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OKLAHOMA PUBLIC EMPLOYEES RETIREMENT SYSTEM

Experience Study

For the Three-Year Period

Ending June 30, 2013

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May 9, 2014

Board of Trustees
Oklahoma Public Employees Retirement System
5801 N. Broadway Extension, Suite 400
P.O. Box 53007
Oklahoma City, OK 73152-3007

Dear Members of the Board:

We are pleased to submit the results of a study of the economic and demographic experience for the Oklahoma Public Employees Retirement System (OPERS) and the Uniform Retirement System for Justices and Judges (URSJJ). The purpose of this investigation is to assess the reasonability of the actuarial assumptions for the System. This investigation covers the three-year period from July 1, 2010 to June 30, 2013. As a result of the investigation, it is recommended that revised assumptions be adopted by the Board for future use.

The experience study includes all active and retired members, including OPERS regular members, elected officials, hazardous duty members, and URSJJ members. The mortality and disability experience was studied separately for males and females. Incidences of retirement and compensation increases were investigated without regard to gender. The withdrawal assumption was studied for males and females, but was concluded to be similar enough that a unisex assumption could be used.

This report shows comparisons between the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. Tables and graphs are used to show the actual decrement rates, the expected decrement rates and, where applicable, the proposed decrement rates.

The recommended decrement tables are shown in Appendix D of this report for OPERS and Appendix E for URSJJ. In the actuary's judgment, the recommended rates are suitable for use until further experience indicates that modifications are needed.

Actuarial assumptions are used to measure and budget future costs. Changing assumptions will not change the actual cost of future benefits. Once the assumptions have been adopted, the actuarial valuation measures the adequacy of the statutory contribution rates.

The experience study was performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement systems. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

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Principal and Consulting Actuary

Brent Banister, PhD, FSA, EA, FCA, MAAA
Chief Pension Actuary

Summary of Results

The following summarizes the findings and recommendations with regard to the assumptions utilized by the Oklahoma Public Employees Retirement System. Explanations for the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the three economic assumptions used in the actuarial valuation and their current and proposed rates. We recommend no change to the assumed rate of price inflation, the assumed rate of return on assets, or the real wage growth assumption.

Item	Current	Proposed
Price Inflation	3.00%	3.00%
Investment Return	7.50%	7.50%
Real Wage Growth	1.00%	1.00%

Recommended Demographic Assumption Changes

The table below lists the demographic assumptions that we recommend be changed based on the experience of the last three years.

Assumption Changes
OPERS
Adjust rates of withdrawal
Decrease rates of disability retirements
Decrease probability of electing a vested benefit
Decrease salary scale
Adjust rates of retirement
URSJJ
Decrease salary scale
Adjust rates of retirement

Recommended Method Changes

We do not recommend any changes in the actuarial methods.

Financial Impact

The table below highlights the impact on the Oklahoma Public Employees Retirement System (OPERS) and the Uniform Retirement System for Justices and Judges (URSJJ) if the proposed assumptions are adopted. The table shows the change in the unfunded accrued liability (UAL), funded ratio and employer contribution rate for both Plans of the System as of June 30, 2013.

	Before Changes	After Assumption Changes
OPERS		
Unfunded Actuarial Accrued Liability	$1,577,248,485	$1,593,428,720
Funded Ratio	81.6%	81.4%
Employer Contribution Rate	8.47%	8.56%
URSJJ		
Unfunded Actuarial Accrued Liability	$6,877,928	$5,496,084
Funded Status	97.3%	97.8%
Employer Contribution Rate	21.01%	19.97%

Economic Assumptions

There are three economic assumptions used in performing the actuarial valuation for the Oklahoma Public Employees Retirement System (OPERS) and the Uniform Retirement System for Justices and Judges (URSJJ). The assumptions are:

- Price Inflation
- Investment Return
- Wage Inflation

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 27, *"Selection of Economic Assumptions for Measuring Pension Obligations"*, which provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. As noted in ASOP No. 27, because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on a mixture of past experience and future expectations. These estimates therefore are best stated as a range utilizing the actuary's professional judgment. In setting the range and the single point within that range to use, the actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27. The following table shows our recommendations followed by explanations of each assumption.

Item	Current	Proposed
Price Inflation	3.00%	3.00%
Real Rate of Return	4.50	4.50%
Investment Return	7.50%	7.50%
Price Inflation	3.00%	3.00%
Real Wage Growth	1.00	1.00
Wage Inflation	4.00%	4.00%

Price Inflation

Background: As seen in the table on the previous page, assumed price inflation is used as a component for both the investment return assumption and the wage inflation assumption. The latter two assumptions will be discussed in detail in the following sections.

While the inflation assumption is not directly used in the actuarial valuation, it is indirectly used because it is a significant component of the wage growth and investment return assumptions. In order to satisfy the requirements of ASOP 27 regarding consistency among economic assumptions, it is therefore important to develop an inflation assumption.

The current price inflation assumption is 3.00% per year.

Past Experience: The Consumer Price Index, US City Average, All Urban Consumers, CPI (U), has been used as the basis for reviewing historical levels of price inflation. The level of that index in June of each of the last 50 years is provided in Appendix A.

In analyzing this data, average rates of inflation have been determined by measuring the compound growth rate of the CPI (U) over various time periods. The results are as follows:

Period	Average Annual Rate of Inflation
2008 – 2013	1.31%
2003 – 2013	2.43%
1993 – 2013	2.43%
1983 – 2013	2.88%
1973 - 2013	4.25%
1963 – 2013	4.15%
1926 - 2013	3.01%

Over shorter historic periods, the average annual rate of increase in the CPI-U has been below 3.00%. The years of high inflation occurring from 1973 to 1982 has a significant impact on the averages over periods which include these rates. Since 1926, the average annual rate of inflation has been just over 3.00%.

The graph below shows the annual increases in the CPI (U) over a 50-year period:

Annual CPI (U) Increases
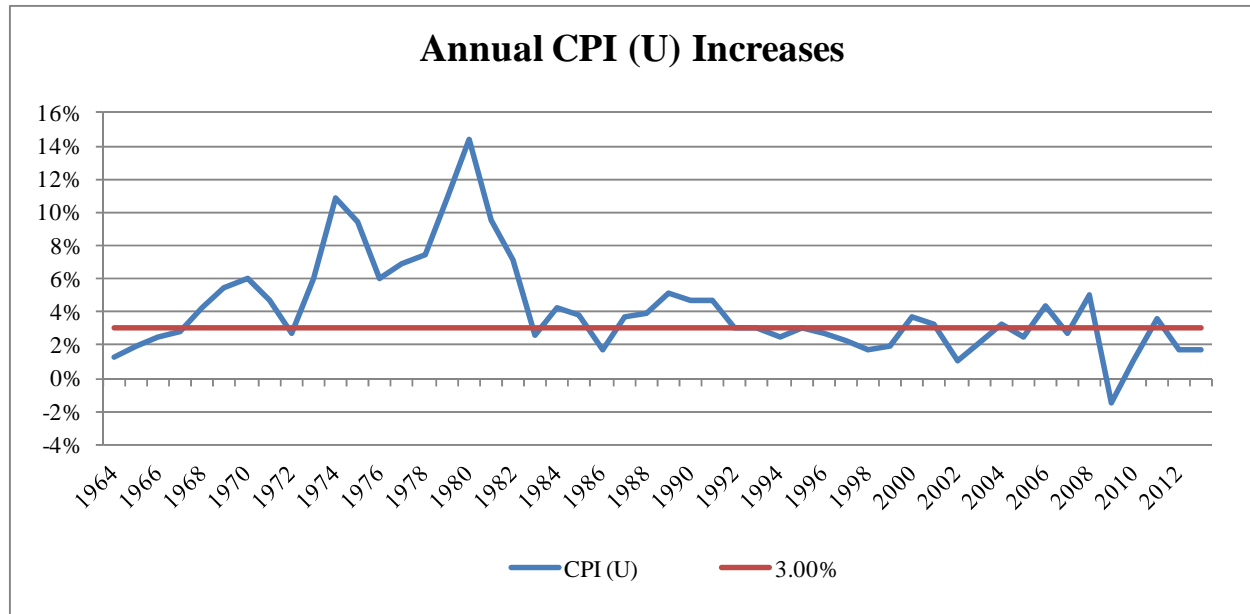
Additional information to consider when determining the reasonable range is obtained from measuring the spread on inflation protected treasury bills (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities and the inflation indexed nominal yield on TIPS of the same maturity is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the maturity of the bond. The table below provides the calculation of the breakeven rate of inflation as of December 31, 2013 over various periods.

Years to Maturity	Bond Nominal Yield	TIPS Nominal Yield	Breakeven Rate of Inflation
10	3.04%	0.80%	2.24%
20	3.72%	1.36%	2.36%
30	3.96%	1.64%	2.32%

The bond market's expectation for the rate of inflation is significantly lower than historical average annual rates. Additionally, based upon information provided from the "Survey of Professional Forecasters" published by the Philadelphia Federal Reserve Bank, the median annual rate of inflation for the ten years beginning January 1, 2014 is 2.3%.

Recommendation: It is difficult to accurately predict inflation. Current economic forecasts and the bond market suggest lower inflation over the next ten to twenty years when compared to the historical averages, which is a shorter time period than appropriate for our purposes. In the 2013 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75-year cost projections on an intermediate inflation assumption that is ultimately 2.8% with a range of 1.8% - 3.8%. We concur in general with a range of 2.0% - 4.0%, and recommend continued use of a 3.0% per year rate recognizing the likely inflation pressures built into the economy at the current time.

Price Inflation Assumption	
Current	3.0%
Reasonable Range	2.00 - 4.0%
Recommended	3.0%

Investment Return

Background: The assumed investment return is one of the most significant assumptions in the annual actuarial valuation process as it is used to discount the expected benefit payments for all active, inactive and retired members of the System. Minor changes in this assumption can have a major impact on valuation results. The investment return assumption should reflect the asset allocation target for the funds set by the Board.

The current assumption is 7.50%, consisting of a price inflation assumption of 3.00% and a real rate of return assumption of 4.50%. The return is net of all investment expenses.

Past OPERS Experience: The actuarial value of assets of the System are developed using a widely accepted asset-smoothing methodology that fully recognizes investment gains and losses over a five-year period. The recent experience for the retirement funds over the last fifteen years is shown in the table below.

Year Ending 6/30	Market Value ($ million)	Market Value Rate of Return (Net of fees)	Actuarial Value ($ million)
1999	$ 4,831	9.2%	$ 4,262
2000	5,246	9.9	4,786
2001	4,815	(6.0)	5,110
2002	4,486	(5.3)	5,300
2003	4,619	5.4	5,355
2004	5,126	14.0	5,412
2005	5,504	10.3	5,451
2006	5,817	7.9	5,654
2007	6,640	16.3	6,110
2008	6,255	(4.2)	6,492
2009	5,174	(15.4)	6,208
2010	5,774	13.9	6,348
2011	6,841	21.5	6,599
2012	6,821	2.2	6,682
2013	7,442	12.0	6,979

Clearly there is a significant amount of variation year to year. By considering compound returns over time, we can get some additional sense of the expected return. The following table shows the effective rate of return over various time periods.

Period	Rate of Return (before fees)
5 years	6.01%
10 years	7.35
15 years	5.74
20 years	7.67
25 years	8.47

Historical Analysis: The historical 50-year real rate of return of the S&P 500 has averaged 5.54%, and the 50-year real rate of return of intermediate government bonds has averaged 2.32%. By weighting these rates by common allocation of large retirement funds (50%/50% to 70%/30%) we construct the reasonable range for real rates of return to be from 3.95% to 5.01%. The table below shows various annualized rates of return based on different time periods and different allocations between equities and bonds. OPERS' current asset allocation (shown in Appendix B) is 68% equities and 32% fixed income.

Time Span In Years	Real Returns by Portfolio Allocation Equities vs. Bonds			
	50%/50%	60%/40%	65%/35%	70%/30%
10	4.31%	4.57%	4.67%	4.75%
20	5.63%	5.96%	6.10%	6.22%
30	7.06%	7.36%	7.49%	7.61%
40	5.28%	5.61%	5.76%	5.89%
50	4.43%	4.74%	4.87%	5.00%

OPERS Portfolio Analysis: The current capital market assumptions and asset allocation developed by the System's investment consultant are shown in Appendix B. Using statistical distribution properties provides an expected range of real (i.e. net of inflation) rates of return over various time horizons. Looking at one year results produces an expected real return with a high standard deviation, which means there is high volatility. Over larger time horizons, the median return does not change much but the volatility declines significantly.

It is important to note that the capital market assumptions are developed with a short term horizon of five years. This is much shorter than the long term perspective required by a pension plan that may need 100 years or more to pay off all current members and beneficiaries.

Consequently, this analysis may be of limited use. The following table provides a summary of results.

Time Span In Years	Real Returns by Percentile				
	5th	25th	50th	75th	95th
1	-14.82%	-4.58%	3.24%	11.69%	25.04%
5	-5.26%	-0.33%	3.24%	6.94%	12.49%
10	-2.84%	0.70%	3.24%	5.84%	9.70%
20	-1.10%	1.44%	3.24%	5.07%	7.77%
30	-0.31%	1.77%	3.24%	4.74%	6.92%
50	0.48%	2.10%	3.24%	4.40%	6.08%
75	0.98%	**2.31%**	3.24%	**4.18%**	5.56%

The chart above shows the percentile rankings for expected returns. Thus for the 20-year time span, 5% of the resulting real rates of return are expected to be below -1.10% and 95% expected to be above that. As the time span increases, the results begin to merge. Over a 75-year time span, the results indicate there is a 25% chance that the real return will be below 2.31% and a 25% chance it will be above 4.18%. In other words there is a 50% chance the real returns will be between 2.31% and 4.18%.

Administrative and Investment Expenses: Administrative expenses are directly reflected as a separate component in the calculation of the contribution rate. However, the investment return is assumed to be net of all investment-related expenses. The table below shows the ratio of expenses to OPERS Plan assets over the last ten years. The expense ratio is calculated as the total expense divided by the ending asset balance at fair market value.

Year	Market Value Assets	Investment Expense	Expense Ratio
2004	$ 5,126	$ 6.3	0.12%
2005	5,504	6.8	0.12
2006	5,817	6.1	0.10
2007	6,640	6.2	0.09
2008	6,255	5.9	0.09
2009	5,174	5.6	0.11
2010	5,774	6.5	0.11
2011	6,841	7.5	0.11
2012	6,821	7.4	0.11
2013	7,442	8.9	0.12

Over the ten-year period the expense ratio averaged approximately 0.11%. This assumption does not have a direct impact on the actuarial valuation results, but it does provide a measure of gross return on investments that will be needed to meet the actuarial assumption used for the valuation. For example, if the investment return assumption is set at 7.50%, then OPERS would need to earn a gross return of 7.61% in order to meet the 7.50% for funding purposes.

Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we can develop a range for the investment return assumption of the 25th to 75th percentile real returns over the 75-year time span plus the recommended inflation assumption less the recommended expense ratio assumption. The following table details the range.

Item	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return	2.31%	3.24%	4.18%
Inflation	3.00	3.00	3.00
Expenses	(0.11)	(0.11)	(0.11)
Net Investment Return	5.20%	6.13%	7.07%

This range of returns is substantially below the observed historical rates of return experienced by the System and other similar investors. A significant factor is the short time frame considered by the System's investment consultant. While five years may be appropriate for determining investment policy, it is too short for developing actuarial assumptions. For instance, because interest rates are currently very low, the expected return of bonds over the next few years ends up being low as well. However, it is doubtful that interest rates will remain near current lows throughout the next 50 to 100 years. Consequently, we are concerned that these results may not be a fair representation of what OPERS should expect to earn over the long term. However, even over the next 5 years, under the assumptions described above, there is a 40% chance of compound earnings in excess of the current 7.5% assumed return.

Considering the three different sources above (OPERS experience, historical markets, short term expectations), we believe that the 7.50% assumption remains reasonable and is in the middle of the reasonable range.

| Investment Return Assumption	
Current	7.50%
Reasonable Range	6.60% - 8.40%
Recommended	7.50%

Wage Inflation

Background: The assumed future increases in salaries consist of an inflation component and a component for promotion and longevity, often called merit increases. Merit increases are generally age and/or service related, and will be studied in the demographic assumption section of the report. Wage inflation normally is greater than price inflation, which reflects the overall return on labor in the economy. The current wage inflation assumption is 4.00%, or 1.00% above price inflation.

Past Experience: The Social Security Administration publishes data on wage growth in the United States. Appendix C shows the last 50 calendar years' data. As we did in our analysis of price inflation, in the table below, we show the wage inflation and a comparison with the price inflation over various time periods. Since wage data is only available through 2012, we use that year as the end point.

Period	Wage Inflation	Price Inflation	Real Wage Growth
2002-2012	2.92%	2.46%	0.44%
1992-2012	3.35	2.49	0.86
1982-2012	3.79	2.91	0.88
1972-2012	4.67	4.36	0.31
1962-2012	4.78	4.14	0.62

Thus, over the last 50 years, annual real wage growth has averaged 0.64%. The following graph shows the annual increases in real wage growth over the entire 50-year period.
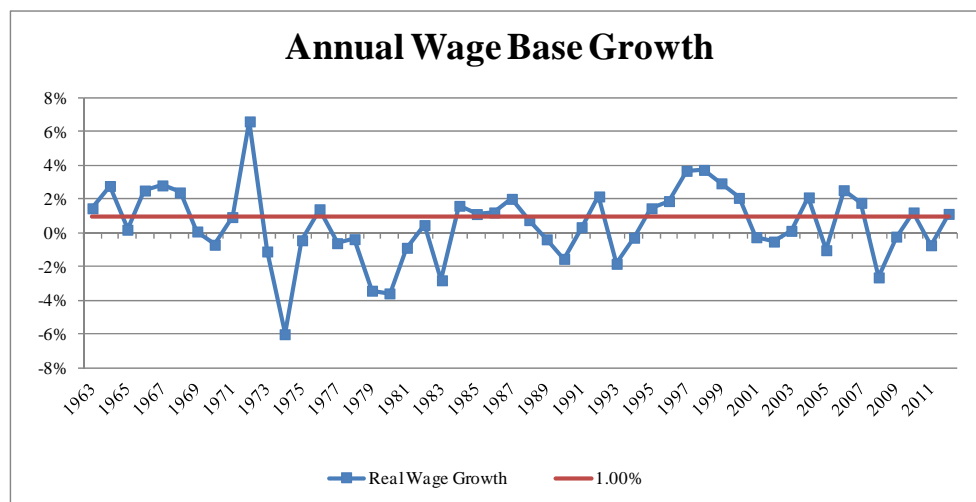
Recommendation: As we did with price inflation, we again look at the 2013 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75-year cost projections on a national wage growth assumption 1.1% greater than the price inflation assumption of 2.8%. We concur in general with a range of 0.5% - 1.5%. We recommend retaining 1.0% for the real wage growth assumption, resulting in a 4.0% wage growth assumption.

Wage Inflation Assumption		
Current	4.00%	
	Reasonable Range	
Real Wage Growth	0.50%	1.50%
Inflation	3.00	3.00
Total	3.50%	4.50%
Recommended	4.00%	

Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for the Oklahoma Public Employees Retirement System (OPERS) and the Uniform Retirement System for Justices and Judges (URSJJ). They are:

- Rates of Mortality
- Rates of Service Retirement
- Rates of Disability Retirement
- Rates of Withdrawal
- Probability of Electing a Vested Benefit
- Rates of Salary Increase for Merit and Promotions

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 35, *"Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations"*, which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (June 30, 2010 through June 30, 2013) with what was expected to happen based on the assumptions used in the most recent actuarial valuations.

Detailed tabulations by age, service and/or gender are performed over the entire study period. These tabulations look at all active and retired members during the period as well as separately identifying those who experience a demographic event, also referred to as a decrement. In addition, the tabulation of all members together with the current assumptions permits the calculation of the number of expected decrements during the study period.

If the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements by age, gender, or service does not follow the expected pattern, new assumptions are recommended. Recommended changes usually do not follow the exact actual experience during the observation period. Judgment is required to extrapolate future experience from past trends and current member behavior. In addition non-recurring events, such as early retirement windows, need to be taken into account in determining the weight to give to recent experience.

It is important to note that during this study period, the United States was emerging from a significant recession and turmoil in the financial markets. As we note in several places on the following pages, these events could be reasonably expected to result in System members making adjustments in behavior. The impact on tax revenues and governmental budgets also has had some impact on salaries and employment levels. Consequently, we believe it is important to be

cautious in making changes to assumptions since the time period studied may be atypical. Where we do recommend changes, we have looked for confirmation by seeing if the changes are consistent with the prior experience study.

The remainder of this section presents the results of the demographic study. We have prepared graphs and tables that show a comparison of the actual and expected decrements and the overall ratio of actual to expected results under the current assumptions. If a change is being proposed, the revised actual to expected ratios are shown as well. These tables are presented in Appendices F and G.

Mortality Tables

Mortality tables are a fundamental assumption in actuarial valuations. Because benefits are typically paid over a retiree's lifetime, it is important to appropriately reflect what a typical lifetime looks like. In addition, deaths before retirement may also result in the payout of benefits to a spouse or survivor. For valuation purposes, we must consider mortality tables for retirees, beneficiaries of retirees, disabled retirees, and active members.

Retiree Mortality:
The post-retirement mortality rates used in the actuarial valuation project the percentage of retirees who are expected to die in a given future year. This assumption is a very important demographic assumption since it typically has the most significant impact on liability projections.

Based upon the long term trend of mortality improvement, actuaries seek to account for future improvements in longevity, either by directly projecting future improvements or by maintaining a sufficient margin in expected rates of mortality to allow for future improvement. While the direct projection – also called generational mortality – may better predict future payouts, it is not an appropriate approach for OPERS. Because the guiding statutes appear to require that actuarial factors for optional form of payments, etc. be the same as the assumptions used in the valuation, the generational approach cannot be used. (It would require a new set of factors each year, something which is not desirable from a member planning perspective and which would be a burdensome administrative challenge.) Consequently, we propose that the selected table reflect some degree of future improvement now, thereby providing a margin for improvement. The current table is the RP-2000 Combined Table, projected to 2010.

Graphs showing actual versus expected post-retirement mortality rates for OPERS members are shown in Appendix F in Table F-1 for males and F-2 for females, and Appendix G Tables G-1 and G-2 have the corresponding numerical data. The analysis of the actual post-retirement mortality experience over the three-year experience study period yields actual/expected ratios of 121% and 117% respectively for males and females. The actual/expected ratios in the prior experience study were 128% and 119% respectively for males and females. This indicates that

mortality has improved slightly since the previous experience study, but significant margin still exists for mortality improvements. Thus we do not recommend any change at this time.

While there is still a sufficient margin, we do note that, as expected, the margin has continued to decrease. At some point, likely in the next experience study or two, the margin will decline to the point where new tables will be required. This update will require the updating of optional form factor tables as well as result in increased liabilities and costs.

Because of the small URSJJ retiree population, we cannot obtain credible analysis of retiree mortality experience. Drawing upon general background on factors affecting mortality, we do anticipate that this group will have better mortality (i.e. live longer) than the broader OPERS membership. This has been recognized by setting the OPERS table back one year, so a 65-year old URSJJ retiree is treated as having the same mortality as a 64-year old OPERS member. We recommend continuing with this table.

Beneficiary Mortality:
For benefits payable with a joint and survivor option, an assumption is needed regarding the beneficiary's lifetime. Because many members take a lifetime only benefit, there is less data available for beneficiaries. Further, data tracking of beneficiaries is less precise during the years when the member is alive. Consequently, we do not find sufficiently credible data to analyze this group separately. We recommend that for both OPERS and URSJJ that the same table used for retirees also be used for beneficiaries.

Disabled Retiree Mortality:
Members who retire under the disability retirement provisions are generally expected to be less healthy than the overall population. Currently, the assumption for this group is the same as the regular members with a 15-year age set forward. Because of the limited data for this group, it is difficult to analyze the actual mortality patterns. In the last study, we noted that at ages under 65 (which includes about 2/3rds of disabled retirees), the actual to expected ratio is 148% for males and 161% for females, while at ages above 65, there was no longer any margin. This time, however, we actually observed fewer deaths than expected. In looking at the last six years in total (an acceptable approach because of the relatively limited data available), the ratio of actual to expected deaths is close enough to 1.0 to be acceptable. Because we anticipate that the healthy mortality rates are likely to change in the next study and because the disabled mortality assumption has only a minor impact on the valuation results, we are comfortable with continuing with the table at this time. However, if the Board wishes to change the tables now (with the corresponding changes to optional form factors), we believe changing the 15-year set forward to a 10-year set forward would be appropriate.

Active Member Mortality:

For active members, the mortality assumption is less significant since it is represents only a small portion of cases where employment ends and benefits begin. Further, there is no need for a margin for future improvements as there is for retirees. We had the following experience over the study period:

	Actual Deaths	Expected Deaths	A/E Ratio
Males	94	89	106%
Females	69	89	78%

While there were fewer deaths than expected for females, we note that changing the table would have a negligible impact on liabilities and costs and therefore recommend continuing to use the same table for active members as is used for retired members. For hazardous duty members, the current assumption is that the death rates should be 10% higher to reflect an increased risk of death in the line of duty. With only 7 total active deaths in this group, including 1 in the line of duty, over the study period, we cannot assess the adequacy of this assumption, but we find it reasonable and recommend its continued use.

Rates of Retirement

The service retirement rates used in the actuarial valuations project the percentage of employees who are expected to retire during a given year. This assumption does not include the retirement patterns of the individuals who terminated from active membership prior to their retirement.

The System provides for two types of retirements based on different eligibility requirements. The first one is for an unreduced retirement benefit. The second one is for an early retirement benefit which is reduced. Separate assumptions have been developed for each type of retirement benefit.

Regular OPERS Members

OPERS provides for a normal, unreduced retirement benefit upon the earlier of (a) age 62 and six years of service or (b) "Rule of 80" (if hired prior to July 1, 1992) or "Rule of 90" (if hired on or after July 1, 1992). Members hired after October 31, 2011 must be 65 rather than 62 or reach age 60 with "Rule of 90". OPERS also provides for an early, reduced retirement benefit upon reaching age 55 and completing ten years of participating service. Under the provisions for early retirement, the benefit is reduced 1/15th for each of the first five years and 1/30th per year for the next two years.

Graphs and detailed tables showing actual versus expected retirement rates are shown in Appendices F-3, F-4, G-3, and G-4. The analysis of the actual retirement experience over the

three-year period yields an actual/expected ratio of 44% for early retirement and 93% for normal retirements. In both cases, we note slightly higher actual retirements by those with higher service and salary, making the effective actual to expected ratio higher.

We believe that the normal (unreduced) retirement rates continue to be appropriate. The utilization of early retirement was less than expected during this three-year period, a pattern that was observed in the prior study as well. While some of the lower usage may be related to the uncertain economy, we believe the actual experience is sufficiently below expected to argue for a reduction in the early retirement rates. We recommend some reduction in the early retirement rates, but retaining the normal retirement rates.

Elected Officials

Elected officials may retire with a normal, unreduced retirement benefit upon the earlier of (a) age 60 and six years of elected service or (b) "Rule of 80". They may also retire with an early, reduced retirement benefit upon reaching age 55 and completing ten years of creditable service. Under the provisions for early retirement, the benefit is reduced 6% per year before age 60. (For those hired after October 31, 2011, the retirement age is 65 with 8 years of service or 62 with 10 years.)

Graphs and detailed tables showing actual versus expected retirement rates are shown in Appendices F-5, F-6, G-5, and G-6. The analysis of the actual retirement experience over the three-year period yields an actual/expected ratio of 31% for early retirement and 76% for unreduced.

Elected members went through two even year election cycles during the study period, so retirements would be expected to be higher. In the previous study, with one election cycle, the actual to expected ratios were somewhat higher for early retirement, but much lower for unreduced retirement. We also note that many elected members continue past age 70, the current age at which retirement is assumed to be certain. The assumed retirement rates for elected officials are challenging to set because retirements are often brought about by elections rather than deliberate member action. Nonetheless, based on the low observed rates over the last two studies, we recommend some reduction in both early and normal retirement rates and extending the assumed certain retirement age to 75.

Hazardous Duty

Hazardous Duty members may retire with a normal, unreduced retirement benefit upon the earlier of (a) 20 years of hazardous duty service, (b) age 62 with 6 years of service, or (c) "Rule of 80" (if hired prior to July 1, 1992) or "Rule of 90" (if hired on or after July 1, 1992). They may also retire with an early, reduced retirement benefit upon reaching age 55 and completing ten years of creditable service. Under the provisions for early retirement, the benefit is reduced

$1/15^{th}$ for each of the first five years before age 62 and $1/30^{th}$ per year for the next two years. New rules will affect those hired after October 31, 2011.

Graphs and detailed tables showing actual versus expected retirement rates are shown in Appendices F-7 to F-9 and G-7 to G-9. Note that unreduced retirement has an assumption that is split into a service based component (for those eligible for the 20 years of service) and an age based component (for those eligible due to age, but with less than 20 years of service). Early retirement had an actual to expected ratio of 32% and the service-based unreduced component had a ratio of 159%, while the age-based unreduced retirement had a ratio of 73%.

The patterns observed for those with less than 20 years of service during this three year period are strikingly dissimilar from those of the prior three years. Coupled with the relatively limited number of exposures, we do not feel comfortable changing the age based rates for these groups. In the prior study, the service based rates had a 107% actual to expected ratio. The ratio this time is even larger. We believe it is appropriate to increase these rates, recognizing at least part of what has been observed. We recommend an increase to the service-based normal retirement rates, while leaving the age based early and normal rates unchanged.

URSJJ

URSJJ members may retire with a normal, unreduced retirement benefit upon the earlier of (a) 65 with eight years of service, (b) age 60 with ten years of service or (c) "Rule of 80". No early retirement option is available for judges. New judges will have different provisions as well.

Detailed tables showing actual versus expected retirement rates are shown in Appendices F-10 and G-10. The analysis of the actual retirement experience over the three-year period yields an actual/expected ratio of 79%.

Since the actual/expected ratio was 55% in the prior experience study period, we believe some changes are worth considering. Because of the relatively small size of the active population, there is a lot of variation in actual experience, but since the last two studies have both shown lower utilization from ages 62 to 65 and greater utilization in the late 60s, we believe some adjustments would be beneficial. We recommend some changes to better fit the observed experience.

Rates of Disability Retirement

The rates of disability used in the actuarial valuation project the percentage of employees who are expected to become disabled each year and begin to receive a disability retirement benefit. In order to qualify for disability benefits, the member must have at least eight years of service and qualify for Social Security or Railroad Retirement Board disability benefits.

Graphs and detailed tables showing actual versus expected disability rates are shown in Appendices F-11 to F-13 and G-11 to G-13.

OPERS disability experience was investigated separately for males and females. The analysis of the actual disability experience for male and females members over the three-year experience period yields an actual/expected ratio of 48% and 43% respectively. We note that the rates were lowered in the prior study.

We see two factors arguing for reducing the rates again. First, the prior study produced a similar pattern of results, adding credibility to our analysis. Secondly, disability utilization is sometimes correlated with the economy in that individuals are often more prone to push for receiving a disability award when other job prospects are bleak. Since we observed fewer disabilities than expected in a period with high unemployment, we have additional confidence in lowering the rates.

The same disability rates that are used for regular OPERS members are also used for the hazardous duty members. We analyzed the hazardous duty males (there is not enough female data to be credible) to see if the same rates are still appropriate. While it appears that hazardous duty members do have higher disability utilization than regular members, the analysis suggests that we can still use the same set of rates for both groups.

Rates of Withdrawal

The rates of withdrawal are used to determine the expected number of separations from active service that will occur prior to attaining the eligibility requirement for a retirement benefit as a result of resignation or dismissal.

The current URSJJ termination rates are 2% for all years of service. Termination from employment for reasons other than death, disability or retirement is uncommon in Judges' systems across the country. Actual experience was close to this over this period, but is based on limited data. We recommend this assumption be maintained.

The current OPERS assumption utilizes an age based approach that sets the withdrawal rates based on years of service. In general, the variation by service is more significant than the variation by age. Withdrawal experience was investigated both with and without regard to gender. No appreciable difference was discovered, so we recommend continuing to use unisex rates.

The analysis of the actual withdrawal experience for all members over the three-year period indicates an overall actual/expected ratio of 134%. This ratio indicates that more members

withdrew during the study period than expected. Appendices F-14 through F-23 and G-14 through G-23 show in detail the actual/expected ratio by years of service. The higher observed rates during this study period may reflect some effort by employers to reduce the size of the workforce or it may reflect increasing job opportunities by other employers in Oklahoma. In any case, we do not believe this is a long term change and so rates should not be unduly adjusted to reflect this.

Service	Exposure	Actual Withdrawals	Expected Withdrawals	A/E Ratio
Under 2	10,964	3,201	2,373	135%
2	7,350	1,445	1,091	132%
3	7,077	1,203	932	129%
4	6,680	882	728	121%
5	5,985	753	498	151%
6	5,275	545	407	134%
7	4,247	431	303	142%
8	3,450	313	240	130%
9	3,130	239	183	131%
Over 9	29,076	1,382	1,029	134%
Total	83,234	10,394	7,784	134%

In the past, we have reviewed the option of using only service as the basis for withdrawal rates. The combined age and service rates allow for potentially more refinement, but at the expense of greater complexity. Our preference is to use the simplest model that adequately reflects what has been observed, but that a more complex model should be used if the simpler model does not fit well. After reviewing the data, we believe that we can simplify the withdrawal assumption to a simpler duration based scale and still represent what is occurring. As a result, we recommend adjusting withdrawal rates to use a service based table. Because the observed terminations during this period are believed to be higher than would be expected long term, we have intentionally set the rates below the most recent observations. The complete tables of recommended withdrawal rates are shown in Appendices F-24 and G-24.

Probability of Electing a Vested Benefit

When a vested member terminates employment, the member (eventually) chooses to either take a deferred retirement benefit or to receive a refund of member contributions in lieu of the deferred benefit. An assumption for the frequency of this election is used for OPERS regular members. Because of the benefit structure, retirement eligibility, and demographic make-up of elected officials, hazardous duty members, and URSJJ members, these members are not expected to take a refund.

Appendices F-25 and G-25 show the analysis of the last three years' experience. Based on this, we have proposed lowering the rates of electing a vested benefit at most ages. In the last experience study, these rates were lowered to partially reflect observed experience. Since the

recent experience continues to reflect the lower rates observed last time, we believe it is appropriate to reduce these rates some more. Because the recent economic situation has been fairly negative, we suspect that some members withdrew their money because of pressing needs and would not have done so in more normal times. Consequently, we are still being cautious in moving toward the observed rates.

Rates of Salary Increase

Under the "building block" approach recommended in ASOP 27, this assumption is composed of three components; inflation, productivity (real wage increases), and merit/promotion. The inflation and productivity components are combined to produce the assumed rates of wage inflation. The rate represents the "across the board" average annual increase in salaries shown in the experience data. The merit component includes the additional increases in salary due to performance, seniority, promotions, etc.

The past three years salary experience has been continued to be influenced by a number of factors. With pressures on state and local budgets, employers responded with strategies such as pay freezes or cuts and furloughs. As a result, our analysis was very limited in usefulness. By aggregating all experience, we observe a pattern of wage growth that trends downward with age, just as assumed. We do note that actual increases at younger ages were higher than expected, but at most ages, they were lower. However, in light of the broader issues affecting pay during this period, we are not comfortable making any adjustments.

Generally, the difference between the total salary increase at the older ages (currently 4.85%) and the payroll growth assumption (currently 4.00%) should be fairly low since employees are presumably near the pinnacle of their career skills, coupled with fewer promotions occurring. Pay increases at this point should mostly reflect changes in overall wage growth. Consequently, we believe that it would be appropriate to adjust rates to decrease this difference.

Detailed salary increase rates at all ages are shown in Appendices F-26 and G-26. We recommend a decrease in the age by age salary scale of 0.35% for all members.

For URSJJ, a flat 5.25% assumption was used. Since there have been no pay increases for several years, our analysis focused on the methodology by which pay increases are determined, part of which is based on reviewing what other states pay judges. In looking at other judges systems that we work with, we believe that the current assumption is high and should be lowered. We recommend lowering this to 5% at this time, recognizing there may be some slightly larger raises in the next few years to partially catch up for the last several years of pay freezes.

Miscellaneous Assumptions

Percent Married: Currently 85% of members are assumed to be married with the husband four years older than the wife. This is a common and reasonable assumption and we recommend maintaining this assumption.

Missing Data: In preparing the valuation data, certain data items are missing, unavailable, or unreasonable. In such cases, we have developed assumptions for what the data element should be. These assumptions are described in Appendices D and E. We recommend keeping these assumptions.

Actuarial Methods

Actuarial valuations utilize methods to determine the liabilities, assets, and costs. While these are not like other assumptions that may change over time, an experience study is still a good opportunity to review these methods to see if they are still appropriate for systematically funding the promised benefits. Significant methods are described below.

Actuarial Cost Method: The cost method is used to allocate the present value of benefits between past service (actuarial accrued liability) and future service (normal cost). Currently the valuation uses the entry age normal cost method. This is the most widely used cost method of large public sector plans and has demonstrated the highest degree of stability as compared to alternative methods. We recommend no change in the use of this method.

Actuarial Value of Assets: The purpose of the asset smoothing is to dampen the impact that market volatility has on valuation results by spreading the unexpected market gains and losses over several years. Currently the System uses a smoothing method that recognizes 20% of the difference between the market value of assets and the expected actuarial value of assets, based on the assumed rate of return. The actuarial value of assets cannot be less than 80% or more than 120% of market value. We recommend no change in the use of this method.

Amortization Method: The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period. The period is a fixed 20 year period, starting July 1, 2007. The payroll growth assumption is used to determine the percentage of payroll required over the remaining amortization period to fully amortize the unfunded liability. We recommend no change in the use of this method.

COLA Reserve: In the last experience study, we removed the use of an explicit COLA assumption and the reserve following legislation that would require a COLA to be funded. Since there have been no COLAs granted in the intervening period, we recommend continuing the practice of not valuing of any future COLA contingency.

Historical June CPI (U) Index

Year	CPI (U)	Year	CPI (U)
1959	29.10	1987	113.50
1960	29.60	1988	118.00
1961	29.80	1989	124.10
1962	30.20	1990	129.90
1963	30.60	1991	136.00
1964	31.00	1992	140.20
1965	31.60	1993	144.40
1966	32.40	1994	148.00
1967	33.30	1995	152.50
1968	34.70	1996	156.70
1969	36.60	1997	160.30
1970	38.80	1998	163.00
1971	40.60	1999	166.20
1972	41.70	2000	172.40
1973	44.20	2001	178.00
1974	49.00	2002	179.90
1975	53.60	2003	183.70
1976	56.80	2004	189.70
1977	60.70	2005	194.50
1978	65.20	2006	202.90
1979	72.30	2007	208.35
1980	82.70	2008	218.82
1981	90.60	2009	215.69
1982	97.00	2010	217.96
1983	99.50	2011	225.72
1984	103.70	2012	229.48
1985	107.60	2013	233.50
1986	109.50		

Capital Market Assumptions and Asset Allocation

Rates of Return and Standard Deviation by Asset Class

Asset Class	Arithmetic Mean Return	Standard Deviation
US Large Cap Equity	7.60%	17.00%
US Small Cap Equity	7.90%	19.50%
US Fixed	2.90%	5.00%
International Stock	7.80%	20.00%
Emerging Market Stock	8.50%	32.00%
TIPS	2.90%	4.50%
Rate Anticipation	3.70%	9.30%

Asset Class Correlation Coefficients

	US Lrg	US Sml	Fixed	Intl	EM	TIPS	Rate Ant
US Large Cap	1.00	0.86	0.15	0.77	0.57	0.10	0.15
US Small Cap	0.86	1.00	0.06	0.72	0.65	0.05	0.06
US Fixed	0.15	0.06	1.00	0.05	-0.08	0.65	0.95
Intl Stock	0.77	0.72	0.05	1.00	0.71	0.04	0.05
EM Stock	0.57	0.65	-0.08	0.71	1.00	0.08	-0.08
TIPS	0.10	0.05	0.65	0.04	0.08	1.00	0.49
Rate Anticipation	0.15	0.06	0.95	0.05	-0.08	0.49	1.00

Asset Allocation Targets

Asset Class	Allocation Percentages
US Large Cap Equity	38.0%
US Small Cap Equity	6.0%
US Fixed	25.0%
International Stock	18.0%
Emerging Market Stock	6.0%
TIPS	3.5%
Rate Anticipation	3.5%

Note: OPERS combines international and emerging markets as one class in their portfolio. The distinction here is to reflect the components in the index.

Social Security Administration Wage Index

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1957	$3,641.72		1985	$16,822.51	4.26%
1958	3,673.80	0.88%	1986	17,321.82	2.97
1959	3,855.80	4.95	1987	18,426.51	6.38
1960	4,007.12	3.92	1988	19,334.04	4.93
1961	4,086.76	1.99	1989	20,099.55	3.96
1962	4,291.40	5.01	1990	21,027.98	4.62
1963	4,396.64	2.45	1991	21,811.60	3.73
1964	4,576.32	4.09	1992	22,935.42	5.15
1965	4,658.72	1.80	1993	23,132.67	0.86
1966	4,938.36	6.00	1994	23,753.53	2.68
1967	5,213.44	5.57	1995	24,705.66	4.01
1968	5,571.76	6.87	1996	25,913.90	4.89
1969	5,893.76	5.78	1997	27,426.00	5.84
1970	6,186.24	4.96	1998	28,861.44	5.23
1971	6,497.08	5.02	1999	30,469.84	5.57
1972	7,133.80	9.80	2000	32,154.82	5.53
1973	7,580.16	6.26	2001	32,921.92	2.39
1974	8,030.76	5.94	2002	33,252.09	1.00
1975	8,630.92	7.47	2003	34,064.95	2.44
1976	9,226.48	6.90	2004	35,648.55	4.65
1977	9,779.44	5.99	2005	36,952.94	3.66
1978	10,556.03	7.94	2006	38,651.41	4.60
1979	11,479.46	8.75	2007	40,405.48	4.54
1980	12,513.46	9.01	2008	41,334.97	2.30
1981	13,773.10	10.07	2009	40,711.61	-1.51
1982	14,531.34	5.51	2010	41,673.83	2.36
1983	15,239.24	4.87	2011	42,979.61	3.13
1984	16,135.07	5.88	2012	44,321.67	3.12

Oklahoma Public Employees Retirement System

Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the Individual Entry Age method of funding.

Sometimes called the "funding method," this is a particular technique used by actuaries for establishing the amount of the annual actuarial cost of pension benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the System is comprised of (1) the normal cost and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Entry Age Actuarial Cost Method, the **Normal Cost** is computed as the level percentage of pay which, if paid from the earliest time each member would have been eligible to join the System if it then existed (thus entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the System.

The **Actuarial Accrued Liability** under this method, at any point in time, is the theoretical amount of the fund that would have accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The **Unfunded Actuarial Accrued Liability** is the excess of the actuarial accrued liability over the actuarial value of System assets on the valuation date.

Under this method, experience gains or losses, i.e. decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

Asset Valuation Method

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- at the beginning of each fiscal year, a preliminary expected actuarial asset value is calculated as the sum of the previous year's actuarial value increased with a year's interest at the System valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;

- the expected actuarial asset value is set equal to the preliminary expected actuarial value plus the unrecognized investment gains and losses as of the beginning of the previous fiscal year;

- the difference between the expected actuarial asset value and the market value is the investment gain or loss for the previous year;

Oklahoma Public Employees Retirement System

- the (final) actuarial asset value is the preliminary value plus 20% of the investment gains and losses for each of the five previous fiscal years, but in no case more than 120% of the market value or less than 80% of the market value.

Amortization Method

Effective July 1, 2008, the unfunded actuarial accrued liability is amortized as a level percent of payroll over a 20-year closed period commencing July 1, 2007. Given a stable active workforce, this amortization method is expected to produce a payment stream that is constant as a percent of covered payroll.

Valuation Procedures

The actuarial accrued liability held for nonvested, inactive members who have a break in service, or for nonvested members who have quit or been terminated, even if a break in service has not occurred as of the valuation date, is equal to the amount of the individual's unclaimed contributions.

The wages used in the projection of benefits and liabilities are considered earnings for the year ending June 30, 2010, increased by the salary scale to develop expected earnings for the current valuation year.

Earnings are annualized for members with less than twelve months of reported earnings.

In computing accrued benefits, average earnings are determined using actual pay history provided for valuation purposes.

The calculations for the required employer contribution are determined as of mid-year. This is a reasonable estimate since contributions are made on a monthly basis throughout the year.

We do not value the 415 limit for active participants. The impact was assumed to be *de minimus*.

The compensation limitation under IRC Section 401(a)(17) is considered in this valuation.

Liability is included for members who appear to be deferred vested, but who are not in the vested data provided. An estimated benefit was calculated based on pay and service from prior valuations. A corrected benefit and status will be provided by the System when the actual benefit and status have been finalized.

Oklahoma Public Employees Retirement System

Valuation Procedures

(continued)

Members who are contributing to the System, but have not yet filled out an enrollment application, are included as active members. Service for this group was provided by the System.

A liability is included for contribution amounts due to be refunded to terminated vested members who made voluntary contributions to increase the maximum compensation limit prior to July 1, 1998. The System supplied the included amounts.

Oklahoma Public Employees Retirement System

SUMMARY OF ACTUARIAL ASSUMPTIONS

Economic Assumptions

Investment Return: 7.5% net of investment expenses per annum, compounded annually

Salary Increases: Sample rates below (midpoint of range shown):

Nearest Age	% Increase
20 - 24	8.40
25 - 29	7.40
30 – 34	6.10
35 – 39	5.50
40 – 44	5.20
45 – 49	4.80
50 – 54	4.50
55 – 59	4.50
60 – 64	4.50
65+	4.50

Payroll Growth: 4.00% per year

Ad hoc benefit increase assumptions

Monthly benefits   No increases assumed
Medical Supplement   No increases assumed

Projection of 401(a)(17)
compensation limit: Projected with inflation at 3.0%

Oklahoma Public Employees Retirement System

Demographic Assumptions

Annual Rates of Retirement Per 100 Eligible Regular Non-Elected Members

| | Hired Prior to 11/1/2011 | | Hired on or After 11/1/2011 | |
| | Those Eligible For Unreduced | Those Eligible For Reduced | Those Eligible For Unreduced | Those Eligible For Reduced |
Age	Retirement	Retirement	Retirement	Retirement
50	20	N/A	N/A	N/A
51	20	N/A	N/A	N/A
52	20	N/A	N/A	N/A
53	20	N/A	N/A	N/A
54	20	N/A	N/A	N/A
55	10	3	N/A	N/A
56	10	4	N/A	N/A
57	11	4	N/A	N/A
58	12	5	N/A	N/A
59	13	6	N/A	N/A
60	14	6	*	7
61	20	15	*	7
62	30	N/A	*	20
63	15	N/A	*	15
64	15	N/A	*	15
65	30	N/A	*	N/A
66	20	N/A	20	N/A
67	20	N/A	20	N/A
68	20	N/A	20	N/A
69	25	N/A	25	N/A
70	100	N/A	100	N/A

*30 when first eligible to retire and 15 thereafter

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Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

Annual Rates of Retirement Per 100 Eligible Elected Members

	Elected Prior to 11/1/2011		Elected on or After 11/1/2011	
	Those Eligible For Unreduced	Those Eligible For Reduced	Those Eligible For Unreduced	Those Eligible For Reduced
Age	Retirement	Retirement	Retirement	Retirement
50	25	N/A	N/A	N/A
51	25	N/A	N/A	N/A
52	25	N/A	N/A	N/A
53	25	N/A	N/A	N/A
54	25	N/A	N/A	N/A
55	20	7.5	N/A	N/A
56	20	7.5	N/A	N/A
57	20	7.5	N/A	N/A
58	20	7.5	N/A	N/A
59	20	7.5	N/A	N/A
60	20	N/A	N/A	10
61	20	N/A	N/A	10
62	20	N/A	20	N/A
63	20	N/A	20	N/A
64	20	N/A	20	N/A
65	20	N/A	20	N/A
66	20	N/A	20	N/A
67	35	N/A	35	N/A
68	35	N/A	35	N/A
69-74	35	N/A	35	N/A
75	100	N/A	100	N/A

Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

Annual Rates of Retirement Per 100 Eligible Hazardous Duty Members

	Hired Prior to 11/1/2011				Hired on or After 11/1/2011		
	Less Than 20 Years of Service	At Least 20 Years of Service			Less Than 20 Years of Service	At Least 20 Years of Service	
Age		**Service**		**Age**		**Service**	
50	N/A	20	25	50	N/A	20	25
51	N/A	21	25	51	N/A	21	25
52	N/A	22	20	52	N/A	22	20
53	N/A	23-34	15	53	N/A	23-34	15
54	N/A	25-29	23	54	N/A	25-29	23
55	4	30-34	25	55	N/A	30-34	25
56	5	35+	100	56	N/A	35+	100
57	5			57	N/A		
58	6			58	N/A		
59	7			59	N/A		
60	7			60	7		
61	20			61	20		
62	40			62	20		
63	22			63	20		
64	25			64	20		
65	40			65	40		
66	25			66	25		
67	23			67	23		
68	22			68	22		
69	21			69	21		
70	100			70	100		

Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

Mortality Rates

Active participants and
nondisabled pensioners

RP-2000 Combined Active/Retiree Healthy Mortality Table projected to 2010 using Scale AA.

Disabled pensioners

RP-2000 Combined Active/Retiree Healthy Mortality Table projected to 2010 using Scale AA set forward 15 years for disabled experience.

Hazardous Duty members

For Department of Corrections officers, we assumed the mortality rate is 10% higher than the above table while the participant is active. This 10% is assumed to be in-line-of-duty.

Disability Rates:

Graduated rates

Disabled rates per 100 members

Nearest Age	Male	Female
20	0.009	0.009
30	0.027	0.027
40	0.072	0.090
50	0.225	0.261
60	0.500	0.350

Oklahoma Public Employees Retirement System

Withdrawal Rates:

Service	Rate
1	22.0%
2	18.0%
3	14.0%
4	12.0%
5	10.5%
6	9.0%
7	8.0%
8	7.0%
9	6.5%
10	6.0%
11	5.3%
12	4.5%
13	4.0%
14	3.5%
115	3.1%
16	2.8%
17	2.6%
18	2.4%
19	2.2%
20	2.0%
21	1.8%
22	1.6%
23	1.4%
24	1.2%
25+	1.0%

Probability of Electing Vested Benefit:

Regular Members Only	
Age	Rate
Under 41	70%
41 - 45	75%
46	80%
47	85%
48	90%
49	95%
50+	100%

Marital Status:

      Percentage Married   85%

      Age difference   Males are assumed to be four years older than spouses.

Children: Special death benefits are provided upon the in-line-of-duty death of Department of Corrections employees who have young children. We have assumed the average age of the youngest child of such employees is nine and that 50% of such children will attend an institution of higher education to age 22.

Form of Payment: Participants are assumed to elect a life-only form of payment.

Assumed age for commencement of deferred benefits: Currently active members assumed to terminate in the future prior to retirement eligibility are assumed to commence benefits at age 62 (non-elected members) or age 60 (elected members).

                                   Currently active members hired on or after 11/1/2011 assumed to terminate in the future prior to retirement eligibility are assumed to commence benefits at age 65.

                                   Currently inactive members with deferred benefits are assumed to commence benefits on a date provided by OPERS.

Provision for expenses: Administrative expenses, as budgeted by the Oklahoma Public Employees Retirement System.

State of Oklahoma
Uniform Retirement System of Justices & Judges

Entry Age Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the individual Entry Age Level Percent of Pay actuarial cost. Sometimes called the "funding method," this is a particular technique used by actuaries for establishing the amount of the annual actuarial cost of pension benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the System is comprised of (1) the normal cost and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Entry Age Actuarial Cost method, the **Normal Cost** is computed as the level percentage of pay which, if paid from the earliest time each member would have been eligible to join the System if it then existed (thus, entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the System.

The **Actuarial Accrued Liability** under this method, at any point in time, is the theoretical amount of the fund that would have accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The **Unfunded Actuarial Accrued Liability** is the excess of the actuarial accrued liability over the actuarial value of System assets actually on hand on the valuation date.

Under this method, experience gains or losses, i.e. decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

Asset Valuation Method

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- at the beginning of each fiscal year, a preliminary expected actuarial asset value is calculated as the sum of the previous year's actuarial value increased with a year's interest at the System valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;

- the expected actuarial asset value is set equal to the preliminary expected actuarial value plus the unrecognized investment gains and losses as of the beginning of the previous fiscal year;

- the difference between the expected actuarial asset value and the market value is the investment gain or loss for the previous fiscal year;

- the (final) actuarial asset value is the preliminary value plus 20% of the investment gains and losses for each of the five previous fiscal years, but in no case more than 120% of the market value or less than 80% of the market value.

State of Oklahoma
Uniform Retirement System of Justices & Judges

Amortization Method

The Unfunded Actuarial Accrued Liability is amortized as a level percentage of payroll over a 20-year period commencing July 1, 2007. Given a stable active workforce, this amortization method is expected to produce a payment stream that remains level as a percent of covered payroll.

Valuation Procedures

The actuarial accrued liability held for nonvested, inactive members who have a break in service, or for nonvested members who have quit or been terminated, even if a break in service has not occurred as of the valuation date, is equal to the amount of the individual's unclaimed contributions.

The wages used in the projection of benefits and liabilities are actual earnings for the year ending June 30, 2010 increased by the salary scale to develop expected earnings for the current valuation year. Earnings are annualized for members with less than twelve months of reported earnings.

In computing accrued benefits, average earnings are determined using actual pay history provided for valuation purposes.

The calculations for the required employer contribution are determined as of mid-year. This is a reasonable estimate since contributions are made on a monthly basis throughout the year.

We do not value the 415 limit for active participants. The impact was assumed to be *de minimus*.

The compensation limitation under IRC Section 401(a)(17) is considered in this valuation.

Liability is included for members who appear to be deferred vested, but who are not in the vested data provided. An estimated benefit was calculated based on pay and service reported for prior valuations. A corrected benefit and status will be provided by the System when the actual benefit and status have been finalized.

Members who are contributing to the System, but have not yet filled out an enrollment application, are included as active members. Where data elements are missing, reasonable estimates are used. Service is estimated based on hours worked. Age is based on average entry age for other members. Gender is assigned in proportion to the overall group.

State of Oklahoma
Uniform Retirement System of Justices & Judges

Economic Assumptions

Investment Return: 7.5% net of investment expenses per annum, compounded
                                          annually

Salary Increases: 5.00% per year

Payroll Growth: 4.00% per year

Ad hoc benefit increase assumption:
    Monthly benefits   No increases assumed
    Medical supplement   No increases assumed

Projection of 410(a)(17) compensation limit   Projected with inflation at 3.0%

Demographic Assumptions

Retirement age:
Active members hired before 1/1/2012

Attained Age	Annual Rates of Retirement Per 100 Eligible Members
Below 62	10
62 – 65	20
66 – 67	10
68 – 74	30
75+	100

Retirement age:
Active members after 1/1/2012

Attained Age	Annual Rates of Retirement Per 100 Eligible Members
Below 62	10
62 – 65	20
66	10
67 – 74	30
75+	100

Deferred vested members   Participants with deferred benefits are assumed to
                                     commence benefits on a date provided by URSJJ. Actives
                                     expected to terminate with a vested benefit are expected to
                                     commence benefits at age 60.

State of Oklahoma
Uniform Retirement System of Justices & Judges

Mortality Rates:

Active Participants and
   nondisabled pensioners

RP-2000 Combined Active/Retired Healthy Mortality Table projected to 2010 using Scale AA, setback 1 year.

Disabled pensioners

RP-2000 Combined Active/Retired Healthy Mortality Table projected to 2010 using Scale AA set forward 14 years.

Separation Rates:

Separation for all reasons other
   than death

2% for all years of service.

Disability Rates: 0%

Marital Status:

Age difference   Males are assumed to be four years older than spouses.

Percentage married   85%

Other Assumptions:

Provisions for expenses

Administrative expenses, as budgeted for the Oklahoma Uniform Retirement System for Justices and Judges.

Form of payment

Active members who were contributing 8% of pay as of August 31, 2005, are assumed to retire with an unreduced benefit payable as a 50% Joint and Survivor annuity. All other members are assumed to retire with a single life annuity.

Experience Study 2010-2013
Appendix F- 1
Probability of Death - Healthy Retirees
OPERS - Males
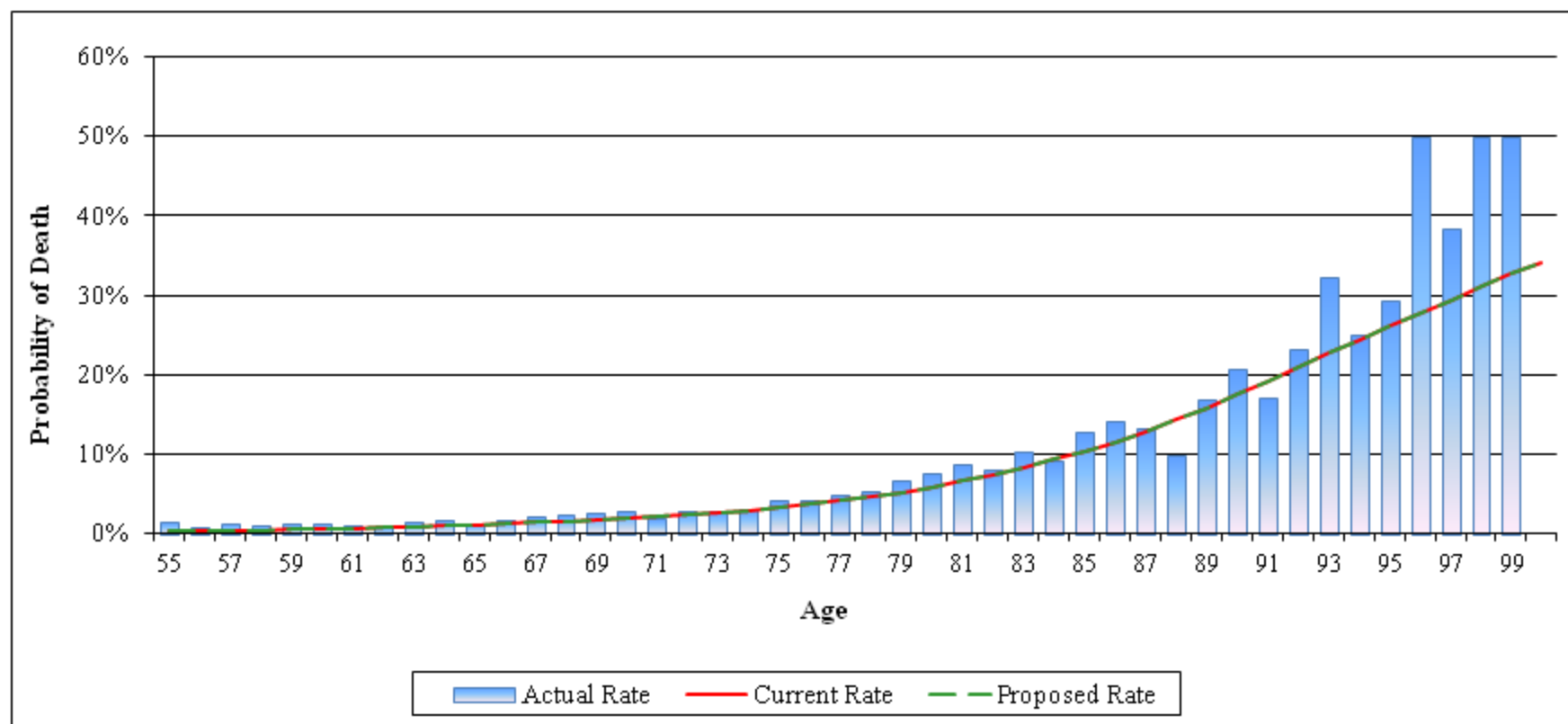
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,334	1,098	1,098
Actual/Expected		121%	121%

Experience Study 2010-2013
Appendix F- 2
Probability of Death - Healthy Retirees
OPERS - Females
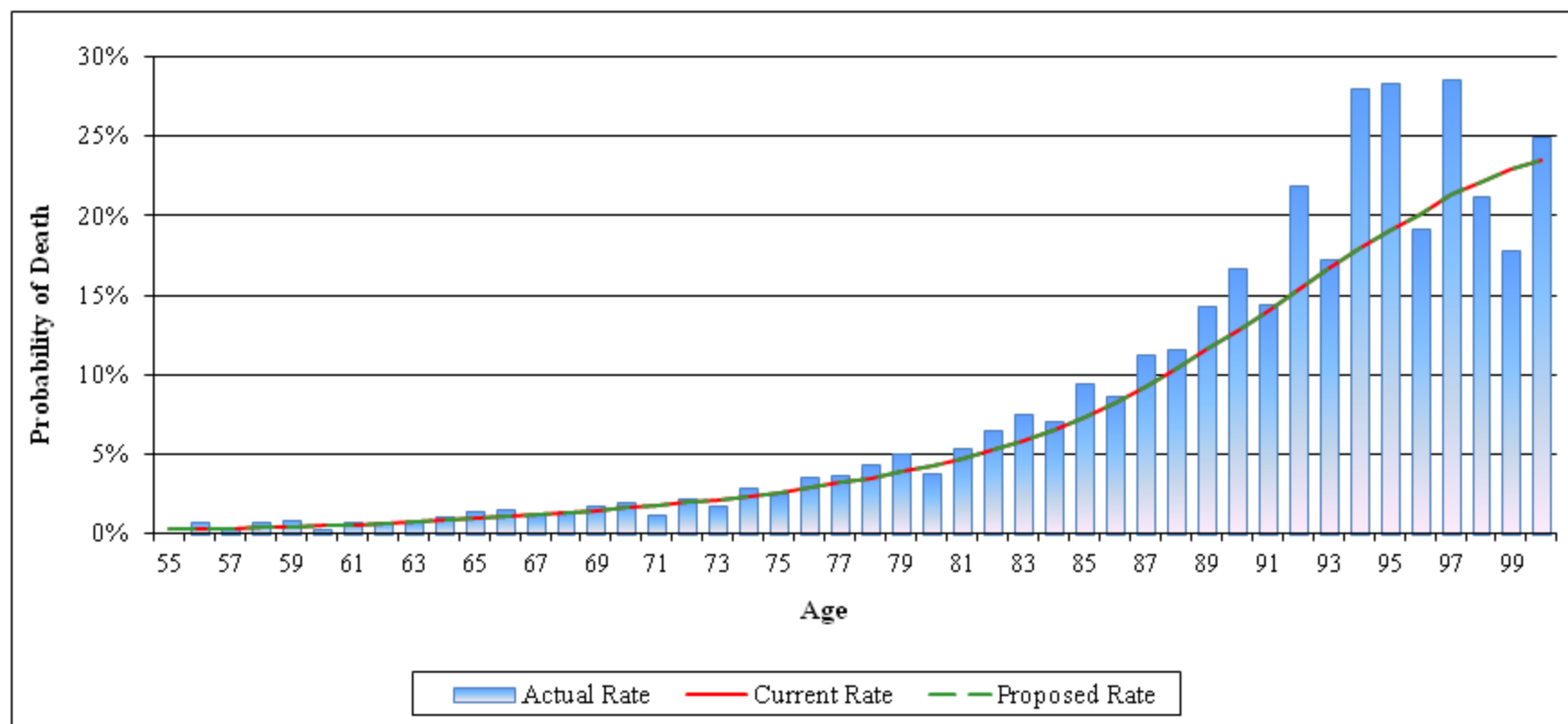
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,288	1,097	1,097
Actual/Expected		117%	117%

Experience Study 2010-2013
Appendix F-3
Retirement Rates
Regular - Early
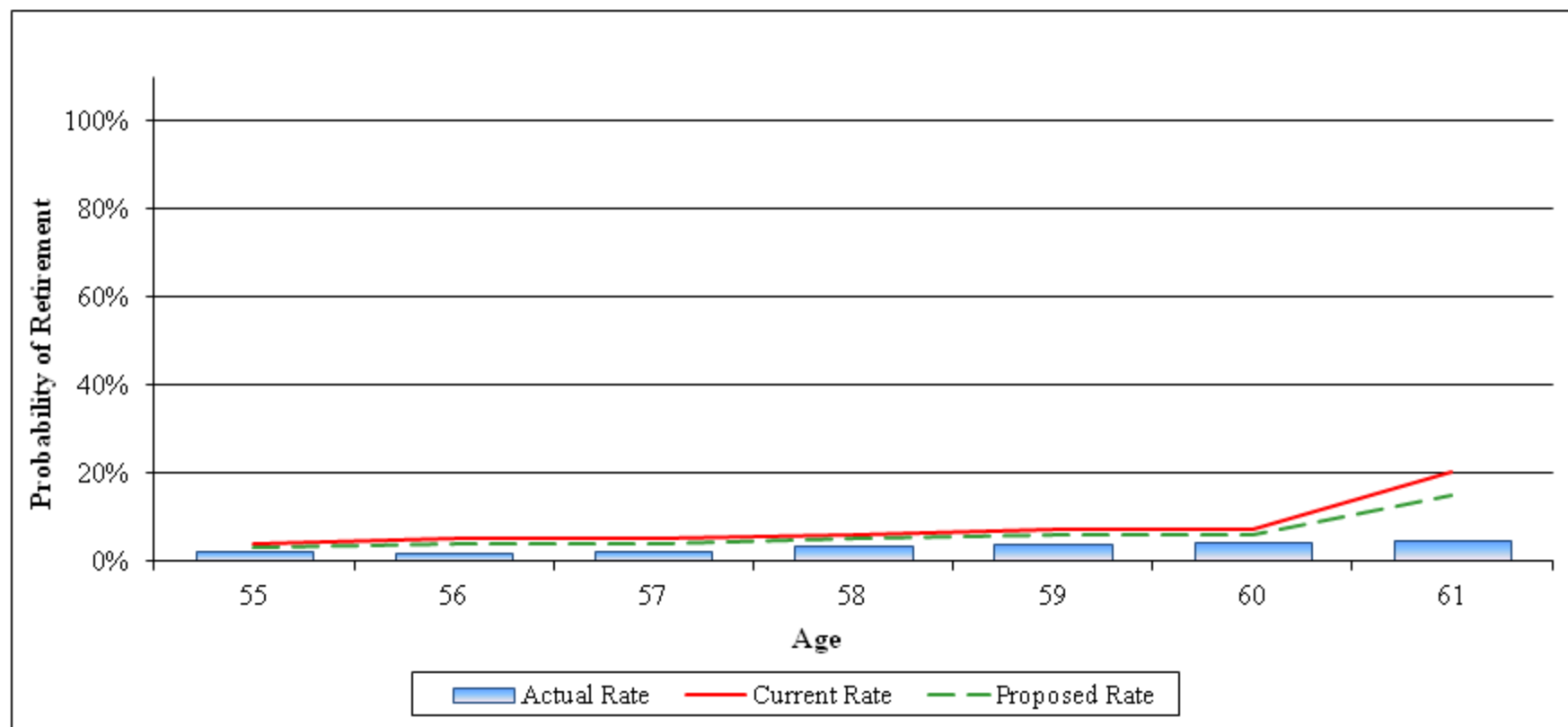
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	271	619	494
Actual/Expected		44%	55%

Experience Study 2010-2013
Appendix F-4
Retirement Rates
Regular - Unreduced
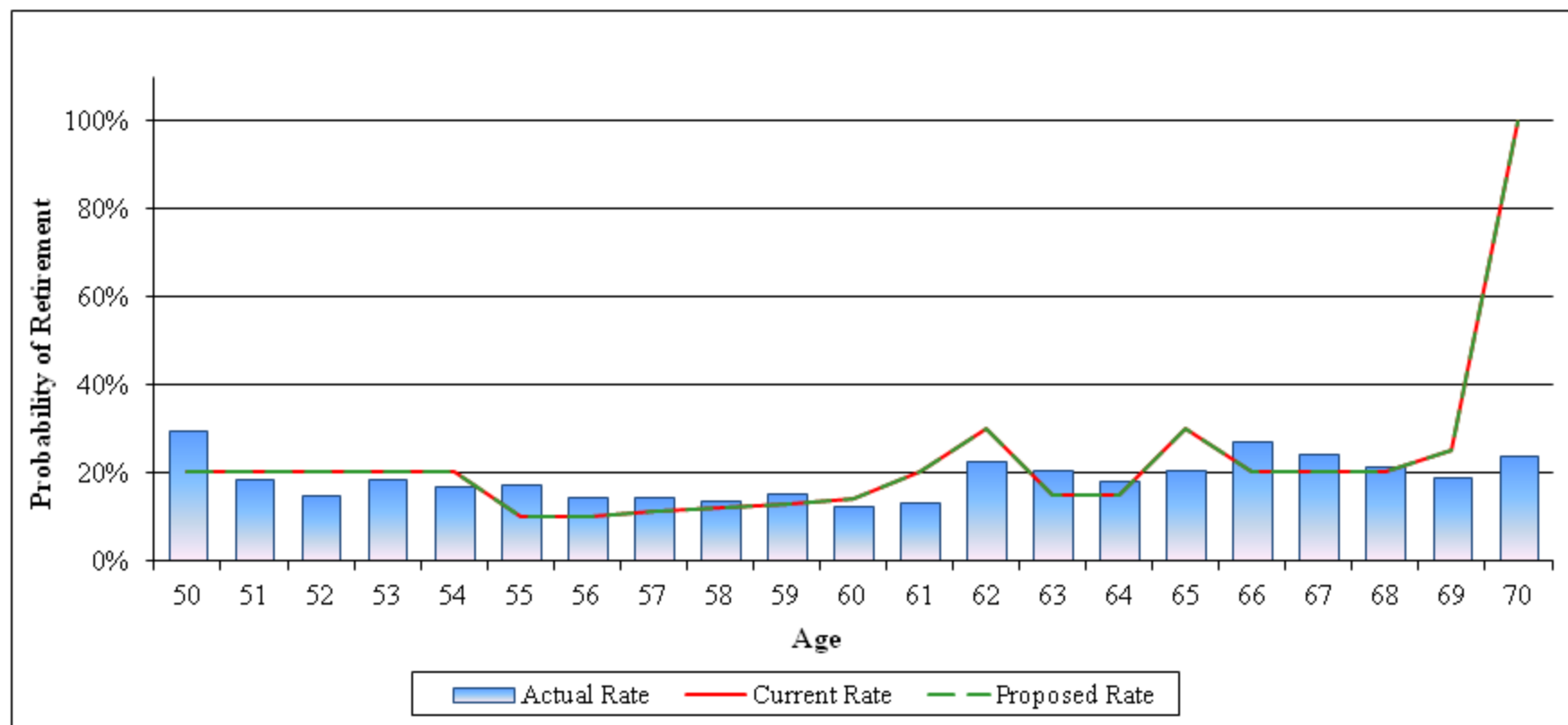
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	3,469	3,719	3,719
Actual/Expected		93%	93%

Experience Study 2010-2013
Appendix F-5
Retirement Rates
Elected Officials - Early
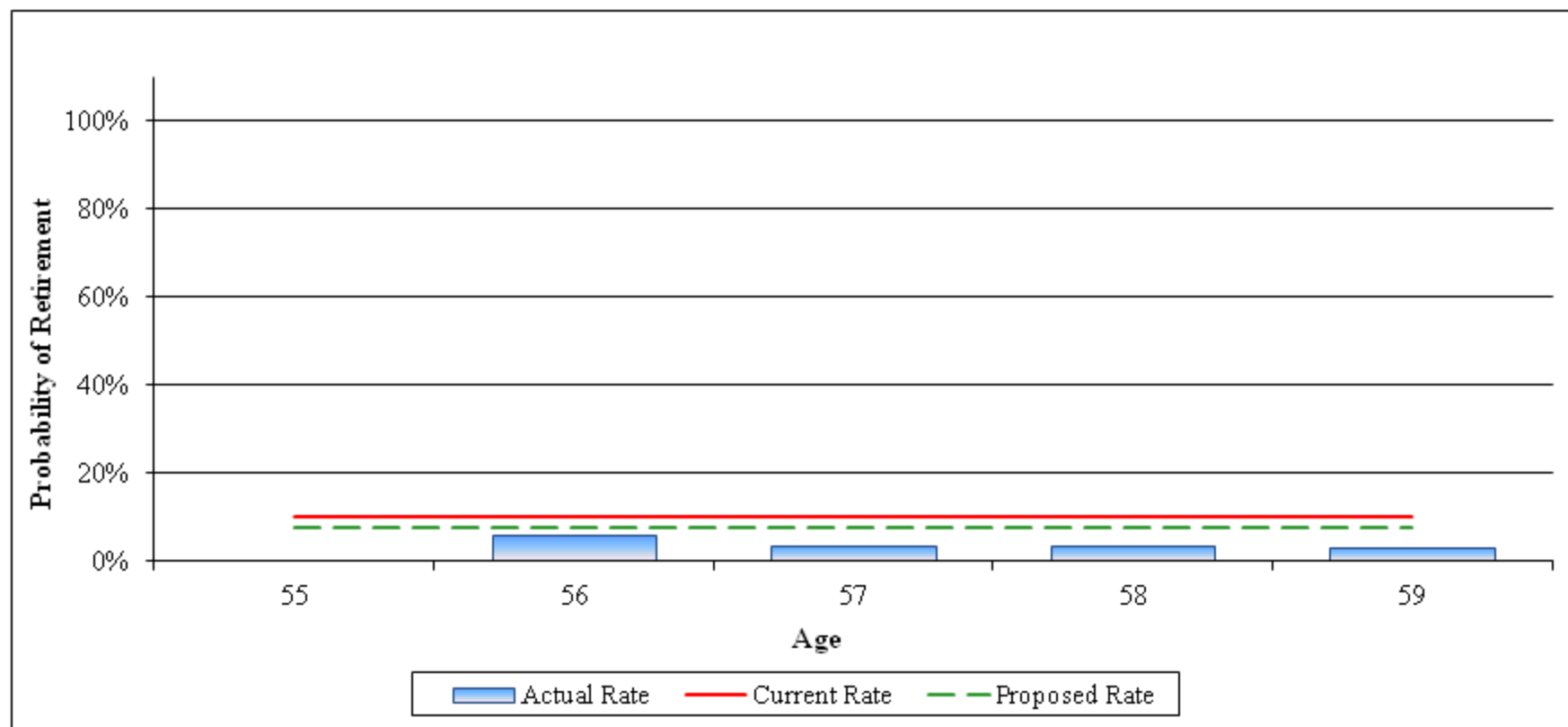
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	5	16	12
Actual/Expected		31%	42%

Experience Study 2010-2013
Appendix F-6
Retirement Rates
Elected Officials - Unreduced
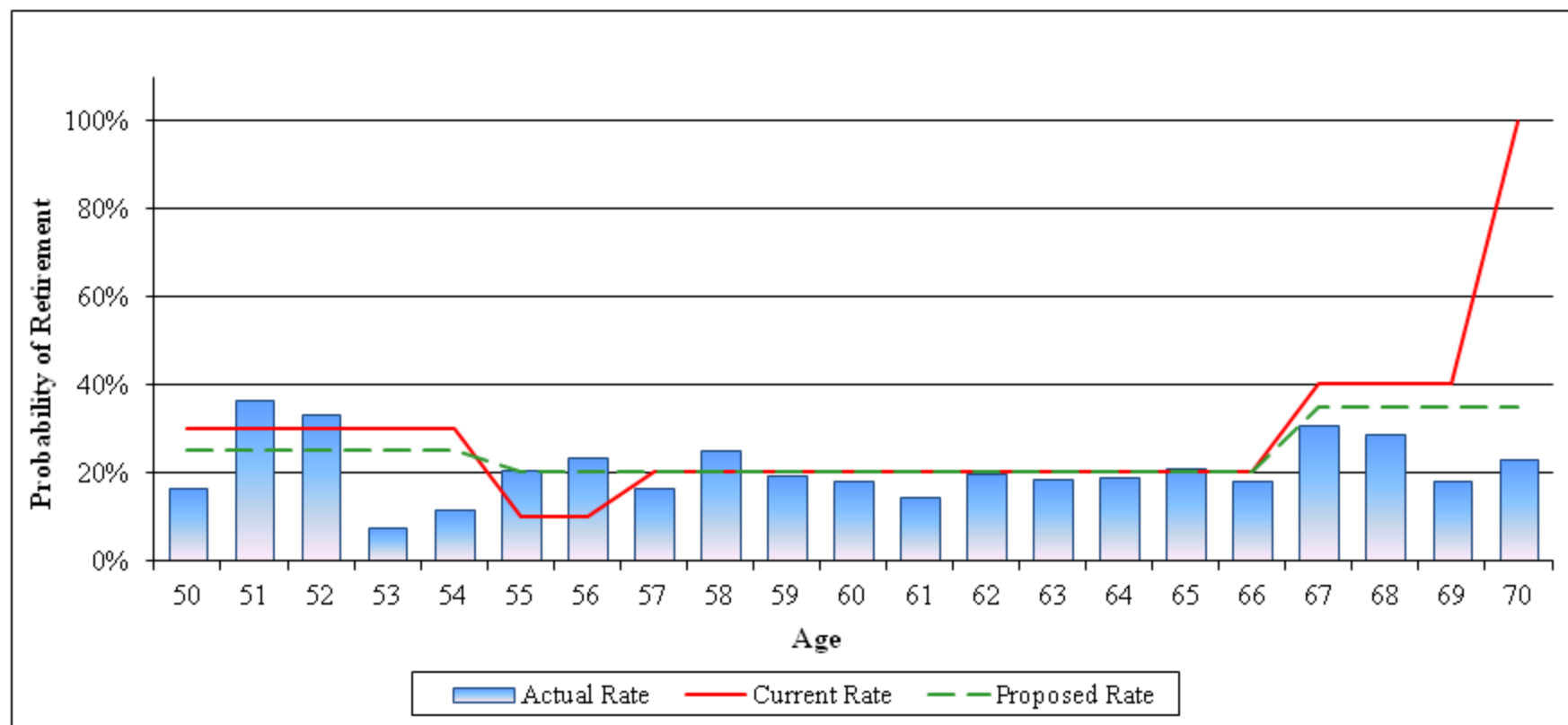
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	154	202	177
Actual/Expected		76%	87%

Experience Study 2010-2013
Appendix F-7
Retirement Rates
Hazardous Duty - Early
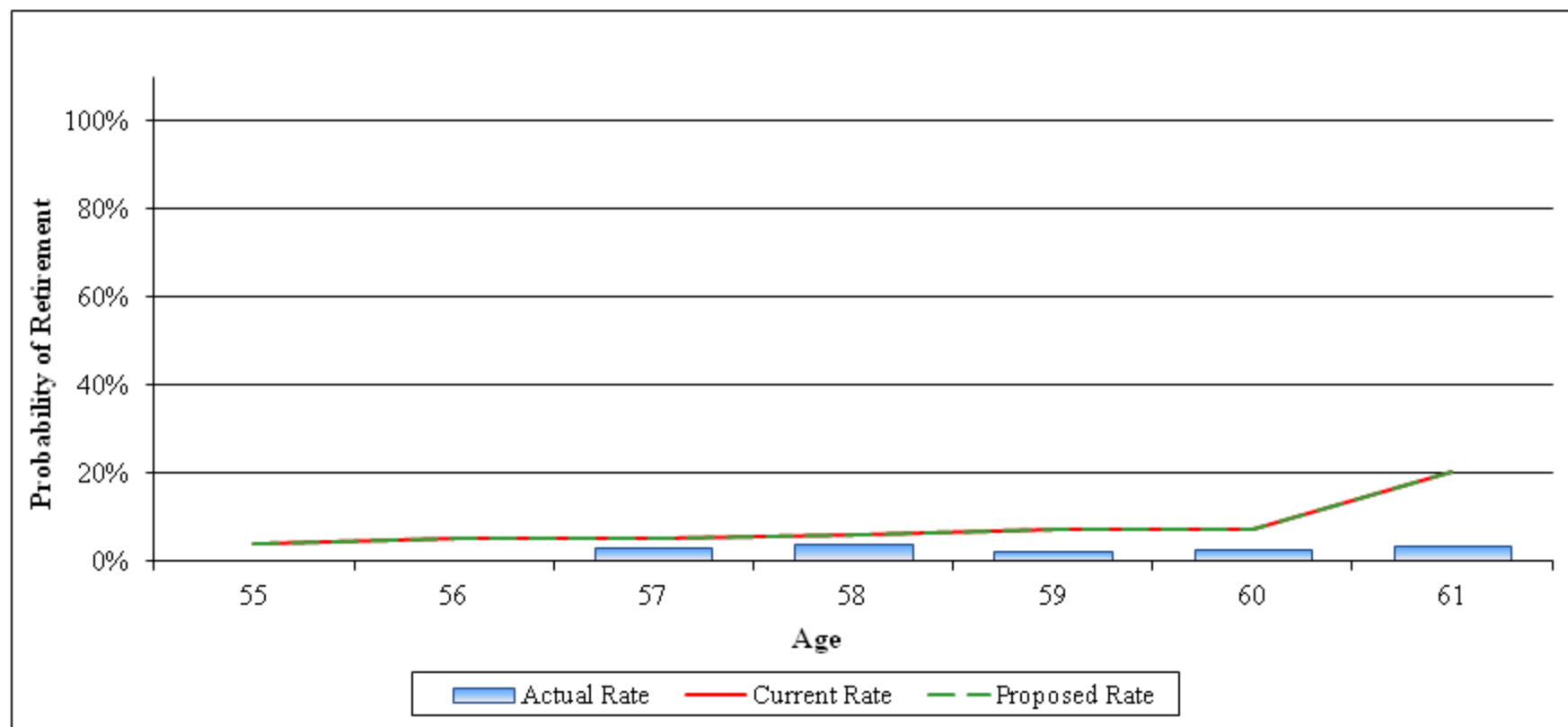
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	7	22	22
Actual/Expected		32%	32%

Experience Study 2010-2013
Appendix F-8
Retirement Rates
Hazardous Duty - Unreduced
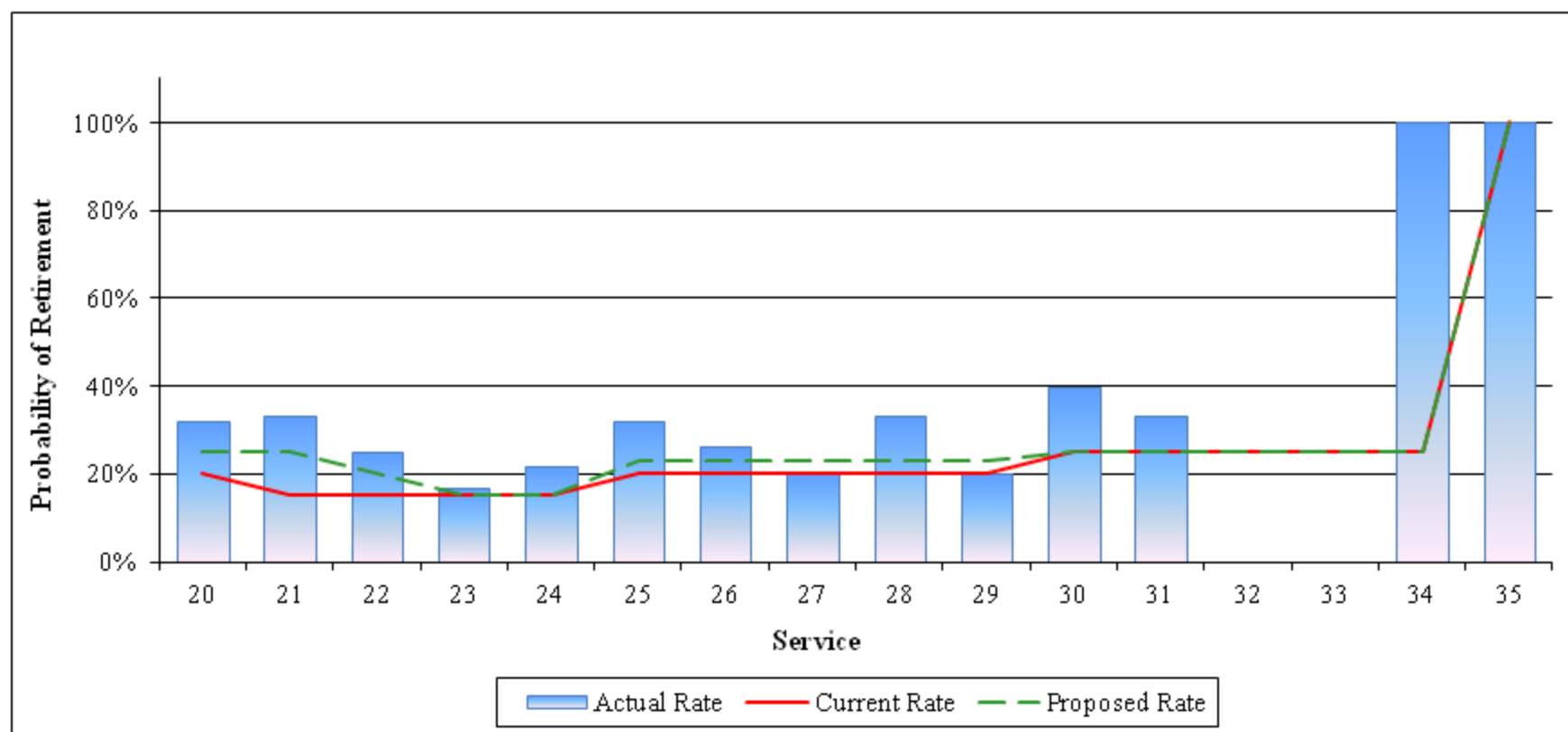
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	148	93	117
Actual/Expected		159%	126%

Experience Study 2010-2013
Appendix F-9
Retirement Rates
Hazardous Duty - Unreduced (Age)
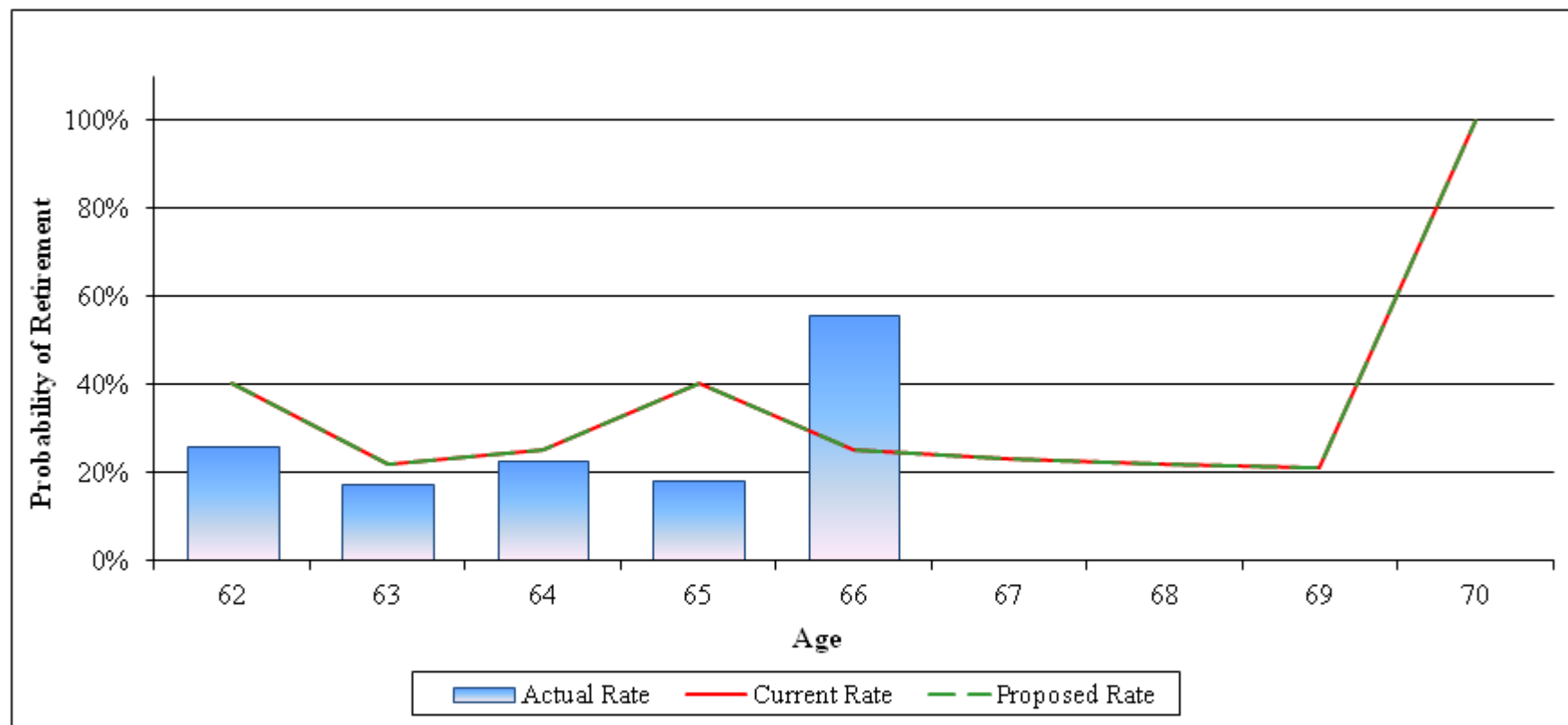
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	24	33	33
Actual/Expected		73%	73%

Experience Study 2010-2013
Appendix F-10
Retirement Rates
URSJJ
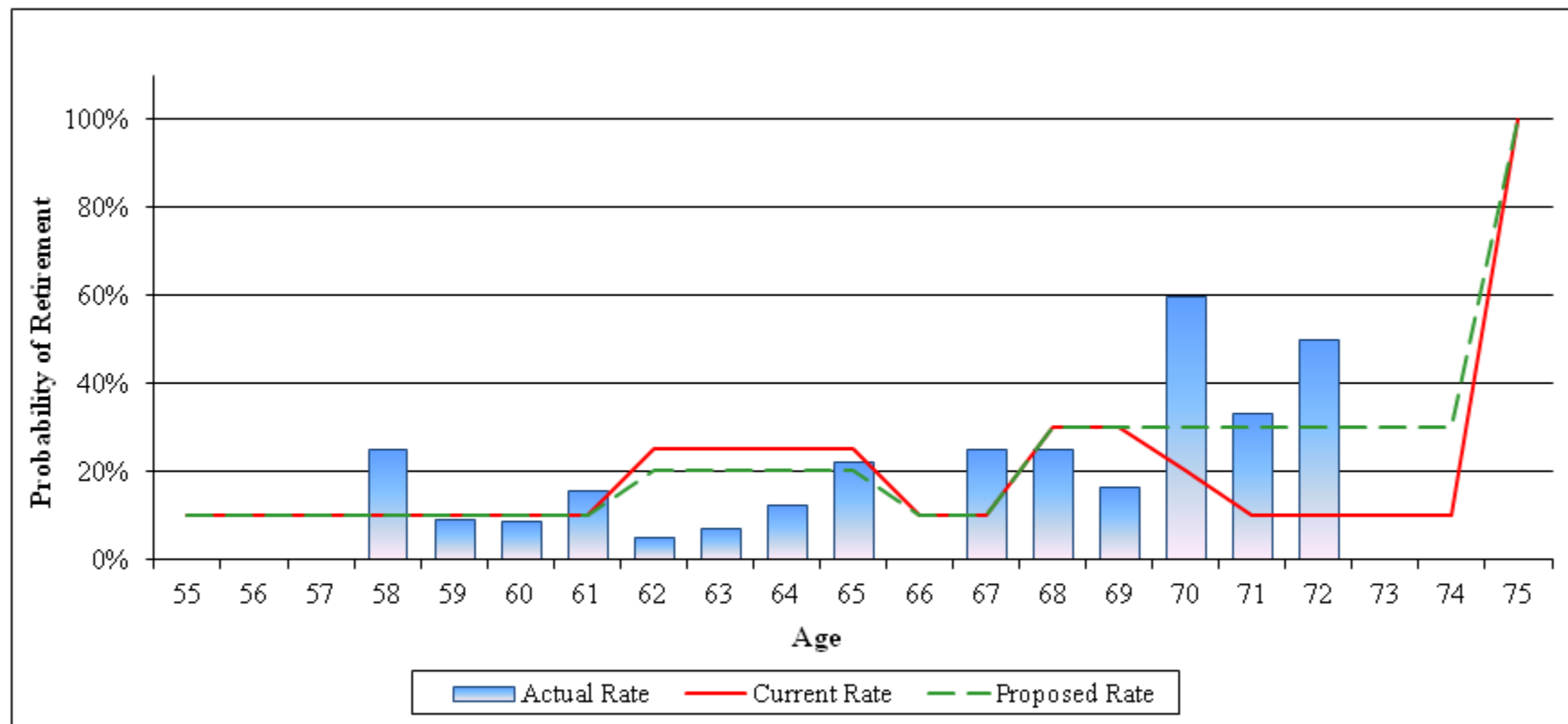
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	31	39	38
Actual/Expected		79%	82%

Experience Study 2010-2013
Appendix F-11
Rate of Disability - Active Lives
OPERS - Males
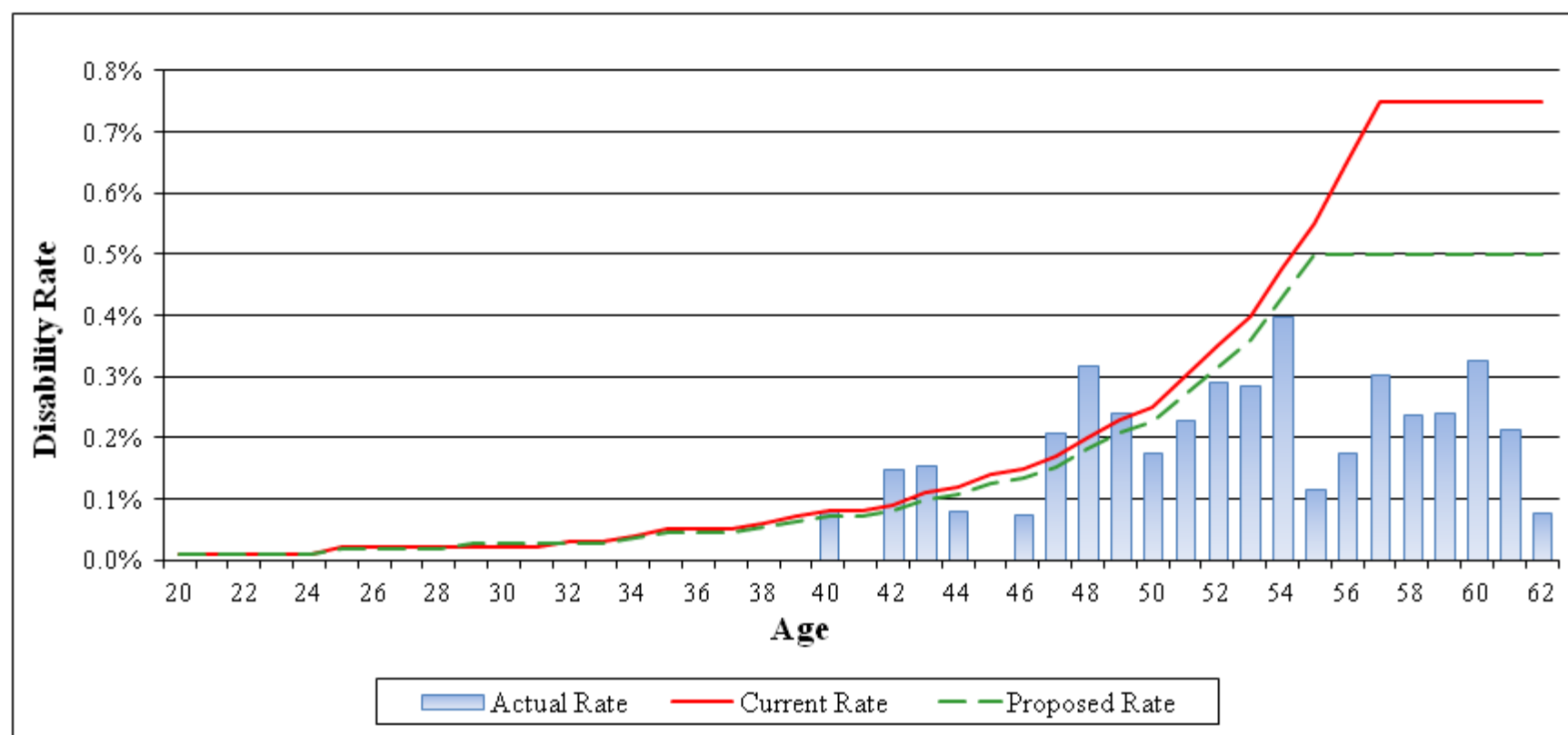
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	70	146	114
Actual/Expected		48%	61%

Experience Study 2010-2013
Appendix F-12
Rate of Disability - Active Lives
OPERS - Females
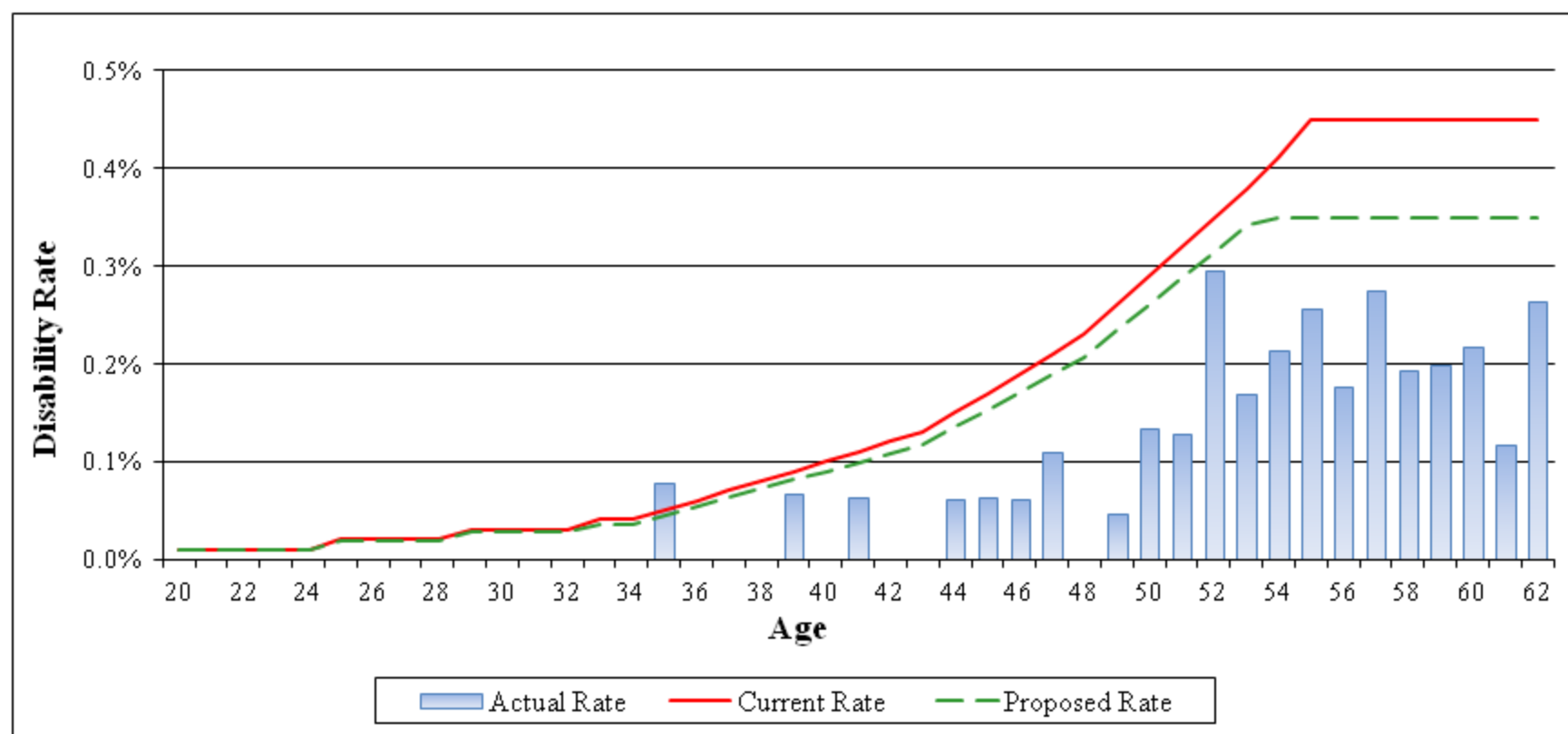
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	65	151	126
Actual/Expected		43%	52%

Experience Study 2010-2013
Appendix F-13
Rate of Disability - Active Lives
Hazardous Duty - Males
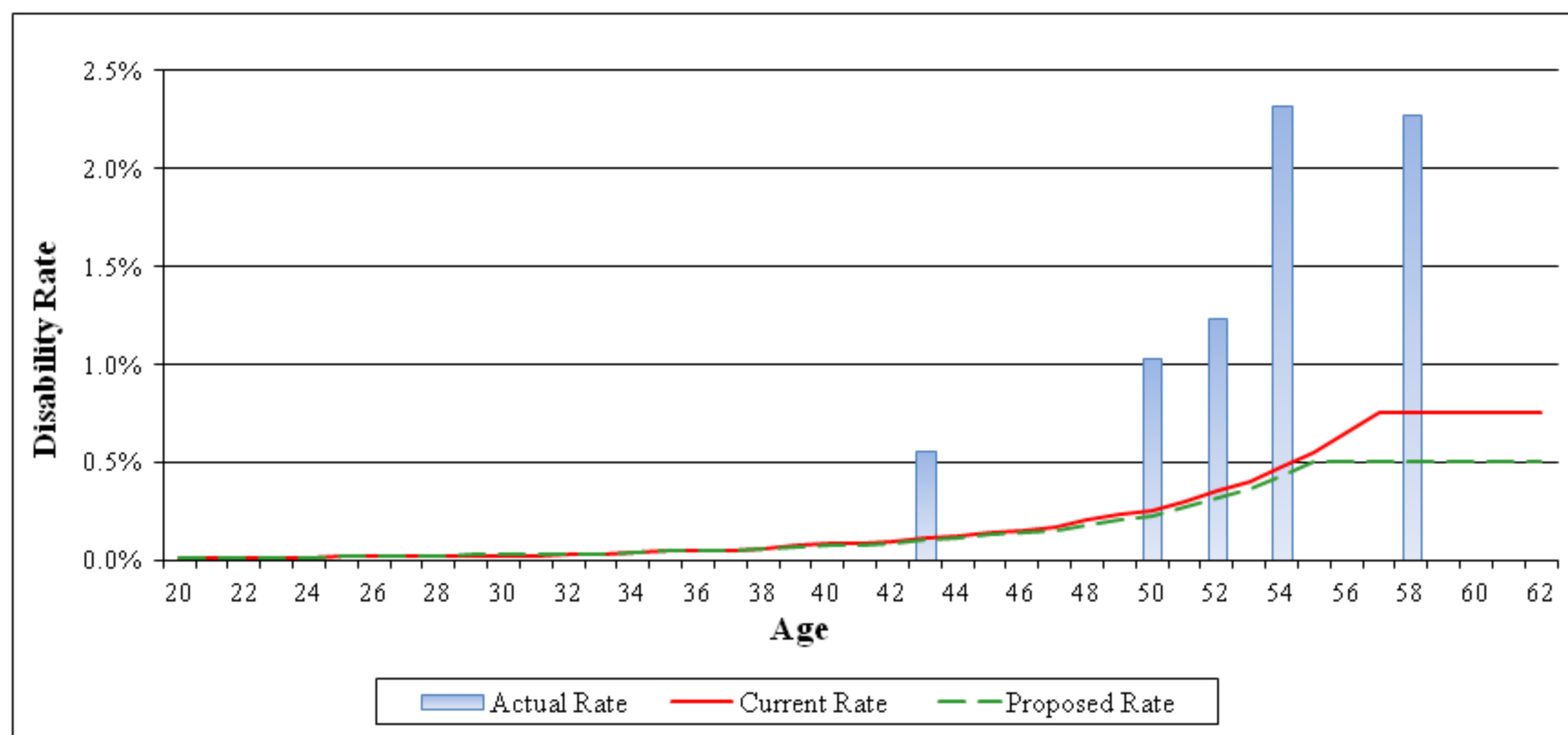
|	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	7	8	7
Actual/Expected		88%	100%

Experience Study 2010-2013
Appendix F-14
Rate of Termination of Employment
OPERS - Less Than 2 Years
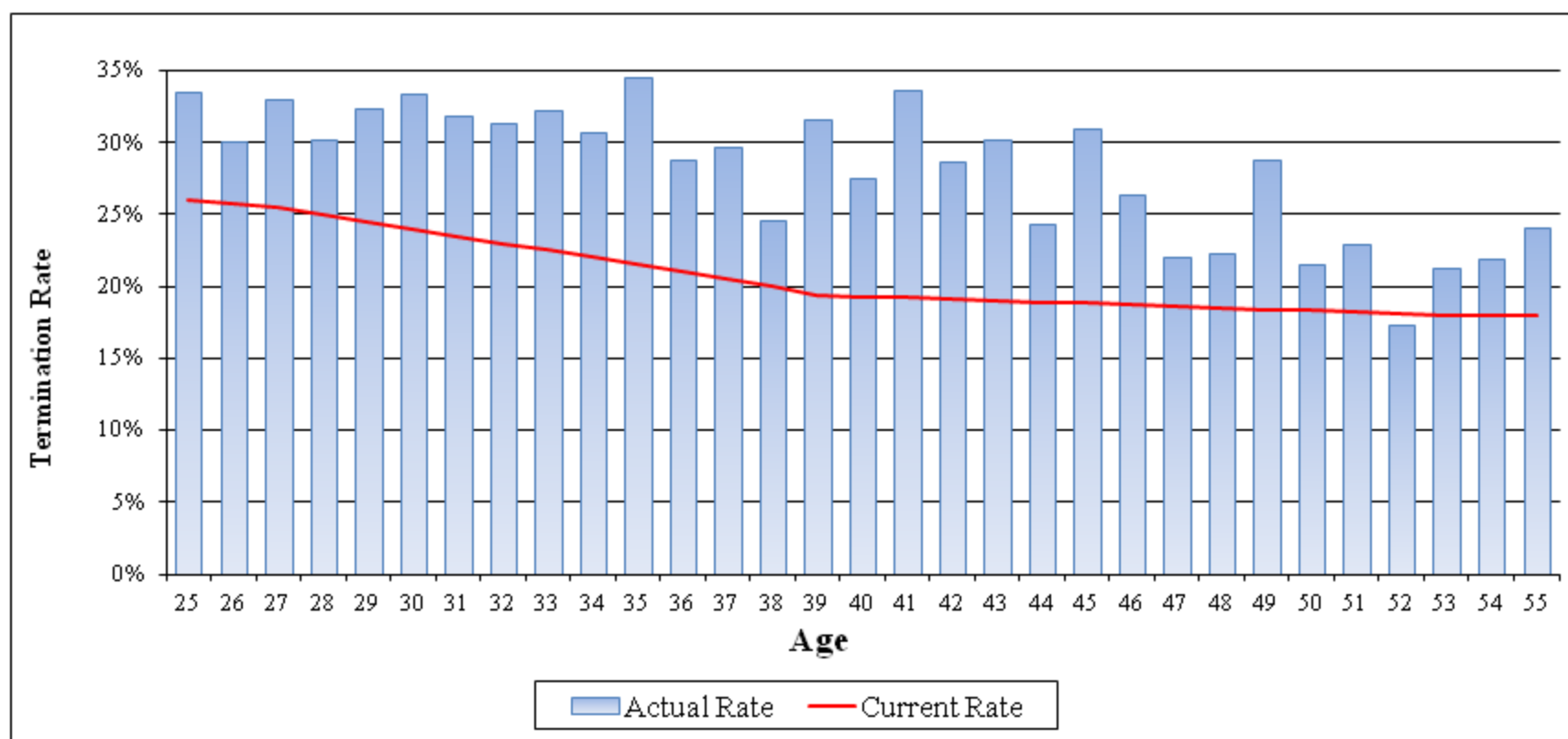
	Actual	Expected - Current Assumptions	
Total Count	3,201	2,373	
Actual/Expected		135%	

Experience Study 2010-2013
Appendix F-15
Rate of Termination of Employment
OPERS - 2 Years
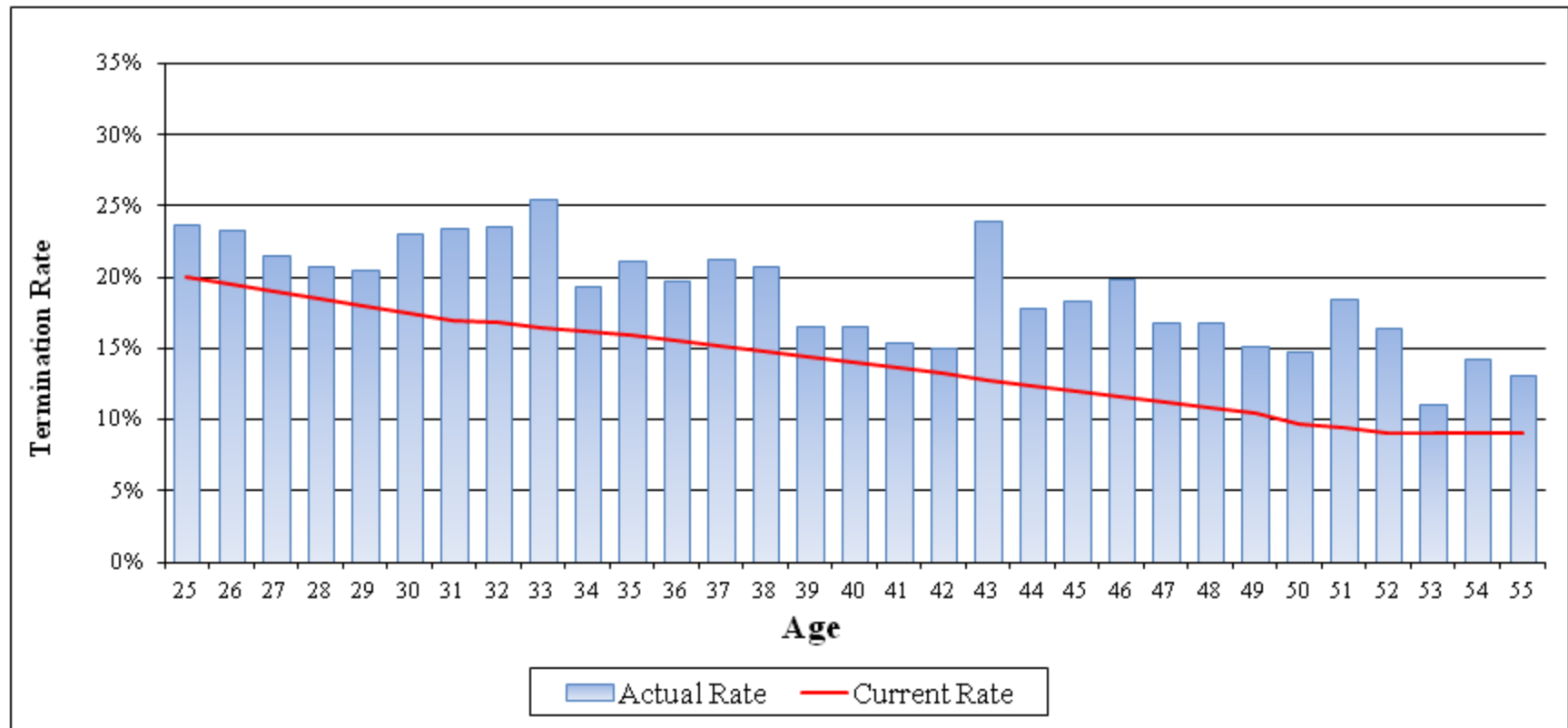
	Actual	Expected - Current Assumptions	
Total Count	1,445	1,091	
Actual/Expected		132%	

Experience Study 2010-2013
Appendix F-16
Rate of Termination of Employment
OPERS - 3 Years
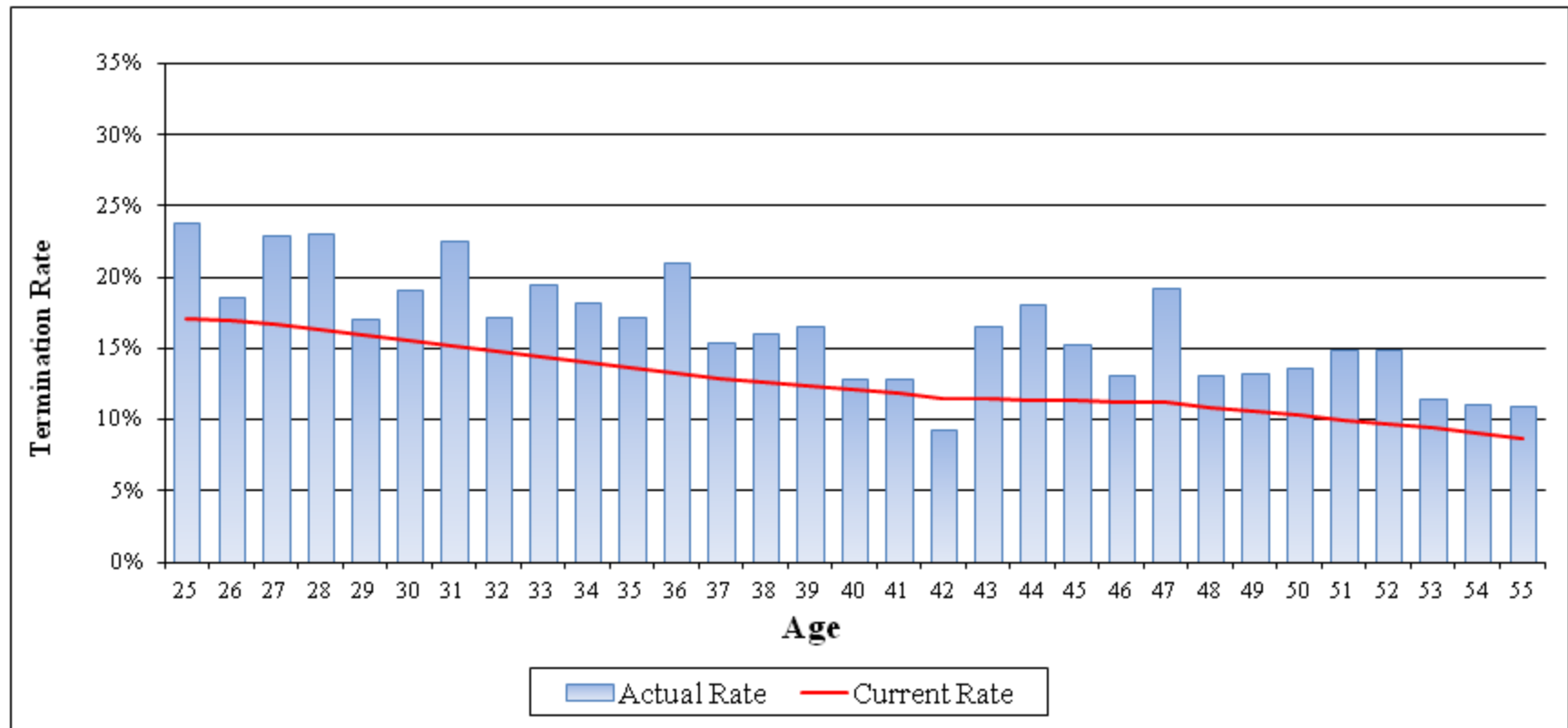
	Actual	Expected - Current Assumptions	
Total Count	1,203	932	
Actual/Expected		129%	

Experience Study 2010-2013
Appendix F-17
Rate of Termination of Employment
OPERS - 4 Years
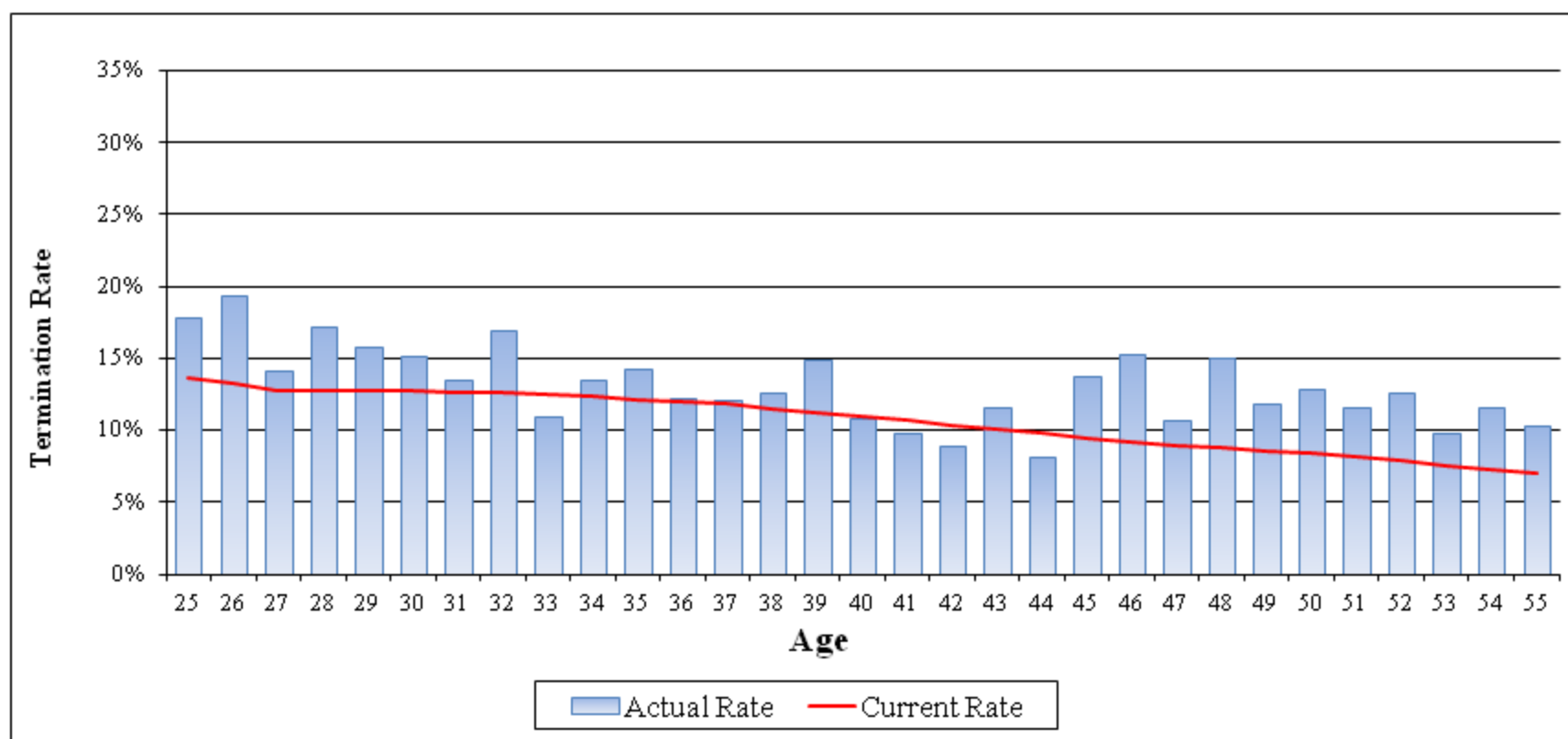
	Actual	Expected - Current Assumptions	
Total Count	882	728	
Actual/Expected		121%	

Experience Study 2010-2013
Appendix F-18
Rate of Termination of Employment
OPERS - 5 Years
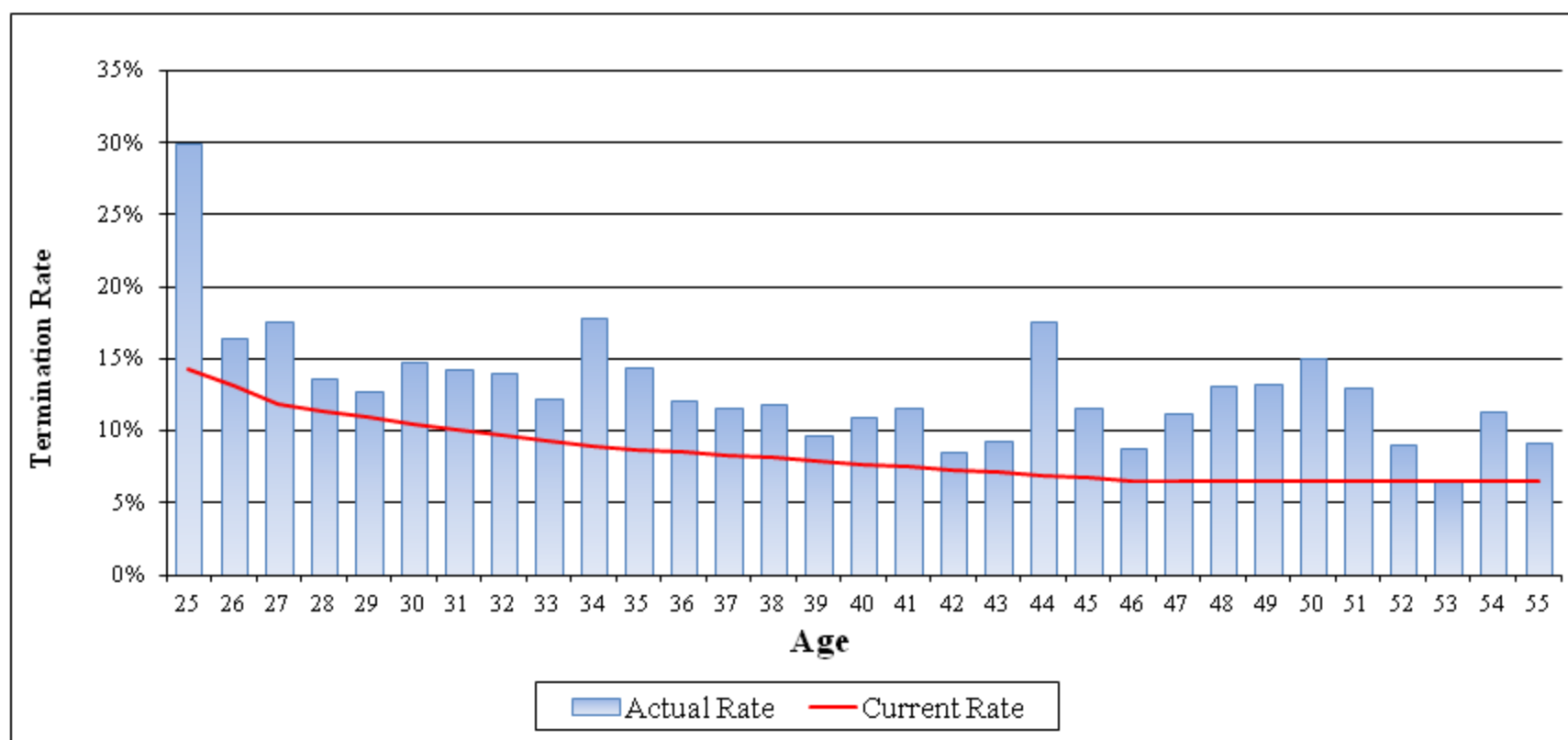
	Actual	Expected - Current Assumptions	
Total Count	753	498	
Actual/Expected		151%	

Experience Study 2010-2013
Appendix F-19
Rate of Termination of Employment
OPERS - 6 Years
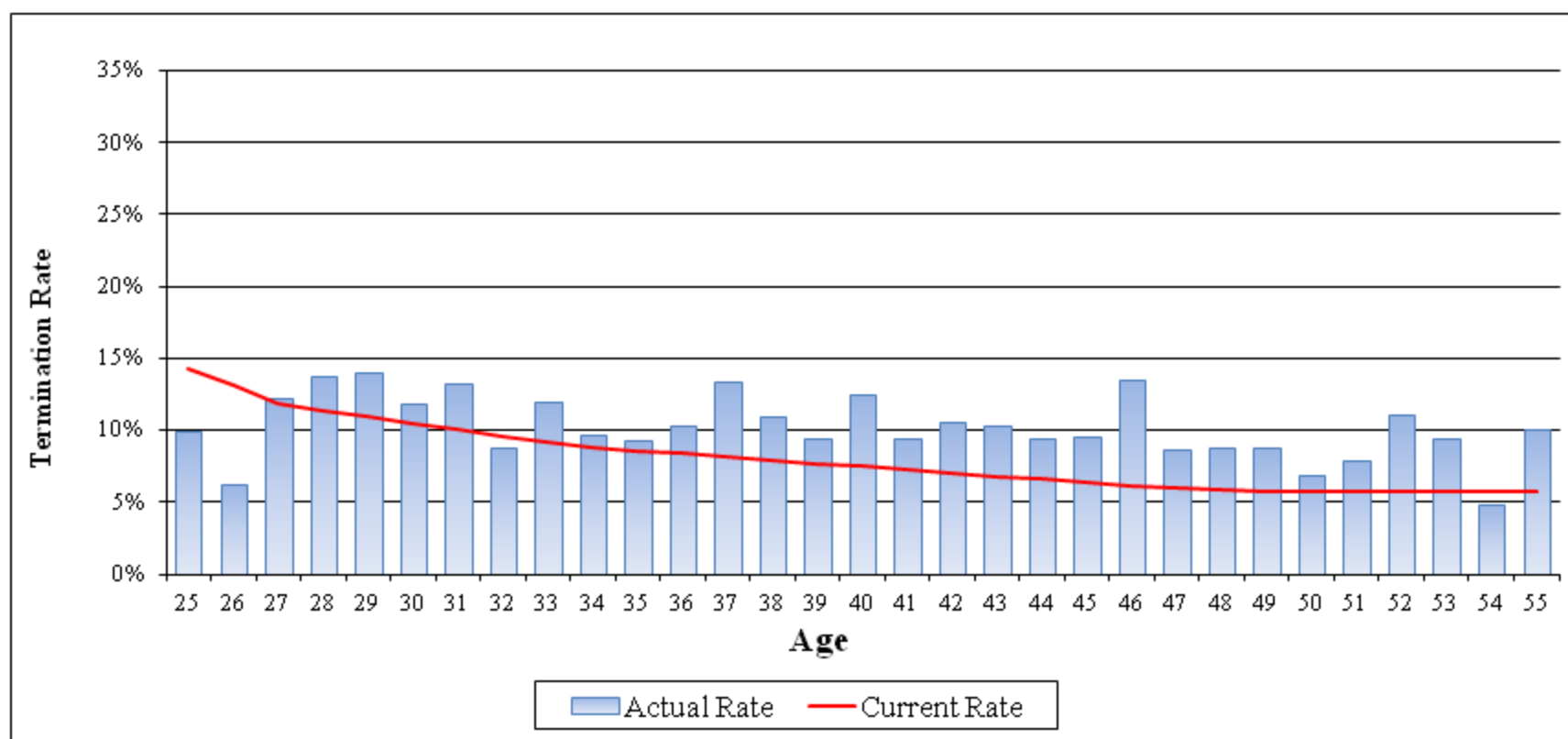
	Actual	Expected - Current Assumptions	
Total Count	545	407	
Actual/Expected		134%	

Experience Study 2010-2013
Appendix F-20
Rate of Termination of Employment
OPERS - 7 Years
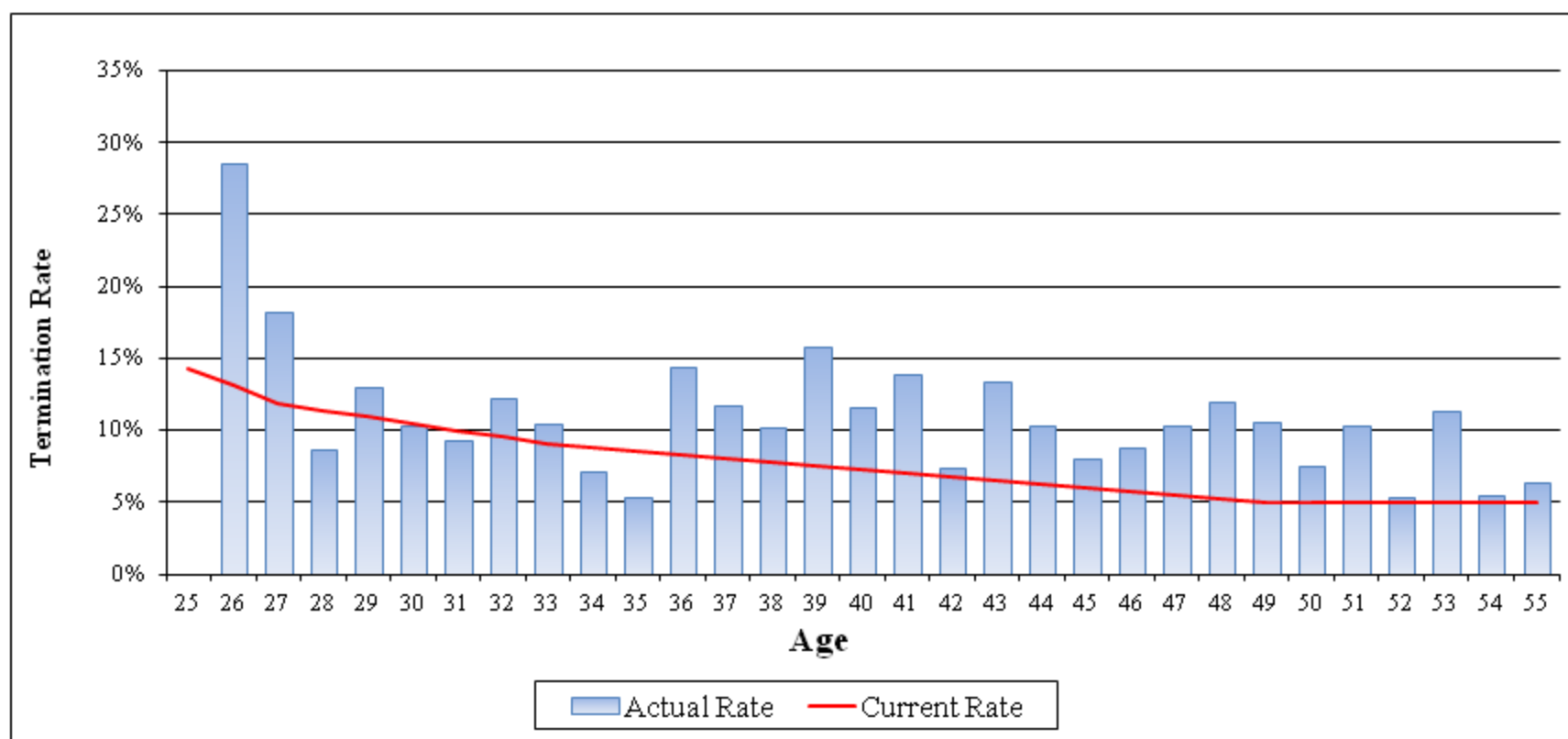
	Actual	Expected - Current Assumptions	
Total Count	431	303	
Actual/Expected		142%	

Experience Study 2010-2013
Appendix F-21
Rate of Termination of Employment
OPERS - 8 Years
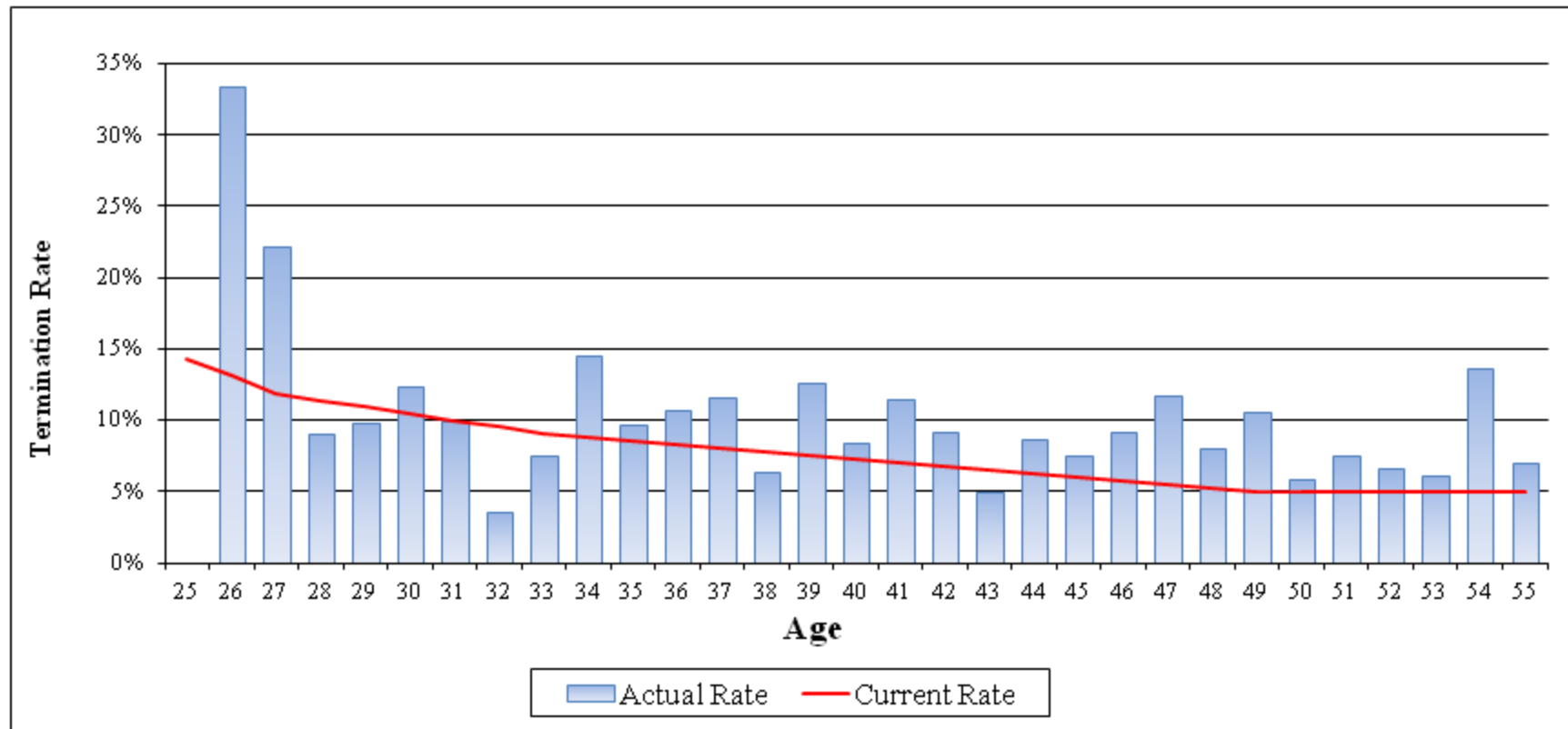
	Actual	Expected - Current Assumptions	
Total Count	313	240	
Actual/Expected		130%	

Experience Study 2010-2013
Appendix F-22
Rate of Termination of Employment
OPERS - 9 Years
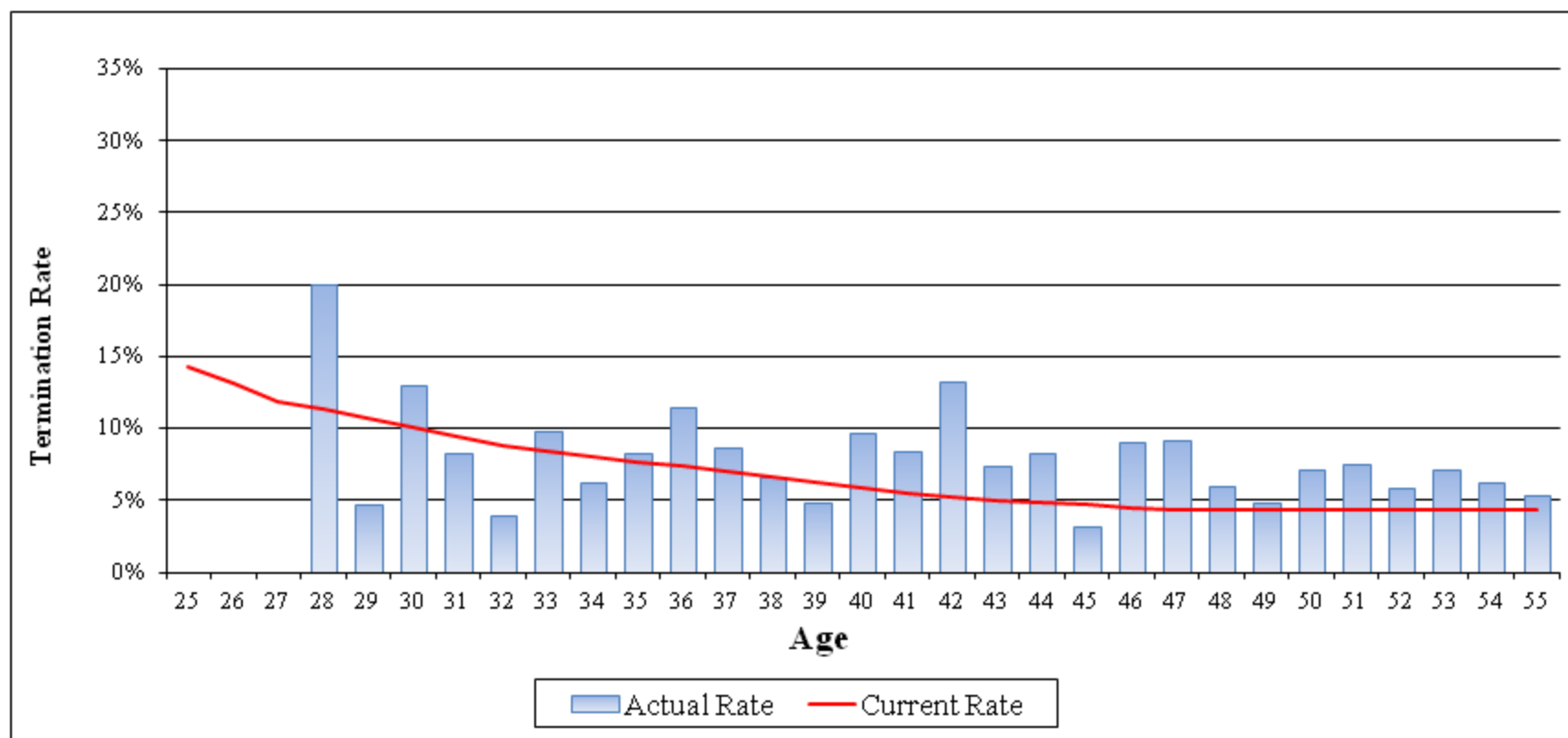
	Actual	Expected - Current Assumptions	
Total Count	239	183	
Actual/Expected		131%	

Experience Study 2010-2013
Appendix F-23
Rate of Termination of Employment
OPERS - More Than 9 Years
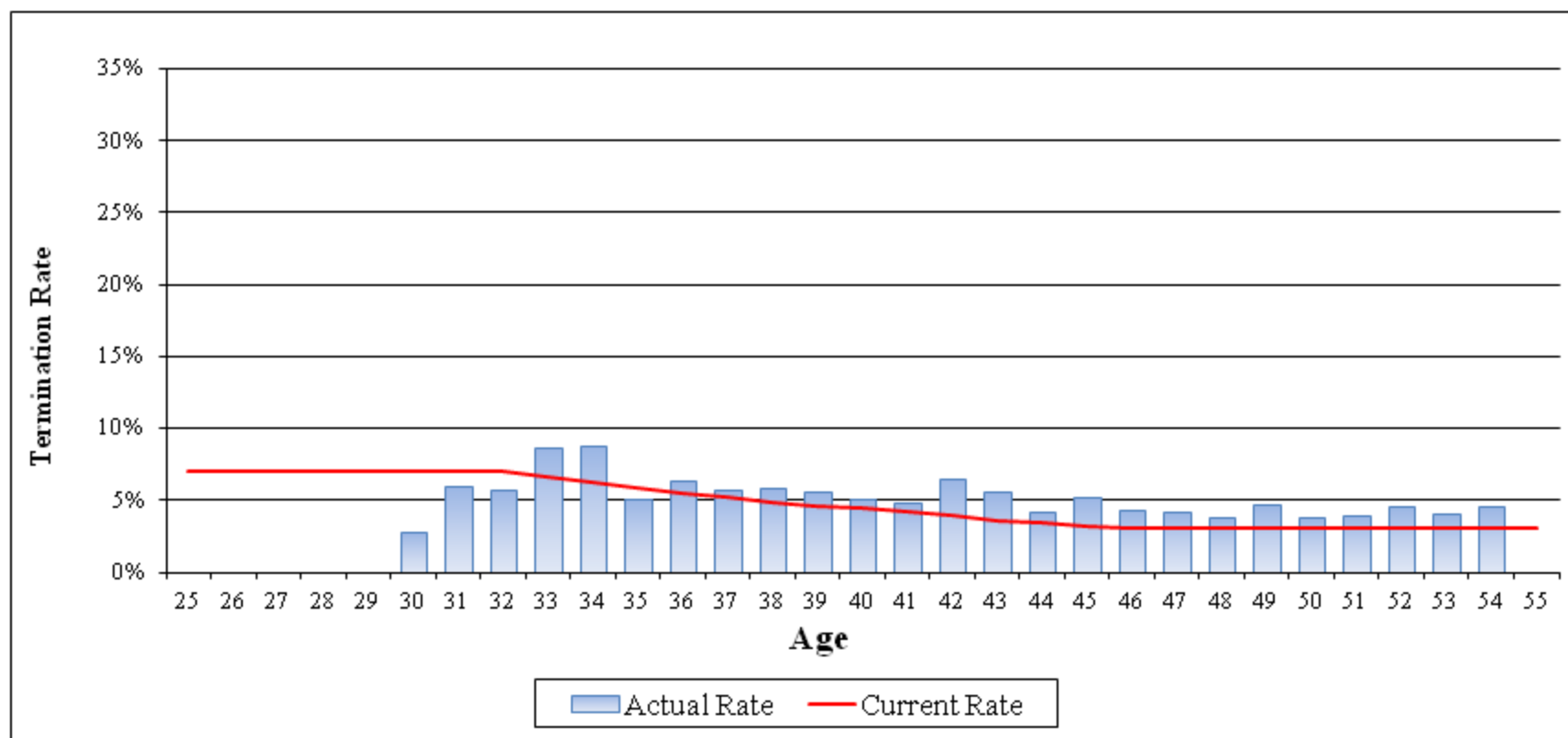
	Actual	Expected - Current Assumptions	
Total Count	1,382	1,029	
Actual/Expected		134%	

Experience Study 2010-2013
Appendix F-24
Rate of Termination of Employment
OPERS
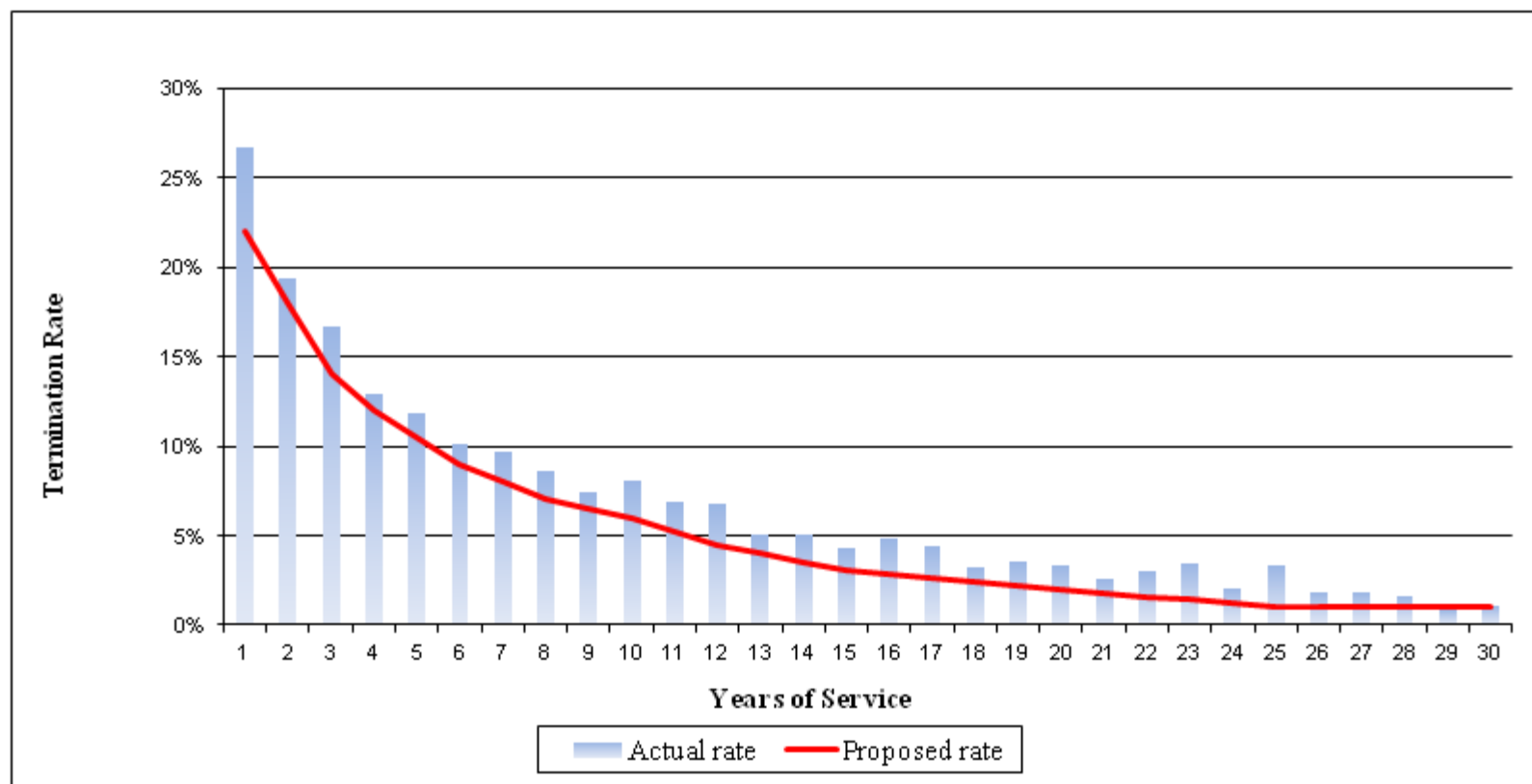
	Actual		Expected - Proposed Assumptions
Total Count	11,136		9,403
Actual/Expected			118%

Experience Study 2010-2013
Appendix F-25
Probability of Contributions Remaining with the System
OPERS - Regular
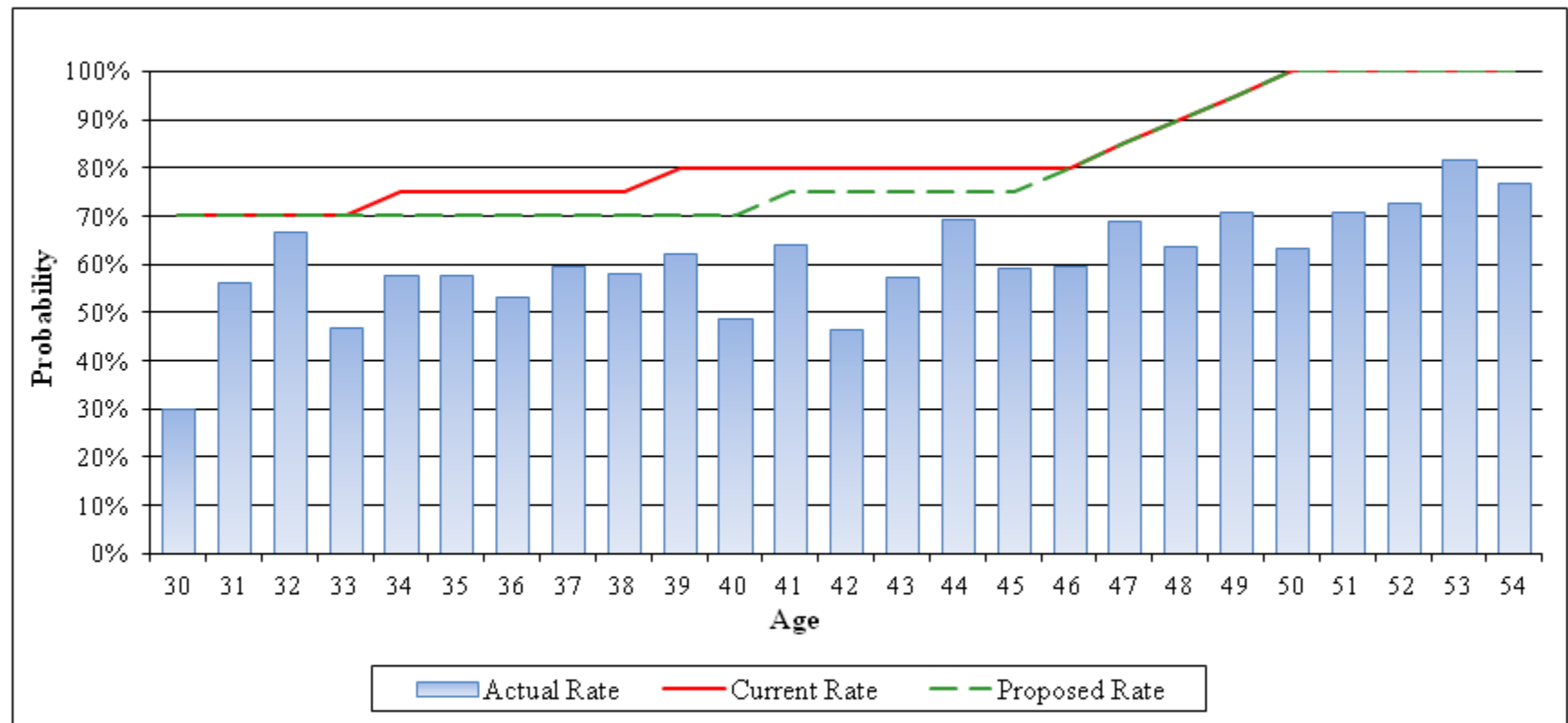
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	783	1,061	1,029
Actual/Expected		74%	76%

Experience Study 2010-2013
Appendix F-26
Total Salary Scale
OPERS
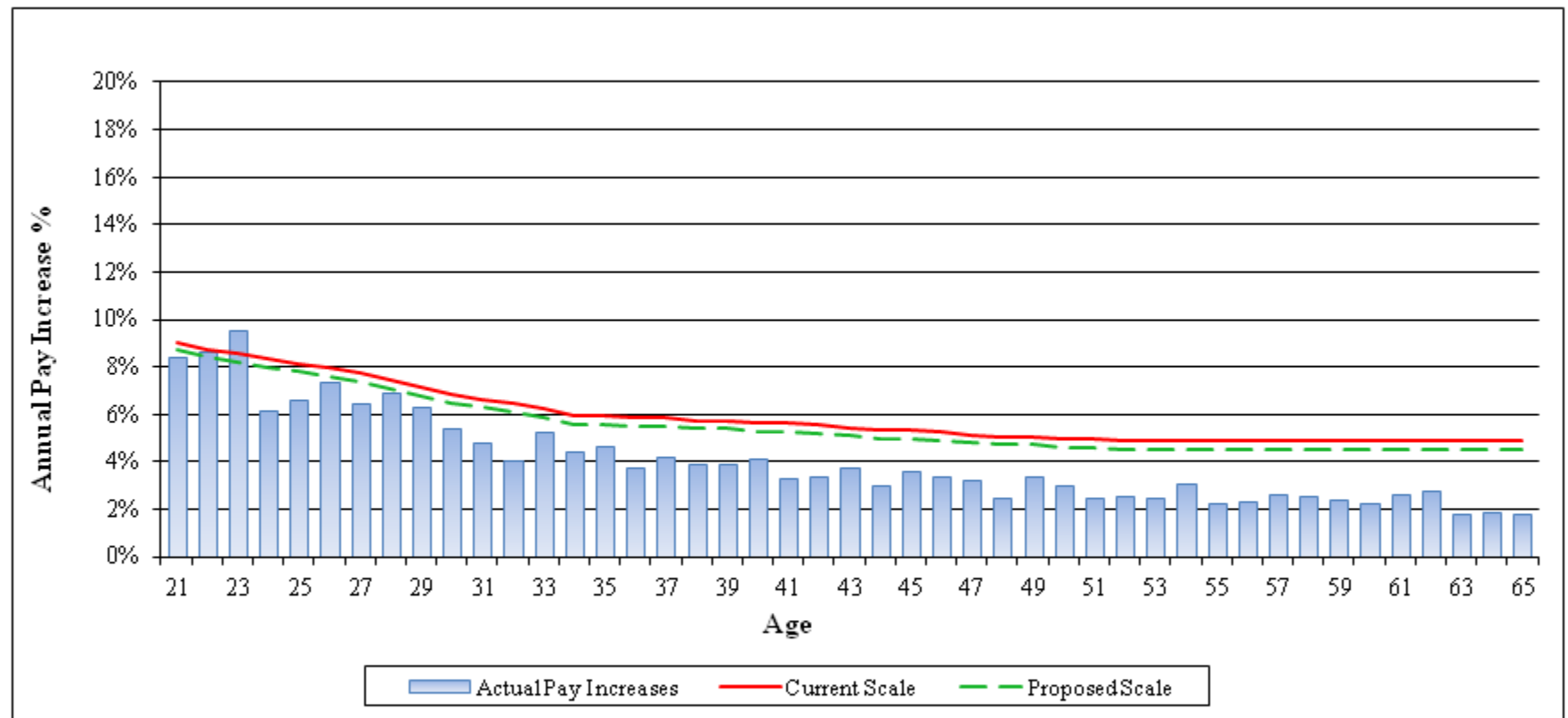
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Average Increase	3.24%	5.35%	5.00%
Actual/Expected		61%	65%

Appendix G- 1
Probability of Death - Healthy Retirees
OPERS - Males

Age	Exposure	Actual Deaths	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	280	4	1.4%	0.8	0.3%	0.8	0.3%
56	377	3	0.8%	1.3	0.4%	1.3	0.4%
57	467	6	1.3%	1.8	0.4%	1.8	0.4%
58	556	6	1.1%	2.5	0.4%	2.5	0.4%
59	669	8	1.2%	3.4	0.5%	3.4	0.5%
60	754	9	1.2%	4.3	0.6%	4.3	0.6%
61	839	8	1.0%	5.5	0.7%	5.5	0.7%
62	1,068	8	0.7%	8.0	0.8%	8.0	0.8%
63	1,495	23	1.5%	13.0	0.9%	13.0	0.9%
64	1,607	27	1.7%	15.7	1.0%	15.7	1.0%
65	1,566	18	1.1%	17.3	1.1%	17.3	1.1%
66	1,529	25	1.6%	19.3	1.3%	19.3	1.3%
67	1,557	32	2.1%	22.0	1.4%	22.0	1.4%
68	1,554	38	2.4%	24.1	1.6%	24.1	1.6%
69	1,489	39	2.6%	25.6	1.7%	25.6	1.7%
70	1,417	41	2.9%	27.1	1.9%	27.1	1.9%
71	1,401	27	1.9%	29.6	2.1%	29.6	2.1%
72	1,324	38	2.9%	31.1	2.3%	31.1	2.3%
73	1,248	36	2.9%	32.6	2.6%	32.6	2.6%
74	1,209	38	3.1%	35.2	2.9%	35.2	2.9%
75	1,151	48	4.2%	37.8	3.3%	37.8	3.3%
76	1,142	49	4.3%	41.8	3.7%	41.8	3.7%
77	1,013	50	4.9%	41.7	4.1%	41.7	4.1%
78	959	52	5.4%	44.3	4.6%	44.3	4.6%
79	840	56	6.7%	43.6	5.2%	43.6	5.2%
80	796	60	7.5%	46.3	5.8%	46.3	5.8%
81	699	61	8.7%	46.0	6.6%	46.0	6.6%
82	615	49	8.0%	45.7	7.4%	45.7	7.4%
83	539	56	10.4%	44.6	8.3%	44.6	8.3%
84	484	44	9.1%	45.0	9.3%	45.0	9.3%
85	425	54	12.7%	43.9	10.3%	43.9	10.3%
86	361	51	14.1%	41.3	11.4%	41.3	11.4%
87	303	40	13.2%	38.8	12.8%	38.8	12.8%
88	274	27	9.9%	39.2	14.3%	39.2	14.3%
89	244	41	16.8%	38.6	15.8%	38.6	15.8%
90	212	44	20.8%	37.4	17.6%	37.4	17.6%

Totals to age 100

	32,917	1,334	4.1%	1,098.5	0.0	1,098.5	3.3%

Appendix G- 2
Probability of Death - Healthy Retirees
OPERS - Females

Age	Exposure	Actual Deaths	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	397	-	0.0%	1.0	0.3%	1.0	0.3%
56	557	4	0.7%	1.6	0.3%	1.6	0.3%
57	653	2	0.3%	2.2	0.3%	2.2	0.3%
58	753	6	0.8%	2.8	0.4%	2.8	0.4%
59	864	7	0.8%	3.6	0.4%	3.6	0.4%
60	990	3	0.3%	4.8	0.5%	4.8	0.5%
61	1,092	8	0.7%	6.0	0.6%	6.0	0.6%
62	1,396	10	0.7%	8.8	0.6%	8.8	0.6%
63	1,771	14	0.8%	12.9	0.7%	12.9	0.7%
64	1,835	20	1.1%	15.0	0.8%	15.0	0.8%
65	1,755	24	1.4%	16.2	0.9%	16.2	0.9%
66	1,759	27	1.5%	18.3	1.0%	18.3	1.0%
67	1,811	22	1.2%	21.0	1.2%	21.0	1.2%
68	1,822	26	1.4%	23.3	1.3%	23.3	1.3%
69	1,741	30	1.7%	24.6	1.4%	24.6	1.4%
70	1,608	32	2.0%	25.6	1.6%	25.6	1.6%
71	1,533	18	1.2%	26.8	1.7%	26.8	1.7%
72	1,470	33	2.2%	28.6	1.9%	28.6	1.9%
73	1,340	23	1.7%	28.7	2.1%	28.7	2.1%
74	1,232	36	2.9%	29.2	2.4%	29.2	2.4%
75	1,205	31	2.6%	31.3	2.6%	31.3	2.6%
76	1,159	41	3.5%	33.1	2.9%	33.1	2.9%
77	1,139	42	3.7%	36.2	3.2%	36.2	3.2%
78	1,056	46	4.4%	37.0	3.5%	37.0	3.5%
79	996	50	5.0%	38.5	3.9%	38.5	3.9%
80	929	35	3.8%	39.7	4.3%	39.7	4.3%
81	863	46	5.3%	40.9	4.7%	40.9	4.7%
82	785	51	6.5%	41.2	5.2%	41.2	5.2%
83	718	54	7.5%	41.8	5.8%	41.8	5.8%
84	645	46	7.1%	41.8	6.5%	41.8	6.5%
85	603	57	9.5%	44.0	7.3%	44.0	7.3%
86	539	47	8.7%	44.3	8.2%	44.3	8.2%
87	489	55	11.2%	45.3	9.3%	45.3	9.3%
88	395	46	11.6%	40.7	10.3%	40.7	10.3%
89	362	52	14.4%	41.9	11.6%	41.9	11.6%
90	293	49	16.7%	37.4	12.8%	37.4	12.8%

Totals to age 100

	39,502	1,288	3.3%	1,096.7	2.8%	1,096.7	2.8%

Appendix G-3
Retirement Rates
Regular - Early

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	1,646	39	2.4%	65.8	4.0%	49.4	3.0%
56	1,554	30	1.9%	77.7	5.0%	62.2	4.0%
57	1,386	29	2.1%	69.3	5.0%	55.4	4.0%
58	1,247	44	3.5%	74.8	6.0%	62.3	5.0%
59	1,103	41	3.7%	77.2	7.0%	66.2	6.0%
60	1,021	44	4.3%	71.5	7.0%	61.3	6.0%
61	915	44	4.8%	183.0	20.0%	137.3	15.0%
	8,872	271	3.1%	619.3	7.0%	494.0	5.6%

Appendix G-4
Retirement Rates
Regular - Unreduced

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
50	180	53	29.4%	36.0	20.0%	36.0	20.0%
51	327	60	18.3%	65.4	20.0%	65.4	20.0%
52	490	72	14.7%	98.0	20.0%	98.0	20.0%
53	635	119	18.7%	127.0	20.0%	127.0	20.0%
54	708	119	16.8%	141.6	20.0%	141.6	20.0%
55	756	130	17.2%	75.6	10.0%	75.6	10.0%
56	815	118	14.5%	81.5	10.0%	81.5	10.0%
57	952	138	14.5%	104.7	11.0%	104.7	11.0%
58	1,061	144	13.6%	127.3	12.0%	127.3	12.0%
59	1,133	172	15.2%	147.3	13.0%	147.3	13.0%
60	1,059	130	12.3%	148.3	14.0%	148.3	14.0%
61	1,006	135	13.4%	201.2	20.0%	201.2	20.0%
62	2,188	492	22.5%	656.4	30.0%	656.4	30.0%
63	1,802	372	20.6%	270.3	15.0%	270.3	15.0%
64	1,550	282	18.2%	232.5	15.0%	232.5	15.0%
65	1,244	255	20.5%	373.2	30.0%	373.2	30.0%
66	940	256	27.2%	188.0	20.0%	188.0	20.0%
67	671	163	24.3%	134.2	20.0%	134.2	20.0%
68	514	109	21.2%	102.8	20.0%	102.8	20.0%
69	399	76	19.0%	99.8	25.0%	99.8	25.0%
70	308	74	24.0%	308.0	100.0%	308.0	100.0%
	18,738	3,469	18.5%	3,719.0	19.8%	3,719.0	19.8%

Appendix G-5
Retirement Rates
Elected Officials - Early

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	33	-	0.0%	3.3	10.0%	2.5	7.5%
56	35	2	5.7%	3.5	10.0%	2.6	7.5%
57	28	1	3.6%	2.8	10.0%	2.1	7.5%
58	30	1	3.3%	3.0	10.0%	2.3	7.5%
59	34	1	2.9%	3.4	10.0%	2.6	7.5%
	160	5	3.1%	16.0	10.0%	12.0	7.5%

Appendix G-6
Retirement Rates
Elected Officials - Unreduced

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
50	6	1	16.7%	1.8	30.0%	1.5	25.0%
51	11	4	36.4%	3.3	30.0%	2.8	25.0%
52	12	4	33.3%	3.6	30.0%	3.0	25.0%
53	13	1	7.7%	3.9	30.0%	3.3	25.0%
54	17	2	11.8%	5.1	30.0%	4.3	25.0%
55	29	6	20.7%	2.9	10.0%	5.8	20.0%
56	34	8	23.5%	3.4	10.0%	6.8	20.0%
57	36	6	16.7%	7.2	20.0%	7.2	20.0%
58	36	9	25.0%	7.2	20.0%	7.2	20.0%
59	41	8	19.5%	8.2	20.0%	8.2	20.0%
60	77	14	18.2%	15.4	20.0%	15.4	20.0%
61	63	9	14.3%	12.6	20.0%	12.6	20.0%
62	51	10	19.6%	10.2	20.0%	10.2	20.0%
63	49	9	18.4%	9.8	20.0%	9.8	20.0%
64	47	9	19.1%	9.4	20.0%	9.4	20.0%
65	43	9	20.9%	8.6	20.0%	8.6	20.0%
66	33	6	18.2%	6.6	20.0%	6.6	20.0%
67	39	12	30.8%	15.6	40.0%	13.7	35.0%
68	42	12	28.6%	16.8	40.0%	14.7	35.0%
69	39	7	17.9%	15.6	40.0%	13.7	35.0%
70	35	8	22.9%	35.0	100.0%	12.3	35.0%
	753	154	20.5%	202.2	26.9%	176.8	23.5%

Appendix G-7
Retirement Rates
Hazardous Duty - Early

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	51	-	0.0%	2.0	4.0%	2.0	4.0%
56	52	-	0.0%	2.6	5.0%	2.6	5.0%
57	65	2	3.1%	3.3	5.0%	3.3	5.0%
58	54	2	3.7%	3.2	6.0%	3.2	6.0%
59	43	1	2.3%	3.0	7.0%	3.0	7.0%
60	36	1	2.8%	2.5	7.0%	2.5	7.0%
61	28	1	3.6%	5.6	20.0%	5.6	20.0%
	329	7	2.1%	22.3	6.8%	22.3	6.8%

Appendix G-8
Retirement Rates
Hazardous Duty - Unreduced

Duration	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	153	49	32.0%	30.6	20.0%	38.3	25.0%
21	96	32	33.3%	14.4	15.0%	24.0	25.0%
22	76	19	25.0%	11.4	15.0%	15.2	20.0%
23	60	10	16.7%	9.0	15.0%	9.0	15.0%
24	41	9	22.0%	6.2	15.0%	6.2	15.0%
25	28	9	32.1%	5.6	20.0%	6.4	23.0%
26	23	6	26.1%	4.6	20.0%	5.3	23.0%
27	15	3	20.0%	3.0	20.0%	3.5	23.0%
28	12	4	33.3%	2.4	20.0%	2.8	23.0%
29	10	2	20.0%	2.0	20.0%	2.3	23.0%
30	5	2	40.0%	1.3	25.0%	1.3	25.0%
31	3	1	33.3%	0.8	25.0%	0.8	25.0%
32	1	-	0.0%	0.3	25.0%	0.3	25.0%
33	1	-	0.0%	0.3	25.0%	0.3	25.0%
34	1	1	100.0%	0.3	25.0%	0.3	25.0%
35	1	1	100.0%	1.0	100.0%	1.0	100.0%
	526	148	28.1%	92.9	17.7%	116.6	22.2%

Appendix G-9
Retirement Rates
Hazardous Duty - Unreduced (Age)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
62	31	8	25.8%	12.4	40.0%	12.4	40.0%
63	23	4	17.4%	5.1	22.0%	5.1	22.0%
64	22	5	22.7%	5.5	25.0%	5.5	25.0%
65	11	2	18.2%	4.4	40.0%	4.4	40.0%
66	9	5	55.6%	2.3	25.0%	2.3	25.0%
67	2	-	0.0%	0.5	23.0%	0.5	23.0%
68	1	-	0.0%	0.2	22.0%	0.2	22.0%
69	1	-	0.0%	0.2	21.0%	0.2	21.0%
70	2	-	0.0%	2.0	100.0%	2.0	100.0%
	102	24	23.5%	32.5	31.9%	32.5	31.9%

Appendix G-10
Retirement Rates
URSJJ

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	1	-	0.0%	0.1	10.0%	0.1	10.0%
56	2	-	0.0%	0.2	10.0%	0.2	10.0%
57	3	-	0.0%	0.3	10.0%	0.3	10.0%
58	8	2	25.0%	0.8	10.0%	0.8	10.0%
59	11	1	9.1%	1.1	10.0%	1.1	10.0%
60	35	3	8.6%	3.5	10.0%	3.5	10.0%
61	32	5	15.6%	3.2	10.0%	3.2	10.0%
62	20	1	5.0%	5.0	25.0%	4.0	20.0%
63	14	1	7.1%	3.5	25.0%	2.8	20.0%
64	16	2	12.5%	4.0	25.0%	3.2	20.0%
65	18	4	22.2%	4.5	25.0%	3.6	20.0%
66	12	-	0.0%	1.2	10.0%	1.2	10.0%
67	12	3	25.0%	1.2	10.0%	1.2	10.0%
68	12	3	25.0%	3.6	30.0%	3.6	30.0%
69	6	1	16.7%	1.8	30.0%	1.8	30.0%
70	5	3	60.0%	1.0	20.0%	1.5	30.0%
71	3	1	33.3%	0.3	10.0%	0.9	30.0%
72	2	1	50.0%	0.2	10.0%	0.6	30.0%
73	2	-	0.0%	0.2	10.0%	0.6	30.0%
74	2	-	0.0%	0.2	10.0%	0.6	30.0%
75	3	-	0.0%	3.0	100.0%	3.0	100.0%
	219	31	14.2%	38.9	17.8%	37.8	17.3%

Appendix G-11
Rate of Disability - Active Lives
OPERS - Males

Age	Exposure	Actual Disabilities	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	70	-	0.000%	0.0	0.010%	0.0	0.009%
21	168	-	0.000%	0.0	0.010%	0.0	0.009%
22	283	-	0.000%	0.0	0.010%	0.0	0.009%
23	421	-	0.000%	0.0	0.010%	0.0	0.009%
24	567	-	0.000%	0.1	0.010%	0.1	0.009%
25	666	-	0.000%	0.1	0.020%	0.1	0.018%
26	756	-	0.000%	0.2	0.020%	0.1	0.018%
27	828	-	0.000%	0.2	0.020%	0.1	0.018%
28	923	-	0.000%	0.2	0.020%	0.2	0.018%
29	962	-	0.000%	0.2	0.020%	0.3	0.027%
30	1,003	-	0.000%	0.2	0.020%	0.3	0.027%
31	1,023	-	0.000%	0.2	0.020%	0.3	0.027%
32	1,014	-	0.000%	0.3	0.030%	0.3	0.027%
33	1,009	-	0.000%	0.3	0.030%	0.3	0.027%
34	1,015	-	0.000%	0.4	0.040%	0.4	0.036%
35	1,028	-	0.000%	0.5	0.050%	0.5	0.045%
36	1,077	-	0.000%	0.5	0.050%	0.5	0.045%
37	1,117	-	0.000%	0.6	0.050%	0.5	0.045%
38	1,144	-	0.000%	0.7	0.060%	0.6	0.054%
39	1,173	-	0.000%	0.8	0.070%	0.7	0.063%
40	1,234	1	0.081%	1.0	0.080%	0.9	0.072%
41	1,268	-	0.000%	1.0	0.080%	0.9	0.072%
42	1,337	2	0.150%	1.2	0.090%	1.1	0.081%
43	1,301	2	0.154%	1.4	0.110%	1.3	0.099%
44	1,246	1	0.080%	1.5	0.120%	1.3	0.108%
45	1,252	-	0.000%	1.8	0.140%	1.6	0.126%
46	1,338	1	0.075%	2.0	0.150%	1.8	0.135%
47	1,444	3	0.208%	2.5	0.170%	2.2	0.153%
48	1,566	5	0.319%	3.1	0.200%	2.8	0.180%
49	1,667	4	0.240%	3.8	0.230%	3.5	0.207%
50	1,719	3	0.175%	4.3	0.250%	3.9	0.225%
51	1,751	4	0.228%	5.3	0.300%	4.7	0.270%
52	1,719	5	0.291%	6.0	0.350%	5.4	0.315%
53	1,757	5	0.285%	7.0	0.400%	6.3	0.360%
54	1,755	7	0.399%	8.3	0.475%	7.5	0.428%
55	1,729	2	0.116%	9.5	0.550%	8.6	0.500%
56	1,697	3	0.177%	11.0	0.650%	8.5	0.500%
57	1,649	5	0.303%	12.4	0.750%	8.2	0.500%
58	1,679	4	0.238%	12.6	0.750%	8.4	0.500%
59	1,666	4	0.240%	12.5	0.750%	8.3	0.500%
60	1,530	5	0.327%	11.5	0.750%	7.7	0.500%
61	1,409	3	0.213%	10.6	0.750%	7.0	0.500%
62	1,312	1	0.076%	9.8	0.750%	6.6	0.500%
	51,272	70	0.137%	145.6	0.284%	113.8	0.222%

Appendix G-12
Rate of Disability - Active Lives
OPERS - Females

Age	Exposure	Actual Disabilities	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	69	-	0.000%	0.0	0.010%	0.0	0.009%
21	149	-	0.000%	0.0	0.010%	0.0	0.009%
22	208	-	0.000%	0.0	0.010%	0.0	0.009%
23	303	-	0.000%	0.0	0.010%	0.0	0.009%
24	482	-	0.000%	0.0	0.010%	0.0	0.009%
25	637	-	0.000%	0.1	0.020%	0.1	0.018%
26	867	-	0.000%	0.2	0.020%	0.2	0.018%
27	1,057	-	0.000%	0.2	0.020%	0.2	0.018%
28	1,173	-	0.000%	0.2	0.020%	0.2	0.018%
29	1,250	-	0.000%	0.4	0.030%	0.3	0.027%
30	1,347	-	0.000%	0.4	0.030%	0.4	0.027%
31	1,357	-	0.000%	0.4	0.030%	0.4	0.027%
32	1,285	-	0.000%	0.4	0.030%	0.3	0.027%
33	1,314	-	0.000%	0.5	0.040%	0.5	0.036%
34	1,276	-	0.000%	0.5	0.040%	0.5	0.036%
35	1,284	1	0.078%	0.6	0.050%	0.6	0.045%
36	1,385	-	0.000%	0.8	0.060%	0.7	0.054%
37	1,427	-	0.000%	1.0	0.070%	0.9	0.063%
38	1,443	-	0.000%	1.2	0.080%	1.0	0.072%
39	1,475	1	0.068%	1.3	0.090%	1.2	0.081%
40	1,514	-	0.000%	1.5	0.100%	1.4	0.090%
41	1,586	1	0.063%	1.7	0.110%	1.6	0.099%
42	1,619	-	0.000%	1.9	0.120%	1.7	0.108%
43	1,634	-	0.000%	2.1	0.130%	1.9	0.117%
44	1,627	1	0.061%	2.4	0.150%	2.2	0.135%
45	1,583	1	0.063%	2.7	0.170%	2.4	0.153%
46	1,654	1	0.060%	3.1	0.190%	2.8	0.171%
47	1,810	2	0.110%	3.8	0.210%	3.4	0.189%
48	2,030	-	0.000%	4.7	0.230%	4.2	0.207%
49	2,157	1	0.046%	5.6	0.260%	5.0	0.234%
50	2,233	3	0.134%	6.5	0.290%	5.8	0.261%
51	2,323	3	0.129%	7.4	0.320%	6.7	0.288%
52	2,364	7	0.296%	8.3	0.350%	7.4	0.315%
53	2,367	4	0.169%	9.0	0.380%	8.1	0.342%
54	2,341	5	0.214%	9.6	0.410%	8.2	0.350%
55	2,337	6	0.257%	10.5	0.450%	8.2	0.350%
56	2,263	4	0.177%	10.2	0.450%	7.9	0.350%
57	2,188	6	0.274%	9.8	0.450%	7.7	0.350%
58	2,076	4	0.193%	9.3	0.450%	7.3	0.350%
59	2,015	4	0.199%	9.1	0.450%	7.1	0.350%
60	1,837	4	0.218%	8.3	0.450%	6.4	0.350%
61	1,698	2	0.118%	7.6	0.450%	5.9	0.350%
62	1,519	4	0.263%	6.8	0.450%	5.3	0.350%
	64,563	65	0.101%	150.6	0.233%	126.3	0.196%

Appendix G-13
Rate of Disability - Active Lives
Hazardous Duty - Males

Age	Exposure	Actual Disabilities	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	-	-	0.000%	-	0.010%	-	0.009%
21	11	-	0.000%	0.0	0.010%	0.0	0.009%
22	37	-	0.000%	0.0	0.010%	0.0	0.009%
23	49	-	0.000%	0.0	0.010%	0.0	0.009%
24	82	-	0.000%	0.0	0.010%	0.0	0.009%
25	96	-	0.000%	0.0	0.020%	0.0	0.018%
26	119	-	0.000%	0.0	0.020%	0.0	0.018%
27	141	-	0.000%	0.0	0.020%	0.0	0.018%
28	142	-	0.000%	0.0	0.020%	0.0	0.018%
29	130	-	0.000%	0.0	0.020%	0.0	0.027%
30	124	-	0.000%	0.0	0.020%	0.0	0.027%
31	118	-	0.000%	0.0	0.020%	0.0	0.027%
32	140	-	0.000%	0.0	0.030%	0.0	0.027%
33	140	-	0.000%	0.0	0.030%	0.0	0.027%
34	168	-	0.000%	0.1	0.040%	0.1	0.036%
35	150	-	0.000%	0.1	0.050%	0.1	0.045%
36	162	-	0.000%	0.1	0.050%	0.1	0.045%
37	164	-	0.000%	0.1	0.050%	0.1	0.045%
38	160	-	0.000%	0.1	0.060%	0.1	0.054%
39	160	-	0.000%	0.1	0.070%	0.1	0.063%
40	162	-	0.000%	0.1	0.080%	0.1	0.072%
41	172	-	0.000%	0.1	0.080%	0.1	0.072%
42	184	-	0.000%	0.2	0.090%	0.1	0.081%
43	180	1	0.556%	0.2	0.110%	0.2	0.099%
44	142	-	0.000%	0.2	0.120%	0.2	0.108%
45	140	-	0.000%	0.2	0.140%	0.2	0.126%
46	128	-	0.000%	0.2	0.150%	0.2	0.135%
47	134	-	0.000%	0.2	0.170%	0.2	0.153%
48	124	-	0.000%	0.2	0.200%	0.2	0.180%
49	120	-	0.000%	0.3	0.230%	0.2	0.207%
50	97	1	1.031%	0.2	0.250%	0.2	0.225%
51	84	-	0.000%	0.3	0.300%	0.2	0.270%
52	81	1	1.235%	0.3	0.350%	0.3	0.315%
53	77	-	0.000%	0.3	0.400%	0.3	0.360%
54	86	2	2.326%	0.4	0.475%	0.4	0.428%
55	91	-	0.000%	0.5	0.550%	0.5	0.500%
56	75	-	0.000%	0.5	0.650%	0.4	0.500%
57	87	-	0.000%	0.7	0.750%	0.4	0.500%
58	88	2	2.273%	0.7	0.750%	0.4	0.500%
59	67	-	0.000%	0.5	0.750%	0.3	0.500%
60	51	-	0.000%	0.4	0.750%	0.3	0.500%
61	45	-	0.000%	0.3	0.750%	0.2	0.500%
62	35	-	0.000%	0.3	0.750%	0.2	0.500%
	4,743	7	0.148%	8.0	0.169%	6.5	0.138%

Appendix G-14
Rate of Termination of Employment
OPERS - Less Than 2 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	635	213	33.5%	165.1	26.0%
26	651	196	30.1%	167.3	25.7%
27	615	203	33.0%	156.8	25.5%
28	592	179	30.2%	148.0	25.0%
29	501	162	32.3%	122.7	24.5%
30	528	176	33.3%	126.7	24.0%
31	440	140	31.8%	103.4	23.5%
32	411	129	31.4%	94.5	23.0%
33	425	137	32.2%	95.6	22.5%
34	361	111	30.7%	79.4	22.0%
35	379	131	34.6%	81.5	21.5%
36	361	104	28.8%	75.8	21.0%
37	330	98	29.7%	67.7	20.5%
38	325	80	24.6%	65.0	20.0%
39	320	101	31.6%	62.1	19.4%
40	313	86	27.5%	60.4	19.3%
41	303	102	33.7%	58.2	19.2%
42	297	85	28.6%	56.7	19.1%
43	295	89	30.2%	56.1	19.0%
44	242	59	24.4%	45.7	18.9%
45	223	69	30.9%	41.9	18.8%
46	254	67	26.4%	47.5	18.7%
47	245	54	22.0%	45.6	18.6%
48	274	61	22.3%	50.7	18.5%
49	219	63	28.8%	40.3	18.4%
50	242	52	21.5%	44.3	18.3%
51	262	60	22.9%	47.7	18.2%
52	231	40	17.3%	41.8	18.1%
53	254	54	21.3%	45.7	18.0%
54	237	52	21.9%	42.7	18.0%
55	199	48	24.1%	35.8	18.0%
	10,964	3,201	29.2%	2,372.8	21.6%

Appendix G-15
Rate of Termination of Employment
OPERS - 2 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	304	72	23.7%	60.8	20.0%
26	390	91	23.3%	76.1	19.5%
27	385	83	21.6%	73.2	19.0%
28	370	77	20.8%	68.5	18.5%
29	351	72	20.5%	63.2	18.0%
30	343	79	23.0%	60.0	17.5%
31	315	74	23.5%	53.6	17.0%
32	276	65	23.6%	46.4	16.8%
33	259	66	25.5%	42.7	16.5%
34	264	51	19.3%	42.8	16.2%
35	241	51	21.2%	38.3	15.9%
36	253	50	19.8%	39.5	15.6%
37	235	50	21.3%	35.7	15.2%
38	212	44	20.8%	31.4	14.8%
39	224	37	16.5%	32.3	14.4%
40	218	36	16.5%	30.5	14.0%
41	208	32	15.4%	28.3	13.6%
42	199	30	15.1%	26.3	13.2%
43	200	48	24.0%	25.6	12.8%
44	179	32	17.9%	22.2	12.4%
45	163	30	18.4%	19.6	12.0%
46	151	30	19.9%	17.5	11.6%
47	179	30	16.8%	20.0	11.2%
48	190	32	16.8%	20.5	10.8%
49	211	32	15.2%	21.9	10.4%
50	163	24	14.7%	15.8	9.7%
51	157	29	18.5%	14.8	9.4%
52	188	31	16.5%	16.9	9.0%
53	171	19	11.1%	15.4	9.0%
54	175	25	14.3%	15.8	9.0%
55	176	23	13.1%	15.8	9.0%
	7,350	1,445	19.7%	1,091.1	14.8%

Appendix G-16
Rate of Termination of Employment
OPERS - 3 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	206	49	23.8%	35.2	17.1%
26	290	54	18.6%	49.0	16.9%
27	367	84	22.9%	61.2	16.7%
28	377	87	23.1%	61.5	16.3%
29	351	60	17.1%	55.9	15.9%
30	319	61	19.1%	49.6	15.5%
31	314	71	22.6%	47.6	15.2%
32	273	47	17.2%	40.4	14.8%
33	256	50	19.5%	36.9	14.4%
34	230	42	18.3%	32.3	14.0%
35	226	39	17.3%	30.9	13.7%
36	200	42	21.0%	26.6	13.3%
37	246	38	15.4%	31.7	12.9%
38	211	34	16.1%	26.6	12.6%
39	211	35	16.6%	26.0	12.3%
40	225	29	12.9%	27.2	12.1%
41	210	27	12.9%	24.8	11.8%
42	216	20	9.3%	24.9	11.5%
43	193	32	16.6%	22.1	11.5%
44	171	31	18.1%	19.5	11.4%
45	164	25	15.2%	18.6	11.3%
46	168	22	13.1%	18.9	11.2%
47	166	32	19.3%	18.6	11.2%
48	182	24	13.2%	19.8	10.9%
49	181	24	13.3%	19.2	10.6%
50	205	28	13.7%	21.1	10.3%
51	188	28	14.9%	18.8	10.0%
52	174	26	14.9%	16.9	9.7%
53	175	20	11.4%	16.4	9.4%
54	190	21	11.1%	17.2	9.0%
55	192	21	10.9%	16.7	8.7%
	7,077	1,203	17.0%	931.7	13.2%

Appendix G-17
Rate of Termination of Employment
OPERS - 4 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	95	17	17.9%	13.0	13.7%
26	176	34	19.3%	23.2	13.2%
27	268	38	14.2%	34.1	12.7%
28	325	56	17.2%	41.3	12.7%
29	355	56	15.8%	45.1	12.7%
30	330	50	15.2%	41.9	12.7%
31	311	42	13.5%	39.4	12.7%
32	277	47	17.0%	35.1	12.7%
33	255	28	11.0%	31.9	12.5%
34	259	35	13.5%	31.9	12.3%
35	210	30	14.3%	25.5	12.1%
36	230	28	12.2%	27.6	12.0%
37	207	25	12.1%	24.5	11.8%
38	223	28	12.6%	25.7	11.5%
39	202	30	14.9%	22.7	11.2%
40	202	22	10.9%	22.1	10.9%
41	215	21	9.8%	22.9	10.7%
42	203	18	8.9%	21.0	10.4%
43	199	23	11.6%	20.0	10.1%
44	195	16	8.2%	19.0	9.8%
45	174	24	13.8%	16.4	9.5%
46	164	25	15.2%	15.0	9.1%
47	168	18	10.7%	15.1	9.0%
48	153	23	15.0%	13.4	8.8%
49	160	19	11.9%	13.7	8.6%
50	187	24	12.8%	15.6	8.3%
51	207	24	11.6%	16.8	8.1%
52	191	24	12.6%	15.0	7.8%
53	173	17	9.8%	13.1	7.6%
54	181	21	11.6%	13.2	7.3%
55	185	19	10.3%	13.0	7.0%
	6,680	882	13.2%	728.4	10.9%

Appendix G-18
Rate of Termination of Employment
OPERS - 5 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	40	12	30.0%	5.7	14.3%
26	67	11	16.4%	8.8	13.1%
27	148	26	17.6%	17.6	11.9%
28	243	33	13.6%	27.4	11.3%
29	268	34	12.7%	29.2	10.9%
30	311	46	14.8%	32.7	10.5%
31	295	42	14.2%	29.8	10.1%
32	263	37	14.1%	25.5	9.7%
33	236	29	12.3%	21.9	9.3%
34	224	40	17.9%	19.9	8.9%
35	216	31	14.4%	18.8	8.7%
36	206	25	12.1%	17.5	8.5%
37	224	26	11.6%	18.6	8.3%
38	211	25	11.8%	17.1	8.1%
39	187	18	9.6%	14.8	7.9%
40	192	21	10.9%	14.8	7.7%
41	206	24	11.7%	15.5	7.5%
42	200	17	8.5%	14.6	7.3%
43	172	16	9.3%	12.2	7.1%
44	176	31	17.6%	12.1	6.9%
45	181	21	11.6%	12.1	6.7%
46	171	15	8.8%	11.1	6.5%
47	161	18	11.2%	10.5	6.5%
48	168	22	13.1%	10.9	6.5%
49	173	23	13.3%	11.2	6.5%
50	166	25	15.1%	10.8	6.5%
51	161	21	13.0%	10.5	6.5%
52	189	17	9.0%	12.3	6.5%
53	198	13	6.6%	12.9	6.5%
54	168	19	11.3%	10.9	6.5%
55	164	15	9.1%	10.7	6.5%
	5,985	753	12.6%	498.4	8.3%

Appendix G-19
Rate of Termination of Employment
OPERS - 6 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	20	2	10.0%	2.9	14.3%
26	32	2	6.3%	4.2	13.1%
27	57	7	12.3%	6.8	11.9%
28	109	15	13.8%	12.3	11.3%
29	199	28	14.1%	21.7	10.9%
30	211	25	11.8%	22.2	10.5%
31	257	34	13.2%	25.8	10.1%
32	240	21	8.8%	23.0	9.6%
33	216	26	12.0%	19.8	9.2%
34	185	18	9.7%	16.3	8.8%
35	171	16	9.4%	14.7	8.6%
36	193	20	10.4%	16.2	8.4%
37	210	28	13.3%	17.1	8.2%
38	192	21	10.9%	15.2	7.9%
39	192	18	9.4%	14.8	7.7%
40	177	22	12.4%	13.2	7.5%
41	201	19	9.5%	14.6	7.3%
42	190	20	10.5%	13.3	7.0%
43	185	19	10.3%	12.6	6.8%
44	159	15	9.4%	10.5	6.6%
45	146	14	9.6%	9.3	6.4%
46	163	22	13.5%	10.0	6.1%
47	161	14	8.7%	9.7	6.0%
48	171	15	8.8%	10.0	5.9%
49	181	16	8.8%	10.4	5.8%
50	176	12	6.8%	10.1	5.8%
51	176	14	8.0%	10.1	5.8%
52	172	19	11.0%	9.9	5.8%
53	191	18	9.4%	11.0	5.8%
54	184	9	4.9%	10.6	5.8%
55	158	16	10.1%	9.1	5.8%
	5,275	545	10.3%	407.3	7.7%

Appendix G-20
Rate of Termination of Employment
OPERS - 7 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	1	-	0.0%	0.1	14.3%
26	14	4	28.6%	1.8	13.1%
27	33	6	18.2%	3.9	11.9%
28	46	4	8.7%	5.2	11.3%
29	100	13	13.0%	10.9	10.9%
30	146	15	10.3%	15.3	10.5%
31	182	17	9.3%	18.2	10.0%
32	179	22	12.3%	17.0	9.5%
33	191	20	10.5%	17.2	9.0%
34	168	12	7.1%	14.7	8.8%
35	149	8	5.4%	12.7	8.5%
36	139	20	14.4%	11.5	8.3%
37	145	17	11.7%	11.6	8.0%
38	177	18	10.2%	13.7	7.8%
39	165	26	15.8%	12.4	7.5%
40	155	18	11.6%	11.2	7.3%
41	130	18	13.8%	9.1	7.0%
42	163	12	7.4%	11.0	6.8%
43	157	21	13.4%	10.2	6.5%
44	146	15	10.3%	9.1	6.3%
45	138	11	8.0%	8.3	6.0%
46	136	12	8.8%	7.8	5.8%
47	145	15	10.3%	8.0	5.5%
48	151	18	11.9%	7.9	5.3%
49	160	17	10.6%	8.0	5.0%
50	147	11	7.5%	7.4	5.0%
51	165	17	10.3%	8.3	5.0%
52	149	8	5.4%	7.5	5.0%
53	150	17	11.3%	7.5	5.0%
54	163	9	5.5%	8.2	5.0%
55	157	10	6.4%	7.9	5.0%
	4,247	431	10.1%	303.5	7.1%

Appendix G-21
Rate of Termination of Employment
OPERS - 8 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	1	-	0.0%	0.1	14.3%
26	3	1	33.3%	0.4	13.1%
27	9	2	22.2%	1.1	11.9%
28	22	2	9.1%	2.5	11.3%
29	51	5	9.8%	5.6	10.9%
30	81	10	12.3%	8.5	10.5%
31	111	11	9.9%	11.1	10.0%
32	139	5	3.6%	13.2	9.5%
33	132	10	7.6%	11.9	9.0%
34	144	21	14.6%	12.6	8.8%
35	154	15	9.7%	13.1	8.5%
36	149	16	10.7%	12.3	8.3%
37	130	15	11.5%	10.4	8.0%
38	126	8	6.3%	9.8	7.8%
39	150	19	12.7%	11.3	7.5%
40	130	11	8.5%	9.4	7.3%
41	131	15	11.5%	9.2	7.0%
42	98	9	9.2%	6.6	6.8%
43	140	7	5.0%	9.1	6.5%
44	115	10	8.7%	7.2	6.3%
45	106	8	7.5%	6.4	6.0%
46	109	10	9.2%	6.3	5.8%
47	120	14	11.7%	6.6	5.5%
48	124	10	8.1%	6.5	5.3%
49	132	14	10.6%	6.6	5.0%
50	153	9	5.9%	7.7	5.0%
51	134	10	7.5%	6.7	5.0%
52	137	9	6.6%	6.9	5.0%
53	131	8	6.1%	6.6	5.0%
54	132	18	13.6%	6.6	5.0%
55	156	11	7.1%	7.8	5.0%
	3,450	313	9.1%	239.7	6.9%

Appendix G-22
Rate of Termination of Employment
OPERS - 9 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	-	-	0.0%	-	14.3%
26	-	-	0.0%	-	13.1%
27	3	-	0.0%	0.4	11.9%
28	10	2	20.0%	1.1	11.3%
29	21	1	4.8%	2.2	10.7%
30	46	6	13.0%	4.6	10.0%
31	72	6	8.3%	6.8	9.4%
32	100	4	4.0%	8.8	8.8%
33	122	12	9.8%	10.3	8.4%
34	127	8	6.3%	10.2	8.1%
35	133	11	8.3%	10.2	7.7%
36	139	16	11.5%	10.2	7.3%
37	139	12	8.6%	9.7	7.0%
38	120	8	6.7%	7.9	6.6%
39	125	6	4.8%	7.8	6.2%
40	145	14	9.7%	8.5	5.9%
41	131	11	8.4%	7.2	5.5%
42	128	17	13.3%	6.6	5.2%
43	108	8	7.4%	5.4	5.0%
44	120	10	8.3%	5.8	4.9%
45	96	3	3.1%	4.5	4.7%
46	111	10	9.0%	5.0	4.5%
47	109	10	9.2%	4.8	4.4%
48	134	8	6.0%	5.8	4.4%
49	125	6	4.8%	5.5	4.4%
50	126	9	7.1%	5.5	4.4%
51	132	10	7.6%	5.8	4.4%
52	120	7	5.8%	5.2	4.4%
53	127	9	7.1%	5.5	4.4%
54	129	8	6.2%	5.6	4.4%
55	132	7	5.3%	5.8	4.4%
	3,130	239	7.6%	182.8	5.8%

Appendix G-23
Rate of Termination of Employment
OPERS - More Than 9 Years

Age	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate
25	1	-	0.0%	0.1	7.0%
26	-	-	0.0%	-	7.0%
27	-	-	0.0%	-	7.0%
28	2	-	0.0%	0.1	7.0%
29	15	-	0.0%	1.1	7.0%
30	35	1	2.9%	2.5	7.0%
31	83	5	6.0%	5.8	7.0%
32	140	8	5.7%	9.8	7.0%
33	231	20	8.7%	15.2	6.6%
34	329	29	8.8%	20.4	6.2%
35	433	22	5.1%	25.1	5.8%
36	592	38	6.4%	32.6	5.5%
37	678	39	5.8%	35.3	5.2%
38	790	46	5.8%	38.7	4.9%
39	872	49	5.6%	40.1	4.6%
40	990	50	5.1%	43.6	4.4%
41	1,115	54	4.8%	46.8	4.2%
42	1,254	82	6.5%	50.2	4.0%
43	1,266	71	5.6%	45.6	3.6%
44	1,348	57	4.2%	45.8	3.4%
45	1,408	73	5.2%	45.1	3.2%
46	1,527	66	4.3%	45.8	3.0%
47	1,763	74	4.2%	52.9	3.0%
48	2,008	77	3.8%	60.2	3.0%
49	2,224	105	4.7%	66.7	3.0%
50	2,172	82	3.8%	65.2	3.0%
51	2,130	84	3.9%	63.9	3.0%
52	2,000	91	4.6%	60.0	3.0%
53	1,882	77	4.1%	56.5	3.0%
54	1,788	82	4.6%	53.6	3.0%
55	-	-	0.0%	-	3.0%
	29,076	1,382	4.8%	1,028.6	3.5%

Appendix G-24
Rate of Termination of Employment
OPERS

Duration	Exposure	Actual Terminations	Actual Rate	Proposed Expected	Proposed Rate
1	10,522	2,813	26.7%	2,314.8	22.0%
2	9,084	1,761	19.4%	1,635.1	18.0%
3	8,701	1,450	16.7%	1,218.1	14.0%
4	8,348	1,081	12.9%	1,001.8	12.0%
5	7,581	895	11.8%	796.0	10.5%
6	6,191	624	10.1%	557.2	9.0%
7	5,028	487	9.7%	402.2	8.0%
8	4,148	358	8.6%	290.4	7.0%
9	3,821	285	7.5%	248.4	6.5%
10	2,944	237	8.1%	176.6	6.0%
11	2,803	194	6.9%	147.2	5.3%
12	2,762	187	6.8%	124.3	4.5%
13	2,496	126	5.0%	99.8	4.0%
14	2,209	112	5.1%	77.3	3.5%
15	1,861	81	4.4%	57.7	3.1%
16	1,570	76	4.8%	44.0	2.8%
17	1,283	56	4.4%	33.4	2.6%
18	1,131	36	3.2%	27.1	2.4%
19	1,164	41	3.5%	25.6	2.2%
20	1,244	41	3.3%	24.9	2.0%
21	1,349	35	2.6%	24.3	1.8%
22	1,350	41	3.0%	21.6	1.6%
23	1,156	40	3.5%	16.2	1.4%
24	944	19	2.0%	11.3	1.2%
25	846	28	3.3%	8.5	1.0%
26	729	13	1.8%	7.3	1.0%
27	546	10	1.8%	5.5	1.0%
28	374	6	1.6%	3.7	1.0%
29	234	2	0.9%	2.3	1.0%
30	90	1	1.1%	0.9	1.0%
	92,509	11,136	12.0%	9,403.5	10.2%

Appendix G-25
Probability of Contributions Remaining with the System
OPERS - Regular

Age	Exposure	Actual Remaining	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
30	10	3	30.0%	7.0	70.0%	7.0	70.0%
31	16	9	56.3%	11.2	70.0%	11.2	70.0%
32	9	6	66.7%	6.3	70.0%	6.3	70.0%
33	32	15	46.9%	22.4	70.0%	22.4	70.0%
34	38	22	57.9%	28.5	75.0%	26.6	70.0%
35	38	22	57.9%	28.5	75.0%	26.6	70.0%
36	45	24	53.3%	33.8	75.0%	31.5	70.0%
37	42	25	59.5%	31.5	75.0%	29.4	70.0%
38	43	25	58.1%	32.3	75.0%	30.1	70.0%
39	37	23	62.2%	29.6	80.0%	25.9	70.0%
40	41	20	48.8%	32.8	80.0%	28.7	70.0%
41	53	34	64.2%	42.4	80.0%	39.8	75.0%
42	71	33	46.5%	56.8	80.0%	53.3	75.0%
43	47	27	57.4%	37.6	80.0%	35.3	75.0%
44	52	36	69.2%	41.6	80.0%	39.0	75.0%
45	54	32	59.3%	43.2	80.0%	40.5	75.0%
46	57	34	59.6%	45.6	80.0%	45.6	80.0%
47	61	42	68.9%	51.9	85.0%	51.9	85.0%
48	55	35	63.6%	49.5	90.0%	49.5	90.0%
49	79	56	70.9%	75.1	95.0%	75.1	95.0%
50	63	40	63.5%	63.0	100.0%	63.0	100.0%
51	69	49	71.0%	69.0	100.0%	69.0	100.0%
52	73	53	72.6%	73.0	100.0%	73.0	100.0%
53	71	58	81.7%	71.0	100.0%	71.0	100.0%
54	78	60	76.9%	78.0	100.0%	78.0	100.0%
	1,234	783	63.5%	1,061.4	86.0%	1,029.5	83.4%

Appendix G-26
Total Salary Scale
OPERS

Age	Initial Salary (Millions)	Subsequent Salary (Millions)	Actual Rate	Current Expected (Millions)	Current Rate	Proposed Expected (Millions)	Proposed Rate
21	3.3	3.6	8.45%	3.6	9.05%	3.6	8.70%
22	5.0	5.5	8.66%	5.5	8.75%	5.5	8.40%
23	8.8	9.6	9.53%	9.5	8.55%	9.5	8.20%
24	14.1	14.9	6.17%	15.2	8.35%	15.2	8.00%
25	21.1	22.5	6.62%	22.8	8.15%	22.7	7.80%
26	29.4	31.5	7.36%	31.7	7.95%	31.6	7.60%
27	38.1	40.5	6.44%	41.0	7.75%	40.9	7.40%
28	45.6	48.7	6.88%	48.9	7.45%	48.8	7.10%
29	52.6	56.0	6.32%	56.4	7.15%	56.2	6.80%
30	56.2	59.3	5.42%	60.1	6.85%	59.9	6.50%
31	60.5	63.4	4.84%	64.5	6.65%	64.3	6.30%
32	60.1	62.5	4.09%	63.9	6.45%	63.7	6.10%
33	60.1	63.2	5.25%	63.8	6.25%	63.6	5.90%
34	59.8	62.5	4.41%	63.4	5.95%	63.2	5.60%
35	62.8	65.8	4.66%	66.6	5.95%	66.3	5.60%
36	69.8	72.4	3.79%	73.9	5.85%	73.6	5.50%
37	72.8	75.9	4.18%	77.1	5.85%	76.8	5.50%
38	75.9	78.9	3.89%	80.3	5.75%	80.0	5.40%
39	78.5	81.5	3.90%	83.0	5.75%	82.7	5.40%
40	82.2	85.6	4.11%	86.9	5.65%	86.6	5.30%
41	86.7	89.6	3.33%	91.6	5.65%	91.3	5.30%
42	91.7	94.8	3.42%	96.7	5.55%	96.4	5.20%
43	91.3	94.8	3.79%	96.3	5.45%	96.0	5.10%
44	92.7	95.5	3.01%	97.7	5.35%	97.4	5.00%
45	91.4	94.7	3.61%	96.3	5.35%	96.0	5.00%
46	98.9	102.2	3.36%	104.1	5.25%	103.7	4.90%
47	108.3	111.7	3.21%	113.8	5.15%	113.5	4.80%
48	123.4	126.5	2.52%	129.6	5.05%	129.2	4.70%
49	133.0	137.5	3.42%	139.7	5.05%	139.2	4.70%
50	141.3	145.6	3.02%	148.3	4.95%	147.8	4.60%
51	145.3	148.9	2.48%	152.4	4.95%	151.9	4.60%
52	145.3	148.9	2.52%	152.3	4.85%	151.8	4.50%
53	145.9	149.5	2.48%	152.9	4.85%	152.4	4.50%
54	144.7	149.1	3.10%	151.7	4.85%	151.2	4.50%
55	144.3	147.5	2.22%	151.3	4.85%	150.8	4.50%
56	141.6	144.9	2.35%	148.5	4.85%	148.0	4.50%
57	136.6	140.3	2.66%	143.2	4.85	142.8	4.50%
58	133.0	136.4	2.54%	139.4	4.85%	139.0	4.50%
59	129.5	132.7	2.42%	135.8	4.85%	135.4	4.50%
60	119.7	122.4	2.26%	125.5	4.85%	125.1	4.50%
61	110.4	113.3	2.60%	115.7	4.85%	115.4	4.50%
62	88.0	90.4	2.75%	92.2	4.85%	91.9	4.50%
63	74.8	76.2	1.84%	78.4	4.85%	78.2	4.50%
64	65.5	66.7	1.87%	68.7	4.85%	68.4	4.50%
65	50.4	51.3	1.81%	52.9	4.85%	52.7	4.50%
	3,790.2	3,915.1	3.30%	3,993.4	5.36%	3,980.1	5.01%