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David A. Swanson

The Washington State Census Board and Its Demographic Legacy

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Foreword

For the world's leading democracy, the USA and all of us (Americans) are, in general, very poorly informed about our government and how it works. Some common misconceptions include:

- Problems are simple. (I believe, on the contrary, that any proposed solution to a problem that begins with "all ya gotta do is…" is wrong.)
- Bureaucrats are stupid and lazy. Who needs 'em?
- Government would be better if it stuck to just a few big things and left the rest to us.
- Get rid of all the non-essentials, which included everything the government does that you never heard of. (Most of which are not only important, but essential.)
- Government cannot do anything right.

Well I could go on—but so could you. We have all said these things in times of exasperation—usually when our real target is our politicians, not the government per se.

This book—which is not designed to deal with any of these things—in fact deals with them all—indirectly, but effectively. Its topic is very simple: How do we keep track of how many of us are there. How do we count Americans, or Californians, or Seattleites or the size of next year's freshman class that our high school has to be ready for. If you have never thought about this, do not beat yourself up. You have other problems: the mortgage, the kids, your aging parents, the boss, and your life. But fortunately, there are people who do take care of that for you … for us. They are the bureaucrats that we often casually disdain. No, not loafers who spend their time leaning on the "shovels" of their work. They are experts in a narrow, specialized field. They hold doctorates, have wide experience in their field, and provide every level of government with population information that is essential if we are to make good decisions on a myriad of important areas. Who knew?

In this short book, we can trace how population figures were gathered, compared, and projected at a time when the hand calculator was the technological cutting edge. We learn how the process was refined and improved as technology

permitted. We see how these "bureaucrats" innovated and developed whole new methods of obtaining and, more importantly, utilizing the population information.

This is a book that everybody can learn from. If you are a layman like me, do not try to decipher the complexities. (There are mathematical formulas for which my computer does not even have keys.) They are just a tiny part of the book and are there, so experts can benefit from it as well. And if you are an expert in the math field, you may learn something new about its history, about how your profession got to be what it is, and how information spread and new approaches were adopted.

But, whether layman or expert, think of this. This is a book that you can read cover to cover if you have the interest and the background. However, as I read it, I kept in mind the relief I felt when, in an introduction to the great Spanish novel, *Don Quixote*, the editor gave the reader "permission" to skip pages and sort through the book. He said in effect that it was a great, but long book. It had beautiful passages that sometimes seem endless. So he advised us to read it with a sense of wonder because it is a wonderful book. But do not ruin the wonder by force-feeding it. Likewise, this book is a small wonder. You may not become an expert in working with populations. But perhaps you may learn a lot about the important "little things" that government does—well—for all of us.

Al Swift
US representative, 1978–1994
Washington
2nd Congressional District

Preface

Demography may not be destiny, but demographic facts, understanding, and models play a very important role in modern societies. Governments, businesses, and most organizations need information to plan for the future. In fact, they need information to be able to do almost anything—allocate resources, provide services, anticipate customer demand, hire staff, maintain inventories, and make investments. Traditionally, managerial and entrepreneurial decisions in most organizations were little more than simple extensions based on last year's activities, feedback from various constituencies, and intuition. Not too surprisingly, few organizations were able to adapt to changing circumstances. The very word, bureaucracy, conjures up a negative image of low organizational performance.

With the development of the tools of social science, along with improved data collection and modern accounting, public administration and business management have become professional vocations and also fields of academic specialization that train practitioners and inform data-driven decision making. In this fascinating book, David Swanson tells the story of how demographic data and models became an important input into public administration in Washington State in the 1940s and 1950s. The case study is one of the particulars—of how farsighted academic researchers responded to the needs of local governments, but Swanson also tells a larger story of how the field of applied demography was created and evolved.

In the early 1940s, many towns and cities in Washington State were overwhelmed with hundreds of thousands of migrants who came to work in industries that seemed to develop overnight with the mobilization for World War II. The public sector was struggling to keep up with unexpected needs for housing, transportation, schools, and public utilities. The decision that the Washington State government should allocate resources to local governments based on population numbers seems perfectly rational today, but it was a very innovative step at the time. The only problem was that 1940 census data were outdated even before they became available. Data were needed on current populations, including their size, distribution, and composition that incorporated the high levels of recent in-migration. The Washington State Census Board, established in 1943, enlisted

Dr. Calvin Schmid, a demographer and professor of sociology at the University of Washington, to solve the problem. Schmid was more than equal to the challenge. He adapted existing methods of population estimation, developed new techniques, and applied them on a scale that had few precedents. In addition to his technical expertise, Schmid was a gifted administrator—he worked well with state agencies and could keep costs to a minimum. For the next two decades, Schmid, while continuing to work full time as a professor at the University of Washington, produced intercensal population estimates for the state of Washington and local governments throughout the state.

In Swanson's well-informed account, there are two important legacies of Calvin Schmid's innovative application of demographic expertise to the Washington State Census Board. The first is the development of applied demography, both as a scientific field and as a key function of public agencies (and also in the corporate sector). The methods of demographic estimation and projection (which Swanson summarizes in a valuable appendix) have continued to progress with contributions by many demographers in universities, in the US Census Bureau, and in many state governments. The Washington State Population Unit in the Office of Financial Management in Olympia is the direct successor of the Washington State Census Board. Over the decades, the Population Unit has been staffed by many distinguished demographers and continued to be an innovative agency with an expansive mandate for providing demographic data, analyses, and projections for Washington State. At present, governmental agencies, marketing firms, and many corporate units routinely use demographic data and models to assess needs and to plan for the future. Calvin Schmid and many of his students were key figures in the development of applied demography.

The second major legacy of Calvin Schmid was the institutionalization of demographic research and training at the University of Washington. In the late 1940s, Schmid parlayed the modest funds received from the Washington State Census Board to launch the Office of Population Research at the University of Washington, one of the earliest academic centers focused on demographic research and training in the USA. Over the course of his career, Schmid supervised 30 Ph.D. students and many more master's students. In addition to their academic training, many of Schmid's students gained practical experience in conducting population censuses and surveys for various municipalities in Washington State. The projects produced timely demographic data requested by their sponsors and were the significant source of financial support for graduate students. Many of Schmid's students went on to have distinguished academic careers, and others became innovative practitioners of applied demography.

The Office of Population Research at the University of Washington was renamed the Center for Studies in Demography and Ecology (CSDE) in the late 1960s and has continued to be one of the leading university-based centers for demographic research and training. At present, there are over 100 University of Washington faculty members (and researchers from nearby institutions) affiliated with CSDE. Every year, dozens of graduate students take courses on population theory, demographic methods, fertility and mortality, migration, urbanization, and many

other demographic topics. Through competitive grant applications, CSDE receives core funding from the National Institutes of Health (NIH) to support population research and training. CSDE faculty affiliates also apply for competitive research grants for NIH and the National Science Foundation to conduct research on a broad variety of basic and applied topics.

The origins of scientific fields and the founding figures of institutions are generally well known by those who were active at the time, but with the passing of generations, history is often lost. Documents are archived, memories begin to fade and then disappear, and new challenges rivet the minds of successive generations. I am particularly grateful to David Swanson for his well-written and carefully documented history of the Washington State Census Board and of the personal account of Calvin Schmid, the founder of demography at the University of Washington. Their legacy is alive and well in the office of the Population Unit in the Washington State government in Olympia and in CSDE at the University of Washington.

Charles Hirschman
Boeing International Professor of Sociology
University of Washington

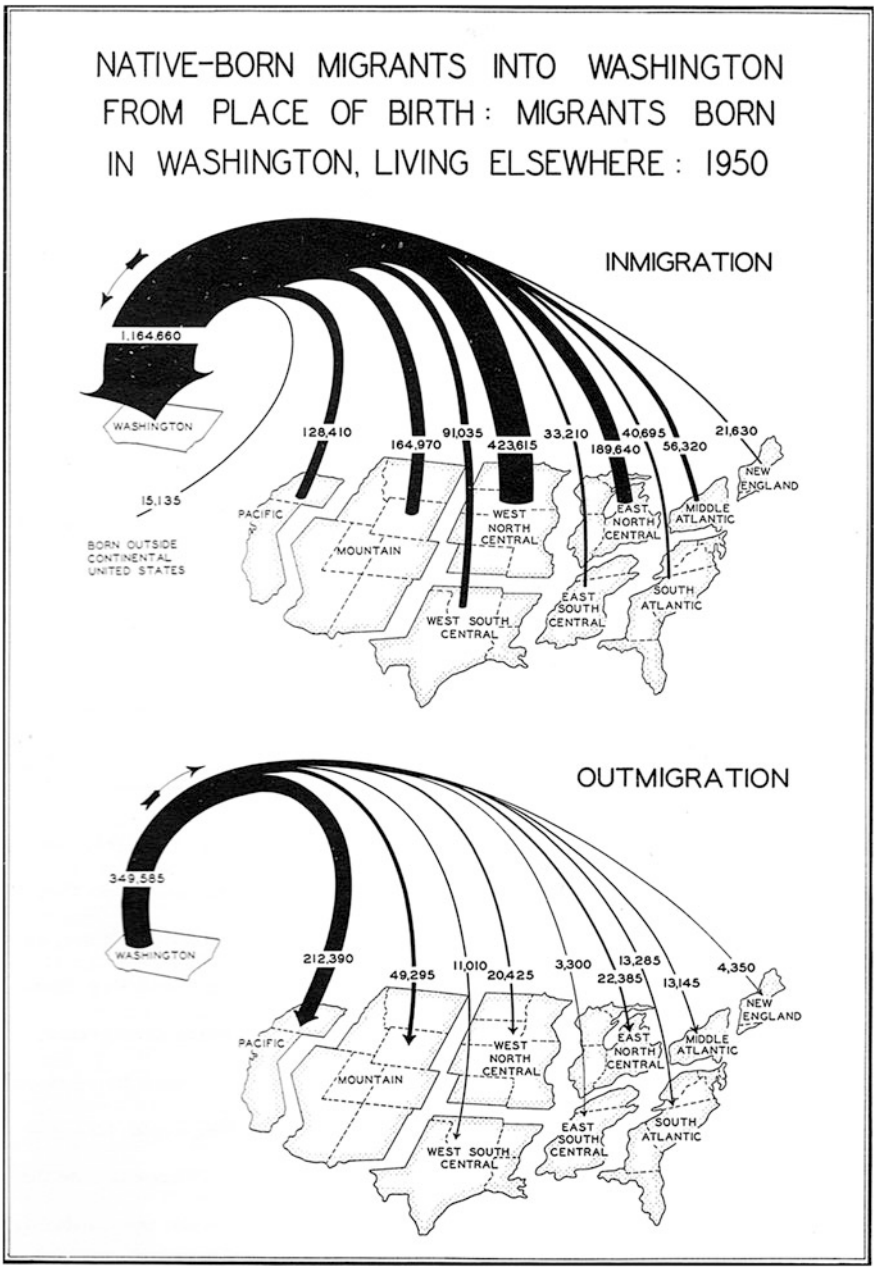

Exhibit 1 Flows of migrants into Washington by region of birth for those residing in Washington in 1950 and out of Washington by region of residence in 1950 for those born in Washington. *Source* Schmid et al. (1955: Fig. 1.8, p. 15)

Exhibit 1 is characteristic of the graphics produced by the Washington State Census Board and its affiliated organization at the University of Washington, the Office of Population Research, both of which were under the direction of Calvin Schmid. In this exhibit, migration to and from the state of Washington by region in 1950 is shown as the width of the "arrows," with the inflows pointed at Washington from the region of origin and the outflows pointed at the region of destination from Washington. The flows are based on a question in the 1950 census that asked respondents their state of birth and their current state of residence. The fact that the flows into Washington far exceed the flows out of Washington gives an indication of the magnitude of the migration between 1940 and 1950 that profoundly and forever changed Washington. Calvin Schmid was a master at getting pictures to tell meaningful and factually correct stories.

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Acknowledgments

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Contents

Abstract

This is the story of the Washington State Census Board and its demographic legacy. Established in 1943 and abolished in 1967, the Board's legacy lives on. Within the state of Washington, the Board's legacy is found today in two organizations: (1) the Population Unit, part of the Forecasting Division of the Governor's Office of Financial Management, and (2) the Center for Studies in Demography and Ecology at the University of Washington. Beyond Washington State, the legacy lives on through many demographers trained under the Board's auspices and the University of Washington.

The book is divided into five chapters and a technical appendix, which contains general descriptions of methods used to estimate and forecast populations. In Chap. 1, an overview is provided, while in Chap. 2, the history of the Board and its activities is found. Chapter 3 starts the story of the Board's legacy when it was abolished in 1967 and its functions moved to a state agency. Chapter 4 expands the legacy beyond the borders of Washington State. Chapter 5 brings us full circle back to the reason why the functions of the Board continue today: the high levels of population growth experienced by Washington since World War II, levels that in 1943 constituted an emergency that never really went away.

Chapter 1
Overview

Abstract An overview of the book is presented in this chapter in chronological order. It starts with the rapid population growth that affected Washington State during World War I. The Washington State Census Board was created by the state government to provide data that could be used to assist local communities in coping with this growth.

Keywords World War II · Rapid population increase · Government response

Between 1940 and 1950, Washington was flooded by the addition of 624,722 residents, the highest decennial increase in population experienced since it was first counted in the 1860 census (Schmid Kalbach and Miller 1953: 2). Most of this growth occurred between the entry of the US into World War II in 1941 and 1944. As an example, a special 1944 census of Benton County counted 70,987 people, an increase of 489 % over the 12,053 counted in the 1940 decennial census (US Census Bureau 1945). While this may be the one of the most spectacular population increases during the war years, it gives you an idea of the population growth that occurred throughout the state. From Seattle to Spokane, Everett to Ephrata, and Port Orchard to Pasco, cities and towns were inundated with defense workers, military personnel, and their dependents. They overwhelmed existing housing, roads, and public services.

Some of this growth was due to the expansion of existing military facilities such as the Vancouver Barracks in Vancouver, Fort Lewis and McChord Field south of Tacoma, Fort Lawton and the Sand Point Naval Air Station in Seattle and the coastal artillery bases that protected the entrance to Puget Sound (Ft. Worden near Port Townsend; Ft. Casey on Whidbey Island; and Ft. Flagler on Marrowstone Island). The Puget Sound Naval Shipyard in Bremerton also expanded as the size of the Navy grew because it had to deal with repairing war-damaged ships as well as an acceleration in the pace of modifications to other warships requiring combat-influenced refitting.

Additional population growth came about because the military established new posts and bases in response to the war. The Army Air Corps established bases near Ephrata, Moses Lake, Spokane, and Walla Walla, while the Navy established an air station near Pasco and another on Whidbey Island. Although highly secret at the

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time, the Army also established the Hanford Engineering Works near Richland as part of the "Manhattan Project." It employed more than 50,000 people during its construction in 1943–44 (Thayer 1996). These facilities had a major role in the rapid population growth of Washington: In addition to the military personnel, there were civilian workers and in some cases, their dependents. The remainder of the population growth was due to the expansion of wartime industrial production. In Seattle, for example, the number of people employed in manufacturing alone more than tripled between 1940 and 1943, going from 35,000 to 115,000 (Thrush 2007: 164). This increase, in turn, had a multiplier effect in that it created demand for many other workers to support and supply the needs of those employed in the manufacturing sector.

As Washington's cities and towns looked for assistance in coping with the housing, transportation and other needs created by the newcomers, a key set of people realized that objective data were needed to identify the both the scope and locations of increased population. One of them was Dr. Calvin F. Schmid, a professor of sociology at the University of Washington, who had long been involved in demography and was familiar with Washington. By 1943, the legislature passed a bill that established the Washington State Census Board, which Governor Arthur Langlie signed into law on March 10th (Washington State Government 1943). A novel piece of this legislation linked the amount of state funding for cities and towns to current population determinations. This was similar to the wording in the US Constitution that set up the US decennial census, but with an important difference. Article I, §2 of the US Constitution states that "Representatives and direct Taxes shall be apportioned among the Several States which may be included within this Union according to their respective Numbers." This meant a benefit and a cost was based on each state's share of the total US population as counted in the most recent census: The benefit was the number of members each state would have in the US House of Representatives and the cost was the amount of money each state was obligated to pay to the federal government in support of the latter's activities (Walashek and Swanson 2006). In the enabling legislation of the Washington State Census Board, the flow of funds was reversed and with a twist: Local governments would receive funds from the state in proportion to a current population determination, not the population counted in the most recent decennial US census. This meant that the Washington State Census Board was in the business of estimating the number of people as well as actually conducting census counts. The allocation of funds to cities and towns based on current population determinations, which included estimates as well as census counts, was legislation unique to the state of Washington in 1943, neither the federal government nor any other state had implemented such a funding mechanism for local government (Exhibits 1.1 and 1.2).[1]

[1]While unique to the US, a similar system was put into place by England in 1932 (Jeffries and Fulton 2006). The Technical Appendix contains definitions of terms and descriptions of methods used to estimate populations.

Sidebar 1.1 Reporting for Work: The Start of a Shift at the Tacoma Shipyard, 1942. In 1929, the Tacoma shipyard was closed and remained so for ten years. Within four years of its reopening, employment went to more than 25,000. At one point it employed 33,000 people during World War II. It is one of the many examples of the wartime industrial activities that caused the huge surge in the number of people moving to Washington during World War II. *Source* Tacoma Public Library. http://search.tacomapubliclibrary.org/images/dt6n.asp?un=25&pg=2&krequest=workers&stemming=On&phonic=&fuzzy=&maxfiles=5000

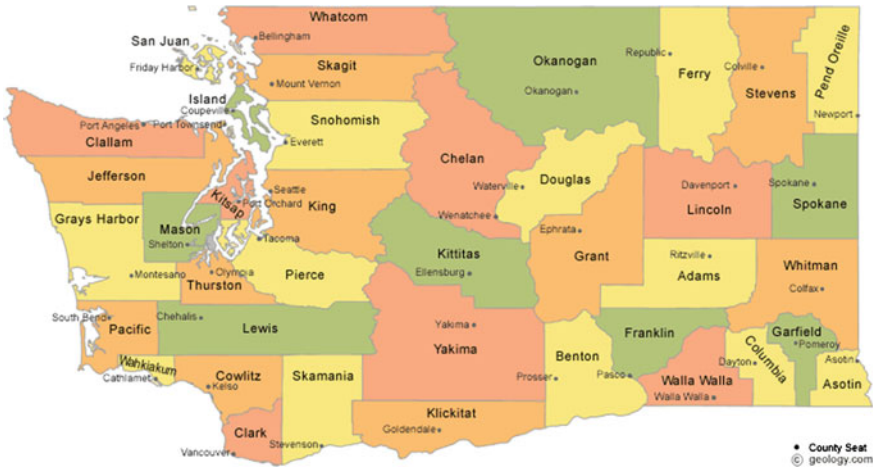

Exhibit 1.1 Washington state by county (39) and county seat. *Source* http://geology.com/state-map/washington.shtml

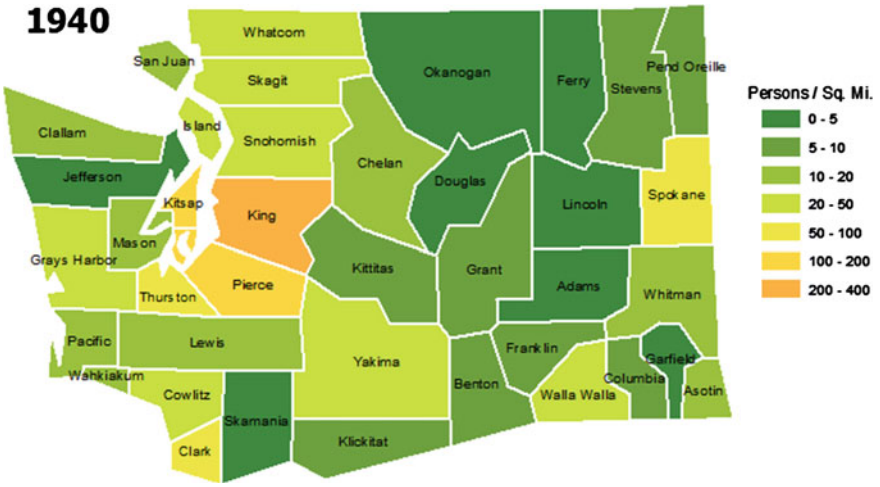

Exhibit 1.2 1940 Washington state population density by county. *Source* Washington state office of financial management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

The legislation that set up the Census Board and the population-based fund allocations was initially intended as an emergency measure aimed at alleviating the financial problems facing Washington's cities and towns due to the high levels of war-related in-migration. The Board produced its first set of population estimates in the spring of 1944 (Ellensburg Daily Record 1944) and another set a year later, shortly before the end of World War II (Spokane Daily Chronicle 1945a). In addition, an opinion in 1945 by the Washington State Attorney General extended the Board's population estimation duties and the fund allocations based on them to counties, should state funds be directed to them (Spokane Daily Chronicle 1945b) (Exhibit 1.3).

The Washington State Census Board did not, however, end with World War II. The annual population determinations it produced and the funds allocated by them were not only popular with cities and towns and their legislative representative, the Association of Washington Cities, but with many state and local agencies. As a consequence, the activities of the State Census Board were not only continued, but expanded. Today, these activities are found in the Population Unit, part of the Forecasting Division of the Office of Financial Management (OFM), the Governor's Budget Office (http://www.ofm.wa.gov/pop/default.asp). The activities include not only annual population determinations for the state's cities and towns, but for its counties and a host of special administrative districts. The OFM Population Unit provides oversight of and support for special census counts and for statutory requirements involving cities when incorporation, dis-incorporation, and annexation occur. It also provides forecasts of population for the state and its counties and it serves as a depository for federal census and other data, higher education enrollment and graduation data, and population estimates. Importantly,

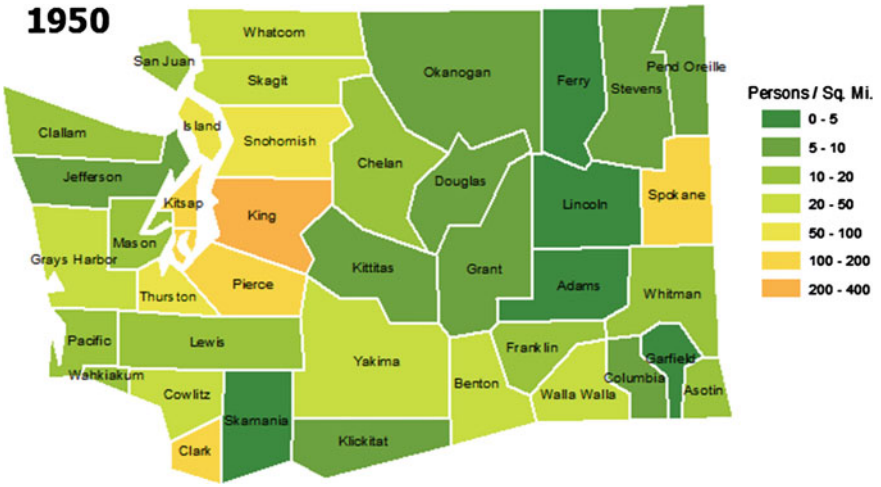

Exhibit 1.3 1950 Washington state population density by county. *Source* Washington state office of financial management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

the data as well as reports on a wide range of research on demographic topics are available at little or no cost. The Population Unit also works closely not only with the other parts of OFM, but with a range of state and local agencies, as well as the US Census Bureau. Its work touches the state's economy, the health and welfare of its residents, their employment and education, and the use of public services.

The impact of the OFM Population Unit and its predecessors extends well beyond the borders of Washington. The original State Census Board and its research arm, the Office of Population Research at the University of Washington, trained students who went on to careers in universities, state and local government, the federal government and the private sector. These students had a multiplier effect in regard to the activities and research done by the State Census Board and the Office of Population Research, one that impacted not only other states (particularly, Alaska, Arkansas, Oregon and California) and provinces (particularly, Alberta and British Columbia), but a number of universities (e.g., the University of Alberta, Duke University, Princeton University, the University of Southern California, and the University of Toronto) as well as the US Census Bureau.

The students interested in demography who were trained and mentored by Schmid who became academics, in turn, trained and mentored a second generation that can be traced to Schmid. Those in the second generation of students interested in demography who became academics created a third generation, which now is creating the fourth. In short, the Washington State Census Board has a legacy that endures not only within institutions, but within people, one that is found not only in Washington, but elsewhere in North America and beyond.

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Chapter 2
The Washington State Census Board, 1943–1967

Abstract This chapter describes the initial establishment of the Board at the University of Washington under the direction of Dr. Calvin F. Schmid in 1943. Its initial activities and reports are described and in chronological order we follow the census board through its initial period of temporary funding to the time it received long term funding as its duties expanded to include enrollment forecasts for the K-12 system and the state's universities and colleges. It describes the key players in establishing and operating the Board as well as key legislative actions, such as tying funding to population estimates and forecasts The Chapter describes actions of administrators at Washington State University to have the Board disbanded. It concludes with a description of the move of the Board's functions to state government under the administration of Governor Daniel J. Evans.

Keywords Demographic methods · Public fund allocation · Institutional conflict

Although the 1943 legislation that created the Washington State Census Board was an emergency measure, the Board itself did not spring from nothingness into being. There are five elements that were important in its creation. First, there was a history in the use of census data by Washington, one that included not only federal but also state and locally-sponsored census counts; Second, the state had a planning council, which, in turn, had a population studies committee, which meant human capital was around to operate a State Census Board; third, municipalities in Washington had a very narrow tax base, which made it difficult for them to respond effectively to rapid population and economic changes; fourth, it was clear that some cities in Washington were being heavily impacted by newcomers early in the 1940s, even before the US entered World War II; and fifth, the Association of Washington Cities decided to sponsor a program of state aid to cities based on current population size. By 1943, the time was right such that the combination of these five elements led to the passage of the enabling legislation of the State Census Board.

Element 1: The use of census data by Washington

When it was a territory, several census counts were taken of Washington, but none of them was used other than to get a general idea of the territorial population.

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In terms of the actual use of census data, the Washington State Constitution (Article II, section 3) called for a state-sponsored census count in 1895 and every ten years thereafter, which was never funded. Thus, Washington relied on federal census data for a wide range of purposes as early as 1890: using the last census count as the official source of the population of cities and counties, which was used not only to classify cities and counties (based on their populations) and the salaries of their elected and appointed officials, but also in terms of city consolidation. By 1920, federal census also were used as the basis of securing bonds, planning ports, building bridges, and insurance regulations, classifying school districts, and as the basis for salaries of school and port officials. In 1923, an important modification occurred, one which allowed a county seeking to change its classification to a higher class to conduct its own census. The law (Chapter 177) set forth specifications, one of which was that the county in question could not conduct its own census within three years of the last or next federal census and that the county would pay for such a census. That is, the special census must be conducted in years ending in 4, 5, or 6. By 1927, a similar law (Chapter 210) was applied to the incorporation of a city, an act that required a minimum of 3000 people as counted in the last state or federal census or a special census taken by the city. In the same year, a law was passed (Chapter 167) that required a census to be taken of a 3rd or 4th class city that desired to be annexed by an existing 1st class city.

Another important modification to the laws of Washington occurred in 1929. This set the stage for the allocation of finances to counties using population data. The law (Chapter 88) dealt with the allocation of the motor vehicle excise tax from the state to local jurisdictions. In this instance, one-fourth of the fund was to be credited to a county on the basis of its share of farms in the state as counted in the last federal census. This law also provided that the county was to distribute its funds to the cities within it on the basis of their classification, which also used the population as counted in the last census.

When prohibition was repealed, Washington set up state liquor stores within counties that decided to have them. Not surprisingly, some of the funds collected from this new source of revenue were to be allocated back to these same counties and the cities within them "according to the population shown by the last federal census" (Chapter 62, Washington State Liquor Act, 1933). That is, the distribution was based on the share of population. In 1935, the law distributing liquor revenue was refined (Chapter 80) and a new law (Chapter 111) set up a similar allocation system for the motor vehicle excise tax.

Element 2: The Washington State Planning Council

Also passed in 1935 was the legislation that created the Washington State Planning Council (Chapter 44). The Planning Council was originally established to provide long-range economic planning for the state during the Depression. It later became involved in planning for the war effort and for the post-war period. Importantly, its Executive Director (1936–45), Percival "Pat" Hetherton, wrote a report in 1938 on the population of Washington (Hetherton 1938). Shortly, thereafter he instituted a "Population Studies Committee" as part of the Council. The

Chairman of the Population Studies Committee was Dr. Calvin F. Schmid, Professor of Sociology, University of Washington (Spokane Daily Chronicle 1940a, b). With these two people, the human capital needed to operate the Census Board was largely in place by 1940. Hetherton was an experienced planner with many professional connections and Schmid was an experienced demographer with many professional connections and, importantly, connections to graduate students at the University of Washington, who would perform much of the labor needed to sustain the State Census Board.

Element 3: the Narrow Municipal Tax Base

Washington is one of seven states currently without a personal income tax at either the state or local level.[1] It has never had one. The operations of the state government and the local governments have always depended on federal funds, taxes on retail sales and property, as well as various excise taxes as its sources of revenue. In addition to the lack of an income tax, cities had far more restrictions on their ability to tax than did the state. Because of the restrictions, cities had virtually no flexibility in dealing either with the ups and downs of their economies or their populations (Washington State Census Board 1944).

Element 4: Cities Impacted by Growth Early in the 1940s

With the passage of the "Two-Ocean" Navy bill shortly after France fell in 1940, US Navy yards around the country, including the one in Bremerton, Washington (Kitsap County), received an infusion in funds that greatly expanded their workforces (US Navy n. d.). This led to an influx of people even before the US entered World War II. In nearby Pierce County, Fort Lewis, jumped from 2,000 soldiers in 1937 to 26,000 at the end of 1940; by the spring of 1941, there were 37,000 additional soldiers training at North Fort Lewis (Simpson 2009). The effects on Tacoma and other nearby cities (including, importantly the state capital, Olympia, which is in Thurston County) were similar to those in Bremerton in that in addition to military personnel and their dependents, a large number of people came to take civilian jobs. These locations and others in Washington served as magnets for people still reeling from the effects of the Depression and the effects of these new residents on housing and public services were very visible.

Element 5: The Association of Washington Cities

Founded in 1933, the Association of Washington Cities is a private, non-profit organization designed to represent the state's cities and towns to the legislature. Given the growth in cities such as Bremerton and Tacoma caused by the expansion of the state's military facilities in 1940 and 1941, the Association was very aware that rapid population increases were occurring around the state and that they were acutely stressing the housing and public services in the impacted cities. Because the

[1]In addition to Washington, the states of Alaska, Florida, Nevada, South Dakota, Texas, and Wyoming have no income tax (Sauter et al. 2013).

Board was located in Olympia, its staff could see the impacts of increased military strength at Ft. Lewis, which spilled over into nearby cities, including Olympia. The Association quickly decided that a fair way to assist cities with these impacts was to have the state provide funding using a formula based on population. The formula it came up with used both the 1940 census and subsequent estimates, with the former being used to distribute part of the funding aid and the latter, the remainder. It made its recommendations to the 1943 legislature, which adopted House bill No. 72 as its version of the recommendations.

The bill was signed into law by Governor Langlie on March 10th as Chapter 81, laws of 1943. The Act appropriated $2,000,000 to cities for the 1943–44 biennium. Half of the appropriation was distributed to all cities based on their proportions of the total municipal populations as of the 1940 census. The remaining $1,000,000 was provided for cities that had experienced an increase in their respective populations of three percent or more since the 1940 census. The allocation of this half of the appropriation was based strictly on the shares of increased municipal population experienced by those cities that met the three percent growth requirement. This half of the appropriation was delivered over a two year period (the biennial budget cycle) so that cities not impacted in 1943, but impacted in 1944 would have some aid to work with. Because half of the aid package was going to be allocated on the basis of population estimates made for 1943 and for 1944, an entity had to be created that was responsible for making these population estimates—The Washington State Census Board.

Creation of the State Census Board

The five elements just described were primary factors leading to the establishment of the Washington State Census Board in 1943. The enabling legislation specified that there were to be three members on the Board, one from the University of Washington, one from Washington State University (then known as the State College of Washington, but usually referred to as Washington State College), and one from the State Planning Council. The appointments from the two universities were to be made by their respective presidents. The appointment from the State Planning Council was to be made by the Planning Council as a whole and would serve as the Executive Secretary of the Board.

From the University of Washington, President Sieg appointed Dr. Calvin Schmid, Professor of Sociology; from Washington State University, President Holland appointed Dr. Alfred A. Cleveland, the founding Dean of the School of Education. The Washington State Planning Council appointed its own Executive Secretary, Pat Hetherton, as the third member and the Executive Secretary of the Census Board. The Board was authorized to receive a per diem of $10.00 in addition to any other salary and to hire clerical staff. The funds for these and other operational purposes were to come from the $1,000,000 set aside for the allocation of state aid to cities based on the post-1940 population estimates done by the Board. In its 1944 report, the Census Board stated that its total operating expenditures for the 1943–44 biennium was $3,219.18 (Washington State Census Board 1944: 38), which left $996,780.82 to be allocated to cities.

While it is difficult to know what precisely led to the decision on the Census Board's membership, it is easy to speculate that Schmid was identified early in the process as the key technical person. Not only had he served as the chair of the Planning Council's Population Committee and was, as such, known to Hetherton, but he also was well-known around the University of Washington, Seattle, and beyond as a demographer.[2] Moreover, President Sieg and Schmid were both alumni of the University of Washington and members of its Phi Beta Kappa chapter (University of Washington 1942). Arthur Langlie, the Governor who signed the legislation that established the Census Board, was Mayor of Seattle when Schmid returned to his alma mater, the University of Washington, as an Associate Professor of Sociology in 1937. Early in 1942, Schmid was recruited by Dr. Calvert Dedrick to work on the data issues involved in rounding and interring the population of Japanese ancestry on the West Coast. Dedrick was a Census Bureau employee on loan to the Army as part of its "Wartime Civil Control Administration" (WCCA), which was the entity operationally responsible for the internment of Japanese on the west coast. The work conducted in 1942 that led to the removal of persons of Japanese Ancestry from "exclusion zones" and internment in camps was heavily publicized, not only in Washington but in Oregon, California, and elsewhere

[2]There are many examples of Schmid's public and professional visibility by the time he was appointed to the State Census Board. Here are some examples. As Schmid was working on his Ph. D. studies at the University of Pittsburgh, his 98 page monograph, *Suicides in Seattle, 1914–1925: an Ecological and Behavioristic Study*, was released by the University of Washington as part of the series, Publications in the Social Sciences. The study he conducted in regard to his 1930 Ph.D. dissertation (*Suicide in Seattle, Washington and Pittsburgh, Pennsylvania: A Comparative Study*) at the University of Pittsburgh was reported on at least twice in the Pittsburgh Press (Pittsburgh Post Gazette 1927; Cloud 1931), his analysis of Washington population trends was reported by newspapers in Washington (Seattle Times 1940; Spokane Daily Chronicle 1940a, b) and an analysis of 1940 census data was reported in the *Seattle Times* in 1942. After he was appointed as an Assistant Professor of Sociology at the University of Minnesota, he continued his work on suicide with a 1933 article in the *American Journal of Sociology* and subsequently expanded this work into *Mortality Trends in the State of Minnesota* (Schmid 1937), which was published upon his return to Seattle from Minnesota and appointment as Associate Professor of Sociology at the University of Washington, as was his 418 page treatise, *Social Saga of Two Cities: An Ecological and Statistical Study of Social Trends in Minneapolis and Saint Paul* (Schmid 1937).

There was another sociologist in Washington who did demographic work prior to World War II and after, Dr. Paul Landis, a Professor of Sociology and Rural Sociology at Washington State College. Prior to the establishment of the State Census Board, he had written at least two reports on the population of Washington (Landis 1936; Landis and Reuss 1938), given at least one public talk on state population trends (Spokane Daily Chronicle 1940a, b), and in 1942 was given a six month leave of absence to study the state's farm labor problem (Spokane Daily Chronicle 1942). Although his main research focus was on the family, in the 1950s he continued to study population trends in Washington (Ellensburg Daily Record 1953; Spokane Daily Chronicle 1953a, b). In regard to Schmid's appointment and the location of the State Census Board at the University of Washington, it may have been the case that Landis was considered to be too "rural" in his professional outlook for those seeking somebody to develop municipal population estimates and Pullman, too isolated to have the Board situated at Washington State College.

FRED C. SCHLAGETER — *Engineering*
Bremerton, Washington
Phi Kappa Sigma: Track (1, 2, 3, 4)

CALVIN F. SCHMID — *Liberal Arts*
Seattle, Washington

MILDRED SCHMIDT — *Liberal Arts*
Seattle, Washington

ROBERT H. C. SCHOFIELD — *Liberal Arts*
Seattle, Washington
Phi Kappa Sigma; Freshman Football; Treasurer Knights of Hook; President Intercollegiate Knights; Defeated Candidates Club; Senior Council; Chairman Montlake Stadium Bridge Committee

CATHARINE SCHRAM — *Liberal Arts*
Seattle, Washington
Pi Beta Phi

NEIL D. SCOTT — *Business Administration*
Wenatchee, Washington
Delta Upsilon; Freshman Football; Rifle Team (1, 2, 3, 4); President Minor "W" Club (4), Vice-President (2);

Sidebar 2.1 Calvin F. Schmid, 1925. The photo of Calvin F. Schmid (*top right*) is from the 1925 edition of the University of Washington student Annual, *Tyee*. This is the year he received his A. B. degree. He would shortly depart Seattle for the University of Pittsburgh, where he earned his Ph.D. After serving as a faculty member there and at the University of Minnesota, he returned to the University of Washington as a faculty member in 1937, a position he retained until his retirement in 1972. *Source* University of Washington Student Annual, *Tyee*, 1925 Edition

(Anderson and Seltzer 2000). Accompanying Schmid to the WCCA's office in San Francisco was David B. Carpenter, a sociology graduate student, who later went on to work in the a US Government's statistical office in Post-war Tokyo as a naval officer and eventually finished his Ph.D. in Sociology at the University of Washington in 1948.

Given the history of competition between the University of Washington and Washington State University, it is not surprising that if somebody from the former was named to the Census Board, someone from the latter would be as well. This was and continues to be a common arrangement in Washington in terms of public boards, commissions, and the like. Cleveland was originally from Oregon, but had become a faculty member (psychology) at Washington State College in 1908 where he quickly rose through the administrative ranks, becoming Dean of the School of Education in 1918, a post he held until 1940, and returned to in an acting capacity in 1944 (Washington State University 2014). Given Cleveland's history in Pullman and his position, he was likely well connected not only within his university, but also beyond it.

Pat Hetherton, the Executive Secretary of the Washington State Planning Council, was appointed by it as the first Executive Secretary of the Census Board. He was born in Dumbarton, Scotland in 1885. At the age of 16 he moved to the US and subsequently received an engineering degree from the University of Minnesota. He served as a Captain in the US Army during World War I. He gained recognition for his work on the design of Longview, Washington, a planned "company town" that was completed in 1921. Upon the death of its first Director shortly after the Washington State Planning Council was formed in 1935, he was moved from being a council member to Director. He served as Director until the Council was abolished in 1945. In 1953, he moved to San Rafael, California, where he served on its

Planning Commission for some years until he retired in 1970. He was thought of so highly that a street in San Rafael was named after him. He died in 1980.

Post-censal Municipal Population Estimation Methods & Data

With a team in place, the next task was to select the methods that would be used for estimating the post-censal populations of municipalities, which involved determining available data that could be used in these methods. Before the Board decided on methods, however, it needed to define what it was estimating and counting. It decided to use the same definition as that used by the US Census Bureau in its decennial census counts, namely, the population that usually resides in the area of interest. This is known as a "de jure" population (Swanson and Tayman 2011). It was an excellent choice, on the one hand, because it would make the Board's estimates consistent with the census counts of the US Census Bureau; on the other, however, it would not cover those found at a given and given time in an area in which they did not usually reside. For example, people who worked in downtown Seattle during the weekdays and impacting its services there during the day, were back at home in the evenings and weekends in one of Seattle's neighborhoods, such as Ballard. The latter type of population, known as a "de facto" population, is important in terms of planning and delivering services, but as is the case even today, this is not a population that can be easily estimated in a timely and inexpensive manner (Swanson and Tayman 2011). Moreover, it is not consistent with the de jure concept of population used by the US Census Bureau in its decennial census counts.

With a conceptual definition in hand of the type of population to be estimated, the Board identified four general classes of methods that could be used to estimate its choice, namely, the de jure populations of the state's municipalities: (1) direct extrapolation of prior census data using various mathematical models: (2) a cohort-component method; (3) sample enumeration; and (4) the use of symptomatic indicators (called "statistical indices" by the Board) and mathematical formulas between them and population data (Washington State Census Board 1944). The first and second methods, as well as the fourth, had data more or less readily available to use, which made them more attractive than the third method, sample enumeration. The latter was expensive and time-consuming and the Board was under pressure not only to keep its operational costs down but to produce estimates very quickly. Although data were available, the first method, direct extrapolation, was deemed unfit for use because of the small populations of many cities and the rapid growth in many cities since the 1940 census, which none of the extrapolation methods would capture. Like the extrapolation methods, the cohort-component approach considered by Schmid and his team is associated with population projections more than it is with population estimation. Evidently, they planned to use this approach in conjunction with reported births and deaths. However, it also was not selected. The fourth set of methods had three major characteristics important to the Board: (1) They were inexpensive in that they relied on data that were generally being collected or tracked for administrative purposes; (2) with these methods, estimates could be done relatively quickly; and (3) the estimates could indicate post-censal

population changes much better than extrapolative methods, the only other cost effective alternative.

The data available to the Board included ration books (issued during World War II), school enrollment and attendance, building permits and other data on new housing units, residential customers of public utilities, particularly new hook-ups, post office receipts, vital statistics (births and deaths) and payroll and other employment statistics (Washington State Census Board 1944: 26). With data like this, the Board could construct ratios between the population and the 1940 census and a given symptomatic indicator. For example, if there were 150 students in grades K-12 in public schools in a given town as of Fall, 1939 and the town's population was 2,000, as counted in the 1940 census the following spring (As of April 1st, the official census date), then the ratio would be 17.33 = 2,600/150. If the fall, 1942, enrollment was 310, then a population estimate for April 1st, 1943 would be 5,373 = 17.33 * 310. Similar ratios can be constructed using vital statistics, school enrollment and attendance records, public utility hook-ups, housing stock, and payroll data Today, this class of population estimators is generally known as a "Censal-Ratio Method" (Swanson and Tayman 2012: 187–194).

The ration book data could not be used strictly in the same manner as a censal ratio estimator since they only had begun to be issued in 1942, well after the 1940 census. However, they could be used to indicate changes in population. For example, if there were 200 ration books for sugar (Ration Book 1) in a given town as of Spring of 1942 and 2,000 as of Spring, 1943. One could infer that a ten-fold population increase had occurred. This type of information could be used in conjunction with the censal-ratio estimators to determine if the direction and magnitude indicated by the latter were reasonable. It is important to note that the Board did not rely exclusively on these data and methods and simply "turn-the crank" to produce a set of estimates. The estimates were complemented by field work, which included visits to cities, interviews with local, knowledgeable sources, and informed judgment (Washington State Census Board 1944: 26).

Other than in the Washington State Census Board's Report of 1944, censal ratio methods were not described in the US-based literature on population estimation until the 1950s (see, e.g., Bogue 1950)—with one exception. The one exception is important, however, because it was done by Shryock (1936) a US Census Bureau demographer. In this report, he provides not only a description of this approach, but also an example of it using enrollment data. Shryock also cites the use of enrollment data in a censal-ratio approach in a 1910 Ph.D. dissertation at Johns Hopkins University by Robert Hazeman (Shryock 1936: 170). However, there is no record that the censal ratio approach was used by the Census Bureau in the period from 1940 to 1945, leaving the Washington State Census Board as a pioneer in the actual use of this method of population estimation. Given Schmid's familiarity with the demographic literature, it is reasonable to assume that he was, however, aware of Shryock's 1936 article.

A censal-ratio method using housing stock would look like the example just shown for enrollment. The ratio of population to housing stock as found in the 1940 census would be multiplied by the new stock added since 1940 and the result added

to the 1940 population total. While this is not what today would be called the "Housing Unit Method," this approach was a pioneering effort that later evolved into what is called the Housing Unit Method (Swanson and Tayman 2012: 137–164). By 1950, the State Census Board was using the Housing Unit Method on a regular basis in conjunction with building permits and other evidence of new housing stock (Lowe 2009).

As a final note regarding the initial methods used by the Washington State Census Board, ration books were also used by the US Census Bureau to estimate the wartime civilian population of states, metropolitan areas, and counties (Hauser and Tepping 1945) and by Office of National Statistics in England, which applied them not only in World War II, but also in World War I for purposes of local population estimates (Jeffries and Fulton 2006).

While the data needed by the methods selected by the Census Board were "available," gathering them relative to current standards had to be tedious. They were not going to be downloaded from the internet; neither would the communications needed between the board and municipal representatives occur by email. Data had to be identified by surface mail or telephone call and collected in the form of typed pages that were delivered by surface mail, parcel post or in person. Mechanical calculators were used to summarize the data and create the measures leading to population estimates, but it is likely that at least of a few of the calculations were done by hand. Numbers were summarized in tables, and with text, placed on sheets of paper by people operating manual typewriters. Graphs were largely done by hand on paper with the aid of drafting tools. The individual sheets of paper were then double and triple checked, and assembled into reports that were duplicated by mimeographing or printing. Coupled with this effort was the intensive field work that became a hallmark of the Census Board. In short, it took a lot of person-hours to put together a report. The Census Board, established in March, 1943, delivered a bound, printed report to the Washington legislature in late 1944 containing both 1943 (As March 13th and September 13th) and 1944 (again, as of March 13th and September 13th) total population estimates and 1940 census counts of the 223 cities that were incorporated as of the 1940 census. Even though the numbers are only shown for the cities estimated to have increased by three percent (per the Census Board's enabling legislation), the production of these numbers in less than two years was a tremendous accomplishment, one in-line with many other achievements accomplished in record time by the US during World War II (e.g., the culmination of the Manhattan Project in less than two years, the launching of Liberty Ships within 90 days of the start of construction). It also is noteworthy to recall that the total cost of this effort by the State Census Board over a two year period was $3,219.18 (Washington State Census Board 1944: 38).

In its 1944 report, the State Census Board (Table 1) shows estimates for 67 cities that it believed had more than a 3 percent increase over the 1940 census as of March 15th while as of September 15th, it shows its estimates for 110 such cities. As of March 15th, 1944, there are estimates for 114 such cities and as of September 15th, there were estimates for 127 of them. It also shows an estimate of 250 as of September 15th, 1944 for the town of Entiat (Chelan County), which incorporated on April 25th, 1944.

One town of interest for which no estimates are provided in 1943 and 1944 is Richland (Benton County). The 1940 census shows a population of 247 for Richland and an estimate for 1945 has it with a population of 15,000 (Williams 2011: 13), an increase of nearly 6000 percent! Why was Richland not shown in the Census Board's 1943 and 1944 estimates? The answer is that it was in Benton County, where one of the main aspects of the highly secret Manhattan Project was

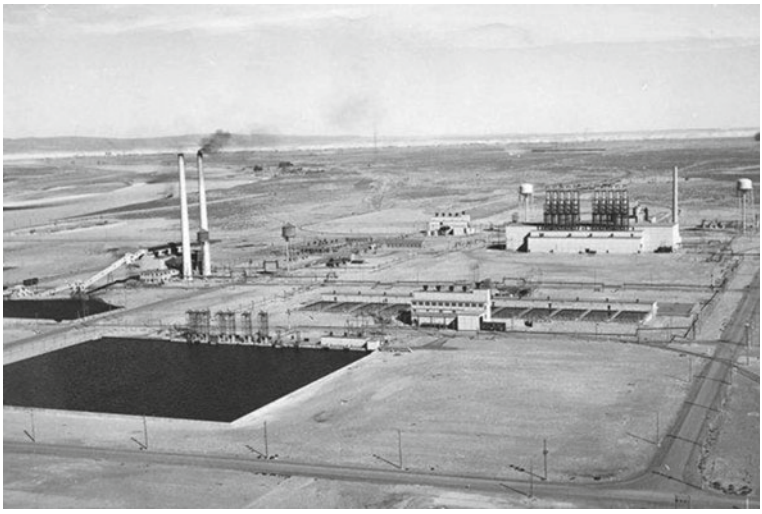
Sidebar 2.2. Friden Electro-Mechanical Calculator, Model STW-10. This motor-driven electro-mechanical digital calculator is an example of the cutting edge technology available to the public before the advent of electronic calculators and computers (devices that used transistors and integrated circuits rather than motors and gears). The staff (mainly graduate research assistants at the University of Washington) of the Washington State Census Board were using earlier versions of the model shown above from the 1940s into the early 1960s to perform calculations. The Model STW-10 shown here was produced in 1961. A description of its capabilities and properties can be found at the Alan Kaminsky Museum of Antique Computing Devices (see URL above). This type of calculator typically covered the top of a desk. *Source* The Alan Kaminsky Museum of Antique Computing Devices (http://www.cs.rit.edu/~ark/museum/friden01.shtml)

initiated in the spring of 1943 with the confiscation of land. This, of course, was the Hanford Facility, the world's first site for producing plutonium on an industrial scale (Williams 2011). It was a huge undertaking that primarily impacted Benton County, Washington. As an example of its impact, recall the special 1944 census of Benton County. It counted 70,987 people, an increase of 489 % over the 12,053 counted in the 1940 decennial census (US Census Bureau 1945). However, in

keeping with the Manhattan Project's code of secrecy, the results were classified and remained so for several years (Tri-City Herald 1950; Beck et al. 1992).

With its estimates completed, the Washington State Census Board showed down to the penny the allocation of the two million dollar appropriation it received. In Table III of its 1944 Report, it shows the initial million allocated according to each municipality's share of the total municipal population in 1940. For example, the city of Aberdeen (Grays Harbor County) received $8,879.46 as of December, 1943 for its 1940 population of 18,846. It did not, however, receive any additional funds because its population was not estimated to have increased by three percent or more between the 1940 census and 1944. The town of Kennewick (Benton County) received $908.65 for the 1918 people counted in the 1940 census; in 1943, it received $992.61 for its estimated population of 2, 850 as of March 15th, and $2,406.32 for its estimated population of 4500 as of September 15th. In 1944, Kennewick received $3,401.50 for its estimated population of 6000 as of March 15th and $3,293.01 for its estimated population of 5500 as of September 15th.

The Washington State Census Board was not the only entity generating population estimates for Washington during World War II. The Census Bureau produced reports (US Census Bureau 1943; 1944a, b, c, d) containing population estimates that could be broadly compared with estimates done by the Washington State



Sidebar 2.3 The B Reactor, Hanford Engineering Works, 1945. The B Reactor is where plutonium-239 was first produced on an industrial scale. The bomb tested in New Mexico on July 16th, 1945 used plutonium-239 created at Hanford, as did the bomb detonated over Nagasaki, Japan on August 9th. Hanford was constructed primarily in Benton County with some of it extending across the Columbia River (in the background) to include a portion of Grant County. Early in 1943 the federal government evicted the small number of people living in the unincorporated towns of Hanford and White Bluffs where the reactors and chemical processing plants would be placed. During construction in 1943–1944, 55,000 workers were employed to build these facilities and the incorporated town of Richland was turned into the site of government housing. In 1940, Richland had 247 residents; by 1945 it was estimated to have 15,000. The US Census counted 12,053 residents of Benton County in the 1940 decennial census and 70,987 in a special 1944 census, the results of which were classified for some years. *Source* US Department of Energy

Census Board. These estimates are discussed by the Board under the sub-heading, "Comparison of Board's Estimates with Other Estimates," which is found in the chapter, "Technical Problems and Procedures," in its 1944 report (Washington Census Board 1944: 27–29). Although the two terms, de jure and de facto, are not used, this section of the Board's essentially describes them and, notes that its estimates are of the de jure population, while those of the US Census Bureau's exclude some members of a de jure population and include some members of a de facto population. The Board concludes that these conceptual differences are largely responsible for the differences found between the estimates done by the Board and the US Census Bureau.

With the release of its 1944 report containing detailed descriptions of the allocation of funds, methods, and sources of data, along with the municipal population estimates and an evaluation thereof, the Washington State Census Board found itself on the verge of going out of existence. The emergency legislation passed in 1943 was for two years and by the time the legislature would next meet (in its regular 1945 biennial session), it was clear that the war was going to end and with it, the war-related population changes.

2.1 Continuation of the Board, 1945–1957: Biennial Appropriations

The only two major questions in regard to the war in 1945 were the time it would take before it ended and how much more it would cost in terms of lives and material. Germany was clearly well on the road to collapse by the time the Washington Legislature convened its regular 1945–46 Biennial Session on January 8th, 1945 and when it ended on March 8th, 1945, Germany was only a few weeks from surrendering unconditionally. Even with the uncertainty regarding the length of time before Japan surrendered, the Washington State Legislature clearly had the state's post-war future in mind.[3]

Inspite of indications that wartime population increases were slowing down and likely coming to an end [e.g., The Board estimated a decline of 500 people for the city of Kennewick between March (6000) and September (5500)], the legislature

[3]Little did the Washington State Legislature know that the end for Japan would come quickly. Even as it was meeting, the first shipment of the plutonium nitrate created at Hanford was sent to New Mexico on February 3rd (Williams 2011: xv). Once in New Mexico, it would be converted to solid metal (13 lbs. worth), set up in an "implosion" device as the world's first atomic bomb, and successfully tested at White Sands, New Mexico on July 16th (Williams 2011: 125–133). Not long afterward Japan surrendered when three events occurred in rapid succession: (1) the detonation of the U-235 "trigger" bomb over Hiroshima on August 6th (using U-235 manufactured at Oak Ridge, Tennessee); (2) the detonation of the second-ever Plutonium implosion bomb over Nagasaki on August 9th; and (3) between these two detonations, the entry of the Soviet Union into the war against Japan on August 8th. On August 15th, the Japanese Emperor announced the country's surrender and by the end of August, US troops were in Japan. World War II was over.

decided that the Washington State Census Board needed to be part of the state's post-war future. Accordingly, on March 16th, 1945, Governor Monrad Wallgren signed House Bill 234 into law as Chapter 231, "Census—Allocation of State Funds." With his signature, not only was the Board was funded through the next biennium, but it was given increased responsibilities.

This act is worth looking at in some detail. It states, in part: "Whenever the cities and towns of the state are under law allocated or entitled to be paid any state funds or state monies from any source, and the allocation is required to be made on the basis of population, on and after the first day of April, 1945, the allocation shall be made on the population of the respective cities and towns and the aggregate population of the cities and towns fixed by the State Census Board hereinafter created…." There followed some provisions about the population sizes of the estimates relative to the 1940 census, such that if an estimate was lower than the 1940 census, the latter would be used. In spite of this minor provision, this law replaced all of the earlier ones in which state funds and the salaries of municipal officials were allocated on the basis of the last federal census.

In terms of the "State Census Board hereinafter continued," the law went on to describe the membership of the Board. As was the case in the initial legislation, there were to be three members, one from the University of Washington and one from Washington State College, and one to be appointed by the Governor. The latter language replaced the earlier languages specifying that the third member be a member of the State Planning Board because it was abolished in this same legislative session. It also varied from the initial legislation in that the three Board members would elect a chairman. Funding for the Board was set for the biennium at $5000, to be taken from the Motor Vehicle Excise Fund. The Board was directed to produce municipal estimates as of February 1st, 1945. Indirectly, this meant it was also expected to produce estimates for 1946 and 1947, since the law was set to expire on April 1st, 1947. In 1947, the State Census Board provided its report on the allocation of funds to the Legislature for 1945 and 1946 (Washington State Census Board 1947).

Chapter 231 was groundbreaking. Instead of having these allocations made on the basis of census data, which could be as old as ten years, it based them on current annual data, with one provision: If a current estimate was lower than the 1940 census, the latter would be used. Even with this provision and the extra work required to ascertain if any of the state's 233 incorporated cities had lost population since the 1940 census, it still meant that an annual set of estimates needed to be made for all of them. This change to using current data preceded by decades federal laws that made similar changes in regard to federal funding allocations, not to mention the Census Bureau's development of an annual population estimation program for states, counties, and cities. The change put in place by Chapter 231 clearly suggests that the legislature expected the Board to operate more than two additional years, but as was often the case with funding, it was only willing to commit funds for the biennial budget cycle.

There also was a substantial change in the source of the funds that would be allocated to the state's cities and towns on the basis of the population estimates (and

1940 census, given a loss in population as shown by an estimate). Instead of a set amount (which in 1943 was $2 million), the total amount to be allocated was 17 percent of the money in the state's Motor Vehicle Excise Fund. This put the amount at well over $2 million.

In addition to the legislative action, as noted earlier, the Washington State Attorney General issued a 1945 opinion that bolstered the Census Board. It stated that any county population determinations developed by the Census Board could be used to obtain grants and matching funds by counties and municipalities (Spokane Daily Chronicle 1945a, b). A second opinion, issued in 1946, also bolstered the Census Board. It stated that a city with a commission form of government could use the State Census Board estimates as of February 1st, 1945 to set the salaries of its mayor and commissioners instead of the last (1940) federal decennial census (Spokane Daily Chronicle 1946).

Just as the 1947 legislative session started, the Association of Washington Cities publicly came out in favor of continuing the Census Board (Coulee City News 1947). This was a crucial vote of confidence. Not surprisingly, Governor Wallgren signed Chapter 51 into law on February 28th. This Act funded the State Census Board for another two years with an appropriation of $10,000. It modified the official date of the annual estimates from February 1st to April 1st, a change that synchronized the state's annual estimates with the official data of the federal decennial census. The membership of the Board was expanded to four people and on July 24th, 1947, the members were named: (1) Chairman, Charles C. Ralls, a Seattle Attorney; (2) Executive Director, Dr. George Lundberg, Professor of Sociology at the University of Washington; Executive Secretary, Dr. Calvin F. Schmid, Professor of Sociology, University of Washington; (4) and as the representative from Washington State College, Dr. Rayburn Tousley, Associate Professor of Marketing (Shelton-Mason County Journal 1947). With this set of appointments, the Board now had three members from Seattle, two of whom were at the University of Washington. They were set to work on the population estimates that would allocate approximately $20 million to cities in towns in Washington over the biennium (Shelton-Mason County Journal 1947). This was a marked increase over the $2 million set aside in 1943 for emergency aid to municipalities over the 1943–45 biennium. The reason behind this increase is that the legislation (Chapter 51) that re-established the State Census Board included the following:

> Whenever the cities and towns of the state are, under law, allocated or entitled to be paid any state funds or state monies from any source, and the allocation is to be made on the basis of population, on and after the first day of April, 1947, the allocation shall be made on the population of the respective cities and towns, and the aggregate population of the cities and towns, as fixed by the State Census Board herein created and as herein provided.

The legislation was signed into law by the Governor on February 28th, 1947. As was the case with the initial enabling legislation in 1943, and the re-authorization legislation in 1945, this was groundbreaking legislation. Now, population estimates were to be used as a means of allocating state funds from any source to the cities and towns of Washington.

During this period, Schmid, wearing his hat as the Director of the Office of Population Research at the University of Washington, volunteered to take on the task of developing a set of sub-county "statistical areas" (geographical areas that have approximately the same boundaries from one decennial census to the other). These sub-county areas would serve in a manner that was similar to that of census tracts in large cities (Klove 1973: 2–3). The outcome was the "Census County Division" (Klove 1973). Carrying out extensive field work in 1948 and 1949, Schmid used the counties of Washington as a test site to develop criteria for identifying the County Census Divisions and procedures to set them up. With some modifications, County Census Divisions were used in 21 states as of the 1970 Census (Klove 1973: 7).

Following the 1949 legislative session, Chapter 60 was signed into law on March 16th by Governor Arthur Langlie, who was back in office after the interruption of the four year term in which Wallgren held the office. This act specified that the State Census Board was to make population determinations pursuant to Chapter 51 until the figures from the 1950 census were released and that, thereafter, all such allocations would be made on the basis of this census. The passage of this act was likely viewed with mixed emotions by the State Census Board. On the one hand, it was to remain in business until the 1950 US Census; on the other, it looked as if it would be out of business following it.

In 1951, the Washington State Legislature passed House Bill 421.1 and it became law as Chapter 96 upon being signed by Governor Langlie on March 13th. This law re-authorized the State Census Board and instructed it to determine annually as of April 1st, the populations of all cities and towns in the state in 1951 and annually thereafter. It also stated that funds in the amount of $20,000 would be appropriated from the Motor Vehicle Excise fund to operate the Census Board for the biennial cycle ending on March 31st, 1951. In the 1953 legislative session, the Board was funded for yet another biennial cycle in the amount of an appropriation of $25,000 from the Motor Vehicle Excise Fund (Chapter 288). In the 1955 biennium, the legislature could not complete its work in a single session and was called back by Governor Langlie for a second session. In the regular session, the State Census Board received an appropriation of $3815 from the Motor Vehicle Excise Fund (Chapter 53); in the extraordinary session it received an appropriation of $25,000 from the same fund.

Thus is how the Washington State Census Board continued its existence after the end of World War II. It was funded on a biennial basis by the legislature from 1945 through 1957. The fact that the appropriations continued and generally increased was a sign that the legislature and the Governor were pleased with the Board's work, which meant that the Board's "constituents" in the form of the state's cities and towns and their legislative representative, the Association of Washington Cities, also were pleased.

The members of the State Census Board for the coming biennium were appointed in November of 1951. They included Dr. Calvin F. Schmid, and Dr. George Lundberg, both professors of sociology at the University of Washington, Dr. Wallis Beasley, a professor of sociology at Washington State College, and A.O.

Burmeister, a Tacoma attorney (Walla Walla Union Bulletin 1951). This same make-up extended into 1953 (Schmid et al. 1953b) and still further into 1955 (Schmid et al. 1955) and 1957 (Schmid and Miller 1957).

During this period of time, 1945–1957, Washington underwent significant changes, many of which were due to factors that caused its massive and rapid change during the early 1940s. Almost as soon as World War II ended, the "Cold War" got underway and it even heated up in the form of the Korean War.[4] These factors kept military forces at relatively high levels in Washington along with the employment in industries that provided materials to the military—the Bremerton Naval Shipyard, the Boeing Airplane company, and the Hanford site, now known as the Hanford Atomic Works.

These war-related factors along with the increase of civilian production are what caused the population of Washington to increase from 1,736,191 in 1940 to 2,378963 in 1950 (Schmid et al. 1953a: 2). This tide was not uniformly distributed throughout the state, those areas with high economic levels gained more people than those with low levels. Given these effects, it appears that the 1945 legislature could indeed see the onset of the Cold War, the effects it would have on Washington's population, and the need to have an entity such as the State Census Board monitoring the state's population. The fact that population increases were still occurring and that they were not evenly distributed around the state kept the Board in business. Between 1945 and 1957, however, the Board was not living solely on the biennial legislative appropriates just and concerning itself only with municipal population estimates. There was a great deal of human capital that the Board had, especially through the Office of Population Research at the University of Washington.

In the late 1940s, Schmid secured funds to develop a 1960 population projection for the state of Washington that was published as part of a broader report by the Pacific Coast Board of Intergovernmental Relations (Schmid et al. 1950). Two graduate students employed as research assistants by the Office of Population

[4]The Cold War also manifested itself in the form of "Red Scares" within the US and Washington was no exception. As part of its 1946 campaign to control the state legislature, the Republican Party accused the Democratic Party of selling its soul to the Communist Party (Curwick 2002). Upon gaining control of both the legislature and the Governor's office, the Republican Party turned its attention to this issue. Albert Canwell, a newly-elected Republican introduced a resolution to create a committee with broad powers to investigate the influence of communism in the state; it was passed, the committee was created and Canwell became its chairman (Curwick 2002). One of the most publicized outcomes of the Committee's hearings and accusations involved six tenured faculty members at the University of Washington. This led to the establishment of a faculty committee that held its own hearings, which resulted a 1948 decision to dismiss one and retain the other five (Curwick 2002). In spite of the sensationalist coverage of this event and the negative shadow it cast on the University of Washington, the legislature and governor continued to support both the State Census Board the Office of Population Research at the University of Washington through the entire "Red Scare" era.

Research were co-authors, Horace W. Mooney and Vincent A. Miller.[5] The population projection was done using the "cohort-survival" approach according to Schmid and his two assistants. Today, this method is known as the "cohort-component" approach and it has become the most commonly used method for making population projections (Smith et al. 2013: 45–50).

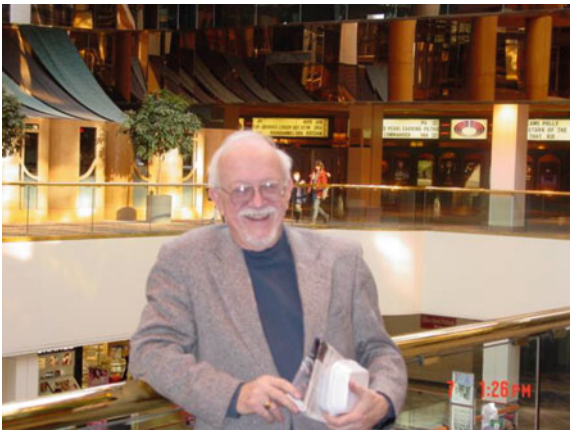
The use of a cohort-component approach to develop population projections was not new, but its use was not widespread in the 1940s (Smith et al. 2013: 45–50). As such, this was a pioneering effort. Moreover, there were three scenarios based on assumptions about the likely levels of the three components of population change, fertility, mortality, and migration. The "low" scenario yielded a 1960 population of 2,807,000; the high one, 3,218,000, and the medium scenario, a 1960 population of 2,918,000. The 1960 US Census counted 2,853,214, which falls between the low and medium scenarios of the forecast (University of Washington 2012).

With the entry into population forecasting under its belt and the growing demand for information about the future for planning purposes, the Office of Population Research provided an enrollment forecast in 1951 for the University of Washington at the request of its President, Raymond B. Allen (Schmid and Shanley 1951). Along with its set of population projections, the Office's enrollment forecast caught the eye of the Legislature. Under a contract with the Legislative Budget Committee, the Washington State Census Board produced a 1953 report that provided trends and forecasts through 1965 of not only the population of Washington, but the state-wide levels of enrollment in its public higher education institutions (including junior colleges) and its K-12 public schools (Schmid et al. 1953b). As was the case with its initial set of 1944 municipal estimates by the State Census Board, the production of these population and enrollment forecasts was groundbreaking. Nothing like it had been done by any other state or by the federal government. It set the stage for additional work to be assigned to the Washington State Census Board.

In addition to his roles with the State Census Board and the Office of Population Research, Dr. Schmid was expected to conduct research and acquire the contracts and grants needed to fund research, publish, teach, and mentor graduate students. The evidence suggests he performed this duties very well, Between 1947 and 1955, he authored or co-authored at least eight refereed journal articles, with several of the co-authored ones being with current or former graduate students: (Schmid 1950; Jahn et al. 1947; Schmid and Young 1951; Schmid and Shanley 1952; Schmid and Griswold 1952; Schmid and MacCannell 1955; Schmid and Van Arsdol 1955). In addition, he was appointed as the chair of the Census Tract Committee for Seattle

[5]Horace W. Mooney received his AB degree from the University of California Berkeley and his Master's degree from the University of Washington. He went on to earn a Ph.D. in sociology from the University of Michigan in 1953 and eventually made his way back to Berkeley, where he worked as a researcher in the School of Public Health at the University of California. Vincent A. Miller chose to remain in Seattle when the Washington State Census Board was abolished and its staff given the opportunity to move with its functions to Olympia. He died in Seattle in 2003 at the age of 88.

(US Census Bureau 1947). Three graduate students who worked for the State Census Board during this period went on to academic careers of their own: Don C Gibbons (Ph.D., 1956; faculty member at Portland State University), Warren Kalbach (Ph.D., 1960; Portland State University, University of Alberta, and the University of Toronto), and Earle MacCannell (Ph.D., 1957; faculty member at San Diego State University, University of Alberta, and Portland State University). With another former graduate student who had worked at the State Census Board, Sanford M. Dornbusch (Ph.D. 1956; faculty member at Harvard University and Stanford University), Schmid co-authored *A Primer of Social Statistics*, published by McGraw-Hill in 1955. He also found time to publish the *Handbook of Graphic Presentation*, which was released by Ronald Press in 1954 (a second edition, co-authored with his son, Stan Schmid, was released by Ronald Press in 1979 and a major revision by Schmid himself was released by John Wiley in 1983). These publications—and many others—coupled with his work on behalf of the Washington State Census Board are what led Van Arsdol and Wendling (1995: 13) to remark that "Schmid was an extraordinarily versatile scholar who saw basic and applied research as closely linked and made important contributions to each area."



Sidebar 2.4 Professor Warren Kalbach relaxing during a break at a Canadian Population Society Conference. One of Schmid's first generation demography students, he established the Oregon State Demographic Center at Portland State University before moving to the University of Alberta, where he then founded the Population Research Laboratory. Both of them exist today. He eventually took a faculty position at the University of Toronto, from which he retired. His research was significant in many demographic areas including that of immigration, general population studies, ethnic segregation, as well as marriage and the family. With Wayne McVey, he co-authored a seminal work on Canadian demography (Kalbach and McVey 1979) and the first textbook on Canadian population, (McVey and Kalbach 1995), both of which were dedicated in part to Calvin F. Schmid. His devotion to the study of Canadian immigration aided in the formation of the 1978 Immigration Act and resulted in a major census monograph on this topic. He served the Canadian Population Society as President from 1982 to 1984 and was a member of the Royal Society of Canada. The annual meeting of the Edmonton Society of Demographers is named the Warren E. Kalbach Population Conference in his honor. *Source* Wayne McVey

As of 1957, the technology used by the Census Board looked much like it did when it was established—surface mail, telephones, mechanical calculators, and the like. Computers were not present at the University of Washington until the 1960s, when an IBM 650 arrived, followed by an IBM 709 (University of Washington 2009).

2.2 Stabilization of Funding and Expansion of Duties: 1957–1967

With the 1957 legislative session came changes. A new governor was in Olympia, Albert D. Rosellini and, unlike his predecessor, Langlie, he was a Democrat. Born in Tacoma on January 21st, 1910 and a graduate of Stadium High School in 1927, he worked at a variety of jobs en route to completing a law degree from the University of Washington in 1933 (Hastings and Waugh 1994). Shortly after starting to practice law in Seattle, Rosellini was appointed as the Deputy Prosecutor of King County in 1935 by Warren G. Magnuson, who was at that time the Prosecuting Attorney for King County. In 1938, he was elected to the State Senate. He ran for Governor in 1952, but was defeated by Hugh Mitchell in the primary election (Hastings and Waugh 1994), who himself went on to lose the 1952 general election to the incumbent, Arthur B. Langlie. On his second try, he was elected and started serving the first of two terms in 1957. While in the legislature he was chairman of the committee on state and local government, which was one of the primary committees concerned with the State Census Board.

With the new legislature and a Democratic Governor, change was in the air and the State Census Board became a beneficiary of the new approach to operating state government. One change came about via House Bill 74.1 which was passed by the legislature and signed into law by Governor Rosellini on March 23rd, 1957 under Chapter 175. This law comprehensively defined the duties and powers of the State Census Board and in it there was no language limiting the State Census Board to operating for only the coming biennial legislative cycle. Consistent with the latter, there was no special biennial appropriation made to operate the State Census Board. Instead, the new law stated that its operations were to be supported by the same monies set aside to be allocated to cities and towns by the State Census Board's annual April 1st population estimates, (RCW) 43.62.0101. This law put the State Census Board on a permanent footing.

With its funding stabilized, the State Census Board not only continued its program of annual municipal population estimates, but its forecasts of population and enrollments, both K-12 and higher education. It also received funding for special studies (e.g., Schmid and Miller 1960; Gossman et al. 1968; Schmid et al. 1968).

While the state, its municipalities, and the Association of Washington Cities were all generally pleased to have annual population estimates and the state funds that were allocated by them, it was inevitable that disagreements over the estimates would arise. Officials representing the cities and towns quickly realized that higher population estimates meant more funds, especially after the elimination of the "last

census" provision, in case a current estimate was lower than the preceding census. In addition, even though no state funds were being allocated directly to counties using the Board's estimates, the opinion of the State Attorney General (Spokane Daily Chronicle 1945a, b), the counties did need population figures to apply for many grants. One of the first disputes arose in 1945 when Chelan County argued that the State Census Board's estimate was too low (Spokesman Review 1946). Schmid and others at the State Census Board quickly realized that disputes over the size of the estimates would be an on-going issue given that they were used to allocate funds to the counties, cities and towns. One response was to have an attorney as a member of the Board, which may have been the reason for the appointment of Charles Ralls in 1947 (Shelton-Mason County Journal 1947) and the subsequent appointment of Burmeister. The latter resigned in 1959 and Governor Rosellini appointed Richard Taylor, mayor of the city of Mukilteo, as his replacement (Port Angeles Evening News 1959). Taylor served on the Board until 1964. He also served as the President of the Association of Washington Cities (1960–61) during his tenure on the Census Board. The appointment of Taylor seemed to set a new course in that another mayor, Scott McDermott, would later be appointed by Rosellini (1964–66) to replace Taylor, when the latter stepped down (Schmid et al. 1966) (Exhibit 2.1).

Another response was to come to an "empirical" resolution of a dispute. That is, to conduct a complete census. The Board also quickly adopted this approach. With it, a county or city claiming that the Board's estimate was too low, could conduct, with the assistance of the Board, its own census. As an example of this means of resolving conflicts, the city of Ellensburg conducted such as census in 1956 (Ellensburg Daily Record 1956). It was directed by Robert Sebastian, a city employee. However, the count was conducted with aid of graduate students from

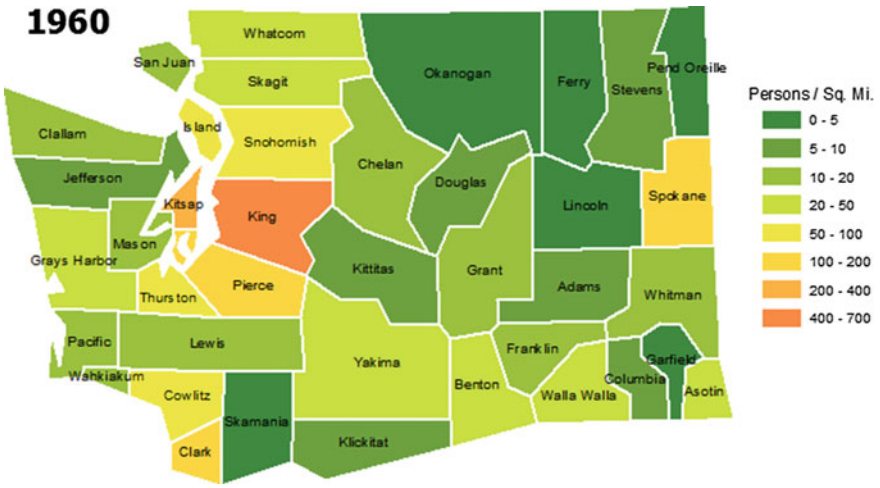


Exhibit 2.1 1960 Washington State Population Density by County. *Source* Washington State Office of Financial Management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

the University of Washington, one of whom was Earle MacCannell, who served as the on-site supervisor. The costs were borne by the city. This was an elegant solution, one perfectly suited to the use of the Housing Unit Method (Swanson Baker and Van Patten 1983). The State Census Board could provide an estimate of the cost of conducting a census while the city (or county) could calculate the expected gain in funds based on what it believed the population was. The net gain to the city (or county) could then be easily determined by subtracting the estimated census costs from the total amount of additional revenue expected to receive. Since a city (or county) never argued that an estimate by the Board was "too high," the decision to conduct a census was strictly based on the net amount of additional funds a city could expect to receive.

Another useful feature of this approach is that the data for the city (or county) in question could be updated if a census was conducted. By the 1960s, this approach was running smoothly. The census procedures developed by the State Census Board (which followed closely those of the US Census Bureau) were refined over time and manuals were developed as part of the training tools (Washington State Census Board 1965).

Not running so smoothly from the standpoint of resolving disputes was the enrollment forecasting work done by the State Census Board. While there were early disputes over the K-12 enrollment forecasts (Ellensburg Daily Record 1955) and later ones (Seattle Times 1966a, b), there was no indication on the part of those disputing the numbers that the Board's K-12 forecasts were biased. This was not the case with the enrollment forecasts for higher education. Although Washington State College had a member on the State Census Board from its start in 1943, it was not long after the Board began producing enrollment forecasts that a hint of bias in the ones for higher education came out of Pullman (Spokane Daily Chronicle 1958).

Sidebar 2.5 Wallis Beasley. Calvin F. Schmid's 1966 resignation letter from the Washington State Census Board was addressed to Wallis Beasley, the Board's chair. Beasley was the Academic Vice President of Washington State University (WSU) at this time. He later would serve as Acting President of WSU. Like Schmid, Beasley was a sociologist (Ph.D., Peabody College). He was a pioneer in the active recruitment of African-American students into graduate programs in sociology and WSU developed a national reputation for producing doctoral students of color at a time when many doors were closed to them. Among its many African-American alumni are Edgar Epps and William Julius Wilson. Beasley retired in 1981 and died in Pullman, Washington at the age of 92 in 2008. The WSU Performing Arts Coliseum is named after him. *Source* Washington State Magazine, http://wsm.wsu.edu/s/index.php?id=252

The argument on the part of parties at Washington State College was that the Board was over-forecasting the enrollment of the University of Washington and under-forecasting the enrollment of Washington State College. It emerged in 1958 shortly after the Board started producing enrollment forecasts for the state's higher education institutions and came to a head early in 1966, by which time Washington State College had become Washington State University (WSU). An example of WSU's view, its President, C. Clement French, wrote a letter to Schmid on February 18th, 1966 that was copied to the Census Board members, presidents of the other public institutions of higher education, Governor Evans, an important (informal) advisor to Evans, Goodwin Chase, and Henry Backstrom, Chairman of the Legislative Budget Committee (Washington State Archives 2014). In the letter, French states:

> A comparison of the enrollments set forth in your forecasts (which are used as a basis for legislative appropriations) with FTE enrollments for the same forecast periods reveals that for one institution, namely, the University of Washington, the forecast figures are essentially the same as (and frequently even higher than) the number of full-time equivalents, while for another institution, Washington State University, (and for the state colleges as well), the full-time equivalent, which is what we have to teach, is substantially greater than the enrollment which you forecast." I therefore repeat a position which I have held and presented unsuccessfully before: It is imperative, if we are to assure equal treatment for all institutions, that the legislature be given enrollment forecasts which are expressed in terms of full-time equivalents.

In advance of French's letter, Census Board member Wallis Beasley, as the WSU Vice President for Academic Affairs, wrote Governor Evans on January 17th, 1966 that he had felt for a long time that a critical review of the Census Board and its Executive Secretary was needed (Washington State Archives 2014). He went on to observe that:

> The Census Board for all practical purposes is defunct and there doesn't seem to be any real need to try to revive it. After careful consideration, I recommend that the functions of the Census Board be moved from the University of Washington and placed in a state agency.

The letter from Beasley was accompanied by a similar letter from Don Patterson, President of Eastern Washington State College and Chairman of the Council of Presidents (Washington State Archives 2014). In a letter dated February 3rd, 1966, Schmid noted in a letter to Governor Evans that in recent weeks there had been strong criticisms and imputations about the higher education enrollment forecasts, which he believed to be unwarranted. In a hand-written note on his copy of this letter, Governor Evans asks where the recommendations by Chester Biesen are in regard to the location of the Board, notes that this issue needs to be cleared up ASAP, and that maybe the Census Board functions should be in a planning agency (Washington State Archives 2014). It is important to note that Chester Biesen was the President of the Association of Washington Cities at this time.

On February 10th, Governor Evans wrote to Schmid that he was concerned about the "apparent drive by some institutions to eliminate the Census Board." Evans noted that it may be the case that the administrative location for the Board's activities may well be in a state agency, but in any event, the information gathered by the Board was too important to allow the function to die. He copied eight people, including Chester Biesen and the presidents of the University of Washington, Central Washington State College and Western Washington State College. Notably, he did not copy anybody at Washington State University (Washington State Archives 2014).

Both Beasley and French continued to press their concerns about the WSU enrollment forecasts. By April, Schmid had enough and resigned from the Board (Seattle Times 1966c; Spokane Daily Chronicle 1966). Although disagreements over population estimates and K-12 enrollment forecasts had occurred, the controversy stemming from the WSU enrollment forecasts represents the only situation where a party hinted that Schmid had produced numbers that favored one entity to the disadvantage of another (Spokane Daily Chronicle 1958; Seattle Times 1966c). For somebody who had built a career on the integrity of his numbers and for whom there is little reason to believe any number he produced was done such that it favored one interest over another, this had to have been a personal blow. In some respects, it is not surprising that WSU complained over numbers concerning its enrollments that were produced by an entity housed at the University of Washington. The conflict over state funding between the two institutions extends into the present, with a recent example provided by the bickering on the part of the University of Washington over the WSU proposal to start a medical school (Inlander 2014; Seattle Times 2014a, b; Spokesman Review 2014).

At this time of his resignation, Schmid was the Executive Secretary of the Board, Wallis Beasley, its Chairman, and Douglas G. Chapman, a University of Washington faculty member, the third member (Schmid et al. 1967).[6] The letter of

[6]At the time he announced his resignation from the Board, Calvin F. Schmid had carried it for 24 years and had been a faculty member at the University of Washington for 29 years and a full professor since 1941. He founded the Office of Population Research at the University of Washington in 1947, which continues to this day as the Center for Studies in Demography and Ecology (https://csde.washington.edu/about/history.shtml). At the time of his announcement, he also had served as president of three professional organizations, the Population Association of America, the Pacific Sociological Association, and the Sociological Research Association.

Wallis Beasley was serving as the Academic Vice President of Washington State College when Schmid announced his resignation in 1966. When President C. Clement French retired in 1967, he was made Acting President until a permanent President was found. He retired in 1981 and died in Pullman in 2008 at the age of 92 (Pullman Daily News 2008).

Douglas G. Chapman was a Professor of Mathematical Statistics at the University of Washington in 1966 when Schmid resigned from the State Census Board. He was noted as an expert on wildlife statistics. As such, the methods with which he was familiar were also familiar to demographers, including Schmid. Chapman subsequently became Dean of the College of Fisheries in 1971, a post he held until 1981 (University of Washington n.d.)

resignation is addressed to Beasley, who was the Academic Vice-President of WSU and would become its acting president when President French stepped down later in the year. In one account, the cited reason for the resignation is a difference in opinion between Schmid and Beasley over the methods used to generate the higher education forecasts (Port Angeles Evening News 1966). In another, Beasley states "…presidents of the state institutions of higher learning have not questioned Dr. Schmid's ability but have felt there is a conflict of interest because he is on the University of Washington faculty" (Spokane Daily Chronicle 1966).

Schmid was well aware that the major operations of the Board were defined by statutes and that in one way or another they would be continued, something made very clear by Governor Evans (Washington State Archives 2014). He also had spent a quarter of a century with it. Given this investment of time and energy and his close identification with the Board, it is not likely he believed it would flounder if he tendered a resignation. He also may have seen for some time that a change was needed in terms of Board's organizational structure. Fortunately, a merit-based civil service system replaced patronage employment with passage of I-207 (an initiative to the people) in the 1960 general election, which meant that if the Board's functions moved to a state agency, they would be implemented by a professional staff

Sidebar 2.6 Governor Daniel J. Evans. In this 1968 photo, Gov. Evans is signing a statement honoring 20th anniversary of the Universal Declaration of Human Rights and the 23rd anniversary of the United Nations. At the time of this photo he was president of the Washington State Council of the United Nations Association. Two of its members are looking on, Mrs. Norman F. Grant and Eugene Breckenridge. Evans was born in Seattle and grew up in the Laurelhurst neighborhood near the University of Washington. He graduated from Roosevelt High School, served in the US Navy (1943–46) and then earned a B.Sc. in civil engineering the University of Washington in 1948 and an M.Sc. in 1949. He was governor of Washington from 1965 to 1977, President of the Evergreen State College, 1977–83, and a U.S. Senator, 1983–1988. He was appointed to the University of Washington's Board of Regents in 1993 and was the Board's president 1996–97. The School of Public Affairs at the University of Washington is named in his honor. *Source* Tacoma Public Library (http://search.tacomapubliclibrary.org/images/dt6n.asp?krequest=subjects+contains+Evans,%20Daniel%20J.,%201925)

rather than patronage employees. If this was the case, then the logical place for the Board's functions was in a state agency. This direction is clearly indicated in the correspondence Schmid had with Evans and the latter's solicitation of a recommendation by Chester Biesen on a state agency within which the Board's functions should be placed. It is bolstered by Beasley's statement in the Spokane Daily Chronicle's article that the presidents of the public colleges and universities felt it was a conflict of interest to have higher education enrollment forecasts done by somebody who was associated with one these same colleges and universities (Spokane Daily Chronicle 1966). Finally, this is confirmed by the letter sent to Schmid by Governor Evans asking him to rescind his resignation, which Schmid did (Seattle Times 1966d). Only when it became clear that the Board's functions would be moved to a state agency in Olympia did Schmid submit a final letter of resignation (Seattle Times 1967; Washington State Archives 2014).

Whatever the reason—or reasons underlying Schmid's decision to resign in April of 1966, and behind-the-scenes actions associated with it, the timing was in many ways beneficial in terms of continuing the Board's functions within a state agency. Daniel J. Evans, a moderate Republican had replaced a two-term Democrat, Albert Rosellini, as Governor in 1965. Evans was a civil engineer and he was a firm believer in rational planning. He served in the Washington Legislature from 1956 until he became Governor. During his gubernatorial campaign, he gave no indication of wanting to radically alter the path set by Rosellini. In addition, he taken a population course from Schmid at the University of Washington and believed that the work of the Board had an important role to play in the future of Washington. In fact, shortly after Evans became Governor, the Census Board was funded to develop a new set of population forecasts for the state. The report was delivered in 1966 (Schmid et al. 1966). This, however, was one of the Census Board's last reports. In 1967, it was officially abolished and its functions moved to the newly-created Planning and Community Affairs Agency in Olympia. Along with its functions, employees of the Board who wanted to join the new agency also were transferred. Importantly, they would enjoy the benefits of a "civil service" job, a professional form of continuity initiated under Governor Rosellini and one that Evans continued.

By the time the Census Board was abolished, many of the students at the University of Washington associated with it had gone on to careers in sociology, often with a focus on demography or its close cousin, human ecology. As noted by Van Arsdol and Wendling (1995), Schmid chaired the dissertations of 30 Ph.D. students and the theses of many more M.A. students. Not all of them went into demography or a closely related field. Some of those who did continue in demography or a closely related field, however, have been already noted (e.g., Don Carpenter, Sanford Dornbusch, Warren Kalbach, and Earle MacCannell). Others include Baha Abu-Laban (University of Alberta), Jarvis M. Finley (Portland State University), Don C. Gibbons (Portland State University), Charles S. Gossman (Western Washington University), Han Young Kim (University of Western Ontario), Water T. Martin (University of Oregon), D. Peter Mazur (Western

Washington University), George Myers (Duke University), Fred Shanley (California State University Los Angeles), Tom Steahr (The University of Connecticut), Maurice Van Arsdol (University of Southern California), Aubrey Wendling (San Diego State University), and David Yaukey (University of Massachusetts—Amherst). Wayne McVey did his M.A. thesis with Schmid, but earned his Ph.D. at the University of Alberta, where he remained as a faculty member for his entire career. Still others went on to careers in applied demography. The latter include Richard Engels (US Census Bureau), Charles Nobbe (The World Bank), Theresa Patricelli (Washington State Office of Financial Management), Donald Pittenger (New York Office of Planning, Washington State Office of Financial Management and Private Consulting), and John R. Walker (University of New Mexico Center for Business Research and the Washington State Office of Financial Management). Calvin's son, Stan, who worked for the Board, went on to become an attorney and retired as an Associate Provost at Washington State University. Some of these alumni had worked for the State Census Board as the University of Washington entered the computer era.[7] Some, such as Chuck Gossman, had even learned how to "program" computers by rewiring them, a skill he later refined by learning the FORTRAN programming language.

In 1967, the last report on population estimates for cities and towns was issued by the Washington State Census Board (Schmid et al. 1967). The report provides estimates for the 267 incorporated towns in Washington, 33 more than found in the first report issued in 1944 (including Entiat, which incorporated in 1944). In addition to the $41 million that was to be allocated by these estimates to the 267 cities, the 1967 legislature authorized an additional "emergency" allocation of $22 million (Schmid et al. 1967: 1). It was a fitting legislative epilogue to 24 years of work: The Washington State Census Board ended as it started, developing current population estimates to provide financial relief to cities and towns trying to cope with substantial and rapid population growth.

One important feature of the Washington State Census Board was its distinctive graphics. Schmid had a keen interest in this area and left a distinctive mark on its use, not only the publications of the Board but in an academic context (Schmid 1954, 1983; Schmid and Schmid 1979). The graphics group represented an important piece of technology even though its work was largely done by hand. Jerry Durham managed the group for many years and when the Board was abolished he took a position with the Washington State Department of Transportation.

[7]In the 1966 population forecast, there is an acknowledgement to David B. Dekker, and Robert C. Roe, Director and Associate Manager, respectively, of the University of Washington's Research Computer Center for data processing assistance (Schmid et al. 1966).

Sidebar 2.7 Tom Steahr, Donald Pittenger, and Charles Gossman. Tom Steahr, Donald Pittenger, and Charles Gossman were research assistants with the Washington State Census Board/Office of Population Research in 1966. They are in Savery Hall on the campus of the University of Washington, where the Board shared office space with the Office of Population Research. All of them are members of Cal Schmid's first generation demography students, but only Steahr and Gossman earned their Ph.D.s at the University of Washington. Tom Steahr accepted a position at the University of Connecticut (essentially as a replacement for Ed Stockwell, who moved to Bowling Green State University). He served as the Connecticut State Demographer, producing statewide demographic projections and doing research on fertility and migration. Steahr died in 1997. Gossman became a faculty member at Western Washington University where he stayed until he retired in 1991. He died in 2014. Pittenger earned his Ph.D. from the University of Pennsylvania. After working for the state of New York, he returned to Washington as the first Ph. D. hired by the successor to the Washington State Census Board, the Office of Program Planning and Fiscal Management, later to become the Office of Financial Management. He did a 15 year stint as a private sector demographic consultant before returning to the Office of Financial Management. He developed innovative approaches to population forecasting, notably in the area of migration modeling. *Source* Donald Pittenger

Sidebar 2.8 Savery Hall, University of Washington. Although the Washington State Census Board was originally housed in Smith Hall, it mainly was housed in Savery Hall during its 24 year existence along with the Office of Population Research and the Department of Sociology. The Board's secretarial staff was located in office space behind the block of three windows at ground level nearest the corner next to the entrance (at the far right, beneath the foliage). Moving to the left, Schmid's office was around the corner of the building. Moving again to the left, the next block of ground level windows is where office space for research assistants such was located as well as the graphics staff. Across the hall was the statistics laboratory where all the Friden calculators (mechanical & electrical) were located. Today, only the Department of Sociology is located in Savery Hall. The Center for Studies in Demography and Ecology, the successor to the Office of Population Research, is located in Raitt Hall and the Population Unit of the Office of Financial Management, the successor to the Washington State Census Board, is now located in the General Administration Building on the state Capitol campus in Olympia. *Source* Donald Pittenger

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Chapter 3
The Demographic Legacy

Abstract Once the Census Board became part of state government, its staff became permanent and more professionalized over time. The statutory basis on which the Board was based was enlarged over time and this continued after it moved to state government. This chapter traces these developments and identifies key players involved in them.

Keywords Staff professionalization · Training and research · Statutory basis strengthened

3.1 Census Board Abolished, Its Functions Moved to Olympia

Even after his resignation and the Board's abolition, Calvin Schmid continued to conduct demographic work out of the Office of Population Research at the University of Washington. In 1968, he and a team of graduate students co-authored a book on the migration of college and university students within the United States (Gossman et al. 1968). The work underlying this major study was started in the early 1960s and was funded by the US Office of Education. Another study pub-

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lished in 1968 was funded by the same agency to which the Board's functions had been moved in 1967, PCAA (Schmid Nobbe and Mitchell 1968).[1]

While the residual work of the State Census Board was being completed, the new group in Olympia was quickly taking shape. John R. Walker, who had worked as a research assistant at the Board while a graduate student at the University of Washington in the late 1950s and early 1960s was brought back from the University of New Mexico as the supervisor of the new group. It was called the "Population and Research Division" within PCAA. He was joined by Theresa Patricelli (later to become Theresa Lowe) who, along with William S. (Bill) Packard, moved directly from the University of Washington as part of the State Census Board staff Richard (Dick) Engels, another former graduate student and Census Board research assistant rounded out the demographic group in the Population and Research Division, which was named, "Population Section."[2] The Population Section quickly got to

[1]Five years after the Census Board was abolished in 1967 and its functions moved from the University of Washington to the newly-created Planning and Community Affairs Agency in Olympia, Dr. Calvin F. Schmid retired as a Professor of Sociology at the University of Washington. By then, he had authored or co-authored more than 100 books and refereed journal articles, supervised 30 Ph.D. dissertations, and many M.A. theses. The techniques and data systems he developed represent lasting legacies to the state of Washington and the profession of demography in terms of the basic and applied research he conducted (Van Arsdol and Wendling 1995). The same year of his retirement he and his son, Stan completed a study for the same agency (Schmid and Schmid 1972).

When he retired in 1972, Calvin Schmid and his wife, Helen, moved to Whidbey Island. They settled into a vacation home near the incorporated town of Clinton that the family had started building in the 1940s and completed in the 1950s (with the assistance of some of Schmid's graduate students, such as Maurice Van Arsdol and Aubrey Wendling, among others, whom he employed to provide them with summer jobs). The Schmids had purchased the land for $600 in 1939, which was only two years after he returned to Seattle to take a position as Associate Professor of Sociology at the University of Washington. Calvin remained in their Whidbey Island home until his death in 1994. He was in good health until 1988 when he suffered a stroke. It did not impair his cognitive abilities but left him with a paralyzed left leg and wheelchair-bound. Upon his death, Helen moved to Panorama City, a retirement community in Lacey, Washington. She died in 2010 (Schmid 2013).

Calvin Schmid was born in Ohio in 1901. His father wanted him to become a baker but, instead, he moved to Seattle to pursue adventure and higher education. He got a job as a janitor at a drafting shop, where one of the employees took Cal under his wing and taught him drafting. He moved up to work on boat plans and related forms of drafting, an experience he applied to his later work on graphics. While in Seattle, he lived at the YMCA and finished a bachelor's degree (liberal arts) in 1925 at the University of Washington. He was drawn into sociology by Howard Woolston and George Lundberg and even started graduate studies at the University of Washington, but he received an attractive offer from the University of Pittsburgh, so he transferred there (Miyamoto 1995). Shortly after earning his Ph.D. in Sociology in 1930, he accepted a position at the University of Minnesota. While there, he met and later married (in 1932), Helen (Ellingboe). Their daughter, Barbara, was born in Minneapolis and currently lives in Honolulu; their son, Stanton (Stan), was born in Seattle, and currently lives in Palm Desert, California (Schmid 2013). It is difficult to view Calvin F. Schmid's decision to pursue adventure and higher education in Seattle instead of a bakery in Ohio as anything but a great choice.

[2]John R. Walker served in the US Army before obtaining a B.A. from San Francisco State University. In 1960, he completed his M.A. Thesis at the University of Washington, "The Impact

work and issued a 1968 report that provided estimates for the state's 267 incorporated cities (Planning and Community Affairs Agency 1968). By the time the 1968 report was issued, there was an additional staff member, Elberta L. Everett. Its tenure at PCAA was to be short-lived, however. Shortly after it issued the 1969 issue of *Washington State Population Trends* (Planning and Community Affairs 1969), the entire Population Section was moved to different executive agency in Olympia, along with John Walker, the supervisor of the Population and Research Division.

In 1969, the legislative authorized the creation of a new and expanded version of the Governor's Budget Office. Under Rosellini, the office was known as the Central Budget Agency; under Evans, it was renamed "The Office of Program Planning and Fiscal Management (OPP&FM)." With the exception of certain items, Governor Evans approved the legislation (Chap. 239) on May 22nd. One of the items approved was the transfer of the population unit from PCAA to OPP&FM. This was a major vote of confidence. No executive agency was more powerful and more secure than the Governor's Budget Office.

(Footnote 2 continued)

of Residential Mobility on Junior High Students." With Warren Kalbach, an expanded version of this thesis was published a chapter in Schmid and Miller (1960). After completing his M.A., he took a position at an office within the University of New Mexico that was similar to the Washington State Census Board. He remained there until he was hired to supervise the research and population unit in the Planning and Community Affairs Agency, which was where the State Board functions went when the Board was abolished in 1967. The group shortly moved to the Office of Program Planning and Financial Management, the Governor's Budget Office, which is where it remained until 1977 when it was renamed the Office of Financial Management when Governor Dixie Lee Ray took office. He died in Olympia, Washington in October, 1983. Walker is credited with the idea of the *Washington State Data Book*, which was first published in 1970 and became a model for similar books published by other states (Washington State Office of Financial Management 1984: iii).

Theresa Lowe (nee Patricelli) obtained her B.A. and M.A. in Sociology at the University of Washington. While a graduate student, she worked as a research assistant with the Washington State Census Board and moved to Olympia when the Board was abolished and its functions moved to PCRA. She moved to Office of Program Planning and Financial Management when the population unit was moved from PCRA. She stayed with the group through its name change to the Office of Financial Management until she retired.

Richard (Dick) Engels received his BA (1962) and MA (1964) in sociology at the University of Washington. Like Walker and Patricelli, he worked as a research assistant at the State Census Board. He was working at the Santa Clara County (California) Planning Agency when the Board was abolished and its functions moved to PCRA. He joined the population group there and stayed through its transfer into OPP&FM, when he took a planning job in Tennessee (1969–74), a position with the Southern Regional Education Board (1974–75), and then joined the US Census Bureau (1975–90). He then worked for the Arriyadh Development Authority; Riyadh, Saudi Arabia (1990–1999), and then returned to the US. He currently resides in Wilmington, North Carolina, where he operates a private real estate investment business.

William S. Packard also received his BA and MA in sociology at the University of Washington. Like Patricelli, he moved directly from Seattle to Olympia when the State Census Board's functions were transferred to PCRA. He died in Seattle in 2007. He subsequently accepted an offer from Tacoma Community College to join its faculty and remained there until he retired.

Given its short tenure at PCAA and the chaos of two moves within a two year period, it is noteworthy that the population unit was able to accomplish not only the production of the two sets of population estimates required of it in the forms of its 1968 and 1969 reports, but also additional work (e.g., Packard 1968). The unit then settled into OPP&FM, where it was given the name of "Population and Enrollment Division" and John Walker, the title of "Chief." By the time that move occurred, both Bill Packard and Dick Engels had departed. Packard took a faculty position at Tacoma Community College and Engels took one with the Center for Business and Economic Research at the University of Tennessee. However, Lawrence M. Weisser, who held an M.A. from the University of California Berkeley, joined the group and he stayed with it until he retired in 2005. David W. Weig also joined the group from New Mexico. He came with a B.A. in economics and completed his M. A. in Economics from the University of New Mexico while working in Washington. His M.A. thesis was on higher education enrollment forecasting and it used data from Washington. Weig subsequently moved to the Department of Revenue, which was followed by a move to the Washington State Investment Board, and then, a final move into private investment consulting.

3.2 Professionalization (The 1970s and 1980s)

With the move to OPP&FM completed, the Population and Enrollment Division could turn its attention to the refinement of its methods and the technical changes taking place in the delivery of data. The Washington State Census Board's location at the University of Washington and its close collaboration with the Office of Population Research had established a culture of research and methodological innovation and improvement. Before turning to these tasks, however, the group produced the 1970 issue of "Washington State Population Trends." The report largely contained data from the 1970 decennial census, which for the first time was being made generally available in electronic form.[3] In 1970, it also found time to

[3]The US Census Bureau has a long history of using new technology in terms of processing decennial census data, starting with the Hollerith electro-magnetic sorter used in 1890. By the time the 1950 census was being processed, it was using "UNIVAC," one of the first computers. By 1960, it was using mainframe computers and tape technology. However, it had not thought of making these tapes publicly available until 1961 when Edgar Horwood, a faculty member in the University of Washington's College of Engineering, placed a call to Jack Beresford, then a member of the US Census Bureau staff (Horwood 1977). Horwood had called to get block level data for Seattle and was told by Beresford that it would not be available for a couple of years in printed form and the only place it currently existed was on computer tapes used by the Census Bureau for processing. Horwood recalls that he then asked Beresford "Well, then why don't you send us a copy of the tape and a write-up of what's on it?" After a pause, Beresford replied "Well, there's nothing I know of that tells me I can't. Provided there is appropriate suppression to avoid disclosure on small entries, I'll send it to you at cost." With the assistance of Arnold Rom at the Boeing Company who had experience with the IBM 709, Horwood and his colleagues produced

assemble and issue the first edition of *State of Washington Pocket Data Book*, a compilation of facts about the state, its counties, and its cities. While printed reports also were distributed, the move to enable electronic data access and manipulation was a huge technological break with the past. It required expertise and equipment that the Population and Enrollment Section now had at OPP&FM. In 1970, the US Census Bureau named OPP&FM as one of a handful of "1970 Summary Tape Processing Centers" around the country (US Census Bureau 1970).

The expertise and equipment available to staff at OPP&FM also allowed for a leap forward in terms of methodological refinement and development. One of the methods pioneered by the Washington State Census Board was refined, namely the Housing Unit Method (A description of this method is found in the Technical Appendix).

The refinement of the Housing Unit Method and other methodological work was greatly assisted by the arrival of Donald Pittenger in 1975, who was appointed Assistant Chief of the population unit. After obtaining his M.A. at the University of Washington, he earned a Ph.D. in demography at the University of Pennsylvania and had worked four years at the New York State Office of Planning Services (known as the Office of Planning Coordination when he started). As a Washington state native who had worked as a research assistant in the Office of Population Research and participated in some of the Board's population estimation work, he had a great deal of "on the ground" experience that was well suited to the intensive field work that was used to generate data needed to develop the annual population municipal estimates for the state. He also had honed a critical eye during his advanced studies at the University of Pennsylvania and had published two articles in refereed journals (Pittenger 1973, 1974) before he came to Olympia. Importantly, he would complete a path-breaking methods book on state and local population projections shortly after his arrival (Pittenger 1976). At the same time, Pittenger was focused on refining the population forecasting model, particularly in regard to ideas found in his book about modeling migration (Exhibit 3.1).

Another refinement that Pittenger had a major hand in was a more systematic approach to the intensive field work used to develop the annual municipal population estimates. The new approach was made tractable by the electronic form of the 1970 census data that OPP&FM could develop and access. With these data, the cities could be mapped by block, and on a sample basis the blocks could be surveyed to determine vacancy rates. Computer generated maps could then be printed and color-coded to show the blocks to be surveyed by the staff doing field work (Lowe et al. 1977). This injected a great deal of rigor into the fieldwork used

(Footnote 3 continued)

"ROMTRAN," the world's first known macro-compiler for processing US Census Bureau data tapes (Horwood 1977). By 1970 the US Census Bureau was ready to release machine readable data tapes. In the meantime, Jack Beresford and others at the US Census Bureau had departed to found "DUALabs," which developed user documentation and the software commands (in COBOL) needed to process the 1970 census tapes and sold these products to users (Swanson and Stephan 2004: 785).

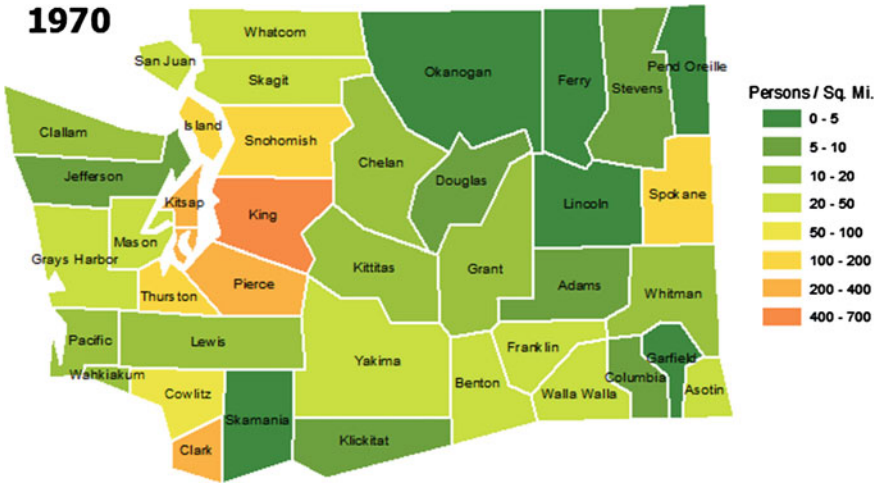

Exhibit 3.1 1970 Washington State population density by county. *Source* Washington State Office of Financial Management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

to generate the municipal estimates. In addition, the data produced by this process enable the application of statistical inference to the estimates they generate (Swanson and Tayman 2012: 207). As such, confidence intervals can be constructed around them (Roe Carlson and Swanson 1992).

There are three other potential methods for obtaining vacancy rates that also are viable: (1) holding vacancy rates from the most recent decennial census constant until the subsequent census; (2) the use of US Postal Service (USPS) delivery data; and (3) modeling, which could also use the vacancy rates from the most recent decennial census and the USPS delivery data as inputs. In terms of holding vacancy rates constant since the last census, there is not much to describe, other than being aware of boundary changes and the use of structure type classifications.

In regard to USPS delivery data, Lowe (1988) examined the accuracy of postal survey data in reporting residential housing unit occupancy estimates against vacancy rates found in the 1970 and 1980 U.S. decennial census counts for 26 Washington State cities. The postal surveys were conducted by the Federal Department of Housing and Urban Development in the 1970s within 2 months of collection of census data. She found that postal surveys almost always show lower vacancy rates than census data because they do not include unfinished or new units, or concealed unoccupied conversions in single family homes. Suburban single family housing generally had the highest occupancy rates. However, she also found that postal data were much more accurate than census data in areas where occupancy rates were subject to high variation, as is found, for example, in cities near military bases, and in multi-unit structures. Because of this variation, Lowe (1988) argued that it was difficult to model vacancy rates in such areas.

In addition to the annual municipal estimates, the population unit also developed estimates for the state's 39 counties. Because housing unit data for unincorporated areas were considered to be insufficiently accurate to use, two methods were used to generated county population estimates: (1) the ratio-correlation method; and (2) Component Method II (Descriptions of these methods are found in the Technical Appendix).

The ratio-correlation method was not developed by the Washington State Census Board, but the two people who did develop it were not far from the University of Washington's campus. This innovative method was developed by Robert C. Schmitt and Albert H. Crosetti (1954). Schmitt was employed by the Seattle City Planning Commission in 1951 and 1952, as was Crosetti. However, Schmitt, who had briefly been in Hawai'i in the late 1940s, tired of the gray clouds of Seattle, and returned to Honolulu by 1952. Crosetti, however, remained with the Seattle Planning Commission until he retired. In spite of the distance between Honolulu and Seattle, Schmitt and Crosetti continued to collaborate, writing co-authored papers through 1956. All of their co-authored work involved testing estimation and forecasting methods using county and city populations as case studies (Schmitt and Crosetti 1951, 1952, 1954; Crosetti and Schmitt 1956).

In their 1951 paper, Schmitt and Crosetti thank two people for reading the original paper and providing many helpful comments. One of them was Calvin F. Schmid. Given this early connection between Bob Schmitt and Cal Schmid, along with the fact they were both from Ohio, it is not surprising that Schmid and the research assistants working with him were aware of the "ratio-correlation" method for estimating county populations. It is likely that they kept up their contact during the summers when Schmid was in Honolulu as a visiting professor teaching courses at the University of Hawai'i (Schmid 2013).

A major challenge in using the "ratio-correlation method" is that until the advent of computers and statistical software such as SPSS (Statistical Package for the Social Sciences), it was an onerous task to perform the calculations needed to build a model, generate estimates with it, and then evaluate it against benchmark data, such as a recent census. This was the case even if only 39 observations were used—the counties of Washington. However, by the 1960s, SPSS and other statistical software packages were finding their ways to universities and research organizations. This type of software greatly facilitated the use of methods such as ratio-correlation. Not surprisingly, the ratio-correlation method was being used by the population unit to generate annual county estimates shortly after the 1970 census.

By 1976, Governor Evans had decided that three terms was enough and did not run for election. In his place, a new governor, Dixie Lee Ray, was elected. Shortly after her arrival in Olympia in 1977, the Office of Program Planning and Fiscal Management was placed under the direction of Orin Smith (who later went on to become Executive Vice-President and CFO of Starbuck's and in 2009 was named a regent of the University of Washington by Governor Gregoire). It also was renamed the Office of Financial Management, a name it bears even today.

As the gubernatorial change occurred, David Swanson arrived (1977), followed not long afterward by Jeff Tayman (1979). Both of them had a great deal of

demographic training and Swanson had worked with OPP&FM in 1972 on the extraction of data from the 1970 summary tape files for Washington while an undergraduate student at Western Washington University. Swanson had just finished his M.A. in Sociology/Population Studies and had worked as a staff researcher at the East-West Center's Population Institute in Honolulu. He was advanced to "All but Dissertation" status en route to a Ph.D. when he arrived and had publications under his belt (e.g., Swanson 1973, 1977; Swanson and Palmore 1976; Swanson et al. 1977). Tayman had one publication when he came to OFM and two others that were published shortly thereafter (Sly and Tayman 1977; Tayman 1980a, 1980b). He had just completed his dissertation by the time he arrived. It was on a method for producing statistical confidence intervals around population estimates. In revised form, his dissertation was published as a co-authored article with his dissertation chair a couple of years after his arrival in Olympia (Espenshade and Tayman 1982), along with a paper on coefficient stability in ratio-correlation models (Mandell and Tayman 1982).

The professional level of the staff by the 1980s is also demonstrated by additional hires into OFM's Population and Enrollment Section. They include Felix D'Allesandro, Steve Lerch, Mike Knight, George Hough, and Wolfgang Opitz. D'Allesandro had a B.Sc. From Western Washington University and first arrived as a summer intern in 1978 while a graduate student at the University of Chicago. He later earned an M.A. from the University of Chicago and returned to the Population and Enrollment Section at OFM, where he worked for several years before moving on to the labor Market and Economic Analysis Section in the Washington State Department of Employment Security. He subsequently became the Manager for Research and Data Analysis at the Washington State Department of Labor and Industries, a position from which he retired.

When he arrived, Steve Lerch did not have a Ph.D., but he went on to earn one in economics from Johns Hopkins University. He is now the Executive Director of the Washington State Economic and Revenue Forecast Council. Mike Knight came from Portland State University to manage OFM's Census Data Center. He eventually moved on to a similar position at the University of Wisconsin, where he stayed for several years before staring his own marketing/demographics company in Madison, Wisconsin.

George Hough and Wolfgang Opitz both earned Ph.D.s in Sociology/Demography from the University of Texas. The former moved on to Portland State University, where he worked in the demographic unit founded by Warren Kalbach for many years. Hough then worked for one year at Rice University with Steve Murdock at the Hobby Center before returning to Olympia as an Education Research Analyst with OFM's Forecasting Division in 2012. Opitz stayed in Olympia, moved into a variety of management positions, and is now the Assistant Treasurer for the state of Washington.

One technological feature that greatly facilitated the modeling work was the fact that OFM was linked via a dedicated Anderson-Jacobson terminal to the mainframe

Sidebar 3.1 Amdahl 470 mainframe computer. In 1982, the largest computer at Washington State University was an Amdahl 470/V8 with 12 megabytes of main memory, 16 I/O channels, 14.8 gigs of disk storage, and a 64K cache. It required an air-conditioned room and a large staff to maintain it. The Amdahl 470/V8 at Washington State University ran at 7.4 million instructions per second (Barnes and Newton, n.d.). Today, its storage and speed are far surpassed by laptops, personal computers, and a number of hand-held devices. *Source* Weiner (2006), http://www.itjungle.com/big/big092606-story01.html

computer at Washington State University (WSU), which depending on the exact date, was one of several different versions of either an IBM or Amdahl mainframe (Barnes and Newton, n.d.). This remote link enabled a level of research-oriented computer power not usually available on state computers in Olympia. Among other analytic tools, it provided access to SPSS (Statistical Package for the Social Sciences), and other statistical software available at WSU not normally found outside of universities during this period of time. In addition, computer jobs could be run relatively fast and even though "card image" text was typed into the terminal, initially using the "WYLBUR" system developed at WSU (Barnes and Newton, n.d.) and later, more sophisticated methods. As primitive as "card image" transmission was, it was far faster than submitting a deck of punched cards as a "job" and waiting for the output in the form of "green bar" printer paper. The link with WSU's computing center greatly facilitated the production of efficiently produced population estimates using methods like ratio-correlation because of the access to SPSS and other statistical software. One technological "loss" that occurred with the move of the Washington State Census Board's functions to state government in 1967 was the trademark graphics developed by Schmid and the Board's graphics group. It was too expensive to have graphics specialists and software packages that produced high quality graphics were still on the horizon.

In addition to the state as a whole, its cities and counties, the OFM Population and Enrollment Section also developed population estimates for Urban Transportation Areas and constructed the state's first model for prison population forecasting (Office of Financial Management 1982). The prison forecasting model was done for the Governor's Interagency Criminal Justice Work Group. The Population and Enrollment Section was awarded a gubernatorial commendation for this work. This recognition led to the assignment of more budget and policy related tasks, including that of forecasting caseloads (Opitz and Nelson 1996).

Under RCW 43.110, OFM was designated in 1977 as the state's official representative to the federal-state cooperative program for population estimates and, also, as Washington's "State Data Center" for processing and disseminating federal census data (a US Census Bureau Program that would eventually be found in every state. Washington was one of the first states to enter into this agreement with the US Census Bureau). It also was designated by this legislation as the agency that would review estimates done by the US Census Bureau and be a liaison between any local government challenging a Census Bureau estimate and the US Census Bureau.

An important event occurred in 1984 that served to validate the OFM Population Unit's procedures and methods. It was a court challenge filed by the City of Bremerton (Thurston County Superior Court Doc. 84 2 0881 1) to the April 1st, 1984 municipal estimates. This case represented the first serious legal challenge to the population estimates program (Lowe and D'Allesandro 1985). Bremerton believed that the crew (and the dependents who accompanied them) of an aircraft carrier that was en route to Bremerton but had not arrived by April 1st should be counted in the 1984 estimate. The state's position was that the carrier had not arrived by April 1st, the official estimate date and its crew and their accompanying dependents should not be counted. The court ruled in favor of the OFM Population Unit citing the statutes along with the definition of population that the Unit used (de jure). It found that the Unit developed estimates in accordance with established procedures and statutes and that they were neither arbitrary nor capricious (Lowe and D'Allesandro 1985).

Building on and extending the considerable success of the population unit, Washington decided to expand its OFM Forecasting function to undertake complex economic analyses and caseload forecasting of programs such as prisons, income and medical assistance, unemployment benefits, and nursing homes. Much of this capacity was created under the leadership of Gary Robinson who took over as Assistant Director of OFM Forecasting in 1985 after John Walker's untimely passing. Robinson would lead the Forecasting Division for 12 years during which he reached out to academic institutions, hired numerous PhD-level researchers, and supported their active involvement in their professional associations and publication of scholarly work. Robinson went on to be OFM deputy director as well as Director. He also served as Department of Information Services Director, and now serves as Pierce County's Director of Budget and Finance.

3.3 Maturity (The 1990s and 2000s)

In many ways, the 1990s looked much like the 1980s. Computing power was coming to "desktops," but until the middle and, especially, latter part of the 1990s, it was still coming largely from mainframe computers. By the end of the decade, laptops were in wide use and they could themselves accommodate sophisticated statistical software such as SPSS. As the staff of the Population Unit adapted to these changes, their tasks were expanded to accommodate new legislation such as the Growth Management Act. However, the core task remained the same one that concerned the Washington State Census Board in 1943: The production of annual population estimates for cities and counties.

As the Population Unit moved into the 21st century, the advent of online and related forms of computing power greatly facilitated its activities. Laptops, database management software, and GIS, among other technological improvements, were coming of age. It was not long before these technologies and the skills needed to operate them became part of the Unit. However, the Population Unit continued to use The Housing Unit Method (HUM) as its primary method for generating annual municipal population estimates (Lowe 2000a), and the importance of this method cannot be understated: Unlike 1943, Washington now has 281 cities instead of 233.

The "HUM" was and still is a labor-intensive effort. The Population Unit has continuously searched for ways to maintain the accuracy of the HUM while reducing the labor and other costs it requires. Not surprisingly, this was a major focus of research for the OFM Population Unit and an in-depth look at this line of work provides an idea of the level of research and evaluation it conducts on the methods it employs.

Picking up on her earlier research in the late 1980s, Lowe (2000b) examined real estate vacancy surveys, which are aimed at the market for apartment rentals (multi-unit structures) and found that because they do not use random sample procedures, they did not match up well with the vacancy rates found in a decennial census, the later typically showing higher rates of vacancy. She suggested that the tendency of real estate vacancy surveys to be lower was primarily due to two factors: (1) many 'rented' units are not 'occupied' in the same manner that the census defines occupancy; and (2) the surveys only cover apartment units that are currently on the rental market (excluding, among other things for examples, newly constructed units that according to census definitions are unoccupied housing units). In her examination, she found that real estate vacancy rates tended to be around five percentage points lower than equivalent census vacancy rates and she provides adjustment factors for real estate vacancy surveys of multi-unit structures so that they more closely match the equivalent census vacancy rates.

Lowe, Mohrman, and Brunink (2003) examined postal delivery data within a context of factors affecting vacancy rates using the 2000 census of Washington as a benchmark. Acknowledging that United States Postal Service (USPS) delivery data recognize postal deliveries rather than housing units, they found that for the state of Washington as a whole, residential postal delivery data exceeded the 2000 census

count of 2,451,075 housing units by 7.6 %. However, when post office box deliveries were excluded, they found that residential deliveries fell about 7.1 % units short of the 2000 census count of housing units for the state as a whole. When looking at Washington's 39 counties, they found, however, that metropolitan counties had lower differences than did non-metropolitan counties. Considering the 2,001,325 housing units counted in the 2000 census for metropolitan counties, the postal delivery data were 7.3 % higher when all deliveries were included and 3.3 % lower when post office box deliveries were excluded. In regarded to the 449,750 housing units counted in the 2000 census for non-metropolitan counties, they found that the postal delivery data were 9.2 % higher when all deliveries were included and 24.1 % lower when the post office box deliveries were excluded.

Moving on to vacancy rates themselves, Lowe et al. (2003: 5) note that postal delivery data recognize deliveries as "possible" and "active." "Active" deliveries are reported within "possible" deliveries. Subtracting "active" from "possible," yields a residual set, "possible, but not active" that corresponds roughly to vacant units (Lowe et al. 2003: 5). Carrying out these operations, they compare the "possible, but not active" set to vacant housing units by county in Washington using 2000 data. They find that for the state as a whole, the 2000 census found a housing unit vacancy rate of 7.33 % while the comparable rate from the USPS data was 1.78 % when all deliveries are used and 1.33 % when post office box deliveries are excluded. Following the state as a whole, Lowe et al. (2003: 6–8) the 2000 USPS data produce, on average, estimates of vacancy rates that are 11–12 % points lower than the vacancy rates from the 2000 census for Washington's 39 counties. They find that the USPS data are only about 2 % points lower than the census vacancy rates in metropolitan counties, however. The largest arithmetic differences are found in counties that have substantial seasonal housing, which are non-metropolitan and that USPS data are, on average, 12–13 % points lower than the census vacancy rates across all non-metropolitan counties. Lowe et al. (2003) also examined changes in the USPS data subsequent to the 2000 test and found that they were in accordance with expected vacancy rate changes due to population and housing changes. They concluded that USPS data may be a useful tool for 'adjusting' (modeling) decennial census vacancy rates at the county level. However, they advise that counties be examined individually in accordance with metropolitan/non-metropolitan classifications and the presence of substantial seasonal housing stock, among other variables.

Lowe and Mohrman (2003) extended the research reported by Lowe et al. (2003) by examining the consistency of 2002 HUM-based county population estimates using USPS adjustments with 2002 population estimates made by the US Census Bureau. They used all possible residential deliveries, including post office boxes and vacancy rates from the 2000 census were adjusted on a county-by-county basis. They found that the mean algebraic percent difference, (or MALPE, which includes the sign of the percent difference) across all 39 counties in 2002 was only 0.14 % and that in 17 counties the HUM-based estimates exceeded the Census Bureau estimate while 22 counties were lower. The highest positive difference (2.80 %) was for the non-metropolitan county of Garfield, which is not adjacent to a metropolitan

county; the highest negative difference (−5.39 %) was for Island County, which is adjacent to the metropolitan county of Snohomish. Lowe and Mohrman (2003) also 'backed-into" the USPS adjustments that would be required to match the "most likely" populations of these counties in 2002 (which were a combination of state and Census bureau estimates, accounted for the population in group quarters, and maintained 2000 PPH values). They found that at the state level, a 25.2 % change was required of the USPS data and that most counties required between a 20 and 40 % change. They concluded that the process they used needed to be extended to more years subsequent to 2000 to assess the stability of the relationship between the (assumed) underlying actual vacancy rates and the rates derived from the USPS data. Concluding this research, Kimpel and Lowe (2007) examined a regression model using administrative data to update household size and found that generally the most accurate population estimates come from using several procedures and understanding the biases in each.

The preceding research thread is but one example of what the OFM Population Unit and its predecessors have done in regard to improvement of methods, products, and product delivery systems. Many more examples are found in the "Research Briefs" series, which can be accessed online and downloaded free at the OFM website: http://www.ofm.wa.gov/researchbriefs/default.asp. This series also gives a good idea of the range of topics the Population Unit conducts that is of interest to policy-makers.

Sidebar 3.2 Staff of the Population Unit, Office of Financial Management, May, 2014. *Left* to *right* Yi Zhao, Tom Kimpel, Erica Gardner, Mike Mohrman, Diana Brunink, and Webb Sprague. In the background is the General Administration Building, where the Population Unit is located. *Source* Tom Kimpel

The current professional staff (as of April 1st, 2015) of the OFM Population Unit includes Diana Brunink, Erica Gardner, Tom Kimpel, Mike Mohrman, Webb Sprague, and Yi Zhao. In 1971, Diana Brunink earned a B.A. in Education at Western Washington University with a major in mathematics and a minor in geology. After several positions in the private sector and state government, she joined OFM in 1980. Since her arrival she has been primarily responsible for the production of the *Washington State Data Book* and annexation processes. She also has performed many other tasks. For example, she co-authored the 1980 report, "Higher Education Enrollment Forecasts for the 1981–1983 Biennium Budget" and several of the *Washington State Research Briefs*.

Dr. Erica Gardner serves as a senior forecast analyst. In this capacity, her primary tasks are supporting the population estimate program, managing annexations, working extensively with Census and federal survey data, such as the American Community Survey and the Current Population Survey, producing the age by sex estimates, and acting as the primary liaison with the Census Bureau for the Washington State Data Center. She received her Ph.D. from Penn State in 2003, joined OFM shortly thereafter, and moved to the Population Unit in 2009. She has authored or co-authored a number of issues of the *Washington State Research Briefs* and has co-authored five referred journal articles.

Mike Mohrman earned his BA in geography in 1989 from Glassboro State College (New Jersey) and his MA in geography in 1992 from the University of Washington (1992). His area of expertise is Geographic Information Systems (GIS). Mohrman has contributed to development of OFM's small area estimates program and participated in the 2010 census count review program. In addition, he has co-authored several *Washington State Research Briefs*. In 2006, Mohrman, Theresa Lowe, and Kyle Reese-Cassal (a former OFM Population Unit staffer, now working as a demographer for ESRI) co-authored a paper presented at the annual conference of the Population Association: "Census Block Population Estimates: Practice and Purpose."

Tom Kimpel joined the Population Unit in 2005. He received his B.Sc. from the University of Oklahoma, an M.A. in Urban and Environmental Planning from the University of Virginia, and in 2006, a Ph.D. in Urban Studies from Portland State University. He processes most of the Census Bureau products for Washington and is involved with a number of internal program including city and town estimates, the state population forecast, small area estimates and special area estimates. Kimpel also publishes demographic data via the state's open data platforms—in both tabular and geospatial format. He has 20 years of experience with GIS. Before coming to Olympia he was employed by the Center for Urban Studies at Portland State University for 10 years. He has co-authored several of the *Washington State Research Briefs* and in 2007, he co-authored an article dealing with a GIS analysis of bus service (Kimpel et al. 2007). He also represents an interesting variation in regard to the many links that can be traced to Calvin F. Schmid in that he has a link to Edgar Horwood, a Professor of Civil Engineering at University of Washington. Among many other accomplishments, Horwood was instrumental in getting the US Census Bureau to release census information in electronic form (see Footnote 3).

The professor who chaired Kimpel's Ph.D. dissertation was Ken Dueker, who received his Ph.D. from the University of Washington under the guidance of Professor Horwood. He also took a graduate course from David Swanson at Portland State University, so he also has a link to Schmid.

Webb Sprague came to the Population Unit at the "All But Dissertation" stage from the University of California Berkeley in early 2009. He completed his Ph.D. in 2013 with the acceptance of his dissertation, "Wood's Method—a Method for Fitting Leslie Matrices from Age-Sex Data, with some Practical Applications." He presented a summary of his dissertation in Boston at the spring, 2014 meeting of the Federal-State Cooperative Program for Population Projections (Sprague 2014). At OFM, he maintains the historical software codebase for the Growth Management Act (GMA) forecast allocations and small area characteristics estimates. He also is the local vital statistics expert, the local school-enrollment data expert, contributes to small area estimates program by collecting data and maintaining SAS computer programs, and helps with yearly estimates. He is a self-taught GIS technician and an open source software user, advocate, and programmer. Sprague also teaches a weekend class on Geographic Information Systems (GIS) at The Evergreen State College and is working on a monograph based on his dissertation.

Yi Zhao is the supervisor of the Population Unit and its Chief Demographer. She received a B. A. and an M.A., both in English/American Studies, from Beijing University in 1979 and 1983, respectively. She obtained an M.A. in Sociology from Bowling Green State University in 1989 with a focus on demography.[4] She subsequently worked at the Southeast Michigan Council of Governments and Science Applications International Corporation before coming to the OFM Population Unit in 1995. Yi Zhao is primarily responsible for the population forecasts and is the author of a number of reports on this subject. She also has authored or co-authored several of the *Washington State Research Briefs* as well as a number of papers and presentations, including one with John Carlson and David Swanson (Swanson et al. 1994).

Today, the Population Unit operates under the umbrella of a set of comprehensive statutes that relate to the Office of Financial Management (OFM). For the

[4]Along with Jerry McKibben, Ron Prevost, and Kimberly Wright Sinha, Yi Zhao received her advanced degree at Bowling Green State University (BGSU). These four BGSU alumni also can be counted as third generation students of Cal Schmid. David Swanson was an assistant professor of sociology when they were graduate students and along with other demographers in the BGSU Sociology Department at that time (Ted Groat, George Hough, Mostafa Nagi, Ed Stockwell, and Jerry Wicks), he had a hand in training and mentoring them. McKibben, Prevost, and Zhao all work as demographers at, respectively, McKibben Demographic Research, LLC, the US Census Bureau, and the OFM Population Unit. Kimberly Wright Sinha is Statistical Programmer/Analyst at Scannell and Kurz, a higher education consulting firm based in Rochester, New York. Along with George Hough, Swanson had a hand in training and mentoring another graduate student, Tom Bryan, while a faculty member at Portland State University. Bryan is employed as a Market Research Manager by Altria Corporation. Swanson also chaired the dissertation committee for Matt Kaneshiro, who earned his Ph.D. in Sociology at the University of California Riverside and is now a research demographer with Nielsen/Claritas.

most part, these statutes are found in the Revised Code of Washington (RCW) under the 43.63 series:

1. RCW 43.62.030 states that OFM shall annually determine the April 1 populations of all cities and towns of the state;
2. RCW 43.62.020 states that OFM population estimates for cities and towns are used in state program administration and in the allocation of selected state revenues;
3. RCW 36.13.100 and RCW 43.62.030 state that population estimates for counties are used to allocate revenues;
4. RCW 43.62.035 states that OFM shall determine the percentage increase in population for each county over the preceding ten-year period, as of April 1 and prepare 25-year population projections on a regular basis;
5. RCW 43.62.050 directs that OFM in even-numbered years (for the biennial budget cycle) shall develop student enrollment forecasts of grades K-12, including both private and public schools and colleges and universities; and
6. RCW 43.62.10 states that a political subdivision of the state or any of its agencies must pay OFM when it uses the population studies services and that the payment shall come out of funds set aside for cities and towns under RCW 82.44.155 before any payments are made to cities and towns.

There are other statutes under other series that relate to the Population Unit of OFM, including:

1. RCW 43.41.400 directs OFM to maintain an education data center; and
2. RCW 35.13.260 relates to having a determination of the population of an area annexed by a city.

OFM also produces annual population estimates for 'special areas' required by statute. They include highway urban areas, public transportation benefit areas, and the thermal electric generating facility area. The special area estimates are based on data produced by the Small Area Estimate Program using GIS-based spatial interpolation procedures.

As the preceding RCWs show, the Population Unit within OFM develops official state and local population estimates and projections for use both in the allocation of state revenues and for planning, such under the growth management policy found in Washington. As the official partner of the U.S. Census Bureau for Washington state, the Population Unit helps disseminate information about the characteristics of Washington's population, housing, and economy and provide guidance to a variety of stakeholders in accessing and using demographic information. Virtually all of the information is available for free online. The starting point for accessing this information is found at http://www.ofm.wa.gov/pop/default.asp.

One example of the information available from the Population Unit is in the form of an interactive map of counties from which a wide range of county and city information can be accessed at no charge: http://www.ofm.wa.gov/localdata/default.asp. Although these maps and the other "graphics" found in the products of the OFM Population Unit are done largely by computers, they represent a link to the

distinctive graphics produced by the Washington State Census Board. However, the assembly, analysis, and delivery of data in the form of PDF publications and MS-EXCEL spreadsheets is a far cry not only from 1945 when the State Census Board delivered its first set of estimates to the legislature, but from even the 1990s when it was delivering materials in printed form via surface mail. Even the *Washington State Data Book*, first issued in 1970 and subsequently on a biennial basis, is now online. The current issue can be accessed at http://www.ofm.wa.gov/databook/. Also of interest is the demographic data that Tom Kimpel publishes via Washington's open data platforms—in both tabular and geospatial format. Examples can be found at:

https://data.wa.gov/browse?category=Demographics&utf8=%E2%9C%93; and http://wa-geoservices.maps.arcgis.com/home/item.html?id=5bdc9342d50f45db8958e316f47185d5

Sidebar 3.3 General Administration Building, Capitol Campus, Olympia. The domed State Capitol Building is to the *right* with the General Administration Building on the *far left*. A portion of Budd Inlet/Capitol Lake can be seen in the *right foreground*. The Forecasting Unit and the Population Unit of the Office of Financial Management are located in the General Administration Building. *Source* http://www.abam.com/portfolio/project/302

The OFM Population Unit provides the state of Washington with information used to allocate funds and inform policy-making. Its activities affect virtually every resident of Washington. The funds allocated via its annual population estimates are used to improve local infrastructure and public services, as well as determine the class of a given city (which in turn establishes its power and the salaries of its elected and appointed officials). Its enrollment forecasts are used to support K-12 and public higher education. Its state-level population forecasts are used in

determining the biennial budget both in terms of expected revenues and expected costs. Its county level population forecasts, mandated by the Growth Management Act, affect a wide range of activities in both the public and private sectors.

Before moving on, it is worthwhile to mention again the forecasting capabilities of the state of Washington, much of which can be traced back to Schmid and the State Census Board. Marc Baldwin, Assistant Director, OFM Forecasting Division, and Steve Lerch, Executive Director and Chief Economist, Economic and Revenue Forecast Council, among others, conduct non-partisan, empirically–based analysis that serves the interests of the state as a whole. Outside reviews have many times affirmed Washington state government's strengths in these matters, one important type of which is in terms of its credit rating. The strength of the state's financial management and willingness to act on empirical, non-partisan analysis is one of the most consistently and frequently cited aspects for the state's high credit rating, and its forecasting capabilities are part of this. For example, in its June, 2014 bond rating report, Moody's (Moody's Investors Service 2014) states:

> Washington's Aa1 general obligation rating incorporates the state's sound management tools such as its quarterly consensus revenue forecasting process (and)…multi-year revenue and expenditure projections…

In the process of serving the needs of Washington and its residents, The OFM Population Unit has become one of the pre-eminent applied demography centers in North America. The Unit and its predecessors developed methods that are used by other state demographic centers (e.g., California, Florida, Oregon, and Texas), regional and local planning organizations (e.g., Puget Sound Council of Governments, San Diego Association of Governments, Seattle Planning Commission), Provincial Demographic Centers (BC Statistics and the Population Research Laboratory, University of Alberta), the U.S. Census Bureau and Statistics Canada. As such, many demographers, planners, and other analysts in the US and Canada are aware of the OFM Population Unit. However, they typically are not aware that its predecessor, the Washington State Census Board, developed methods and procedures that they are using today—particularly those methods and procedures used in the areas of population estimation and population forecasting.

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Chapter 4
Impacts Beyond Washington State

Abstract Because the Census Board was physically housed on the campus of the University of Washington, a population research center was established to complement it. Both organizations were under the direction of Dr. Calvin Schmid. Both organizations provided training and financial support for graduate students. Dr. Schmid supervised graduate students, many of whom went on to distinguished academic and non-academic careers. This first generation, in turn, went on to train a second generation and a third generation is now training the fourth generation of students who can be traced back to Schmid. This chapter provides an idea of the extent of this influence on academic demography as well as applied demography by tracing the links from two first generation students though the third generation.

Keywords Public and private sectors · Applied demography · Academic demography

How did the Washington State Census Board and its successors come to have a substantial effect on the practice of demography? The answer is in two parts: (1) the development of new methods and applications of existing ones; and (2) and the number of people it trained in their uses. The Board was a model for the Oregon State Demographic Center (Portland State University) and the Population Research Laboratory at the University of Alberta. It also shaped the development of California's State Demographic Unit (housed in the Department of Finance). In addition to its direct impacts on other organizations, the Board provided experience for students that completed the sociology graduate program at the University of Washington. Many of the people who earned M.A.'s and Ph.D.'s in sociology there during the period 1943 to 1967 had this experience. In turn, they collectively acted as a multiplier effect that led to the proliferation of the Board's impacts on demography programs throughout the US and in Canada.

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4.1 Direct Impacts on Other Demographic Centers, State and Provincial

Before he completed his Ph.D., Warren Kalbach accepted a position at Portland State University in 1958 as Director of its newly established Population Research Center. In 1955, Oregon established a State Census Board; not surprisingly, it was modeled after the Washington State Census Board (Schmid et al. 1967: i). However, it really started to become fully functionaly after Kalbach arrived. Dr. George Hough (Ph.D., University of Texas) left a position with the Population Enrollment Section at OFM (where he had been for several years) for one at the Population Research Center in 1994. He was joined a year later by David Swanson, who subsequently moved on—to the Helsinki School of Economics, University of Mississippi, and, finally, the University of California Riverside. Hough returned to Olympia in 2011.

When Kalbach completed his dissertation in 1960, he accepted an appointment at the University of Alberta. He moved to Edmonton in 1961 and immediately set to work on establishing the first "population research centre" in western Canada (McVey 2005). Known as the Population Research Laboratory, it was modeled after the Office of Population Research established by Calvin F. Schmid at the University of Washington. Kalbach was later joined by Wayne McVey. They co-authored the first textbook on the population of Canada in 1995, which in part was dedicated to the memory of Calvin F. Schmid (McVey and Kalbach 1995). Kalbach and McVey also co-authored a seminal work on Canadian demography (Kalbach and McVey 1979), also dedicated in part to Schmid. The Population Research Laboratory is still in operation at the University of Alberta under the direction of Dr. Gillian Stevens. It employs an alumnus of Western Washington University, a 2nd generation student of Schimd's, David Odynak, as a Demographic Research Analyst.

While no demographer affiliated with the University of Washington or the Washington State Census Board (and its successors) moved to British Columbia, there was interaction between British Columbia Statistics (BC Statistics) and The Population and Enrollment Section of the Washington Office of Financial Management. David O'Neill and Ravi Verma (who later went to Statistics Canada, from which he retired in 2010) were among the BC Statistics staff who consulted with their OFM counterparts, (Theresa Lowe, Donald Pittenger, David Swanson and Jeff Tayman) on methods. They also consulted with their counterparts in Alberta, such as Wayne McVey.

Similarly, while no alumni of the Washington State Census Board moved to Sacramento to work with the Population Unit in the California State Department of Finance, certain procedures and methods used by the Washington State Census Board were adopted by California (Schmid et al. 1967: i) and there was a great deal of informal communication between the two agencies. However, there is an alumnus of OFM' Population and Enrollment Section who moved to a major agency in California that produces demographic information—The San Diego Association of Governments (SANDAG). In 1982, Jeff Tayman accepted an offer from SANDAG to direct its forecasting and estimation efforts. He developed numerous methods for

producing estimates and forecasts for small geographic areas, including cities, census tracts and blocks, and assessor parcels. He retired as the Director of the Technical Services Department in 2006 and is currently a lecturer in the Economics Department at the University of California San Diego.

In 1981, David Swanson accepted a position as Alaska's first State Demographer, as part of the staff of the Research and Analysis Section, Alaska Department of Labor. He brought with him to Juneau, the statutes under which the population activities in Washington operated along with manuals, publications, and the experience he had gained in Olympia doing population estimates and population and enrollment projections. Much of this became the principles under which the population unit in Alaska operated (Alaska Department of Community and Regional Affairs 1981a, b; Alaska Department of Labor 1981, 1982). His work was continued and improved upon by the two subsequent Alaska State Demographers, Greg Williams and Eddie Hunsinger.

In 1992, Swanson accepted a position with the Institute for Economic Advancement, which was part of the School of Business at the University of Arkansas, Little Rock. Because Arkansas had a state income tax, it did not need population estimates to allocate state money to its local governments, it did, however, have a need for population forecasts and the experience gained by Swanson in Washington and Alaska was used for this purpose on behalf of Arkansas. The methods he introduced are still in use at the Institute.

The Successors to the Washington State Census Board also had impacts on other state demographic centers and the US Census Bureau through two organizations, the Federal State Cooperative Program for Population Estimates (FSCPPE) and the Federal State Cooperative Program on Population Projections (FSCPPP). The FSCPPE was formally organized between 1967 and 1973 by a group of Census Bureau and state demographers who did population estimates on behalf of their respective states. At its regular meetings, Washington state demographers regularly presented evaluations of their estimation methods and, in turn, learned of developments at other state demographic centers and the US Census Bureau. Ideas on a similar organization that dealt with population projections started circulating soon after the FSCPPE was formed. By 1981, the FSCPPP was in business. Through it, Washington state demographers regularly presented evaluations of their population projection methods and, in turn, learned of developments at other state demographic centers and the US Census Bureau.

4.2 Direct Private Sector Impacts

Joan Naymark (née Gentili) accepted a position in 1978 as a research analyst with the Minnesota Office of the State Demographer. She had a BA and MA from Western Washington University and had worked as an intern in 1975 with the population and enrollment studies unit at OPP&FM in Olympia, Washington. In 1982, she accepted a position with the Dayton-Hudson Corporation (now known as Target Stores). When she retired in 2012, she was Director of Market Analytics and

Planning. During her career she served on a number of advisory committees for the US Census Bureau and was an active member of the Association of Public Data Users. During her tenure, she pioneered the use of a wide range of small area data, including the US Census Bureau's "American Community Survey."

Donald Pittenger worked as a research assistant from January to August in 1966 on the student migration project conducted under the auspices of the Board and the Office of Population Research was with the OFM Population and Enrollment Section from 1975 to 1980. In 1980 he opened "The Demographics Laboratory" and worked as a private consultant for fifteen years. Among his clients were General Motors, Chrysler Corporation, Mattel Toys, Transamerica Insurance, A. C. Neilsen, and Stroh Brewery. While in the private sector he developed methods for forecasting socio-economic characteristics. He returned to OFM in 1995 and worked in the Population Unit, where he continued to refine and develop population forecasting techniques, particularly in the form of migration models, until he retired in 2006. His 1961 B.A. degree was in Commercial Design and his 1966 M.A. was in Sociology. Both degrees were from the University of Washington. He earned a Ph.D. (Sociology/Demography) from the University of Pennsylvania in 1973.

Sidebar 4.1 Joan (née Gentili) Naymark is one of Schmid's second generation demography students. She earned a B.Sc. and M.A. from Western Washington University and retired as the Director of Market Analytics and Planning for the Target Corporation after a 30-year career. She is the founder and Director of MACS—Minnesotans for the American Community Survey. MACS' mission is to educate Minnesota's Congressional Delegation and the public about the critical importance of ACS Census data to improve Minnesota's economy and the well-being of all Minnesotans. Naymark was a member of the National Census Advisory Committee from 1995 to 2011, representing the U.S. Chamber of Commerce. She chaired the North American Research Task Force for the International Council of Shopping Centers from 2010–2012 and currently serves as Vice President of APDU, the Association of Public Data Users. Before joining Target, she was a research analyst in the Minnesota Office of State Demographer and Manager of Population Studies for the Upper Midwest Council, offices to which she brought her experience as an intern with the Population and Enrollment Section of the Washington State Office of Program Planning and Fiscal Management. *Source* Joan Naymark

Prior to running the Census Data Center for the Population and Enrollment Section of OFM from 1987 to 1990, Mike Knight was with the Center for

Population Research at Portland State University (the unit founded by Warren Kalbach). He held a B.Sc. in economics from Utah State University (1984) and an MPA (1987) from Portland State University. He accepted an offer in 1990 to direct the Census Data Center at the University of Wisconsin's Applied Research Laboratory. In 1995, he founded Third Wave Research and was its president and chief executive officer for 18 years before selling most of its parts to MEDSEEK. Third Wave was known for its ability to integrate data from a wide range of sources and produce models that were useful to clients. One project of interest was the development of a model used to estimate household income for households in large data bases (e.g., a large retailer) for which income was missing. When MEDSEEK bought most of Third Wave, Knight retained its retail analysis section, which is now known as Customer Analytics, LLC. He is the president of CEO of this company, which has a branch in Verona, Wisconsin and another in Chennai, India. Its staff ranges from 50 to 200, depending on projects.

Sidebar 4.2 Peter Mazur is one of Schimd's first generation students. As a teenager, Mazur lost his right arm to a German hand grenade in Poland during World War II. He survived the loss and after the war made his way to France and eventually the US. He received a B.A. from Stetson University (Florida) and his Ph.D. from the University of Washington. He primarily studied soviet and eastern European demography. Mazur was known for his sense of humor, which comes out in the photo as he displays his likeness to a picture of Vladimir Lenin in the book he is holding. Like Charles Gossman, one of his fellow graduate students at the University of Washington, Mazur accepted a position at Western Washington University and remained there for his entire career; also like Gossman (who served in the US Marine Corps), the effects of injuries he sustained in World War II remained with him throughout his life. *Source* Ed Stephan

4.3 University Impacts

Three generations of demographers can be traced to Calvin F. Schmid through three pathways: (1) the Washington State Census Board and its successor agencies; (2) the Office of Population Research at the University of Washington (now known as the Center for Studies in Demography and Ecology); and (3) the Department of Sociology at the University of Washington. The first generation was trained by Schmid and as noted by Van Arsdol and Wendling (1995), Schmid chaired the dissertations of 30 Ph.D. students and many more theses for M.A. students. Identified earlier were 18 Ph.D. students (Baha Abu-Laban, Don Carpenter, Sanford Dornbusch, Jarvis M. Finley, Don C. Gibbons, Charles S. Gossman, Warren Kalbach, Han Young Kim, Water T. Martin, D. Peter Mazur, Earle MacCannell, Wayne McVey, George Myers, Fred Shanley, Tom Steahr, Maurice Van Arsdol, Aubrey Wendling, and David Yaukey. This group then trained and mentored a second generation interested in demography and the second generation trained and mentored a third.

Because the 18 students in the first generation were widely scattered, the second generation that can be traced to them also is widely scattered, and the third even more so. This makes tracing the entire second and third generations difficult. However, it is possible to gain an idea of the magnitude of these numbers by focusing on two of the first generation students, Charles Gossman and Peter Mazur, and identifying their second generation students. In turn, we also can trace the third generation students linked to two of their second generation students.

Sidebar 4.3 Like Joan Naymark and Lucky Tedrow, Jay Teachman is a member of Schmid's second generation demography students. After earning his B.A. at Western Washington University, he earned a Ph.D. from the University of Chicago in 1978. He was a faculty member at five universities (Iowa, Brown, Old Dominion, Maryland, and Washington State University) before returning to Western Washington University as a Professor of Sociology in 1998. He is widely known for his methodological contributions and his work on families and on the effects of military service (He is a US Navy Veteran). *Source* Western Washington University

Gossman and Mazur remained in Washington for their entire academic careers—at a non-Ph.D. granting institution, Western Washington University (WWU). There, along with Ed Stephan (with a Ph.D. from the University of Oregon, earned under the training and mentoring of Walter T. Martin, one of Schmid's first generation students) and others, they trained and mentored a second "WWU" generation who became demographers. Because one of the second WWU generation members, Lucky Tedrow, remained at WWU and another, Jay Teachman, later joined him, members of the third generation mentored and trained by them at WWU also can be identified.

Sidebar 4.4 Lucky Tedrow (*left*) is one of Schmid's 2nd generation demography students, trained and mentored by D. Peter Mazur and Charles Gossman. Tedrow and Jay Teachman trained a 3rd generation at Western Washington University. Tedrow established an endowed scholarship at Western Washington University for undergraduate students interested in demography and directed six "demography summer camps" funded by the National Science Foundation's "Research Experiences for Undergraduates" program. To the *right* of Lucky is his wife, Loretta, a now-retired teacher who earned her degrees and certifications at Western Washington University. To the *right* of Loretta is Jeff Tayman, who earned his Ph.D. at Florida State University and then took a position with the Population and Enrollment Section of the Washington State Office of Financial Management. He later accepted an offer from the San Diego Association of Governments to direct its forecasting and estimation efforts. He retired as the Director of the Technical Services Department in 2006 and is currently a lecturer in the Economics Department at the University of California San Diego. *Source* Jeff Tayman

As summarized at the end of this section, the number of second generation WWU students provides a means of estimating the number of second generation students trained and mentored by Schmid's 18 first generation students who were primarily demographers and became faculty members. In turn, the number of third generation WWU students provides a means of getting an idea of the total number of Schmid's third generation students. For purposes of completeness, all of the 16 second generation WWU students are listed, even though three of them never went into academics and four others did so for only a portion of their careers. The two major people of interest in the second generation of WWU students are Teachman and Tedrow because they are the ones who had a hand in training and mentoring the third generation of WWU students.

4.3.1 Second Generation: Western Washington University

All of the 16 people listed immediately below earned a bachelor's degree at Western Washington University (and in some cases, an M.A.). They are shown in alphabetical order with their highest degrees and the universities that granted them, and their current positions (If retired, their last positions). All of them can be described as having a background in demography, which the majority of them continued to use in their professional positions.

Felix D'Allesandro (M.A., University of Chicago; retired from the Washington State Department of Labor and Industries as Program Manager for Research and Data Analysis).
Julie Brines (Ph.D., Harvard University; Associate Professor of Sociology, University of Washington).
Peter Callero (Ph.D., University of Wisconsin at Madison; Professor of Sociology, Western Oregon State College).
Mitchell Eggers (Ph.D., University of Pennsylvania; Chief Scientist, Global Market Institute).
Mike Finch (Ph.D., University of Minnesota; Senior Director, Health Systems Innovation).
Bridget Gorman (Ph.D., Pennsylvania State University; Professor and Chair, Department of Sociology, Rice University).
Ryken Grattet (Ph.D., University of California, Santa Barbara; Professor of Sociology: University of California at Davis).
Douglas Massey (Ph.D. Princeton University; Henry G. Bryant Professor of Sociology and Public Affairs, Princeton University).
Terrance Miethe (Ph.D., Washington State University; Professor of Criminal Justice: University of Nevada-Las Vegas.

Mike Micklin (Ph.D., University of Chicago; Senior Advisor to the Director, Division of AIDS, Behavioral and Population Sciences, National Institutes of Health and Adjunct Professional Lecturer, American University).
David Myers (Ph.D., Washington State University; President and CEO, American Institutes for Research).
Joan Naymark (nee Gentili) (M.A., Western Washington University; retired from Target Corporation as Director of Market Analytics and Planning).
Dave Odynak (M.A. Western Washington University, Demographic Research Analyst, Population Research Laboratory, University of Alberta).
David Swanson (Ph.D., University of Hawai'i; Professor of Sociology, University of California Riverside).
Jay Teachman (Ph.D. University of Chicago; Professor of Sociology, Western Washington University).
Lucky Tedrow (M.A., Western Washington University; Director of the Demographic Research Laboratory, Western Washington University).

Sidebar 4.5 Along with Joan Naymark, Lucky Tedrow, and Jay Teachman, Doug Massey is one of Schmid's 2nd generation demography students from Western Washington University. After earning his B.A. degree (with a triple major: psychology, sociology, and Spanish), he received his Ph.D. from Princeton University in 1978. Following faculty positions at the University of Pennsylvania and the University of Chicago, he returned to Princeton and is currently the Henry G. Bryant Professor of Sociology and Public Affairs in the Woodrow Wilson School of Public and International Affairs. He is the author of award-winning books and an elected member of several national scholarly organizations, the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Philosophical Society. He is Past-President of the Population Association of America, the American Sociological Association, and the American Academy of Political and Social Science. *Source* Princeton University

4.3.2 Third Generation: Western Washington University

All of the 26 people listed below earned a bachelor's degree at Western Washington University (and in some cases, an M.A.). They are shown in alphabetical order with their highest degrees and the universities that granted them, and their current positions. These are third generation students that Teachman and Tedrow had a hand in training and mentoring. Like the 16 second generation WWU students just listed they can be described as having a background in demography, which the majority of them continued to use in their professional positions.

Kiyomi Ando (Ph.D., Louisiana State University; Lecturer, Meijo University).
Bruce Arneklev (Ph.D., University of Oklahoma, Associate Professor of Criminal Justice; Florida Atlantic).
Thomas Beamish (Ph.D., University of California, Santa Barbara; Associate Professor of Sociology. University of California at Davis).
Angela Brittingham (MA, Georgetown; Demographic Statistician, US Census Bureau).
Rachel Cassidy (MA, Georgetown; Analyst, Starbucks International Marketing).
Jacob Cheadle (Ph.D., Pennsylvania State University; Associate Professor of Sociology, University of Nebraska—Lincoln).
Wade Cole (Ph.D., Stanford University; Associate Professor of Sociology, University of Utah).
Jennifer Filion-Louch (MPH, University of Washington; Program Planner, Seattle-King County Public Health Department).
Amy Fuhrman-Spring (Ph.D., University of Washington; Assistant Professor of Sociology, Georgia State University).
Randy Gainey (Ph.D., University of Washington; Professor of Sociology and Criminal Justice, Old Dominion University).
Joanna Gregson (Ph.D., University of Colorado at Boulder; Professor of Sociology, Pacific Lutheran University).
Brian Goesling (Ph.D., Pennsylvania State University; Associate Director of Human Services Research, Mathematica Policy Research, Inc.).
Matthew Hall (Ph.D., Pennsylvania State University; Assistant Professor of Policy Analysis and Management, Cornell University).
Julie Harms-Cannon (Ph.D., University of Nebraska-Lincoln; Adjunct Professor of Sociology, Seattle University).
Elizabeth Hirsh (Ph.D., University of Washington; Associate Professor of Sociology, University of British Columbia).
Heath C. Hoffman (Ph.D., University of Georgia; Associate Professor of Sociology, College of Charleston).
Bruce Keith (Ph.D., University of Nebraska-Lincoln; Professor of Sociology, US Military Academy).

Jamie Lynch (Ph.D., Ohio State University; Assistant Professor of Sociology, St. Norbert College).
Ryan Masters (Ph.D., University of Texas at Austin; Assistant Professor of Sociology, University of Colorado- Boulder).
Heather O'Maonaigh (Ph.D., Tulane University; Research Associate, Oak Ridge Center for Advanced Studies).
Patrick O'Hagan (MA, Western Washington University; Senior Market Planning Analyst, Starbucks International Marketing).
Phyllis Riddle (Ph.D., Stanford University; Professor of Sociology and Chair, St. Vincent College).
Amy Ritualo (MA, Georgetown; Evaluation Specialist, US Department of Agriculture).
Mike Shively (Ph.D., University of Massachusetts—Amherst; Senior Associate, Abt Associates).
Georgie Weatherby (Ph.D., University of Washington; Professor of Sociology and Criminal Justice, Gonzaga University).
Chris Williams (M.A., Western Washington University; Deputy Director, Emergency Preparedness, Washington State Department of Social and Health Services).

Sidebar 4.6 Joanna Gregson is a third generation student of Calvin Schmid who received her B. A. in Sociology at Western Washington University in 1993 and a Ph.D. in Sociology from the University of Colorado—Boulder in 1998. She is a professor (and department chair) of Sociology at Pacific Lutheran University in Tacoma, Washington. *Source* Pacific Lutheran University. http://www.plu.edu/womens-studies/contacts/home.php

Although distinct from the WWU alumni, there is a set of third generation students closely related to them—undergraduate students who participated in the "summer demography camps" directed by Lucky Tedrow. These summer-long institutes were funded by the National Science Foundation under its "Research Experiences for Undergraduates" program. Only a few of many applicants were

selected for each of the six institutes held at WWU. At least six of the participants of this program are known to have obtained Ph.D.s and be working in demography, a related area (e.g., Family, Ecology), or applying demographic methods and concepts in their work: Sharon Birch (Ph.D., Bowling Green State University, Senior Instructional Designer, Gettysburg College); Stephanie Bohon (Ph.D., Pennsylvania State University, Professor of Sociology, University of Tennessee); Stephen Perz (Ph.D., University of Texas—Austin; Professor of Sociology, University of Florida); Lee Vigilant (Ph.D. Boston College, Professor of Sociology, Minnesota State University Moorhead); Janet Wilmoth (Ph.D., Pennsylvania State University, Professor of Sociology, Syracuse University); and Brett Zollinger (Ph. D., Utah State University, Professor and Chair, Department of Sociology and Social Work, Fort Hays State College). Three of these alumni participated in the 1989 summer camp and can be found in the 1989 photo for this group: Sharon Birch; Stephanie Bohon; and Janet Wilmoth. The remaining three participated in the 1991 summer camp and can be found in the 1991 group photo: Stephen Perz, Lee Vigilant, and Brett Zollinger.

Sidebar 4.7 Students and faculty in the 1989 WWU "Summer Demography Camp". First row (standing, *left* to *right*): Christopher Williams (Western Washington University); Rebecca A. Cole (Valparaiso University); Delilah Maloney (Idaho State University); Janet Wilmoth (Lenoir-Rhyne College); Lindy Kelson (Idaho State University); and Megan Polzer (University of New Mexico). Second row (standing, *left* to *right*): Sandra McDaniel (Tougaloo College); Stephanie A. Bohon (The College of Idaho); and Sharon Birch (Southwestern University). Third row (standing, *left* to *right*): Eric Miller (University of Idaho); Ed Stephan (Western Washington University, faculty); David Swanson (Pacific Lutheran University, faculty); Lucky Tedrow (Western Washington University, faculty); and Barry T. Meek (Roanoke College). *Source* Lucky Tedrow

Sidebar 4.8 Students and faculty in the 1991 WWU "Summer Demography Camp". First row (seated, *left* to *right*): Lee Vigilant (California State University Bakersfield); Teonni Brewer (University of Arkansas Little Rock); Charlene Begay (Northern Arizona University); David Moen (St. Olaf College); Stephen Perz (Southwestern University). Second row (standing, *left* to *right*): Eliza I. Stefaniw (Bryn Mawr College); Brett Zollinger (Northwestern Oklahoma State University); Reine G. Moffett (Lewis-Clark State College); Hector Valadez, Jr. (Western Washington University); Tanya Miyashiro (University of San Diego); and Rachel Warren (Macalester College). Third row (faculty, standing, *left* to *right*): Ed Stephan (Western Washington University); James Inverarity (Western Washington University); David Swanson (Pacific Lutheran University); and Lucky Tedrow (Western Washington University). *Source* Lucky Tedrow

4.3.3 The Total Number of Schmid's 2nd and 3rd Generation Students

The number (16) of second generation WWU "demography" students trained and mentored by Schmid's two first generation students, Gossman and Mazur, provides a means of estimating the number of second generation students trained and mentored by the 18 "demography" students who represent Schmid's first generation students who had academic careers. Given the 16 second generation WWU demography students identified with Gossman and Mazuz and the 18 first generation students of Schmid's who were primarily demographers who served as faculty is considered, it is possible that Schmid's second generation demography students number 144 (where $144 \approx 18 * 16/2$). In thinking about the third generation demography students, recall the 26 second generation WWU demography students

mentored by Teachman and Tedrow. Given this, it is possible that Schmid's second generation demography students had a hand in training and mentoring a third generation with 1872 members (where $1872 \approx 144 * 26/2$).

In 1995, Maurice Van Arsdol and Aubrey Wendling wrote in the obituary they prepared for Calvin F. Schmid that he was "…an extraordinarily versatile scholar who saw basic and applied research as closely linked and made important contributions in each area." This perspective left its mark on his first, second and third generation students. As examples from the first generation, there are: Gossman, Mazur, Myers, Van Arsdol, and Wendling (basic research); Engels, Lowe, Pittenger, and Walker (applied research); and Kalbach, McVey, and Steahr (a mix of basic and applied). In terms of Schimd's 16 second generation students from Western Washington University, seven can generally be placed within the basic research category (Brines, Callero, Gorman, Grattet, Massey, Miethe, and Teachman), another six in the applied research category (D'Allesandro, Eggers, Finch, Myers, Naymark, and Odynak), and the remaining three in both (Micklin, Swanson and Tedrow). While the distribution is somewhat different among the 26 third generation students from Western Washington University, they also represent a mix of basic and applied interests, a characterization that likely applies to all of Schimd's first, second and third generation students.

Sidebar 4.9 Stephen Perz is one of the six "Demography Summer Camp" participants at Western Washington University who was mentored by Lucky Tedrow and went on to earn a Ph.D. His is in Sociology with a specialization in demography (University of Texas Austin, 1997). He is currently a Professor in the Department of Sociology and Criminology and Law at the University of Florida. Perz conducts research on demographic processes and environmental change, land use practices, and the impacts of roads on social-ecological systems. His work emphasizes interdisciplinary and international collaboration and has resulted in roughly 80 publications in numerous journals and books. *Source* University of Florida http://www.clas.ufl.edu/users/sper/

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Chapter 5
The Emergency that Never Went Away

Abstract Washington State continued to experience rapid and sustained growth even after World War II ended. The Forecasting unit in the Washington State Office of Financial Management houses the group that is the successor to the Washington State Census Board. Its personnel, activities, and statutory basis are described in this chapter along with the effects the Board had on a wide range of state government activities.

Keywords Rapid population growth · Effects of rapid growth · Mitigation of effects of rapid growth

The State Census Board started as the result of an emergency measure passed by the Washington Legislature in 1943. In a very real sense, the emergency never went away. Unlike many states that reverted back to a pre-war situation when World War II ended, Washington was one of the states forever changed by it. The tide of economic and demographic change that was deemed an emergency in 1943 did not abate. The state continued to post population gains after 1950. Between 1960 and 1970 it grew by 560,036 people; between 1970 and 1980, by 719,103, which surpassed the record of 634,722 set between 1940 and 1950. Between 1980 and 1990, another record was set, a gain of 734,310. Between 1990 and 2010, yet another decennial record was set, one that still stands: The state increased by 1,027,480. The most recent census counts, 2000 and 2010, show that Washington increased by 839,107. This was not a record, but it far exceeds the increase of 634,722 posted between 1940 and 1950, one that generated the emergency measure that led to the founding of the Washington State Census Board.

The changes in population from 1950 to 2010 have mirrored the economic, cultural, and social changes undergone by Washington. As the population grew, it diversified in terms of race, ethnicity, and national origin. Its gender and age composition changed. These population changes are massive. They had far-reaching consequences that virtually assured the Board and its later incarnations would continue playing an important role for Washington. This role has affected Washington's profit and non-profit organizations, state government, local governments, schools, colleges, and universities. The work of the Board and its successors

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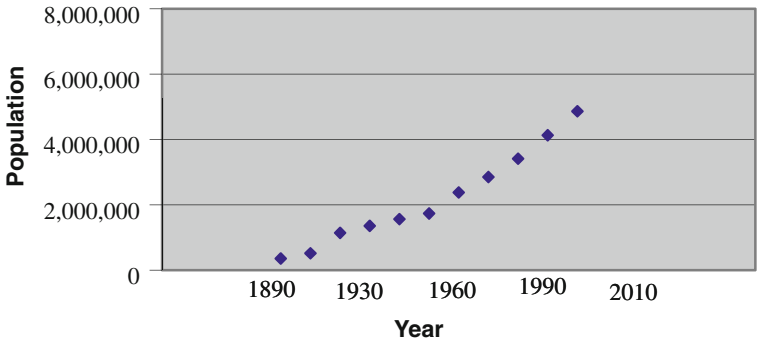

Fig. 5.1 The Population of Washington by Decade, 1890 to 2010. *Source* Decennial Census Data assembled by the Population Unit, Washington Office of Financial Management, Decennial Census Counts of Population: 1890–2010 (http://www.ofm.wa.gov/pop/april1/hseries/default.asp)

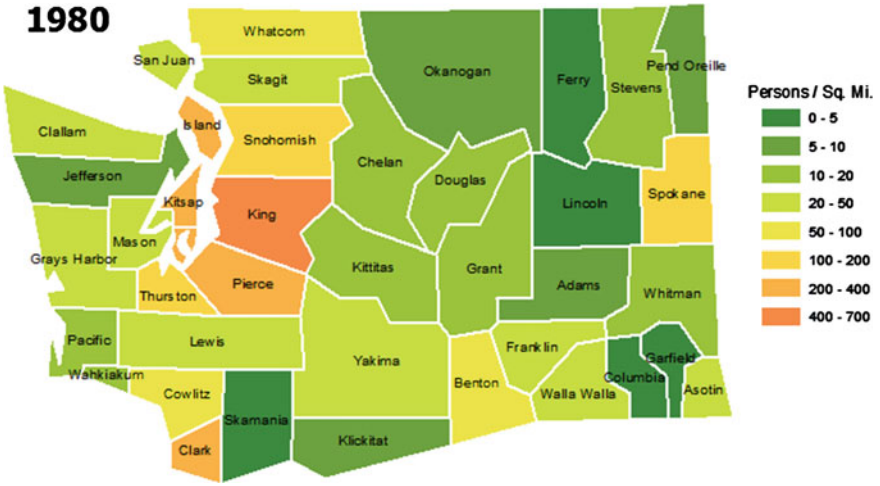

Exhibit 5.1 1980 Washington State Population Density by County. *Source* Washington State Office of Financial Management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

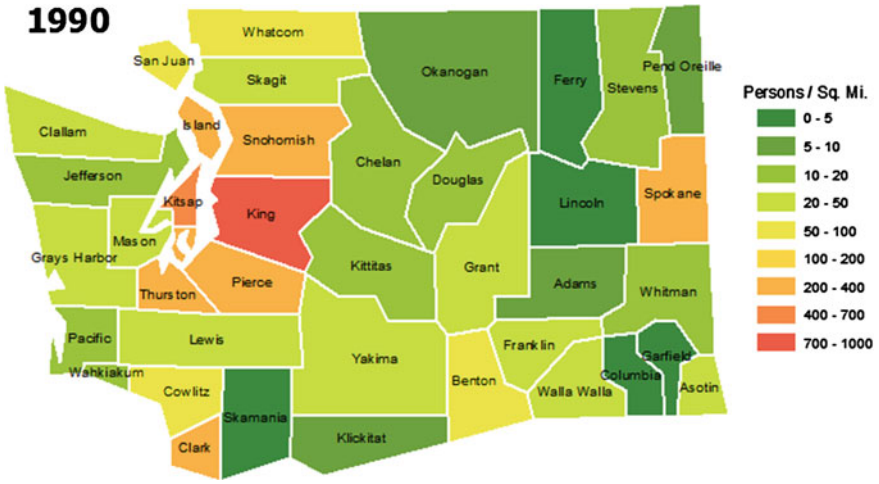

Exhibit 5.2 1990 Washington State Population Density by County. *Source* Washington State Office of Financial Management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

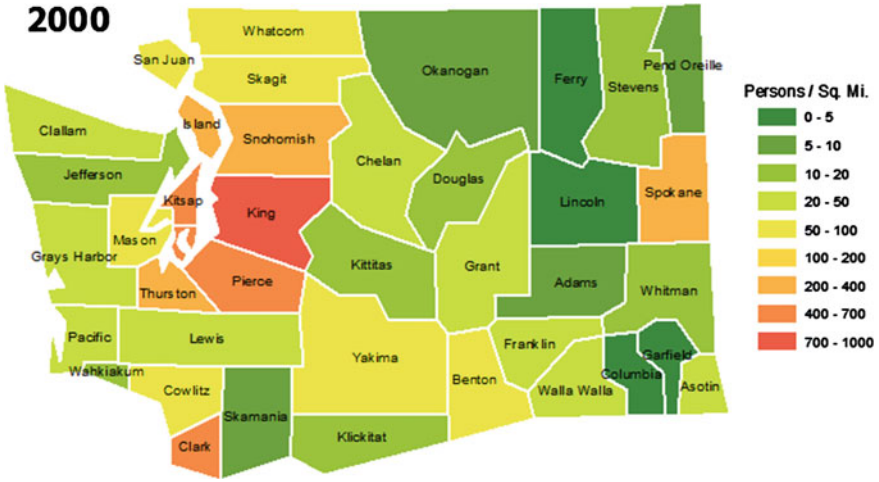

Exhibit 5.3 2000 Washington State Population Density by County. *Source* Washington State Office of Financial Management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

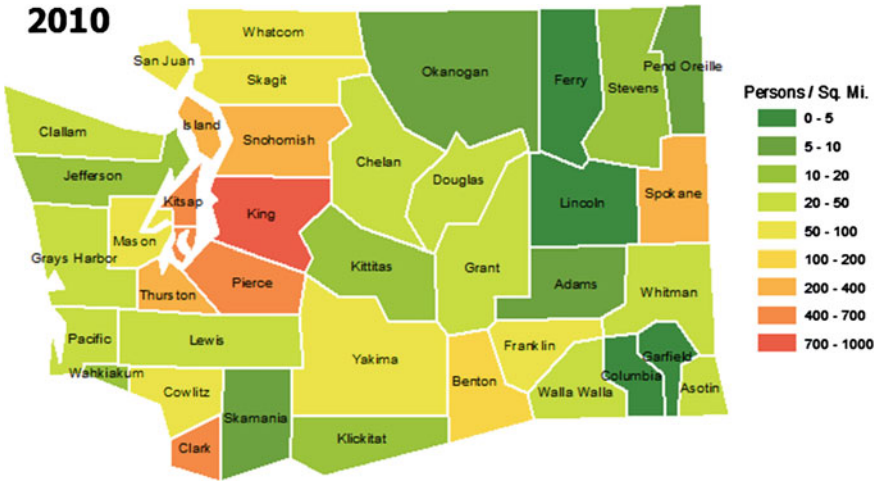

Exhibit 5.4 2010 Washington State Population Density by County. *Source* Washington State Office of Financial Management (http://www.ofm.wa.gov/pop/popden/map_county.asp)

has touched the life of virtually every one of Washington's residents since 1943. In the process, the State Census Board left a demographic legacy that extends even beyond the borders of Washington, one in large part due to the efforts and vision of a single person, Dr. Calvin F. Schmid (Fig. 5.1; Exhibits 5.1, 5.2, 5.3 and 5.4).

Technical Appendix

A.1 Population Estimates

A population estimate is the determination of the size or the characteristics of a population at a current or past date in the absence of census data for the same date. In the United Sates, an estimate usually is made on a de jure basis, which means that people are estimated where they usually reside. This makes sense because the U.S. census is conducted on a de jure basis. However, there also is a need for estimating the de facto population of a given place at a given time and researchers have developed such estimates (Swanson and Pol 2005, 2008; Swanson and Tayman 2011). These estimates include vacationers (of interest, for example, to the casino industry in Las Vegas and the Hawaii Visitors Bureau), migratory workers (of interest, for example, to health care, school, and other social service providers), and the people who work in the central business district of a large city each day, but leave it largely vacant in the evenings (of interest to the San Francisco City Planning Office, for example). While estimates of de facto populations are of great interest, they are very difficult to make in the United States because of the lack of census benchmarks (Cook 1996; Smith 1994; Swanson and Tayman 2011). An estimate can be prepared for a nation or a sub-national area such as a state, county, city, town, or census tract. An estimate also can be prepared for groups of sub-national areas, groups of nations, or even the world as a whole. The principal demographic characteristics for which an estimate is made include age and sex. However, in multiracial and multi-ethnic countries such as the United States and Canada, an estimate might be done not only by age and sex, but also by race and ethnicity. An estimate also can be made of social and economic sub-groups of the population, households, and families.

The term "population estimate" is frequently used in the public domain to refer to the determination of the size or the characteristics of a population at a future date. However, most demographers prefer to use the term projection when talking about the possible size and characteristics of a population in the future. In developing a portrait of a given population in the future, it is not uncommon for a series of projections to be made that incorporate a range of plausible assumptions (e.g., expected trends in fertility, mortality, and migration). However, when one of these

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projections is selected as representing the most likely future, it then becomes a forecast for the population in question. As opposed to a projection or a forecast, a population estimate is concerned with either the present or the past, but not the future (Smith Tayman and Swanson 2013: 3–4). Thus, it is useful to make the following distinctions among the terms "estimate," "projection," and "forecast."

Estimate—A calculation of a current or past population, typically based on symptomatic indicators of population change.

Projection—The numerical outcome of a particular set of assumptions regarding future population trends.

Forecast—The projection deemed most accurate for the purpose of predicting future population.

Virtually all methods of population estimation can be categorized into one or the other of two traditions: (1) demographic (Bryan 2004a); and (2) statistical (Kordos 2000; Platek et al. 1987; and Rao 2003). Demographic methods are used to develop estimates of a total population as well as its ascribed characteristics, age, race, and sex. Statistical methods are largely used to estimate the achieved characteristics of a population, and include, for example, educational attainment, employment status, income, and marital status. As is the case in the national statistical agencies of other countries, the US Census Bureau produces estimates using both of these traditions, demographic and statistical.

Demographers and statisticians have developed a wide range of estimation methods designed to meet different information needs at varying levels of accuracy and cost. As noted earlier, for the most part they are based on the concept of a de jure population although there are exceptions (Swanson and Pol 2005). The methods can be roughly placed into three categories: (1) analytical and statistical models that use data symptomatic of population and its changes; (2) mathematical models that use historical census data; and (3) sample surveys. Methods falling into the first category have generally been developed by and for applied demographers, many of whom work for national, state, and local governments. Methods falling into the second category have generally developed by and for academic demographers, many of whom work at universities and research institutes. The methods falling into the third category have generally been developed by and for statisticians and survey research scientists, but they also are widely used by demographers. Not surprisingly, there also are techniques that combine methods from two or even all three categories.

Population estimation methods also can be identified along a temporal dimension: (1) inter-censal estimates, which refer to a date between two census counts and usually take the results of both counts into consideration; (2) post-censal estimates, which refer to a date subsequent to the latest census count and usually take into account one or more previous census counts; and (3) pre-censal estimates, which refer to a date prior to a census count, but usually take into account one or more subsequent census counts. This temporal classification is useful because different methods are typically employed in the development of inter-censal, post-censal, and pre-censal estimates (Bryan 2004b).

Among survey statisticians, the demographer's definition of an estimate is generally termed an "indirect estimate" because unlike a sample survey, the data used to construct a demographic estimate do not directly represent the phenomenon of interest (Swanson and Stephan 2004: 758 and 763). In the context of the present work, the definition of an estimate found in the demographic tradition is used.

There are other ways to classify estimation methods. John Long (1993), for example, categorizes them generally into two types: (1) "flow" methods; and (2) "stock" methods. Flow methods are also known as component methods, because they require estimation of each component of population change (births, deaths, and migrants) since the last census. Stock methods relate changes in population size since the last census to changes in other measured variables: the number of housing units, automobile registrations, total number of deaths (and births), and tax returns. Long (1993) also notes that stock and flow methods may be used in combination. Popoff and Judson (2004: 603), make the following useful distinctions between stocks and flows: "…stock data are the numbers of persons at a given date, classified by various characteristics…(and) are recorded from censuses….flow data are the collection of or summation of events. At the most basic level this includes births, deaths, and migration…." This distinction is useful for purposes of this paper because, as is discussed later in this section, there are population estimations methods that solely rely on "stock" data while others rely on a combination of "stocks" and "flows."

Finally, it is useful here to consider micro data and aggregated data in the context of population estimation methods. "Micro data" means records for individual persons. These records are often linked by relationships to form family and household records and the term "micro data" refers to these linked records as well. The "Public Use Microdata Sample" (PUMS) is such a file (Swanson and Stephan, 2004: 772). "Aggregated data" are summations of records of individuals (families and households) such as one would find in a table. The aggregations are often done to specific geographic areas, but they can also be done for types of people across different geographies. The life table constructed by Kintner and Swanson (1994) for retirees of General Motors is an example of such an aggregation.

The development of methods of population estimation roughly corresponds to the development of censuses and vital statistics registries. For example, in the late 17th century, John Graunt estimated the population of London and then of the whole of England and Wales using what today is known as a censal-ratio method (Devlin 2008: 93–94). Not long afterward, the French mathematician, Laplace, also used a censal-ratio method in combination with recorded births and a population sample to estimate the population of France (Stigler 1986: 163–164). However, methodological development really only took off in the late 1930s and early 1940s, fueled in large part by the need for low-cost and timely information generated by the great depression of the 1930s and World War II (Bryan 2004a; Eldridge 1947; Hauser and Tepping 1944; Shryock 1938; Shryock and Lawrence 1949). In the United States, the Census Bureau played a major role in this effort, but it was not alone. As described in this book the Washington State Census Board developed a comprehensive program of annual population determinations based on estimation

methods that are still used today (Swanson and Pol 2005, 2008). Around this same time, demographers also began developing estimation methods for what were then called "underdeveloped countries," (Brass 1968; Chandrasekaran and Deming 1949; Popoff and Judson 2004; United Nations 1969) and the use of sample surveys as a substitute for complete census counts took hold (Bryan 2004a).

Today, population estimates are ubiquitous. They are done around the world by a host of governmental and non-governmental entities, as well as individual consultants (Bryan 2004a; Siegel 2002; Swanson and Pol 2008). The widespread availability of data, methods, and technology has made is possible for many people not only to develop estimates, but to do so more quickly and less expensively than has ever been done before. This trend is not likely to abate, but it carries certain costs in that estimates may both be made and used with little or no understanding of the issues involved, what constitutes good estimates, and how to identify them.

A.2 The Housing Unit Method (HUM)

The HUM is designed to generate estimates of the total population by focusing on the population residing in households. As such, it inherently fits within the demographic tradition. However, while the HUM is inherently demographic in nature, two key HUM elements, Persons Per Household (PPH) and Vacancy Rate (VR) are generated using methods that fit within the statistical tradition. Thus, both traditions are covered in discussing the HUM. Given that the HUM is aimed at the population residing in households, it is easy to see that is used to generate estimates of the total "De jure" population. This, of course, is the definition of population used by the US Census Bureau, which is based on place of "usual residence" (Cook 1996; Wilmoth 2004).

One of the first times that the HUM is mentioned in the academic literature is found in an article by Starsinic and Zitter (1968), who found that it made a "… surprisingly strong showing…" and that "…it may be worthwhile to devote considerably more effort to refining the input data for estimating the number of households in addition to dealing with the problem of deriving current estimates on the size of households" (Starsinic and Zitter 1968: 484). The article mentions work by Carl Frisén (1958) on the HUM in the 1950s for the California Department of Finance. The work by Frisén involved testing methods of population estimation against special censuses done by the state of California during the 1950s. Earlier work along these lines by was reported by Frisén (1951) when he was at San Jose State University.

However, the HUM was used even before 1950. It was used in the 1940s under the auspices of the Washington State Census Board (Lowe 2009). As detailed elsewhere in this book, the Board was abolished in 1967, and its operations transferred to the Washington State government. It exists in the state's Office of Financial Management (Lowe 2009). Washington's use of the HUM is done in conjunction with census counts that allows cities and towns to conduct a special

'headcount' census when disagreements over estimates arise (Washington Office of Financial Management 1978, 2007). These census counts are conducted in accordance with residency and housing definitions used by the Census Bureau with training assistance and supervision (including auditing) from the Washington Office of Financial Management. In 1981, the Washington system of municipal population estimation was adapted by the state of Alaska (Alaska Department of Community and Regional Affairs 1981a, b; Alaska Department of Labor 1981, 1982; Swanson Baker and Van Patten 1983). Today, the HUM is arguably the most commonly used method of population estimation in the United States (Bryan 2004a).

The Housing Unit Method (HUM) is a "stock" method that describes a basic identity in the same way that the balancing equation does (Bryan 2004a). In the case of the HUM, this identity is usually given as

$$P = H * (1 - VR) * PPH + GQ \quad (A.1)$$

where

P = Population
H = Housing units,
VR= Vacancy Rate (Proportion Vacant),
PPH = Average number of persons per household, and
GQ = Population residing in "group quarters" and the homeless.

The HUM equation can be expressed in less detail (i.e., P = HH * PPH + GQ, where HH = H * (1 − VR), Smith and Cody 2004: 2) or more detail - by structure type, for example (Swanson et al. 1983). It also can be used in combination with sample data, which opens the door to developing measures of statistical uncertainty for the estimates so produced (Roe et al. 1992).

The HUM is based on the assumption that virtually everyone lives in some type of housing structure. It is generally accepted that the HUM is the most commonly used method for making small area population estimates in the United States (Byerly 1990; Smith 1986; Smith et al. 2002). Because of how data are collected, the HUM has not been a method that could be used for all sub-national areas and the nation as a whole until recently. However, with the continuous "Master Address File," it has now emerged as a method that can be used by the US Census Bureau for all sub-national areas and the nation as a whole (Wang 1999).

Key issues in making the HUM work are: (1) the stock of housing units in the area to be estimated; (2) the vacancy rate for this stock (which when subtracted from 1.00 becomes the occupancy rate); (3) the average number of persons per household for this stock; and (4) the number of people in the area not residing in the housing stock (i.e., those in group quarters and the homeless).

A.3 Censal Ratio Method

The censal-ratio method can be implemented in several different ways. The most basic approach is to use relationships between symptomatic indicators and population counts in census years to estimate populations in non-census years and applying these relationships to symptomatic indictors available in the years for which estimates are desired. The general form of this approach is as follows.

$$R_{i,j,t} = S_{i,j,t} / P_{i,t} \tag{A.2a}$$

where

R = Censal-ratio
P = population
S = symptomatic indicator
j = indicator ($1 \leq j \leq k$)
i = subarea ($1 \leq j \leq n$)
t = year of the most recent census

Once a censal-ratio is constructed, a population estimate for time t+k is developed by dividing the t+k value of the symptomatic indicator ($S_{i,j,t+k}$) by the ratio ($R_{i,j,t}$)to yield an estimate of $P_{i,t+k}$:

$$\hat{P}_{i,t+k} = S_{i,j,t+k} / R_{i,j,t} \tag{A.2b}$$

If area i has a parent area for which an independently-derived population estimate is available, it is common is to effect a final "control" so that the sum of the i subarea population estimates is equal to the independently estimated population for the parent of these i subareas, $\sum \mathbf{P_{i,t+k}}$, which is accomplished as follows:

$$\hat{P}_{i,t+k} = \left(\hat{P}_{i,t+k} \Big/ \sum \hat{P}_{i,t+k}\right) * \left(\sum \mathbf{P_{i,t+k}}\right) \tag{A.2c}$$

It should be noted that as long as the algebra yields an estimate of P_i at time t + k, it is immaterial if $R_{i,j,t} = P_{i,t} / S_{i,j,t}$ or if $R_{i,j,t} = S_{i,j,t} / P_{i,t}$. In the case of the latter version, Equation (A.2a) and (A.2b) become, respectively

$$R_{i,j,t} = P_{i,t} / S_{i,j,t} \tag{A.2d}$$

$$\hat{P}_{i,t+k} = \left(R_{i,j,t}\right) / \left(S_{i,j,t+k}\right) \tag{A.2e}$$

One advantage of using Eqs. (A.2a) and (A.2b) over (A.2d) and (A.2c) is that resulting ratio of interest is easier to interpret. If one uses deaths as the symptomatic indicator, then the ratio is the crude death rate. Similarly, if one uses births, the resulting ratio is the crude birth rate.

A.4 Ratio-Correlation Method

The most common regression-based approach data to estimating the total population of a given area is the ratio-correlation method. It is an extension of the censal l ratio method, one that can incorporate multiple ratios and accommodate changes in the ratios over time. It was introduced and tested by Schmitt and Crosetti (1954) and again tested by Crosetti and Schmitt (1956). This multiple regression method involves relating between changes in several variables known as symptomatic indicators on the one hand to population changes on the other hand. The symptomatic indicators that are used reflect population change. Examples of symptomatic variables that have been used for this purpose are births, deaths, school enrollment, tax returns, motor vehicle registrations, employment data, and registered voters. The ratio-correlation method is used where a set of areas (e.g., counties) are structured into a geographical hierarchy (e.g. the populations of counties within a given state sum to the total state population). It proceeds in two steps. The first is the construction of the model and the second is its implementation —actually using it to create estimates for given years.

Because the method looks at change, population data from two successive censuses are needed to construct the model along with data for the same years representing the symptomatic indicators. During its implementation step the ratio-correlation method requires symptomatic data representing the year for which an estimate is desired and an estimate of the population for the highest level of geography (e.g., the state as a whole) that is independent of the ratio-correlation model.

The ratio-correlation method expresses the relationship between (1) the change over the previous inter-censal period (e.g., 1990 to 2000) in an area's share (e.g., a given county) of the total for the parent area (e.g., the state as a whole) for several symptomatic series and (2) the change in an area's share of the population of the parent area. The method can be employed to make estimates for either the primary or secondary political, administrative and statistical divisions of a country (Bryan 2004).

In general terms, the ratio-correlation model is formally described as follows (Swanson and Beck 1994):

$$P_{i,t} = a_0 + \sum (b_j) * S_{i,j,t} + \varepsilon_i \qquad \text{(A.3a)}$$

where

a_0 = the intercept term to be estimated
b_j = the regression coefficient to be estimated
ε_i = the error term
j = symptomatic indicator ($1 \leq j \leq k$)
i = subarea ($1 \leq j \leq n$)
t = year of the most recent census

and

$$P_{i,t} = \left(P_{i,t} \Big/ \sum P_{i,t}\right) \Big/ \left(P_{i,t-z} \Big/ \sum P_{i,t-z}\right) \tag{A.3b}$$

$$S_{i,t} = \left(S_{i,t} \Big/ \sum S_{i,t}\right) \Big/ \left(S_{i,t-z} \Big/ \sum S_{i,t-z}\right) \tag{A.3c}$$

where

z = number of years between each census for which data are used to construct the model
p = population
s = symptomatic indicator

Once a ratio-correlation model is constructed, a set of population estimates for time t + k is developed in a series of six steps. First, $\left(S_{i,t+k} \Big/ \sum S_{i,t+k}\right)_j$ is substituted into the numerator of the right side of Eq. (A.3c) for each symptomatic indicator j and $\left(S_{i,t} \Big/ \sum S_{i,t}\right)_j$ into the denominator of the right side of Eq. (A.3c) for each symptomatic indicator j, which yields $S_{i,j,t+k}$ Second, the updated model with the preceding substitution of symptomatic data for time t + k is used to estimate $P_{i,t+k}$. Third, $\left(\left(P_{i,t} \Big/ \sum P_{i,t}\right)\right)$ is substituted into the denominator of $P_{i,t+k}$, which yields $P_{i,t+k} = \left(P_{i,t+k} \Big/ \sum \mathbf{P_{i,t+k}}\right) \Big/ \left(P_{i,t} \Big/ \sum P_{i,t}\right)$, where $\sum \mathbf{P_{i,t+k}}$ represents the independently estimated population of the "parent" area of the i subareas for time t + k (Note that this estimate is given in boldface and is done by a method exogenous to the ratio-correlation model (e.g., a component method)). Fifth, since $P_{i,t+k}$, $\left(P_{i,t} \Big/ \sum P_{i,t}\right)$ and $\sum \mathbf{P_{it+k}}$ are all known values, the equation $P_{i,t+k} = \left(P_{i,t+k} \Big/ \sum \mathbf{P_{i,t+k}}\right) \Big/ \left(P_{i,t} \Big/ \sum P_{i,t}\right)$ is manipulated to yield an estimate of the population of area i at time t + k:

$$\left(P_{i,t+k}\right) * \left(P_{i,t} \Big/ \sum P_{i,t}\right) * \left(\sum \mathbf{P_{i,t+k}}\right) = P_{i,t+k} \tag{A.3d}$$

As Eq. (A.3d) shows, it is important to remember that an independent estimate of the population for the "parent" geography $\left(\sum \mathbf{P_{i,t+k}}\right)$ of the i subarea is required when using the ratio-correlation model to generate population estimates. The sixth and final step is to effect a final "control" so that the sum of the i subarea population estimates is equal to the independently estimated population for the parent of these i subareas: $\sum P_{i,t+k} = \sum \mathbf{P_{i,t+k}}$, which is accomplished as follows:

$$P_{i,t+k} = \left(P_{i,t+k} \Big/ \sum P_{i,t+k}\right) * \left(\sum \mathbf{P_{i,t+k}}\right). \tag{A.3e}$$

It should be clear from the preceding definitions that we are focusing on the ratio-correlation method as a means of developing post-censal estimates. However, it can be used to develop inter-censal estimates. It also could be run in reverse to estimate "historical" populations.

There are variations on the standard form discussed here. They include the rate-correlation model (Swanson and Tedrow 1984) and the difference-correlation model (Schmitt and Grier 1966).

A.5 Component Methods

There are several methods of population estimation that belong to the "component" family. All of the component methods are based on the fundamental demographic equation:

$$P_{i,t+k} = P_{i,t} + B_i - D_i + I_i - O_i \quad \text{(A.4a)}$$

where

$P_{i,t}$ = Population of area i at time t (the launch date)
$P_{i,t+k}$ = Population of area i at time t + k (the estimate date)
B_i = Births in area i between time t and t + k
D_i = Deaths in area i between time t and t + k
I_i = In-migrants in area i between time t and t + k
O_i = Out-migrants in area i between time t and t + k

This deceptively simple equation can be displayed in a number of forms (Hoque 2010; Murdock et al. 1995; Zitter and Shryock 1964). For example, it is common to combine in-migrants and out-migrants into net number of migrants and use the fundamental equation to estimate net migration between two censuses one taken at time t and the other at time t + k:

$$N_i = P_{i,t+k} - P_{i,t} - B_i + D_i \quad \text{(A.4b)}$$

where

$P_{i,t}$ = Population of area i at time t
$P_{i,t+k}$ = Population of area i at time t + k
B_i = Births in area i between time t and t + k
D_i = Deaths in area i between time t and t + k

$Ni = I_i - O_i =$
(In-migrants to area i between time t and t + k) − (Out-migrants from area i between time t and t + k)

To be exactly true, the fundamental equation must apply to a defined population (e.g., the resident population) of a fixed area i and there must be no measurement errors. For example, if we are using it to estimate the resident population of area i at time t + k, then all births and deaths used must be to the resident population of area i between time t and time t + k while all in- and out-migrants during the same period also apply to this same resident population and $P_{i,t}$ is measured without error.

The fundamental equation can be applied to age, sex, race, and ethnic segments of the population. In the case of an age group the age specification of the group changes over the period. For example, if t is 10 years, then one should compare age x at time 0 with x + 10 at time t. Put another way, this age group is a "cohort" that is followed over time. In conjunction with age groups, and the use of future fertility, mortality and net migration rates, the expanded version of the fundamental equation can be used to make both estimates and projections. This is known as the "cohort-component method" (Smith et al. 2013), where "cohort" is defined as before and "component" is used to refer to the three components of population change, fertility, mortality, and migration.

All of the component methods generally employ counts of births and deaths because they are generally available every year from vital statistics records while migration data are only available in countries with well-maintained population registers (e.g., Finland). They tend to vary in how the migration component is estimated. Two examples follow, "Component Method II" and the "Cohort-Component Method."

A.5.1 Component Method II

Component Method II (CM II) is based on an estimate of net migration that finds the difference between a current estimate of school-age children (e.g., time = t + k) in area i with the expected number "survived" from the last census (e.g., time = t) of area i and then converting the difference to a migration rate that is applied to the entire population of area i at time t. The net migration component is estimated in six steps: (1) Enrollment in selected grades (e.g. grades 2 to 8 or in grades Kindergarten to 9) at time = t + k is adjusted to approximate the population of corresponding elementary school age on the basis of the relative size of these two groups at the last census (relating local school enrollment data to a census count at time t); (2) next, the "expected" population (assuming no net migration) of elementary school age for area i for time t + k is found by "surviving" the population in the same cohort from time t (including, if necessary, births subsequent to time t) to t + k (This is usually done using survivorship probabilities found a life table that is assumed to apply to area for the period t to t + k; (3) the net migration of children of school age is estimated as the difference between the "actual" population of school age and the "expected" population of school age; (4) the estimated net migration of school-age children is converted into the estimated net migration of the remainder of the population by dividing these other population groups by the number of school age children at the time of the last census; (5) the estimated net number of migrants in each age group is then summed to obtain an estimate of the net number of migrants for the total population; and (6) in the final step, the total population is obtained by using the fundamental demographic equation: adding to the population in the last census, the net number of migrants and the number of births during the period and subtracting the number of deaths.

Where administrative records data are available on the population aged 65 years and over (e.g., in the US Medicare data), it is not uncommon to use CM II to develop an estimate of the population less than 65 years with appropriate adjustments to the six steps just described and then use the administrative records data to estimate the population age 65 years and over (Murdock et al. 1995). The two groups are added together to get an estimate of the total population in what could be termed a composite method (Bogue 1950; Bogue and Duncan 1959). There are more variations on the basic idea (Bryan 2004b; U.S. Census Bureau 2010; Zitter and Shryock 1964), but these six steps essentially describe CM II.

CM II assumes: (1) there has been no change since the last census in the ratio of the population of elementary school age to the number enrolled in the elementary grades; and (2) that the ratio of the net migration rate of the total population to the migration rate of the school-age population of area i for the period t to t + k corresponds to that for the net migration of adults for this are over the same period.

It is worthwhile to note that other variations in the use of school data to estimate net migration in a component model are possible. One is the "grade-progression method," which determines the annual net migration of school-age children by comparing the number of children enrolled in, for example, grades 2 to 7 in one year with the number enrolled in grades 3 to 8 in the following year. The remaining steps in a school-progression approach are those described for CM II.

A.5.2 Cohort-Component Method

The cohort-component method was introduced by Cannan (1895), subsequently used by Bowley (1924), and later re-discovered independently by Whelpton (1928). It is the most widely used method for producing population projections. Since it is used for projections it also can be used for estimates. Whether used for projections or estimates, the basic framework is the same as shown in Equations (A.4a) and (A.4b), but with age and sex details. We only provide an overview of the cohort-component method here. Full implementation details are found in Smith et al. (2013).

The cohort-component method divides the population at time = t (the launch date) population into age-sex groups (i.e., cohorts) and accounts separately for the fertility, mortality, and migration behavior of each cohort as it passes from he launch date at time = t to the estimate data at time = t + k. The division of the population into age groups was an important methodological advance (de Gans 1999). Not only does this account for the differences in mortality, fertility, and migration rates among different age groups at a particular time, but it also allows for changes in these rates for individual cohorts as they cycle through time.

Age cohorts can be defined in a number of ways, but cohort-component models typically use either single years or 5-year groups. The oldest age group is virtually always "open-ended," usually 75+, 85+, or 90+. Age groups are typically divided

by sex and are sometimes further subdivided by race, ethnicity, and other ascribed characteristics.

The cohorts are cycled through time in "intervals," where the components of change are applied to the cohorts in each interval as appropriate to bring them forward in time from the launch date. It is customary that the width of the number of years used to define the cohorts corresponds to the number of years in the temporal interval (i.e., 5-year age cohorts when the cohort-component method uses 5-year intervals).

The first step in the process is to establish the launch year (time = t) population and calculate the number of persons in it who survive to the estimation date (tie = t + k) . This is done by applying age-sex-specific survival rates to each age-sex group in the launch year population. These can be "controlled" so that the numbers they generate match reported deaths for each interval (e.g., year) up to the estimate date.

The second step is to calculate migration for each age-sex group in each interval from time = t to time = t + k. The third step is to calculate the number of births in each interval. This is usually done by applying age-specific birth rates to the female population in each age group. As was the case with the age-sex specific survival rates, these can be "controlled" so that the numbers they generate match reported deaths for each year up to the estimate date.

The fourth and final step in the process is to add the number of births (distinguishing between males and females) to the rest of the population. These calculations provide an estimate of the population by age and sex at the end of each interval. This population then serves as the starting point for the following interval. The process is repeated until the estimate date is reached.

*The discussions of methods are largely taken from Swanson and Tayman (2013).

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