Recent archaeological investigations along the lower Negro and upper Xingu Rivers in the Brazilian Amazon provide important new evidence bearing on long-standing debates about the size and permanence of Amerindian settlements in the region. Preliminary regional surveys and more in-depth study of selected large (30–50 ha) sites, particularly analyses of the associations between structural features, anthropogenically altered soils, and artifact distributions, lead us to conclude that large, permanent settlements, likely associated with fairly dense regional populations, existed prehistorically in both areas. These findings cast doubt on the view that environmental limitations prevented sedentism and demographic growth among Amerindian populations throughout much or all of the region. Specifically, we conclude that fully sedentary and relatively large populations emerged in a variety of Amazonian settings prehistorically, not necessarily correlated with the distribution of one or another narrowly defined ecological variable (e.g., high fertility soils). Thus, a critical evaluation of core concepts in Amazonian anthropology, such as the varzea/terra firme dichotomy or tropical forest culture, is advised.

Amerindian settlement patterns in Amazonia have been a source of considerable debate, particularly focusing on the general causes of increasing sedentism and regional population growth or the lack thereof. Diverse viewpoints have been expressed, but a gross distinction can be made between those arguments that suggest large, fully sedentary populations rarely, if ever, developed indigenously in Amazonia and those that argue such populations existed but were largely restricted to select riverine areas. Proponents of the former view believe that the generally small, impermanent, and relatively dispersed settlements characteristic of ethnographic communities adequately represent prehistoric variability in Amerindian settlement patterns in the region (e.g., Meggers 1996, 1997). This view conforms to initial definitions of the “tropical forest culture” (Lowie 1948; Meggers and Evans 1957:17–32; Steward 1948, 1949), or what Viveiros de Castro (1996:180) has aptly called the “standard model.” The alternative “revisionist” position, which has gained increasing currency over the past several decades, expands on Steward’s (1948:886, 1949:698) suggestion that ecological differences between floodplain (várzea) and upland (terra firme) areas were the predominant factor in Amazonian cultural evolution. Protagonists of the revisionist “várzea model” suggest that large, fully sedentary villages were not

Among archaeologists working in the tropical lowlands, Betty Meggers was the first to propose and remains the main advocate of the standard model. Based on ethnographic examples, such as the Mekragnoti Kayapó, the Yanomamí, and groups from the Guiana highlands, among others, Meggers has repeatedly espoused a general model for Amazonia in which settlements are portrayed as uniformly small (averaging 50 to 150 people), impermanent, dispersed, and politically autonomous (e.g., Meggers 1954, 1994, 1995a, 1995b, 1995c, 1996;Meggers and Evans 1957). Using selected archaeological data from the Programa Nacional de Pesquisas Arqueológicas na Bacia Amazônica (PRONAPABA), she states that there is “no evidence that terra firme communities were larger, more closely spaced or more sedentary in Precolumbian times than indigenous communities today” (Meggers 1992:199). Moreover, this basic pattern has “existed for at least two millennia without significant alteration in village size or permanence,” an equilibrium that she feels results from unique human adaptations to severe environmental constraints (Meggers et al. 1988:291; see also Meggers 1994:416, 1995c:69). The várzea habitats, narrowly defined as the floodplain and adjacent riverbluff areas of the Amazon and its major Andean-derived tributaries (i.e., the so-called “white-water” rivers), are viewed as slightly more propitious for sedentism and demographic growth than other Amazonian environments. Nevertheless, population density is considered to be comparable between the two areas (roughly 0.3/km²) and, in general, settlement patterns are “not significantly different from [those] reconstructed along clear and black-water tributaries of the terra firme” (Meggers 1992:201–203).

Increased recognition of early ethnohistoric accounts of large, complex societies and identification of extensive anthropogenic “black earth” (terra preta do índio, hereafter TP) sites along the Amazon River led revisionist scholars to focus on apparent differences between these relatively dense riverine societies, largely decimated within a century of initial European contact (ca. A.D. 1550), and the typically small and autonomous villages known ethnographically from upland areas. Proponents of the várzea model suggest that higher levels of productivity, in terms of agriculture and/or faunal capture, provided the economic basis for sedentism and population growth in these riverine areas. In contrast, low soil fertility and scarce and dispersed game of the terra firme are seen to limit productivity and, hence, population growth (e.g., Brochado and Lathrap 1982; Brochado 1984; Carneiro 1986, 1995; Denevan 1984, 1996; Gross 1975; Lathrap 1968, 1970a; Lathrap et al. 1985; Meggers 1995b, 1996; Roosevelt 1980, 1991, 1994). (There is disagreement on the distribution of the riverine, or “várzea,” pattern, as described in the historic chronicles, but most authors emphasize rich floodplains, thus restricting the term to Andean-derived rivers, since most black- and clear-water rivers lack nutrient-rich floodplains and are commonly included in the generic category terra firme, along with interfluvial areas). Thus, most revisionists agree that sedentary populations emerged early in the Amazonian várzea and developed into regionally organized, hierarchical societies (chiefdoms) in many cases, but still view the standard model from ethnography as generally applicable to broadly defined terra firme settings, before and after European contact.

Detailed archaeological field studies and research methodologies designed to identify regional-level settlement patterns in Amazonia are still largely lacking. Even basic aspects of chronology, regional settlement patterns, and the characteristics of individual sites and site components (e.g., size, duration, and internal variability) are poorly understood and minimally reported from most areas. Models of Pre-Columbian occupations therefore typically are hypothetical, based largely on nonarchaeological data (ethnographic, ethnohistoric, and/or ecological) and untested theoretical assumptions. In other words, various models have been proposed for what prehistoric occupations should or may have been like, based on the expectations of general models, but few relevant archaeological studies directly bear on what they were, in fact, like, in terms of demonstrable archaeological patterning. DeBoer et al. (1996) drew attention to a clear example of this problem, the disjuncture between empirical evidence and hypothetical models, in an incisive critique of Meggers’ reconstructions of prehistoric settlement behavior in
Amazonia based on analysis of seriated ceramic sequences (e.g., Meggers 1986, 1990, 1991; see also Machado 1993:107–112; Raymond 1995:225–226, for recent critiques of Meggers’ seriation technique). Specifically, they concluded that the evidence provided by Meggers (1991) does not justify her interpretation that large TP sites in Amazonia represent palimpsests of numerous successive and only partially overlapping reoccupations, as opposed to extensive contemporaneous occupations and long-term settlement permanence.

Meggers’ reconstructions are particularly significant since they represent one of the few attempts to infer prehistoric settlement patterns based on archaeological data from broadly defined terra firme settings in Amazonia. Nonetheless, her conclusions seem to stem from two unwarranted assumptions: 1) TP is composed of relatively undifferentiated deposits that largely lack stratigraphy or other significant internal structure, regardless of their areal extent or depth; and 2) this uniformity is expectable for partially overlapping, sequential occupations by small communities. Assessment of prehistoric settlement patterns requires the development of appropriate methods of identification, analysis, and interpretation of spatial patterning, such as the distribution of cultural remains across sites or settlement distributions within discrete regions (see Roosevelt 1991). Minimally, such methods must include careful examination of the actual archaeological contexts (i.e., the configuration of cultural deposits and their internal associations within natural depositional matrices), from which the raw materials for seriation and other analyses are derived (see Brochado and Lathrap 1982:20–21; DeBoer et al. 1996; Lathrap 1970b; Lathrap et al. 1985; Roosevelt 1991:115–116). Given the very limited testing (one or a few small excavations and uncontrolled surface collection) and minimal attention paid to archaeological context in the studies employed by Meggers, we concur with DeBoer et al. (1996) that there is no sound empirical basis to support her contention that the standard model can be extended into prehistory (e.g., Meggers 1990, 1991; Meggers et al. 1988). Not only has Meggers failed to provide a compelling archaeological case for the standard model, but there is clear evidence that large and permanent settlements were present in both varzea and terra firme areas of Amazonia in the prehistoric period.

In the present study, prehistoric settlement size and permanence are discussed in relation to large TP sites in two separate areas of Amazonia: 1) the “black-water” setting of the lower Negro River in the central Amazon and 2) the headwater region of the Xingu River, “clear-water” southern tributary of the Amazon (Figure 1). The results of preliminary regional surveys and more detailed analysis of the large (30+ ha) Açutuba site, lower Negro River, and three large sites (30–50 ha) in the upper Xingu, Nokugu, Kuhikugu, and Hialugihãi, including surface artifact and TP distributions, site stratigraphy, subsurface sediment chemistry, visible structural features, and overall site plans, provide important new evidence incompatible with the standard model. Specifically, if multiple partially or non-overlapping occupations by small mobile or semi-sedentary groups (100 to 300 people) cumulatively produced extensive anthropogenic deposits, as Meggers suggests, we could expect relatively homogeneous (vertically and horizontally) or patchy distributions of TP, interspersed with areas of little or no sediment alteration. TP deposits are neither patchy nor homogeneous at Açutuba or the upper Xingu sites, but instead form broad contiguous strata with considerable variability in depth and composition within and between sites and within individual excavation units, due to differential deposition, intensity of use, functional variability, and, in some cases, significant landscape modification. Likewise, TP generally lacks intervening non-cultural sediments (paleosols) or other evidence of abandonment. In short, small-scale occupations, as inferred by the standard model, simply do not create the areally extensive alterations characteristic of many prehistoric occupations in both regions (see Woods and McCann 1998), an assertion amply supported in our studies by the lack of extensive TP deposits related to small-scale occupations by contemporary neo-Brazilian (caboclo) hoe-farmers at Açutuba and recent Amerindian villages in the upper Xingu.

Our findings also document that certain areas of these sites, namely central site areas, were used far more intensively and over a much longer span of time than other, more peripheral occupation areas. Stratigraphy and associated radiocarbon dates indicate that TP, most notably in these central site areas, are accretional deposits formed by gradual deposition and sediment enrichment related to relatively continuous human occupation. The substantial structural elaboration at each of these sites, including the construc-
tion of central plazas, earthworks, and specialized midden deposits, documents the type of landscape alteration and functional variability that would be expected for large, sedentary occupations, but highly unlikely for small, impermanent communities. Rather than suggesting broadly similar, repeated occupations across these sites, they indicate long-term, relatively continuous occupation of central site areas, continuity in overall site layout (with occupations gravitating toward a central plaza), and settlement growth outward from core areas. Based on these findings, we conclude that large sedentary communities, likely associated with relatively high regional population densities, were present prehistorically in both the lower Negro and upper Xingu regions.

The Açutuba Locality
Recent archaeological investigations along the lower Negro River provide a rather different picture of prehistoric settlement patterns than that offered by the standard model. Preliminary regional survey in the lower Negro study area in 1995 and 1997, involving initial assessment of site size through visible surface distributions of artifacts and TP, sediment coring, and occasional test-pitting, has identified 19 prehistoric archaeological sites (Neves and Bartone 1998);3 an additional 12 sites were previously identified in this area by Hilbert (1968) and Simões (1970, 1974a, 1974b, 1983; Simões and Kalkman 1987)5 (Table 1, Figure 2). These surveys document substantial settlement variability: small and medium-sized sites (roughly 2 to 10 ha of TP) are located in diverse ecological settings, including major rivers, side channels, small to medium streams (igarapés), and upland (terra firme) lakes, but the largest sites (some with over 30 ha of TP) are apparently most common on river bluffs along the Solimões and Negro Rivers.

A more detailed investigation was conducted at
Table 1. Uncalibrated Radiocarbon Dates from the Açutuba Site and Other Sites in the Middle-Lower Negro River Region.

<table>
<thead>
<tr>
<th>Site/Provenience</th>
<th>Lab. #</th>
<th>^14C Age B.P.</th>
<th>d^13C</th>
<th>Material Dated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Açutuba IA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modeled-Incised:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 2, 30 to 40 cm</td>
<td>Beta 97527</td>
<td>1030 ± 100</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Unit 2, 70 to 80 cm</td>
<td>Beta 90724</td>
<td>1800 ± 80</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Açutuba IIB Initial site occupation (?):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 1, 90 to 100 cm</td>
<td>Beta 90721</td>
<td>6850 ± 100</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Modeled-Incised:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S231W859 130 to 140 cm</td>
<td>Beta 109182</td>
<td>1100 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Unit 1, 30 to 40 cm</td>
<td>Beta 90723</td>
<td>1270 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Unit 1, 40 to 50 cm</td>
<td>Beta 106437</td>
<td>1230 ± 70</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Unit 1, 50 to 60 cm²</td>
<td>Beta 106438</td>
<td>1590 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Unit 1, 60 to 70 cm</td>
<td>Beta 97528</td>
<td>2310 ± 140</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>S250W500 130 to 140 cm</td>
<td>Beta 109179</td>
<td>1830 ± 80</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Guarita:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface (Guarita polychrome)</td>
<td>Beta 90009</td>
<td>980 ± 60</td>
<td>-28.2%</td>
<td>Caraipe Temper</td>
</tr>
<tr>
<td>Surface (Guarita &quot;grooved&quot;)</td>
<td>Beta 97529</td>
<td>790 ± 40</td>
<td>-30.1%</td>
<td>Caraipe temer</td>
</tr>
<tr>
<td>S231W859 40 to 50 cm²</td>
<td>Beta 109180</td>
<td>710 ± 80</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Surface (finger-punctate)</td>
<td>Beta 97530</td>
<td>690 ± 40</td>
<td>-29.8%</td>
<td>cauixi temer</td>
</tr>
<tr>
<td>S350W970 60 to 70 cm</td>
<td>Beta 109184</td>
<td>670 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>S250W500 40 to 50 cm</td>
<td>Beta 109178</td>
<td>600 ± 80</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>S231W859 70 to 80 cm²</td>
<td>Beta 109181</td>
<td>520 ± 80</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>S230W889 40 to 45 cm</td>
<td>Beta 109183</td>
<td>510 ± 70</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Related Sites</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santa Rosa (lower Negro)²</td>
<td>SI 2751</td>
<td>1125 ± 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paredão (lower Negro)³</td>
<td>GrN 4329</td>
<td>1080 ± 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paredão (lower Negro)³</td>
<td>GrN 4330</td>
<td>1070 ± 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engheno Velho (middle Negro)³</td>
<td>SI 4055</td>
<td>1070 ± 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nova Vida (middle Negro)³</td>
<td>SI 4054</td>
<td>730 ± 65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unini River (middle Negro)³</td>
<td>Beta 106436</td>
<td>610 ± 50</td>
<td>-25.0%</td>
<td></td>
</tr>
<tr>
<td>Vista Alegre (middle Negro)³</td>
<td>SI 4053</td>
<td>625 ± 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terra Preta (lower Negro)³</td>
<td>SI 2752</td>
<td>405 ± 60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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² Level 50-60 was redated since the first radiocarbon date (2910 ± 70 B.P., or 960 B.C., Beta 90722) was out of sequence and because the dated sample may have been mixed (or switched) with another in the lab.
³ The weighted average of these two dates (Beta 109180 and 109181) is 615 ± 57 B.P. (A.D. 1335).
⁵ Hilbert 1968.

Related Sites: Excavation of 18 test pits (0.5 m²) and 5 larger units (0.5 x 1 m, 1 m² and 1 x 1.5 m) were conducted in central areas of Açutuba I, II, and III;³ numerous sediment cores also were taken to help determine the extent and depth of the TP (Figure 4). In composite, the site extends at least 3 km along the Negro River, and primary habitation areas minimally extend over an area of 30 ha, based on the clearly observable distribution of TP. The extent of cultural activities is larger (50+ ha), however, as documented by an artificial ditch and Amerindian ceramics located well beyond the TP deposits at Açutuba II. The overall occupation area may extend farther upstream and downstream to adjac-
Figure 2. Location of sites identified by the authors in the lower Negro study area, Amazonas, Brazil; previously identified sites are marked with small blackened circles (Note: Site sizes are approximated, dashed lines mark edge of high ground, and short horizontal lines mark seasonally inundated areas within the study area).

Figure 3. Map of the Açutuba locality (AM-IR-02) showing approximate distribution of primary terra preta deposits and 1995 excavations at Açutuba I, II, and III (Note: 35- m contour roughly defines riverbluff).
Figure 4. Map of Açutuba II showing location of 1995 and 1997 excavation units and test pits, trash middens, probable central plaza, and primary surface distribution of Guarita "fine-ware."

Stratigraphy and Distributions

The depth and color of the TP varies dramatically across the Açutuba site due to the variable intensity, duration, and nature of cultural activities, as well as to differential natural deposition, largely related to eolian transport from the extensive dry-season beaches of the Negro River. Three test pits (.5 m²) and one larger (1 m²) unit were excavated at Açutuba I. These investigations served to document 30 to 80 cm of TP deposits. Radiocarbon dates of A.D. 150 ± 80 (70 to 80 cm) and A.D. 920 ± 100 (30 to 40 cm) minimally bracket the intact cultural deposits in this area (Table 1, Figure 5). Amerindian cultural remains, including TP, also were encountered across Açutuba IIIA.

Eight test pits and four larger units (one .5 x 1 m, two 1 m², and one 1 x 1.5 m units) were excavated at Açutuba II (subdivided into IIA, IIB, and IIC based on topography in relation to a low central area; see below) (see Figure 5). Cultural remains extend well beyond the area of primary TP at Açutuba II, as evidenced by very light- or non-TP soils, artifact distributions, and the presence of artificial earthworks (e.g., excavated ditches) in one or more peripheral areas. Likewise, earlier, presumably cultural, deposits were encountered in the less altered (light TP) sediments.
Figure 5. Profile of south and west walls of Açutuba I Excavation Unit 2 (top) and Açutuba II Excavation Unit 1 (bottom). Munsell color descriptions of strata include: ( Açutuba I, Unit 2) I = 10 YR 5/8 (yellowish brown); I/II = 10 YR 4-5/4 (dark yellowish brown); II = 10 YR 3-3 (dark brown); III = 10 YR 3-3; ( Açutuba II, Unit 1) I = 10 YR 5-5/8 (yellowish brown); I/II = 10 YR 5/8; II = 10 YR 3-4/3 (dark brown); III = 10 YR 2/2 (very dark brown); IV = 10 YR 2/2 (very dark brown). Note: Sediment texture is fine to medium sand with small quantities of silt; Stratum I in both units apparently predates cultural deposits, Stratum III at Açutuba I apparently postdates cultural deposits and is plow-disturbed, and Stratum IV at Açutuba II is plow-disturbed.
Table 2. Sediment Data from 1995 Excavation Units at Aqutuba I and II.

<table>
<thead>
<tr>
<th>depth (cm)</th>
<th>% Org./Total carbon</th>
<th>Mehlich ppm-P</th>
<th>Ca ppm</th>
<th>P ppm</th>
<th>K ppm</th>
<th>Mg ppm</th>
<th>Zn ppm</th>
<th>Mn ppm</th>
<th>Cu ppm</th>
<th>P fract.</th>
<th>sum mg/kg</th>
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<tbody>
<tr>
<td>20-30</td>
<td>2.23/1.81</td>
<td>619.2</td>
<td>3212</td>
<td>2281</td>
<td>301.3</td>
<td>227.8</td>
<td>58.2</td>
<td>294.4</td>
<td>16.4</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td>1.95/1.61</td>
<td>646.9</td>
<td>3176</td>
<td>2035</td>
<td>182.3</td>
<td>208.4</td>
<td>48.8</td>
<td>226.7</td>
<td>15.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td>1.54/1.35</td>
<td>674.3</td>
<td>2626</td>
<td>1819</td>
<td>160.1</td>
<td>177.1</td>
<td>44.7</td>
<td>177.8</td>
<td>13.8</td>
<td>1327.2</td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td>1.22/1.16</td>
<td>379.2</td>
<td>1890</td>
<td>1406</td>
<td>123.3</td>
<td>137.9</td>
<td>42.8</td>
<td>158.7</td>
<td>12.5</td>
<td></td>
<td></td>
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<tr>
<td>60-70</td>
<td>0.87/0.94</td>
<td>216.4</td>
<td>1078</td>
<td>948</td>
<td>73.4</td>
<td>93.7</td>
<td>30.2</td>
<td>105.3</td>
<td>9.2</td>
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<tr>
<td>70-80</td>
<td>0.67/0.94</td>
<td>165.7</td>
<td>767</td>
<td>891</td>
<td>56.1</td>
<td>68.5</td>
<td>30.9</td>
<td>81.2</td>
<td>8.1</td>
<td>601.3</td>
<td></td>
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<tr>
<td>80-90</td>
<td>0.65/0.80</td>
<td>123.6</td>
<td>645</td>
<td>817</td>
<td>75.1</td>
<td>59.1</td>
<td>21.6</td>
<td>59.0</td>
<td>5.7</td>
<td></td>
<td></td>
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<tr>
<td>90-100</td>
<td>0.51/0.82</td>
<td>105.3</td>
<td>702</td>
<td>776</td>
<td>60.9</td>
<td>56.4</td>
<td>20.3</td>
<td>54.8</td>
<td>5.1</td>
<td></td>
<td></td>
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<tr>
<td>100-110</td>
<td>0.57/0.93</td>
<td>111.8</td>
<td>428</td>
<td>758</td>
<td>16.9</td>
<td>46.4</td>
<td>18.9</td>
<td>72.7</td>
<td>4.6</td>
<td>560.5</td>
<td></td>
</tr>
</tbody>
</table>

Note: Data in Table 2 are a summary of sediment analyses being conducted under the direction of William Woods (Southern Illinois University–Edwardsville) and they represent total values. The upper levels (0–20) were clearly disturbed by recent farming activities and were excluded from the preliminary analysis. Aqutuba IA pH values range from 4.44 to 4.88 (mean=4.73) and Aqutuba IB values range from 5.53 to 6.17 (mean=5.98) (with values measured for each of the samples described in Table 2).

The limited amount of subsurface testing conducted thus far precludes full assessment of the overall variability of site deposits at Aqutuba. Nonetheless, excavations, extensive surface collections, and sediment coring conducted to date do permit several general observations. In almost all excavation units, there is a clear vertical increase in artifact frequency and soil alteration (darkening and chemical alteration) toward the surface (Tables 2 and 3). Dark TP (Munsell 10YR 2-3/1-3) generally dates to after ca. A.D. 800 to 1000 in radiocarbon-dated units, but includes older deposits in Unit 1 at Aqutuba II. Analysis of sediment chemistry from this unit and Unit 2 at Aqutuba I documents the high degree of human-influenced alteration, relative to both natural (latosol) sediments and other TP deposits in Amazonia (e.g., Eden et al. 1984:1231–133; Kern 1996; Mora et al. 1991; Pabst 1991; Smith 1980:556; Woods and McCann 1998; cf. Petersen 1996), particularly associated with the upper dark TP of Aqutuba II. The radiocarbon date (A.D. 150 ± 80) from near basal cultural deposits (very light TP) in Unit 2 at Aqutuba I (the deepest TP identified at Aqutuba I) indicates that this portion of the site was likely occupied later and, based on the lighter soils and lower sediment chemical values and artifact densities, less intensively than Aqutuba II.

That such extensive anthropogenic alteration as documented at Aqutuba is fairly typical of permanent occupation but unlikely for short-term occupations, as suggested elsewhere (Eidt 1984; Woods and McCann 1998), is supported by visible sediment alterations associated with small households of neo-Brazilian (caboclo) hoe-farmers at Aqutuba I. These permanent occupations have failed to produce significant, areally extensive deposits of TP even after more than 50 years of continuous residence. They instead prompt localized sediment alteration through concentrated refuse disposal or domestic activities underlying the dark TP in several excavation units; in fact, possibly cultural non-TP deposits lying immediately above basal stratum I (a compact layer of laterite pebbles and cobbles) in Unit 1 at Aqutuba II may date as early as 4900 ± 100 B.C.
The distribution of ceramic remains, pertaining to two distinctive macro-ceramic complexes defined at the site, also is revealing insofar as it indicates the broad contemporaneity and significant functional variability of late prehistoric occupations across the site. Ceramics pertaining to the earlier complex, roughly correlated with the so-called "Modeled-Incised" (Barrancoid) or "Incised-Rim" traditions, and more locally to the Itacoatiara and Manacapuru phases (Hilbert 1968; Lathrap 1970a, 1970b; Meggers and Evans 1961, 1983), are radiocarbon dated from ca. 360 B.C. to A.D. 850 at Açutuba 11, and ca. A.D. 150 to A.D. 920 at Açutuba I. These ceramics are commonly found in large quantities in subsurface contexts, but are rare on the site surface (see Table 3). On the other hand, diagnostic ceramics related to the later ceramic complex, associated with the Guarita phase of the Amazonian Polychrome tradition (Hilbert 1968) and radiocarbon dated from ca. A.D. 980 to A.D. 1440 at Açutuba II, are widely distributed across the entire site surface (Açutuba I, II, and III). The most elaborately decorated styles, "Guarita fine ware" (notably including red- and/or black-on-white painted, wide-line incised ["grooved"], flanged, and complicated modeled designs), are concentrated in central portions of Açutuba II in close association with a probable central "plaza" and several prominent Guarita-age mounded middens.

**Definition of a Central Plaza**

The immediate impression of the Açutuba locality is one of occupations gravitating toward a fixed center prominently marked by a rectangular, low-lying area in the middle of Açutuba II (see Figure 4). We tentatively interpret this hollow as a central public...
Table 3. Ceramic Remains from Select Excavation Units at Acutuba I and II.

<table>
<thead>
<tr>
<th>Depth</th>
<th>Açutuba I, Unit 2</th>
<th>Açutuba I, Unit 1</th>
<th>Açutuba II, S231W858-859a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count/Weight (Total Rims/MVC)</td>
<td>Count/Weight (Total Rims/MVC)</td>
<td>Count/Weight (Total Rims)</td>
</tr>
<tr>
<td>0-10</td>
<td>50/125 (4/4)</td>
<td>625/1,641 (22/22)</td>
<td>3,240/8,839 (168)</td>
</tr>
<tr>
<td>10-20</td>
<td>40/162 (2/2)</td>
<td>403/1,731 (18/18)</td>
<td>3,956/13,807 (233)</td>
</tr>
<tr>
<td>20-30</td>
<td>106/463 (11/10)</td>
<td>1,123/9,592 (73/64)</td>
<td>3,027/10,717 (178)</td>
</tr>
<tr>
<td>30-40</td>
<td>890/9,387 (76/67)</td>
<td>3,654/19,360 (84/80)</td>
<td>2,429/8,844 (119)</td>
</tr>
<tr>
<td>40-50</td>
<td>1,047/4,398 (35/28)</td>
<td>1,957/14,584 (73/70)</td>
<td>2,532/11,898 (173)</td>
</tr>
<tr>
<td>50-60</td>
<td>288/960 (18/18)</td>
<td>600/4,785 (39/38)</td>
<td>1,638/8,754 (150)</td>
</tr>
<tr>
<td>60-70</td>
<td>128/610 (17/15)</td>
<td>172/983 (13/12)</td>
<td>2,200/11,090 (156)</td>
</tr>
<tr>
<td>70-80</td>
<td>44/199 (4/4)</td>
<td>165/2,110 (13/11)</td>
<td>1,441/5,450 (78)</td>
</tr>
<tr>
<td>80-90</td>
<td>17/36 (1/1)</td>
<td>46/560d (1/1)</td>
<td>858/3094 (58)</td>
</tr>
<tr>
<td>90-100</td>
<td>10/29 (4/4)</td>
<td>122/5771 (77)</td>
<td>1,213/7,541 (114)</td>
</tr>
<tr>
<td>100-110</td>
<td>1/1</td>
<td>186/7/171 (95)</td>
<td>550/1951 (35)</td>
</tr>
<tr>
<td>110-120</td>
<td></td>
<td>1,715/5681 (30)</td>
<td>715/5681 (30)</td>
</tr>
<tr>
<td>120-130</td>
<td></td>
<td>215/420 (5)</td>
<td>12/8</td>
</tr>
<tr>
<td>130-140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140-150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150-160</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a S231W858-859 denotes coordinates of 2-x-1-m unit in site grid established in 1997 (only 1 x 1.5 was excavated; other two units are 1 m2 units designated using 1995 system).
bWeight is rounded to nearest gram.
cDenotes the total number of rim sherds over the minimal vessel count (MVC), which represents the subset of rims that clearly pertain to separate vessels (MVC for 1997 1-x-1.5 unit not available).
dCeramic counts include clearly intrusive ceramics from a rodent burrow in Subunit 1C and are therefore artificially high (Subunit 1C constitutes 61 percent, 92 percent, and 72 percent of the total in the three levels, respectively); by averaging the number of sherds in the other three subunits we can calculate the following, likely more realistic estimates: 60 to 70 cm = 89/381.6; 70 to 80 cm = 76/47.6; 80 to 90 cm = 122/1,346.
eWall refers to sherds recovered when walls were cleaned (brought to true vertical) at various stages of excavation.

(nondomestic) area or “plaza.” It forms an obvious sunken amphitheater-like feature, characterized by two roughly parallel, steep-sided (eastern and western) banks and a more gradually sloping bank at the northern end. The symmetry and uniformity of this central area indicates that it may represent an artificially reworked natural drainage feature. Shallow TP deposits, largely disturbed by plowing, were noted in one test pit and numerous sediment cores. Surface artifacts are likewise present, particularly in extreme northern areas of the plaza. It seems likely, however, that the plaza area was originally characterized by low artifact densities and limited TP development since current distributions at least partially reflect erosion from the higher flanking areas, particularly due to north to south drainage and recent plowing. An excavated ditch (110 m in length, 5 to 6 m across, and 1 to 2 m in depth) presumably marks the southern boundary of the plaza floor, which thus measures at least 450 x 100 m in extent.11

On the high terrace areas flanking the northwestern margins of the presumed plaza, lying some 8 to 10 m above the plaza floor, densely concentrated ceramics (the highest frequencies of ceramics and, particularly, Guarita fineware, from across the site) and extremely dark TP, associated with three large mounded middens, further indicate that this central area was functionally distinctive. Although imprecisely defined, these oblong mounds each extend across areas of 1500 to 2000 m² or more. Excavations in and around the easternmost mound document that it is about 50 to 60 x 30 to 35 m in areal extent, about 1 m thick, and associated with late prehistoric Guarita occupations, based on diagnostic ceramics, radiocarbon dates, and the recovery of an earlier burial urn. The urn, which was encountered 110 to 150 cm below the surface, was associated with a radiocarbon date of A.D. 850 ± 60. Excavations and/or surface collections around the other mounds suggest that they also relate to Guarita occupations. No other prominent mounded deposits have been encountered elsewhere at Açutuba.

It seems extremely unlikely that it is only by coincidence that the large trash middens, the highest arti-
fact concentrations and most pronounced TP, and the excavated earthworks occur in close association with the plaza. These features were obviously interrelated and together comprise a settlement layout organized around a definitive center, the plaza, which formed the fixed and highly constructed core of the local built environment. We argue that the large mound middens overlooking the plaza area were possibly associated with special activities linked to communal ritual and public affairs concentrated near the village center and plaza. This is indicated not only by the middens’ central location, flanking the plaza, but also by the frequency of very large sherds, multiple sherds from single vessels (including nearly whole vessels), and ritually “killed” vessels encountered in excavations (particularly S231W857-858), which distinguishes these features from the TP deposits in other parts of the site. This reconstruction also would explain the notable concentration of finely decorated non-utilitarian ceramics (Guarita fineware), likely manufactured for ceremonial or otherwise restricted use, around the plaza. It follows that social groups occupying areas adjacent to the plaza likely had greater control or involvement in activities conducted in these core areas than those living in more peripheral areas. In short, we propose that the central area represents a locus communis of public affairs, which was a politico-religious center of community life and perhaps dominated by limited segments of society.

The structural elaboration of the site, both intentional and unintentional, and patterned variability in stratigraphy, sediment chemistry, and artifact distributions, particularly insofar as they relate to a fixed center or plaza, are incompatible with the view that such large sites represent homogeneous deposits created by multiple, randomly placed reoccupations of the same locale by small communities over time (e.g., Meggers 1990, 1991). The massive size, restricted distribution, and unique ceramic remains of the mound middens indicate that, although composed of refuse, they are not the product of generalized refuse disposal by small households over a short period of time, nor likely even the aggregate of such occupations. Although site abandonment and reoccupation undoubtedly occurred over the long sequence of occupation (perhaps spanning 7,000 years), we suggest that relatively fixed occupations were established in central portions of the site (central Açutuba II) by A.D. 1, if not before. About this time, occupations may have expanded to adjacent portions of the long terrace, at least Açutuba I, based on the radiocarbon date of A.D. 150 from near basal deposits on Unit 2 at Açutuba I. By late prehistoric times (after A.D. 1000), central areas of the settlement at Açutuba II became the focus of concentrated and perhaps functionally specialized residential activities, although contemporaneous, if less dense, occupations also occurred in more peripheral areas of Açutuba II, as well as across Açutuba I and III.

In sum, we suggest that Açutuba was occupied almost continuously, if not continuously, throughout the Christian era, if not before, and, although we cannot precisely estimate the overall extent of contemporaneous occupations, it was likely the home of a large, sedentary population in the centuries immediately preceding European contact. Stretching over at least 3 km along the Negro River, it appears to be more akin to the large, complicated settlements reported from the middle Amazon in the sixteenth and seventeenth centuries (e.g., Porro 1993, 1996) than the general semi-sedentary pattern suggested from ethnography and predicted by the standard model. Regional survey has documented several other extensive (30 ha or more of TP), generally contemporaneous late prehistoric sites (i.e., containing diagnostic Guarita ceramics) within a 30-km radius of Açutuba, providing further evidence of a high regional population density.

The Upper Xingu

In the headwater region of the Xingu River, a major southern (clear-water) tributary of the Amazon, an even clearer example of large village size and permanence has been documented. The upper Xingu has long been prominent in debates over village size and permanence in Amazonia due to Robert Carneiro’s (e.g., 1957, 1960, 1983, 1985) observations regarding subsistence and settlement patterns in the region. He noted that the Kuikuru and other Xinguano villages, although relocating every so often (10 to 30 years), had moved no more than a few hundred meters in nearly 100 years (ca. 1860 to 1960) in some cases. Thus, village relocation was not caused by the exhaustion of garden soils or local ecological degradation. Furthermore, Xinguano agricultural technology, he argued, could support a large, permanent population, perhaps as many as 2,000 in a single settlement. Carneiro’s conclusions have been challenged on the grounds of both agricultural productivity and the availability of fished, hunted, and
foraged resources in the region (e.g., Descola 1996:183–186; Gross 1975; Johnson 1982; Ross 1978). Nevertheless, vestiges of ancient fortified villages, notably including peripheral ditches or moats, provided evidence that Xinguano villages were much larger in the past (Carneiro 1957:212; Dole 1961/1962; see also Agostinho 1993). The ditches were misinterpreted as natural features by several archaeologists who briefly worked in the region, and have therefore received little attention in discussions of Precolumbian settlement patterns in Amazonia (Becquelin 1978, 1993; Kneip 1969; Simões 1967).

Recent archaeological investigations at three late prehistoric sites in the upper Xingu—Nokugu (MT-FX-06), Kuhikugu (MT-FX-11), and Hialugiñi (MT-FX-13)—demonstrate that these ditches are constructed earthworks and that prehistoric villages were dramatically larger and more structurally elaborated than those of contemporary Xinguano villages, although sharing the same circular central plaza configuration (Figure 8; see Heckenberger 1996 for a more detailed discussion). Demonstrable cultural continuity throughout the chronological sequence (ca. A.D. 1000–2000), documented by marked conservatism not only in village spatial organization (plaza and spoke-like road configuration) but also in ceramic technology, subsistence economics, and village location (Heckenberger 1996,
Table 4. Uncalibrated Radiocarbon Dates from the Upper Xingu River.

<table>
<thead>
<tr>
<th>Site/Provenience</th>
<th>Lab. #</th>
<th>$^{14}C$ Age B.P</th>
<th>$d^{13}C$</th>
<th>Material Dated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nokugu</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation surface A</td>
<td>Beta 72261</td>
<td>1000 ± 70</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Occupation surface B</td>
<td>Beta 78979</td>
<td>700 ± 70</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Ditch 1 fill (middle)</td>
<td>Beta 81301</td>
<td>360 ± 70</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Ditch 1 fill (top)</td>
<td>Beta 72260</td>
<td>180 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td><strong>Kuhikugu</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation surface A</td>
<td>Beta 72263</td>
<td>900 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Base of road fill</td>
<td>Beta 72262</td>
<td>440 ± 70</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td><strong>Hialugihiti</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base of <em>terra preta</em></td>
<td>Beta 88363</td>
<td>910 ± 80</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Top of <em>terra preta</em></td>
<td>Beta 88362</td>
<td>690 ± 60</td>
<td>-25.0%</td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Morenã¹</td>
<td>Gif 3308</td>
<td>920 ± 90</td>
<td></td>
<td>wood charcoal</td>
</tr>
<tr>
<td>Tuatuari¹</td>
<td>Gif 5365</td>
<td>680 ± 60</td>
<td></td>
<td>wood charcoal</td>
</tr>
</tbody>
</table>

¹ Bequelin 1993.

1998a, 1999a), permits fairly detailed direct historical comparisons. Fieldwork relevant to the present discussion included: 1) systematic mapping of earthworks, including single and paired ditches around settlements and contiguous linear ridges (curbs) demarcating plaza areas and causeways within villages; 2) excavations into and beneath the artificial earthworks, including three 1 m² excavation units at Kuhikugu (one positioned over a road curb adjacent to the plaza and two sectioning the interior berm of a peripheral ditch), one at Hialugihiti (located over the plaza-marginal curb), and an excavation trench at Nokugu (11 contiguous 1 m² units bisecting a ditch); 3) systematic surface collection of 1,336 and 1,949 2 m² units at Nokugu and Kuhikugu, respectively (surface soil color and vegetation also were recorded); and 4) sediment coring conducted in various portions of the three sites (e.g., plaza areas,

Figure 8. Site map of prehistoric site of Nokugu (Mt-Fx-06). *Note:* Closed named circles (Ati, Ahanitahagu and Waura) represent Xinguano occupations between ca. 1850 to 1971.¹²
roads, areas between roads, and ditches located near and distant from the plaza) to evaluate subsurface sediment characteristics.

Stratigraphy and Chronology

In almost all excavations, intact anthropogenic TP soils, designated Stratum II at all sites, were encountered beneath reworked overburden deposits related to earthwork construction (stratum III) (Figure 9). The intact TP ranged from about 40 to 50 cm in depth, although artifacts extend into a reddish brown transitional zone between the TP and sterile basal sediments (red-colored Stratum I). Shallower, lighter, and non-TP deposits also were documented in more peripheral areas of each site, as documented in surface soil characteristics, sediment cores, and excavations. Radiocarbon dates obtained from slightly above the stratum I/II interface at Nokugu (A.D. 950 ± 70), Hialugihiti (A.D. 1040 ± 80), and Kuhikugu (A.D. 1050 ± 60) roughly date initial site occupations to the period immediately prior to A.D. 900–1000. No earlier occupations are known from the upper Xingu basin.

The dates from all three sites provide internally consistent cultural sequences for the intact TP (stratum II), indicating accretional formation. Correlation of dates for intact Stratum II between the three sites indicates roughly contemporaneous initial occupations (base of Stratum II) by ca. A.D. 800 to 900 and earthwork construction (top of Stratum II) ca. A.D. 1400 to 1450. The maintenance of earthworks apparently declined within a century or so of European contact, based on a date of A.D. 1590 ± 70 from the middle of Stratum IV (cultural fill deposited in ditch). The sites were completely abandoned by the mid-1700s as the result of depopulation from introduced diseases and territorial consolidation (Heckenberger 1996).

Village Size and Configuration

Like contemporary Xinguano communities, late prehistoric villages were constructed around a large, central plaza (Figure 10). This is an area of low artifact density and minimal soil alteration (i.e., little TP formation). In both contemporary and prehistoric villages, areas directly outside of the plaza are characterized by high artifact densities and pronounced soil alteration related to domestic activities (Table...
One obvious contrast between prehistoric and contemporary villages is that the plaza location remained fixed during much or all of the long occupational history of the prehistoric villages, as documented by the substantial TP (± 50 cm) deposits surrounding the “clean” plaza areas (within a ring of approximately 100 to 200 m around the plazas). In other words, whereas contemporary settlement patterns result in a patchy distribution of TP, related to the doughnut-shaped distribution of TP around multiple non-overlapping plaza villages, the extensive and relatively deep TP deposits that formed around plazas in prehistoric sites were undoubtedly the result of long-term, continuous occupation of central site areas.

The earliest occupations of these sites were apparently smaller than those of terminal prehistoric times, at least at Nokugu and Kuhikugu where distributions of artifacts and TP are better understood. They were likely intermediate in size between historically known villages and late prehistoric villages (compare Figures 10 and 11). This hypothesis is based on the lack of notable anthropogenic soil alteration (i.e., TP formation), as would be expected with long-term occupation, in areas more distant from the plaza at Nokugu and Kuhikugu. Domestic ceramics (i.e., residential areas) were distributed across the surface of the sites (i.e., throughout the area confined within the ditches) except in road and plaza areas. We surmise that areas farthest from the central plaza(s) were occupied late (and apparently briefly) in the history of each site due, in part, to population nucleation concomitant with the construction of village fortifications.

The prominent village earthworks, such as ditches and curbed plaza/causeway systems, enable accurate reconstruction of village size and configuration, at least in terminal prehistoric times. Village earthworks were articulated in an integrated and, therefore, contemporaneous architectural plan. Even if one or another village had been temporarily abandoned...
Table 5. Sediment Data from Upper Xingu.

<table>
<thead>
<tr>
<th>Site/Location</th>
<th>% Org. Mat.</th>
<th>Ex. Mg ppm</th>
<th>Ex. Ca ppm</th>
<th>Ex. K ppm</th>
<th>Ex. Na ppm</th>
<th>pH</th>
<th>P fract. b sum mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuikuru I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midden</td>
<td>13.5</td>
<td>68.7</td>
<td>509.2</td>
<td>38.1</td>
<td>7.2</td>
<td>7.5</td>
<td>479</td>
</tr>
<tr>
<td>House</td>
<td>5.1</td>
<td>7.9</td>
<td>19.5</td>
<td>15.5</td>
<td>5.2</td>
<td>5.6</td>
<td>216</td>
</tr>
<tr>
<td>Plaza a</td>
<td>5.4</td>
<td>5.4</td>
<td>14.9</td>
<td>10.8</td>
<td>5.1</td>
<td>5.2</td>
<td>76</td>
</tr>
<tr>
<td>Plaza</td>
<td>5.4</td>
<td>.3</td>
<td>4.1</td>
<td>2.1</td>
<td>4.1</td>
<td>4.6</td>
<td>72</td>
</tr>
<tr>
<td>Plaza</td>
<td>5.7</td>
<td>.1</td>
<td>2.3</td>
<td>1.2</td>
<td>3.5</td>
<td>4.1</td>
<td>77</td>
</tr>
<tr>
<td>Midden</td>
<td>8.2</td>
<td>20.1</td>
<td>142.8</td>
<td>54.5</td>
<td>5.5</td>
<td>5.9</td>
<td>550</td>
</tr>
<tr>
<td>Nokugu</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Plaza</td>
<td>5.8</td>
<td>9.2</td>
<td>52.9</td>
<td>4.1</td>
<td>6.8</td>
<td>5.6</td>
<td>299</td>
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<tr>
<td>Domestic</td>
<td>7.5</td>
<td>18.9</td>
<td>143.8</td>
<td>3.8</td>
<td>5.8</td>
<td>6.4</td>
<td>556</td>
</tr>
</tbody>
</table>

*Note:* Sediment analyses were conducted by the Soils and Physical Geography Laboratory, University of Wisconsin-Madison (UWM) and represent total values.

*Phosphate fractionation (P fract.) results presented above represent sum of fractions*

*Denotes sample from approximately 5 meters in front of house*

Prior to A.D. 1400 to 1500, it is clear from the scale of earthmoving at each site that villagers did not intend to abandon their villages once they had built these features. Structural elaboration of a village to this degree is exactly what would be expected of large, fully sedentary populations, but seems less typical of small, semi-sedentary groups. Moreover, it is hard to imagine that communities occupying the large and structurally elaborate prehistoric villages practiced a more mobile settlement pattern than their contemporary descendants, who have an essentially sedentary lifestyle.

As is the case in contemporary villages, the central plaza was the gravitational center of prehistoric...
villages. Domestic areas surrounding the plaza were many times larger than today, although plaza dimensions are comparable to those of contemporary villages (up to 250 m in diameter). The partitioning of each site, conditioned by the placement of artificial earthworks, created discrete intravillage precincts, or "neighborhoods," situated between roads and also delimited by the plaza and excavated ditches. These partitions may well correspond to social divisions (e.g., kin groups or factions), an elaboration on the clustering of related households in contemporary villages. Likewise, households were more than likely positioned with respect not only to affiliation with one or another rival kin group but also internal rank within that group. What is clear in contemporary villages is that the most powerful individuals (hereditary chiefs) live in houses positioned at key points around the plaza (e.g., cardinal directions or in opposition to one another), and other households position themselves with relation to these in either adjacent areas around the plaza or behind the house of a chief. We can assume that the plaza, in prehistory as today, was not only a gravitational center of the local built environment but also the center of political and ritual life.

In the upper Xingu, as suggested for Açutuba, the plaza was controlled by a specific segment of society, namely adult men and particularly chiefs. In present-day villages, both the village and central plaza are symbolically "owned" by the two primary named chiefs (in Kuikuru they are called eté-êto, or "owner of the village," and hugogô êto, or "owner of the center/plaza," respectively). As the locus of diverse intercommunity rituals, the plaza also is a symbolic point of articulation between communities in the integrated regional system. In short, prehistoric cultural patterns fail to meet the expectations of standard model, i.e., communities were neither small and impermanent nor likely egalitarian and politically autonomous.

Without entering into a detailed discussion of population estimates, it is reasonable to conclude that populations in prehistoric villages were considerably higher than those from historically known villages (50 to 350 people), if for no other reason than their physical size (.3 to .5 km² compared to .06 km²). The largest recent Xinguano village on record is the Kuikuru village, recorded by Heckenberger in 1995, at about .06 km², or 6 ha, in size with a village population of about 330. It is important to recognize, however, that plaza space constitutes over half of the entire village area in the contemporary Kuikuru village, but considerably less in prehistoric villages (i.e., there is far more residential space in prehistoric villages). Late prehistoric villages were not only up to 10 times larger than contemporary ones but also substantially more elaborated spatially and structurally, likely the product of a workforce considerably larger than available under current conditions. Therefore, it seems highly likely that village populations ranged into the low thousands, at least 1,000 to 1,500, as known historically from much smaller circular villages among central Brazilian peoples (Nimuendajú 1967; Posey 1994; Turner 1991; Wüst and Barreto 1999), although their populations may have ranged significantly higher, as suggested elsewhere (Agostinho 1993:275).

Regardless of exact village sizes, regional population must have been dramatically higher than historically documented (some 3,000 people in 20 or more villages during the 1880s), due to the much higher incidence of contemporaneous sites, as suggested by the density and regular placement of fortified villages constructed ca. A.D. 1400 to 1500. Specifically, excavations at Nokugu, Kuhikugu, and Hialugihiî not only have revealed similar developmental histories for these sites, but indicate that the ditches and the linear mounds placed at the edges of plazas and roads were constructed more or less simultaneously across the region. Thus, the earthworks reflect a relatively sudden shift in regional settlement patterns that, by extension, applies to other undated fortified sites (i.e., Mt-Fx-17, 18 and 22 also were more or less contemporaneous).

Like contemporary villages, prehistoric settlements were undoubtedly interconnected by a well-developed system of roads and paths (i.e., extensions of the intravillage causeways), but there is no evidence that one or another of these villages held sway over any other. Given available site distribution data and dating in the upper Xingu, some contemporaneous settlements were larger and probably more powerful than others. Research to date suggests that numerous relatively large and closely spaced settlements with extensive earthworks were present in the area during late prehistoric and early historic times, but their precise interrelationship remains unknown. In the Kuikuru study area, where today there is only one plaza village, there may have been five contemporaneous plaza villages (Mt-Fx-06, 11, 13, 17 and 18) and perhaps even more (Mt-Fx-22 and 23), with few
or no intervening second-order settlements. At the regional level, it appears that large villages existed as more or less peer communities, with perhaps one or a few smaller satellites (e.g., Mt-Fx-19, 20, and 21). Similar dense, sedentary social formations apparently characterized the Pareci groups, closely related Arawak-speaking peoples who lived west of the upper Xingu. In the 1720s, Pires de Campos (1862:443–444; authors' translation) noted that they existed "in such numbers, that their villages could not be counted and often in a day's march, 10 to 12 villages were passed, each with 10 to 30 houses of 30–40 paces [meters] width... even their roads they make very straight and wide and conserved so clean and in good repair that not even a leaf is to be found."

Discussion

The findings from the lower Negro and upper Xingu underscore the substantial variability of Amazonian settlement patterns, including apparently large and fully sedentary communities and fairly dense regional population aggregates across a more diverse range of ecological settings than commonly accepted. Specifically, our findings neither support the standard model, insofar as it suggests that, due to environmental constraints, Amerindian settlements in Amazonia are necessarily small, impermanent, and dispersed (e.g., Meggers 1992, 1995b, 1996, 1997), nor do they agree with the more limited application of the standard model to non-várzea settings or those areas that lack nutrient-rich soils (e.g., Roosevelt 1980, 1991, 1994; cf. Carneiro 1985, 1995). A further implication of our studies is that the "carrying capacity" of diverse Amazonian settings is substantially higher than commonly accepted and, therefore, cannot be easily correlated with any narrowly defined ecological variable (e.g., high fertility soils), as proposed by some revisionists (e.g., Lathrap 1970a:36–44; Roosevelt 1980:79–92, 112–119). In other words, although variability in settlement patterns across the region obviously correlates, in part, to ecological patterning, it cannot be explained through recourse to general models derived from broadly defined ecological variables (e.g., várzea vs. terra firme, white-water vs. black- or clear-water rivers). The várzea/terra firme dichotomy (or várzea model) and the standard model from ethnography (i.e., the tropical forest culture) thus perpetuate images of homogeneity where it has not been demonstrated and undoubtedly grossly oversimplify Precolumbian patterns.

A particularly dubious assumption that arises from ignoring regional variability is that sociocultural formations were necessarily similar across vast areas, corresponding to one or a few narrowly defined cultural "types" (e.g., várzea chiefdoms, tropical forest tribes). The natural landscape of Amazonia was extremely varied, and the cultures that lived in and transformed it were no less diverse. Minimally, we can conclude that the "complex end" of cultural diversity in the terra firme (i.e., black-water and clear-water rivers, small tributaries, and interfluves), in terms of sedentism, local and regional population size, economic production, and sociopolitical complexity (both hierarchical and heterarchical), has been significantly underestimated due, in large part, to assumptions derived from ethnography and recent human ecology. Ethnographic patterns of small village size and frequent relocation, such as predicted by the standard model, are well known from Amazonia, but many groups described as definitive examples of such a pattern have been demonstrably displaced as a result of contact (e.g., Kayapó and Tarumã), or live in areas that seem to have supported relatively large, sedentary social formations prehistorically (e.g., Jivaro and Siriono). As the upper Xingu example clearly demonstrates, we must exercise extreme caution in retrodicting ethnographic patterns, generally derived from observations made during the demographic nadir of Amazonian peoples (ca. 1925 to 1975), into the past (Beckerman 1978, 1979, 1991; DeBoer et al. 1996; Roosevelt 1989; Whitehead 1994).

In both the lower Negro and upper Xingu, settlement patterns show a strong tendency toward occupation of non-inundated forest areas that are directly adjacent to major waterways. Thus, tracts of arable terra firme land and rich aquatic resources undoubtedly provided the economic base for these large settled populations (see Carneiro 1986; Denevan 1996). This conclusion conforms to a general pattern in Amazonia whereby fishing takes precedence over terrestrial hunting in areas where aquatic resources are abundant (Beckerman 1979, 1994; Carneiro 1970, 1986, 1995; Lathrap et al. 1985; Rivière 1984:11).

There could have been little or no emphasis on local floodplain agriculture in either the upper Xingu or lower Negro areas. In the upper Xingu, the seasonally saturated, compact (gley) soils of the floodplain are unsuitable for cultivation, as are the sand levees (galeria forests) directly adjacent to major
rivers. As more fully explained elsewhere (Heckenberger 1998a), manioc agriculture in terra firme areas of the upper Xingu must have been the prehistoric economic base, as it is today (see Carneiro 1985; Dole 1961/1962). In the lower Negro case, there are no such floodplains at all. High terra firme riverbluffs rise above seasonal sand beaches and inundated forests (igapós) along the Negro. Thus, the hypothesis that higher economic productivity of restricted floodplain settings provided the necessary basis for sedentism and population growth, as has commonly been proposed (e.g., Carneiro 1986, 1995; Denevan 1992a, 1992b, 1996; Lathrap 1970a; Meggers 1996; Moran 1991, 1993, 1995; Roosevelt 1980, 1994), is untenable for both the lower Negro and upper Xingu. The large, sedentary villages in both areas were apparently supported by intensive terra firme agriculture (see Denevan 1992a), rather than extensive shifting agriculture as typical of contemporary Amerindian groups in Amazonia, or the intensive floodplain agriculture suggested for some areas in the prehistoric period (Roosevelt 1980, 1994).

An inescapable implication of our research is that Amerindian villages can no longer be generally portrayed as small, impermanent, or autonomous—isolated “clearings” in an otherwise vast, homogeneously forested landscape. Our findings support a growing body of research that documents that Amerindian populations are not only highly selective in their use of the natural landscape, but that over time choice settlement locations are not necessarily degraded but can become even more desirable through intentional modifications and unintentional alterations resulting from human occupation (e.g., Balée 1989, 1994, 1995; Denevan 1992a, 1992b, 1996; Denevan and Padoch 1988; Posey and Balée 1989). Long-term settlement continuity and outward growth from central or “core” areas at Açutuba and in the upper Xingu resulted in increased internal differentiation and alteration (construction) of the local environment. As village populations increased and village spatial organization became more enduring and structurally elaborated, including maintenance of fixed central plazas and substantial earthmowing, specific places were radically transformed and communities became more committed to them. Açutuba and particularly the upper Xingu exemplify this kind of organization, but we strongly doubt they are unique. Some populations, such as in the Northwest Amazon, were strongly attached to specific places, but remained small in terms of community and regional population (e.g., Mora et al. 1991; Neves 1998). Still other communities reached large sizes, but were unstable in their location and composition, such as some Gê villages, for example (e.g., Nimuendo 1967; Posey 1994; Turner 1991; Verswijver 1992; Wüst and Barreto 1999). Furthermore, there was considerably greater variation within discrete regions than is commonly accepted, as indicated by both the lower Negro and upper Xingu studies.

In conclusion, we believe that prehistoric Amazonian societies, as a broadly comparable cultural universe, were neither ecologically prevented from settled village life nor narrowly constrained by an egalitarian ideology (Heckenberger 1999b, 1999b). Nonetheless, the presence of large, sedentary population aggregates does not lead us to conclude that these societies were politically integrated into centralized, hierarchical sociopolitical systems at local or regional levels (see Clastres 1977; Fausto 1992). Rather, it demonstrates that there is no a priori reason to assume that they were not.

Acknowledgments. The authors thank the Ideta family, particularly Kunitaka Ideta and his family, and Dona Cândida Jesus de Silva, her family, and the other families of the Açutuba community, co-owners of the Açutuba locality, who graciously provided permission to study the site, as well as accommodations and assistance throughout the project. Research in the lower Negro area is being conducted under a formal agreement between the Museu de Arqueologia e Etnologia, Universidade de São Paulo (MAE/USP) and the Carnegie Museum of Natural History (CMNH). Heckenberger especially thanks the Kuikuru (Xinguano Amerindian) community for their gracious support of the upper Xingu research; in particular, Chief Afukaka Kuikuru, his brothers and family, and the numerous young men who aided in the conduct of the fieldwork. Various individuals at the MAE/USP, the CMNH, and the University of Maine at Farmington Archaeology Research Center (UMF ARC) aided the project in a variety of ways, particularly at the MAE/USP where the authors and assistants conducted the laboratory work. We gratefully acknowledge the William Talbot Hillman Foundation (Pittsburgh), the Wenner-Gren Foundation (New York), the UMF ARC, the CMNH, and the Universidade de São Paulo for financial support of the Açutuba research. Heckenberger thanks the Museu Nacional/UFederal do Rio de Janeiro (UFRJ) and the Museu Antropológico, UFederal de Goiás (UFG), institutional co-sponsors of the upper Xingu research, and, in particular, Bruna Franchetto (UFRJ) and Irminfd Wüst (UFG) for their support. Financial support for the upper Xingu research was provided by the Social Science Research Council (New York), the National Science Foundation (Grant No. DBS-9214806), Victor and Mary Heckenberger, the UMF ARC, and the W. T. Hillman Foundation. Denise Dal Pino de Souza (MAE/USP) and Jeff Williams (UMF ARC) drafted Figure 2, and Williams con-
tributed to many of the other figures as well. Marina Valesco kindly provided the Spanish abstract. Cindy Longwell (University of Vermont) helped in final manuscript preparation. Discussions with Robert Carneiro, William Denevan, Anna Roosevelt, and William Woods provided helpful insights for the paper, as did the comments of six anonymous reviewers and the editorial staff of Latin American Antiquity. As customary, all errors or omissions are the responsibility of the authors.

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Notes
1. *Terra preta do índio* refers to anomalously dark (brown to black) and nutrient-rich Amazonian soils of anthropogenic origin and is typically found in association with archaeological remains (e.g., Smith 1980; Woods 1995).
2. In Portuguese, *várzea* generally refers to any river floodplain or inundated bottomlands.
3. There are at least three distinct sites overlooking Lago Grande (designated AM-IR-12 on Figure 2) and three or more possibly related sites around Lago do Limão (AM-IR-9 on Figure 2).
4. The four sites identified by Hilbert ("Paredão," "Refinária," "Ponta de FAB," and "Manaus"), all lying on river bluff areas within central portions of Manaus, are not plotted on Figure 2. Smith (1980:560) mentioned an additional six sites in the Manaus area; three of these may correspond to sites encountered in our survey (Praia Dourado, MT-MA-35), or those of Simões (1974a; Ponta Negra and Siderama just upstream from Manaus). Neither these nor the remaining three small sites (.5 to 4 ha), located some distance from the Negro River on small perennial streams, can be precisely plotted on Figure 2.
5. All excavations were conducted in 10-cm levels within natural stratigraphy and all sediment from test pits and excavation units was screened (6.4 mm); samples of recovered sediment (5 to 15 liters) were waterscreened using a 1.0 mm sieve, or floated using a 1.5 mm heavy fraction sieve.
6. Artifacts encountered in this dated level may have been redeposited from higher levels and carbonized botanical remains may reflect natural burning. Nonetheless, the chemical values from these lower levels (80 to 110 cm) generally correlate well with those from other cultural deposits at the site and from other Amazonian sites (Eden et al. 1984; Kern 1996; Smith 1980), indicating that this may well be an early cultural horizon.
7. Apparently earlier ceramics were encountered in levels radiocarbon dated to between 6850 ± 100 B.P. (90 to 100 cm) and 2310 ± 140 B.P. (60–70 cm) in Unit 1, Açutuba IIB.
8. *Cauixi* (sponge-spicule) is the dominant temper, although *caraipe* and *caraipe/cauixi*-tempered ceramics are present throughout the sequence, as are other temper materials in lesser quantities, including grog, charcoal, and perhaps sand. Primary decoration includes incision, punctuation, modeling, and a unique "cut" rim technique. Possibly associated with this complex are co-occurring variants of polychrome painted ceramics (red, orange, and other paints on a white slip clearly distinctive from later Guarita polychrome techniques and styles) and distinctive fine-line incised varieties, both from deposits securely dated to ca. A.D. 150 (see Heckenberger et al. 1998). Ceramics broadly comparable to these Açutuba ceramics are known from radiocarbon-dated deposits in the central Amazon at the Itacoatiara (ca. 95 B.C. and A.D. 86), Manacapuru (A.D. 425), Coari (ca. A.D. 763), and Caíambé sites (ca. A.D. 640 and 730) (Hilbert 1968:253).
9. The majority of the diagnostic Guarita ceramics are tempered with *caraipe*, with lesser amounts of *cauixi* and *caraipe/cauixi*-tempered sherds present. Similar ceramic materials have been recovered from sites on the Uatumã River, dated to ca. A.D. 890 to 1520 (Miller 1992:17–20), from sites on the Apaúã River (middle Negro), dated to ca. A.D. 825 to 1560 (Simões 1974a; Simões and Kalkman 1987), and to A.D. 1150 at Coari on the middle Solimões River (Hilbert 1968:253). A medially-flanged vessel, identical to Guarita forms at Açutuba, from the middle Negro has recently been dated to A.D. 1340 (Heckenberger 1997).
10. These high concentrations of ceramics do not apparently relate to specialized production areas due to the general lack of ceramic manufacture refuse or sherds from unused vessels.
11. The ditch bisecting the plaza may have connected with another ditch identified in northwestern portions of Açutuba II, but the exact configuration and position of this ditch is uncertain since it was filled in by the landowner and has since been plowed over numerous times. Our placement of this ditch in Figure 4 is approximate and based on landowner testimony.
12. North arrow in Figure 8 is revised from Heckenberger 1996, 1998.
13. The ph values from the central plaza samples (more distant from the houses and middens) correspond well with the values obtained by Carneiro (1983:Table 3.3) for chemically unaltered soils from Kuikuru gardens.

Received February 7, 1998; accepted October 26, 1998; revised May 19, 1999.