

5. Sedentism: A Temporal Shift or a Transitional Change in Hunter-Gatherer Mobility Patterns?

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Abstract: Archaeologists widely perceive sedentism as a necessary precondition for social elaboration and complexity among hunter-gatherers. The origins and causes of sedentism are major archaeological research problems, and researchers concern themselves with the transition between nomadism and sedentism. In this paper I argue that there is only variation in residential patterns, which may include sedentism; that sedentism, however it is defined, is not a stable residential pattern among hunter-gatherers; and that, rather than explain the causes of sedentism, one must explain shifts in residential mobility patterns. The case study illustrating these points is drawn from the dry interior region of the Pacific Northwest, the Intermontane Plateau, which preserves an excellent record of residential mobility patterns spanning the last 6,000 years.

Introduction

Archaeologists commonly see sedentism—settling down—as one of the great watersheds in human history, a "stage in general cultural evolution . . . a higher level than nonsedentary settlement patterns" (Rafferty 1985:116), causing or allowing the evolution of large, complex agricultural societies, such as our own. While the interest in the origins of sedentism originally concerned the relationship between sedentism and agriculture, the focus is now expanding to include semisedentary and sedentary hunter-gatherers and the transition from nomadism to sedentism among hunter-gatherers.

Although some investigators treat sedentism as an either/or circumstance—a group is sedentary or it not (Rafferty 1985)—most archaeologists recognize a continuum of settlement patterns between nomadism and sedentism (e.g.,

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Hitchcock 1982) marked by long-term transitions. Brown and Vierra (1983), for example, speak of the Middle Archaic in the central United States as a period of slow transition to sedentism—a period in this case lasting 4,000 years. A 4,000-year-long transition, however, is not a useful concept. The notion of transition itself obscures the very dynamics of culture change that archaeologists seek to understand. The idea of transition is based upon two assumptions. First, culture change is progressive, leading to increased complexity; and second, it is unidirectional in the sense that major changes, such as to sedentism, are fixed and permanent after they occur. If there is a single developmental continuum from nomadism to sedentism, then all variability in residential and settlement patterns is fitted onto that continuum and is inevitably seen as transitional. Further, causation must be sustained and long-term in order to move transitional societies up the continuum to greater and greater sedentism. Population growth, long-term trends in climate, and even accumulating environmental knowledge are the kinds of processes invoked to explain such long-running trends.

I argue that sedentism is only one class of variation in settlement and residential patterns; that sedentism is not necessarily a stable or permanent condition among hunter-gatherers; and that explanation must account for shifting settlement and residential patterns, including why and under what conditions sedentism becomes permanent. Archaeologists should not automatically expect sedentism to persist in a region once it appears.

I am not proposing that archaeologists substitute a cultural version of the punctuated equilibrium model of evolutionary dynamics (Eldridge and Gould 1972) for cultural gradualism, nor am I arguing that long-term processes of culture change do not exist. I am suggesting that the expectation of a gradualist pattern of culture change among hunter-gatherers be abandoned and, specifically, that sedentism not be seen as a permanent change in settlement patterns.

I examine these issues using a case study drawn from the Columbia-Fraser Plateau region of northwestern North America, which contains an archaeological record of semisedentary patterns spanning the last 5,500 years. Were this record to be viewed as transitional, a rich diversity in settlement patterns and cultural dynamics would be missed.

Sedentism and Semisedentism

I am examining semisedentary residential patterns. Semisedentary systems differ from sedentary ones in that their fixed places are not occupied for all seasons of the year, even though their residential settlements may be as permanent in the landscape as those of agricultural or industrialized societies. Many definitions of sedentism (see Rafferty 1985) do not help us understand semisedentism, nor do they do credit to regional settlement systems that include both sedentary and semisedentary populations.

Both sedentism and semisedentism might be better thought of as particular kinds of social geographies (Conkey 1984) or as particular kinds of artificially

constructed landscapes in which residential patterns and associated social and cultural patterns become fixed and maintained at certain places for some period of time. In a sense, residential sites become part of the furniture of the landscape. In our culture, that furniture is taken for granted, and economic and social relations are structured to create sedentary residential sites. In other systems, such localities are not assumed to be a necessary part of the cultural terrain.

The question then becomes, how do such cultural landscapes develop? This question implies that the phenomenon of sedentism is regional in scope and that answers must be sought on a regional scale. In the Northwest, for example, some Tlingit groups appear to have been completely sedentary (Oberg 1973), while others shifted their residence at least once during a year; yet all groups participated in the same social, economic, and subsistence systems. Along the lower 200 miles of the Columbia River, there may have been several settlement-residential patterns followed, including full sedentism (Saleeby 1983; Saleeby and Pettigrew 1983) and perhaps two or three varieties of semisedentism, again all within an integrated regional system (Boyd and Hajda 1987).

The landscape I am discussing is an intricate mosaic of processes—some local and short-term, others regional and long-term. Under what circumstances does (semi)sedentism become an option, and what can prevent it from becoming a (or the) dominant pattern? In considering these issues, several attributes of hunter-gatherer residential patterns, of which sedentism is only one, are important. These attributes include the following:

1. *Duration*: how long a residential site is occupied during an annual cycle
2. *Seasonality of residence*: the seasons during which a residential site is occupied
3. *Permanence*: the number of annual cycles (years) a site is occupied or reoccupied (Rafferty 1985)
4. *Size*: areal extent of the residential site (Rafferty 1985)
5. *Organization*: the degree to which areas within a site are functionally differentiated (which can extend from the organization of interior domestic space to the organization of a great city)
6. *Investment*: amount of labor, time, and materials expended on the residential site

It seems reasonable to expect that different attributes, including some not listed here, have evolutionary significance under different circumstances. Sedentism may not always be the crucial development initially leading to complexity or the other changes commonly linked to sedentism.

Case Study

The Intermontane Plateau of northwestern North America (Figure 5-1) provides a detailed 11,000-year record of the settlement and residential patterns of hunter-gatherers. These data are, in some ways, quite fine grained,

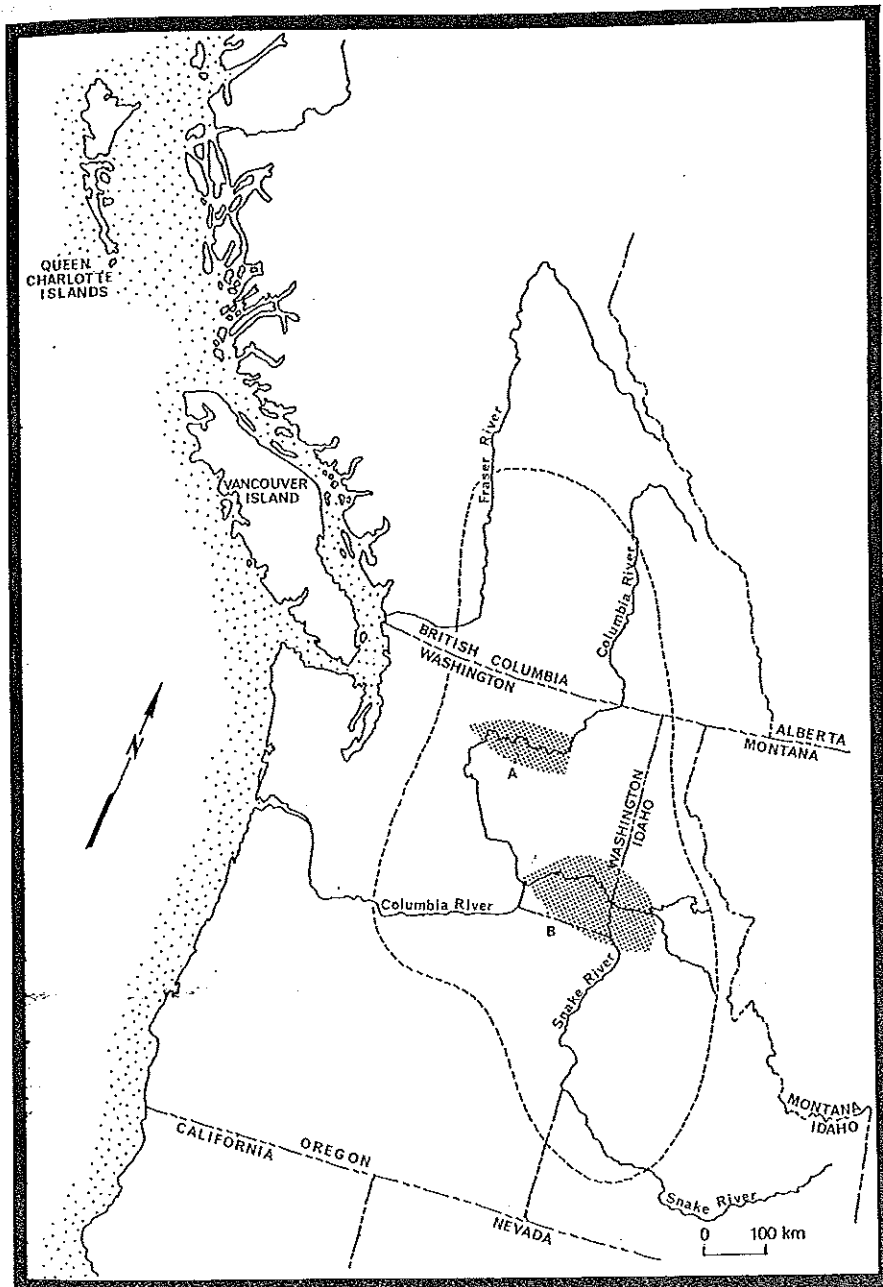


Figure 5-1. Map of the Intermontane Plateau showing the location of the Upper Columbia and Lower Snake archaeological regions. Dashed line encloses region from which the pithouse data were drawn. A is the Upper Columbia region; B is the Lower Snake River region.

showing regional differences in settlement and subsistence patterns. The Intermontane Plateau includes the region between the Cascade Range-Coast Mountains of Oregon, Washington, and British Columbia and the Rocky Mountains. It contains the basins of the Fraser and Columbia rivers, which drain portions of Washington, Oregon, Idaho, and southern British Columbia. The region has dramatic topography. The rivers have cut great canyons 150 m to 1,830 m deep among the high mountains and plateaus. As a result, the environment is a complex productive mosaic.

At European contact, the Indian peoples in much of the region were heavily dependent upon annual runs of Pacific salmon (*Oncorhynchus* sp.). Stored salmon were important as one of the main winter staples. Winters were spent along the rivers in "villages" of varying sizes. During the warm months, people spread into the uplands, particularly the plateaus, where they collected a variety of roots and hunted mainly deer and elk. Fish were taken through the summer and into the autumn as the runs came. Narrows in the main rivers were major fishing places. Where the rivers ran through major canyons and rapids, large numbers of people gathered to fish throughout the fishing season. The catch was transported home.

Documenting when salmon production intensified and the relationship of that development to semisedentary residence has always been a major research problem in Plateau prehistory (Ames and Marshall 1980; Brauner 1976; Lohse and Sammons-Lohse 1986; Nelson 1969, 1972; Sanger 1967; Schalk 1977; Swanson 1962). In the early literature, life in villages and heavy reliance on salmon fishing were equated, evidence of the former was evidence of the latter. Changes in settlement and subsistence patterns were explained by diffusion (e.g., Nelson 1972) or by environmental changes (Brauner 1976; Sanger 1967). More recently, some have argued that semisedentism resulted from increasing collection and storage of roots (Ames and Marshall 1980). Others argue that the acquisition of adequate storage technology was the important change (Schalk 1977; Schalk and Cleveland 1983). The most recent work emphasizes population growth (Burtchard 1988) and resource stress (Lohse and Sammons-Lohse 1986). The crux of all these arguments is the causal relationship between the development of focal economies (Cleland 1976) and semisedentism in the region.

The primary evidence for semisedentism in the study area is the remains of semisubterranean pithouses (termed *pithouses* throughout the rest of this paper). This analysis draws upon two related sets of pithouse data. The first contains over 120 radiocarbon dates associated with floors and fill of excavated house pits in the Intermontane Plateau area (hereafter simply the plateau). The other includes pit plan view, cross section, and number of floors as well as length, width, depth, area, and volume for 296 excavated structures from the same region. But, only length, width, depth, area, and volume are used here (Table 5-1). Of the 296 structures, 250 can be dated within a millennia.

There are inherent dangers in using radiocarbon dates as they are used here. The radiocarbon dates were collected from site reports, and I used the dates that the authors of the reports stated were associated with each particular house pit or where that relationship could be established. This procedure is

Table 5-1. *Pithouse Attributes*

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1. Floor area: Length x width of excavated house pit. When possible, these measurements were taken for the actual floor. More usually, reports simply gave length and width for the pit, without specifying if they had measured the top of the pit or the bottom.
 2. Volume: Area x depth. Volume refers to the volume of the pit.
 3. Population: Cook's formula estimates 13.92 m² for the first six people in an area, and 9.29 m² for any additional people. The more conservative approach here would be to compare occupation area. I prefer to use population estimates, despite their well-known problems, because I find it easier to think in terms of numbers of people than area. As long as the figures are used as providing estimates of the general size of households (small, medium, and large), they can be used safely. I have used Cook's formula to estimate populations of Northwest Coast house groups, and it is reasonably accurate for small to medium houses (Ames 1988b).
 4. House volume: This is an estimate of the total roofed volume of a structure. It was estimated using the volume for a cone or pyramid, depending upon whether the plan view of the house pit was circular or rectangular. For a circular structure, the formula is

$$HV = \frac{(\pi r^2 / \text{sq.}) \text{ height}}{3} + \text{volume}$$

The formula for a rectangular structure is

$$HV = \frac{\text{Area (height)}}{3} + \text{volume}$$

Height in both cases is estimated at 2.5 m, which is probably a trifle low for large structures and too high for the smallest.

5. Pitspace: pit volume/population. This estimates the per person volume within the house pit. It provides a rough gauge of the space available for activities, both individual and group, and of storage within the pit (Ames 1988b).
 6. TotSPACE: house volume/population. This estimates the volume per capita within the structure. It provides an estimate for the total space available for activities and storage. Both pitspace and totspace are estimates built on other estimates and are subject to many vagaries that cannot be controlled. However, together, they do provide some sense of the space available within a structure and a way to chart interior changes through time. I defend their use elsewhere (Ames 1988b).
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sometimes risky. I frequently had only an author's assertion that a given sample dated a structure; I did not always have the sample's exact provenience.

Additional problems arise both from the way samples were selected for dating and from the complex taphonomy of house pits themselves. House 1 at Hatwai (Ames 1989) provides an excellent example of these problems. Six dated carbon samples were taken from the floor zone and fill units of this structure in addition to one obsidian hydration sample. The C-14 dates span the period from 5500 to 3100 B.P. (Table 5-2). The samples postdating 3500 B.P. are all from the pit fill, while the pre-4000 B.P. dates are from the floor zones. However, even those dates span a 1,500-year period. Is the floor 4,300, 4,700 or 5,500 years old?. In this study, unless the author of a report dismissed a date or presented evidence that allowed me to dismiss a date, I have accepted all dates as indicating an episode of pit occupation. Older structures have more dates because they are old and excavators wanted to be certain of the structure's age; younger structures usually have only one dated sample, and many are not dated using C-14 samples. As a result, my acceptance of the dates has the probable effect of exaggerating the number of early structures and lowering the number of more recent structures.

That many houses are dated with only a single date is another (uncontrollable) source of error. Had House 1 been dated by a single date, it could now be reported as 3,100 years old—a rather undistinguished age—or as 5,500 years old, which would make it one of the oldest reported domestic structures in the Northwest.

These problems cannot be resolved on a case-by-case basis. They are attacked here using what might be termed the *brute-force method*. As large a temporal and spatial sample as is practical is collected, on the assumption that taphonomic problems will balance out. Any temporal or spatial trend is also examined using several lines of evidence. If similarities emerge across different categories of data, then the pattern is taken to be meaningful in an archaeological sense.

In addition to the data for the entire region, two local areas are compared and contrasted in greater detail: the Lower Snake River region of the southeastern plateau and the Upper Columbia River region of the western plateau (Figure 5-1). These areas have the most complete and the most accessible archaeological records.

Regional Trends in Pithouse Construction

The earliest pithouses in the region include a structure with a date of 5640 ± 155 B.P. (corrected 6419 B.C.) in northeast California's Surprise Valley (O'Connell 1975) and at House 1 at the Hatwai site in central Idaho, which has a date of 5550 ± 120 B.P. (Ames et al. 1981 [corrected 6314 B.C.]). After this time, these structures were in sporadic but general use throughout the region.

Looking first at the 250 structures that can be dated to within a millennium, the number of excavated houses increases slightly between 5000 and 2000 B.P. (Table 5-3, Figure 5-2). After 2000 B.P. the number of structures triples.

Table 5-2. Radiocarbon Dates for Hatwai (10-NP-143), House 1

<i>Date</i>	<i>Material</i>	<i>Lab #</i>	<i>Feature</i>
5550 ± 220	Charcoal	Tx-3262	Floor zone 3
4740 ± 230	Charcoal	Tx-5721	Floor zone 4
4340 ± 90	Charcoal	Tx-3263	Floor zone 4
4470 ± 190	Charcoal	Tx-5720	Floor zone 3
3330 ± 70	Charcoal	WSU-1842	Floor zone 1
3130 ± 90	Charcoal	WSU-1878	Floor zone 3
1222 ± 100	Obsidian	MOH-LAB 27-867	Westbench 2

Source: House 1 date from Ames (1989).

Table 5-3. Number and Percentage of Houses and House Population per Millennium

<i>Age B.P.</i>	<i>No. of Houses</i>	<i>% of Houses</i>	<i>Pop. per House</i>	<i>% Pop.</i>
Unknown	47	—	238	—
6000–5000	6	3	60	2
5000–4000	18	7	216	8
4000–3000	24	10	240	9
3000–2000	31	13	248	10
2000–1000	74	30	740	28
1000–250	73	30	803	31
2000–250 ^a	20	8	300	12
Total between 2000 and 250	167	68	1843	71

^aThese structures could be dated to within only the last two millennia.

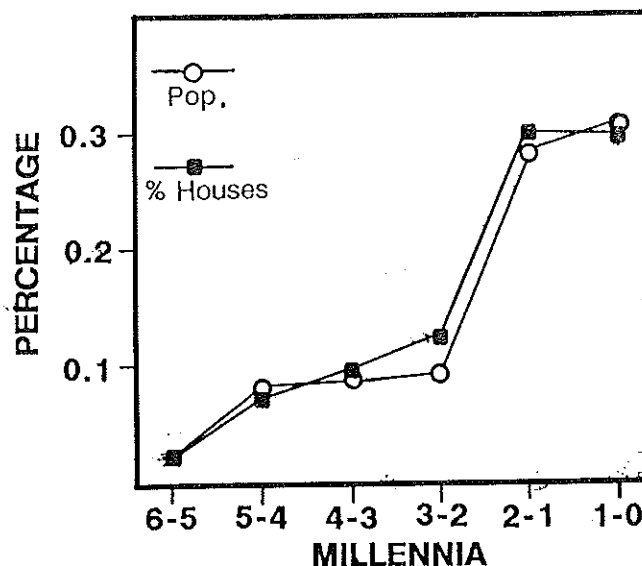


Figure 5-2. Changes in house frequency and population through time.

Seventy-one percent of all structures postdate 2000 B.P. Population size also increases somewhat between 5000 and 2000 B.P., after which it rises sharply and continues to rise after 1000 B.P. (Figure 5-2). Whether these figures accurately reflect regional population patterns through time cannot be determined presently. The population figures are based on estimated household populations. The number of house occupants was calculated using Cook's formula for estimating population size based on habitation space (Hassan 1981:91) or, in this case, house floor area.

There are at least four possible explanations of these patterns: (1) sampling error; (2) older structures have suffered greater attrition from postdepositional processes, so there are fewer of them to excavate; (3) an explosive growth in population occurred around 2000 B.P.; or (4) there was some sort of change in residential patterns at 2000 B.P., leading to the same number of people building many more houses. Two possibilities for these latter changes include increased mobility, so that the same number of people constructed more domiciles; and changed domestic cycle, so that families during their existence constructed more houses. Obviously, none of these possibilities is mutually exclusive.

The evidence just reviewed suggests that house numbers and regional population grew slightly, if at all, between 5000 and 2000 B.P. After 2000 B.P., population and houses both rapidly increased in numbers. The radiocarbon dates display a somewhat different pattern. The dates were plotted twice, once using uncorrected dates and once using corrected dates. Plotting uncorrected dates using midpoints in 100-year increments (Figure 5-3) shows four modalities for dates older than 3600 B.P.: 3800, 4000-4200, 4400-4700 and 5000-5700 with a distinct peak at 4100 B.P. While there are no gaps in the

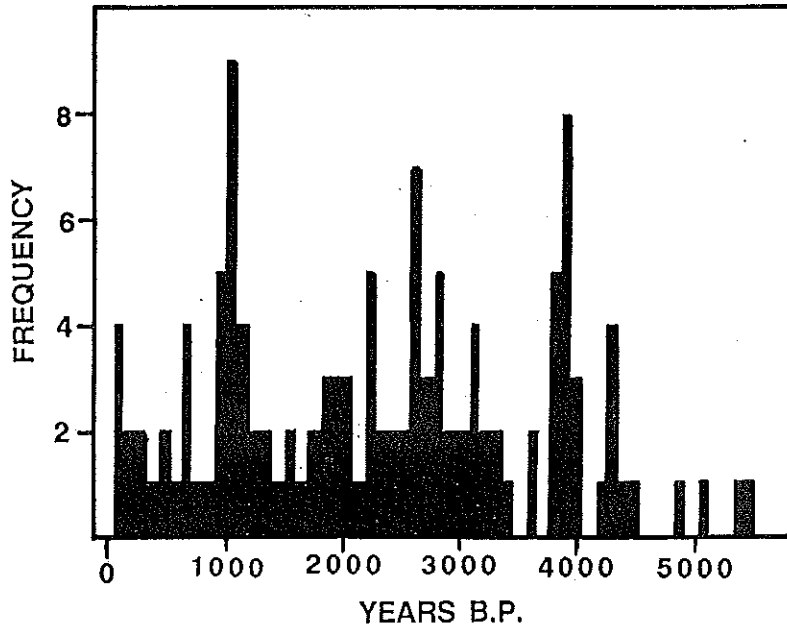


Figure 5-3. *Uncorrected radiocarbon dates: Columbia Plateau pithouses.*

radiocarbon record after 3600 B.P., there are two major modes: 3600–2000 and 1400–1000, with a strong peak at 1300–1100 B.P.

The dates were corrected to determine whether some or all of this pattern was the result of the fluctuating amounts of C-14 in the atmosphere. The University of Washington Quaternary Isotopes Laboratory radiocarbon calibration program, version 1.3 (Stuiver and Reimer 1986), was used to calculate the corrected dates. The midpoints of the resulting date ranges were then plotted in 100-year increments (Figure 5-4). A given uncorrected radiocarbon date, can have more than one corrected date. Since I had no basis for deciding which corrected dates to accept or reject, and since I wanted to determine whether the gaps in the distribution of uncorrected dates would also appear with the corrected dates, all corrected dates were plotted.

The basic patterning is the same among the corrected dates as among the uncorrected dates. However, additional gaps appear at 2500–2700 B.P., at 900 B.P., and at 400 B.P. The relative heights of the bars reflect the numbers of dates produced by the correction algorithm. As previously noted, many early dates produce multiple corrections, and the shape of the graph is, to some extent, a reflection of variation in atmospheric C-14. The overall shape of both graphs, however, seems to indicate periods of fluctuating usage of pithouses in the region.

Finally, the two sets of data were combined (Figure 5-5). The number of houses per millennium (Figure 5-2) was combined with the number of *uncorrected* radiocarbon dates per century to provide a relative scale to the patterning evident among the radiocarbon dates. Four episodes of house

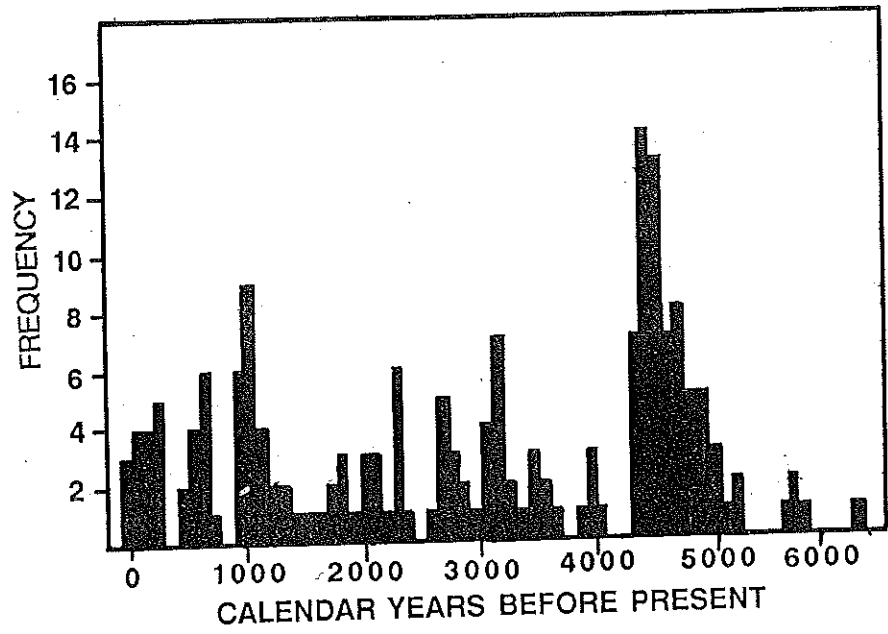


Figure 5-4. Corrected radiocarbon dates: Columbia Plateau pithouses.

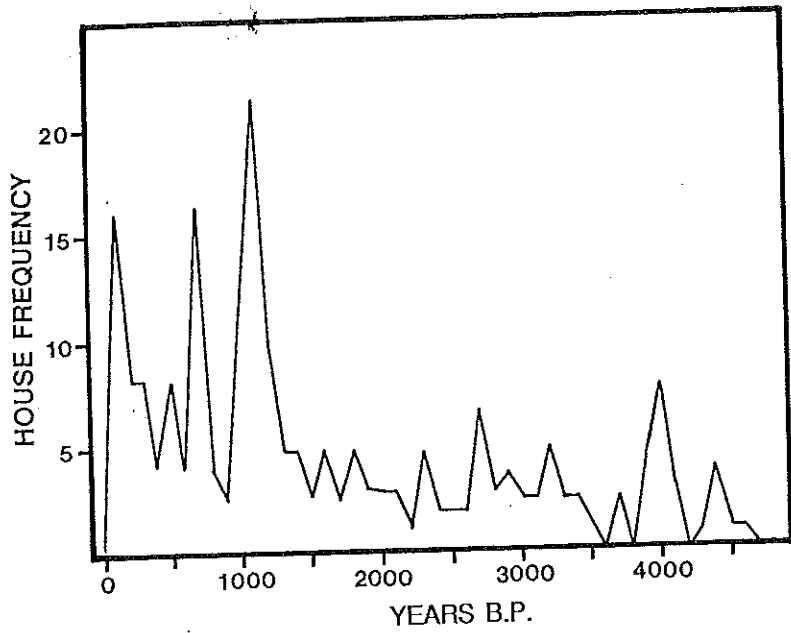


Figure 5-5. House construction through time (based upon combining Figure 5-2 and Figure 5-3).

construction clearly stand out: 100-1400, 1400-2200, 2200-3600, and pre-3600 B.P.

The metrical and morphological data parallel the patterning evident in the radiocarbon dates. The following discussion reviews the residential and settlement patterns for the period between 5500 and 250 B.P. This long span of time is broken into four periods: 5500-4000, 4000-3000, 3000-2000, and 2000-250 B.P. These periods do not correspond exactly to those observed above. The data upon which the following discussion is based are not the same as those used above, and it is not possible to make the periods correspond.

Before reviewing this information, a brief description of the earlier subsistence, settlement, and residential systems on the plateau is in order. (I have provided these descriptions in detail elsewhere [Ames 1988a]). During the period between 11,000 and 7000 B.P., subsistence was diffuse. A broad array of animals was taken, from marmots to bison, with the smaller mammals at least as important as the larger ones. People were foragers in Binford's (1980) terms, shifting their residential camps to resources. Population densities were likely quite low, and storage played little or no role in their economy. Local groups were of necessity integrated into far-flung maximal bands (Wobst 1976) to establish marriage and other ties. The only domestic structures known for this period are three small tentlike structures that postdate 8000 B.P. (Chatters 1986).

The following discussions sketch duration, seasonality, permanence, site size, organization, and investment for each of the four periods of time under examination.

5500-4000 B.P.

Duration: Year-round and seasonal occupation dominated. Site 45-OK-11, the oldest excavated pithouse site along the Upper Columbia River, was apparently occupied year-round. Lohse and Sammons-Lohse (1986) believe it was a fully sedentary settlement of four to five simultaneously occupied houses. Hatwai, the equivalent site in the southeastern plateau, was probably occupied during winter and early spring.

Seasonality: Sites were occupied in the winter and year-round.

Permanence: The structures were occupied for several years, perhaps as many as 10 or more (Ames 1989; Chatters 1986; Lohse and Sammons-Lohse 1986). The abandoned house pits were not frequently reused; sometimes several hundred years would elapse before a pit was reoccupied and reroofed.

Size: Throughout this period, floor area varied within fairly narrow limits (Table 5-4). The structures built between 5000 and 4000 have the largest mean area and the greatest estimated house populations of any in the sample. This period is unique in that large houses (11-18 people) comprise more than half the houses for the period (Figure 5-6), which suggests that the period was marked by a distinctive household organization based on large extended families. As noted above, 45-OK-11 may have contained four or five simultaneously occupied houses. Hatwai may have also been a hamlet of two or three houses, although evidence of its being a hamlet is weak. The more

Table 5-4. Statistics for Quantitative House Attributes

	Years B.P.					
	6000-5000	5000-4000	4000-3000	3000-2000	2000-1000	1000-120
<i>N</i>	6	18	24	31	74	73
AREA						276
<i>n</i>	4	12	17	19	65	71
mean	54.7	70.7	51.8	35.7	50.5	62.9
<i>s</i>	25.7	30.0	30.3	27.8	42.1	51.8
min	28.3	28.3	15.2	7.1	12.6	3.1
max	90.0	121.0	113.1	95.0	227.0	283.5
VOLUME						
<i>n</i>	4	12	14	19	49	51
mean	36.1	39.3	28.9	31.5	36.7	72.6
<i>s</i>	12.9	21.4	20.2	37.7	38.1	123.2
min	24.0	13.6	4.6	1.2	2.5	0.5
max	54.0	85.5	66.0	142.6	172.5	737.2
POPULATION						
<i>n</i>	4	12	17	19	65	71
mean	10.4	12.1	10.1	8.3	9.9	11.3
<i>s</i>	2.8	3.2	3.3	3.0	4.5	5.6
min	7.6	7.6	6.1	5.3	5.9	4.8
max	14.2	17.5	16.7	14.7	28.9	35.0
HOUSVOL						
<i>n</i>	4	12	17	19	65	71
mean	139.2	163.5	126.3	119.1	150.2	200.0
<i>s</i>	32.3	100.4	78.5	111.1	130.7	234.7
min	98.1	38.8	33.9	19.1	20.8	8.7
max	167.2	334.3	296.3	391.4	766.7	1479.5
TOTSPACE						
<i>n</i>	4	12	17	19	65	69
mean	13.8	12.9	12.0	11.9	13.3	14.9
<i>s</i>	3.6	6.6	5.0	7.4	5.6	7.9
min	9.1	5.0	4.6	3.7	2.9	1.7
max	13.8	22.7	20.1	26.6	26.5	42.2

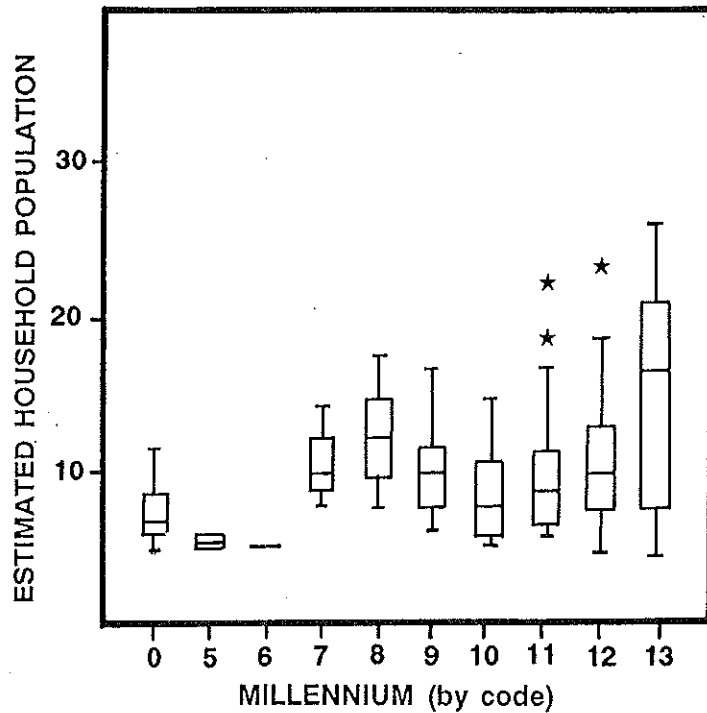


Figure 5-6. Box and whisker plots of estimated household population by millennium. 0 = no date; 5 = 8000-7000 B.P.; 6 = 7000-6000 B.P.; 7 = 6000-5000 B.P.; 8 = 5000-4000 B.P.; 9 = 4000-3000 B.P.; 10 = 3000-2000 B.P.; 11 = 2000-1000 B.P.; 12 = 1000-120 B.P.; 13 = 2000-120 B.P.

conservative estimate is that Hatwai never had more than one house at a time. This was probably the more common community pattern. Community size varied from 11 to 12 individuals to perhaps as many as 70 or more people.

Organization: Houses generally lack any evidence of interior spatial differentiation. They have no distinctive interior features, such as prepared hearths or storage pits. There is little evidence of specialized outside features either. However, large-scale specialized processing sites are known for the period (Thoms and Burchard 1986, 1987). They contain earth ovens for baking camas (*Camassia quamash*), a lily with a highly nutritious root.

Investment: The excavators generally interpret these houses as having been fairly substantial (Ames 1989; O'Connell 1975) like the large, heavily roofed pithouses built in southern British Columbia during the last century (Rice 1985; Teit 1900). There is seldom evidence of superstructures, however. Artifacts associated with these structures indicate the occupants' capability of heavy woodworking. Measuring investment in other ways, the three excavated houses at Hatwai were associated with some 80 mortar bases and large flat anvil stones, some of which weighed over 70 kg.

The subsistence economy and the settlement patterns do not mirror the regional uniformity among the houses. The subsistence economy seems to have been more focal than diffuse (Cleland 1976). In the southeastern plateau, it was very focal (Atwell 1988). Faunal and artifactual evidence suggest that deer, fish, roots, and mollusks were the dietary mainstays (Atwell 1988). Though the faunal collections are taxonomically diverse, containing many species, only a few taxa, primarily deer, dominate. This pattern is in sharp contrast to the subsistence practices before 5500 B.P., which were quite broadly based.

Subsistence was slightly broader on the Upper Columbia. Minor quantities of elk, antelope, and bison supplemented the deer; and fishing emphasized Cyprinidae (minnows) as much or more than it did salmon. Freshwater mussels and plant foods were also important. Lohse and Sammons-Lohse (1986) regard these people as generalists, based upon the taxonomic diversity of the dietary remains, but as at Hatwai, certain resources dominate. In both areas, processing tools are important parts of the artifact assemblages, with the highest percentages of any time during the 11,000-prehistory of the region.

Some workers (Chatters 1986; Lohse and Sammons-Lohse 1986) see these people as having been fully sedentary foragers, exploiting highly productive, diverse habitats from their residential bases without logistical movement. They suggest that storage may have played a minor role at best. I personally doubt this model, but it does indicate a possible form that these settlement and economic systems took. The data from Hatwai do indicate seasonal movement and at least some logistical movement. However, it was not until later periods that classic collector settlement patterns appeared.

4000-3000 B.P.

Duration: One or two seasons was the typical duration, but some structures at the end of the period may have been occupied year-round (Chatters 1986). Such features as floor zones are not well developed; houses themselves are not common for several hundred years.

Seasonality: There were both winter and summer houses.

Permanence: Sites were occupied for shorter occupation cycles than during the earlier time periods. Residential mobility probably increased.

Size: Houses were smaller both in area and in volume, and the household group was smaller. Sixty percent of these houses are small (5-9 individuals) in contrast with the previous period (Figure 5-6). Hamlets probably seldom had more than four to six houses and single-house communities may have been the common pattern. Community size probably ranged from five to perhaps as many as 60 people.

Organization: As in the previous period, there is little or no strong evidence of internal differentiation within or among structures at a given site beyond the minor differences in house size. Specialized storage and processing features appear in residential sites. Salmon storage pits are among these features.

Investment: Investigators usually state that these structures do not appear to have been as substantial as during the previous period. In some instances, where pits of much older houses were reoccupied, it is not possible even to

demonstrate that the pits were roofed, even when the reoccupation was intense.

3000-2000 B.P.

Duration: Residential sites were occupied both seasonally and year-round (Chatters 1986).

Seasonality: In the Upper Columbia, there are suggestions that some sites were winter residences; others were summer residences associated with fishing (Campbell 1985; Lohse and Sammons-Lohse 1986).

Permanence: The general sense among various investigators (Ames 1989; Campbell 1985; Chatters 1986; Lohse and Sammons-Lohse 1986) is that occupation cycles were much shorter than before 4000 B.P.

Size: This set of houses is the smallest in the sample (Figure 5-6). Seventy-five percent of these houses are small (5-9 people), and the few large structures housed 11 to 14 people. This period and the previous one are quite similar to each other in the range and patterning of house sizes and quite distinct from the periods before 4000 B.P. and after 2000 B.P., suggesting that the nuclear family was the household group during this 2,000-year span. Settlement size is the same as in the preceding millennium. Community size may have varied from five to a maximum of 40 to 50 individuals.

Organization: There is evidence of increased regional organization in that there are clear indications of strong logistical residential mobility patterns throughout the plateau, and there is the possibility that families constructed houses at more than one locality.

Investment: Investment was at a level similar to that from 4000 to 3000 B.P.

Subsistence was more focal on the Upper Columbia River than during previous periods, and mobility strategies were more logistic. The focal subsistence patterns in this area were marked by slightly reduced dietary diversity (Campbell 1985) and much greater unevenness (Atwell 1988): fewer kinds of foods were collected, and a limited number of food resources accounted for a greater proportion of them. Salmon became the dominant fish, freshwater mussels declined in frequency, and deer became the dominant land mammal in the diet. While these trends cannot be directly monitored for plant remains, the numbers of processing tools increased (although their frequency declined), but not as rapidly as did hunting and fishing tools. Subsistence and technological remains in the southeastern plateau appear similar to those before 4000 B.P., but that impression may be as much due to the way archaeologists have organized the culture history of this region as to the patterns themselves.

There is good evidence of expansion into previously seldom used marginal areas and environments (Chatters 1982). As I have noted, mean household size declined. The data suggest greater overall mobility. Both of these changes began before 3000 B.P. The connection between greater logistical mobility and

smaller household size is interesting in light of arguments that greater logistical organization indicates a more complex division of labor (e.g., Ames 1985). The decline in household size may point to an increase in extrahousehold ties and alliances.

2000–250 B.P.

The 2000–250 B.P. period should probably be split at about 1400 B.P., but the period appears to be too complex, and the available data insufficient, to justify division in this paper. The period is marked by drastic changes both in regional and in local residential patterns.

Duration: Residence appears to have been both year-round (Chatters 1986; Lyman 1985; Alan G. Marshall, personal communication 1985) and seasonal (Campbell 1985; Chatters 1986).

Seasonality: As in the previous period, there are suggestions of both winter and summer residential sites, with the latter associated with fishing (Lohse and Sammons-Lohse 1986). This pattern exists on the Upper Columbia and probably on the Lower Snake River as well.

Permanence: As in the previous period, residential cycles appear to have been short (i.e., perhaps only one to four years in any one cycle).

Size: The mean size of structures (as measured by house volume and area) increased slightly, but the upper range of house size in all measures (Figures 5-6, 5-7, and 5-8) increased dramatically. Mean household population also increased slightly. The graphic distribution is bimodal, with the largest mode between six and 10 people per house and a second, much smaller mode, from 15 to 20 people per house (Figure 5-6). There is also a group of extremely large structures. Any household in this sample of 11 to 18 individuals (using Cooke's formula for estimating household size) is a normally large household. Any household greater than that size must be considered extremely large. Likewise, any structure with an estimated interior volume of more than 290 m³ must also be considered extremely large. Extremely large structures appeared in this period and become larger through time (Table 5-4). Additionally, the number of large and very large houses increased from 34% of the sample between 2000 and 1000 B.P. to 42% after 1000 B.P. This increase suggests the formation of corporate groups (Hayden and Cannon 1982) and significant differences in household wealth and power (Netting 1982).

Large clusters of structures also appear in the record. The largest of these are at the confluence of the Snake River and the Columbia River in Washington and the confluence of the Fraser and Thompson rivers in British Columbia (Hayden et al. 1985). Smaller clusters occur in many areas. The Miller Site (45-FR-5) on Strawberry Island in the Snake River, just above its confluence with the Columbia River, has some 130 depressions. While all of these depressions were probably not domestic structures, nor were they all occupied contemporaneously, they do indicate a large, complex occupation (Cleveland 1976; Schalk 1983). Similarly, there are large surface groupings of house pits elsewhere in the plateau that indicate sizable contemporary populations.

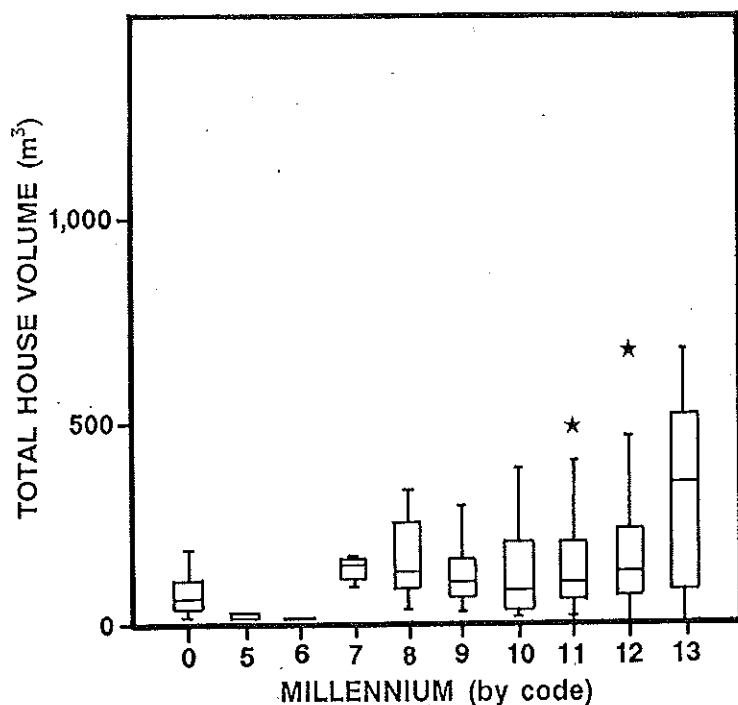


Figure 5-7. Box and whisker plots of total house volume by millennium. 0 = no date; 5 = 8000–7000 B.P.; 6 = 7000–6000 B.P.; 7 = 6000–5000 B.P.; 8 = 5000–4000 B.P.; 9 = 4000–3000 B.P.; 10 = 3000–2000 B.P.; 11 = 2000–1000 B.P.; 12 = 1000–120 B.P.; 13 = 2000–120 B.P.

The number of excavated structures increases threefold from the previous period, from 13% of all structures to 68% of all structures (Figure 5-2). Estimated total household population increases from 10% (248) to 78% (1,843) of the total estimated population for the time span discussed in this paper.

As noted above, this increase could reflect sampling bias, population growth, increased mobility producing more houses, or a change in the domestic cycle leading to more houses being built. The available evidence minimally indicates that increased mobility was a factor. However, the pattern of increased mobility extends back perhaps 1,000 years without an accompanying upsurge in the number of houses. It seems reasonable that these figures reflect both greater mobility and sharp increases in population.

Organization: The presence of very large households indicates that there may have been some new forms of household organization and perhaps household economy. The large clusters of house pits mentioned above commonly have some very large structures as well as much smaller ones. The smaller ones probably include sweat lodges, menstrual huts, storage buildings, and so on, but the data clearly indicate widespread differences in house size within what are likely to have been contemporary settlements (e.g., Hackenburger et al.

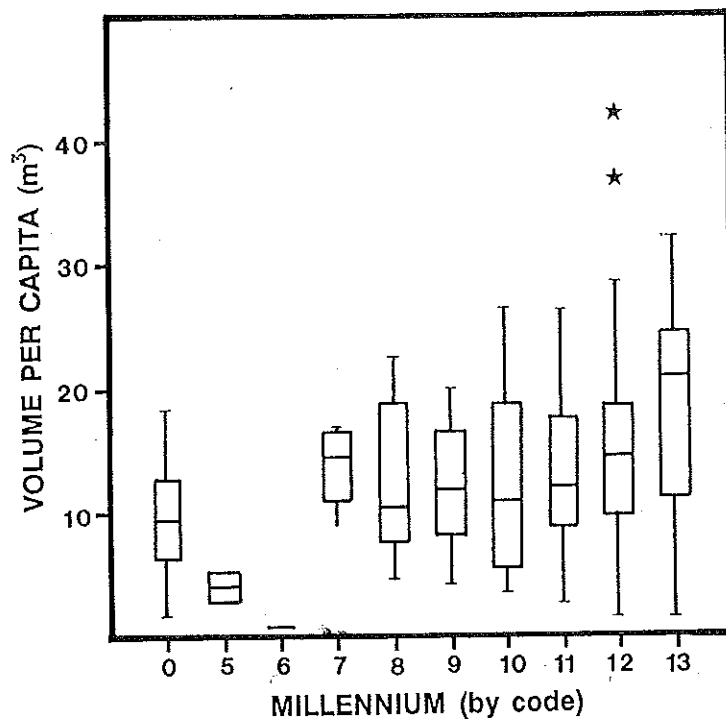


Figure 5-8. Box and whisker plots of household space per capita by millennium. 0 = no date; 5 = 8000–7000 B.P.; 6 = 7000–6000 B.P.; 7 = 6000–5000 B.P.; 8 = 5000–4000 B.P.; 9 = 4000–3000 B.P.; 10 = 3000–2000 B.P.; 11 = 2000–1000 B.P.; 12 = 1000–120 B.P.; 13 = 2000–120 B.P.

1988; Hayden et al. 1985). Building on this observation for southern British Columbia (Stryd 1973), Hayden and his coworkers (1985) argue for a regional settlement hierarchy in southern British Columbia in which there were small satellite pithouse villages, without associated large structures, and larger house clusters, with associated larger houses. On the Columbia Plateau, a widespread shift from semisubterranean pithouses to longhouses, some of which were also semisubterranean, also suggests a major reorganization of the household group. The earliest archaeological evidence of longhouses may be in the Calispell Valley, where at least one and possibly four such structures date between 1300 and 1600 B.P. One of these was perhaps 5 m wide and 27 m long (Greg C. Burtchard, personal communication 1988).

Longhouses may have facilitated the formation of domestic groups whose size fluctuated considerably through time (Suttles 1988). A mat lodge that housed a nuclear family could have been combined with several lodges to produce a longhouse that sheltered scores of people, which could then have broken apart again.

These very large structures overlap in interior size with the historic plank houses on the northern Northwest Coast. I argue elsewhere (Ames 1988b) that

this shift means that the ways in which domestic labor and stores were controlled in these large structures were quite different from in the smaller ones. Hayden (1987) suggests they may have housed big men.

Investment: There are indications in the archaeological record of significantly increased levels of investment. House 1 at the Avey's Orchard site (45-DO-176) near Wenatchee, Washington, dates to the very end of this period (1080 ± 50 B.P. [Galm and Marsten 1985:84]). It was a large semisubterranean structure made of poles, cedar-bark mats, and cedar planks. The planks were made of western red cedar (*Thuja plicata*), which commonly grows above 800 m in the Washington Cascades (Franklin and Dryness 1973), 5 km west of the site and across the Columbia River. Elevations above 800 m are a greater distance away. The wood in the structure was either driftwood or wood that was transported some distance to be used for the house. The very large structures throughout the region are themselves indications of higher levels of effort (though this might be easily exaggerated—pithouses are not necessarily difficult or laborious to construct).

These changes are accompanied by regional shifts in settlement patterns and locally different subsistence patterns. Logistical mobility with frequent annual moves was the dominant pattern (e.g., the excavators of House 1 at Avey's Orchard suggest that the house may have been occupied for only one year [Galm and Marsten 1985]).

Subsistence on the Upper Columbia River was increasingly focal. Dietary diversity remained virtually stable (the number of exploited species was about the same as during previous periods) while salmon and deer became increasingly important. In contrast, on the Lower Snake River, subsistence diversified. Diversity increased and no resource appears to have been dominant, at least not like deer, fish, mussels, and roots had been before 4000 B.P. Fish did become increasingly important. The variety of exploited ungulates grew to include deer, elk, antelope, and bison, all that were available. Rabbits and large rodents were more important on the Snake River than on the Upper Columbia. The diversification in the subsistence base was matched by a major increase during this period in the frequency of projectile points and in the numbers and kinds of fishing gear. Processing tools, such as mortars and pestles, also became more numerous. Similar trends in technology occurred on the Upper Columbia, but there they were much weaker. The presence of late-summer residence camps containing pithouses and associated with fishing indicates that a complex seasonal pattern of movement and residence existed.

Summary and Conclusion

As outlined above, the period before 6000 B.P. can be characterized as having had a very diverse, broad-spectrum resource base. People shifted their residences to resources throughout the year, exploiting different resources as they came into season (Ames 1988a; Chatters 1986). Population densities were quite low, and small local groups were no doubt integrated into rather far-flung maximal bands (Wobst 1976).

A shift then to long-term sedentary, or even semisedentary, residence in one place was a major break from previous practices. The plateau data suggest that the break was not fully complete until approximately 4400 B.P. Authors who have noted a gap in radiocarbon dates between 3700 B.P. and about 3400–3000 B.P. on the plateau (Campbell 1985; Chatters 1986; Salo 1985) have suggested that the gap is due to climatic factors of some kind, including increasing aridity (Chatters 1986). Climatic change is an attractive explanation because it can be seen operating on a sufficiently large scale.

On the Columbia Plateau, the period between 7000 and 5400 B.P. was marked by a warmer, dryer climate than exists today. By 4000 B.P., there was more available moisture. The period between 4000 and 3000 B.P. was perhaps even cooler and moister with an unusually strong cool-moist episode around 3600 B.P. (Mehring 1985). The northern Great Basin environmental record seems to offer a generally similar pattern (Mehring 1985).

Burtchard (1988) presents evidence for increased camas (*Camasia quamash*) processing in the Calispell Valley of northeastern Washington and the Willamette Valley of western Oregon from about 5500 to 4000 B.P. (based on radiocarbon dates from the excavated earth ovens that were used to bake camas). Both sets of dates have a gap between approximately 4000 and 3500–3200 B.P. It is tempting to see the regional pattern of house-pit construction between 6000 and 4000 B.P. as indicating increasing environmental productivity, produced by increasingly effective moisture, leading, among other things, to an increase in camas production. If so, why should the pattern break down after 4000 B.P., when generally moist environmental regimes appear to have been common throughout much of western North America? Obviously, changes in the seasonality of production, rainfall, drought, and so forth may be crucial. In short, because the residential pattern is complex, any explanatory answer must also be quite complex.

In any case, increasing environmental productivity alone does not explain why people became sedentary. Population growth and resource stress are two possible explanations. In Rafferty's (1985) model of increasing sedentariness, she argues that resource stress is the proximate cause of sedentism and that population growth is one of the causes of resource stress.

Sedentism was only one of several attributes of the prehistoric plateau residential and settlement patterns. It was also one of the least variable. Greater complexity accompanied increasing mobility and decreasing permanence rather than greater duration of residence. There was not a direct continuum between nomadism and sedentism. This becomes particularly clear when these changes are viewed on a broad regional scale rather than at a single site or even within a narrowly circumscribed region. On the Intermontane Plateau, changes in residential patterns were a regional phenomenon produced by a complex web of regional and local causes.

The evidence indicates that there were at least three distinct episodes of house construction and sedentism on the plateau. These episodes are clearly distinguished from each other in their household and community size and organization. They also differ in residential mobility and subsistence patterns. Sedentism is combined with both very long occupation cycles (high

permanence) and very short ones (low permanence). The greatest organizational complexity and the largest populations occur with low-permanence sedentism.

Some of the changes described were regional in scope; others were distinctly local. The regional-scale changes include investment in house construction, size and duration of the household, and community organization; while subsistence changes appear to have been local. The subsistence economies of the Upper Columbia River region and the southeastern plateau used the same technologies and resources, sustained very similar residential and settlement patterns, yet evolved in different directions.

In the earliest period (5500–3900 B.P.), house construction was both temporally and spatially sporadic until 4200 B.P. At this time, there developed a regionwide pattern of small hamlets or villages of from one to six houses. The houses were substantial and were home to large domestic groups. The communities that appeared were large and quite permanent in some places. The subsistence base of these communities is the subject of an emerging controversy. These communities were a regional phenomenon, and the pattern itself probably lasted no more than 300 years.

There is then a 300-year gap in the radiocarbon dates. Dates from two structures at 3800 B.P. punctuate this gap. After 3600 B.P., houses were regularly constructed but in widely varying numbers. Household, community, and mobility patterns were markedly different after 3600 B.P. Between 3600 and 2200 B.P., household and community sizes were much smaller than previously (although the *number* of households per community appears to have remained constant), houses were less substantial, residential cycles were much shorter, and storage facilities became widespread (many with salmon). The people were classic collectors (Binford 1980). Subsistence appears to have become increasingly focal.

The number of houses declined at 2200 B.P. and then rebounded. House numbers increased sharply after 2000 B.P. The distribution of radiocarbon dates indicates that the increase occurred after 1400 B.P. The same data suggest that the period after 1400 B.P. was marked by strong fluctuations in the numbers of houses (Figure 5-5). The overall increase in the number of houses is the result of population growth and a pattern of mobility that produced multiple houses per domestic group.

The period after 2000 B.P. was also marked by the presence of very large houses, large aggregations of houses, and settlement hierarchies. Longhouses—probably mat lodges—appear in the archaeological record. They became the dominant house form on the Columbia Plateau by the time of contact with Euroamericans. All of these changes indicate differential access to authority and power as well as major shifts in household organization, including the formation of what Hayden and Cannon (1982) have termed *corporate households*. The large aggregations of houses can legitimately be called *villages*. Residential mobility patterns combined sedentism, low permanence (high mobility), and logistical movement. Residential cycles appear to have been short. Sedentary occupations were sometimes as short as a year. The sharp increases in house numbers at 1200, 700, and 200 B.P. were probably the result of short

occupational cycles producing multiple houses per domestic group.

These data do not provide evidence for long-term trends. Rather, they indicate that residence and settlement systems can shift and change quickly. There is no trend of increasing complexity coupled with increasing sedentism through time; instead the reverse occurred: increased complexity (as measured here) is coupled with increased mobility. Year-round occupation of a residential site and permanence, investment, or population size are not correlated. There is no simple continuum between nomadism and sedentism.

I have avoided any discussion of what may have caused the initiation of sedentary and semisedentary residence on the plateau. The question is too complex at this point because one must also answer the ancillary question, "Which time?"

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