Bounded population forecasts of Nye County communities generated by the cohort-component method: A mushrooming development

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Bounded population forecasts of Nye County communities generated by the cohort-component method: A mushrooming development

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University of Nevada, Las Vegas, 1994
Bounded Population Forecasts of Nye County Communities
Generated by the Cohort-Component Method:
A Mushrooming Development.

by

Douglas G. Arnold

A thesis submitted in partial fulfillment
of the requirements for the degree of

Master of Arts
in
Economics

Department of Economics
University of Nevada, Las Vegas
August 1994
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August 1994
ABSTRACT

This study will forecast the subcounty population of Nye County, Nevada in convenient and useful boroughs for the purpose of assisting local planners in allocating essential services. We shall explore and revise a new technique by providing a means of quantifying the accuracy of population projections using the cohort-component method. This technique will place a formal measure of uncertainty around the projections by analyzing bias and random errors; a Mean Square Error (M.S.E.) Confidence Interval (CI). The two sources of error will be extended to cover errors in cohort-component projections resulting from net migration, mortality, and fertility. In addition, the cohort-component method will include a basic industry adjustment for net migration. This new approach will extradite unforeseen, economic motivated migration. Net-migration will also be trended to the western states average to account for changing migratory behavior. Under a similar assumption, fertility will be linearly trended toward national levels to account for the changing demographic characteristic of the population.
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Hypothesis

The purpose of this paper is twofold: 1) To explore the attributes of the cohort-component and extend its application to an area with severe data deficiencies. The isolated character of Nye County presents an ideal test area. 2) To expand the recent work on the cohort-component method by placing a formal measure of confidence around a forecast in an open society.
Chapter 1

Introduction

The Department of Energy (DOE), under the Yucca Mountain Socioeconomic Monitoring Program, has expended immense resources in time and money to acquire a population projection for Nye County and subcounty areas. To date, after several tedious and frustrating years, a reliable, accurate, and defendable projection that all involved parties agree on, has not been released. One purpose of this paper is produce yet another projection. The anticipated results of this paper are hoped to either substantiate or contradict previous work. In addition, it is hoped that the process used to make the projections will be accepted not only in Nye County, but as an inexpensive means for other small areas to acquire population projections.

Population projections are key elements of many planning and policy studies. Unfortunately, they have been inherently inaccurate. In small areas, the lack of data has made detailed projections even more improbable. In some areas, the absence of socioeconomic projections has, by default, allocated sub-county population by a best-guess approach. When projections were available, the user, until recently, had no means of determining the accuracy of
projections. Instinct and experience were the only tools available in appraising the reliability of estimates.

The intent of this study is to increase the small area planners' ability to forecast populations in the short term. We will explore and revise a new technique by providing a means of quantifying the accuracy of projections. This technique will place a formal measure of uncertainty around population projections using the cohort-component method. By analyzing bias and random errors, a Mean Square Error (M.S.E.) Confidence Interval (CI) will be constructed around projections. Bias is accounted by Demographic Analysis (D.A.) over two successive census counts. Random error is attributed to sampling errors naturally occurring in enumeration. The two sources of error will be extended to cover errors in cohort-component projections resulting from net migration, mortality, and fertility.¹

The cohort-component method will include a basic industry adjustment for net migration. This new approach will extract unforeseen, economically motivated migration by adjusting the net migration rates. Net-migration rates will be trended to the western states average at an appropriate time in the future to account for changing migratory behavior. Fertility will be linearly trended toward

national levels to account for the changing demographic characteristic of the population and their subsequent change in behavior.

Projections from the cohort-component method will be presented in a manner that will easily assist the small area planner. That is, cohorts will be categorized independently, in five year age groups, by gender, and in aggregate. Confidence intervals around the population projection are designed to assist the planner by setting boundaries around the projected value, given a set of strategic assumptions. The assumptions regard secular trends in the components of population change. Precision statements will follow population projections to help assess their accuracy. Together, the presentation format, confidence intervals, and precision statements may be used to assist local officials in allocating essential services throughout Nye County communities.

B) The Study Area:

Nye County, Nevada is a sparsely populated area due north of Las Vegas, Nevada. It is the second largest County in the forty-eight contiguous United States. It has a land mass of 18,155 square miles (47,021 square km.) which is slightly larger than the combined states of Connecticut (5,009 mi.), Delaware (2,057 mi.), Massachusetts (5,009 mi.), and Rhode Island (1,214 mi.). Nye County's 1990 population
density is equally impressive, 0.99 persons per square mile (0.38 per square km.) compared to the national average of 69.2 persons per square mile (43.3 per square km.). The bulk of the populace lives in scattered semi-urban unincorporated communities.

Two distinct subdivisions exist within Nye County. Each has approximately the same landmass. In the south, the communities tend to be larger, population density is greater and the economy more diverse than its northern partner. Tourism, and service industries, replace mining activities as the major employer. Non-economic migration, plays a greater role in determining growth. However, the south retains the isolated properties that characterize the north. The majority of the land is uninhabited desert, held predominantly by the Bureau of Land Management and population centers tend to be scattered. Unlike the south, the north is subdivided by two mountainous ridges that isolate the region into three corridors running north-south. The ridges act as a barrier to trade and development. It is hypothesized that natural increase and economic migration will be the decisive factors in determining future growth in this sector.

The Nevada Test Site (NTS) occupies approximately one-fifth of the County. Located on the eastern border of the County, half in the north, half in the south, the Department of Defence operates this facility as a nuclear testing
ground. The Nellis Air Force Gunnery and Bombing Range, though technically a separate identity, is not distinguished as such in this paper. It is located adjacent to the NTS and operates with the same restrictions. Access to both is restricted, operating in seclusion from the rest of the County. The facility is located thirty miles north of Las Vegas and extends north 180 miles.
Chapter 2

Demographic Metabolism

Births and deaths of individuals viewed from a societal standpoint is a massive process of personnel replacement, referred to as "demographic metabolism." The biological progress of the individual throughout his/her life is distinguished from changes in the population of which they are a component. Both developments are important to the small area planner. Births and deaths in the populace are crucial in determining rates for the purpose of forecasting population size in future years. The biological process of the individual is important for determining lifecycle effects on the type and quantity of services the individual demands and will demand in the future. Population estimates are crucial in determining the allocation of funds at the state and substate level. Rosenberg and Myers verify this fact. "There are many states that now allocate state-generated revenues as well as selected federal grants wholly

---

or partially on the basis of demographic information..."³

Natural increase is the single most influential component of population growth in many small areas. It is paramount that demographic metabolism rates match reality for the construction of accurate population estimates. A slight error could mean a divergence in a population estimate, and hence, inequitable funding. Simulating natural increase accurately is vital to our forecasts.

The most common approach in projecting mortality is to compute age and gender specific survival rates from appropriate life tables and project these rates into the future. In the absence of location specific rates (Nye County rates), Nevada age-specific rates will be applied to the 1980 census population (1990 survival rates cannot be calculated. It is anticipated that the Census Bureau will release the necessary data from the 1990 census in the fall


Many other scholars agree that natural increase is significant in determining population estimates and the subsequent level of funding local government receives from higher government. These sources include:

Doolittle and Jones, "Developing Population Updates For Revenue Sharing In Florida," Review of the Public Data Use Two, 1974, P.8-14.


of 1994). Rates are formed by the National Center for Health Statistics using the Life Table Survival Method (LTSM) centered at a one year interval around 1980. The three year moving average is taken as a proxy of behavior to minimize the possibility of sampling bias that may occur in any one year.

Mortality rates have dramatically decreased in the past century. Advances in medicine, shelter, and nutrition have continually increased the expected life of the average American. Incremental changes have steadily fallen suggesting marginal future increases in the life expectancy of Americans. That is, individuals in the study area in the next fifteen years are expected to live approximately the same average lifespan as people in the study area do today. Thus, mortality rates will not be trended downward to account for the slightly longer life expectancy in the future. The short time span, fifteen years, coupled with relatively small changes in mortality rates, do not warrant the extra labor restructuring the rates would demand.

Table 1A

Expected Life of a Nye County Resident, 1960-1990.

<table>
<thead>
<tr>
<th>Time</th>
<th>Male</th>
<th>Female</th>
<th>Percent Change in Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>67.4</td>
<td>74.1</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>69.1</td>
<td>76.3</td>
<td>2.52</td>
</tr>
<tr>
<td>1980</td>
<td>70.7</td>
<td>78.1</td>
<td>2.45</td>
</tr>
<tr>
<td>1990</td>
<td>72.7</td>
<td>79.6</td>
<td>2.83</td>
</tr>
</tbody>
</table>

Male 2.83 Female 1.92
Dismissing the restructuring of mortality rates alleviates the responsibility of justifying what the restructured rates should be. This does not mean that mortality rates will remain stable throughout the projected period. Differences in mortality rates may arise if the demographic, or socioeconomic character of an area is changing. Nye County is experiencing such change. High migration is altering the demographic composition of the populace. As the character of society changes, values change. These changes have and will exert marked effects on behavior. An adjustment should be made to simulate these changes. To compensate for the changing society, mortality rates will be trended to national levels in fifty years. Fifty years was chosen as a proxy for complete mortality change because migration by this interval will be so overwhelming as to dwarf the "original" 1990 population, and the values they hold.

To compute the number of survivors in the simplest manner, the number of persons in any period, in any age category, are carried forward to the next five year interval by multiplying the number of individuals by their corresponding age-specific five year survivorship rate. For instance, the 1990, male 5-10 age group is survived to 1995 by multiplying the male 0-4 survival rate to the group.

---

Each age category and gender group is forwarded by the same technique. Newborns are survived by a slightly different procedure. Since we are not sure when the babies in the next five years will be born, we assume that they are evenly distributed throughout the five year interval. Since the average age of newborns at the end of the five year interval will approach two and a half years, the application of the full five year mortality rate is unjustified. A mortality rate of one-half must be applied to account for their average shorter lifespan. Arithmetically, the new survival rate for 0-4 age group will be:

$$\text{ASR}_{ij} = (1 - (0.5 \times (1 - S_{ij})))$$

where, $\text{AS}_{ij} =$ Half of the 0-4 gender specific age category survival rate. 
$S_{ij} =$ Nevada age and gender specific survival rate for ages 0-4 years.

A mortality trend to national levels is easily accomplished by adding the differential from the Nevada and National survival rates. This produces a linear progression of survival rates towards the national average. The survival rate differential multiplied by the number of forecast intervals from 1990 is added to the Nevada survival rate each period:

$$\text{TRENDS} = (1 - (0.5 \times (1 - S_{ij}) \times (T \times (S_{ij} - \text{NAT}_{Sij})))$$

where, $\text{TRENDS} =$ Survival rate trended to national levels. 
$S_{ij} =$ Nevada age and gender survival rates. 
$\text{NAT}_{Sij} =$ National age and gender survival rates. 
$T =$ Number of five year intervals from 1990.

The remaining question is, at what future date will Nye
County mortality rates equal national rates, and why? The author has chosen to trend mortality rates to national levels in fifty years. Fifty years was chosen as the interval after a review of expected life of Nye County residents and the national average. Gains in the expected lifespan of Nye County residents have continuously declined. Further, the gap between Nye County lifespans and national average expected life has closed. The trend will likely persist. Mortality authorities suggest state and national schedules will converge sometime between twenty and fifty years. To maintain a conservative forecast, the later date will be used. The course at which the change will occur is a subject of conjecture and speculation. This view is consistent with the U.S. Actuary of Social Security Administration.\textsuperscript{5} Mortality is slightly nonlinear in the short term, but, Carter maintains over time a linear mortality path is present.\textsuperscript{6} Following Carter's findings, a linear path will be initiated.

The mortality trend is very simple to add to the calculations.


A) Calculate the difference between national mortality rates and county specific rates for all age/gender categories.

\[ \text{DIF} = \text{NTSR} - \text{NSR} \]

where, \( \text{DIF} \) = Difference in Rates
\( \text{NTSR} \) = National Survival Rates
\( \text{NSR} \) = Nevada Survival Rates

B) Divide the difference in age/gender specific rates by six (6) to get a linear five year difference in rates.

\[ \text{5DIF} = \text{DIF} / 10 \]

where, \( \text{5DIF} \) = Five Year Difference

C) Calculate new age/gender specific survival rates.

\[ \text{ASR} = \text{CSR} + (T \times \text{5DIF}) \]

where, \( \text{ASR} \) = Adjusted Survival Rates
\( T \) = Number of intervals from 1990.

D) Survive all age/gender specific categories using \( \text{ASR} \).

\[ \text{POPi} = \text{ASR} \times \text{POPi-5} \]

where, \( \text{ASR} \) = Adjusted Survival Rate
\( \text{POPi} \) = Population in an any age group (Male or Female)
\( \text{POPi-5} \) = Population in one lower age group (Male or Female) five years earlier.

A regeneration of the population is necessary for replacement of the population and growth. Local fertility rates are preferred for small area analysis because differences in rates regularly occur and depend on geographical location, culture, religion, and race. Fertility rates employed in this model are county specific. Births, by age of the mother, were retrieved from the state's vital statistics department. Births were recorded from origin of residence, eliminating births in Nye County from individuals who reside outside of county boundaries. Children born outside of Nye County to parents who reside within the county are included. Age-specific fertility rates were calculated by summing the number of births in
each five year age category of the mother in ten year period (1980-1990) and dividing by the corresponding number of females.

Fertility rates, in contrast to mortality rates, have not experienced the dramatic changes in the past twenty years. The relative constancy in fertility rates in Nye County is an indication that the status-quo may persist. The model's fertility rates will not be trended for no empirical justification exists. Fertility rates are assumed constant throughout the forecast interval.

To avoid bias, the fertility rate for each five-year interval is applied to the estimated number of women in the center of that interval. Interpolating the female population in the middle of each projection period is accomplished by averaging the number of potential mothers in each age group and surviving the potential mothers at one-half the mortality rate. Using this technique, mortality rates (1-survival rates) and net-migration rates are reduced to half of their normal potency.

\[
B_j = \frac{((F_b \times %M \times \text{Ferti}) + (F_e \times %M \times \text{Ferti}))}{2} \times (1 - 0.5 \times (1 - \text{ASR}))
\]

where:  
- \( B_j \) = Gender specific births.  
- \( F_b \) = number of males or females at the beginning of the interval.  
- \( F_e \) = number of males or females at the end of the interval.  
- \( \text{Ferti} \) = age-specific fertility rate.  
- \( %M \) = ratio of male babies to total babies 1980-89.  
- \( %F \) = ratio of female babies to total babies 1980-89.  
- \( \text{ASR} \) = age specific survival rate for age group 0-4 years.

As time passes, the survival rate differential is added to
the Nevada survival rate. To forecast births for intervals in the future, the number of females in 1990 must be replaced with the correct forecasted female population bounding the forecasted period (the previous period and the projected period).

Several alternative techniques are available for calculating the number of births in a five-year projection period using age-specific fertility rates. However, each is unsatisfactory. Age-specific birth rates may be applied to potential mothers at the end or beginning of the five-year interval. If the number of females in the initial period was applied, one would ignore the chances of these individuals dying before motherhood, and the impact of net-migration of the number of potential mothers. If the post period number of females was used, net-migration will over inflate the number of potential mothers. In either case, survival rates will be applied in full to the potential mothers, decreasing their numbers before the possibility of motherhood. Alternatively, births may be calculated for the first and last year of the five year period, summed, and inflated by two and a half. An apparent disadvantage to this technique is the possibility of error if the female population is significantly understated or overstated in the first or last period. The calculation assumes even growth of the female population throughout the interval.
Chapter 3

Net Undercount Errors

Recent exploration has nullified some of the problems that underlie census errors. The problems arise from undercount errors in the census. Young children and minorities are routinely undercounted. An undercount would understate the adult population in the future and perpetually undercount the net-migrants throughout the forecast interval. Since Nye County is almost homogeneously Caucasian, race is not an issue. However, enumeration errors exist in all age groups, with marked undercount errors in children. Left uncorrected, bias would enter the model through the use of biased estimators. A correction, through the use of a net census undercount adjustment, could be incorporated into the model to produce unbiased estimators. A conscious decision, each with advantages, must be made, to use either biased or unbiased estimators in the model. This decision will be addressed in full, later. Meanwhile, assuming the net undercount adjustment may be relevant and beneficial for our purpose (see Migration:MSE

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Boundary section) the technique will be pursued. The technique is commonly referred to as an "inflation-deflation" procedure.

The inflation-deflation procedure is a double count system designed to estimate individuals omitted from the census. The initial population is deflated when the census is administered, and subsequently inflated to more appropriate levels. Net censal bias is eliminated by the use of demographic analysis (DA). DA provides a proportional count, by age, gender and race, of the undercount for a census.⁸

DA chosen for the net undercount adjustment is in five year national age specific intervals for "Whites Only" for the censal years of 1980, 1990. To compute a net undercount estimate for a specific census year, the census population is divided by one subtract DA (DA is forwarded two age groups to account for their real age ten years ahead in 1990) subtract the census population. An example is provided below.

\[
\frac{\text{POP}_{ij}}{(1-\text{DA}) - \text{POP}_{ij}}
\]

where, $U_{ij} = 1980$ net undercount for age group $i$, gender $j$. 
$PO_{ij} = 1980$ population for a five year age and gender group. 
$DA_{ij} = 1980$ Demographic Analysis forwarded two age categories.

This procedure is applied to all age groups, except the youngest and oldest two categories. Individuals 80 years and older are omitted from the net undercount adjustment, for they will be in the 85+ age category in 1990, and assumed deceased by 1995, the year the net undercount takes effect. The forwarded population of newborns, and 5-10 age group, in 1990 must be accounted for in 1980. To adjust for the number of newborns in the 1990 census, the number of births, by gender, in the interval 1985-1989, is divided by one subtract $DA$ for the 0-5 age category, subtract the number of births (by gender, 1985-89). Likewise, to adjust the 5-10 age group in 1990, the number of births, by gender, in the interval 1980-84, is divided by one subtract $DA$ for the 5-10 age category, subtract the number of births.

$$
U_{(0-4)j}^{85-89} = \frac{B_{ij}^{85-89}}{(1-DA_{(0-4)j}) - B_{ij}^{85-89}}
$$

where, $U_{(0-4)j} = 1980$ net undercount for age group 0-4, gender $j$. 
$B_{ij}^{85-89} = $ Gender specific births, 1985-89. 
$DA_{ij} = $ Demographic Analysis, 1980, for age group $i$, gender group $j$. 
\[
U_{(5-9)j}^{80-84} = \frac{B_{ij}^{80-84}}{(1-DA_{(5-9)j}^{80-84}) - B_{ij}^{80-84}}
\]

where, \(U_{(5-9)j}^{80-84}\) = 1984-89 net undercount for newborns, \(80\) gender group \(j\).
\(B_{ij}^{80-84}\) = Gender specific births, 1980-84.
\(DA_{(5-9)j}^{80-84}\) = Demographic Analysis, 1980, for age group 5-9, gender group \(j\).

The net undercount error for 1990 is calculated exactly in the same manner, except DA does not need to be forwarded two periods. The calculation of net undercount errors for 1990, for all age and gender groups proceeds as follows:

\[
U_{ij}^{90} = \frac{B_{ij}^{90-84}}{(1-DA_{ij}^{90}) - B_{ij}^{90-84}}
\]

where, \(U_{ij}^{90}\) = 1990 net undercount, for age group \(i\), gender \(j\).
\(B_{ij}^{90-84}\) = Gender specific, age specific births, 1980-84.
\(DA_{ij}^{90}\) = 1990 Demographic Analysis, for age group \(i\), gender group \(j\).

Several problems are associated with the proposed "inflation-deflation" procedure. One, precision over time is difficult when tracking projections of true births of cohorts. The second problem, census coverage error may vary significantly over different locations. Measuring the errors across communities is extremely difficult and beyond
the scope of this paper. In an uncertain environment, an assumption that coverage errors are equal among communities is made. The major difficulty, according to Eriksen and Kadane, is demographic analysis provides only an estimate of net undercount but provides no information on its components.\textsuperscript{9} We know an undercount exist. The problem arises in quantitatively pinpointing the cohorts. A final criticism of demographic analysis and net undercount is the count is too low. Undocumented aliens are not included in the demographic model making the estimated undercount artificially low.\textsuperscript{10} The problems associated with the net undercount are formidable. If unbiased estimators are desired, a partial correction is better than allowing all the undercount errors to persist. If biased estimators are desired, the net undercount correction will be useful in calculating net-migration and population boundaries. Therefore, national demographic analysis ratios will be applied to estimate local census sampling error.\textsuperscript{11} The components of the undercount will be allocated by age and


\textsuperscript{11} Bender and Verna, "Projecting Populations by Age and Sex: The Complete Model," Projecting State and Local Populations, Chapter 9, P.203-205.
gender according to their original 1990 ratios of the total community population.
Chapter 4

Migration Review

Generalizations about migration have been advanced by many population specialists. Their theories, laws, models, hypotheses, and typologies are as diverse as the backgrounds of the individuals who created them. To form a solid theoretical foundation for migration, a literary review will be profitable. Particular attention will focus on major achievements and new developments that influenced our decision in quantifying migration in the cohort-component method. The theoretical foundation for the underlying assumptions in the cohort-component method is based on the innovative work presented.

One of the earliest and certainly most influential theorist on migration is E.G. Ravenstein. His 1885 paper, "The Laws of Migration" and subsequent publication under the same title, revolutionized migration theory. Ravenstein's ideas can be summarized in seven points: 1) Economic factors and employment opportunities are motivating elements and predominate other factors 2) Migrants usually travel short distances - later supported by migration revolutionist, G.K. Zipf 3) large industrial centers induce long distance migration 4) strong migration currents cause feeble
counter-current migration 5) an emphasis from rural to urban migration 6) females are more likely to migrate 7) a small world theory - migration increases as technology and industrialization take place.\textsuperscript{12} Ravenstein's papers were highly criticized by his colleagues and many of his theories do not hold today. However, his assertion that migration is primarily economically induced directed researchers to a new field that dominates scholarly discussions today.

Early studies concentrated on Gravity-type models, which assume migration is directly related to the size of the population in the origin and destination. It was assumed that the magnitude of migration was inversely related to the distance between origin and destination. Gravity models imply a hidden psychic cost associated with distance. The further an individual moves from their origin, the higher the cost, due to the opportunity costs associated with less information, and less frequent interaction with family and friends. The higher the cost, the less likely an individual will perceive migrating beneficial.\textsuperscript{13}

The socioeconomic "push-pull" theory is the most widely used theory by researchers. The theory contends that


migration results from socioeconomic imbalances between communities, regions, and countries. Individuals are "pushed" away from their origin by disadvantageous local conditions and "pulled" to other destinations by attractive or advantageous factors. The theory generalizes that migration tends to proceed from less to more prosperous areas. Application of the "push-pull" theory in economic models is numerous. Unfortunately, no consensus has been established on what variables entice people to migrate. Economists have demonstrated, with bountiful empirical support, that higher real wage rates offer strong incentives to potential migrants.\textsuperscript{14} Labor market theory offers a different approach. Spatial mobility of labor assumes that given a differential availability in jobs and employment opportunities between two areas, the labor force will move


from areas of less to areas of more jobs.\textsuperscript{15}

Some empirical models combine variables from several fields. For example, the Economic-Demographic Forecasting and Simulation Model (EDFS) developed by Regional Economic Modelling Incorporated (REMI) uses responses to changes in relative factor costs, expected income, wage responses to changes in labor market conditions, and changes in the share of local and export markets in response to changes in regional profitability to determine migration between regions, counties, and communities.\textsuperscript{16} Other models have combined rational expectations with differential economic opportunities to form several behavioral models of migration.\textsuperscript{17} The developments in the various fields of migration are impressive. Each has demonstrated a logical progression of thought with substantial empirical support. However, a definitive, qualitative, explanation of the determinants of migration is yet to be defined.


Non-economic considerations entice individuals to migrate. Quality of life (QOL) conditions such as schools, medical services and cultural amenities also enter the decision making process.\textsuperscript{18} Place characteristics such as climate, geography, pollution and distance from personal important centers such as family, affect the individual's decision to migrate.\textsuperscript{19} Alternatively, demographers contend that an individual's propensity to migrate is related to the stage or development of the potential migrant in their life and their goals.\textsuperscript{20} An individual's final decision may be a culmination of several factors, each with varying significance. However, it is generally accepted that migration is more responsive to marginal changes in economic factors than QOL or other factors.\textsuperscript{21} Amenities, place characteristics, life cycle considerations, or distance may only serve as compensating factors for real wage or


employment differentials. Recent studies on the determinants of migration have focused on the context of individual utility maximization. Current emphasis is on the family or household as a decision making unit. In any event, the formation of these studies are congruent with microeconomic theory and aid in analyzing migration patterns.

Each of the various determinants are responsible, to some extent, in attracting migrants to Nye County. For this, aspects of each have been incorporated in the cohort-component method. Differential labor opportunities is the foundation for the basic industry adjustment. The western migration trend is oriented to gravity models. Pahrump's relatively unaltered migration rate is a function of quality of life and life cycle considerations.

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Chapter 5

Net Migration

a) Cohort-Component Net Migration

Estimates of net-migration in the cohort-component are formed through a residual based technique, aptly named the cohort migration-survival method. The 1980 population forwarded to 1990 will be subtracted from the 1990 census population (P1) to obtain a residual. The residual is interpreted as net-migration (NM) incurred between 1980-1990. A debate is currently engaged between the advocates of the precensal and postcensal migration rates. The implication of using either method is clear. This paper shall use neither. The net migration estimates used in this document were developed using the "Forward" version of the Life Table Survival Method (LTSM) and the cohort migration-survival method. From a technical standpoint the "forward" version of the LTSM is superior for it accounts for births and deaths in the studied period while excluding net-migration.23

\[ NM_{ij} = \frac{POP_{ij} - (POP_{ij} \times S_{ij})}{90} \]


where, $\text{NM}_{ij} = \text{Net migration, age group } i, \text{ gender group } j.$  
$\text{POP}_{ij}^{90} = 1990 \text{ age/gender specific population.}$  
$\text{POP}_{ij}^{80} = 1980 \text{ age/gender specific population.}$  
$S_{ij} = \text{Age and gender specific survival rate.}$

The estimated net-migration (NM) is converted to rates for the purpose of forecasting. The superior rates are calculated by dividing the NM by the "expected" population, that is, the survivors at the end of the intercensal period, of the initial population.\textsuperscript{24} The accuracy of the net migration estimates depends on two factors: 1) the accuracy of the Life Table survivorship rates used in the application and 2) the relative accuracy of the census counts bracketing the period for which net migration is desired. The life table survivorship rates, as mentioned, are Nevada specific and are trended to national levels (for justification see mortality section). The other concern is the census counts. They were conducted by the United States Bureau of the Census and corrections for net census undercount have been purposely omitted (see net undercount section and population forecast section) for the purpose of retaining biased estimators.

b) Net Migration: Trended Toward Western United States Average

Net migration rates will be trended toward the 1990 three year moving western United States regional average. The western rates are a weighted average, using population as weights, for the states of Arizona, California, Idaho, New Mexico, Nevada, Oregon, Utah, and Washington. These states were chosen for two pivotal reasons: 1) The Internal Revenue Service (IRS) records County to County migration patterns from income tax forms and are easily obtained. They enumerate the entire (legal) potential internal migrants of the United States 2) IRS data for the years 1979-89 reveals that the top ten places of residence for new migrants entering Nye County come from the West.

The western states were chosen purposely. According to the IRS, the western states have consistently accounted for more than 77 percent of all inmigrants in Nye County. Outmigration is slightly less unequally distributed. Eight out of ten residents leaving Nye County migrate to other Western states (table 5A). One caution should be issued: IRS gathers data from citizens and registered aliens; illegal aliens are not enumerated for obvious reasons. The extent of illegal alien migration in Nye County is an unknown variable. However, it does exist, causing an error.

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in the net-migration forecasts.

Table 5A

Nye County Migration Patterns of the Combined Western United States, 1978-1990.

(expressed in percent of total migration)

<table>
<thead>
<tr>
<th>Year</th>
<th>Inmigration</th>
<th>Outmigration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>82.64</td>
<td>81.94</td>
</tr>
<tr>
<td>1980</td>
<td>77.68</td>
<td>81.57</td>
</tr>
<tr>
<td>1981</td>
<td>83.22</td>
<td>83.98</td>
</tr>
<tr>
<td>1982</td>
<td>81.10</td>
<td>86.13</td>
</tr>
<tr>
<td>1983</td>
<td>81.01</td>
<td>84.50</td>
</tr>
<tr>
<td>1984</td>
<td>86.14</td>
<td>87.01</td>
</tr>
<tr>
<td>1985</td>
<td>85.40</td>
<td>87.09</td>
</tr>
<tr>
<td>1986</td>
<td>85.51</td>
<td>88.20</td>
</tr>
<tr>
<td>1987</td>
<td>86.65</td>
<td>82.57</td>
</tr>
<tr>
<td>1988</td>
<td>85.51</td>
<td>84.74</td>
</tr>
<tr>
<td>1989</td>
<td>85.64</td>
<td>87.19</td>
</tr>
<tr>
<td>1990</td>
<td>82.49</td>
<td>86.30</td>
</tr>
</tbody>
</table>

Average of 1978-1983          81.13  83.62
Average of 1986-1990          85.16  85.80

The extraordinary migration to and from the western United States to Nye County dwarfs all other centers and regions. Economic ties between western states have steadily increased. A correlation between surplus labor in industries that require skilled labor and job opportunities is evident in several states, especially in states heavily involved in mining. Distance from large centers of population on the east coast has discouraged migration to Nye County while the close proximity to California has encouraged it. Reviewing the origin and destination of migrants to and from Nye County, the influence of the west
is overwhelming. The average five year immigration rates from the western states have changed from 81.13% in 1978-83 to 85.16% in 1986-1990; an increase of 5.00%. Outmigration to western states has increased 2.61% in the same period.

The migration patterns exhibited in the past fifteen years has a profound effect on the character of the population. As more individuals migrate to Nye County from the West, and as more long time residents leave, the attitudes, beliefs, and behavior of the populace will change. The new residents will alter the County's propensity to migrate, moving it toward the Western U.S. rate. As a result, Nye County's migration rates should not remain stable. Nor should it reflect national trends. Rather, a strategic assumption will be made, converging Nye County's migration rate to the Western average.

In the cohort-component method presented, location specific migration rates are converged to the western region's average by the following:

\[ 5CNM_{ij} = \frac{(WNM_{ij} - NM_{ij})}{10} \]

where, \( 5CNM_{ij} \) = Five year net migration convergence rates, age and gender specific.
\( WNM_{ij} \) = Western United States age and gender specific net migration rates, 1980-1990.
\( NM_{ij} \) = Nye County age and gender specific net migration rates.

\[ NNM_{ij} = NM_{ij} + T(5WNM_{ij}) \]

where, \( NNM_{ij} \) = New converging Nye County net migration rates, age and gender specific.
\[ \text{NMij} = \text{Nye County age and gender specific net migration rates.} \]

\[ T = \text{Number of five year intervals from 1990.} \]

\[ 5WNMij = \text{Western United States age and gender specific net migration rates, 1980-1990.} \]

Each age and gender group's new migration rate is calculated identically, at a constant convergent rate in percentage terms. In real terms, this produces different migration convergent rates for each age and gender group at each location due to dissimilar variances between the location specific and western average migration rates. Therefore, the intensity of change for the new age and gender specific migration rates will vary.

The new age and gender specific net migration rates will be applied to the base period population to calculate an estimate of net migration for the following forecast period, and throughout the forecast horizon.

\[ \#\text{NMij} = \text{NNMij} \times \text{POPij} \]

where, \#\text{NMij} = \text{Age and gender specific migration.}

\text{NNMij} = \text{New converging Nye County net migration rates, age and gender specific.}

\text{POPij} = \text{Base population at the beginning of the interval, age and gender specific.}

c) Migration: Basic Industry Adjustment

If we rely on the assumption that current employment (1992) will remain constant for the forecasted interval, and previous migration (in or out) due to mining employment opportunities was a function of commodity prices, which cannot be accurately forecasted, then an economic adjustment
for the influence of a basic industry is warranted if the industry distorts net migration. A basic industry is characterized as one which dominates an area, and the existence of other industries is reliant on the continued operation of the basic industry. Mining is a basic industry in the northern region of Nye County, and to a lesser extent determines the magnitude of migration in many southern communities. Mining offers lucrative employment opportunities that cannot be found elsewhere. In outlying areas, mining may provide the only source of employment.

As mining activity increases, retail and commercial businesses relocated to cater to the needs of the miners. In many cases, the businesses would not relocate, or would be operating in a reduced capacity, if mining activity was absent.

The underlying assumption of the economic adjustment stresses the uncertainty of commodity prices for the minerals and metals. Current prices are depressed, smoothing exploration and development in Nye County. Endowed with imperfect information and conscious of uncertain markets, the only defensible assumption is the continuance of current market prices and conditions; no new major high grade deposits will be discovered in Nye County.

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the economy suffers no major disruptions, excessive changes in demand and unfavorably swings in policy. With these assumptions holding, we conclude that previous migration to Nye County by individuals for employment in mining ventures was unexpected and should be subtracted from the existing population before computing the county/community's net migration rate. Since the cohort component technique uses the prevailing migration rate between two intercensal periods as the forecasts migration rate, the economic migration in this period must be examined. Specifically, economically motivated migration, due to employment opportunities in the mining industry, between the years 1980-90 must be subtracted.

Quantifying the influence of changing mining activities on net migration is difficult. The number of persons employed in the mines of Nye County is available in aggregate, but employment at the individual mines for the whole period (1980-1990) is not. This would not effect the formation of our county level forecast, but we would be unable to suballocate net migration to the community. The earliest employment data available on the individual mines is 1986. Although, it comes in the middle of our metered period it is the best available data. An attempt to obtain the required data from the major mines throughout the county was unsuccessful. To remain consistent for all communities and intervals, the 1986-93 data from the Nevada Department
of Minerals will be used.

The formation of an economic adjustment on migration due to unpredictable mining opportunities is calculated for the 1985-1990 interval in the following manner:

\[
EMP = EMP_{1990} - EMP_{1986}
\]

where,

- \(EMP_{C1} = \text{Change in Nye County mining employment, 1986-1990 (only major operations reporting to Nevada Department of Minerals).}\)
- \(EMP_{90} = 1990 \text{ Nye County mining employment (major operations reporting to Nevada Department of Minerals).}\)
- \(EMP_{86} = 1986 \text{ Nye County mining employment (major operations reporting to Nevada Department of Mines).}\)

\[
EMIG = EMP_{C1} \times \text{Mult}_{C1}
\]

where,

- \(EMIG_{C1} = \text{Economic migration to Nye County for the purpose of employment mining, 1986-1990.}\)
- \(\text{Mult} = \text{Rural Nevada mining industry's multiplier on the creation of jobs in all sectors of the economy.}\)

Unfortunately, age and gender of the individuals is unknown and must be estimated. Age and gender of the economic migrants engaged in mining is estimated along the lines of the latest county population estimates by simple ratios. It does not include the whole population. Rather, only those individuals under sixty-five, including children. Sixty-

five was chosen because most individuals retire by this age, and relocating to a different community for the purpose of employment is unlikely. Children were included because they will accompany their family to their new home.

\[
\text{AMIGij} = \text{EMIGij} \times \left( \frac{\text{POPij}}{\text{TPOP}} \right) \\
\text{C1} \quad \text{C1} \quad 90 \quad 90
\]

where, \( \text{AMIGij} \) = Age and gender specific economic migration adjustment for individuals engaged in mining, 1990. 
\( \text{POPij} \) = Age and gender specific survived population 1990, under 65 years. 
\( \text{TPOP} \) = Total Nye County survived population, 1990, under 65 years.

Age and gender of the economic migrants engaged in mining is estimated along community lines. Estimating along community lines is necessary because the various communities have distinct demographic characteristics that should not be altered in the absence of rational ideology. Allocation of the individuals will occur on the basis of the mine's proximity to the nearest community; it is assumed that all employees of the mine reside in the community boundaries.

To incorporate the economic adjustment of mining into the net migration equation, one final step must be made:

\[
\text{TNMij} = \#\text{NMIj} - \text{AMIGij}
\]

where, \( \text{TNMij} \) = Total age and gender specific net migration, for a five year interval after basic industry adjustment.
d) Migration: MSE Boundary

The chances that actual net migration falls exactly on the forecast is small. To increase the usefulness of the forecast a boundary will envelop the estimate. The boundary will be in the form of a 95% MSE CI (see Population Boundary section). The interval is a set of boundaries uniting random (variances in migration), and systematic errors (net undercount error in census counts underlying the base population) around our strategic assumptions. It should be interpreted as a range that is likely to occur nineteen times out of twenty, with the likelihood diminishing as the distance from the forecast increases. Several steps are involved in calculating the interval. 1) The standard error stemming from the random variation inherent in scientific sampling.

\[ SE = (POP*(NSR+(T*SCR)) * (1-(NSR+(T*SCR))))^{0.5} \]

where, \( SE \) = Standard error.

\( NSR_{ij} \) = Nevada survival rate, age and gender specific.
\( SCR_{ij} \) = Rate of convergence of Nevada to national survival rates, age and gender specific.
\( T \) = Number of forecast periods from 1990.

2) The MSE CI, based on two types of error, a) the random variation inherent in mortality and b) measurement error based on the relative magnitude of systematic error occurring in successive decennial census counts for given birth cohorts as measured by demographic analysis (see Bias section).
\[
RMSE = ((SE)^2 + (BIASij)^2)^{0.5}
\]

where, \(RMSE\) = Root mean square error.
\(BIASij\) = Bias from net undercount error, age and gender specific.

a) Work on the random variance inherent in mortality was developed by Chiang.\(^{28}\) While Chiang's work has a strong empirical and theoretical foundation, the calculations are lengthy and tedious. Expanding the foundations set by Chiang, Kintner and Swanson developed a measure of the random variation inherent in mortality without complex calculations.\(^{29}\) In this method, the distribution of the number of survivors at time \(T\) is \((POPij*CSRij)\) where \(i\) denotes the age category, and \(j\) the gender. The expected number of survivors is \(E(S(T)) = POPij*CSRij\) and the variance \(V(S(T)) = ((POPij*CSRij)*(1-CSRij))\). Therefore, the sampling error (SE) for \(S(T)\) is \(SE(S(T)) = (V(S(T)))^{0.5}\). Since the only source of random variation in this system is produced by mortality, the formula for its variance also provides the variance of the number of net migrants found using the forward LTSM. \(V(NM) = V(S(T))\). It follows that the SE of the number of net migrants is \(SE(NM) = (V(NM))^{0.5}\) (see RMSE section).


b) Bias, the second source of error, is measured using the difference between net migration estimates using the 1980 and 1990 census figures for uncorrected for net undercount error and the net migration estimate using the adjusted 1980 and 1990 census figures.

\[
\text{BIAS} = ((U_{ij} \times \text{CSR}_{ij})-(U_{ij+10T}))_{80}^{90}
\]

Where, \(U_{ij} = 1980\) net undercount for age group \(i\), gender \(j\). (see net undercount section).

\(U_{ij+10} = 1990\) net undercount for age group \(i\), gender \(j\), aged ten years (see net undercount section).

\(\text{CSR}_{ij} = \) Age and gender specific County survivorship rates.

A 95\% MSE CI around migration forecast is estimated:

\[
\text{BMIG}_{ij} = \#NM_{ij} + (\text{RMSE} \times 1.96)
\]

where, \(\text{BMIG}_{ij} = \text{Boundary around migration.}\)

\(1.96 = t\text{-value associated with a 95\% C.I.}\)
Chapter 6

Population Forecasts

The population forecast consists of the interaction of all the segments discussed above. All age categories above five years are calculated identically. That is, the summation of the survived population and net migration, subtract the economic migration adjustment. Empirically, the forecasts appear:

\[ \text{POP}_{ij} = \sum_{1}^{16} (\text{Sij} \times \text{POP}'_{ij}) + \text{NMij} - \text{AMIGij} \]

where, \( \text{POP}_{ij} \) = Age and gender specific population.
\( \text{POP}'_{ij} \) = Age and gender specific population one five year interval prior.
\( \text{Sij} \) = Nevada age and gender specific survival rates, 1990.
\( \text{NMij} \) = Net migration, age and gender specific.
\( \text{AMIGij} \) = Basic industry adjustment, age and gender specific.

a) A Formal Measure of Uncertainty

Until recently, a formal measure of uncertainty for population forecasts in the cohort-component were unavailable. The problem of placing a formal measure of uncertainty is not unique to the Life Table Survival Model (LTSM). The underlying life table errors have created problems for all "deterministic" demographic measures. Swanson, Kintner, and McGehee illustrated how confidence
intervals can be placed around age-gender groups in a closed population through survivorship as well as age-gender groups of net-migrants by the LTSM.\textsuperscript{30} This paper will use a refined approach developed by Swanson and Kintner that measures uncertainty in the LTSM based migration estimates. The final version will be extended to include CI's for population projections in a open population.

The method is in the form of a Mean Squared Error (MSE) CI. The interval places an upper and lower boundary around the estimate such that the limits can be given a probabilistic interpretation concerning the accuracy of the estimate (see Precision Statement section).

The MSE CI has several advantages over the traditional CI's based on standard error (SE). SE is the most commonly used form of CI. It collects the variation from random errors found solely in sampling procedures. SE based CI's have the disadvantage of using only unbiased estimators in the formation of the interval. In our application, this would force us to adjust the net census undercount error found in the census by a formula or by a demographic analysis schedule. The adjustment in a MSE CI is not necessary; it uses biased estimators. The use of biased

estimators, and corresponding MSE CI, takes into account both random mortality error (measuring the precision of life table survivorship rates) and sampling error found in the relative net census undercount error (measuring the relative accuracy of the census counts). The incorporation of the additional error in the CI is believed to present a more accurate statement concerning the uncertainty around the forecast.

Discontent with SE based CI's stems from the width of the intervals. Kintner and Swanson found CI's generated from SE are too large to be used in many applications, including measuring uncertainty around net migration estimates.\textsuperscript{31} Kintner and Swanson base their dissatisfaction with the width of SE intervals on empirical grounds. Initial dissatisfaction with traditional multiple regression (unbiased estimators) centered around wide intervals that permitted an unacceptable number of type two errors. Ultimately, the problem assisted in the development of Ridge Regression techniques.\textsuperscript{32} Ridge Regression offers a solution to a problematic matrix, which may produce artificially inflated SE values and subsequent, type 2 errors around the


coefficients. It attempts to retain all relevant independent variables while altering the definition of error from SE to MSE. To accomplish this feat, unbiased estimators are replaced by biased ones. Doing so, Ridge Regression significantly reduces MSE, and in turn, reduces type 2 errors.

An opposing concern was the width of the MSE CI's. They were suspect as being too narrow. Excessively narrow CI's would be too restrictive for the model to operate in achieving it's goal of bounding net migration and population forecasts. In a small area, such as Nye County, "tight" intervals are undesirable since the forecasts will have significantly more error than larger urban forecasts (any single error in a small sample causes a greater variation than in a larger sample). A choice between narrow MSE CI's and the large SE CI's must be made. Our solution parallels Ridge Regression results; a preference for bias estimators, and the corresponding measure of MSE, to incorporate "total error" (accuracy) rather than use unbiased estimators, SE, which can measure only "sampling error" (precision). The disadvantages of adjusting our data for net censal undercount outweigh the restrictive behavior of the MSE CI's. The narrow intervals produced by MSE are only a side effect that leads to more conservative results. Adjusting for net censal undercount in small areas may add more error through rounding than what it is correcting.
Narrow intervals produced by MSE presents a serious challenge when choosing an appropriate interval. To illustrate the narrowness of a MSE CI, an example shall be given comparing a MSE CI and a corresponding SE CI. With infinite observations, a t-value of 1.96 is associated with a 95 percent SE CI. However, a t-value of 1.96 is associated with a level of probability that can greatly exceed 95% for a MSE CI depending on the ratio of bias to SE. Therefore, using a t-value of 1.96 for a MSE CI conveys a level of uncertainty greater than 95 percent.

The disproportionality that exists between a SE and MSE CI's must be taken into consideration when choosing an appropriate level of uncertainty. The level of uncertainty in small areas is not equivalent to the level of uncertainty in larger regions; small areas are inherently less accurate. Stoto discovered the USBC high and low national forecasts to corresponded to a 68 percent (plus or minus 1 Standard Deviation). Drawing on Stoto's work, the demographic community favors a narrow CI, relying on a 66 percent CI. The disadvantage of using such a liberal CI is the extension of a narrow population projection boundary. However, in

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constructing definitive population projections for small
areas a wider interval is appealing. Drawing on other
empirical work, a 95 percent MSE CI seems more suitable for
small areas. In Swanson's words, a 95 percent CI provides
an interval that is not too wide, nor too narrow.

Interpreting the MSE CI is exactly the same as CI based
on SE alone. That is, we are 95 percent certain that the
ture number of individuals residing in the predescribed area
will fall between the interval. It should be noted that the
population projection is a middle value, and the boundaries
constitute high and low projections. The middle projection
is interpreted as the most likely projection, not because it
retain qualities or information that the outer projections
do not have, because it is the middle value. The likelihood
of the actual population exactly falling on any projection
is unimportant. What is important, is the degree of
certainty that the researcher has in the projected interval.

The MSE CI's have some limitations. They are designed
to place intervals around a forecast given a set of
strategic, tactical, and logistical assumptions. Since the
assumptions are judgmental, that is, evaluated by the
individual developing the forecast and incorporated into the

35 Wider confidence intervals are appealing in small
area analysis because the projections are inherently less
accurate for several reasons. Data restrictions and the
subsequent manipulation of available data, combined with
small population base are the principle causes.

36 Conversation with Dr. David Swanson, July 1993.
model only when the event seems likely, the forecasts and the intervals bordering the forecasts should be viewed as judgmental. Essentially, the CI's are valid only if all the assumptions in the model are valid.37

b) Precision Statement

A precision statement accompanies all forecasts. It's intention is to lend credibility to the forecast. However, credibility is judgmental, with the user being the final judge on how much variation in the forecast is acceptable. The precision statement should be interpreted as a probabilistic means of evaluating uncertainty around the forecast. The larger the precision statement, the less reliable the forecast. To derive the precision statement, the population forecast is subtracted by the lower population boundary and subsequently divided by the forecast population. For appearance and ease of understanding, the precision statements are presented in percentage terms. Since a 95 percent confidence interval is used to obtain the forecast, the results of the precision statement should be interpreted as being within ninety-five percent of the forecast, nineteen time out of twenty.

The total and each individual age category has a confidence interval placed around the forecast. The intervals should not be viewed as secondary forecasts. Rather, they are intended as bounds for the original forecast. The formation of the boundaries are based on a 95% R.M.S.E. C.I. To calculate the bounds, each age category must be carefully manipulated. An example is provided.

\[ BPOP_{ij} = POP_{ij} + ((RMSE + SE) \times 1.96) \]

where, \( RMSE \) = Root mean squared error.
\( SE \) = Standard error.
\( BPOP_{ij} \) = Population boundary, age and gender specific.
Chapter 7

Subcounty Allocation

In Nye County, Gabbs is the only incorporated place while Beatty, Pahrump and Tonopah are Census Designated Places. In these communities, the census provides detailed demographic data on all residents. Four other communities of interest, Amargosa Valley, Duckwater, Manhattan, and Round Mountain/Hadley are identified as using administrative taxation boundaries. The taxation boundaries were chosen as boundaries for communities without census designation because they fulfilled two pivotal criteria. One, they provided legal descriptions of geographical boundaries that can easily be identified. Two, they are compatible with voter registration lists, utilized in the 1980 allocation. An additional factor aided in the selection of taxation boundaries. A 1990 housing profile of Nye County, successfully completed in 1993, attempted the same allocation. The following is a brief description of their methodology in defining the relationship between Census Bureau boundaries and taxation boundaries.

"To determine proxy census community boundaries, it was decided to overlay administrative taxation boundaries on census block maps. The Census Blocks within these boundaries were listed and indexed by community. On occasion, some Census Blocks extended beyond the administrative taxation boundaries... After field observations and consultation with county representative (Levy, 1992; Pitts, 1992), it was determined that Cross-boundary blocks... the number of persons and housing units involved was negligible."39

Compiling data from the communities where the Census Bureau geography did not correspond to community boundaries required a three step procedure to verify the disparity and population. The proper census blocks were associated with their corresponding communities and the appropriate data was retrieved from the census tapes. Data, by community, was summed by census blocks in order to determine a community count for population. A list of census blocks by community can be found in Appendix A.

The separation of census data into a uniform area is a thesis topic in itself. Having achieved a suitable geography for 1990 census data, a consistent geography for 1980 must be forged. The initial allocation of population to the community level is a vital concern; it is the benchmark for future populations and is an integral component in the age/gender specific migration rates. Unfortunately, the 1980 census is little help in

accomplishing this task. Due to the small populations of the communities, age structure and gender statistics are not provided in the census. Accepting the deficiencies of the 1980 census bequeaths a want for replacement data. Two sources of administrative records provide the solution: school enrollment and voter registration lists.

School age children and young adults are fully documented.\textsuperscript{40} Elementary and high school records identify the number and gender of students enrolled at the various locations throughout the County. Students in each grade will be summed to their appropriate five year age and gender specific category. In addition, school staff members are recorded, including the number of bus drivers, providing a symptomatic indicator of the number of children residing beyond the two mile radius of the school. Pupils using public transportation are be assumed to reside outside of the community boundaries and will be recorded in "Other Nye" unless contrary information is evident. For example, students from Amargosa Valley attend high school in Beatty. These students will be disseminated from school transportation records as residents of Amargosa Valley, not Beatty. The remaining pupils will be assumed to live in the community where they attend school. For our purpose, school enrollment and personnel data were recorded annually in

\textsuperscript{40} School enrollment retrieved from the Nye County School District, Tonopah, Nevada.
April. A review of the elementary school enrollment data prior to 1980 is necessary. Previous enrollment will be used as an indicator of the number of children who graduated from elementary school in their community, continue to reside in the community, yet, attend school in another community. The review is essential to the allocation of children because several communities are too small to warrant a school in their community.

The age category, 15-19, is more difficult to enumerate. High school attendance records provide some pertinent data, but is incomplete. Legally, at age sixteen, students can voluntarily withdraw from school. However, the drop out rate is not significant enough to hinder our results, granting their use until age eighteen. To safeguard our assumption, past enrollment will be examined for significant disparities for students over sixteen. This will require school enrollment data from 1977 through 1980—the years when the eighteen year olds (1980) were legally obligated to attend school.

The status of adults is less clear. In areas not designated by the USBC, voter registration ratios (1980/1990) will be applied to the data we know. That is, the number of inhabitants in 1990 in each community, eighteen and over, will be multiplied by the voter registration ratio.

Voter registration lists provide aggregate population
totals for enumerated residents of each community over the age of eighteen years. The geographical boundaries for voter registration in comparison to the tax boundaries range from poor to nearly identical depending on the community. In some instances, such as Pahrump and Tonopah, several voting districts may be combined to form an area consistent with tax boundaries. In others, the voting districts cannot be altered to isolate the community from the surrounding rural territory. In these places a visual field examination is necessary to determine whether a significant portion of the population resides outside of the tax boundaries. The communities of Duckwater and Gabbs use this approximation. Overlaying a map of the 1980 voting district on the 1990 Tax Boundaries highlights the disparities. However, field studies indicate the population residing in these areas are few and will not significantly influence our results. The majority of the population, in each community, reside in the valley corridor encircled by the tax boundary.

In Voting Districts where the disparities were found to be significant or inconclusive, the population is allocated to the "Other Nye" category. An attempt to disseminate the population in the "Other Nye" category is made. The communities of Amargosa Valley, Beatty, Manhattan, Round Mountain/Hadley, and Remainder of Rural Nye, are forecasted.

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Voter registration lists, 1980, 1990, were retrieved from the Nye County Clerks Office, Tonopah, Nevada.
These should be viewed as secondary forecasts. The forecasts are probable, but, their accuracy is significantly less than areas where the tax and voting district coincide. The sum of the "Other Nye" communities is accurate, reflecting the true future population, given our set of assumptions.

Individuals enumerated in each district are used as a symptomatic indicator of the community population. It would be inaccurate to contend that the registration lists represent the population of individuals eighteen and over since many individuals are not enumerated. Therefore, 1980 community voter registration lists will be compared to the 1980 County voting list to determine a ratio. The ratio will then be applied to the 1980 community adult population (18+ years). Implicit in this method is the assumption that enumeration techniques between communities were equally successful.

The 1980 adult community population (18+ years):

\[
acPOPi = \frac{acPOP \times CVL}{CVL}
\]

where, \( acPOP = 1980 \) adult community population (18+ years).
\( acCPOP = 1980 \) adult County population (18+ years).
\( cVL = 1980 \) community voter list (voting district).
\( CVL = 1980 \) County voters list.

To conform with our age categories, the eighteen and
nineteen year old individuals must be subtracted from the adult population. The number of individuals is equal to the number of students added to the 15-19 age category.

The senior population is a considerable segment of the communal population. Enumerating these subjects is crucial for planning purposes. The number of seniors in the population may suggest a gentrification of the community; one, that is not capable of reviving itself. Opposing this view is the conviction that a collection of individuals that share the same interests and experiences will grow into a sustainable retirement village. In any event, the senior population is an important segment of the population, well deserving a separate enumeration. The 1980 community population over the age of sixty-five is estimated:

\[ \text{scPOP} = \text{SCPOP} \frac{\text{CVL}}{(80)} \]

where, \( \text{scPOP} \) = Community senior population (65+ years), 1980.
\( \text{SCPOP} \) = County senior population (65+ years), 1980.

Newborns (0-4 years) are virtually impossible to enumerate by community. No records, including medical, are publicly available at the community level. County data must suffice. The youngest category will be assigned to communities based on the number of women in their childbearing years and county fertility ratios. This
technique has the advantage of considering the different age structures, the number of women of child bearing age, within a community before forecasting the number of births. Since location has no impact on the gender of newborns, gender will be assigned on the basis of county fertility ratios (1980-1989).

The community forecasts can be calculated with the same procedure as the County level forecasts, with some slight modifications. The "Forward" version of the LTSM is easily extended to produce subcounty estimates. However, sub-county age and gender specific LTS rates are not available and state statistics must be substituted. Basic communal age and gender specific migration rates are calculated identically to their county counterparts. That is, the residual between the 1990 and 1980 communal population is divided by the 1980 ten year survived population. Births occurring in the interval are calculated using the county age specific fertility rates applied to the sum of a ratio of the female populations in 1980 and 1990. The birthing procedure for the 1980-90 interval for potential mothers age 15-20 is provided below. All age groups are calculated with the same procedure.

\[
B_{80-84} = \left(0.75 \times F_{80} + 0.25 \times F_{90}\right) \times \text{Fert} \times (\%M \text{ or } \%F) \\
B_{85-89} = \left(0.25 \times F_{80} + 0.75 \times F_{90}\right) \times \text{Fert} \times (\%m \text{ or } \%F) 
\]
where, $B_{(80-84)}$ = Births (male or female) between 1980-84.  
$B_{(85-89)}$ = Births (male or female) between 1985-89.  
$F_{(80)}$ = Females age 15-20 in 1980.  
$F_{(90)}$ = Females age 15-20 in 1990.  
$Fert$ = County fertility rate by age category.  
%$M$ = Percentage of the babies born between 1980-1989 that are male.  
%$F$ = Percentage of the babies born between 1980-1989 that are female.

All trends, including migration to the western average, and mortality to the national average, in the subcounty estimates are indistinguishable in technique from their county forecasts.

Migration to each community is independent of the county's forecast. True, the sum of the communities net migration must sum to the county's total, but a community's migration rate is unlikely to equal the county's average. Hence, community migration rates should not be dependent on the county's rate. Rather, it should be based on the conditions experienced in the community. The migration rate should (and will) be community specific, calculated using the residual of the survived population to the actual population, identical to the county net migration rate.

The computations for the community specific, economic adjustment on migration for unforeseen mining opportunities are slightly different than the county's. All units in the calculation of the county's estimate remain as they were, except, the number of individuals influenced by mining
opportunities. These revert to community specific, whereas the county's was a summation of all the individuals affected in the communities. Appendix B provides a brief outline of the labor participants in each observed mine, 1986-1993.
Chapter 8

Modelling Instrument

The lack of data presents a dilemma to the researcher by restricting the researcher's choice of an accurate modelling instrument. In many instances, the researcher may wish to embark upon a different path but is prevented from doing so by insufficient data. A compromise must be realized; a compromise between achieving the goal of acquiring a detailed population projection and the limitations of the available data.

Data Restrictions

To understand the selection of the cohort-component method as the choice modelling tool for small areas, one must completely understand the constraints faced by the researcher.

The lack of available data is the principal problem confronting the small area researcher. Nye County's isolated nature, expanse of land, and small population provides an ideal domain for data shortages. Neglect, financial constraints and continuously changing boundaries are traditional culprits. Data shortages constrain researchers, calling into question their ability to produce
county forecasts, and frustrating their attempts to produce community level forecasts. In Nye County the data shortages arise from the failure to comply with two basic criteria: a) common geographical boundaries and b) public and private industry's failure to survey the demographic composition of the populace.

a) Common Geography

The lack of data stems from the United States Bureau of the Census decision to alter reporting techniques. In the past, the Census Bureau created ad-hoc geographical boundaries called Townships for its reporting of information in greatest detail. In 1990, the Census Bureau decided to alter it's reporting techniques, making the Minor Civil Division (MCD) the smallest area. The two areas are distinct, making historical comparisons between the two impossible.

Common geography over study intervals is required for any modeling technique. The inconsistency forces the researcher to adjust the data set by redefining the boundaries; a very difficult task given no prior knowledge of the study area. Adjusting the data set is a viable option, but, somewhat beyond the resources of this paper. An alternative is to discard the census boundaries and find a common geography elsewhere. But what? The Census Bureau is not alone in altering the boundaries they use. Postal
Zip codes provide a well defined geographical boundary but change frequently. They may also include several communities of interest leading us back to the initial problem of adjusting the population. Mandatory building permits that typically proceed construction of residential housing units in urban areas, are non-existent in many rural settings. Nye County is not the exception. In fact no building permits, residential or otherwise, are issued in the County. A simple allocation of the 1980 county population among communities along 1990 census proportions is unrealistic. Growth in each community is unlikely to be equivalent; the diverse economies of each community and the tendency for oscillating cyclical behavior decreases the likelihood of equal growth. Referring to the census for housing units is not profitable, for no housing counts before 1990 exist in rural Townships. A formal housing count in the field, referred to as the Housing Unit Method (HUM), is another option. Unfortunately, HUM would be a tedious, expensive and time consuming venture. Using utility hook ups as a symptomatic indicator of population is impractical due to the provision of service by several providers that have well defined service areas, yet, incompatible with our study interests. Multibox hook ups add another problem. They are frequently used in apartment complexes and trailer parks, inciting an undercount of the population. Enumeration of individuals according to tax
boundaries is impossible, for the boundaries periodically grow with legislative fiats, or were not operating in 1980. The deficiencies found in these data sources greatly reduce the available choices the small area researcher has. Finding common geography is a difficult task.

b) Detailed Age and Gender Statistics

The purposes of small area studies are numerous. Frequently, detailed population estimates and forecasts are used by community planners as a blueprint by which essential services and facilities are allocated. In addition, population estimates and forecasts are key determinants in financing for revenue shared programs. Since the demand for various services and facilities differs with age and gender of the residents, the need for demographic statistics in the forecasts is self-evident.

In many small areas the only source of demographic information available is the census. Demographic details are easily obtained from Census Bureau files, with detail down to the census block. In Nye County, the census provides detailed demographic data on Gabbs, Beatty, Pahrump and Tonopah in 1990. In 1980, only Gabbs was incorporated (Beatty, Pahrump, Tonopah became Census Designated Places in 1990). Other data sources easily accessed provide only County statistics. For instance, Medicare recipients may be used as a symptomatic indicator of the elderly population at
the county level. Community data is not available. Attempts to match county to county migration patterns from Federal Income Tax receipts, to the community level failed. Detailed demographic data below the county level is very difficult to procure.

Private industry, whose revenues rely more on the number of individuals rather than the composition of the population has for the most part, ignored collecting demographic data. The private sector's neglect of demographics leads the researcher to search for data in the public sector. The search for public documents led to elementary and high school enrollment data, and voter registration lists. These two sources proved to be the only easily accessed demographic sources of data available below the county level.

The Cohort-Component Method Overview

Numerous models have been developed for the purpose of projecting populations. Each has been designed for a specific area, population size, and data requirements. Presentation of results varies significantly, depending upon the design and intent of the model. Examples of these models include, but are not limited to, extrapolation techniques, shift-share analysis, and a variety of regression
techniques. Unfortunately, they proved to be inadequate. Each technique fails to satisfy at least one criterion necessary to serve in a small area environment. Since they do not function in the restrictions of the study area, their use is greatly diminished.

Demographic forecasting offers the most promising solution to the problems confronting the small area researcher. Demographic techniques satisfy the criteria set above, plus one; it is inexpensive to operate. The last quality is vital since local governments and small businesses usually have fewer financial resources to conduct research.

Demographic forecasting has been dominated by a single method, the cohort-component. It is widely used by demographers, ecologists, sociologists, and economists. It is a double-entry accounting framework for population inflows and outflows for a specific period of time that allows the forecaster to work through the implications of a set of assumed cohort-specific fertility, mortality, and migration rates. The analytical strength of the method

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lies in the fact that each component not only is determined by different factors but also has qualitatively different consequences for population growth.44 For our purpose, the cohort-component method is a valuable tool for several reasons: 1) The underlying assumptions of the components can adapt to the peculiarities and uniqueness of the study area. Strategic assumptions may be used to alter the rates. 2) The cohort-component model was specifically designed for small area population forecasting. The designers foresaw the need for a model that could produce accurate projections with the limited data typically found in rural areas. 3) A myriad of literature supports the hypothesis that population projections should be oriented to the short term, and attempts to forecast longer into the future are useless.45 For the purpose allocating services, a time frame of less than twenty years is ideal due to uncertain future financial endowments of counties. 4) The cohort-component method was


designed to include the demographic features of the population. The term cohort usually refers to the grouping of individuals by birth but may be defined in a broader sense as a shared experience such as marriage or graduation from school. We chose to concentrate on the age-sex composition of the populace since these two demographic features are the most influential in determining local service requirements.

The historical criticism of the cohort-component method is the fact that it is not a statistical model - less sophisticated - and therefore, less accurate. The historical criticism does not fully apply today. It remains non-statistical, but, no evidence has been found that substantiates the assertion that more complex techniques produce more accurate forecasts. Pant and Starbuck offer a more definitive statement; "A general law seems to be at work: more complex, subtle, or elegant techniques gives (SIC) no greater accuracy than simple, crude, or naive ones."46 "More complex methods might promise to extract more information from the data, but such methods also tend to mistake noise for information. As a result, more complex methods make more serious errors, and they rarely yield the

gains they promised."47

The cohort-component method has evolved from simple demographic principles. An evolutionary like process has improved the methods ability to project. Until recently, critics have claimed that the method did not allow for the usual computation of confidence intervals around forecasts.48 The newest improvement has introduced confidence intervals around intercensal net-migration and population projections in closed societies.49 Further work is needed to expand the role of CI's to transform the boundaries around net migration forecasts to CI's around populations in an open society.50

The cohort-component method has carelessly, and erroneously, been associated with trend-based techniques.

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Unlike trend-based techniques, the cohort-component method does not necessarily hold its components rigid. Strategic assumptions permit the variables to vary as time passes according to a predetermined schedule or value. Therefore, it escapes the attributes which make other techniques unattractive (see Use of Cohort-Component Rates section).

A final concern the critics have is the method's use in areas of high migratory turnover. Cohort identity is presumed to be altered by the replacement of migrants for original persons. As migration occurs, the composition of the population changes, beliefs change, lifestyles change, and the underlying assumptions of the components may no longer hold. Historical trends may not follow into the future. Indeed, the accusations are based on sound reasoning and are relevant to the high migratory influences present in Nye County. However, the accusation ignores the possibility of underlying strategic assumptions present in dynamic models. Proper assumptions may correct demographic blips that distort actual behavior.

**Use of Cohort-Component Rates**

A variety of choices, other than the methods employed, is available for tending natality, mortality and net-migration rates. The decision to alter any rate must be

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based on actual experience in some recent period in the study area. It may incorporate additional information the researcher has uncovered in the near future. A sound theoretical justification must be included. Rates are typically trended to some datapoint in the future by a specified formula or proportion of the previous intercensal rate. Likewise, tending the rates to approximate rates of other regions is empirically sound. Correlation between the size of rates and economic variables is common, tempting researchers to adjust the rates in projections according to economic variables and/or cycles. A thorough analysis of previous local, regional and national trends is necessary before adjustments can be made.
A feature typically found in the cohort model, and suspiciously absent in this paper, is a provision for "special populations". A special population is a group of persons found in a locality usually by reason of an administrative decision or legislative fiat. Typical special populations are college students, military personnel, inmates at correctional facilities, reformatories, and hospitals. Dependents of military personnel are generally added to this unique group. This segment of the population is motivated by non-economic considerations when determining place of residence. Frequently, they are insulated from the general public and interaction is irregular. Hence, these individuals have peculiarities that distort ordinary population projections. The peculiarities arise in two forms: (1) a concentration of persons in only a small number of age categories, distorting the pattern of age-specific net migration; and (2) the group exhibits extraordinary demographic behavior which conflicts with the norm. Such behavior may include, but is not

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52 Bender and Verna, "Projecting Populations by Age and Sex," Projecting State and Local Populations, Chapter 9, P.205.
limited to, unusually high or low mortality and fertility rates.

The analyst need not worry about special populations that are small relative to the unit being projected. Special treatment in a projection is warranted only when the presence of the special population is unduly obvious in the benchmark data or following years. Otherwise, the inclusion of this group will not yield results significantly different than projections made solely on general population data.

Nye County has a small special population: 100 persons were classified as belonging to group quarters in the 1980 census (16 Pahrump, 43 Amargosa Valley, 6 Beatty, 28 northern Nye), 124 in 1990 (36 Tonopah, 7 Beatty, 81 Pahrump). No university or college exists within the boundaries of the county. Long-term care for medical patients are routinely transferred to nearby Las Vegas. Inmates at correctional facilities and reformatories are almost non-existent. In 1990, there were only 72 inmates at the county's only facility, the Tonopah Conservation Camp. The short duration of the low-security inmates is occupied by performing community service duties throughout the county.

The remaining group, military personnel, associates,

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and dependents, is present in southern Nye County. These individuals are civilians contracted by the Department of Energy to perform specialized activities for national nuclear programs. An unknown number of individuals reside at the NTS. It is known that the community of Mercury has 1016 housing units that temporarily house short-term workers. Occupancy is not known. Even if occupancy were known, the employees' status as a special population is questionable. Demographically, the characteristics of the temporary civilian workers constitute a special population; they are grouped into a small number of age categories, have low mortality rates, low birth rates and are predominantly male. However, housing at the NTS is not considered their permanent residence. The individuals that occupy these units are visitors. Their families permanently reside elsewhere. Our population study focuses on the resident population, not visitors. The NTS workers who reside at Mercury are omitted based on their temporary housing status.

The majority of the NTS workers do not live in the government sponsored housing units.\(^{54}\) They reside and actively participate in their local communities. Their lifestyle, and behavior parallels the rest of society; they do not constitute a special population.

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Chapter 10

Analysis of Forecasts

The purpose of this section is to quantitatively analyze the existing population between 1980 and 1990. The forecasted population will subsequently be analyzed in timely intervals. Disparities between trends will be highlighted.

a) County

1980-90

The county population underwent a substantial change between 1980 and 1990. A growth rate of 96.25% and the population increased by 8709 individuals was experienced. Appendix D illustrates population growth, in total and by gender, surrounded by population boundaries. Appendix E provides forecasted growth rates. The female growth rate exceeded the male rate by 1.71%. The tremendous growth is somewhat misleading, for the initial base (1980) population was small. The gender proportions remained relatively constant, 53.64% male in 1980 and 53.48% in 1990.

The population matured in the 1980-1990 interval. The aging population is especially evident in the younger categories, under fifteen years, and the elderly population, 65+ years (see Appendix G1). The young residents, fifteen
and under, increased from 2066 individuals to 3740 in 1990. The 80.10% increase is well below the average growth of the entire population (see Appendix E1). In comparison, children under fifteen increased 1664 individuals, but decreased relative to the total population, representing 22.83% in 1980 and 21.06% in 1990 (see Appendix G1). In fact, the lowest growth rates were posted by the 20-24 and 15-19 age categories which underwent a modest growth of 16.67% and 20.07%, respectively. In the other extreme, the older age categories experienced high growth rates. All age categories above the age of thirty experienced rates exceeding the average, most well above 100% growth. The largest gains were made by the 80-84 age group, 247.8% increase. The elderly population represented the fastest growing segment of the population. The elderly population increased by 1359 individuals, or 166%. Appendix F provides growth rates for the four main age categories of society. The proportion of elderly in the total population increased from 9.05% to 12.27%. Appendix G1-G4 provides graphical illustrations Nye County age distributions for all age categories.

Each male age category increased in size, with significant changes in the relative positions they held in respect to the total male population. The greatest change was in young males. They increased their numbers by 798 individuals, but relative to the entire male population
decreased 16.21% from 22.65% to 18.98% (see Appendix F2, G2). The lowest growth rates were in the 20-24 age category, 8.59% and the 85+ age group, 60.00%. Again, the older age categories were subjected to the highest growth. All age categories between 65-84 held growth rates that exceeded 160%. Elderly males increased 695 individuals. The percentage of the male population greater than sixty-five grew from 8.74% to 11.78%. Appendix F2, G2 provides growth rates and age distribution of the populace. One surprise was the proportional loss of elderly people in the 85+ age category, falling from 30.91% to 25.27%. The oldest age category, 85+ years, held the second lowest growth rate, a modest 60.00%.

The change in the female population closely resembled the changes experienced by the entire population. The similarities are graphically depicted in Appendix E1-E3. Young people (0-15), though increasing their numbers by 896, held some of the lowest growth rates (see Appendix H3). The 15-19 and 20-24 age groups experienced especially low growth, 23.48% and 26.51%, respectively. Surprisingly, the low growth rates did not adversely effect the relative proportion of young people to the total population. The young were 23.05% of the population in 1980. In 1990, they represented 22.50%. The highest growth rates were held by the retired population. All age categories above the age of 65 years had growth rates that exceeded 160%. In response,
the retired population increased from 9.39% of the female population to 12.78%. Following the example of the entire population, the 80-84 age category had the highest growth rate, 276%, increasing their numbers by 69. Females, on average, continue to outlive their male counterparts. Compared to the whole female population, the number of females continue to post rates approximately twice as high as their male companions for the two eldest age categories (80-84, 85+ years). The number of females 85+ fell approximately in the same proportion as their male counterparts, 1/3, from 0.48% of the population to 0.38%.

1990-2005

I predict that the population of Nye County will endure a profound change in the next fifteen year interval. The overall growth of the population will increase by 22435 individuals, a 126.3% growth rate. Males represent 53.0% of the growth, increasing by 11821 individuals, representing 53.0% of the population. Females increase by 10614 individuals. The lowest growth rates will be experienced by the three youngest age categories. Appendix H1 illustrates the growth rates for the five year age cohorts, while Appendix F1 depicts growth in the four main age segments. The number of children will increase by 1176 individuals (31.45% growth) but their share of the population will decline from 21.06% of the population to 12.23%. All age
categories under the age of forty will experience a decline in the percentage of total population, although most will be marginal (see Appendix G). The highest growth rates will be scattered throughout the mature adult population. The 80-84 age group will have the highest growth rate, a staggering 250.1% increase or 400 individuals. The growth in the 55-59 and 40-44 age categories will be equally impressive, 239.1% and 202.2%. The high growth categories will be highly skewed toward the elder ages (40+ years). The retired population will experience a disproportional increase in their numbers, increasing by 4395 individuals, 201.9%. Appendices F, G, and H provide graphical portrayals of the elderly growth.

The male population will follow the trends of the entire population closely. The growth rate for all ages 124.5%, parallel the county total, deviating by only 1.8% (see Appendices E2, H2). The high growth categories will be the elder population, categories above the age of forty experiencing growth above 205.8%. The highest growth will be in the 80-84 age cohorts, 175 individuals or 264.7%. The retired population (65+ years) is forecasted to increase by 2291 individuals, a growth rate of 204.7%. Appendices F2, H2 provide graphs that assist in observing the elderly growth. Male retirees will accounted for 16.00% of the male population in the year 2005, up from 11.78% in 1990. In the opposite extreme, male children (under fifteen) will
experience the lowest growth, 35.16%, 19.26%, and 11.68%, respectively. Appendix G2 illustrates the change in the male population as a total of the whole male population, 1980 through 2005. The number of children will increase by 419 individuals (22.09% growth rate) but their share of the population will decline from 19.97% of the population to 10.86%. The 25-29 and 30-34 age categories will suffer a substantial decline in relative population falling 3.63% and 3.18%, respectively, between 1990 and 2005. The largest gains in relative population will be in the mature and elderly age categories. The largest gain are predicted in the 55-59 age category, increasing from 6.72% to 10.11%.

The forecast for the female population closely resembles the county population trends. A 127.9% growth rate, 10593 individuals, in all female age categories is insignificantly different from the county's (see Appendix E3). Children under the age of fifteen continued to have the lowest growth rates, slightly higher than the 1990 rates. The mature adults and elderly continued to post the highest growth rates (see Appendices F3, H3). Extraordinary low growth will be experienced in the female 25-29 and 30-35 population. Their numbers will increase by 536 individuals, posting a meager growth of 41.74% (see Appendix H3). Similarly, their population to the total female population declined dramatically, from 15.51% to 9.64%. A general decline relative to the total female population will be
evident in each cohort under forty. The cohorts above the age of forty will increase their share. These trends are illustrated in Appendices F3, G3.

**Subcounty Forecasts**

The purpose of the subcounty analysis is to identify behavior in the community forecasts that substantially differs from the county. Since listing all disparities between the community and the county forecasts would try the patience of even the most dedicated researcher, generalizations will be made. Possible explanations for the disparity are suggested. The suggestions should not be taken as the sole definitive explanation for the change, but, only as one possible rational for the change.

**Pahrump**

The Pahrump Valley is and will continue to be the most influential community in determining the population of Nye County. Population in the valley will swell from its 1990 level of 7393 individuals to 18403 in 2000, and 28866 in 2005. Appendix J1 provides Pahrump population forecasts and boundaries, 1980-2005. The incredible growth experienced in the 1980's (111.47%) will be surpassed by the growth in the 1990-2000 interval (148.92%). The growth in the population will continue into the twenty-first century with a 56.85% in
the first five year interval. Appendix K1 provides the growth rates for the four main age segments of society. The highest rates will occur in the elderly categories peaking with the 80-84 year olds. It will be the elderly segment that has the largest impact on the changing character of the population (see Appendices K1-K3). The age composition of the populace is presented in Appendix L. Lowest growth will be experienced by the middle-aged individuals (30-39 years). All other age groups, with the exception of the 5-9 years olds, will experience growth above 100%. Males will tend to have lower growth rates than their female partners.

The progressive aging of Pahrump's population, though increasingly skewed to the elderly as time passes, is consistent with the aging of the national population. The extraordinary growth in the senior population can be attributed to non-economic migration. In the past decade, developers have successfully marketed Pahrump as an alternative retirement community, combining the services of nearby Las Vegas with a small town lifestyle. Since the greatest disparity exists in the elderly growth rates and extensive documentation has found that females live longer than males, it is not surprising that the female growth rates outpace their male companions. The bedroom community atmosphere has attracted others as well. Middle-aged persons who are preparing for retirement in ten to fifteen
years have recently migrated to Pahrump. This segment of the population is attracted by the inexpensive lifestyle needed for retirement while pursuing higher wage employment opportunities in Las Vegas.

**Tonopah**

Tonopah's population will undergo the least amount of change, in percentage terms, of all the communities studied. Population increased from 2408 to 3574 in the 1980's. Population will continue to grow at the same rate in the nineties to 4815 in the year 2000, and 5663 in the year 2005. Appendix M provides the forecasted population, through 2005. A growth of 58.45% will occur between 1990-2005; impressive elsewhere, low for Nye County. Growth in the different age categories will be relatively evenly distributed approximating their 1980 and 1990 growth rates. The high growth category will the 45-49 year olds with a 133.42% increase. Low growth of 14.27% will occur in the 5-9 segment. Males tended to have more variation in the growth rates. Men will experience a disproportional increase in young adults while women will have balanced growth throughout all categories. Surprisingly, the passage of time will not affect the age composition of the population significantly. A slight drop in the elderly proportion and modest gains in the middle-aged individuals are the most obvious exceptions. Equally surprising is the
steady proportion of the population classified as children. Men and women experienced opposing trends in the elderly. Moderate loses will be experienced by the female segments while the men make gains. In other segments, gender differences will not create significant deviations. Appendices O and P provide graphical illustrations of growth rates and age composition of Tonopah residents, 1980-2005.

The community of Tonopah has one distinct advantage over other communities in Nye County; it is the County seat. In the absence of new mining developments, employment in local government drives the economy, and subsequent population growth. The persistent growth is indicative of the stable employment the County seat provides. Furthermore, it influences the age composition of the community as individuals are recruited for community service in government positions. Likewise, the stable employment of persons, many in their child-rearing years, is responsible for the steady stream of children and the even dispersion of the population throughout the age spectrum.

Gabbs

The incorporated city of Gabbs provided the only aberration in the study. Population in the community declined in the 1980-1990 interval from 811 individuals to 660, notwithstanding an increase in mining employment of 189 persons. Forecasting on the premise that the strategic
basic industry adjustment assumption would hold throughout the County produced a negative population projection in Gabbs by the year 2005. A revision was necessary. Gabbs did not exhibit the trends the other communities so closely followed.

The strategic assumption that mining opportunities induce migration is founded on sound theoretical principles, but, did not hold in the unique environment of Gabbs. This does not mean the assumption does not have value. Rather, it only declares the assumption does not hold in Gabbs. Therefore, the basic industry adjustment will be omitted from the Gabb's population forecasts.

The decline in the population of Gabbs will continue unless new employment opportunities are created in the surrounding area. Barring new developments, the population will decline 41.64% (1990-2005) from 660 individuals in 1990 to 441 in 2000 and 385 in 2005 (Appendices R and Q provide forecasted population totals for Gabbs residents, through 2005). A slight gentrification of the population will occur in this interval as high school graduates leave Gabbs for opportunities elsewhere. The remaining population, predominately employed in local mining activities, will slowly age toward retirement (see Appendix T). All age groups, except the elderly, will experience negative growth in the next fifteen years as illustrated in Appendix S. Male retirees will increase significantly, 118% by 2005, as
the original mine employees age. Children will experience the greatest decline, 61.70%, as the resident population ages beyond the child rearing years (see Appendix S).

Duckwater

The community of Duckwater holds a unique identity within the County of Nye. It is a Native American Reservation and, therefore, constitutes a separate entity. The fate of Duckwater depends on whether Native American Reservations remain viable politically. Without considering this political distinction one would automatically categorize Duckwater with the remainder of Nye communities due to it's small population. However, one cannot operate in a vacuum. Researchers must consider multiple criteria for establishing boundaries. Political distinctions are one such distinction.

The community of Duckwater will steadily grow in the next decade and a half. The 1990 population of 189 will increase to 319 at the turn of the century and reach 428 in 2005, cateris paribus. The growth rates for the population will increase as time passes, posting an increase 27% below the County average of 96% in the 1990-2000 interval, and a growth rate equal to the County's in the 1990-2005 interval (126%). Appendix U provides population forecasts for Duckwater throughout the intervals, while Appendix W provides growth rates for selected age categories. Growth
in the young adult categories were impressive. Combined, they posted a 288% increase between 1990-2005. A majority of the gain will come from the 15-19 age group (411% gain). An aberration in growth rates will be evident in the elderly. Combined, they will increase by 113.04% in the 1990-2005 interval. This is a large percentage gain, but given the small base population, the gain will amount to only 26 individuals. In percentage of total population, gains will be realized in the young adults and mature adult cohorts. The elderly, especially the extreme elderly, will endure losses in representation. Appendix X provides the changing age structure of the population throughout the fifteen year study period. Unlike any other community in Nye, the female population surpasses the number of males. Females represented 53.97% of the Duckwater population in 1990. By 2000, they will represent 54.55% and steadily grow to 54.91% in 2005. Males on average have a more evenly distributed population, except the extreme elderly who is under represented. Females will endure large variations in cohort growth patterns. The disparity is highlighted by a forecasted 29.62% loss in the 75-79 age category while the 80-84 year olds will increase 139.71%. The variations in growth will affect the age structure of the female population. However, when combined into the four main age categories, the volatile growth is smoothed, approximating the growth of males.
Duckwater is an isolated community with autonomous self-rule. The community is partially insulated from the influences other communities experience. Migration to the reservation is restricted by band approval, ownership of land is forbidden, and negotiating mineral and ranching rights is complicated by the nation's sovereignty. These disadvantages, combined with current market conditions for minerals and beef, will restrict development, and population growth, in Duckwater.

Remainder of Nye

The lack of data prior to 1990 forced a modification in the forecasting technique employed for the remaining communities. The absence of community specific demographic data rendered the application of community specific migration ratios impossible. In response, adjusted county migration ratios were employed as substitutes. The adjusted county rates were used to approximate behavior in the communities.

Round Mountain

The twin communities of Round Mountain/Hadley will steadily grow at a rate approaching 35% every five year interval. The population will increase from its 1990 level of 1720 individuals to 4127 in 2005, a 139.2% increase. Appendix Y provides population forecasts for Round
Mountain/Hadley, through 2005. A disparity in the rate of growth in the different age categories will cause a progressive aging of the population (see Appendix AA). In fact, all but one age category under the age of thirty-five will grow rate the average rate. Above average growth will occur in the 15-19 age category, inspired by an acute growth in females. Likewise, all age categories over the age of thirty-five will grow above the community's average. Growth rates for each five year interval is provided in Appendix AA for selected age categories. The consequences of nonsymmetrical growth is a marked decline in the percentage of the population below fifteen and corresponding increase in mature adults and retirees (see Appendix AB). The female population will experience larger growth than males, 148.5% opposed to 132.4%. The disparity is evident in Appendices Z2, Z3. In addition, the differential in the distribution of the population from the communal average is significantly higher for males, especially for children.

Mining provides the nucleus for economic activity in the Smokey Valley. Luckily, local mining activity will remain competitive throughout the decade. Echo Bay, operator of Round Mountain Gold, intends to expand production at the facility increasing the labor force by sixty sometime in 1995 causing continued prosperity for the valley. The influx of miners, accompanied by their families, will offer new opportunities
to local business people, inducing growth in the area.

**Beatty**

Beatty will grow slightly below the county's average, in the 1990-2005 interval. Population in the community will expand from 1614 in 1990 to 2518 in 2000 and 3263 in 2005 (refer to Appendix AC for population forecasts). The demographic composition of the population will be slightly less male dominated, falling from 56.32% of the population to a more equitable 54.78%. The younger age groups will endure the lowest growth rates, with all categories below the age of thirty-five posting rates below the communal average. One age category, 25-29, posts a negative rate of -25.51%, decreasing forty-eight individuals. Another aberration will occur in the 85+ age category. The category will increase 40.36%, significantly below the County average of 153%. Males tended to have higher growth rates in the older age categories than their female counterparts, while the opposite trend occurred in the children. Males had two age categories with negative growth, the 5-9 and 25-29. Females will have one negative growth category, the 25-29. Appendix AE provides growth rates for the four main age categories throughout the fifteen year interval. Appendix AF provides the changing age structure of the populace throughout the same interval.
Beatty's population is influenced by several factors. The continued successful operation of the Bullfrog mine is a vital element in the community's prosperity. Likewise, tourism, and tourism related industries, are increasingly becoming major employers. The proposed nuclear repository at Yucca Mountain has recently made Beatty a political hotbed since it is the closest community to the facility. The facility is anticipated to slightly increase the population and increase Beatty's rank in county politics. The potential to extract additional funding for local services is evident - possibly attracting additional individuals to the community.

Amargosa Valley

Amargosa Valley will undergo moderate growth in the next decade and a half. The population will increase from it's 1990 level of 742 individuals to 1231 in the year 2000, and 1593 in 2005 (refer to Appendix AG). The growth in the population represents a 65.90% increase between 1990-2000, and 114.68% from 1990-2005; slightly below the county average. The majority of the growth will occur in the mature adult categories, but some significant variations from the county as a whole will transpire. One, occurs in the young adult category which experience abnormally high growth rates. The 20-24 age category deserves special attention, exploding 242.39% between 1990-2005. Conversely,
the 30-34 age category is the only segment that endures negative growth. Females will continue to post larger growth rates than males, accounting for their proportional increase the total population from 49.73% in 1990 to 51.10% in 2000, and 52.17% in 2005. Appendices AI and AJ provide growth rates for selected age categories and age composition of the populace, 1990-2005.

The growth of Amargosa Valley is contingent on the availability of water. The agricultural base of the valley is second in employment only to mining. Adequate sources of water will spur growth in the valley, without it, growth in the agricultural industry will cease. Mining activities may increase, accounting for some growth, but increases in employment are purely speculative. Growth must come from the service industry, capitalizing on increased tourist traffic and the local provision of services. Growth of a service industry demands infrastructure and time, and this is reflected in the lower average growth rates than the rest of the county. As the economy diversifies, employment opportunities other than those dominated by men will expand, causing a rise in the female population.

Manhattan

Manhattan was and will continue to be a mining community. The oscillating periods of boom and bust the community has recently experienced will continue until high
grade ore is discovered and/or mineral prices recover. The scope of this population forecast cannot accurately evaluate the possibility of this occurrence. Until that time, the community will be dominated by weekend miners and retired members of society. The small base population of Manhattan distorts numerical evaluation and misrepresents what actually is forecasted for the community. It is suffice to state that the population of Manhattan will remain stable, possibly with a small natural increase.

Barring new mining developments, the average age of the residents will progress, as young adults leave in search of employment opportunities, and experienced miners and semi-retired individuals enter. Appendices AK, AL, AM, AN provide forecasted population, growth rates, and age composition of the populace through 2005.

**Remainder of Rural Nye**

Rural Nye County population will increase from 1650, in 1990, to 3052, in the year 2000, and 3935, in 2005 (see Appendix AO). This represents an 84.98% and 138.51% rate of growth between 1990-2000 and 1990-2005. The population is characterized as being middle-aged, male, and predominantly white. The absence of a sizeable child population in 1990 will steadily increase in the forecasted
Likewise, a small elderly population (75+ years of age) exists, increasing to less than 3% of the population in 2005. Appendix AR provides a graphical illustration of the age structure of the populace, 1990-2005. Growth in the population is achieved by immigration of adults and the young elderly. Growth in the older adult population is impressive growth since negative growth will be experienced by every age category between 20-35 years. Young adults, 15-24 years, post equally low growth rates, averaging a meager 9.15% between 1990-2005. Growth rates for selected segments of the population are available in graphical form in Appendix AQ. Females will experience growth rates above their male counterparts, increasing their representation from 29.03% of the population in 1990, to 34.24% in the year 2000, and 35.17% in 2005.

Rural Nye County is diverse in structure and homogeneous in demographics. Changes in any one area is independent of all others. A comprehensive explanation for each possible source of change in every area would be cumbersome and tiresome. Rather, a brief list of possible sources may suffice. Mining attracts many small independent claim holders throughout the county. Inexpensive rural living lures retirees. Abundance of land coupled with low grazing fees attract ranchers. The proposed nuclear waste
repository may attract site workers. Increased tourist traffic offers incentives to small business persons. The possibilities are numerous. The motivation to migrate to rural Nye is multivariate but the impetus is personal.
Chapter 11

Conclusion

Forecasting the population of Nye County communities with the cohort-component method has mixed results. All data requirements are satisfied for forecasting the County population. The method is empirically sound. Unfortunately, the method loses its reliability as the study area shrinks. The problem remains finding data for a common geographic location over time. In Pahrump, Tonopah, Gabbs, and Duckwater a political boundary could be matched with census, school, and voting district data. These communities could be forecasted accurately. In Amargosa Valley, Beatty, Manhattan, and Round Mountain/Hadley, geography could not be precisely paired with the data. Geography in these locations is approximated, with large areas out/inside the bounds included or omitted. The ambiguous geography influences the validity of the results.

The boundaries surrounding the population forecasts are empirically sound. Given a sound forecast, the boundaries, based on a reasonable margin for error, provide a periphery which the forecast will fall within. The boundaries may be used by a small area planner as a minimum and maximum population for which services would be demanded. In
addition, the boundaries provide the forecaster with a means to evaluate their performance over time. For instance, the forecasted may predict 15 children, 7 boys and 8 girls, to be born in a period. However, in reality 10 boys and 7 girls may be born. Traditional forecasts would considered the predicted values a failure. With confidence boundaries, actual births, male and female, may fall within the bounds. Boundaries allow conservative variations from the predicted value to be considered successful. In regions with dense population, boundaries may be less useful due to less variation, in percentage terms, in the forecast. In small areas, boundaries should be considered a necessity due to the greater variation in forecasts partially caused by data constraints and small base population.

The strategic assumptions in the method are unique to the study area. An attempt to duplicate their work in other regions will probably fail. However, their use is sound. In fact, their omission from our forecast, without adjusting by some other procedure, would be a mistake.

One disappointment was the use of precision statements following the population forecasts. They were designed to evaluate the accuracy around the forecast given our strategic assumptions. Their weakness lies in the fact that they do not provide a set of guidelines to evaluate how much variation is too much. They are judgemental. Hence, the
user decides how much variation is too much, inviting an opportunity for judgement error.

The purpose of this paper was to benefit the small area planner. I have provided a means of accurately forecasting a small area population. Further, it has been done inexpensively. No other technique can provide timely, demographic information on the populace, in such a convenient manner, at such a low cost. Small area planners be aware.
Appendix A
Communities by Census Tracts

Appendix A provides a listing of census blocks indexed by community for each community in this report for which the Census Bureau has no formal government or statistical boundary. Block areas are included for the purpose of identifying census blocks. By listing the BNA and block number, location of the appropriate blocks is possible. For example, Amargosa Valley block 231. The first number "2," indicates block group 2 and the last two digits, "3" and "1," indicate block 31. Block 231 has a corresponding BNA of 9804. Only those census blocks and BNA used in the community estimates are illustrated. Using this numbering scheme, it is possible to identify exactly which block is being accessed for data.

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<th>Duckwater BNA</th>
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Appendix B

Nye County Mine Employment, 1986-93

Appendix B provides a list of mines operating in Nye County in any period between 1986 and 1993. An economic migration adjustment due to the influence of irregular mining patterns is accomplished using this data. Each mine is categorized with its associated community and the number of employees are listed.

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| **Round Mountain:** |           |      |      |      |       |       |       |       |
| Rd. Mtn. Gold     | **345**   | **615** | **560** | **270** | **-55** | 1.74 | **470** | **-96** |
| Centennial        | 9          | 0    | 0    | -9   | 0     | 1.74  | -16   | 0     |
| **Total**         | **354**   | **615** | **560** | **261** | **-55** |       |       | **454** | **-96** |

| **Amargosa. V:**   |           |      |      |      |       |       |       |       |
| American Borate    | 3          | 25   | 32   | 22   | 7     | 1.74  | 38    | 12    |
| Industrial M.V.    | 51         | 74   | 70   | 23   | -4    | 1.74  | 40    | -7    |
| **Total**          | **54**    | **99** | **103** | **45** | **3**  |       |       | **78** | **5**  |

| **Pahrump:**       |           |      |      |      |       |       |       |       |
| Calhoon's S&G      | 2          | 0    | 0    | -2   | 0     | 1.74  | -3    | 0     |
| Wulfenstien's      | 2          | 0    | 0    | -2   | 0     | 1.74  | -4    | 0     |
| **Total**          | **4**     | **0** | **0** | **-4** | **0**  |       |       | **-7** | **0**  |

| **Manhattan:**     |           |      |      |      |       |       |       |       |
| Ivy Minerals       | 3          | 3    | 0    | 0    | 0     | 1.74  | 0     | 0     |
| Tenneco            | 43         | 0    | 0    | -43  | 0     | 1.74  | -75   | 0     |
| Echo Bay           | 60         | 1    | 1    | -59  | 0     | 1.74  | -103  | 0     |
| **Total**          | **106**   | **4** | **1** | **-102** | **0**  |       |       | **-178** | **0**  |

| **Rest of Nye:**   |           |      |      |      |       |       |       |       |
| Marshall Earth     | 5          | 0    | 0    | -5   | 0     | 1.74  | -9    | 0     |
| Marshall #2        | 2          | 0    | 0    | -2   | 0     | 1.74  | -3    | 0     |
| Mar. Catharine     | 4          | 0    | 0    | -4   | 0     | 1.74  | -7    | 0     |
| Mar. Stonewall     | 2          | 0    | 0    | -2   | 0     | 1.74  | -4    | 0     |
| **Total**          | **13**    | **0** | **0** | **-13** | **0**  |       |       | **-23** | **0**  |

| County Total       | **772**   | **1736** | **1116** | **908** | **-618** | **1912** | **881** |     |
## Appendix C
### Forecasted Nye County Population, 1880-2008

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E2

E3
### Appendix F

#### Distribution of Nye County Residents, by Selected Age Categories, 1980.

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Appendix H

H1


H2


H3

Distribution of Nye County Female Population, 1980 to 2005.
Appendix I

Nye County Growth Rates, by Age Category.

Growth in Percent (100X)

- 1980-90T
- 1990-00T

Age Category

Nye County Male Population Growth Rates, by Age Category.

Growth in Percent (100X)

- 1980-90 M
- 1990-00 M

Age Category

Forecasted Nye County Female Growth Rates, by Age Category.

Growth in Percent (100X)

- 1980-90 F
- 1990-00 F

Age Category
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**Forecasted Gabbs Female Population, 1980-2005.**

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- 16-24 0.268066 0.26 -0.228261
- 26-64 -0.166866 -0.380403 -0.476604
- 65+ -0.62241 0.608061 0.616182


Age Categories

- 0-14 0.01087 -0.430108 -0.612903
- 16-24 -0.314280 -0.333333 -0.291807
- 26-64 -0.130031 -0.414608 -0.607772
- 65+ -0.609768 1 1.1876


Age Categories

- 0-14 -0.010417 0.462632 -0.663168
- 16-24 -0.186186 -0.181818 -0.138304
- 26-64 -0.206186 -0.337662 -0.436066
- 65+ -0.695238 0.236294 0.470688
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Appendix W

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**Forecasted Round Mountain/Hadley Population, 1990-2005.**

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Forecasted Round Mountain/Hadley Age Composition, 1990-2005.
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#### AE1

**Forecasted Beatty Growth Rates for Selected Age Categories, 1990-2000, 1990-2006.**

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<td>9.8888889</td>
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</table>
Forecasted Rural Rest Of Nye Age Composition, 1990-2005.
Bibliography


Bender and Verma. Projecting Populations By Age And Sex: The Complete Model, Chpt.9, PP.203-205.


Conversation with Mr. Darrelle C. Cypert, Manager, Western Operations, American Borate Company, Amargosa Valley, Nevada, 10/93.

Conversation with Mr. Steve Myers, General Manager, LAC Bullfrog Mine, Beatty, Nevada. 10/93.

Conversation with Mr. Joe Wujcik, General Manager, Industrial Mining Venture, Amargosa Valley. 11/93.


Enterline, P.E. Causes of Death Responsible For Recent Increases in Sex Mortality Differentia in the United States, Milbank Memorial Fund Quarterly, 38, 1960, PP.312-325.


Ryder,N. Cohort Analysis in Social research: Beyond the Identification Problem, New York: Springer-Verlag, 1985 P.10.

Science Applications International Corporation. Housing Profile of Clark, Lincoln, and Nye County Communities, Las Vegas, PP.2-5.


State of Nevada, Department of Industrial Relations. *Directory of Nevada Mining Operations Active During Calendar Year 1986*, Carson City, Nevada.

State of Nevada, Department of Industrial Relations. *Directory of Nevada Mining Operations Active During Calendar Year 1990*, Carson City, Nevada.

State of Nevada, Department of Industrial Relations. *Directory of Nevada Mining Operations Active During Calendar Year 1992*, Carson City, Nevada.


Swanson, Kintner, Carlson, Williams, Arnold. 
*Constructing Confidence Intervals for Population Projects Generated by the Cohort-Component Method.* 1994, P.3.


