

POPULATION ESTIMATES & PROJECTIONS

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Use of Postal Delivery Data in the Population Estimate Process

Contributors: Theresa Lowe, Mike Mohrman

THE OFFICE OF FINANCIAL MANAGEMENT'S (OFM) April 1 population estimates program develops estimates for local jurisdictions that are used for revenue allocations and program administration (RCW 43.62.020). Vacancy/occupancy trends are an important factor in the estimation method used. This Brief extends the evaluation of postal vacancy/occupancy rates presented in Research Brief No.17. It examines the relationship between vacancy trends in postal data versus census data, describes how the postal rates were used in the 2003 estimation process using the Housing Unit Method, and identifies avenues for further evaluation.

A simplified version of the Housing Unit Method is shown below (a housing unit can be a house, apartment, etc.)

$$\begin{array}{rcl}
 \text{Current City Housing X Occupancy Rate X Avg. Persons Per Occupied Unit} & = & \text{Persons in Housing} \\
 \text{Current count of persons in nursing homes, correctional, other facilities} & = & \text{Persons in Facilities} \\
 & & + \\
 & & \text{Total City Population}
 \end{array}$$

Annual population estimates are benchmarked to the most recent federal decennial census and use federal census data and definitions. Administrative data, such as the postal data, are used to *adjust* the base federal census occupancy rates in years following a census. They are never used to *replace* the census rates because of differences in 1) the universe of postal stops versus housing, 2) the boundaries of the geographical areas represented in the data sets, and 3) the definition of active or inactive postal stops compared to the federal census concepts of occupied or vacant. These issues were covered in Brief No.17. Residential construction has been flourishing due to low mortgage rates, but the housing boom does not necessarily reflect population increases.

1. Development of vacancy trends from postal carrier route data

United State Postal Service (USPS) carrier route data were grouped to represent counties. County postal vacancy trends were applied to subcounty areas because the county data have the stability of large numbers and more constant carrier route boundaries. When developing trend data, it is very important that the boundaries of the geographic areas examined are comparable at each point in time. At the county level, it is also possible to assess how much of the postal vacancy change should be applied to the federal census rates.

The postal data used was for all possible residential deliveries, including post office boxes. This was considered the best match to federal census housing counts for counties. The average absolute percent difference between the census housing counts and postal deliveries by county is 12.6 percent for all deliveries and 24.5 percent for deliveries excluding post office boxes. Coverage is particularly poor for areas with a large number of post office box deliveries—typically the very rural areas and those counties with seasonal housing. Research Brief 17, Table 2.

Table 1. Estimated vacancy percentages based on USPS delivery statistics

County	Averaged Vacancy Rate				Change in Occupancy Rates		
	February- April 2000	February- April 2001	February- April 2002	February- April 2003	2000 to 2001	2001 to 2002	2000 to 2002
Adams	6.80	7.00	6.81	10.90	-0.20	0.19	-0.02
Asotin	2.61	2.97	5.87	6.19	-0.37	-2.89	-3.26
Benton	2.20	2.27	2.94	3.27	-0.08	-0.67	-0.75
Chelan	2.44	6.18	7.50	8.41	-3.74	-1.33	-5.06
Clallam	2.94	3.23	4.00	4.02	-0.29	-0.77	-1.06
Clark	0.82	1.21	2.87	3.17	-0.39	-1.66	-2.06
Columbia	11.83	14.96	15.46	14.64	-3.12	-0.51	-3.63
Cowlitz	1.08	3.01	5.10	5.61	-1.94	-2.09	-4.03
Douglas	3.46	5.14	7.28	8.24	-1.68	-2.14	-3.81
Ferry	13.97	16.63	18.88	20.87	-2.67	-2.25	-4.92
Franklin	3.85	4.40	5.38	4.74	-0.55	-0.98	-1.53
Garfield	5.82	4.50	5.11	5.75	1.32	-0.61	0.71
Grant	2.89	5.42	7.05	6.95	-2.52	-1.63	-4.16
Grays Harbor	2.44	10.96	11.00	11.32	-8.51	-0.04	-8.56
Island	0.77	4.52	4.33	4.27	-3.75	0.19	-3.56
Jefferson	2.46	4.70	5.07	6.73	-2.24	-0.38	-2.61
King	0.66	1.57	2.04	2.77	-0.92	-0.47	-1.39
Kitsap	2.13	3.20	3.68	3.64	-1.07	-0.48	-1.55
Kittitas	2.21	4.59	5.57	5.07	-2.39	-0.98	-3.36
Klickitat	1.84	5.65	7.25	8.03	-3.81	-1.59	-5.40
Lewis	2.71	6.50	6.46	6.55	-3.79	0.03	-3.75
Lincoln	13.01	15.65	16.14	15.75	-2.64	-0.49	-3.13
Mason	2.76	6.04	8.96	8.70	-3.28	-2.92	-6.20
Okanogan	3.86	7.94	8.54	10.74	-4.07	-0.60	-4.68
Pacific	1.10	2.85	4.64	6.61	-1.75	-1.80	-3.54
Pend Oreille	6.02	6.60	10.43	11.39	-0.57	-3.83	-4.40
Pierce	1.55	2.88	3.22	3.61	-1.33	-0.34	-1.68
San Juan	1.52	7.34	7.11	6.15	-5.82	0.23	-5.59
Skagit	1.46	4.27	4.59	5.03	-2.81	-0.32	-3.14
Skamania	0.45	2.59	3.50	2.62	-2.14	-0.91	-3.05
Snohomish	0.69	2.11	2.86	3.31	-1.43	-0.75	-2.17
Spokane	3.31	3.83	6.06	6.00	-0.52	-2.23	-2.74
Stevens	6.57	7.18	8.09	9.09	-0.61	-0.92	-1.52
Thurston	0.69	2.91	3.23	3.00	-2.22	-0.32	-2.54
Wahkiakum	3.97	7.67	10.34	11.25	-3.69	-2.67	-6.36
Walla Walla	4.97	5.82	6.43	6.98	-0.85	-0.61	-1.46
Whatcom	2.38	7.53	8.21	8.52	-5.14	-0.68	-5.83
Whitman	7.51	9.71	11.09	11.47	-2.20	-1.38	-3.58
Yakima	1.92	5.37	6.86	6.80	-3.45	-1.49	-4.94
State	1.65	3.25	4.07	4.48	-1.60	-0.83	-2.43

Postal delivery statistics from the United States Post Office: Address Information System (AIS), Delivery Statistics Product, April 2000 – April 2003. Vacancy rates estimates are based on active and possible residential deliveries including: Home, Curbside, Central Curbside, PO Box (contract), Neighborhood Collection Box, Residential Facility, Detached, Non-Staffed and 'Other' deliveries as defined by the USPS.

Washington State Office of Financial Management, Forecasting Division, August 2003.

Table 2. Comparison of Federal Census Bureau and Office of Financial Management (OFM) population estimates

County	Census 2000	Federal Census Bureau July 1 Population Estimates			Bureau Est.	OFM Est.	Percent Difference
		2000	2001	2002	April 1 2002	April 1 2002	
Adams	16,428	16,467	16,318	16,434	16,405	16,600	1.17
Asotin	20,551	20,558	20,447	20,453	20,452	20,700	1.20
Benton	142,475	143,110	145,858	150,368	149,241	147,600	-1.11
Chelan	66,616	66,747	66,832	67,051	66,996	67,600	0.89
Clallam	64,179	64,673	65,304	66,304	66,054	64,900	-1.78
Clark	345,238	347,584	359,339	370,241	367,516	363,400	-1.13
Columbia	4,064	4,074	4,069	4,103	4,095	4,100	0.13
Cowlitz	92,948	93,037	93,753	94,516	94,325	94,400	0.08
Douglas	32,603	32,680	32,964	33,409	33,298	33,100	-0.60
Ferry	7,260	7,292	7,290	7,269	7,274	7,300	0.35
Franklin	49,347	49,581	50,802	52,745	52,259	51,300	-1.87
Garfield	2,397	2,392	2,350	2,327	2,333	2,400	2.80
Grant	74,698	75,048	76,511	77,983	77,615	76,400	-1.59
Grays Harbor	67,194	67,192	68,234	68,470	68,411	68,400	-0.02
Island	71,558	71,842	75,731	77,477	77,041	73,100	-5.39
Jefferson	26,299	26,097	26,468	26,762	26,689	26,600	-0.33
King	1,737,034	1,739,125	1,753,922	1,759,634	1,758,206	1,774,300	0.91
Kitsap	231,969	232,532	232,901	236,178	235,359	234,700	-0.28
Kittitas	33,362	33,483	33,802	34,371	34,229	34,800	1.64
Klickitat	19,161	19,236	19,301	19,381	19,361	19,300	-0.32
Lewis	68,600	68,635	69,061	69,711	69,549	70,200	0.93
Lincoln	10,184	10,183	10,142	10,097	10,108	10,200	0.90
Mason	49,405	49,581	50,226	51,008	50,813	49,800	-2.03
Okanogan	39,564	39,571	39,305	39,186	39,216	39,800	1.47
Pacific	20,984	20,945	20,766	20,778	20,775	21,000	1.07
Pend Oreille	11,732	11,745	11,861	12,008	11,971	11,800	-1.45
Pierce	700,820	704,017	718,925	732,293	728,951	725,000	-0.54
San Juan	14,077	14,161	14,333	14,565	14,507	14,600	0.64
Skagit	102,979	103,488	105,236	106,908	106,490	105,100	-1.32
Skamania	9,872	9,903	9,992	10,050	10,036	9,900	-1.37
Snohomish	606,024	609,240	621,646	631,698	629,185	628,000	-0.19
Spokane	417,939	418,706	423,041	427,512	426,394	425,600	-0.19
Stevens	40,066	40,246	40,478	40,557	40,537	40,400	-0.34
Thurston	207,355	208,364	212,833	217,645	216,442	212,300	-1.95
Wahkiakum	3,824	3,836	3,769	3,793	3,787	3,800	0.34
Walla Walla	55,180	55,290	55,357	56,150	55,952	55,400	-1.00
Whatcom	166,814	167,594	170,676	174,364	173,442	172,200	-0.72
Whitman	40,740	40,685	40,376	40,631	40,567	40,600	0.08
Yakima	222,581	222,776	223,366	224,824	224,460	225,000	0.24
State	5,894,121	5,911,716	5,993,585	6,069,254	6,050,337	6,041,700	-0.14

Washington State Office of Financial Management, Forecasting Division, August 2003.

Postal vacancy rates were developed by dividing inactive residential postal deliveries by all possible residential postal deliveries. Rates were developed for all counties and the state for 2000, 2001, and 2002. Annual change in the postal occupancy rates—given the increase in the vacancy rates—were developed for 2000-01, 2001-02, and 2000-02 (Table 1).

2. How do postal occupancy/vacancy rate changes compare to federal census trends?

Since postal data lack a one-to-one correspondence with census data, the change in postal rates may need some type of adjustment before being applied to federal census rates. Developing an adjustment was done as follows:

1. Census Bureau July 1, 2001 and 2002 population estimates were converted to April 1, 2002, by linear interpolation and compared to OFM's population estimates (Table 2). There was fairly good agreement between the independent estimates by the Bureau and OFM. Estimates for 31 of Washington's 39 counties were within 1.5 percent of each other.
2. The April 1, 2002, estimates were averaged for the 31 counties where the Bureau and OFM figures were in best agreement. The "averaged number" for each county was considered the "most likely" April 1, 2002, population.
3. OFM estimates of group quarters population for 2002 were subtracted from the "most likely" total population figure for each of the 31 counties to obtain household population for 2002.
4. Housing unit estimates for 2002 were developed using Census 2000 housing as a base. Net new housing units (as reported by local governments in Washington through 2002) were added.

Table 3 shows how the change in postal occupancy rates relates to change in the census occupancy rates. The column headings in Table 3 follow the Housing Unit Method computation presented at the beginning of this Brief.

1. The formula assumes change in each county's population over the 2000-02 period is due to changes in the housing stock (Column 1) and changes in the occupancy rate (Column 3).
2. Average household size as reported in the 2000 census is assumed to remain constant.
3. Column 4 specifically shows what portion of the 2000-02 change in the postal occupancy rate would be needed to adjust the 2000 census occupancy rate to obtain each county's "most likely" 2002 household population.

Column 4 in Table 3 shows that in nearly all cases the change in postal occupancy rates between 2000 and 2002 overstates the likely amount of change occurring in the 2000 census occupancy rates. At the state level, using only 0.252—or 25.2 percent—of the change in the postal rate is needed to adjust the 2000 census occupancy rate to obtain the 2002 population. Most counties require about 20 to 40 percent of the change in the postal rate to obtain their 2002 population. For a few counties, however, a large proportion of the 2000-02 postal rate change is needed—about 80 percent for Stevens, King, and Kitsap counties. For others, only a minimal portion of the postal change is needed—4 percent for Pierce County and 2 percent for Walla Walla County.

The relationship between the change in postal and census rates appears somewhat tenuous. Erratic results occur in counties with negligible postal rate change (Adams and Benton) and in slow growing or stable population counties if there is substantial housing growth (Skamania). This underscores the need to develop stable and valid postal rates so that change due to extraneous data factors—such as changes in carrier route boundaries—do not confound the results.

3. How was the postal occupancy rate change used in the 2003 OFM population estimates?

In 2003, the county level postal occupancy rate change from 2000-03 was used to develop the population estimates for counties and cities. In most cases, the portion of the postal rate change needed to obtain the 2002 population as shown in Table 3, Column 4 was used. In questionable cases the state change portion, 25 percent, was substituted. This produced a series of Housing Unit population estimates for the state, county, and subcounty areas that were developed by consistent procedures.

The final 2003 populations for each county were an average of independent estimates from three methods: the Component Method, the Housing Unit Method, and Ratio Correlation. Thus, the initial Housing Unit estimates for the cities and the unincorporated area population in each county were adjusted to add to the final county total.

4. Conclusions and indications for further evaluation

The present study shows that the increase in postal vacancy rates generally overstates actual housing unit vacancies. It also shows that there is considerable variation among the counties as to how much of the increase in postal rates should be used to develop the most accurate population estimates.

Additional study is needed to determine how stable the relationship is between the change in postal rates and the change in census rates over time. The evaluation shown in Table 3 should be repeated each year when the Census Bureau releases their population estimates for Washington counties.

Study is also needed to determine how appropriate county level vacancy trends are for the communities within each county. While the use of city-specific postal rates and postal change is probably not a feasible due to the variability in carrier route and city boundaries, some limited evaluation is needed. City size may play a role in how useable the postal data are at a subcounty level.

Finally, evaluation of procedures to track household size is also important to the Housing Unit Method. Present examination of postal occupancy rates assumes that household size is constant. It is likely that increased home building due to historic lows in mortgage rates—coupled with declining population growth in Washington—has resulted in some dilution of persons per household. Better estimation of household size should improve our analysis of the postal data.

Table 3. Census 2000 occupancy rate adjustments using postal vacancy rate changes

County	Housing Units 2002	* (Occupancy Rate Census 2000	+ (Change in Postal Occupancy Rate 2000-02	* Portion of Postal Change Used to Get 2002 Population) * Ave. Household Size Census 2000	= "Most Likely" 2002 Household Population
	Col.1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
Adams	5,919	0.9058	-0.0002	104.0	3.095	16,257
Asotin	9,228	0.9180	-0.0326	0.325	2.416	20,233
Benton	58,127	0.9447	-0.0075	-0.04	2.679	147,595
Chelan	30,991	0.8229	-0.0506	0.14	2.619	66,217
Clark	142,390	0.9491	-0.0206	0.1425	2.690	362,416
Columbia	2,071	0.8360	-0.0363	0.406	2.363	4,019
Cowlitz	39,673	0.9282	-0.0403	0.2634	2.553	92,940
Douglas	13,258	0.9059	-0.0381	0.137	2.755	32,903
Ferry	3,876	0.7478	-0.0492	0.34	2.494	7,067
Grays Harbor	32,941	0.8251	-0.0856	0.16	2.483	66,360
Jefferson	14,692	0.8233	-0.0262	0.386	2.212	26,431
King	764,008	0.9578	-0.0139	0.8143	2.390	1,728,656
Kitsap	95,182	0.9328	-0.0155	0.795	2.601	227,848
Klickitat	8,931	0.8656	-0.0540	0.396	2.536	19,121
Lewis	30,445	0.8892	-0.0375	0.241	2.569	68,838
Lincoln	5,371	0.7835	-0.0313	0.415	2.423	10,029
Okanogan	19,477	0.7874	-0.0468	0.363	2.576	38,656
Pacific	14,173	0.6501	-0.0354	0.339	2.271	20,540
Pend Oreille	6,811	0.7020	-0.0440	0.27	2.507	11,786
Pierce	288,048	0.9413	-0.0168	0.0393	2.605	705,757
San Juan	10,314	0.6630	-0.0560	0.263	2.159	14,435
Skagit	44,078	0.9103	-0.0314	0.137	2.603	103,955
Skamania	5,322	0.8206	-0.0305	3.545	2.612	9,904
Snohomish	245,925	0.9519	-0.0217	0.16	2.655	619,207
Spokane	178,779	0.9349	-0.0274	0.0625	2.465	411,180
Stevens	18,040	0.8533	-0.0152	0.815	2.644	40,107
Wahkiakum	1,833	0.8666	-0.0636	0.41	2.424	3,735
Walla Walla	21,439	0.9291	-0.0146	0.0225	2.539	50,550
Whatcom	76,977	0.8722	-0.0583	0.0895	2.511	167,591
Whitman	17,011	0.9149	-0.0356	0.202	2.312	35,692
Yakima	80,765	0.9346	-0.0494	0.191	2.958	220,990
State	2,286,095	0.9267	-0.0243	0.252	2.535	5,908,777

Washington State Office of Financial Management, Forecasting Division, August 2003