regional variability in Jomon subsistence resulted in regional variations in receptivity to rice agriculture at the beginning of the Yayoi period.

In relation to Akazawa's (1981; 1982a; 1982b; 1986a; 1986b; 1986c; 1987) study, Soffer's (1989) interpretation of variability in Jomon subsistence is also noteworthy. In her comparative analysis of prehistoric hunter-gatherers in Eurasia, Soffer suggests that the "shelf-life" or social use value of the stored product is an important parameter in the discussion of the development of sedentism among hunter-gatherers. In her opinion, stored foods with short "use-lives," such as meat and fish, do not necessarily imply sedentism, while stored foods with long use-lives led to the development of sedentism and the ultimate rise of food production. Soffer used the Jomon as an example of the storage of long use-life products, and suggests that the storage of nuts, including acorns, was closely linked to the development of sedentism. Following Akazawa (1981; 1986b), she suggests that it is not surprising that the introduction of food production in the form of rice at the beginning of the Yayoi period occurred in western Japan, precisely in the areas whose residents traditionally relied more on stored plant products.

While I believe that stored food with long use-life played an extremely important role in the development of Jomon cultural complexity as a whole, the relationships between storage, sedentism, and the development of food production among Jomon hunter-gatherers may not be as straightforward as Akazawa (1986a; 1986b; 1987) and Soffer (1989) suggest. Storage pits with nut remains are not distributed only in western Japan; they are also quite common in northeastern and central Honshu. Furthermore, as described above, carbon and nitrogen isotope analyses by Minagawa and Akazawa (1992) indicate that plant foods formed an important part of Jomon diet for all of the three sites that they examined in northeastern and central Honshu. In other words, it is more likely that most of the Jomon people, with the exception of those in Hokkaido, were all heavily reliant on plant food, but that the type(s) of staple food were different among regions and over time.

In order to understand fully the characteristics of Jomon subsistence, additional studies that examine data from a specific time phase in a specific region are required. However, because of the generally poor preservation of organic materials in Jomon sites, it is difficult to examine characteristics of Jomon subsistence solely on the basis of faunal and floral data. Accordingly, studies of settlement patterns in relation to subsistence strategies become critical. In the next chapter, I will outline recent results of Jomon settlement archaeology, and interpret the results in the context of the collector–forager model described in the first chapter.

4 Settlement archaeology

Together with pottery chronology, settlement archaeology has been a major research focus of Jomon archaeology throughout the post-World War II period. Settlement studies have been called "*shuraku-ron* (discussions of settlements)," and they have become a distinctive field within Jomon archaeology. In particular, the rapid increase in the number of salvage excavations beginning in the 1960s has resulted in a significant increase in the amount of Jomon settlement data. On the one hand, this increase in rescue excavations has resulted in the discovery of numerous small Jomon settlements, many of which would have been missed if large-scale land development had not taken place. On the other hand, the number of large Jomon settlements that were completely excavated has also increased over the past several decades, and this has provided invaluable data for examining intrasite spatial patterns. As a result, the amount of data available for Jomon settlement analysis is incredibly rich.

This chapter first reviews the history of Jomon settlement studies, and outlines the problems of these studies. Following this review, I present two case studies on Jomon settlement pattern analyses in the context of the collector–forager model described in the first chapter.

History of Jomon settlement studies

Wajima's settlement archaeology

The majority of Jomon settlement studies conducted by Japanese archaeologists are either directly or indirectly influenced by the work of Wajima (1948; 1958; 1962), whose theoretical framework was that of classical Marxism. In his 1948 article entitled "Prehistoric settlement structure," Wajima made two major points, following a Marxist approach. First, he suggested that the Jomon society was that of a "clan community" (also called a "primitive community"). Using survey and test excavation results from several Jomon sites, Wajima suggested that the semicircular or horseshoe-shaped layout of dwellings within each settlement represents the presence of strict social rules that determined the placement of each dwelling. Since there is no evidence of social classes from the Jomon period, Wajima suggested that such strict social rules were formed under "primitive communal societies," which, according to classical Marxist theories, are defined as the first stage of social development. Second, Wajima (1948) indicated that settlement patterns from the Initial to Late Jomon periods developed gradually from mobile to more sedentary, and that the change was associated with a significant population increase. While the theory of social development was an important component of Marxist history in postwar Japan (Nagahara 1974), Wajima applied the theory not only to explain changes from the Jomon to the following Yayoi and Kofun periods, but also to understand changes over time within the Jomon period. In particular, the prominence of large settlements during the Middle Jomon period, such as the Togariishi site in Nagano Prefecture (F. Miyasaka 1946) and the Ubayama site in Chiba Prefecture, was interpreted as evidence for a high degree of sedentism of the Middle Jomon people, thus supporting his argument on increasing sedentism from the Initial to Middle Jomon periods. According to Wajima (1948), such changes were triggered by a population increase, which occurred as a result of an increase in overall productive capacity (subsistence production capacity).

BOX 5: *Wajima and Marxism in Japanese archaeology*

Wajima's interest in Marxism as a means of historical interpretation predated and continued through World War II. As early as the 1930s, he attempted to interpret archaeological data from the Japanese archipelago within the framework of Marxism. Since Marxism was severely banned in Japan before and during World War II, Wajima had to use the pen name Misawa to disguise his identity (Misawa 1936). His 1936 article was published in a volume *Textbook of Japanese History* (*Nihon Rekishi Kyotei*) edited by Yoshimichi Watanabe and others (1936).

Yoshimichi Watanabe was a member of the Japanese Communist Party, who was arrested in 1928 at the time of the March 15 Incident (a mass arrest of writers and scholars who were identified as left-wingers by the Japanese government). Furthermore, the primary objectives of this edited volume were to study the development of the ancient state in Japan and to reexamine the history of the Imperial Family through the systematic and scientific analysis of prehistoric and protohistoric societies. In other words, the main purpose of the book was to demystify the nature of so-called "national polity" (*kokutai*) defined by the Maintenance of Public Order Act (Chian Iji Ho) in order to support the proletariat and the commoners who were fighting against the ultranationalistic government (Inumaru 1976). In this regard, Wajima's attempt to study archaeological data from a perspective of historical materialism had not only academic but also political

BOX 5: (*cont.*)

connotations (Hara 1972; Ichihara 1984; for political restrictions imposed on the practice of Japanese archaeology before and during World War II, see also Habu 1989a; Habu and Fawcett 1990).

With the end of World War II in 1945, academic studies in Japan, including archaeology, entered a new stage. Marxist interpretations became not only accepted but also popular among historians and archaeologists through the late 1940s and 1950s. Thus, in the immediate postwar years, Wajima and his followers were able to concentrate on using Marxism (usually referred to as historical materialism in Japanese archaeology) to reconstruct functions of prehistoric settlements and to study how these settlements changed over time. Their primary research interests were on the increased efficiency of food production and population growth through time, as well as the division of labor, social stratification, and the formation of the ancient state.

By the 1970s, the Marxist perspective had become less popular in archaeology just as it had lost adherents in many other social sciences in Japan. However, the model of increased productivity thorough time (i.e., the notion that the transition through the various stages of hunter-gatherer to agriculturalist was one of increased efficiency of food acquisition) and the idea that the size of individual settlements gradually increased through time have continued to underlie settlement studies until today (e.g., Amakasu 1986).

Wajima's (1948) article, with its firm commitment to historical materialism and its strong emphasis on archaeological studies of intrasite settlement patterns, formed the foundation of Jomon settlement archaeology during and after the 1950s. In 1955, Wajima excavated the Nanbori shell-midden (sometimes called "Minamibori"), a large Early Jomon settlement in Kanagawa Prefecture (Wajima 1958). The result of this excavation also confirmed the presence of a horseshoe-shaped layout of pit-dwellings with an empty space at the center of the site (fig. 4.1). After this excavation, the Nanbori settlement was widely cited as the model of the "Jomon village," and the excavation strategy that Wajima adopted (i.e., to excavate the entire settlement area rather than to conduct a partial excavation by placing test pits and trenches) strongly influenced the excavation method of Jomon settlements thereafter.

Interest in "group territory" and intrasite spatial analyses

Following the excavation of the Nanbori settlement, the primary research focus of Jomon settlement archaeology from the late 1950s to the 1970s was on the "social structure" of the Jomon people, with an emphasis on the interpretation of intrasite settlement patterns. Many of the Jomon settlement studies published during this time period were influenced

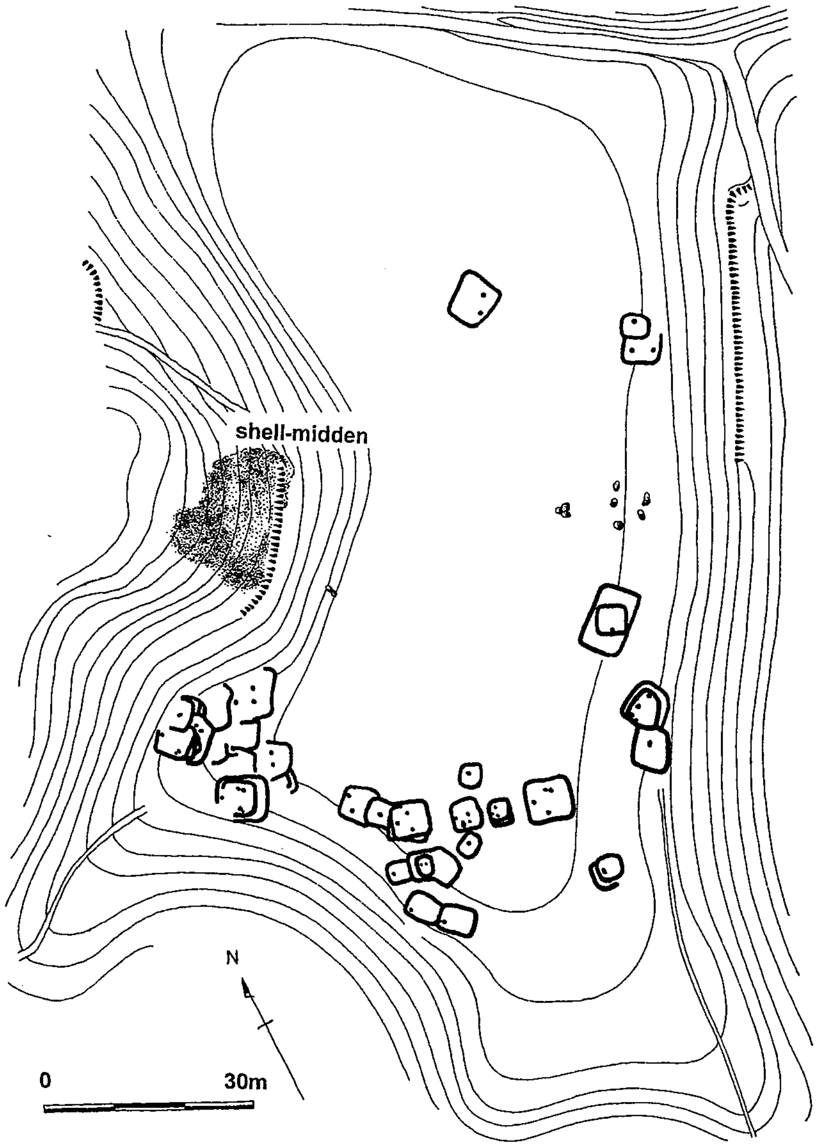

Figure 4.1 Feature distribution at the Nanbori shell-midden site, Kanagawa Prefecture (modified and redrawn from Wajima 1958: 37)

by Wajima's (1948) work, with an emphasis on the study of the "clan/primitive community" (e.g., Aso 1960; I. Okamoto 1975; Sugawara 1972; see also Teshigawara 1988). The works of Marxist scholars in other fields of social sciences, such as Seita Toma (1951) in history, Hisao Otsuka (1955) in social economics, and Seiichi Izumi (1962) in cultural anthropology, also influenced this research field.

The late 1950s to the 1970s was also a time when the study of "group territory" made significant progress in relation to the analysis of regional settlement patterns. For example, Ichihara (1959) studied the distribution of Middle Jomon settlements along the Oi River in Shizuoka Prefecture, and suggested that these settlements were located at a distance of at least 10 kilometers from each other. He concluded from this that the residents of each site maintained a hunting-gathering territory extending over a diameter of 10 kilometers. It is worth noting that Ichihara's work, which actually preceded the site catchment analysis of Vita-Finzi and Higgs (1970) by more than ten years, did not use an ecological approach, but instead was conducted within a Marxist framework, with an emphasis on the study of redistribution systems, division of labor, and regional social networks. Following Ichihara's study, a number of archaeologists also examined regional settlement pattern data and discussed the "activity sphere" (*seikatsu-ken*) and "group territory" (*shudan ryoiki*) of the residents of each site (Hayashi 1974; 1975; Horikoshi 1972; Mukosaka 1970; Shimizu 1973; Mamoru Takahashi 1965). While all of these studies took the natural environment into consideration, the ultimate goal was to reconstruct the "primitive community." In other words, they shared the theoretical foundation with Wajima and his followers whose primary research focus was on intrasite settlement patterns.

During the 1960s, Mizuno's (1963) intrasite spatial analysis of the Middle Jomon Yosukeone site in Nagano Prefecture also played a significant role in enhancing researchers' interests in the "social structure" of the Jomon people. According to his analyses, the basic unit of Jomon settlements comprises three pairs of pit-dwellings (i.e., six pit-dwellings); the three pairs are characterized by the presence of a large stone rod (*sekichu*), clay figurines (*dogu*), and phallic stones (*sekibo*) respectively (see also Mizuno 1968; 1969a; 1969b; 1970). Later, Kazuhito Goto (1970: 116–117) and the "Flake" Association (Fureiku Dojinkai 1971) criticized the model on the grounds that, in many cases, Mizuno manipulated archaeological data, such as the chronological identification of each pit-dwelling, so that two-dwelling "small units" and six-dwelling "large units" could be identified. Consequently, very few scholars today support Mizuno's hypothesis. Nevertheless, his analysis stimulated the development of intrasite settlement pattern analyses during and after the 1970s (e.g., Mukosaka 1970; Murata 1974; Nagasaki 1977; Obayashi 1971). In particular, citing Lévi-Strauss, Niwa (1978; 1982) attempted a structural interpretation of Jomon intrasite settlement patterns. Mizuno's work also encouraged the analysis of intrasite settlement patterns in relation to the spatial distribution of "ceremonial" artifacts such as large stone rods (phallic stones) and clay figurines (Nagasaki 1973; Tsuboi 1962).

Ecological approaches and the influence of North American settlement archaeology

As described above, the majority of Jomon settlement studies from the 1950s to the 1970s analyzed both inter- and intrasite settlement patterns in relation to the social structure of the Jomon people. Because of this emphasis, very few settlement studies incorporated subsistence data in their analyses. One of the few exceptions was the work of Hitoshi Watanabe (1964; 1986), who compared Jomon data with ethnographic examples of the Ainu in Hokkaido, and who suggested there was a need to examine the relationship between settlement patterns and subsistence strategies in the context of ecological anthropology. In addition, a series of publications by Takeru Akazawa (1980; 1981; 1982a; 1982b; 1986a; 1986b; 1986c; 1987; Akazawa and Maeyama 1986) also used explicit ecological approaches to examine Jomon settlement data. In particular, Akazawa (1981) applied the site catchment model (Vita-Finzi and Higgs 1970) in the examination of Jomon site territories, and compared characteristics of the natural environment within a 10-kilometer radius of each Jomon site with faunal remains excavated from each site. With the exception of these works, however, studies of Jomon settlements are basically separate from those of Jomon subsistence.

While the Jomon settlement studies described above essentially developed within the context of Japanese archaeology, Tatsuo Kobayashi (1973; 1980; 1986) attempted to apply the method of North American settlement archaeology, which was first introduced into Japan by Keally (1971), to regional settlement pattern data from the Tama New Town area in western Tokyo. The Tama New Town area is in the suburbs of Tokyo, where large-scale land developments took place from the 1960s to the 1980s. The Board of Education of Tokyo began surveying this area in the late 1960s. In the following two decades, more than 900 sites were excavated. Many of these sites are quite large in area, measuring between several thousand to often tens of thousands of square meters.

Using survey and excavation results from the Tama New Town area, Kobayashi (1973) classified Jomon settlements in this area into six types: (A) large settlements arranged in semicircular or horseshoe-shaped patterns; these sites are usually associated with many artifacts and features, including storage pits and burials; (B) medium-sized settlements without clear semicircular/horseshoe-shaped layouts; (C) small settlements with only one or two dwellings; (D) small sites without dwellings but with some other features; (E) small sites with a specific function, such as cemeteries, artifact depots, clay mining sites, quarries, and stone tool production sites; and (F) sporadic artifact scatters. Later in his 1980 article, Kobayashi suggested that his classifications (A) to (F) basically correspond to Campbell's ethnographic site typology of Tuluaqmiut in central Alaska (Campbell 1968).

Kobayashi's settlement pattern analysis was new in the sense that it examined various characteristics of Jomon settlements, including site location, total number of dwellings, presence or absence of storage pits and burials, feature distribution, types and quantities of artifacts, and duration of site occupation. As Kobayashi himself stated, however, it was essentially a typology of sites (Kobayashi 1973: 20), and the interpretations of site function in relation to subsistence strategies have yet to be presented.

Questions about Jomon settlement size and the degree of sedentism

It is evident from the above that the majority of Jomon settlement studies shared Wajima's (1948; 1958) interest in the reconstruction of the primitive community. Many of these studies also inherited Wajima's assumption that the degree of sedentism during the Jomon period was quite high. The presence of circular or horseshoe-shaped settlements associated with a large number of pit-dwellings has been interpreted as evidence for a high degree of Jomon sedentism. Scholars who did not share the Marxist perspective (e.g., Koyama 1978; 1984; H. Watanabe 1966; 1986) also accepted this assumption of Jomon sedentism.

By the end of the 1970s, several scholars began to question this assumption, and suggested the need to reexamine the degree of sedentism during the Jomon period. One such scholar was Ishii (1977), who published a detailed analysis of cross-sections of postmolds of Jomon pit-dwellings in the Kohoku New Town area in Kanagawa Prefecture. Based on this analysis, he suggests that, unlike previous suggestions, many Jomon pit-dwellings were occupied intermittently rather than continuously.

Other scholars suggested that the seemingly large size of Jomon settlements needed to be reexamined, and therefore the large site size should not be interpreted as evidence for full sedentism. For example, Yoshio Doi

(1985) pointed out that the majority of Jomon settlements were in fact small, and large settlement sites occurred only as a result of long-term occupation of the same place. Kuro'o (1988), who examined intrasite spatial patterns of Middle Jomon large settlement sites, suggested that the number of simultaneously occupied pit-dwellings at each subphase was actually quite small. Tatsuo Kobayashi (1986: 55) also supported the idea that most of the Jomon settlements were small, and suggested that the average number of simultaneously occupied pit-dwellings at a Jomon settlement site must have been between three and six. Such articles played a significant role in suggesting the necessity to reexamine traditional assumptions on Jomon sedentism and large settlement size. However, an alternative picture of Jomon settlements to that of Wajima (1948; 1958) has yet to be presented.

Behind these questions was the rapid increase in the number of salvage excavations in Japan beginning in the 1960s. As indicated in the case of the Tama New Town area, large-scale salvage excavations resulted in an increase in both the quality and quantity of Jomon settlement pattern data. Before the 1960s, Jomon settlement studies were based on the results of excavations of only several hundred sites. The majority of these sites were either shell-middens or large settlements, both of which were easy to identify from surface surveys. Since then, however, tens of thousands of additional Jomon sites have been discovered and excavated. A significant number of these newly excavated sites are small settlements with only one pit-dwelling, or at most a few. These small sites would never have been identified if large-scale land developments had not taken place.

The rapid increase in the number of salvage excavations, on the other hand, revealed the presence of a small number of extremely large Jomon settlements. These include the Miharada site in Gunma Prefecture (341 Middle Jomon pit-dwellings; Akayama 1982), the Sannomaru site in Kanagawa Prefecture (286 Middle Jomon pit-dwellings; Kohoku New Town Maizo Bunkazai Chosa-dan 1985), the Nakanoya Matsubara site in Gunma Prefecture (239 Early Jomon pit-dwellings; Annaka-shi Kyoiku Iinkai 1996; fig. 4.2), and the Nakano B site in Hokkaido (more than 500 Initial Jomon pit-dwellings; Izumita 1996). In particular, the discovery at the Sannai Maruyama site in Aomori Prefecture, which is associated with more than 700 Early and Middle Jomon pit-dwellings and numerous other features, attracted the attention of both researchers and the media (for details of the Sannai Maruyama study, see Case Study 2 on pp. 108–132). While some researchers interpret the presence of large settlements as evidence for full sedentism, the roles and functions of these large settlements in overall Jomon settlement systems have yet to be examined.

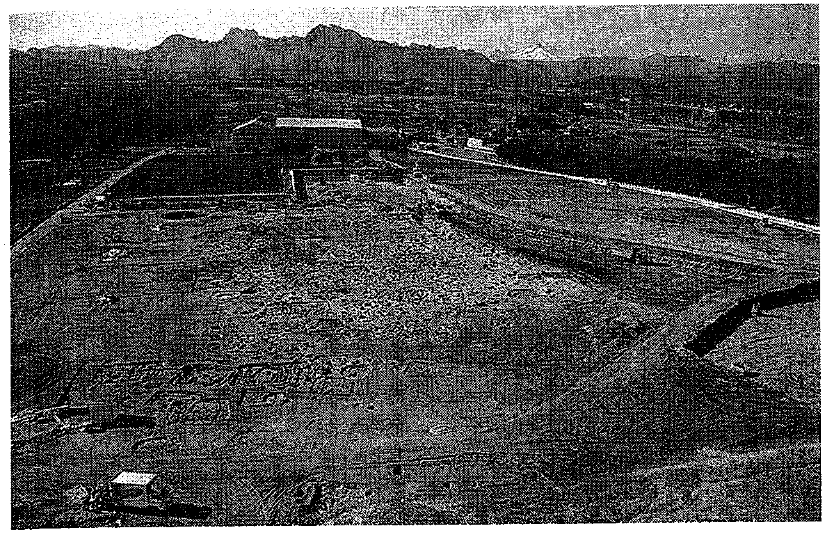

Figure 4.2 Excavation of the Early Jomon Nakanoya Matsubara site, Gunma Prefecture (from Muto 1999; permission for reproduction obtained from Annaka-shi Kyoiku Iinkai [Board of Education of Annaka City])

What became apparent through these new excavations is intersite variability in each region, as well as interregional and temporal variability in Jomon settlement patterns. Because of this large variability, outlining generalized characteristics of Jomon settlements would tell us little about the lifeways of Jomon people in different regions at different time periods. In order to understand characteristics of Jomon settlement systems as a whole, it is necessary to conduct a series of settlement pattern analyses using data from different regions and time periods, and then compare the results. Conducting systematic comparisons between the results of these analyses makes it possible to identify the extent of regional and temporal variability in Jomon settlement systems.

Case Study 1: Analysis of Early Jomon settlement data from central Japan

As the first step in approaching Jomon settlement systems, I examined intersite variability in lithic assemblages, site size, and site location from the Early Jomon Moroiso phase of the Kanto and Chubu Mountain

Table 4.1 *Expected patterns of residentially used sites*

Type	Intersite variability in lithic assemblages	Intersite variability in site size	Site distribution pattern
Fully sedentary collectors	small	small	clustered
Collectors with seasonal moves	large	large	clustered
Foragers	small	small	dispersed

regions in central Japan (for the full description of this case study, see Habu 2001).

Hypotheses

The first step I took was to formulate multiple hypotheses in which expected patterns of archaeological data for each subsistence–settlement system are suggested. Table 4.1 summarizes expected characteristics in lithic assemblage, site size, and site distribution patterns for foragers, collectors with seasonal moves, and fully sedentary collectors respectively (Habu 1996; 2000; 2001). As shown in fig. 1.6 (p. 11), collectors with seasonal moves (or relatively sedentary collectors) would have conducted seasonally different activities at seasonally different residential bases. Accordingly, comparison in lithic assemblages from these different residential sites is expected to reveal large intersite variability. Figure 1.6 also indicates that settlement patterns of relatively sedentary collectors are often characterized by seasonal amalgamation and dispersal of residential groups. In the case shown in fig. 1.6, the group formed a large residential base during the winter and early summer, but was dispersed into smaller residential bases during the late summer. Accordingly, it is expected that variability in site size among residential bases is quite large.

In contrast, all residential bases of fully sedentary collectors are occupied throughout the year (fig. 1.7; p. 13). This implies that activities conducted at each of these residential bases are relatively similar to each other. Accordingly, it is expected that variability in both lithic assemblages and site size among residential bases is relatively small. The model also assumes collectors' residential bases to be located near primary resource concentrations. Therefore, in the case of both fully and relatively sedentary collectors, it is expected that residential bases would be clustered at specific localities near resource concentrations.

Unlike collectors, who are adapted to environments in which seasonal/temporal distribution of critical resources is uneven, foragers are adapted to environments where the distribution of critical resources is homogeneous. Thus, it is likely that activities conducted at each of the foragers' residential bases are all related to exploiting a similar type of environment. Accordingly, it is expected that intersite variability in lithic assemblages and site size is relatively small. In this regard, the first and second columns of table 4.1 for both the fully sedentary collectors and the foragers are the same. However, residential bases of foragers tend to be much smaller than those of collectors. This is because (1) foragers' residential bases tend to be occupied for a relatively short time period because of their frequent seasonal movements, and (2) while collectors tend to reoccupy previously used residential bases, it is less common for foragers to reoccupy their residential bases. Finally, in terms of site distribution, it is expected that foragers' residential bases would be dispersed throughout the research area, because the distribution of critical resources, which determines the locations of residential bases, is spatially homogeneous.

Materials and methods

Using these hypotheses, I examined data from the Early Jomon Moroiso phase in the Kanto region and the Chubu region (also called the Chubu Mountain region). The Moroiso phase is the third phase of the Early Jomon period, dating to around 5000 bp (*ca.* 5900 cal BP). This phase is characterized by an abundance of pottery decorated with parallel lines and nail-shaped impressions made with half-split bamboos, as well as with thin clay bands attached to the surface of pottery. Typological chronology of Moroiso-style pottery indicates that the Moroiso phase can be divided into three subphases: Moroiso-a, Moroiso-b, and Moroiso-c from the earliest to the latest (see e.g., T. Suzuki 1989). Figure 4.3 shows typical examples of Moroiso-style pottery.

Raw data were taken from Moroiso-phase sites in six prefectures in the Kanto and Chubu regions (fig. 4.4). The study zone was divided into four areas: Areas I to IV (fig. 4.5). Areas I and II are the northwestern and southwestern parts of the Kanto region respectively. It should be mentioned that Area II includes Tokyo and the adjacent coastal area, and is characterized by an abundance of salvage excavations. Area III is the mountainous area of the Chubu region: the area was further subdivided into IIIa and IIIb for the convenience of preparing site distribution maps. Finally, Area IV covers the Izu Islands. These six prefectures cover the major distribution area of Moroiso-style pottery.

In this analysis, 1,058 Moroiso-phase sites were examined. These sites were first classified into two groups: (1) nondwelling sites, and (2)

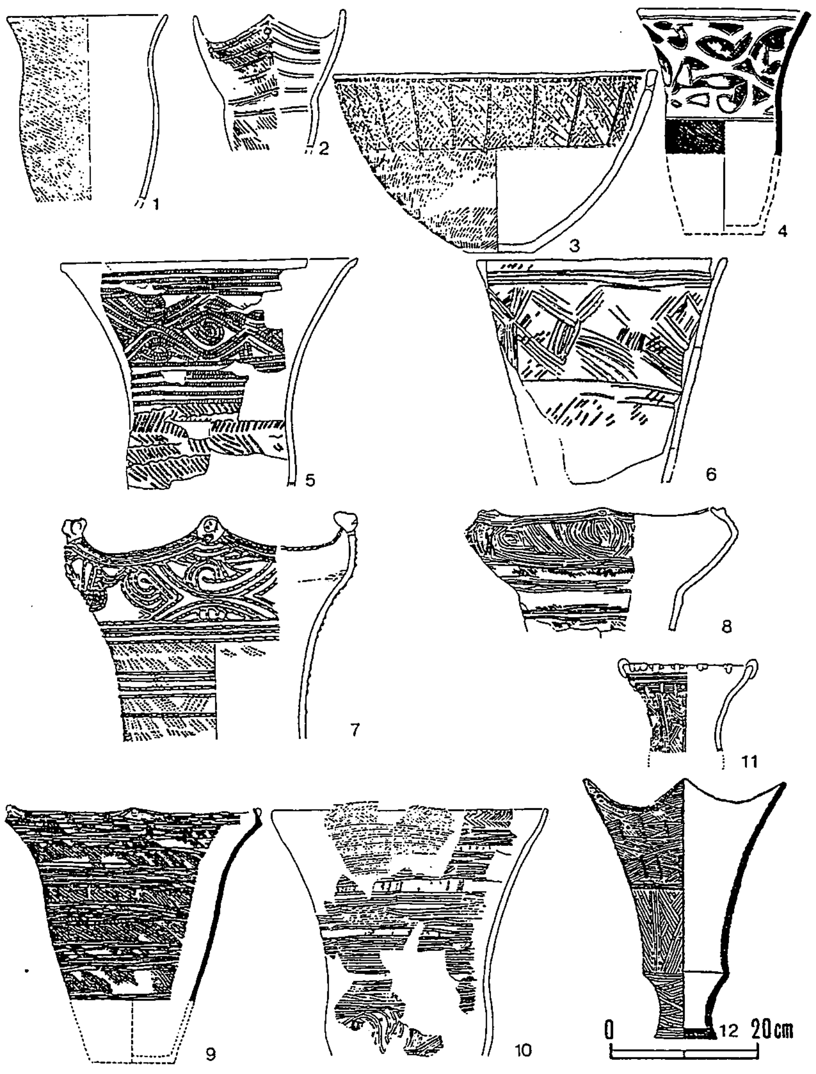

Figure 4.3 Examples of Moroiso-style pottery: 1–4. Moroiso-a style; 5–10. Moroiso-b style; 11–12. Moroiso-c style (from Habu 1988: 149)

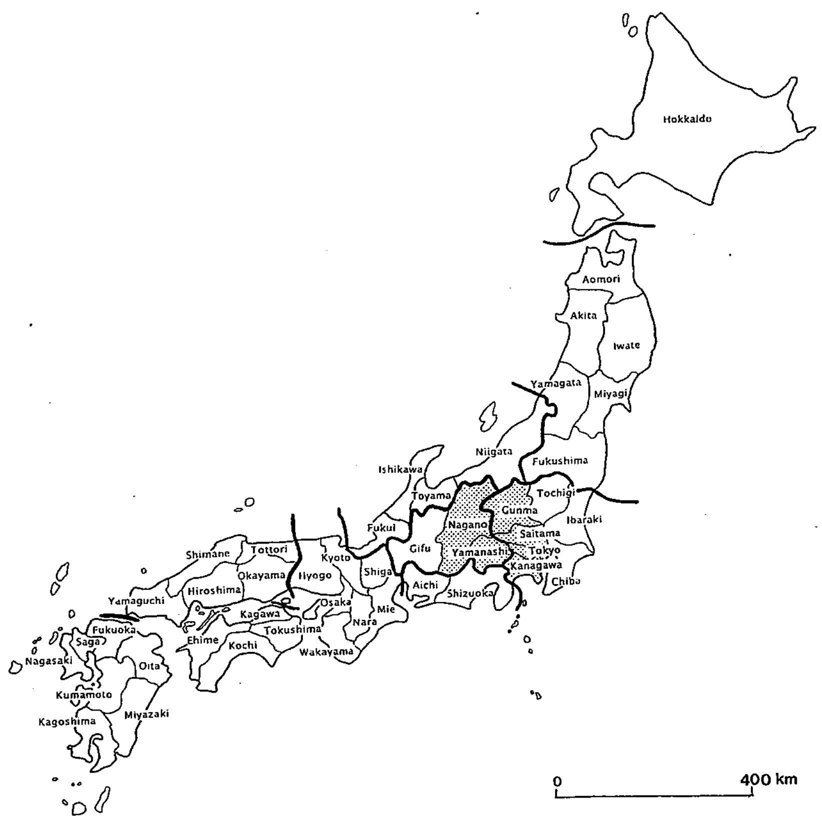

Figure 4.4 Map of Japan showing research area. The shaded area represents the six prefectures studied (redrawn from Habu 2001: 30)

dwelling sites. A nondwelling site refers to a site in which no pit-dwellings were excavated or identified. A dwelling site refers to a site with which one or more pit-dwellings were associated. Since Jomon pit-dwellings were fairly labor-intensive, as they were constructed by digging into the ground for at least 30–40 centimeters, I assumed that the majority of these dwelling sites were used as residential bases. Of the 1,058 Moroiso-phase sites examined, 242 sites were identified as dwelling sites. All 242 dwelling sites were used for the analysis of site size variability. For the analysis of lithic assemblage variability, only 95 dwelling sites were used, because the total number of lithic tools from the remaining 147 sites was either too small for quantitative analyses, or unreported (fig. 4.6).

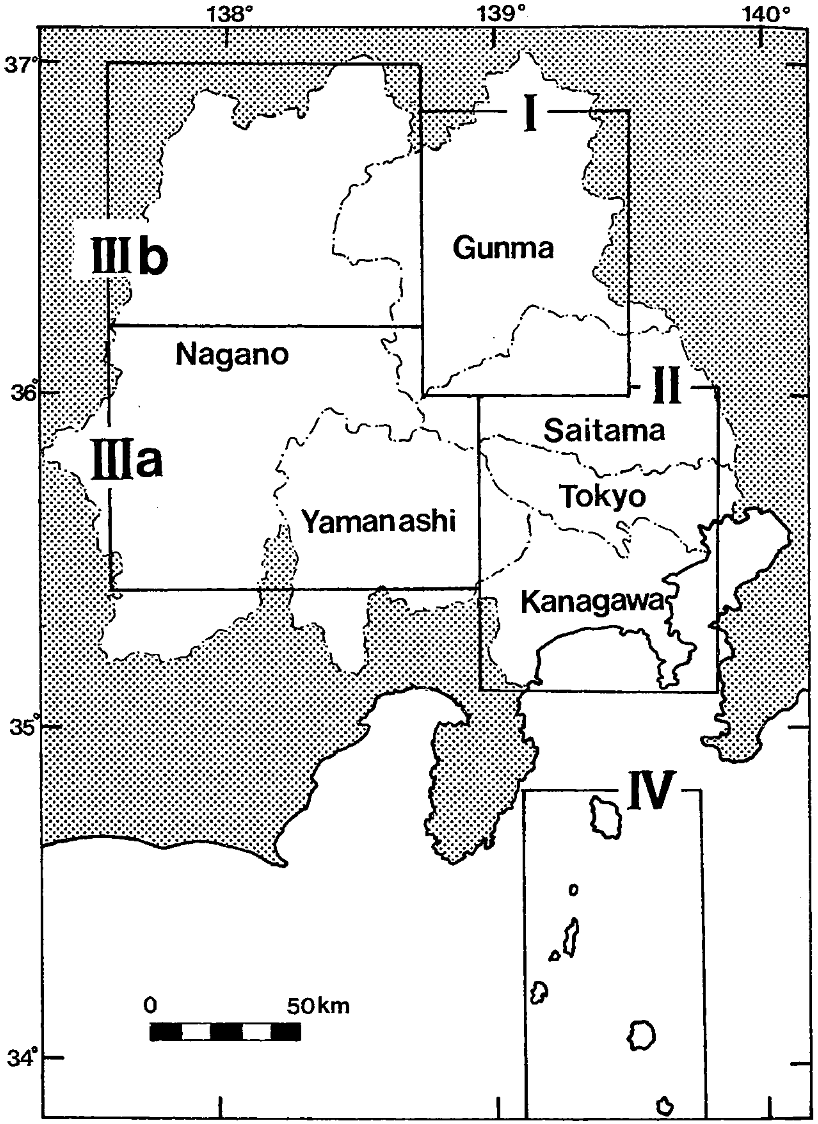

Figure 4.5 The location of Areas I to IV. The shaded area lies outside the six prefectures studied (from Habu 2001: 31)

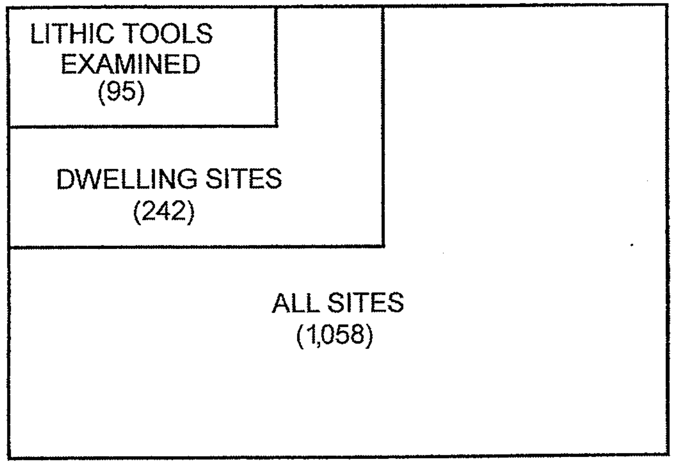

Figure 4.6 Data structure

Lithic tools from the ninety-five sites were classified into the following eleven categories (designations used in tables and figures are indicated in parentheses): (1) arrowheads (ARH), (2) stemmed scrapers (SSC), (3) awls (AWL), (4) chipped stone axes (CAX), (5) polished stone axes (PAX), (6) pebble tools (PBL), (7) stone mortars (MTR), (8) grinding stones (GRD), (9) net sinkers (NSK), (10) ornaments (ORN), and (11) others (OTH) (fig. 4.7). Relative frequencies of these eleven tool categories were calculated for each of the ninety-five sites, and used to establish site typology.

In this analysis, the ninety-five sites were first classified according to the most abundant category of lithic tools in each assemblage. Figure 4.8 shows the five site types identified as a result of this analysis. In these graphs, each line represents one site. For example, when the relative frequency of arrowheads from a site was the highest among the eleven tool categories, the site was classified into the arrowhead peak type (fig. 4.8: upper left). The majority of the ninety-five sites were identified either as arrowhead peak, chipped stone axe peak (fig. 4.8: middle left), or grinding stone peak sites (fig. 4.8: lower left). Of the remainder, two sites were classified as pebble tool peak sites (fig. 4.8: upper right), and one site was classified as a net sinker peak site (fig. 4.8: middle right).

Next, the first three of these five types (i.e., arrowhead peak, chipped stone axe peak, and grinding stone peak) were further divided into two subtypes on the basis of assemblage diversity. For example, if I look at relative frequencies of eleven categories of tools for all the arrowhead

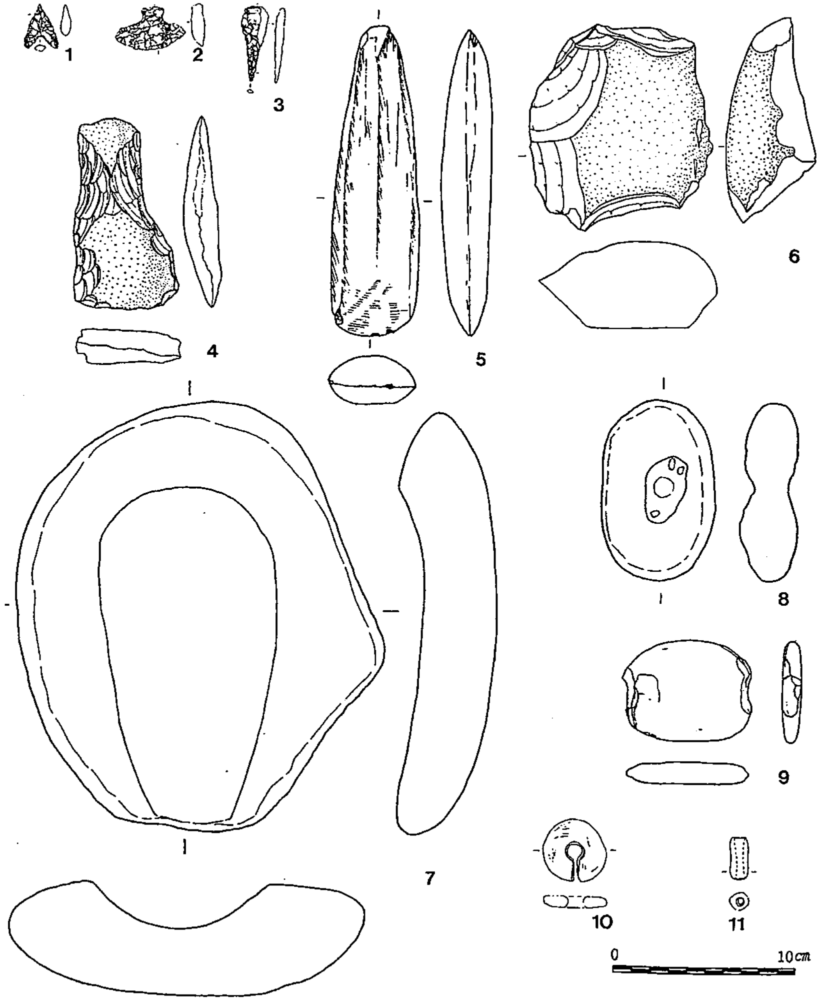

Figure 4.7 Lithic tools from Moroiso-phase sites: 1. arrowhead; 2. stemmed scraper; 3. awl; 4. chipped stone axe; 5. polished stone axe; 6. pebble tool; 7. stone mortar; 8. grinding stone; 9. net sinker; 10–11. ornaments (from Habu 2001: 33)

peak sites (fig. 4.8: upper left), some assemblages are characterized by extremely high percentages of arrowheads, as high as 85 percent. When the relative frequency of arrowheads is significantly high, relative frequencies of other tool categories are by definition low. As a result, the graph

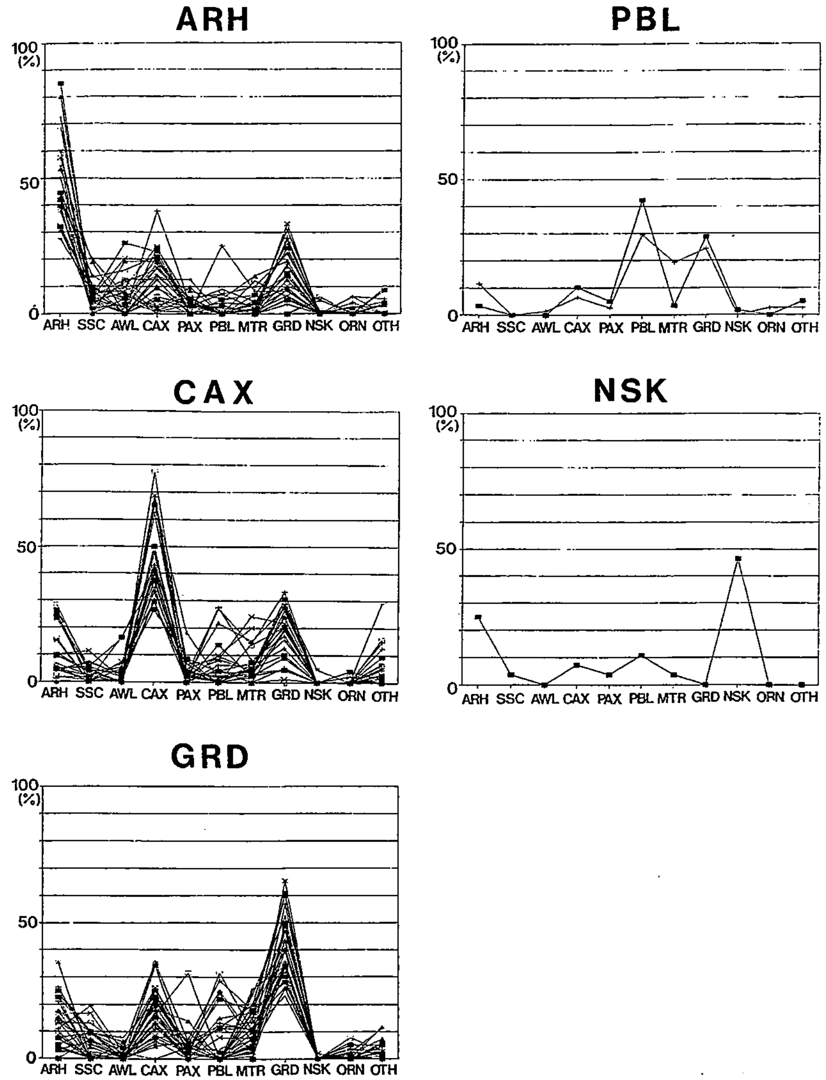

Figure 4.8 Five site types based on the highest artifact category frequency in assemblage composition (from Habu 2001: 52)

showing this type of assemblage is characterized by a single peak in the category of arrowhead. On the other hand, when the relative frequency of arrowheads is lower, the graph tends to be characterized by two or more peaks.

In my analysis, when the relative frequency of the most abundant category exceeds 50 percent of the assemblage, the site is called a "single peak site." When the highest peak accounts for less than 50 percent, the site is classified as a multiple peak site. Single peak sites are identified in three tool categories: (1) arrowheads (fig. 4.9: upper), (2) chipped stone axes (fig. 4.9: middle), and (3) grinding stones (fig. 4.9: lower).

Settlement system of the Moroiso phase

Figure 4.10 shows the distribution of the ninety-five sites according to the types and numbers of associated dwellings. The solid symbols represent multiple peak sites. The empty symbols represent single peak sites. The size of the symbols reflect site size using the maximum number of possibly simultaneously occupied dwellings in each site (1–4 dwellings = small, 5–10 dwellings = medium, and more than 10 dwellings = large).

Two things are clear from this analysis. First, dwelling sites tend to form concentrations. Such a pattern corresponds very well to the model of collectors (see table 4.1). The presence of site concentrations can be seen more clearly in enlarged maps. Figures 4.11–4.13 are enlarged maps of Areas I, II, and IIIa. In these maps, all the Moroiso-phase sites in each area are plotted. In addition to the symbols that are explained above, "S" marks represent dwelling sites for which the lithic assemblage size is too small for quantitative analysis. The "U" marks represent dwelling sites which have been already excavated, but the detailed lithic assemblage data of which are unreported. Finally, "x" marks indicate nondwelling sites (see fig. 4.13 for legend). In Area I, six site concentrations (A–F) can be identified (fig. 4.11). The large circles on this figure indicate a 10-kilometer radius, or approximate foraging radius, around each site concentration (for the definition of the foraging radius, see Binford 1980). In Area II (fig. 4.12), the Tokyo area, four site concentrations (G–J) were identified. In Area IIIa (fig. 4.13), the pattern of site concentration is not as clear as in the first two areas, but there seem to be several site concentrations (indicated as K–P in fig. 4.13). Since Area IIIa is mountainous, and less developed than the first two areas, I assume that a number of unreported sites are still hidden in this area. The sample size of Area IIIb and Area IV was too small to identify any patterns of site location.

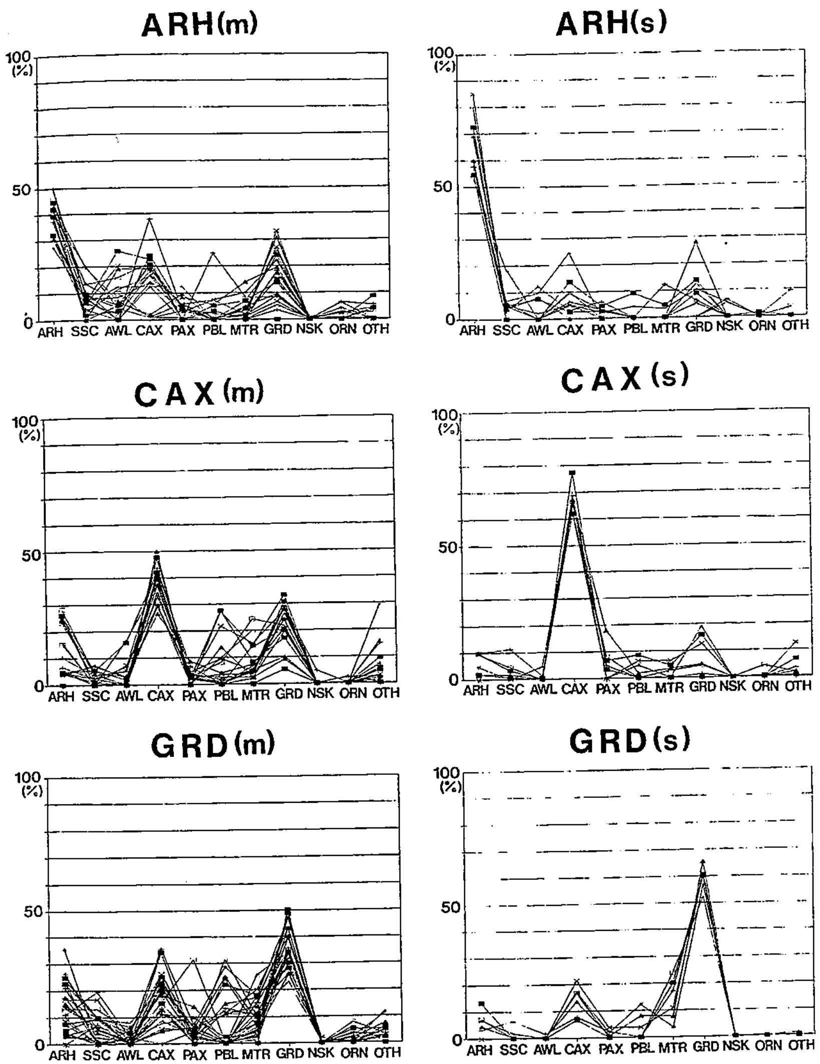

Figure 4.9 Single peak sites (s) and multiple peak sites (m) for three categories of lithic tools (from Habu 2001: 53)

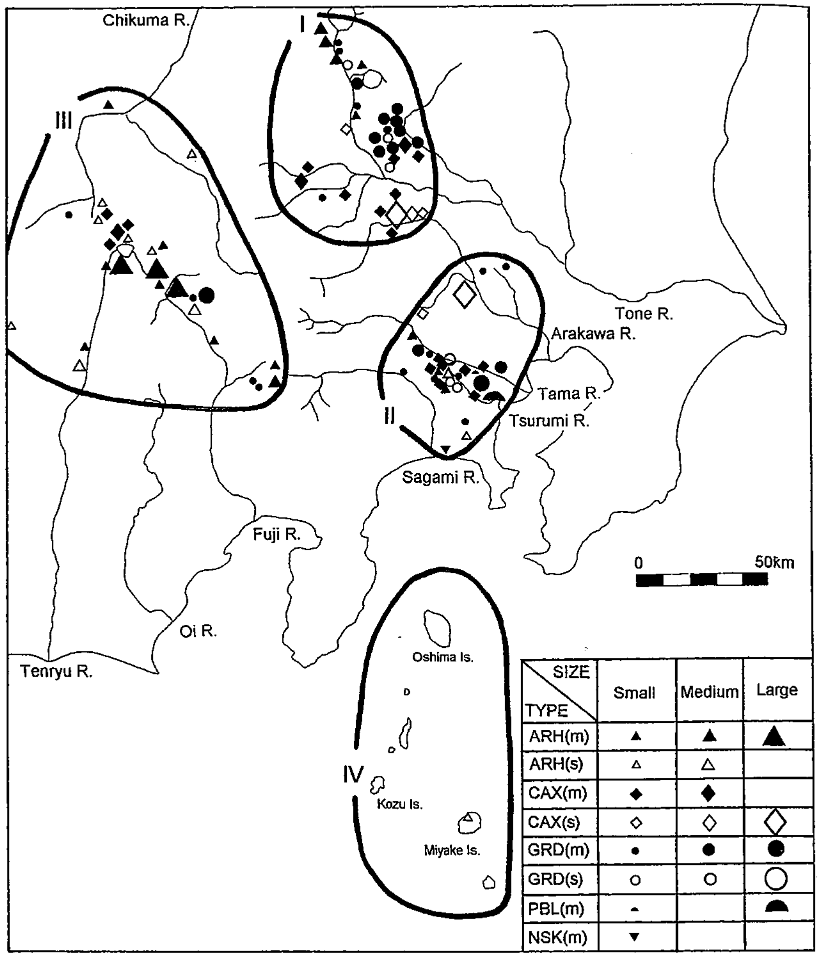

Figure 4.10 Distribution of ninety-five LTE (lithic tools examined) sites (redrawn from Habu 2001: 55)

Second, as shown in the distribution map of the ninety-five sites (fig. 4.10), there is considerable intersite variability both in site type based on lithic assemblage characteristics, and in site size. According to the hypotheses, these are characteristics of collectors who move their residential bases seasonally. Note that arrowhead peak sites (shown as triangles), chipped stone axe peak sites (diamonds), and grinding stone

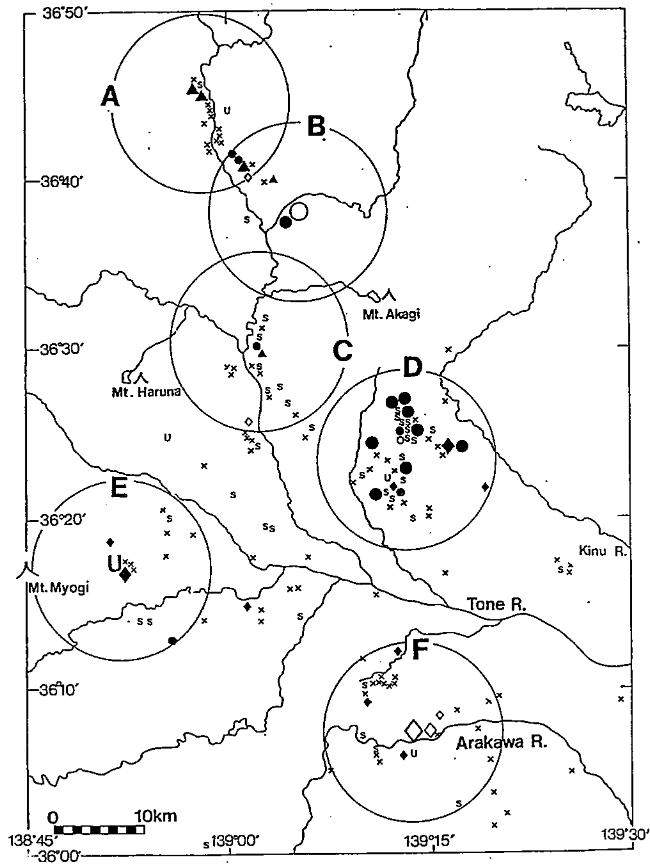

Figure 4.11 Site concentrations in Area I (see fig. 4.13 for legend [modified from Habu 2001: 61])

peak sites (circles) are never found exclusively in each of the Areas I, II, and III. Such a pattern seems to represent a wide diversity of subsistence activities practiced in the residential bases within each area.

Of the three tool types, arrowheads must have been associated with hunting. Chipped stone axes are believed to have been used as hoes for collecting plant roots, or possibly for incipient plant cultivation. Grinding stones were probably used for processing nuts, such as acorns. Given the seasonal and regional diversity in available resources in the study area, it is very likely that the differences in assemblage composition reflect seasonal

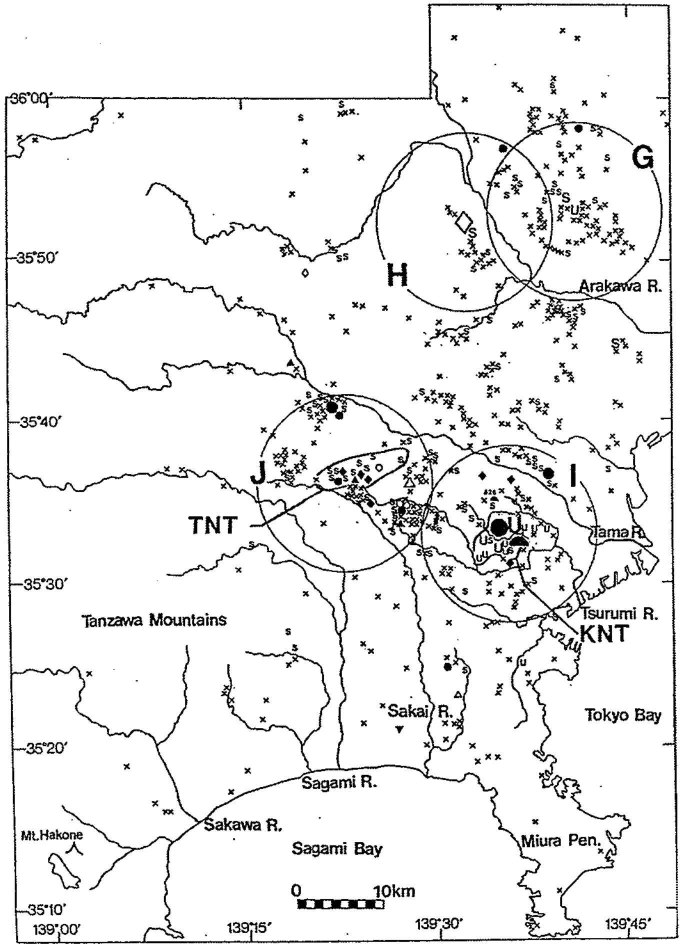

Figure 4.12 Site concentrations in Area II. In addition to the sites represented in the diagram, there are 168 nondwelling sites in the Tama New Town area (indicated as TNT) and 31 nondwelling sites in the Kohoku New Town area (indicated as KNT) respectively. See figure 4.13 for legend (modified from Habu 2001: 62)

occupations of the residential bases. Furthermore, variability in site size seems to represent seasonal dispersion and amalgamation of residential groups.

Some of the readers of this book may think that sites with different lithic assemblage characteristics may have been occupied year-round by groups

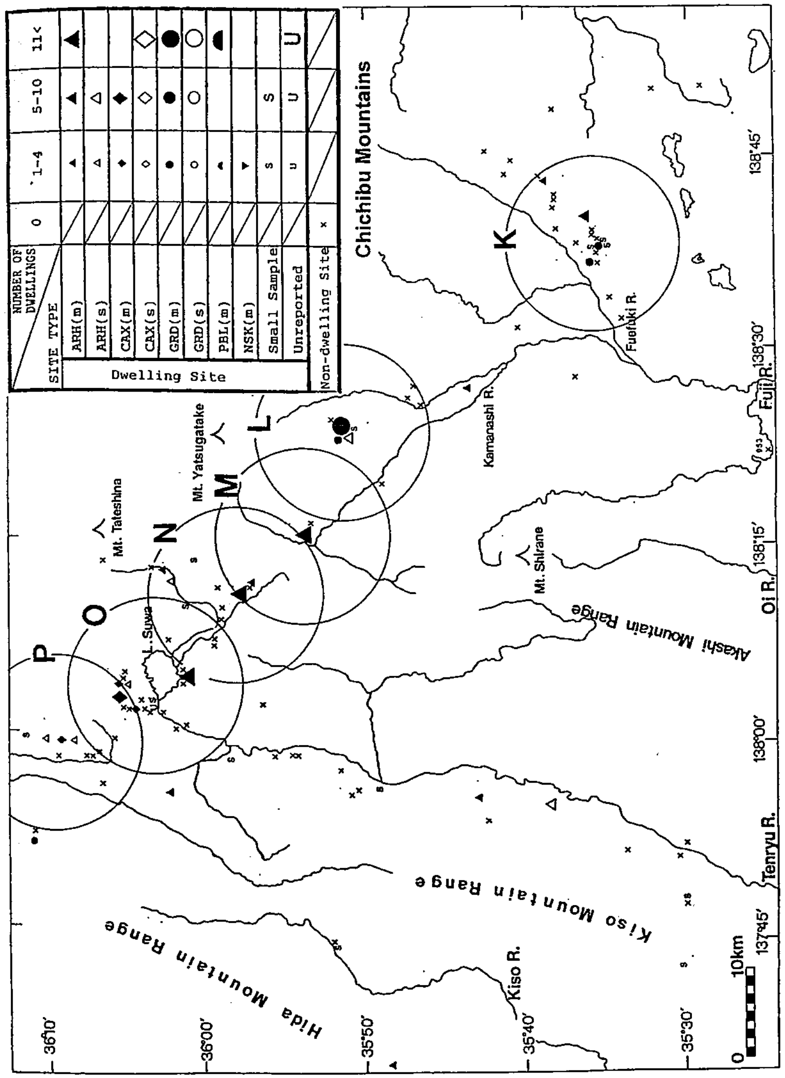

Figure 4.13 Site concentrations in Area IIIa (modified from Habu 2001: 63)

with different subsistence strategies. While this is theoretically possible, the fact that the distances between site clusters characterized by different lithic assemblages are often within the range of collectors' residential moves (i.e., approximately 10–30 kilometers; see table 1 of Kelly 1983) makes this explanation less convincing. Ethnographic examples indicate that, if different resources are seasonally available within the possible range of residential moves, hunter-gatherers tend to move their residential bases unless the area is territorially defended by another group (see for example Karok and Yurok cited in Schalk 1981). In the case of the present study, since chronological changes in site occupation patterns are evident (see below), it is unlikely that there was a long-term fixed territory during the Moroiso phase.

Changes through time within the Moroiso phase

So far, the results of my analysis support the hypothesis that the Moroiso-phase people were collectors who moved their residential bases seasonally. However, as noted above, Japanese archaeologists have divided the Moroiso phase into three subphases: Moroiso-a, -b, and -c, from the oldest to the youngest, and some of them believe that settlement patterns changed significantly within the Moroiso phase (e.g., K. Imamura 1992). If that was the case, the characteristics of intersite variability and settlement patterns observed above might be biased by the temporal changes throughout the Moroiso phase.

Therefore, as the next step in my analysis, I made distribution maps of each of the three subphases separately, and tested the validity of the conclusions presented above. The results were generally consistent with the conclusions discussed above with one exception, the Moroiso-c subphase in Area II. As described above, Area II is the coastal area, which includes present-day Tokyo. As shown in fig. 4.14, the settlement pattern of the Moroiso-c subphase in this area is characterized by a scarcity of dwelling sites; most of the sites indicated in this map are nondwelling sites, represented by "x" marks.

I suggest that these nondwelling sites might have functioned as residential bases in a forager system. As the residential bases of foragers are likely to be less complex than those of collectors, it is quite possible that many of these nondwelling sites represent such residential bases. If this was the case, it can be suggested that, unlike other subphases, the people of the Moroiso-c subphase in Area II were closer to foragers than to collectors. This indicates that some of the Jomon people were not only not fully sedentary, but in fact may have been quite mobile.

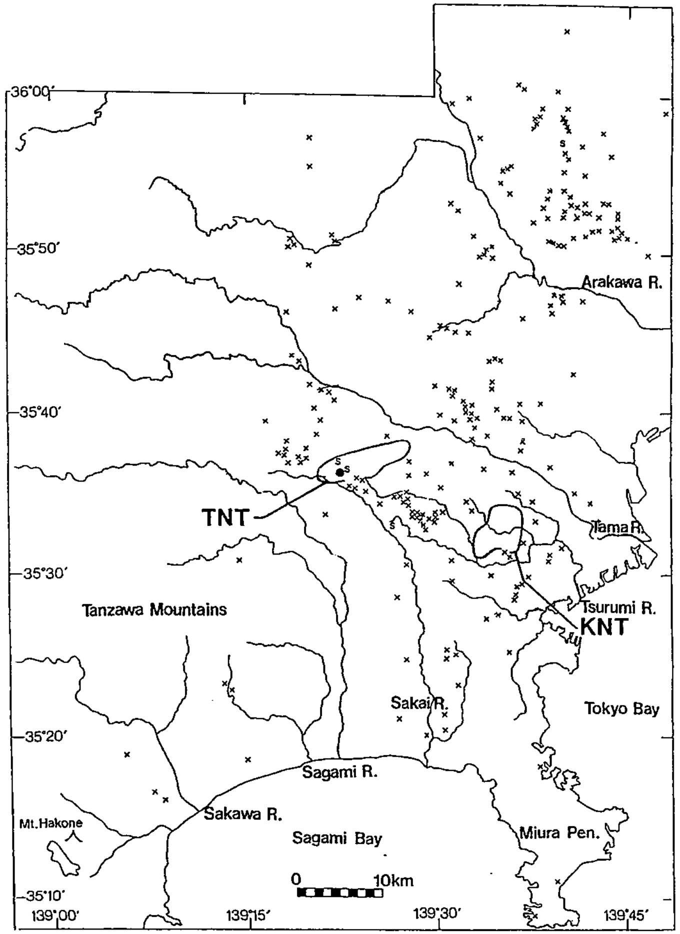

Figure 4.14 Distribution of Moroiso-c subphase sites in Area II. In addition to the sites represented in the diagram, there are 37 nondwelling sites in the Tama New Town area (indicated as TNT) and 5 nondwelling sites in the Kohoku New Town area (indicated as KNT) respectively. See figure 4.13 for legend (modified from Habu 2001: 85)

The fact that these nondwelling sites are dispersed throughout Area II also supports the hypothesis that the people of the Moroiso-c subphase in Area II were foragers. According to Binford's original model (table 1.1), collector systems occur where the distribution of critical resources is spatially or temporally uneven, whereas forager systems

Table 4.2 *Frequencies of shell-midden sites in southwestern Kanto*

	Moroiso-a	Moroiso-b	Moroiso-c
Number of all sites	273	631	278
Number of shell-midden sites	23	14	0
Percentage of shell-midden sites	8.4	2.2	0.0

are responses to environments where the distribution of resources is more homogeneous. Therefore, if there was a shift from collecting to foraging systems in Area II, we might be able to find corresponding environmental changes.

Environmental data suggest that the Moroiso phase coincides with the "Climatic Optimum," the time of maximum sea-level transgression. According to Matsushima (1979) and Matsushima and Koike (1979), the sea level in this area reached its maximum between 6500 and 5500 bp (ca. 7400–6300 cal BP). Some researchers (Fuji 1984; Sakamoto and Nakamura 1991) suggest that the sea level was at its maximum during the Kurohama phase (the phase before the Moroiso-a subphase), while others (Horiguchi 1983) believe that it occurred during the Moroiso-a subphase. In either case, it is very likely that the sea level gradually started to retreat through the Moroiso-b and -c subphases.

How did this sea-level change affect the distribution of available resources? Matsushima and Hiroko Koike (1979) suggest that in the western Kanto, especially along the Tsurumi River, sea-level retreat may have resulted in the destruction of the habitat of littoral molluskan species such as oysters (*Crassostrea gigas*) and granular ark (*Tegillarca granosa*). The frequency of shell-midden sites in southwestern Kanto shows a corresponding decrease as indicated in table 4.2: of all the Moroiso-a sites in southwestern Kanto, 8.4 percent are associated with shell-middens, whereas only 2.2 percent of the Moroiso-b sites are associated with shell-middens. No shell-middens have been reported from the Moroiso-c subphase (Habu 2001). It should be noted here that the difference in the total number of sites between subphases might reflect the difference in the duration of each subphase. In particular, the fact that the total number of sites in the Moroiso-b subphase is twice as much as that of the other two subphases may indicate that the Moroiso-b subphase lasted longer than the other two subphases. Nonetheless, the decrease in the relative proportion of shell-midden sites over time is apparent.

It is likely that the decline in the frequency of shell-middens reflects changes in the availability of shellfish resources over time. While many Jomon scholars assume that shellfish was not the most important food category for the Jomon people (e.g., K. Suzuki 1979), this decline nevertheless must have caused significant changes in the overall resource distribution patterns in Area II. Since the distribution of shellfish is spatially limited to the coastal area, and since they are key resources for hunter-gatherers during the spring when relatively few other resources are available, the decrease in the amount of shellfish would have resulted in a more homogeneous distribution of overall resources. Since Binford's original model predicts that forager systems are preferred under environments in which the distribution of resources are temporally and spatially homogeneous, the environmental data also support the interpretation that there was a change from collecting to foraging systems in Area II.

Influence of this system change on the development of the "Middle Jomon type" of system

The shift from collecting to foraging systems in Area II offers particular insights when we look at the long-term settlement pattern change from the Early to Middle Jomon periods at the interregional level (Habu 2002b). Because the shift in Area II was associated with a dramatic decrease in the total number of sites and average site size, it must have entailed a significant population decrease in this area. This can imply either a catastrophic increase in the mortality rate, or population movement to a neighboring area (or areas).

Changes in the number of sites in each region seem to indicate the possibility of population movement from Area II to Area III (the Chubu Mountain region). First, detailed analysis of settlement pattern changes in Area II indicates that the shift from the Moroiso-b to Moroiso-c subphases was heralded by a gradual shift from the Moroiso-a to Moroiso-b subphases in the concentration of site distribution from the coast to inland (Habu 2002b). Since the inland part of Area II was a gateway to Area III, such a shift in site distribution is consistent with the assumption of long-term population movement toward Area III. Second, the total number of sites in Area III increased from the Moroiso-b to Moroiso-c subphases, which is also consistent with the scenario of population movement. Third, lithic assemblage data from the Moroiso-c subphase in Area III show a new trend: several sites are characterized by an abundance of chipped stone axes for the first time. This trend continues through the remaining Early Jomon period to the Middle Jomon period.

Currently, we do not have any convincing explanations for why this major system change occurred. However, if there was population movement from Area II to Area III, that would have resulted in a significant increase in population pressure in Area III, which would provide a reason for the system change.

Because Areas II and III shared the same pottery style (the Moroiso style), the travelers may not have perceived their relocation as a permanent migration from one area to another. Rather, the change may have occurred as a result of a series of annual decisions about where to obtain food and where to establish a new camp/residential base.

Given these considerations, I have hypothesized elsewhere (Habu 2002b) that the possible population movements from Area II to III in the Moroiso-c subphase had resulted in a significant increase in population pressure within Area III, which triggered the development of a new type of a collecting system associated with a large number of chipped stone axes. This new system eventually dominated both the Kanto and Chubu regions (i.e., Areas I, II, and III) during the Middle Jomon period.

The development of a Middle Jomon settlement system with a large number of chipped stone axes in the Kanto and Chubu regions has attracted the attention of many archaeologists, since the system was associated with various unique cultural characteristics, including large settlement size and sophisticated material culture represented in the decoration of various shapes of Jomon pots and clay figurines (see for example Kamikawana 1970). It is this system that made Fujimori (1950; 1970) and others hypothesize that Middle Jomon people may have been relying on plant cultivation rather than hunting and gathering (see chapter 3). Other scholars, such as Keiji Imamura (1996), believe that the abundance of chipped stone axes represents a heavy reliance on collecting wild plant roots rather than plant cultivation.

Despite the active debates on the nature of this "Middle Jomon type" of subsistence-settlement systems, very few scholars have discussed the mechanisms of this development. The results of the settlement pattern analysis presented above indicate that interregional population movements may have been its cause. In this possible scenario, the system change in Area II can be explained within the context of the collector–forager model. However, the population movement from Area II to III and the resulting changes in the subsistence-settlement systems in Area III should be considered as historically unique events (i.e., these events occurred only as a result of a series of preceding events and regionally specific conditions). In this regard, this case study not only confirms the utility of the collector–forager model, but it also demonstrates the possible use of Jomon data to expand the original model (for theoretical implications of this case study, see Habu 2002b).

Discussion

In summary, the results of this case study indicate that intersite variability in lithic assemblages and site size, as well as site distribution patterns from the Moroiso phase, are generally consistent with those of collectors with seasonal moves, with the exception of settlement patterns from the Moroiso-c subphase of southwestern Kanto, which may represent the forager system. Since the hypothesis used in this analysis is based on several assumptions, further analysis will be necessary in order to investigate the general characteristics of the subsistence-settlement systems of the Moroiso-phase people, as well as the interrelationships between environmental changes and the possible collapse of logistically organized subsistence-settlement systems in southwestern Kanto. Nevertheless, currently available data indicate that the Moroiso-phase people were not fully sedentary. In other words, the analysis did not support the interpretation suggested by Wajima (1948; 1958) and other scholars that the people of the Jomon period were fully sedentary. The case study also demonstrated that, with its large body of archaeological data, Jomon settlement studies could contribute to the sophistication of archaeological models of hunter-gatherer behavior.

In order to determine whether the Moroiso-phase example represents a typical Jomon settlement pattern, further analysis of data from other phases and other regions will be necessary. Although detailed analyses of data from other phases have yet to be conducted, I would like to present preliminary results of site size analysis using data from three other phases. Figure 4.15 shows site size variability among dwelling sites from the Moroiso phase and three other phases of the Middle and Late Jomon periods in the Kanto region: the Katsusaka, Kasori-E, and Horinouchi phases. In this figure, site size is measured by the total number of pit-dwellings from each site. Unfortunately, lithic assemblage data from these phases are not available at this time. However, as shown in this figure, the site size data of these phases exhibit similar patterns. Based on these results, I suggest that in terms of site size variability, the Moroiso-phase case is not an anomaly among settlement pattern data from various Jomon phases.

At the same time, I believe my conclusions that the Moroiso-phase people were not fully sedentary should not automatically be generalized to all other phases of the Jomon period. Analyses of changes through the

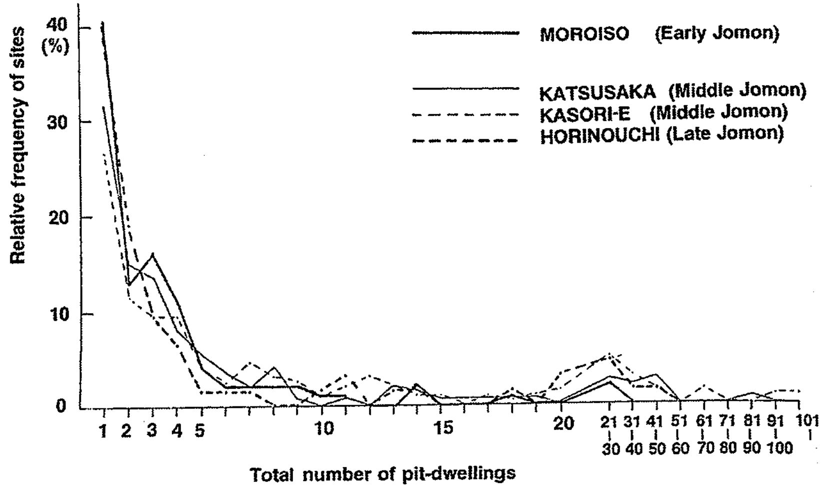

Figure 4.15 Comparison of site size variability between phases (modified and redrawn from Habu 1989b: 86; raw data from Nihon Kokogaku Kyokai 1984)

Moroiso phase indicate that the settlement systems could change significantly in a fairly short time, even within a single phase. Furthermore, the results of recent excavations have revealed that the regional and temporal variability of the Jomon culture was far more diverse than archaeologists had once assumed.

Case Study 2: The Sannai Maruyama site and its place in regional settlement systems

As I stated in the previous section, the case study described above does not necessarily draw a picture of a "typical" Jomon settlement pattern, because the Moroiso-phase data represent only a small part of the rich Jomon database. Furthermore, many Japanese researchers think that the assumption of Jomon sedentism should be tested against Middle Jomon data, not the Early Jomon data, since the relative abundance of extremely large settlements is particularly characteristic of the Middle Jomon period in the Tohoku, Kanto, and Chubu regions. In other words, reexamination of the traditional assumption of Jomon sedentism should ideally include systematic analyses of Middle Jomon large settlements.

The recent excavation of the Sannai Maruyama site in Aomori Prefecture (fig. 1.1; for site location see fig. 4.16) provides us with an excellent

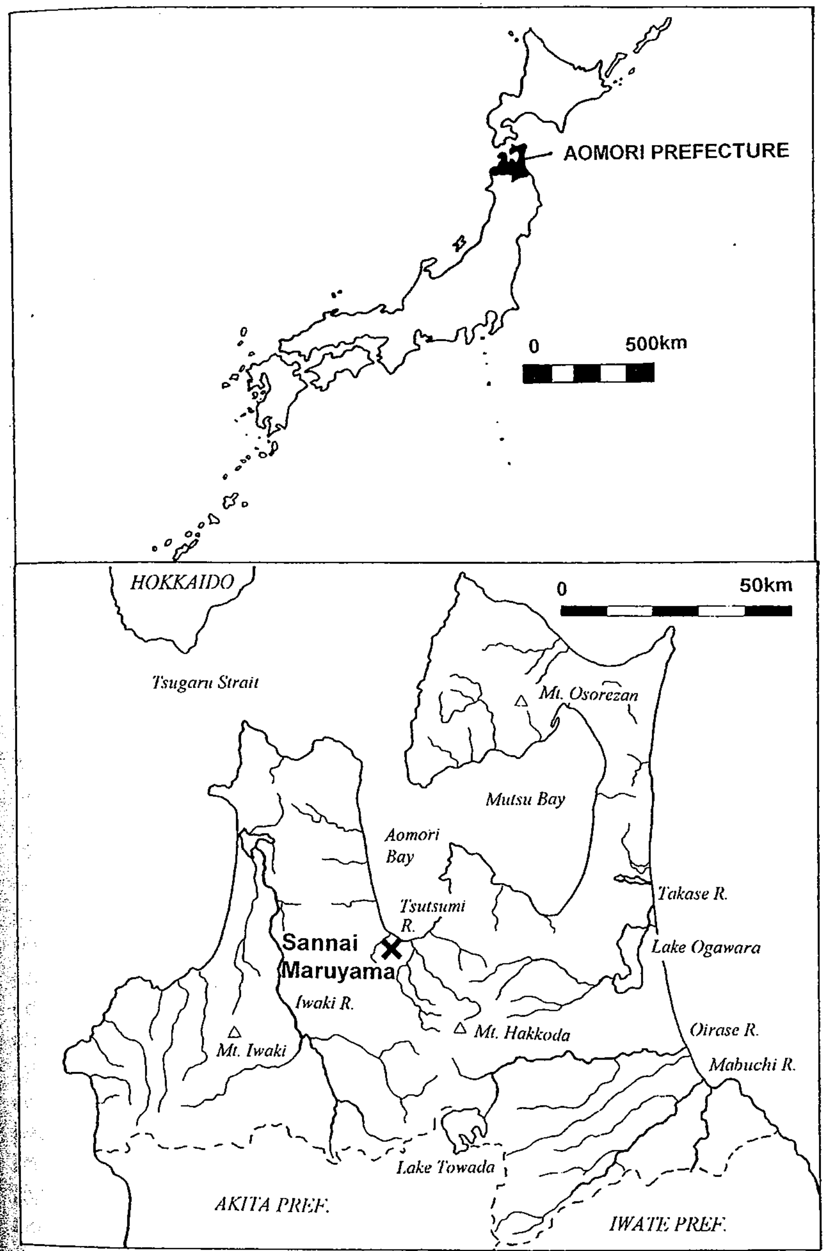

Figure 4.16 The locations of Aomori Prefecture (upper) and the Sannai Maruyama site (lower)

opportunity to examine the degree of sedentism of the Middle Jomon people in relation to site size. As mentioned in the first chapter, Sannai Maruyama is an extremely large site dated to the Early and Middle Jomon periods. The site area was originally planned as a baseball stadium, but the presence of numerous features and artifacts in the site, revealed through salvage excavations prior to the construction of the stadium, made the governor of the prefecture decide that the stadium construction should be halted for the sake of preserving the site. Subsequent test excavations indicated that the site area extends outside the Stadium Area. To date, more than 700 pit-dwellings, as well as numerous other features including long-houses, grave pits, burial jars, and "circular stone burials," have been recovered. It is currently one of the major tourist spots in Aomori Prefecture.

Overview of the Sannai Maruyama site

Figure 4.17 illustrates various excavation areas of the Sannai Maruyama site. These excavations were conducted by the Board of Education of Aomori Prefecture and the Board of Education of Aomori City from 1977 to 1999. Prior to these excavations, part of the Stadium Area was excavated by Keio University between 1953 and 1958. The two sections shaded with oblique lines (the West Parking Lot Area and the Chikano Area) indicate areas excavated during the 1970s. The excavation of the West Parking Lot Area (Aomori-ken Kyoiku Iinkai 1977) revealed the presence of fifty-six grave pits aligned in two rows in the east–west direction. The Chikano Area, on the lower right-hand corner of the figure, was originally identified as a separate site (Aomori-ken Kyoiku Iinkai 1977) but is now considered to be part of the Sannai Maruyama site complex. The coarse dots indicate areas excavated as CRM projects from 1992 to 1994 (Aomori-ken Maizo Bunkazai Chosa Center 1994a; 1994b; 1995; Aomori-ken Kyoiku-cho Bunka-ka 1996b; 1997b; 1998a; 1998b; 2000b; 2000c; 2000d; Aomori-shi Kyoiku Iinkai 1994; 1996). 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. Finally, the areas shaded with fine dots or marked in black (Excavation Areas nos. 1–19 in fig. 4.17) represent a series of test excavations conducted after the preservation of the site was declared (i.e., during and after 1995) (Aomori-ken Kyoiku-cho Bunka-ka 1996a; 1997a; 1997b; 1998c; 1998d; 1999; 2000a; 2001; 2002a; 2002b). The primary purposes of these test excavations were to identify the areal extent of the site, and to obtain more data for intrasite spatial pattern analyses.

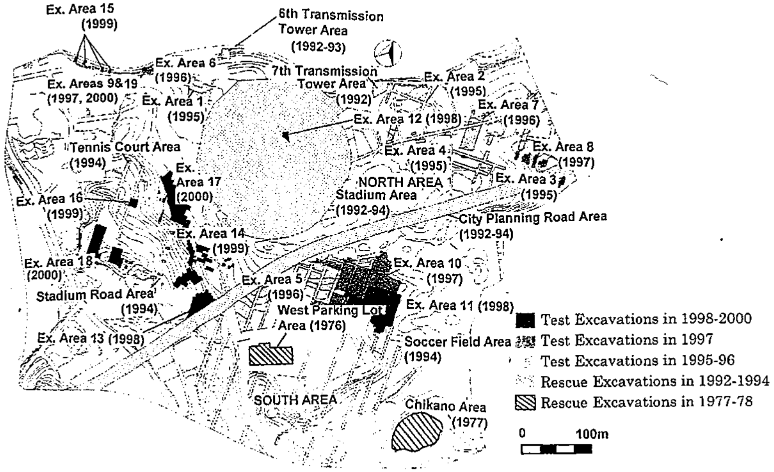

Figure 4.17 Excavation areas at the Sannai Maruyama site (modified from Aomori-ken Kyoiku-cho Bunka-ka 1998d: 12; permission for reproduction obtained from Aomori-ken Kyoiku-cho Bunka-ka)

Among these excavations, the excavation of the Stadium Area revealed particularly high concentrations of features and artifacts. Figure 4.18 illustrates the distribution of features recovered within the Stadium Area. Within this area alone, more than 500 pit-dwellings have been identified. Several clusters of features are illustrated in this figure: Early Jomon pit-dwellings are primarily clustered on the west side of the Northern Valley Midden, whereas Middle Jomon pit-dwellings are distributed throughout the Stadium Area. Middle Jomon grave pits and burial jars are located in the northeastern part of the area, and three clusters of "raised-floor buildings" can be identified in the center, northwest, and southwest quadrants (Okada 1995a). A "raised-floor building" refers to a set of six postmolds that are placed in a rectangular plan. Since there is no clear evidence of a floor associated with any of these features, most archaeologists assume that the floors of these features were constructed above the ground surface and supported by posts driven into the ground (see Miyamoto 1995).

One of these six postmold features recovered from the northwestern part of the Stadium Area was associated with particularly large postmolds. Each of the six postmolds was about 1.8 meters in diameter and more than 2 meters deep (fig. 4.19). Because the postmolds were so deep, the bases of the wooden posts were preserved. They were approximately 75 to 95 centimeters in diameter and were identified as chestnut (Okada 1995a). Some scholars suggest that these were ceremonial wooden poles such

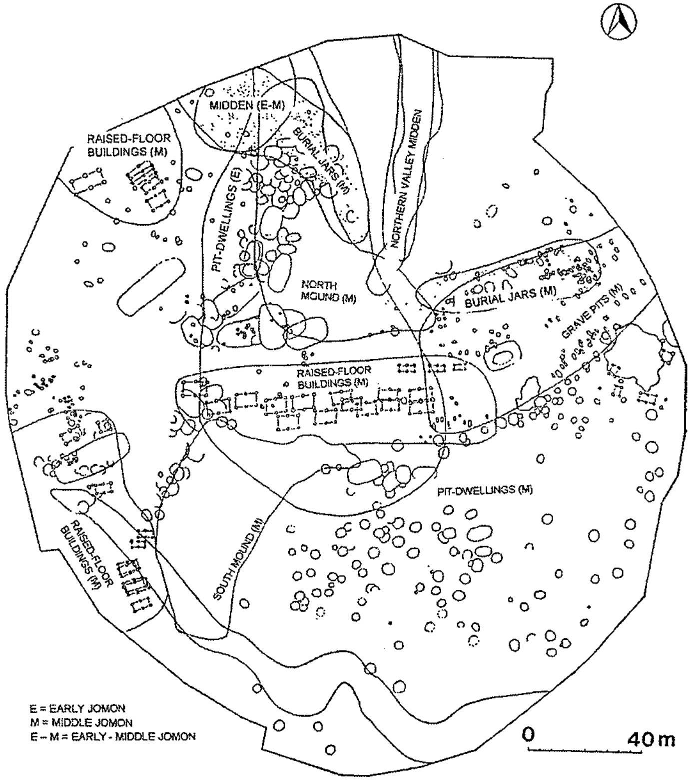

Figure 4.18 Distribution of features at the Stadium Area, the Sannai Maruyama site (from Okada and Habu 1995)

as totem poles (e.g., T. Kobayashi 2000: 156–163). Many others (e.g., Okada 1995a), however, believe that the posts represent the remains of a raised-floor building with a heavy superstructure (see Miyamoto 1995), possibly a tower. Following this suggestion, the feature was reconstructed as a 17-meter tower at the site near the original location.

The Northern Valley Midden indicated in the upper part of fig. 4.18 is a waterlogged midden in which a large number of potsherds as well as abundant faunal and floral remains were recovered. The majority of these are dated to the Early Jomon period, although the midden itself continued to be used until the beginning of the Middle Jomon period. A similar kind of midden deposit has also been identified along the northwestern edge of the site, such as the Sixth Transmission Tower Area and Excavation Area 6 (see fig. 4.17). The South and North Mounds are dated to the

Figure 4.19 Features associated with six large posts (photograph provided by courtesy of Aomori-ken Kyoiku-cho Bunka-ka)

Middle Jomon period. Although these are called "mounds," the primary nature of these features is probably also middens, since a large number of potsherds have been recovered from the mounds. Unlike the Northern Valley Midden, however, the organic remains in these mounds are poorly preserved. A similar feature from the Middle Jomon period called the West Mound has been identified in Excavation Area 17.

The artifact assemblage excavated from the Sannai Maruyama site also is probably the largest of any of the Jomon sites. From the Stadium Area alone more than 40,000 cardboard boxes (approximately 40 × 30 × 25 cm) of archaeological remains were excavated (Okada 1995b; 1997). Since the average quantity of artifacts excavated from all the other CRM projects within Aomori Prefecture per year fills between 800 and 1,000 cardboard boxes (Okada 1997), it is apparent that the quantity recovered from Sannai Maruyama is extraordinary. It is estimated that these artifacts are only a small portion of all the artifacts contained within the site. The majority of the excavated artifacts are potsherds. In particular, the accumulation of potsherds in the Northern Valley Midden and the South and North Mounds was extremely dense. In addition, approximately

1,500 clay figurines or figurine fragments (Ogasawara and Katsuragi 1999) have been recovered. Lithic tools recovered from the site include various kinds of hunting and food-processing tools, such as arrowheads, stemmed scrapers, grinding stones, and stone mortars. An abundance of artifacts made from organic materials, such as bone and wood, is also a characteristic of the artifact assemblage of Sannai Maruyama (Aomori-ken Maizo Bunkazai Chosa Center 1995). The majority of these organic remains were recovered from Early Jomon waterlogged middens. Various types of bone and ivory tools and ornaments, as well as wooden containers, lacquerware, basketry, cordage, and textiles, were recovered (Okada 1995a; Ozeki 1996). Finally, the abundance of exotic materials such as jade, amber, asphalt, and obsidian, in contrast to the paucity of these materials at other sites, is also a characteristic of the Sannai Maruyama site (Okada 1995a).

Chronological studies of pottery excavated from the site indicate that the site was occupied through twelve consecutive phases. They are, from the oldest to the youngest, the Lower-Ento-a, -b, -c, and -d (Early Jomon), Upper-Ento-a, -b, -c, -d, and -e, Enokibayashi, Saibana, and Daigi 10 (Middle Jomon). Based on traditional Jomon chronology, the site occupation duration was first estimated to have been from 5500 to 4000 bp (ca. 6300–4500 cal BP) (Okada 1995a; 1995b; 1997). Results of recent AMS radiocarbon dates from the site (M. Imamura 1999; Tsuji 1999; Toizumi and Tsumura 2000) indicate that the occupation of the site spanned approximately 5050 to 3900 bp (ca. 5900–4400 cal BP) (fig. 4.20). Using a computer simulation, Mineo Imamura (1999) has calculated the probability distribution of calibrated dates per ten years for each phase (fig. 4.21).

Because of the long occupational span, no scholar believes that all 700 pit-dwellings were occupied simultaneously. Okada (1995b) estimates the number of simultaneously occupied pit-dwellings to have been between 40 and 50, and, at one point in the Middle Jomon period, as many as 100. He also assumes that the average number of people in each pit-dwelling was probably 4 or 5, and suggests that approximately 200 to 500 people occupied the site continuously for over 1,500 years. Other researchers agree that the population of Sannai Maruyama could have been as large as 500 or more (see e.g., Koyama 1995; Obayashi et al. 1994; but contra M. Yamada 1997).

Analyses of faunal and floral remains from the site provide us with useful information regarding the subsistence activities of the site residents. Nishimoto (1995), who analyzed faunal remains from the Sannai Maruyama site, reports that the faunal assemblage from the site is characterized by an abundance of fish, birds, and small terrestrial mammals.

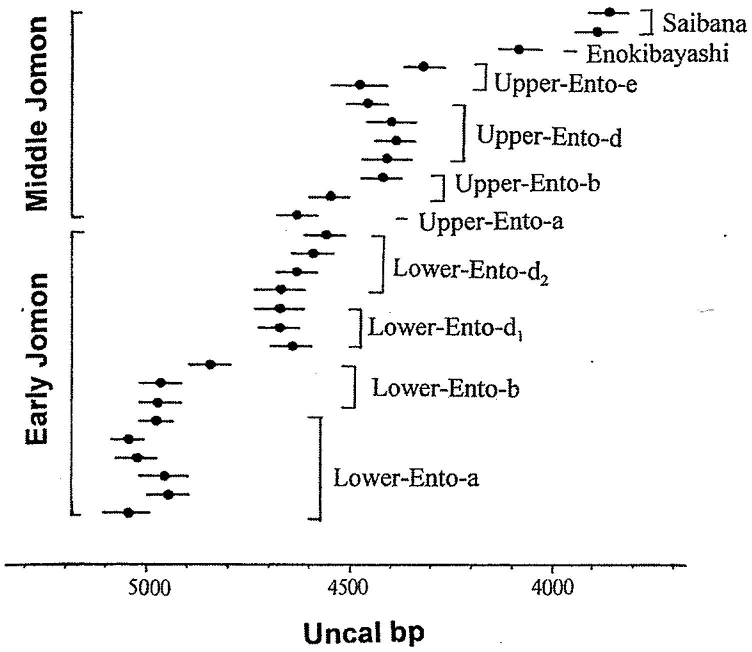

Figure 4.20 Uncalibrated ^{14}C dates from the Sannai Maruyama site. Each dot represents one sample. The line indicates the one sigma range for each sample. The Lower-Ento-d phase is subdivided into d_1 and d_2 phases. No ^{14}C dates are currently available from Lower-Ento-c, Upper-Ento-c, and Daigi 10 phases (modified and redrawn from Tsuji 1999: 36).

For example, based on the minimum number of individuals (MNI), more than half of the terrestrial mammal assemblage from the Sixth Transmission Tower Area (see the north edge on fig. 4.17) consists of *Lepus* (rabbit) and *Petaurista leucogenys* (flying squirrels) (Nishimoto 1998). This is in sharp contrast with most other Jomon sites, where *Cervus nippon* (sika deer) and *Sus scrofa* (wild boar) are the two most commonly reported terrestrial mammals. Nishimoto (1995) presents a hypothesis that the Sannai Maruyama hunters had to hunt primarily rabbits and flying squirrels despite their low meat content since both deer and boar in this region had been overexploited.

Analysis of fish remains recovered from the Sixth Transmission Tower Area presented by Toizumi (1998) indicates that, in terms of MNI, fish remains retrieved with a 4 mm mesh screen and those collected

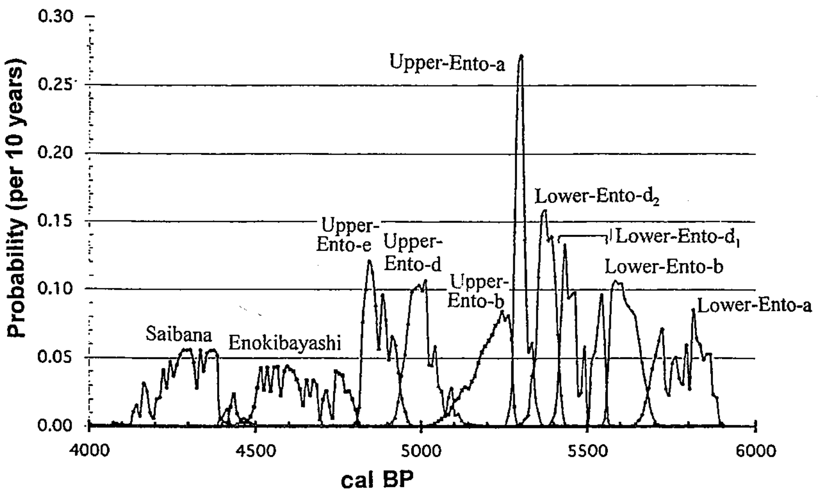

Figure 4.21 Probability distribution of calibrated dates for each phase (modified from Mineo Imamura 1999: 30; permission for reproduction obtained from Mineo Imamura)

by excavators during the fieldwork are characterized by an abundance of *Seriola* (yellow tail), Pleuronectidae (flatfish), Tetraodontidae (blowfish), *Scomber* (mackerel), Scorpaenidae (scorpion fish), *Clupea* (herring), Embiotocidae (surf perch), and Monacanthidae (file fish). In terms of the total numbers of vertebrae, the common presence of Chondrichthyes (cartilaginous fish), 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). Nishimoto (1995) suggests that, while various kinds of faunal remains have been identified, the total quantity of faunal remains found at the site does not seem to be enough to support the site residents throughout the year. Accordingly, the importance of plant food should be considered seriously.

Macro floral remains identified from the Sannai Maruyama site are characterized by an abundance of nuts, such as *Castanea* (chestnut) and *Juglans* (walnut), and various kinds of fruit seeds, such as *Rubus* (raspberry), *Sambucus* (elderberry), *Morus* (mulberry), and *Vitis* (wild grape)

(Minaki 1995; Tsuji 1997a; Minaki, Saito, and Tsuji 1998; Minaki, Tsuji, and Sumita 1998). The majority of these floral remains were recovered from waterlogged Early Jomon middens, and are not carbonized. Minaki (1995) notes that the majority of walnut remains are husks, most of which are fragments and often have traces of processing in the form of hammering marks. An abundance of berries, particularly of elderberry and mulberry, has been interpreted as an indication of the brewing of fruit wine by the site residents (Minaki 1995; Tsuji 1997a; 1998). The common presence of chrysalides of Drosophilidae (fruit fly) in the concentration of these plant seeds (Y. Mori 1998a; 1998b; 1999), indicating the fruits were in the process of fermentation when they were discarded, also seems to support the fruit wine hypothesis.

Results of pollen analyses (Tsuji 1997a; Yasuda 1995; Yoshikawa and Tsuji 1998) also provide insights into understanding changes in not only the vegetation surrounding the site but also the use of plants by the site residents. According to Yoshikawa and Tsuji (1998), who analyzed pollen data from the Sixth Transmission Tower Area, chestnut pollens increased significantly at the time of the beginning of the site occupation (i.e., during the Lower-Ento-a phase) and became dominant by the time of the Lower-Ento-b through -d phases. This change seems to have been accompanied by the decline of the deciduous forest and the development of secondary vegetation near the site. Tsuji (1996) suggests that the chestnut forest, which originally developed as a result of clearing the landscape for human habitation, may have been later tended or managed by the site occupants because of its usefulness as food/lumber/fuel resources. He believes that the chestnut forest continued to dominate the landscape from the beginning of the site occupation up to at least the Upper-Ento-e phase in the middle of the Middle Jomon period. It should be mentioned, however, that pollen data provided by Yasuda (1995) indicate that the amount of chestnut pollen may have fluctuated significantly over the 1,500 years of site occupation.

The possibility of chestnut cultivation/domestication has also been suggested by Sato and Yamanaka (Y. Sato 1997; 1998; Y. Sato et al. 2003; Yamanaka et al. 1999) through DNA analyses of chestnut remains recovered from the site. According to their analyses, genetic diversity of neutral mutations (*sensu* Kimura 1968) such as isozymes and DNA fingerprint types among excavated chestnut seeds was remarkably low in comparison to that found in the wild chestnut population. Citing their previous DNA studies on rice and barley, these researchers suggest that the reduction of genetic diversity of neutral mutations is a typical occurrence in the course of domestication. Similar DNA analysis conducted on walnut remains from the Sannai Maruyama site (Kiyokawa 2000) indicates that the reduction of genetic diversity is not noticeable among walnut remains from the site.

In addition to nuts and fruit seeds, possible cultigens such as *Lagenaria* (bottle gourd), Leguminosae (bean), and *Arctium* (burdock) have also been identified (Minaki 1995; Tsuji 1996), although the quantity of these remains is extremely small. Bottle gourd seeds have been recovered from many Jomon sites, including the Early Jomon Torihama shell-midden (Fukui Prefecture) and the Early Jomon Awazu shell-midden (Shiga Prefecture). Since bottle gourds are not indigenous in the Japanese archipelago, they are believed to have been introduced from mainland Asia as a cultigen (Yoshizaki 1995). However, they were probably valued for their use as containers rather than as food. Bean remains have also been reported from many Jomon sites, but their identification has been controversial. While many of the bean remains were initially identified as green gram (*Vigta radiata*), which is a cultigen, subsequent studies indicate that it is difficult to distinguish green gram from other domesticated beans, such as *Azukia angularis* (azuki bean) and *Glycine max* (soybean), and from wild beans, such as *Azukia angularis* var. *nipponensis* (*yabutsuru azuki* in its Japanese common name), *Glycine soja* (*tsuru-mame*; wild soybean), and *Amphicarpaea edgeworthii* (hog peanut) (Yoshizaki 1995).

Finally, microscopic analysis of the clay of Middle Jomon potsherds excavated from the site revealed the presence of phytoliths of *Echinochloa crusgalli* (barnyard grass) (Fujiwara 1998), although its relative importance in the diet of the Sannai Maruyama people has been questioned (Yasuda 1995). *Echinochloa* seeds have also been reported from many sites, including the Incipient Jomon Nakano B site, the Early Jomon Hamanasuno site, and the Middle Jomon Usujiri B site in Hokkaido (Takahashi 1998), as well as from the Middle Jomon Tominosawa site in Aomori Prefecture (Yoshizaki and Tsubakisaka 1992). Yoshizaki (1995) points out that many of the *Echinochloa* seeds from these sites are larger than regular *E. crusgalli* seeds and suggests the possibility of semicultivation. Some ethnobotanists suggest that the transition from wild *E. crusgalli* to cultivated *E. utilis* (barnyard millet) occurred somewhere in northeastern Eurasia, possibly in the Japanese archipelago (e.g., Sadao Sakamoto's statement in Sasaki and Matsuyama 1988: 366).

Conventional interpretation of the site

The general picture of the Sannai Maruyama site emerging from the above description is that of a large settlement occupied by a group of

extremely "affluent" hunter-gatherers, who may have carried out a little plant cultivation, for over 1,500 years. Because of its large size, many researchers have suggested that residents of the Sannai Maruyama site were fully sedentary, occupying the site throughout the year. For example, Okada (1995a; 1995b), who directed the Stadium Area excavation and who is presently the head archaeologist of the Preservation Office of the Sannai Maruyama Site (Sannai Maruyama Iseki Taisaku-shitsu; a branch office of the Cultural Affairs Section of the Agency of Education of Aomori Prefecture), suggests that the major characteristics of the site can be summarized by three key words: "large," "long," and "abundant." He suggests that all of these characteristics reflect the affluence of the lifeways of the site residents, and that the affluence was established on the basis of long-term full sedentism. Based on his intrasite spatial analysis, Okada also suggests that, because similar types of feature tend to form clusters, the location of different types of feature must have been determined under strict social control with long-term planning. Since potsherds from twelve successive phases (Early Jomon Lower-Ento-a, -b, -c, -d, and Middle Jomon Upper-Ento-a, -b, -c, -d, -e, Enokibayashi, Saibana, and Daigi 10 phases) are present at the site, Okada (1995a) suggests that the site was continuously occupied by several hundred people for approximately 1,500 years.

Koyama (1995) supports other scholars' suggestions that the site population was over 500, and suggests that this number is much larger than the population of a typical "band society" such as the Australian Aborigines and the Great Basin Shoshone. Citing ethnographic records, Koyama points out that large settlements that are similar to Sannai Maruyama are common among hunter-gatherers of the Northwest Coast of North America, where there was social differentiation between the nobles, commoners, and slaves. He also suggests that the North and South Mounds may have had a ceremonial or religious function, and that the extraordinarily large quantity of pottery and artifacts recovered from these mounds is not just debris but it may reflect some kind of ceremonial activity conducted at the mounds.

On the basis of currently available data, Koyama (1995) presents visual images of the Sannai Maruyama settlement in several drawings. In one of the drawings, the South and North Mounds are reconstructed as large trapezoidal mounds with stairways resembling the Mississippian mounds in Cahokia. According to his interpretation, the row of raised-floor store houses in the drawing represents an abundance of stored food and/or valuable goods, such as lacquerware, for exchange in long-distance trade. A long-house, which he suggests was either a shrine, communal house, or the residence of the chief, is painted with red and black, the two colors that the Jomon people used for the decoration of lacquerware and pottery. The overall image of the life of the site residents is quite sophisticated, and the advanced nature of Jomon technology and culture is emphasized.

Complexity in site structure

The images of extremely "affluent," fully sedentary hunter-gatherers occupying the site for over 1,500 years have strongly appealed not only to many archaeologists but also to the media and to the general public (Habu and Fawcett 1999). However, detailed examination of currently available data from the site suggests that the interpretation of the site may not be as straightforward as one might think (Habu et al. 2001).

It should be emphasized that there are apparent changes in the number of pit-dwellings and other kinds of features, as well as in intrasite feature distribution patterns, over time. Because these changes are quite significant, reconstructing the general picture of the site without specifying a particular occupational phase would tell us little about the lifeways of the site residents. According to Okada (1998a), in terms of feature distribution, pit-dwellings and other features from the Early Jomon period (the Lower-Ento-a, -b, -c, and -d phases) are located primarily within the central and northern parts of the Stadium Area (see fig. 4.18). By the early Middle Jomon period (the Upper-Ento-a, -b, and -c phases), 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 during the middle of the Middle Jomon period (the Upper-Ento-d, Upper-Ento-e, Enokibayashi, and Saibana phases) outside the Stadium Area (see fig. 4.17). For example, the majority of pit-dwellings recovered from Excavation Areas 10 and 11, which are located immediately southeast of the Stadium Area, are dated to the Upper-Ento-d and -e phases (Hata 1998). Finally, the size of the settlement shrank dramatically at the end of the Middle Jomon period (the Daigi 10 phase, which is the last phase of the Middle Jomon period) (Okada 1998a). Thus, despite his interpretation of Sannai Maruyama being an extremely large settlement over 1,500 years, Okada acknowledges significant changes in intrasite spatial patterns through time.

Given the evidence of changes through time, I suggest that the image of a large settlement associated with an extremely large number of pit-dwellings may apply to the middle of the Middle Jomon period, but not necessarily to the other phases. Furthermore, to make things complicated, currently available faunal and floral data from the site are largely restricted to those from Early Jomon waterlogged layers. The preliminary results of faunal and macro floral analyses described above are based on the results

from two middens, the Northern Valley Midden and the midden at the Sixth Transmission Tower Area, both of which are dated primarily to the Early Jomon period. In other words, results of faunal and floral analysis should not be considered fully representative when we discuss subsistence strategies of the site residents during the Middle Jomon period (i.e., the height of prosperity for the Sannai Maruyama in terms of the number of associated pit-dwellings). Faunal and floral data are invaluable sources of information as long as we keep in mind the time period with which they are associated.

Alternative approaches

To find alternative approaches, I suggest that we should go back to the collector–forager model described in the first chapter and think how we can examine subsistence and settlement practice at Sannai Maruyama within this context. In both Okada's (1995a; 1995b; 2003) and Koyama's (1995) interpretations, the large site size, the long occupational span, and the abundance of artifacts are the primary lines of archaeological evidence to suggest long-term full sedentism. However, from the perspective of hunter-gatherer studies and the collector–forager model, this interpretation is not necessarily convincing. Ethnographic examples of hunter-gatherers from California, the Northwest Coast of North America, and the Arctic indicate that large site size itself does not necessarily imply full-year occupation. As indicated in the first chapter, many hunter-gatherers with large settlements are relatively sedentary collectors, occupying large residential bases in a particular season of the year (often in the winter), while still moving their residential bases to other places in the rest of the year (see fig. 1.6). In most cases, large, seasonal residential bases are reoccupied on a multi-year basis; i.e., people came back to the same site every year in a particular season (or seasons) and reoccupied or rebuilt houses and other features (Binford 1982). As a result, in terms of typological chronology of associated artifacts, it may look as if these sites were occupied continuously. In other words, in order to determine whether a particular site was occupied by fully sedentary collectors or seasonally sedentary collectors, examination of several lines of evidence is required.

Changes in the number of pit-dwellings The first step in understanding the settlement systems of the Sannai Maruyama residents is to understand changes over time in site characteristics so that data from different phases are not mixed up when they are being interpreted. In this regard, changes in the number of pit-dwellings from each phase show

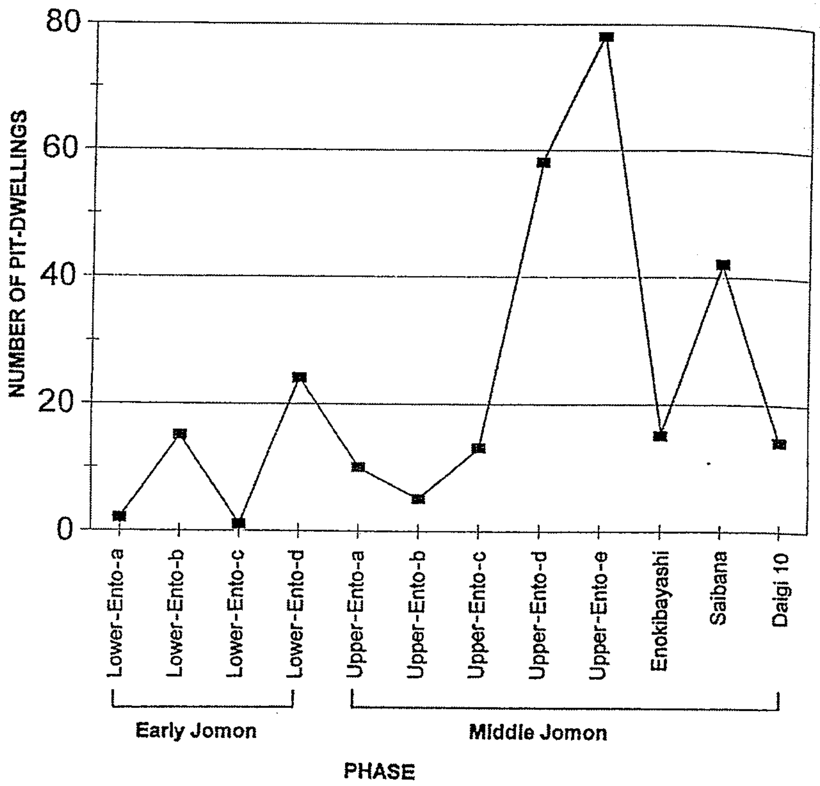

Figure 4.22 Changes in the number of pit-dwellings at Sannai Maruyama (from Habu et al. 2001: 14)

an interesting trend. Figure 4.22 indicates changes in the number of pit-dwellings identified in each phase (Habu et al. 2001; the original data illustrated in the figure were presented by Sannai Maruyama Iseki Taisaku-shitsu 1999). When possible, a specific phase was assigned to each pit-dwelling on the basis of the typological classification of associated pottery. Unfortunately, less than half of the 700 pit-dwellings were available for this analysis, since associated artifacts from the other pit-dwellings were either not diagnostic enough or they were 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 as many of the pit-dwellings from the same phase overlap. In other words, the number of pit-dwellings in the figure does not

represent absolute population levels. Rather, the number should be seen as a possible reflection of general trends in the increase and decrease in the number of associated dwellings (Habu et al. 2001).

From this graph, several interesting characteristics can be observed. First, in terms of the number of pit-dwellings, only two phases, Upper-Ento-d and Upper-Ento-e, are associated with more than fifty pit-dwellings. In other words, for the other ten phases we have no archaeological evidence to support the image of a large settlement associated with more than fifty pit-dwellings. Second, a rapid increase in the number of pit-dwellings from the Upper-Ento-c to Upper-Ento-d phases is apparent. This may reflect major changes in site function from the earlier to the later phases of site occupation. Third, the line graph does not form a smooth and gradually increasing curve but instead is characterized by several decreases followed by sharp increases. This suggests that the size of the Sannai Maruyama settlement, measured by the number of associated pit-dwellings, not only changed through time but may also have fluctuated significantly.

Changes in dwelling size Second, changes over time are also evident in terms of variability in the size of pit-dwellings. Figure 4.23 illustrates changes through time in pit-dwelling size variability measured by long-axis length. Data from the Lower-Ento-a and Lower-Ento-c phases are currently unavailable. Nevertheless, several trends are evident. First, the two Early Jomon phases represented in this figure (i.e., Lower-Ento-b and -d) are characterized by a relatively wide diversity in dwelling size. If we exclude pit-dwellings of more than 10 meters in length, which are usually classified as long-houses and are considered to have been communal houses, the plots are scattered primarily between 2.5 and 7 meters, but with no apparent concentrations. In other words, if we tentatively classify plots as small (less than 4 m in length), medium (4–6 m), and large (more than 6 m), we find roughly equal numbers of pit-dwellings in each category. In contrast, many of the pit-dwellings from the Middle Jomon period are relatively small, the length of the long axis being between 2.5 and 4 meters. This pattern is particularly characteristic of the Upper-Ento-d, -e, and Enokibayashi phases, from which more than 80 percent of pit-dwellings measure less than 4 meters along the long-axis length. The difference between the Early and Middle Jomon periods is also apparent from table 4.3.

The small size of pit-dwellings from the Upper-Ento-d and -e phases at Sannai Maruyama does not imply that the pit-dwelling size in this region was generally small during this time period. According to Okada (1998b), the majority of Upper-Ento-e pit-dwellings at Sannai Maruyama measure

Table 4.3 *Changes in the average length of the long axis of pit-dwellings from each phase*

Phase[1]	Mean of long-axis length (SD)[2]
Saibana (n = 13)	3.94 (± 1.04)
Enokibayashi (n = 10)	3.31 (± 0.89)
Upper-Ento-e (n = 32)	3.62 (± 0.82)
Upper-Ento-d (n = 30)	3.42 (± 0.54)
Lower-Ento-d (n = 12)	5.23 (± 1.79)
Lower-Ento-b (n = 13)	4.80 (± 1.58)

Notes:
[1] Phases with n < 10 are excluded.
[2] Excluding pit-dwellings the long axes of which measure more than 10 m.
Sources: Data were compiled from Aomori-ken Maizo Bunkazai Chosa Center 1994a, and Aomori-ken Kyoiku-cho Bunka-ka 1998b; 2000b; 2000c (modified from Habu 2002c:171).

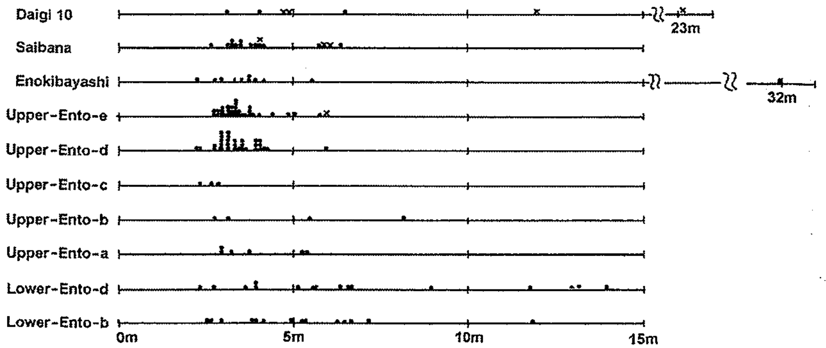

Figure 4.23 Changes in the long-axis length of pit-dwellings at Sannai Maruyama (data compiled from Aomori-ken Maizo Bunkazai Chosa Center 1994a, and Aomori-ken Kyoiku-cho Bunka-ka 1998b; 2000b; 2000c, modified from Habu 2002c: 171)

less than 10 square meters in floor area. These pit-dwellings correspond roughly to pit-dwellings with less than 4 meters in long-axis length as shown in fig. 4.23. On the other hand, measurement of floor areas of Upper-Ento-e pit-dwellings at the Tominosawa site, another large Middle Jomon settlement in Aomori Prefecture (Aomori-ken Maizo Bunkazai Chosa Center 1992a; 1992b), indicates that pit-dwellings at Tominosawa include larger ones, 10–30 square meters in floor area (see figure 1 in

Okada 1998b). This may imply that the difference in pit-dwelling size between these two sites reflects different site function.

Changes in lithic assemblages Third, changes over time are also evident through the examination of lithic assemblage data. Figure 4.24.1 through 5 shows the percentages of eleven categories of lithic tools associated with each phase. These data were taken from pit-dwellings dated to each phase with the exception of the data for Lower-Ento-a (fig. 4.24.1; see the caption to the figure). The eleven categories of stone tools are: (1) arrowheads (ARH), (2) stemmed scrapers (SSC), (3) awls (AWL), (4) semi-circular chipped stone tools (SSC), (5) polished stone axes (PAX), (6) pebble tools (PBL), (7) stone mortars (MTR), (8) grinding stones (GRD), (9) net sinkers (NSK), (10) ornaments (ORN) and (11) others (OTH).

From these graphs, significant changes through time in lithic assemblage characteristics can be observed. The lithic assemblage of Lower-Ento-a phase is characterized by an abundance of stemmed scrapers as well as arrowheads and awls (fig. 4.24.1). Assemblages from the following Lower-Ento-b, Lower-Ento-d, and Upper-Ento-a phases are characterized by multiple peaks in the categories of arrowheads, stemmed scrapers, and grinding stones (fig. 4.24.2). The Upper-Ento-b, -c, and -d phases, on the other hand, are characterized by an abundance of grinding stones (fig. 4.24.3). Finally, the latter part of the site occupation from the Upper-Ento-e to Daigi 10 phases is generally characterized by a single peak of arrowheads (fig. 4.24.4) with the exception of the Saibana phase (multiple peaks in arrowheads, mortars, and grinding stones: fig. 4.24.5).

A life history of the Sannai Maruyama site: a model

The data analysis presented here is preliminary, since it is based on only the published results of the previous site excavations. Nevertheless, from these three lines of evidence it is apparent that the "life history" of the site may have been quite complex. In other words, we cannot assume that the function of the site remained the same over the 1,500 years of its use.

Rather than assuming a large, monofunctional settlement gradually developing and declining over 1,500 years, I suggest that the Sannai Maruyama site represents a palimpsest of multiple occupations over a long period, each of which was characterized by a different subsistence-settlement system. While the amount of currently available data is not sufficient to provide a conclusive statement regarding *the* life history of the site, I suggest that the occupational span of the site can be tentatively

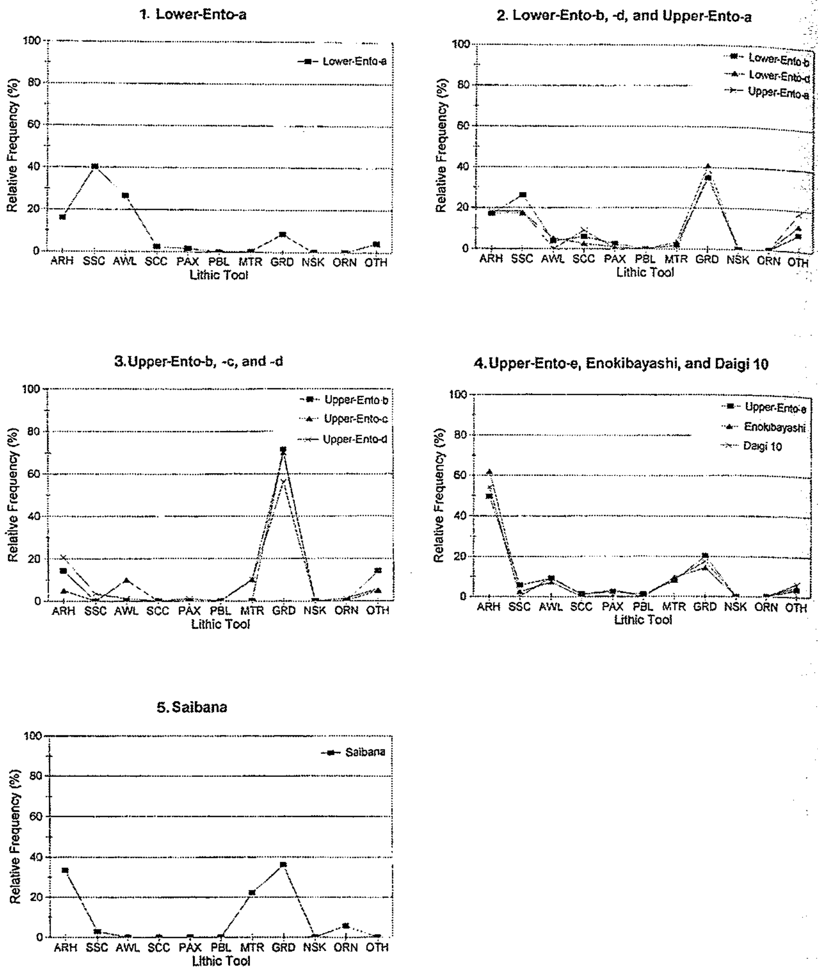

Figure 4.24 Relative frequencies of lithic tools for each category for each phase at Sannai Maruyama. For the Lower-Ento-a phase, the numbers of lithic tools from Layers VIa and VIb, which are dated to this phase, were used as raw data. For the other phases, the numbers of lithic tools associated with pit-dwellings from each phase were used. (Data compiled from Aomori-ken Maizo Bunkazai Chosa Center 1994a, and Aomori-ken Kyoikucho Bunka-ka 1998a; 1998b; 2000b; 2000c, modified from Habu 2002c: 172)

divided into the following five periods. The dates assigned to these periods are approximate estimates based on Mineo Imamura (1999) (see fig. 4.21).

Period I: Lower-Ento-a phase (ca. 5900–5650 cal BP) This period is characterized by a scarcity of pit-dwellings. However, the presence of waterlogged midden deposits from this phase identified in the Sixth Transmission Tower and the Northern Valley areas, which are associated with a large number of faunal and floral remains, suggests that the site was actively utilized by the Jomon people during this phase. In order to understand the overall subsistence-settlement systems of the site residents during this phase, we need to examine further the seasonality of site occupation using several lines of archaeological evidence. As noted above, Toizumi (1998), who analyzed fish remains from this phase, reports the presence of fish taxa from all four seasons, and suggests the year-round occupation of the site. However, in fact only 5 percent of his samples is definitely winter fish, a fact that may indicate a relatively low level of activity during the winter. The scarcity of deer and boar remains from the middens associated with this phase, which was pointed out by Nishimoto (1995; 1998), may also reflect that the site was not actively used during the winter. According to H. Kaneko (1979), deer and boar hunting must have been conducted primarily during the winter, when both of these species form large groups. In other words, the scarcity of deer and boar remains does not necessarily indicate the depletion of these resources; it simply may be a result of seasonal site occupation. Given these lines of faunal evidence, and given the fact that the number of pit-dwellings associated with this phase is extremely small, I suggest that the site may have been used primarily during the spring to fall either as a special-purpose site (probably a field camp) or as a seasonal residential base of relatively sedentary collectors, with a short-term additional use in the winter.

Period II: Lower-Ento-b to -d phases (ca. 5650–5350 cal BP) Assuming that the number of features associated with the Lower-Ento-c phase was underestimated because of the problem of pottery chronology, we can say that this period was characterized by a relative abundance of associated pit-dwellings compared to the previous period. Various characteristics of the site from this period, including the types of associated features and relatively large variability in dwelling size, are similar to many other large Jomon sites that are believed to have functioned as residential bases (*sensu* Binford 1980). Given the substantial amount of labor investment to construct pit-dwellings, long-houses (the long axes of which measure more than 10 meters), and other features, it is likely that the residents of the sites were a "collector" type of hunter-gatherer as opposed to "foragers." Whether the site functioned as a residential base of fully sedentary collectors or seasonally sedentary ones needs to be further examined, however. The upper half of the waterlogged deposit of the Northern Valley midden is dated to the Lower-Ento-b phase, and the midden identified at Excavation Area 6 is dated to Lower-Ento-d phase. Both of these middens contain a large number of faunal and floral remains, but results of the analyses of these remains have not yet been published.

Period III: Upper-Ento-a to -c phases (ca. 5350–5050 cal BP) The number of associated pit-dwellings for these three phases is very small. Also, because no waterlogged midden during and after this period has been recovered, currently available faunal and floral evidence from which to infer the subsistence strategies of this period is extremely limited.

Despite the scarcity of pit-dwellings from these phases, Okada (1998a) suggests that the Upper-Ento-a and -b phases represent a rapid expansion in the settlement size compared to the Early Jomon period. This is because, when we look at the distribution of features assigned to these phases, they seem to cover a larger area than they did in the previous period. Okada also indicates that these phases are characterized by the appearance of new types of feature, which were not associated with the Early Jomon period. These features include the South, North, and West Mounds, raised-floor buildings, storage pits, burial pits, and burial jars. It should be remembered, however, that dating such features as raised-floor buildings, storage pits, and burial pits is not an easy task, since usually very few datable artifacts are associated with these features. In other words, in many cases dates assigned to these features are only rough estimates and are not based on firm archaeological evidence.

Contrary to Okada's interpretation, I suggest the possibility that the scarcity of the pit-dwellings from this period may imply that the function of the site during this period was substantially different from both previous and subsequent periods. While a fair amount of pottery and some features are definitely associated with this period, overall I found no clear evidence that the site functioned as a substantial residential base. It is also unlikely that the scarcity of pit-dwellings from this period is due to the duration of this period being shorter than the others. As indicated by radiocarbon dates, the estimated duration of Period III (approximately 5350–5050 cal BP) is no shorter than the estimated duration of other periods.

It is interesting to note that the number of Jomon sites associated with pit-dwellings from Upper-Ento-a, -b, and -c phases is relatively small within the Aomori Prefecture (Murakoshi 1998). In particular, only three sites with pit-dwellings from the Upper-Ento-b phase have been reported, none of which is a large settlement. While the amount of available archaeological data is currently limited, it seems that the subsistence-settlement systems in the Aomori area during this period were characterized by a scarcity of substantial residential bases. This may imply the presence of a forager system rather than a collector system during this period.

In terms of lithic assemblage data, the characteristics of the Upper-Ento-a phase are similar to those of the Lower-Ento-b and -d phases (fig. 4.24.2). Lithic assemblage characteristics of the Upper-Ento-b and -c phases, on the other hand, resemble those of the following Upper-Ento-d phase (fig. 4.24.3). These facts may indicate the necessity of redefining the boundaries between Periods II, III, and IV. Further analyses will be necessary in order to explain the incongruity between changes in the numbers of pit-dwellings and lithic data.

Period IV: Upper-Ento-d and -e phases (ca. 5050–4800 cal BP) Since both of these phases are associated with more than fifty pit-dwellings, this period represents the maximum site size in terms of the number of associated pit-dwellings. However, it is important to note that the majority of these pit-dwellings are small, typically measuring only between 2.5 and 4 meters in long-axis length (fig. 4.23). Furthermore, many of the pit-dwellings from this period are shallow and are associated with only a small number of postmolds. This implies that these pit-dwellings are less labor-intensive, probably constructed for short-term use (i.e., not for full-year occupation). In other words, it is very unlikely that the site functioned as a full-year residential base of fully sedentary collectors.

Although currently available archaeological data are still limited, I suggest the possibility that the site functioned as a seasonally occupied residential base and/or a trading center. An abundance of shallow, small pit-dwellings is reminiscent of summer or early fall residential bases observed among Arctic hunter-gatherers (Mathiassen 1927:133–136). Alternatively, the aggregation of a large number of people at trading centers is also commonly described in ethnographic record. For example, Spencer (1959) describes a trading center used by the Nunamiut and Tareumiut in northern Alaska as the following:

> The appearance of a trading center was everywhere the same. The people had come by prearrangement and would gather to await their partners, those from the opposite ecological setting. They unloaded their umiaks, set up their tents, the nunamiut favouring the iccellik, the tareumiut the conical skin-covered kalurvik.

> The tents were set up in rows, those from each community or grouping tending to congregate in one place. The umiyaks were drawn up on the bank, turned over to dry, and the goods for trade cached under them or placed on racks that might be especially built. In a few cases, families built a paameraq as a summer dwelling at the trading center. This was not generally done, however, unless they remained for a longer period and fished nearby. (Spencer 1959:199–200)

According to Spencer's description, the number of people who came to the trading center varied from year to year. For example, at Nerliq, one of the major trading centers in northern Alaska, the number was normally between 400 and 500 but sometimes as many as 600 people. The trade fair represented the height of the summer activities of these groups. The primary items traded between the groups were caribou hides from the inland group (Nunamiut), and seal and whale oil from the maritime group (Tareumiut). After the trading ended, games and dances were usually held for several days.

Since Sannai Maruyama is located at the head of the Aomori Bay, the location would have been ideal for such a large gathering from both the inland and coastal areas. Because of the relative abundance of exotic materials recovered from the site, including jade, amber, asphalt, and obsidian, some Japanese archaeologists have suggested the possible importance of trading activity among the site residents. While many of these exotic goods, which consist of both raw materials and artifacts, are currently dated roughly to the Middle Jomon period, determination of the exact phases these materials belong to will be helpful to examine further the possibility of Sannai Maruyama being a trade center at one point in its life history.

Period V: Enokibayashi, Saibana, and Daigi 10 phases (ca. 4800–4400 cal BP) Only a limited amount of archaeological information is available from these last three phases of site occupation. Okada (1998a) interprets these phases as the time when the site size was gradually diminishing. Data regarding the number of pit-dwellings, however, indicate that the site size in the Enokibayashi phase, measured by the total number of associated pit-dwellings, decreased dramatically relative to that in the previous Upper-Ento-e phase. The site size then increased significantly again in the Saibana phase, and declined again in the Daigi 10 phase. The slight increase in the average length of the pit-dwellings from the Enokibayashi to Saibana phases may also reflect possible differences in site function between the Enokibayashi and Saibana phases. Lithic assemblage characteristics in the Saibana phase (fig. 4.24.5) are also different from those of the other three phases in this period (fig. 4.24.4), which may indicate change in site function. In any case, by the Daigi 10 phase the size of settlement measured by the number of associated pit-dwellings had become quite small.

Future directions of research

For the moment, the interpretation presented above remains only a model. While several lines of evidence indicate the presence of certain patterns, there are still multiple ways to interpret the archaeological patterns. Nevertheless, through the discussions presented above, it became clear that the life history of the Sannai Maruyama site was much more complex than previously assumed. Given the available archaeological evidence, I suggest that the function of the site changed through time, probably between residential base and special-purpose site as defined in the collector–forager model (Binford 1980; 1982). Even if the site was functioning as a residential base throughout most of its life history, it is more likely that the primary subsistence activities conducted at the site changed significantly through time as reflected in changes in the lithic assemblages. This also implies that we cannot assume that the seasonality of site occupation and the overall subsistence-settlement systems that encompassed Sannai Maruyama remained the same during its occupational span of over 1,500 years.

Future directions of Sannai Maruyama research should include further examination of multiple lines of archaeological evidence. In particular, I suggest that the investigation of regional settlement patterns in relation to intersite variability in site size, tool assemblages, as well as faunal and floral remains, will be critical to understanding the function(s) of Sannai Maruyama. Several large Early and Middle Jomon settlements are known from the immediate vicinity of the Sannai Maruyama site. In addition, a number of smaller Jomon settlements are located within the foraging zone (approximately 10 km in radius) and the logistical zone (approximately 20 km in radius) of the Sannai Maruyama site. Many of these sites have been excavated by Aomori-ken Kyoiku Iinkai (the Board of Education of Aomori Prefecture) and other archaeological units, and the excavation results are available in the form of detailed monographs. By examining characteristics of the Sannai Maruyama site in comparison to those of other sites in its vicinity *for each phase or period* and by comparing the regional settlement patterns with general models of hunter-gatherer subsistence-settlement systems such as the collector–forager model, we will be able to infer the possible function of the Sannai Maruyama site at each phase in relation to subsistence strategies and residential mobility. Through these examinations, we will be able to discuss changes in the site function in the context of the changes in the "cultural landscape."

To suggest that Sannai Maruyama may not have been a monofunctional site, or a fully sedentary residential base throughout its life history, does not imply that I am downplaying the importance of archaeological discoveries at the site. Rather, I suggest that the site may provide us with a unique example in which changes in hunter-gatherer lifeways may not necessarily fit into the traditional assumption of unilinear cultural evolution. In the past, many hunter-gatherer archaeologists, including Japanese archaeologists studying the Jomon culture, assumed that fully sedentary hunter-gatherers are more culturally evolved or advanced than mobile hunter-gatherers. Following this view, the presence of large settlements is often interpreted as evidence of full sedentism. However, as I have suggested elsewhere (Habu 2000), the relationship between the degree of sedentism and cultural complexity among hunter-gatherers is much more complex than scholars have previously assumed. Unlike the case of hunter-gatherers in California and the Northwest Coast, where you can see steady developments in the degree of sedentism, subsistence intensification, population density, and social stratification through time, the trajectory of the prehistoric Jomon culture does not necessarily indicate that all of these aspects developed hand in hand. By examining the interrelationship between these cultural elements in both archaeological and ethnographic examples, we will be able to have a better understanding of various aspects of hunter-gatherer lifeways. In this regard, the case of Sannai Maruyama is providing us with an excellent opportunity to understand the nature of hunter-gatherer cultural complexity.

Discussion

Case Studies 1 and 2 demonstrate that the examination of Jomon settlement data from a perspective of the collector–forager model can help us understand Jomon cultural landscapes, including the degree of sedentism. Contrary to the conventional interpretation, neither of the two cases suggests the presence of fully sedentary systems. Seasonal movements of residential bases would have significantly affected the way the Jomon people perceived their surrounding environments. In this regard, the traditional assumption, in which the degree of sedentism in Jomon society was basically equated with that in small-scale agricultural societies, needs to be reexamined. These case studies also revealed wide regional and temporal variability.

These results do not necessarily imply that none of the Jomon people were fully sedentary hunter-gatherers. On the contrary, given the large regional and temporal variability observed through these studies, it would not be a surprise if some of the collector-end Jomon groups in fact practiced full sedentism. While only two case studies have been presented here, the large body of Jomon settlement data allows us to conduct similar analyses for various parts of the Japanese archipelago in each Jomon subperiod.

Ultimately, what is important here is not to determine the degree of sedentism itself, but to understand *how* the degree of sedentism was related to various other aspects of Jomon cultural landscapes, including subsistence practice, population density/pressure, and social complexity. In terms of organizational complexity in subsistence and settlement, it is likely that both the Moroiso-phase systems in central Honshu (with the exception of the Moroiso-c subphase system in the Kanto region) and Early/Middle Jomon systems in the northern Tohoku region (with the possible exception of Period III) generally represent relatively complex systems (i.e., highly logistically organized). In other words, they are likely to have been closer to the collector end of Binford's (1980; 1982) forager–collector continuum. However, what seems most interesting here is not the average degree of organizational complexity in subsistence and settlement, but the constantly changing nature of these systems.

In Case Study 1, this fluidity of the systems seems to have led to the major change from the Early to the Middle Jomon periods. In Case Study 2 at Sannai Maruyama, we do not have enough data to assess the long-term implications of the system changes from Periods I through to V, since regional settlement pattern analyses of the northern Tohoku region have yet to be conducted. Interestingly, however, many Japanese archaeologists (e.g., Kodama 2003; Okada 2003) have noted the rapid disappearance of large settlements in northern Tohoku at the end of the Middle Jomon (i.e., the period that coincides with the last phase of the Sannai Maruyama occupation). Thus, it is likely that the abandonment of the Sannai Maruyama settlement was part of a major system change in northern Tohoku from the Middle to Late Jomon.

The ever-changing nature of Jomon subsistence-settlement systems may restrict our ability to depict subsistence-settlement characteristics at a given time in each region. Nevertheless, it does not prohibit us from examining the long-term trajectory of Jomon subsistence-settlement systems. Many scholars have pointed out that Jomon site density and settlement size show a gradual increase over time, and reached their highest point during the Middle Jomon. This trend is particularly characteristic of the Kanto and Chubu regions.

Keiji Imamura (1996:93) reports that 70 percent of all excavated Jomon pit-dwellings in the Kanto and Chubu regions are dated to the

Middle Jomon, with 50 percent of all excavated pit-dwellings belonging to the latter half of this period. In these two regions, site density (based on the total number of sites) and the frequency of large settlements (sites associated with a large number of pit-dwellings) decreased significantly from the Middle to Late Jomon. The exception is the eastern half of the Tokyo Bay area, where a concentration of Late Jomon settlements associated with large shell-middens is reported. Finally, site density and the frequency of large settlements in these two regions became very low during the Final Jomon. These changes are reflected in the population estimate presented by Koyama (see table 2.5 on p. 48). Although this may partly be due to the relatively short duration of the Final Jomon period, it does not seem to be the only reason.

To a certain extent, similar trends in long-term change can be observed in the Tohoku region. The frequency of large settlements decreases significantly from the Middle to the Late/Final Jomon periods (Kodama 2003; Okada 2003). However, a decrease in site density is not as evident as in the case of the Kanto and Chubu regions (Kodama 2003). Because of the latter factor, the population estimate for Tohoku by Koyama (1984) (table 2.5) does not show as significant a decrease from the Middle through to Final Jomon as in the case of Kanto and Chubu.

High site density and a high frequency of large settlements are characteristic of collecting systems, because logistically organized strategies typically involve a number of special-purpose sites and the aggregation of people. Thus, at least in the Kanto and Chubu regions, and to a certain extent in the Tohoku region, the degree of organizational complexity in subsistence and settlement increased from the Incipient to the Middle Jomon, and then decreased through to the Late and Final Jomon periods.

This pattern of long-term change in subsistence and settlement does not fit into the unilinear model of the development of cultural complexity. Moreover, changes over time in social aspects including those reflected in mortuary/ceremonial practices, crafts, and exchange systems indicate rather different patterns. In the following two chapters, these topics are discussed.

Contrary to the patterns observed in eastern Japan, in western Japan (Kinki, Chugoku, Shikoku, and Kyushu), site density and the frequency of large settlements did not reach their highest points during the Middle Jomon. Rather, they continued to increase from the Middle to Late Jomon. The discrepancy between eastern and western Japan will be further discussed in chapter 7.

Part III

Rituals, crafts, and trade