

**A Comparison of Different Methods to Estimate Population
Among Sites in the La Venta Corridor, Highland Jalisco.**

March 7, 1998

Slightly more formal version of the paper delivered at the Midwestern Mesoamerican Meetings,
East Lansing, Michigan

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All archaeologists have trouble with estimating the population of the various households, hamlets, villages, cities and regions that we observe in the field. The more successful efforts have tended to be based on the actual number and size of residential structures, when preserved, or around the density and distribution of artifacts recovered from the surface. Poor surface visibility coupled with minimal destructive agriculture have led to methods emphasizing structure counts in the Maya lowlands, while precisely the opposite situation has led to a dependence on artifact distributions in the highland valleys and lake basins. Researchers in both these regions have used known ethnohistoric and ethnographic populations as a baseline to turn their material culture into numbers of people.

In the Tequila lake basins of central Jalisco, debate in and out of print has centered around the degree of political complexity and centralization of the Teuchitlan Tradition. The Tradition may be glossed here as a Late Formative through Classic period society with a distinctive form of circular surface public architecture, with some kind of definite association with the well-known shaft tombs, and which form clusters within a virtually contiguous dispersion of settlement over some 240 km² (Weigand 1985). Now this area of the Teuchitlan Tradition is surrounded by a ring of strategic sites at the entrances to the central valleys, which I have interpreted elsewhere as a boundary defining the core of a single polity (Beekman 1996). There are also smaller, derivative examples of Teuchitlan Tradition architecture found in distant locations of western Mexico along communication routes out of the core, suggesting some centralized political interest in trade. But

while the regional pattern of the Tradition suggests a complex polity or system of polities, one disturbing counter-argument has been the remarkably low surface density of ceramics in the core area. It is not uncommon to walk over a site with monumental architecture all around, but with very few sherds to be seen. These are systematic patterns, quite independent of surface visibility and whether we were surveying plowed or unplowed fields.

Ceramics should indicate *something* about the density of population, and we would in turn expect a certain density of population to be present for a complex society showing the regional patterns described. Thus we would appear to have two contradictory sets of evidence regarding population levels in the core of this putative polity or polities, which I would like to examine more systematically for you here today. There could be significant implications for how we view the Teuchitlan Tradition.

Methods used in the field

My own work in Jalisco has centered on the La Venta Corridor (SLIDE), one of the passes through the Sierra La Primavera into the core of the Teuchitlan Tradition, including both survey and test excavations. The 1993-1994 survey was a particularly intensive one, emphasizing full coverage of the La Venta Corridor and a systematic surface collection program. Good surface visibility allowed us to place survey lines 35 meters apart, so as to spot almost any structures and any surface scatters of debris of 30 meters in diameter or greater (SLIDE).

The very low ceramic density meant that defining sites whose structures no longer existed was going to be tricky. When we encountered 2 artifacts within 2 meters of one another, this density was sufficient to define a *Collection Unit*, which was a one meter radius “dog leash” circle placed on the survey line, within which all artifacts were collected. Collection Units were placed every 35 meters along the survey line thereafter, until the artifact density dropped once again. Each survey line was treated separately, and while collection might begin in one line, the neighboring line might go without any. One or more Collection Units made up a “site” as long as they were within 140 meters of one another, a fairly arbitrary unit, but one designed to equate to four of our survey lines. A figure of 100 meters was used by the Valley of Oaxaca survey (Blanton, et al. 1982: 10), but I could not find comparable data on the Basin of Mexico project.

Now some of these “sites” were of course pretty minor and perhaps 10% were not locations of permanent or even temporary settlement, but generally we ended up with fewer “sites” than one might expect from this kind of collection system, due to the extremely low ceramic density.

The lowest possible density of artifacts necessary to declare a site, all the way up to the maximum artifact density ever encountered during the survey, would all fit into the *Scanty* or *Scanty to Light* sherd density in the system used in the Basin of Mexico survey (Sanders, et al. 1979: 38-39) and the *Trace* or *Very Light* density from the Valley of Oaxaca survey (Blanton, et al. 1982: 9-11), or just 2-5 people/hectare. Therefore, the La Venta Corridor sites would all fall into the categories of *Compact Rancheria* in the settlement typology used in the Basin of Mexico. Nevertheless, in the La Venta Corridor a substantial number of sites had public architecture, indicating functional distinctions only associated with the rather significant *Regional Center* category in the central Basin of Mexico (Sanders, et al. 1979: 39,55-57).

In other words, the ceramic density, even in the obviously regionally significant sites in the La Venta area, is far lower than has been noted in architecturally comparable sites in the Basin of Mexico, and therefore I doubt that the low quantities of artifacts are a correlate of a lower population density. I should note that most sites located by the Valley of Oaxaca survey are also described as having fallen into the *Very Light* range (Blanton, et al. 1982: 9-10). But, it appears that the Oaxaca surveyors used a substantially higher population ratio, and they also emphasized the presence of architecture over ceramic density when determining population estimates and settlement category assignments of their sites.

Calculating site areas in the La Venta area could have been done simply by multiplying the number of *Collection Units* times 1225m², as this is technically the 35 X 35 meter sample area represented by each of the systematic collections. However, while the overall distribution of surface material might correspond to the general area of activity, structures were not uncommonly found just outside the area of systematic collections. Therefore, I focused on measuring the total area enclosed by the collections and, when applicable, site architecture. Structures without collections were given very low and often subjective area estimates, sometimes defined by topography.

Analysis of the Settlement Data

To illustrate the difficulties in making population estimates from these figures, we can use the population:artifact ratios proposed by the Basin of Mexico project (Parsons, et al. 1982: 66,69-70). I calculate that what those archaeologists called Scanty artifact densities to be equivalent to approximately 4000 artifacts/hectare, which they consider to represent a population of around 2 people per hectare. Their Light surface material ranges broadly around 50,000 artifacts/hectare, and indicates a density of around 5 people per hectare, but none of the sites evaluated here actually reached that higher density of surface material.

The sites I would like to single out here all have excellent architectural preservation, and unromantic numeric designations. Site 2 had architecture of the Teuchitlan Tradition, with a light distribution of Classic period artifacts in the area. Site 6 was an Epiclassic site with a large platform and three smaller house platforms atop it, again with a light artifact distribution. More impressive are sites 7, 48, and 50, which might be seen as different units of the same settlement. They are walled hilltop sites with a wide variety of platforms, walkways, and public architecture scattered across several ridges. While these remains appear to correspond to various points in the Classic period, there are also “Corral” shaped residences and ceramics from the Postclassic across Site 7, evidently taking advantage of the earlier location. Lastly, Site 16 has a couple of examples of these “Corral” structures along with strictly Postclassic remains.

Numerous excavations at lowland Maya sites have led to some of the most detailed discussions of calculating population in Mesoamerica (Culbert and Rice 1990), and I made use of these methods to provide alternate population estimates. The standardized formula is generally: (# of structures) x (% of structures determined to have been residential) x (% of structures dated to phase in question) x (% contemporaneity) x (# of individuals living in each structure) (e.g. Tourtellot, et al. 1990: 253).

Those structures capable of serving as habitations (e.g. those other than walls, walkways, altars, etc.) were first calculated for each site. Unlike the Maya lowlands, where a surprising number of completely buried “invisible” structures have been identified, the soil depth on the sites of PP.6, PP.7, PP.16, and PP.48-50 is very thin, so the base number of structures was not modified upwards to compensate. The total number of buildings was revised downwards,

however, in response to excavation findings that from 5-30% of small platforms in Maya lowland contexts were nonresidential. In counting the total number of structures to begin the calculations, I had already weeded out several candidates, and therefore only lower the total estimate by 10% to account for nonresidential structures. Not all structures were necessarily occupied at the same time, and Mayanists use a variety of contemporaneity figures, ranging from 55% (Webster and Freter 1990: 47) to 90% (Tourtellot 1990: 92). Weigand used more conservative figures of 40% to 70% in his estimates of the Teuchitlán Tradition core population (1992; Ohnersorgen and Varien 1996). I would like to keep all calculations similar to his in order to encourage comparability, but the ceramic phases I have defined in the La Venta Corridor cover shorter periods of time. I therefore use a contemporaneity figure of 75%. Finally, I find the floor area of most of the structures in the sites under consideration to have been more limited than those forming the baseline for calculations in the Maya region (e.g. Tourtellot et al. 1990:253-254), and likely to have slept no more than 4 individuals.

The results are clear. Population estimates based on artifact density and site area are extremely low in relation to those calculated from the actual structures. I must therefore conclude that the "populations" calculated from artifact densities are almost certainly poor representations of the actual number of inhabitants in these sites, and appear to be off by a factor of 2 to over 40. The artifact-based calculations that are closest to the architecturally based scores are those in the very small and probably briefly occupied sites, but these are at best 25% lower than the number of structures would suggest.

Comparisons with the Teuchitlan Core and Some Regional Patterns

Taken at face value, the artifact densities in the central valleys of Jalisco would indicate a population density of 2-5 persons/hectare in the most densely packed, strategic regional centers of the La Venta Corridor, totally out of keeping with both the quantity and nature of their architectural components. Public architecture, walls, agricultural terraces, walkways, strategic locations, and... 2 people living there. This is plainly ludicrous. Population estimates for the core of the Teuchitlan Tradition would make even less sense. I have less control over the estimates in this area since the basic data were not collected similarly, but where Weigand has calculated up to

15 people/hectare on the basis of structure densities, surface material is impressionistically similar in frequency to what I have described in the La Venta Corridor sites. Hence we have an environmentally rich and diverse series of linked highland valleys, packed with numerous centers of monumental architecture, ballcourts, raised fields, and literally thousands of residential compounds over an area of 24km², which we would estimate to hold a total of perhaps 5000-10,000 people. Regardless of chronological difficulties during the Classic period, contemporaneity problems cannot be invoked to explain away the Teuchitlan Tradition's concentration of architecture. In fact, in my experience surface ceramic density appears to remain the same or even increase as one moves away from central Jalisco and the concentration of architecture that Phil Weigand has identified there.

So what is the explanation? Perhaps ceramic density is a lot lower due to the destructive practices associated with sugar cane farming in the Tequila valleys, but these are hardly more destructive than those used in the valley of Mexico. Weigand, Galvan, and Cabrero have all proposed that bottle gourds were being used extensively as containers in this region in place of ceramics, and we may have to begin taking these suggestions seriously. On the other hand, an examination of the Valley of Oaxaca methodology reveals that they gave substantially higher population counts for a given ceramic density than did the Basin of Mexico surveyors. I would estimate that they upped their population estimates by 2 to 10 times over . This is not to say their estimates are incorrect, but that they appear to have had problems very comparable to those in central Jalisco. Taking this into account, it is the Valley of Mexico that is looking more peculiar all the time. Perhaps we should question not why artifact density is so low in places like Jalisco or Oaxaca, but why is it so extraordinarily high/person in the valley of Mexico.

Figure 1 - Basic formula for calculating population from structure counts

$$\begin{aligned} & \text{(# of structures)} \\ & \times \\ & \text{(% of structures determined to have been residential)} \\ & \times \\ & \text{(% of structures dated to phase in question)} \\ & \times \\ & \text{(% contemporaneity)} \\ & \times \\ & \text{(# of individuals living in each structure)} \\ & \hline & = \text{population} \end{aligned}$$

Table 1- Comparison of population estimates using ceramic density and structure counts.

Site	Phase	Area (ha)	Terraces	Platforms	Corrales	-10% non-residential structures	x75% Contemp	x4people/room	Artif./ha	Pop. est. from artifacts
2	Tabachines 2	1.80		10		9	7	28	2382	2
6	El Grillo	.41		2		2	1	4	11413	2
7	Tabachines 2-3	7.52	23 +	26		44	33	132	4615	17
	Atemajac	7.52	23 +	24 +	14 =	55	41	164	4615	17
16	Atemajac	.64			2	2	1	4	7920	3
48	Tabachines 2-3	3.00	17 +	21		34	26	104	2210	3
50	Tabachines 2-3	4.00	6 +	9		14	11	44	390	1

Table 2 - Comparison of Nomenclature for ceramic densities, and population equations, for the Basin of Mexico and Valley of Oaxaca surveys, with comparisons to the Tequila valleys.

Sherd Densities	Basin of Mexico	Valley of Oaxaca	Tequila Valleys
0/m ²	Absent	Absent	
		Trace - 5-10 pers./ha	Many sites
.4/m ²	Scanty - 2 pers./ha	Very Light - 10-25 pers./ha	Many sites
up to 5/m ²	Scanty to Light- up to 5 pers./ha		A few sites
	Light to Scanty		
up to 16/m ²	Light - up to 10 pers./ha	Light - 25-50 pers./ha	
	Light to Moderate - 10-25 pers./ha	Moderate	
100-200/m ²	Moderate - 25-50 pers./ha	Heavy	
up to 200-400/m ²	Moderate to Heavy - up to 50-100 pers./ha		
	Heavy - up to 100-200 pers./ha		

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