

# *The indigenous population of El Salvador on the eve of the spanish conquest \**

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As in all America, the first European contact with the indigenous populations of El Salvador resulted in a demographic catastrophe of staggering proportions. At the time of the Conquest (1524), the territory of El Salvador was occupied by diverse ethnic groups, principally the Pipil, the Chorti Maya, and the Lenca. The Pokoman Maya held small pockets of territory in the west, while small enclaves of Mangué, Ulua, and Cacaopera speakers inhabited zones in the east and northeast. The total population of these groups numbered in the hundreds of thousands.

This is the first in a series of essays that will explore the demographic history of El Salvador from the 16th century through the colonial period to the present. While a considerable amount of recent historical demographic research has focused on Central America, the demographic history of El Salvador is little known.

In order to study the dynamic changes, development, and alteration in composition of the population of El Salvador, a baseline estimate of the aboriginal population at the time of Spanish contact is needed. In arriving at this estimate, previous estimates by Barón Castro (1942) and Daugherty (1969) are reassessed. Three separate methods of calculation are used: 1. a calculation based

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on estimated size of native armies that opposed the first European invaders; 2. an extrapolation from data in the 1548-51 *tasaciones de tributos* (tribute assessments) conducted by the second Audiencia of Guatemala; and 3. an estimate based on carrying capacity.

## PREVIOUS ESTIMATES

Previous estimates of the population of Central America at the time of European contact, including El Salvador, have been summarized and discussed by Denevan (1976: 38-39) and Newson (1928: 254-255). These estimates range from 736,500 to 10,800,000-13,500,000 (Table 1). The extreme divergence of opinion represented by these numbers suggests not only the degree of controversy surrounding estimates of contact-period aboriginal American populations, but also the need for further, carefully considered estimates on regional and microregional scales.

TABLE 1  
ESTIMATES OF THE NATIVE POPULATION OF CENTRAL AMERICA  
AT EUROPEAN CONTACT

Source	Estimate
Steward, 1949:664 ... ..	736,500 *
Rosenblat, 1954:I, 102 ... ..	800,000
Sapper, 1924:100 ... ..	5,000,000 - 6,000,000
Denevan, 1976:291 ... ..	5,650,000
Dobyns, 1966:415 ... ..	10,800,000 - 13,500,000

\* 392,500 estimated for El Salvador, Honduras, and Nicaragua. Steward's estimate was influenced by that of Kroeber (1939) who believed that accounts of contemporary observers were highly exaggerated. Kroeber's own estimate (1939:166) for Central America of 100,000 applied only to Honduras and Nicaragua. Concerning the assumption of exaggerated contemporary accounts, Palerm (1980:46-47) was characteristically perceptive:

Kroeber, que fue una figura avuncular para los antropólogos de mi generación, confrontó dos tipos de datos sobre Mesoamérica. Por un lado los que provenían de fuentes escritas españolas o indígenas y hablaban de grandes centros urbanos, de estados bien organizados, de clases sociales y de enormes poblaciones. Por otro lado tomó los datos de una etnografía moderna incompleta, fragmentaria y, por qué no decirlo, mal realizada aun a nivel descriptivo, que hablaba de comunidades rurales primitivas, homogeneidad social, agricultura rudimentaria y bajas densidades de población...

La conclusión fue que alguien estaba mintiendo y que ese alguien eran los cronistas. Kroeber trasladó la economía y la tecnología indígena contemporánea al pasado, sin llegar siquiera a conocerlas bien y mucho menos a comprenderlas, y demostró la incongruencia existente entre este nivel de supuesto primitivismo y las descripciones literarias de una sociedad compleja y avanzada. Su *dictum*, que ejerció incalculable influencia, fue que semejante sociedad no podía ser otra cosa que una fábula tejida por los conquistadores, encomenderos, misioneros y funcionarios, interesados en aumentar sus éxitos, incrementar los tributos y extraer más trabajo de la población indígena.

Specific attempts to estimate the contact-period population of El Salvador have been realized by Barón Castro (1942) and Daugherty (1969). Barón Castro, a disciple of Angel Rosenblat's and the pioneer in Salvadoran demographic studies, estimated the native population of El Salvador in 1524 at 116,000-130,000 (Barón Castro, 1942: 105-124). This range is based upon a complex series of calculations and guesses involving the size of the invading Spanish army and allies, the size of opposing native armies, the proportion of warriors to total regional population, and extension of the results to the territory of El Salvador as a whole.

Daugherty, a historical geographer influenced by the so-called Berkeley School of historical demography, pointed out a number of problems with Barón Castro's estimate and revised it upward. His parameters, based on the same evidence with which Barón Castro worked, are 360,000 to 475,000, and he did not rule out the «distinct possibility» of a considerably larger population (Daugherty 1969: 106-121). Denevan (1976: 291) raised Daugherty's estimate to 500,000.

The fact that these estimates are based on just one of several means of calculating native population at Spanish contact—and a very risky one at that—indicates the need for their reassessment and further estimates based on other methods.

#### CONTEMPORARY TESTIMONY

The contemporary sources that described or estimated the native populations of El Salvador are appallingly few. Nevertheless, there are several quantitative and qualitative statements that, taken together, help to form an impression of population density at the time of Spanish contact. Without exception, the sources who had first-hand knowledge of Central America during the Conquest period consistently reported large and densely settled populations. To paraphrase Sauer (1966: 65), it remained for scholars of the present century to assert that Central America was sparsely inhabited.

General sources on the early colonial ethnology of El Salvador made a number of clear and specific references to the fertility and abundant natural resources of El Salvador. These sources include García de Palacio (1881: 9, 15, 34), Ciudad Real (1873: I, 402-405), and Vázquez de Espinosa (1969: pt. 1, bk. 5, chs. 12-15, pp. 155-159).

Each of these sources had considerable first-hand knowledge of Central America, and there is no reason to believe that their reports are exaggerated (Fowler 1985).

The only primary, eyewitness source to report on native Salvadoran populations was Pedro de Alvarado, the commander of the 1524 Spanish *entrada* into the Pipil territory of western El Salvador. In his fourth letter written to Hernando Cortés he made constant references to the large populations he encountered and the large number of Pipil troops that he met in battle (for example, Alvarado 1934: 278-280). Alvarado gave no specific estimates of the size of Pipil populations, but he repeatedly used superlatives in describing the magnitude of their numbers. These impressions were reinforced five years later in Alvarado's defense versus charges filed against him in Mexico (Libro Viejo 1934: 190-191).

One could object that Alvarado exaggerated these figures to glorify his conquest of the area. This objection may be effectively countered by the fact that Alvarado, as commander of the Spanish *entrada*, was destined to become the governor of Guatemala, and thus would be accountable to higher authorities for native tribute-paying capacity. While Alvarado was not overly concerned with administrative protocol, he surely realized that his reports of population size would ultimately be considered in determining the amount of tribute due the Crown (Lovell 1982: 104, 107, 1985: 68-69; Veblen 1982: 85). As noted previously (Fowler 1985: 43), scholars may lament the fact that many phenomena escaped Alvarado's attention, but native population size was not one of them. His qualitative statements on this matter are probably not greatly exaggerated. On the other hand, it seems prudent to remain skeptical of Alvarado's specific numerical estimates of enemy troop strength. As Cook and Borah (1971: 8-9) cautioned, «men in the excitement and strains of combat are not good judges of numbers».

Barón Castro (1942: 109-110) cited Alvarado's qualitative statements on the great population density of the Pipil regions through which the conquistador passed. Although he did not justify his assessment of these statements, Barón Castro, rejected them as hyperbole. As mentioned, there is no justifiable reason to conclude that these statements are exaggerated; indeed, their essential accuracy is supported by calculations based on the Cerrato *tasación* data and carrying capacity.

Another source, Las Casas, while not an eyewitness to the conquest of the Pipil, was certainly familiar with the magnitude of

native Central American populations. Las Casas was, of course, noted for his polemical stand in defense of the Indians, and many regard his population estimates as gross and unfounded exaggerations. Sauer (1966: 39), however, defended Las Casas as an «attentive and acute observer» whose «concern with data was meticulous».

Las Casas (1965: 88, 89) reported that when Alvarado and his army entered the Pipil center of Cuscatlan they were met by more than 20,000 or 30,000 Indians loaded with turkeys and other food for the Spaniards and their allies. This estimate is indirectly supported by a qualitative statement made by Alvarado himself (*Libro Viejo* 1934: 191). Although Barón Castro (1942: 110) rejected Las Casas's estimate, a population of 20,000-30,000 for Cuscatlan—one of the largest and most important Pipil states at the time of the Conquest—does not seem at all unreasonable. In fact, this estimate appears conservative when one considers that it would refer not just to Cuscatlan proper, but would also include the population of the surrounding villages and towns that were subject to this center of power.

These statements provide a general indication of the high level of population density in western El Salvador at the time of the Conquest. While some would reject Alvarado's and Las Casas's statements as exaggerations motivated by vanity, greed, or zeal, it is more reasonable to use them as a point of departure and see if they stand the test of quantitative estimates (see Cook and Borah 1971: 7; MacLeod 1973: 17-18. Denevan 1976: 36).

#### EXTRAPOLATION FROM AN ESTIMATE OF NATIVE ARMY SIZE

This is the most hazardous of the three methods employed, as no specific statements exist on the number of native troops that fought the Spaniards in battles of the conquest of El Salvador. The first problem, then, is to find a reasonable basis for estimating the number of men in native armies. A second problem is that the size of the territory from which warriors were fielded for specific battles is unknown. Third is the problem of establishing the ratio of warriors to total population. In spite of the many inherent problems, this method is workable since it produces results that converge reasonably well with those of the other methods used here.

Barón Castro (1942: 113-114) maintained that the only means of obtaining concrete figures was through speculation on Pipil troop strength and extrapolation of the result to the population as a whole. The size of Alvarado's invading force is his basis for speculation of the size of the Pipil force in the Conquest. The Spaniards and their Indian auxiliaries fought two major battles against the Pipil at Acajutla and Tacuscalco. The conquistador himself stated that his troops in the battle of Acajutla numbered 100 cavalry, 150 foot soldiers, and 5,000 to 6,000 native auxiliaries (Alvarado 1934: 279). According to Ixtlilxóchitl (1891-92: I, 395), the Spaniards' allies in this battle numbered 9,000. López de Gómara (1946: 401) and Fuentes y Guzmán (1932-33: pt. 2, bk. 3, ch. 1, p. 114) accepted Alvarado's maximum estimate of 6,000 native auxiliaries.

A group of Tlaxcalan auxiliaries who served under Alvarado stated later that their numbers in the Conquest were «one thousand men and more» (Tlaxcalans to Crown, 15 Mar. 1547, AGI AG 52). Barón Castro was unaware of this statement when he wrote his monumental work on Salvadoran population history (1942), but in a later monograph he accepted the Tlaxcalan's information as evidence that the auxiliary fighting force did not exceed 1,000 men (Barón Castro 1950: 52). The Tlaxcalan's statement, however, probably refers only to troops from Tlaxcala proper. In a suit brought by former Mexican auxiliaries residing in Ciudad Vieja (Almolonga), Guatemala, attempting to obtain exemption from tribute payments, a Tlaxcalan witness stated that 800 troops had been recruited from Tlaxcala, 400 from Guajaçingo (Huejotzingo), 1,600 from Tepeaca, and an unspecified number from Mexico (Tenochtitlan) and other cities (AGI JU 291, 1564, f. 171). Indian auxiliaries were pressed into service in Oaxaca and Soconusco as Alvarado's army pushed southward. An elderly witness from Huehuetlan, Soconusco, stated that he joined the force as one of 300 warriors recruited from the province (ibid.: f. 88v). Cakchiquel warriors were added to the force in Guatemala. Thus, there appears no obstacle to accepting Alvarado's estimate of 5,000-6,000 native auxiliaries.

Barón Castro (1942: 114), for unstated reasons, chose the minimum force of 5,250 troops in Alvarado's army. He granted a numerical superiority of 25 % to the Pipil troops, calculating that about 6,562 Pipil warriors met the Spaniards in each of the two major battles. But he felt that as many as 25 % of the Pipil

men who fought in the first battle also fought in the second. Thus, Barón Castro (1942: 120) estimated a total of 11,484 Pipil warriors in both battles. He rounded this figure to 11,500 and considered the estimate to represent all Pipil troops from the settlements located between the Paz and the Acelhuate rivers.

To convert the number of estimated warriors to total population, he assumed that warriors comprised 60 % of the male population between the ages of 17 and 50, calculating a male population of 16,100, to which he added another 20 % to account for fugitives, obtaining a total estimated male population of 19,320 for the region between the Paz and the Acelhuate. He doubled this figure to obtain an estimate for the total population of the region. At no point in this series of calculations did Barón Castro offer an empirical basis or justification for any of the critical assumptions involved. He concluded that the total population for the region between the Paz and the Acelhuate numbered 38,640, noting that the population between the Acelhuate and the Lempa rivers was probably about the same size. Thus, the total population of western and central El Salvador between the Paz and the Lempa rivers was estimated by Barón Castro (1942: 123) at 77,280. He added another 38,640 to this figure to account for the population of the eastern territory between the Lempa and Goascorán rivers. Finally, allowing a 10 % error, he estimated a total contact population of 116,000-130,000 (p. 124).

Daugherty (1969), in a balanced and realistic appraisal, maintained that Barón Castro's population estimate is «an extreme error on the conservative side» (p. 106). He challenged Barón Castro's estimate of a total aboriginal force of 11,500 troops in the two major battles on several grounds.

First, when Alvarado (1934: 279) first confronted the Pipil army at Acajutla he estimated their troop strength to be so great that he ordered a retreat (cf. López de Gómara 1946: 401). It is unlikely that a force so small as that estimated by Barón Castro (6,562 men) would have caused Alvarado, a skilled and seasoned commander, to take this action. Second, Barón Castro ignored the fact that the Pipil suffered several thousand battle deaths at Acajutla alone. Indeed, Alvarado (1934: 279) stated that none of the Pipil warriors in the battle of Acajutla survived the encounter. Even if this statement is regarded as an exaggeration, it is an indication of the extent of native losses suffered in this battle. Third, in spite of the heavy casualties in the first battle, the Pipil

fielded a second large force for the battle of Tacuscalco, only five days later and 15 km away. Thus, Daugherty (1969: 117) postulated that the combined Pipil forces in both battles numbered a maximum of 25,000 men.

Daugherty (1969: 118) also objected to Barón Castro's estimate of the proportion of warriors to the total population. He noted that Cook and Simpson (1948) estimated that 90 % of the male population between the ages of 15 and 50 (about 22 % of the total population) fought against the Spaniards in the battles of conquest in central Mexico. Assuming that 22 % of the total population of the region fought in the two battles, Daugherty's estimate for the Pipil of the southwest coastal plain of El Salvador and the Sonsonate Valley is approximately 113,600. Assuming a population of equal size in the San Salvador basin and the Acelhuate Valley, and populations of 10,000-25,000 in other regions, Daugherty (1969: 118-120) estimated a minimum total population for El Salvador at the time of the Conquest on the order of 360,000-475,000. Daugherty's estimate is certainly more realistic than Barón Castro's, but a careful reading of Alvarado's letters to Cortés suggests that the former's reasoning is conservative.

Alvarado (1934: 272) reported that, in a Guatemalan entrada some three months earlier, as he approached Quetzaltenango his troops were attacked by a force of 3,000-4,000 Quiche warriors. Later they were attacked by a force of 30,000. Alvarado stated that although their horses were tired, his troops met this large force and routed the enemy. They fought another battle and then entered Quetzaltenango which by this time was abandoned. Six days later they were attacked by a force too large to count, but Alvarado (1934: 273) estimated that it included about 12,000 warriors from Quetzaltenango and the surrounding region. Following Veblen (1982: 85), who has subjected these reports to extensive scrutiny, Alvarado's estimates of enemy troops strength are held to be reasonably accurate. One should not, however, place as much confidence in Alvarado's absolute numbers of enemy troops as Veblen does.

By the time he led the expedition to Guatemala and Cuscatlan, Alvarado was a hardened veteran of five years of Indian wars who had fought numerous battles against the Aztecs, the Totonacs, the Zapotecs, the Mixtecs, and other indigenous groups of central and southern Mexico. It is perhaps not surprising that he expressed no fear or apprehension concerning these battles against the



Quiche, nor did he order his army to retreat even when he faced an enemy force reportedly numbering 30,000.

In contrast, the Pipil forces deployed against his army of 250 Spaniards and 5,000-6,000 native auxiliaries in the battle of Acajutla were so numerous that Alvarado (1934: 279) ordered a retreat. It would seem, therefore, that the Pipil troops in this battle numbered at least 20,000. An army of approximately the same size engaged the Spanish forces five days later in the battle of Tacuscalco. Describing this encounter, Alvarado admitted that his troops faced an enemy force so large and well armed that he was frightened («... yo estuve espantado»; *ibid.*).

Judging from these statements, an estimate of a combined Pipil force of about 30,000 warriors in both major battles seems consistent with the evidence. Veblen (1982: 487) used a ratio of 1:4 for calculating total population from the estimated total number of warriors that fought against Alvarado in Totonicapán. For the Tlaxcala region of central Mexico, Gibson (1952: 139) used a warrior to population ratio of 1:5. Lovell (1982: 108, 1985: 70) used ratios of 1:4 and 1:5 and averaged the result to obtain an estimate for the Cuchumatán highlands. Cook and Simpson's (1948) estimate, used by Daugherty (1969: 118), that native warriors comprised about 22 % of the total population falls near the midpoint between warrior-to-population ratios of 1:4 and 1:5. Applying these two ratios to the estimated 30,000 warriors yields a population estimate of 120,000-150,000. An average of these figures yields an estimate of the Pipil population of the southwest coastal plain and the Sonsonate Valley in 1524 of about 130,000.

It is reasonable to assume, as Daugherty did, that the basin of San Salvador and the upper Acelhuate Valley had a population equal to that of the southwest coastal plain and the Sonsonate Valley. Furthermore, there were at least eight other regions of relatively dense settlement at the time of the Conquest: the Guija-Metapán Basin, the Santa Ana-Chalchuapa-Ahuachapán region, the Zapotitán Valley, the upper Lempa floodplain near Suchitoto, and the Jiboa Valley, the Usulután coastal lowland, the Tecapa-San Miguel (Chaparrastique) region, and the Gulf of Fonseca coastal lowland and islands. Daugherty (1969: 119-120) postulated 10,000-25,000 inhabitants for each of these regions. Since present calculations based on estimates of native army size show that Daugherty's estimates are low, the estimated population of each of

these five secondary regions of dense settlement should be raised to 15,000-40,000. Thus, the total population of these regions is estimated at 120,000-320,000. Daugherty (1969: 120) postulated an additional 50,000 inhabitants of scattered regions not encompassed by his estimate. These regions would include the Tacuba highlands, the Balsam Coast, the Paraíso Basin (Cerrón Grande region), the Chalatenango highlands, and the Cacaguatique highlands, among others. This figure should be raised to 80,000-100,000. Adding these figures produces a rough estimate of the contact population of El Salvador of 740,000-960,000.

#### EXTRAPOLATION FROM DATA IN THE CERRATO TASACIONES

This estimate is based on extrapolation from the tributary populations recorded in the *tasaciones* (tribute assessments) conducted by the president of the Audiencia de Guatemala, Alonso López de Cerrato, and his *oidores* (associate justices), Pedro Ramírez de Quiñones, and Juan Rogel, in 1548-51 (AGI AG 128). The extrapolation is based on a method developed by Lovell and Swezey (1982) and Lovell et al. (1984) for estimating the mid-16th-century and the contact-period population of southern Guatemala, with modifications necessitated by the nature of the Salvadoran data.

The Cerrato *tasaciones* are the earliest intact set of tribute assessments in existence for the Audiencia of Guatemala. They contain data on the number of tributary Indians in most settlements that were assessed, the nature and amount of tribute to be paid annually, and the name of the *encomendero* of each settlement. Although the Cerrato *tasaciones* constitute the most valuable document known for the demographic, social, and economic history of indigenous populations in Central America in the mid-16th century (Newson 1982: 264), there are a number of problems connected with their use as a source of demographic data. These problems, which have been identified and discussed in detail by Lovell et al. (1984: 465-468), may be briefly summarized as follows:

1. A significant number of the settlements listed have no record of the number of tributaries against whom tribute was assessed. This problem is actually more crucial for southern Guatemala than for El Salvador. The *tasaciones* carry entries for

172 Salvadoran towns, 23 of which (13.4 %) have no registered number of tributaries. In contrast, Lovell et al. (1984: 465) found that about 20 % of the 169 settlement listings for Guatemala lack a registered number of tributaries.

2. Most of the registered tributary counts seem to be only approximations, since most figures were rounded to units of 5. Only 13 of 148 registered tributary counts for El Salvador are not divisible by 5.

3. Cerrato did not report the full number of eligible tributaries in his counts. This problem was recognized almost immediately by contemporary observers. Bishop Marroquín and the *cabildo* (city council) of Santiago de Guatemala sharply criticized Cerrato for drastically lowering tributary counts and for relying for these counts upon reports from local caciques (Bishop Marroquín to Crown, 8 May 1549, AGI AG 156, and Sáenz de Santa María 1964: 247; Cabil of Santiago to Crown, 30 Apr. 1549, 6 May 1549, 1 Aug. 1549, 24 Jan. 1550, AGI AG 41, ff. 94v, 98v, 102v, 107v; cf. Carmack 1973: 138-140; Veblen 1982: 93; O'Flaherty 1984: 144). Cerrato himself implied that he deliberately underreported the number of tributaries. Soon after he arrived to assume the presidency of the audiencia he reported that the *tasaciones* were so excessive that the Indians could not pay half of them even if their numbers were doubled (Lic. Cerrato to Crown, 28 Sept. 1548, AGI AG 9A, f. 188).

Furthermore, empirical evidence exists to demonstrate that Cerrato underrecorded tributaries. The *residencia* of the oidor Antonio Mexía, who served in the audiencia from 1555 to 1564, contains a transcript of labor draft requirements levied by the audiencia in 1555 (AGI JU 310, 1561-62, ff. 253v-257). The document lists 26 settlements in the jurisdiction of San Salvador, their distance from that city, the number of «hombres» in each, and the number of *jornaleros* (laborers) that each was to provide for public works in San Salvador. Twenty-five of the settlements (24 entries) can be correlated with those listed in the Cerrato *tasaciones* (Table 2).

Like Cerrato, Mexía was accused of relying upon caciques's reports rather than actual counts (AGI JU 310, 1561-62, f. 5), but his assessments were probably closer to reality than Cerrato's. On at least one occasion he ordered a cacique beaten in public for attempting to conceal tributaries (ibid. : f. 4), and his behavior and attitudes toward the Indians (see Sherman 1979: 205, 226-227,

TABLE 2  
COMPARISON OF DEMOGRAPHIC DATA IN 1548 CERRATO TASACIONES  
AND 1555 LABOR DRAFT REQUIREMENTS

<i>N.º of tributarios 1548 (AGI AG 128)</i>	<i>Settlement <sup>a</sup></i>	<i>N.º of hombres 1555 (AGI JU 310)</i>
400	Coxutepeque ... ..	400
360	Perulapa/Purulapa <sup>b</sup> ... ..	350
220	Tonacatepeque ... ..	250
82	Xilopango ... ..	50
90	Coyapango ... ..	50
75	Tequeçaquango <sup>c</sup> ... ..	80
100	Tequeçaquango <sup>c</sup> ... ..	100
330	Cuzcatan ... ..	400
180 <sup>d</sup>	Ateo ... ..	180
300	Oloquiltá e Coyultitán <sup>e</sup> ... ..	350
50	Terlinquetepeque ... ..	50
100	Xayacatepeque ... ..	60
80	Maçagua <sup>c</sup> ... ..	100
120	Maçagua <sup>c</sup> ... ..	60
100	Maçagua <sup>c</sup> ... ..	80
140	Yçucar ... ..	150
140	Tepeçontle <sup>c</sup> ... ..	130
80	Tepeçontle <sup>c</sup> ... ..	100
114	Xaloçinagua ... ..	160
60	Apocopa ... ..	80
48	Queçaltepeque ... ..	40
80	Atempa <sup>c</sup> ... ..	50
35	Atempa <sup>c</sup> ... ..	50
40	Gualçapa ... ..	50
3,324	<i>Totals</i> ... ..	3,370

<sup>a</sup> The spelling of settlement names follows that of AGI AG 128.

<sup>b</sup> A single settlement divided between two encomenderos; listed as «Los Perulapas» in AGI JU 310.

<sup>c</sup> Distinct settlements.

<sup>d</sup> Ateo was divided between two encomenderos, and the number of tributaries (90) was recorded for only one-half. In this case the number of tributaries is doubled to obtain a number for the entire settlement.

<sup>e</sup> Two settlements included in the same tasacion record.

308,309, 312) suggest that he had no motive for underreporting tributaries. A comparison of Cerrato's and Mexía's totals appears to indicate fairly close agreement, but this is a false impression. Considering the indigenous population decline that undoubtedly occurred as a result of disease and other factors between 1548 and 1555 (MacLeod 1973: 104-106), if both counts were accurate one would expect Mexía's figures to be uniformly lower than

Cerrato's. This is true in only nine cases. Three cases show no change in the counts, while 12 show increases of 6.7 % to 42.9 % over Cerrato's tributary counts (Table 2). This discrepancy clearly indicates Cerrato's substantial underrecording bias.

Yet another indication of Cerrato's underrecording is seen in the audiencia's 1580-84 investigation of the encomendero of Izalco, Diego de Guzmán. Elderly Spanish and Indian witnesses were called to give testimony on the population of Izalco and neighboring settlements in 1549, the year of Cerrato's assessment of these towns. The witnesses, each of whom had first-hand knowledge of the settlements, consistently stated that at the time of Cerrato tasación Naolingó had 350-400 tributaries, Caluco 650-800, and Izalco 700-960 (AGI EC 331A, 1582, ff. 1429-1493). Cerrato recorded only 200 tributaries for Naolingó and 400 for Caluco; the number of tributaries for Izalco was not recorded (AGI AG 128, 1549, ff. 82, 82v, 86). (Caluco was listed as one of the two «Yçalcos» in the document. In later 16th-century documents, it is frequently referred to as «Caluco Yçalco». The identification is confirmed by encomienda succession data.)

4. The tasaciones do not include a significant number of fugitive or apostate Indians who fled their towns and villages to escape *congregación* and epidemics. The policy of *congregación* did not play as strong a role in El Salvador as it did in Guatemala, but disease, especially the 1545-48 *gucumatz* pandemic greatly reduced indigenous populations all over Central America (MacLeod 1973: 98-99, 110). The Izalco region was particularly hard hit, and it was reported in 1548 that the population was so small that there were not enough people to care for the cacao orchards (Información de Juan de Guzmán, 16 Feb. 1548, AGI JU 289). In 1556 Izalco was described as «a province with few people...; it has a large cacao industry on which almost all of the trade of Guatemala depends ... and people are needed for the cultivation of the cacao ...» (Nicolao López de Irrarra to Crown, 26 Apr. 1556, AGI AG 52).

5. Serious spatial lacunae in the Cerrato tasaciones are evident. Probably only about half of Guatemala was covered by the assessments. This problem is not as critical for El Salvador, as the area was much more completely conquered and pacified than Guatemala by 1548. This was probably due in large part to the relatively greater cacao potential of much of El Salvador. But there are several settlements known to have been inhabited in

the mid-16th century, some of which had large populations, that were not assessed, and a few regions of sparse to moderate settlement were not included. A glance at Browning's (1971: Map 3) plot of indigenous settlements of El Salvador in the mid-16th century, based on the Cerrato tasaciones, reveals a number of significant spatial lacunae, especially in the northcentral and north-eastern parts of the country.

6. Finally, the ratio of tributaries to total population is not known with certainty. This statement requires no elaboration.

Despite these limitations, the Cerrato tasaciones can be used, with the application of correction factors to compensate for the problems listed above, to estimate the mid-16th-century indigenous population of most areas of northern Central America and Yucatan. The result can in turn be extrapolated to obtain population estimates for the time of Spanish contact.

Before outlining the procedures and results of this method, it is appropriate to review briefly previous attempts to derive population estimates for El Salvador from the Cerrato tasación data. Barón Castro (1942: 181-199, 570-580) conducted an intensive study of the Cerrato tasaciones, extrapolating from the tributary data to obtain an estimate of the population of El Salvador in the mid-16th century. He made a few errors in reading or transcribing the number of tributaries recorded in the document, and he mistakenly assumed that four settlements listed under the jurisdiction of Santiago were located in El Salvador. These settlements are Gueymango, Yçapa, Miahuatlan, and Maçagua (Barón Castro 1942: 579). Their location within the modern republic of Guatemala has been conclusively demonstrated by W. G. Lovell, C. H. Lutz, and W. R. Swezey (Lovell, personal communication, 1985).

These mistakes led Barón Castro (1942: 194) to total the tributary population enumerated in the Cerrato tasaciones at 16,640. He applied a factor of 15 % to compensate for unregistered tributaries, obtaining a total estimated tributary population of 19,136 (*ibid.*: 195). He then committed the critical error of assuming that this population included all able-bodied adults between the ages of 18 and 55 (*ibid.*: 187, 195). This is clearly a mistake since single persons and women were not counted as tributaries until later in the 16th century (Newson 1982: 265). Assuming that the tributary population represented 46 % of the total indigenous population, Barón Castro (1942: 197) calculated the latter at 41,716.

Conscious of the problem of spatial lacunae in the Cerrato tasaciones, he added 20 % to compensate for the population not assessed by Cerrato, deriving an estimate of the indigenous population of 50,059. Supposing a maximum error of 20 %, Barón Castro's final estimate of the population of El Salvador in 1548-51, including 400 Spanish *vecinos*, is 60,000 (ibid.: 199).

Browning, in his excellent and stimulating social geography of El Salvador, mapped as many of the settlements in the Cerrato tasaciones as possible, including six settlements that are known to have existed in the mid-16th century and were not included in the tasaciones (Browning 1971: Map 3). Using a population-to-tributary ratio of 5: 1, he provided an estimate of the population of each town based on the tributary counts in the tasaciones (ibid.: 304-308). For the settlements with non-registered tributaries and those not included in the tasaciones, Browning relied upon «approximate estimates, made by the author in the face of a complete absence of details about these villages in the tasación» (ibid.: 305). The population estimates listed by Browning yield a total of 85,780. This figure is unrealistically low due failure to compensate for under-reporting and inadequate compensation for spatial lacunae. Furthermore, it must be noted that Browning made a number of errors in reading or transcribing the tributary counts, or in converting these figures to full population.

I now turn to my extrapolation of the Cerrato tasación data for El Salvador (AGI AG 128). There are 176 tasación records for El Salvador, made in 1548-49. These include all but one (now within the republic of Honduras) of the listings for the province of San Salvador, all but two (now within the republic of Honduras) for the province of San Miguel, and 16 listings of settlements within the jurisdiction of Santiago. The three Honduran settlements are Arameçina (f. 193), Langatique (f. 176), and Oloçinga (f. 32). The Salvadoran settlements that were within the jurisdiction of Santiago are Acatepeque (f. 130), Acajutla (f. 69v), Aguachapa (f. 105v), Apaneca (f. 55), Ataco (f. 59v), Joxutla (f. 74v), Maçagua y Mecameos (f. 111), Naolingo (f. 86), Nopicalco (f. 68v), Queçalcoatitan (f. 56v), Tacuba (f. 68), Tacusalco (f. 111v), Xitaulco (f. 127), Xuayua (f. 125v), Yçalco (f. 82), and Caluco (f. 82v). Because some listings include two settlements, some settlements were divided between two or more encomenderos, and because the records for two settlements were duplicated, the 176 tasación records for El Salvador represent 172 settlements.

The total tributary population enumerated for these 172 settlements is 15,977. This number excludes the tributaries registered for the three Honduran settlements and the duplicated tributaries of two settlements (Guataoxia, f. 188v — Guataoxiao, f. 190v; and Tocorostique, ff. 188, 190). Barón Castro (1942: 576-578) seems to have overlooked these problems in his treatment of these data.

About 15 % of the 172 settlements have no registered number of tributaries. To compensate for unregistered tributaries, 15 % (2,397) is added to the registered tributary population of 15,977. To the result (18,374), an additional 50 % (9,187) is added to compensate for under-recording (see Lovell *et al.*, 1984: 469-470). This figure (27,561) does not represent the full tributary population, however, as a number of settlements were not assessed in the Cerrato tasaciones. To compensate for these spatial lacunae, another 25 % is added. Lovell *et al.* (1984: 470-471) use a spatial-lacunae factor of 100 %. I reduce this factor considerably since El Salvador was much better covered by the tasaciones than was southern Guatemala. The result is a total estimated or potential tributary population of 34,451.

To convert this figure to total population, a population-to-tributary (P: T) ratio of 5 : 1 is used. This ratio is justified by data in detailed tasaciones recorded in 1561-62 for eight Guatemalan communities which state not only the number of tributaries but also enumerate the non-tributary populations (AGI AG 45; Lovell *et al.*, 1984: 472, Table II). These tasaciones hold the only extant data known for Guatemala with sufficient internal breakdown to establish a ratio of tributary to non-tributary population. Applying a P: T ratio of 5: 1 to the estimated tributary population of 34,451 yields an estimate of the total population of El Salvador of 172,255 in 1548-49.

To extrapolate from this figure to obtain an estimate of the population at the time of the Conquest, I apply a depopulation rate of 75 %. This rate is used following Lovell and Swezey (1982: 74) who adopted it on the basis of depopulation estimates for central Mexico from the time of the Conquest until the mid-16th century (Borah and Cook 1967, 1969; Cook and Borah 1971). This rate may, in fact, be conservative, as the population of southern Guatemala is estimated to have declined from a population of about 2,000,000 on the eve of the Conquest (Lovell and Swezey 1982) to 427,850 at mid-century (Lovell *et al.*, 1984). This decline



represents a depopulation rate of about 79 %. Applying the depopulation rate of 75 % yields an estimate of the native population of El Salvador in 1524 of 689,020.

#### ESTIMATES BASED ON CARRYING CAPACITY

This calculation is made by multiplying the area of El Salvador (21,041 km<sup>2</sup>) by a factor representing the approximate population density at the time of the Conquest. Because it depends on an unknown factor (the real population density), this method is imprecise. It is useful, however, as an indicator of potential population size, and it serves as a check on the other methods.

The density factor must be established through qualitative considerations of environmental conditions and subsistence technology. Due to spatial variation in subsistence technology, resource availability, and economic systems, it is difficult to adapt an estimated density from one area to another. Comparisons with other areas do help to establish limits of credibility, however, and it is appropriate to review briefly some comparative estimated densities.

Borah and Cook's (1963: 91) estimate for central Mexico on the eve of the Conquest indicates a density of approximately 67/km<sup>2</sup>. Sanders' (1976: 129, Table 4.9) estimate for the Central Mexican Symbiotic Region, an area much smaller than Borah and Cook's «central Mexico», in 1519 indicates an average density of about 127-148/km<sup>2</sup>, with a range in density of local populations from 56-68 to 474-527/km<sup>2</sup>.

Veblen's (1982) estimates for the department of Totonicapán, in the western highlands of Guatemala, indicate a minimum density of 60/km<sup>2</sup> in 1524 and 90-120/km<sup>2</sup> in 1520. Lovell's (1982, 1985b) estimates for the Cuchumatán highlands of northwest Guatemala work out to densities of 16/km<sup>2</sup> in 1520 and 9/km<sup>2</sup> in 1525-30. Zamora's (1983, 1985) estimates for western Guatemala (the colonial administrative unit of the *alcaldía mayor* of Zapotitlán and Suchitepéquez) yield densities of approximately 14/km<sup>2</sup> in 1520 and 9/km<sup>2</sup> in 1524. His calculations indicate that the piedmont had a higher population density than the highlands (Zamora 1983: 303; 1985: 119-120). Sanders and Murdy (1982: 31) found that the Valley of Guatemala during the early Late Classic period, its phase of maximum population, probably supported about 120

persons per km<sup>2</sup>, with some zones reaching densities exceeding 300/km<sup>2</sup>. According to their data, population density declined during the Postclassic to a nadir of about 20/km<sup>2</sup> (Sanders and Murdy 1982: 29). This density would presumably apply as well to the Valley of Guatemala on the eve of the Conquest. Lovell and Swezey's (1982) estimate for southern Guatemala (the area of the modern republic excluding the Petén) at the time of Spanish contact indicates a density of about 27/km<sup>2</sup>.

These figures help to establish a comparative frame of reference with which to evaluate hypothetical population densities for El Salvador. Considering the differences in environment, resources, settlement patterns, and economic systems, one would expect densities in El Salvador to be higher than those of highland Guatemala and somewhat lower than the average density for central Mexico.

Daugherty (1969: 120-121) calculated, on the basis of his estimate discussed above, that the average aboriginal population density of El Salvador was approximately 18-25/km<sup>2</sup>. He postulated that the major regions of high population density had at least 50 persons per km<sup>2</sup>, and that some zones had considerably greater densities. As mentioned, however, the estimate for El Salvador from which Daugherty calculated this density appears to be conservative. Furthermore, this density is similar to those derived from the estimates of Lovell (1982, 1985b), Lovell and Swezey (1982), Sanders and Murdy (1982), and Zamora (1983, 1985) for various regions of highland Guatemala. This similarity indicates the likelihood of an average density in El Salvador considerably greater than 18-25/km<sup>2</sup>.

Newson (1982: 258) estimated that under a barbecho system of cultivation Pacific Nicaragua could have supported 60 persons per km<sup>2</sup>. She suggested a density for the central highlands of Nicaragua, where root crops predominated, of 15/km<sup>2</sup>, and for the Nicoya region, which has mature lateritic soils of low fertility, of 15/km<sup>2</sup>.

Most of El Salvador is extremely fertile and has good climatic conditions for cultivation. Although little is known of agricultural practices in El Salvador on the eve of the Conquest, its Pre-Columbian inhabitants had a diversified agricultural economy and sophisticated agricultural technology (Sheets 1982). Evidence for intensive cultivation accompanied by irrigation in El Salvador

dates to as early as the Late Preclassic period (400 B.C.-A.D. 250) (Earnest 1976; Fowler and Earnest 1985).

The fertile volcanic uplands, coastal plain and piedmont, and interior basins of the Pacific versant of El Salvador were capable of supporting a population equal to or greater than that of Pacific Nicaragua. This area encompasses about 80 % of El Salvador's surface area of 21,041 km<sup>2</sup>, or about 16,833 km<sup>2</sup>. Applying the density of 60/km<sup>2</sup> calculated by Newson (1982: 258) for Pacific Nicaragua to this area of El Salvador yields a result of 1,009,968. Newson (1982: 259) assumes that only 50 % of Pacific Nicaragua was exploited, but El Salvador was probably more thoroughly exploited than Nicaragua. While almost all of El Salvador was occupied with varying degrees of density at the time of the Conquest, it probably was not exploited in its entirety. It seems reasonable, therefore, to reduce this figure by about 60 %-75 %, thus obtaining an estimated population of 605,980-757,476 for this portion of El Salvador at the time of the Conquest.

The northern mountains of El Salvador (departments of Chalatenango, Cabañas, and Morazán), comprising about 20 % of the area of the republic, had a much lower average population density. It is postulated that this area was capable of supporting a density equal to or greater than that of the central highlands of Nicaragua and highland Guatemala at the time of Spanish contact. Assuming an average density for the northern mountain region of 15-20/km<sup>2</sup> yields a carrying capacity estimate of 63,120-84,164, with an average of 73,642. Assuming that only about 50 % of the northern mountains was exploited, the population of this region can be estimated at 36,821.

Adding the estimated populations of the Pacific regions and the northern mountains, on the basis of carrying capacity the population of El Salvador at the time of contact is estimated at 642,801-794,297.

## CONCLUSION

Three independent methods of calculation have been used to estimate the population of El Salvador in 1524 (Table 3).

While each of the estimates is tenuous and based upon inadequate data and rather crude methods of calculation, confidence is inspired by their remarkable convergence. The first method,

TABLE 3  
SUMMARY OF RESULTS OF POPULATION ESTIMATES OF EL SALVADOR  
AT EUROPEAN CONTACT

<i>Basis of calculation</i>	<i>Range</i>	<i>Mean</i>
Native army size ... ..	470,000 - 690,000	580,000
Cerrato tasacion data ... ..		689,020
Carrying capacity estimates ... ..	642,801 - 794,297	718,549

based on extrapolation of an estimate of native army size, is the most risky of the three. Nevertheless, the results obtained by this method are certainly not unreasonable. The calculation based on an extrapolation of the 1548-49 Cerrato tasación data produces a higher mean estimate. This figure is only slightly lower, however, than the mean estimate derived from carrying capacity calculations. Taking all these results into consideration, it seems reasonable to estimate the native population of El Salvador at Spanish contact at 600,000-700,000. This estimate indicates an average population density of 28.5-33 km<sup>2</sup>.

Note that this estimate applies only to the population of El Salvador in 1524. The population a few years before contact was possibly much higher. MacLeod (1973: 41) reckons that at least one-third of the population of Guatemala perished in an epidemic of smallpox and plague in 1520. It is not known whether the indigenous population of El Salvador escaped this cataclysm. Although Newson (1982: 278) maintains that there is no evidence of disease spreading further south until 1527, it seems highly unlikely that El Salvador was spared (cf. Crosby 1967: 328-331). This raises the possibility of a population in El Salvador in 1519 of 900,000-1,050,000, or, in round numbers, just over 1,000,000.

To place this estimate into broader perspective, it is worth considering that the total population of El Salvador in 1950 was 1,855,917, with an average density of 88/km<sup>2</sup> (Ministerio de Economía, 1965: xv). The estimated population in 1980, based on projection of the 1976 census, was 5,270,000, with an estimated average density of 250/km<sup>2</sup>. The demographic profiles of Mexico and Central America seem to follow a similar long-term process of rapid decline followed by gradual recovery and growth, with the population regaining its contact-period magnitude at approximately the mid-20th century (Lovell 1985: 71). Judged by this

standard, the population estimates reached here for El Salvador may be considered conservative.

It seems appropriate to conclude by comparing these estimates with other recent population estimates for Central America at Spanish contact (Table 4). The estimates for El Salvador are consistent with other recent calculations for Central America, and this consistency provides further support for the validity of the estimates.

TABLE 4  
RECENT ESTIMATES OF NATIVE POPULATION OF CENTRAL AMERICA  
AT SPANISH CONTACT

Area	Time	Estimate	Authority
Guatemala ... ..	ca. 1492	2,000,000	Denevan, 1976
Southern Guatemala ...	ca. 1520	2,000,000	Lovell and Swezey, 1982
El Salvador ... ..	1524	600,000 - 700,000	Fowler, this paper
El Salvador ... ..	ca. 1520	1,000,000	Ibid.
Honduras and Belize ...	ca. 1492	750,000	Denevan, 1976
Honduras ... ..	ca. 1523	800,000	Newson, 1981
Western Nicaragua <sup>a</sup> ...	1523	1,000,000	Radell, 1976
Nicaragua <sup>b</sup> ... ..	ca. 1523	825,000	Newson, 1982
Costa Rica ... ..	ca. 1492	400,000	Denevan, 1976

<sup>a</sup> Including Guanacaste, Costa Rica.

<sup>b</sup> Including Nicoya, Costa Rica.

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AG Audiencia de Guatemala.

EC Escribanía de Cámara.

JU Justicia.

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