OKLAHOMA

OKLAHOMA PUBLIC EMPLOYEES RETIREMENT SYSTEM

Experience Study

For the Three-Year Period

Ending June 30, 2025

SUBMITTED: May 13, 2026

CavMac
Actuarial Consulting Services

May 13, 2026

Board of Trustees
Oklahoma Public Employees Retirement System
5400 N Grand Boulevard, Suite 400
P.O. Box 53007
Oklahoma City, OK 73112-5625

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 each of the Plans. This investigation covers the three-year period from July 1, 2022 to June 30, 2025. As a result of the investigation, it is recommended that revised assumptions be adopted by the Board for future use.

The recommended assumptions and decrement tables are shown in Appendix B of this report for OPERS and Appendix C 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.

We hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries. In particular, we have prepared the assumptions developed in this report in keeping with our understanding of Actuarial Standards of Practice 27 (Selection of Assumptions for Measuring Pension Obligations).

In order to prepare the measurement of the impact on liabilities in this report, we have utilized actuarial models that we developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

We note that during much of the prior experience study period, the world had been in a pandemic, and uncertain lingering impacts, both economic and demographic, potentially remain for this experience period of the last three years in this current study. We have taken this into consideration as we reviewed the experience, particularly regarding mortality, retirement, termination and disability patterns as well as inflation and salary increases. While we do not believe that there is yet sufficient data to warrant the significant modification of any of our assumptions specifically due to COVID-19, or any Federal legislation or policy initiatives, we will continue to monitor outside influences and advise the Board in the future of any adjustments that we believe would be appropriate.

We would like to acknowledge the help in the preparation of the data for this investigation given by the OPERS staff.

We, Alisa Bennett, Brent Banister and Virginia Fritz, are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

Alisa Bennett, FSA, EA, FCA, MAAA
President

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

Virginia Fritz, FSA, EA, FCA, MAAA
Senior Actuary

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SECTION I – SUMMARY OF RESULTS

The following summarizes the findings and recommendations for 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 key economic assumptions used in the actuarial valuation and their current and proposed rates. We are not recommending any changes to these assumptions at this time.

Item	Current	Proposed
Price Inflation	2.50%	2.50%
Investment Return	6.50%	6.50%
Real Wage Growth	0.75%	0.75%

Recommended Demographic Assumption Changes

The table below lists the demographic assumptions that we recommend be changed based on recent observed experience. While the results in this study generally show data from the three-year study period, we have also considered prior studies in making our recommendations.

Assumption Changes
OPERS ➢ Update mortality ➢ Increase withdrawal rates for most service durations ➢ Minor adjustments to rates of retirement, disability, and salary merit scale **URSJJ** ➢ Update mortality

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 actuarial accrued liability (UAAL), funded ratio and employer contribution rate for both Plans of the System as of July 1, 2025. The actual changes, which will first be reflected in the July 1, 2026 valuations, will be different, but should be of a similar magnitude.

	Before Assumption Changes	After Assumption Changes
OPERS		
Unfunded Actuarial Accrued Liability	($920,982,069)	($1,060,307,861)
Funded Ratio	107.8%	109.1%
Employer Contribution Rate	4.17%	3.16%
URSJJ		
Unfunded Actuarial Accrued Liability	($28,730,645)	($34,799,983)
Funded Ratio	107.2%	108.8%
Employer Contribution Rate	(0.99%)	(2.40%)

SECTION II – 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

Unlike demographic assumptions, economic assumptions do not lend themselves to analysis largely on the basis of internal historical patterns because economic assumptions are impacted by external forces in the economy. The investment return and general wage increase assumptions are selected on the basis of expectations in an inflation-free environment and then increased by the long-term expectation for inflation, called the "building block" approach.

Sources of data considered in the analysis and selection of the economic assumptions included:

- The 2025 Social Security Trustees Report
- Future expectations of OPERS investment consultant, Cerity
- Future expectations of other investment consultants (2025 Horizon Survey)
- U.S. Department of the Treasury bond rates
- Assumptions used by other large public retirement systems, based on the Public Fund Survey, published by the National Association of State Retirement Administrators (NASRA)
- Historical observations of price and wage growth statistics and investment returns

Actuarial Standard of Practice Number 27

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standard of Practice (ASOP) 27, *Selection of Assumptions for Measuring Pension Obligations*. 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. These estimates are based on a mixture of past experience, future expectations, and professional judgment.

ASOP 27 requires the actuary to select a "reasonable" assumption. For this purpose, an assumption is reasonable if it has the following characteristics:

a. it is appropriate for the purpose of the measurement;
b. it takes into account historical and current economic data that is relevant as of the measurement date;
c. it reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
d. it has no significant bias (i.e., it is neither significantly optimistic nor pessimistic) except when provisions for adverse deviation or plan provisions that are difficult to measure are included.

SECTION II – ECONOMIC ASSUMPTIONS

With respect to relevant data, the standard recommends the actuary review appropriate recent and long-term historical economic data but advises the actuary not to give undue weight to recent experience. Furthermore, it advises the actuary to consider that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment. In addition, with respect to any particular valuation, each economic assumption should be consistent with all other economic assumptions over the measurement period.

ASOP 27 recognizes that economic data and analyses are available from a variety of sources, including representatives of the plan sponsor, investment advisors, economists, and other professionals. The actuary is permitted to incorporate the views of experts, but the selection or advice must reflect the actuary's professional judgment.

The standard also discusses a "range of reasonable assumptions" which in part states "Different actuaries will apply professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop both for an individual actuary and across actuarial practice."

The remaining section of this report will address the relevant types of economic assumptions used in the actuarial valuation to determine the obligations of the System. In our opinion, the economic assumptions proposed in this report have been developed in accordance with ASOP 27.

The following table summarizes the current and proposed economic assumptions:

	Current Assumptions	Proposed Assumptions
Price Inflation	2.50%	2.50%
Investment Return	6.50%	6.50%
Real Wage Growth	0.75%	0.75%
Payroll Growth	3.25%	3.25%

PRICE INFLATION

Use in the Valuation

Future price inflation has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment return, general wage growth (which then impacts individual salary increases), and payroll growth.

Inflation also has a direct impact on the valuation results. The long-term relationship between price inflation and investment return has long been recognized by economists. The basic principle is that the investor demands a more or less level "real return" – the excess of actual investment return over price inflation. If inflation rates are expected to be high, investment return rates are also expected to be high, while low inflation rates are expected to result in lower expected investment returns, at least in the long run.

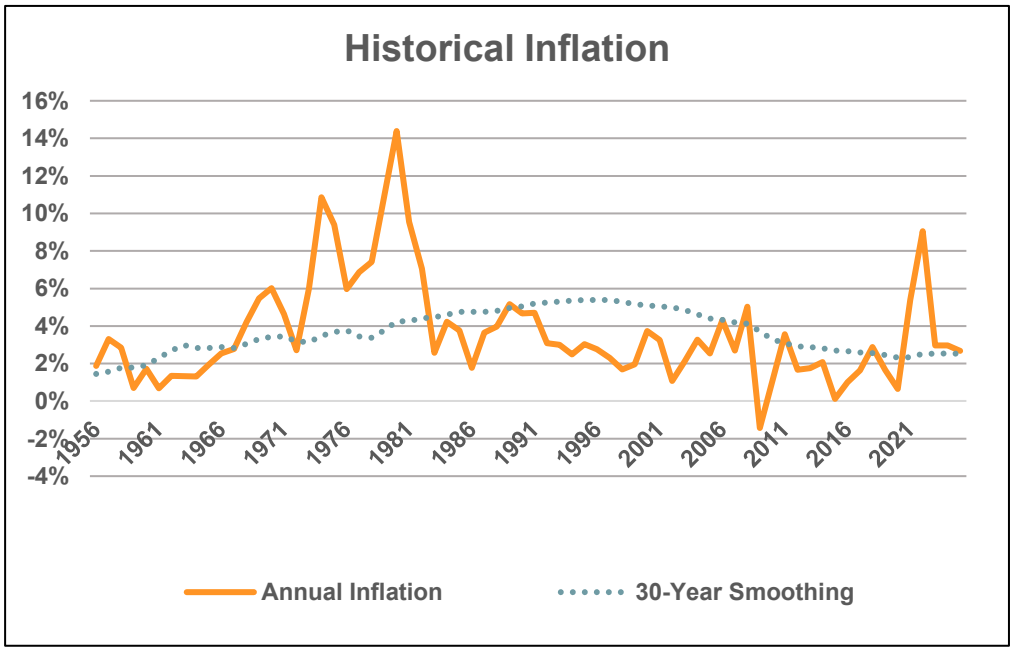
The current assumption for price inflation is 2.50% per year which was recommended and adopted in the last experience study.

Past Experience

Although economic activities in general, and inflation in particular, do not lend themselves to prediction solely on the basis of historical analysis, historical patterns and long-term trends are factors to be considered in developing the inflation assumption. 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 following table provides historical annualized rates and annual standard deviations of the CPI-U over periods ending June 30th.

Period	Number of Years	Annualized Rate of Inflation
1925 – 2025	100	2.96%
1965 – 2025	60	3.95
1975 – 2025	50	3.65
1985 – 2025	40	2.78
1995 – 2025	30	2.53
2005 – 2025	20	2.56
2015 - 2025	10	3.06

The following graph illustrates the historical annual change in price inflation, measured as of December 31 for each of the last 70 years, as well as the 30-year rolling average through that date.



From 2008 through 2020, the annual rate of increase in the CPI-U was below the current assumption of 2.50% almost every year. The period of high inflation from 1973 to 1982 has a significant impact on the averages over periods which include these rates, as does the spike in 2021 and 2022.

Forecasts of Inflation

Additional information to consider in formulating this assumption is obtained from measuring the spread on Treasury Inflation Protected Securities (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities (bonds) and the inflation indexed 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 period to maturity. Current market prices as of December 2025 suggest that investors expect inflation to be around 2.25% over the next 5 to 30 years. The bond market expectations may be heavily influenced by the interest rate environment, including the actions of the Federal Reserve Bank.

OPERS' investment consultant, Cerity, also has an inflation forecast in their capital market assumptions. Their short-term assumption (10 years) is 2.7%, while over 30 years they assume 2.3%. Horizon Actuarial Services surveys a significant portion of the major investment advisors and publishes their assumptions. For the 2025 study, the 10-year and 20-year inflation assumptions were 2.4%

Social Security Projections

Although many economists forecast lower inflation than the assumptions used by retirement systems, they are generally looking at a shorter time horizon (10 years) than is appropriate for a pension valuation. To consider a longer, similar time frame, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the most recent report (June 2025), the projected average annual increase in the CPI over the next 75 years was estimated to be 2.4%, under the intermediate (best estimate) cost assumption. The range of price inflation used in the Social Security 75-year modeling, which includes low and high-cost scenarios, in addition to the intermediate cost projection, was 1.8% to 3.0%.

Peer System Comparison

While we do not recommend the selection of any assumption based on what other systems use, it does provide another set of relevant information to consider. Based on the Public Plan Database (a survey of over 125+ state and local retirement systems maintained by a collaboration between the Center for Retirement Research at Boston College, the Center for State and Local Government Excellence, and the National Association of State Retirement Administrators), the average inflation assumption for governmental plans has been steadily declining. Based on the current data, the average inflation assumption is 2.48%. Although inflation has spiked recently, we have not seen a reversal of this trend and expect most systems to take a wait-and-see approach.

Recommendation

The current inflation assumption is 2.50%, a level it has been at for the last six years (two studies). While there has been a spike in inflation since 2021, there has been some moderation over the last three to four years. Most forecasts, including the financial market pricing are also indicating that inflation is expected to return to where it was prior to this spike. Based on all of this information, **we recommend retaining the price inflation assumption of 2.50%.**

Price Inflation	
Current Assumption	2.50%
Recommended Assumption	2.50%

INVESTMENT RETURN

Use in the Valuation

The investment return assumption reflects anticipated returns on the current and future assets. It is one of the primary determinants in the calculation of the expected cost of the System's benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. This assumption has a direct impact on the calculation of liabilities, normal costs, and contribution rates. Generally, the investment return assumption should be set with consideration of the asset allocation policy, expected long term real rates of return on the specific asset classes, the underlying inflation rate, and any investment expenses, but is also impacted by the dynamics of the system along with the risk tolerance and preferences of the Board.

The current investment return assumption is 6.50% per year, net of all investment-related and administrative expenses. This investment assumption has been in effect for the last six years. The 6.50% rate of return is referred to as the nominal rate of return and is composed of two components. The first component is price inflation (previously discussed). Any excess return over price inflation is referred to as the real rate of return. The real rate of return, based on the current set of assumptions, is 4.00% (6.50% nominal return less 2.50% inflation).

ASOP 27 provides guidance to actuaries on the selection of economic assumptions used for measuring pension obligations. Our findings and analysis, following that ASOP, are discussed below.

Long Term Perspective

Because the economy is constantly changing, assumptions about what may occur in the near term are volatile. Asset managers and investment consultants usually focus on this near-term horizon so as to make prudent choices regarding how to invest the trust funds, i.e., the asset allocation. For actuarial calculations, we typically consider very long periods of time as some current employees will still be receiving benefit payments more than 80 years from now. For example, a newly hired employee who is 25 years old may work for 35 years, to age 60, and live another 30 years, to age 90. The retirement system would receive contributions for the first 35 years and then pay out benefits for the next 30 years. During the entire 65-year period, the system is investing assets on behalf of the member. For such a typical career employee, more than one-half of the investment income earned on assets accumulated to pay benefits is received after the employee retires. This difference in time horizon is frequently a source of debate and confusion when setting economic assumptions.

Forward Looking Analysis

We believe the most appropriate analysis to consider in setting the investment return assumption is to model the expected returns given the system's target asset allocation and forward-looking capital market assumptions. However, we are trained as actuaries and not as investment professionals. As such, we rely heavily on professional investment consultants, such as Cerity, to provide investment expertise including capital market assumptions.

In performing our analysis, we use the building block approach so the real rate of return of the portfolio is modeled, based on the target asset allocation, and then the expected return is added to the price inflation assumption. Therefore, our analysis focuses on the real rate of return while the analysis of the investment consultants more typically focuses on the nominal return in their asset allocation consulting. OPERS' current target asset allocation, along with their investment consultant's (Cerity) long-term capital market assumptions, are shown in the following table (more detail is shown in Appendix A):

OPERS Target Asset Allocation and Cerity Assumptions

Asset Class	Target Allocation	Ten Year Return Forecast*	Standard Deviation Forecast
US Large Cap Equity	34.0%	7.6%	15.6%
US Small Cap Equity	6.0%	7.6%	21.5%
Global Equity ex-US	28.0%	10.7%	19.9%
Core Fixed Income	25.0%	4.4%	4.6%
Long Term Treasuries	3.5%	4.6%	13.2%
US TIPS	3.5%	4.3%	5.6%
Total	100.0%		

*Arithmetic mean, assumes 2.7% inflation.

Based on their 2025 capital market assumptions, Cerity's expected one-year arithmetic mean return is 6.68%. Because of the nature of compounding returns, however, the arithmetic mean is of limited value. A more important measure is the geometric mean, which is the expected long-term compound rate of return and the measure that gives guidance to our assumption. Mathematically, the geometric return will be less than the arithmetic return. Under the assumptions, the geometric mean is 5.95% (with 2.7% inflation expected over 10 years). Cerity also provides long-term (30-year) capital market assumptions, which have a geometric mean of 6.26% (with 2.3% inflation expected over that period).

It should be noted that there is currently a fair amount of variation in expectations among investment professionals, and that the assumptions have been changing more noticeably over the past two to three years.

It must be noted that one-year expected returns come with high standard deviations, over 12% in this case, and therefore high volatility. It is helpful to look at expected returns over a longer time horizon as shown in the table that follows. The returns shown are real returns (excluding inflation) so that a long-term inflation assumption can be incorporated. The table uses the Cerity 30-year assumptions.

Time Span In Years	Cerity 30-year Assumptions Real Returns by Percentile				
	5th	25th	50th	75th	95th
1	-14.68%	-4.12%	3.96%	12.70%	26.55%
5	-4.82%	0.26%	3.96%	7.78%	13.52%
10	-2.33%	1.33%	3.96%	6.65%	10.64%
20	-0.53%	2.09%	3.96%	5.85%	8.64%
30	0.28%	2.43%	3.96%	5.50%	7.76%
50	1.10%	2.77%	3.96%	5.15%	6.89%
75	1.62%	**2.99%**	**3.96%**	**4.93%**	6.35%

The chart above shows the percentile rankings for expected returns. Thus, for the 20-year time span, 5% of the resulting cumulative real rates of return are expected to be below -0.53% and 95% expected to be above that. As the time span increases, the results begin to converge. Over a 75-year time span, the results indicate there is a 25% chance that the real return will be below 2.99% and a 25% chance it will be above 4.93%. In other words, there is a 50% chance the real returns will be between 2.99% and 4.93%. With our 2.5% inflation assumption reflected, the corresponding nominal return range would be 5.49% to 7.43%, with a median return of 6.46%.

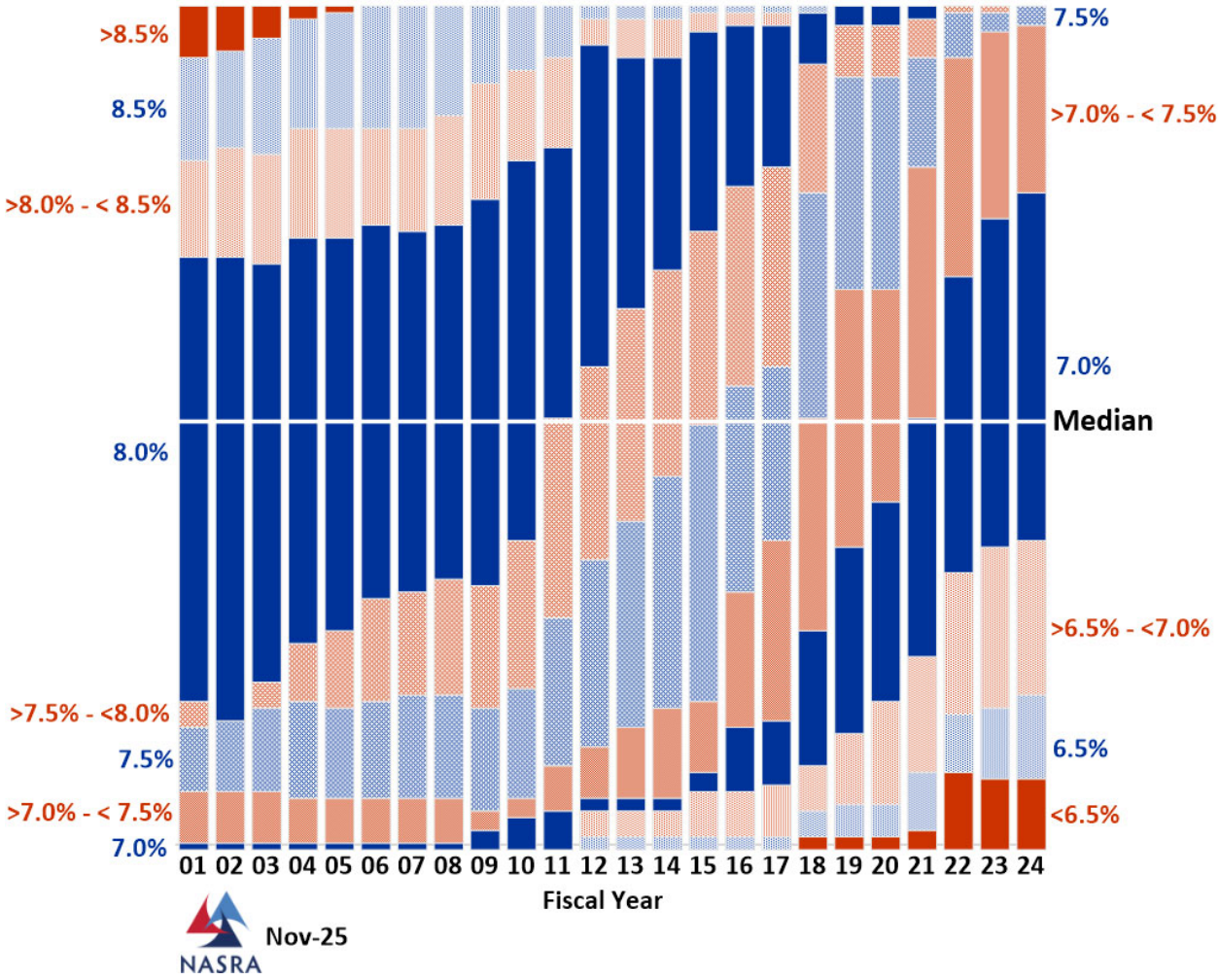
Peer System Comparison

Public retirement systems have historically compared their investment performance to their peer group. While we believe there is some merit in assessing the movement in the assumed rate of return for other systems, this is not an appropriate basis for setting this assumption in our opinion. For example, different plans have different plan dynamics which will impact their choice of the assumed investment return. This peer group information merely provides another set of relevant data to consider as long as we recognize that asset allocation varies from system to system.

The graph below shows the change in the distribution of the investment return assumption from fiscal year 2001 through 2025 for the 120+ large public retirement systems included in the NASRA Public Fund Survey. As it indicates, the investment return assumptions used by public plans have

decreased over the last two decades, partially impacted by a corresponding decrease in the underlying inflation assumption from over the same period. It is worth noting that the median investment return assumption in fiscal years 2001 to 2011 was 8.00% and declined to 7.00% by fiscal year 2022.

DISTRIBUTION OF INVESTMENT RETURN ASSUMPTIONS



Administrative and Investment Expenses

Budgeted administrative expenses are directly reflected as a separate component in the calculation of the contribution rate, and so no assumption is required. Generally, capital market assumptions are reflective of passive investment strategies where there are minimal investment expenses. Where active management is utilized, it is assumed that the additional return from active management is at least as great as the additional expense, and so no investment expense adjustment is required.

Recommendation

Using the building block approach of ASOP 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. The following tables details the ranges using Cerity's 30-year assumptions.

Cerity 30-Year Assumptions

Item	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return	2.99%	3.96%	4.93%
Inflation	2.50	2.50	2.50
Net Investment Return	5.49%	6.46%	7.43%

One additional consideration for OPERS is that the plan is partially closed. Over a fairly long period of time, this is anticipated to result in benefit payments being increasingly larger than the contributions from members and employers. This requires the gradual reduction of the investment pool but is not a cause for concern – this is the very reason the investment pool exists. This drawdown may require some change in asset allocation, however, which could affect the net investment returns shown above. We have discussed this long-term drawdown with OPERS investment staff and believe some degree of caution is in order, although the ultimate impact cannot yet be fully quantified. While the URSJJ portfolio is not subject to these same concerns, the fact that the large OPERS portfolio and the much smaller URSJJ portfolio are invested together argues for a common investment return assumption for the time being.

Considering the different sources discussed above (OPERS experience, historical markets, Certity's short-term expectations), we believe that 6.50% continues to be a reasonable assumption. Because OPERS is currently conducting an Asset-liability study that could result in some change in the assets allocation, we believe it would be appropriate to wait until that study is complete and then assess whether it is appropriate to adjust the investment return assumption.

Investment Return Assumption	
Current	6.50%
Recommended	6.50%

GENERAL WAGE GROWTH

Background

General wage growth, thought of as the "across-the-board" rate of salary increases, is composed of the price inflation assumption and an assumption for the real rate of wage increases/real wage growth. The excess of wage growth over price inflation represents the increase in the standard of living, also called productivity growth.

In constructing the salary increase assumption used to project future salary increases for individual members, the wage growth assumption is combined with an assumption for service-based salary increases (called a merit scale). The service-based salary increase assumption will be addressed when the demographic assumptions are studied. Currently, the 2.50% inflation assumption combined with the 0.75% real wage growth assumption leads to a general wage growth assumption of 3.25%.

Historical Perspective

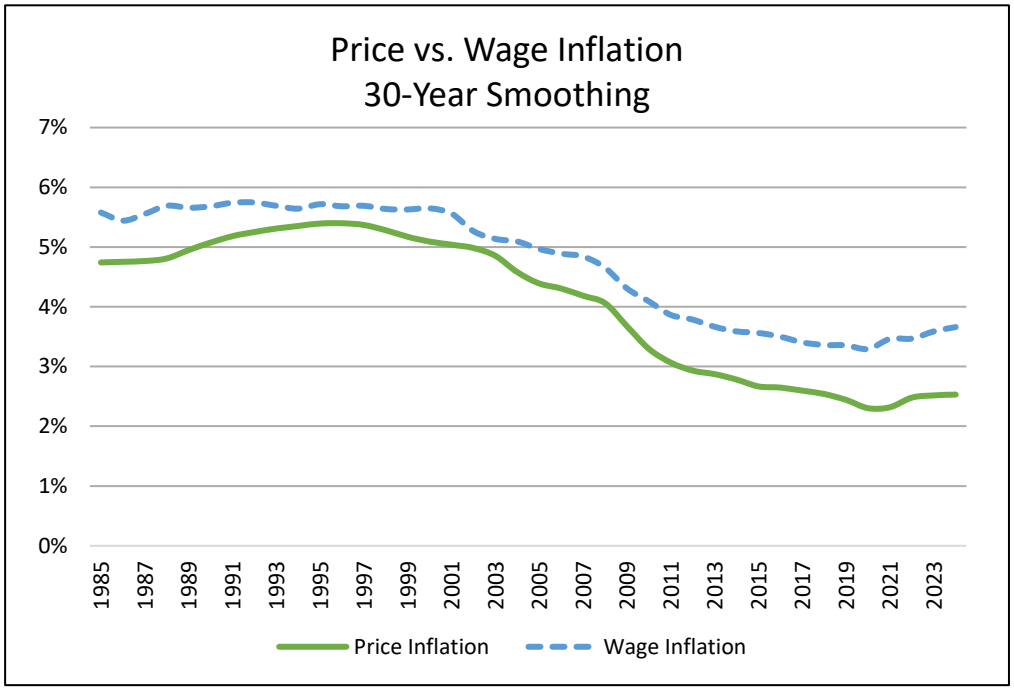
Wage statistics are found in the Social Security System database on the National Average Wage data. This information goes back to 1955 and is the most comprehensive database available. Because the National Average Wage is based on all wage earners in the country who are covered by Social Security, it can be influenced by the mix of jobs (full-time vs. part-time, manufacturing vs. service, etc.) as well as by changes in some segments of the workforce that are not seen in all segments (e.g., regional changes or growth in computer technology). Furthermore, if compensation is shifted between wages and benefits, the wage index would not accurately reflect increases in total compensation. OPERS membership is composed exclusively of governmental employees working in Oklahoma, whose wages and benefits are somewhat linked as a result of state and local tax revenues, funding allocations, and governing policies. Because the competition for workers can, in the long term, extend across industries and geography, the broad national earnings growth will have some impact on OPERS members. In the shorter term, however, the wage growth of OPERS and the nation may be less directly correlated.

The excess of wage inflation over price inflation represents the real wage inflation rate. Although real wage inflation has been very low in recent years, likely due to the slow recovery from the 2008 financial crisis, our focus must remain on the long term. The following tables show the compounded wage growth over various periods, along with the comparable price inflation rate for the same period. The differences represent the real wage inflation rate. The table on the left shows the real wage inflation over different 10-year periods while the table on the right shows the real wage inflation over increasing periods of 10 to 70 years.

Decade	General Wage Inflation	CPI Incr.	Real Wage Inflation
2014-2024	4.16%	3.00%	1.16%
2004-2024	3.42%	2.56%	0.86%
1994-2024	3.66%	2.52%	1.14%
1984-2024	3.73%	2.78%	0.95%
1974-2024	4.42%	3.68%	0.74%
1964-2024	4.65%	3.93%	0.72%
1954-2024	4.52%	3.59%	0.93%

Period	General Wage Inflation	CPI Incr.	Real Wage Inflation
2014-2024	4.16%	3.00%	1.16%
2004-2014	2.69%	2.12%	0.57%
1994-2004	4.14%	2.43%	1.71%
1984-1994	3.94%	3.58%	0.36%
1974-1984	7.23%	7.33%	-0.10%
1964-1974	5.78%	5.22%	0.56%
1954-1964	3.79%	1.57%	2.22%

Similar information over rolling 30-year periods is shown in the following graph:



Public Sector Compensation and Wages

The Bureau of Labor Statistics publishes the Employment Cost Index, including detail for real (net of inflation) total compensation and wages and salaries. Further, this index is also broken down for state and local government workers. From 2010 through 2025, total compensation grew at an annualized rate of 2.82%, while wages and salaries grew at a rate of 2.49%. (For private industry, the rates were 2.91% and 3.01%, respectively.) This difference is a reflection that state and local government workers have had a significant portion of their compensation increase delivered through benefits rather than wages and salaries. While it is certainly reasonable to anticipate that total compensation will continue to increase faster than wages and salaries, it is also reasonable to anticipate that the difference between the two will moderate over time.

Recommendation

Over the last 50-70 years, the actual experience on a national basis has been close to the current assumption. However, this is based on SSA data which uses the average wages of all US workers. As mentioned earlier, the median real wage increase has been significantly lower. We believe that wages will continue to grow at a greater rate than prices over the long term, although not necessarily at the level projected for all employers (private and governmental) by the SSA. We anticipate wage growth for governmental employees could be lower than the national average, at least in the short term, due to budget challenges still being experienced by both state and local governmental employers.

Based on the available data and our professional judgment, **we recommend that the long-term assumed real wage growth be kept at 0.75% per year. When coupled with the price inflation assumption of 2.50%, the resulting general wage growth assumption remains at 3.25%.**

PAYROLL GROWTH ASSUMPTION

In 2014, Senate Bill 2120 and House Bill 2630, in combination, began to significantly reduce the number of new members entering the plan after November 1, 2015. While this has had an impact on the valuation results since July 1, 2016 and will have an impact going forward, the impact emerges slowly since it only concerns employees hired after November 1, 2015. However, there are potential ramifications of this legislation that will affect on-going plan funding. In particular, the current amortization of the UAAL is based on the assumption of increasing payroll. The current provision of this legislation provide the difference between the defined contribution plan match and the statutory rate for the System be added to the defined benefit plan. Historically, this has provided at least as much payment toward the UAAL as would have been expected otherwise, so it has been appropriate to continue the methodology of amortizing as a level percentage of payroll.

In the 2026 legislative session, House Bill 4050 was enacted and will reduce the contributions from state agencies effective July 1, 2026. The reduction will significantly reduce the amount of

money that OPERS will receive based on Pathfinder payroll, and so our rationale for assuming payroll growth is not as strong as it has been in the past. However, as long as the OPERS fund remains in a fully funded situation with a negative amortization payment, assuming growing payroll results in a higher (less negative) amortization payment and is therefore conservative.

With amortization as a level percentage of payroll, the valuation requires an assumption regarding future annual increases in covered payroll. The wage growth assumption is typically used for this purpose. The current payroll growth assumption for OPERS and URSJJ is 3.25%, the same as the current wage growth assumption.

Based on the recommended wage growth assumption of 3.25%, we recommend the payroll growth assumption be retained at 3.25%.

SUMMARY OF ECONOMIC CHANGES

The following table summarizes the current set of economic assumptions along with the recommended set of economic assumptions:

	Current Assumptions	Recommended Assumptions
Price Inflation	2.50%	2.50%
Investment Return	6.50%	6.50%
General Wage Growth	3.25%	3.25%
Payroll Growth	3.25%	3.25%

SECTION III – 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

As with the economic assumptions, ASOP 27 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 27.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (July 1, 2022 through June 30, 2025) 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, 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. Comparing the actual to expected results provides an indication of the reasonableness of the assumption. This actual to expected ratio, or A/E ratio, is not the only indicator, however, since an assumption that is too high for part of the group and too low for another part might still have an A/E ratio near 100%. Consequently, we also consider graphical displays of the results as another aid in assessing the results of a 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. We note in particular that the period of time in the prior study overlapped with the COVID-19 pandemic that affected not only the health of individuals, but also led to individuals and employers responding differently than they had before. As a result, we were more cautious in the prior study in recommending changes for demographic assumptions than we would be in a more normal period. We kept that in mind as we analyzed the current period and developed our recommendations.

Because a major purpose of an actuarial valuation is to determine the liability, it is often preferable to measure the events that occurred by the proportion of liability that experience the change rather than simply the proportion of individuals who experienced the change. This "liability weighting" reflects that if certain events are connected with the salary or service level of individuals, then we should give more weight to those with greater liability. In some cases, there may be a noticeable difference in the results based upon whether we look at the analysis on a count or weighted basis. In these cases, we may select an assumption somewhere in between the two and move over time as the credibility of the liability-weighted results increases.

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 D and E.

Rates of Mortality

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 estimate the percentage of retirees who are expected to die in a given future year. This assumption typically has the most significant impact on liability projections of any demographic assumption. The current assumption is based on a table from the Society of Actuaries and is technically described as the PubG-2010(B) table (the "G" indicates general membership and the "(B)" indicates below median benefit amounts) with female ages set forward two years, projected generationally using projection scale MP-2019. Female ages set forward two years means that, for example, a woman aged 80 would be expected to die at the same rate as an 82-year-old woman based on the table. The male table is a good fit without any adjustment.

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. Until the last experience study, OPERS used the approach of maintaining a margin, a practice in which mortality rates are set with some future expected improvement already included. Following the last study, OPERS adopted the "generational mortality" approach in which there is no appreciable initial margin, but we instead build in expected improvement each year in the future. Generational mortality means that the probability of death depends not only on a person's age but the year that

age is obtained. Therefore, a person aged 80 in 2026 will have a higher expected probability of death than a person who will be age 80 in 2046.

Graphs showing actual versus expected post-retirement mortality rates for OPERS members are shown in Appendix D in Exhibit D-1 for males and D-2 for females, and Appendix E Exhibits E-1 and E-2 have the corresponding numerical data. The analysis of the actual post-retirement mortality experience over the three-year experience study period are significantly inconsistent with the observed mortality in the prior studies. In the last study, we did not rely on the observed mortality data because of the COVID-19 pandemic that occurred during much of the study period. We are generally comfortable that the current study period reflects COVID-19 as an endemic disease and that therefore we can use the observed data in guiding our mortality assumption.

The Society of Actuaries has released an updated public plan mortality table, designated as Pub-2016, since the last study. This table was based on a study of a large volume of public plan data and made generally small changes to the prior (Pub-2010) tables, primarily reflecting that mortality improvement was not quite as large as had been expected. In the intervening years, the MP-2021 projection scale has also been issued as an update to the MP-2019 projection scale currently used to estimate generational mortality improvement.

We are recommending a change to the mortality tables for retirees and beneficiaries to use the PubG-2016(B) table, the table for below median amounts for general membership, with a two-year age set forward for females and no age adjustment for males, projected generationally using scale MP-2021.

Because of the small URSJJ retiree population, we cannot obtain credible analysis of retiree mortality experience. Drawing upon the 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 in the past by setting the OPERS table back two years, so a 65-year-old URSJJ retiree is treated as having the same mortality rate as a 63-year-old OPERS member. **We recommend setting the OPERS table back two years for URSJJ members.**

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. Some studies indicate that survivor mortality may differ from member mortality due to factors such as different work experiences or the stress of being a surviving spouse, but we do not have enough data to credibly assess whether this might be applicable. Consequently, we do not attempt 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 12-year age set forward. We believe a 12-year age set forward remains an appropriate adjustment. There is admittedly not a lot of data to draw from, but the disability incidence is also low enough that this assumption is not significant. **We recommend setting the OPERS table forward 12 years for disabled members.**

Active Member Mortality:
For active members, the mortality assumption is less significant since it represents only a small portion of cases where employment ends and benefits begin. There are also additional challenges with collecting accurate data since some members may begin a disability retirement or terminate shortly before death, thereby affecting the reliability of the data. We had the following experience over the study period for active members ages 20 to 65:

	Actual Deaths	Expected Deaths	A/E Ratio
Males	52	93	56%
Females	42	65	65%

Because we are recommending a change to the mortality tables for retirees and beneficiaries, we believe it is reasonable to make the corresponding adjustment for active employees. We are recommending the employees version of the PubG-2016(B) table, with a two-year age set forward for females and no age adjustment for males, projected generationally using scale MP-2021. 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 the very limited data available, we cannot assess the adequacy of this assumption, but we find it reasonable and recommend its continued use.

Optional Form Tables:
Historically OPERS updates the optional form tables when the mortality or interest rate assumptions change. Since the mortality change proposed in this study is fairly minor, we do not feel strongly that factors should be updated, but recognize that OPERS may wish to do so from the perspective of maintaining a consistent policy.

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.

SECTION III – DEMOGRAPHIC ASSUMPTIONS

The System provides for two types of retirements based on different eligibility requirements. The first of these is for an unreduced retirement benefit. The second 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 (age 60 for members hired after October 31, 2011) 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.

Because of when the Rule of 90 replaced the Rule of 80, we are now beginning to observe Rule of 90 members who are eligible for unreduced retirement before age 62. Members hired before that date (Rule of 80), in contrast, have been largely eligible for unreduced retirement for several years and a large portion have already retired. Very few of those hired since 2011 have reached age 65, or even reached eligibility for early retirement because of the 10-year service requirement. We do see similar retirement patterns between the pre-2011 groups at ages above 62, and so we believe it reasonable to anticipate that retirement patterns among eligible employees who will eventually meet Rule of 90 before age 62 are not unlike the patterns of those who now meet Rule of 80 at those ages. Over the coming years, we will begin to be able to test the validity of that belief. For now, the practical result of the groups and eligibility requirements is that we use a uniform retirement assumption for those eligible to retire.

Graphs and detailed tables showing actual versus expected retirement rates are shown in Exhibits D-3, D-4, E-3, and E-4. The analysis of the actual retirement experience over the three-year period yields an actual/expected ratio of 59% for early retirement and 81% for unreduced retirement, indicating fewer retirements than expected.

The early retirement rates from 55 to 61 were lowered in the last two studies and early retirement continues to exhibit a similar pattern in this study. We believe that a further reduction in the early retirement rates toward the observed rates will improve the overall fit. For normal (unreduced) retirement, **we propose a slight reduction in the rates for ages 61 and 62.**

Retirement rates for members hired after October 31, 2011 are based primarily upon professional judgment rather than actual experience because no meaningful experience yet exists, especially for early retirement. Experience will be limited for many years. We will continue to base the rates on professional judgment and will monitor actual experience as it becomes available.

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.)

Because elected officials' retirements often coincide with elections, three-year experience studies capture either one or two general elections. This study period includes two election, and so observed retirements were slightly more than what was expected. Combining with the prior study (with one election), we do not see any significant mismatch between the expected and observed for this relatively small group, and so **we recommend retaining the current elected official retirement rates.**

Retirement rates for members hired after October 31, 2011 are based upon professional judgment rather than actual experience because very few members in this group have reached retirement eligibility yet. We will continue to base the rates on professional judgment and will monitor actual experience as it becomes available.

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

Graphs and detailed tables showing actual versus expected retirement rates are shown in Exhibits D-5 to D-7 and E-5 to E-7. Note that unreduced retirement has an assumption that is split into a service-based component (for those eligible because of 20 years of service) and an age-based component (for those eligible due to age, but with less than 20 years of service).

As in the prior studies, retirement experience for this smaller group has been somewhat volatile in terms of retirement utilization. We continue to see, however, some differences for those not attaining Rule of 80 or Rule of 90 and who then retire at 62 or later. **We propose reducing the rate at age 62 and increasing the rates from 66 to 69.**

Retirement rates for members hired after October 31, 2011 are based upon professional judgment rather than actual experience because no such experience yet exists. These members will begin to become retirement eligible in the next experience study period, but this experience will still be

limited. We will continue to base the rates on professional judgment and will monitor actual experience as it becomes available.

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". For Judges taking office after January 1, 2012, retirement age is sixty-seven (67) with eight (8) years of service or age sixty-two (62) with ten (10) years of service. No early retirement option is available for Judges.

Detailed tables showing actual versus expected retirement rates are shown in Exhibits D-8 and E-8. The analysis of the actual retirement experience over the three-year period yields an actual/expected ratio of 65%. In reviewing the last two studies, we do not see a discernible pattern in how retirements deviate from expected, partly because this is a small group. As a result, **we do not recommend any changes at this time.** In addition, we recommend using a single set of retirement rates for all Judges, whether hired before or after January 1, 2012, since we do not have any reason to anticipate different behavior.

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 Exhibits D-9, D-10, E-9, and E-10.

Currently there are two sets of unisex rates for the OPERS, one for Regular and Elected members and one for Hazardous Duty members. Judges are not assumed to have any disability retirements. While liability-weighted results are typically used in analyzing decrements, we use counts for analyzing the disability assumption in order to better reflect situations in which a member has had reduced earnings in the year ahead of disability.

As has been the case in recent studies, observed disabilities remain well below the expected rates. In the prior study, we did not adjust rates because we were concerned that COVID-19 might be a distorting factor. With the continued observation of low disability rates for both groups, we believe some reduction in rates at older ages is appropriate. **We recommend updating the disability rates for both Regular/Elected and Hazardous Duty members as shown in the Appendices.**

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. Over this period, with an observed termination rate of 1.1%, slightly lower than expected. **We recommend this assumption be maintained**.

The OPERS assumption is based on years of service and uses unisex rates. During this study period, the observed withdrawal rates were above the assumed rate as shown in Exhibits D-11 and E-11. Higher turnover in employment has been something we have observed in other locales as well, so this is not surprising. Further, we recognize that the OPERS active membership has fewer state employees over time (since the plan was closed to most state employees more than 10 years ago) and that the mix of jobs held by OPERS active members is likely changing to a mix that traditionally might have more turnover. **We recommend updating the withdrawal rates as shown in the Appendices.**

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.

The probabilities are based on duration. Exhibits D-12 and E-12 show the analysis of the last three years' experience. **We believe the current assumption remains a good predictor of behavior and recommend continuing with this assumption.**

Rates of Salary Increase for Merit and Promotion

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.

During this study period, OPERS salary increases averaged above the expected levels, not unexpected following some periods of high inflation. Based on what we observe in Exhibits D-13 and E-13, we want to be somewhat cautious in making any adjustments. Because the general "shape" of the increases is largely in line with what we observed, and because recent studies have shown smaller than expected increases, we are proposing to leave the merit scale largely unchanged. We are recommending a reduction in rates for ages under 25 to better align the shape of the merit scale with observed salary increases. **We recommend the salary increase rates as shown in the Appendices.**

For URSJJ, a flat 3.50% assumption was used. In general, there is little merit component in judges' pay, with all judges at the same level usually receiving the same pay rate, and very little promotion to higher courts. While this would normally argue for an assumption of pay increases equal to the wage growth assumption, there have been very few pay increases over the past decade, and so there may be some catch up over time. Therefore, **we recommend keeping this assumption at 3.50%, a rate slightly above our assumed wage inflation.**

Miscellaneous Assumptions

Percent Married: Currently 85% of members are assumed to be married with the husband four years older than the wife. These are common and reasonable assumptions, and **we recommend maintaining these assumptions.**

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**.

SECTION IV – 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 as of July 1, 2021 is amortized as a level percent of payroll over a 20-year closed period commencing July 1, 2007. Beginning in 2022, new experience bases due to assumption changes, benefit changes, or actual experience gains/losses are established each year and are amortized over closed 15-year periods. Given the way in which OPERS and URSJJ are funded, this amortization method is expected to produce a payment stream that is consistent as a percent of covered payroll. **We recommend no change in the use of this method.**

COLA Reserve: With the 2011 valuation we removed the use of an explicit COLA assumption and the reserve following legislation that would require a COLA to be funded (House Bill 2132). While there have been recent considerations of COLAs, they have not been provided with any regularity and therefore, **we recommend continuing the practice of not valuing any future COLA contingency. However, this recommendation could change if COLAs or stipends are funded from the plan with any regularity. While an *ad hoc* COLA being granted, as was done in the 2026 legislative session, does not give the expectation that it would be provided again, granting a COLA every year or two over six or eight years would cause a COLA expectation to be reasonable and we would anticipate reinstating the assumption and reserve.**

Capital Market Assumptions and Asset Allocation

Target Allocation, Rates of Return, and Standard Deviation by Asset Class

Asset Class	Target Allocation	Ten Year Return Forecast*	Standard Deviation Forecast
US Large Cap Equity	34.0%	6.5%	15.6%
US Small Cap Equity	6.0%	8.4%	21.2%
Global Equity ex-US	28.0%	8.6%	19.9%
Core Fixed Income	25.0%	4.8%	4.9%
Long Term Treasuries	3.5%	5.6%	13.4%
US TIPS	3.5%	4.7%	5.5%
Total	100.0%		

Asset Class Correlation Coefficients

	US Large	US Small	Global	Core	Treas	TIPS
US Large	1.00	0.90	1.00	0.40	0.20	0.50
US Small	0.90	1.00	0.90	0.40	0.10	0.40
Global	1.00	0.90	1.00	0.40	0.20	0.50
Core	0.40	0.40	0.40	1.00	0.80	0.90
Long Treas	0.20	0.10	0.20	0.80	1.00	0.80
TIPS	0.50	0.40	0.50	0.90	0.80	1.00

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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.

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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;

- 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.

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Amortization Method

The unfunded actuarial accrued liability as of July 1, 2021 is amortized as a level percent of payroll over a 20-year closed period commencing July 1, 2007. New experience bases due to assumption changes or actual experience gains/losses will be established each year and will be amortized over closed 15-year periods. Given a stable active workforce, this amortization method is expected to produce a payment stream that is consistent 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 on the June 30 prior to the valuation date, 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.

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.

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SUMMARY OF PROPOSED ACTUARIAL ASSUMPTIONS

Economic Assumptions

Price Inflation: 2.50% per annum, compounded annually

Investment Return: 6.50% net of investment expenses per annum, compounded annually

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

Nearest Age	% Increase
20 - 24	8.75
25 - 29	7.55
30 – 34	6.05
35 – 39	5.25
40 – 44	4.95
45 – 49	4.55
50 – 54	4.25
55 – 59	4.05
60 – 64	3.55
65+	3.25

Wage and Payroll Growth: 3.25% 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 2.50%

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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	
Age	Those Eligible For Unreduced Retirement	Those Eligible For Reduced Retirement	Those Eligible For Unreduced Retirement	Those Eligible For Reduced Retirement
50	15	N/A	N/A	N/A
51	15	N/A	N/A	N/A
52	15	N/A	N/A	N/A
53	15	N/A	N/A	N/A
54	15	N/A	N/A	N/A
55	10	3.25	N/A	N/A
56	10	3.25	N/A	N/A
57	11	3.25	N/A	N/A
58	12	3.5	N/A	N/A
59	13	4.5	N/A	N/A
60	14	5.25	30/15*	5
61	18	9.0	30/15*	6
62	22	N/A	30/15*	6
63	15	N/A	30/15*	6
64	15	N/A	30/15*	13
65	30	N/A	30/15*	N/A
66	30	N/A	25	N/A
67	30	N/A	25	N/A
68	30	N/A	25	N/A
69	30	N/A	25	N/A
70	40	N/A	50	N/A
71	40	N/A	50	N/A
72	40	N/A	50	N/A
73	40	N/A	50	N/A
74	40	N/A	50	N/A
75	100	N/A	100	N/A

*30 when first eligible to retire and 15 thereafter

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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	
Age	Those Eligible For Unreduced Retirement	Those Eligible For Reduced Retirement	Those Eligible For Unreduced Retirement	Those Eligible For Reduced 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	7.0	N/A	N/A
56	20	7.0	N/A	N/A
57	20	7.0	N/A	N/A
58	20	7.0	N/A	N/A
59	20	7.0	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

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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	20	50	N/A	20	20
51	N/A	21	20	51	N/A	21	20
52	N/A	22	20	52	N/A	22	20
53	N/A	23-24	15	53	N/A	23-34	15
54	N/A	25-29	20	54	N/A	25-29	20
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	5			58	N/A		
59	5			59	N/A		
60	5			60	7		
61	20			61	20		
62	22			62	20		
63	22			63	20		
64	25			64	20		
65	40			65	40		
66	40			66	25		
67	40			67	23		
68	40			68	22		
69	40			69	21		
70	100			70	100		

Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

Mortality Rates

Active participants and nondisabled pensioners	Pub-2016 Below Median, General Membership Active/Retiree Healthy Mortality Table with base rates projected generationally using Scale MP-2021. Male rates are unadjusted and female rates are set forward two years.
Disabled pensioners	Nondisabled retiree mortality set forward 12 years for disabled experience.
Hazardous Duty members	Rates are increased from the regular and elected member active mortality rates by 10% for line-of-duty deaths.

Disability Rates: Graduated rates

Disabled rates per 100 members

Nearest Age	Regular/Elected	Hazardous Duty
20	0.007	0.007
30	0.007	0.017
40	0.017	0.046
50	0.108	0.144
60	0.170	0.320

State of Oklahoma
Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

Withdrawal Rates:

Service	Rate
0	27.0%
1	23.0%
2	19.5%
3	16.0%
4	13.8%
5	11.5%
6	10.0%
7	8.8%
8	7.8%
9	7.0%
10	6.5%
11	5.8%
12	5.3%
13	5.0%
14	4.8%
15	4.5%
16	4.3%
17	4.0%
18	3.8%
19	3.5%
20	3.3%
21	3.0%
22	2.8%
23	2.5%
24	2.3%
25	2.0%
26	1.8%
27	1.5%
28	1.3%
29+	1.0%

State of Oklahoma
Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

Probability of Electing Vested Benefit:

Regular Members Only	
Duration	Rate
8	80%
13	85%
18	90%
23	95%
28	100%

Marital Status:

Percentage Married	85%
Age difference	Males 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. In the event an Elected Official has previously commenced their benefits, has no beneficiary on the record, and has no defined optional form of payment, it is assumed that 60% will receive the 50% joint and survivor annuity.

State of Oklahoma
Oklahoma Public Employees Retirement System

Demographic Assumptions (continued)

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 as of July 1, 2021 is amortized as a level percent of payroll over a 20-year closed period commencing July 1, 2007. New experience bases due to assumption changes or actual experience gains/losses will be established each year and will be amortized over closed 15-year periods. Given a stable active workforce, this amortization method is expected to produce a payment stream that is consistent 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 on the June 30 prior to the valuation date, increased by the salary scale to develop expected earnings for the current valuation year.

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

SUMMARY OF PROPOSED ACTUARIAL ASSUMPTIONS

Economic Assumptions

Price Inflation:	2.50% per annum, compounded annually
Investment Return:	6.50% net of investment expenses per annum, compounded annually
Salary Increases:	3.50% per year
Wage and Payroll Growth:	3.25% 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 2.50%

Demographic Assumptions

Retirement age:

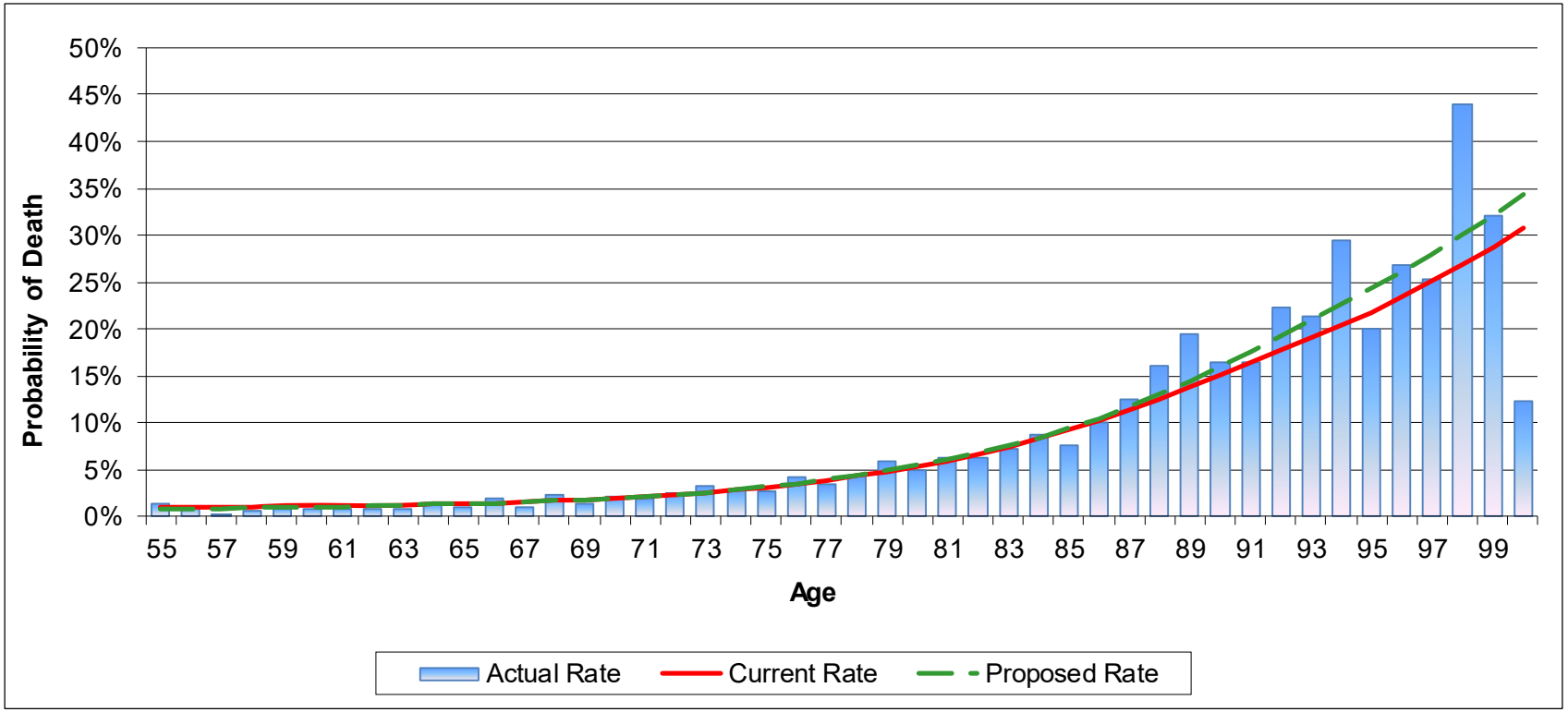
Attained Age	Annual Rates of Retirement Per 100 Eligible Members
Below 59	5
59 – 61	10
62 – 66	15
67 – 68	20
69 – 74	25
75+	100

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

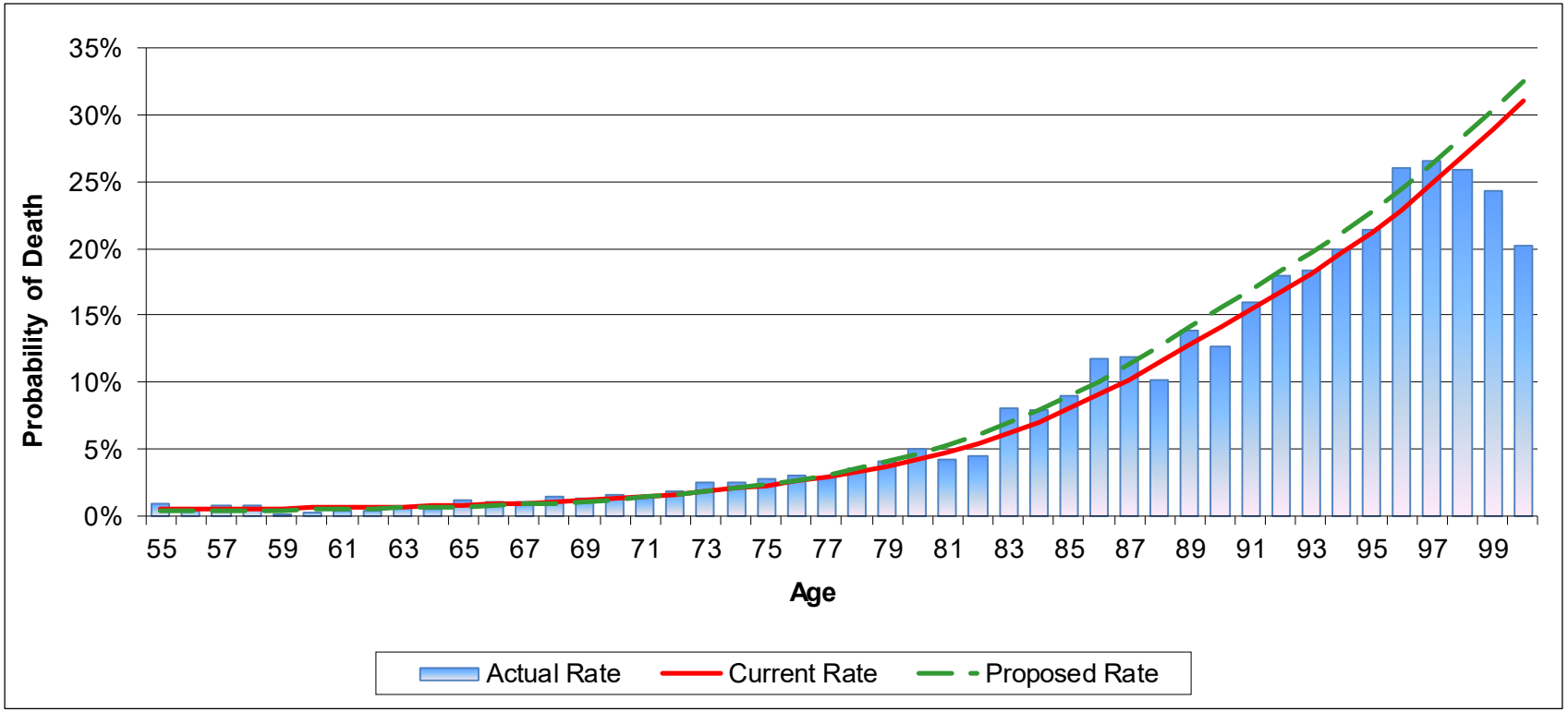
Mortality Rates:	
Active Participants and nondisabled pensioners	Pub-2016 Below Median, General Membership Active/Retiree Healthy Mortality Table with base rates projected generationally using Scale MP-2021. Male rates are set back two years and female rates are unadjusted.
Disabled pensioners	Nondisabled retiree mortality set forward 12 years for disabled experience.
Separation Rates:	
Separation for all reasons other than death	2% for all years of service prior to retirement eligibility.
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.
Missing age or service	For members who have not completed the application process and are missing data, we assume they are 50 years old as of the valuation date with half a year of service.

Experience Study 2022-2025
Exhibit D-1
Probability of Death - Healthy Retirees
OPERS - Males



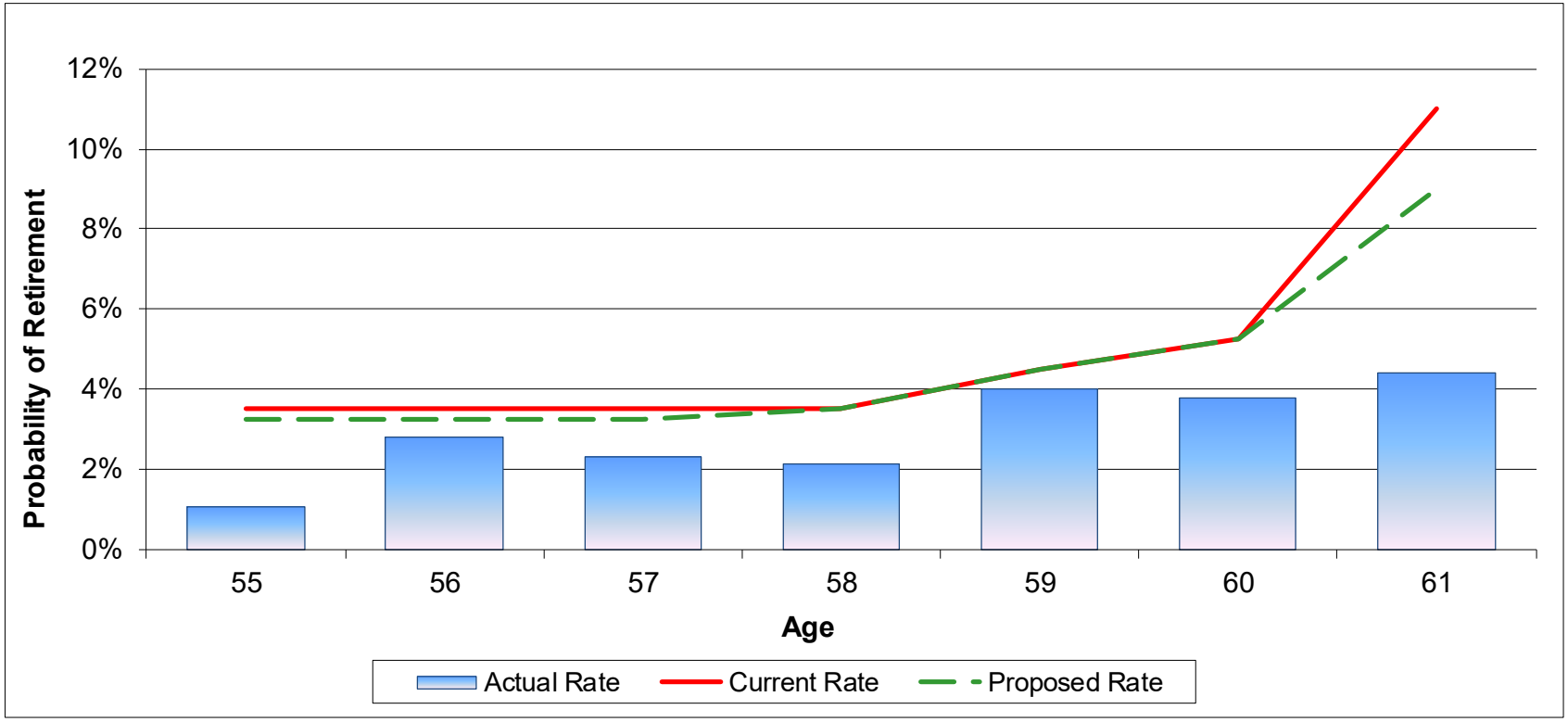
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	2,472,203	2,399,220	2,434,467
Actual/Expected		103%	102%

Experience Study 2022-2025
Exhibit D-2
Probability of Death - Healthy Retirees
OPERS - Females



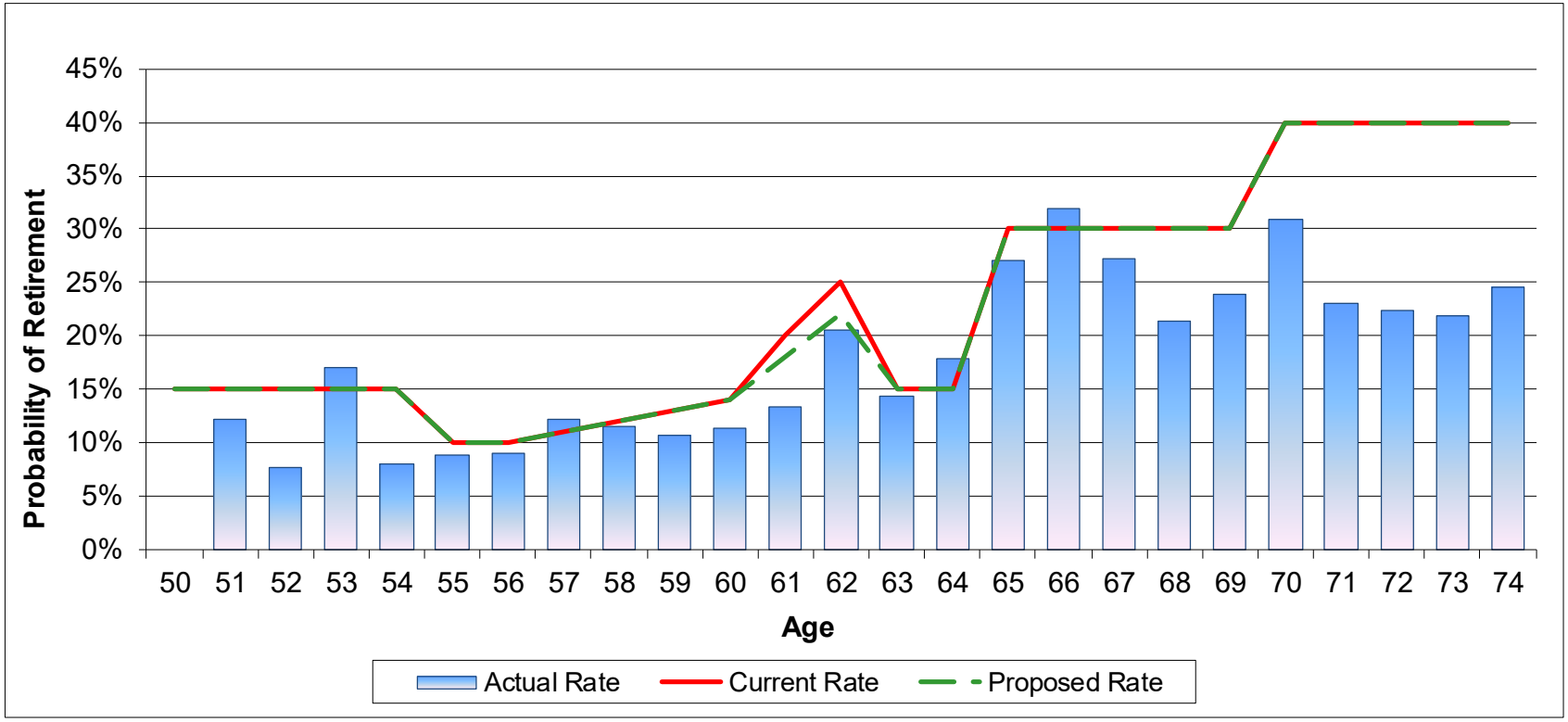
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	2,371	2,177	2,271
Actual/Expected		109%	104%

Experience Study 2022-2025
Exhibit D-3
Retirement Rates
Regular - Early



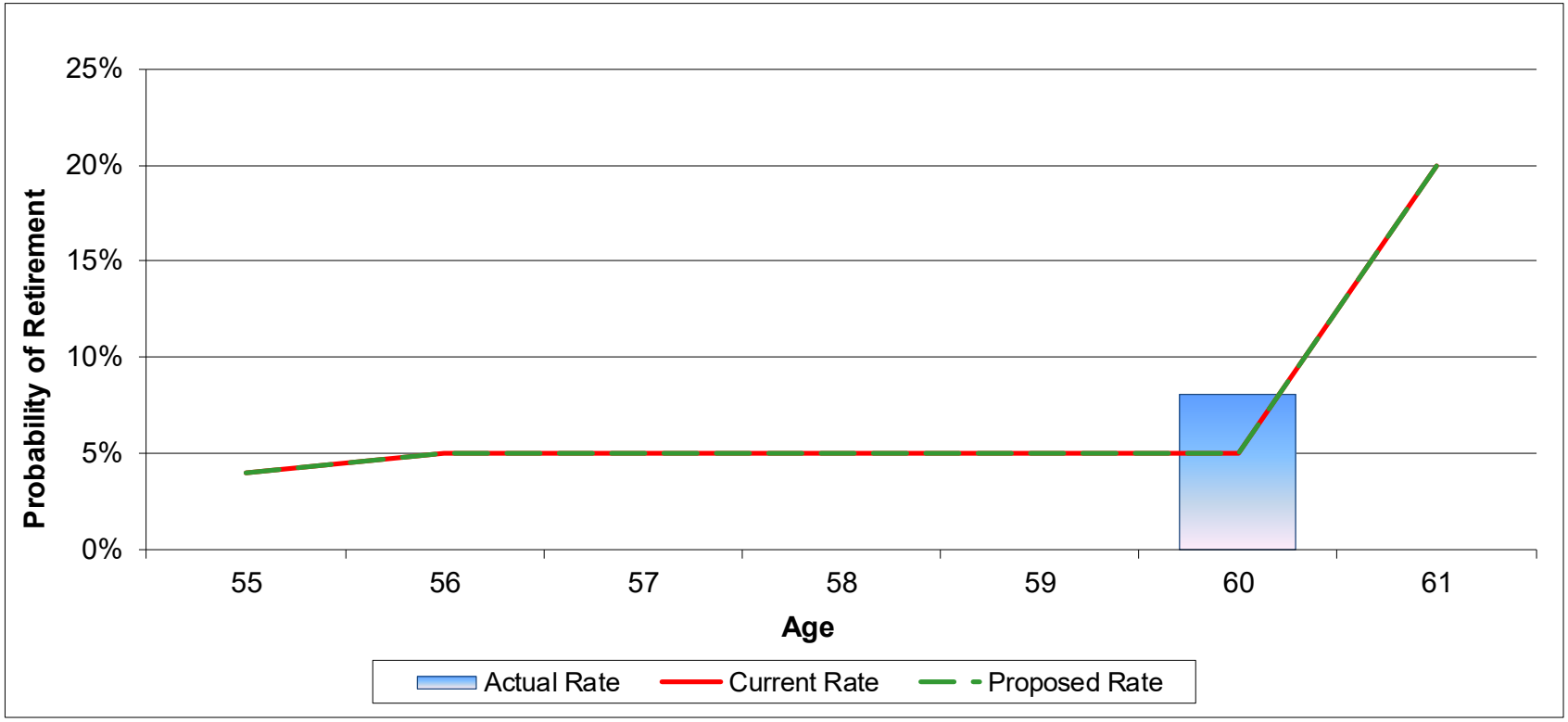
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	255,943	431,256	398,443
Actual/Expected		59%	64%

Experience Study 2022-2025
Exhibit D-4
Retirement Rates
Regular - Unreduced



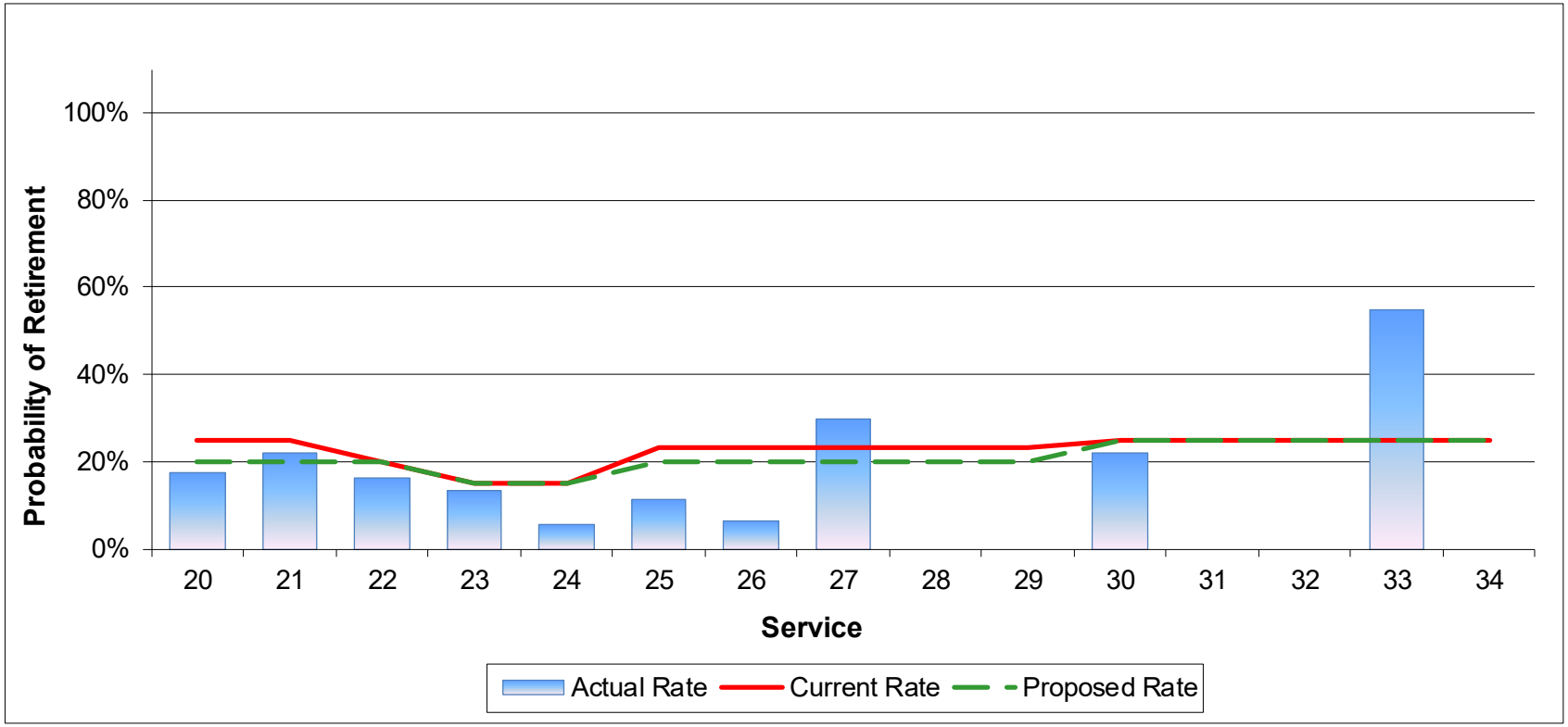
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	3,196,363	3,756,405	3,652,919
Actual/Expected		85%	88%

Experience Study 2022-2025
Exhibit D-5
Retirement Rates
Hazardous Duty - Early



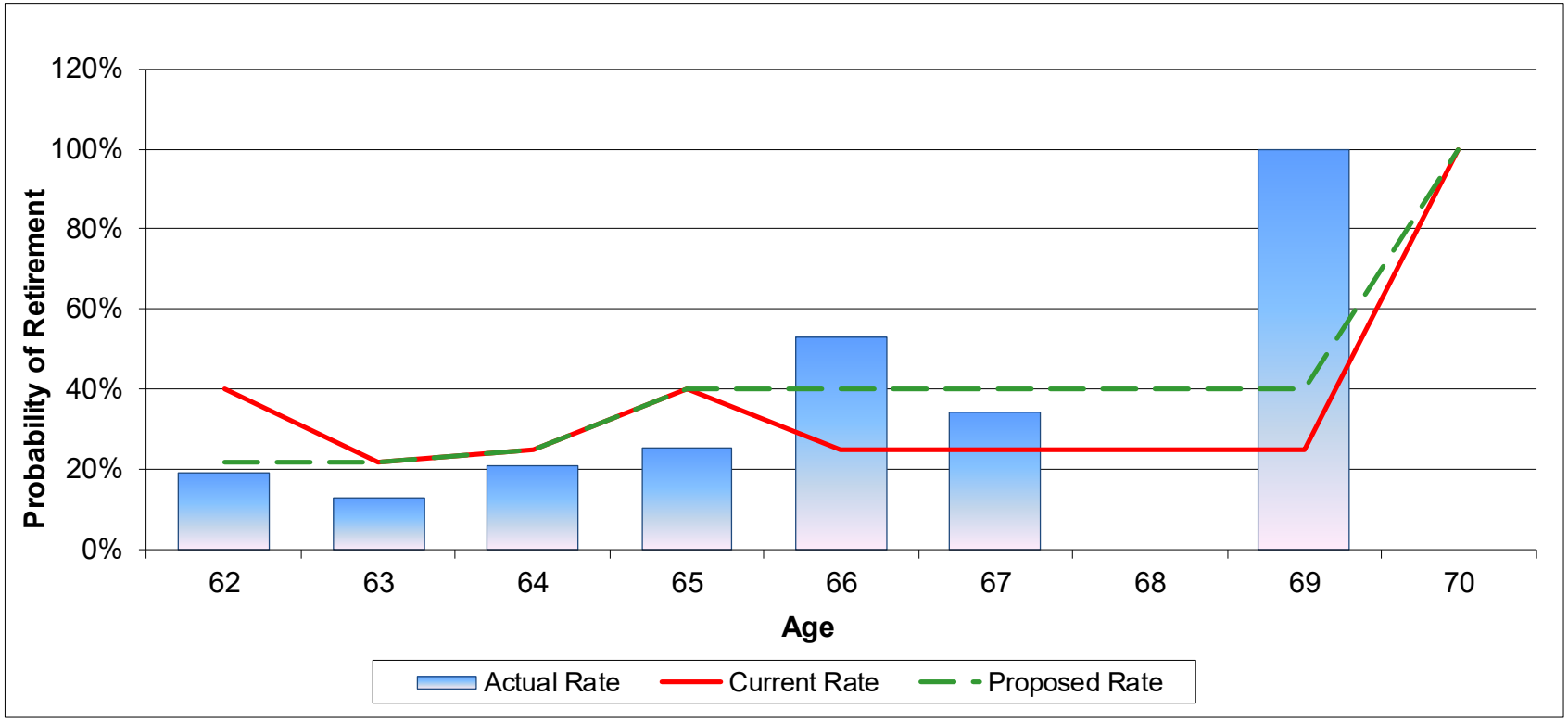
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	1,429	4,103	4,103
Actual/Expected		35%	35%

Experience Study 2022-2025
Exhibit D-6
Retirement Rates
Hazardous Duty - Unreduced



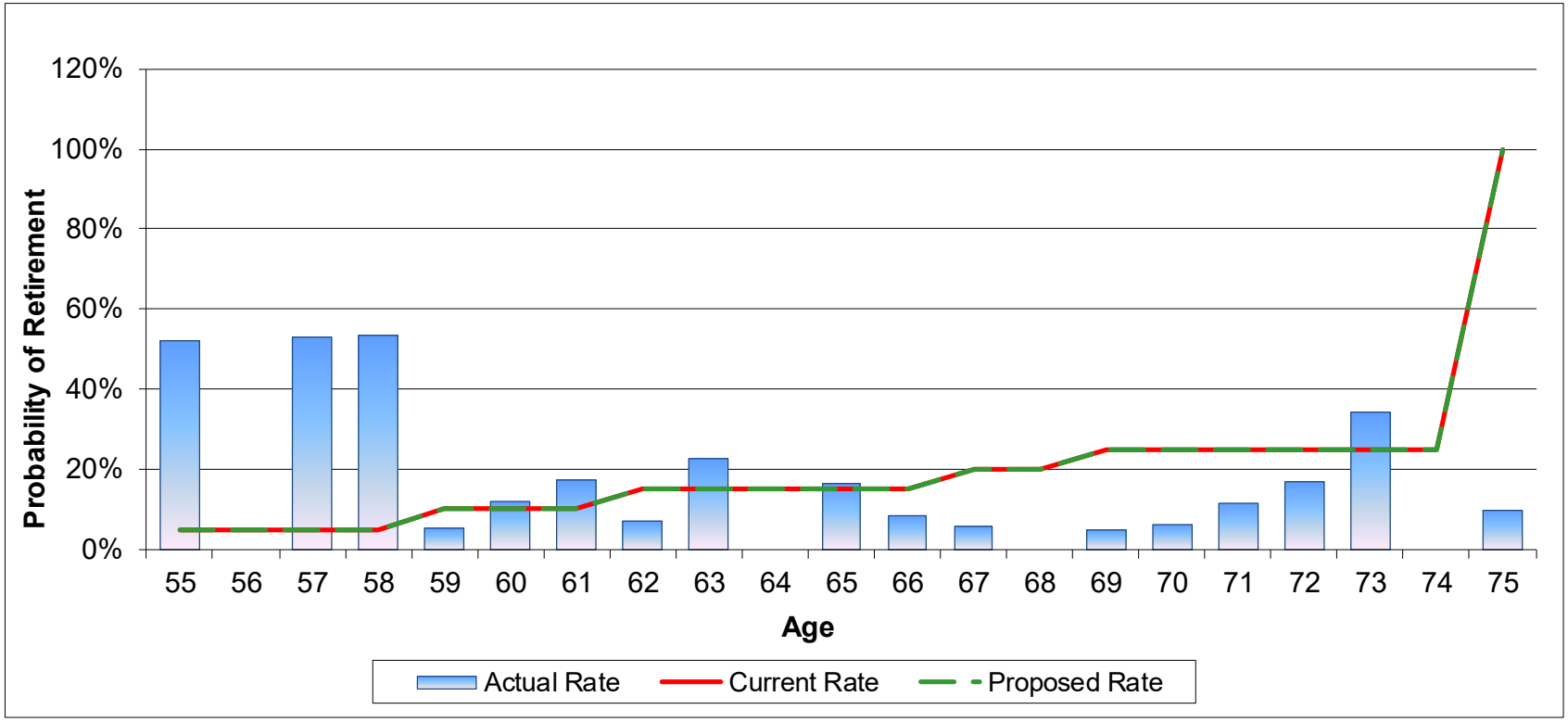
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	50,161.69	76,070	65,388
Actual/Expected		66%	77%

Experience Study 2022-2025
Exhibit D-7
Retirement Rates
Hazardous Duty - Unreduced (Age)



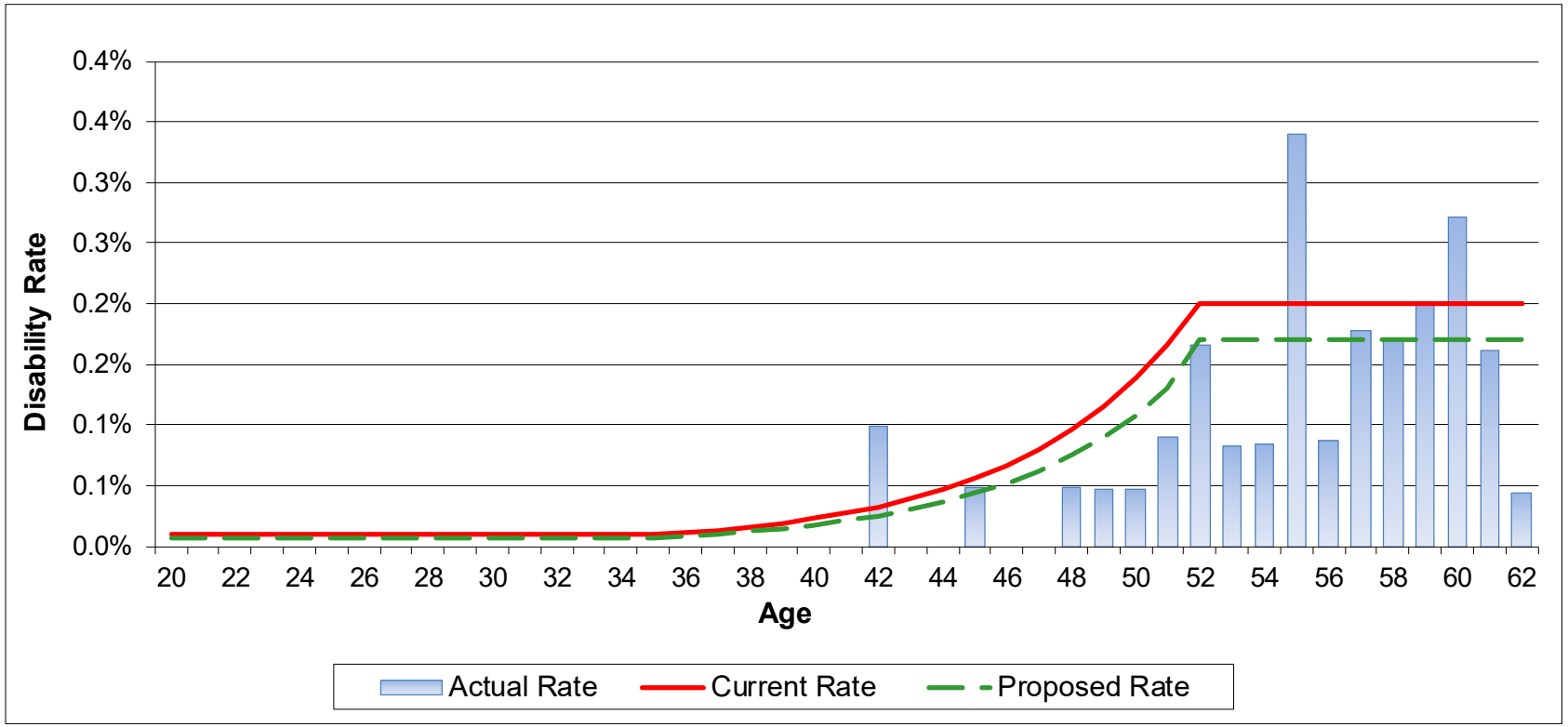
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	7,420	9,518	8,945
Actual/Expected		78%	83%

Experience Study 2022-2025
Exhibit D-8
Retirement Rates
URSJJ



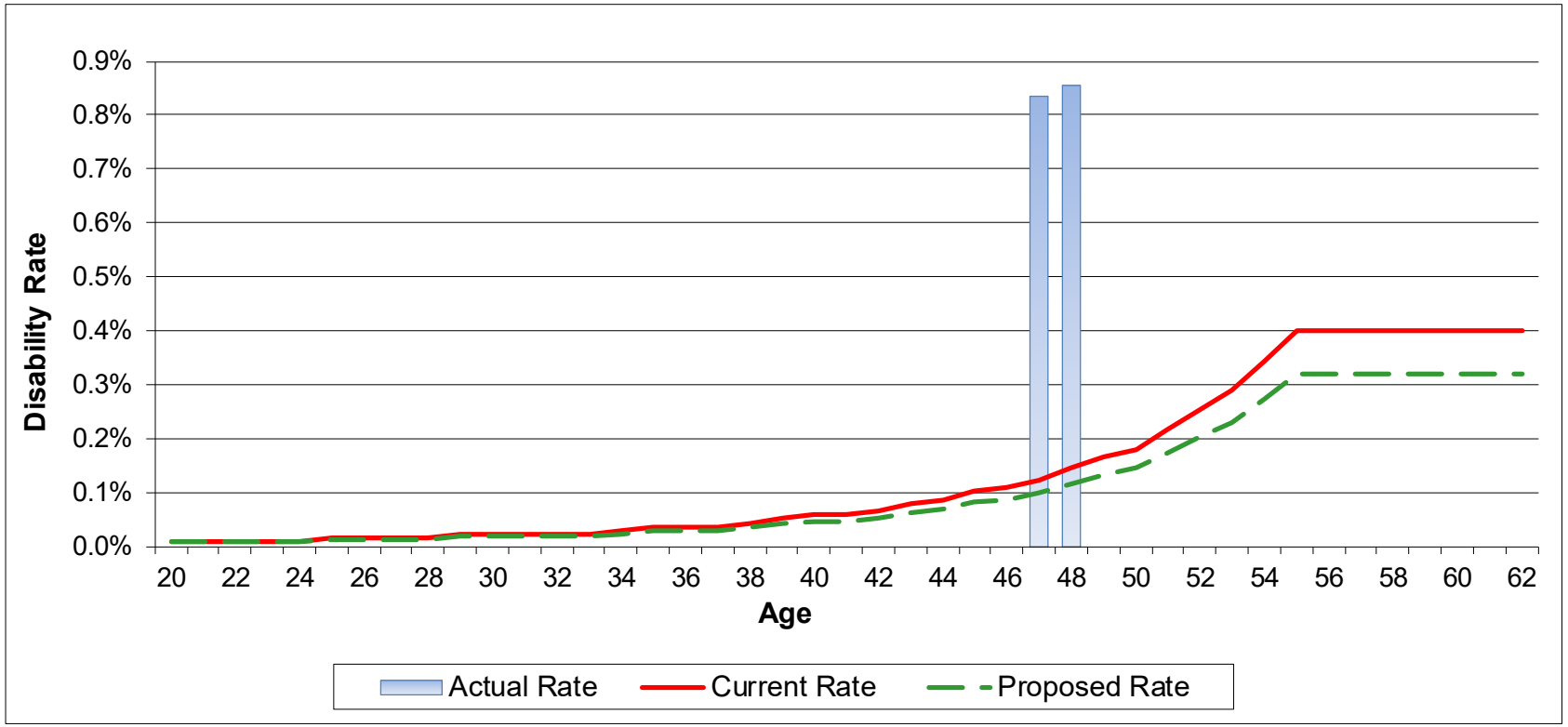
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	73,091	111,954	111,954
Actual/Expected		65%	65%

Experience Study 2022-2025
Exhibit D-9
Rate of Disability - Active Lives
Regular and Elected Members



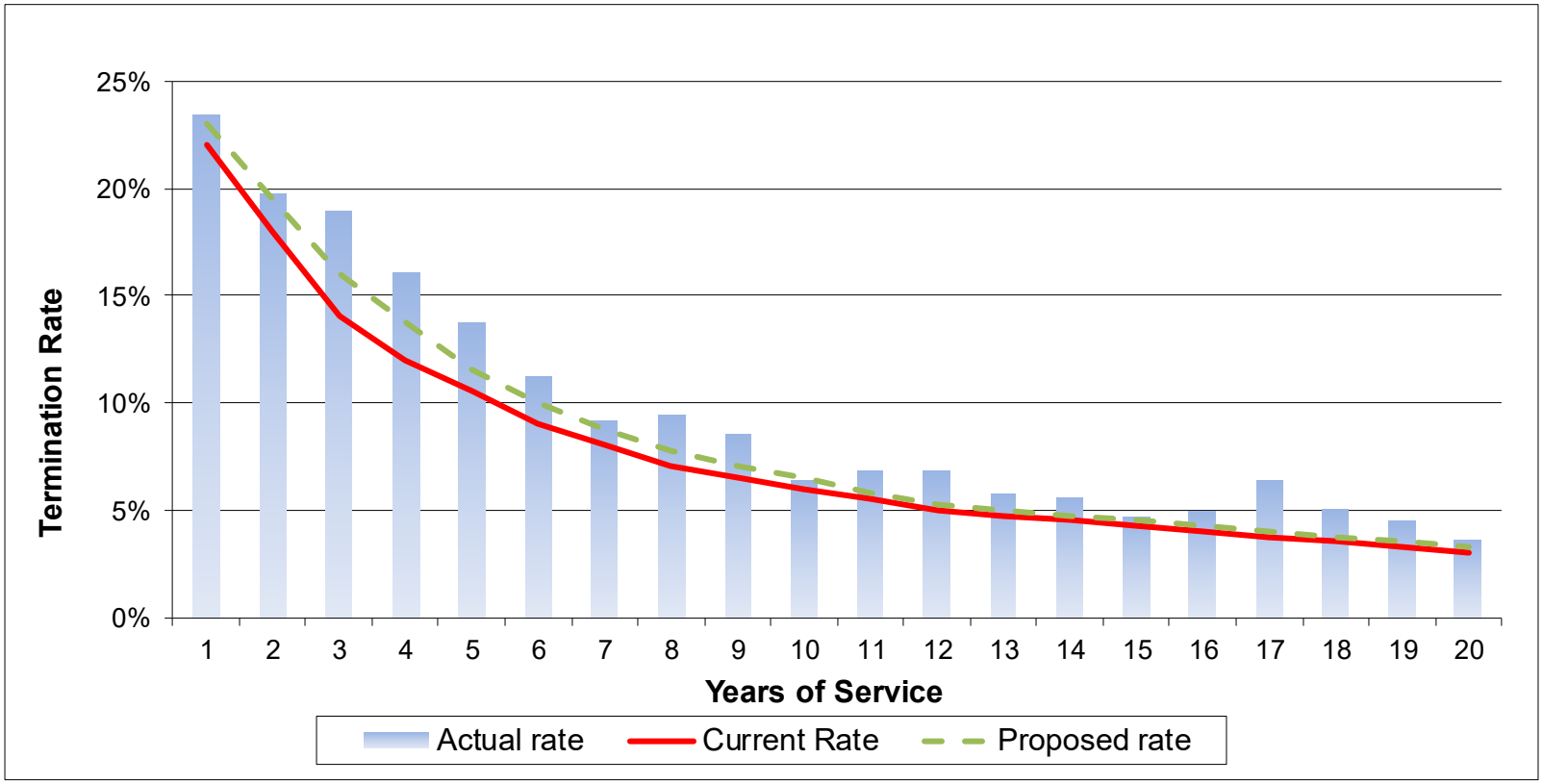
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	51	73	61
Actual/Expected		70%	84%

Experience Study 2022-2025
Exhibit D-10
Rate of Disability - Active Lives
Hazardous Duty



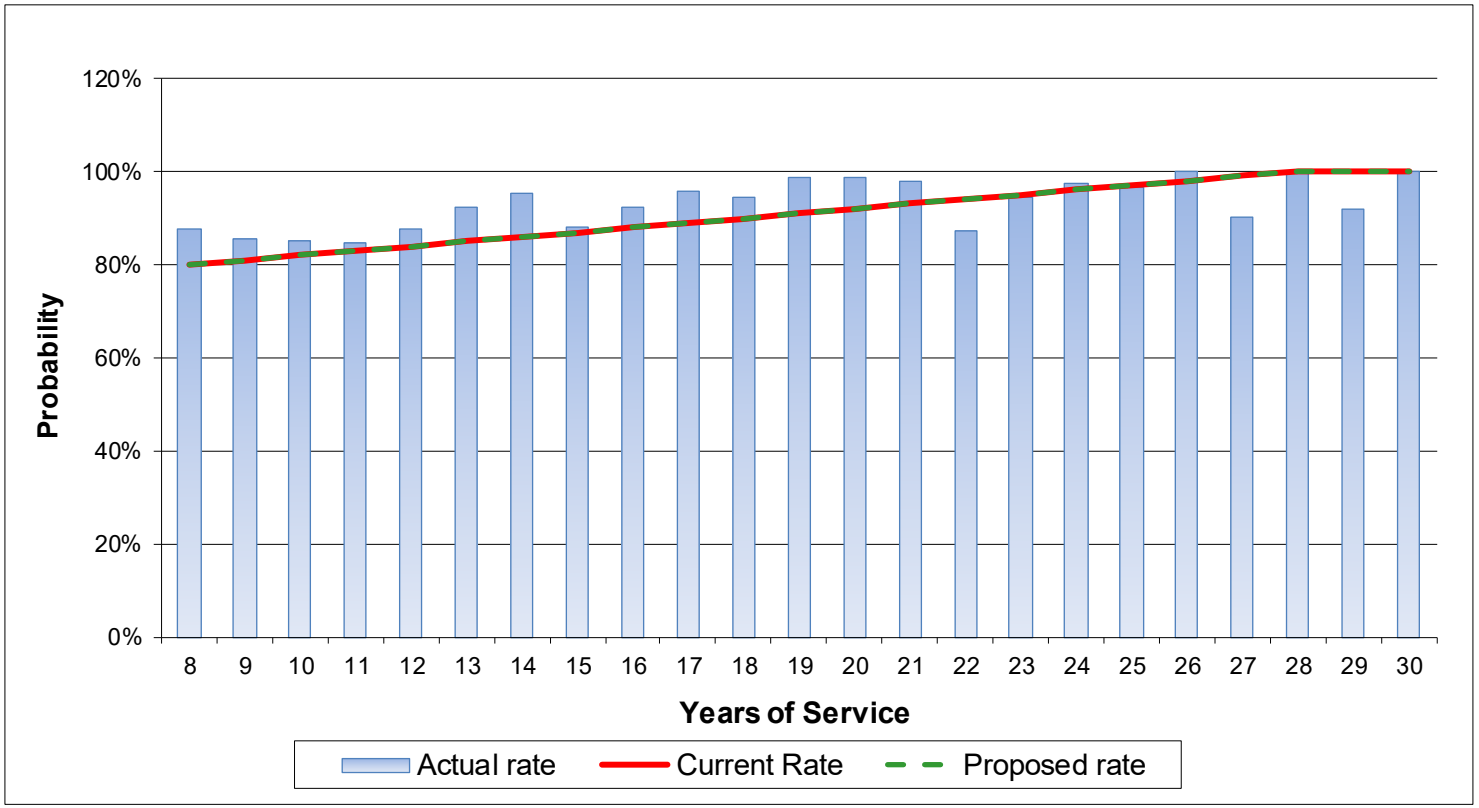
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	2	5	4
Actual/Expected		40%	50%

Experience Study 2022-2025
Exhibit D-11
Rate of Termination of Employment
OPERS



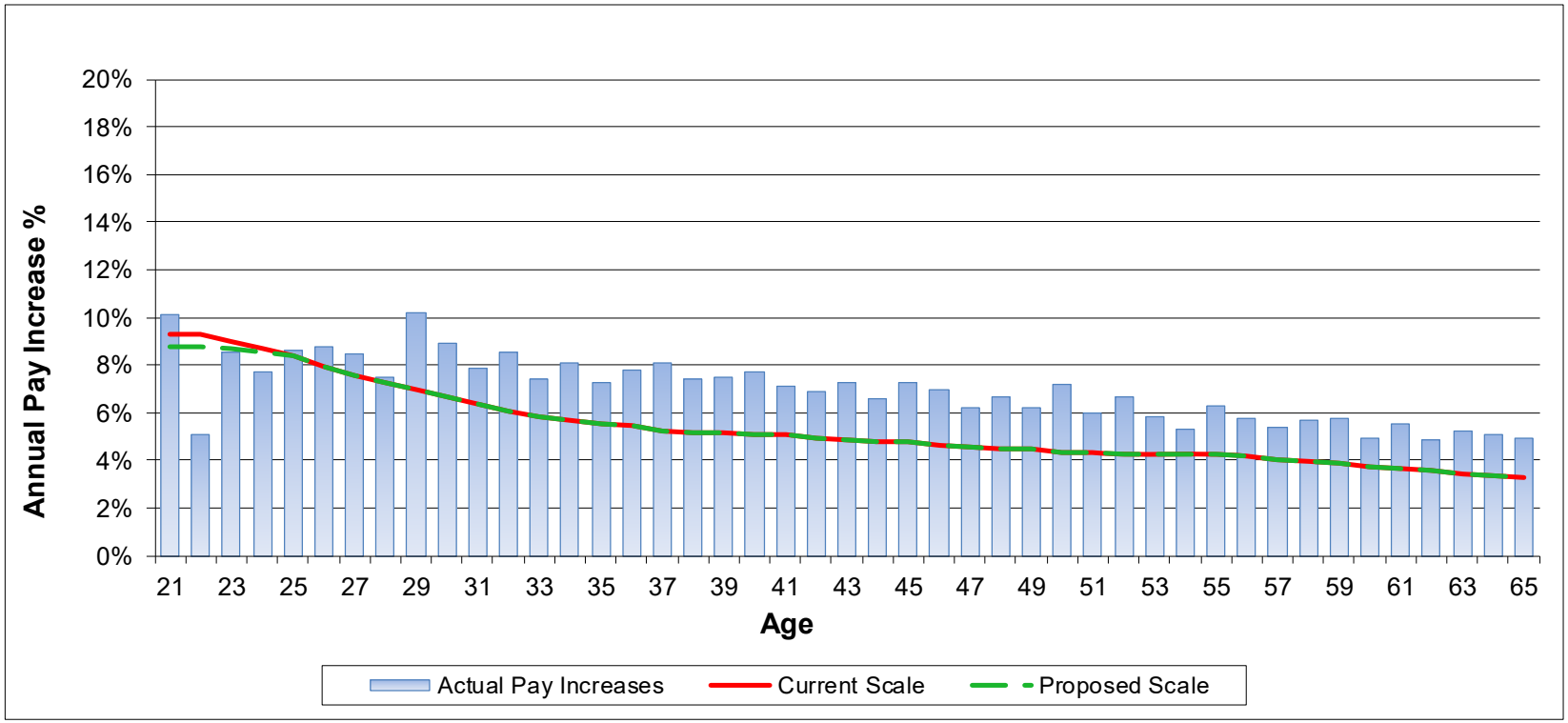
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	173,496	137,455	148,662
Actual/Expected		126%	117%

Experience Study 2022-2025
Exhibit D-12
Probability of Contributions Remaining with the System
OPERS - Regular



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	151,337	144,540	144,540
Actual/Expected		105%	105%

Experience Study 2022-2025
Exhibit D-13
Total Salary Scale
OPERS



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Average Increase	6.42%	4.55%	4.55%
Actual/Expected		141%	141%

Exhibit E-1
Probability of Death - Healthy Retirees
OPERS - Males

Age	Exposure	Actual Deaths	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	409.1	5.4	1.3%	3.5	0.9%	3.0	0.7%
56	494.8	4.9	1.0%	4.5	0.9%	3.9	0.8%
57	607.5	1.6	0.3%	5.9	1.0%	5.0	0.8%
58	857.6	4.8	0.6%	8.7	1.0%	7.5	0.9%
59	1,142.6	9.4	0.8%	12.1	1.1%	10.6	0.9%
60	1,380.1	11.4	0.8%	15.3	1.1%	13.5	1.0%
61	1,666.1	11.4	0.7%	19.3	1.2%	17.3	1.0%
62	1,907.9	14.0	0.7%	22.8	1.2%	21.0	1.1%
63	2,268.0	16.2	0.7%	28.0	1.2%	26.5	1.2%
64	2,441.3	33.0	1.4%	31.1	1.3%	30.3	1.2%
65	2,545.6	23.8	0.9%	33.4	1.3%	33.7	1.3%
66	2,832.1	56.2	2.0%	39.8	1.4%	40.0	1.4%
67	3,070.3	30.6	1.0%	46.4	1.5%	46.5	1.5%
68	3,219.2	76.2	2.4%	52.6	1.6%	52.6	1.6%
69	3,352.5	47.5	1.4%	59.5	1.8%	59.2	1.8%
70	3,571.4	73.4	2.1%	69.0	1.9%	68.6	1.9%
71	3,565.7	64.8	1.8%	75.4	2.1%	74.9	2.1%
72	3,365.6	84.4	2.5%	78.0	2.3%	77.7	2.3%
73	3,081.5	101.1	3.3%	78.5	2.5%	78.5	2.5%
74	3,038.9	88.6	2.9%	85.4	2.8%	85.8	2.8%
75	3,210.0	85.9	2.7%	99.8	3.1%	100.6	3.1%
76	3,063.0	127.7	4.2%	105.5	3.4%	106.8	3.5%
77	2,719.0	90.6	3.3%	104.0	3.8%	105.6	3.9%
78	2,285.2	97.6	4.3%	97.3	4.3%	99.0	4.3%
79	2,119.1	123.4	5.8%	100.6	4.7%	102.5	4.8%
80	1,887.5	93.7	5.0%	100.0	5.3%	101.8	5.4%
81	1,681.8	106.2	6.3%	99.6	5.9%	101.3	6.0%
82	1,506.8	92.6	6.1%	99.7	6.6%	101.4	6.7%
83	1,403.6	100.1	7.1%	103.8	7.4%	105.4	7.5%
84	1,224.8	107.4	8.8%	101.1	8.3%	102.7	8.4%
85	988.9	74.8	7.6%	90.9	9.2%	92.6	9.4%
86	773.2	77.8	10.1%	79.0	10.2%	80.8	10.4%
87	654.7	81.2	12.4%	74.0	11.3%	76.3	11.6%
88	557.3	89.9	16.1%	69.6	12.5%	72.3	13.0%
89	449.5	87.1	19.4%	61.7	13.7%	64.8	14.4%
90	368.5	60.6	16.4%	55.4	15.0%	58.9	16.0%
Total to 100	70,688.9	2,472.2	3.5%	2,399.2	3.4%	2,434.5	3.4%

Note: Counts are weighted

Exhibit E-2
Probability of Death - Healthy Retirees
OPERS - Females

Age	Exposure	Actual Deaths	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	239.4	2.1	0.9%	1.2	0.5%	0.8	0.4%
56	400.1	1.4	0.3%	2.1	0.5%	1.5	0.4%
57	538.8	4.4	0.8%	2.9	0.5%	2.2	0.4%
58	696.3	5.1	0.7%	3.9	0.6%	3.0	0.4%
59	1,022.4	1.8	0.2%	6.0	0.6%	4.7	0.5%
60	1,293.1	2.7	0.2%	8.0	0.6%	6.3	0.5%
61	1,733.4	6.9	0.4%	11.2	0.6%	9.1	0.5%
62	2,112.9	9.9	0.5%	14.2	0.7%	11.9	0.6%
63	2,831.4	19.7	0.7%	19.8	0.7%	17.2	0.6%
64	3,032.2	14.6	0.5%	23.1	0.8%	20.0	0.7%
65	3,401.7	39.8	1.2%	28.1	0.8%	24.6	0.7%
66	3,783.8	39.0	1.0%	34.1	0.9%	30.2	0.8%
67	4,236.8	43.2	1.0%	41.8	1.0%	37.6	0.9%
68	4,412.2	63.2	1.4%	47.9	1.1%	43.8	1.0%
69	4,447.7	60.8	1.4%	53.2	1.2%	49.5	1.1%
70	4,366.3	71.9	1.6%	57.9	1.3%	54.8	1.3%
71	4,242.0	59.6	1.4%	62.5	1.5%	60.1	1.4%
72	3,966.8	72.9	1.8%	65.3	1.6%	63.7	1.6%
73	3,807.2	97.8	2.6%	70.0	1.8%	69.5	1.8%
74	3,620.8	92.8	2.6%	74.6	2.1%	75.1	2.1%
75	3,485.4	95.0	2.7%	80.7	2.3%	82.4	2.4%
76	3,117.6	95.0	3.0%	81.2	2.6%	84.1	2.7%
77	2,676.8	78.8	2.9%	78.6	2.9%	82.5	3.1%
78	2,313.2	84.2	3.6%	76.7	3.3%	81.6	3.5%
79	2,239.3	92.9	4.1%	84.0	3.8%	90.6	4.0%
80	2,093.9	105.0	5.0%	89.1	4.3%	97.2	4.6%
81	1,876.1	79.6	4.2%	90.5	4.8%	99.8	5.3%
82	1,540.3	69.2	4.5%	84.3	5.5%	93.8	6.1%
83	1,375.8	111.5	8.1%	85.5	6.2%	95.6	6.9%
84	1,141.7	91.0	8.0%	80.6	7.1%	90.1	7.9%
85	970.0	87.7	9.0%	77.7	8.0%	86.7	8.9%
86	818.6	96.3	11.8%	74.2	9.1%	82.6	10.1%
87	693.8	82.0	11.8%	70.9	10.2%	78.7	11.4%
88	572.4	58.2	10.2%	65.7	11.5%	73.0	12.7%
89	538.6	74.5	13.8%	68.8	12.8%	76.3	14.2%
90	456.8	57.8	12.7%	64.4	14.1%	71.2	15.6%
Total to 100	81,657.2	2,371.1	2.9%	2,176.9	2.7%	2,271.5	2.8%

Note: Counts are weighted

Exhibit E-3
Retirement Rates
Regular - Early

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	1,506,547	15,987	1.1%	52,729.1	3.5%	48,962.8	3.3%
56	1,442,210	40,562	2.8%	50,477.3	3.5%	46,871.8	3.3%
57	1,348,928	31,352	2.3%	47,212.5	3.5%	43,840.2	3.3%
58	1,254,097	26,688	2.1%	43,893.4	3.5%	43,893.4	3.5%
59	1,221,867	48,858	4.0%	54,984.0	4.5%	54,984.0	4.5%
60	1,153,881	43,771	3.8%	60,578.8	5.3%	60,578.8	5.3%
61	1,103,463	48,725	4.4%	121,380.9	11.0%	99,311.7	9.0%
	9,030,993	255,943	2.8%	431,256.1	4.8%	398,442.6	4.4%

Note: Counts are weighted

Exhibit E-4
Retirement Rates
Regular - Unreduced

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
50	3,377	-	0.0%	506.5	15.0%	506.5	15.0%
51	32,671	3,990	12.2%	4,900.6	15.0%	4,900.6	15.0%
52	81,796	6,280	7.7%	12,269.4	15.0%	12,269.4	15.0%
53	149,787	25,620	17.1%	22,468.0	15.0%	22,468.0	15.0%
54	189,026	15,169	8.0%	28,353.9	15.0%	28,353.9	15.0%
55	279,286	24,899	8.9%	27,928.6	10.0%	27,928.6	10.0%
56	407,675	36,552	9.0%	40,767.5	10.0%	40,767.5	10.0%
57	498,392	60,630	12.2%	54,823.1	11.0%	54,823.1	11.0%
58	619,826	71,765	11.6%	74,379.2	12.0%	74,379.2	12.0%
59	850,871	91,025	10.7%	110,613.3	13.0%	110,613.3	13.0%
60	1,053,433	119,829	11.4%	147,480.6	14.0%	147,480.6	14.0%
61	2,191,236	291,461	13.3%	438,247.3	20.0%	394,422.6	18.0%
62	1,988,707	410,022	20.6%	497,176.7	25.0%	437,515.5	22.0%
63	1,726,176	247,593	14.3%	258,926.4	15.0%	258,926.4	15.0%
64	1,625,622	291,532	17.9%	243,843.3	15.0%	243,843.3	15.0%
65	1,512,135	408,189	27.0%	453,640.5	30.0%	453,640.5	30.0%
66	1,120,841	357,875	31.9%	336,252.2	30.0%	336,252.2	30.0%
67	771,136	210,285	27.3%	231,340.8	30.0%	231,340.8	30.0%
68	585,153	125,092	21.4%	175,545.8	30.0%	175,545.8	30.0%
69	438,855	104,755	23.9%	131,656.4	30.0%	131,656.4	30.0%
70	348,024	107,387	30.9%	139,209.4	40.0%	139,209.4	40.0%
71	249,153	57,271	23.0%	99,661.2	40.0%	99,661.2	40.0%
72	201,448	45,148	22.4%	80,579.3	40.0%	80,579.3	40.0%
73	200,444	43,768	21.8%	80,177.7	40.0%	80,177.7	40.0%
74	164,144	40,226	24.5%	65,657.6	40.0%	65,657.6	40.0%
	17,289,212	3,196,363	18.5%	3,756,405.1	21.7%	3,652,919.1	21.1%

Note: Counts are weighted

Exhibit E-5
Retirement Rates
Hazardous Duty - Early

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	13,812	-	0.0%	552.5	4.0%	552.5	4.0%
56	12,120	-	0.0%	606.0	5.0%	606.0	5.0%
57	12,680	-	0.0%	634.0	5.0%	634.0	5.0%
58	12,507	-	0.0%	625.4	5.0%	625.4	5.0%
59	16,033	-	0.0%	801.6	5.0%	801.6	5.0%
60	17,675	1,429	8.1%	883.8	5.0%	883.8	5.0%
61	-	-	0.0%	-	20.0%	-	20.0%
	84,827	1,429	1.7%	4,103.2	4.8%	4,103.2	4.8%

Note: Counts are weighted

Exhibit E-6
Retirement Rates
Hazardous Duty - Unreduced

Duration	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	124,100	21,676	17.5%	31,024.9	25.0%	24,819.9	20.0%
21	46,493	10,152	21.8%	11,623.2	25.0%	9,298.5	20.0%
22	23,376	3,812	16.3%	4,675.2	20.0%	4,675.2	20.0%
23	13,884	1,835	13.2%	2,082.5	15.0%	2,082.5	15.0%
24	19,036	1,016	5.3%	2,855.5	15.0%	2,855.5	15.0%
25	23,964	2,701	11.3%	5,511.7	23.0%	4,792.8	20.0%
26	22,107	1,442	6.5%	5,084.7	23.0%	4,421.4	20.0%
27	10,653	3,170	29.8%	2,450.2	23.0%	2,130.6	20.0%
28	8,591	-	0.0%	1,976.0	23.0%	1,718.2	20.0%
29	6,432	-	0.0%	1,479.4	23.0%	1,286.5	20.0%
30	7,833	1,716	21.9%	1,958.2	25.0%	1,958.2	25.0%
31	4,487	-	0.0%	1,121.7	25.0%	1,121.7	25.0%
32	9,541	-	0.0%	2,385.3	25.0%	2,385.3	25.0%
33	4,805	2,642	55.0%	1,201.3	25.0%	1,201.3	25.0%
34	2,561	-	0.0%	640.2	25.0%	640.2	25.0%
35	4,934	-	0.0%	4,934.0	100.0%	4,934.0	100.0%
	332,797	50,162	15.1%	81,004.0	24.3%	70,321.9	21.1%

Note: Counts are weighted

Exhibit E-7
Retirement Rates
Hazardous Duty - Unreduced (Age)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
62	10,168	1,963	19.3%	4,067.4	40.0%	2,237.1	22.0%
63	5,420	706	13.0%	1,192.3	22.0%	1,192.3	22.0%
64	3,203	676	21.1%	800.7	25.0%	800.7	25.0%
65	3,405	863	25.4%	1,362.0	40.0%	1,362.0	40.0%
66	3,818	2,017	52.8%	954.6	25.0%	1,527.4	40.0%
67	2,414	829	34.3%	603.6	25.0%	965.8	40.0%
68	1,785	-	0.0%	446.3	25.0%	714.0	40.0%
69	365	365	100.0%	91.3	25.0%	146.1	40.0%
70	-	-	0.0%	-	100.0%	-	100.0%
	30,579	7,420	24.3%	9,518.2	31.1%	8,945.4	29.3%

Note: Counts are weighted

Exhibit E-8
Retirement Rates
URSJJ

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	6,973	3,625	52.0%	348.7	5.0%	348.7	5.0%
56	6,850	-	0.0%	342.5	5.0%	342.5	5.0%
57	7,388	3,918	53.0%	369.4	5.0%	369.4	5.0%
58	6,749	3,614	53.6%	337.4	5.0%	337.4	5.0%
59	36,173	1,879	5.2%	3,617.3	10.0%	3,617.3	10.0%
60	57,957	6,828	11.8%	5,795.7	10.0%	5,795.7	10.0%
61	45,665	7,956	17.4%	4,566.5	10.0%	4,566.5	10.0%
62	46,584	3,226	6.9%	6,987.7	15.0%	6,987.7	15.0%
63	38,109	8,570	22.5%	5,716.3	15.0%	5,716.3	15.0%
64	46,320	-	0.0%	6,948.0	15.0%	6,948.0	15.0%
65	52,721	8,615	16.3%	7,908.2	15.0%	7,908.2	15.0%
66	45,053	3,811	8.5%	6,757.9	15.0%	6,757.9	15.0%
67	27,419	1,601	5.8%	5,483.8	20.0%	5,483.8	20.0%
68	26,888	-	0.0%	5,377.6	20.0%	5,377.6	20.0%
69	32,522	1,611	5.0%	8,130.4	25.0%	8,130.4	25.0%
70	40,442	2,449	6.1%	10,110.6	25.0%	10,110.6	25.0%
71	32,766	3,777	11.5%	8,191.6	25.0%	8,191.6	25.0%
72	30,177	5,093	16.9%	7,544.1	25.0%	7,544.1	25.0%
73	15,432	5,307	34.4%	3,858.0	25.0%	3,858.0	25.0%
74	4,778	-	0.0%	1,194.4	25.0%	1,194.4	25.0%
75	12,368	1,208	9.8%	12,367.6	100.0%	12,367.6	100.0%
	619,333	73,091	11.8%	111,953.7	18.1%	111,953.7	18.1%

Note: Counts are weighted

Exhibit E-9
Rate of Disability - Active Lives
Regular and Elected Members

Age	Exposure	Actual Disabilities	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	326	-	0.000%	0.0	0.009%	0.0	0.007%
21	440	-	0.000%	0.0	0.009%	0.0	0.007%
22	508	-	0.000%	0.0	0.009%	0.0	0.007%
23	533	-	0.000%	0.0	0.009%	0.0	0.007%
24	589	-	0.000%	0.1	0.009%	0.0	0.007%
25	596	-	0.000%	0.1	0.009%	0.0	0.007%
26	603	-	0.000%	0.1	0.009%	0.0	0.007%
27	616	-	0.000%	0.1	0.009%	0.0	0.007%
28	697	-	0.000%	0.1	0.009%	0.0	0.007%
29	755	-	0.000%	0.1	0.009%	0.1	0.007%
30	853	-	0.000%	0.1	0.009%	0.1	0.007%
31	992	-	0.000%	0.1	0.009%	0.1	0.007%
32	1,162	-	0.000%	0.1	0.009%	0.1	0.007%
33	1,304	-	0.000%	0.1	0.009%	0.1	0.007%
34	1,377	-	0.000%	0.1	0.009%	0.1	0.007%
35	1,382	-	0.000%	0.1	0.009%	0.1	0.007%
36	1,642	-	0.000%	0.2	0.011%	0.1	0.008%
37	1,716	-	0.000%	0.2	0.013%	0.2	0.010%
38	1,703	-	0.000%	0.3	0.016%	0.2	0.012%
39	1,767	-	0.000%	0.3	0.019%	0.3	0.015%
40	1,836	-	0.000%	0.4	0.022%	0.3	0.017%
41	1,929	-	0.000%	0.5	0.027%	0.4	0.021%
42	2,031	2	0.098%	0.7	0.032%	0.5	0.025%
43	2,067	-	0.000%	0.8	0.039%	0.6	0.030%
44	2,069	-	0.000%	1.0	0.046%	0.7	0.036%
45	2,085	1	0.048%	1.2	0.056%	0.9	0.043%
46	2,004	-	0.000%	1.3	0.067%	1.0	0.052%
47	2,062	-	0.000%	1.7	0.080%	1.3	0.062%
48	2,078	1	0.048%	2.0	0.096%	1.6	0.075%
49	2,113	1	0.047%	2.4	0.116%	1.9	0.090%
50	2,164	1	0.046%	3.0	0.139%	2.3	0.108%
51	2,213	2	0.090%	3.7	0.166%	2.9	0.129%
52	2,403	4	0.166%	4.8	0.200%	4.1	0.170%
53	2,432	2	0.082%	4.9	0.200%	4.1	0.170%
54	2,387	2	0.084%	4.8	0.200%	4.1	0.170%
55	2,356	8	0.340%	4.7	0.200%	4.0	0.170%
56	2,305	2	0.087%	4.6	0.200%	3.9	0.170%
57	2,259	4	0.177%	4.5	0.200%	3.8	0.170%
58	2,349	4	0.170%	4.7	0.200%	4.0	0.170%
59	2,476	5	0.202%	5.0	0.200%	4.2	0.170%
60	2,582	7	0.271%	5.2	0.200%	4.4	0.170%
61	2,489	4	0.161%	5.0	0.200%	4.2	0.170%
62	2,310	1	0.043%	4.6	0.200%	3.9	0.170%
	70,560	51	0.072%	73.5	0.104%	60.9	0.086%

Exhibit E-10
Rate of Disability - Active Lives
Hazardous Duty Members

Age	Exposure	Actual Disabilities	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
20	5	-	0.000%	0.0	0.009%	0.0	0.007%
21	44	-	0.000%	0.0	0.009%	0.0	0.007%
22	67	-	0.000%	0.0	0.009%	0.0	0.007%
23	90	-	0.000%	0.0	0.009%	0.0	0.007%
24	123	-	0.000%	0.0	0.009%	0.0	0.007%
25	132	-	0.000%	0.0	0.014%	0.0	0.012%
26	175	-	0.000%	0.0	0.014%	0.0	0.012%
27	192	-	0.000%	0.0	0.014%	0.0	0.012%
28	193	-	0.000%	0.0	0.014%	0.0	0.012%
29	179	-	0.000%	0.0	0.022%	0.0	0.017%
30	213	-	0.000%	0.0	0.022%	0.0	0.017%
31	198	-	0.000%	0.0	0.022%	0.0	0.017%
32	215	-	0.000%	0.0	0.022%	0.0	0.017%
33	176	-	0.000%	0.0	0.022%	0.0	0.017%
34	170	-	0.000%	0.0	0.029%	0.0	0.023%
35	174	-	0.000%	0.1	0.036%	0.1	0.029%
36	168	-	0.000%	0.1	0.036%	0.0	0.029%
37	171	-	0.000%	0.1	0.036%	0.0	0.029%
38	156	-	0.000%	0.1	0.043%	0.1	0.035%
39	148	-	0.000%	0.1	0.050%	0.1	0.040%
40	139	-	0.000%	0.1	0.058%	0.1	0.046%
41	153	-	0.000%	0.1	0.058%	0.1	0.046%
42	152	-	0.000%	0.1	0.065%	0.1	0.052%
43	133	-	0.000%	0.1	0.079%	0.1	0.063%
44	122	-	0.000%	0.1	0.086%	0.1	0.069%
45	122	-	0.000%	0.1	0.101%	0.1	0.081%
46	121	-	0.000%	0.1	0.108%	0.1	0.086%
47	120	1	0.833%	0.1	0.122%	0.1	0.098%
48	117	1	0.855%	0.2	0.144%	0.1	0.115%
49	105	-	0.000%	0.2	0.166%	0.1	0.132%
50	116	-	0.000%	0.2	0.180%	0.2	0.144%
51	102	-	0.000%	0.2	0.216%	0.2	0.173%
52	99	-	0.000%	0.2	0.252%	0.2	0.202%
53	95	-	0.000%	0.3	0.288%	0.2	0.230%
54	82	-	0.000%	0.3	0.342%	0.2	0.274%
55	72	-	0.000%	0.3	0.400%	0.2	0.320%
56	70	-	0.000%	0.3	0.400%	0.2	0.320%
57	58	-	0.000%	0.2	0.400%	0.2	0.320%
58	61	-	0.000%	0.2	0.400%	0.2	0.320%
59	72	-	0.000%	0.3	0.400%	0.2	0.320%
60	59	-	0.000%	0.2	0.400%	0.2	0.320%
61	44	-	0.000%	0.2	0.400%	0.1	0.320%
62	38	-	0.000%	0.2	0.400%	0.1	0.320%
	5,241	2	0.038%	5.1	0.097%	4.1	0.077%

Exhibit E-11
Rate of Termination of Employment
OPERS

Duration	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
0					26.0%		27.0%
1	17,435	4,087	23.4%	3,836	22.0%	4,010	23.0%
2	28,643	5,646	19.7%	5,156	18.0%	5,585	19.5%
3	40,590	7,673	18.9%	5,683	14.0%	6,494	16.0%
4	49,553	7,952	16.0%	5,946	12.0%	6,814	13.8%
5	54,049	7,400	13.7%	5,675	10.5%	6,216	11.5%
6	76,339	8,551	11.2%	6,870	9.0%	7,634	10.0%
7	128,022	11,667	9.1%	10,242	8.0%	11,202	8.8%
8	183,998	17,367	9.4%	12,880	7.0%	14,260	7.8%
9	190,587	16,245	8.5%	12,388	6.5%	13,341	7.0%
10	180,033	11,440	6.4%	10,802	6.0%	11,702	6.5%
11	161,154	11,011	6.8%	8,863	5.5%	9,266	5.8%
12	136,997	9,392	6.9%	6,850	5.0%	7,192	5.3%
13	134,314	7,759	5.8%	6,380	4.8%	6,716	5.0%
14	145,556	8,128	5.6%	6,550	4.5%	6,914	4.8%
15	156,893	7,310	4.7%	6,668	4.3%	7,060	4.5%
16	156,169	7,729	4.9%	6,247	4.0%	6,637	4.3%
17	150,718	9,626	6.4%	5,652	3.8%	6,029	4.0%
18	131,398	6,553	5.0%	4,599	3.5%	4,927	3.8%
19	99,400	4,429	4.5%	3,230	3.3%	3,479	3.5%
20	97,941	3,531	3.6%	2,938	3.0%	3,183	3.3%
	2,319,787	173,496	7.5%	137,455	5.9%	148,662	6.4%

Note: Counts are weighted.

Exhibit E-12
Probability of Contributions Remaining with the System
OPERS - Regular

Duration	Exposure	Actual Remaining	Actual Rate	Proposed Expected	Proposed Rate
8	16,959	14,856	87.6%	13,567	80.0%
9	17,851	15,303	85.7%	14,460	81.0%
10	11,973	10,207	85.3%	9,818	82.0%
11	11,358	9,594	84.5%	9,427	83.0%
12	10,482	9,181	87.6%	8,805	84.0%
13	8,437	7,804	92.5%	7,171	85.0%
14	9,816	9,364	95.4%	8,442	86.0%
15	8,473	7,461	88.1%	7,372	87.0%
16	9,220	8,531	92.5%	8,113	88.0%
17	11,690	11,182	95.7%	10,404	89.0%
18	9,961	9,426	94.6%	8,965	90.0%
19	6,005	5,928	98.7%	5,465	91.0%
20	5,035	4,962	98.6%	4,632	92.0%
21	3,760	3,677	97.8%	3,497	93.0%
22	4,506	3,931	87.3%	4,235	94.0%
23	3,426	3,230	94.3%	3,255	95.0%
24	3,516	3,432	97.6%	3,375	96.0%
25	3,678	3,555	96.7%	3,568	97.0%
26	4,400	4,400	100.0%	4,312	98.0%
27	2,589	2,332	90.0%	2,564	99.0%
28	1,545	1,545	100.0%	1,545	100.0%
29	1,439	1,325	92.1%	1,439	100.0%
30	109	109	100.0%	109	100.0%
	166,229	151,337	91.0%	144,540	87.0%

Note: Counts are weighted

Exhibit E-13
Total Salary Scale
OPERS

Age	Initial Salary ($ Millions)	Subsequent Salary ($ Millions)	Actual Rate	Current Expected ($ Millions)	Current Rate	Proposed Expected ($ Millions)	Proposed Rate
21	3.8	4.2	10.13%	4.2	9.25%	4.2	8.75%
22	6.5	6.8	5.10%	7.1	9.25%	7.1	8.75%
23	9.3	10.1	8.55%	10.1	8.95%	10.1	8.65%
24	11.5	12.4	7.72%	12.5	8.65%	12.5	8.55%
25	13.6	14.8	8.59%	14.7	8.35%	14.7	8.35%
26	16.4	17.8	8.79%	17.7	7.95%	17.7	7.95%
27	19.3	20.9	8.47%	20.7	7.55%	20.7	7.55%
28	22.2	23.8	7.45%	23.8	7.25%	23.8	7.25%
29	25.3	27.8	10.16%	27.0	6.95%	27.0	6.95%
30	30.0	32.7	8.88%	32.0	6.65%	32.0	6.65%
31	37.2	40.1	7.83%	39.6	6.35%	39.6	6.35%
32	47.3	51.3	8.57%	50.1	6.05%	50.1	6.05%
33	53.7	57.7	7.40%	56.9	5.85%	56.9	5.85%
34	59.1	63.8	8.11%	62.4	5.65%	62.4	5.65%
35	62.5	67.0	7.27%	65.9	5.55%	65.9	5.55%
36	67.2	72.4	7.80%	70.8	5.45%	70.8	5.45%
37	74.0	80.0	8.09%	77.9	5.25%	77.9	5.25%
38	81.3	87.4	7.44%	85.5	5.15%	85.5	5.15%
39	85.0	91.3	7.47%	89.3	5.15%	89.3	5.15%
40	91.1	98.2	7.72%	95.7	5.05%	95.7	5.05%
41	97.1	104.0	7.08%	102.0	5.05%	102.0	5.05%
42	102.7	109.8	6.88%	107.8	4.95%	107.8	4.95%
43	103.7	111.2	7.25%	108.7	4.85%	108.7	4.85%
44	106.0	112.9	6.57%	111.0	4.75%	111.0	4.75%
45	105.6	113.3	7.26%	110.7	4.75%	110.7	4.75%
46	104.2	111.4	6.92%	109.0	4.65%	109.0	4.65%
47	106.3	112.9	6.21%	111.2	4.55%	111.2	4.55%
48	107.1	114.2	6.65%	111.9	4.45%	111.9	4.45%
49	110.6	117.4	6.22%	115.5	4.45%	115.5	4.45%
50	112.3	120.4	7.15%	117.2	4.35%	117.2	4.35%
51	117.1	124.1	5.96%	122.2	4.35%	122.2	4.35%
52	123.1	131.2	6.64%	128.3	4.25%	128.3	4.25%
53	125.2	132.5	5.83%	130.6	4.25%	130.6	4.25%
54	121.7	128.1	5.30%	126.8	4.25%	126.8	4.25%
55	117.9	125.3	6.28%	122.9	4.25%	122.9	4.25%
56	117.1	123.9	5.79%	122.0	4.15%	122.0	4.15%
57	112.8	118.8	5.39%	117.3	4.05%	117.3	4.05%
58	112.7	119.1	5.64%	117.2	3.95%	117.2	3.95%
59	119.5	126.3	5.72%	124.1	3.85%	124.1	3.85%
60	124.7	130.9	4.95%	129.4	3.75%	129.4	3.75%
61	116.2	122.6	5.52%	120.4	3.65%	120.4	3.65%
62	101.3	106.2	4.85%	104.9	3.55%	104.9	3.55%
63	93.3	98.2	5.20%	96.5	3.45%	96.5	3.45%
64	83.3	87.5	5.08%	86.1	3.35%	86.1	3.35%
65	66.2	69.5	4.91%	68.4	3.25%	68.4	3.25%
	3,523.9	3,752.5	6.49%	3,686.2	4.60%	3,686.1	4.60%