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Chapter 9

Life in the Big House: Household Labor and Dwelling Size on the Northwest Coast

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This paper is an outgrowth of a long-term research program aimed at understanding the household economies of those human societies archaeologists usually label as "complex hunter-gatherers" or "affluent foragers." A basic underlying assumption of this program is that one must understand how the household functioned in these societies if one is to understand their evolution at all. The household was a (perhaps was the) basic unit of economic production and biological and social reproduction among these peoples. It was where ecology, economy, society and culture met. The household is the theoretical nexus—or Gordian knot—for studies of these societies. I have found Wilk and Rathje's (1982) model of household functions quite useful in approaching this nexus or knot.

Ethnoarchaeology can provide insights into the household economies of generalized hunter-gatherers as well as peasants and others in modern industrialized economies. However, there are no extant complex hunter-gatherers. Therefore, archaeology, coupled with judicious use of the available ethnographic and ethnohistoric records of recent complex hunter-gatherers, such as those of the Northwest Coast, is the only available route. The Northwest Coast is particularly important here because of the role ethnography plays there in building theories about complex hunter-gatherers.

This paper has number of theoretical and substantive issues surrounding hunter-gatherer households as its underpinnings; it does not resolve these issues and is therefore a progress report. The theoretical issues concern the organization of labor among complex hunter-gathers. In this paper, the house or dwelling is treated as an object of labor and a focus of production in an attempt to expand our knowledge of hunter-gatherer economies beyond the subsistence economy. The substantive problems that hold this paper together are those arising from a series of linked events in northwestern North America over the last 5000 years or so (Ames 1991a; 1991b; 1994). In it I examine dwellings along the Northwest Coast of North America. Originally I intended to include a much broader region (cf. Ames 1991b), but that proved impractical. The paper is about very big houses, and presents preliminary steps in discussing the household ecology of life in them.

Households and Dwellings

Smith's discussion of the utility of household studies may be taken as a starting point for this paper:

> First, the household is the basic unit of production and consumption in ... societies.... many of the activities involved in adaptation to the natural and social environment take place at the household level. Second, a focus on households usually permits a consideration of the entire range of social variation within a given society, since households can be selected from various economic classes, residential areas, occupational groups, and so on. Thirdly, many large-scale social, political, and economic institutions and processes have impacts at the household level, and the study of households allows the researcher to address such larger patterns through their expression in a controlled social setting (Smith 1987:297–335)

Household research can be split into research on the household itself and on the dwelling(s) where the household resides. The *household* represents "a social unit, specifically the group of people that shares in a maximum definable number of activities..." (Ashmore and Wilk 1988:6), while the *dwelling* is "the physical structure or area within which residential activities take place. It is the physical setting of the activities ... that have been defined as part of the domestic sphere" (Ashmore and Wilk 1988:6). They also define the *coresidential group* as a social unit "consisting of people who regularly share living quarters. This group need not be equivalent to a household, in that people often live in the same building without sharing in the activities that normally define a household" (Ashmore and Wilk 1988:6). This section will first discuss households, then dwellings.

Virtually all definitions of households are functional. Ashmore and Wilk, for example, speak of a "maximum definable number of activities." These functional definitions vary somewhat in terminology and focus, but display common central functions (e.g., Cheal 1987). For archaeology, definitions of households and methodological approaches to them are inextricably and inevitably linked to the remains of dwellings.

The dwellings that households occupy are produced by labor. Studies of hunter-gatherer economies seldom look beyond the labor invested in subsistence. There are no equivalent studies of complex hunter-gatherers, like those who occupied the Northwest Coast in the late 18th century, for the simple reason that these societies either no longer exist, or are no longer hunter-gatherers.

Nevertheless, a full understanding of the economies of these societies calls for knowledge of the labor required for aspects of the infrastructure other than subsistence (e.g., Arnold 1992). This paper is an attempt to move in that direction by linking the dwelling to the organization of labor.

Wilk and Rathje's Model of Household Function and Household Labor

Wilk and Rathje (1982) recognize four general categories of household functions: production, distribution, reproduction and transmission. Basically, production is "human activity that procures resources or increases their value" (Wilk and Rathje 1982:622). They focus on how productive labor is *scheduled*. By scheduling, I understand them to mean how productive activities are organized and distributed in time and space:

> ... the range and scale of productive activities within households varies enormously. In defining how households adapt to variation in production, the most important kind of variability is the *scheduling* of productive labor" (Wilk and Rathje 1982: 622, emphasis theirs).

They recognize a continuum of task organization between the poles of linear and simultaneous tasks.

Wilk and Rathje's (1982) classification of the organization of work (tasks in their terms) along a continuum between simultaneous and linear tasks provides a useful basis for this discussion. Simultaneous tasks are those which are accomplished by a group at the same time, while linear tasks are those which a single person can do over time. Many tasks can be done either way; many cannot. They also distinguish between simple and complex simultaneous tasks,

> each of which has very different social consequences and solutions. A simple simultaneous task requires many people doing the same task at the same time, as in a planting group of twenty farmers, each planting a row at a time. Complex simultaneous tasks involve specialization: all work at the same time, but do different parts of the job (Wilk and Rathje 1982:622).

These simple distinctions between kinds of tasks have important implications. Household size is certainly related to the complexity of the tasks the household must habitually perform (Wilk and Rathje 1982). Household organization and social structure are as well. This is clearly seen on the Northwest Coast.

Panowski (1985) has shown that there is a relationship between the elaborateness of the ranking systems in different Northwest Coast societies and the variety and quantity of foods stored for winter.

Donald (1983) argues that on the Northwest Coast slave labor was crucial to production because it provided extra hands to do the labor, but, perhaps more importantly, extra hands that were outside the division of labor. Most Northwest Coast subsistence tasks were complex simultaneous tasks and the sexual division of labor frequently determined the composition of task groups. Slaves provided labor which could be applied to any task, regardless of the kind of work. Further, slaves were labor directly controlled by the elite.

According to Wilk and Rathje (1982:624), distribution is "the process of moving resources from producers to consumers, and ... includes consumption of those resources." They distinguish between pooling, or distribution within households, and exchange, distribution among households or between larger corporate units. For archaeological purposes, large-scale storage is often taken as evidence for distribution.

For Wilk and Rathje (1982:627), transmission is the inter-generational transfer of "rights, roles, lands and property." Patterns of transmission depend upon the concepts of ownership of a particular culture as well as the social level of the unit in which property rights are vested.

In Wilk and Rathje's scheme, reproduction is the rearing and socializing of children, and is, according to them, one of the least flexible household functions. Reproduction also involves fecundity and fertility, and consequently is affected by social organization and production. Reproduction can also refer to social reproduction and the social transmission of culture and social practices. This paper will focus on production, distribution and transmission.

Methods

Production

The first methodological problem is how one investigates labor organization among prehistoric hunter-gatherers. In this paper, I use evidence from dwellings—specifically their sizes—to inform us about domestic labor processes. The floor areas of prehistoric houses are used to estimate household size. While there are well known methodological problems in the use of floor area to estimate population size (Hassan 1981), these estimates do provide useful "ball-park" figures for comparisons. Their use here is only for comparative purposes, not to draw conclusions about the actual number of people per household.

Differences in house floor area within a culture appear to be correlated with household size and wealth (Hayden and Cannon 1982; Netting 1982). As will be seen below, floor area and house volume also reflect house function (McGuire and Schiffer 1983). On the Northwest Coast during the late 18th century, houses were used as stages for elaborate ceremonies, as symbols of authority and power, and as food-processing and storage facilities (Suttles 1991). My assumption is that, while intra-group differences in dwelling size reflect differences in household size and wealth, inter-group differences reflect, among other things, how internal space is used, including whether or not stores are kept within the structure. Since many factors contribute to inter-cultural variation in house size, I do not assume that interior storage is the single or even primary factor, just that it must be important.

Household size is estimated here using Cook and Heizer's (1968) formula for estimating population on the basis of occupied space (see also Hassan 1981). They estimate 13.92 m^2 for the first six people in an area and 9.29 m^2 per person for any additional people. The formula has proven quite accurate in estimating household size for Northwest Coast structures with known populations.

Another approach that could be used is to estimate household population on the basis of the number of hearths present in a structure (e.g., Warrick this volume). This approach cannot be used for all Northwest Coast structures because, in some house styles, there was a single central hearth for the entire household, which may have included several families. Further, it is not always possible to demonstrate that all excavated hearths were contemporaneous.

The second methodological problem is determining labor investment in the dwelling itself as a measure of the household's capacity to sustain itself physically through time. This is accomplished indirectly by estimating the labor costs of building structures. For the Northwest Coast, I estimate the amount of lumber present in wooden structures in units of board feet (12 in x 12 in x 1 in), the standard measure for lumber in the United States. A modern, single-family dwelling in the United States requires 10,000 to 12,000 board feet (Ames et al. 1992). The estimates for Northwest Coast plank houses include the timbers comprising the house frames and the cedar plank sheathing of the houses' walls and roofs. Since house floors could be either planked or earthen, I use estimates both including and excluding plank floors (Ames et al. 1992). As it turns out, a planked floor was a significant investment. The estimates do not include wood used

for internal fixtures, such as frames and pegs, making them quite conservative.

Distribution and Storage

An important methodological concern is how to investigate distribution in an archaeological culture, like those of the Northwest Coast, in which the stores were kept in perishable vessels, or were located in places seldom sampled by archaeologists. On the Northwest Coast of North America, stores were commonly kept in boxes and baskets within houses. Consequently, evidence for storage is indirect: the presence of tools used for processing stored resources, the actual remains of stored items, or sedentism. The usual argument is that, since sedentism is impossible on the coast without storage, sedentism is itself *prima facie* evidence for storage.

In this paper, I explore these issues by treating houses as potential storage boxes, estimating house volume to determine the potential of a structure to contain a significant volume of stores. I compare ethnographically documented houses from the Northwest Coast and prehistoric and historic houses from the Columbia-Fraser Plateau with the more poorly documented prehistoric structures from the coast. On the coast, historic houses were all either gable or shed-roofed (Vastokas 1966). On the Plateau, house styles varied, but were predominantly pithouses prehistorically and mat lodges and long houses historically (Rice 1985). In all these regions, houses were sometimes built around, on and in pits excavated to depths of 20 cm to 2 m. My estimates of the volumes of coastal houses include the volume of the cube formed by the walls of the structure, the volume of the attic and, where present, the volume of the interior pit. The formula is:

$$V_s = V_w + V_r + V_p$$

where V_s is the volume of the structure, V_w is the walled volume, V_r is the roof volume and V_p is the pit volume. Since V_w and V_r of prehistoric structures could not be measured directly, I used estimates. Where there was no basis to do otherwise, I used a constant wall height of 3 m.

The foregoing calculations are simple transformations of floor area. However, the estimated volumes are a significant transformation, since volume informs us, as floor area alone cannot, about a structure's potential for storage (or other purposes). As noted below, Northwest Coast houses were the region's primary food-processing tool. The rafters of houses were hung with food, the platforms along the walls were stacked with storage boxes, and, in some places, there were cellars below floors. Animals were butchered on the earthen and plank floors of houses (Ames et al. 1992), and other food-processing activities occurred indoors. Volume is the only measure which allows us to estimate the space available for all these functions.

Transmission

Some theories of social evolution among hunter-gatherers center on Woodward's (1980) concept of delayed return or inter-generational control of facilities (Gilman 1981; Bender 1989). Transmission is thus theoretically important. How can it be approached? Smith (1987) suggests labor investment as a measure of wealth, but it can be used as a measure of other things, including transmission. When the dwelling is the focus for an investigation of transmission, the methodological problem is to determine how long the structure stood. Was there something material to transmit? On the Northwest Coast, the house itself was the physical container of the household, and represented a great deal of labor. The approach followed here is to develop chronologies of house construction and reoccupation for specific dwellings to establish how long the dwellings stood, how frequently their locations were reused, and what was the interval of re-use. Ingold's (1987) discussion of "sedentarization" is useful in this context. He distinguishes between sedentism caused by circumscription of mobility, and sedentism that results when "dominant social relations are anchored by the possession of immobile, landed property" (Ingold 1987:169). The former is situational and reversible; the latter, in his view, irreversible.

The Northwest Coast

Currently, the earliest evidence for rectangular houses—presumably plank houses—on the Northwest Coast is from sites in three widely separated areas: northwestern British Columbia, southwestern British Columbia, and the northern Oregon Coast (Figure 9.1). In northwestern British Columbia, the Paul Mason Site, at Kitselas Canyon of the Skeena River, appears to be a village of ten small, rectangular houses, arranged in two rows. Coupland (1985a; 1985b; 1988) interprets these as small plank houses (Table 9.1). He (Coupland 1988) dates the village to ca 3200–2700 BP, the earliest evidence of such a village anywhere on the coast. Two house features at the Boardwalk site in Prince Rupert Harbor, also in northwestern coast of British Columbia, are similar in size and shape to those at the Paul Mason site (Table 9.1).

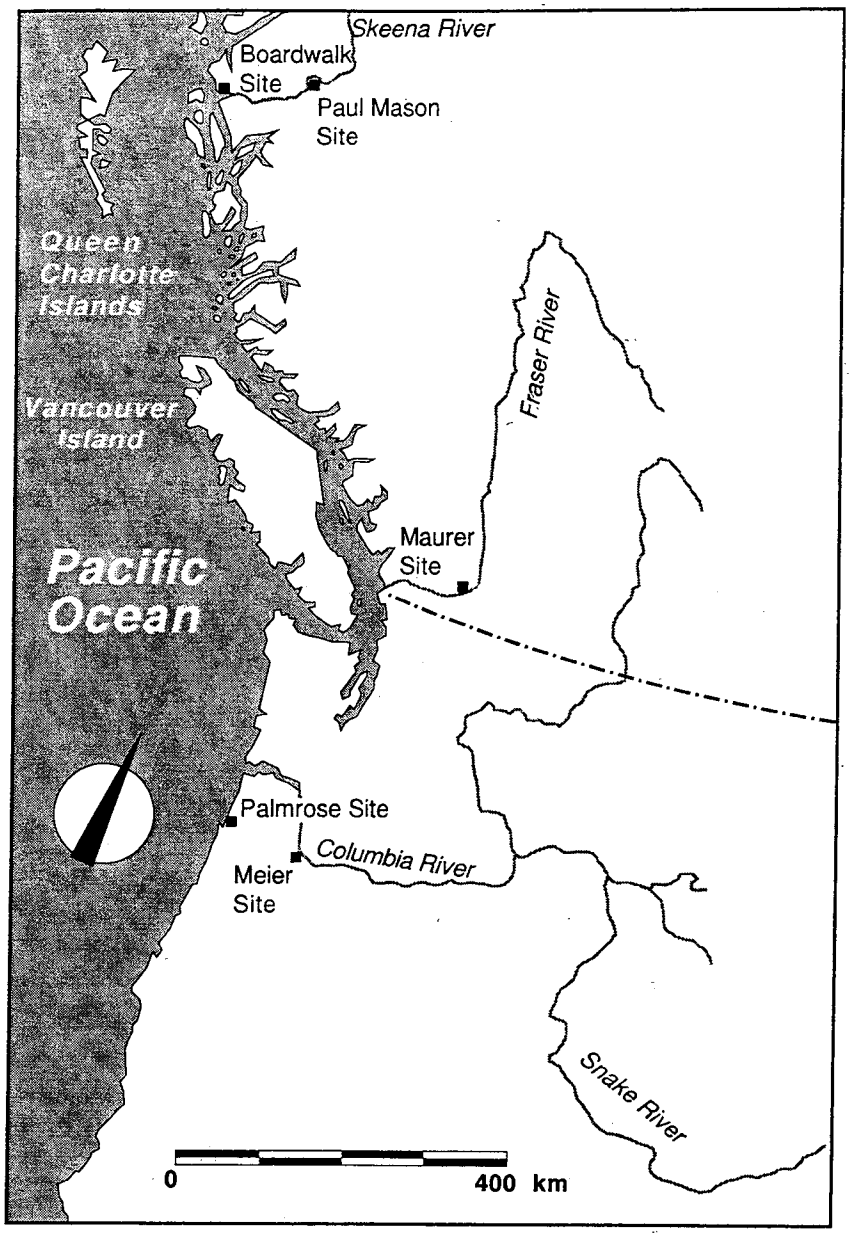

Figure 9.1. North Pacific coast, showing archaeological sites mentioned in the text.

The Boardwalk houses may have been the last two surviving structures of a village that once contained several rows of houses. Dated only stratigraphically (Ames 1994a), they may be roughly contemporary with the village at the Paul Mason site. In southwestern British Columbia, the Mauer site on the lower Fraser River (LeClair 1976) contains a single, large, rectangular pit that has been dated between 3900 and 4800 BP. The pit resembles the interior pit commonly found in some Northwest Coast plank houses. Hatzic Rock, above Mauer on the Fraser River, has produced another structure contemporary with Mauer. The nature of the structure is not clear, although it may have been a gable-roofed house. Ham (1982) argues that there is evidence for gable-roofed structures near the mouth of the Fraser at this time, although his claims are not universally accepted (cf. Matson 1992)

On the Oregon coast, a series of radiocarbon dates from the Palmrose house spans the period from 2600 BP to 1600 BP (Connelly 1992). This structure is larger than the earlier houses farther north. Indeed, its

Table 9.1. Estimates of Size and Lumber Requirements for the Earliest Rectangular Houses on the Northwest Coast.

Site	Length (m)	Width (m)	Area (m^2)	Estimated population	Volume (m^3)	Volume per capita (m^3)	Lumber (board-ft)	Lumber per capita (board-ft)	Lumber (floored) (board-ft)	Lumber per capita (floored)
Paul Mason	10	7	71	12	247	20	7671	633	10467	864
Paul Mason	10	7	66	12	232	20	7194	618	9816	843
Paul Mason	10	7	69	12	240	20	7452	626	10168	855
Paul Mason	11	7	73	12	254	21	7877	640	10748	873
Paul Mason	8	6	51	10	179	18	5555	555	7580	757
Paul Mason	9	6	55	10	191	18	5920	571	8078	779
Paul Mason	9	5	46	9	160	17	4965	527	6775	719
Paul Mason	10	6	65	12	228	20	7083	614	9665	838
Paul Mason	10	7	70	12	245	20	7595	631	10364	861
Paul Mason	8	7	52	10	182	18	5642	559	7699	762
Total				**111**			**66953**	**601**	**91359**	**820**
Mean	10	6	62	11	216	19	6695	597	9136	815
sd	1	0	9	1	32	1	1007	38	1374	52
Gbto31 A	9	6	56	11	195	19	6049	576	8254	786
Gbto31 B	9	5	48	10	170	17	5256	541	7172	738
Mauer	11	7	77	13	229	18	7086	554	9670	756
Seaside	20	6	115	17	345	20	10695	634	14593	865

dimensions place it well within the typical size range for plank houses in this region during the 18th and 19th centuries (Tables 9.2 and 9.3).

More recent archaeological plank houses are equally widespread, and equally rare. Coupland has recently tested a rectangular structure at the McNichol Creek site in Prince Rupert harbor which dates to ca. 1600 BP (Coupland et al 1993). Chatters (1989; Chatters et al. 1990) excavated portions of a plank house dated to ca. 1900 BP on the Black River, south of Seattle. Rectangular house remains dating to ca. 2200 BP were encountered at the Kersting site, near Portland, Oregon. Excavated structures dating to the last 300 to 400 years have also been reported. These include the famous Ozette excavations (Samuels 1983). In addition to plank houses, research along the coast and in adjacent inland areas has produced sporadic evidence of pithouses up to 5000 years old (Ames 1991b).

Production

The estimated populations, volume and lumber requirements of the early houses (Table 9.1) can be compared with the same estimates for a number of coastal houses of the European contact period (tables 9.2 & 9.3), including one Simon Fraser described on his trip down the Fraser River in 1800 (Suttles 1991), the largest documented residential structure on the Northwest Coast (Table 9.3). Even larger structures may have existed, but these were probably ceremonial "Potlatch houses."

The early houses at Paul Mason and Boardwalk are about the same size as the means of the houses in the three northern historic villages listed in Table 9.2. Paul Mason, however, lacks the larger structures present in the late 18th century. Coupland (1988) interprets the absence of larger houses at Paul Mason as evidence for a lack of intra-house social ranking. Such ranking was a feature of coastal culture at the time of European contact; the larger the house, the higher the rank of the household and of the title-holders who lived in the house.

Table 9.3 shows quite interesting patterns in the sizes of Northwest Coast houses of the late 18th century. As one moves from north to south, from Kluckwan in Alaska to the Chinookan region in Washington and Oregon, both the range of house sizes and mean house size increase. Chief Weah's house in Masset, on the Queen Charlotte Islands, the largest house reported on

Table 9.2. Estimates of Size and Lumber Requirements (With and Without Wooden Floors) for all House Structures in Three Northern Villages and One Southern Village: Gitlaxdzawkl and Gitsaex (Coupland 1988), Ninstints (MacDonald 1983), 45SAll (Minor et al. 1989).

Site	Length (m)	Width (m)	Area (m^2)	Estimated population	Volume (m^3)	Volume per capita (m^3)	Lumber (board-ft)	Lumber per capita (board-ft)	Lumber (floored) (board-ft)	Lumber per capita (floored)
Gitlaxdzawkl	9	9	81	13	284	21	8789	665	11992	907
Gitlaxdzawkl	9	8	75	13	261	21	8096	646	11047	881
Gitlaxdzawkl	12	12	149	21	521	25	16149	787	22036	1074
Gitlaxdzawkl	9	9	80	13	280	21	8689	662	11856	904
Gitlaxdzawkl	11	9	96	15	338	23	10466	703	14281	959
Gitlaxdzawkl	11	11	112	17	393	24	12191	735	16635	1002
Gitlaxdzawkl	14	14	188	25	657	27	20364	824	27788	1125
Gitlaxdzawkl	9	9	83	13	290	22	8985	670	12260	914
Gitlaxdzawkl	9	9	83	13	290	22	8985	670	12260	914
Gitlaxdzawkl	10	12	119	17	418	24	12948	746	17668	1018
Total				160			115662	724	157823	988
Mean	10	10	107	16	373	23	11566	711	15782	970
sd	2	2	35	4	122	2	3785	57	5165	74
Gitsaex	11	9	102	15	355	23	11015	714	15030	974
Gitsaex	12	12	148	20	517	25	16015	785	21852	1072
Gitsaex	11	10	108	16	378	23	11731	727	16007	992
Gitsaex	10	12	116	17	406	24	12586	741	17174	1011
Gitsaex	10	10	99	15	346	23	10720	708	14627	966
Gitsaex	13	11	141	20	495	25	15351	778	20946	1062
Gitsaex	11	14	148	20	519	25	16084	786	21947	1073
Gitsaex	11	8	87	14	305	22	9441	681	12882	929
Gitsaex	8	10	79	13	277	21	8593	660	11726	900
Gitsaex	10	11	112	17	892	24	12152	734	16582	1001
Gitsaex	9	10	85	14	299	22	9270	677	12649	923
Gitsaex	9	6	53	10	186	18	5758	564	7856	769
Gitsaex	9	8	70	12	245	20	7603	631	10374	861
Gitsaex	10	10	95	15	333	23	10308	700	14065	955
Gitsaex	10	10	106	16	371	23	11510	723	15705	986
Gitsaex	9	10	84	13	292	22	9062	672	12365	916
Gitsaex	10	8	84	14	294	22	9114	673	12436	918
Total				261			186311	713	254224	973
Mean	10	10	101	15	354	23	10959	703	14954	959
sd	1	2	26	3	90	2	2293	57	3811	76
Ninstints	12	11	132	19	462	25	14322	765	19543	1044
Ninstints	10	10	100	15	350	23	10850	711	14805	970
Ninstints	13	11	143	20	582	29	18027	906	24597	1236
Ninstints	11	13	143	20	501	25	15516	780	21171	1064
Ninstints	11	9	99	15	347	23	10742	709	14657	967
Ninstints	9	9	81	13	284	21	8789	665	11992	907
Ninstints	10	9	90	14	315	22	9765	688	13325	939
Ninstints	6	6	36	8	126	15	3906	446	5330	636
Ninstints	9	8	72	12	252	21	7812	638	10660	870
Ninstints	7	8	56	11	196	19	6076	577	8291	787
Ninstints	13	12	156	21	645	30	19995	939	27283	1281
Ninstints	8	10	80	13	280	21	8680	662	11844	903

Table 9.2. *Continued*

Site	Length (m)	Width (m)	Area (m^2)	Estimated population	Volume (m^3)	Volume per capita (m^3)	Lumber (board-ft)	Lumber per capita (board-ft)	Lumber (floored) (board-ft)	Lumber per capita (floored)
Ninstints	10	10	100	15	350	23	10850	711	14805	970
Ninstints	8	8	64	11	224	20	6944	610	9475	832
Ninstints	10	9	90	14	315	22	9765	688	13325	939
Ninstints	11	11	121	18	424	24	13129	749	17914	1022
Ninstints	11	8	88	14	308	22	9548	683	13028	932
Total				254			184714	727	193100	760
Mean	10	9	95	15	344	23	10649	703	14531	959
sd	2	2	32	3	133	4	4108	108	5605	147
45SA11										
1	11	10	107	16	283	18	8776	547	11974	747
2/3	11	10	107	16	282	18	8738	547	11923	746
2/2	11	10	110	16	291	18	9021	551	12309	752
2/1	10	9	85	14	225	16	6961	510	9498	696
3/2	10	8	80	13	212	16	6560	500	8951	682
3/1	11	9	98	15	260	17	8059	534	10997	729
4/3	9	8	70	12	186	15	5765	477	7866	651
4/2	9	8	70	12	186	15	5765	477	7866	651
4/1	9	9	77	13	202	16	6265	492	8548	671
5/3	10	9	88	14	232	17	7206	516	9833	704
5/2										
5/1	11	8	84	14	222	16	6879	508	9386	693
6/2	9	7	56	11	148	14	4578	435	6246	594
6/1	9	8	74	12	194	16	6027	485	8224	662
7/2	8	7	55	10	146	14	4533	433	6186	591
7/1	8	7	57	11	151	14	4666	439	6367	599
Total				199			99797	502	136175	685
Mean	10	8	76	13	201	15	6237	497	8511	678
sd	1	1	23	1	62	44	1069	38	2920	52

the northern Northwest Coast (Table 9.3; Blackman 1972; Suttles pers. comm.) is still smaller than many structures on the central and southern coasts.

Some of the very large structures on the central and southern Northwest Coast exceeded 100 m in length. Such dwellings could have housed many people. Some of these houses may have been ceremonial structures, but certainly the Simon Fraser house was not (Suttles 1991). The Chinookan data suggest that there were two classes of houses, common structures ranging from 26 to 167 m^2 (e.g., 45SAl I, Minor et al. 1989) and a class of much larger houses.

Generally, interior spaces of Northwest Coast houses were used for ceremonial purposes, but not reserved exclusively for that purpose. A high ranking household would have a large house in part because of the ceremonies that went with high rank, but at other times animals were butchered on the floor and the hearth used for cooking. Northwest Coast houses were food-processing facilities and their size also reflected that aspect of their function. (cf. Suttles 1991).

These very large houses also suggest profound differences in wealth and status among household groups on the central and southern coast, perhaps exceeding such differences on the northern Coast. These differences in household size very likely rested on differences in the productivity of the resource base of individual households (Donald and Mitchell 1975) and the relative abilities of chiefs to create social stores (Ingold 1987).

It is well known that households, as well as individuals, differed in relative status and prestige in Northwest Coast societies. In fact, household status and house chief's status were the same. Netting (1982), using cross-cultural data, showed that there is a general correlation between household size and

Table 9.3. Estimates of Size and Lumber Requirements for Various Ethnographically and Archaeologically Documented Structures Along the Northwest Coast from North to South

Group	Site	Structure	Length (m)	Width (m)	Area (m^2)	Estimated population	Volume (m^3)	Volume per capita (m^3)	Lumber (board-ft)	Lumber per capita (board-ft)	Lumber (floored) (board-ft)	Lumber per capita (floored)
Tlingit	Kluckwan	Whale house	13	13	169	23	712	31	22072	973	30118	1327
Tsimshian	Typical	Typical	17	15	255	32	766	24	23748	742	32405	1013
Gitksan	Gitlaxdzwakl	Mean	10	10	107	16	373	23	11566	711	15782	933
Gitksan	Gitsaex	Mean	10	10	101	15	354	23	10959	703	14954	959
Haida	Ninstints	Mean	10	9	95	15	344	23	10649	703	14531	959
Typical	Typical	Large	15	18	278	34	834	24	25869	751	35299	1025
Haida	Massett	Weah	18	15	269	34	2053	61	63642	1900	86841	2592
Nootka	Typical	Maximum	30	15	446	53	1496	28	46364	883	63265	1205
Nootka	Typical	Minimum	12	9	111	17	374	23	11591	702	15816	958
Wakashan	Typical	Typical	29	12	335	41	1006	25	31177	768	42542	1048
Wakashan	Typical	Maximum	46	12	558	65	6620	41	81234	1259	110845	1718
Wakashan	Typical	Minimum	12	11	134	19	403	21	12481	659	17030	899
Makah	Ozette	House 1	21	12	246	31	916	30	28407	917	38762	1251
Makah	Ozette	House 2	17	10	162	22	602	27	18649	852	25447	1163
Salish	Typical	Salish	24	12	283	35	849	24	26323	753	35918	1027
Salish	Simon Fraser	Estimate	192	18	3456	377	18662	50	578534	1537	789420	2097
Salish	Simon Fraser	Reported Po	192	18	3456	200	18662	93	578534	2893	789420	3947
Salish	Old Man House	Early	52	22	1153	129	4294		133120	1035	181644	1413
Salish	Old Man House	Late	160	18	2880	315	10728		332568	1057	453794	1443
Salish	Typical	Salish	18	18	334	41	1003	25	31104	768	42442	1048
Chinook	Typical	Maximum	18	9	167	23	442	20	13694	609	18686	830
Chinook	Typical	Minimum	6	4	26	7	69	9	2130	292	2907	393
Chinook	Typical	Extreme	49	14	669	77	1767	23	547767	716	74743	977
Chinook	Extreme	1	61	9	557	65	1472	23	45647	708	62286	966
Chinook	Extreme	2	91	9	836	95	2209	23	68470	725	93429	989
Chinook	Extreme	3	144	9	1313	146	3468	24	107498	737	146683	1006
Chinook	Extreme	4	110	9	1003	113	2650	24	82164	730	112114	997
Chinook	Extreme	5	69	9	630	72	1664	23	51581	713	70383	973
Chinook	45SA11	Mean	10	8	76	13	201	15	6237	497	8511	678
Chinook	45SA11	sd	1	1	23	1	62	44	1069	38	2920	52
Chinook	Meier	House 1/b	35	14	490	57	1294	23	40126	701	54752	956

household wealth world-wide. Donald and Mitchell (1975) have demonstrated for the Southern Kwakiutl of Vancouver Island that relative group status varied directly with the productivity of the salmon stream controlled by a particular group.

Donald and Mitchell (Donald 1983, 1985; Mitchell 1984, 1985; Mitchell and Donald 1985) have made a strong case that chiefly status on the coast rested on the ability of chiefs to control the productive labor of commoners and particularly of slaves. The groups housed in the very large structures among the Salish and Chinook could have fielded a significant amount of slave and commoner labor. Mitchell (1985) estimates that in 1825 almost 24 percent of the Chinook population along the Lower Columbia River were slaves. Thus the slave population of the large Chinookan houses listed in Table 9.2 might have been between 16 and 35 individuals. He estimates that, in the 1840s, approximately 5 percent of Puget Sound Salish were slaves. If this estimate is applicable to the early European contact period, then 15 to 20 of the inhabitants of the Simon Fraser house may have been slaves. While my estimates are all contingent, and must be treated cautiously, they do clearly indicate the potential size of the labor pool of house chiefs on the southern coast for their own projects.

In contrast, among the three northern villages for which I have data (Table 9.2), the range of house sizes is much smaller than on the southern coast. Population estimates for the northern coast houses range from 11 to 25, suggesting there was *less* labor available in northern houses than in the south. This differential may have been crucial in coping with complex tasks (Wilk and Rathje 1982). It was common for northern households to occupy several houses, however, and so to include 75 to 120 individuals. Mitchell and Donald (1985) present estimates of the number of slaves among the northern groups ranging from 0 to 27%, indicating that the number of slaves may have been quite variable from household to household. The differences between the mean size of the Paul Mason houses and the historic Tsimshian houses in Kitselas Canyon could be accounted for by the presence of slaves in the latter if slaves constituted 6 percent of the population among the Kitselas Tsimshian, a figure that is not unreasonable.

The capacities of different households to field labor is indicated by the amount of lumber in different structures. The Simon Fraser house required more than half a million board feet of lumber. The range of variation in lumber requirements appears to have been the most extreme among the Chinook of the lower Columbia River. For example, the plank house at the Meier site, near Portland, Oregon, originally had a fully planked floor (Ames et al. 1992) that required nearly 15,000 board feet of lumber, enough to build two of the houses at 45SA11, a small Chinookan village in the Columbia Gorge.

Different estimates for the size of Old Man House in Puget Sound (Table 9.2; Snyder 1956) may indicate the capacity to field labor along the central coast. The early and late estimates in Table 9.2 represent observations made 14 years apart in the 19th century. The differences could be due to observer error or to an increase in the size of the house (Mauger 1978). If the latter, it points to an enormous and relatively rapid investment in lumber. Coupland and Banning (this Volume) cite Oberg's (1973) statement that among the Tlingit, men worked all winter to accumulate the lumber for a single house. Oberg's comment provides a perspective on the labor involved in Old Man House.

Distribution

Internal house volumes were estimated as a measure of storage potential. The mean volumes of the three northern historic villages in Table 9.2 are nearly 150 m^3 greater than those of the Paul Mason and Mauer sites. This suggests the possibility that there was less room for stores in the early northern structures, as well as smaller household size.

It is likely that pithouses preceded plank houses on the coast (Ames 1991b; Matson 1992). If we assume that early pithouses on the Plateau (Table 9.4) were similar in size to pre-plank-houses that probably occurred on the coast, then the earliest plank houses represent a significant increase in size over their predecessors. In fact, it is not until the last millennium that pithouses on the Columbia Plateau had mean volumes equivalent to those of the earliest Northwest Coast rectangular structures. We may conclude then that plank houses minimally had a greater potential for interior storage than did pithouses. This gives a basis for suggesting that plank houses themselves represent the appearance of a significant reliance on stores in Northwest Coast economics.

Transmission

Transmission, the inter-generational transfer of rights, roles, lands and property, is quite difficult to tackle directly using archaeological data. The approach here is to attempt to develop construction and occupation histories of particular dwellings and localities, and then estimate how long the dwellings were in use—how long they stood—on the grounds

that this at least gives an indication that there was something to transmit. Ingold makes a useful distinction between sedentism which is caused by restrictions on mobility, and sedentism which reflects "dominant social relations ... anchored by the possession of immobile, landed property" (Ingold 1987:169). Ingold notes that people characterized by such social relations may actually be quite mobile, but they are still socially tied, or tethered to particular places.

The ethnographic record of the Northwest Coast makes it clear that households owned their houses. Indeed, households sometimes owned several houses or house frames in different places. The frames were left standing as household members seasonally changed residence, taking the house planks with them. These planks were sometimes lashed across canoes, and used as rafts to float the household and its possessions to the next place, where the raft was disassembled and the planks lashed to the existing frame. The archaeological record suggests that the frames may have persisted for a long time, and that rights to use particular residential locations may have lasted even longer. This is quite difficult to demonstrate, but I can give three Northwest Coast examples of how it might be done.

The Meier Site

The Meier site contains a large plank house dating between AD 1400 and ca. AD 1800 (Ames et al. 1992) (Figures 9.2 and 9.3). Our evidence strongly suggests that the structure and probably its location must have been a significant piece of "immobile, landed property" (Ingold 1987) that was central to social relationships of its occupants. During the excavations, we developed a detailed construction history that indicates that the house probably stood most of those 400 years (Ames et al. 1992). My arguments are based on the following evidence.

The radiocarbon dates associated with the house support a long use-life for the house. They cluster in two periods: ca. 500 BP (two dates) and ca. 250–150 BP (two dates). One of the early dates is from the floor of the house's cellar, and I regard it as an upper limit on the age of that feature. The second early date is from a pit beneath a midden that accumulated against the east wall. This pit had been filled, perhaps when the house was constructed, and then the midden accumulated against the house's wall. The two younger dates are from deposits that accumulated in the cellar. Stratigraphic evidence suggests that the cellar was free of debris for some time before it was filled. It was during this period, or when deposits first began to accumulate in the cellar, that the 500-year-old charcoal was deposited. The terminal date is based on the presence of early historic trade goods.

Renovations in the house are another source of evidence that it was used for a long time. Elements such as eaves posts and ridge-pole planks were replaced at least five or six times, but very probably many more times than that. In one case, a timber supporting the roof was replaced 18 to 22 times. Western red cedar *(Thuja plicata)*, the wood from which the house was built, will generally last in the ground some 12 to 20 years (Ames et al. 1992). A conservative estimate is that the house would have required almost complete replacement of its planking about every 20 years. Replacements of the roof timber combined with the use-life of red cedar suggest a life span for this house of 360 to 440 years.

Both sources of evidence suggest life-spans that are in close agreement, while the distribution of features in the structure clearly indicates that the dwelling did not shift its position during this entire span.

The house represented a considerable investment. It was originally constructed with a cellar that was perhaps 1.5 to 2 m deep. The board foot estimates used here assume a single course of roof planks; many structures are described as having two courses, one laid parallel to the long axis of the house, and another at right angles, increasing watertightness. If the Meier house had a double course of roof planks as well as a planked floor, it would have required 77,000 board feet of lumber. Over its estimated span of occupation, when construction and repair are both taken into account, the structure would have required between 400,000 and 1,000,000 board feet of lumber (Ames et al. 1992).

The Boardwalk Site

The two structures at the Boardwalk site (GbTo-31) provide a contrasting example. Probably built about 3000 to 2700 BP and abandoned around 2200 BP, these two early houses appear to have been rebuilt or repaired three or four times. Their outer walls were replaced and the adjacent shell midden was truncated (Ames 1994a) (Figure 9.4). Furthermore, they were in use long enough for midden to build up around them to the extent that, when they were finally abandoned, deep depressions were left where the houses stood (Figure 9.5). This is a common phenomenon on the coast, but we have no idea how long this buildup might take.

This does not mean that the houses were in use that entire time. The reconstruction episodes could easily

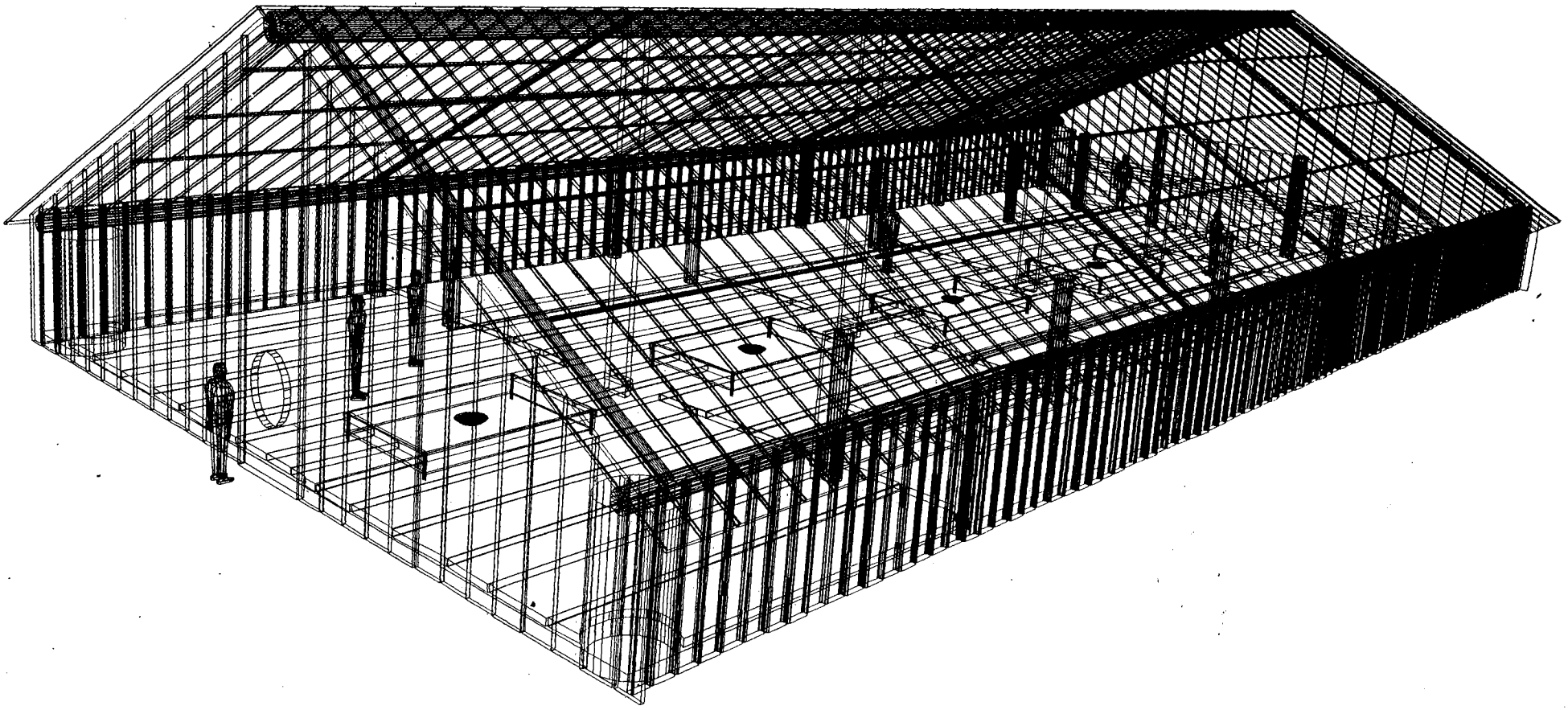

Figure 9.2. Reconstruction of the exterior and interior of House 1B at the Meier Site. The figures used for scale are 1.65 m tall (computer graphics by D. Molnar).

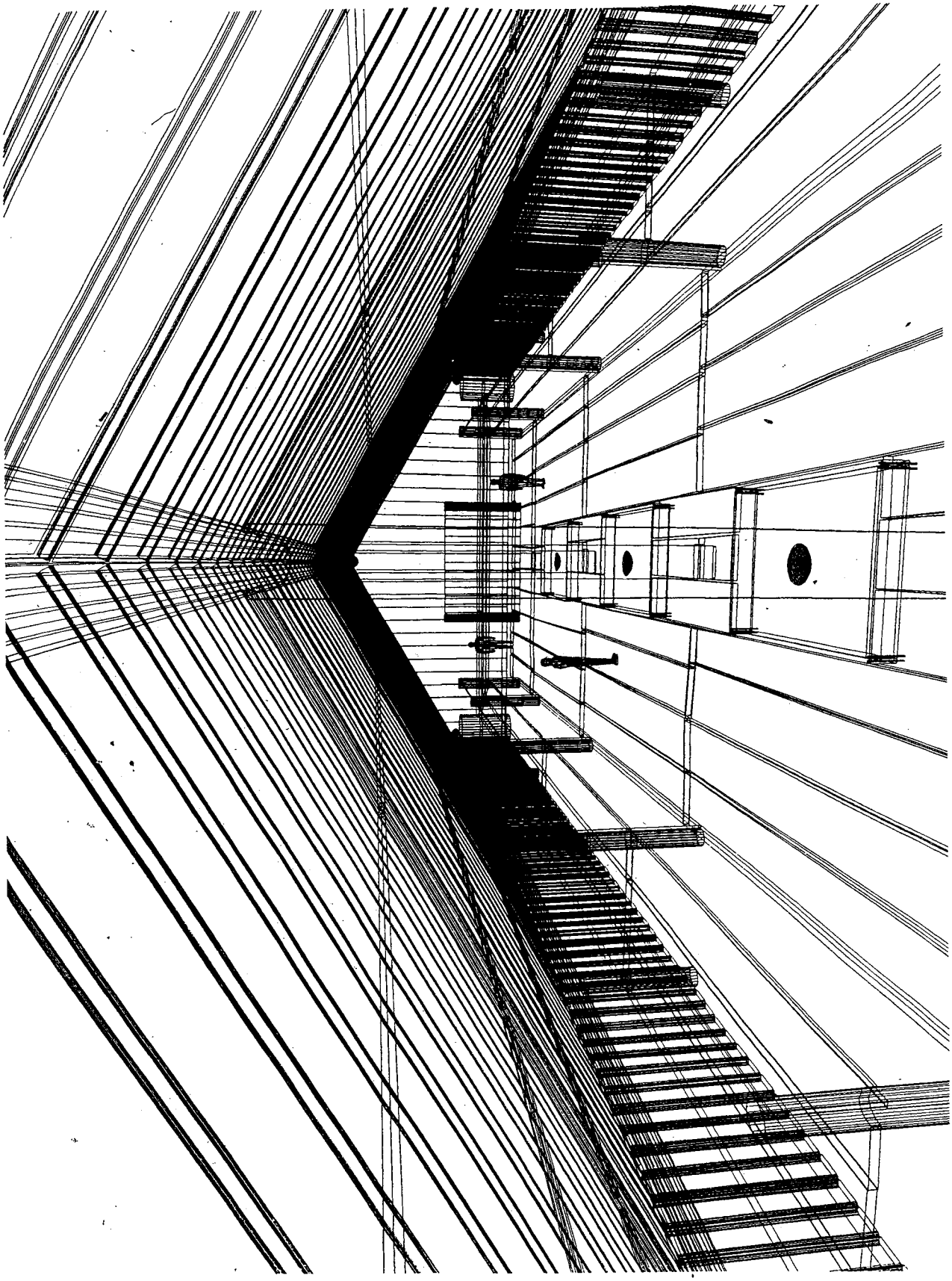

Figure 9.3. Inside view of House 1B at the Meier site, looking toward the rear of the structure. In this "X-ray" view, the floor planking and hearths are visible, as is some of the structure's interior framework. Figures used for scale are 1.65 m tall (computer graphics by D. Molnar).

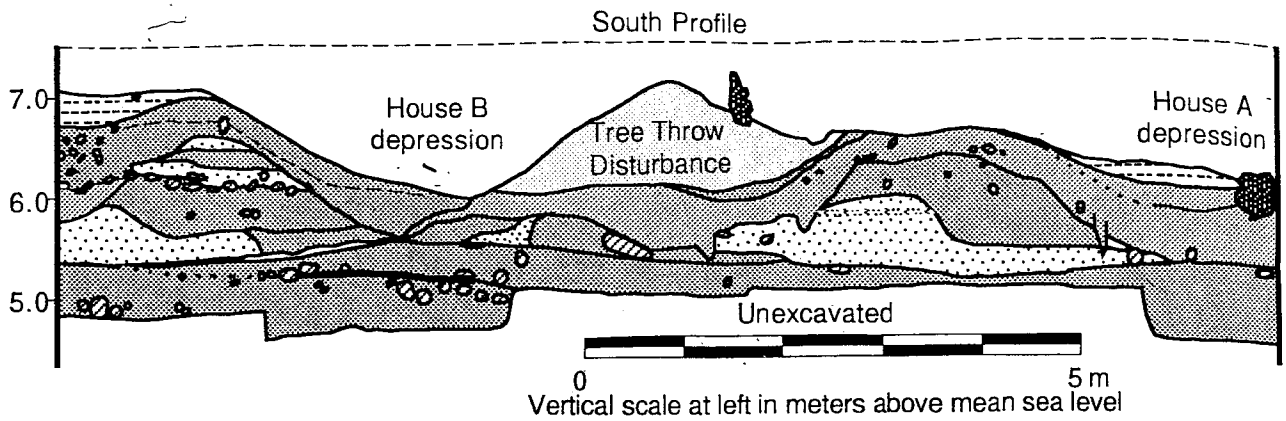

Figure 9.4. Profile of trench through Houses A and B, Boardwalk site (based on illustration courtesy of the Canadian National Museum of Civilization, Hull, Quebec).

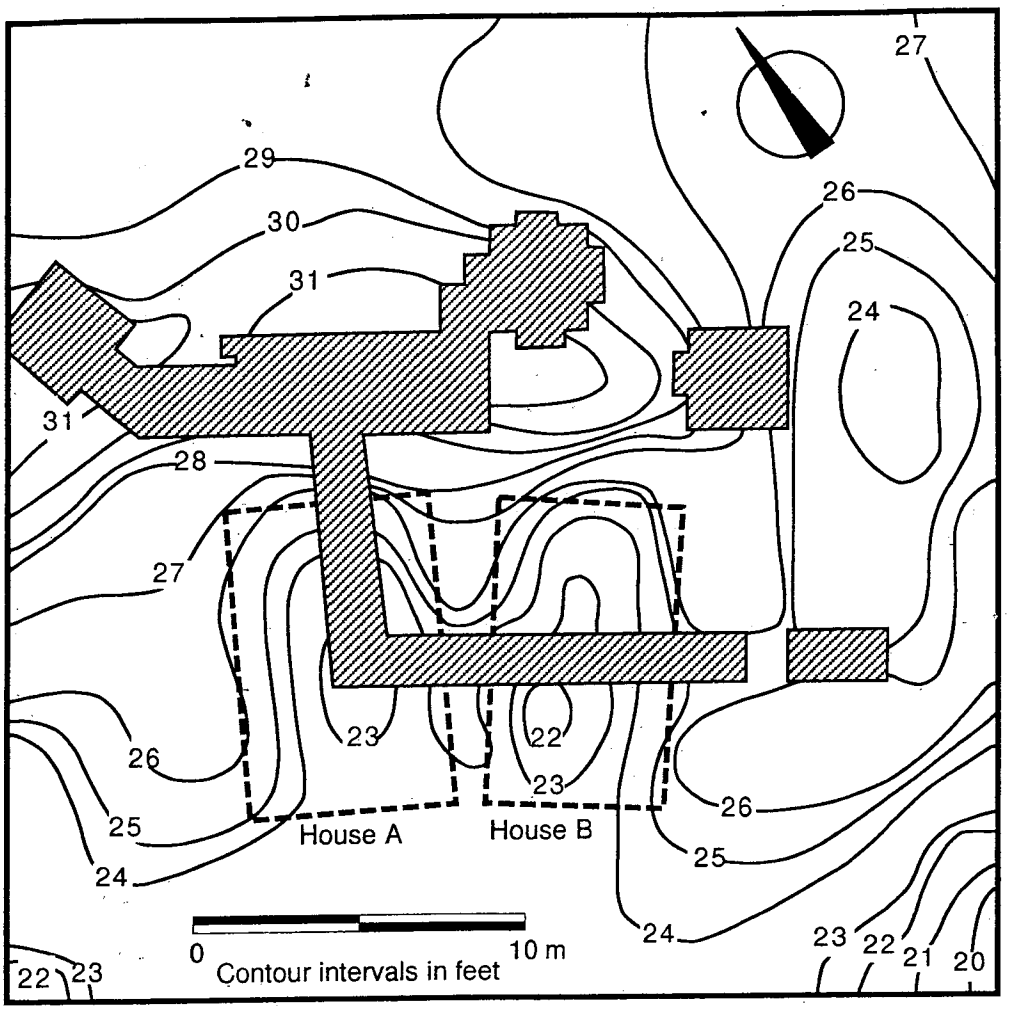

Figure 9.5. Contour Map of Houses A and B, Boardwalk site (based on illustration courtesy of the Canadian National Museum of Civilization, Hull, Quebec).

reflect periodic abandonment and reoccupation during a period of several hundred years. If the houses were repaired as they stood, rather than after abandonment, we would estimate the period between repair episodes, using the data on red cedar cited above, as somewhere between 50 and 80 years, or two to three generations. These estimates may be somewhat conservative, since the posts comprising the frame—particularly at the corners—may have been quite substantial. Thus the *frames* could have stood for a longer period and been available for re-use. Persistence of the frames, even during periods of abandonment, would explain why, if the episodes of midden truncation represent periodic reoccupations of the houses, the rebuilt structures maintained the size and position of the previous structures in the depressions. There are no suggestions in the available data that these dwellings were the focus of the kind of sustained occupation described for the Meier house.

The evidence from the Boardwalk houses, then, suggests much less investment in the structures than at Meier over a span of perhaps 800 years. Although their actual cumulative use-lives may have been only a few generations, and it is not clear that these were consecutive, there is evidence for long-term investment at the site. The structures are immediately adjacent to a cemetery area that was used between ca. 3000 BP and 1500 BP. The cemetery contains burials, some with grave goods (Ames 1994a) that indicate that the locality was a major focus of funerary ritual. The cemetery may have been the anchoring property reflecting or shaping social relations.

The Palmrose Site

The Palmrose site, like the Meier site, contains the remnants of one large house (Table 9.1). Radiocarbon dates span the period from 2750 BP to 1500 BP, and there seems to have been at least three major periods of house construction and repair: 2750–2350 BP; 2350–1850 BP, and 1850 to 1500 BP, which may have been the result of major subduction earthquakes (Connelly 1992). In any case, a structure seems to have been maintained in the same place for more than a millennium, despite occasional natural disasters.

These three examples suggest that sustained investment, through maintenance and rebuilding, in individual houses on the Northwest Coast may have spanned several hundred years. The clear implication of this is that there were rights to be transmitted.

Summary and Conclusions

This paper has been a preliminary exploration of the relationships among dwelling size, labor, distribution and transmission among hunter-gathers on the Northwest Coast, following Wilk and Rathje's (1982) functional definition of the household. The discussion has focused on different dimensions and aspects of the size of dwellings as indirect measures of these relationships.

Production

Northwest Coast houses were clearly the objects of considerable work and effort, particularly in view of the tools available to fell trees and turn them into usable lumber. Northwest carpenters used ground stone mauls, adzes with ground stone blades; wedges and chisels of bone, antler, shell, and beaver incisors; as well as other hand tools. House size clearly reflects the labor a household was able to field.

Houses on the Northwest Coast functioned in a number of ways. Recent work at Meier, Ozette and other ancient houses (citations in Ames et al. 1992; Ames 1994b) clearly shows that they were, among other things, food-processing facilities. The size (floor area and volume) facilitated the butchering of large animals such as wapiti and sea lions.

The houses were also large as a result of the labor requirements of the Northwest Coast economy. Coupland and Banning (this volume) and Matson (this volume) argue that the labor requirements for catching and processing large numbers of salmon produced the need for a large, available labor pool. I agree with this position, so far as it goes. I would argue, however, that short-term, once-a-year labor requirements can be met in a variety of ways, including large seasonal aggregations. Supporting large households year-round to meet a short-term need seems unnecessary. On the other hand, sustained labor requirements would justify the formation of a large household.

Wilk and Rathje make these arguments about the formation of large households: they will form as a result of "the need for task simultaneity" (Wilk and Rathje 1982:631); and where resources are spatially clustered, but temporally varied.

> Large households have a potential for great flexibility in dealing with very diverse or scattered economic opportunities that

> require simultaneous labor. They have greater political potential for forming a power base and for taking advantage of new opportunities that require capital investment (Wilk and Rathje 1982:632).

These are exactly the circumstances on the Northwest Coast, where the subsistence economy was based not only on salmon and salmon storage, but on the procurement of a very wide range of resources through the productive portions of the year, resources that were sometimes scores of kilometers apart.

It is important to stress here that Northwest Coast hunter-gatherers were maritime. They used large canoes and had access to the sea for transportation. They were not pedestrian hunter-gatherers who needed to carry everything home on their backs. They were able to exploit large hinterlands and process resources both in the field and at home in a way terrestrial hunter-gatherers are not. They were able then simultaneously to exploit productive resources that were available great distances apart through their labor organization and their technology.

One of the more interesting outcomes of this research has been the clear documentation of the presence of extremely large dwellings on the central and southern Northwest Coast. Dwellings of similar size developed in the interior Northwest, on the Columbia Plateau (Ames 1991a). This may reflect a regional social response to an increasingly complex economy (Ames 1991b). These were very large social groups, and I do not think they were functional equivalents of villages (i.e., all the separate houses of a village coalesced into a single dwelling). On the Columbia River, near Portland, Oregon, Lewis and Clark visited a village with 900 people, and 14 houses in three rows. A preliminary examination of the site suggests some of these houses were far larger than the Meier house; one is 63 m long and another 50 m.

One outcome of the lumber estimates is the demonstration that the labor requirements of Northwest Coast plank houses were enormous. While it is well known that they required high levels of craftsmanship, the board-foot estimates indicate that their requirements in labor effort and raw materials were substantial. Furthermore, seemingly simple additions to these structures, such as installing a plank floor or a second course of roof planks, had tremendous implications for labor and procurement of raw materials.

Distribution

Plank houses can, I think, be legitimately viewed as storage boxes. It is perhaps no accident that we see rectangular structures in the archaeological record not long after we see evidence of boxes (Ames 1994b). The internal volume of these houses reflects their roles as food-processing and food-storage facilities. That they were not always adequate for this purpose is indicated by the occasional presence of sub-floor storage pits and even cellars (Ames et al. 1992). Increases in the house volume through time may in part reflect increases in the capacity to store foods, or at least in the potential to store greater volumes of food.

Ingold (1987) distinguishes among three kinds of storage: ecological, physical and social. Before getting to his definition of social storage, it is important to understand that for Ingold "storage" means the labor processes involved in putting up stores; and "stores" means the actual stuff produced. Storage technology includes the knowledge, techniques and tools used to create stores. The physical activity, the labor, applied to create "stores" is "storage."

Ecological storage is the accumulation of nutrients within an ecosystem, and can include standing biomass. Physical storage is the accumulation of stores to meet human physical needs; for example, a farm family may put up food to get it through the winter.

> Social storage refers to the *appropriation* (emphasis Ingold's) of materials in such a way that rights over their future distribution or consumption converge upon a single interest, ... the store has to be considered in its aspect as property or wealth, and storage as a concomitant of social relations of distribution (Ingold 1987:206).

These distinctions effectively decouple physical from social storage. The physical act of putting up stores and the existence of storage technology do not tell us about the nature, or even existence, of social storage. Generally in the archaeological literature all these aspects of storage are conflated.

It is necessary to comment on social storage in some detail. Dried and otherwise processed foods were produced in the Northwest for a variety of purposes. Chief among these, of course, were foods to be consumed in the feasting associated with potlatches and the winter ceremonials held throughout the Northwest. In addition to this, stores were exchanged or traded.

The Coast Tsimshian, on the northern British Columbia coast, owned the access rights to the spring eulachen (*Thaleichthys pacificus*) runs at the mouth of the Nass River. These runs occurred when food stocks were running low and were crucial not only to the Tsimshian but to their neighbors, the Tlingit and

Haida. Tsimshian chiefs traded fishing rights and fish oil for Haida canoes. The oil was traded far inland, moving along "grease trails." The Tlingit traded cedar baskets, fish oil, iron and shell ornaments with the Athabascan peoples in the interior for moose hides and copper (Oberg 1973).

Huelsbeck (1988) has sought to demonstrate the importance of exchange, particularly in sea mammal products, among peoples of the central Northwest Coast using both ethnohistoric and archaeological data. It is clear that a wide range of commodities, including foodstuffs, were exchanged among the Makah and other Nootkan peoples, as well as other coastal groups.

To the south, on the Columbia River, the various Chinookan groups traded stores among themselves, in at least one case trading one species of dried salmon for another. The Chinook in what is now the Portland, Oregon, area, produced large quantities of wapato (*Sagittaria latifolia*) for trade (Hajda 1987). The Wasco-Wishram, who lived at the eastern end of the Columbia Gorge, 150 km from Portland, produced large baskets of salmon pemmican for trade.

Anastasio (1975) indicates that peoples on the Columbia plateau specialized in the production of dried foods and other goods, such as basketry for trade. The Nez Perce, for example, living in an area rich in camas (*Camassia quamash*), whose nutritious root was fundamental to their subsistence, dug large quantities of the root for trade.

This is by no means an exhaustive list; it is meant to be indicative only. Following Ingold's definitions, all of this trade and exchange of processed foods is social storage. Storage, as a labor process, involves production well beyond immediate household needs. Northwest Indian households and, their labor, were parts of regional economies.

Variation in house size, as we have seen along the Northwest Coast, may reflect not only the need for physical stores for the winter, but the relative roles of social storage, i.e., the need to process and store dried foods used in ceremonials and exchanges — the need to produce a surplus.

Transmission

Finally, I attempt to evaluate transmission by estimating the life-span of several coastal dwellings. The only structure for which I have firm data is the Meier house, which stood for perhaps 400 years and may have required well over a million board feet of lumber. This degree of permanence and investment by hunter-gatherers in a single dwelling suggests that current revisions in our views of hunter-gatherers have not gone far enough.

Minimally, these data suggest a considerable potential time depth for Northwest Coast households. The Meier house was abandoned as a result of the effects of contact with Europeans, not some cyclical failure in household organization. The burial data cited above from Boardwalk hint at even greater potential time depth associated with the cemetery at the rear of the site.

This time depth and the effort associated with the houses (in their construction, reconstruction and function) is similar to the sustained investment in particular facilities, including houses, that anthropologists usually associate with sedentary peasant agriculturalists, and not with hunter-gatherers. This has important implications for our understanding of social evolution. If one lives in a house that has stood several centuries, at the cost of continual work, then whoever controls that dwelling will be able to exert considerable control over other aspects of life, particularly on the coast where the house itself was the major instrument of production. It would be of considerable interest, for example, to know the labor costs and use lives of Natufian houses with their stone footings (see Banning, this volume), or Jomon houses, which sometimes display multiple episodes of post settings.

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Notes

1. Others have discussed Northwest Coast economies (e.g., Donald and Mitchell 1988, Croes and Hackenberger 1988), but the difference here is the focus on the economy of household reproduction (e.g., Ames et al. 1992)

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