

Setting Demographic Limits: The North American Case

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Abstract

The size of the aboriginal population of North America at the time of European discovery is a controversial issue. Estimates for the portion of the continent north of Mexico range from 1-18 million. A few scholars argue for very high numbers, usually by assertion and in the absence of empirical evidence. Many others argue that the higher estimates are preposterous, but usually atheoretically and on the basis of negative evidence. I argue that explicit theory and simple mathematical modelling allows us to establish a means to assess upper population limits at local, regional, and continental scales. This approach, along with rare empirical tests, allows us to conclude with greater confidence that the 1492 population size was near the lower end of the range, around 3.4 million.

The size of the aboriginal population of North America in AD 1500 is a controversial issue, and estimates on the size of the population have varied widely. This is an important issue because so much else in the way of subsistence, socio-political organization, settlement types, and so forth is associated with demography.

Estimates for the portion of the continent north of Mexico range from 1-18 million. Estimates have also been typically based on scanty ethnohistorical (documentary) evidence. For example, Henry Dobyns (Dobyns 1966, 1983) worked almost exclusively with documentary sources. Further, he assumed that any epidemic observed anywhere in North America in the sixteenth century must have been the local expression of a widespread pandemic. Because most of his sources dated to late in that century or to the seventeenth century, he also assumed that most or all of his scanty census data related to populations already reduced by disease. This led him to assume that most historical counts of Indians amounted to 5-10% of their earlier AD 1500 sizes. When he aggregated his inflated estimates, he came up with a total of at least ten million Indians north of central Mexico in AD 1500. Some others have proposed even larger numbers (up to 20 million) based on similar arguments.

One problem with high estimates is that archaeologists cannot provide enough addresses to accommodate ten million or more people in North America five hundred years ago. Another problem with them is that Indian enthusiasts have seized upon the inflated numbers, preferring them to lower estimates for modern political purposes. The same enthusiasts usually also attribute high ecological virtue to the same Indian populations. So we have to cope with several modern myths, some of them scholarly, some of them popular.

Douglas Ubelaker (Ubelaker 1988) attempted to provide some balance and published a paper in which he argued for a total population of less than two million people for North American (north of central Mexico) in AD 1500. He used the component chapters of the *Handbook of North American Indians* as his primary sources, although he was often working with manuscripts that were available to him at the Smithsonian Institution prior to publication, and therefore unavailable to the rest of us. He deferred to specialist authors when they offered well-reasoned estimates of aboriginal population sizes for specific populations. He came up with an

estimate of 1,894,280 as shown in table 1. I have corrected two typographical errors in the table he published.

The problem with Ubelaker's work is that we have no empirical data for large parts of the Northeast and the Southeast. We also have almost no data at all for the Plains. The mounted nomadic tribes for which the Plains are famous today did not yet exist in 1500 because the domesticated horse had not yet been introduced to North America. Indeed, it is unclear to me where Ubelaker's data could have come from for this and some other regions.

My work on the Mohawk case (Snow 1995) was the first, and so far the only, successful effort to measure population size and its change over time by archaeological means. Trends in Mohawk population size from 1525 to 1776 are summarized in table 2. The results implied that Ubelaker's estimate for the continent was much closer to the mark than that of Dobyns. But for most of North America direct archaeological measurement is even less easy to do than measurement based on documents.

More recently I turned to a simpler ecological approach. I divided the continent into thirteen broad ecological zones. This was based on a simple map provided on line by the National Geographic Society. I simplified it further and remapped the ecological zones of the continent using MapInfo (figure 1). Then I looked for cases of American Indian societies for which we have both reliable pre-epidemic population estimates and reliable land area estimates. I found many, but not all, of these in various volumes of the *Handbook of North American Indians*. There are too many cases and too many sources for me to report all of them here, but I will provide them to anyone seeking to replicate my results.

Figure 2 shows tribal areas for North America in 1500. These too come largely but not entirely from volumes of the *Handbook of North American Indians*. Some come from the *Atlas of Ancient America* (Coe et al. 1986). We have population and area figures for the shaded areas shown because adequate records were made in them before epidemics and dislocations occurred. From these figures I could compute population densities. By separating them according to their ecological zones I was able to determine in a rough way the average population densities of the zones. Table 3 summarizes the ecozones and the numbers of cases for which I found data in each of them. The aggregated cases for each ecozone constitute the sample for that ecozone.

REGION	AD DATE					Overall
	1500	1600	1700	1800	1900	Decline
Arctic	73,700	73,700	73,700	59,190	34,994	53%
Subarctic	103,400	103,400	99,750	76,350	45,535	56%
Northwest Coast	175,330	175,330	175,330	98,333	29,785	83%
California	221,000	221,000	221,000	200,000	14,825	93%
Southwest	454,200	420,000	276,260	215,950	158,283	65%
Great Basin	37,500	37,500	37,500	33,905	14,606	61%
Plateau	77,950	77,950	77,950	70,000	18,720	76%
Plains	189,100	189,100	189,100	120,330	62,656	67%
Northeast	357,700	357,700	149,360	117,260	95,457	73%
Southeast	204,400	157,400	105,125	60,370	61,701	70%
TOTALS	1,894,280	1,813,080	1,405,075	1,051,688	536,562	72%

Table 1: North American Indian population change, 1500-1900 (after Ubelaker 1988, with corrections).

Periods	Population
1755-1776	614
1712-1754	600
1693-1711	790
1689-1692	1100
1679-1688	1100
1666-1678	2000
1659-1665	2304
1657-1658	2304
1646-1656	1734
1643-1645	1760
1635-1642	2835
1626-1634	7740
1614-1625	6225
1580-1613	4575
1560-1579	2019
1545-1559	1570
1525-1544	1490

Table 2: Mohawk population change.

I found 150 usable cases. In no case did I have complete data for an ecozone, but for nine of them I had enough data to compute densities. For six ecozones there were enough cases to make descriptive statistics informative. These are reported in table 4. Note that the population densities reported in table 3 are computed from aggregate sample areas and aggregate sample populations. The mean densities reported in table 4 are means of sample densities, which because of skewing are not necessarily equal to the ecozone densities reported in table 3. Unfortunately, four of the thirteen zones had no useable cases at all. These were the Great Plains Grasslands, Plateau Grasslands Oregon Broadleaf Woodlands, and Flooded Grasslands. Two of them are very small ecozones when compared to others used here. For each of these zones I had to use a rough estimate based on neighboring ecozones. My estimates were based on densities in regions having roughly similar carrying capacities. All four of the zones in question supported mainly hunter/gatherers in AD 1500, so an estimate of 0.18 persons per square kilometer is appropriate.

When I computed human population sizes by ecological zone using observed or likely densities and area totals in square kilometers, I obtained probable human population sizes for all thirteen zones.



Figure 1: Ecological zones of the continent.

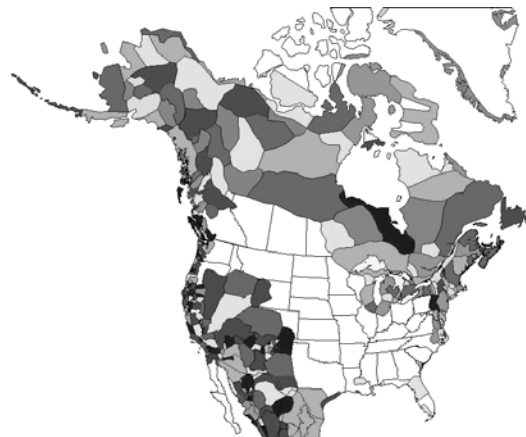


Figure 2: Tribal areas for North America in 1500.

The aggregate total land area inhabited in 1500 is 23,163,390 square kilometers. The aggregate human population in 1500 was probably around 3.4 million.

This means of estimating North American population size in 1500 seems so simple and so obvious that I cannot understand why it appears not to have been used by anyone in the past. The approach has the advantage of exposing the absurdity of much higher published estimates. However, it has the persisting disadvantage of requiring extrapolations from few or no cases in seven out of thirteen ecozones. The standard deviations for the remaining six

Ecozone	Cases	Sample Area	Sample Population	Sample Density	Total Area	Total Population
Mediterranean Scrub	11	64,967	61,921	0.95	131,000	124,858
Boreal Forest	20	4,811,231	83,466	0.02	5,310,000	92,119
Atlantic Coniferous Forest	5	141,600	46,410	0.33	490,500	160,763
Pacific Coniferous Forest	41	480,767	197,745	0.41	1,976,000	812,752
Desert	15	1,284,534	226,923	0.18	2,613,000	461,607
Eastern Broadleaf Woodlands	34	910,825	324,984	0.36	2,955,000	1,054,349
Gulf Coast Grasslands	1	19,520	3,600	0.18	75,590	13,941
California Grasslands	2	40,690	46,465	1.14	52,050	59,437
Tundra	21	2,310,349	40,703	0.02	6,534,000	115,114
Great Plains Grasslands	0	0	0	0.18	2,925,000	526,500
Plateau Grasslands	0	0	0	0.18	54,550	9,819
Oregon Broadleaf Woodlands	0	0	0	0.18	14,650	2,637
Flooded Grasslands	0	0	0	0.18	32,050	5,769
TOTALS	150				23,163,390	3,439,665

Table 3: American Indian populations by ecozone.

	Valid N	Mean	Minimum	Maximum	Std.Dev.
Mediterranean Scrub	11	106.0	21.2	182.8	62.8
Boreal Forest	20	2.0	0.4	4.3	1.5
Pacific Coniferous Forest	41	117.5	4.6	665.6	123.8
Desert	15	81.5	3.2	480.0	120.5
Eastern Broadleaf Woodlands	34	60.0	8.3	320.0	81.5
Tundra	21	6.6	0.2	84.9	18.3

Table 4: Statistics for selected ecozone densities.

(table 4) are sobering. Skewing, small sample sizes, and large ranges have produced some astounding values. What we learn from the exercise is that the best course is to dampen the effects of variability within each ecozone by aggregating sample data and computing density from the sums. However, the variability within ecozones revealed by table 4 must be remembered when reasonable estimates are generated for the seven ecozones for which we have few or no cases. There is only one case available for the Gulf Coast Grasslands. Should we assume that it accurately represents the whole? Perhaps it is unrepresentatively high – or low. Thus we must rely on informed judgment, and like Ubelaker I have depended upon that of the specialists who know the individual cases best. Allowing reasonably for lacunae, the sum of the best judgment of those scholars is that the total population north of Mexico in AD 1500 was around 3.4 million people. Even if that number is 20% in error it is within a range well below the absurdly high estimates that have enjoyed popularity in recent years. Perhaps now that a more rational estimate is in hand we can get on with the solution of other important problems in Native American demography.

References

- COE, M., SNOW, D.R. and BENSON, E., 1986. *Atlas of Ancient America*. Facts on File, New York.
- DOBYNS, H.F., 1966. Estimating Aboriginal American Population. *Current Anthropology* 7(4):395-416.
- DOBYNS, H.F., 1983. *Their Number Become Thinned: Native American Population Dynamics in Eastern North America*, University of Tennessee Press, Knoxville.
- SNOW, D.R., 1995. Microchronology and Demographic Evidence Relating to the Size of Pre-Columbian North American Indian Populations. *Science* 268:1601-1604.
- UBELAKER, D.H., 1988. North American Indian Population Size, A.D. 1500 to 1985. *American Journal of Physical Anthropology* 77(3):289-294.