

Washington State Public Retirement Systems

2001-2006 Experience Study

PERS, TRS, SERS, LEOFF, WSPRS, PSERS

September 2008



Office of the State Actuary

"Securing tomorrow's pensions today."

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Letter of Introduction Experience Study Report As of September 30, 2006 September 2008

As required under RCW 41.45.090, this report documents the results of an experience study of the following Washington State retirement systems:

- ❖ Public Employees' Retirement System (PERS)
- ❖ Teachers' Retirement System (TRS)
- ❖ School Employees' Retirement System (SERS)
- ❖ Public Safety Employees' Retirement System (PSERS)
- ❖ Law Enforcement Officers' and Fire Fighters' Retirement System (LEOFF)
- ❖ Washington State Patrol Retirement System (WSPRS)

The primary purpose of this study is to develop demographic assumptions for the systems listed above for use in future actuarial valuations. We organized this report in the following three sections:

- ❖ Executive Summary
- ❖ Development of Demographic Assumptions
- ❖ Glossary

The Executive Summary section provides a high-level summary of the study results for all systems. The Development of Demographic Assumptions section provides detailed information for each assumption by system and plan. The Glossary provides definitions of actuarial terms used throughout this report.

We encourage you to submit any questions you might have concerning this report to our regular address or our e-mail address at actuary.state@leg.wa.gov. We also invite you to visit our website, at the address below, for further information regarding the actuarial funding of the Washington State retirement systems.

Sincerely,

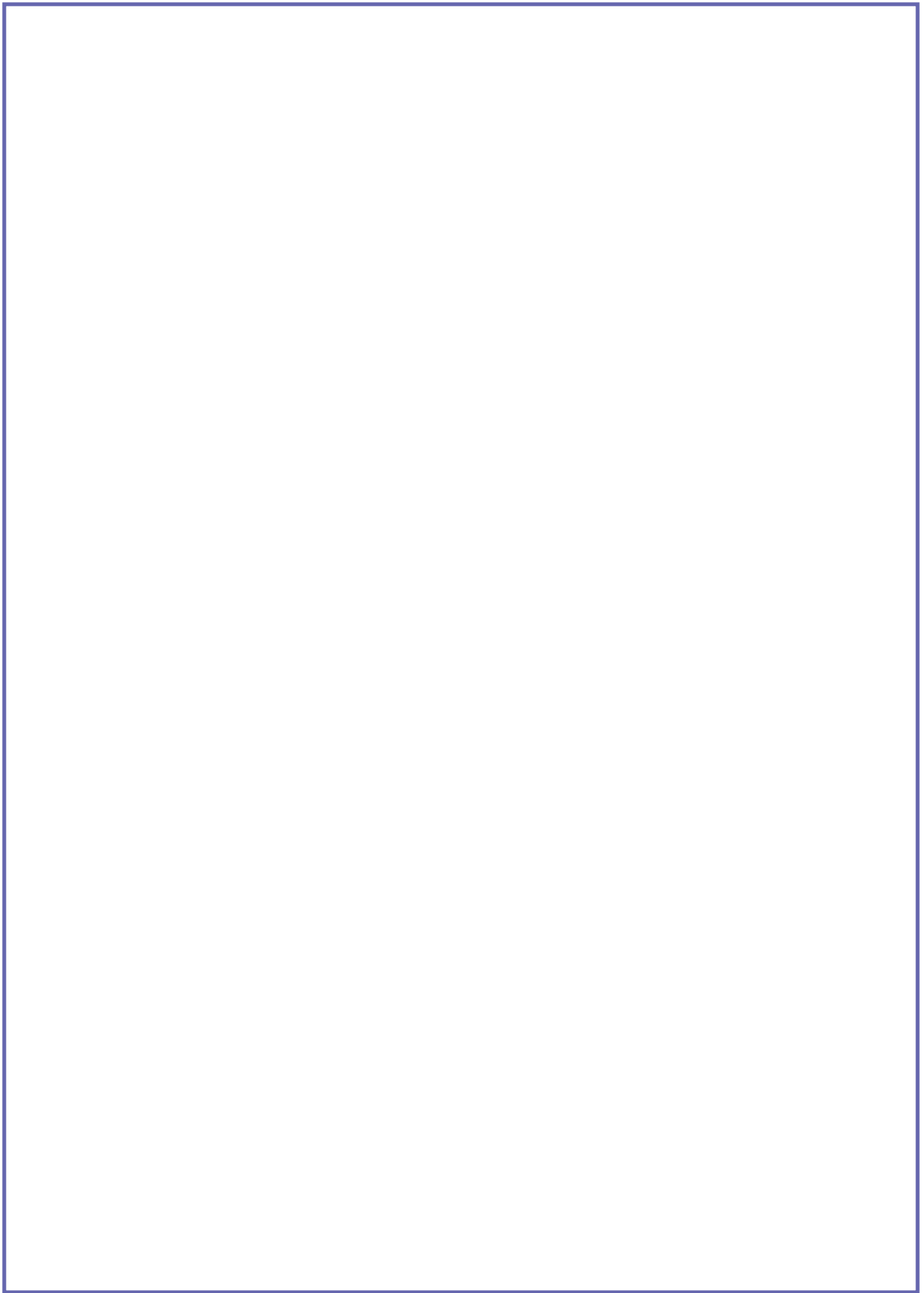
Matthew M. Smith, FCA, EA, MAAA
State Actuary



Section One

Executive Summary





Executive Summary

The Office of the State Actuary (OSA) prepared this actuarial experience study on the Washington State retirement plans as required under [RCW 41.45.090](#). This experience study covers the period 2001 through 2006 and includes an analysis of all demographic assumptions used to develop contribution rates, administrative factors, and estimated fiscal costs (fiscal notes and projections) associated with the retirement plans.

Intended Use

The primary purpose of this experience study is to compare the current demographic assumptions to the actual experience of the plans to determine if any adjustments are required to ensure our assumptions remain reasonable. Readers should not use this study for other purposes. We also advise readers of this study to seek professional guidance as to its content and interpretation, and not to rely upon this communication without such guidance. Distribution of or reliance on only parts of this study could result in its misuse, and may mislead others.

Our Approach

We gathered sufficient data, made assumptions where necessary, and established study methods for each assumption to evaluate how well our current demographic assumptions compare to past actual experience. We also reviewed whether different assumption formats (i.e., assumptions by gender, age, or years of service, etc.) would provide a better fit to past experience than the current formats. Lastly, we made expectations for the future and applied our professional judgment to update our current assumptions where necessary.

Please see the Development of Demographic Assumptions section for additional information.

Fiscal Impact

Actuaries use demographic and economic assumptions to estimate the cost of future plan benefits which determines the timing and amount of plan contributions. Actual plan benefit payments less returns on invested plan contributions determine the actual cost of benefits. Furthermore, we will review all demographic assumptions again in six years and likely make further updates at that time. Therefore, any assumption changes from this experience study impact short-term financing costs only.

Please see the 2007 Actuarial Valuation Report for the impact on plan liabilities and contribution rates resulting from this experience study.

Economic Assumptions

We review the economic assumptions for the plans every two years as part of the contribution rate-setting process under RCW 41.45.030. The current economic assumptions, prescribed by the Legislature, follow:

Inflation	3.50 percent
General salary growth	4.50 percent
Annual investment return	8.00 percent
Growth in system membership	1.25 percent (0.90 percent in TRS)

Although economic assumptions are not part of the analysis of this demographic experience study, we have recommended a change to the general salary growth assumption (a decrease from 4.50 percent to 4.25 percent). We describe this change briefly in this summary and in more detail in the Development of Demographic Assumptions section of this report for the service-based salary increase assumption. The Pension Funding Council (PFC) adopted our recommended general salary growth assumption change. The LEOFF 2 Board did not. The Legislature may revise both actions during the 2009 Legislative Session.

Demographic Assumptions

The following information summarizes the results for the major categories of demographic assumptions that comprise this report. Please see the Development of Demographic Assumptions section for additional information.

Mortality Rates

Analysis of our experience data shows lower rates of mortality in all of our plans than our current assumptions predict. This experience indicates that people are living longer. In addition, national trends suggest improvements in mortality will continue in the future. As a result, we recommend the use of the RP-2000 mortality table (published by the Society of Actuaries) with projected improvements at 50 percent of Scale AA. Scale AA is a table of annual mortality improvement rates published by the Society of Actuaries. Using 50 percent instead of 100 percent of Scale AA recognizes that we expect future improvements in mortality to slow down.

We also recommend the continued use of age adjustments (shifts to the underlying RP-2000 table) to further refine our expected rates with our experience data. These age adjustments have changed for males and females in PERS and males in LEOFF, WSPRS, and PSERS.

We base our current mortality assumptions for retirees with disabilities on the RP-2000 "Healthy" table with minimum rates and large age offsets. We recommend that we move to the RP-2000 "Disabled" table, also published by the Society of Actuaries, for each plan except LEOFF 1. We also recommend projected improvements in disabled mortality at 50 percent of Scale AA.

The recommended changes in the mortality assumptions increase the expected short-term cost of the plans and require an increase in contribution rates to fund these higher expected short-term costs.

Retirement Rates

Our experience data show significant decreases in our retirement rates over the last six years except for WSPRS, TRS 1, and LEOFF 1. This experience indicates that people are delaying their retirement. In addition, national trends suggest people are working longer and delaying retirement. We recommend lower retirement rates for PERS, TRS 2/3, SERS, and LEOFF. PSERS has insufficient data as of this experience study to recommend any changes. WSPRS and TRS 1 assumptions are a good fit and only minor updates are recommended for these plans.

Reducing the retirement rates decreases the expected short-term cost of the plans and decreases the contribution rates required to fund these lower expected short-term costs.

Termination Rates

Termination rates for all plans have increased during the study period which suggests that fewer workers are staying in public employment. Some of this trend can be explained by the economy - when the economy is strong, people change jobs more frequently. We observed two strong economic periods and only one downturn during the study period. We have taken this information into account in developing new termination rates. Because we can't predict the economy for the future, we blended our experience data with the current assumptions to produce a reasonable set of new termination rates.

Increasing the termination rates decreases the expected short-term cost of the plans and decreases the contribution rates required to fund these lower expected short-term costs.

Disability Rates

Overall, the current disability assumptions provide a good fit to the experience of the plans. We recommend minor updates for TRS 2/3 and SERS 2/3, a new assumption format for WSPRS, and lower rates for LEOFF 1 to provide a better fit to past experience in these plans.

The recommended changes to the disability assumptions create a minimal impact on contribution rates.

Service-Based Salary Increases

To estimate future salaries, we model two types of salary growth – general salary increases and service-based salary increases. General salary increases fall under the economic assumption category and service-based salary increases fall under the demographic assumption category. The purpose of this experience study is to analyze the demographic assumptions. However, during our analysis of past salary growth, we determined that the economic and demographic categories of salary assumptions should be considered together to effectively model total salary growth.

Our experience data shows lower general salary increases than expected and higher service-based salary increases, except for LEOFF and WSPRS.

We recommend a 0.25 percent reduction in the general salary increase assumption for all plans. We recommend modest increases to the service-based salary increase assumption for PERS, TRS, and SERS and reductions for LEOFF and WSPRS.

Combining both salary assumption changes results in lower expected short-term costs of the plans and lower contribution rates.

Miscellaneous Assumptions

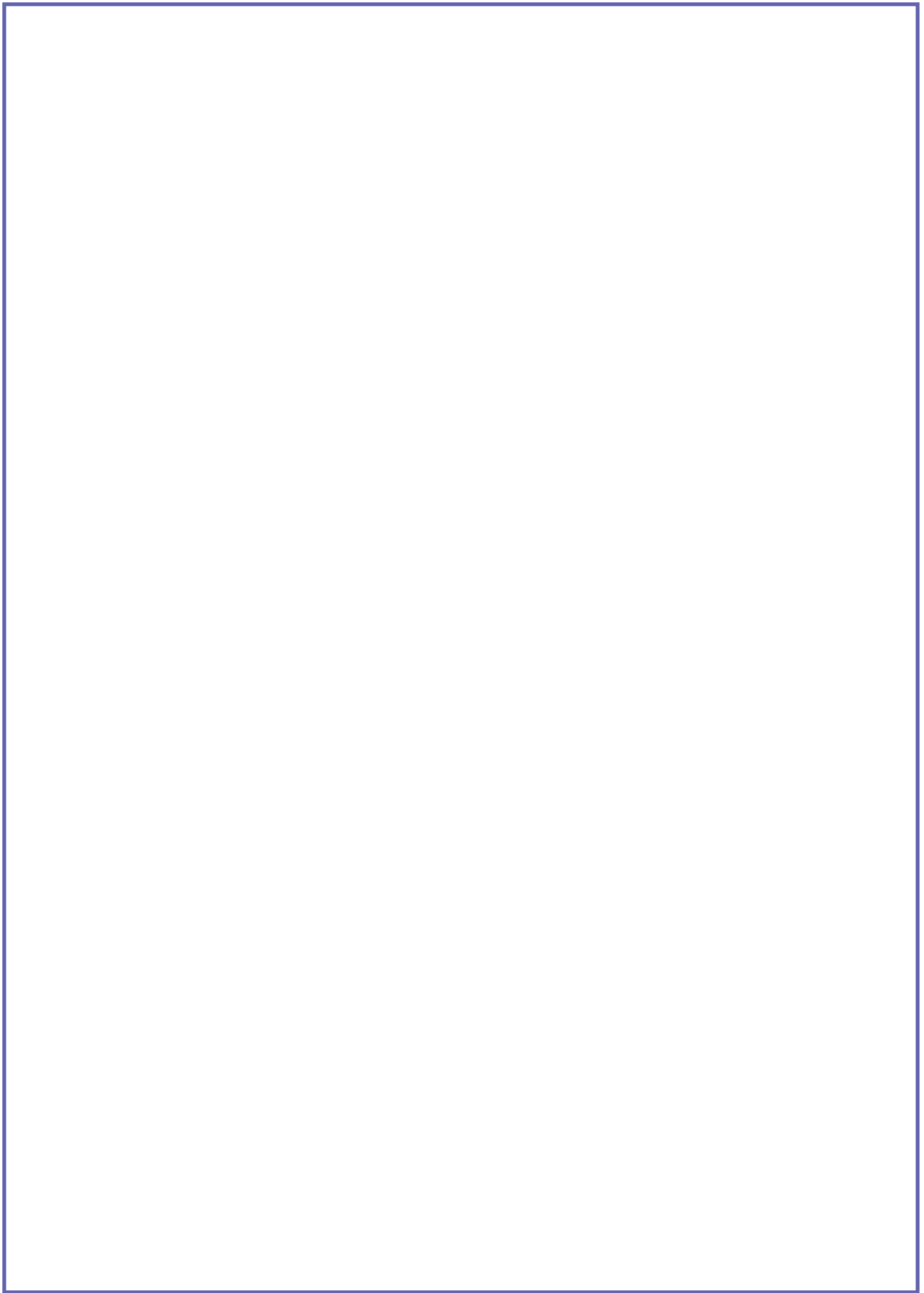
In addition to the major demographic assumptions described earlier, we use several other demographic assumptions in our actuarial valuation model to estimate the costs of the plans. We include each miscellaneous assumption, and its analysis, in this report. Overall, we recommend general updates, where appropriate, and each update has a very small impact on the expected costs and contribution requirements of the plans. The total impact for all miscellaneous assumptions results in lower expected short-term costs and lower contribution rates for each plan.



Section Two

Development Of Demographic Assumptions







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**Actuarial Certification Letter
Experience Study Report
As of September 30, 2006
September 2008**

This report documents the results of an experience study of the retirement plans defined under Chapters 41.26, 41.32, 41.35, 41.37, 41.40, and 43.43 of the Revised Code of Washington (RCW). The primary purpose of this study is to compare current demographic assumptions to the actual experience of the plans, for the period 2001 through 2006, and to develop new demographic assumptions for the future. This report should not be used for other purposes.

The experience study results summarized in this report involve methods for analyzing past demographic experience and setting new demographic assumptions for the plans. I believe that the methods used and the assumptions developed in this study are reasonable and are in conformity with generally accepted actuarial principles and standards of practice as of the date of this publication.

The Department of Retirement Systems provided member and beneficiary data to us. We checked the data for reasonableness as appropriate based on the purpose of this study. An audit of the participant data was not performed. I relied on all the information provided as complete and accurate. In my opinion, this information is adequate and substantially complete for purposes of this study.

The undersigned, with actuarial credentials, meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Sincerely,

Matthew M. Smith, FCA, EA, MAAA
State Actuary

Mortality Rates

We primarily use mortality assumptions to estimate how long pension benefits will be paid. We also use these assumptions to determine the probability that a member will survive until retirement. Using the mortality assumptions in our valuation software, we estimate the probability of death in a given year for both the member and their survivor. We also determine what percent of deaths are duty-related because members who die in the line-of-duty receive enhanced benefits.

The annual pension amount and the number of payments drive the cost of the pension system. Therefore, mortality rates are key assumptions in our valuation model.

Data Used

We used experience study records from 1984-2006 to study mortality experience.

Assumptions Made

All assumptions used in the development of mortality rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To calculate a raw mortality rate at a given age, we divided the number of deaths during the year by the number of members alive at the beginning of the year. We made this calculation for each system, by age and gender. We compared observed rates of mortality to our current mortality assumptions to determine if we need to change our assumptions.

We took three distinct steps to arrive at our new mortality assumptions. First, we looked for a trend in the data to determine if mortality rates are improving over time. Second, we matched our mortality rates to the RP-2000 mortality table using age offsets. Lastly, we projected the mortality rates into the future to reflect improving mortality. These steps are explained in greater detail in the Development of Rates section below.

Development of Assumptions

Past Experience and Future Expectations

If members consistently live longer than expected, the pension system will accumulate actuarial losses. The following table shows the life expectancy of U.S. citizens throughout the twentieth century.

Year	Life Expectancy
1900	47.3
1920	54.1
1940	62.9
1960	69.7
1980	73.7
2000	77

U.S. Census Bureau; all races, all genders.

The table shows that life expectancy improved consistently and significantly throughout the twentieth century. The rate of improvement slowed in the second half of the century. To fund the pension systems adequately, assumed mortality rates must take into account future life expectancies.

Multiple organizations conducted studies to determine the expected annual mortality improvement for each age. The Society of Actuaries (SOA) created the most commonly used improvement scale, Scale AA, in 1994. We compared improvement in our mortality rates to Scale AA to determine if we should apply Scale AA to our assumption.

We calculated the raw mortality rate at each age in each year of the 23-year period. We looked for a trend in the raw mortality rates to see if and how the rates changed over time. We took the logarithm, or log, of each raw mortality rate, and for each age group, found the best fit line through the data points. The annual trend in the data equals one minus the exponent of the slope of the best fit line. We then compared our annual growth trends to Scale AA. Since this is a complicated idea, we show an example below.

Raw mortality rates by year for PERS males 60-64 years old:

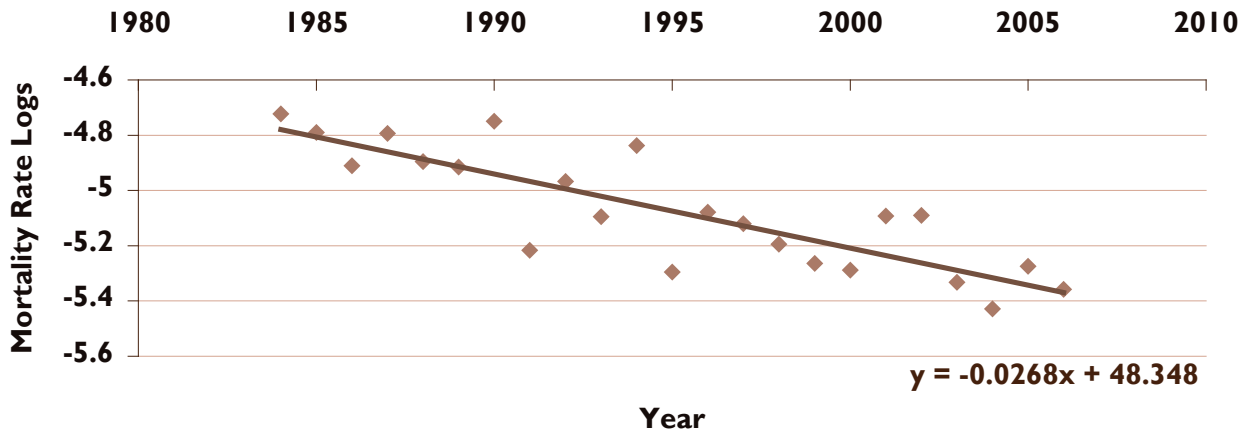
Year	1984	1988	1992	1996	2000	2004
Mortality	0.0089	0.0075	0.0070	0.0062	0.0051	0.0044

Log of raw mortality rates by year for PERS males 60-64 years old:

Year	1984	1988	1992	1996	2000	2004
Mortality	-4.7226	-4.8956	-4.9669	-5.0781	-5.2878	-5.4284

The following graph shows the log of raw mortality rates for PERS males aged 60-64. The equation for the best fit line is $y = -0.0268x + 48.348$. The slope equals -0.0268.

Logarithms of Raw Mortality Rates for 60-64 Year Old PERS Males



The annual trend equation (one minus the exponential value of the slope):

$$\text{Annual Trend} = 1 - e^{(-0.0268)} = 2.64\%$$

The annual improvement over the 23-year period is 2.64 percent per year. Scale AA suggests that male mortality improvement for these ages is 1.5 percent per year. Therefore, this particular improvement measure suggests we use 176 percent of Scale AA for this age group. We repeated this process for all age groups in PERS, TRS, and LEOFF and analyzed the results. We did not analyze results for SERS or WSPRS; neither system had enough data to develop reliable trends.

We studied six measures of mortality improvement for each system, yielding 18 different measures of annual mortality improvement for each age group. We ranked the resulting measures in ascending order and assigned them percentiles to see the average value and how much the results varied. The next table shows the results for males.

Improvement as a Percent of Scale AA	Percentile
42.02%	5%
42.12%	11%
46.78%	16%
51.32%	21%
64.65%	26%
65.21%	32%
65.61%	37%
69.26%	42%
70.25%	47%
72.05%	53%
76.09%	58%
76.36%	63%
81.80%	68%
84.71%	74%
86.89%	79%
93.48%	84%
96.85%	89%
99.53%	95%

The average annual improvement rate was slightly over 70 percent of Scale AA. Our best estimate range fell between 64 and 85 percent of Scale AA. We repeated this process for females and their average was about 42 percent. Our best estimate range for females was between 5 and 80 percent. The females showed more variance and a lower average percent of Scale AA than males. In total, the average expected improvement rate was about 59 percent of Scale AA. Our best estimate range was between 33 and 81 percent.

We studied the credibility of our data. We studied about 7.3 million lives and 67,000 deaths. In general, this seems like a lot of data. However, relative to the data that was used to create Scale AA, our study was small. The SOA used both Federal Civil Service and Social Security data to create Scale AA. Their study included hundreds of millions of lives. In the end, we concluded that our data showed mortality improvement, but that our data was not credible enough to use the actual average rate of improvement. We believe that mortality improvement is slowing down, so we lowered the 59 percent found in the data to 50 percent of Scale AA.

After arriving at a mortality improvement trend assumption, we fit our data to a mortality table. The most current, widely used mortality table is the RP-2000. The Society of Actuaries created it in the year 2000. We used the RP-2000 the last six years to estimate the cost of the Washington State public pension systems.

We projected the RP-2000 table to the middle of the six-year experience study period (2003) to fit our data. To project the table, we used 50 percent of Scale AA. We'll call this new table RP-2003 to signify that it approximates 2003 mortality rates. We compared the mortality rate for each age over the six-year period to RP-2003. We selected the age offsets for each system that fit the data the best when we compared mortality experience to RP-2003.

After fitting each system to the RP-2003 table, we projected each system's mortality rates to 2007 using 50 percent of Scale AA. We will refer to this table as RP-2007.

Ideally, we would use a fully generational (as opposed to static) mortality table in the valuation. Fully generational mortality rates mean that the mortality rates change in each future year of the valuation according to the projection scale. However, this presents a number of complications, including difficulty presenting the mortality rates on paper.

Instead we projected the RP-2007 table to a static table in a future year. We want the liabilities from the fully generational valuation to be approximately equal to the liabilities of the static valuation. We ran a valuation using fully generational mortality rates with the RP-2007 table at 50 percent of Scale AA. We then projected the RP-2007 mortality table to a future year at 50 percent of Scale AA and ran a valuation with this new static mortality table. We repeated this process for each plan group, using a different future year until the liabilities were as close to equal as possible. We selected a single future year that best fit PERS 1, TRS 1, and LEOFF 1. We also selected a single future year that best fit PERS 2/3, TRS 2/3, SERS 2/3, PSERS 2, LEOFF 2, and WSPRS. The pension payments to Plan 2/3 members generally extend later than those for Plan 1 members, so we projected the static tables for the Plans 2/3 to later years than those of the Plans 1.

A table containing the age offsets and projection year for each plan group can be seen on the following page:

Age Offsets and Projection Year							
Base Mortality Table			Age Offset				Projection To (Year)
System	Healthy	Disabled	Healthy Males	Healthy Females	Disabled Males	Disabled Females	
PERS I	RP-2000 Healthy	RP-2000 Disabled	-1	-1	0	0	2018
PERS 2/3	RP-2000 Healthy	RP-2000 Disabled	-1	-1	0	0	2031
TRS I	RP-2000 Healthy	RP-2000 Disabled	-2	-2	0	0	2018
TRS 2/3	RP-2000 Healthy	RP-2000 Disabled	-2	-2	0	0	2036
SERS 2/3	RP-2000 Healthy	RP-2000 Disabled	0	-2	0	0	2030
PSERS 2	RP-2000 Healthy	RP-2000 Disabled	-1	-1	0	0	2038
LEOFF 1	RP-2000 Healthy	RP-2000 Healthy	-1	1	2	2	2019
LEOFF 2	RP-2000 Healthy	RP-2000 Disabled	-1	1	0	0	2034
WSPRS I	RP-2000 Healthy	RP-2000 Disabled	-1	1	0	0	2028

We assume that the duty-related death rate is constant at all ages. The duty-related death rates remain unchanged for all systems except LEOFF. We changed the percent Fire Fighters assumption from 42 percent to 43 percent. This resulted in a minor change to the LEOFF duty-related death assumption. You can read more about this assumption change in the Miscellaneous section under Occupational Diseases for Fire Fighters. The table below shows the old and new duty-related death assumptions:

System	Old	New
PERS	0.000026	0.000026
TRS	0.000008	0.000008
SERS	0.000026	0.000026
PSERS	0.000026	0.000026
LEOFF	0.000374	0.000376
WSPRS	0.000200	0.000200

Assumption Format

We produced mortality rates for ages 20 to 110 by gender. We based the healthy mortality rates on the RP-2000 mortality tables and adjusted with age offsets. We based the disabled mortality rates on the RP-2000 disabled mortality table instead of the RP-2000 healthy combined table, which is a change from the last experience study. In addition, we no longer use minimum mortality rates for the disabled mortality rates. The exception to this is LEOFF1, whose disabled mortality rates are based on the RP-2000 healthy mortality table.

We considered separate mortality tables for actives and annuitants, but decided that a combined table fit the data better.

Best Estimate Mortality Rates

PERS

Sample of Healthy Mortality Rates					Sample of Disabled Mortality Rates				
PERS I			PERS 2/3		PERS I			PERS 2/3	
Age	Males	Females	Males	Females	Age	Males	Females	Males	Females
20	0.000291	0.000165	0.000257	0.000149	20	0.019008	0.006447	0.016790	0.005808
25	0.000342	0.000177	0.000320	0.000161	25	0.020624	0.006565	0.019323	0.005992
30	0.000394	0.000226	0.000381	0.000212	30	0.021577	0.006807	0.020886	0.006378
35	0.000671	0.000394	0.000650	0.000367	35	0.021577	0.006746	0.020886	0.006279
40	0.000951	0.000566	0.000903	0.000513	40	0.021000	0.006506	0.019934	0.005899
45	0.001244	0.000892	0.001143	0.000803	45	0.020071	0.006447	0.018440	0.005808
50	0.001698	0.001327	0.001510	0.001188	50	0.024623	0.009892	0.021893	0.008853
55	0.002687	0.002248	0.002374	0.002134	55	0.029847	0.015392	0.026364	0.014611
60	0.005145	0.004245	0.004635	0.004109	60	0.036383	0.020877	0.032775	0.020208
65	0.009940	0.008239	0.009073	0.007975	65	0.044215	0.026791	0.040356	0.025934
70	0.017319	0.014205	0.015704	0.013751	70	0.054652	0.035977	0.049557	0.034825
75	0.029828	0.023722	0.027225	0.022517	75	0.072319	0.048595	0.066008	0.046127
80	0.052850	0.038967	0.049516	0.037231	80	0.099936	0.067889	0.093631	0.064864
85	0.093676	0.065758	0.089503	0.063239	85	0.132943	0.094928	0.127019	0.091292
90	0.160288	0.115978	0.156171	0.113736	90	0.176916	0.136316	0.172371	0.133681
95	0.245849	0.179536	0.242672	0.177216	95	0.262717	0.191037	0.259322	0.188569
100	0.329712	0.231040	0.329712	0.231040	100	0.344556	0.237467	0.344556	0.237467
105	0.392003	0.279055	0.392003	0.279055	105	0.397886	0.293116	0.397886	0.293116
110	1.000000	1.000000	1.000000	1.000000	110	1.000000	1.000000	1.000000	1.000000

TRS

Sample of Healthy Mortality Rates					Sample of Disabled Mortality Rates				
TRS I			TRS 2/3		TRS I			TRS 2/3	
Age	Males	Females	Males	Females	Age	Males	Females	Males	Females
20	0.000291	0.000165	0.000245	0.000143	20	0.019008	0.006447	0.016007	0.005579
25	0.000338	0.000173	0.000309	0.000153	25	0.020624	0.006565	0.018844	0.005785
30	0.000376	0.000214	0.000359	0.000196	30	0.021577	0.006807	0.020626	0.006220
35	0.000603	0.000358	0.000577	0.000324	35	0.021577	0.006746	0.020626	0.006108
40	0.000900	0.000523	0.000837	0.000457	40	0.021000	0.006506	0.019538	0.005681
45	0.001159	0.000812	0.001030	0.000703	45	0.020071	0.006447	0.017848	0.005579
50	0.001585	0.001228	0.001347	0.001053	50	0.024623	0.009892	0.020925	0.008483
55	0.002452	0.002041	0.002065	0.001899	55	0.029847	0.015392	0.025135	0.014321
60	0.004563	0.003750	0.003949	0.003585	60	0.036383	0.020877	0.031485	0.019957
65	0.008823	0.007311	0.007775	0.006989	65	0.044215	0.026791	0.038963	0.025611
70	0.015630	0.012853	0.013649	0.012286	70	0.054652	0.035977	0.047726	0.034392
75	0.026737	0.021403	0.023562	0.019914	75	0.072319	0.048595	0.063730	0.045212
80	0.047483	0.035296	0.043386	0.033137	80	0.099936	0.067889	0.091314	0.063737
85	0.084104	0.059126	0.078960	0.056014	85	0.132943	0.094928	0.124812	0.089930
90	0.145042	0.104286	0.139908	0.101506	90	0.176916	0.136316	0.170655	0.132682
95	0.229147	0.167391	0.225057	0.164404	95	0.262717	0.191037	0.258028	0.187628
100	0.314823	0.223611	0.314823	0.223611	100	0.344556	0.237467	0.344556	0.237467
105	0.383040	0.266044	0.383040	0.266044	105	0.397886	0.293116	0.397886	0.293116
110	1.000000	1.000000	1.000000	1.000000	110	1.000000	1.000000	1.000000	1.000000

SERS

Sample of Healthy Mortality Rates			Sample of Disabled Mortality Rates		
SERS 2/3			SERS 2/3		
Age	Males	Females	Age	Males	Females
20	0.000259	0.000150	20	0.016951	0.005855
25	0.000324	0.000159	25	0.019420	0.006034
30	0.000412	0.000202	30	0.020938	0.006410
35	0.000717	0.000335	35	0.020938	0.006314
40	0.000957	0.000478	40	0.020014	0.005944
45	0.001240	0.000737	45	0.018560	0.005855
50	0.001630	0.001108	50	0.022092	0.008929
55	0.002722	0.001945	55	0.026617	0.014670
60	0.005302	0.003639	60	0.033040	0.020259
65	0.010317	0.007095	65	0.040640	0.025998
70	0.017717	0.012472	70	0.049931	0.034912
75	0.030645	0.020398	75	0.066473	0.046313
80	0.055381	0.033841	80	0.094102	0.065092
85	0.099699	0.057033	85	0.127465	0.091566
90	0.172717	0.102424	90	0.172717	0.133882
95	0.259582	0.165393	95	0.259582	0.188758
100	0.344556	0.223611	100	0.344556	0.237467
105	0.397886	0.266044	105	0.397886	0.293116
110	1.000000	1.000000	110	1.000000	1.000000

PSERS

Sample of Healthy Mortality Rates			Sample of Disabled Mortality Rates		
PSERS 2			PSERS 2		
Age	Males	Females	Age	Males	Females
20	0.000240	0.000141	20	0.015704	0.005490
25	0.000309	0.000154	25	0.018656	0.005705
30	0.000375	0.000204	30	0.020523	0.006158
35	0.000638	0.000353	35	0.020523	0.006041
40	0.000878	0.000487	40	0.019382	0.005596
45	0.001092	0.000759	45	0.017617	0.005490
50	0.001417	0.001119	50	0.020550	0.008340
55	0.002220	0.002075	55	0.024660	0.014207
60	0.004381	0.004038	60	0.030983	0.019857
65	0.008637	0.007837	65	0.038419	0.025483
70	0.014898	0.013512	70	0.047013	0.034220
75	0.025919	0.021894	75	0.062841	0.044851
80	0.047808	0.036329	80	0.090403	0.063292
85	0.087333	0.061923	85	0.123940	0.089392
90	0.153997	0.112547	90	0.169973	0.132284
95	0.240979	0.175980	95	0.257512	0.187253
100	0.329712	0.231040	100	0.344556	0.237467
105	0.392003	0.279055	105	0.397886	0.293116
110	1.000000	1.000000	110	1.000000	1.000000

LEOFF

Sample of Healthy Mortality Rates				
LEOFF 1			LEOFF 2	
Age	Males	Females	Males	Females
20	0.000288	0.000165	0.000249	0.000146
25	0.000340	0.000188	0.000316	0.000169
30	0.000393	0.000280	0.000378	0.000260
35	0.000669	0.000462	0.000645	0.000425
40	0.000948	0.000671	0.000892	0.000599
45	0.001236	0.001048	0.001121	0.000929
50	0.001683	0.001577	0.001469	0.001388
55	0.002662	0.002872	0.002307	0.002704
60	0.005104	0.005544	0.004524	0.005340
65	0.009871	0.010445	0.008883	0.010060
70	0.017189	0.017689	0.015353	0.017038
75	0.029620	0.028695	0.026657	0.027021
80	0.052585	0.047507	0.048777	0.045073
85	0.093349	0.081706	0.088566	0.078106
90	0.159968	0.140538	0.155235	0.137409
95	0.245603	0.201512	0.241945	0.198510
100	0.329712	0.244834	0.329712	0.244834
105	0.392003	0.307811	0.392003	0.307811
110	1.000000	1.000000	1.000000	1.000000

Sample of Disabled Mortality Rates				
LEOFF 1			LEOFF 2	
Age	Males	Females	Males	Females
20	0.000306	0.000166	0.016316	0.005670
25	0.000350	0.000196	0.019034	0.005867
30	0.000536	0.000319	0.020730	0.006283
35	0.000862	0.000497	0.020730	0.006176
40	0.001123	0.000738	0.019696	0.005768
45	0.001527	0.001135	0.018082	0.005670
50	0.002239	0.001724	0.021307	0.008629
55	0.003926	0.003238	0.025619	0.014436
60	0.007529	0.006348	0.031995	0.020057
65	0.014088	0.011598	0.039514	0.025739
70	0.023645	0.019676	0.048450	0.034565
75	0.041107	0.031652	0.064631	0.045576
80	0.073395	0.052666	0.092234	0.064186
85	0.127467	0.091266	0.125690	0.090472
90	0.208834	0.153186	0.171339	0.133080
95	0.294206	0.211504	0.258545	0.188004
100	0.371685	0.254498	0.344556	0.237467
105	0.400000	0.322725	0.397886	0.293116
110	1.000000	1.000000	1.000000	1.000000

WSPRS

Sample of Healthy Mortality Rates		
WSPRS 1/2		
Age	Males	Females
20	0.000264	0.000153
25	0.000325	0.000176
30	0.000384	0.000268
35	0.000654	0.000440
40	0.000914	0.000627
45	0.001166	0.000975
50	0.001551	0.001460
55	0.002443	0.002770
60	0.004748	0.005420
65	0.009266	0.010213
70	0.016063	0.017295
75	0.027805	0.027679
80	0.050266	0.046032
85	0.090449	0.079526
90	0.157111	0.138652
95	0.243402	0.199705
100	0.329712	0.244834
105	0.392003	0.307811
110	1.000000	1.000000

Sample of Disabled Mortality Rates		
WSPRS 1/2		
Age	Males	Females
20	0.017277	0.005950
25	0.019615	0.006120
30	0.021043	0.006474
35	0.021043	0.006384
40	0.020175	0.006034
45	0.018804	0.005950
50	0.022495	0.009083
55	0.027130	0.014788
60	0.033575	0.020361
65	0.041215	0.026129
70	0.050689	0.035088
75	0.067414	0.046685
80	0.095050	0.065550
85	0.128362	0.092118
90	0.173410	0.134285
95	0.260101	0.189136
100	0.344556	0.237467
105	0.397886	0.293116
110	1.000000	1.000000

Retirement Rates

Each system has certain minimum age and service requirements that active members must meet before they become eligible to retire. Upon meeting the minimum requirements of their system, members may elect to stop working and start collecting a pension benefit. Retirees may select one of several benefit options including a single life annuity, one of several joint and survivor annuities, or a lump-sum (if eligible).

The retirement rates developed in this section determine the likelihood that a member who meets the minimum requirements of their system will retire in a given year. The rates determine when we expect the system will begin paying annuities.

Data Used

We used twelve years of experience study records, from 1995 to 2006, to analyze retirement experience.

Assumptions Made

All assumptions used in the development of retirement rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

For each year and for each system and plan we counted both the members who met the minimum eligibility requirements at the beginning of the year (exposures), and the members who retired during the year (retirements). We divided the number of retirements by the number of exposures to arrive at an observed, or actual, retirement rate.

We extended the age at which we assume automatic retirement in our model based on our expectation that people will work longer. For most systems, this means we changed the maximum retirement age from 70 to 80. In LEOFF, the maximum assumed retirement age increased from 65 to 70. The WSPRS maximum retirement age increased from 60 to 65 during the 2007 Legislative session. We increased our maximum assumed retirement age for this system accordingly.

The main issue in setting the retirement rates during this experience study is limiting large shifts in the rates over short periods of time. We did not let the retirement rates decrease as much as the most recent information implies they should. If the data from the next experience study show the trend of decreasing retirement rates continuing we will reduce retirement rates further.

Methods used in individual systems will be listed under the descriptions for those systems below.

Development of Assumptions

PERS

Past Experience

Over the twelve years from 1995-2006, the observed number of retirements in PERS Plan 1 totaled about 82 percent of the number predicted by the old retirement rates. The following table shows the observed and expected retirements for PERS 1 by gender and age using the old retirement rate assumptions.

PERS Plan I Retirement Experience from 1995-2006						
Age	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
45-49	281	0	0.00	203	0	0.00
50-54	2,811	3,395	0.83	1,428	1,681	0.85
55-59	3,430	4,011	0.86	2,879	3,288	0.88
60-64	3,410	3,989	0.85	4,140	4,727	0.88
65-69	833	1,019	0.82	1,189	1,377	0.86
70-74	127	550	0.23	190	903	0.21
75-79	31	159	0.19	44	305	0.14
80+	9	45	0.20	22	101	0.22
Total	10,932	13,169	0.83	10,095	12,381	0.82

We show the year-by-year observed to expected ratios in the next table.

PERS Plan I Retirements by Year						
Year	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
1995	832	889	0.94	732	850	0.86
1996	837	896	0.93	752	857	0.88
1997	945	960	0.98	798	885	0.90
1998	952	1003	0.95	832	930	0.90
1999	1052	1098	0.96	945	979	0.96
2000	1120	1139	0.98	1005	1036	0.97
2001	799	1088	0.73	780	1038	0.75
2002	981	1176	0.83	972	1129	0.86
2003	917	1212	0.76	844	1110	0.76
2004	881	1231	0.72	804	1143	0.70
2005	854	1255	0.68	810	1196	0.68
2006	762	1221	0.62	821	1227	0.67

PERS 1 closed in 1977. Most of the remaining active members have at least 30 years of service and are retiring later than we have seen in the past.

Over the study period the actual number of retirements in PERS 2/3 totaled about 58 percent of the number of retirements predicted by the old rates. The following table shows the observed and expected retirements for PERS 2/3 by gender and age using the old retirement rate assumptions.

PERS Plan 2/3 Retirement Experience from 1995-2006						
	Males			Females		
Age	Observed	Expected	Ratio	Observed	Expected	Ratio
55-59	168	724	0.23	231	473	0.49
60-64	1,288	2,014	0.64	1,268	2,019	0.63
65-69	1,930	2,275	0.85	1,897	2,199	0.86
70-74	239	1,133	0.21	266	1,210	0.22
75-79	55	228	0.24	58	309	0.19
80+	14	62	0.23	16	69	0.23
Total	3,694	6,437	0.57	3,736	6,279	0.60

We show the year-by-year observed to expected ratios in the next table.

PERS Plan 2/3 Retirements by Year						
	Males			Females		
Year	Observed	Expected	Ratio	Observed	Expected	Ratio
1995	210	238	0.88	178	249	0.71
1996	223	259	0.86	217	304	0.71
1997	228	290	0.79	253	323	0.78
1998	284	351	0.81	295	362	0.81
1999	320	388	0.82	365	439	0.83
2000	321	424	0.76	366	435	0.84
2001	209	437	0.48	201	433	0.46
2002	293	574	0.51	265	538	0.49
2003	322	668	0.48	335	652	0.51
2004	379	771	0.49	363	717	0.51
2005	417	938	0.44	436	851	0.51
2006	488	1099	0.44	462	976	0.47

The 2001-2006 PERS 2/3 data contain more than three times the number of exposures in the 1995-2000 data. The 2001-2006 data show relatively fewer retirements than the 1995-2000 data at virtually every age and in most plans.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently develop separate retirement rates by age and gender for Plan 1. We also use a set of rates by age and gender for Plans 2 and 3 combined.

We looked at separating the Plan 2/3 retirement rates by plan. It appears that Plan 3 retirement rates are lower than Plan 2 rates at most ages. We did not see the first Plan 3 retiree in the valuation data until 2002. We decided not to change the assumption format due to the lack of Plan 3 experience. The overall credibility of the data improves when Plan 2 and Plan 3 data are combined.

We will continue to monitor Plan 2 and Plan 3 retirement behavior and re-evaluate the data in the next experience study.

Future Expectations

Past experience is important in developing our retirement rates. However, future trends and expectations should also be considered in the analysis.

We expect members to work longer for several reasons. First, people are living longer. If they live longer, they run the risk of outliving their assets. They might also feel that if they live longer, they face longer periods of inflation. Finally, they face increasing health care costs. We believe all of these reasons combine to delay retirement on average.

Benefit improvements tend to have the opposite effect on members' retirement behavior. Most benefit improvements or plan provision changes create incentives for members to retire sooner rather than later. Combined with the 2001-2006 data, the arguments for members working longer generally outweigh the expectations for members retiring earlier.

PERS 2/3 members entered service starting in 1977, and no member has 30 years of service as of the most recent data (2006). Not only do we expect Plan 2/3 members to eventually reach 30 years of service, but we expect these members to retire at higher rates than members with fewer than 30 years of service. We expect the rates to be higher for these members because the early retirement reduction factors (ERFs) change from an actuarial reduction (63 percent at age 55 when this report was published) to a subsidized reduction (20 percent at age 55). During the 2007 Legislative session, EHB 2391 (Chapter 491, Laws of 2007) improved the ERFs for members with at least 30 years of membership service beginning at age 55. The ERFs from before and after EHB 2391 are compared to the Actuarial Equivalent Value (AEV) ERFs for members with fewer than 30 years of service in the following table.

Age	Subsidized		AEV
	Post 2391 ERFs	Pre 2391 ERFs	Plan 2/3 ERFs
55	0.80	0.70	0.37
56	0.83	0.73	0.40
57	0.86	0.76	0.43
58	0.89	0.79	0.49
59	0.92	0.82	0.55
60	0.95	0.85	0.61
61	0.98	0.88	0.67
62	1.00	0.91	0.73
63	1.00	0.94	0.82
64	1.00	0.97	0.91
65	1.00	1.00	1.00

Best Estimate PERS Retirement Rates

We compared the observed retirement rates at each age to each of the following:

- The six-year average retirement rates from 1995-2000.
- The six-year average retirement rates from 2001-2006.
- The twelve-year average retirement rates from 1995-2006.
- The old retirement assumptions.

For both males and females the actual retirement rates shown by the 1995-2000 data are higher than the rates shown by the 2001-2006 data at almost every age. The old retirement rates were set to fit the 1995-2000 data.

We decreased the PERS retirement rates at most ages for both genders so that the new retirement rates are close to the twelve-year average retirement rates shown by the 1995-2006 data. In some cases the new rates were set between the twelve-year average rates shown in the 1995-2006 data and the average rates shown in the 2001-2006 data. There were many cases where the twelve-year average retirement rates were less than 50 percent of the old retirement rates. We did not decrease the rates by more than 50 percent. We also copied the first positive rates for eligible Plan 1 members back from age 50 to age 47.

We did not make any changes to the Plan 1 retirement rates to reflect the changes in the retiree-rehire provisions of the plan. We felt that the overall adjustments made to the rates during the experience study outweigh the minor adjustments made to value the retiree-rehire bills.

The beginning-of-year exposures include two groups of people, those eligible to retire at the beginning of the year and those who became eligible later in the year and actually retired. The inclusion of members from the latter group caused unusual rate increases, or spikes, because among those members, the observed retirement rate was 100 percent.

We noticed spikes in the retirement rates for PERS 2/3 at age 64. Rather than attempt to smooth out the rates shown by the data, we adjusted our eligibility requirements in our valuation software. For PERS 2/3, we shifted the eligibility for retirement from age 65 with five years of service to age 64.5 with five years of service. This picks up the additional retirements from the members included in the data who become eligible to retire in the second half of the year.

We also saw spikes in the retirement rates for PERS 1 at the age 55 and 60 eligibility cliffs. These spikes were smaller in magnitude than those for Plan 2/3; we did not adjust the eligibility ages in our software for PERS 1.

We lowered the retirement assumptions for all plans in PERS. Summaries of the old retirement rates, the two six-year observed averages, the twelve-year observed average, and the new retirement rates appear in the following tables.

PERS Plan 1 Retirement Rates										
Age	Males					Females				
	1995-2000	2001-2006	1995-2006	Old Rates	New Rates	1995-2000	2001-2006	1995-2006	Old Rates	New Rates
47	0.47	0.53	0.50	0.00	0.50	0.60	0.64	0.63	0.00	0.60
50	0.62	0.48	0.55	0.66	0.55	0.38	0.28	0.31	0.41	0.35
55	0.22	0.23	0.22	0.23	0.22	0.20	0.25	0.23	0.27	0.23
60	0.16	0.15	0.15	0.22	0.15	0.18	0.16	0.17	0.18	0.17
61	0.28	0.19	0.23	0.22	0.23	0.24	0.18	0.21	0.22	0.21
62	0.37	0.28	0.33	0.41	0.33	0.32	0.25	0.29	0.38	0.29
63	0.25	0.21	0.23	0.26	0.23	0.23	0.19	0.21	0.26	0.21
64	0.37	0.22	0.30	0.30	0.30	0.32	0.19	0.26	0.26	0.26
65	0.47	0.34	0.40	0.49	0.40	0.43	0.35	0.39	0.46	0.39
70	0.29	0.21	0.24	1.00	0.24	0.23	0.20	0.21	1.00	0.20
75	0.20	0.18	0.19	1.00	0.20	0.11	0.15	0.13	1.00	0.20
80	0.38	0.13	0.20	1.00	1.00	0.19	0.23	0.22	1.00	1.00

PERS Plan 2/3 Retirement Rates for Members with Service Less Than 30 Years										
Age	Males					Females				
	1995-2000	2001-2006	1995-2006	Old Rates	New Rates	1995-2000	2001-2006	1995-2006	Old Rates	New Rates
55	0.01	0.01	0.01	0.05	0.03	0.05	0.02	0.02	0.05	0.03
60	0.06	0.03	0.03	0.14	0.09	0.16	0.04	0.05	0.14	0.09
61	0.19	0.06	0.08	0.14	0.09	0.22	0.08	0.09	0.18	0.12
62	0.33	0.15	0.17	0.33	0.25	0.33	0.14	0.16	0.30	0.22
63	0.32	0.17	0.18	0.26	0.20	0.30	0.13	0.15	0.26	0.20
64	0.91	0.41	0.60	0.79	0.55	0.90	0.42	0.61	0.82	0.55
65	0.51	0.39	0.43	0.52	0.45	0.49	0.38	0.42	0.49	0.45
70	0.31	0.19	0.24	1.00	0.20	0.24	0.22	0.23	1.00	0.23
75	0.21	0.20	0.20	1.00	0.20	0.26	0.13	0.18	1.00	0.20
80	0.15	0.29	0.23	1.00	1.00	0.22	0.24	0.23	1.00	1.00

Since we do not have any Plan 2/3 data to aid in the assumption-setting process for members with at least 30 years of service, we looked at several different methods for setting retirement rates for Plan 2/3 members when they do eventually earn 30 or more years of service.

To set the Plan 2/3 retirement rates we applied the subsidized ERRF to the Plan 1 retirement rates in a method similar to how the ERRF is applied to a member's benefit. We believe that a 1 percent change in benefit leads to more than a 1 percent change in retirement behavior. To reflect this belief, instead of reducing the retirement rate in the same proportion as the ERRF reduces a member's benefit, we reduced the rate by twice the ERRF reduction amount.

We feel that the new Plan 1 rates compare very favorably to the new Plan 2/3 lower-service retirement rates from ages 65 to 70. The only place we deviated from this method was for the rate at age 64. For example, for males the rate suggested by the Plan 1 rate would be 0.30. This is nearly half the 0.55 new lower-service Plan 2/3 rate implying that members with higher benefits would retire at lower rates. This is inconsistent with our expectation that higher-service members retire at higher rates, so we set the age 64 rate at 0.60.

The following table shows summarized Plan 2/3 retirement rates for members with at least 30 years of service.

PERS Plan 2/3 Retirement Rates for Members with at Least 30 Years of Service								
Males					Females			
Age	New <30 Rates	Old >=30 Rates	Plan 1 New Rates	New >=30 Rates	New <30 Rates	Old >=30 Rates	Plan 1 New Rates	New >=30 Rates
55	0.03	0.08	0.22	0.13	0.03	0.08	0.23	0.14
60	0.09	0.25	0.15	0.14	0.09	0.25	0.17	0.15
61	0.09	0.25	0.23	0.22	0.12	0.32	0.21	0.20
62	0.25	0.79	0.33	0.33	0.22	0.61	0.29	0.29
63	0.20	0.50	0.23	0.25	0.20	0.55	0.21	0.25
64	0.55	0.93	0.30	0.60	0.55	0.94	0.26	0.60
65	0.45	0.52	0.40	0.45	0.45	0.49	0.39	0.45
70	0.20	1.00	0.24	0.20	0.23	1.00	0.20	0.23
75	0.20	1.00	0.20	0.20	0.20	1.00	0.20	0.20
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TRS

Past Experience

Over the twelve years from 1995-2006, the observed number of retirements in TRS Plan 1 totaled about 103 percent of the number predicted by the old retirement rates. The following table shows the observed and expected retirements for TRS 1 by gender and age using the old retirement rate assumptions.

TRS Plan 1 Retirement Experience from 1995-2006						
Age	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
45-49	0	0	N/A	0	0	N/A
50-54	1,361	1,309	1.04	1,297	1,090	1.19
55-59	3,297	3,158	1.04	3,573	3,213	1.11
60-64	1,564	1,514	1.03	2,696	2,704	1.00
65-69	287	338	0.85	615	665	0.93
70-74	19	77	0.25	78	234	0.33
75-79	1	7	0.14	3	21	0.14
80+	0	0	0.00	0	3	0.00
Total	6,529	6,404	1.02	8,262	7,929	1.04

TRS 1 closed in 1977, more than 30 years ago. Most of the remaining active members have at least 30 years of service and are retiring later than we have seen in the past.

We show the year-by-year observed to expected ratios in the table on the following page.

TRS Plan I Ratios of Observed to Expected Retirements by Valuation Year						
Year	Service <> 30		Service = 30		All Service	
	Males	Females	Males	Females	Males	Females
1995	0.92	0.93	0.99	1.04	0.94	0.95
1996	0.94	0.90	0.79	1.07	0.89	0.93
1997	0.88	0.90	0.88	1.04	0.88	0.92
1998	1.10	1.00	1.18	1.20	1.13	1.04
1999	0.96	1.05	1.18	1.13	1.04	1.07
2000	0.94	1.00	1.18	1.36	1.02	1.10
2001*	2.04	2.06	1.74	1.88	1.95	2.02
2002	1.44	1.24	0.97	1.06	1.34	1.21
2003	1.14	1.04	0.54	0.91	1.02	1.02
2004	1.14	1.03	0.63	0.81	1.02	1.00
2005	1.02	1.00	0.54	0.81	0.90	0.97
2006	0.99	0.93	0.71	0.75	0.94	0.91

*15-month valuation plan year. We saw two year's worth of retirements, but only counted exposures for one year.

Over the study period the actual number of retirements in TRS 2/3 totaled about 49 percent of the number of retirements predicted by the old rates. The following table shows the observed and expected retirements for TRS 2/3 by gender and age using the old retirement rate assumptions.

TRS Plan 2/3 Retirement Experience from 1995-2006						
Age	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
55-59	53	228	0.23	214	802	0.27
60-64	159	374	0.43	455	841	0.54
65-69	134	162	0.83	374	403	0.93
70-74	15	42	0.36	26	100	0.26
75-79	1	1	1.00	4	6	0.67
80+	0	0	0.00	0	0	0.00
Total	362	806	0.45	1,073	2,152	0.50

We show the year-by-year observed to expected ratios in the next table.

TRIS Plan 2/3 Ratios of Observed to Expected Retirements by Valuation Year		
Year	Males	Females
1995	0.77	0.61
1996	0.98	0.67
1997	1.02	0.89
1998	0.69	0.62
1999	0.74	0.67
2000	0.60	0.65
2001*	0.89	0.94
2002	0.43	0.46
2003	0.30	0.39
2004	0.38	0.41
2005	0.30	0.42
2006	0.34	0.41

**15-month valuation plan year. We saw two year's worth of retirements, but only counted exposures for one year.*

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers. The eligibility for retirement in TRS 1 requires members to have 30 years of membership service or be at least age 55 with at least 25 years of service. We excluded all 808 exposures for members younger than age 55 with less than 30 years of service. Of the 808 exposures all 808 actually retired. Our data processing program only flagged the members as eligible to retire because they were actually reported to us as retirees.

Assumption Format

We currently develop separate retirement rates by age and gender for Plan 1. The data continue to show cause for using different rates for members with exactly 30 years of service and members who do not have 30 years of service.

We also use a set of rates by age and gender for Plans 2 and 3 combined. For members with at least 30 years of service, we separated the Plan 2/3 retirement rates into two categories, members with exactly 30 years and members with greater than 30 years. This is consistent with the assumption format of the TRS 1 retirement rates.

We looked at separating the Plan 2/3 retirement rates by plan. It appears that Plan 3 retirement rates are lower than Plan 2 rates at most ages. We did not see the first Plan 3 retiree in the valuation data until 1997. We decided not to change the assumption format due to the lack of Plan 3 experience. The overall credibility of the data improves when Plan 2 and Plan 3 data are combined.

We will continue to monitor Plan 2 and Plan 3 retirement behavior and re-evaluate the data in the next experience study.

Future Expectations

Using past experience is important when developing our retirement rates. Considering future trends and expectations is also important in the analysis.

As with PERS, we expect members to work longer because they will live longer, be concerned about inflation and longevity risks, and face higher future health care costs.

Benefit improvements tend to have the opposite effect on members' retirement behavior, enticing members to retire sooner rather than later. Combined with the 2001-2006 data, the arguments for members working longer generally outweigh the expectations for members retiring earlier.

TRS 2/3 members entered service starting in 1977, and no member has 30 years of service as of the most recent data (2006). Not only do we expect Plan 2/3 members to eventually reach 30 years of service, but we expect these members to retire at higher rates than members with fewer than 30 years of service. During the 2007 legislative session, EHB 2391 (Chapter 491, Laws of 2007) improved the ERFs for members with at least 30 years of membership service beginning at age 55. The ERFs from before and after EHB 2391 are compared to the Actuarial Equivalent Value (AEV) ERFs for members with fewer than 30 years of service in the next table:

Age	Subsidized		AEV
	Post 2391 ERFs	Pre 2391 ERFs	Plan 2/3 ERFs
55	0.80	0.70	0.37
56	0.83	0.73	0.40
57	0.86	0.76	0.43
58	0.89	0.79	0.49
59	0.92	0.82	0.55
60	0.95	0.85	0.61
61	0.98	0.88	0.67
62	1.00	0.91	0.73
63	1.00	0.94	0.82
64	1.00	0.97	0.91
65	1.00	1.00	1.00

Best Estimate TRS Retirement Rates

As with PERS, we compared the observed retirement rates at each age to each of the following:

- The six-year average retirement rates from 1995-2000.
- The six-year average retirement rates from 2001-2006.
- The twelve-year average retirement rates from 1995-2006.
- The old retirement assumptions.

For both males and females the TRS 1 observed retirement rates shown by the 1995-2006 data are slightly higher than the old rates at the younger ages, but lower at the older ages. The old retirement rates were set to fit the 1995-2000 data.

To study the rates for Plan 1 members who don't have exactly 30 years of membership service, we looked at members with less than 30 years (<30), and members with more than 30 years (>30) independently.

At almost every age, we saw the observed retirement rates bounce back and forth around the old assumptions. In most cases the rates were very close to each other. Therefore, we set the new assumed retirement rates at the average of the <30 and >30 rates. The only exceptions to this method are for members younger than age 55. We set their rates equal to the observed rates for members with more than 30 years of service.

We did not make any changes to the Plan 1 retirement rates to reflect the new retiree-rehire provisions of the plan. We felt that the overall adjustments made to the rates during the experience study outweigh the minor adjustments made to value the retiree-rehire bills. The following tables display a summary of TRS 1 observed rates, along with old and new assumptions by service.

TRS Plan I Male Retirement Rates						
Age	Observed Svc < 30	Observed Svc > 30	Old Rates Svc <> 30	New Rates Svc <> 30	Old Rates Svc = 30	New Rates Svc = 30
50	0.00	0.00	0.26	0.00	0.42	0.00
55	0.27	0.25	0.26	0.25	0.42	0.40
60	0.20	0.25	0.21	0.25	0.47	0.45
61	0.25	0.30	0.21	0.25	0.62	0.50
62	0.40	0.35	0.47	0.40	0.62	0.60
63	0.28	0.30	0.30	0.29	0.60	0.50
64	0.23	0.30	0.25	0.27	0.60	0.50
65	0.35	0.45	0.45	0.40	0.90	0.70
70	0.25	0.20	1.00	0.23	1.00	1.00
75	0.20	0.20	1.00	0.20	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00

TRS Plan I Female Retirement Rates						
Age	Observed Svc < 30	Observed Svc > 30	Old Rates Svc <> 30	New Rates Svc <> 30	Old Rates Svc = 30	New Rates Svc = 30
50	0.00	0.00	0.21	0.00	0.31	0.00
55	0.23	0.20	0.21	0.22	0.32	0.35
60	0.25	0.20	0.26	0.23	0.31	0.35
61	0.25	0.25	0.21	0.25	0.36	0.45
62	0.25	0.30	0.36	0.30	0.57	0.60
63	0.25	0.20	0.25	0.23	0.50	0.50
64	0.30	0.20	0.20	0.25	0.50	0.50
65	0.45	0.43	0.45	0.44	0.90	0.60
70	0.50	0.20	1.00	0.35	1.00	0.45
75	0.20	0.20	1.00	0.20	1.00	1.00
80	1.00	1.00	1.00	1.00	1.00	1.00

For both males and females the Plan 2/3 observed retirement rates shown by the 1995-2000 data are higher than the rates shown by the 2001-2006 data at almost every age. The old retirement rates were set to fit the 1995-2000 data.

We decreased the TRS 2/3 retirement rates at most ages for both genders so that the new retirement rates stayed close to the twelve-year average retirement rates shown by the 1995-2006 data. In some cases the new rates were set between the twelve-year average rates shown in the 1995-2006 data and

the average rates shown in the 2001-2006 data. There were many cases where the twelve-year average retirement rates were less than 50 percent of the old retirement rates. We did not decrease the rates by more than 50 percent. The table below shows a summary of observed, old, and new retirement rates for Plan 2/3 members with less than 30 years of service.

The beginning of year exposures include two groups of people, those eligible to retire at the beginning of the year and those who became eligible later in the year and actually retired. The inclusion of members who retired during the year, but who weren't eligible to retire at the beginning of the year caused unusual rate increases, or spikes, in certain instances.

We noticed spikes in the retirement rates for TRS 2/3 at age 64. Rather than attempt to smooth out the rates shown by the data, we adjusted our eligibility requirements in our valuation software. For Plan 2/3, we shifted the eligibility for retirement from age 65 with five years of service to age 64.5 with five years of service. This picks up the additional retirements from the members included in the data who become eligible to retire in the second half of the year. Summaries of the old retirement rates, the two six-year observed averages, the twelve-year observed average, and the new retirement rates for lower-service Plan 2/3 members appear in the following table.

TRS Plan 2/3 Retirement Rates for members with Less Than 30 Years of Service										
	Males					Females				
Age	1995-2000	2001-2006	1995-2006	Old Rates	New Rates	1995-2000	2001-2006	1995-2006	Old Rates	New Rates
55	0.01	0.01	0.01	0.05	0.03	0.02	0.01	0.01	0.03	0.02
60	0.14	0.03	0.04	0.20	0.11	0.08	0.06	0.06	0.15	0.09
61	0.24	0.09	0.10	0.40	0.11	0.13	0.10	0.10	0.20	0.12
62	0.29	0.13	0.15	0.30	0.25	0.23	0.12	0.13	0.30	0.25
63	0.30	0.13	0.16	0.30	0.20	0.25	0.15	0.16	0.30	0.25
64	0.55	0.46	0.47	0.60	0.50	0.53	0.41	0.43	0.50	0.45
65	0.50	0.50	0.50	0.50	0.50	0.45	0.45	0.45	0.50	0.45
70	0.32	0.20	0.28	1.00	0.30	0.23	0.35	0.27	1.00	0.25
75	0.00	0.00	0.00	1.00	0.50	0.00	0.50	0.50	1.00	0.25
80	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00

Since we do not have any Plan 2/3 data to aid in the retirement assumption-setting process for members with high service, we looked at several different methods for setting retirement rates for Plan 2/3 members when they do eventually earn 30 or more years of service.

To set the Plan 2/3 retirement rates we applied the subsidized ERRF to the Plan 1 retirement rates in a method similar to how the ERRF is applied to a member's benefit. We believe that a 1 percent change in benefit leads to more than a 1 percent change in retirement behavior. To reflect this belief, instead of reducing the retirement rate in the same proportion as the ERRF reduces a member's benefit, we reduced the rate by twice the ERRF reduction amount.

We feel that the new Plan 1 rates compare very favorably to the new Plan 2/3 lower-service retirement rates from ages 65 to 70. The only place we deviated from this method was for the rate at age 64. For example, for males the rate suggested by the Plan 1 rate would be 0.25, which is 40 percent lower than the new low-service Plan 2/3 rate, implying that members with higher benefits would retire at lower rates. This is inconsistent with our expectation that higher-service members retire at higher rates, so we set the age 64 rate at 0.50.

We assumed the same trend would occur in the Plan 2/3 retirement behavior as the information has shown for Plan 1 retirements. We think retirement rates for members with more than 30 years of service will be lower than the rates for members with exactly 30 years. Since the benefits in Plan 1 are unreduced at earlier ages, we felt that retirement rates in Plan 2/3 would be higher after 30 years of service than they were before 30 years of service. Therefore we used the same method but applied it to both the Plan 1 new retirement rates before and after a member reaches 30 years. The best estimate assumptions are summarized below, along with the comparable old assumptions and the new Plan 1 rates.

Males							
TRS Plan 2/3 Retirement Rates by Years of Service						Plan 1 New Rates	
Age	Pre 2391	Post 2391	New <30	New =30	New >30	=30	<>30
55	0.08	0.10	0.03	0.24	0.15	0.40	0.25
60	0.30	0.36	0.11	0.41	0.23	0.45	0.25
61	0.60	0.72	0.11	0.48	0.24	0.50	0.25
62	0.45	0.70	0.25	0.60	0.40	0.60	0.40
63	0.45	0.45	0.20	0.50	0.30	0.50	0.29
64	0.90	0.90	0.50	0.55	0.55	0.50	0.27
65	0.50	0.50	0.50	0.50	0.50	0.70	0.40
70	1.00	1.00	0.30	0.30	0.30	1.00	0.23
75	1.00	1.00	0.50	0.50	0.50	1.00	0.20
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Females							
TRS Plan 2/3 Retirement Rates by Years of Service						Plan 1 New Rates	
Age	Pre 2391	Post 2391	New <30	New =30	New >30	=30	<>30
55	0.05	0.06	0.02	0.21	0.13	0.35	0.22
60	0.23	0.28	0.09	0.32	0.21	0.35	0.23
61	0.30	0.36	0.12	0.43	0.24	0.45	0.25
62	0.45	0.65	0.25	0.60	0.35	0.60	0.30
63	0.45	0.65	0.25	0.50	0.30	0.50	0.23
64	0.75	0.80	0.45	0.50	0.50	0.50	0.25
65	0.50	0.50	0.45	0.45	0.45	0.60	0.44
70	1.00	1.00	0.25	0.25	0.25	0.45	0.35
75	1.00	1.00	0.25	0.25	0.25	1.00	0.20
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00



Past Experience

Over the study period the actual number of retirements in SERS 2/3 totaled about 48 percent of the number of retirements predicted by the old rates. The following table shows the observed and expected retirements for SERS 2/3 by gender and age using the old retirement rate assumptions.

SERS Plan 2/3 Retirement Experience from 1995-2006						
	Males			Females		
Age	Observed	Expected	Ratio	Observed	Expected	Ratio
55-59	53	228	0.23	214	802	0.27
60-64	159	374	0.43	455	841	0.54
65-69	134	162	0.83	374	403	0.93
70-74	15	42	0.36	26	100	0.26
75-79	1	1	1.00	4	6	0.67
80+	0	0	0.00	0	0	0.00
Total	362	806	0.45	1,073	2,152	0.50

We show the year-by-year observed to expected ratios in the next table.

SERS Plan 2/3 Ratios of Observed to Expected Retirements by Valuation Year		
Year	Males	Females
1995	0.91	0.58
1996	0.88	0.69
1997	0.72	0.67
1998	0.81	0.74
1999	0.68	0.61
2000	0.44	0.42
2001	0.45	0.40
2002	0.43	0.42
2003	0.45	0.46
2004	0.43	0.51
2005	0.33	0.46
2006	0.37	0.42

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently use a set of rates by age and gender for Plans 2 and 3 combined.

We looked at separating the Plan 2/3 retirement rates by plan. It appears that Plan 3 retirement rates are lower than Plan 2 rates at most ages. We did not see the first Plan 3 retiree in the valuation data until 2000. We decided not to change the assumption format due to the lack of Plan 3 experience. The overall credibility of the data improves when Plan 2 and Plan 3 data are combined.

We will continue to monitor Plan 2 and Plan 3 retirement behavior and re-evaluate the data in the next experience study.

Future Expectations

We believe that past experience is important in developing our retirement rates, but we also believe that future trends and expectations should be considered in the analysis.

As with PERS, we expect members to work longer because they will live longer, be concerned about inflation and longevity risks, and face higher future health care costs.

Benefit improvements tend to have the opposite effect on members' retirement behavior, enticing members to retire sooner rather than later. Combined with the 2001-2006 data, the arguments for members working longer generally outweigh the expectations for members retiring earlier.

SERS 2/3 members entered service starting in 1977, and no member has 30 years of service as of the most recent data (2006). Not only do we expect Plan 2/3 members to eventually reach 30 years of service, but we expect these members to retire at higher rates than members with fewer than 30 years of service. During the 2007 legislative session, EHB 2391 (Chapter 491, Laws of 2007) improved the ERFs for members with at least 30 years of membership service beginning at age 55. The ERFs from before and after EHB 2391 are compared to the Actuarial Equivalent Value (AEV) ERFs for members with fewer than 30 years of service in the next table:

Age	Subsidized		AEV
	Post 2391 ERFs	Pre 2391 ERFs	Plan 2/3 ERFs
55	0.80	0.70	0.37
56	0.83	0.73	0.40
57	0.86	0.76	0.43
58	0.89	0.79	0.49
59	0.92	0.82	0.55
60	0.95	0.85	0.61
61	0.98	0.88	0.67
62	1.00	0.91	0.73
63	1.00	0.94	0.82
64	1.00	0.97	0.91
65	1.00	1.00	1.00

Best Estimate SERS Retirement Rates

We compared the observed retirement rates at each age to each of the following:

- The six-year average retirement rates from 1995-2000.
- The six-year average retirement rates from 2001-2006.
- The twelve-year average retirement rates from 1995-2006.
- The old retirement assumptions.

For both males and females the actual retirement rates shown by the 1995-2000 data are higher than the rates shown by the 2001-2006 data at ages between age 62 and age 70. The old retirement rates were set to fit the 1995-2000 data during those years.

We decreased the SERS retirement rates at most ages for both genders so that the new retirement rates lay close to the twelve-year average retirement rates shown by the 1995-2006 data. In some cases the new rates were set between the twelve-year average rates shown in the 1995-2006 data and the average rates shown in the 2001-2006 data. There were many cases where the twelve-year average retirement rates were less than 50 percent of the old retirement rates. We did not decrease the rates by more than

50 percent.

The beginning of year exposures include two groups of people, those eligible to retire at the beginning of the year and those who became eligible later in the year and actually retired. The inclusion of members who retired during the year, but who weren't eligible to retire at the beginning of the year caused unusual rate increases, or spikes, in certain instances.

We noticed spikes in the retirement rates for SERS 2/3 at age 64. Rather than attempt to smooth out the rates shown by the data, we adjusted our eligibility requirements in our valuation software. For Plan 2/3, we shifted the eligibility for retirement from age 65 with five years of service to age 64.5 with five years of service. This picks up the additional retirements from the members included in the data who become eligible to retire in the second half of the year.

The table below shows a summary of observed, old, and new retirement rates for Plan 2/3 members with less than 30 years of service.

SERS Plan 2/3 Retirement Rates for Members with Service Less Than 30 Years										
	Males					Females				
Age	1995-2000	2001-2006	1995-2006	Old Rates	New Rates	1995-2000	2001-2006	1995-2006	Old Rates	New Rates
55	0.02	0.00	0.00	0.05	0.03	0.05	0.02	0.02	0.05	0.03
60	0.00	0.03	0.03	0.14	0.09	0.16	0.04	0.05	0.14	0.09
61	0.07	0.07	0.07	0.14	0.09	0.22	0.08	0.09	0.18	0.12
62	0.15	0.18	0.18	0.33	0.25	0.33	0.14	0.16	0.30	0.22
63	0.29	0.16	0.18	0.26	0.20	0.30	0.13	0.15	0.26	0.20
64	0.84	0.35	0.49	0.79	0.50	0.90	0.42	0.61	0.82	0.50
65	0.52	0.35	0.42	0.52	0.45	0.49	0.38	0.42	0.49	0.45
70	0.23	0.17	0.21	1.00	0.20	0.24	0.22	0.23	1.00	0.23
75	0.00	0.19	0.19	1.00	0.20	0.26	0.13	0.18	1.00	0.20
80	0.00	0.25	0.25	1.00	1.00	0.22	0.24	0.23	1.00	1.00

Since we do not have any Plan 2/3 data to aid in the assumption-setting process for members with high service, we looked at several different methods for setting retirement rates for Plan 2/3 members when they do eventually earn 30 or more years of service.

To set the Plan 2/3 retirement rates we applied the subsidized ERRF to the Plan 1 retirement rates in a method similar to how the ERRF is applied to a member's benefit. We believe that a 1 percent change in benefit leads to more than a 1 percent change in retirement behavior. To reflect this belief, instead of reducing the retirement rate in the same proportion as the ERRF reduces a member's benefit, we reduced the rate by twice the ERRF reduction amount.

We feel that the new Plan 1 rates compare very favorably to the new Plan 2/3 lower-service retirement rates from ages 65 to 70. The only place we deviated from this method was for the rate at age 64. For example, for males the rate suggested by the Plan 1 rate would be 0.30, which is over one-third lower than the new low-service Plan 2/3 rate, implying that members with higher benefits would retire at lower rates. This is inconsistent with our expectation that higher-service members retire at higher rates, so we set the age 64 rate at 0.55.

The following table shows summarized Plan 2/3 retirement rates for members with at least 30 years of service.

SERS Plan 2/3 Retirement Rates for Members with at Least 30 Years of Service								
Males					Females			
Age	New <30 Rates	Old >=30 Rates	Plan I New Rates	New >=30 Rates	New <30 Rates	Old >=30 Rates	Plan I New Rates	New >=30 Rates
55	0.03	0.08	0.22	0.13	0.03	0.08	0.23	0.14
60	0.09	0.25	0.15	0.14	0.09	0.25	0.17	0.15
61	0.09	0.25	0.23	0.22	0.12	0.32	0.21	0.20
62	0.25	0.79	0.33	0.33	0.22	0.61	0.29	0.29
63	0.20	0.50	0.23	0.25	0.20	0.55	0.21	0.25
64	0.50	0.93	0.30	0.55	0.50	0.94	0.26	0.55
65	0.45	0.52	0.40	0.45	0.45	0.49	0.39	0.45
70	0.20	1.00	0.24	0.20	0.23	1.00	0.20	0.23
75	0.20	1.00	0.20	0.20	0.20	1.00	0.15	0.20
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

PSERS

PSERS Plan 2 opened in 2006 and does not have enough experience data to develop plan-specific retirement rates. We will continue to use the retirement rates developed for PSERS when the system opened, and we will continue to monitor the appropriateness of these rates for PSERS.

LEOFF

Past Experience

Over the twelve years from 1995-2006, the observed number of retirements in LEOFF Plan 1 totaled about 82 percent of the number predicted by the old retirement rates. LEOFF 2 saw only about 29 percent of retirements expected under the old retirement assumption. The following table shows the observed and expected retirements for LEOFF by age using the old retirement rate assumptions.

LEOFF Retirement Experience from 1995-2006						
Age	Plan 1 Males and Females			Plan 2 Males and Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
50-54	605	677	0.89	194	691	0.28
55-59	455	587	0.77	175	647	0.27
60-64	131	145	0.90	75	197	0.38
65-69	10	55	0.18	21	54	0.39
70+	2	3	0.67	0	1	0.00
Total	1,203	1,468	0.82	465	1,590	0.29

We show the year-by-year observed to expected ratios in the next table.

LEOFF Ratios of Observed to Expected Retirements by Valuation Year				
Year	Plan 1		Plan 2	
	Males	Females	Males	Females
1995	0.92	1.84	0.29	0.00
1996	0.85	1.52	0.13	0.00
1997	0.85	8.00	0.31	2.44
1998	0.87	20.00	0.17	0.10
1999	0.86	0.00	0.27	0.00
2000	0.94	0.00	0.22	0.00
2001	0.72	0.00	0.25	0.68
2002	0.71	0.00	0.22	0.48
2003	0.76	0.00	0.25	0.59
2004	0.77	0.00	0.32	0.45
2005	0.80	1.52	0.33	0.41
2006	0.79	0.97	0.34	0.46

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently develop separate retirement rates by age and plan, for males and females combined.

We looked at separating the retirement rates by gender for both plans. There simply are not enough data for female retirees in LEOFF to set reasonable retirement rates by gender. For LEOFF 2, we considered separating the rates by occupation; that is, developing separate rates for law enforcement officers and fire fighters. It appears that fire fighter retirement rates are slightly lower than law enforcement officer rates at some ages. We decided not to change the assumption format due to the lack of retirement experience. The overall credibility of the data is improved when data are combined for all categories. We will re-examine the appropriateness of the assumption format for retirement rates in the next experience study.

Future Expectations

Past experience is important in developing our retirement rates. However, future trends and expectations should also be considered in the analysis.

As a result of SHB 2688 (Chapter 350, Laws of 2006), the 60 percent benefit cap was removed for a group of LEOFF 1 members. We expect to see increased retirement rates for members with at least 30 years of service as a result of this legislation.

In 2000, the retirement age in LEOFF 2 was reduced from 55 to 53 and the subsidized ERRFs were extended down to age 50 for members with at least 20 years of service. With this lower retirement age, we expected to see different retirement behavior for Plan 2 members.

Best Estimate LEOFF Retirement Rates

The observed retirement rates shown by the combined LEOFF 1 data from 2001-2006 are lower than the rates shown by the 1995-2000 data at most ages. The old retirement rates were set to fit the 1995-2000 data during those years.

The observed retirement rates shown by the combined LEOFF 2 data from 1995-2006 are significantly lower than the old retirement rates, which were set with very limited data.

We decreased the rates at every age so that the new retirement rates stayed closer to the twelve-year average retirement rates shown by the 1995-2006 data. In some cases the new rates were set between the twelve-year average rates shown in the 1995-2006 data and the average rates shown in the 2001-2006 data. There were many cases where the twelve-year average retirement rates were less than 50 percent of the old retirement rates. We did not decrease the rates by more than 50 percent.

The method used to price the removal of the Plan 1 30-year benefit cap involved moving the disability rates for LEOFF 1 members with 30 years of service to the retirement rates. We applied that method to the new LEOFF 1 retirement rates in this study using the new disability rates developed in this experience study. The method used to price this bill also included slightly reducing the retirement rates for members with fewer than 30 years of service. We did not adjust the recommended retirement rates to reflect this particular adjustment because the relative change from the fiscal note is small compared to the adjustments recommended in this experience study.

Considering the amount of retirement data and the sizeable decrease in retirement rates suggested by the data, we determined that the decrease in retirement rates recommended below is appropriate. No further adjustment to the rates was made to reflect future expectations from the lower Plan 2 retirement age.

We lowered the retirement rates for both plans in LEOFF. The old retirement rates, the two six-year averages, the twelve-year average, and the recommendation for the new retirement rates are summarized in the next table.

LEOFF Retirement Rates										
Plan 1 Males and Females						Plan 2 Males and Females				
Age	1995-2000	2001-2006	1995-2006	Old Rates	New Rates	1995-2000	2001-2006	1995-2006	Old Rates	New Rates
50	0.06	0.07	0.07	0.08	0.07	0.00	0.01	0.01	0.09	0.05
51	0.07	0.07	0.07	0.06	0.07	0.00	0.02	0.02	0.09	0.05
52	0.06	0.07	0.07	0.07	0.07	0.03	0.05	0.05	0.09	0.05
53	0.07	0.08	0.07	0.07	0.07	0.01	0.05	0.05	0.16	0.10
54	0.12	0.10	0.11	0.09	0.11	0.02	0.06	0.05	0.19	0.12
55	0.14	0.10	0.12	0.14	0.12	0.04	0.07	0.07	0.24	0.15
56	0.15	0.12	0.13	0.14	0.12	0.06	0.07	0.07	0.25	0.15
57	0.15	0.15	0.15	0.14	0.15	0.06	0.07	0.07	0.25	0.15
58	0.20	0.13	0.16	0.21	0.16	0.14	0.08	0.09	0.33	0.20
59	0.15	0.16	0.16	0.21	0.16	0.10	0.08	0.09	0.33	0.20
60	0.39	0.20	0.27	0.23	0.23	0.11	0.09	0.09	0.33	0.20
65	0.33	0.19	0.23	1.00	0.25	0.50	0.48	0.48	1.00	0.25
70	0.50	1.00	0.67	1.00	1.00	0.00	0.00	0.00	1.00	1.00

Past Experience

Over the study period the actual number of retirements in WSPRS 1/2 totaled about 101 percent of the number of retirements predicted by the old rates. The following table shows the observed and expected retirements by age using the old retirement rate assumptions.

WSPRS Retirement Experience from 1995-2006			
	Males and Females		
Age	Observed	Expected	Ratio
45-49	129	126	1.02
50-54	154	153	1.01
55-59	86	86	1.00
60-64	6	7	0.86
Total	375	373	1.01

We show the year-by-year observed to expected ratios in the next table.

WSPRS Ratios of Observed to Expected Retirements by Valuation Year	
Year	Males and Females
1995	1.10
1996	1.32
1997	0.74
1998	0.91
1999	0.91
2000	0.93
2001	1.00
2002	0.89
2003	1.18
2004	1.15
2005	1.19
2006	0.82

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We looked at separating the retirement rates by gender. There simply is not enough information for female retirees to set reasonable retirement rates by gender.

We also considered separating the retirement rates by years of service, since WSPRS members may retire at any age with 25 years of service. There are not enough data to set credible rates for different age and service combinations. The overall credibility of the data is improved when data are combined for all age and service combinations. We will continue to monitor WSPRS retirement behavior based on service and re-examine the assumption format in the next experience study.

Future Expectations

Using past experience is important when developing our retirement rates. Considering future trends and expectations is also important in the analysis.

During the 2007 Legislative Session, HB 1325 (Chapter 87, Laws of 2007) increased the mandatory retirement age in WSPRS from age 60 to age 65. We would expect to see members retiring at higher ages in the future, so we developed the retirement assumptions to recognize this possibility.

Best Estimate WSPRS Retirement Rates

In general the actual retirement rates shown in the 1995-2006 WSPRS data compared extremely well to the old retirement rates. We increased the age 45 retirement rate. We decreased the rates slightly at a few other ages. Most of the decreases occurred at the higher ages.

We used four thirds (133 percent) of the LEOFF 2 retirement rates developed in this study to set new retirement rates for ages 59 to 64 to adjust for the higher mandatory retirement age of 65.

Summaries of the old retirement rates, the two six-year averages, the twelve-year average, and the recommendation for the new retirement rates are compared in the next table.

WSPRS Retirement Rates					
Age	1995-2000	2001-2006	1995-2006	Old Rates	New Rates
45	0.73	0.33	0.64	0.31	0.45
50	0.33	0.20	0.28	0.31	0.28
51	0.19	0.28	0.22	0.23	0.23
52	0.20	0.29	0.23	0.23	0.23
53	0.27	0.23	0.25	0.23	0.23
54	0.26	0.23	0.25	0.23	0.23
55	0.24	0.27	0.25	0.23	0.23
56	0.16	0.24	0.20	0.28	0.23
57	0.34	0.19	0.26	0.28	0.23
58	0.20	0.20	0.20	0.28	0.20
59	0.56	0.61	0.59	0.28	0.23
60	0.50	1.00	0.86	1.00	0.23
65	0.00	0.00	0.00	1.00	1.00

Disability Rates

We use rates of disability in our valuation model to determine when members become eligible for a disability benefit. A disability occurs when a member has an incidence of disability and selects a disability benefit. The selection aspect of a disability reflects an individual's decision regarding which benefit to take based on factors affecting their life. Health, job satisfaction, financial security, work ethic, and work/home balance influence a member's decision to continue working, choose service retirement, or select a disability benefit. The selection aspect of disability is very difficult to predict. We estimate rates of disability based on the experience of a large population and adjust the rates as our data evolve and our confidence in the data increases.

Data Used

We used experience study records from 1995-2006 to analyze disability rates.

Assumptions Made

For purposes of setting disability rates, we assume members eligible for normal service retirement will not select a disability benefit. We set our disability rates to zero in our valuation model once members attain the age and service combination required for a normal retirement. We do not, however, make this assumption for WSPRS or LEOFF because those plans offer more valuable disability benefits. Our valuation model does not turn the disability rates off for these plans so we have not removed members eligible for normal retirement from our experience data.

Our old valuation model assumed all members will retire no later than age 70. As a result of this experience study, we extended retirement and disability rates to age 80 for all plans that do not have a mandatory retirement age.

We also assume members will not return to active status after disabling.

All other assumptions used in the development of disability rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

Our data provide twelve years of records. We summed experience from all years to improve reliability of the data. We viewed the number of active members not eligible for normal retirement, for all plans except WSPRS and LEOFF, as our basis for members eligible for disability. We counted all newly disabled members over this twelve-year period. This is a method change from our last experience study, where we summed experience over the previous six-year period.

We divided the number of new disabilities by the number of actives eligible for disability to arrive at an observed, or actual, rate of disability. We made this calculation for each system, by age and gender. We

compared actual rates of disability to our current disability assumptions to determine if an adjustment is necessary.

Part of our analysis also includes limiting volatility over short periods of time. We do not want to make large adjustments to fit the past experience to exactly 100 percent. If we did this, we may see the rates rebound in the other direction in the next experience study. Our goal is to move closer to 100 percent and make further refinements, if necessary, in subsequent experience studies.

Please see the Development of Rates section below for a discussion of how we developed our disability assumptions for each system.

Development of Assumptions

PERS

Past Experience

Our disability assumptions closely predicted the observed number of PERS members selecting disability benefits during the study period.

We extended the age 70 disability rates to age 80 to reflect the extension of our retirement rates.

The following table shows the observed and expected disabilities for PERS 1 by gender and age.

PERS Plan I						
	Males			Females		
Age	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	0	0.00
35-39	0	0	0.00	0	1	0.00
40-44	13	10	1.35	17	15	1.13
45-49	50	58	0.87	71	63	1.13
50-54	127	155	0.82	159	174	0.91
55-59	157	163	0.96	164	163	1.01
60-64	2	9	0.23	3	4	0.71
65+	0	3	0.00	0	1	0.00
Total	349	397	0.88	414	421	0.98

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Our observed male disability counts for PERS 1 totaled 88 percent of our expected number of disabilities. This would lead us to consider adjusting our assumptions down. However, our assumptions predict less than twenty male disabilities for 2006. Making an adjustment to the assumption would lower the expected disabilities for 2006 by about two. Also, since this is a closed plan with an aging population, the

expected disabilities are decreasing rapidly. Most members are very close to normal retirement eligibility and would soon be excluded from disability eligibility. Based on this analysis, we decided not to change the assumptions for PERS 1 males.

Our observed female disability counts for PERS 1 totaled 98 percent of our expected number of disabilities. Our assumptions fit our experience data well and we did not change them.

PERS 1 also has a duty disability benefit under the retirement system that requires an assumption in order to model the benefit. The duty disability assumption reflects the percent of disabilities that are duty-related. The duty disability assumption for PERS 1 is 10 percent. The past six years of experience study data show 9.1 percent of disabilities being duty related. We did not change this assumption of 10 percent.

The following table shows the observed and expected disabilities for PERS 2/3 by gender and age.

PERS Plan 2/3						
	Males			Females		
Age	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	3	4	0.72	3	1	3.57
30-34	9	10	0.88	10	9	1.06
35-39	21	18	1.16	30	28	1.08
40-44	39	38	1.03	42	42	1.00
45-49	81	79	1.03	102	82	1.24
50-54	134	132	1.02	153	148	1.03
55-59	198	204	0.97	190	218	0.87
60-64	239	241	0.99	230	228	1.01
65+	13	26	0.51	4	21	0.19
Total	737	752	0.98	764	778	0.98

We did not eliminate any data due to quality concerns. We removed one data point for females at age 79 because we considered it an outlier.

Our observed disability counts for PERS 2/3 totaled 98 percent of our expected number of disabilities for both males and females. Our assumptions fit our experience data well and we did not change our assumptions.

We also analyzed disabilities by year looking for an obvious trend in the rates over time. The following table shows overall disabilities by plan and valuation year.

PERS Disability Counts by Year						
Year	Plan 1			Plan 2/3		
	Observed	Expected	Ratio	Observed	Expected	Ratio
1995	68	78	0.87	63	87	0.73
1996	93	78	1.19	112	93	1.20
1997	62	76	0.81	78	101	0.77
1998	78	74	1.05	93	108	0.86
1999	64	71	0.90	119	115	1.03
2000	58	67	0.87	117	124	0.95
2001	71	78	0.91	103	128	0.80
2002	65	71	0.91	150	137	1.10
2003	60	64	0.93	179	146	1.23
2004	65	59	1.10	154	155	1.00
2005	48	53	0.90	164	164	1.00
2006	31	48	0.65	169	172	0.98
Total	763	818	0.93	1,501	1,530	0.98

The observed disability counts in PERS are fairly consistent with expected counts on a year-by-year basis. One exception is the PERS 1 observed disabilities for the 2006 valuation year, which are considerably lower than expected. The observed and expected disabilities dropped off quickly and we will see this trend continue as more members reach normal retirement eligibility. We did not make adjustments to reflect this trend.

Assumption Format

We currently apply the disability rates for Plan 1 and Plan 2/3, by gender and by age.

We considered developing one set of rates for both genders, but we believe the rates for males and females differ enough that blending the male and female rates would cause a material difference. Also, since PERS has a large population for both males and females, we have confidence in the data to maintain rates by gender.

Future Expectations

Using past experience is important when developing disability rates. Considering future trends and expectations is also important in the analysis.

Since PERS 1 closed to new members in 1977 and the population is quickly reaching normal retirement age, we expect the number of future disabilities to decline quickly. As a result, we don't believe changing the assumptions will provide a material improvement in our experience.

Best Estimate PERS Disability Rates

We did not change disability rates for any of the PERS Plans.

The table below shows observed disability rates over the twelve-year period and our current disability assumptions for selected ages by Plan and by gender.

Age	PERS 1				PERS 2/3			
	Observed Rate		Current Assumption		Observed Rate		Current Assumption	
	Males	Females	Males	Females	Males	Females	Males	Females
20	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000052	0.000000
30	0.000000	0.000000	0.000000	0.000000	0.000000	0.000123	0.000115	0.000056
35	0.000000	0.000000	0.000310	0.000319	0.000109	0.000193	0.000156	0.000194
40	0.001558	0.000867	0.000762	0.000710	0.000259	0.000276	0.000235	0.000275
45	0.001538	0.002422	0.001481	0.001431	0.000540	0.000480	0.000476	0.000467
50	0.002513	0.003898	0.002542	0.003023	0.000489	0.000902	0.000922	0.001003
55	0.007075	0.007028	0.008240	0.006411	0.002674	0.002073	0.002630	0.002782
60	0.000000	0.009479	0.011701	0.006502	0.006035	0.008103	0.007603	0.007681
65	0.000000	0.000000	0.011701	0.005495	0.008457	0.000000	0.010244	0.010271
70	0.000000	0.000000	0.011701	0.005495	0.006342	0.000000	0.010244	0.010271
75	0.000000	0.000000	0.011701	0.005495	0.000000	0.000000	0.010244	0.010271
80	0.000000	0.000000	0.011701	0.005495	0.000000	0.000000	0.010244	0.010271

PSERS

PSERS opened in 2006 and does not have enough experience data to develop plan-specific rates. We will use PERS disability rates for PSERS and we will continue to monitor the appropriateness of these rates for PSERS.

We did not change the PERS disability rates as a result of this experience study.

TRS

Past Experience

The observed number of TRS 1 members selecting disability benefits during the study period was very close to the number our disability assumption predicted. However, TRS 2/3 had higher rates of disability than we expected.

We had a fifteen-month valuation period in 2001 (7/1/00 – 9/30/01). We adjusted the disability counts for this year by dividing the counts by 162 percent. We looked at disabilities by month and found that for TRS, about 45 percent of disabilities occur in the month of July in any given year. Since the 2001 valuation period covered two summers, the unbalanced weighting made it necessary to adjust the 2001 data to more accurately reflect twelve months of experience. The total disability weighting for the fifteen-month period was 162 percent.

The following table shows the observed and expected disabilities for TRS 1 by gender and age. We extended the age 70 disability rate to age 80 to reflect the extension of our retirement rates.

TRS Plan 1						
Age	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	0	0.00
35-39	0	0	0.00	0	0	0.00
40-44	2	2	0.82	8	5	1.49
45-49	16	21	0.76	37	39	0.95
50-54	57	52	1.09	93	98	0.95
55-59	17	14	1.16	64	68	0.95
60-64	0	1	0.00	1	1	0.95
65+	0	0	0.00	0	0	0.00
Total	91	90	1.01	203	211	0.96

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Our observed male and female disability counts for TRS 1 totaled 101 percent and 96 percent, respectively, of the number of disabilities we expected. Our assumptions fit the experience data well, and we did not make any adjustments.

The following table shows the observed and expected disabilities for TRS 2/3 by gender and age.

TRS Plan 2/3						
Age	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	1	0.00	0	1	0.00
30-34	0	2	0.00	0	3	0.00
35-39	2	3	0.76	3	4	0.71
40-44	2	5	0.44	6	8	0.76
45-49	8	8	0.92	14	17	0.80
50-54	10	11	0.96	19	24	0.80
55-59	15	5	2.74	27	13	2.10
60-64	12	3	4.00	21	6	3.52
65+	0	0	0.00	0	0	0.00
Total	49	37	1.32	90	77	1.17

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Our observed male and female disability counts for TRS 2/3 totaled 132 percent and 117 percent, respectively, of the number of disabilities we expected. Our assumptions did not fit our experience data well.

We also analyzed disabilities by year looking for an obvious trend in the rates over time. The chart below shows overall disabilities by plan and valuation year.

TRS Disability Counts by Year						
Year	Plan 1			Plan 2/3		
	Observed	Expected	Ratio	Observed	Expected	Ratio
1995	36	33	1.11	1	5	0.18
1996	34	33	1.04	7	6	1.13
1997	38	32	1.18	8	7	1.16
1998	33	32	1.03	10	7	1.35
1999	31	31	1.01	6	8	0.73
2000	17	29	0.59	11	9	1.24
2001	27	26	1.05	9	10	0.95
2002	20	23	0.87	16	11	1.47
2003	20	20	0.99	10	12	0.87
2004	14	17	0.83	24	12	1.98
2005	11	14	0.79	11	13	0.87
2006	12	11	1.05	25	13	1.89
Total	293	301	0.98	138	113	1.22

TRS 1 observed disability counts remained fairly consistent with expected counts on a year-by-year basis. TRS 2/3 observed experience bounces back and forth each year above and below 100 percent of expected experience. The observed experience overall is higher than our assumptions and there is no trend in one direction that we can expect for the future.

Assumption Format

We currently apply the disability rates for Plan 1 and Plan 2/3, by gender and by age.

We considered developing one set of rates for both genders, but we believe the rates for males and females differ enough that blending the rates would cause a material difference. Also, since TRS has a large population for both males and females, we have confidence in the data to maintain rates by gender.

Future Expectations

Using past experience is important when developing disability rates. Considering future trends and expectations should be also important in the analysis.

The year-by-year analysis for TRS 2/3 did not suggest any particular trend for the future. As a result, we fit the new rates to a curve similar to the old rates, but with higher overall values especially at the older ages.

Best Estimate TRS Disability Rates

We did not change disability rates for TRS 1 since the assumptions fit the observed experience data well.

We developed new disability rates for TRS 2/3 by analyzing the fit of the old assumptions to the observed experience over the past twelve-year period. Since disabilities are highly correlated to age, we fit an exponential curve to the data incorporating the old assumptions and the observed experience. We picked three specific data points that we wanted to model and fit an exponential curve to those points. The resulting trend equation was used to develop all disability rates between those data points.

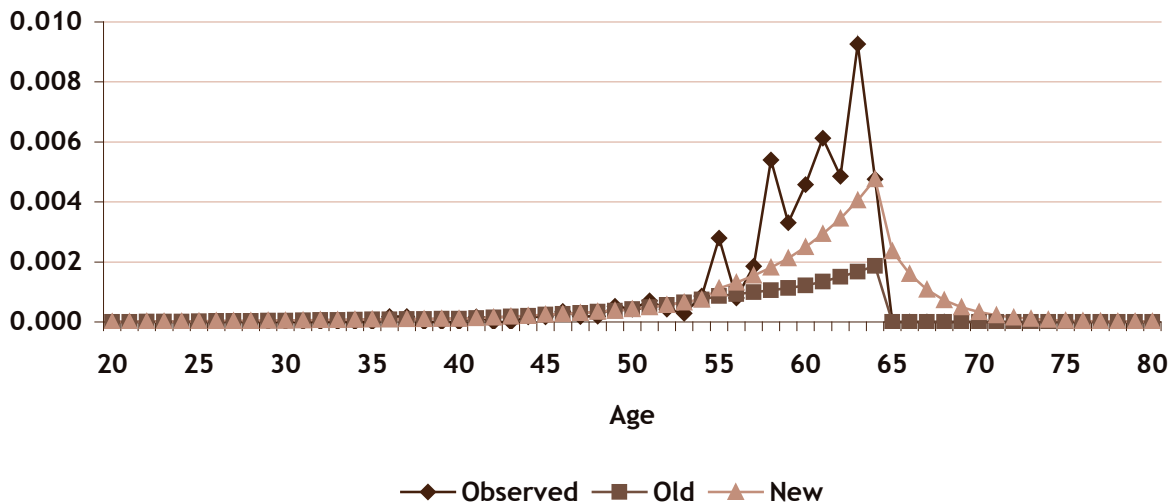
The table below shows the TRS 2/3 observed disability counts over the twelve-year period compared to the number of disabilities we expected under our old and new assumptions. The ratio shown compares our observed disabilities to the number we would expect with the new assumptions.

TRS Plan 2/3									
Age	Males				Females				
	Observed Rate	Old Assumption	New Assumption	Ratio	Observed Rate	Old Assumption	New Assumption	Ratio	
20-24	0	0	0	0.00	0	0	0	0.00	
25-29	0	1	1	0.00	0	1	1	0.00	
30-34	0	2	2	0.00	0	3	3	0.00	
35-39	2	3	3	0.76	3	4	4	0.71	
40-44	2	5	5	0.44	6	8	8	0.76	
45-49	8	8	8	0.92	14	17	17	0.80	
50-54	10	11	11	0.96	19	24	24	0.80	
55-59	15	5	8	1.77	27	13	17	1.61	
60-64	12	3	7	1.77	21	6	13	1.64	
65+	0	0	0	0.00	0	0	0	0.00	
Total	49	37	44	1.11	90	77	87	1.03	

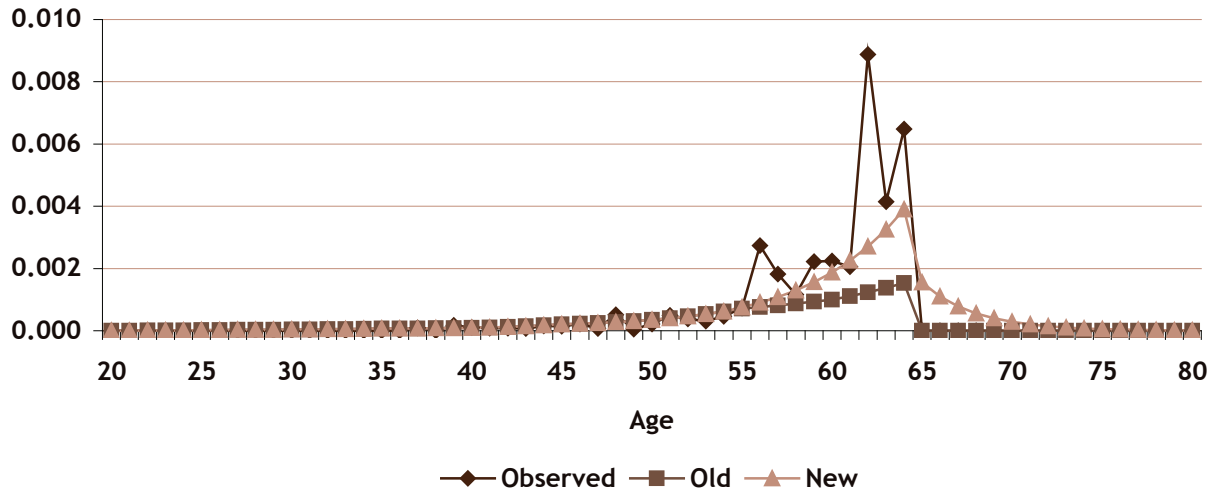
The new assumptions show an observed to expected ratio for males of 111 percent and females of 103 percent.

The following graphs show the observed, old, and new disability rates for TRS 2/3 by gender and age.

TRS 2/3 - Male Disability Rates by Age



TRS 2/3 - Female Disability Rates by Age



The tables below show the observed disability rates over the experience study period and our current (or old) disability assumptions for selected ages by plan and by gender.

TRS I				
Age	Observed Rate		Current Assumption	
	Males	Females	Males	Females
20	0.000000	0.000000	0.000013	0.000014
25	0.000000	0.000000	0.000091	0.000092
30	0.000000	0.000000	0.000187	0.000190
35	0.000000	0.000000	0.000321	0.000326
40	0.000000	0.002398	0.000428	0.000434
45	0.000998	0.000503	0.000944	0.000957
50	0.001649	0.002293	0.001634	0.001656
55	0.002918	0.001808	0.003347	0.003393
60	0.000000	0.000000	0.004686	0.004750
65	0.000000	0.000000	0.007213	0.007311
70	0.000000	0.000000	0.007213	0.007311
75	0.000000	0.000000	0.007213	0.007311
80	0.000000	0.000000	0.007213	0.007311

TRS 2/3						
Age	Observed Rate		Old Assumption		New Assumption	
	Males	Females	Males	Females	Males	Females
20	0.000000	0.000000	0.000003	0.000003	0.000003	0.000003
25	0.000000	0.000000	0.000024	0.000019	0.000024	0.000019
30	0.000000	0.000000	0.000048	0.000040	0.000048	0.000040
35	0.000000	0.000000	0.000083	0.000068	0.000083	0.000068
40	0.000000	0.000104	0.000111	0.000091	0.000111	0.000091
45	0.000175	0.000147	0.000244	0.000201	0.000244	0.000201
50	0.000430	0.000214	0.000422	0.000347	0.000422	0.000347
55	0.002793	0.000731	0.000866	0.000712	0.001118	0.000750
60	0.004580	0.002240	0.001212	0.000997	0.002500	0.001875
65	0.000000	0.000000	0.000000	0.000000	0.002362	0.001552
70	0.000000	0.000000	0.000000	0.000000	0.000334	0.000283
75	0.000000	0.000000	0.000000	0.000000	0.000047	0.000052
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

SERS

Past Experience

We observed fewer SERS 2/3 members selecting disability benefits during the study period than our old disability assumption predicted.

The following table shows the observed and expected disabilities for SERS by gender and age.

SERS Plan 2/3						
Age	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	4	2	1.63
35-39	2	2	0.98	11	11	0.98
40-44	5	7	0.74	16	13	1.23
45-49	14	15	0.95	36	33	1.10
50-54	25	29	0.87	65	94	0.69
55-59	38	58	0.65	92	112	0.82
60-64	76	89	0.86	65	74	0.88
65+	7	12	0.57	3	5	0.62
Total	167	212	0.79	292	344	0.85

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Our observed male and female disability counts for SERS totaled 79 percent and 85 percent, respectively, of the number of disabilities we expected. Our assumptions did not fit our experience data well.

We also analyzed disabilities by year looking for an obvious trend in the rates over time. The chart below shows observed and expected disabilities for SERS by valuation year.

SERS 2/3 Disability Counts by Year			
Year	Observed	Expected	Ratio
1995	17	34	0.50
1996	58	36	1.59
1997	30	39	0.76
1998	30	43	0.69
1999	46	46	1.00
2000	48	44	1.09
2001	20	46	0.44
2002	45	48	0.93
2003	42	51	0.82
2004	51	53	0.97
2005	37	56	0.66
2006	35	59	0.60
Total	459	556	0.83

SERS observed disability counts are consistently low compared to expected counts on a year-by-year basis. There is a slight trend toward even lower experience in the past few years. We will adjust the rates to lower our future expectations.

Assumption Format

We currently apply our disability rates for SERS 2/3, by gender and by age.

We considered developing one set of rates for both genders, but we believe that rates for males and females differ enough that blending the rates would cause a material difference. Also, since SERS has a large population for both males and females, we have confidence in the data to maintain rates by gender.

Future Expectations

The year-by-year analysis for SERS 2/3 suggests a trend toward lower rates for the future. We reduced the disability rates to move the observed to expected ratio closer to 100 percent.

Best Estimate SERS Disability Rates

We developed new disability rates for SERS 2/3 by analyzing the fit of the old assumption to the observed experience over the past twelve-year period. Since disabilities are highly correlated to age, we fit an exponential curve to the data incorporating the old assumption and the observed experience. We picked three specific data points that we wanted to model and fit an exponential curve to those points. The resulting trend equation was used to develop all disability rates between those data points.

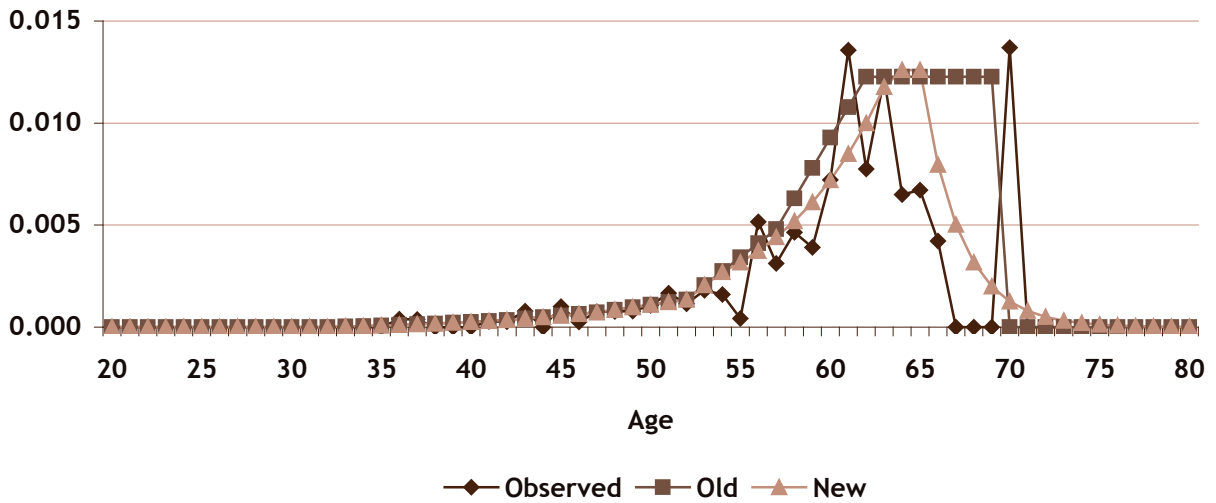
The table below shows the SERS observed disabilities over the twelve-year period compared to the numbers we expected under our old assumptions and under our new assumptions. The ratio shown compares our observed disabilities to the number of disabilities we would predict with the new assumptions.

SERS Plan 2/3								
Age	Males				Females			
	Observed Rate	Old Assumption	New Assumption	Ratio	Observed Rate	Old Assumption	New Assumption	Ratio
20-24	0	0	0	0.00	0	0	0	0.00
25-29	0	0	0	0.00	0	0	0	0.00
30-34	0	0	0	0.00	4	2	2	1.63
35-39	2	2	2	0.98	11	11	11	0.98
40-44	5	7	7	0.74	16	13	13	1.23
45-49	14	15	15	0.95	36	33	33	1.10
50-54	25	29	29	0.88	65	94	89	0.73
55-59	38	58	50	0.76	92	112	92	1.00
60-64	76	89	76	1.00	65	74	73	0.89
65+	7	12	8	0.91	3	5	3	1.14
Total	167	212	186	0.90	292	344	316	0.92

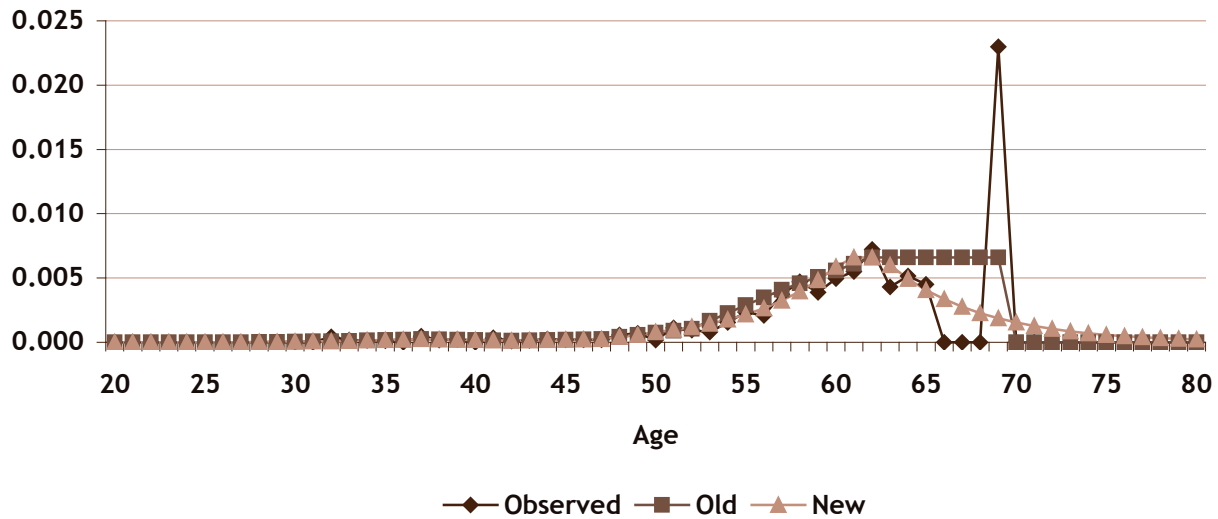
The new assumptions show an observed to expected ratio for males and females of 90 percent and 92 percent, respectively.

The following graphs show the observed, old, and new disability rates for SERS by gender and age.

SERS 2/3 - Male Disability Rates by Age



SERS 2/3 - Female Disability Rates by Age



The table below shows observed disability rates over the experience study period and our old and new disability assumptions for selected ages by gender.

SERS 2/3						
Age	Observed Rate		Old Assumption		New Assumption	
	Males	Females	Males	Females	Males	Females
25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30	0.000000	0.000000	0.000000	0.000048	0.000000	0.000048
35	0.000000	0.000124	0.000081	0.000176	0.000081	0.000176
40	0.000000	0.000000	0.000258	0.000164	0.000258	0.000164
45	0.001005	0.000201	0.000568	0.000201	0.000568	0.000201
50	0.001069	0.000172	0.001102	0.000738	0.001102	0.000797
55	0.000416	0.002331	0.003428	0.002876	0.003175	0.002166
60	0.007213	0.004952	0.009292	0.005589	0.007200	0.005888
65	0.006711	0.004505	0.012272	0.006589	0.012600	0.004069
70	0.013699	0.000000	0.000000	0.000000	0.001260	0.001538
75	0.000000	0.000000	0.000000	0.000000	0.000126	0.000581
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

LEOFF

Past Experience

The female population in LEOFF is small with very little disability experience. Although we performed our initial analysis independently by gender, we combined the male and female data to develop new rates.

Fewer LEOFF members selected disability benefits during the study period than our old disability assumption predicted.

The following table shows the observed and expected disabilities for LEOFF 1, by age, over the twelve-year period.

LEOFF 1			
Age	Observed	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	2	2	0.99
40-44	64	57	1.13
45-49	328	397	0.83
50-54	620	703	0.88
55-59	252	384	0.66
60-64	31	69	0.45
65+	0	7	0.00
Total	1,297	1,620	0.80

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Our observed disability counts for LEOFF 1 totaled 80 percent of the number of disabilities we expected. Our assumptions did not fit our experience data well.

The following table shows the observed and expected disabilities for LEOFF 2, by age, over the twelve-year period.

LEOFF 2			
Age	Observed	Expected	Ratio
20-24	0	0	0.00
25-29	3	3	0.95
30-34	1	8	0.13
35-39	8	13	0.61
40-44	10	16	0.61
45-49	17	27	0.63
50-54	32	44	0.72
55-59	20	23	0.88
60-64	7	5	1.45
65+	1	0	2.56
Total	99	140	0.71

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers. The expected (non-duty + duty) rates in the chart above reflect the introduction of the new duty-related disability rates in 2005. We blended the duty rates with the non-duty rates to represent an overall disability rate in LEOFF 2.

Our observed disability counts for LEOFF 2 totaled 71 percent of the number of disabilities we expected. Our assumptions did not fit our experience data well. However, several factors contribute to this. We will address the poor fit following the year-by-year analysis.

We analyzed disabilities by year looking for an obvious trend in the rates over time. The chart below shows overall disabilities by plan and valuation year.

LEOFF Disability Counts by Year						
Year	Plan 1			Plan 2		
	Observed	Expected	Ratio	Observed	Expected	Ratio
1995	176	195	0.90	0	1	0.00
1996	213	189	1.13	1	1	1.04
1997	156	177	0.88	1	1	0.89
1998	176	167	1.05	1	1	0.79
1999	136	152	0.89	1	1	0.69
2000	127	140	0.91	8	2	4.81
2001	89	124	0.72	2	2	1.10
2002	74	115	0.64	8	2	3.89
2003	58	105	0.55	8	2	3.44
2004	45	95	0.47	10	3	3.77
2005	20	85	0.24	20	59	0.34
2006	27	75	0.36	39	65	0.60
Total	1,297	1,620	0.80	99	140	0.71

LEOFF 1 observed declining disability rates. The youngest member in the plan is just under fifty and most members are at or near normal retirement eligibility. We reduced the disability rates for LEOFF 1, but we did not add any additional reduction as a result of the above trend.

Changes in LEOFF 2 benefit provisions caused several changes to observed and expected disabilities since 2005. The observed counts increased rapidly due to recent legislation that introduced duty (occupational) disability benefits as well as total (catastrophic) disability benefits and expanded definitions for occupational disease. We have started seeing duty-related disability experience, but some of that data reflects previous terminations or non-duty disabilities that have qualified as duty disabilities. The experience data at this time is not reliable enough to properly model duty disability. We increased the disability rates to reflect these law changes.

Assumption Format

We currently apply our disability rates by plan and by age.

We considered developing separate rates by gender, but our female data and experience are too small to develop credible rates. We also considered developing separate rates by occupation (fire fighter and law enforcement officer), but again, we don't have enough experience to develop rates with an appropriate level of confidence. We will continue to evaluate these optional formats in future experience studies.

Future Expectations

Past experience is important in developing our disability rates. Considering future trends and expectations is also important in the analysis.

Our expected disabilities for LEOFF 1 have dropped by more than 60 percent since 1995. This is a closed plan with an aging population, and the members are quickly reaching normal retirement age. We reduced the disability rates for this plan, but not beyond what the past experience has shown.

We expect to see the disability experience in LEOFF 2 continue to increase in the future as a result of the new disability benefits. We introduced our current disability rates in 2005 to reflect the duty-disability benefit provisions. At this time, we feel it is prudent to maintain these rates until reliable experience becomes available.

Best Estimate LEOFF Disability Rates

We developed new disability rates for LEOFF 1 by analyzing the fit of the old assumptions to the observed experience over the past twelve-year period. Since disabilities are highly correlated to age, we fit an increasing curve to the data incorporating the old assumptions and the observed experience. We picked three specific data points that we wanted to model and fit a regression trend line to those points. The resulting trend equation was used to develop all disability rates between those data points.

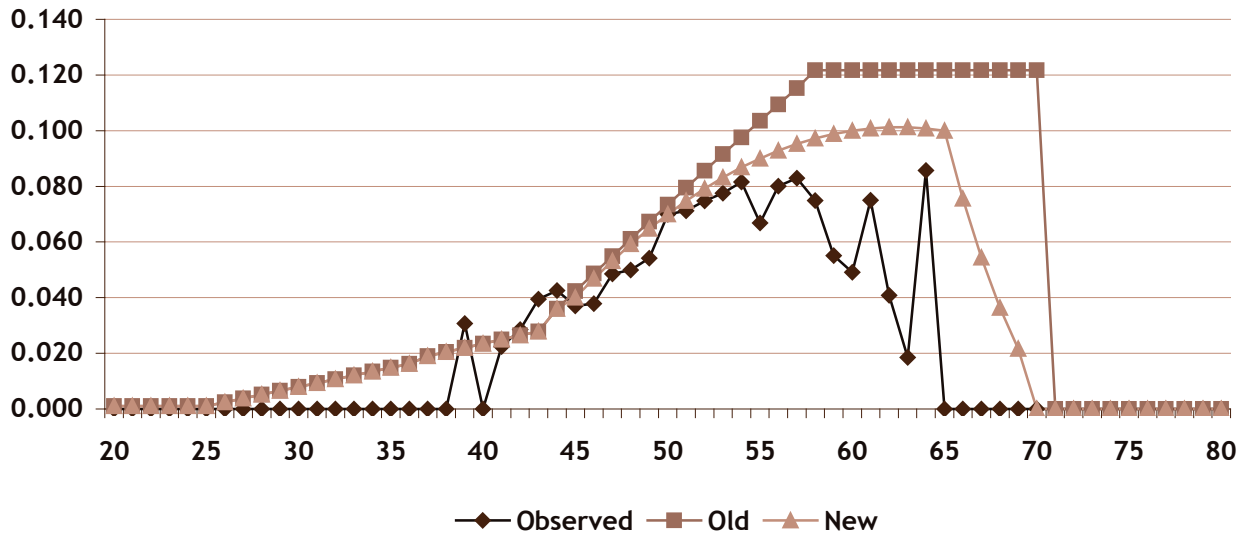
The table below shows the LEOFF 1 observed disabilities over the twelve-year period compared to the numbers we expected under our old assumptions and under our new assumptions. The ratio shown compares our observed disability counts to the number of disabilities we would expect with the new assumptions.

LEOFF I				
Age	Observed Rate	Old Assumption	New Assumption	Ratio
20-24	0	0	0	0.00
25-29	0	0	0	0.00
30-34	0	0	0	0.00
35-39	2	2	2	0.99
40-44	64	57	57	1.13
45-49	328	397	383	0.86
50-54	620	703	650	0.95
55-59	252	384	322	0.78
60-64	31	69	57	0.54
65+	0	7	4	0.00
Total	1,297	1,620	1475	0.88

The new assumptions show an observed to expected ratio of 88 percent for LEOFF Plan 1.

The following graph displays the observed, old, and new disability rates for LEOFF 1 by age.

LEOFF 1 Disability Rates by Age



The table below shows a summary of observed disability rates over the experience study period and our old and new disability assumptions for LEOFF 1.

LEOFF 1			
Age	Observed Rate	Old Assumption	New Assumption
20	0.000000	0.001000	0.001000
25	0.000000	0.001000	0.001000
30	0.000000	0.007968	0.007968
35	0.000000	0.014888	0.014888
40	0.000000	0.023471	0.023471
45	0.037079	0.042372	0.040000
50	0.069926	0.073417	0.070000
55	0.066787	0.103493	0.090000
60	0.049107	0.121663	0.100000
65	0.000000	0.121663	0.100000
70	0.000000	0.121663	0.000000
75	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000

The table below shows observed disability rates over the experience study period and our current disability assumptions for LEOFF 2. We also show the percent of disabilities considered non-duty and duty-related at selected ages.

LEOFF 2				
Age	Observed Rate	Current Assumption	Non-Duty Percent	Duty Percent
20	0.000000	0.000981	0.07%	99.93%
25	0.000466	0.001088	0.09%	99.91%
30	0.000173	0.001208	0.16%	99.84%
35	0.000000	0.001652	0.19%	99.81%
40	0.000308	0.002263	0.34%	99.66%
45	0.000806	0.002988	0.59%	99.41%
50	0.000364	0.010134	0.78%	99.22%
55	0.006944	0.024045	0.69%	99.31%
60	0.009569	0.024045	0.69%	99.31%
65	0.000000	0.024045	0.69%	99.31%
70	0.000000	0.000000	0.69%	99.31%
75	0.000000	0.000000	0.69%	99.31%
80	0.000000	0.000000	0.69%	99.31%

One final disability assumption for LEOFF 2 is the total (catastrophic) disability rate. The Legislature passed this new benefit in 2005. We use this assumption to distinguish between duty-disability types. In 2005, we assumed that 18 percent of all duty disabilities would be total (catastrophic) disabilities. We do not recommend any change to that assumption at this time since experience is still emerging. We will continue to monitor this assumption as part of the overall LEOFF 2 disability rates.

Past Experience

WSPRS is a small system with very little disability experience. Also, the female population is very small. Although we performed our initial analysis independently by gender, we combined the male and female data to develop rates.

Disability benefits for WSPRS members are paid out of a separate fund and not from the retirement system. The retirement system pays a survivor benefit to an eligible spouse if a disabled member dies. As a result, we model the rate that members leave the retirement system on disability, but we only value survivor benefits that may become payable. Fewer WSPRS members left the plan on disability during the study period than our old disability assumption predicted.

The following table shows the observed and expected disabilities for WSPRS by age.

WSPRS 1/2			
Age	Observed	Expected	Ratio
20-24	0	0.1	0.00
25-29	1	1.3	0.76
30-34	1	2.5	0.40
35-39	0	2.5	0.00
40-44	1	1.9	0.54
45-49	4	1.5	2.70
50-54	1	0.9	1.17
55-59	0	0.3	0.00
60-64	0	0.0	0.00
65+	0	0.0	0.00
Total	8	10.9	0.74

We eliminated 1995 data due to quality concerns. We did not remove any data points considered to be outliers.

Our observed disability counts for WSPRS totaled 74 percent of the number of disabilities we expected. Considering our small database and low observed numbers of disabilities, our assumptions fit our experience well.

We also analyzed disabilities by year looking for an obvious trend in the rates over time. The chart below shows overall disabilities for WSPRS by valuation year.

WSPRS 1/2 Disability Counts by Year			
Year	Observed	Expected	Ratio
1996	2	0.9	2.22
1997	2	0.9	2.18
1998	1	0.9	1.08
1999	1	0.9	1.08
2000	0	1.0	0.00
2001	0	1.0	0.00
2002	1	1.0	0.97
2003	0	1.0	0.00
2004	1	1.1	0.93
2005	0	1.1	0.00
2006	0	1.0	0.00
Total	8	10.9	0.74

Disability experience is very small in WSPRS on both an observed and expected basis. With so few data points, it is not unusual to see the ratios fluctuate from zero to one or two as observed above. We did not adjust rates based on this analysis.

Assumption Format

We currently apply our disability rates for the entire system, by age.

We considered developing separate rates by gender, but our female data and experience are too small for an appropriate level of confidence.

Future Expectations

We do not see any trends in our data that we expect to continue.

Best Estimate WSPRS Disability Rates

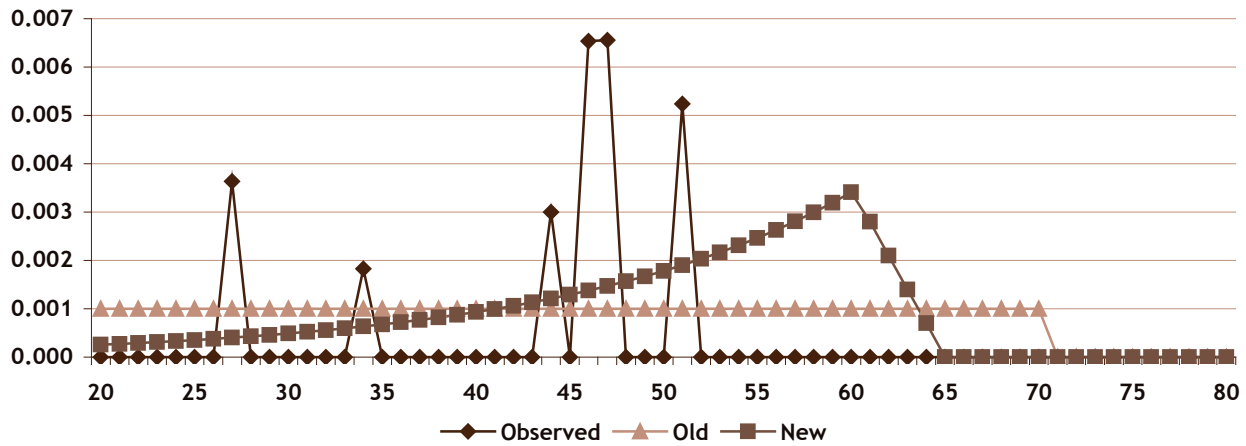
We developed new disability rates for WSPRS by analyzing the fit of the old assumptions to the observed experience over the past eleven-year period. Because the disability experience in WSPRS is very limited, we did not adjust the disability rates to improve the ratio of the observed to expected. However, we did create an assumption format that reflects the correlation of disability rates with age. To accomplish this, we fit an exponential curve to the data by selecting three specific data points that we wanted to model. We used the resulting trend equation to develop all disability rates between those data points.

The table on the following page shows the observed disabilities over the eleven-year period compared to the numbers we expected under our old assumptions and under our new assumptions. The ratio shown compares our observed disability counts to the number the new assumptions predict.

WSPRS 1/2			
Age	Observed Rate	Old Assumption	New Assumption
20	0.000000	0.001000	0.000256
25	0.000000	0.001000	0.000353
30	0.000000	0.001000	0.000488
35	0.000000	0.001000	0.000675
40	0.000000	0.001000	0.000933
45	0.000000	0.001000	0.001290
50	0.000000	0.001000	0.001783
55	0.000000	0.001000	0.002465
60	0.000000	0.001000	0.003408
65+	0.000000	0.001000	0.000000

The new assumptions show an observed to expected ratio of 76 percent. The following graph shows the observed, old, and new disability rates for WSPRS by age.

WSPRS 1/2 Disability Rates by Age



The following table shows observed disability rates over the experience study period and our old and new disability assumptions for selected ages.

WSPRS 1/2				
Age	Observed Rate	Old Assumption	New Assumption	Ratio
20-24	0	0.1	0.0	0.00
25-29	1	1.3	0.6	1.82
30-34	1	2.5	1.4	0.71
35-39	0	2.5	1.9	0.00
40-44	1	1.9	2.0	0.51
45-49	4	1.5	2.2	1.84
50-54	1	0.9	1.7	0.58
55-59	0	0.3	0.8	0.00
60-64	0	0.0	0.0	0.00
65+	0	0.0	0.0	0.00
Total	8	10.9	10.5	0.76

Termination Rates

Members who leave eligible positions, but are not annuitants in the system, are generally considered inactive, or terminated. Any member who terminates has the right to withdraw their contributions, with interest. Members of Plans 1 and 2 who make such withdrawals lose their membership service and forfeit their rights to future benefits. Plan 3 members do not lose their service upon withdrawal of their defined contribution accounts.

We use termination assumptions in our valuation software in combination with our percent vested assumption to determine who we expect to collect a deferred retirement benefit. We assume that terminated members who do not take a deferred retirement benefit get a refund of accumulated contributions.

Data Used

We used experience study records from 1995-2006 to count terminations.

Assumptions Made

We assume that a member who is eligible to take a service retirement will not terminate. We therefore set our termination rates to zero in our valuation model once a member has attained the age and service combination required for retirement.

We also assume a member will not return to active status if they remain terminated for more than two years. Please see the Methods section below for more detail.

All other assumptions used in the development of termination rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

Our data provide twelve years of records. We summed experience from most of those years to improve reliability of the data. We viewed the number of active members not eligible for normal retirement as our basis for members able to terminate. We counted newly terminated members, but subtracted members who rehired to active positions within two years, to arrive at our net number of terminations.

This is a method change from our last experience study, where we looked to the end of the experience study period to find rehires, regardless of the year the member terminated. Also, we only used four years of data to set termination rates in our last study.

We only considered active members and new terminations through 2004 because we looked forward two years to exclude terminated members who eventually return to work. Any of those members who terminated through 2004, and were not rehired by 2006, were included in our count of actual terminations.

We divided the net number of terminations by the number of actives who could terminate to arrive at an observed, or actual, rate of termination. We made this calculation for each system, by years of service and gender. We compared observed rates of termination to the rates we expected under our current set of termination assumptions to determine if an adjustment was necessary.

Part of our analysis includes limiting volatility over short periods of time. We do not want to make adjustments to fit the recent past experience to exactly 100 percent. If we did this, we may see the rates rebound in the other direction in the next experience study. Our goal is to move closer to 100 percent and make further refinements, if necessary, in subsequent experience studies.

Please see the Development of Rates section below for a discussion of how we developed our new termination assumptions for each system.

Development of Assumptions

PERS

Past Experience

We observed more PERS members terminating during the study period than our old termination assumption predicted. The table below summarizes this information by gender and service.

PERS Termination Experience 1995-2004						
	Males			Females		
Service	Observed	Expected	Ratio	Observed	Expected	Ratio
0-4	27,078	27,195	1.00	38,423	38,036	1.01
5-9	7,129	6,581	1.08	10,657	9,773	1.09
10-14	3,734	3,626	1.03	5,049	4,471	1.13
15-19	1,932	1,786	1.08	2,238	1,979	1.13
20-24	848	514	1.65	927	563	1.65
25-29	233	114	2.05	146	76	1.92
30+	0	0	0.00	0	0	0.00
Total	40,954	39,816	1.03	57,438	54,897	1.05

We adjusted the data due to a short (nine-month) valuation period in 2001. We looked at terminations by month and found that for PERS, 78 percent of terminations occur from January through September. As a result, we adjusted the observed termination counts for this year by dividing the counts by 78 percent.

We also adjusted the observed rehire counts prior to 2001 in a similar way:

- 1999 – divided by $(1+0.78)/2 = 0.89$ (full year in 2000, short year in 2001)
- 2000 – divided by $(0.78+1)/2 = 0.89$ (short year in 2001, full year in 2002)

We did not need to adjust the observed rehire counts for 2001 and beyond.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We considered terminations by year to see if we could identify any obvious trends in the rates over time. The table below shows observed to expected ratios for the entire system by valuation year.

PERS Termination Counts by Year			
Year	Observed	Expected	Ratio
1995	9,225	9,241	1.00
1996	8,628	8,893	0.97
1997	9,316	8,927	1.04
1998	9,424	9,019	1.04
1999	10,213	9,608	1.06
2000	11,557	9,849	1.17
2001	12,310	10,063	1.22
2002	9,307	9,990	0.93
2003	9,237	9,701	0.95
2004	9,174	9,424	0.97
Total	98,392	94,713	1.04

We believe that termination rates increase when the economy is strong, and decrease in a weaker economic environment. We think that during the years 1995-2004, the economy showed more strong times than weak ones. In other words, we believe there was not a complete business cycle in that time period. We think this might partially explain why observed termination rates were higher than expected.

Assumption Format

We currently apply termination rates for the entire system, by gender. We considered developing termination rates by age, rather than service, but the resulting rates are quite variable at older ages. We did not pursue developing termination rates by age.

We also considered developing separate rates for each plan, but experience in the closed plans decreases over time, especially at lower service levels. We did not pursue this format change.

We considered developing one set of rates for both genders, but we believe that rates for males and females are different enough from each other that blending the rates for both genders would cause a material difference. Since PERS has large populations of both males and females, we have confidence in the data to maintain rates by gender.

Future Expectations

Using past experience is helpful when developing our new termination rates. However, future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We set our old termination rates to match the experience in the 1995-1998 data. Some of the variability in the actual rates we see for this current study period of 1995-2004 comes from our method change (how we count observed terminations). However, most of the variability comes from newer data than we

had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current observed results.

We expect termination rates to continue to fluctuate with the economy as they have in the past. We also believe that rates are higher than they might be if we had studied data during a complete economic cycle. We therefore assigned an additional downward adjustment factor of 5 percent.

Best Estimate PERS Termination Rates

Observed average termination rates in PERS start out very high for members with little service. They then drop off rapidly as service increases. After a few years of service, the slope of the curve flattens out, showing a much slower decrease as service increases.

To fit these curves, we matched the rates for lower service to our observed experience, beginning with zero years of service. We continued with this matching theme until we saw an increase in the observed termination rate from one service level to the next. From that point on, we used a rolling five-year average of observed termination rates to smooth our estimated rates. Additionally, if the transition from observed rates to the rolling five-year average produced an increase in rates from one service level to the next, we started the five-year average at a lower service level to help smooth the curve. Finally, we held the rates at 30 years of service constant for all other, higher service levels. If termination rates dropped to zero before 30 years of service, we kept the rate from the prior year of service constant for higher service levels. This allowed us to use a small termination rate for members with high service, but not yet eligible for retirement.

The rate-setting method above resulted in rates that generally predict more terminations than the old rates. For the reasons discussed in the Future Expectations section, we reduced our new termination rates so they are slightly less than halfway, or 45 percent, between our old rates and our new observed rates.

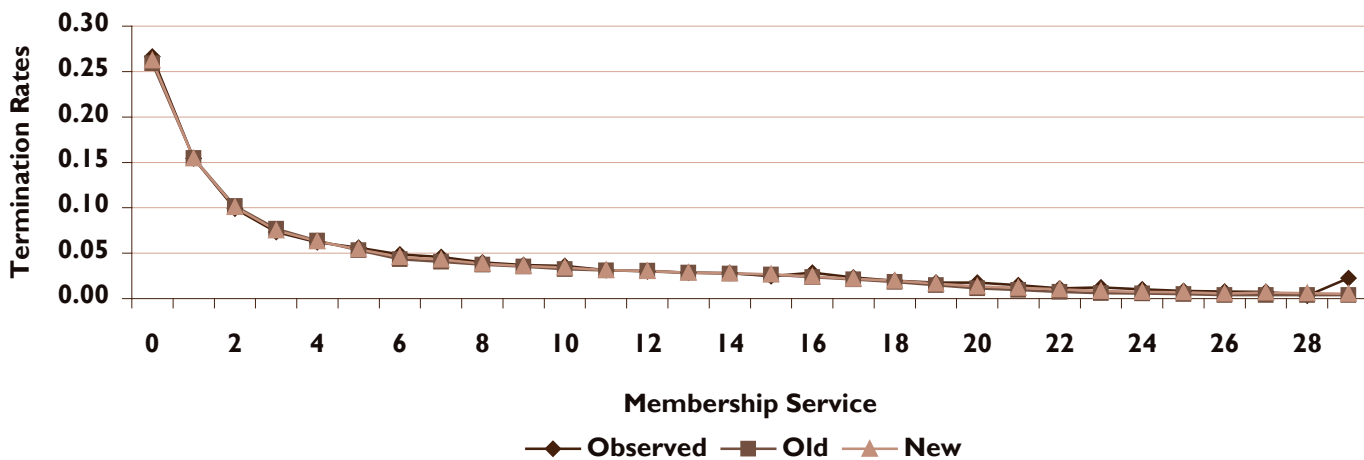
The following table shows a recap of observed and expected counts, along with the ratio of observed to expected counts under the new PERS termination rates.

PERS Termination Experience 1995-2004								
Males					Females			
Service	Observed	Old Assumption	New Assumption	Ratio	Observed	Old Assumption	New Assumption	Ratio
0-4	27,078	27,195	27,142	1.00	38,423	38,036	38,210	1.01
5-9	7,129	6,581	6,828	1.04	10,657	9,773	10,171	1.05
10-14	3,734	3,626	3,675	1.02	5,049	4,471	4,701	1.07
15-19	1,932	1,786	1,854	1.04	2,238	1,979	2,117	1.06
20-24	848	514	660	1.28	927	563	719	1.29
25-29	233	114	163	1.43	146	76	104	1.40
30+	0	0	0	0.00	0	0	0	0.00
Total	40,954	39,816	40,322	1.02	57,438	54,897	56,021	1.03

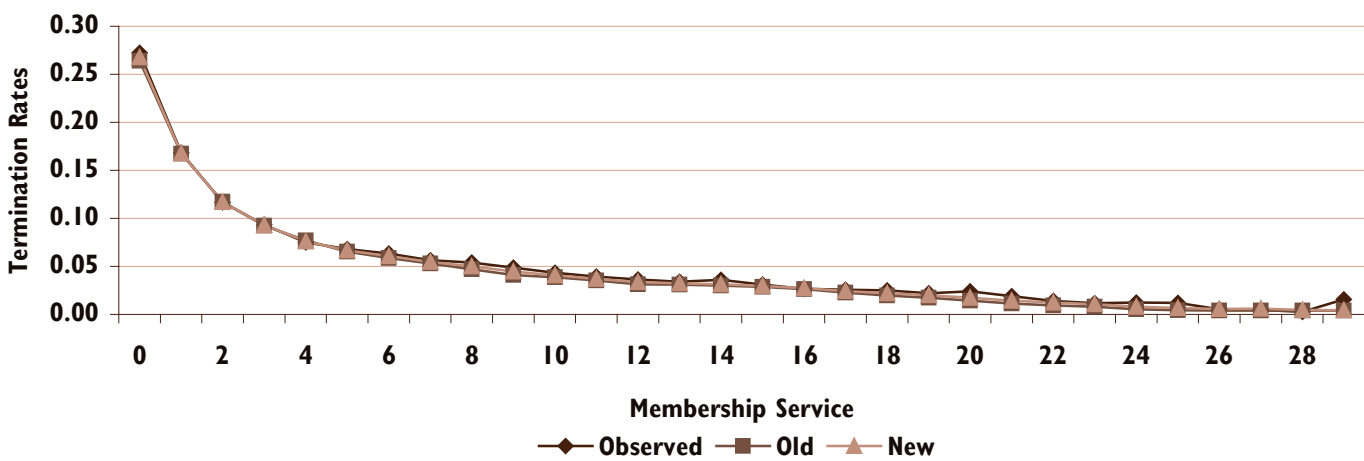
By using partial credibility for our recent past experience, we make reasonable adjustments to our termination rates without over-adjusting them. This approach allows us to keep monitoring observed rates, making small adjustments in response to new experience.

The following graphs show the observed, expected (old assumptions), and new termination rates for PERS by gender and service.

PERS - All Plans
Male Termination Rates by Years of Service



PERS - All Plans
Female Termination Rates by Years of Service



PERS - All Plans						
Probability of Termination						
Service Years	Observed Rates		Old Rates		New Rates	
	Males	Females	Males	Females	Males	Females
0	0.2665	0.2723	0.259000	0.263900	0.262397	0.267698
1	0.1545	0.1684	0.154600	0.167200	0.154534	0.167747
2	0.0991	0.1168	0.102000	0.117200	0.100683	0.117007
3	0.0732	0.0934	0.076900	0.092500	0.075236	0.092904
4	0.0620	0.0750	0.063900	0.076900	0.063052	0.076024
5	0.0561	0.0681	0.053100	0.065300	0.054443	0.066544
10	0.0360	0.0433	0.032500	0.038700	0.034062	0.040754
15	0.0267	0.0307	0.026600	0.028600	0.026640	0.029525
20	0.0162	0.0208	0.011400	0.014400	0.013551	0.017270
25	0.0092	0.0092	0.005000	0.004500	0.006909	0.006627
30+	0.0051	0.0037	0.004000	0.004000	0.004516	0.003866

PSERS

PSERS opened in 2006 and does not have enough experience data to develop plan-specific rates. We will use PERS termination rates for PSERS and we will continue to monitor the appropriateness of these rates for PSERS.

TRS

Past Experience

We observed more TRS members terminating during the study period than our old termination assumption predicted. The next table summarizes this information by gender and service.

TRS Termination Experience 1995-2004						
Service	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
0-4	2,906	2,809	1.03	9,412	8,713	1.08
5-9	1,119	965	1.16	3,987	3,015	1.32
10-14	516	409	1.26	1,638	1,199	1.37
15-19	270	207	1.31	820	581	1.41
20-24	241	135	1.78	429	235	1.83
25-29	166	97	1.72	187	107	1.74
30+	0	0	0.00	0	0	0.00
Total	5,219	4,621	1.13	16,474	13,850	1.19

We adjusted the data due to a long (fifteen-month) valuation period in 2001. We looked at terminations by month and found that for TRS, 141 percent of terminations occur from July through the following September. As a result, we adjusted the observed termination counts for this year by dividing the counts by 141 percent.

We also adjusted the observed rehire counts prior to 2001 in a similar way:

- 1999 – divided by $(1+1.41)/2 = 1.21$ (full year in 2000, long year in 2001)
- 2000 – divided by $(1.41+1)/2 = 1.21$ (long year in 2001, full year in 2002)

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We considered terminations by year to see if we could identify any obvious trends in the rates over time. The following table shows observed to expected ratios for the entire system by valuation year.

TRS Termination Counts by Year			
Year	Observed	Expected	Ratio
1995	1,662	1,693	0.98
1996	1,815	1,697	1.07
1997	1,682	1,627	1.03
1998	1,874	1,677	1.12
1999	2,207	1,708	1.29
2000	2,409	1,749	1.38
2001	2,463	1,816	1.36
2002	2,860	2,227	1.28
2003	2,373	2,193	1.08
2004	2,349	2,085	1.13
Total	21,693	18,472	1.17

We believe that termination rates increase when the economy is strong, and decrease in a weaker economic environment. We think that during the years 1995-2004, the economy showed more strong times than weak ones. In other words, we believe there is not a complete business cycle in that time period. We think this might partially explain why observed termination rates were higher than expected.

Assumption Format

We currently apply termination rates for the entire system, by gender. We considered developing termination rates by age, rather than service, but the resulting rates are quite variable at older ages. We did not pursue developing termination rates by age.

We also considered developing separate rates for each plan, but experience in the closed plans decreases over time, especially at lower service levels. We did not pursue this format change.

We considered developing one set of rates for both genders, but we believe that rates for males and females are different enough from each other that blending the rates for both genders would cause a material difference. Since TRS has large populations of both males and females, we have confidence in the data to maintain rates by gender.

Future Expectations

We believe that past experience is helpful in developing our new termination rates, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We set our old termination rates to match the experience in the 1995-1998 data. Some of the variability in the actual rates we see for this current study period of 1995-2004 comes from our method change (how we count observed terminations). However, most of the variability comes from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current observed results.

We expect termination rates to continue to fluctuate with the economy as they have in the past. We also believe that rates are higher than they might be if we had studied data during a complete economic cycle. We therefore assigned an additional downward adjustment factor of 5 percent.

Best Estimate TRS Termination Rates

Observed average termination rates in TRS start out high for members with little service. They then drop off rapidly as service increases. After a few years of service, the slope of the curve flattens out, showing a much slower decrease as service increases.

To fit these curves, we matched the rates for lower service to our observed experience, beginning with zero years of service. We continued with this matching theme until we saw an increase in the observed termination rate from one service level to the next. From that point on, we used a rolling five-year average of observed termination rates to smooth our estimated rates. Additionally, if the transition from observed rates to the rolling five-year average produced a jump in rates from one service level to the next, we started the five-year average at a lower service level to help smooth the curve. Finally, we held the rates at 30 years of service constant for all other, higher service levels. If termination rates dropped to zero before 30 years of service, we kept the rate from the prior year of service constant for higher service levels. This allowed us to use a small termination rate for members with high service, but not yet eligible for retirement.

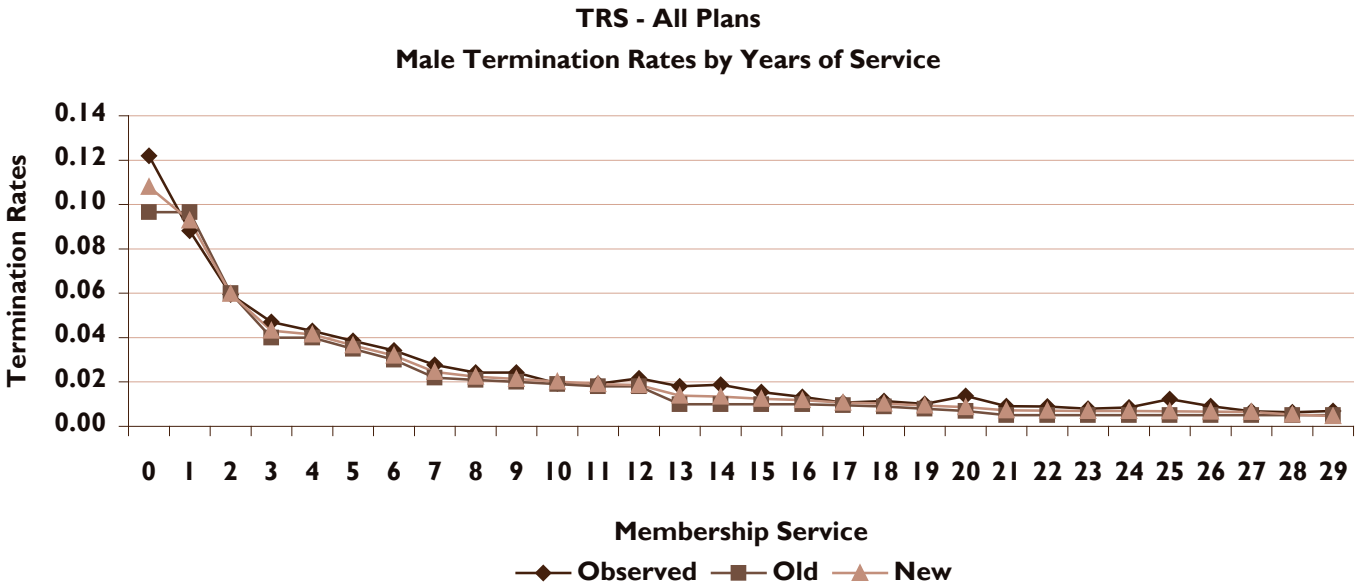
The rate-setting method above resulted in rates that generally predict more terminations than the old rates. For the reasons discussed in the Future Expectations section, we reduced our new termination rates so they are slightly less than halfway, or 45 percent, between our old rates and our new observed rates.

The next table shows a recap of observed and expected counts, along with the ratio of observed to expected counts under the new TRS termination rates.

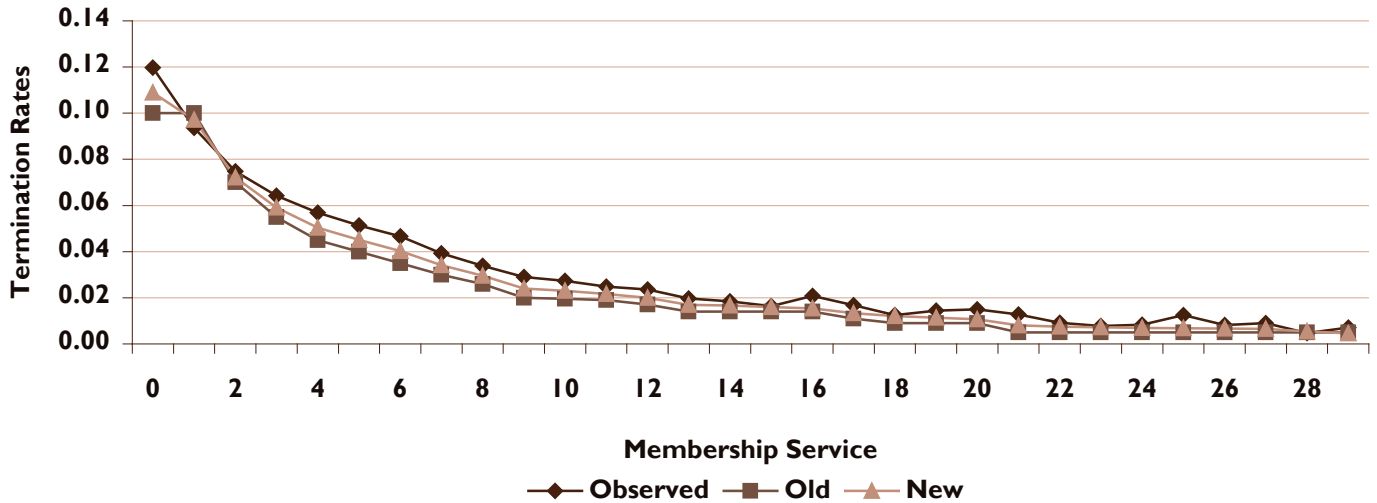
TRS Termination Experience 1995-2004								
Males					Females			
Service	Observed	Old Assumption	New Assumption	Ratio	Observed	Old Assumption	New Assumption	Ratio
0-4	2,906	2,809	2,853	1.02	9,412	8,713	9,027	1.04
5-9	1,119	965	1,030	1.09	3,987	3,015	3,452	1.15
10-14	516	409	460	1.12	1,638	1,199	1,409	1.16
15-19	270	207	242	1.12	820	581	692	1.19
20-24	241	135	185	1.30	429	235	327	1.31
25-29	166	97	118	1.41	187	107	133	1.41
30+	0	0	0	0.00	0	0	0	0.00
Total	5,219	4,621	4,889	1.07	16,474	13,850	15,040	1.10

By using partial credibility for our recent past experience, we make reasonable adjustments to our termination rates without over-adjusting them. This approach allows us to keep monitoring observed rates, making small adjustments in response to new experience.

The following graphs show the observed, expected (old assumptions), and new termination rates for TRS by gender and service.



TRS - All Plans
Female Termination Rates by Years of Service



The table below shows a summary of our observed termination rates, our old rates, and our new rates by service and gender.

TRS - All Plans						
Probability of Termination						
Service Years	Observed Rates		Old Rates		New Rates	
	Males	Females	Males	Females	Males	Females
0	0.121984	0.119705	0.0965	0.1000	0.107968	0.108867
1	0.088181	0.093623	0.0965	0.1000	0.092756	0.097130
2	0.059438	0.074749	0.0600	0.0700	0.059747	0.072137
3	0.047053	0.064262	0.0400	0.0550	0.043174	0.059168
4	0.043065	0.056850	0.0400	0.0450	0.041379	0.050333
5	0.038498	0.051356	0.0350	0.0400	0.036574	0.045110
10	0.021722	0.027388	0.0190	0.0195	0.020225	0.023050
15	0.015235	0.018408	0.0100	0.0140	0.012356	0.015984
20	0.010648	0.012752	0.0070	0.0090	0.008641	0.010689
25	0.008947	0.009141	0.0050	0.0050	0.006776	0.006864
30+	0.002674	0.002371	0.0050	0.0050	0.003953	0.003817

Past Experience

We observed slightly fewer SERS male members terminating during the study period than our old termination assumption predicted. We saw more female members terminate than we expected. The next table shows a breakdown of this information by gender and service.

SERS Termination Experience 1995-2004						
Service	Males			Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
0-4	5,472	5,615	0.97	17,839	16,941	1.05
5-9	1,200	1,217	0.99	4,978	4,637	1.07
10-14	533	517	1.03	2,241	2,227	1.01
15-19	234	198	1.18	833	753	1.11
20-24	72	28	2.55	222	80	2.78
25-29	6	1	6.28	4	2	2.63
30+	0	0	0.00	0	0	0.00
Total	7,517	7,576	0.99	26,117	24,640	1.06

We adjusted the data due to a short (nine-month) valuation period in 2001. We looked at terminations by month and found that for SERS, 85 percent of terminations occur from January through September. As a result, we adjusted the observed termination counts for this year by dividing the counts by 85 percent. We adjusted the observed rehire counts prior to 2001 in a similar way.

SERS opened to new membership on September 1, 2000, and had its first valuation date December 31, 2000. This four-month valuation period was too short to measure termination rates reliably, so we excluded the data for 2000.

Otherwise, we did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We identified records for 1995 through 1999 from PERS data as Plan 2 and 3 school district and educational service district employees. We added this information to our database to improve the overall credibility of the data for purposes of this study.

After removing the 2000 counts, we considered terminations by year to see if we could identify any obvious trends in the rates over time. The next table shows observed to expected ratios for the entire system by valuation year.

SERS Termination Counts by Year			
Year	Observed	Expected	Ratio
1995	3,391	3,416	0.99
1996	3,263	3,289	0.99
1997	3,631	3,383	1.07
1998	3,556	3,572	1.00
1999	3,751	3,588	1.05
2001	4,355	3,873	1.12
2002	3,846	3,811	1.01
2003	4,122	3,792	1.09
2004	3,719	3,491	1.07
Total	33,634	32,216	1.04

We believe that termination rates increase when the economy is strong, and decrease in a weaker economic environment. We think that during the years 1995-2004, the economy showed more strong times than weak ones. In other words, we believe there is not a complete business cycle in that time period. We think this might partially explain why observed termination rates were higher than expected.

Assumption Format

We currently apply termination rates for the entire system, by gender. We considered developing termination rates by age, rather than service, but the resulting rates are quite variable at older ages. We did not pursue developing termination rates by age.

We also considered developing separate rates for each plan, but experience in the closed plans decreases over time, especially at lower service levels. We did not pursue this format change.

We considered developing one set of rates for both genders, but we believe that rates for males and females are different enough from each other that blending the rates for both genders would cause a material difference.

Future Expectations

Using past experience is helpful when developing our new termination rates. Considering future trends and expectations is also important in the analysis. We do not believe we should rely entirely on data from the recent past.

We set our old termination rates to match the experience in the 1995-1998 data. Some of the variability in the actual rates we see for this current study period of 1995-2004 comes from our method change (how we count observed terminations). However, most of the variability comes from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current observed results.

We expect termination rates to continue to fluctuate with the economy as they have in the past. We also believe that rates are higher than they might be if we had studied data during a complete economic cycle. We therefore assigned an additional downward adjustment factor of 5 percent.

Best Estimate SERS Termination Rates

Observed average termination rates in SERS start out high for members with little service. They then drop off rapidly as service increases. After a few years of service, the slope of the curve flattens out, showing a much slower decrease as service increases.

To fit these curves, we matched the rates for lower service to our observed experience, beginning with zero years of service. We continued with this theme until we saw an increase in the observed termination rate from one service level to the next. From that point on, we used a rolling five-year average of observed termination rates to smooth our estimated rates. Additionally, if the transition from observed rates to the rolling five-year average produced a jump in rates from one service level to the next, we started the five-year average at a lower service level to help smooth the curve. Finally, we held the rates at 30 years of service constant for all other, higher service levels. If termination rates dropped to zero before 30 years of service, we kept the rate from the prior year of service constant for higher service levels. This allowed us to use a small termination rate for members with high service, but not yet eligible for retirement.

The rate-setting method above resulted in rates that generally predict more terminations than the old rates. For the reasons discussed in the Future Expectations section, we reduced our new termination rates so they are slightly less than halfway, or 45 percent, between our old rates and our new observed rates.

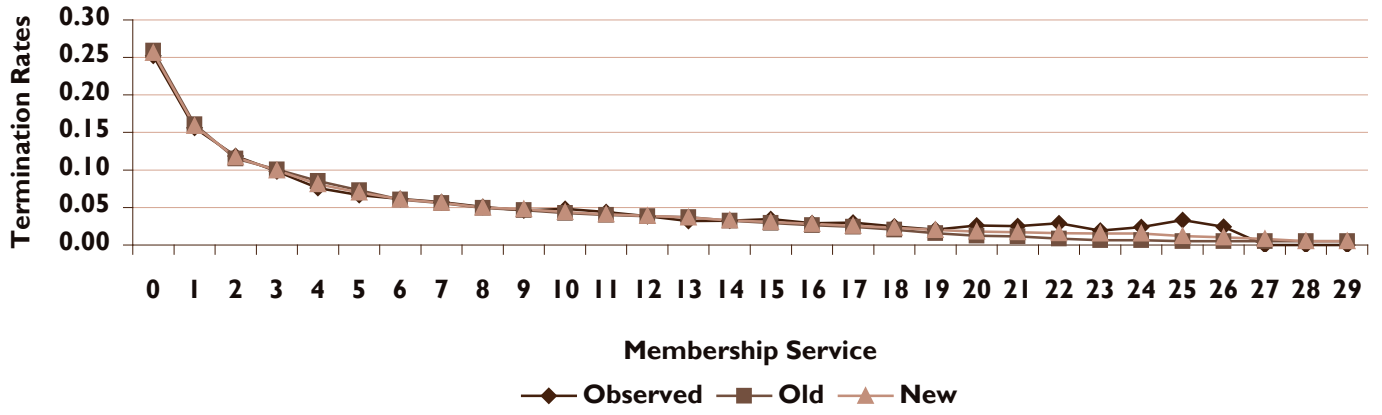
The following table shows a recap of observed and expected counts, along with the ratio of observed to expected counts under the new SERS termination rates.

SERS Termination Experience 1995-2004								
Service	Males				Females			
	Observed	Old Assumption	New Assumption	Ratio	Observed	Old Assumption	New Assumption	Ratio
0-4	5,472	5,615	5,551	0.99	17,839	16,941	17,346	1.03
5-9	1,200	1,217	1,214	0.99	4,978	4,637	4,790	1.04
10-14	533	517	523	1.02	2,241	2,227	2,246	1.00
15-19	234	198	214	1.09	833	753	796	1.05
20-24	72	28	48	1.50	222	80	136	1.62
25-29	6	1	2	2.74	4	2	3	1.30
30+	0	0	0	0.00	0	0	0	0.00
Total	7,517	7,576	7,553	1.00	26,117	24,640	25,317	1.03

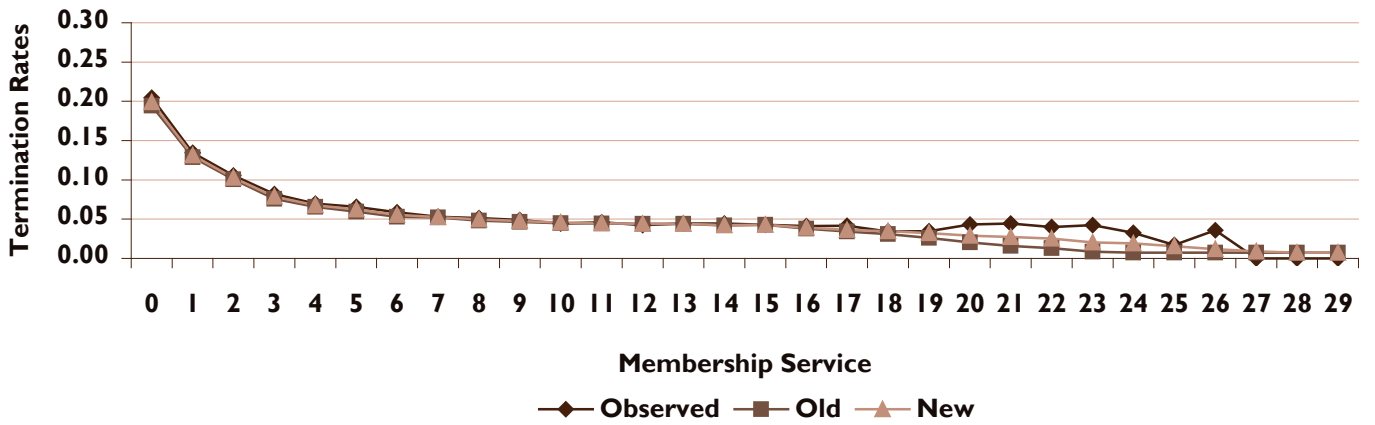
By using partial credibility for our recent past experience, we make reasonable adjustments to our termination rates without over-adjusting them. This approach allows us to monitor observed rates, making small adjustments in response to new experience.

The following graphs show the observed, expected (old assumptions), and new termination rates for SERS by gender and service.

SERS - All Plans
Male Termination Rates by Years of Service



SERS - All Plans
Female Termination Rates by Years of Service



The next table shows a summary of our observed termination rates, our old rates, and our new rates by service and gender.

SERS - All Plans						
Probability of Termination						
Service Years	Observed Rates		Old Rates		New Rates	
	Males	Females	Males	Females	Males	Females
0	0.252277	0.204566	0.2590	0.1945	0.255974	0.199030
1	0.156178	0.134436	0.1609	0.1287	0.158775	0.131281
2	0.118767	0.105607	0.1154	0.1007	0.116915	0.102908
3	0.098055	0.081778	0.1007	0.0760	0.099510	0.078600
4	0.075990	0.069707	0.0852	0.0658	0.081055	0.067558
5	0.066580	0.065750	0.0728	0.0597	0.070001	0.062423
10	0.045471	0.046611	0.0426	0.0450	0.043892	0.045725
15	0.031638	0.042911	0.0296	0.0426	0.030517	0.042740
20	0.025093	0.039237	0.0124	0.0203	0.018112	0.028822
25	0.020194	0.025563	0.0050	0.0075	0.011837	0.015628
30+	0.004878	0.007143	0.0050	0.0075	0.004945	0.007339

LEOFF

Past Experience

We observed more LEOFF members terminating during the study period than our old termination assumption predicted. The next table shows a breakdown of this information by service.

LEOFF Termination Experience 1995-2004			
Males & Females			
Service	Observed	Expected	Ratio
0-4	1,327	1,262	1.05
5-9	637	606	1.05
10-14	408	349	1.17
15-19	198	157	1.26
20-24	131	91	1.43
25-29	21	20	1.07
30+	0	0	0.00
Total	2,722	2,484	1.10

We adjusted the data due to a short (nine-month) valuation period in 2001. We looked at terminations by month and found that for LEOFF, 75 percent of terminations occur from January through September. As a result, we adjusted the observed termination counts for this year by dividing the counts by 75 percent. We adjusted the observed rehire counts prior to 2001 in a similar way.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We considered terminations by year to see if we could identify any obvious trends in the rates over time. The table below shows observed to expected ratios for the entire system by valuation year.

LEOFF Termination Counts by Year			
Year	Observed	Expected	Ratio
1995	220	230	0.96
1996	236	236	1.00
1997	239	241	0.99
1998	267	243	1.10
1999	304	241	1.26
2000	314	263	1.20
2001	347	251	1.38
2002	258	263	0.98
2003	250	254	0.99
2004	286	263	1.09
Total	2,721	2,484	1.10

We believe that termination rates increase when the economy is strong, and decrease in a weaker economic environment. We think that during the years 1995-2004, the economy showed more strong times than weak ones. In other words, we believe there is not a complete business cycle in that time period. We think this might partially explain why observed termination rates were higher than expected.

Assumption Format

We currently apply our termination rates for the entire system, males and females combined.

We considered developing termination rates by gender, but the female population in LEOFF is too small. There is not enough experience to develop reliable rates at this time. Even if we could develop reliable rates, there are so few females that there is not a material difference between the two approaches. We will continue to consider this change as female membership in LEOFF increases.

We considered developing termination rates by age, rather than service, but the resulting rates are quite variable at older ages.

We considered developing separate rates for each plan, but experience in Plan 1 is very small because it is a closed plan and most members are at or near retirement eligibility. We did not pursue this format change.

We also looked at developing termination rates by occupation (fire fighters and law enforcement officers). The resulting separate assumptions did not produce a material difference in the plan's liabilities. We will continue to monitor this approach as a possibility for future studies.

Future Expectations

Past experience is helpful in developing our new termination rates. However, future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

Our old termination rates were set to match the experience in the 1995-1998 data. Some of the variability in the actual rates we see for this current study period of 1995-2004 comes from our method change

(how we count observed terminations). However, most of the variability comes from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current observed results.

We expect termination rates to continue to fluctuate with the economy as they have in the past. We also believe that rates are higher than they might be if we had studied data during a complete economic cycle. We therefore assigned an additional downward adjustment factor of 5 percent.

Best Estimate LEOFF Termination Rates

Observed average termination rates in LEOFF start out high for members with little service. They then drop off rapidly as service increases. After a few years of service, the slope of the curve flattens out, showing a much slower decrease as service increases.

To fit this curve, we matched the rates for lower service to our observed experience, beginning with zero years of service. We continued with this theme until we saw an increase in the observed termination rate from one service level to the next. From that point on, we used a rolling five-year average of observed termination rates to smooth our estimated rates. Additionally, if the transition from observed rates to the rolling five-year average produced a jump in rates from one service level to the next, we started the five-year average at a lower service level to help smooth the curve. Finally, we held the rates at 30 years of service constant for all other, higher service levels. If termination rates dropped to zero before 30 years of service, we kept the rate from the prior year of service constant for higher service levels. This allowed us to use a small termination rate for members with high service, but not yet eligible for retirement.

The rate-setting method above resulted in rates that generally predict more terminations than the old rates. For the reasons discussed in the Future Expectations section, we reduced our new termination rates so they are slightly less than halfway, or 45 percent, between our old rates and our new observed rates.

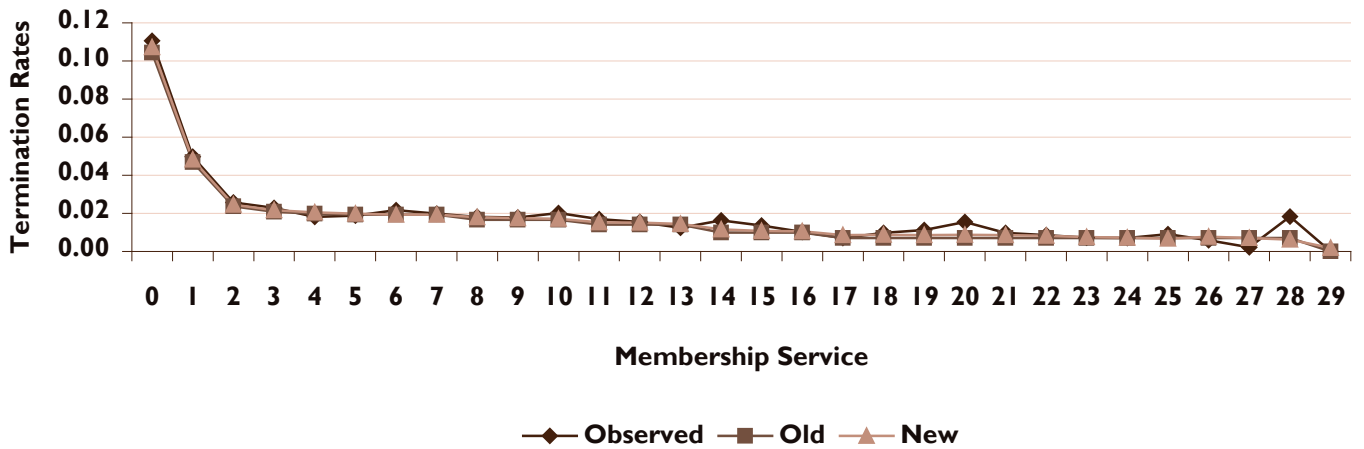
The table below shows a recap of observed and expected counts, along with the ratio of observed to expected counts under the new LEOFF termination rates.

LEOFF Termination Experience 1995-2004				
Males & Females				
Service	Observed	Old Assumption	New Assumption	Ratio
0-4	1,327	1,262	1,337	0.99
5-9	637	606	621	1.02
10-14	408	349	370	1.10
15-19	198	157	181	1.10
20-24	131	91	106	1.23
25-29	21	20	20	1.07
30+	0	0	0	0.00
Total	2,722	2,484	2,635	1.03

By using partial credibility for our recent past experience, we make reasonable adjustments to our termination rates without over-adjusting them. This approach allows us to monitor observed rates, making small adjustments in response to new experience.

The following graph shows the observed, old, and new termination rates by service.

**LEOFF - All Plans
Termination Rates by Years of Service**



The next table shows a summary of our observed termination rates, our old rates, and our new rates by service.

We added an additional column to show that termination rates have been adjusted for Plan 2. We expect more members will become eligible for duty-related disability benefits under new occupational disease provisions for fire fighters. We believe if more members receive disability benefits, then fewer members will terminate. Please check the Miscellaneous section for more details about occupational disease benefits.

LEOFF - All Plans				
Probability of Termination				
Males and Females				
Service Years	Observed Rates	Old Rates	New Rates	Plan 2 - Adjusted Rates
0	0.110639	0.1043	0.1072	0.1062
1	0.049741	0.0469	0.0482	0.0472
2	0.025710	0.0237	0.0246	0.0236
3	0.022870	0.0208	0.0217	0.0208
4	0.021475	0.0198	0.0206	0.0196
5	0.020303	0.0194	0.0198	0.0188
10	0.017702	0.0167	0.0172	0.0162
15	0.011935	0.0099	0.0108	0.0098
20	0.010940	0.0070	0.0088	0.0078
25	0.006269	0.0070	0.0067	0.0057
30+	0.003659	0.0000	0.0016	0.0007

Past Experience

We observed more WSPRS members terminating during the study period than our old termination assumption predicted. The next table shows a breakdown of this information by service.

WSPRS Termination Experience 1995-2004			
Males & Females			
Service	Observed	Expected	Ratio
0-4	39	44	0.88
5-9	35	32	1.09
10-14	24	18	1.35
15-19	10	8	1.23
20-24	7	2	3.45
25-29	0	0	0.00
30+	0	0	0.00
Total	116	105	1.10

We adjusted the data due to a short (nine-month) valuation period in 2001. We looked at terminations by month and found that for WSPRS, 75 percent of terminations occur from January through September. As a result, we adjusted the observed termination counts for this year by dividing the counts by 75 percent. We adjusted the observed rehire counts prior to 2001 in a similar way.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We did not consider terminations by year to see if we could determine any obvious trends in the rates over time. WSPRS termination experience is too limited to get meaningful trend information.

We believe that termination rates increase when the economy is strong, and decrease in a weaker economic environment. We think that during the years 1995-2004, the economy showed more strong times than weak ones. In other words, we believe there is not a complete business cycle in that time period. We think that this might partially explain why observed termination rates were higher than expected.

Assumption Format

We currently apply our termination rates for the entire system, males and females combined.

We considered developing termination rates by gender, but the female population in WSPRS is too small. There is not enough experience to develop reliable rates at this time. Even if we could develop reliable rates, there are so few females that there is not a material difference between the two approaches. We will continue to consider this change as female membership increases.

We also considered developing separate rates for each plan, but experience in Plan 2 is quite limited at this point. We did not pursue this format change.

Future Expectations

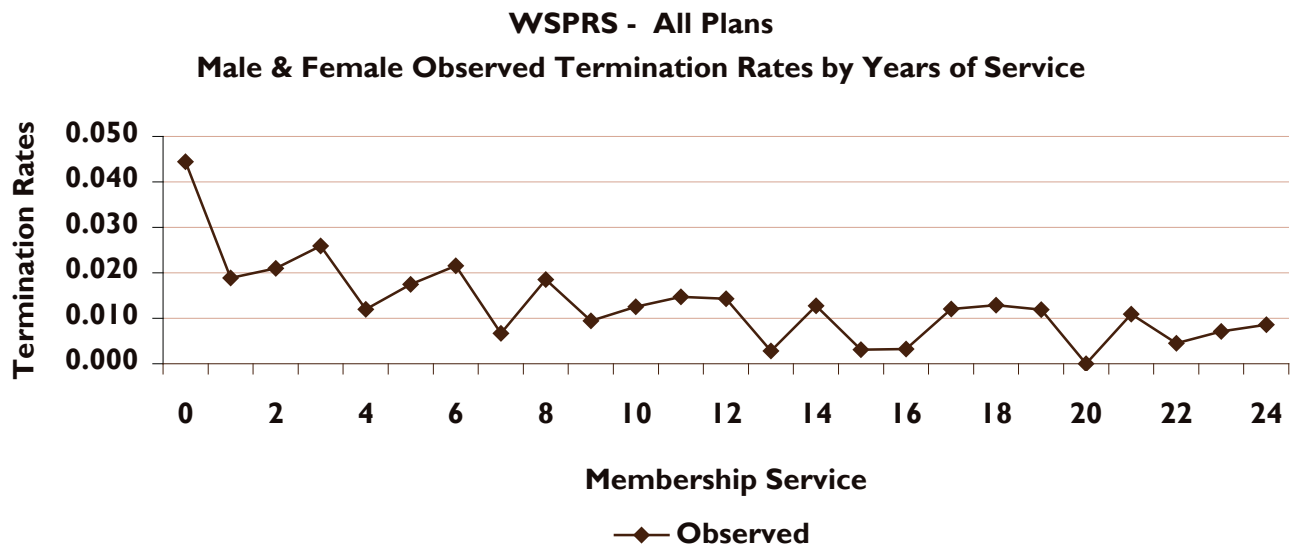
Using past experience is helpful when developing our new termination rates. Considering future trends and expectations is also important in the analysis. We do not believe we should rely entirely on data from the recent past.

Our old termination rates were set to match the experience in the 1995-1998 data. Some of the variability in the actual rates we see for this current study period of 1995-2004 comes from our method change (how we count observed terminations). However, much of the rest of the variability comes from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current observed results.

We expect termination rates to continue to fluctuate with the economy as they have in the past. We also believe that rates are higher than they might be if we had studied data during a complete economic cycle. We therefore assigned an additional downward adjustment factor of 5 percent.

Best Estimate WSPRS Termination Rates

Observed average termination rates in WSPRS start out high for members with little service. They then drop off rapidly as service increases. After a few years of service, the slope of the curve flattens out, showing a much slower decrease as service increases. The chart below shows observed WSPRS termination rates by service for males and females combined.

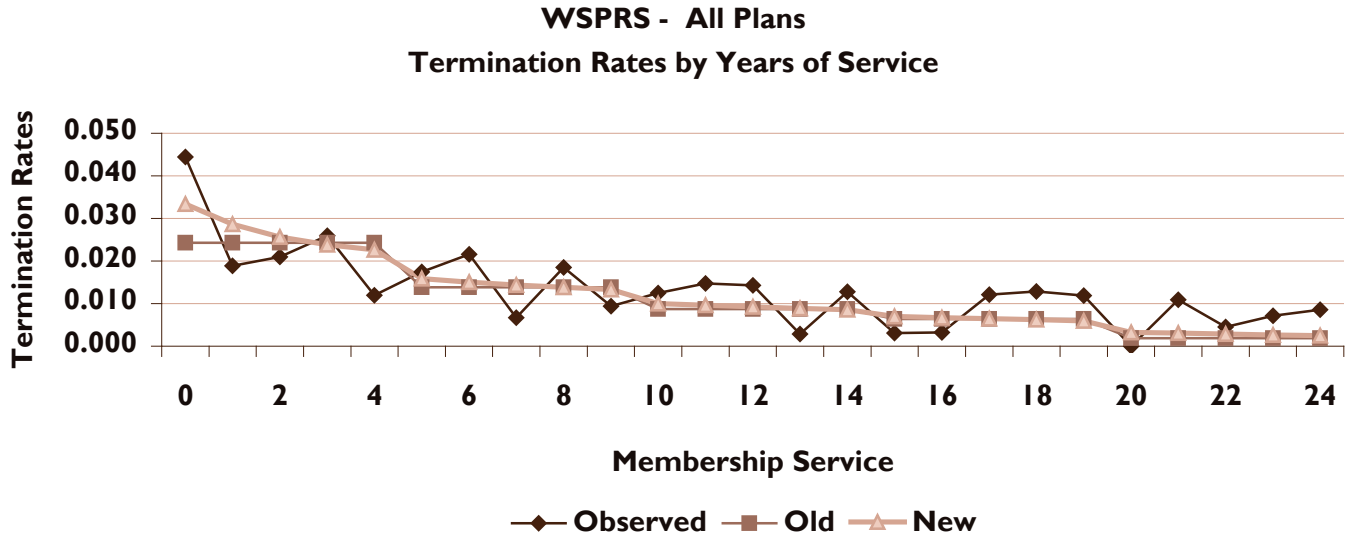


WSPRS is such a small system that we see much more variable rates between service levels than we see for other systems. If we were to use the same method to develop our termination assumption, the curve would not be as smooth as those for other systems. However, we can still see the general decrease in termination rates as service increases. We used regression analysis to develop a natural logarithm curve that can “predict” an expected termination rate by membership service.

This method is different from the previous method used to fit a curve to the actual rates. Our old method found five-year average rates and continued those rates for five years. The result was a series of disjointed horizontal line segments that decreased every five years.

The new rate-setting method above resulted in rates that generally predict more terminations than the old rates. For the reasons discussed in the Future Expectations section, we reduced our new termination rates so they are slightly less than halfway, or 45 percent, between our old rates and our new observed rates.

The following chart shows the termination rates we actually observed, our old termination assumptions, and our new termination rates.



The table below shows a summary of our observed termination rates, our old rates, and our new rates by service.

WSPRS - All Plans			
Probability of Termination			
Males and Females			
Service Years	Observed Rates	Old Rates	New Rates
0	0.044444	0.0243	0.033365
1	0.018868	0.0243	0.028665
2	0.021012	0.0243	0.025639
3	0.025940	0.0243	0.023870
4	0.011966	0.0243	0.022614
5	0.017478	0.0138	0.015865
10	0.012509	0.0087	0.010034
15	0.003115	0.0064	0.006999
20	0.000000	0.0019	0.003269
25+	0.000000	0.0000	0.000000

Service-Based Salary Increases

We assume active members in each system receive salary increases into the future, as long as they remain active in their retirement plan.

We set assumptions for two types of salary increases – general salary and service-based salary.

The general salary increase assumption is an economic assumption. The Legislature prescribed the current assumption of 4.5 percent.

We study all other service-based salary increases to form a single assumption for use in our valuation software. These increases can include step or merit increases, promotions, overtime, or extra contracts.

Both of these assumptions together model total salary increases in our valuation software.

Data Used

We used experience study records from 1982-2006 to measure salary increases.

Assumptions Made

As we developed our service-based salary assumptions, we found that the prescribed general salary increase assumption should be lowered. While we typically do not study economic assumptions during a demographic experience study, we believe the two types of assumptions must fit together well. If one of them does not accurately reflect actual experience, then the total salary increase assumption is not accurate.

All other assumptions used in the development of the service-based salary increase assumption match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

Our data provide twenty-five years' records, from 1982 to 2006. We summed experience from most of those years to improve reliability. We studied the salaries of active members who remained full-time two years in a row. For this reason, our first study year was 1984.

We organize our data by service level and by year. For each service level, we divide the current year salary by the prior year salary to determine the total salary increase.

From there, we approximate an observed general salary increase for all service levels. Once we remove the general salary increase, we are left with actual, or observed, service-based salary increase assumptions.

Part of our analysis includes limiting volatility over short periods of time. We do not want to make adjustments to fit the recent past experience to exactly 100 percent. If we did this, we may see observed

increases rebound in the other direction in the next experience study. Our goal is to move closer to 100 percent and make further refinements, if necessary, in subsequent experience studies.

Please see the Development of Rates section below for a discussion of how we developed our new service-based salary increase assumptions for each system.

Development of Assumptions

PERS

Past Experience

Over the twenty-three-year study period, we saw smaller average total salary increases in PERS than expected. The next table shows actual and expected average total salary increases, and the ratio of actual to expected increases.

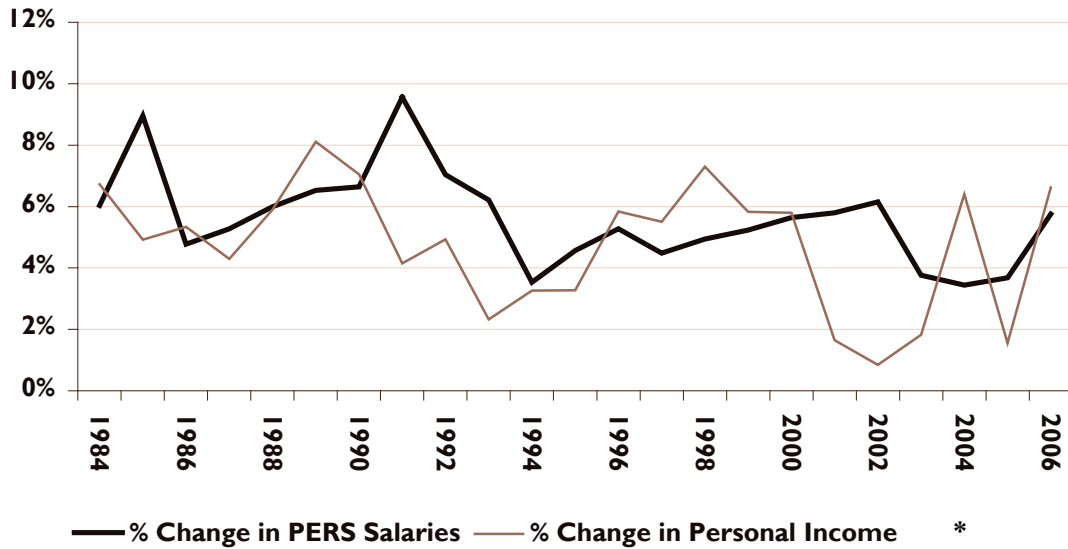
PERS Actual vs. Expected Total Salary Increases 1984-2006			
Service	Actual	Expected	Ratio
1	10.24%	10.87%	0.94
2	8.85%	9.52%	0.93
3	7.71%	8.47%	0.91
4	6.97%	7.53%	0.93
5	6.28%	6.69%	0.94
6-10	5.00%	5.38%	0.93
11-15	4.23%	4.67%	0.91
16-20	3.94%	4.52%	0.87
21+	3.84%	4.50%	0.85
Total	5.20%	5.92%	0.88

We eliminated one PERS record that showed zero years of service at the end of their first full-time year. Either the service was incorrect, or, more likely, the field indicating full-time status was in error.

We adjusted the data due to a short (nine-month) valuation period in 2001. We changed the salary increase for this year by increasing the second-year salary using three months' general salary increase. This adjustment mitigates the missed salary increases in the last three months of the year.

We considered total salary increases by year to see if we could determine any obvious trends in the increases over time. The next chart shows PERS total salary increases as compared to Washington per capita income for the same period.

**Percent Change in Washington Per Capita Personal Income
and PERS Salaries by Year 1984 - 2006***



*Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce.

We found that total salary increases were positively correlated to increases in per capita income for the study period. We believe that salary increases are larger when the economy is strong, and smaller in a weaker economic environment. We believe the economy had as many strong cycles as weak ones from 1984 to 2006. We do not believe an additional adjustment to salary increases is necessary.

To get from total salary increases to service-based assumptions, we backed out an observed average general salary increase of 3.9 percent at all service levels.

Assumption Format

We currently apply our service-based salary increase assumptions for the entire system, both genders combined, by service.

We considered developing separate rates for each plan, but experience in the closed plans is shrinking, especially at lower service levels. We did not pursue this format change.

We did not consider developing rates by gender.

We believe salary is more strongly tied to service than to age, so we did not consider a change to age-based assumptions.

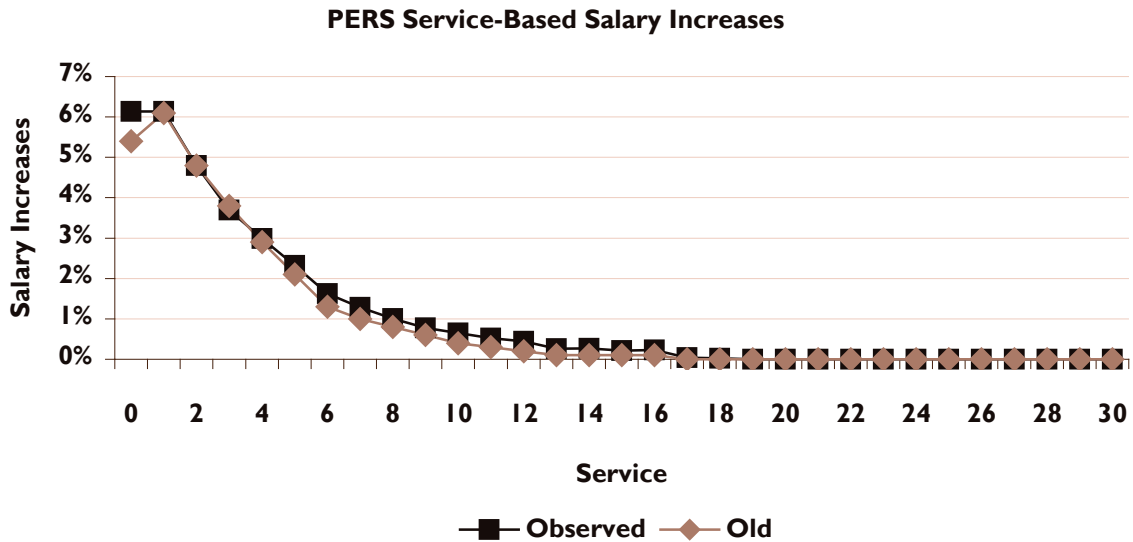
Future Expectations

We believe that past experience is helpful when developing our new service-based salary increase assumptions. However, future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We expect total salary increases to continue to fluctuate with the economy as they have in the past.

Best Estimate PERS Service-Based Salary Increases

Average PERS service-based salary increases start out high for members with little membership service. They then drop off rapidly as service increases. After several years of service, the slope of the curve flattens out, showing a much slower decrease as service increases. The following chart shows a comparison of observed increases and increases expected under our old assumption.



PERS observed increases match expected increases fairly closely. We made minor adjustments to the observed service-based salary increases so that our new salary scale would fall between the old assumption and the observed increases.

The following table shows a summary of observed, old, and new service-based salary increase assumptions for PERS.

PERS - All Plans - Service-Based Salary Increase Assumption			
Service	Observed	Old	New
1	6.13%	6.10%	6.10%
2	4.80%	4.80%	4.80%
3	3.70%	3.80%	3.80%
4	2.99%	2.90%	2.90%
5	2.32%	2.10%	2.20%
10	0.65%	0.40%	0.50%
15	0.22%	0.10%	0.20%
20	0.00%	0.00%	0.00%
25	0.00%	0.00%	0.00%
30	0.00%	0.00%	0.00%

Past Experience

Over the twenty-three-year study period, we saw smaller average total salary increases in TRS than expected. The next table shows actual and expected average total salary increases, and the ratio of actual to expected increases.

TRS Actual vs. Expected Total Salary Increases 1984-2006			
Service	Actual	Expected	Ratio
1	9.42%	10.98%	0.86
2	8.05%	9.10%	0.89
3	7.98%	8.89%	0.90
4	7.50%	8.16%	0.92
5	7.02%	7.74%	0.91
6-10	6.42%	6.94%	0.93
11-15	5.32%	5.85%	0.91
16-20	4.10%	4.54%	0.90
21+	3.93%	4.50%	0.87
Total	5.49%	6.37%	0.86

We eliminated two TRS records that showed zero years of service at the end of their first full-time year. Either the service was incorrect, or, more likely, the field indicating full-time status was in error.

We adjusted the data due to a long (fifteen-month) valuation period in 2001. We changed the salary increase for this year by decreasing the second-year salary using one month’s general salary increase. This adjustment mitigates the additional salary increases in the first three months of the year. We only removed one month’s increase because the salary increase for that year was not far from expected.

We considered total salary increases by year to see if we could determine any obvious trends in the increases over time. As with PERS, we found that total salary increases were positively correlated to increases in per capita income for the study period. We do not believe an additional adjustment to salary increases is necessary.

To get from total salary increases to service-based assumptions, we backed out an observed average general salary increase of 3.8 percent at all service levels.

Assumption Format

We currently apply our service-based salary increase assumptions for the entire system, both genders combined, by service.

We considered developing separate rates for each plan, but experience in the closed plans is shrinking, especially at lower service levels. We did not pursue this format change.

We did not consider developing rates by gender.

We believe salary is more strongly tied to service than to age, so we did not consider a change to age-based assumptions.

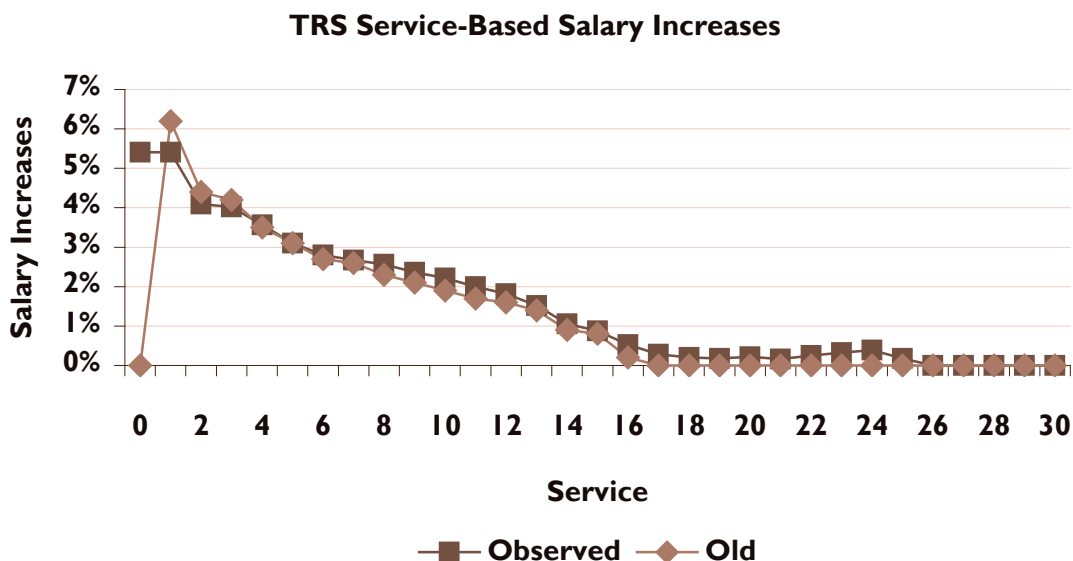
Future Expectations

We believe that past experience is helpful in developing our new service-based salary increase assumptions, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We expect total salary increases to continue to fluctuate with the economy as they have in the past.

Best Estimate TRS Service-Based Salary Increases

Average TRS service-based salary increases start out high for members with little membership service. They then drop off rapidly as service increases. After several years of service, the slope of the curve flattens out, showing a much slower decrease as service increases. The following chart shows a comparison of observed increases and increases expected under our old assumption.



TRS observed increases match expected increases fairly closely. We made minor adjustments to the observed service-based salary increases so that our new salary scale would fall between the old assumption and the observed increases.

The following table shows a summary of observed, old, and new service-based salary increase assumptions.

TRS - All Plans - Service-Based Salary Increase Assumption			
Service	Observed	Old	New
1	5.41%	6.20%	5.80%
2	4.09%	4.40%	4.30%
3	4.02%	4.20%	4.10%
4	3.57%	3.50%	3.50%
5	3.10%	3.10%	3.10%
10	2.21%	1.90%	2.00%
15	0.88%	0.80%	0.80%
20	0.22%	0.00%	0.10%
25	0.18%	0.00%	0.10%
30	0.00%	0.00%	0.00%

SERS

Past Experience

Over the twenty-three-year study period, we saw smaller average total salary increases in SERS than expected. The next table shows actual and expected average total salary increases, and the ratio of actual to expected increases.

SERS Actual vs. Expected Total Salary Increases 1984-2006			
Service	Actual	Expected	Ratio
1	10.22%	11.82%	0.87
2	7.31%	8.58%	0.85
3	6.27%	7.43%	0.84
4	5.71%	6.90%	0.83
5	5.53%	6.80%	0.81
6-10	4.57%	5.62%	0.81
11-15	3.73%	4.86%	0.77
16-20	3.30%	4.53%	0.73
21+	3.04%	4.50%	0.68
Total	4.91%	6.27%	0.78

We did not eliminate any SERS records due to quality concerns.

We adjusted the data due to a short (nine-month) valuation period in 2001. We changed the salary increase for this year by increasing the second-year salary using three months' general salary increase. This adjustment mitigates the missed salary increases in the last three months of the year.

We considered total salary increases by year to see if we could determine any obvious trends in the increases over time. As with PERS, we found that total salary increases were positively correlated to increases in per capita income for the study period. We do not believe an additional adjustment to salary increases is necessary.

To get from total salary increases to service-based assumptions, we backed out an observed average general salary increase of 3.3 percent at all service levels.

Assumption Format

We currently apply our service-based salary increase assumptions for the entire system, both genders combined, by service.

We considered developing separate rates for each plan, but we did not pursue this format change.

We did not consider developing rates by gender.

We believe salary is more strongly tied to service than to age, so we did not consider a change to age-based assumptions.

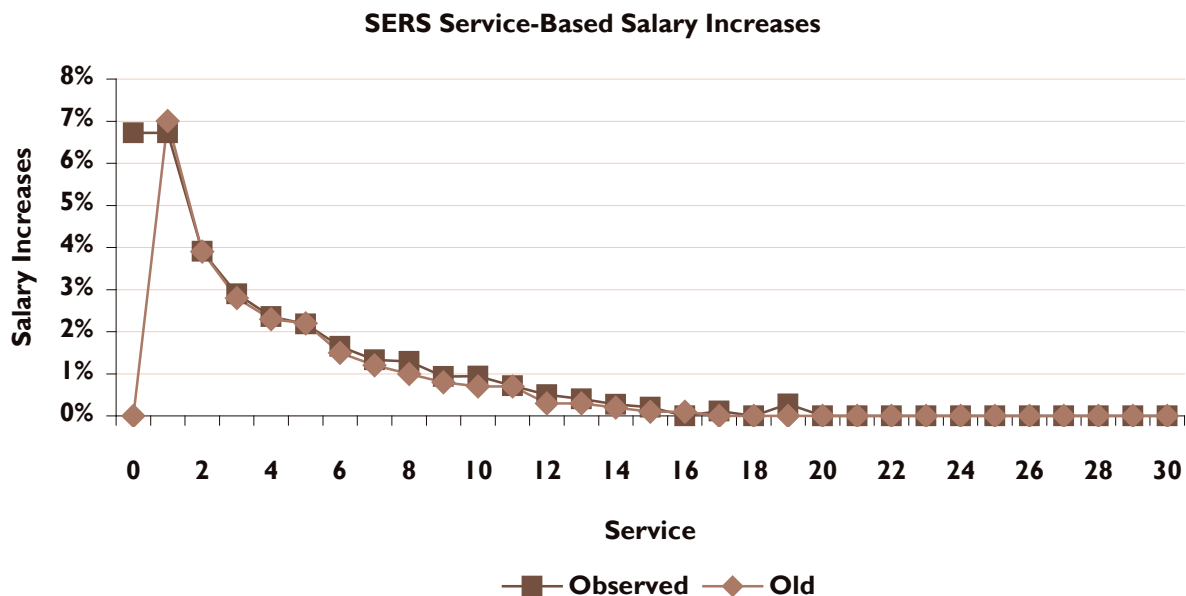
Future Expectations

Using past experience is helpful when developing our new service-based salary increase assumptions. However, future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We expect total salary increases to continue to fluctuate with the economy as they have in the past.

Best Estimate SERS Service-Based Salary Increases

Average SERS service-based salary increases start out high for members with little membership service. They then drop off rapidly as service increases. After several years of service, the slope of the curve flattens out, showing a much slower decrease as service increases. The following chart shows a comparison of observed increases and increases expected under our old assumption.



SERS observed increases match expected increases fairly closely. We made minor adjustments to the observed service-based salary increases so that our new salary scale would fall between the old assumption and the observed increases.

The following table shows a summary of observed, old, and new service-based salary increase assumptions.

SERS - All Plans - Service-Based Salary Increase Assumption			
Service	Observed	Old	New
1	6.72%	7.00%	6.90%
2	3.91%	3.90%	3.90%
3	2.90%	2.80%	2.90%
4	2.35%	2.30%	2.30%
5	2.18%	2.20%	2.20%
10	0.95%	0.70%	0.80%
15	0.20%	0.10%	0.10%
20	0.00%	0.00%	0.00%
25	0.00%	0.00%	0.00%
30	0.00%	0.00%	0.00%

LEOFF

Past Experience

Over the twenty-three-year study period, we saw smaller average total salary increases in LEOFF than expected. The next table shows actual and expected average total salary increases, and the ratio of actual to expected increases.

LEOFF Actual vs. Expected Total Salary Increases 1984-2006			
Service	Actual	Expected	Ratio
1	14.61%	16.73%	0.87
2	11.47%	12.96%	0.89
3	9.60%	11.40%	0.84
4	7.54%	9.20%	0.82
5	6.36%	7.84%	0.81
6-10	5.05%	6.75%	0.75
11-15	4.74%	6.30%	0.75
16-20	4.57%	6.08%	0.75
21+	3.65%	4.50%	0.81
Total	5.57%	7.33%	0.76

We did not eliminate any LEOFF records due to quality concerns.

We adjusted the data due to a short (nine-month) valuation period in 2001. We changed the salary increase for this year by increasing the second-year salary using three months' general salary increase. This adjustment mitigates the missed salary increases in the last three months of the year.

We considered total salary increases by year to see if we could determine any obvious trends in the increases over time. As with PERS, we found that total salary increases were positively correlated to increases in per capita income for the study period. We do not believe an additional adjustment to salary increases is necessary.

To get from total salary increases to service-based assumptions, we backed out an observed average general salary increase of 3.9 percent at all service levels.

Assumption Format

We currently apply our service-based salary increase assumptions for the entire system, both genders combined, by service.

We considered developing separate rates for each plan, but experience in the closed plans is shrinking, especially at lower service levels. We did not pursue this format change.

We did not consider developing rates by gender.

We believe salary is more strongly tied to service than to age, so we did not consider a change to age-based assumptions.

We considered but did not pursue developing separate salary scales by occupation (fire fighter and law enforcement officer). We will continue to evaluate these optional formats in future experience studies.

Future Expectations

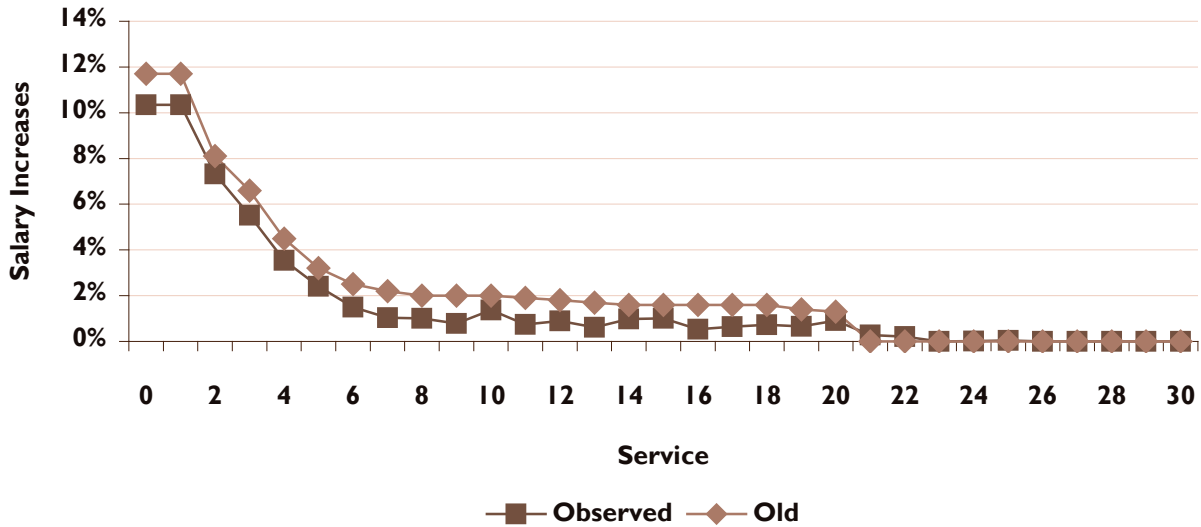
We believe that past experience is helpful in developing our new service-based salary increase assumptions, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We expect total salary increases to continue to fluctuate with the economy as they have in the past.

Best Estimate LEOFF Service-Based Salary Increases

Average LEOFF service-based salary increases start out high for members with little membership service. They then drop off rapidly as service increases. After several years of service, the slope of the curve flattens out, showing a much slower decrease as service increases. The following chart shows a comparison of observed increases and increases expected under our old assumption.

LEOFF Service-Based Salary Increases



LEOFF observed increases do not match expected increases as closely as they do in other systems. We made minor adjustments to the observed service-based salary increases so that our new salary scale would fall between the old assumption and the observed increases.

The following table shows a summary of observed, old, and new service-based salary increase assumptions.

LEOFF - All Plans - Service-Based Salary Increase Assumption			
Service	Observed	Old	New
1	10.35%	11.70%	11.00%
2	7.33%	8.10%	7.70%
3	5.52%	6.60%	6.10%
4	3.54%	4.50%	4.00%
5	2.40%	3.20%	2.80%
10	1.37%	2.00%	1.70%
15	1.00%	1.60%	1.30%
20	0.90%	1.30%	1.10%
25	0.04%	0.00%	0.00%
30	0.00%	0.00%	0.00%

Past Experience

Over the twenty-three-year study period, we saw smaller average total salary increases in WSPRS than expected. The next table shows actual and expected average total salary increases, and the ratio of actual to expected increases.

WSPRS Actual vs. Expected Total Salary Increases 1984-2006			
Service	Actual	Expected	Ratio
1	12.73%	10.77%	1.18
2	10.29%	10.77%	0.96
3	8.78%	10.77%	0.82
4	8.36%	10.77%	0.78
5	8.72%	10.77%	0.81
6-10	5.14%	7.02%	0.73
11-15	3.83%	5.86%	0.65
16-20	4.30%	5.61%	0.77
21+	4.36%	4.50%	0.97
Total	5.26%	6.91%	0.76

We did not eliminate any WSPRS records due to quality concerns.

We adjusted the data due to a short (nine-month) valuation period in 2001. We changed the salary increase for this year by increasing the second-year salary using three months' general salary increase. This adjustment mitigates the missed salary increases in the last three months of the year.

We considered total salary increases by year to see if we could determine any obvious trends in the increases over time. As with PERS, we found that total salary increases were positively correlated to increases in per capita income for the study period. We do not believe an additional adjustment to salary increases is necessary.

To get from total salary increases to service-based assumptions, we backed out an observed average general salary increase of 4.2 percent at all service levels.

Assumption Format

We currently apply our service-based salary increase assumptions for the entire system, both genders combined, by service.

We considered developing separate rates for each plan, but experience in Plan 2 is still very limited. We did not pursue this format change.

We did not consider developing rates by gender.

We believe salary is more strongly tied to service than to age, so we did not consider a change to age-based assumptions.

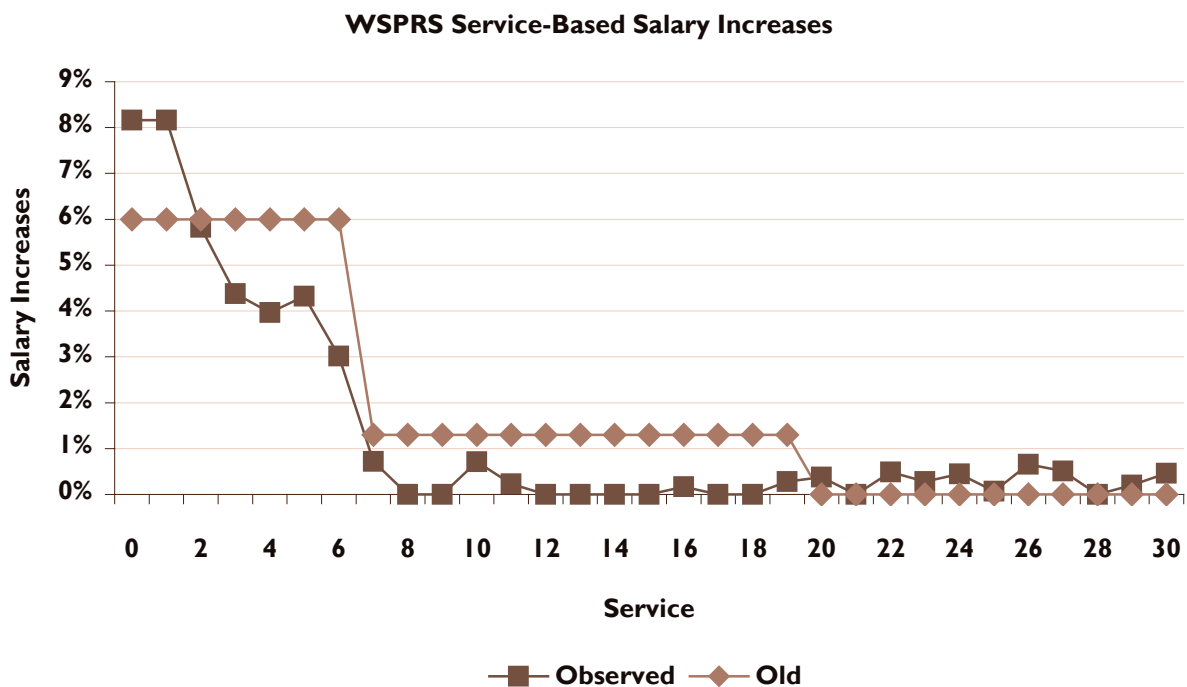
Future Expectations

Past experience is helpful when developing our new service-based salary increase assumptions. Considering future trends and expectations is also important in the analysis. We do not believe we should rely entirely on data from the recent past.

We expect total salary increases to continue to fluctuate with the economy as they have in the past.

Best Estimate WSPRS Service-Based Salary Increases

Average WSPRS service-based salary increases start out high for members with little membership service. They then drop off rapidly as service increases. After several years of service, the slope of the curve flattens out, showing a much slower decrease as service increases. This system is smaller than the others, so we expect a curve that is not as smooth as those for other systems. The following chart shows a comparison of observed increases and increases expected under our old assumption.



WSPRS observed increases do not match expected increases very well. We made adjustments to the observed service-based salary increases so that our new salary scale would fall between the old assumption and the observed increases.

The following table shows a summary of observed, old, and new service-based salary increase assumptions.

WSPRS - All Plans - Service-Based Salary Increase Assumption			
Service	Observed	Old	New
1	8.16%	6.00%	7.10%
2	5.82%	6.00%	5.90%
3	4.38%	6.00%	5.20%
4	3.97%	6.00%	5.20%
5	4.32%	6.00%	5.20%
10	0.71%	1.30%	0.80%
15	0.00%	1.30%	0.40%
20	0.38%	0.00%	0.40%
25	0.07%	0.00%	0.40%
30	0.46%	0.00%	0.00%

Miscellaneous

Percent Vested

Members who terminate service may be vested and entitled to a future annual benefit. Still other members are not vested, but may return to active employment at some time in the future. Members who terminate have the right to withdraw their contributions, with interest, or they may leave their savings in the plan.

Our Percent Vested assumption models the likelihood that terminated vested members will leave their savings in the plan. In our valuation model, those who leave their savings in the plan are entitled to deferred retirement benefits. Those who withdraw their savings receive an immediate return-of-contributions benefit upon termination.

Data Used

We used experience study records from 1995-2006 to count terminations, and among those, members who withdrew their savings.

Assumptions Made

We assume that a member who is eligible to take a service retirement will not terminate. We therefore set our termination rates to zero in our valuation model once a member has attained the age and service combination required for retirement.

We also assume a member will not return to active status if they remain terminated for more than two years.

Lastly, we assume a member who withdraws contributions will do so within two years of termination. Please see the Methods section below for more detail.

Please note that we assume 100 percent of Plan 3 members are vested. These members might withdraw their defined contributions upon termination, but they will not lose their service upon withdrawal.

All other assumptions used in the development of termination rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

Our data provide twelve years' records. We summed experience from most of those years to improve reliability. We viewed the number of active members not eligible for normal retirement as our basis for

members able to terminate. We counted newly terminated members, but subtracted members who rehired to active positions within two years, to arrive at our net number of terminations.

This is a method change from our last experience study, where we looked to the end of the experience study period to find rehires, regardless of the year the termination occurred.

We also looked forward two years to count withdrawals, regardless of the year terminated. This, too, is a method change from our last experience study. In the last study, we looked to the end of the study period to count withdrawals, regardless of the year the terminations occurred.

We only considered active members, new terminations, and withdrawals through 2004 because we looked forward two years to exclude terminated members who eventually returned to work, and to count members who withdrew their savings. Any of those members who terminated through 2004, and did not rehire or withdraw by 2006, were included in our count of actual terminations.

We divided the number of members who did not withdraw by the net number of terminations to arrive at an observed, or actual, percent vested. We made this calculation for each system, by years of service and by plan. The exception to this is WSPRS, which has one rate for both plans combined.

Please see the Development of Rates section below for a discussion of how we developed our new percent vested assumptions for each system.

Development of Assumptions

PERS

Past Experience

We observed more PERS members vesting (not withdrawing) during the study period than our old percent vested assumption predicted. The next table shows this information by plan and service. We set observed and expected counts for service under five years to zero because our valuation model assumes that all members who are not vested receive a refund of contributions upon termination.

PERS Members Maintaining Savings Funds After Termination						
	Plan 1			Plan 2		
Service	Observed	Expected	Ratio	Observed	Expected	Ratio
0-4	0	0	0.00	0	0	0.00
5-9	588	447	1.31	7,978	6,187	1.29
10-14	561	414	1.36	4,379	3,362	1.30
15-19	539	459	1.18	2,072	1,698	1.22
20-24	549	462	1.19	701	529	1.32
25-29	285	227	1.26	36	27	1.32
30+	0	0	0.00	0	0	0.00
Total	2,522	2,009	1.26	15,166	11,804	1.28

The valuation end date changed in 2001, giving us a nine-month valuation period for that year. We adjusted the observed termination counts for this year by dividing the counts by 78 percent. We adjusted the observed rehire and withdrawal counts prior to 2001 in a similar way. Please see the termination rates section for a more detailed explanation of these adjustments.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We studied percent vested by year to see if we could identify any obvious trends in the rates from year to year. While there appears to be some cyclical movement present in the percent vested over time, we did not make additional adjustments to the rates to account for this.

Assumption Format

We currently apply our percent vested assumptions by plan, both genders combined.

We considered but did not pursue developing this assumption by gender. While it appears that separate rates might be statistically different from each other, the resulting liability and contribution rate change would not be different enough to warrant further complicating our valuation model.

Future Expectations

We believe that past experience is helpful in developing our new percent vested assumptions, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We used data for years 1995-1998 in developing our old assumptions. Those rates were set to match the experience in those years. Some of the variability in the actual rates we saw for this current study period of 1995-2004 came from our method change (how we counted net terminations and withdrawals), but most of the variability came from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current actual results.

Best Estimate PERS Percent Vested Assumptions

As a reminder, we set percent vested rates to zero for members with less than five years of service, even if their actual rate is positive. Observed average percent vested rates in PERS start out low for members with little service. They then increase as service increases. The observed rates are quite variable between service levels.

We calculated an average rate for every five-year grouping, beginning at zero years of service. We rounded these averages to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

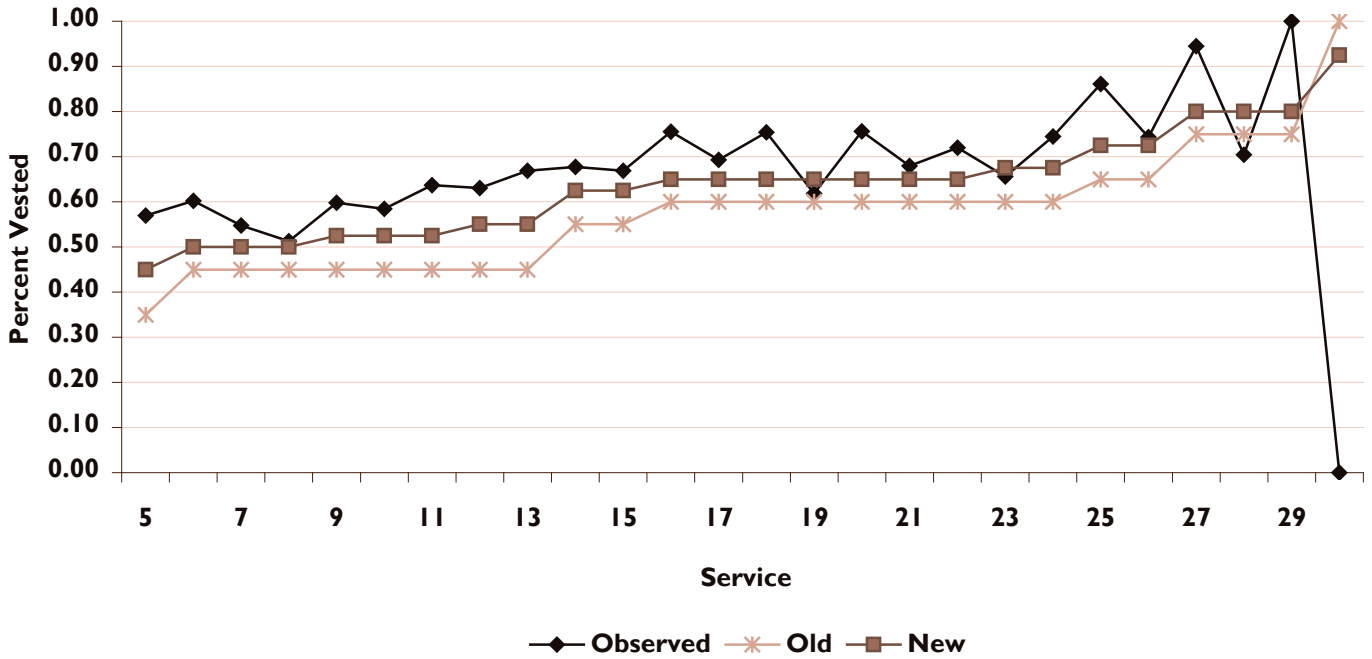
When these averages produced curves that increased or decreased in a way that did not make sense, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

The rate-setting method above resulted in rates that generally predict higher percent vested levels than the old rates. For the reasons discussed in the Future Expectations section, we reduced the rates above so

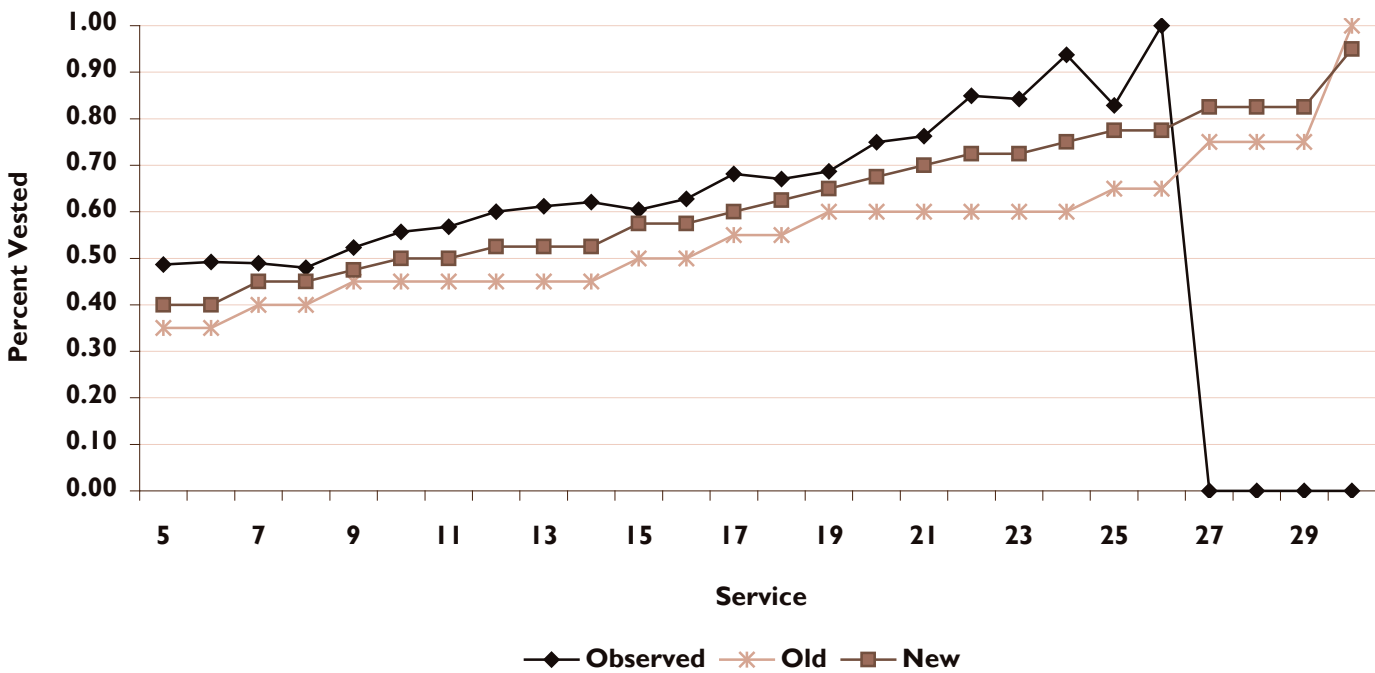
that our new assumptions were halfway between rates developed under the method described above and the old assumptions.

The following charts show the percent vested rates we observed, our old assumptions, and our new rates for each plan.

PERS Plan I Percent Vested by Service



PERS Plan 2 Percent Vested by Service



The next table shows a summary of observed, old, and new percent vested rates by service and plan.

PERS Percent Vested						
Service Years	Plan 1			Plan 2		
	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
0	0.6290	0.0000	0.0000	0.7478	0.0000	0.0000
5	0.5695	0.3500	0.4500	0.4868	0.3500	0.4000
10	0.5843	0.4500	0.5250	0.5570	0.4500	0.5000
15	0.6688	0.5500	0.6250	0.6040	0.5000	0.5750
20	0.7560	0.6000	0.6500	0.7496	0.6000	0.6750
25	0.8608	0.6500	0.7250	0.8286	0.6500	0.7750
30+	0.0000	1.0000	0.9250	0.0000	1.0000	0.9500

PSERS

PSERS opened in 2006 and does not have enough experience data to develop system-specific assumptions. We used PERS Plan 2 percent vested assumptions for PSERS and we will continue to monitor the appropriateness of these rates for PSERS.

TRS

Past Experience

We observed more TRS members vesting during the study period than our old percent vested assumption predicted. The next table shows this information by plan and service. We set observed and expected counts for service under five years to zero because our valuation model assumes that all members who are not vested receive a refund of contributions upon termination.

TRS Members Maintaining Savings Funds After Termination						
Service	Plan 1			Plan 2		
	Observed	Expected	Ratio	Observed	Expected	Ratio
0-4	0	0	0.00	0	0	0.00
5-9	197	169	1.16	1,682	1,415	1.19
10-14	274	246	1.12	632	539	1.17
15-19	297	279	1.06	266	239	1.11
20-24	332	326	1.02	48	44	1.09
25-29	335	325	1.03	3	3	1.11
30+	0	0	0.00	0	0	0.00
Total	1,434	1,345	1.07	2,631	2,240	1.17

The valuation end date changed in 2001, giving us a fifteen-month valuation period for that year. We adjusted the observed termination counts for this year by dividing the counts by 141 percent. We adjusted the observed rehire and withdrawal counts prior to 2001 in a similar way. Please see the termination rates section for a more detailed explanation of these adjustments.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We studied percent vested by year to see if we could identify any obvious trends in the rates from year to year. While there appears to be some cyclical movement present in the percent vested over time, we did not make additional adjustments to the rates to account for this.

Assumption Format

We currently apply our percent vested assumptions for by plan, both genders combined.

We considered but did not pursue developing this assumption by gender. While it appears that resulting separate rates might be statistically different from each other, the resulting liability and contribution rate change would not be different enough to warrant further complicating our valuation model.

Future Expectations

Using past experience is helpful in developing our new percent vested assumptions. However, future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We used data for years 1995-1998 in developing our old assumptions. Those rates were set to match the experience in those years. Some of the variability in the actual rates we saw for this current study period of 1995-2004 came from our method change (how we counted net terminations and withdrawals), but most of the variability came from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current actual results.

Best Estimate TRS Percent Vested Assumptions

As a reminder, we set percent vested rates to zero for members with less than five years of service, even if their actual rate is positive. Observed average percent vested rates in TRS start out low for members with little service. They then increase as service increases. The observed rates are quite variable between service levels.

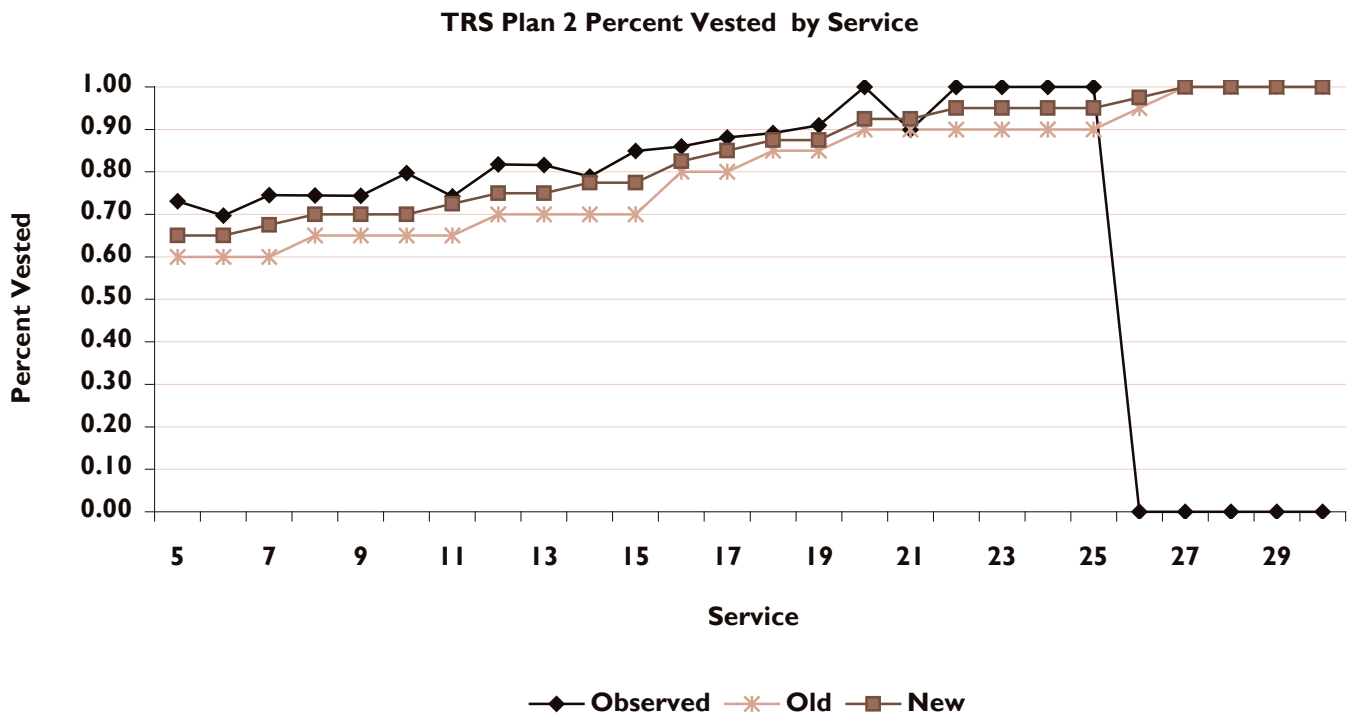
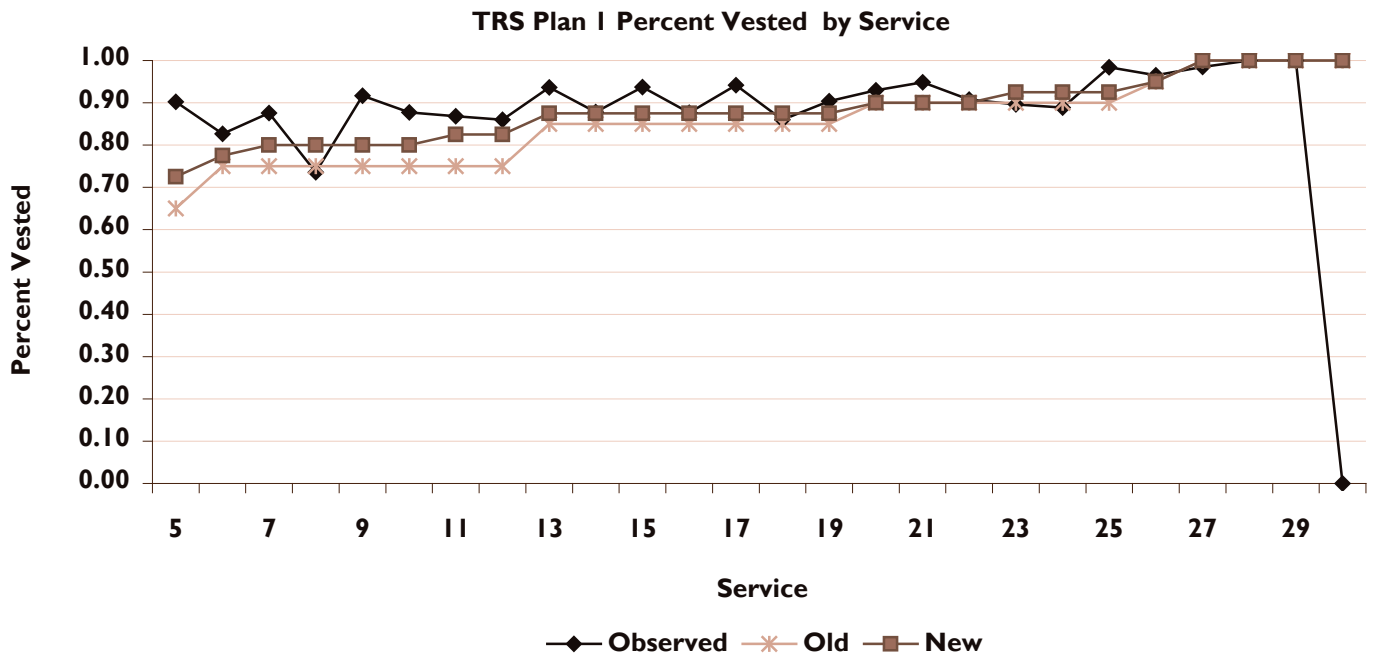
We calculated an average rate for every five-year grouping, beginning at zero years of service. We rounded these averages to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced curves that increased or decreased in a way that did not make sense, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

The rate-setting method above resulted in rates that generally predict higher percent vested levels than the old rates. For the reasons discussed in the Future Expectations section, we reduced the rates above so

that our new assumptions were halfway between rates developed under the method described above and the old assumptions.

The charts below show the percent vested rates we observed, our old assumptions, and our new rates for each plan.



The next table shows a summary of observed, old, and new percent vested rates by service and plan.

TRS Percent Vested						
Service Years	Plan 1			Plan 2		
	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
0	0.8049	0.0000	0.0000	0.8123	0.0000	0.0000
5	0.9025	0.6500	0.7250	0.7306	0.6000	0.6500
10	0.8771	0.7500	0.8000	0.7976	0.6500	0.7000
15	0.9369	0.8500	0.8750	0.8492	0.7000	0.7750
20	0.9295	0.9000	0.9000	1.0000	0.9000	0.9250
25	0.9840	0.9000	0.9250	1.0000	0.9000	0.9500
30+	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000

SERS

Past Experience

We observed slightly more SERS members vesting during the study period than our old percent vested assumption predicted. The next table shows this information by service. We set observed and expected counts for service under five years to zero because our valuation model assumes that all members who are not vested receive a refund of contributions upon termination.

SERS Members Maintaining Savings Funds After Termination			
Service	Plan 2		
	Observed	Expected	Ratio
0-4	0	0	0.00
5-9	3,602	3,286	1.10
10-14	1,454	1,390	1.05
15-19	662	612	1.08
20-24	131	131	1.00
25-29	11	10	1.06
30+	0	0	0.00
Total	5,860	5,430	1.08

The valuation end date changed in 2001, giving us a nine-month valuation period for that year. We adjusted the observed termination counts for this year by dividing the counts by 85 percent. We adjusted the observed rehire and withdrawal counts prior to 2001 in a similar way. Please see the termination rates section for a more detailed explanation of these adjustments.

SERS opened to new membership on September 1, 2000, and had its first valuation date December 31, 2000. This four-month valuation period was too short to measure percent vested reliably, so we excluded the data for 2000.

Otherwise, we did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We identified records for 1995 through 1999 from PERS data as Plan 2 and 3 school district and educational service district employees. We added this information to our database to improve the overall credibility of the data for purposes of this study.

We studied percent vested by year to see if we could identify any obvious trends in the rates from year to year. While there appears to be some cyclical movement present in the percent vested over time, we did not make additional adjustments to the rates to account for this.

Assumption Format

We currently apply our percent vested assumptions by plan, both genders combined.

We considered but did not pursue developing this assumption by gender. While it appears that separate rates might be statistically different from each other, the resulting liability and contribution rate change would not be different enough to warrant further complicating our valuation model.

Future Expectations

We believe that past experience is helpful in developing our new percent vested assumptions, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We used data for years 1995-1998 in developing our old assumptions. Those rates were set to match the experience in those years. Some of the variability in the actual rates we saw for this current study period of 1995-2004 came from our method change (how we counted net terminations and withdrawals), but most of the variability came from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current actual results.

Best Estimate SERS Percent Vested Assumptions

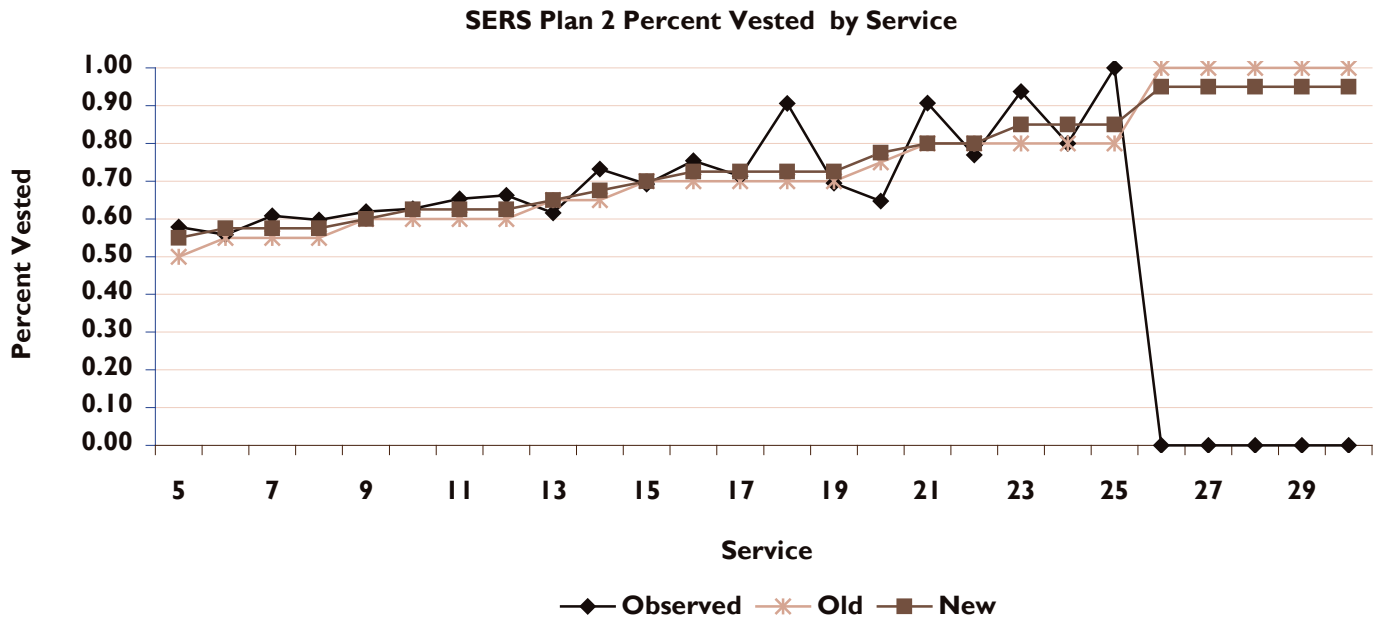
As a reminder, we set percent vested rates to zero for members with less than five years of service, even if their actual rate is positive. Observed average percent vested rates in SERS start out low for members with little service. They then increase as service increases. The observed rates are quite variable between service levels.

We calculated an average rate for every five-year grouping, beginning at zero years of service. We rounded these averages to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced a curve that increased or decreased in a way that did not make sense, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

The rate-setting method above resulted in rates that generally predict higher percent vested levels than the old rates. For the reasons discussed in the Future Expectations section, we reduced the rates above so that our new assumptions were halfway between rates developed under the method described above and the old assumptions.

The chart below shows the percent vested rates we observed, our old assumptions, and our new rates.



The next table shows a summary of observed, old, and new percent vested rates by service.

SERS Percent Vested			
Service Years	Plan 2		
	Observed Rates	Old Rates	New Rates
0	0.8141	0.0000	0.0000
5	0.5782	0.5000	0.5500
10	0.6272	0.6000	0.6250
15	0.6924	0.7000	0.7000
20	0.6475	0.7500	0.7750
25	1.0000	0.8000	0.8500
30+	0.0000	1.0000	0.9500

LEOFF

Past Experience

We observed more LEOFF members vesting during the study period than our old percent vested assumption predicted. The next table shows this information by plan and service. We set observed and expected counts for service under five years to zero because our valuation model assumes that all members who are not vested receive a refund of contributions upon termination.

LEOFF Members Maintaining Savings Funds After Termination						
	Plan 1			Plan 2		
Service	Observed	Expected	Ratio	Observed	Expected	Ratio
0-4	0	0	0.00	0	0	0.00
5-9	0	0	0.00	205	80	2.58
10-14	1	0	6.67	132	66	1.99
15-19	1	0	2.86	85	41	2.08
20-24	28	27	1.04	87	92	0.94
25-29	23	23	1.00	11	11	1.00
30+	0	0	0.00	0	0	0.00
Total	53	51	1.05	520	290	1.79

The valuation end date changed in 2001, giving us a nine-month valuation period for that year. We adjusted the observed termination counts for this year by dividing the counts by 75 percent. We adjusted the observed rehire and withdrawal counts prior to 2001 in a similar way. Please see the termination rates section for a more detailed explanation of these adjustments.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We studied percent vested by year to see if we could identify any obvious trends in the rates from year to year. While there appears to be some cyclical movement present in the percent vested over time, we did not make additional adjustments to the rates to account for this.

Assumption Format

We currently apply our percent vested assumptions by plan, both genders combined.

We considered but did not pursue developing this assumption by gender. While it appears that separate rates might be statistically different from each other, the resulting liability and contribution rate change would not be different enough to warrant further complicating our valuation model. We also expect that with the rapidly shrinking LEOFF 1 population, we will not see many, if any, members with less than 20 years of service in the future.

Future Expectations

Using past experience is helpful when developing our new percent vested assumptions. Considering future trends and expectations is also important in the analysis. We do not believe we should rely entirely on data from the recent past.

We used data for years 1995-1998 in developing our old assumptions. Those rates were set to match the experience in those years. Some of the variability in the actual rates we saw for this current study period of 1995-2004 came from our method change (how we counted net terminations and withdrawals), but most of the variability came from newer data than we had for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current actual results.

Best Estimate LEOFF Percent Vested Assumptions

As a reminder, we set percent vested rates to zero for members with less than five years of service, even if their actual rate is positive. Observed average percent vested rates in LEOFF start out low for members with little service. They then increase as service increases. The observed rates are quite variable between service levels. This variability is even more pronounced in LEOFF Plan 1, with its small active population.

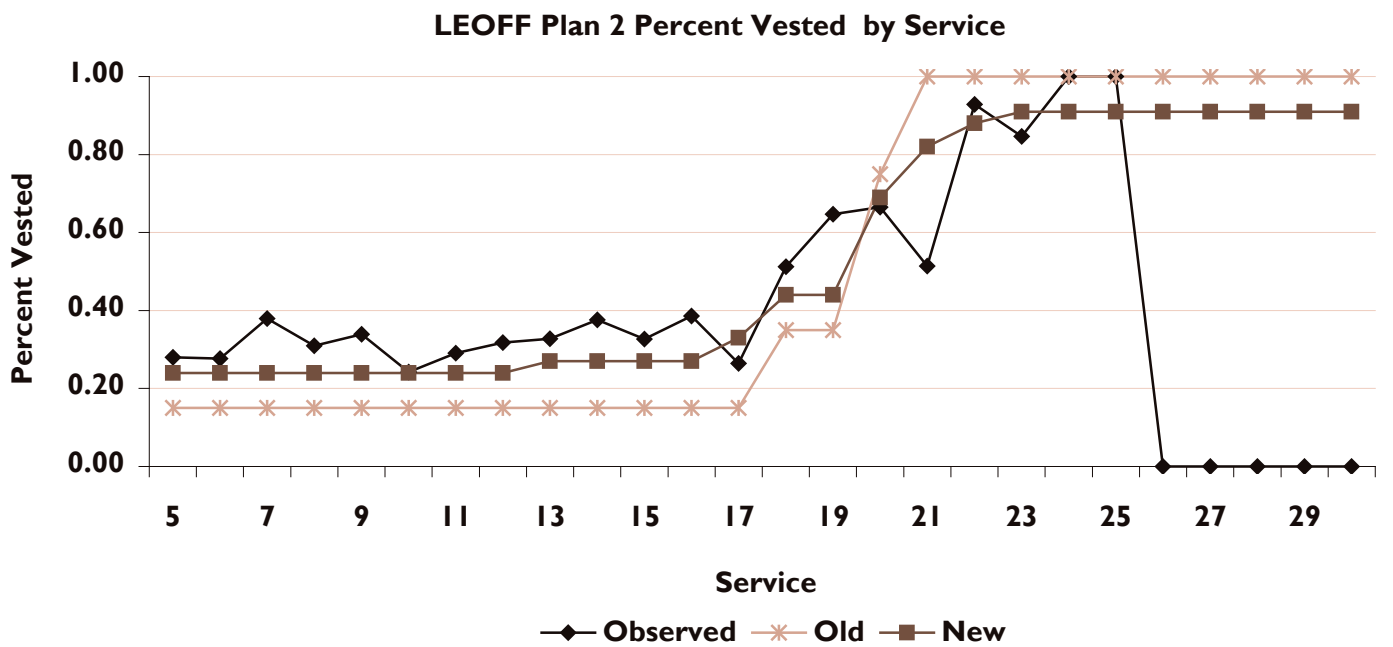
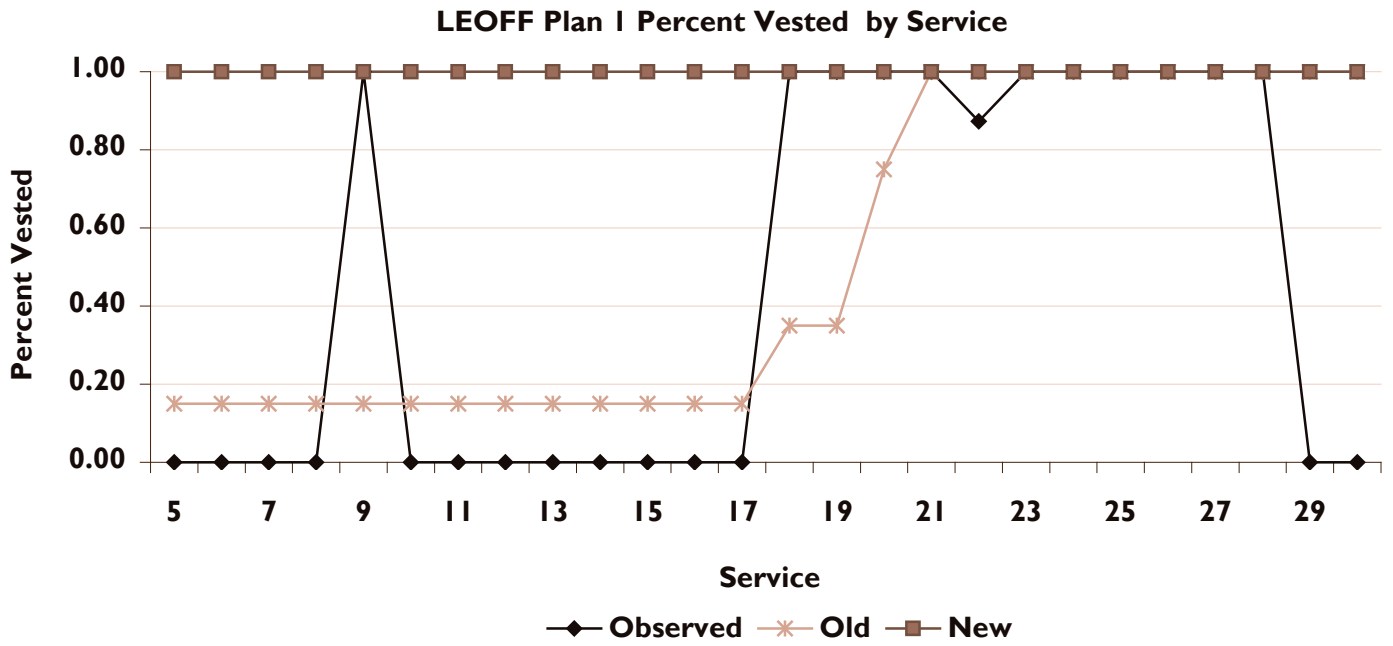
We set the LEOFF 1 percent vested assumption to 100 percent for all service levels at and above five years. We do not expect to see many Plan 1 members with less service than about twenty years in the future.

For Plan 2, we calculated an average rate for every five-year grouping, beginning at zero years of service. We rounded these averages to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced a curve that increased or decreased in a way that did not make sense, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

The rate-setting method above resulted in rates that generally predict higher percent vested levels than the old rates. For the reasons discussed in the Future Expectations section, we reduced the rates above so that our new assumptions were halfway between rates developed under the method described above and the old assumptions.

The charts on the following page show the percent vested rates we observed, our old assumptions, and our new rates for each plan.



The next table shows a summary of observed, old, and new percent vested rates by service and plan.

LEOFF Percent Vested						
Service Years	Plan 1			Plan 2		
	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
0	1.0000	0.0000	0.0000	0.6439	0.0000	0.0000
5	0.0000	0.1500	1.0000	0.2803	0.1500	0.2400
10	0.0000	0.1500	1.0000	0.2422	0.1500	0.2400
15	0.0000	0.1500	1.0000	0.3266	0.1500	0.2700
20	1.0000	0.7500	1.0000	0.6652	0.7500	0.6900
25	1.0000	1.0000	1.0000	1.0000	1.0000	0.9100
30+	0.0000	1.0000	1.0000	0.0000	1.0000	0.9100



Past Experience

The observed number of WSPRS members vesting during the study period was higher than the number our old percent vested assumption predicted. The next table shows this information by plan and service. We set observed and expected counts for service under five years to zero because our valuation model assumes that all members who are not vested receive a refund of contributions upon termination.

WSPRS Members Maintaining Savings Funds After Termination			
Service	Plan 1/2		
	Observed	Expected	Ratio
0-4	0	0	0.00
5-9	13	5	2.41
10-14	13	4	3.57
15-19	6	3	2.48
20-24	6	7	0.84
25-29	0	0	0.00
30+	0	0	0.00
Total	38	19	2.03

The valuation end date changed in 2001, giving us a nine-month valuation period for that year. We adjusted the observed termination counts for this year by dividing the counts by 75 percent. We adjusted the observed rehire and withdrawal counts prior to 2001 in a similar way. Please see the termination rates section for a more detailed explanation of these adjustments.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

We did not consider terminations and withdrawals by year to see if we could determine any obvious trends in the rates over time. WSPRS termination experience is too limited and variable to derive meaningful trend information.

Assumption Format

We currently apply our percent vested assumptions for the entire system.

We considered but did not pursue developing this assumption by gender. While it appears that separate rates might be statistically different from each other, the resulting liability and contribution rate change would not be different enough to warrant further complicating our valuation model.

We also did not pursue separating this assumption by plan. Plan 2 termination experience is too limited at this point to develop reliable percent vested assumptions for that plan alone. We will continue to monitor developments in the separate plans.

Future Expectations

We believe that past experience is helpful in developing our new percent vested assumptions, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on data from the recent past.

We used data for years 1995-1998 in developing our old assumptions. Those rates were set to match the experience in those years. Some of the variability in the actual rates we saw for this current study period of 1995-2004 came from our method change (how we counted net terminations and withdrawals), but most of the variability came from newer data than was available for the last study. We therefore assigned a credibility adjustment factor of 50 percent to the current actual results.

Best Estimate WSPRS Percent Vested Assumptions

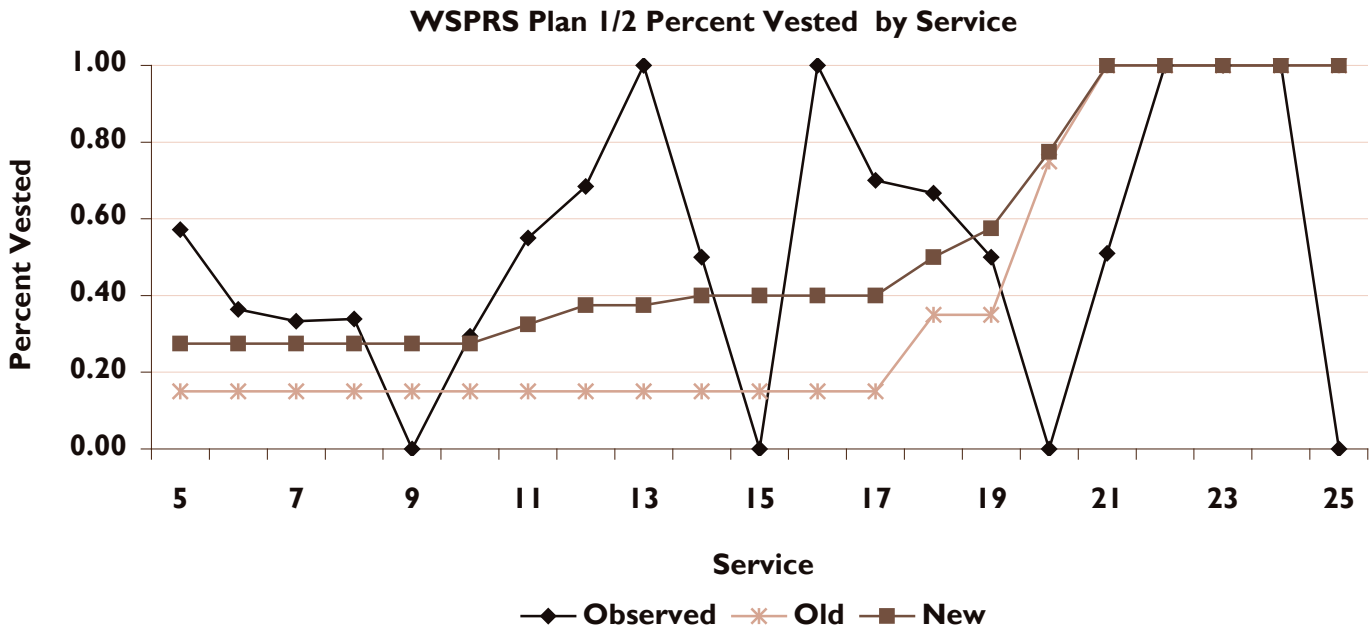
As a reminder, we set percent vested rates to zero for members with less than five years of service, even if their actual rate is positive. Observed average percent vested rates in WSPRS start out low for members with little service. They then increase as service increases. The observed rates are quite variable between service levels, especially for this small system.

We calculated an average rate for every five-year groupings, beginning at zero years of service. We rounded these averages to the nearest 5 percent. For service levels within the five-year periods, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced curves that increased or decreased in a way that did not make sense, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

The rate-setting method above resulted in rates that generally predict higher percent vested levels than the old rates. For the reasons discussed in the Future Expectations section, we reduced the rates above so that our new assumptions were halfway between rates developed under the method described above and the old assumptions.

The chart below shows the percent vested rates we observed, our old assumptions, and our new rates for each plan.



The next table shows a summary of observed, old, and new percent vested rates by service and plan.

WSPRS Percent Vested Plan 1/2			
Service Years	Observed Rates	Old Rates	New Rates
0	0.7273	0.0000	0.0000
5	0.5714	0.1500	0.2750
10	0.2941	0.1500	0.2750
15	0.0000	0.1500	0.4000
20	0.0000	0.7500	0.7750
25	0.0000	1.0000	1.0000
30+	0.0000	1.0000	1.0000

Ratio of Survivors of Active Deaths Selecting Annuities

When an active member dies, their survivor can select a lifetime annuity or a refund of member contributions. Our valuation model requires an assumption of the percent of survivors that will select a lifetime annuity.

For LEOFF Plan 1 and WSPRS Plan 1, we also apply this assumption to current retirees because we do not have data on who has survivors in the plans.

Data Used

We used experience study records from 1995-2006 to develop this assumption.

Assumptions Made

All assumptions used in the development of these rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

For LEOFF 1, we counted the number of active and service-retired members who died during the study period as the basis for our study. For all other plans, we counted the number of members who die from active status as the basis.

We divided the number of survivors collecting annuities by the number of deceased members to arrive at an observed, or actual, rate.

Please see the Development section below for a discussion of how we developed our new assumptions for each system and plan.

Development of Assumptions

PERS

Past Experience

The observed ratio of PERS 1 and 2 active members who died and whose survivors selected annuities during the study period matched our expectations fairly well. The Plan 3 observed percentages did not match our expectations as well. The next tables show a breakdown of this information for males and females, by plan and age.

PERS Males - Survivors of Active Deaths Selecting Annuities										
Age	Plan 1			Plan 2			Plan 3			
	Observed	Expected	Ratio	Observed	Expected	Ratio	Observed	Expected	Ratio	
20-24	0	0	0.00	0	0	0.00	0	0	0.00	
25-29	0	0	0.00	0	0	0.00	0	0	0.00	
30-34	0	0	0.00	0	0	0.00	1	2	0.52	
35-39	0	0	0.00	0	0	0.00	0	0	0.00	
40-44	3	3	0.95	3	3	1.05	2	4	0.52	
45-49	24	23	1.04	6	4	1.54	4	8	0.51	
50-54	60	64	0.93	38	25	1.50	5	7	0.69	
55-59	66	60	1.10	59	52	1.13	6	7	0.82	
60-64	39	46	0.84	69	72	0.96	7	6	1.08	
65+	16	18	0.88	38	44	0.86	1	1	1.27	
Total	208	215	0.97	213	201	1.06	26	35	0.73	

PERS Females - Survivors of Active Deaths Selecting Annuities										
Age	Plan 1			Plan 2			Plan 3			
	Observed	Expected	Ratio	Observed	Expected	Ratio	Observed	Expected	Ratio	
20-24	0	0	0.00	0	0	0.00	0	0	0.00	
25-29	0	0	0.00	0	0	0.00	0	0	0.00	
30-34	0	0	0.00	0	0	0.00	0	1	0.00	
35-39	0	0	0.00	0	0	0.00	3	3	1.00	
40-44	1	1	1.11	1	0	0.00	0	1	0.00	
45-49	8	9	0.87	1	0	0.00	2	4	0.53	
50-54	30	27	1.09	13	8	1.63	2	5	0.38	
55-59	48	34	1.40	21	18	1.19	1	1	0.69	
60-64	19	25	0.77	21	13	1.57	0	0	0.00	
65+	12	14	0.86	12	11	1.07	0	0	0.00	
Total	118	110	1.07	69	50	1.37	8	15	0.52	

Experience in Plan 3 is just beginning to emerge. When we developed our old assumptions for this plan, which did not open to new members until 2002, we based our assumptions on future expectations. We will continue to monitor the experience in this relatively new plan.

We had a nine-month valuation period in 2001. We did not adjust for this because it measures a percentage. The ratio of members leaving survivors who collect annuities should not change due to a single longer or shorter valuation period.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently apply our percent married assumptions by plan, gender, and age.

We considered applying this assumption by service, but we believe it is better modeled using age.

We also considered combining Plans 2 and 3 for rate-setting purposes, but Plan 2 members' survivors can opt to collect a refund of the member savings rather than taking a lifetime annuity. Plan 3 members do not have the same return of savings feature. We believe this difference leads to materially different assumptions between the two plans.

Future Expectations

Past experience is helpful in developing this assumption, but future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on the data from the recent past.

For Plans 1 and 2, we gave 50 percent credibility to the data from our current study period. For Plan 3, we gave 75 percent credibility to data from this study. We rely more on the current study, because we based our old assumption largely on future expectations, since there was no PERS 3 experience at that time.

Beginning in 2003, survivors of active members who die in the line of duty may receive a joint and 100 percent survivor annuity that is not actuarially reduced for the difference between the member's age at death and the normal retirement age. We believe that this recent benefit improvement could put upward pressure on this assumption, but we think this experience is still developing. We will continue to study the possible effects of this new benefit.

Best Estimate PERS Assumptions

Observed survivor annuity ratios start out low for members at younger ages, where fewer deaths occur. They then increase as age increases. The actual ratios are quite variable between age levels, especially when experience is limited.

We calculated an average rate for every five-year period, beginning at twenty years of age. These averages were rounded to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced curves that increased or decreased in a way that did not seem reasonable, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

For the reasons discussed in the Future Expectations section, we amended the rates above so that our new assumptions were halfway between Plan 1 and 2 rates developed under the method described above and the old assumptions. We assigned a 75 percent credibility factor for the recent Plan 3 experience.

The next tables show summaries of the observed survivor annuity rates, our old assumptions, and our new rates by plan, gender, and age.

PERS 1						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
40	0.0000	0.4500	0.4552	0.0000	0.1000	0.0957
45	0.6667	0.5500	0.5564	0.3333	0.4000	0.3348
50	0.3846	0.6500	0.6070	0.6667	0.4500	0.4783
55	0.8571	0.7000	0.7081	0.6000	0.4500	0.4783
60	0.6364	0.7000	0.7081	0.3333	0.4500	0.4783
65	0.7500	0.7000	0.7081	0.3333	0.4500	0.4783
70	0.6250	0.7000	0.7081	0.5000	0.4500	0.4783
75	0.0000	0.7000	0.7081	0.0000	0.4500	0.4783
80	0.0000	0.7000	0.7081	0.0000	0.4500	0.4783

PERS 2						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
40	0.0000	0.0500	0.0483	0.0000	0.0000	0.0420
45	0.0000	0.0500	0.0966	0.0000	0.0000	0.0420
50	0.2500	0.2000	0.2898	0.0000	0.1000	0.1260
55	0.3704	0.4000	0.4347	0.0909	0.2000	0.2100
60	0.4667	0.6500	0.5795	0.2778	0.2000	0.2100
65	0.5455	0.6500	0.5795	0.2000	0.2000	0.2100
70	0.6250	0.6500	0.5795	0.6000	0.2000	0.2100
75	0.0000	0.6500	0.5795	0.0000	0.2000	0.2100
80	1.0000	0.6500	0.5795	0.0000	0.2000	0.2100

PERS 3						
Ratio of Survivors of Active Deaths Selecting Annuities						
Males				Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
20	0.0000	0.2000	0.0000	0.0000	0.3500	0.0000
25	0.0000	0.4800	0.4295	0.0000	0.6300	0.1144
30	0.0000	0.6400	0.4832	0.0000	0.7300	0.2288
35	0.0000	0.7200	0.4832	0.0000	0.7500	0.2860
40	0.0000	0.7700	0.5369	0.0000	0.7600	0.3432
45	0.0000	0.7900	0.5369	0.5000	0.7600	0.4576
50	0.5000	0.8000	0.6228	0.0000	0.7600	0.5148
55	0.0000	0.8100	0.6979	0.0000	0.7200	0.5720
60	0.5000	0.8100	0.7516	0.0000	0.6700	0.5720
65	0.0000	0.7900	0.7516	0.0000	0.5800	0.5720
70	0.0000	0.7700	0.7516	0.0000	0.4700	0.5720
75	0.0000	0.7700	0.7516	0.0000	0.4700	0.5720
80	0.0000	0.7700	0.7516	0.0000	0.4700	0.5720

TRS

Past Experience

The observed ratio of TRS 1 active members who died and whose survivors selected annuities during the study period matched our expectations fairly well. The Plan 2 and 3 observed percentages did not match our expectations as well. The next tables show a breakdown of this information for males and females, by plan and age.

TRS Males - Survivors of Active Deaths Selecting Annuities									
Age	Plan 1			Plan 2			Plan 3		
	Observed	Expected	Ratio	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00	0	1	0.00
30-34	0	0	0.00	0	0	0.00	3	4	0.78
35-39	0	0	0.00	0	0	0.00	1	1	0.69
40-44	5	4	1.28	0	0	0.00	3	8	0.39
45-49	7	8	0.83	0	0	0.00	5	13	0.40
50-54	36	33	1.09	0	0	0.00	8	14	0.56
55-59	32	29	1.09	6	6	1.09	7	11	0.62
60-64	13	15	0.87	7	5	1.33	3	3	0.93
65+	6	7	0.89	1	2	0.67	1	1	1.27
Total	99	97	1.03	14	12	1.14	31	56	0.55

TRIS Females - Survivors of Active Deaths Selecting Annuities									
Age	Plan 1			Plan 2			Plan 3		
	Observed	Expected	Ratio	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00	0	2	0.00
30-34	0	0	0.00	0	0	0.00	3	7	0.46
35-39	0	0	0.00	0	0	0.00	4	7	0.59
40-44	0	1	0.00	0	0	0.00	6	14	0.44
45-49	16	14	1.16	0	0	0.00	7	14	0.48
50-54	12	17	0.70	1	1	0.83	18	27	0.66
55-59	20	19	1.06	5	5	1.04	10	15	0.66
60-64	10	8	1.30	3	6	0.50	2	3	0.75
65+	1	1	0.71	3	4	0.75	0	0	0.00
Total	59	59	0.99	12	16	0.75	50	89	0.56

Experience in Plan 3 is just beginning to emerge. When we developed our old assumptions for this plan, which did not open to new members until 1996, we based our assumptions substantially on future expectations. We will continue to monitor the experience in this relatively new plan.

We had a fifteen-month valuation period in 2001, but we did not make adjustments for that in developing this assumption because it measures a percentage.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently apply our percent married assumptions by plan, gender, and age.

We considered applying this assumption by service, but we believe it is better modeled using age.

We also considered combining Plans 2 and 3 for rate-setting purposes, but Plan 2 members' survivors can opt to collect a refund of the member savings rather than taking a lifetime annuity. Plan 3 members do not have the same return of savings feature. We believe this difference leads to materially different assumptions between the two plans.

Future Expectations

Past experience is helpful in developing this assumption, but future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on the data from the recent past.

For Plans 1 and 2, we gave 50 percent credibility to the data from our current study period. For Plan 3, we gave 75 percent credibility to data from this study. We rely more on the current study because we based our old assumption largely on future expectations. There was very little TRS 3 experience at that time.

Beginning in 2003, survivors of active members who die in the line of duty may receive a joint and 100 percent survivor annuity that is not actuarially reduced for the difference between the member's age at death and the normal retirement age. We believe that this recent benefit improvement could put upward

pressure on this assumption, but we think this experience is still developing. We will continue to study the possible effects of this new benefit.

Best Estimate TRS Assumptions

Observed survivor annuity ratios start out low for members at younger ages, where fewer deaths occur. They then increase as age increases. The actual ratios are quite variable between age levels, especially when experience is limited.

We calculated an average rate for every five-year grouping, beginning at twenty years of age. These averages were rounded to the nearest 5 percent. For service levels within the five-year periods, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced curves that increased or decreased in a way that did not seem reasonable, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

For the reasons discussed in the Future Expectations section, we amended the rates above so that our new assumptions were halfway between Plan 1 and 2 rates developed under the method described above and the old assumptions. We assigned a 75 percent credibility factor for the recent Plan 3 experience.

The next tables show summaries of the observed survivor annuity rates, our old assumptions, and our new rates by plan, gender, and age.

TRS I						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
40	0.0000	0.6500	0.5907	0.0000	0.5500	0.4005
45	0.0000	0.6500	0.6399	0.5000	0.5500	0.4506
50	0.6154	0.6500	0.6891	0.2500	0.4500	0.4506
55	0.6154	0.6500	0.6891	0.4286	0.4500	0.4506
60	0.6667	0.7500	0.6891	0.7500	0.3500	0.4506
65	0.6000	0.7500	0.6891	0.0000	0.3500	0.4506
70	0.0000	0.7500	0.6891	0.0000	0.3500	0.4005
75	0.0000	0.7500	0.6891	0.0000	0.3500	0.4005
80	0.0000	0.7500	0.6891	0.0000	0.3500	0.4005

TRS 2						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
50	0.0000	0.0000	0.1881	0.0000	0.1500	0.1718
55	1.0000	0.5000	0.5173	0.0000	0.4000	0.2864
60	1.0000	0.7500	0.7054	0.3333	0.5000	0.4582
65	0.0000	0.7500	0.7054	0.5000	0.6700	0.5155
70	0.0000	0.7500	0.7054	1.0000	0.6700	0.8019
75	0.0000	0.7500	0.7054	0.0000	0.6700	0.8019
80	0.0000	0.7500	0.7054	0.0000	0.6700	0.8019

TRS 3						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
20	0.0000	0.2000	0.0000	0.0000	0.3500	0.0000
25	0.0000	0.4800	0.3384	0.0000	0.6300	0.4480
30	0.0000	0.6400	0.3384	1.0000	0.7300	0.5039
35	0.0000	0.7200	0.3948	1.0000	0.7500	0.5599
40	0.0000	0.7700	0.4512	0.0000	0.7600	0.5039
45	0.2500	0.7900	0.4738	0.3333	0.7600	0.5039
50	0.0000	0.8000	0.5076	0.4000	0.7600	0.4480
55	0.0000	0.8100	0.5076	0.6667	0.7200	0.4480
60	1.0000	0.8100	0.5640	0.6667	0.6700	0.4480
65	0.0000	0.7900	0.6204	0.0000	0.5800	0.4480
70	0.0000	0.7700	0.6768	0.0000	0.4700	0.4480
75	0.0000	0.7700	0.6768	0.0000	0.4700	0.4480
80	0.0000	0.7700	0.6768	0.0000	0.4700	0.4480

SERS

Past Experience

The observed ratio of SERS 2 active members who died and whose survivors selected annuities during the study period matched our expectations fairly well. The Plan 3 observed percentages did not match our expectations as well. The next tables show a breakdown of this information for males and females, by plan and age.

SERS Males - Survivors of Active Deaths Selecting Annuities						
Age	Plan 2			Plan 3		
	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	1	0.00
35-39	0	0	0.00	0	1	0.00
40-44	0	0	0.00	0	2	0.00
45-49	2	0	13.33	0	3	0.00
50-54	0	2	0.00	6	14	0.44
55-59	7	6	1.25	2	4	0.49
60-64	6	7	0.92	5	9	0.56
65+	11	12	0.94	2	2	0.86
Total	26	26	1.02	15	36	0.42

SERS Females - Survivors of Active Deaths Selecting Annuities						
Age	Plan 2			Plan 3		
	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	1	0.00
30-34	0	0	0.00	0	0	0.00
35-39	0	0	0.00	2	2	0.89
40-44	0	0	0.00	2	6	0.33
45-49	1	0	0.00	7	15	0.46
50-54	4	1	3.64	10	21	0.49
55-59	6	3	2.14	9	13	0.69
60-64	4	1	2.86	4	4	1.00
65+	1	3	0.38	1	3	0.37
Total	16	8	2.03	35	64	0.54

Experience in Plan 3 is just beginning to emerge. When we developed our old assumptions for this plan, which did not open to new members until 2000, we based our assumptions substantially on future expectations. We will continue to monitor the experience in this relatively new plan.

We had a nine-month valuation period in 2001, but we did not make adjustments for that in developing this assumption because it measures a percentage.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently apply our percent married assumptions by plan, gender, and age.

We considered applying this assumption by service, but we believe it is better modeled using age.

We also considered combining Plans 2 and 3 for rate-setting purposes, but Plan 2 members' survivors can opt to collect a refund of the member savings rather than taking a lifetime annuity. Plan 3 members

do not have the same return of savings feature. We believe this difference leads to materially different assumptions between the two plans.

Future Expectations

We believe that past experience is helpful in developing this assumption, but we also believe that future trends and expectations should be considered in the analysis. We do not believe we should rely entirely on the data from the recent past.

For Plan 2, we gave 50 percent credibility to the data from our current study period. For Plan 3, we gave 75 percent credibility to data from this study. We rely more on the current study because we based our old assumption largely on future expectations. There was very little SERS 3 experience at that time.

Beginning in 2003, survivors of active members who die in the line of duty may receive a joint and 100 percent survivor annuity that is not actuarially reduced for the difference between the member's age at death and the normal retirement age. We believe that this recent benefit improvement could put upward pressure on this assumption, but we think this experience is still developing. We will continue to study the possible effects of this new benefit.

Best Estimate SERS Assumptions

Observed survivor annuity ratios start out low for members at younger ages, where fewer deaths occur. They then increase as age increases. The actual ratios are quite variable between age levels, especially when experience is limited.

We calculated an average rate for every five-year grouping, beginning at twenty years of age. These averages were rounded to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced curves that increased or decreased in a way that did not seem reasonable, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

For the reasons discussed in the Future Expectations section, we amended the rates above so that our new assumptions were halfway between Plan 2 rates developed under the method described above and the old assumptions. We assigned a 75 percent credibility factor for the recent Plan 3 experience.

The next tables show summaries of the observed survivor annuity rates, our old assumptions, and our new rates by plan, gender, and age.

SERS 2						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
40	0.0000	0.0500	0.0489	0.0000	0.0000	0.0000
45	0.0000	0.0500	0.1468	0.0000	0.0000	0.0326
50	0.0000	0.2000	0.2937	1.0000	0.1000	0.1306
55	0.6667	0.4000	0.3916	0.2500	0.2000	0.1959
60	0.0000	0.6500	0.5874	0.6667	0.2000	0.2938
65	0.6667	0.6500	0.6363	0.0000	0.2000	0.3264
70	0.0000	0.6500	0.7342	0.0000	0.2000	0.3264
75	0.0000	0.6500	0.8321	0.0000	0.2000	0.3264
80	0.0000	0.6500	0.8321	0.0000	0.2000	0.3264

SERS 3						
Ratio of Survivors of Active Deaths Selecting Annuities						
	Males			Females		
Age	Observed Rates	Old Rates	New Rates	Observed Rates	Old Rates	New Rates
20	0.0000	0.2000	0.0000	0.0000	0.3500	0.0000
25	0.0000	0.4800	0.0000	0.0000	0.6300	0.0000
30	0.0000	0.6400	0.0000	0.0000	0.7300	0.0000
35	0.0000	0.7200	0.0000	0.0000	0.7500	0.3397
40	0.0000	0.7700	0.2322	0.0000	0.7600	0.3397
45	0.0000	0.7900	0.3483	0.2500	0.7600	0.3963
50	0.0000	0.8000	0.4064	0.6250	0.7600	0.3963
55	0.0000	0.8100	0.4645	0.3333	0.7200	0.5662
60	0.0000	0.8100	0.5225	0.0000	0.6700	0.5662
65	0.0000	0.7900	0.5225	0.5000	0.5800	0.5662
70	1.0000	0.7700	0.5225	0.0000	0.4700	0.5662
75	0.0000	0.7700	0.5225	0.0000	0.4700	0.5662
80	0.0000	0.7700	0.5225	0.0000	0.4700	0.5662

LEOFF

Past Experience

The observed ratio of LEOFF 1 active and retired members who died and whose survivors selected annuities during the study period was slightly lower than we expected to see. The Plan 2 observed percentages of active deaths whose survivors selected annuities were quite a bit higher than we would expect under our old assumptions. The next table shows a breakdown of this information by plan and age.

LEOFF Survivors Selecting Annuities*						
Age	Plan 1 Males and Females			Plan 2 Males and Females		
	Observed	Expected	Ratio	Observed	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	0	0.00
35-39	0	0	0.00	1	0	0.00
40-44	2	1	1.67	3	0	0.00
45-49	9	7	1.25	4	0	0.00
50-54	16	12	1.33	10	4	2.50
55-59	13	16	0.83	3	1	3.00
60-64	24	26	0.91	4	3	1.60
65+	163	196	0.83	0	1	0.00
Total	227	259	0.88	25	8	3.13

*Plan 1 counts include survivors of retiree deaths; Plan 2 counts include only survivors of active deaths.

Experience in Plan 2 is just beginning to emerge. When we developed our old assumptions for this plan, we based our assumptions substantially on future expectations because there were almost no deaths in LEOFF 2 at that time. We will continue to monitor the experience in this relatively young plan.

We had a nine-month valuation period in 2001, but we did not make adjustments for that in developing this assumption because it measures a percentage.

We did not eliminate any data due to quality concerns. We also did not remove any data points considered to be outliers.

Assumption Format

We currently apply our percent married assumptions by plan and age, for both genders combined.

We considered applying this assumption by service, but we believe it is better modeled using age.

We also considered developing this assumption by gender, but total experience in LEOFF is limited due to the system's small size. Female experience is even more limited and would not produce reliable percentages.

Future Expectations

Using past experience is helpful in developing this assumption, but future trends and expectations should also be considered in the analysis. We do not believe we should rely entirely on the data from the recent past. We think we should give 75 percent credibility to the Plan 2 data from this study, because we based our old assumption largely on future expectations. Experience for this plan is just beginning to emerge. Please see the Best Estimate section below for a discussion about Plan 1 development.

Survivors of active Plan 2 members who die in the line of duty may receive a joint and 100 percent survivor annuity that is not actuarially reduced for the difference between the member's age at death and the normal retirement age. We believe that this benefit improvement could put upward pressure on this assumption, but we think this experience is still developing. We will continue to study the possible effects of this relatively new benefit.

Best Estimate LEOFF Assumptions

Observed survivor annuity ratios start out low for members at younger ages, where fewer deaths occur. They then increase as age increases. The actual ratios are quite variable between age levels, especially when experience is limited, as it is for this small system.

To fit the Plan 1 assumption, we carried forward our current LEOFF 1 method of finding a constant percentage to apply for all ages. Our old assumption of 60 percent for members 40 and over was higher than we actually observed. We lowered it from 60 percent to 56 percent for all ages 40 and over.

Additionally, we use a slightly higher percentage in some parts of our model to compensate for the fact that the model understates liabilities associated with this assumption. We changed that percentage as well, from 65 percent to 60 percent.

For LEOFF Plan 2, we calculated an average rate for every five-year grouping, beginning at twenty years of age. These averages were rounded to the nearest 5 percent. For service levels within the five-year groups, the rate stayed the same as the first rate. The result was a series of horizontal line segments, connected by increasing segments.

When these averages produced a curve that increased or decreased in a way that did not seem reasonable, we used judgment to smooth the curve. This usually happened when experience was insufficient to provide a reasonable rate.

For the reasons discussed in the Future Expectations section, we amended the rates above so that our new assumptions are 75 percent of the way between Plan 2 rates developed under the method described above and the old assumptions.

The next table shows a summary of the observed survivor annuity rates, our old assumptions, and our new rates by age.

LEOFF 1				LEOFF 2			
Ratio of Survivors Selecting Annuities				Ratio of Survivors of Active Deaths Selecting Annuities			
Males & Females				Males & Females			
Age	Observed Rates	Old Rates	New Rates	Age	Observed Rates	Old Rates	New Rates
35	0.0000	0.0000	0.0000	35	0.0000	0.0000	0.0658
40	0.0000	0.6000	0.5600	40	0.2000	0.0000	0.1644
45	0.0000	0.6000	0.5600	45	0.5000	0.0000	0.2631
50	1.0000	0.6000	0.5600	50	0.5000	0.2500	0.2960
55	0.5000	0.6000	0.5600	55	1.0000	0.2500	0.3947
60	0.8333	0.6000	0.5600	60	1.0000	0.5000	0.5262
65	0.5455	0.6000	0.5600	65	0.0000	0.5000	0.5262
70	0.5000	0.6000	0.5600	70	0.0000	0.5000	0.5262
75	0.5769	0.6000	0.5600	75	0.0000	0.5000	0.5262
80+	0.4975	0.6000	0.5600	80	0.0000	0.5000	0.5262

WSPRS is too small to develop reliable ratios for purposes of predicting how many member deaths will result in continuing survivor annuities. The next table demonstrates the very limited experience we saw from 1995 through 2006.

WSPRS Survivors of Active Deaths Selecting Annuities			
Plan 1/2 Males and Females			
Age	Observed	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	1	0	0.00
40-44	2	1	1.67
45-49	0	1	0.00
50-54	0	0	0.00
55-59	0	0	0.00
60-64	0	0	0.00
65+	0	0	0.00
Total	3	2	1.67

Without sufficient data to develop a reliable assumption, we needed an alternate method to develop rates for WSPRS.

In the past, we used LEOFF Plan 1 rates to estimate this ratio for the entire WSPRS system. We will continue to use LEOFF 1 rates for WSPRS Plan 1. We think it is appropriate to use LEOFF 2 rates for WSPRS 2 because the survivor options available to Plan 2 members in the two systems are a better match. Neither WSPRS 2 nor LEOFF 2 has free survivor benefits.

Best Estimate WSPRS Assumptions

The table below shows a summary of observed rates (in LEOFF), our old assumptions, and our new rates by plan and age.

WSPRS 1				WSPRS 2			
Ratio of Survivors Selecting Annuities				Ratio of Survivors of Active Deaths Selecting Annuities			
Males & Females				Males & Females			
Age	L1 Observed Rates	L1 Old Rates	L1 New Rates	Age	L2 Observed Rates	L2 Old Rates	L2 New Rates
35	0.0000	0.0000	0.0000	35	0.0000	0.0000	0.0658
40	0.0000	0.6000	0.5600	40	0.2000	0.0000	0.1644
45	0.0000	0.6000	0.5600	45	0.5000	0.0000	0.2631
50	1.0000	0.6000	0.5600	50	0.5000	0.2500	0.2960
55	0.5000	0.6000	0.5600	55	1.0000	0.2500	0.3947
60	0.8333	0.6000	0.5600	60	1.0000	0.5000	0.5262
65	0.5455	0.6000	0.5600	65	0.0000	0.5000	0.5262
70	0.5000	0.6000	0.5600	70	0.0000	0.5000	0.5262
75+	0.5769	0.6000	0.5600	75	0.0000	0.5000	0.5262

Percent of Members Selecting Joint and Survivor Options Upon Retirement

Our valuation model requires an estimate of the percentage of PERS Plan 1 and TRS Plan 1 members who will select a joint and survivor benefit option when they retire. This assumption models how many survivor beneficiaries will continue to receive Uniform COLA increases upon their primary annuitants' deaths.

Data Used

We used new service and disability retirement records from the 2001 through 2006 valuation data to study the percentage of members choosing a joint-and-survivor option upon retirement.

Assumptions Made

Assumptions used in the development of percent joint and survivor options selected match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop this assumption, we found the percent of PERS and TRS Plan 1 members newly retired in the last five years who elected a survivor option. We calculated separate percentages for male and female retirees.

These methods differ from those used to develop our old assumptions. The old assumptions were based on a weighted average percentage of members for the entire system, males and females combined, that opt for joint-and-survivor benefits.

Development of Assumptions

Past Observations

We analyzed new service and disability retirements by system. We changed our methods as described in the Methods section above. We also studied data for recent retirees using the original method to see how experience has changed in the last six years. The table below shows our latest observations for system membership compared directly to our old assumptions. Note that while PERS experience has remained fairly constant, TRS retirees are selecting joint and survivor options more often than in our prior study.

Percent Selecting Joint & Survivor Options - Entire System, Males and Females Combined		
	Old Assumptions	Recent Experience
PERS	31%	32%
TRS	29%	37%

Future Expectations

We expect to see that percentages of members selecting joint and survivor options will vary slightly in the future. We cannot predict whether they will increase or decrease, or even the extent to which they will change. We will continue to monitor this measure with each new experience study.

Percent Selecting Joint and Survivor Option Assumptions

We developed the Plan 1 rates shown below, by gender, to use in our valuation model. We also show a weighted-average percentage for males and females combined (this is for reference only).

Percent Selecting Joint & Survivor Options - Plan 1 Only			
	Males and Females	Males	Females
PERS I	33%	48%	18%
TRS I	39%	55%	30%

Portability

Under [Chapter 41.54 RCW](#), an active member of an eligible plan can elect to become a dual member if they have prior service in another eligible plan. Dual membership, also known as portability, allows the member to restore service credit withdrawn from another dual member system, combine service credit for benefit eligibility, and use their highest “base salary” in a dual member system to calculate their retirement benefit.

Our current valuation model uses a portability increase factor, or load, to increase the accrued benefit for all eligible plans to reflect the expected number of dual members and the expected increase in benefits as a result of portability.

Assumptions Made

All assumptions match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Development of Assumptions

Best Estimate Portability Load

The portability loads we developed as part of the 1995-2000 Experience Study will continue to apply for the 2007 Actuarial Valuation Report (AVR). Starting with the 2008 AVR, we will remove the portability load and implement a data processing change to value actual portability benefits. This data processing change has already been implemented with PSERS. We use past PERS service to develop a total service field and value PSERS benefits on this new field. Since we already use actual data, we have set the PSERS portability load to zero.

The 2007 AVR will use the following portability loads, by Plan:

Plan	Portability Load
PERS I	0.20%
PERS 2/3	0.30%
TRS I	0.30%
TRS 2/3	0.10%
SERS 2/3	0.30%
PSERS 2	0.00%
LEOFF I	0.00%
LEOFF 2	0.10%
WSPRS 1/2	0.00%

AFC Load

When a member retires from PERS 1, TRS 1, or WSPRS 1 they may be eligible for cash payments that will increase the Average Final Compensation (AFC) used in calculating their retirement benefit. Since these payouts are unknown at the valuation date and will increase a member's retirement benefit in the future, we must make an assumption to reflect an expected increase in a member's AFC. We use an increase factor, or load, to represent this expected extra cost.

Some of these cash payments may include payouts of accumulated annual leave, overtime, bonuses, or holiday pay. A portion of these cash payments, however, are billed to the employer. The employer-billable amounts include annual leave in excess of 240 hours, bonuses and overtime in excess of two-times pay, sick leave, and other miscellaneous termination or severance pay. The employer-billable amounts increase the pension payment, but are offset by actuarially equivalent assets that are deposited into the retirement fund. The result is no net increase in pension liabilities, so we exclude the employer-billable amounts in the development of the AFC load.

Data Used

We used retiree records from 1996 through 2006 to study the increase in AFC as a result of additional cash payments. The data include the AFC, the increase in AFC due to eligible payouts, and the increase in AFC due to eligible payouts that are billable to the employer.

Assumptions Made

Assumptions used in the development of the AFC load match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop the AFC load assumption, we calculate the average increase in AFC due to eligible payouts as a percent of AFC for all retired members, by year of retirement. We exclude the portion of AFC that is billable to the employer since that liability will be offset by a deposit of assets into the retirement fund.

Development of Assumptions

Past Observations

We analyzed the AFC increase rates under three methods; (i) year by year; (ii) three-year rolling averages; and (iii) aggregate (or total) of all retirements from 1996 through 2006. The rates, by Plan, are shown in the following table.

Year	PERS I		TRS I		WSPRS I	
	Year by Year Rate	3-Year Rolling Average	Year by Year Rate	3-Year Rolling Average	Year by Year Rate	3-Year Rolling Average
1996	5.3%		1.0%		1.4%	
1997	5.0%		1.3%		3.2%	
1998	4.9%	5.1%	1.0%	1.1%	7.7%	4.1%
1999	5.0%	5.0%	0.8%	1.0%	7.4%	6.1%
2000	5.3%	5.1%	1.1%	1.0%	7.6%	7.6%
2001	5.4%	5.2%	1.1%	1.0%	7.5%	7.5%
2002	4.6%	5.1%	1.0%	1.1%	6.0%	7.0%
2003	4.2%	4.8%	0.8%	1.0%	7.1%	6.9%
2004	3.9%	4.2%	0.9%	0.9%	7.1%	6.7%
2005	4.1%	4.1%	0.7%	0.8%	7.2%	7.1%
2006	4.1%	4.0%	0.8%	0.8%	7.6%	7.3%

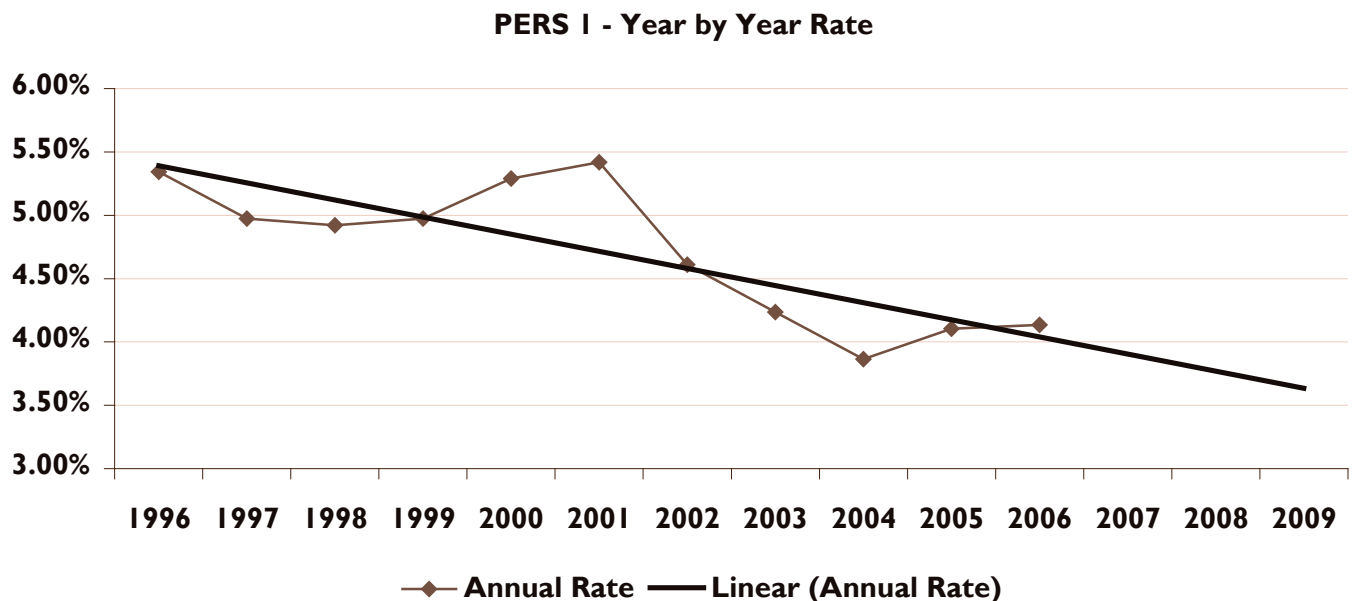
The aggregate rates for the plans are 4.7 percent for PERS 1, 1.0 percent for TRS 1, and 6.9 percent for WSPRS 1.

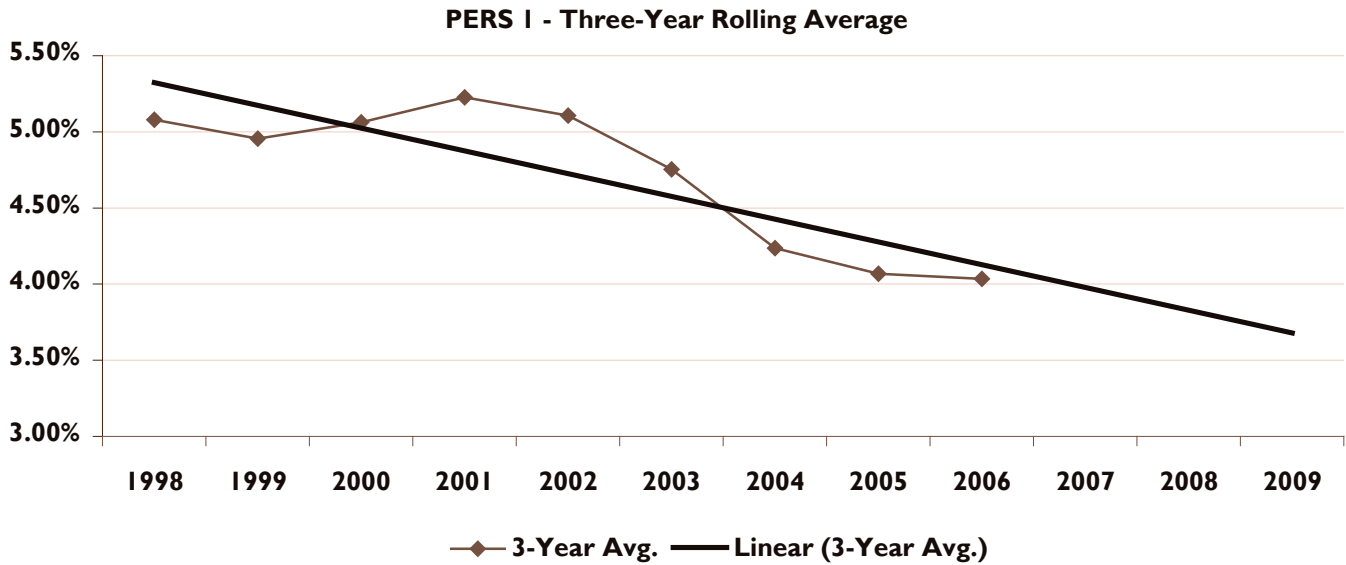
Future Expectations

We developed trend lines for the year by year rates and three-year rolling average rates and projected these out to 2009. These provide us with an expectation of future rates assuming they follow the same trends as our past experience.

PERS 1

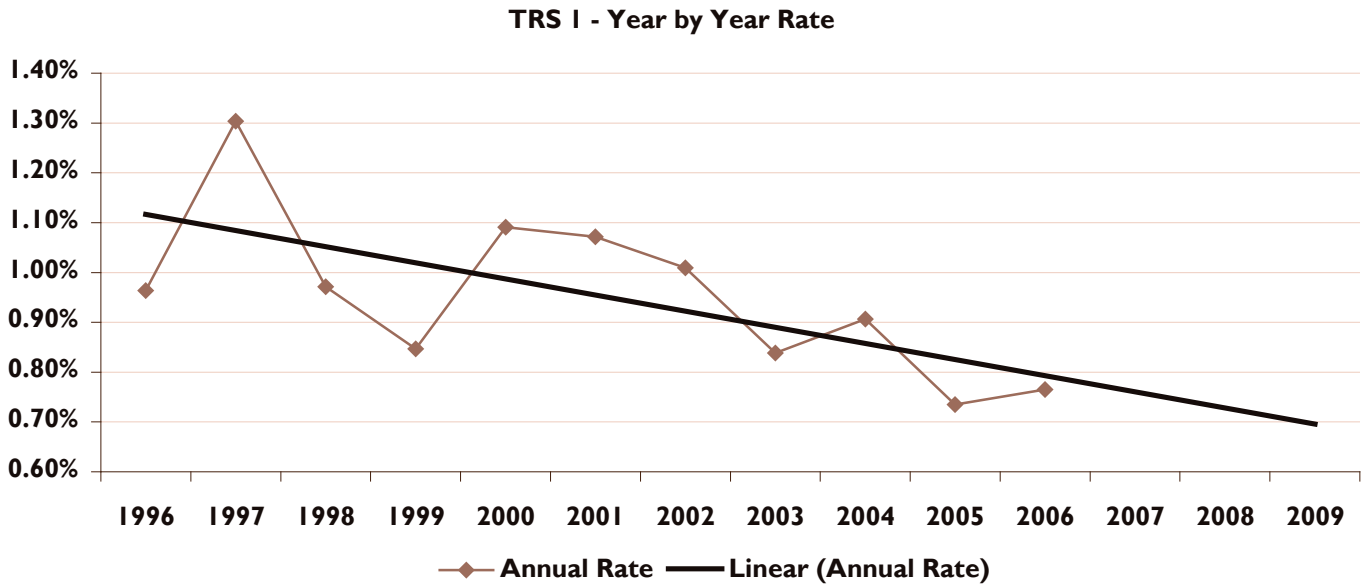
The PERS 1 data provided reasonable trends for future expectations. The future trends suggest rates in the range of 4.1 percent to 3.8 percent as shown in the following graphs. Our current assumption is 5.0 percent and we reduced the assumption 0.5 percent to 4.5 percent for PERS 1.



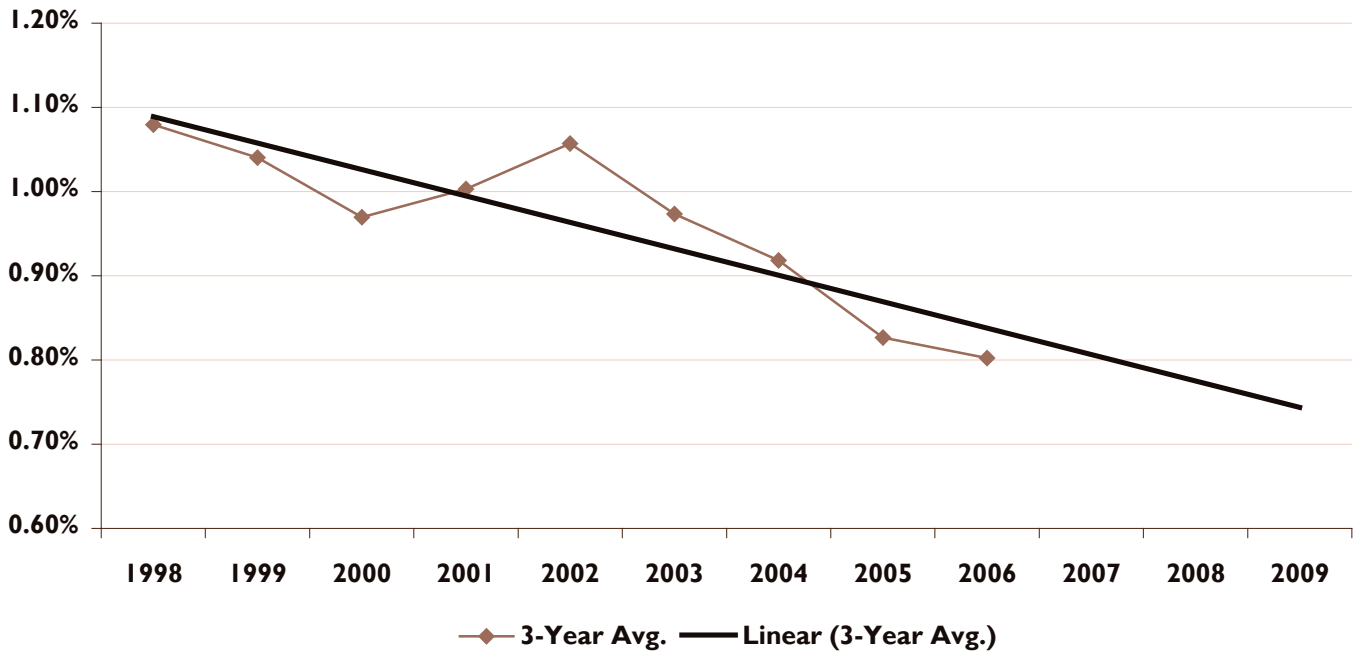


TRS 1

The TRS 1 data provided reasonable trends for future expectations. The future trends suggest rates in the range of 0.9 percent to 0.8 percent as shown in the following graphs. Our current assumption is 1.0 percent and we did not change this assumption for TRS 1.



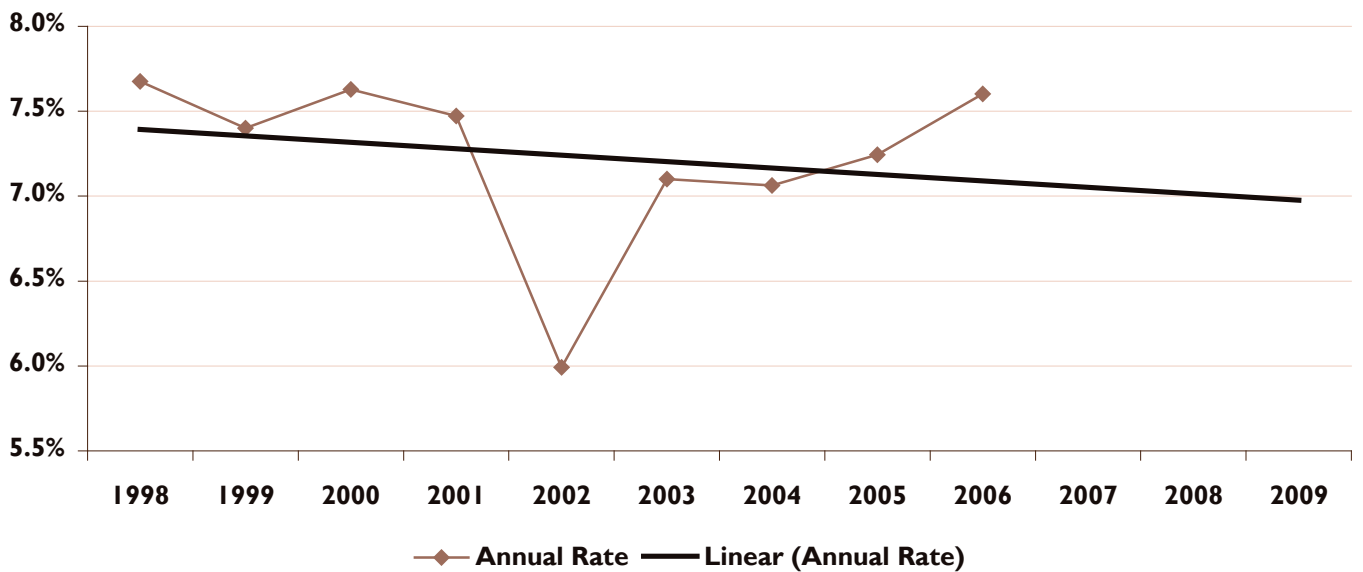
TRS I - Three-Year Rolling Average



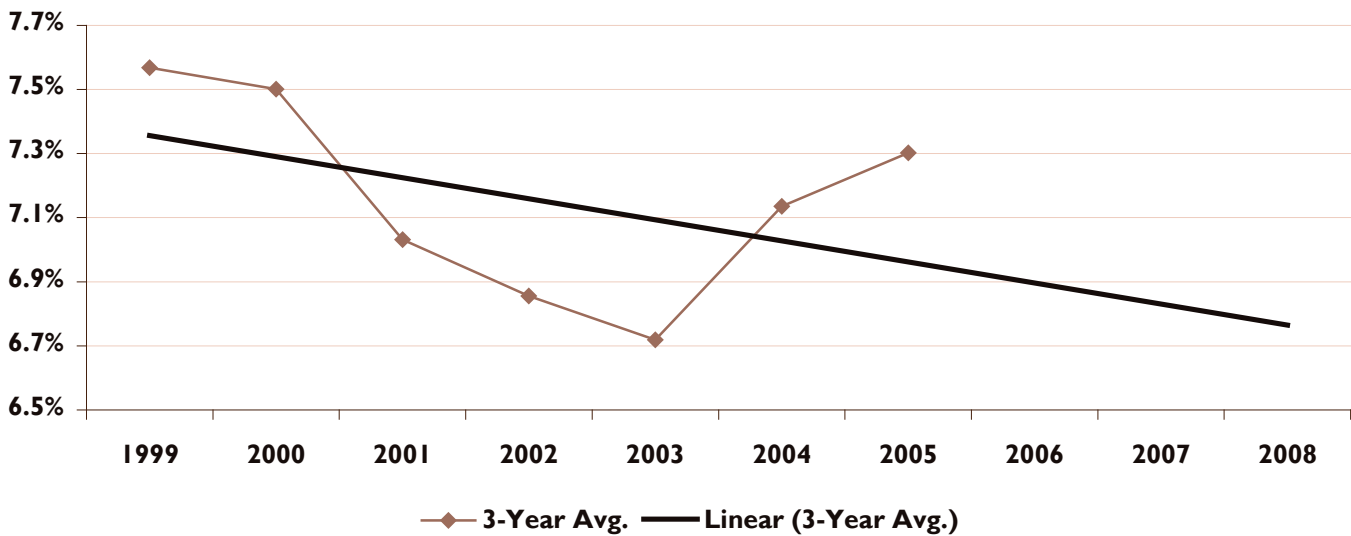
WSPRS 1

The WSPRS 1 data did not provide reasonable trends for future expectations due to unusually low rates in the early years of our analysis. We removed the 1996 and 1997 data, considering them as either questionable data or outliers, and analyzed the resulting trends. The future trends suggest rates around 7.0 percent as shown in the following graphs. Although the trends suggest 7.0 percent, we have one very low rate in 2002, which could be an outlier, and our most recent data is 7.6 percent. As a result, we did not change this assumption for WSPRS 1.

WSPRS I - Year by Year Rate



WSPRS I - Three-Year Rolling Average



Best Estimate AFC Load Assumption

We used the analysis from all three methods, plus a consideration of the future trends through to 2009, to develop our best-estimate for the AFC loads. We rounded the rates to the next highest 0.5 percent. The new rates are listed below along with the assumptions developed from the last experience study.

Plan	Old Assumption	New Assumption
PERS I	5.0%	4.5%
TRS I	1.0%	1.0%
WSPRS I	7.5%	7.5%

Certain and Life Annuity

In many of the plans, the standard retirement option is a monthly benefit payable for the lifetime of the member. If a retired member dies before the total pension payments they've received exceed the value of their accumulated contributions, the difference is paid to their beneficiary. We calculate the value of this benefit using a Certain and Life Annuity - a life annuity with a certain, or guaranteed, payment period.

Data Used

We used retiree records from the 2003 through 2006 valuation data to study the average ratio of annual retirement benefits to accumulated contributions for Plan 1 members.

We used active records from the 2006 valuation data to study expected certain periods for Plan 2 members.

Assumptions Made

We developed the expected certain period assumption by using new retirement rates and service-based salary increase scales detailed in this report. All other assumptions used match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop the certain and life annuity assumption, we determine the average ratio of accumulated contributions to annual retirement benefits.

For the closed Plans 1 that have very reliable retirement data and an average population that is close to retirement age, we use recent retiree data to calculate this ratio. It is simply the total savings funds divided by the total annual retirement benefits for all retirees.

For the open Plans 2 that have fewer retirements and a younger average population, our best estimate for a future certain and life annuity assumption is to model the future expectation of accumulated contributions and annual retirement benefits of a new entrant. For each plan, we project future accumulated contributions using the average entry age of a member, the contribution rate for that plan, the general salary increase assumption of 4.5 percent, the service-based salary scale, and the assumed savings fund interest rate of 5.5 percent. To calculate the future annual retirement benefit for each plan, we use the general salary increase assumption, the service-based salary scale, retirement rates, and early retirement reduction factors. These calculations are developed for each eligible retirement age. The certain period is determined at each retirement age by dividing the accumulated contributions by the annual retirement benefit. Finally, we develop one average expected certain period for each plan by weighting each calculation by the probability of retiring at each age.

Development of Assumptions

Past Observations

The average entry age developed for each plan represents the difference between the average age and the average service of the plan's active members as calculated in the 2006 AVR.

PERS

PERS 1 analysis of recent retiree records results in a certain period of three years. This is consistent with our current assumption.

PERS 2, with an average entry age of 36, has an average future expected certain period of four years. This is higher than our current assumption of three years.

TRS

The certain and life annuity assumption for TRS 1 only applies to the annuity portion of disability benefits. TRS 1 analysis of recent disabled retiree records results in a certain period of 11 years, which is consistent with our current assumption.

TRS 2, with an average entry age of 37, has an average future expected certain period of five years. This is higher than our current assumption of four years.

SERS

SERS 2, with an average entry age of 39, has an average future expected certain period of four years. This is higher than our current assumption of three years.

PSERS

To determine the average entry age of 29 for PSERS members, we included their prior PERS service. The average future expected certain period is four years. We currently use the PERS 2 assumption of three years.

LEOFF

Analysis of recent LEOFF 1 retiree records shows a certain period of three years. We previously assumed no certain period for these members because they begin retirement at a relatively young age. In this study, we wish to use a consistent approach for all members entitled to a potential refund of accumulated contributions.

LEOFF 2, with an average entry age of 29, has an average future expected certain period of five years. This is consistent with our current assumption.

WSPRS

Analysis of recent WSPRS Plan 1 retiree records shows a certain period of three years. We previously assumed no certain period for these members because they begin retirement at a relatively young age. In this study, we wish to use a consistent approach for all members entitled to a potential savings refund.

WSPRS 2, with an average entry age of 27, has an average future expected certain period of four years. This is consistent with our current assumption.

Future Expectations

We expect to see future certain and life annuities for the closed Plans 1 that closely match the recent retiree experience.

In the open Plans 2, we expect future certain period calculations, as described in the methods section, will model the average new member moving through the system to retirement.

Best Estimate Certain and Life Annuity Assumption

We developed our certain, or guaranteed, period for the standard life annuity retirement option specific to each plan. The closed, mature Plans 1 used recent past experience as the best estimate for future expectations. The open, younger Plans 2 used a forward-looking method based on an average new entrant moving through the plan to retirement. Based on our analysis, we have calculated the following certain periods:

Certain and Life Annuities:		
Years Certain		
Plan	Previous Assumption	New Assumption
PERS 1	3	3
PERS 2	3	4
TRS 1*	11	11
TRS 2	4	5
SERS 2	3	4
PSERS 2	3	4
LEOFF 1	N/A	3
LEOFF 2	5	5
WSPRS 1	N/A	3
WSPRS 2	4	4

**Applies only to "annuity" portion of disability benefits.*

Prior Military Service Credit

According to [RCW 41.40.170](#), members of PERS 1 can receive up to a total of five years of military service credit for both interruptive and non-interruptive military service combined. Non-interruptive military service occurs before members begin public service; interruptive military service interrupts members' public service. Any PERS 1 member can receive interruptive military service credit. PERS 1 members who have completed 25 years of creditable service as public employees may receive credit for certain non-interruptive military service. No member or employer payments are required for this military service credit.

Under [RCW 43.43.260](#), WSPRS Plan 1 members may also receive up to five years of military service credit once they have completed 25 years of service credit in WSPRS. This service is creditable whether the members served in the military prior to or during their WSPRS employment. Like PERS 1 members, WSPRS members receive this service credit at no cost.

These member benefits have a cost to the system because members and their employers are not required to pay for the benefits. The respective systems therefore absorb the cost, which we must estimate in our valuation model.

Data Used

We used annuitant records from our September 2007 retiree data files to study military service credit.

Please see the sections below for a full description of the development of military service credit assumptions.

Assumptions Made

Assumptions used in the development of military service credit rates match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop military service credit assumptions, we determined the number of annuitants with non-interruptive military service credit among those who have at least 25 years of service credit. We also estimated the average length of military service credit for those who have received the credit. The average length of military service credit among all members with 25 years of service is:

Average months of military service x Percent of members with military service.

The value we calculated above is an average amount of service only for those members who have at least 25 years of service. Our valuation model requires that we enter an increase factor for military service credit for all active members – whether they have military service credit or not. The members' future retirement benefits are multiplied by this increase factor to determine the cost of free military service

credit. To convert the average service above to a usable factor, we divided the average length of military service by the average service among all active members. This results in an increase factor that we use to estimate costs for future military service credit.

Development of Assumptions

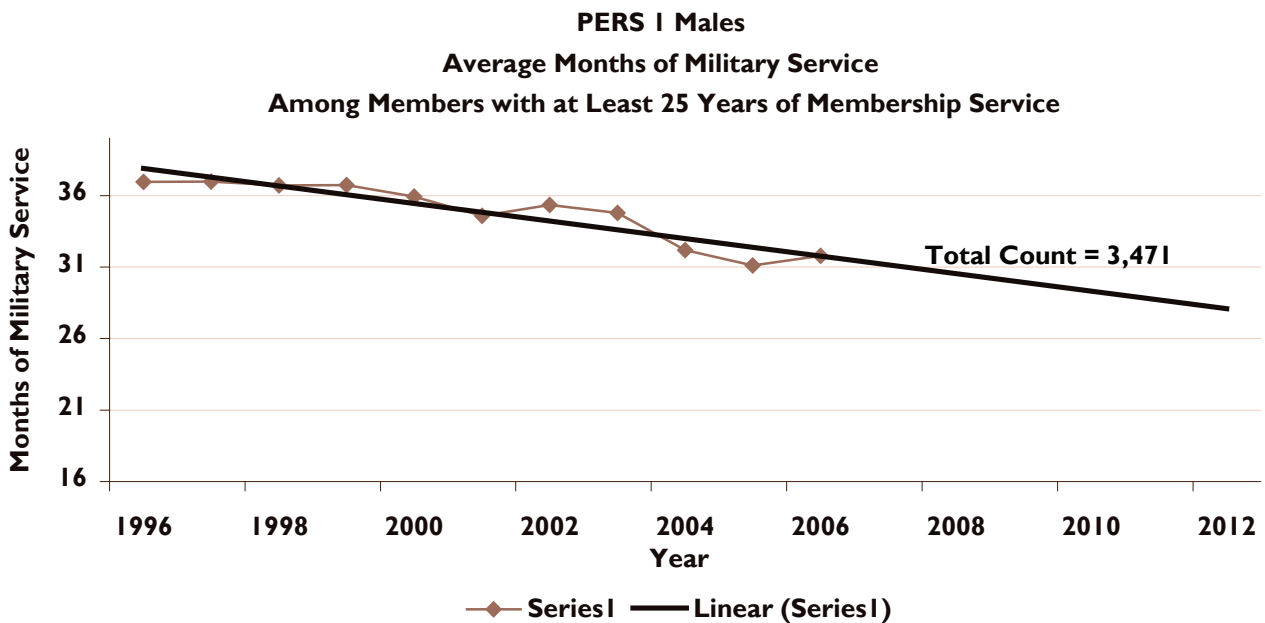
PERS

Past Observations

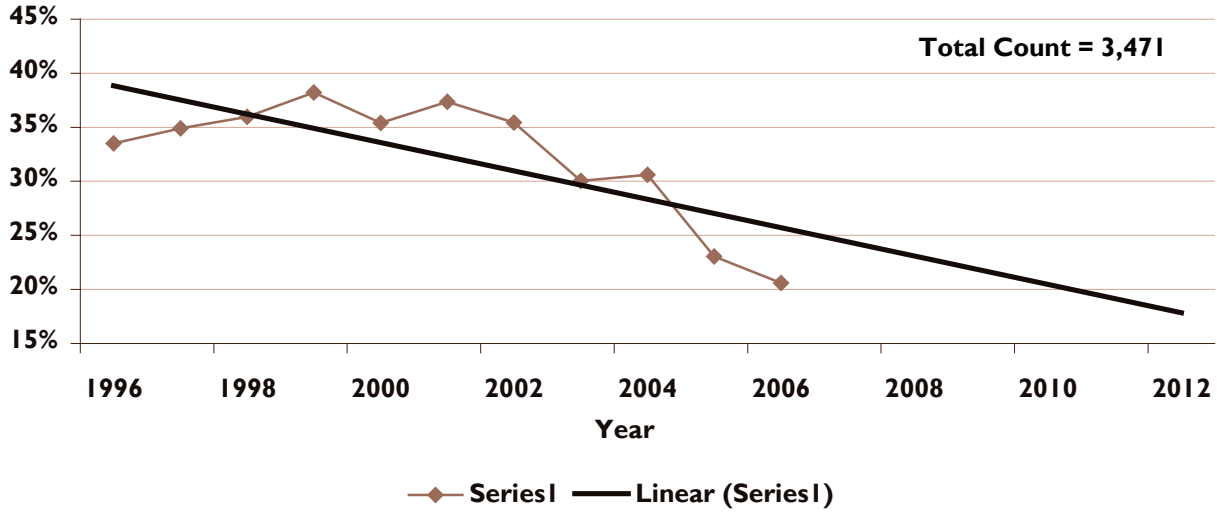
To find the average number of months of military service credit, we have traditionally taken the average number of months of military service credit among those members who have retired during the experience study period. We analyzed a table of these members by year of retirement and found apparent downward trends in both the number of months of military service and the percentage of members with military service. To see if these were trends, and not just normal variability in the data, we included more retirees in our study. We expanded the group by setting the earliest allowable retirement year back to 1996.

The decreased numbers of members who receive military service credit more recently is understandable. PERS Plan 1 has been closed since September 30, 1977. Even the youngest of actives are approaching 50 years of age. The last military conflict in which they might have participated prior to Plan 1 employment was the Vietnam War.

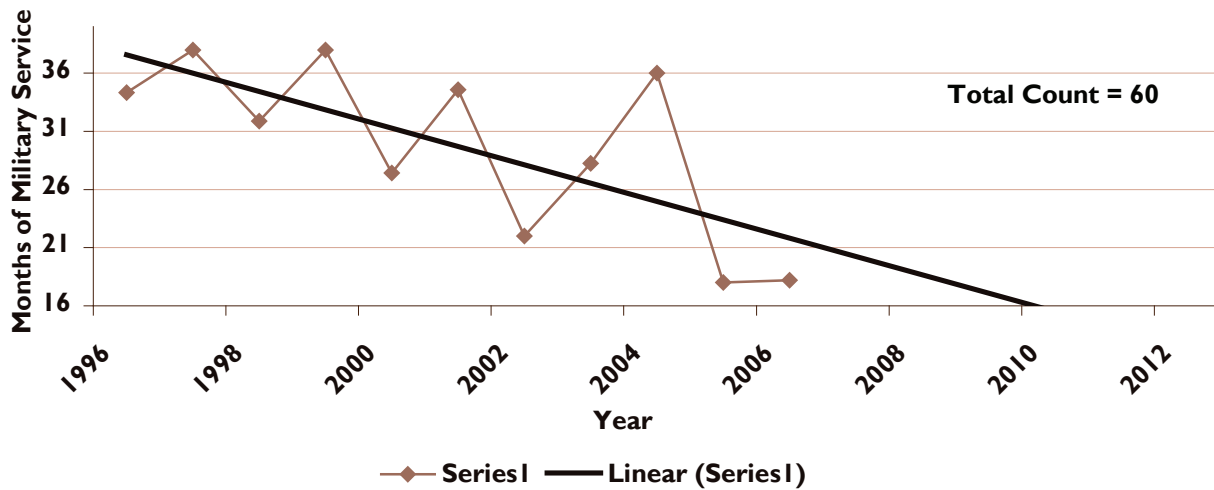
The charts below display the trends by year in PERS Plan 1 for males and females. The observations for females in these charts are more variable because there are fewer females with military service. Among over 11,000 new female retirees over the eleven-year study period, only 60 had prior military service. Even slight changes in such a small group from year to year can significantly impact averages. Despite the apparent volatile nature of the female data, we believe there is a general downward trend there as well.



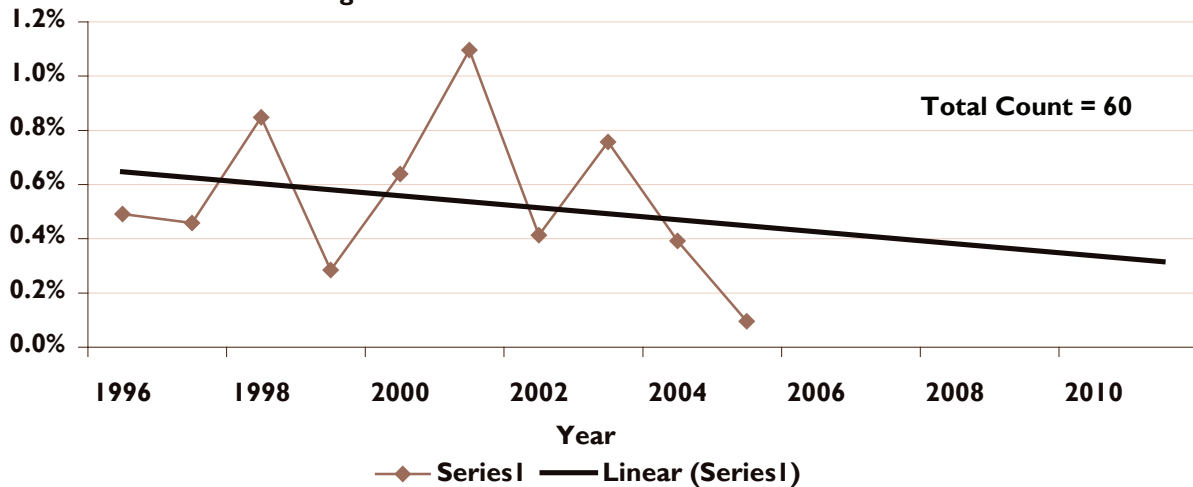
PERS I Males
Percent With Military Service
Among Members with at Least 25 Years of Service



PERS I Females
Average Months of Military Service
Among Members with at Least 25 Years of Membership Service



PERS I Females
Percent With Military Service
Among Members with at Least 25 Years of Service



Future Expectations

We expect to see that future military service credit will decline among PERS Plan 1 members, both in length of time served and in percentage of members receiving this credit. We will continue to monitor levels of prior military service credit for this plan.

Best Estimate Pers 1 Military Service Factors

To estimate the new military service credit assumption, we used the general trend lines displayed in the charts of this section to develop increase factors projected to the year 2009, which is the midpoint of the next experience study period. The following table lists the military service credit assumptions for PERS Plan 1 members:

PERS I Prior Military Service Credit Assumptions				
	Percent with Military Service	Avg. Military Service Months	Overall Avg. Add'l. Service Yrs.	Increase Factor
Old Assumptions				
Males	48%	37	1.48	5.9%
Females	1%	35	0.03	0.1%
New Assumptions				
Males	25%	30	0.64	2.5%
Females	1%	17	0.01	0.1%

Note: Totals may not agree due to rounding.

WSPRS

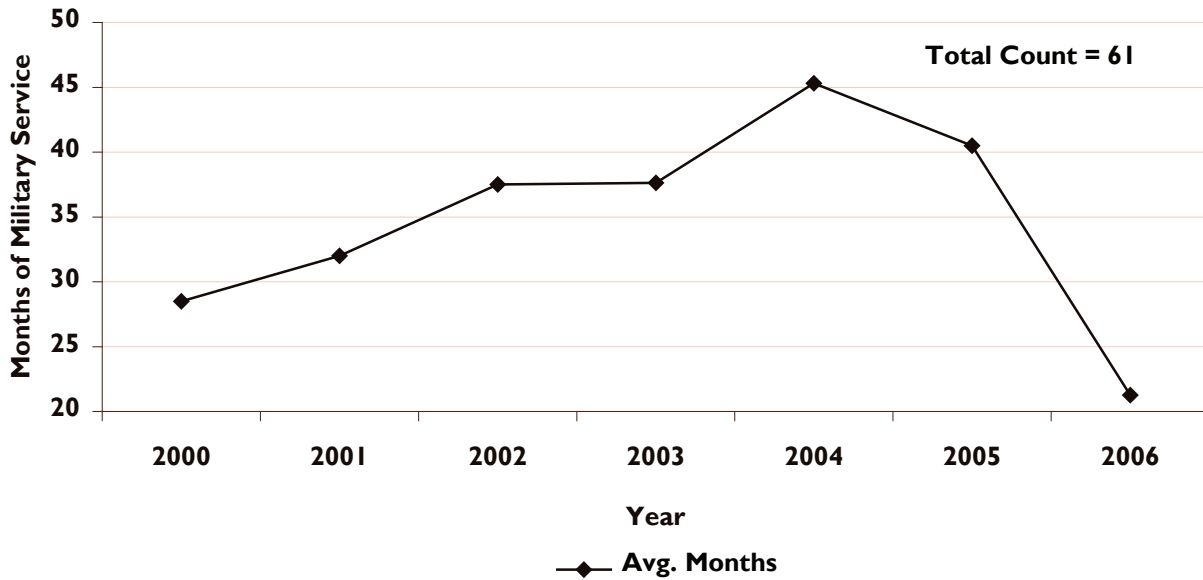
Past Observations

As with PERS Plan 1, we determined the number of annuitants with military service credit among those who have at least 25 years of service credit. We also approximated the average length of military service credit for those who have received the credit. Therefore, the average length of military service credit among all members with 25 years of service is:

Average Months of Military Service x Percent of Members with Military Service.

The charts below display average lengths of and percentages of members receiving military service credit. Note that there are no female retirees with such credit; these charts show only males.

WSPRS I Males
Average Months of Military Service
Among Members with at Least 25 Years of Membership Service



WSPRS I Males
Percent With Military Service
Among Members with at Least 25 Years of Service



At first blush, there appears to be a slight downward trend in the data we studied to set this assumption. In fact, the data for 2006 shows low average military service and percentages with such service. However, there are relatively few members in WSPRS, as the system is very small. The counts and percentages by year show significant variability in general. We did not observe sufficient evidence to conclude that the rate of military service credit per member will continue to decline over the long term. We believe that the changes we see from year to year could be regular short-term variability. Unlike PERS 1, WSPRS Plan 1 was closed to new membership on December 31, 2002. We might not see the impacts of more recent conflicts, such as those in the Middle East, for a number of years.

Future Expectations

We do not have enough information at this time to determine whether the rate at which military service credit is granted will increase or decrease in the near term. We will continue to monitor these rates for this plan.

Assumption Format

For this study period, we developed separate assumptions for WSPRS Plan 1 males and females. This is a departure from our prior assumptions, where we applied one increase factor for both genders. We found no females in WSPRS Plan 1 with military service credit. This is understandable, as there are very few female retirees in this plan. However, we believe it is reasonable to assume that females in WSPRS Plan 1 serve in the military at a rate similar to females in PERS 1. We therefore set the increase factor for WSPRS 1 females to match that of PERS 1.

Best Estimate WSPRS 1 Military Service Factors

We used the procedure described in the methods section to develop new military service credit assumptions as shown below. Note that while we do not believe that military service credit rates will decline indefinitely, we have adjusted our assumption downward slightly to reflect information from our most recent retiree data.

WSPRS 1 Prior Military Service Credit Assumptions				
	Percent with Military Service	Avg. Military Service Months	Overall Avg. Add'l. Service Yrs.	Increase Factor
Old Assumptions*				
Males	43%	32	1.15	4.0%
Females	43%	32	1.15	4.0%
New Assumptions				
Males	35%	36	1.07	3.7%
Females	0%	0	0.00	0.1%

Note: Totals may not agree due to rounding.

**Applied the same increase factors to all members.*

Age Difference

Our valuation model requires the age of the member's spouse in order to calculate the survivor benefits that are payable for the spouse's life. If this spousal data is missing from our valuation data file, we use an assumption for the age difference between the member and their spouse.

Data Used

We used service and disability retiree records from our experience study data (2001 through 2006) to determine average age differences between members and their spouses.

Assumptions Made

All assumptions match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop the age difference assumption, we determined the age difference for each retiree that has spousal information reported. We develop assumed age differences by gender and by Plan. We sum the age differences and divide by the number of retired members that reported spousal information.

Development of Assumptions

Past Observations

The experience study analysis, by system, results in the following age differences:

Plan	Member	Age Difference
PERS	Males	3
	Females	-2
TRS	Males	3
	Females	-2
SERS	Males	3
	Females	-2
PSERS*	Males	3
	Females	-2
LEOFF	Males	4
	Females	-1
WSPRS	Males	4
	Females	-6

**PSERS is a new system introduced during this experience study period and we do not have any plan-specific data to analyze. We have based the development of the PSERS rates on the PERS data.*

LEOFF 1 and WSPRS 1 are small plans. These plans do not require members to select a survivor option upon retirement, so this data is often not reported.

WSPRS 2 is a new plan introduced during this experience study period and we do not have retiree data to develop an age difference assumption specific to this plan.

The LEOFF and WSPRS systems have very small female populations. The data is therefore not reliable for determining an average age difference assumption.

Future Expectations

There is no evidence that any particular plan will have experience that is significantly different from the general population. Therefore, we have assumed the same age difference for all plans.

Alternate Formats

We also analyzed the retiree data by Plan. For example, in PERS we reviewed the data independently in Plan 1, Plan 2, and Plan 3. The age differences, by Plan, are detailed in the following table:

Plan	Member	Age Difference	Plan	Member	Age Difference
PERS 1	Males	3	SERS 2	Males	4
	Females	-2		Females	-1
PERS 2	Males	4	SERS 3	Males	3
	Females	-1		Females	-3
PERS 3	Males	3	LEOFF 1	Males	4
	Females	-1		Females	-1
TRS 1	Males	3	LEOFF 2	Males	3
	Females	-2		Females	-1
TRS 2	Males	4	WSPRS 1	Males	4
	Females	-1		Females	-6
TRS 3	Males	4			
	Females	-2			

We determined that each system as a whole is a reasonable representation for each of the plans.

Best Estimate Age Difference Assumption

We have determined that one set of rates for all the systems is sufficiently accurate in setting the age difference assumption for future valuations. The new assumptions, based on the gender of the plan member, are as follows:

Age Difference			
Plan	Member	Old Assumption	New Assumption
PERS	Males	3	3
	Females	-2	-2
TRS	Males	3	3
	Females	-2	-2
SERS	Males	3	3
	Females	-2	-2
PSERS	Males	3	3
	Females	-2	-2
LEOFF	Males	4	3
	Females	-4	-2
WSPRS	Males	3	3
	Females	-2	-2

Member Salaries

Each year we review the salaries reported in the valuation data for reasonableness and make a number of salary adjustments when we determine it is necessary. We must also estimate default salaries for certain members for whom salaries are not provided in the data.

If a member's salary is higher than is reasonably expected, we reset the salary to a predetermined maximum salary.

Conversely, if we find that a reported salary for an active member is too low, we reset that salary to a minimum level. Unreasonably low salaries might result from a number of sources. Some active members work less than full-time while receiving full-time service credit. Occasionally, employers report incorrect or incomplete salaries for certain members, and those errors are not always corrected before the valuation data is prepared.

Active members with less than a full year of service require salary adjustments because our valuation software projects service and salaries based on full-time employment. If the member has at least two months of service, we simply annualize their salary. If the member's service is less than two months, we have found the reported data to be unreliable for purposes of annualizing. As a result, we set default salaries for these members.

Historical salaries for terminated vested members are not provided in the valuation data. Our valuation model requires a salary estimate because terminated vested members may receive deferred retirement benefits. We therefore develop basic salary levels for these members during each experience study.

Historical salaries for TRS Plan 1 members temporarily disabled under [RCW 41.32.540](#) are not provided in the valuation data. Temporarily disabled TRS 1 members are not annuitants, nor are they active. Like terminated vested members, they are inactive members who will eventually be entitled to a pension. We must estimate default salaries for these members.

Finally, we estimate salaries for currently disabled WSPRS members. These members are also inactive members. Their disability benefits are paid from a fund outside the pension system. However, upon the member's death, a spouse may receive a survivor pension paid out of the pension fund.

Data Used

We used active records from the 2006 valuation data to study member salaries.

Maximum Salaries

For all systems, we set the maximum allowable salary each year equal to the salary limit in section [401\(a\)\(17\)](#) of the Internal Revenue Code. For the 2007 valuation period, this maximum salary is \$225,000.

Minimum Salaries

Assumptions Made

We assume that active members will become full-time in the future, even if they are not reported as full-time in any given valuation period. Some members begin full-time employment part of the way through a valuation period. Still others are hired in part-time positions, but move into full-time work as their careers advance.

Methods Used

For each retirement system, we consider the demographic makeup of the membership in determining minimum salaries. For example, teachers receive salaries that are different than those of judges in the state's court system. Fire fighters receive different salaries than administrative assistants. The job classes in each system vary according to the membership eligibility rules for that system. Below is a description of the method used in determining each system's minimum salaries.

PERS

Job classifications in PERS are quite varied. For this reason, salaries range from very low to quite high. We believe the minimum salary in PERS can reasonably be represented by the minimum wage in Washington. Each valuation year, we set the minimum PERS salary to the minimum hourly wage in effect on January 1 of the valuation year multiplied by 2,080 hours, (40 hours per week, times 52 weeks in a year). We round the resulting annual salary to the nearest thousand dollars. As an example, the minimum salary for 2007 is shown below.

2007 PERS Minimum Salary			
Minimum Wage	Full-Time Hours	Minimum Salary	Rounded
\$7.93	2,080	\$16,494.40	\$16,000

This method remains unchanged for Plans 2 and 3 from previous years. This method is a change for PERS 1. Prior to this experience study period, we based PERS Plan 1 minimum salaries on the minimum monthly retirement benefit for Plan 1 members described in [RCW 41.40.1984\(1\)](#).

TRS

Membership in TRS mainly consists of certificated teachers and administrators employed by school districts. Washington State's teachers' pay schedule is an appropriate measure to set minimum salaries. Salaries in this scale vary by education level and years of experience teaching. We select the salary level for a teacher with a Bachelor of Arts degree and zero years of experience, rounded down to the nearest thousand dollars, as the minimum TRS salary. Using the 2007 state scale, this minimum salary is \$31,000.

This method remains unchanged for Plans 2 and 3 from previous years. This method is a change for TRS 1. Prior to this experience study period, we based TRS Plan 1 minimum salaries on the minimum monthly retirement benefit for Plan 1 members described in [RCW 41.32.485\(1\)](#).

SERS

SERS membership consists of non-certificated employees of school districts and educational service districts. In SERS, as in PERS, salaries are widely varied. However, because of the shorter school year, we see many SERS members who work a lower number of hours in the valuation period. If we were to try to apply the same method for setting minimum salaries in SERS as we do in PERS, we would find an unreasonably high number of members requiring a minimum adjustment. For SERS, we take a slightly different approach in setting the minimum salary. We multiply the state's minimum hourly wage in effect January 1 of the valuation year by the full-time number of hours in a school year, which we estimate as eight hours a day times 180 days in a school year. We round this value to the nearest thousand dollars. This method has changed from previous years, where we used the median hourly wage multiplied by the minimum number of hours required to receive full-time service credit. As an example, the minimum salary calculation for 2007 under the new method is displayed below.

2007 SERS Minimum Salary				
Minimum Wage	Hours Per Day	Days Per School Year	Minimum Salary	Rounded
\$7.93	8	180	\$11,419.20	\$11,000.00

LEOFF Plans 1 and 2

LEOFF is a smaller system than those previously listed. Members in LEOFF also have varied salaries, but more uniform job classifications. A reasonable way to set the minimum salary in LEOFF is to view a distribution of salaries by plan and select the rounded salary above which 99 percent of the plan's salaries fall. This results in a minimum salary for all LEOFF Plan 1 and Plan 2 active members of \$38,000. As with most salaries, we expect LEOFF salaries will increase every year. However, we will not increase this minimum each year because it would not make a material difference in the valuation results. This method is unchanged from prior periods.

PSERS

PSERS is the newest system in this study. Members in PSERS have varied salaries and job classifications. As with LEOFF, we viewed a distribution of salaries and chose the approximate salary above which 99 percent of the plan's salaries occur. The minimum salary for PSERS active members is \$26,000. We also expect PSERS salaries will increase every year. However, we will not increase this minimum each year because it would not make a material difference in the valuation results.

WSPRS

Members in WSPRS are commissioned Washington State Troopers. As with LEOFF and PSERS, we selected the approximate salary above which 99 percent of the plan's salaries occur. The minimum salary for WSPRS Plan 1 active members is \$55,000. For Plan 2, the minimum salary is \$42,000. We expect WSPRS salaries will increase every year. However, we will not increase this minimum each year because it would not make a material difference in the valuation results. This method is unchanged from the last experience study period.

Low-Service Salaries

Assumptions Made

As with minimum salaries, we assume that low-service active members will become full-time in the future, even if they are not reported as full-time in a given valuation period.

Methods Used

We use the following methods when setting low-service salaries. Low-service actives fall into two categories: those with less than two months' service during the valuation year and those with at least two months' service, but less than a full year of service for the year.

Non-SERS Members

For active non-SERS members with less than two months' service credit, we assign a default salary according to the following. First, a default entry salary is found by examining the prior year's valuation data. The entry salary for a given system is the average salary for actives with one year of service, rounded to the nearest thousand dollars. We adjust the salary with one year of the general salary increase assumption to bring last year's salary forward to the current valuation year. Then, to reflect that not all members with low service are new members, we adjust this entry salary by our service-based salary increase scale. Members with more work experience, who receive this adjustment, are assigned a higher salary. Finally, the resulting adjusted salary is rounded to the nearest thousand dollars.

As an example, suppose we have an active PERS member who only worked one month in the 2007 valuation period. This member's salary must be adjusted for low service. The 2006 average annual pay for a PERS member with one year of service was \$36,000. We carry forward to 2007 with our general salary increase assumption of 4.5 percent. Suppose further that this member has nine years of service. The salary increase factor for a PERS member with nine years of service is 1.326. The salary increase factor for a member with one year of service is 1.054. We need this factor as well, since we must adjust the salary that is reflective of one year of service. This member's pay is assigned as:

$$\$36,000 \times 1.045 \times (1.326 / 1.054) = \$47,328 \text{ (or } \$47,000 \text{ when rounded)}$$

We will use the service-based salary scales developed in this experience study for the 2008 valuation period and later.

Members with more than two months' service, but less than a full year of service also have their salaries adjusted to an annual level. We do this by dividing their actual pay by the portion of full service credit they received. For example, a member with 0.25 years of service during the year who earned \$10,000 during that time receives an annualized salary of \$40,000. These methods remain unchanged from previous years.

SERS Members

As we found with SERS minimum salaries, it is not always practical to use the non-SERS method described above to set SERS low-service default salaries. The method results in unreasonably high salaries for the system. Instead, for members with less than two months' service, we multiply the median hourly pay

by the average number of hours worked by all full-time actives, both from the previous year's valuation data. This default salary, which is not adjusted for past service, is rounded down to the nearest thousand dollars. For 2007, the SERS default low-service salary was:

$$\$14.62 \text{ per hour} \times 1,540 \text{ hours} = \$22,514.80 \text{ (or } \$22,000 \text{, when rounded down)}$$

SERS active members with more than two months' service, but less than a full year of service need their salaries adjusted for use in our valuation model. Members who worked the full school year, but received less than a full year of credit, have their salaries adjusted in the same method as non-SERS members above. However, members who began their service for the year late (after November 15) are assigned the greater of the SERS default low-service salary above and their actual salary for the period. Again, we find that annualizing SERS salaries when they have not worked the entire year tends to increase too many naturally lower salaries that should not be adjusted. These methods are unchanged from the prior experience study period.

Terminated Vested Salaries

Methods Used

To determine default salaries for terminated vested members, we estimate average pay for each system in various service groups as of a base year. We assign members a salary consistent with their service level (service is rounded down to the nearest full year). We then adjust the salaries by the general salary increase for as many years as have passed between the base year and the year the member terminated. We round the resulting salary to the nearest thousand dollars. The following table lists the new base salaries by system and service.

Terminated Vested Base Salaries as of 2006						
Years of Service	LEOFF	PERS	TRS	SERS	PSERS	WSP
Less Than 5	\$60,000	\$40,000	\$43,000	\$20,000	\$40,000	\$52,000
At least 5, Less Than 10	72,000	47,000	50,000	24,000	51,000	63,000
At least 10, Less Than 15	76,000	52,000	59,000	26,000	55,000	68,000
At least 15, Less Than 20	81,000	54,000	64,000	29,000	57,000	71,000
At least 20, Less Than 25	86,000	57,000	66,000	34,000	59,000	75,000
At Least 25	87,000	59,000	68,000	37,000	61,000	80,000

As an example, a vested TRS member who terminated in 1994 with 23 years of service would be assigned a salary of $\$66,000 / (1.045^{(2006 - 1994)}) = \$38,917.82$ (or \$39,000, when rounded).

As another example, a LEOFF Plan 1 or Plan 2 member with eight years of service who terminates in 2007 would be assigned $\$72,000 / (1.045^{(2006 - 2007)}) = \$75,240$ (\$75,000, when rounded). Note in the last example that members can terminate after the base year, which results in an estimated salary that is higher than the base salary.

Beginning with the 2008 valuation data, we will use a new method to assign salaries for terminated vested members where possible. Reasonable prior annualized salaries for newly terminated vested members will be sought from the previous year's valuation data. If the prior salary for such a newly terminated member is not reasonable (i.e. outside the minimum and maximum limits), we will use the method described above. All members terminated prior to 2007 will continue to receive estimated salaries as described above.

TRS Plan 1 Temporary Disability Salaries

Method Used

To set the default salary for these members, we use the salary from the default terminated vested table above for TRS members with between 20 and 25 years of service, or \$66,000. This salary has a base year of 2006. In our valuation model, we adjust the salary by the general salary increase assumption for each year between the current valuation year and the base year, rounded to the nearest thousand dollars. This method remains unchanged from previous years.

For example, if we wish to value a temporarily disabled member in 2009, the salary assigned at that time will be $\$66,000 \times (1.045^{(2009 - 2006)}) = \$75,317$ (or \$75,000 when rounded).

WSPRS Disability Average Final Salaries

Method Used

According to [RCW 43.43.270](#), the average final salary of a disabled member who dies and leaves a survivor shall be the same as for currently active members who hold the same rank the disabled member held when the disability occurred. Our valuation model requires that we supply this salary for currently disabled members. We estimate the default salary using the average annual salary (rounded to the nearest thousand dollars) in the 2006 data for all active Plan 1 members. This salary is \$70,000. We use the average salary for all members because there is no information in the data about the rank held at disability for individual members. At this time, there are no Plan 2 disabled members, so we do not include their average salaries in this estimate. Similar to the methods for terminated vested salaries and TRS Plan 1 temporary disability salaries above, we adjust by the general salary increase assumption to inflate the salary for years passed between the current year and the base year.

The method described above is a departure from the method used since 2005. For 2005 and 2006, we estimated the default salary for these members by finding the average active salary for all Plan 1 members during the given valuation year. The new method is more consistent with other, similar default salaries in our model. It will also simplify our process by eliminating the need to replace the default salary every year.

Percent Male/Female

Our valuation data requires a gender code for each plan member in order to calculate and project benefits accurately since many assumptions vary by gender. We use several gender-based assumptions in the actuarial valuation, such as mortality and disability. Occasionally we receive data with missing gender information. As a result, we assign a missing gender code with an assumed percent male/female.

Data Used

We used active records from the 2000 through 2006 valuation data to study percent male/female.

Assumptions Made

Assumptions used in the development of percent male/female match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop percent male/female assumptions, we simply calculate the percent of active members that are male and the percent of active members that are female.

Development of Assumptions

Past Observations

We analyzed the active data by plan and by system. For example, in PERS, we reviewed the data independently for each of the three plans and we also reviewed the data for the PERS system as a whole.

PERS

PERS 1 analysis, independent of Plan 2 and Plan 3, results in slightly lower male rates than the analysis of the PERS system as a whole. Since Plan 1 is a closed plan and much smaller than the other PERS plans, we feel the analysis of PERS as a whole is sufficiently accurate.

PERS 3 was introduced as a new plan during this experience study period and we do not have historical data for the entire period. The data we have for PERS 3 models the same trends as the PERS 2 data.

PSERS

PSERS was introduced during this experience study period. The only PSERS specific data we have is for 2006. We used the 2006 valuation data to isolate the social security numbers of the current PSERS members. We then traced these members back to 2000, in their prior plans, to determine the percent male/female rates for each year from 2000 to 2006. This allowed us to develop an appropriate percent male/female assumption for PSERS.

LEOFF

LEOFF 1 analysis, independent of Plan 2, results in higher male rates than the analysis of the LEOFF system as a whole. Since the LEOFF 1 plan is closed and much smaller than the LEOFF 2 plan, we feel the analysis of the LEOFF plan as a whole is sufficiently accurate.

WSPRS

WSPRS 2 was introduced during this experience study period and we do not have historical data for the entire period. The data we have for WSPRS 2 models the same trends as the WSPRS 1 data.

Future Expectations

We expect to see future female membership in PSERS, LEOFF, and WSPRS continue to increase. We will round the percent female assumption upward for this experience study, but we will not make any other adjustment at this time. We will continue to monitor levels of female membership for these plans.

In all other plans, we expect future percent male/female membership will closely match what we developed for this experience study period.

Best Estimate Percent Male/Female Assumptions

We found the results, by plan, to match exactly with the system as a whole, except for PERS 1 and LEOFF 1 as described above. We have determined that the analysis, by system, provides a sufficiently accurate method for determining the percent male/female assumption. Based on our analysis, we have calculated the following percentages in the table below:

Percent Male/Female Assumptions				
Old Assumptions			New Assumptions	
Plan	Percent Male	Percent Female	Percent Male	Percent Female
PERS	50%	50%	50%	50%
TRS	30%	70%	30%	70%
SERS	20%	80%	20%	80%
PSERS	50%	50%	70%	30%
LEOFF	90%	10%	90%	10%
WSPRS	90%	10%	90%	10%

WSPRS Disabled Life Expectancy

Under [RCW 43.43.270](#), when a disabled member dies, their spouse may receive a survivor benefit. The survivor benefit is based on the salary for current active members who hold the same rank the disabled member held when the disability occurred. Our valuation model requires that we estimate the salary used to determine the survivor benefit. For our active members, we adjust their current salary with the salary inflation assumption for years between the age of disablement and the year when the survivor benefit will first become payable. In order to make this adjustment, we need to determine the life expectancy, by gender, for a disabled WSPRS member.

Data Used

We used inactive records from the 2006 valuation data to determine an average age of disablement.

Assumptions Made

We assumed that the Disabled Mortality Rates developed as part of this experience study applied to the development of WSPRS Disabled Life Expectancy. All other assumptions match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

To develop the disabled life expectancy assumption, we determined the average age of disablement for all current disabled members and used the disabled mortality rates to estimate the life expectancy for that age, by gender. The life expectancy models when the survivor benefit first becomes payable.

Development of Assumptions

Past Observations

As of September 30, 2006, there were 57 disabled members with an average age at disablement of 42.92. The following table summarizes the data:

Age at Disability	Number
<30	5
30-34	5
35-39	10
40-44	10
45-49	11
50-54	14
55-59	2
Total	57

Future Expectations

We expect future disabilities will occur, on average, at the same age as our current average age. We have not made any additional adjustments to the data.

Best Estimate WSPRS Disabled Life Expectancy

Based on the disabled mortality rates, we expect a 43-year-old disabled male to have a future life expectancy of 24 years (to age 67) and a 43-year-old disabled female to have a future life expectancy of 31 years (to age 74). Our valuation software automatically adds a cost-of-living adjustment to this benefit, starting from the member's date of disablement. We removed this adjustment in the calculation below because the survivor benefit commences when the member dies, not when the member disables. Using the unrounded rates, we calculated the salary factor for the survivor disability benefit as follows:

$$\text{Male: (Increase Factor)}^{\text{(Life Expectancy - Age)}} = (1.045/1.03)^{\text{(66.95 - 42.92)}} = 1.4$$

$$\text{Female: (Increase Factor)}^{\text{(Life Expectancy - Age)}} = (1.045/1.03)^{\text{(74.32 - 42.92)}} = 1.6$$

We will use this salary factor in the valuation to project the active member's salary to the estimated date the survivor benefit will first become payable.

LEOFF Plan 1 Dependent Children

According to [RCW 41.26.130\(1\)](#), LEOFF Plan 1 members who receive a disability benefit may receive an additional benefit of 5 percent of their final average salary (FAS) for each dependent child, to a maximum additional 10 percent of FAS.

Surviving spouses of members who die in service also receive an additional 5 percent of FAS benefit for each child, to a maximum of 10 percent.

Only children under the age of 18 may receive these benefits. Benefits may be extended to age 20 years, 11 months when the child is a full-time student. Handicapped children may be eligible for benefits beyond these ages.

These additional benefits represent a liability to the system because they are provided to the member at no cost. Therefore, we develop assumptions about how many LEOFF 1 members are expected to have children. We also estimate the average length of time these benefits will be payable. We apply these assumptions to show the cost of child benefits for active members who might die or become disabled in the future.

Data Used

We used annuitant records from the 2006 valuation data to study this LEOFF Plan 1 benefit.

Please see the sections below for a full description of the development of LEOFF 1 child benefit assumptions.

Assumptions Made

We assume that when a member has dependent children, there are always two children. Therefore, our valuation model will pay 10 percent of the member's FAS for the entire expected duration of the child benefit.

We assume all children will attend college on a full-time basis. This means our average duration assumption will extend to age 21 from the age of the average youngest child. We also ignored the effects of mortality in calculating the expected duration, as death rates are close to zero for people in this age group.

Adult children with disabilities may receive a child benefit for life. There are actually very few of these disabled beneficiaries, and we believe the additional cost to the system for their expected payment term is immaterial, so we assumed there were no adult disabled dependents when we developed the expected duration of payments.

All other assumptions used match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

We developed the probability of having dependent children by observing the number of current disabled members and survivors who have dependent children by attained age. The actual ratio of annuitants with dependent children to all annuitants forms the basis for our analysis. We plotted these ratios by age on a chart and fitted trend lines to the data to arrive at our final expected probability of having dependent children. Please see the development section below for further details.

We developed the expected average duration of payments assumption as follows. We produced a distribution of annuitants with dependent children including counts by the youngest child's current age. We then calculated the duration of remaining payments for each age under 21. The expected duration of payments is an average duration weighted by the counts at each age.

The death benefits paid under [RCW 41.26.160\(1\)](#) and [41.26.161\(1\)](#) also allow for all child benefits if there is no spouse (to a maximum of 60 percent of FAS), but we do not include that provision in our valuation model.

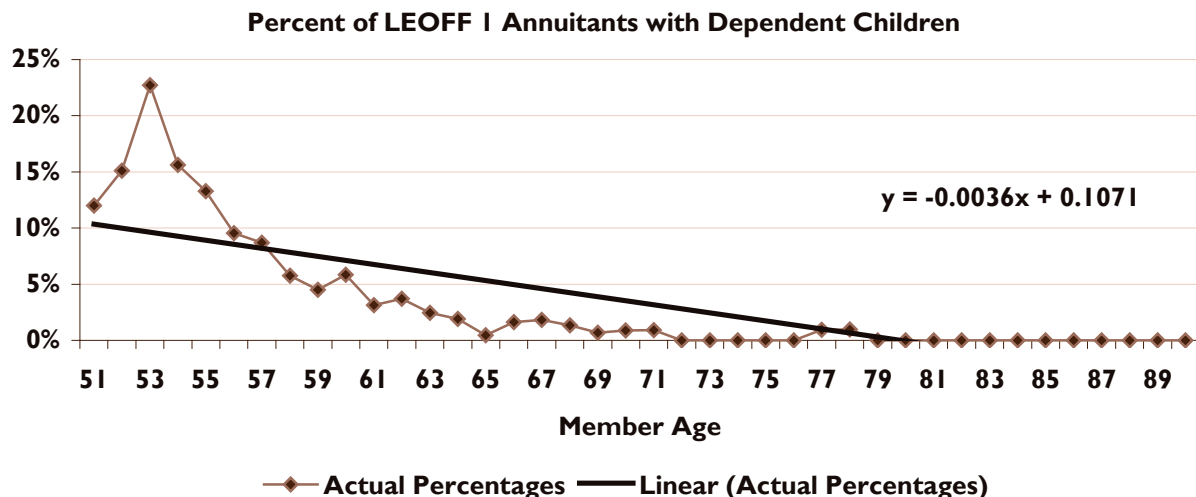
Development of Assumptions

Past Observations

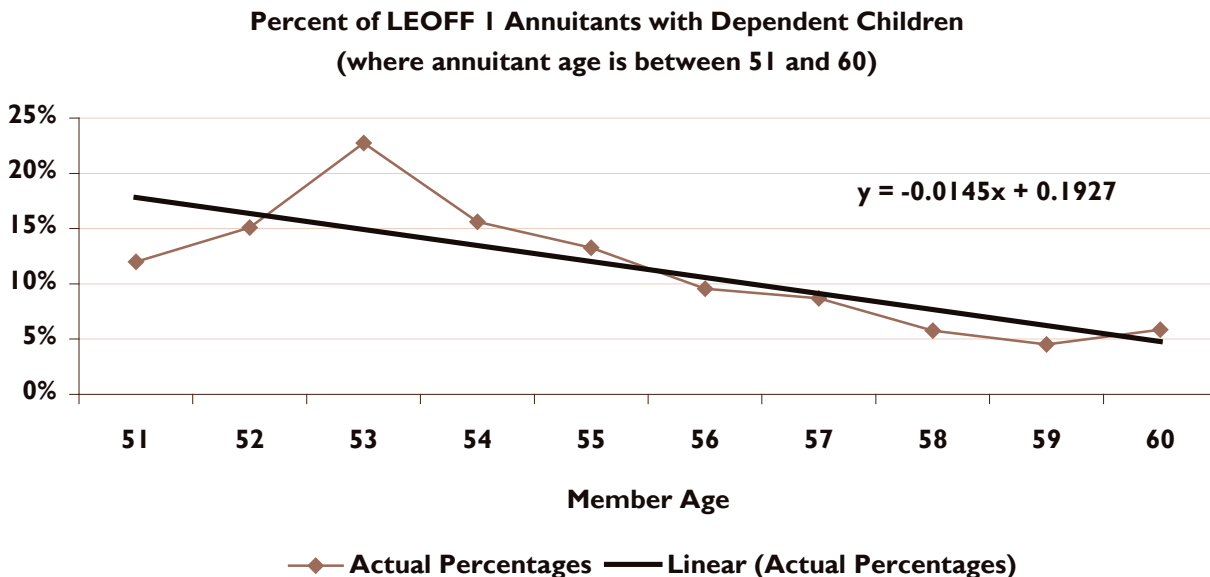
As members in LEOFF Plan 1 have matured, the number of dependent children has decreased on average. The number of new disabilities has also dropped over the last several years, which results in fewer dependent children for disabled members.

In the charts that follow, we used regression analysis to develop linear equations, or trend lines, which can “predict” an expected percentage of members with dependent children based on the member's age. The equations for these “best-fit” lines are displayed in the charts.

Upon observation of the ratios of members with dependent children to all members, it seemed that assigning a single line to approximate the ratios would not be adequate. The chart below demonstrates that for ages 60 and under, the ratios are quite a bit higher than the ratios for older annuitants. If we used a single trend line to represent average ratios by age, we would understate the expected probabilities for younger members, and overstate those probabilities for older members.



Instead of trying to fit one trend line to all of the observations, we split our data into two age groups: those age 60 and under, and those over 60. The charts below show the separate plots, along with the best-fit lines we used to estimate the probability that future disabilities and in-service deaths will result in payments to children.



Future Expectations

We expect to see fewer dependent children on average as LEOFF Plan 1 members continue to age. The active population in LEOFF 1 is declining, so we expect to see the number of new in-service deaths to decrease over time as well. We did not make any adjustments to our probability of having dependent children assumption to reflect this expectation, but we will continue to examine this assumption with each experience study in the future.

We also expect to see the dependent children of these annuitants become older on average as their parents continue to age. We made a slight downward adjustment in the expected duration of payments assumption to reflect this expectation. Please see the Expected Duration of Payments subsection below for more detail.

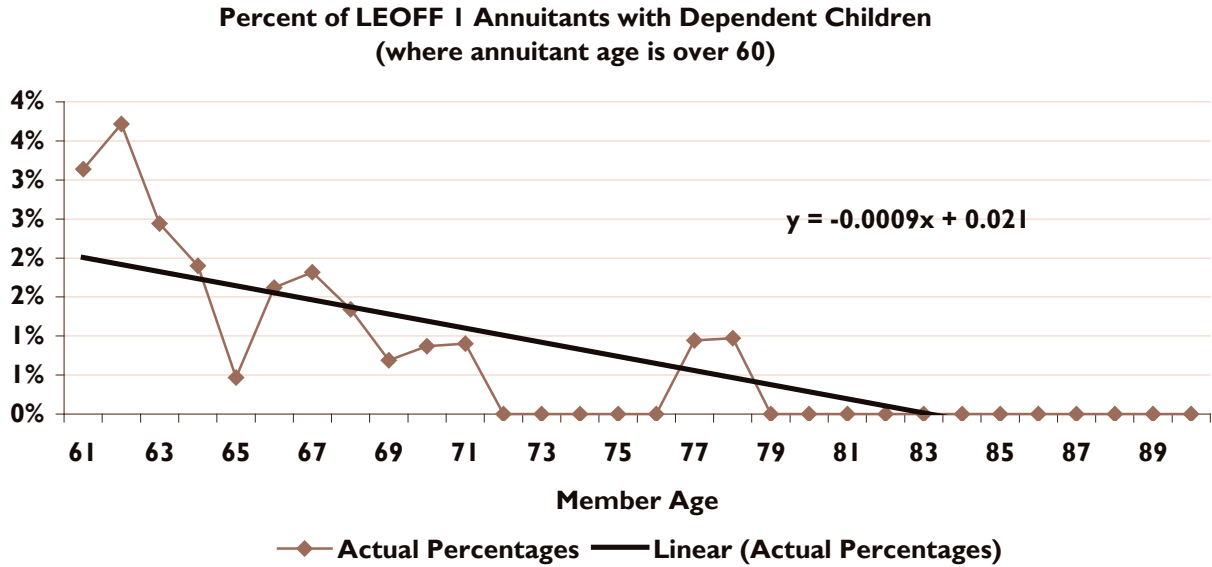
Assumption Format

We developed these assumptions based on a unisex format. We considered developing a gender-distinct assumption, but there are very few female members in LEOFF 1. We would likely see unreliable results if we tried to develop assumptions from the limited number of observations. In fact, even if we could develop these assumptions separately by gender, there are few enough females that the difference in cost generated by the alternate format would be immaterial.

Best Estimate LEOFF 1 Dependent Children Assumptions

Probability of Having Dependent Children

The table below displays our old and new probability of having dependent children assumption by age. Please note that our new assumption is zero for ages younger than 40, as no members under 40 remain in the plan.



Expected Duration of Payments

Based on the method described above, our duration of child payments assumption is five years. We found that the average age of the youngest child among those annuitants with dependent children was 15.4. Therefore the average expected duration of payments for these members to age 21 is 5.6 years. We rounded the expected duration down to reflect our expectation that this assumption will decrease with time.

LEOFF Plan I Probability of Having Dependent Children							
Old Assumption				New Assumption			
Age	Males & Females	Age	Males & Females	Age	Males & Females	Age	Males & Females
20	0.394	50	0.477	20	0.0000	50	0.1927
21	0.439	51	0.433	21	0.0000	51	0.1782
22	0.484	52	0.381	22	0.0000	52	0.1637
23	0.529	53	0.329	23	0.0000	53	0.1492
24	0.574	54	0.276	24	0.0000	54	0.1347
25	0.620	55	0.224	25	0.0000	55	0.1202
26	0.665	56	0.172	26	0.0000	56	0.1057
27	0.710	57	0.156	27	0.0000	57	0.0912
28	0.754	58	0.141	28	0.0000	58	0.0767
29	0.797	59	0.125	29	0.0000	59	0.0622
30	0.841	60	0.110	30	0.0000	60	0.0477
31	0.884	61	0.094	31	0.0000	61	0.0210
32	0.928	62	0.079	32	0.0000	62	0.0201
33	0.931	63	0.064	33	0.0000	63	0.0192
34	0.934	64	0.000	34	0.0000	64	0.0183
35	0.936	65	0.000	35	0.0000	65	0.0174
36	0.939	66	0.000	36	0.0000	66	0.0165
37	0.942	67	0.000	37	0.0000	67	0.0156
38	0.929	68	0.000	38	0.0000	68	0.0147
39	0.916	69	0.000	39	0.0000	69	0.0138
40	0.902	70	0.000	40	0.3377	70	0.0129
41	0.889	71	0.000	41	0.3232	71	0.0120
42	0.876	72	0.000	42	0.3087	72	0.0111
43	0.831	73	0.000	43	0.2942	73	0.0102
44	0.786	74	0.000	44	0.2797	74	0.0093
45	0.740	75	0.000	45	0.2652	75	0.0084
46	0.695	76	0.000	46	0.2507	76	0.0075
47	0.650	77	0.000	47	0.2362	77	0.0066
48	0.563	78	0.000	48	0.2217	78	0.0057
49	0.520	79	0.000	49	0.2072	79	0.0048
		80	0.000			80	0.0039

Occupational Disease for Fire Fighters

According to [RCW 41.26.048](#), when a LEOFF fire fighter dies from a duty-related illness, their survivor receives a \$150,000 benefit. This benefit is payable if the fire fighter dies as an active member or within a certain extended period of time after they stop working. The extended period of time is limited to the minimum of 60 months or three months for each year of service.

Estimating the cost of the benefit payable after the member stops working requires several assumptions. We develop assumptions for the probability of a duty-related death, the percentage of members in LEOFF that serve as fire fighters, and the average length of service for members who might be eligible for these benefits in the future. We apply these assumptions to show the cost of the benefits for eligible members who die from occupational diseases.

Data Used

We used active and annuitant valuation data from LEOFF Plan 2 for the years 1995 through 2007 to study these assumptions.

Assumptions Made

We developed the expected average length of service assumption by using the new disability, mortality, retirement, and termination rates disclosed in this report. All other assumptions used match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Methods Used

We used data from 1950-1999 provided by the Department of Health to estimate the probability that a fire fighter's death was caused by an occupational disease listed in statute. We developed our current assumption as part of the pricing associated with the recent legislation that expanded the definition of occupational disease. We did not change this assumption as part of this experience study.

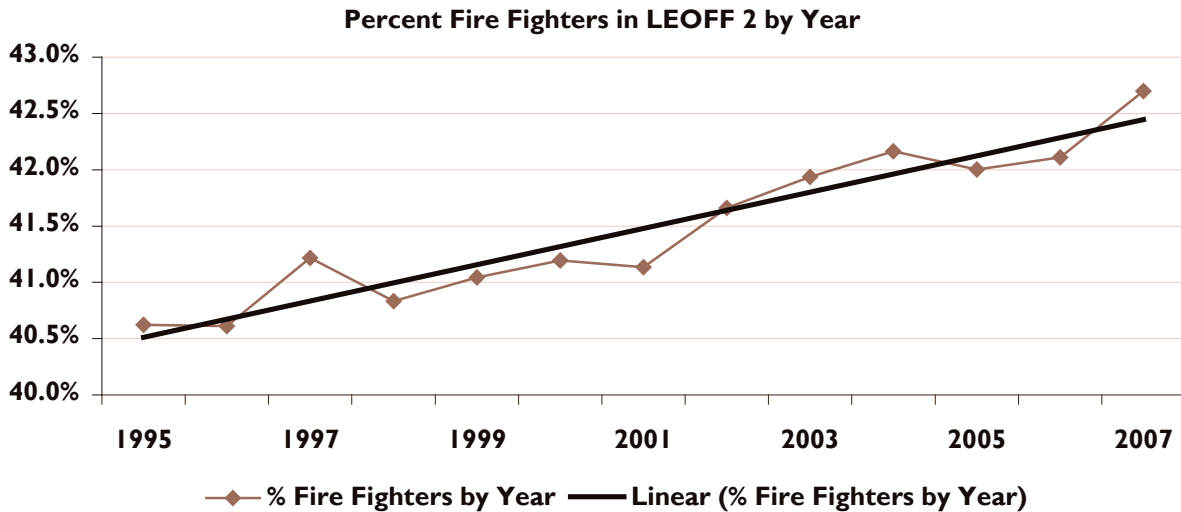
We developed the assumption for the percentage of members who serve as fire fighters in LEOFF by observing the number of active fire fighters by year. We studied the ratio of fire fighters to all active LEOFF Plan 2 members for our analysis. We plotted these ratios by year on a chart and fit trend lines to the data to arrive at our final expected percentage of fire fighters. Please see the development section below for further details.

We developed the expected average length of service assumption by modeling the average length of service for a new entrant. We assumed that a new entrant follows the new disability, mortality, retirement, and termination rates developed in this experience study. Using these rates, we estimated the total service that would be accrued by a member who either disabled, retired, or terminated from active service. Finally, we used the "three months per year of service" rule to calculate the expected length of time a member is eligible for the inactive death benefit. Please see the development section below for further details.

Development of Assumptions

Past Observations

We developed the percentage of fire fighters in LEOFF by using the valuation data for active members in LEOFF Plan 2. In the chart that follows, we used regression analysis to develop linear equations, or trend lines, which can “predict” an expected percentage of fire fighters in LEOFF.



Future Expectations

We expect to see the trend in the percentage of fire fighters in LEOFF Plan 2 to continue, at least in the short term. Therefore, we projected this trend to the year 2009, which is the mid-point of the next experience study cycle.

We based our calculation of the average length of service assumption on our future expectations for a new entrant. We used an average new entrant age of 29. This age represents the difference between the average age and average amount of membership service for current LEOFF Plan 2 active members. We assumed that disability and termination rates would cease once the member is eligible to retire.

Assumption Format

The assumption for the percent of fire fighters in LEOFF will serve as a static percentage throughout the next experience study cycle. This percentage applies to all LEOFF benefits that specifically affect fire fighters.

We developed the expected length of service assumption to determine the cost of the occupational disease survivor death benefit. Only members who die from an occupational disease within the allowable period of time, following their departure from employment, will receive the benefit. The extended period assumption, developed by modeling a new entrant through their career, will take the form of a single-point estimate for each type of departure from employment.

Best Estimate Occupational Disease for Fire Fighters Assumptions

Probability a Fire Fighter will Die from an Occupational Disease

We assume that 14.7415 percent of deaths are duty-related for members aged 20 to 49. For members aged 50 and up, we assume that 27.3934 percent of deaths are duty-related.

Fire Fighters as a Percentage of Active Membership in LEOFF

The assumption for the percent of all LEOFF actives serving as fire fighters used a linear trend for estimating the future value. The projected trend to 2009 equals 42.59 percent, which we rounded 43 percent. The old assumption was 42 percent fire fighters.

Expected Average Length of Service

The following table shows the old and new expected average length of service assumption. Please note that the extended period values have a limit of five years.

LEOFF Plan 2 Expected Average Length of Service					
Old Assumption			New Assumption		
Status	Years of Service	Extended Period	Status	Years of Service	Extended Period
	Unrounded	Rounded		Unrounded	Rounded
Disability	16.55	4	Disability	16.26	4
Termination	12.21	3	Termination	14.06	4
Retirement	18.08	5	Retirement	27.42	5

Indexed Benefit Increases for Certain Terminated Vested Members

Members of LEOFF Plan 2, PERS 3, TRS 3, and SERS 3 who terminate with at least 20 years of service may receive additional benefits if they defer their retirement. For each year the member defers retirement, their retirement allowance increases by 3 percent. This additional benefit has a cost to the system because it is not offset by an actuarial reduction for the member.

Members in LEOFF 2 may retire as early as age 50, as long as they have at least 20 years of service. These members can also decide to defer their retirement beyond age 50 and collect an additional 3 percent on their benefit for each year they defer.

Members in PERS 3, TRS 3, and SERS 3 may retire as early as age 55. If they terminate with at least 20 years of service, they may also defer their retirement benefits up to ten years, receiving an additional 3 percent each year they defer.

We must develop an assumption to use in our valuation model to estimate how long members will defer their retirement if they terminate with at least 20 years of service.

Data Used

Retirement experience in LEOFF 2 and the Plans 3 is still relatively small. We did not use historical data to develop a new assumption for this study period.

Assumptions Made

All assumptions used in the development of this terminated vested indexed benefit assumption match those disclosed in the 2006 Actuarial Valuation Report (AVR).

Development of Assumptions

LEOFF

LEOFF Plan 2 members who have at least 20 years of service may retire as early as age 50, with a 3 percent benefit reduction per year from their normal retirement age of 53. This reduction is more attractive to the member than a full actuarially equivalent reduction faced by other members electing an early retirement.

Our valuation model assumes that LEOFF 2 members will not defer their retirement strictly to increase their benefit by 3 percent per year. We believe that the advantage of collecting their benefits earlier outweighs the advantage offered by a slightly larger benefit.

PERS 3, TRS 3, and SERS 3

Plan 3 members who terminate with at least 20 years of service may retire as early as age 55. Those who have less than 30 years of service face an actuarially equivalent reduction in their benefits if they retire before age 65. Members with at least 30 years of membership service may retire with a much smaller reduction in their benefits. Because not all members who can receive this indexed benefit increase get an advantageous benefit reduction, we cannot reasonably assume that all members will retire as early as possible once they qualify. Without adequate experience to accurately model the cost of this benefit, we believe it is safe to estimate the cost as follows.

We assume members who terminate with at least 30 years of service will retire as soon as possible. Like the LEOFF 2 members discussed in the section above, we think receiving an immediate benefit is more valuable to these members.

We assume that of the members who terminate with at least 20 years of service, but less than 30 years, one-half of them will retire as soon as possible. The other half will defer retirement to age 65, taking advantage of the additional 3 percent per year, and avoiding the actuarial reduction of their benefits.

We could try to develop more sophisticated assumptions but this would unnecessarily complicate our valuation model.

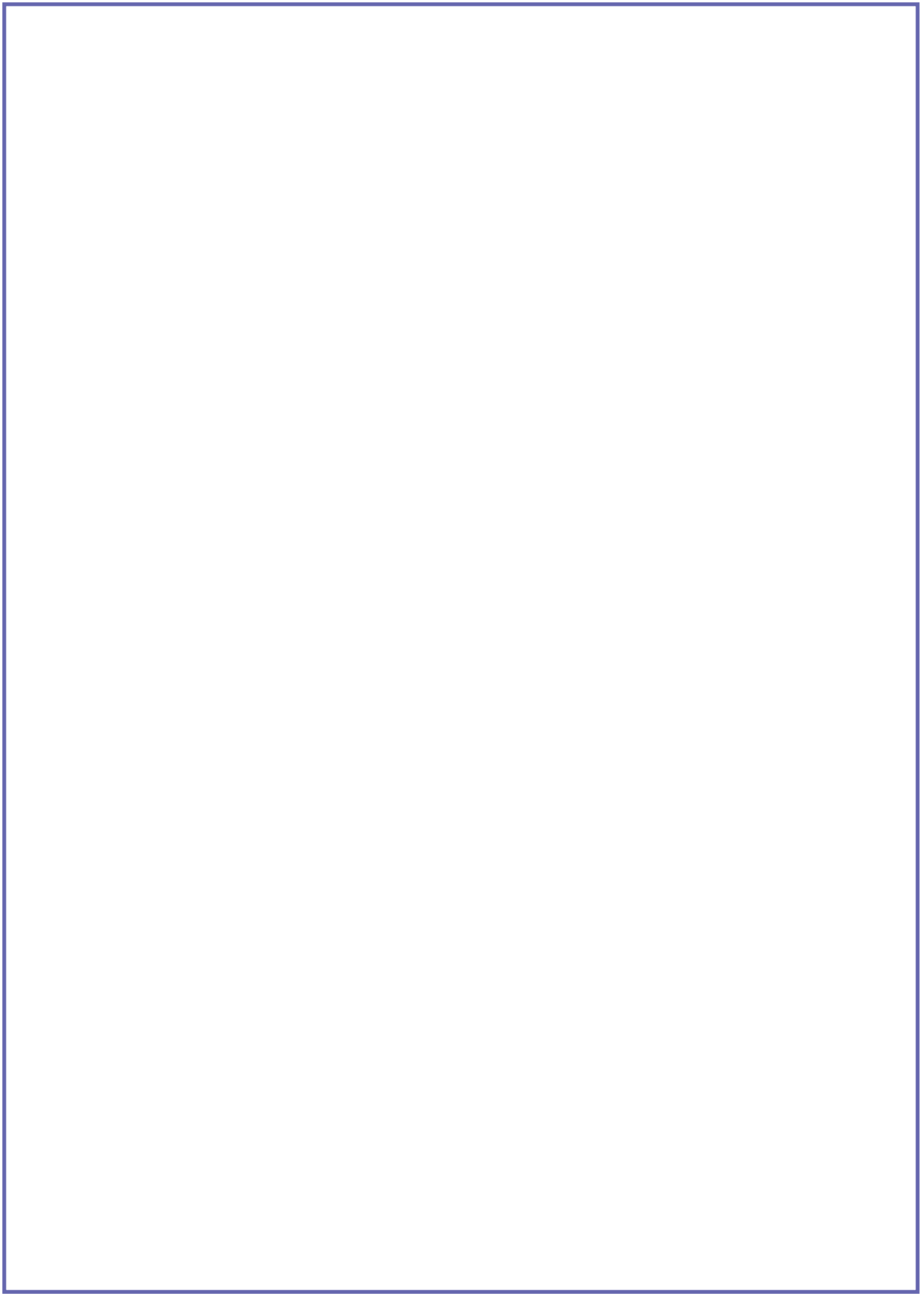
As Plan 3 retirement experience continues to emerge, we will monitor retirement deferral behavior among members who terminate before normal retirement age. If the numbers indicate our assumption needs refinement, we will modify it in the future.



Section Three

Glossary





Glossary

Active Member

A person currently employed in an eligible position with a public employer. Active members accrue membership service in a public retirement system and generally make contributions toward their retirement benefits.

Actuarial Assumptions

Factors actuaries use to estimate the cost of funding a defined benefit pension plan. Examples include: the rate of return on plan investments; mortality rates; and the rates at which plan participants are expected to leave the system because of retirement, disability, termination, etc.

Prescribed Assumption

A specific assumption mandated or selected from a specific range that is deemed to be acceptable by law, regulation, or other binding authority.

Assumption Format

The form in which a particular assumption will be used or expressed. The format can be as simple as a single point estimate, where one number is applied, regardless of a member's age or gender. An assumption can also be developed by age, gender, credited service, plan or other group, or any combination of those categories.

Actuarial Gain or Loss

Experience of the plan, from one year to the next, which differs from that assumed, results in an actuarial gain or loss. For example, an actuarial gain would occur if assets earned 10 percent for a given year since the assumed interest rate in the valuation is 8 percent.

Actuarial Reduction

A reduction in a benefit received at an early date so that the expected total cost to the retirement system is equivalent to the cost if the benefit did not begin until later.

Annuitant

A person receiving periodic payments from a retirement system. This term includes service and disability retirees, and their survivors.

Annuity

A series of periodic payments, usually for life, payable monthly or at other specified intervals.

Deferred Annuity

An annuity for which payments do not commence until a designated time in the future.

Joint and Survivor Annuity

A provision that enables a plan participant to take annuity payments with continuing payments of all or part of the benefits after his or her death going to a designated beneficiary. The survivor annuity will automatically be provided to a married participant if he or she does not choose against it. The annual pension benefits of the participant electing to have such a survivor annuity are generally reduced to provide for the survivor.

Life Annuity

A monthly benefit payable as long as the annuitant is alive. There are no residual payments to survivors.

Beneficiary

The person designated to receive benefits under an employee benefit plan in the event of the death of the person covered by the plan.

Data Outliers

Observations that lie well outside the normal range experienced by others. An example of an outlier could be a recorded service retirement at age 110, when most other members retire by age 80.

Death Benefit

A benefit payable to a survivor or estate by reason of a member's death. The benefit can be in the form of a lump sum, an annuity, or a refund of the member's contributions.

Life Expectancy

The average number of future years a person of a given age might be expected to live.

Portability

The ability of an employee who changes jobs and joins a different retirement system to become a dual member, maintaining membership in both systems. Dual members may combine service for benefit eligibility. They may also use their highest salary from either system for benefit calculation.

Ratio of Actual to Expected (A/E)

A helpful statistic in determining how closely existing assumptions match actual experience. Ratios near 1.0 indicate a very close match. Ratios below 1.0 demonstrate that current assumptions are higher than actual rates. Ratios above 1.0 show that current assumptions are lower than actual rates.

Retirement

Disability Retirement

A termination of employment that provides, as a result of an accident or sickness, the payment of a retirement allowance before a participant is eligible for normal retirement.

Service Retirement

Retirement dependent upon attainment of a specified age and/or completion of a given length of service. In some cases, the term has the same meaning as “normal retirement”.

Early Retirement

A termination of employment that provides the payment of a retirement allowance before a participant is eligible for normal retirement. The retirement allowance payable in the event of early retirement is often lower than the normal retirement allowance.

Vesting

The right of an employee to the benefits he or she has accrued, or some portion of them, even if employment under the plan is terminated. An employee who has met the vesting requirements of a pension plan is said to have a vested right. Voluntary and mandatory employee contributions are always fully vested.

Withdrawal

The termination of employment prior to becoming eligible for any benefits. The term sometimes refers to subsequent termination of membership in a system by withdrawal of the employee's accumulated contributions from the system.

