally, even if a systematic quantification method is employed, we suggest that simply examining the presence or absence of taxa from all four seasons will not provide the final answer to the question of the degree of sedentism at Sannai Maruyama. Ethnographic examples of hunter-gatherers who are relatively sedentary but who relocate their residential bases several times a year indicate that the function of one site might change according to the seasonal residential movement of a group. For example, a location used as a residential base during the summer might be used later as a field camp after the group had moved its residential base to another location (Binford 1982). In this case, the presence of faunal and floral remains from all four seasons simply implies that the site was used in all seasons but it does not necessarily mean that the site was occupied throughout the year. Accordingly, in order to address the issue of the degree of sedentism at the site, we need to understand the overall subsistence-settlement systems, including the seasonal cycles of the subsistence activities and the function(s) of the site in the context of regional settlement patterns.

ALTERNATIVE APPROACHES

In order to understand the subsistence-settlement systems at the Sannai Maruyama site, we suggest that the following approaches should be pursued to provide additional lines of evidence.

i) Faunal and Floral Analysis

First, we suggest that faunal and floral remains should be collected using finer mesh screens. While sorting faunal and floral remains collected through fine mesh screens is extremely time consuming, especially when using 1 mm or

finer mesh, these small-sized remains sometimes form a major portion of faunal and floral assemblages from Jomon sites (e.g., Komiya 1980, 1998). Accordingly, in order to determine relative frequencies of different taxa in a particular assemblage, it is necessary to screen at least part of the collected soil samples with fine mesh screens so that small-size specimens will not be under-represented¹.

As the first step in the quantitative analysis of faunal and floral remains, we screened a small amount of Early Jomon soil samples collected by the Board of Education of Aomori Prefecture during their 1992-1994 salvage excavations. These samples derive from two locations within the site, the Sixth Transmission Tower Area and the Northern Valley Midden of the Stadium Area. Soil samples from both of these two locations are extremely rich in organic remains. These samples were provided by courtesy of the Preservation Office of the Sannai Maruyama site.

While the analyses of these samples are still in process, preliminary results indicate several interesting characteristics. In particular, some of the samples from the Sixth Transmission Tower Area are characterized by an abundance of fish remains smaller than 4 mm. For example, a soil sample from Layer VIb of the Sixth Transmission Tower Area, screened at 1, 0.5 and 0.25 mm mesh sizes, indicates that the majority of identifiable fish vertebrae would be missed if the sample was screened with a 4 mm mesh only. Of the 275 vertebrae retrieved with a 1 mm mesh screen (i.e., vertebrae larger than 1 mm), less than 10 % were larger than 4 mm. The remaining specimens were vertebrae measuring less than 4 mm of which more than 50% were less than 2 mm. These small-sized vertebrae include both freshwater fish, such as *Gobiidae* (goby) and *Cobitidae* (loach), and marine fish, such as *Engraulidae* and *Sardinops*. This result indicates that, at least for the Sixth Transmission Tower Area, relative frequencies of different taxa obtained through a 4 mm mesh screen may not be representative. Preliminary results of our test screening are also suggestive for the quantification of floral remains. Furthermore, preliminary results of our analysis of floral remains indicate that the majority of the floral remains retrieved from Layers VIa and VIb are smaller than 4 mm. Recovered remains include *Sambucus*, *Morus*, *Actinidia* (gooseberry), *Rubus*, *Boehmeria* (false nettle), *Pilea* (artillery plant), and *Galeola*.

In addition to the samples provided by the Preservation Office of the Sannai Maruyama Site, we are currently analyzing two columnar samples of soil from the site collected during the summers of 1997 and 1998. These columnar samples were sliced at artificial intervals of 5 cm in order to examine changes through time. One columnar sample was taken from Excavation Area No 6, which is located on the northwestern edge of the site, while the other was from Excavation Area No.12, which covers part of the Northern

Valley Midden of the Stadium Area (see Figure 2). Preliminary results of our analysis of the first columnar sample indicate significant changes through time in floral assemblage diversity.

ii) Lithic Assemblage Variability

Analyses of lithic assemblages associated with features from different time phases can provide another line of evidence to infer characteristics of subsistence-settlement systems associated with various phases. If the subsistence strategies of the Sannai Maruyama settlement did not change significantly through time, we can expect lithic assemblages relating to subsistence activities from different phases to be relatively homogeneous. Results of our preliminary analyses, however, would appear to indicate otherwise. The percentages of 14 different categories of lithic tools recovered from Early Jomon layers in the Sixth Transmission Tower Area are shown in Figure 5. Data were taken from the Preservation Office of the Sannai Maruyama Site (1998c). As indicated, the lithic assemblage is characterized by an abundance of stemmed scrapers. This is in sharp contrast to the lithic assemblage characteristics associated with Middle Jomon pit-dwellings in the eastern part of the Stadium Area published in Archaeological Center of Aomori Prefecture (1994a). As indicated in Figure 6, the Middle Jomon assemblage is characterized by an abundance of grinding stones, which were probably used for processing plant food such as nuts. Because the context of these two assemblages is different (the Early Jomon assemblage is from a midden deposit, whereas the Middle Jomon assemblage is from pit-dwellings), further examination in intra-site spatial variability is necessary before we can

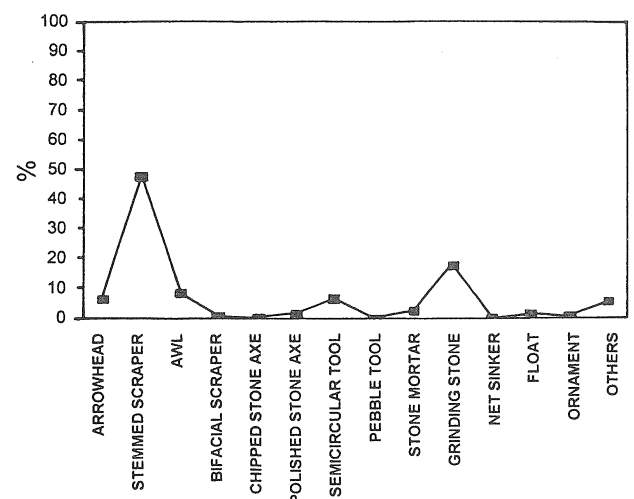


Figure 5: Relative frequencies of lithic tools per category from the Early Jomon Period (Sixth Transmission Tower Area).

conclude that the difference reflects changes in subsistence strategies through time. Nevertheless, the results emphasize the necessity of the examination of intra-site temporal and spatial variability in lithic assemblages.

iii) Regional Settlement Pattern Studies and Inter-Site Comparisons

Third, we suggest that the examination of the Sannai Maruyama site should be conducted in the context of overall regional settlement systems. In a previous study, Habu (1995, 1996) modified the collector-forager model suggested by Binford (1980) in order to examine the residential mobility of Jomon hunter-gatherers. According to Binford's model, subsistence-settlement systems of hunter-gatherers can be classified into two basic types: forager systems, which are characterized by high residential mobility, and collector systems, which are characterized by relatively low residential mobility. Habu (1995) points out that the latter includes both relatively sedentary hunter-gatherers who move their residential bases several times a year, and fully sedentary hunter-gatherers. Following the model, she also suggests that the analysis of intersite variability in site size and lithic assemblages can be used to distinguish relatively sedentary collectors from fully sedentary ones. Habu (1995, 1996) applied the model to settlement pattern data from the Early Jomon Moroiso phase of the Kanto and Chubu regions. The results suggest that settlement patterns of the Moroiso phase generally correspond to relatively sedentary collectors rather than fully sedentary collectors. A similar type of analysis could be conducted with data from Jomon sites in Aomori Prefecture, where the Sannai Maruyama site is located. Since a large number of excavation reports on

other Jomon sites in Aomori Prefecture have been published, basic information such as the numbers and kinds of features from various phases and the characteristics of associated lithic assemblages is available.

In addition, comparative studies of faunal and floral remains between Sannai Maruyama and other Early and Middle Jomon sites within Aomori Prefecture should be conducted in relation to the study of regional settlement patterns. As discussed above, currently available data from Sannai Maruyama are not robust enough to make a conclusive statement regarding the degree of sedentism of the site residents. Although Toizumi's (1998) list of identified fish remains from Early Jomon layers at Sannai Maruyama includes taxa from all four seasons, he also notes the dominance of taxa that are characteristic of spring to fall (Toizumi 1998: 86). The only taxon that is definitely from the winter is *Gadus* (cod), which accounts for only 4.6% of the assemblage based on MNI, and 5.7% based on the total number of vertebrae. Toizumi suggests that such a pattern represents the importance of fishing in the spring and summer when other food resources were scarce, and that chestnut collecting in the fall must have been the other major subsistence activity for the site residents. However, a similar pattern could also occur if the site was occupied primarily during the spring to early fall and was subsequently used as a special purpose site during the winter.

It should also be remembered that the Early Jomon mammal assemblage from the site is characterized by scarcity of remains of sika deer and boar, for which the best hunting season is considered to have been the winter (Kaneko 1979, 1982). Despite Nishimoto's (1995) suggestion that these species were over-exploited in this region by the Early Jomon period, preliminary results of our archival study indicate faunal assemblages from some of the Middle Jomon sites within Aomori Prefecture, such as Futatsumori (Kobayashi 1992) and Furuyashiki (Board of Education of Kamikita Town 1983), contain an abundance of the remains of these two species. These sites are approximately 45 and 53 km away from the Sannai Maruyama site respectively; in other words, they are not located within the foraging (approximately 10 km radius) or logistical (approximately 20 km radius) zones of the Sannai Maruyama site, but they are not too far away from the possible residential move range of Sannai Maruyama residents. Since the faunal data from Sannai Maruyama are from the Early Jomon, and those from Futatsumori and Furuyashiki are from the Middle Jomon, comparison between these assemblages will not directly help us clarify Early Jomon subsistence strategies at Sannai Maruyama. Nor do we suggest that these two sites themselves represent part of the residential move of the Sannai Maruyama residents. Nevertheless, we strongly

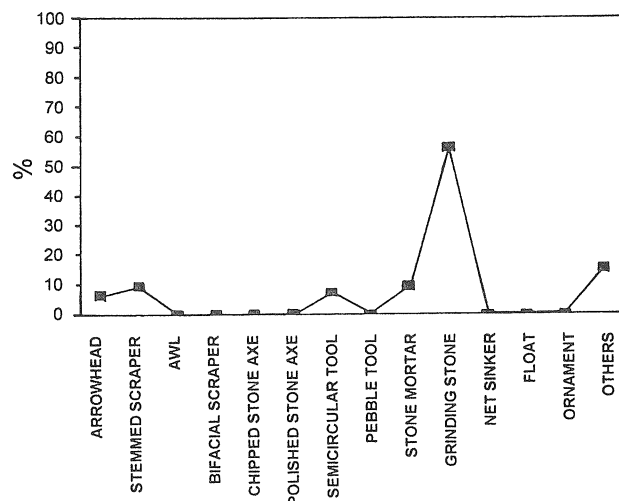


Figure 6: Relative frequencies of lithic tools per category from the Middle Jomon Period (pit-dwellings in the eastern part of the Stadium Area).

believe that the validity of the over-exploitation theory of deer and boar should be further investigated, and that the inter-relationship between faunal assemblage characteristics and site function/seasonality in this region should be examined in a more systematic fashion.

CONCLUDING REMARKS

In this paper, we have reviewed currently available data on the Sannai Maruyama site, discussed the site's structural complexity and suggested alternative approaches that can potentially enhance our understanding of the site. Because of its extraordinarily large size, the site has attracted the attention of not only archaeologists but also the mass media and the general public in Japan (Habu and Fawcett 1999). Media coverage such as newspaper articles and television programs has repeatedly noted that the archaeological discoveries at the Sannai Maruyama site have changed the traditional view of Jomon culture, which assumed that the Jomon people were "poor and savage nomads" (for criticisms of media reports, see Habu 1997). On the basis of the large size of the Sannai Maruyama settlement, some scholars have also suggested that, from now on, the Jomon culture should be called a "civilization" (e.g., Yasuda 1995) and that the site was a "city". While we acknowledge the academic importance of the excavation of the Sannai Maruyama site, we suggest that the large site size and an abundance of artefacts should not automatically be equated with a high degree of sedentism nor a high "cultural level" from our contemporary perspective. Furthermore, it should be stressed that the Sannai Maruyama site represents only one component of Jomon culture, given that regional and temporal variability within Jomon culture is quite large.

These suggestions, of course, do not imply that the research potential of the Sannai Maruyama site should be downplayed. On the contrary, we believe that the site provides us with an excellent opportunity to examine a number of important issues, including the origins of plant cultivation, the development of sedentism, and the inter-relationships between hunter-gatherer subsistence, settlement and the emergence of social inequality. We also believe that the Sannai Maruyama data will shed new light on various characteristics of the Jomon culture in the Tohoku region of northern Japan, which appear to have been quite different from that in the Kanto region of central Japan. Unlike the Kanto region, where a number of large-scale rescue excavations of Jomon sites have been conducted, the Tohoku region is archaeologically underdeveloped. As a result, the amount of available information on the Tohoku Jomon culture is much smaller than that of the Kanto Jomon. Metaphorically, the archaeological picture of the Kanto Jomon is a jigsaw puzzle in which a fair number of pieces are already fitted. On the other hand, we are still missing the

majority of the pieces in the jigsaw puzzle of Tohoku Jomon archaeology. The Sannai Maruyama site provides an important new piece to this extremely complex puzzle, although we are still far from having a complete picture.

NOTE

1. On the other hand, if the primary goal of the project is to retrieve specimens that are relatively large in size but extremely small in quantity, screening a large amount of soil with only coarse mesh screens may be justified. Some of the remains of cultivated plants, such as seeds of *Lagenaria* (bottle gourd), are more likely to be retrieved by screening a large amount of soil even with a coarse mesh screen. Thus, neither of the two methods is superior to the other, but they are complementary.

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