

# Mestizaje and Migration

## Modeling Population Dynamics in Seventeenth-Century New Mexico's Spanish Society

*Heather Trigg*

*University of Massachusetts Boston*

*Debra Gold*

*St. Cloud State University*

*The Spanish colonists entering New Mexico in 1598 and 1601 came from diverse cultural backgrounds. Various cultural practices encouraged the incorporation of Plains and Pueblo women into colonial households. The gender ratio of colonists and their attitudes towards sexual relations with indigenous women led to mestizaje. The incorporation of indigenous women into the Spanish community affected relations between native peoples and colonists, and among colonists, because bloodline was an important way by which colonists judged each other. Different rates for mestizaje are modeled and compared to census data, and implications for migration and changing cultural practices are discussed.*

Human demography was among the first and most extensively investigated aspects of the European colonization of the New World. Since the 1930s, geographers, historians, and anthropologists such as Carl Sauer, Woodrow Borah, B. Simpson, Henry Dobyns, and Sherburne Cooke explored the dramatic toll that Old World diseases, warfare, malnutrition, and other factors took on indigenous populations (Keen 1985; Weber 1988). For the most part, these early investigations attempted to quantify the magnitude of indigenous population loss, but more recently archaeologists have explored the social consequences of such declines (Lycett 1989). The impact of colonization and the accompanying cross-cultural interactions on the colonizers' demographic processes has received somewhat less attention. As work by Deagan (1996) has shown, demographic processes including mestizaje and migration were as important for the colonizers as they were for the indigenous peoples whose populations declined. During the first years of many colonial situations, men colonists greatly outnumbered women colonists (Deagan 1996), yet often, a relatively small

of a small pool of candidates. Just as intermarriage had important repercussions for colonial societies, the recruitment of indigenous women had impacts on native cultures. Some indigenous women chose colonists for mates, perceiving advantages of being associated with them (Nash 1980). Such a draw could have negative consequences for indigenous populations already stressed by high mortality rates.

*Mestizaje* is a term used to describe the process of biological and cultural mixing, typically between Spanish and Native American people. This process had profound social consequences for both groups. Scholars have begun to explore the impact of *mestizaje* on culture change and power relations, focusing on the nature of such social phenomena. Documents from seventeenth-century New Mexico detail a variety of sexual encounters between colonists and native peoples—marriage, concubinage, and rape. Only a portion of these interactions would have generated children who were counted among the colonists. For example, it is unlikely that children resulting from rape or concubinage would have been acknowledged as legitimate members of the Spanish population. No doubt the children of indigenous-Spanish unions that were not acknowledged by the colonists contributed to native populations and had an impact on social relations within native communities, but our focus here is on the children acknowledged in the colonial community. It is apparent that not all of the “wives” were in formal, sanctified marriages, but for our purposes, the term “marriage” will cover the range of unions that produced children that were acknowledged as colonists. The influence of *mestizaje*, however, is not dependent merely on the nature of the interaction, but also on the intensity and scale of these interactions, which is the primary concern of this paper.

### New Mexico's Colonial Demography

The first authorized colonization of New Mexico began in 1598 when roughly 500 men, women, and children, including noblemen, commoners, and slaves, left Mexico and traveled 700 miles north to Okey (San Juan Pueblo in New Mexico (Hammond and Rey 1953)). During the early colonial period, the colonists were able to build churches, ranches, and the town of Santa Fe; they subdued thousands of indigenous peoples and forced them to make tribute payments (*encomienda*) of maize, cloth and hides. They married, established homes, and raised children. Priests suppressed native religions, and colonists bought slaves from the Plains and forced Pueblo peoples to assist them in herding, cultivating, and constructing buildings. For 82 years the colonists managed to maintain control over the region, apparently through intimidation, but this power did not last. In 1680, the Pueblo and Plains people rebelled against Spanish control, burning churches, killing priests and forcibly expelling the survivors. An estimated 500 colonists, mostly priests and settlers in outlying ranches, were killed in the rebellion. The survivors, roughly 1,500 colonists accompanied by about 500 slaves from the Plains and Pueblo peoples, escaped down the Rio Grande to Mexico. On the eve of the Pueblo Rebellion, the number of people who identified themselves as Spanish colonists in New Mexico had risen to about 2,000 individuals. Throughout the early colonial period the population of colonists fluctuated due to immigration, famines, epidemics, and

number of Europeans not only gained a foothold in the New World, but also dominated the indigenous cultures. The demographic profile of colonists, including their ages and sex ratios, were among the most important factors that structured interactions between colonizers and indigenous peoples in these colonial encounters (Deagan 1996; Nash 1980), yet the magnitude of the colonists' demographic processes is not frequently examined. Because researchers have paid more attention to the demography of native peoples, more is known about indigenous population dynamics. However, there is interplay between the demography of colonizers and the colonized peoples, and in this paper we focus on the demography of the colonizers to explore the impact of *mestizaje* and migration on population growth in seventeenth-century New Mexico.

The initial Spanish colonization of New Mexico during the seventeenth century was an encounter that was tightly bounded in time and space, and thus provides a useful case study with which to examine the colonists' demographic processes and their impacts on the social dynamics of the colony. It is the “Spanish” people or individuals identified as colonists whose demographic processes are modeled here. In this paper, we estimate birth and death rates among the New Mexico colonists to determine if the initial population of colonists could account for the population growth seen in seventeenth-century New Mexico. With this information, we then explore the magnitude and implications of migration into the colony and *mestizaje* between colonists and native peoples.

In colonies such as New Mexico that were isolated from their homelands, it was frequently difficult to maintain a viable population of colonists. Stochastic processes associated with small populations make them vulnerable to extinction, and many early colonies suffered from high death rates due to famine and disease. Cultural rules for choosing proper husbands and wives limited the number of individuals from which to choose a mate. Moreover, the sex ratio of Spanish colonists was often skewed toward men. Migration was one source of new colonists, providing an influx of individuals to the colony, but recruiting women from indigenous population as wives and mothers also helped to bolster colonial populations.

New Mexico's first colonists arrived in two waves in 1598 and 1601 as part of formal colonizing expeditions. Little is known of later émigrés to the colony. In 1677, the Spanish Crown sent 44 male convicts to New Mexico, apparently in hopes of strengthening the colonists' population levels (Hackett 1937), but these individuals would have had little impact on the number of colonists by the end of the early colonial period. Most scholars suggest that travel between Mexico and New Mexico was limited in the late sixteenth and seventeenth centuries, but new arrivals probably traveled with the triennial mission supply caravans (Scholes 1930; Ivey 1993). Investigations of population dynamics in the eighteenth century indicate that there was little immigration and that population growth was almost entirely due to intrinsic factors (Tjarks 1978), but the scope of migration during the early colonial period remains unknown.

Because of the imbalance of men and women colonists, the exchange of sexual partners was one fundamental cross-cultural interaction. The appropriate choice of mate influenced a colonist's social standing and that of his or her children—a particularly important factor in Spanish colonies where there was a complex and highly stratified hierarchy of racial categories. However, the ideals of cultural marriage rules frequently clashed with the reality

abandonment of the colony, but most scholars estimate that the number of colonists never rose above 2,500 people (Scholes 1935).

The Spanish Crown envisioned that the colony would not be merely a military outpost or missionary endeavor, but that colonists would become permanent residents who established a viable self-sustaining economy, similar to that in Zacatecas. It is true that the Crown supported the missionizing effort more than civil government, but colonists were recruited with the lure of land and nobility status if they remained in the colony. Initial colonizers could be given *encomiendas*, an inheritable right to collect tribute. Some of the men sold substantial landholdings in Mexico and were accompanied by their wives and children. It is clear that they too envisioned a permanent civilian settlement in the region, populated with Spanish households of men, women, and children, and not merely a military colony.

Spanish society in the seventeenth century had a highly developed system of racial categorization, and ethnic identity in the colonies was a complex matter (Barnes, Naylor, and Polzer 1981). Some of the original colonists were *peninsulares* (individuals born in Spain), some were born in other European countries (Europeans), others were *criollos* (those born in the New World of Spanish parents), and still others were *mestizos* (people with mixed Spanish and Native American parentage). Many of New Mexico's earliest colonists were born in Mexico (Snow 1996). Servants accompanying the initial colonists were identified as *indios* (Indians) and *mulatos* (Africans). One servant, part of Governor Otermin's retinue, was identified as a *zambigo* (one parent of African and the other of Native American ancestry), and a census taken in 1790 also recorded some New Mexicans as *españoles* (Spanish, essentially *criollos*), *castas* (mixed parentage which included some Spanish ancestry), *coyotes* (one parent who was *mestizo* or *mulatto* and the other Native American), and *color quebrado* (literally broken color) which identified people of mixed but undetermined parentage. Genizaro identified detribalized indigenous peoples. These categories could be quite detailed, taking into consideration not just one's parents, but also grandparents; in some classification schemes, individuals with two *mestizo* grandparents were identified differently from those with three or four. With these labels came varying statuses because bloodline was an important criterion by which the Spanish colonists judged each other and were judged by civil authorities. *Criollos* and *españoles*, those with a "pure" Spanish bloodline, were considered the highest-status individuals and were given the most opportunities and powers; *mestizos* were apparently considered inferior. It appears that the term *mestizo* could be used as a disparaging epithet, for one clergyman referred to several New Mexican officials as "mestizo dogs" (Scholes 1936). However, in the early years of colonization, *mestizos* frequently could achieve power and authority. This was true in early colonial New Mexico where *mestizos* became civil authorities.

It is difficult to determine how many categories were in use in seventeenth-century New Mexico, although it is clear that the terms *españoles*, *castas*, *indios*, *genizaros*, *mestizos*, and *mulatos* were widely used. While some of New Mexico's colonists considered themselves Spaniards, many were *castas* or *mestizos* of some degree (Kessel 1997). Acknowledging the complexity of the ethnic heritage of the colonists, historian France Scholes noted: "The non-aboriginal population of New Mexico was a heterogeneous group made up of Spaniards, creoles, castes, and Mexican Indians" (1935:96). Because of the small number

of original colonists, intermarriage with local Plains and Pueblo peoples was no doubt commonplace, and through time, the "Spanish" colonists were increasingly a population of *mestizos*. Moreover, Scholes estimated that by the end of the first colony "eighty percent—perhaps ninety per cent—of the population [colonists] were natives (born in the colony) of the province itself" (1935:97). Scholes and other scholars have suggested that through the seventeenth and eighteenth centuries, colonial population growth was largely intrinsic to the colony, not a result of emigration from Mexico and abroad. The amount of *mestizaje* had fundamental implications for the ethnic identity of the colonists and social relations between the Pueblos, Plains peoples, and colonists, but more importantly, the influx of new, non-Spanish individuals, particularly women, impacted the stability and growth of the colonial population. Given the importance of such interactions, what was the amount of *mestizaje*? Scholes (1935) suggested that it is impossible to determine the magnitude of this process, but by using demographic data from a 1790 census, we can begin to model such basic demographic processes as fertility, mortality, and survivorship rates for the colonial population. By combining this information with computer simulations, we can examine the growth rate of the colonial population using a variety of "marriage" rules.

As a result of the detailed record keeping of the Spanish Administration, we have a good estimate of the number of people who traveled during the first two authorized expeditions (in 1598 and 1601), and in many cases, the names of the earliest male colonizers (Hammond and Rey 1953). Before the original expeditions were allowed to travel to New Mexico, officials of the Spanish Crown inspected the travelers and their belongings, recording the names of the men (Hammond and Rey 1953). Some individuals also indicated that they brought their wives and children.

This far-flung Spanish colony was initially colonized in 1598 by fewer than 300 "Spanish" individuals (Simmons 1991). The route to New Mexico was entirely through Mexico itself; at the time, New Mexico was Spain's northernmost colony. Travel between the colony and Mexico was difficult and limited by the distance, cost of transportation, and dangers posed by hostile indigenous groups situated in northern Mexico. The 1598 expedition took five months to travel from northern Mexico to New Mexico. Only 129 men "of fighting age" were listed in the last formal inspection of the expedition before it left Mexico (Simmons 1991:96). This colonization effort was all the more astonishing in that fewer than 300 colonists attempted to control an area of hundreds of square miles with an indigenous population of more than 64,000 people (Schroeder 1992). In 1600, the Spanish Crown sent an additional 100 or so people to the colony to bolster the population, and their names are also recorded. Life for the original colonists was difficult, the stresses more than some were willing to endure, and in 1601 a large number of colonists, including many priests, abandoned New Mexico. This left an estimated 150 to 180 men, women, and children to maintain the colony and provide the foundation for future population increases (Snow 1996). Yet 80 years later, the population of colonists had reached at least 2,000. How did that initial population expand? Given the fertility and mortality rates of the time and the sex ratio of the colonists' population, is it likely that these individuals were able to give rise to a population of 2,000 individuals in 80 years?

### Demographic Data

All records held in the colony in 1680 were destroyed in the Rebellion, but from texts stored in Mexico we have the names of some of the earliest colonizers (Hammond and Rey 1953) and the names of those who survived the Rebellion (Hackett and Shelby 1942). From these two sets of documents we are able to determine the size and gender ratio of the initial colonizers and the size of the population some 80 years later. Several scholars have identified individuals whose names were recorded in seventeenth-century documents (Chávez 1992; Snow 1996). Drawing upon some of the extant records, archaeologist David Snow (1996) was able to piece together the demography of the early colonial New Mexico. Our analysis relies heavily on these data for estimating the size and sex ratio of the initial population of the colony (Table 5.1).

Examining the available early colonial documents, Snow was able to identify the name and sex of most of the individuals in New Mexico during the early years. He was also able to identify the birthplaces of many of the men as well as their racial categories. Women's birthplaces were more difficult to determine. Some women and men were specifically identified as mestizos, indios, and mulatos, but those not identified were assumed to be criollos, born in the New World. It is not possible to identify the ages of all colonists. The men did list their ages, but not those of their wives and children. In some instances the documents do tell us that the children were minors, but in other cases it is clear that some sons were adults (Snow 1996). Snow identifies the colonists who can be securely determined to have stayed in the colony when most abandoned it in 1601, and he lists a few others who were likely candidates.

Snow estimates that there were between 150 and 180 colonists; he specifically identified 97 men and boys and 50 women and girls who were in the colony in 1601, and identifies a small number of individuals who cannot be positively identified, but whose mention in later documents suggests their presence in 1601. These individuals are included in our model, raising the number to 115 men and 50 women. While most men are named, determining the number and identity of women is less secure because at times the documents merely relate that a colonist was accompanied by his wife. The identification of children is particularly difficult, and there are some unnamed and unenumerated children. With the current data, determining the age structure of the population is not possible.

Snow has been able to piece together the birthplaces and racial categories of some of these individuals; about half the men were born in Spain, a few were born in other European countries, and the remaining half were born in Mexico. For the initial colonizing effort, the Crown desired criollos or españoles, and individuals were required to identify their racial category. Under threat of punishment, mestizos were specifically ordered to reveal this information. In New Mexico in 1601, there were 108 male españoles or criollos; one man was a mestizo. A few Mexican indios also accompanied the colonists as servants and 2 are included in their number; 4 mulato servants also remained in the colony in 1601. Of the women, much less is known. The birthplaces of some of the women have been identified, and most of the others were probably born in Mexico (Snow 1996). A few of the women (7) associated with the colonists are identified as indias, and there were 8 mulatas. Only 2 of the women were identified as mestizas.

Table 5.1. Colonists arriving in New Mexico before 1605.

Racial Category	Male	Female
Españoles/Pensinsulares	108	33
Mestizos	1	2
Indios	2	7
Mulatos	4	8
Totals	115	50

Source: Snow 1996.

Censuses were not taken during the early colonial period, and many other documents, such as baptism, marriage, and death records, that might help to explore population dynamics were destroyed in the Pueblo Rebellion. Thus we turned to demographic formulae to model the population expansion over the 80 years. For modeling population growth among the colonists, a variety of biological and social factors are involved—age at marriage, fecundity, fertility and mortality rates, age structure, sex ratio, marriage rules, famines and diseases that affect fertility, and acknowledgement of children born outside of marriage. All these factors played a role in seventeenth-century New Mexico.

### Demographic Modeling

The simplest demographic models focus on age-specific birth rates and age-specific death rates. In the absence of census information for the seventeenth century, fertility, mortality, and survivorship data were calculated from eighteenth-century census data. Several times during the eighteenth century, population estimates were made (Tjarks 1978), but there are problems with most of them; some ignored segments of the population (such as the Pueblo children) while others merely enumerated the population without providing the age or sex. The most comprehensive census was taken in 1790. It records such demographic information as the name, age, and racial identity of primary adults (husband and wife); number, age, and gender of children; the age, gender and affiliation of other household members such as widowed mothers, aunts, widowed children, or nephews; the number, gender, ages, and ethnic identity of servants; whether the head of household was a widow or widower; and the occupation of the head of household (Olmsted 1975). This census covered all Spanish communities in New Mexico and included many Pueblo villages. Because the demographic information was collected in such a detailed manner, fertility rates, sex ratios, and population structure can be determined for different racial categories. Analysis of these data indicates that fertility and mortality were highly dependent upon racial identity (Tjarks 1978). Birth rates to indigenous women were much lower due to infectious diseases, lack of immunity, infertility derived from sexually transmitted diseases, and perhaps social factors (Tjarks 1978). The families identified as indios had dramatically higher mortality rates than either españoles or castas. Due to these differences, we used information about españoles and their

Table 5.3. Fertility and mortality rates for the eighteenth-century Spanish New Mexican population.

Age Class	Fertility of Women	Population Mortality
0-5	0	0.0783
5-9	0	0.2912
10-14	0.002165	0.1159
15-19	0.135076	0.1486
20-24	0.308068	0.3236
25-29	0.342282	0.0370
30-34	0.290456	0.1677
35-39	0.248120	0.2015
40-44	0.112994	0.2491
45-49	0.065574	0
50-54	0.017391	0.3116
55-59	0	0.4118
60-64	0	0.2998
65-69	0	0.4283
70-74	0	0.6255
75-79	0	0.1340
80-84	0	0.0714
85-89	0	1.0000

number of one-year-olds. This, of course, ignores the number of children who died before their first birthday, but it does provide the best estimate of the number of children born in a single year. The youngest woman in the 1790 census to have given birth was 14 years old, while the oldest was 50. For each five-year age group from 10 to 50 years we calculated the number of children born (Table 5.3).

After we calculated these proxy data from the 1790s census, population growth for the seventeenth century was simulated using *Populus*, a computer program developed by Don Alstad at the University of Minnesota (see References Cited). This program simulates a variety of population dynamics; for this investigation we used the age-structured population growth model to calculate population changes through time. This model relies only on female reproductive and survivorship data and thus yields information about the women and girls of the population (Table 5.4). It appears from the documents that the number of available women was a limiting factor for colonists' population growth; therefore, focusing on the women is appropriate. As the simulation models half of the population, we doubled the simulated levels to achieve the total population levels.

## Engaged Anthropology

Table 5.2. Life table for eighteenth-century españoles.

Age interval	Number of Deaths (D)	% of Deaths (d)	Survivors Entering (l)	Probability of Death (q <sub>x</sub> )	Total Years Lived between X and X+5 (L <sub>x</sub> )	Total Years Lived alter Lifetime (T)	Life Expectancy (e')
0	121	7.83	100.00	0.0783	480.425	2433.800	24.39
5	415	26.84	92.17	0.2912	393.750	1953.375	21.19
10	117	7.57	65.33	0.1159	307.725	1559.625	23.87
15	133	8.60	57.76	0.1486	267.300	1251.900	21.67
20	246	15.91	49.16	0.3236	206.025	984.600	20.03
25	19	1.23	33.25	0.0370	163.175	778.575	23.42
30	83	5.37	33.02	0.1677	146.675	615.400	18.64
35	83	5.37	26.65	0.2015	119.825	468.730	17.59
40	82	5.30	21.28	0.2491	93.150	348.900	16.40
45	0	0	15.98	0	79.900	255.750	16.00
50	77	4.98	15.98	0.3116	67.450	175.850	11.00
55	70	4.53	11.00	0.4118	43.675	108.400	9.85
60	30	1.94	6.47	0.2998	27.500	64.725	10.00
65	30	1.94	4.53	0.4283	17.800	37.225	8.22
70	25	1.62	2.59	0.6255	8.900	19.425	7.50
75	2	0.13	0.97	0.1340	4.525	10.525	10.85
80	1	0.06	0.84	0.0714	4.050	6.000	7.14
85	12	0.78	0.78	1.0000	1.950	1.950	2.50
90	0	0	0	0	0	0	0

children, about 8,000 individuals, for determining proxy rates for the seventeenth-century panish colonists. To ignore the children in mixed marriages was to ignore a substantial portion of the population; therefore, adults identified as Spanish and their children (even if a marriage was mixed and the children would have been considered mestizos using the colonial classification system) were included in our calculations.

To obtain the age structure of the population, we tallied the number of españoles by sex and age, and following many demographic models, used five-year age intervals. From the age structure we were able to determine the mortality and survivorship rates for the population. One critical piece of data is the number of deaths in each age interval, but not having such information, we assumed that the population difference between any two age classes represented the number of deaths for the first age class. Using life table formulae adapted by Ubelaker (1989) for the analysis of prehistoric population dynamics, we calculated the mortality ( $q_x$ ) and survivorship ( $l_x$ ) for the eighteenth-century population (Table 5.2).

The actual birth rate cannot be determined by the census information because a full year's worth of newborns could not be counted. In place of the actual birth rate, we used the

Table 5.4. Estimated fertility and survivorship data for five-year intervals used in the simulation.

Age-Class	M (probability of female birth)	Survivorship ( $l_x$ )
0-4	0	1.0000
5-10	0	0.9217
10-14	0	0.6550
15-19	0.335	0.5776
20-24	0.770	0.4916
25-29	0.850	0.3325
30-34	0.720	0.3302
35-39	0.620	0.2665
40-44	0.280	0.2128
45-49	0.260	0.1598
50-54	0.040	0.1598
55-59	0	0.1100
60-64	0	0.0647
65-69	0	0.0453
70-74	0	0.0259
75-79	0	0.0097
80-84	0	0.0084
85-89	0	0.0078
90+	0	0

The probability of giving birth to a girl, calculated as age-specific fertility  $\times$  .5.

Using these data, we investigated population growth using a variety of "marriage" rules designed to explore differing rates of mestizaje. We used the seventeenth-century data for sex ratios and racial categories to provide the baseline population, and we used the eighteenth-century survivorship and fertility rates to determine population growth rates. We ran a total of four different trials, each trial simulating population levels from 1600 to 1680 (the length of the early colonial period) in five-year intervals using the different marriage rules. Current analyses of the seventeenth-century documents do not allow us to determine the age structure of the colonists. While we know that children accompanied the colonists, the enumeration of women in particular tended to be limited to adults. When running the simulation for trials 1 through 3, we evenly distributed the number of women across the childbearing years, 14 through 50. We also wanted to examine population growth using a normal age distribution of females in a seventeenth-century population, and in trial 4, we distributed the number of females across all age classes according to eighteenth-century age structure. While it is clear from eighteenth-century documents that men frequently remarried

and had concubines and children out of wedlock, we assumed that men were serially monogamous, and that only children of their wives were considered legitimate. Some Spanish women in the 1790s census are identified as taking Pueblo or Plains men for husbands, but in the early years of the colony when women were in the minority, it is unlikely that such marriages would have been sanctioned. We, therefore, assumed that Spanish women could only take Spanish or mestizo men for husbands.

*Trial 1:* In this trial, we limited the colonists' population growth to the descendants of the Spanish women. That is, every available Spanish woman or girl marries a Spanish man and raises children that are acknowledged as colonists. The colonial population growth is determined by the 33 Spanish women and their mates.

*Trial 2:* In this trial, all immigrant women, regardless of their racial category, married Spanish men, and all of their children were considered legitimate colonists. Population growth in this model was limited by the 50 women émigrés and approximates a closed demographic pool confined to the immigrants.

*Trial 3:* All Spanish and mestizo men married, taking wives of any racial classification. In this trial it is assumed that the children of any Spanish or mestizo man would be acknowledged and considered legitimate. Since mestizos appeared to have much greater social mobility than either indios or mulatos, we examined the colonists' population growth with both Spanish and mestizo racial categories. By necessity, native women, whether from Pueblo or Plains groups, were incorporated into the colonial population. This trial simulates cross-cultural exchange of marriage partners.

*Trial 4:* In the final trial, we used the same marriage assumptions as trial 3, but we used the age-structure of eighteenth-century New Mexico. Each of the Spanish and mestizo men were allowed to take a wife of any racial classification, and their children would be considered colonists.

The results from each of the trials show slow population growth (Fig. 5.1). In trials 1 and 2, which use only the immigrant women, the population of women rises in 80 years to at most 120 women, giving a total population of 240 individuals. In trial 3, which allows all Spaniards and mestizos to marry, the initial population gives rise only to 260 women for a total population of 520. The age structure of the initial population clearly had an impact on the final population. In trial 4, when the age structure of the simulated population approximated a normal structure, the population grew faster than the other trials, giving a total population of about 1,000 individuals after 80 years.

One striking aspect of all of the trials is that under no condition was the initial group of immigrants sufficient to account for the entire population growth evident in New Mexico during the early colonial period. Fertility rates were high during the colonial period; during the eighteenth century, an average of 7 children were born to each Spanish woman. However, mortality rates were also high, exemplified by the deaths of at least 3 children during the 6 month journey from Mexico to New Mexico (Hammond and Rey 1953). The only trials that showed dramatic population increase required that the immigrants draw heavily on the population of indigenous women. Because of diseases and malnutrition, fertility among

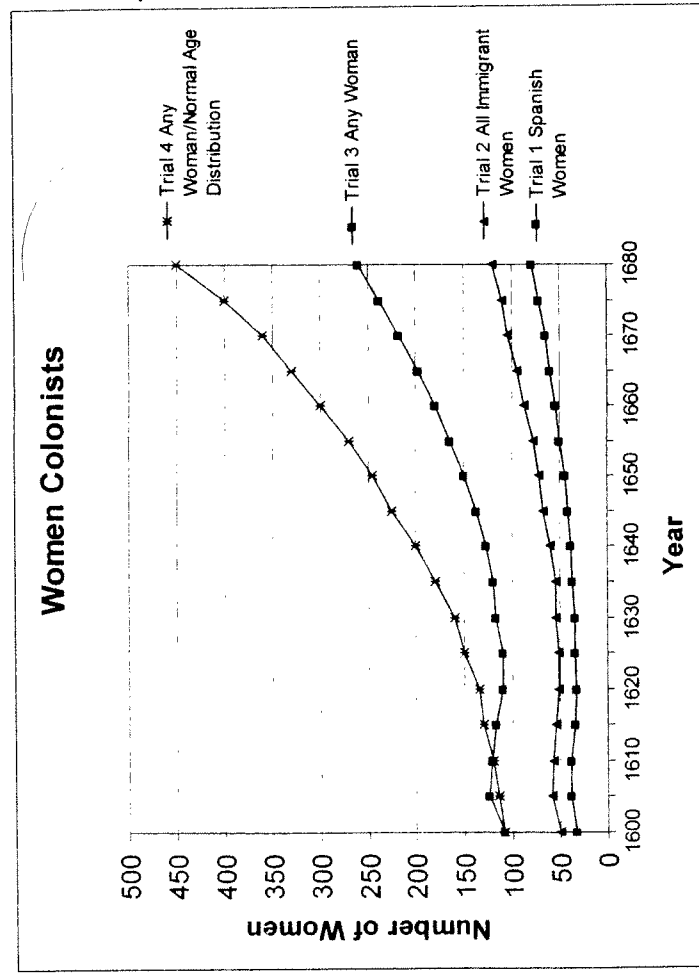


Figure 5.1. Female population growth.

native women was much lower than among the Spanish women or mestizas (Tjarks 1978); incorporating native women into the colonists' population may have led to a less robust population growth than is indicated in the simulation.

### Implications of Mestizaje and Migration

One goal of these simulations is to examine rates of mestizaje. The results of the simulation suggest the Spanish men must have taken Pueblo or Plains women for wives because there were less than one-third of the needed women among the population of colonists. At this rate of mestizaje, fully two-thirds of the children would be mestizos in a single generation, and as time progressed, mestizos would comprise an increasing proportion of the population. If the children of the original criollos were allowed to marry mestizos, the pace of mestizaje would have increased.

The results of the simulation also have implications for the rate of migration. It is apparent that not only were Pueblo and Plains women needed to account for the population growth evident in the early colonial period, but that additional men were also required. At best, the initial group of men, drawing heavily on indigenous women, could account for half of the population increase. Of course these trials assume that there is no migration of colonists

from Mexico after the initial two expeditions in 1598 and 1600, and we know this was not the case. The Spanish Crown sent 40 convicts to the colony in 1677, and Chávez's (1992) research on early colonial families identifies approximately 100 different family names in use during the early colonial period. Of these 100 names, only 40 are recorded in the 1598 and 1600 documents. The remaining 60 names either represent colonists unidentified in the early records, or colonists and perhaps their families arriving after 1601.

Some scholars have suggested that later immigrants traveled with the triennial mission supply caravans. Through the mission supply service, the Spanish Crown shipped large quantities of goods (building materials, food, cloth, metal, and many other items) to the Franciscan missions in New Mexico. This large-scale provisioning of the missions required 32 wagons, 52 drivers and crew plus military escort, and 544 mules to transport goods to the colony (Ivey 1993), and new colonists may have taken advantage of the safety and support offered by caravans to travel to New Mexico. From 1609 to 1630, these caravans were sent only sporadically. In the 1630s, the Crown and Franciscans formalized the agreement in a contract, and caravans traveled regularly every three years. Certainly colonists could have accompanied each of these caravans, but we have no record of it. These simulations indicate that to achieve a population seen on the eve of the Rebellion in 1680, there needed to be both more men and more women present in the colony than are recorded in the documents. This suggests that migration was an important factor in the colony's population growth. Moreover, population growth is an exponential process—the earlier individuals are added to the population, the smaller that number needs to be. There must have been substantial migration throughout the 80 years of the early colonial period. With the available documents, it is not possible to determine the identities of these individuals, but if the later émigrés to New Mexico had similar racial backgrounds and the same sex ratio (roughly 1 to 3) as the first colonizers, additional españoles would have been added to the population. With this sex ratio, the draw on Pueblo and Plains women would have been similar to that modeled in the trials; however, the rate of mestizaje would have been slower.

The results of our trials suggest that the initial population of male colonists drew heavily on the Plains or Pueblo peoples for wives. The magnitude of this draw is uncertain because the trials also suggest a substantial migration of colonists from Mexico that has not yet been studied or even acknowledged. The rate of mestizaje must have been significant if the sex ratio of the later immigrants remained as skewed as the earliest colonizing expeditions. We are not yet able to determine the specific impact this draw had on the demography and social relations of the Plains and Pueblo communities. We know that there was a substantial trade in slaves from the Plains, but further work is needed to determine if the slave trade was the source of some women for the New Mexico colony. Did indigenous women find advantages in marrying Spanish men, as they did in Mexico? If the rate of mestizaje was as high as is indicated by the simulations, how was status among the colonists negotiated? What was the basis of status differences?

The continuous influx of people from Mexico would have greatly impacted social relations both among colonists and between colonists and native peoples, and this research raises additional questions. How were the new colonists integrated into the community? How were resources, such as arable land, water, or native labor, distributed to them? How

was status among the colonists negotiated? Did the newest colonists have the same status as the descendants of the original founders? If the descendants were mestizos and the recent émigrés criollos, was one group afforded higher status than the other? Did all of the later immigrants travel to the colony with the mission supply caravans? If not, how much travel was there along the Camino Real? Current models suggest that New Mexico was largely isolated from the rest of New Spain, but given the amount of migration indicated, how much contact was there between the colony and Mexico? Future research on these questions will help us understand a variety of colonial phenomena.

The basic biological necessity of reproduction had profound social consequences in colonies that were in the early stages of their existence. In this paper we have used census data to reconstruct key demographic details for the seventeenth-century colony of New Mexico. We then incorporated these details into a series of population simulations, allowing us to examine population growth under various conditions. These simulations show that both mestizaje and migration were involved in the survival and growth of the New Mexico colony in the decades prior to 1680. During the early colonial period in New Mexico, both immigration of new colonists and the incorporation of native women contributed to the population of those people who identified themselves as Spanish colonists. There must have been fluidity within the elaborate system of Spanish castes to allow the creation of the colonial society with this influx of disparate peoples.

#### Acknowledgments

The inspiration for this paper lies with our mentor, Richard I. Ford, and his work on the Pueblo and Spanish communities in northern New Mexico. Several years ago the first author had a discussion with Dick about his study of census records from nineteenth-century New Mexico. He noted how easily different generations of families seemed to move between Pueblo and Hispanic communities of New Mexico. This idea of fluidity between communities intersected with the first author's interest in the interactions between Spanish colonizers and Pueblo peoples during the seventeenth century, leading eventually to the work presented in this paper. Both authors would like to thank Dick for his guidance and support over many years; his emphasis on the integration of cultural and biological perspectives provided the framework for our collaboration on this paper. Thanks also to Sunday Eiselt and Michelle Hegmon for organizing this volume and to Michelle for her insightful comments on the draft version of this chapter.

#### References Cited

- Print Sources*
- Barnes, Thomas, Thomas Naylor, and Charles Polzer  
1981 *Northern New Spain: A Research Guide*. Tucson: The University of Arizona Press.
- Chávez, Fray Angélico  
1992 *Origins of New Mexico Families: A Genealogy of the Spanish Colonial Period*, revised edition. Santa Fe: Museum of New Mexico Press.

- Deagan, Kathleen  
1996 Colonial transformation: Euro-American cultural genesis in the early Spanish-American colonies. *Journal of Anthropological Research* 52:135-60.
- Gutiérrez, Ramón A.  
1991 *When Jesus Came, the Corn Mothers Went Away: Marriage, Sexuality, and Power in New Mexico, 1500-1846*. Stanford: Stanford University Press.
- Hackett, Charles  
1937 *Historical Documents relating to New Mexico, Nueva Vizcaya, and Approaches Thereto, to 1773*. Baltimore: The Lord Baltimore Press.
- Hackett, Charles, and Charmion Shelby  
1942 *Revolt of the Pueblo Indians of New Mexico and Otermin's Attempted Reconquest 1680-1682*. Albuquerque: University of New Mexico Press.
- Hammond, George, and Agapito Rey  
1953 *Don Juan de Oñate: Colonizer of New Mexico 1595-1628*. Albuquerque: University of New Mexico Press.
- Ivey, James  
1993 Seventeenth-century mission trade on the Camino Real. In *El Camino Real de Tierra Adentro*, Gabrielle Palmer, Project Director, pp. 41-67. Santa Fe: Bureau of Land Management, New Mexico State Office.
- Keen, Benjamin  
1985 Main currents in United States writings on colonial Spanish America, 1884-1984. *Hispanic American Historical Review* 65:657-82.
- Kessel, John  
1997 Restoring seventeenth-century New Mexico, then and now. *Historical Archaeology* 31:46-54.
- Lycett, Mark  
1989 Spanish contact and Pueblo organization: long-term implications of European colonial expansion in the Rio Grande Valley, New Mexico. In *Columbian Consequences Vol. 1: Archaeological and Historical Perspectives on the Spanish Borderlands West*, edited by David Hurst Thomas, pp. 115-25. Washington, DC: Smithsonian Institution Press.
- Nash, June  
1980 Aztec women: the transition from status to class in empire and colony. In *Women and Colonization: Anthropological Perspectives*, edited by Mona Etienne and Eleanor Leacock, pp. 135-48. New York: Praeger Scientific.
- Olmsted, Virginia  
1975 *New Mexico Colonial Censuses 179, 1823, 1845: Spanish and Mexican*. Albuquerque: New Mexico Genealogical Society.
- Scholes, France  
1930 The supply service of the New Mexico missions in the seventeenth century. *New Mexico Historical Review* 5:93-116, 186-210, 386-404.



- 1935 Civil government and society in New Mexico in the 17th century. *New Mexico Historical Review* 10:71-111.
- 1936 Church and state in New Mexico 1610-1650. *New Mexico Historical Review* 11:9-76, 145-78, 283-94, 297-349.
- Schroeder, Albert
- 1992 Protohistoric demographic changes. In *Current Research on Late Prehistoric and Early Historic New Mexico*, edited by Bradley Vierra, pp. 29-35. Albuquerque: New Mexico Archeological Council.
- Simmons, Marc
- 1991 *The Last Conquistador: Juan de Oñate and the Settling of the Far Southwest*. Norman: The University of Oklahoma Press.
- Snow, David H.
- 1996 *New Mexico's First Colonists: The 1597-1600 Enlistments for New Mexico under Juan de Oñate, Adelante and Gobernador*. Albuquerque: Hispanic Genealogical Research Center of New Mexico.
- Tjarks, Alicia
- 1978 Demographic, ethnic and occupational structure of New Mexico, 1790: the census report of 1790. *The Americas* 35:45-88.
- Ubelaker, Douglas
- 1989 *Human Skeletal Remains: Excavation, Analysis, Interpretation*, second edition. Washington: Taraxacum.
- Weber, David
- 1988 Turner, the Boltonians, and the borderlands. In *Myth and the History of the Hispanic Southwest*, edited by David Weber, pp. 33-54. Albuquerque: New Mexico University Press.

#### Online Source

Populus. Simulations of population biology, computer program developed by Don Alstad, University of Minnesota [[www.cbs.umn.edu/populus](http://www.cbs.umn.edu/populus)].

## 6

# The Art of Ethnobotany Depictions of Maize and Other Plants in the Prehispanic Southwest

Kelley Hays-Gilpin  
Northern Arizona University

Michelle Hegmon  
Arizona State University

*Maize was, and is, a staple crop with great ritual and cultural significance for past and contemporary Native people in the U.S. Southwest. However, in prehispanic material culture, depictions of maize and other economically important plants vary widely in form and frequency. The authors analyze the distribution of plant depictions across various media, including painted pottery, murals, and rock art, across the Southwest in the Pueblo II-IV periods, and find that plants are not often depicted until quite late. They are rare on Mimbres painted pottery, but are relatively common on fifteenth- and sixteenth-century Hopi and Rio Grande kiva murals. Changing distributions are important for understanding gender, ritual organization, migration histories, ethnogenesis, and cultural affiliation.*

In a 1994 article entitled "Corn Is Our Mother," Dick Ford noted that for Pueblo people, corn is more than a plant: "Corn means everything in Pueblo cultures. . . . Here is a plant symbol whose study can reveal 3,000 years of southwestern prehistory." To study such a key symbol, "Paleoethnobotany should and can look beyond materialism to understand the cultural codes of the past. . . . Contextual archaeology should examine 'idealism' in the past. 'Idealism' here is used in the sense of a cultural model of how things should be" (Ford 1994:524-25). For Pueblo peoples, plants are equally important in the spirit and everyday worlds, and their specific importance and meanings are expressed in art.<sup>1</sup> Here, we engage Ford's challenge and examine depictions of corn and other plants in Southwest rock art, pottery, and mural painting traditions, ranging from tenth- and eleventh-century Mimbres to the historic Pueblos.

Anthropological Papers  
Museum of Anthropology, University of Michigan  
Number 94

**Engaged Anthropology**  
Research Essays on North American  
Archaeology, Ethnobotany, and Museology

edited by  
Michelle Hegmon  
B. Sunday Eiselt

PAPERS IN HONOR OF **RICHARD I. FORD**

Ann Arbor, Michigan  
2005