Chapter **1**

Introduction

Beyond Foraging and Collecting: Evolutionary Change in Hunter-Gatherer Settlement Systems

JUNKO HABU AND BEN FITZHUGH

THE FORAGER/COLLECTOR MODEL

Twenty years ago, Lewis Binford published an article that revolutionized the study of hunter-gatherer settlement and land use. The article, *Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation* (Binford 1980), made the simple but elegant argument that seasonal or short-term hunter-gatherer mobility should be patterned in predictable ways with respect to spatial and temporal variation in resource availability. In the model, Binford distinguished residential mobility (the movement of all members of a residential base from one locality to another) from logistical mobility (the movement of specially organized task groups on temporary excursions from a residential base). Based on these distinctions, Binford identified two basic subsistence-settlement systems: forager systems that are characterized by low logistical mobility and high residential mobility and collector systems that have high logistical mobility and low residential mobility. According to Binford, the former systems are responses to environments where the distribution of important resources is spatially and/or temporally (seasonally) homogeneous, whereas the latter

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systems are adapted to environments where the distributions of critical resources are spatially or temporally uneven.

Binford's (1980) distinction between residentially mobile foragers and logistically mobile collectors has contributed significantly to our understanding of hunter-gatherer settlement systems and is probably the most influential source of hunter-gatherer settlement theory. Unlike many other models of hunter-gatherer mobility, Binford's forager/collector model "stresses the strategies behind the observed patterns, rather than the empirical patterns themselves" (Thomas 1983: 11). In other words, the primary objective of the model was to explain hunter-gatherer variability, rather than to create another set of normative generalizations about hunter-gatherer behavior. As a result, even though the forager/collector model was an informal model based on ethnographic examples of the G/wi San (Silberbauer 1972) and Nunamiut (Binford 1978), the model is applicable to a wide range of archaeological and ethnographic cases from various parts of the world.

Furthermore, the fact that the model specified the material consequences of hunter-gatherer behavior in terms of site types and intersite variability in associated tool assemblages (Binford 1980, 1982; see also Binford 1978) made this model extremely attractive to many archaeologists who were eager to find middle-range theories to bridge the gap between archaeological data and past people's behavior. Examples of the applications of this model to archaeological and ethnographic hunter-gatherer data include Schalk (1981), Thomas (1981), Kelly (1983), Savelle (1987), Savelle and McCartney (1988), Bang Anderson (1996), and Cowan (1999).

One dimension that has rarely been systematically discussed in the archaeological literature is the relevance of the forager/collector model in the study of long-term changes in hunter-gatherer subsistence-settlement systems. Because the model was based on short-term ethnographic observations, the primary focus was placed on the annual cycles of subsistence activities and resulting settlement pattern changes. The exception is Binford's 1983 article, which was entitled *Long-Term Land-Use Patterning: Some Implications for Archaeology.* Based on his interviews with elderly Nunamiut men, Binford defined an annual range as the area where people lived, hunted, fished, and collected during an annual cycle. According to his article, each Nunamiut group typically moved its annual range to a new area every nine years or so, and they came back to the same annual range after approximately 40 years. Although these observations are extremely insightful, the shift of annual range discussed in Binford's (1983) article did not lead to overall system changes, nor did it reveal changes during periods of several hundred to more than a thousand years. In other words, "the archaeology of the *longue durée*" (Ames 1991) in relation to the forager/collector model has yet to be developed. This is particularly important in the context of the study of complex hunter-gatherers (e.g., Price and Brown 1985; Price and Feinman 1995), in which long-term changes in subsistence and settlement may play a critical role in explaining evolutionary changes in hunter-gatherer cultural complexity, including the development of social inequality (e.g., Fitzhugh 1996, 2002).

Binford's original formulation of the forager/collector model was subsequently critiqued and expanded by Polly Wiessner (1982), who argued that people regularly construct social relationships to mediate spatiotemporal resource variation, and that these social relationships are as significant in hunter-gatherer settlement strategies as the environmental parameters emphasized by Binford. Subsequent development of this line of reasoning in ecological anthropology has focused on the contexts in which exchange, mobility, and storage are differentially pursued (e.g., Blurton Jones 1987; Bettinger 1999; Goland 1991; Gould 1982; Hawkes 1992; Hegmon 1991; O'Shea 1981; Rowley-Conwy and Zvelebil 1989; Smith 1988; Speth 1990; Winterhalder 1986).

Binford himself has presented revisions to his original model, arguing, for example, that increased costs of pursuing terrestrial game should affect residential patterns in the absence of population pressure (Binford 1990). In such cases, investment in productive and predictable aquatic resources and the development of technologically intensive methods for improving the foraging efficiency of these prey items should lead to more residential stability. The addition of technological intensification to these models provides a mechanism for significant systemic change in the relative benefits of residential mobility that is generated, at least proximately, by internal developments in the technoeconomic system. Because the original version of the forager/collector model was framed in strictly environmental terms, any extension of the model to address long-term/evolutionary change would necessarily invoke environmental change as the primary cause of changes in residential and logistical strategies. By adding technological change in combination with environmental change, the forager/collector model leaves more room for the strategic input of individual decision makers and becomes more appropriate to the theme of evolutionary change (see Fisher, this volume; Fitzhugh, this volume).

Paralleling the forager/collector distinction, a separate but overlapping set of models has explored the social implications of hunter-gatherer modes of production and consumption. Woodburn's (1980) distinction between immediate-return and delayed-return hunting and gathering has been nearly as influential as Binford's forager/collector model. Highlighting the social consequences of immediate consumption compared to storage systems, this model has further engaged hunter-gatherer theory to consider the embedded contexts of environmental and social domains. It is significant that immediate-return hunter-gatherers share many basic elements with Binford's concept of "foragers," whereas delayed-return foragers are very similar to Binford's "collectors," and the two models are often combined in application (for an exception, see Kelly 1995). Unlike the forager/collector model, the immediate/delayed-return distinction has more often been central in models of long-term systemic or cultural change (e.g., Testart 1982). Nevertheless, it can be argued that the model is insufficient because it lacks a mechanism to explain the economic change from immediate to delayed return and thus is little improvement over the original forager/collector model in the evolutionary dimension.

Bettinger's traveller/processor model (1999) draws together elements of the forager/collector model and the immediate/delayed-return model. Inspired in part by optimal foraging models, Bettinger proposes that a critical phase shift occurs when mobile hunter-gatherers find mobility increasingly costly relative to investment in processor-intensive subsistence pursuits. For him, a key shift occurs when people begin to invest their limited energy in resources that entail considerable processing costs to be useful. In his model, population growth and social circumscription are identified as proximate causes of increased mobility costs. In some ways, Bettinger's model comes closest to the goals of this volume in theorizing and indeed demonstrating that systemic (evolutionary) change is an expected consequence of long-term hunter-gatherer sequences (see Fitzhugh, this volume for similar argumentation).

Given these contexts, this edited volume pushes the range of hunter-gatherer theory and brings together a diverse set of authors and perspectives toward their goal of expanding our understanding of hunter-gatherer settlement dynamics and change. Within this context, this book seeks to contribute to (1) the development of new models that can explain variability in hunter-gatherer settlement and land use and (2) theoretical discussions of the mechanisms of long-term changes in hunter-gatherer settlement systems.

REEVALUATION OF THE FORAGER/COLLECTOR MODEL

The first dimension of this book concerns the reevaluation of Binford's forager/collector model (Binford 1980). The authors in this book take the pulse of the forager/collector model twenty years after its introduction. In particular, we assess the strengths and weaknesses of the model as it has evolved during this period. The authors are unified in the conviction that Binford's model has been, and continues to be, one of the best tools for understanding a major source of variation in hunter-gatherer subsistence-settlement dynamics. Nevertheless, several authors see a need to modify the model to make it applicable to cases outside of the rather restrictive set on which the model was developed (e.g., Ames 1991), as well as to make it applicable to evolutionary scale changes in settlement system (e.g., Aldenderfer, Cannon, Fisher). In addition, this volume also provides an opportunity to subject the forager/collector model to rigorous archaeological evaluation.

Several authors in this volume point out the complexity of human–environment interactions and suggest that, in addition to the distribution pattern of critical resources as suggested by Binford (1980), other ecological, economic, technological, social, and ideological factors may have played an important role in determining subsistence-settlement systems. For example, for several authors, evolutionary ecology and its strict economic logic and formal modeling machinery is an excellent framework for formalizing the forager/collector model into a more testable set of hypotheses. David Zeanah, using optimal foraging models as his point of departure, suggests that the presence of unanticipated variability among Great Basin subsistence-settlement systems is a result of local trade-offs between diet breadth, transport costs, and central place location. Ben Fitzhugh draws on the patch choice model to suggest that maritime hunter-gatherers of the North Pacific might not always have been residentially stable "collectors," as is often assumed. Using a modified diet breadth model (Schmidt 1998), Lynn Fisher's chapter on the Paleolithic–Mesolithic transition in southern Germany suggests that hunter-gatherers may alter search modes (e.g., between focal pursuit of big and small game) in response to threshold conditions related to the costs and benefits of subsistence-based mobility. Merging environmental and social considerations with the help of evolutionary ecological risk theory, Renato Kipnis argues that late Pleistocene and early Holocene Brazilian rock art sites reflect changes in the context of intergroup information sharing and territoriality.

Ken Ames critiques the applicability of the forager/collector model to boat-using hunter-gatherers, suggesting that regular access to boats revolutionizes mobility strategies, residential patterns, and processing patterns of procured food, resulting in both longer foraging radii and longer logistical forays. He suggests that none of these changes can be accommodated by the classic forager/collector model. Ames' treatment reaffirms the value of comparative ethnography for refining archaeological models, and his conclusions are generally compatible with the archaeological applications of Cannon and Fitzhugh, who also consider boat-based hunter-gathering around the greater Pacific Northwest of North America.

One aspect of the forager/collector model that is not given sufficient discussion in any single chapter, but which emerges in the comparison between the chapters, pertains to the analytical meaning of the central concepts of the forager/collector model: foraging, collecting, residential mobility, and logistical mobility. According to its original formulation, foragers are supposed to

Chapter **2**

Going by Boat

The Forager–Collector Continuum at Sea

KENNETH M. AMES

INTRODUCTION

In 1990, Binford argued that logistical mobility strategies...

> are the consequence of two major evolutionary changes that occurred long ago: (1) the "aquatic resource revolution" with its early occurrence primarily in higher latitudes, and (2) the perfection of transport technologies, particularly water transport vessels and the use of pack and draft animals. (Binford 1990: 138)

Hunter-gatherers that pursue aquatic resources will be strongly logistical in their mobility strategies. In fact, they are virtually obligatory collectors (Binford 1990). Following Binford, I will accept these statements as guides to further research. The purpose of the current paper is to explore two broad implications of these statements.

First, it has long been recognized that in contrast with terrestrial, pedestrian hunter-gatherers, aquatic hunter-gatherers tend to have higher population densities (e.g., Renouf 1988; Keeley 1988), to be residentially more stable, i.e., more sedentary, and to be perhaps more socially and economically complex than most terrestrial hunter-gatherers. Explanations for the causes of these apparent distinctions commonly focus on the relative or absolute productivity and dietary value of aquatic relative to terrestrial resources. In these discussions, lip service is paid to the importance of

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"transport technologies," but their importance is rarely investigated. However, access to waterborne transportation alone can have a significant positive impact on population size and stability (Batten 1998). This implies a more complex (and interesting) interplay between environment and technology in the evolution of mobility strategies than is generally appreciated.

Secondly, most aquatic hunter-gatherers are collectors, following Binford's basic definition that collectors move resources to people. However, archaeological expectations for recognizing collectors and foragers are based on terrestrial hunter-gatherers. There are important differences between aquatic and terrestrial hunter-gatherers, due, in part, but not exclusively, to differences in transport. These differences mean that the archaeological record of terrestrial and aquatic collectors may be quite different from each other, at least in degree. A question arising from these considerations is whether these differences in degree are, cumulatively, differences in kind. If this is so, a further question is whether comparative analyses, such as those of Binford (1980, 1990), Keelley (1988), and Kelly (1995) that are based on ethnographic samples with significant numbers of aquatic hunter-gathers, are therefore flawed (see Yesner 1980 for an early argument to this effect).

This paper is about boats, but it is about boats as transportation, about the integration of boats into production on a daily basis, about boats being used to haul material 100 meters across a lake or 1000 kilometers over difficult seas. It is not about the evolution of boats or about evidence for the earliest boats, or about boats as the only way to get to Australia, or as a means to people the Americas. It is about boats as instruments of production and whether the use of boats is theoretically important.

AQUATIC HUNTER-GATHERERS

What to call the people who are the focus of this paper? Binford (1990) uses the term "aquatically oriented hunter-gatherers." These are people who are "dependent" on aquatic resources, by which he means aquatic hunting and fishing, but not collecting aquatic or hydrophytic plants. When Kelly (1995) speaks of aquatic resources, he clearly means fishing and sea-mammal hunting. My meaning of the term is somewhat broader. Aquatic hunter-gatherers are those whose production activities rely on water for procuring food, other resources, and for transportation. I use this term because there is no alternative that clearly distinguishes these from terrestrially based economies. "Maritime hunter-gatherer" generally refers to people who exploit marine environments, be they close inshore littoral environments or distant pelagic ones. The phrase has always struck me as both too broad and too narrow. It is too broad because it can be applied, and often is, equally to people, like the Aleut, who hunt whales in open water with highly evolved tackle, including their vessels, and to those who are essentially strandloopers, collecting mollusks and exploiting near-shore environments without specialized gear or tackle. Lyman (1991) calls the latter a "littoral" adaptation and reserves the title "maritime" for the former, with its specialized gear and knowledge. This distinction is at the heart of Lyman's debate with Hildebrandt and Jones over whether people along the Oregon coast hunted seals from boats in open water or clubbed or speared them in their rookeries (Hildebrandt and Jones 1992; Lyman 1995; Jones and Hildebrandt 1995). Lyman's distinction, useful as it is, does not capture my meaning. Maritime is also too narrow because it does not apply to people who exploit wetlands, rivers, lakes etc.

The Chinookan peoples who lived in the Wapato Valley region of the lower Columbia River are a case in point. Although riverine fishing was central to their economy, they harvested a wide array of terrestrial, wetland, lacustrine, and riverine resources. It would, in fact, be difficult to categorize them as either terrestrial or aquatic hunter-gatherers based solely on the sources of their food resources. They, however, relied very heavily on canoes of a variety of shapes and sizes. They used these canoes to move resources and themselves across the landscape. It is as much this dependence on canoes that makes them aquatic hunter-gatherers as it is the salmon and sturgeon they harvested from their boats.

Binford's seminal paper on collectors and foragers (Binford 1980) was published in the same year as Yesner's on "Maritime Hunter-Gatherers: Ecology and Prehistory (Yesner 1980)." Yesner's article was something of a manifesto for the study of and theory building about maritime hunter-gatherers. He argued that modern hunter-gatherer studies may have little direct relevance for understanding ancient hunter-gatherers because, according to Yesner, most modern hunter-gatherers occupy marginal environments. He also criticized the methodology used by Binford and others to look for broad regularities or correlations between environment and economy, suggesting that such studies masked important dimensions of variability. He strongly implied that these studies are flawed by the use of the wrong scales of "cultural and ecological units for analysis (to avoid spurious correlations) (Yesner 1980: 728)." Yesner went on to argue that maritime hunter-gatherers are and were significantly different from modern, terrestrial hunter-gatherers in marginal environments. Like many others, Yesner also addressed the productivity of marine environments as a source of dietary calories, protein, and nutrients relative to terrestrial environments.

For Binford (1990: 134), the apparent increasing use of aquatic resources in the Holocene is "one of the major problems archaeologists have yet to address realistically in terms of the issues of complexity and human evolution." Debate over this question generally focuses on the ecological productivity of aquatic (usually understood as marine) and terrestrial environments (e.g., Erlandson 1988, 1994; Keeley 1988; Osborne 1997; Perlman 1980; Schalk 1981; Yesner 1980). Here, I do not directly address the relative merits of the arguments of these authors; rather I explore an alternative or supplementary position, which is that the availability of efficient (or effective) transportation can have a significant positive impact on the net productivity of aquatic environments.

AQUATIC TRANSPORT

Batten examined the population histories of 327 European cities in the period from 1500 to 1800 A.D. to determine the relationship of city growth (as a measure of urbanization) and transportation. His actual concern was the impact of transportation on urbanization in ancient Mesoamerica. However, the European data provided (1) good estimates of population size, (2) precise estimates of age, and (3) good control over systems of transportation. Cities were assigned to three "transportation" categories: landlocked, river, and ocean (see Batten 1998: 494–496, for the way these seemingly broad categories relate to transportation). As a result of his analyses, Batten concluded:

1. Ocean cities (those accessible from the ocean, port cities) exhibited faster and more sustained growth during the period of his study.
2. Median populations of cities on water (both ocean and river) far surpassed those of landlocked cities.
3. Population sizes of landlocked cities were more subject to fluctuations. They were the only cities to lose populations during this period.
4. "Population should be proportional to the size of the food producing hinterland... if... food supply is an important part of the relationship between transport and population size (Batten 1998: 510).

Batten's results cannot be translated directly to hunter-gatherers. He was not certain they could be directly applied to urbanization in Mesoamerica from Europe. However, the implications are suggestive and do find some support from recent comparative work on modern hunter-gatherers. For example, both Keeley's (1988) and Kelly's (1995) data sets indicate that population densities for coastal hunter-gatherers are generally higher than among terrestrial peoples, although Keeley indicates that the differences are not large. However, if one compares coastal groups with adjacent terrestrial groups, rather than comparing them globally, the differences are more marked.

I calculated median, mean, and standard deviations (Table 2.1) and constructed box and whisker plots (Fig. 2.1) of the population densities for

Table 2.1. Descriptive Statistics of Population Densities (individuals/100/km^2) for Aquatic and Terrestrial Hunter-Gatherers in Western North America (density estimates from Kelly 1995, Table 6-4, 222–226)

Region	N	Mean Density	Std. Dev.	Median	Minimum	Maximum
California						
Aquatic	18	203.7	199.8	173	25	843
Terrestrial	25	125	91	103	12	103
Northwest Coast/Plateau						
NW Coast	16	68.3	49.2	61	10	195
Plateau	10	14.6	13.1	9.5	2	38
Arctic/Subarctic						
Coast	16	11	16.9	3.4	.5	65
Interior	23	1.5	1.9	.8	.2	7.6

aquatic and terrestrial hunter-gatherers in western North America, including California (aquatic and terrestrial[1]), the Northwest Coast and Plateau,[2] and the Arctic and Subarctic.[3] I used the density figures in Kelly's Table 6-4

[1]I assigned groups to the "aquatic" and "terrestrial" classes based on my reading of ethnographies, particularly the accounts in the Handbook (Heizer 1978). This assignment was not always straightforward. Some groups located on or near the Pacific coast made almost no use of coastal resources, for example. On the other hand, salmon was an important resource for many peoples living in the interior of central and northern California. In this latter case, I generally assigned these groups to the terrestrial category because fishing was usually their only "aquatic" harvest, the rivers did not provide usable transportation routes, and they made little use of water plants.

[2]This comparison is between coastal peoples and those of the continental interior, rather than a clear-cut comparison between aquatic and terrestrial economies. The peoples along the Northwest Coast are straightforward examples of aquatic hunter-gatherers, although many groups generally considered maritime by anthropologists may have relied more heavily on terrestrial plant foods than typically thought (Duer 1999). The Plateau is not so straightforward. The Plateau of North America is the topographically complex region between the Cascade/Coast Ranges of the Pacific coast and the Rocky Mountains from southern Oregon to central British Columbia. Many peoples (but not all) of the Plateau heavily relied on salmon and other fish; canoe travel was also important, although how important is not known. However, Plateau groups also were very dependent on roots (e.g., Thoms 1989; Peacock 1998) and terrestrial mammals. Rather than trying to class Plateau groups as more or less aquatic and terrestrial, I compare the two large regions.

[3]All of the groups in the "aquatic" class are coastal, and most are found in the North American Arctic. Kelly's sample includes only the Aleut and Chugach from the Pacific coast of Alaska, not the Koniag of Kodiak Island and adjacent mainland areas. Virtually all the "terrestrial" groups are subarctic hunters, and most are Athabaskans. Interior Inuit groups include Nunamuit and Copper Eskimo.

Chapter ***3***

Jomon Collectors and Foragers

Regional Interactions and Long-term Changes in Settlement Systems among Prehistoric Hunter-Gatherers in Japan

JUNKO HABU

INTRODUCTION

The purpose of this chapter is to expand the utility of the forager/collector model (Binford 1980, 1982) by examining the dynamics of long-term system change on an interregional scale. Among numerous models of hunter-gatherer behavior, Binford's (1980, 1982) forager–collector continuum has been one of the most frequently cited models of subsistence and settlement organization during the past two decades. As with most formal models of subsistence and settlement (such as optimal foraging models), the forager/collector model assumes that economic rationality is the basic principle that determines hunter-gatherer subsistence strategies and residential mobility. However, unlike optimization models, which are deductive and formal in their structure, Binford's model was inspired by ethnographic examples. Because of its informal and inductive origins, the

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forager/collector model is flexible enough to account for various anomalies. The concept of serial foragers (Binford 1980: 16–17), which refers to cold-environment hunter-gatherers who adopt "mapping-on" strategies to position themselves so that they can exploit seasonally fluctuating resources, is a good example of this. Similarly, various nonenvironmental factors that can influence hunter-gatherer subsistence-settlement practice, such as population pressure, trade/exchange, and group alliance, are not necessarily ignored by the model. We may need to modify the model to incorporate these factors as part of the system, but the core of the model that outlines the basic principles of labor investment versus return with regard to resource distribution, subsistence strategies, and residential mobility can still be operational. Thus, despite some scholars' critical views (e.g., Wiessner 1982), the forager/collector model remains useful.

This does not imply, however, that the model does not need expansion or elaboration. Issues that have not been fully addressed since the original appearance of the model include the causes, mechanisms, and consequences of long-term system change in the context of regional interactions between groups. Though Binford (1983) was apparently interested in long-term hunter-gatherer behavior, what he was able to infer from Nunamiut ethnographic data and oral history was temporally and spatially limited. As a result, we have very little knowledge about the way changes in one system might affect neighboring systems, and what the long-term effects of these changes might be during the course of several hundred years.

In this regard, archaeological studies of prehistoric Jomon hunter-gatherers on the Japanese Archipelago provide us with an excellent opportunity to examine long-term settlement pattern change at the interregional level. In Japan, a large number of large-scale salvage excavations took place during and after the 1960s following the implementation of the national government's land development policy (Habu 1989). Tens of thousands of Jomon sites have been excavated with systematic financial support from national, prefectural, and municipal governments, as well as private developers. In many cases, the results of these excavations are available as published reports. As a result, we have hundreds, and sometimes even thousands, of excavated sites from each of the Jomon subperiods, which can be used to examine the course of long-term change in subsistence and settlement practice.

This chapter examines long-term change in regional settlement patterns from the Early to the Middle Jomon periods (ca. 6100–4000 uncalibrated b.p.; for the rest of this paper, lower-case b.p. will be used for uncalibrated ^{14}C dates) in the context of the forager/collector model (Binford 1980, 1982). Through this case study, possible factors that triggered changes between collecting and foraging systems are inferred, as are their mechanisms. The implications of these changes are discussed in relation to the development of hunter-gatherer cultural complexity.

BACKGROUND TO THE STUDY

Jomon is the name of a prehistoric culture in the Japanese Archipelago that followed the Palaeolithic period and preceded the agricultural Yayoi period. Unlike many other prehistoric hunter-gatherer cultures, the Jomon culture is characterized by the production and use of pottery. The Jomon period is conventionally divided into six subperiods: Incipient, Initial, Early, Middle, Late, and Final. The appearance of pottery (ca. 13,000 b.p.) marks the beginning of the Jomon period (Nakamura and Tsuji 1999; Taniguchi 1999), but not all of the characteristics that researchers commonly associate with the Jomon culture were present during the Incipient and Initial Jomon periods. By the Early Jomon, however, a distinctive set of cultural traits that characterize the rest of the Jomon period began to emerge. These include the presence of large settlements, various kinds of ceremonial features and artifacts, food storage, and long-distance trade. In this regard, the Early to Final Jomon cultures share a number of characteristics with so-called "complex" hunter-gatherers in various parts of the world (Price and Brown 1985). For this reason, researchers in the broader field of hunter-gatherer archaeology have been interested in the study of the Jomon culture (Aikens 1981; Aikens and Dumond 1986; Aiken et al. 1986; Cohen 1981; Hayden 1990; Pearson 1977; Price 1981; Price and Brown 1985; Soffer 1989).

Recent developments in Jomon studies have revealed that regional and temporal variability within the Jomon culture was far greater than scholars once assumed (Ikawa-Smith 1998). For example, at the Initial Jomon Uenohara site in Kagoshima Prefecture in southern Kyushu, sophisticated pottery, such as jars with long necks, and ornaments, such as clay earrings, were recovered (Okamura 1995). Neither of these two types of artifacts had been reported from Initial Jomon sites in other parts of Japan. Other lines of evidence, such as feature types and lithic assemblage characteristics, also indicate that the Incipient and Initial Jomon cultures in this region were quite different from those in the rest of the Japanese Archipelago (Amemiya 1999; Shinto 1995, 1999). At the Early and Middle Jomon Sannai Maruyama site in Aomori Prefecture, northern Japan, an extraordinarily large settlement associated with more than 700 pit-dwellings has been recorded (Habu et al. 2001; Kidder 1998; Okada 1995a,b; Okada and Habu 1995). Radiocarbon dates indicate that the site was occupied from approximately 5050 to 3900 b.p., or 5900 to 4300 calibrated B.P. (Tsuji 1999; see also M. Imamura 1999). Because the site was occupied for more than 1500 years,

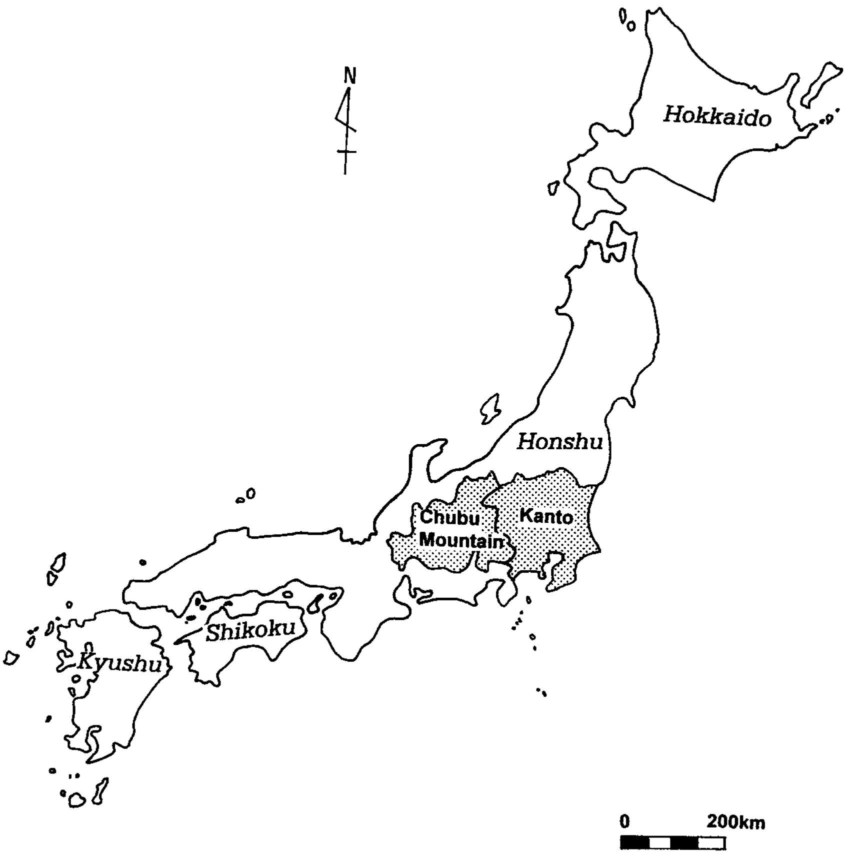

Figure 3.1. Map of Japan showing the location of the Kanto and Chubu Mountain regions.

it is unlikely that all of the 700 pit-dwellings were inhabited contemporaneously. Nevertheless, the number of pit-dwellings and other features from the site is unusually large compared to other Jomon sites.

Among these regional varieties, the Middle Jomon culture in the Kanto region (eastern side of central Honshu Island including Tokyo) and the adjacent Chubu Mountain region (inland part of central Honshu; Fig. 3.1) have attracted considerable attention because of the extremely high site density, large site size, and the complex pottery decoration in these sites. According to K. Imamura (1996: 93), 70% of all excavated Jomon pit-dwellings in the Kanto and Chubu Mountain regions belong to the Middle Jomon period, and 50% of all excavated pit-dwellings belong to the latter half of this period. Many researchers have also pointed out that the Middle

Jomon sites in these regions are characterized by an abundance of so-called "chipped stone axes." Although these stone tools are called "axes," most researchers believe that they were used as hoes for digging, either to collect wild plant roots (Watanabe 1976) or possibly for incipient plant cultivation (e.g., Fujimori 1950; Oyama 1927, 1934).

Archaeologists have long recognized the prosperity of the Middle Jomon culture in the Kanto and Chubu Mountain regions, but very few studies have systematically examined the processes of its development. Because of the presence of large settlements during and after the Middle Jomon period in these regions, scholars have assumed that the development of sedentary life in these regions began in the Early Jomon period and that the degree of Jomon cultural complexity increased gradually and smoothly from the Early to the Middle Jomon (e.g., Wajima 1948, 1958). However, detailed examination of changes in regional settlement patterns at the end of the Early Jomon period indicates that the long-term development from the Early to the Middle Jomon may have been more complex than previously assumed.

SETTLEMENT PATTERNS OF THE EARLY JOMON MOROISO PHASE

In a previous study, I examined regional settlement patterns of the Early Jomon Moroiso phase (ca. 5000 b.p.) of the Kanto and Chubu Mountain regions (Habu 1996, 2001) from the perspective of the forager/collector model (Binford 1980, 1982). The Moroiso phase is the second to the last phase of the Early Jomon period and is divided into three subphases: Moroiso-a, -b and -c from the earliest to the latest. The duration of the Moroiso phase is estimated to have been approximately 200–300 years (Habu 2001).

According to the forager/collector model, subsistence-settlement systems of hunter-gatherers can be classified into two basic systems: (1) forager systems that are characterized by high residential mobility and (2) collector systems that are characterized by low residential mobility. Foragers tend to acquire food on a day-to-day basis near their residential base, whereas collectors tend to organize their subsistence activities logistically (i.e., they send specialized task groups to acquire food resources located far away from their residential base, who then bring these resources back and store them). Forager systems are commonly found in environments in which the distribution of critical resources is seasonally and spatially homogeneous, whereas collector systems are adapted to environments in which the distribution of critical resources is seasonally or spatially uneven (for a description of the forager/collector model, see also Kelly 1995).