



Seattle City Employees' Retirement System

Investigation of Experience

January 1, 2018 through December 31, 2021

Prepared by:

Nick J. Collier, ASA, EA, MAAA

Principal and Consulting Actuary

Julie D. Smith, FSA, EA, MAAA

Consulting Actuary

Milliman, Inc.
1301 Fifth Avenue, Suite 3800
Seattle, WA 98101-2605
Tel +1 206 624 7940
milliman.com



1301 Fifth Avenue
Suite 3800
Seattle, WA 98101-2605
USA

Tel +1 206 624 7940

milliman.com

April 19, 2022

Seattle City Employees' Retirement System
720 Third Avenue, Suite 900
Seattle, WA 98104

Re: Investigation of Experience

Dear Members of the Board:

It is a pleasure to submit this report of our investigation of the experience of the Seattle City Employees' Retirement System (SCERS) for the period of January 1, 2018 through December 31, 2021. The results of this investigation are the basis for recommended changes in actuarial assumptions for the actuarial valuation to be performed as of January 1, 2022. Note that the assumptions included in this report were presented at the March 10, 2022 Board of Retirement meeting and adopted at that time.

The purpose of this report is to communicate the results of our review of the actuarial methods and the economic and demographic assumptions to be used in the completion of the upcoming valuation. Several of our recommendations represent changes from the prior methods or assumptions and are designed to better anticipate the emerging experience of the System.

We have provided financial information showing the estimated impact of the recommended assumptions, if they had been reflected in the January 1, 2021 actuarial valuation. We believe the recommended assumptions provide a reasonable estimate of anticipated experience affecting SCERS. Nevertheless, the emerging costs will vary from those presented in this report to the extent that actual experience differs from that projected by the actuarial assumptions. Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as the following:

- Plan experience differing from the actuarial assumptions,
- Future changes in the actuarial assumptions,
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as potential additional contribution requirements due to changes in the plan's funded status), and
- Changes in the plan provisions or accounting standards.

Due to the scope of this assignment, we did not perform an analysis of the potential range of such measurements.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by SCERS staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We used SCERS' benefit provisions as stated in our January 1, 2021 Actuarial Valuation report. We found this information to be reasonably consistent and comparable with information used for other purposes. The experience study results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations need to be revised.

This work product was prepared solely for SCERS for the purposes described herein and may not be appropriate to use for other purposes.

Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

Milliman's work is prepared solely for the internal business use of SCERS. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions:

- (a) SCERS may provide a copy of Milliman's work, in its entirety, to the System's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the System.
- (b) SCERS may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are retirement actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and has been prepared in accordance with generally recognized accepted actuarial principles and practices, which are consistent with the principles prescribed by the Actuarial Standards Board and the *Code of Professional Conduct and Qualification Standard for Actuaries Issuing Statements of Actuarial Opinion* in the United States, published by the American Academy of Actuaries. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

We would like to acknowledge the help from the SCERS staff in the preparation of the data for this investigation.

Sincerely,

A handwritten signature in black ink, reading "Nick Collier", written over a horizontal line.

Nick J. Collier, ASA, EA, MAAA
Principal and Consulting Actuary

A handwritten signature in black ink, reading "Julie D. Smith", written over a horizontal line.

Julie D. Smith, FSA, EA, MAAA
Consulting Actuary

April 19, 2022

Date

Table of Contents

1. Executive Summary and Recommendations	1
2. Economic Assumptions	7
3. Salary Increases Due to Promotion and Longevity (Merit)	17
Exhibit 3-1 Total Annual Rates of Increase in Salary Due to Merit and Longevity Males and Females	18
4. Death While Active	19
5. Retired Mortality	20
Exhibit 5-1 Mortality Among Service Retirees – Males	22
Exhibit 5-2 Mortality Among Service Retirees – Females	23
Exhibit 5-3 Mortality Among Disabled Retirees – Males and Females	24
6. Service Retirements	25
Exhibit 6-1 Retirement with Reduced Benefits – Males	26
Exhibit 6-2 Retirement with Reduced Benefits – Females	27
Exhibit 6-3 Retirement with Unreduced Benefits – Males	30
Exhibit 6-4 Retirement with Unreduced Benefits – Females	31
7. Disability Retirement	32
8. Other Terminations of Employment	33
Exhibit 8-1 Termination by Years of Service – Males	34
Exhibit 8-2 Termination by Years of Service – Females	35
9. Probability of Refund upon Vested Termination	36
Exhibit 9-1 Probability of Refund upon Vested Termination – Males and Females	37
10. Actuarial Methods	38
Appendix A Summary of Proposed Assumptions	40
Table A-1 Summary of Valuation Assumptions	43
Table A-2 Future Salaries – Plans 1 and 2	44
Table A-3 Retirement – Plan 1	45
Table A-4 Disability – Plans 1 and 2	47
Table A-5 Mortality – Plans 1 and 2	48
Table A-6 Other Terminations of Employment Among Members Not Eligible to Retire – Plans 1 and 2	49
Table A-7 Probability of Refund – Plans 1 and 2	50

1. Executive Summary and Recommendations

Overview

Any actuarial valuation is based on certain underlying assumptions. Determining the adequacy of the contribution rate is dependent on the assumptions that the actuary uses to project the future benefit payments and then to discount the value of future benefits to determine the present values. Thus, the assumptions are critical in assisting the System in adequately pre-funding the benefits prior to retirement.

To assess the reasonableness of the assumptions used in the valuation, they should be studied regularly. This process is called an investigation of experience (or experience study).

Summary of Results

This section describes the key findings of this investigation of experience of the Seattle City Employees' Retirement System (SCERS) for the period of January 1, 2018 through December 31, 2021. We have recommended several changes to the demographic assumptions. Additionally, we have recommended certain changes to the current economic assumptions. New assumptions were adopted by the SCERS Board at its March 2022 meeting based on these recommendations.

It should be noted that this experience study covers a four-year period. We take into account both the results of the current and prior study when making recommendations for changes to assumptions, in an attempt to identify short-term vs. long-term trends.

The following table shows a summary of the changes adopted at the March 2022 meeting.

Assumption	Adopted Change
Inflation	Reduce to 2.60%
Investment Return	Reduce to 6.75%
Wage Growth	Inflation + 0.75%
Membership Growth	Reduce to 0.25%
Interest on post-2011 contributions	Inflation + 1.25%
Admin. Expenses	Keep at 0.80%
Portability	Add assumption for increased final salary for dual members of other Washington systems
Merit Salary Scale	No change
Death while Active	Update table
Retirement	Reduce rates; add adjustment for service
Disability	Reduce rates
Retired Mortality	Reduce rates; update projection scale
Termination	Small increase in male rates
Probability of Refund	Reduce rates

The adopted assumptions will result in an increase in the total contribution rate required to pay off the Unfunded Actuarial Accrued Liability (UAAL) over a 21-year period as of the January 1, 2022 actuarial valuation and will result in a decrease in the Funded Ratio of the system as of that date compared to if the assumptions from the January 1, 2021 actuarial valuation were used. This is discussed further in the Financial Impact section at the end of the Executive Summary.

COVID-19

Almost half of the study period overlapped with the pandemic, so some of the experience was undoubtedly influenced by the effects of COVID-19 and the impact of some of the restrictions of the pandemic. We therefore gave the data partial credibility and also considered the results of the prior experience study period in making our recommendations.

Economic Assumptions

Section 2 of this report discusses the economic assumptions: price inflation, general wage growth (includes price inflation and productivity), active membership growth, the variable interest rate credited to member contributions made on or after January 1, 2012, and the investment return assumption. We have proposed, and the Board has adopted, reductions in these assumptions from the current economic assumptions. For price inflation, general wage growth and the interest crediting, the reduction is 0.15%.

As discussed in Section 2, SCERS' investment consultant, New England Pension Consultants (NEPC) is projecting a median return of approximately 6.8% for the next 30 years. This is consistent with Milliman's projection of a median net return of 6.7% and close to the average expected return based on capital market assumptions of other investment consultants. For 10-year or shorter projections, many investment consultants are projecting returns of 6.0% or less (based on SCERS' asset allocation). These expected returns, lower than the current 7.25% assumption, are the reason we are recommending a lower return assumption of 6.75%.

The economic assumptions tend to be more subjective than the demographic assumptions; we have proposed a recommended set of assumptions, but there may be other combinations of assumptions which we would also consider reasonable for valuation purposes.

We also reviewed the active membership growth assumption, which is currently 0.5%. We believe a reasonable range for this assumption is 0.0% to 0.5%. Based on discussions at the March 2022 Board meeting, a reduction in this assumption to 0.25% was adopted.

Administrative Expenses

Administrative expenses are calculated as a percentage of active payroll for SCERS, and are included as a component of the ongoing Normal Cost of benefits as a percentage of pay. As of the January 1, 2021 valuation, the total Normal Cost of benefits was 15.10% of payroll, which included an assumption of 0.80% of payroll for administrative expenses.

Over the last two years, administrative expenses have been close to 0.80% of payroll. Therefore, we are recommending no change in the administrative expense assumption from the current 0.80% of payroll.

This means there is no impact on the Normal Cost Rate or the Total Contribution Rate.

Individual Salary Increases Due to Promotion and Longevity (Merit)

Section 3 discusses the individual salary increases due to promotion and longevity – the merit component of salaries. Overall, the results of our salary study were in line with the current rates predicted. We are recommending no change to this assumption.

Death While Active

Section 4 discusses the results of death from active status. Overall, the actual number of deaths from active status was greater than the current assumptions predicted. This is indicated by an actual-to-expected ratio of 108%. That is, there were 8% more active deaths than the current assumptions would have predicted.

We are recommending an update to the assumptions to be based on the Society of Actuaries' recent mortality study based solely on public plan experience, with an adjustment of 95% to reflect SCERS experience.

Deaths While Active					
Gender	Actual	Expected	Act/Exp	Proposed	Act/Prop
Male	38	30	127%	39	97%
Female	15	19	79%	17	88%
Total	53	49	108%	56	95%

Retired Mortality

Section 5 discusses the rates of mortality among service retirees, disabled retirees, and beneficiaries.

Overall, the number of actual deaths on a benefit-weighted basis was less than expected for total service retiree deaths and more than expected for disabled retiree deaths during the study period, with actual retiree deaths on a benefit-weighted basis being 93% of those estimated by the current assumptions. Note that beneficiary mortality is not explicitly studied but based on service retiree experience.

We are recommending mortality rates be updated to be based on the most recent set of mortality tables that are specific to public plans, PubG-2010, multiplied by 95%. The 2010 in the title refers to the central year of the data used by the Society of Actuaries; the "Pub" indicates that the mortality experience was specific to public retirement plans in the United States. We recommend using the amount-weighted tables, adjusted by 95%. Note that an adjustment of less than 100% indicates mortality that is less than the general public plan population and life expectancies that are greater.

We are also recommending updating the table that projects future mortality improvement from the MP-2014 Ultimate projection scale to the MP-2021 Ultimate projection scale, the most recent scale published by the Society of Actuaries. Projection scales reflect gradual year-to-year improvement in mortality that is expected to occur in the future. This approach is sometimes referred to as "generational mortality" as each succeeding generation of members is projected to live longer than the preceding one. Overall, the proposed mortality assumptions combined with the projection scale would result in small increases in life expectancy compared to the prior assumption at most ages.

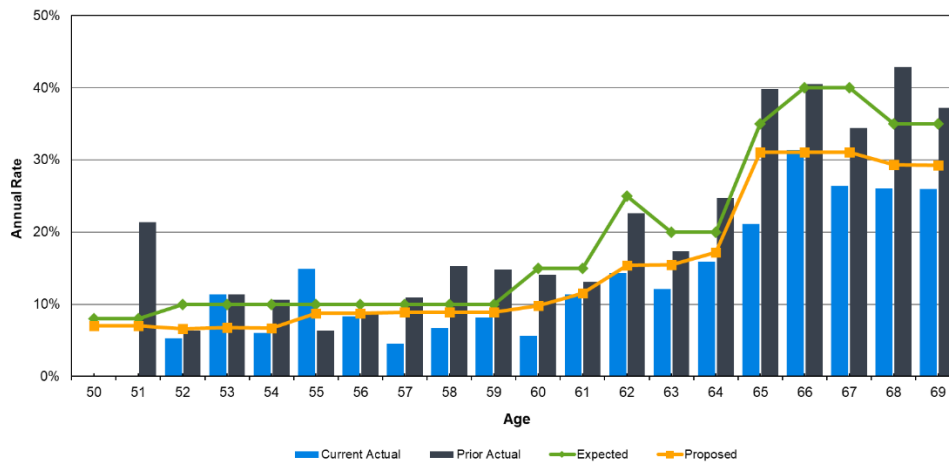
See Section 5 for further details in setting the retired mortality assumption.

Service Retirement

Section 6 discusses the rates of service retirement. Currently in the actuarial valuation, the retirement assumptions are split into two segments: members eligible for reduced retirement benefits and members eligible for unreduced retirement benefits. For this study, we are recommending additional adjustments based on members with less than 10 years of service, 10-19 years of service, 20-29 years of service, and greater than or equal to 30 years of service.

Overall, the actual number of service retirements was less than what the assumptions predicted in aggregate, although experience at some ages was higher and at some ages was lower than expected. We are recommending reducing the retirement ages to better reflect the experience over the study period. The following

graph shows the results for all male members eligible for unreduced retirement in aggregate (regardless of service level).



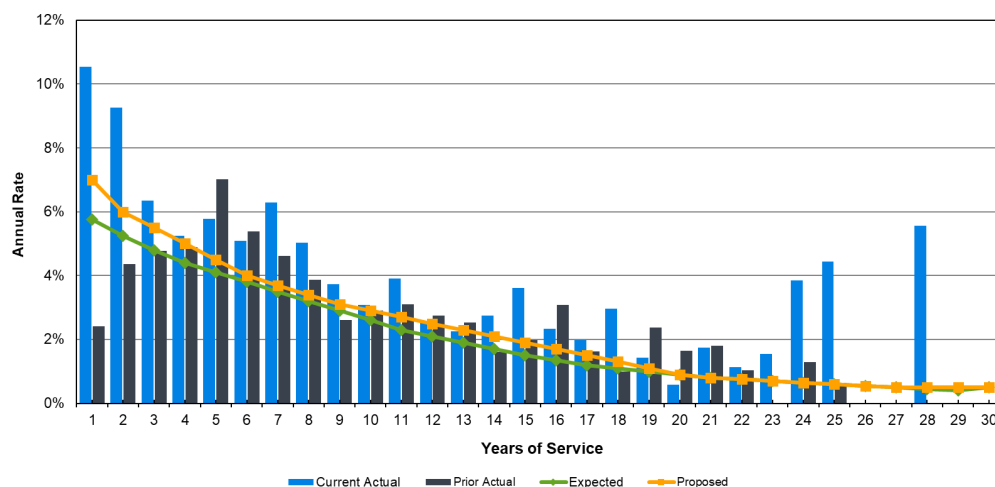
We are also recommending various adjustments to the rates of retirement with reduced benefits. See Section 6 of this report for further details.

Disability Retirement

Section 7 discusses rates of disability retirement. Over the four-year study period, there were fewer disability retirements than expected. We are recommending a small reduction to the rates of disability.

Termination

Section 8 discusses other terminations of employment. Overall, the actual number of terminations was greater than projected by the current assumptions. We are recommending no change to the termination rates for females and a slight increase to the male assumption as shown in the following graph.



Probability of Refund upon Vested Termination

Section 9 discusses the probability of refund upon vested termination. The actual number of refunds for vested members at termination was less than the number predicted by the current assumptions for members with less than 20 years of service.

We are recommending lowering the rates of refund at termination for all service levels based on the results of this study.

Miscellaneous Assumptions

We have recommended changes to other assumptions that fall under the category of “miscellaneous” assumptions, discussed in Section 10.

Probability of Marriage or Registered Domestic Partner: Currently, 60% of active members are assumed to have a spouse or eligible domestic partner for purposes of the SCERS' death benefit. We recommend no change to this assumption.

Mortality Tables used for Optional Factors: We recommend the mortality tables for optional factors be updated to reflect the adopted adjustments (95% of the PubG-2010 Healthy Retired Mortality tables) to male and female service retiree mortality. We recommend a fully generational projection to 2025 (using MP-2021 Ultimate projection scale) based on age 60 and the 50%/50% male/female blend continue to be used. The base age of 60 means that for ages less than 60, mortality is projected to 2025 which is 15 years from the 2010 base table. For members over age 60, mortality is projected the additional number of years from age 60. Note that the combination of the mortality change and the lower investment return assumption that were adopted will materially affect the benefit amount calculated under the two times match benefit, which is based on member contributions with match converted on an annuity.

Portability: We are recommending reflecting the cost of portability by adjusting the compensation used to value the formula benefit for current and future deferred vested members by one additional year of compensation (wage growth plus assumed merit = $3.35\% + 0.50\% = 3.85\%$).

Actuarial Methods

Section 11 describes the actuarial methods used in the valuation. We recommend no changes to these methods at this time. Specifically, we recommend continuing to use the entry age normal actuarial cost allocation method, which creates a theoretically level normal cost rate as a percentage of pay over an employee's projected full career. We also recommend retaining the actuarial asset valuation method which smooths actuarial investment gains and losses over a five-year period.

Financial Impact of Recommended Assumptions

The following exhibit is designed to give the reader an idea of how the assumption changes may affect key valuation measurements. The changes increase the Total Contribution Rate needed to amortize the UAAL over 22 years beginning January 1, 2021 and decrease the reported Funded Ratio as of that date.

The estimated financial impact was evaluated by performing additional valuations with the January 1, 2021 valuation data and reflecting the assumption changes. This allows us to assess the relative financial impact of the various changes. Note that the relative impact of the various assumption changes by component is somewhat dependent on the order in which they are evaluated.

Note that these are just estimates of the relative impact of specific changes. The actual January 1, 2022 valuation results will vary due to actuarial experience during the period, such as the change in payroll and the actual investment return. Additionally, partial recognition of deferred asset gains as of the January 1, 2021 valuation, as well as the actuarial gain on assets for the 2021 year, will apply for the January 1, 2022 actuarial valuation, but are not reflected here.

It should be noted that with the new retired mortality and new investment return assumption adopted by the Board, the factors used in the calculation of member benefits under optional forms of payment are impacted, as well as the minimum SCERS benefit for Plan 1 members, which is equal to twice the member contributions with interest converted to a monthly annuity. For the minimum benefit, we have reflected the expected impact of an immediate update of the new assumptions on the annuity factors used in the valuation. In practice there will be some deferral past the January 1, 2022 date.

For purposes of the following estimate, we have assumed the full increase due to the assumption changes would be reflected immediately. As discussed with the Board at the March 2022 meeting, it would be reasonable to phase in the contribution rate increases due to the assumption changes. We will provide additional analysis of the potential impact of gradually recognizing the contribution rate increase due to the assumption changes with our valuation report.

	Total Contribution To Amortize UAAL Over 22 Years	Funded Ratio
January 1, 2021 Valuation	24.68%	71.6%
Demographic Assumptions		
Subtotal Demographic Change	-0.90%	1.2%
January 1, 2021 Valuation with Demographic Changes	23.78%	72.8%
Economic Changes		
Recommended Economic Assumptions⁽¹⁾		
6.75% Inv. Return, 3.35% Wage Growth, 2.60% CPI		
3.85% Member Crediting Rate, 0.25% Membership Growth	2.90%	-3.2%
Combined Change	2.00%	-2.0%
January 1, 2021 Valuation with Demo + Econ Changes	26.68%	69.6%

1. Assumes annuity purchase rates for 2 times match benefit are immediately updated to reflect assumption changes.

2. Economic Assumptions

Actuarial Standard of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans. Because no one knows what the future holds with precision, 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. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience. To meet the standard, the assumption should reflect “the actuary’s estimate of future experience” and “it has no significant bias (i.e., it is not significantly optimistic or pessimistic).”

After completing the selection process, the actuary should review the set of economic assumptions for consistency. This may lead the actuary to recommend the same inflation component in each of the economic assumptions proposed.

This section will discuss the economic assumptions. In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27. The table on the following page summarizes our recommended changes, as well as an alternative set that would also be considered reasonable. Note that these are not the only sets of assumptions that would be considered reasonable.

The Board adopted a reduction of 0.50% in the investment return assumption, accompanied by a 0.15% reduction in the price inflation and wage growth assumptions, and 0.25% reduction in the population growth assumption.

The following table shows the current assumptions and the adopted assumptions:

Economic Assumptions	Current Assumptions	Adopted Assumptions
Investment Return Assumption ⁽¹⁾	7.25%	6.75%
Consumer Price Inflation	2.75%	2.60%
Real Wage Inflation	0.75%	0.75%
Wage Growth (<i>price inflation plus wage inflation</i>)	3.50%	3.35%
Active Membership Growth	0.50%	0.25%
Payroll Growth (<i>wage & membership growth</i>)	4.02%	3.61%
Interest on Post-2011 Contributions	4.00%	3.85%

1. Net of investment expenses.

Consumer Price Inflation and Member Contribution Crediting Rate

Use in the Valuation

When we refer to inflation in this report, we are generally referring to price inflation. The inflation assumption has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment return, general wage increases, payroll increase assumptions, and the interest crediting assumption for member contributions made after December 31, 2011. It also has a direct impact on the valuation results as it will be used to determine the expected floor COLA payment.

The long-term relationship between inflation and investment return has long been recognized by economists. The basic principle is that the investors demand a “real return” – the excess of actual investment returns over inflation. If inflation rates are expected to be high, investors will demand investment returns that are also expected to be high enough to exceed inflation, while lower inflation rates will result in lower expected investment returns, at least in the long run.

The current valuation assumption for inflation is 2.75% per year. The Board adopted a lower assumption of 2.60% at its March 2022 meeting.

Historical Perspective

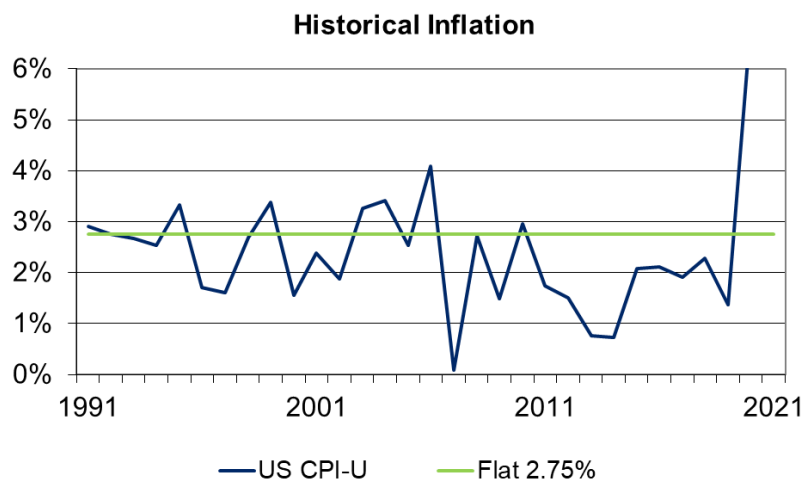
The data for inflation shown below is based on the national Consumer Price Index, US City Average, All Urban Consumers (CPI-U) as published by the Bureau of Labor Statistics.

Although economic activities in general, and inflation in particular, do not lend themselves to prediction on the basis of historical analysis, historical patterns and long term trends are a factor to be considered in developing the inflation assumption.

There are numerous ways to review historical data, with significantly differing results. The tables below show the compounded annual inflation rate for various 10-year periods, as well as for the 50-year period ended in December 2021.

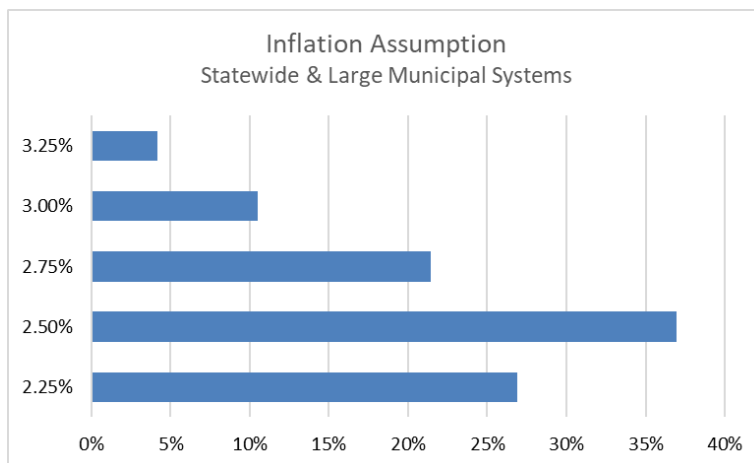
Decade	CPI Increase
2012-2021	2.1%
2002-2011	2.5%
1992-2001	2.5%
1982-1991	3.9%
1972-1981	8.6%
Prior 50 Years	
1972-2021	3.9%

The following graph shows historical national CPI increases. Note that the actual CPI increase has been less than 2.75% for most of the last 25 years, although recent inflation has been significantly higher.



Peer System Comparison

According to the Public Fund Survey (a survey of over 200 large public retirement systems), the average inflation assumption for these systems has been steadily declining. As of the most recent study, the median inflation assumption was 2.50%.



Forecasts of Inflation

Since the U.S. Treasury started issuing inflation-indexed bonds, it is possible to determine the approximate rate of inflation anticipated by the financial markets by comparing the yields on inflation-indexed bonds (TIPS) with traditional fixed government bonds. Current market prices as of March 2022 suggest investors expect inflation to be about 2.6% over the next 30 years.

Additionally, we reviewed the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the 2021 Trustees Report, the projected average annual increase in the CPI over the next 75 years under the intermediate cost assumptions was 2.4%.

SCERS' current inflation assumption is higher than that being forecast for the U.S. by SCERS' investment consulting firm, New England Pension Consultants (NEPC), in their January 2022 capital market assumptions. NEPC is projecting 2.6% inflation over a 30-year time horizon.

Recommendation

The consumer price inflation assumption impacts SCERS' funding as it is used to project the Floor COLA payments. It also affects the wage growth and payroll growth assumptions.

Given the future expectations of inflation, we recommend that the inflation assumption be 2.60%, although an assumption between 2.00% and 2.75% could be reasonable. The Board elected to reduce the assumption from 2.75% to 2.60% per year. We are also recommending a corresponding decrease in the general wage growth and investment return assumptions, as outlined in following sections.

The adopted assumption satisfies ASOP No. 27.

Consumer Price Inflation	
Current Assumption	2.75%
Adopted Assumption	2.60%

Crediting Rate on Member Contributions

For member contributions made on or after January 1, 2012, an annual interest credit is determined which may vary from year to year. This rate is based on the prior 12 months' average yield on 30-year U.S. Treasury Bonds, with a maximum credit interest rate equal to 5.75%. Note that, for member contributions made prior to this date, a flat 5.75% annual interest credit applies.

The current assumption for interest crediting for the post-2011 contributions is 4.00% per year. With the inflation assumption reduced, we recommend reducing the interest credit assumption by the same amount, as the total yield on treasuries will be influenced by inflation expectations and capital market assumptions. Thus, our recommendation for the assumed crediting rate on member contributions made on or after January 1, 2012 is 3.85% with inflation of 2.60%. This was adopted by the Board.

Wage Growth

Use in the Valuation

Estimates of future salaries are based on two types of assumptions: 1) general wage increase and 2) merit increase. Rates of increase in the general wage level of the membership are directly related to inflation, while individual salary increases due to promotion and longevity generally occur even in the absence of inflation. The promotion and longevity assumptions, referred to as the merit scale, will be reviewed with the other demographic assumptions.

The current assumption is for 0.75% wage growth above the inflation assumption.

Historical Perspective

We have used statistics from the Social Security Administration on the National Average Wage back to 1972.

There are numerous ways to review this data. For consistency with our observations of other indices, the table below shows the compounded annual rates of wage growth for various 10-year periods. The excess of wage growth over price inflation represents "productivity" or the increase in the standard of living (also called the real wage inflation rate).

Decade	Wage Growth (a)	CPI Increase (b)	Real Wage Inflation (a) - (b)
2012-2021	3.4%	2.1%	1.3%
2002-2011	2.7%	2.5%	0.2%
1992-2001	4.2%	2.5%	1.7%
1982-1991	4.7%	3.9%	0.8%
1972-1981	7.8%	8.6%	-0.8%
Prior 50 Years			
1972-2021	4.5%	3.9%	0.6%

Forecasts of Future Wages

Wage inflation has been projected by the Office of the Chief Actuary of the Social Security Administration. In the 2021 Trustees Report, the long-term annual increase in the National Average Wage is estimated to be 1.2% higher than the Social Security intermediate inflation assumption of 2.4% per year.

Recommendation

The national average real wage growth has been 0.6% over the last 50 years. We believe future real wage inflation will remain around this level and are proposing no change in the assumption.

Real Wage Inflation Rate	
Current Assumption	0.75%
Adopted Assumption	0.75%

The wage growth assumption is the total of the consumer price inflation assumption and the real wage inflation rate. Since the real wage inflation assumption remains 0.75% and the price inflation assumption is reduced to 2.60%, this results in a total wage growth assumption of 3.35%. This assumption was adopted by the Board.

Active Membership Growth and Payroll Increase Assumption

Use in the Valuation

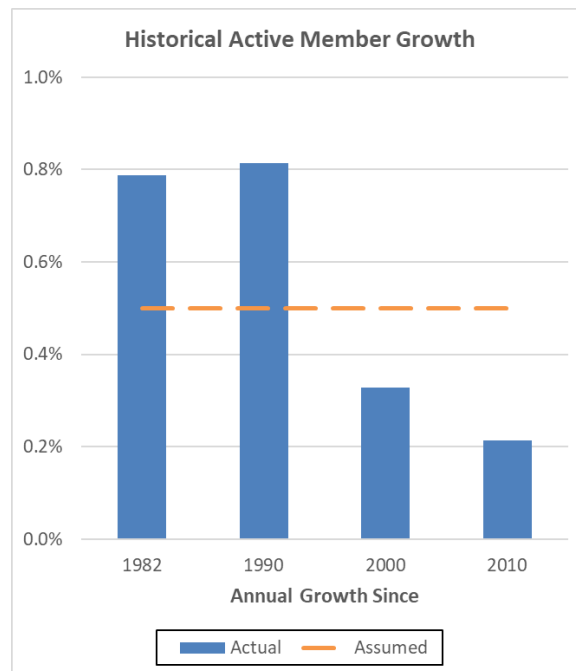
The membership growth assumption does not impact the actuarial accrued liability, the UAAL, or the normal cost rate. However, it does impact the calculation of the required contribution rate to finance the UAAL. This is because it is treated as a component of the payroll increase assumption.

When a membership growth assumption is applied, the total aggregate payroll of the system is expected to increase by both the payroll growth assumption, and the membership growth assumption. This effectively reduces the calculated contribution rate as a percentage of payroll needed to finance the UAAL because payroll for anticipated future members is already being considered as of the valuation.

The current assumption in use by SCERS is that the active population will grow at a rate of 0.5% per year. The only effect of this assumption is on the calculated contribution rate needed, as greater future payroll is assumed on which to make UAAL contributions if membership growth greater than 0% is assumed.

Historical Perspective

Over the last 40 years, active membership in SCERS has exceeded 0.5% but since 2000 it has been less than 0.5%. This historical active membership growth is illustrated in the table below.



Comments

Very few public retirement systems have a non-zero active membership growth assumption. If a positive growth in active membership is assumed and future growth is less than the assumption, this will result in increasing contribution rates as a percentage of payroll in the future (all other things being equal). Conversely, if no growth in active membership is assumed and there is future growth, this will result in decreasing contribution rates as a percentage of payroll off into the future (all other things being equal). If there is an unfunded liability, an assumption of growth in active membership greater than 0% results in a lower calculated contribution rate as a level percentage of pay compared to an assumption of 0%, all else being equal.

We believe that an active member growth assumption of between 0.0% and 0.5% would be reasonable and would satisfy the requirements of ASOP 27. The Board adopted a 0.25% active member growth assumption.

Payroll Increase Assumption

The assumption for growth in the aggregate payroll of SCERS is a combination of the wage growth and active membership growth assumptions (currently 3.50% and 0.50%, respectively). The current payroll increase assumption is therefore equal to 4.02%. Note that the components are multiplicative, so the assumption is slightly greater than just adding the two together.

Recommendation for Active Membership Growth Assumption

We recommend that the payroll increase assumption remain equal to the combined impact of the wage growth assumption and assumed changes in active membership. Since our recommendations for these two components are 3.35% and 0.00%-0.50%, we recommend that the payroll growth assumption be between 3.35% and 3.85%.

As the board adopted an active membership growth assumption of 0.25%, the payroll increase assumption is 3.61%.

Active Membership Growth	
Current Assumption	0.50%
Reasonable Range	0.00%-0.50%
Adopted Membership Growth Assumption	0.25%
Adopted Payroll Growth Assumption	3.61% ⁽¹⁾

1. Wage growth and membership growth are assumed to be multiplicative, not additive.

Investment Return

Use in the Valuation

The investment return assumption is one of the primary determinants in the calculation of the expected cost of the System's benefits, providing a discount of the future benefit payments that reflects the time value of money. This assumption has a direct impact on the calculation of liabilities, normal costs, member contribution rates, and the factors for optional forms of benefits. The current investment return assumption for SCERS is 7.25% per year, net of investment-related expenses.

Expected Investment Return

NEPC, SCERS' investment consultant, has calculated the expected return of the portfolio as 6.8% based on their 2022 capital market assumptions. The 6.8% expected return is the forward-looking 30-year expected average annual rate of return and is the median return on a geometric basis for SCERS' target portfolio. That is, in NEPC's model there is a 50% probability the return will exceed 6.8% and a 50% probability the return will be less than 6.8% compounded over a 30-year period based on these capital market assumptions.

We independently calculated the expected investment return using NEPC's 2022 assumptions for capital markets and SCERS' current target asset allocation and verified that NEPC's 6.8% calculation is reasonable. The target asset allocation, along with NEPC's 30-year capital market assumptions, are summarized in the following table:

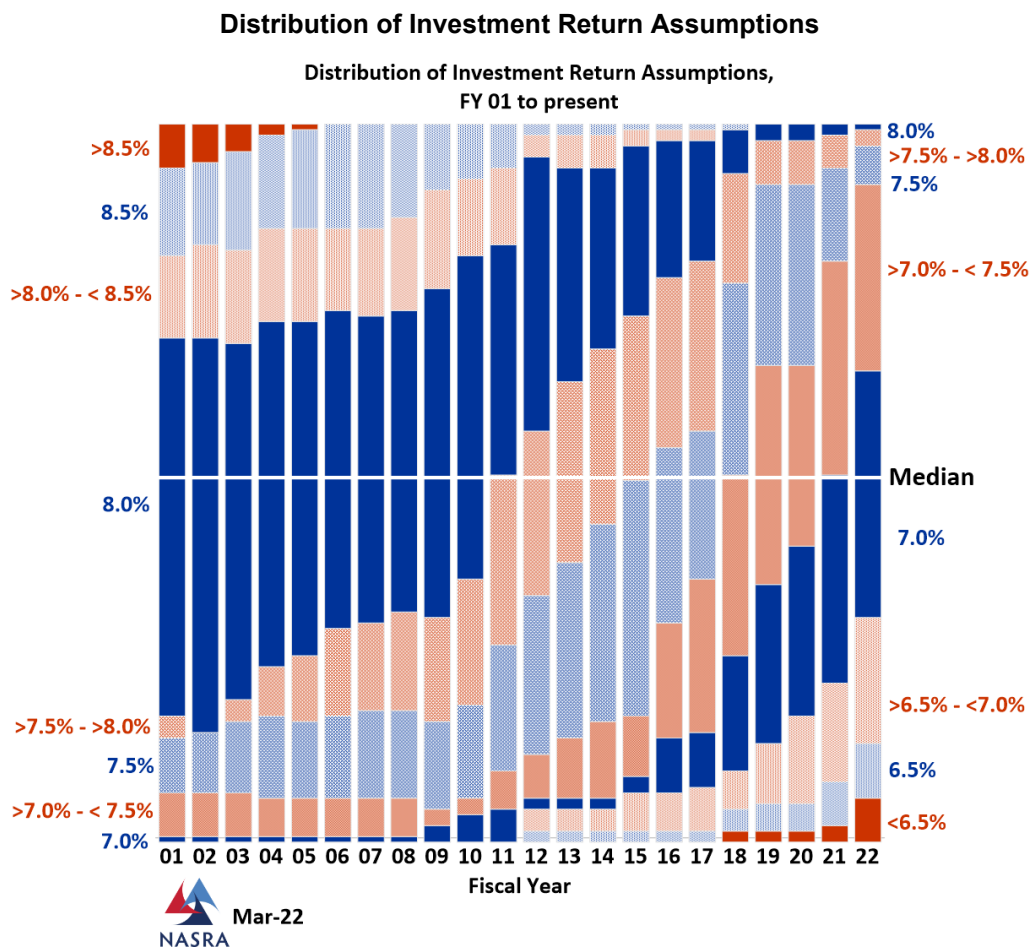
Class	Target Allocation	Expected Return ⁽¹⁾	Standard Deviation
Public Equity	48%	6.8%	17.9%
Private Equity	11%	10.0%	25.2%
Core Fixed	18%	3.1%	5.6%
Credit Fixed	7%	6.5%	10.5%
Real Estate	12%	6.1%	15.2%
Infrastructure	4%	6.6%	12.6%

1. 30-year expected geometric return based on NEPC's capital market assumptions.

For comparison, using SCERS target allocation and Milliman's 30-year capital market assumptions, the expected return is 6.7%.

Peer System Comparison

According to the Public Fund Survey, the average investment return assumption for large public retirement systems has been steadily declining. As of the most recent study, the median rate is 7.0%. The following chart shows a progression of the distribution of the investment return assumptions. In 2001, less than 2% of systems had an assumption of 7.0% or less. As of March 2022, about 65% of systems have an assumption that is 7.0% or less.



Variance in Capital Market Assumptions

Different investment consultants will have different capital market assumptions. Note that we have primarily used NEPC's capital market assumptions in our analysis, as we believe they are the most familiar with SCERS' investments. To provide an idea of how NEPC's capital market assumptions relate to other investment consultants, we calculated the expected return using SCERS' asset allocation and the average of the capital market assumptions used by other investment consultants (*Horizon Survey of Capital Market Assumptions – 2021 Addition*). Based on this analysis, we found the expected short-term return (10 years or less) was about 6.1%. Using the average long-term (20 years or more) capital market assumptions from the Horizon Survey, we calculated an expected return of 6.9%, very close to NEPC's calculation. We have also shown the expected returns based on Milliman's capital market assumptions.

	NEPC	Milliman	Horizon
Based on 10-Year Assumptions			
Median Annualized Return	5.5%	5.6%	6.1%
Assumed Inflation	2.4%	2.3%	2.1%
Based on 30-Year Assumptions			
Median Annualized Return	6.8%	6.7%	6.9%
Assumed Inflation	2.6%	2.3%	2.2%

Contribution Rate Implications of Changes in Investment Return Assumption

In most retirement systems with variable contribution rates, such as SCERS, the greatest factor contributing to the volatility of contribution rates is the return on investments. If, in the future, the return assumption is not met, there would likely be an increase in the employer contribution rates.

The member contribution rates are fixed in the municipal code. Therefore, any experience gain or loss in investments is not expected to directly impact the member contribution rates but will impact the employer contribution rates.

To assist the Board in understanding the sensitivity to changes in the assumptions, we revalued the January 1, 2021 valuation results using the recommended assumptions, including the economic assumptions that were adopted at the March 2022 meeting. These results are shown at the end of the Executive Summary.

Conclusion

Based on the lower expected returns being forecast by investment consultants, we recommended a reduction in the investment return assumption to 6.75%. This assumption was adopted by the Board.

Investment Return (net of investment expenses)	
Current Assumption	7.25%
Adopted Assumption	6.75%

Administrative Expenses

Future administrative expenses are recognized in the normal cost rate. The expected dollar amount is expressed as a percent of payroll. The current assumption is that administrative expenses will be 0.80% of payroll.

The administrative expenses reported in SCERS' financial statements for the last 10 years are shown in the following table. Note that the reported amounts exclude expenses related to internal investment staff for 2017 and beyond, with the adjustment to the 2021 expenses being estimated, as the financials are not yet final.

(\$millions)			
Year	Covered Payroll	Admin. Expense	Expense Ratio
2012	\$568	\$3.34	0.59%
2013	598	5.06	0.85
2014	631	5.33	0.84
2015	642	8.21	1.28
2016	709	9.25	1.30
2017	733	11.15	1.52
2018	779	12.20	1.57
2019	786	9.20	1.17
2020	877	7.20	0.82
2021	865	6.98	0.81

The administrative expenses were significantly higher in 2015 through 2018. Our understanding is that this was primarily due to development costs associated with SCERS' new pension administration system. These costs decreased in 2019 and have leveled off in 2020 and 2021.

Recommendation

The reported administrative expenses have been close to 0.80% over the last two years. We are recommending no change to the administrative expense assumption at 0.80%. The Board adopted this assumption.

3. Salary Increases Due to Promotion and Longevity (Merit)

Results

Estimates of future salaries are based on assumptions for two types of increases:

1. Increases in each individual's salary due to promotion or longevity, which occur even in the absence of inflation (merit increases); and
2. Increases in the general wage level of the membership, which are directly related to inflation and increases in productivity.

In Section 2 we proposed that the second of these rates, the general wage inflation, be reduced from 3.50% to 3.35%.

The purpose of this section is to examine the first source of these increases, due to promotion or longevity.

Exhibit 3-1 shows the actual merit increases over a 15-year period. Note that this is longer than the four-year study period because our goal is to not give undue weight to recent experience, as indicated by the guidelines of the actuarial standards of practice. Increases were higher earlier in a member's career (lower service) and then decreased over time, consistent with the current assumptions; however, the actual increases were somewhat lower than the increases expected by the assumptions.

Recommendation

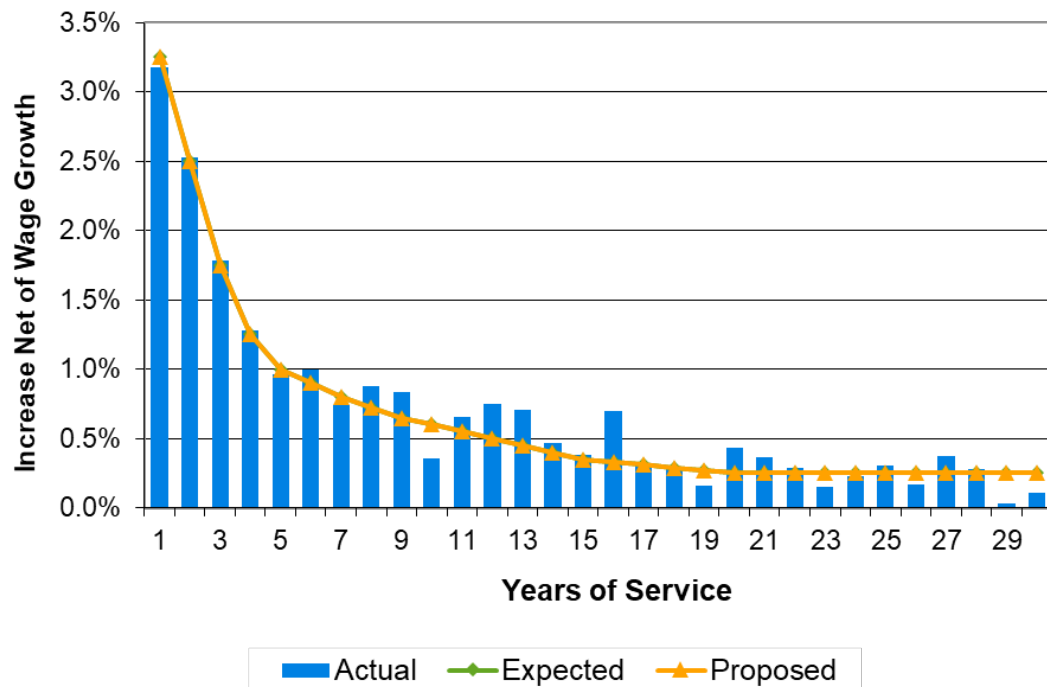
As actual experience was close in line with expectations, we are recommending no change to the assumption. The Board adopted this assumption.

The recommended rates are shown on Exhibit 3-1.

Exhibit 3-1

Total Annual Rates of Increase in Salary Due to Merit and Longevity

Males and Females



4. Death While Active

Results

In this section, we discuss the analysis of actual and expected death rates of active members. Mortality among active members has only a very small financial impact on the system's liabilities.

For current and future retired members, mortality has a much more significant impact. This section only refers to the experience of active members. An analysis of mortality for retired and disabled members is found in Section 5 of this report.

For male active members, actual deaths were greater than the number of expected deaths. For female active members, fewer deaths than expected occurred. Overall, there were 53 deaths from active status during the study period, while the assumptions predicted 49 deaths. The results are shown in the following table.

Deaths While Active			
Gender	Actual	Expected	Act/Exp
Male	38	30	127%
Female	15	19	79%
Total	53	49	108%

Recommendation

The current assumptions use the RP-2014 Employee Tables for Males and Females, adjusted by 95% to account for better-than-average mortality. Although the current mortality tables are reasonable, we are recommending updating them to reflect a more recent study of active mortality table, PubG-2010 Employee Tables for Males and Females, adjusted by 95%. The Board adopted this assumption.

The current assumptions are projected for expected future improvements in mortality using the MP-2014 Ultimate projection scale on a fully generational basis. We are recommending an update to the projection scale based on recent studies to the MP-2021 Ultimate projection scale on a fully generational basis.

The proposed rates result in an Actual-to-Proposed ratio of 95%, as shown in the following table.

Deaths While Active					
Gender	Actual	Expected	Act/Exp	Proposed	Act/Prop
Male	38	30	127%	39	97%
Female	15	19	79%	17	88%
Total	53	49	108%	56	95%

5. Retired Mortality

In this section, we discuss the analysis of actual and expected rates of death among retired members. We studied rates of mortality among healthy and disabled retired members. The assumption for retired mortality is an important one, as it is a key driver of actuarial liabilities. The assumption for retiree life expectancy directly determines the number of years over which we expect retirees will receive benefit payments.

Despite some variance, primarily caused by the effect of COVID-19, there is a long-established trend of mortality improvement, and most experts expect this to continue. As such, we recommend continued use of generational mortality tables (see later discussion) to account for projected future improvements in mortality. Generational mortality is reflected by including a mortality improvement scale that projects small annual decreases in mortality rates. Therefore, generational mortality explicitly assumes that members born more recently will live longer than the members born before them.

The Actuarial Standards of Practice require expected future mortality improvements to be considered in selecting the assumption. Using generational mortality tables achieves this.

Generational Mortality Tables

Most actuarial valuations for public sector retirement systems, including SCERS, use generational mortality tables, which explicitly reflect expected improvements in mortality. Generational mortality tables include a base table and a projection scale. The projection scale reflects the expected annual reduction in mortality rates at each age. Therefore, each year in the future, the mortality at a specific age is expected to decline slightly (and people born in succeeding years are expected to live slightly longer). This can result in significant differences in life expectancies when projecting improvements 30-plus years into the future.

One of the main benefits of generational mortality tables is that the valuation assumptions should effectively update each year to reflect improved mortality, and the mortality tables would need to be changed less frequently.

Projection Scale for Mortality Improvement

There is a strong consensus in the actuarial community that future improvements in mortality should be reflected in the valuation assumptions. There is less consensus, however, about how much mortality improvement should be reflected. The projection scale (which projects future improvements in mortality) published by the Society of Actuaries (SOA) in 2014 incorporates a complex matrix of rates of improvement that vary by both age and birth year. Ultimately, the projection scale (MP-2014) goes to a flat 1% annual improvement in years 2027 and later for ages 85 or less.

SCERS currently uses the MP-2014 Ultimate projection scale. Our recommendation is to use the most recent mortality projection scale published by the Society of Actuaries, the MP-2021 Ultimate projection scale. We have compared our recommended projection scale with actual mortality improvement from the most recent 60 years of experience of the US Social Security system and found them to be reasonably consistent.

New Public Plan-Specific Mortality Tables

The Society of Actuaries recently published new mortality tables based on data from public sector retirement systems. We compared how well the current SCERS mortality tables and the new general member-specific mortality table matched the actual experience. Based on our analysis, we found that the new public plan-specific mortality tables matched well with the retired mortality experience.

Results and Recommendations

There is a well-established correlation between higher benefit level and lower rates of mortality. Since the value of benefits is related both to how long people live and the amount of the monthly benefit they receive, there will be an understatement of liabilities if assumptions do not account for this correlation. Accordingly, we have studied SCERS mortality experience for service retirees in a benefit-weighted manner.

The results of the current study show that the actual retired mortality experience during the study period was reasonably consistent with the rates of mortality predicted by the current assumptions.

We are recommending updating the mortality tables to reflect recent SCERS experience as well as recent mortality studies by the Society of Actuaries as discussed in the prior section. SCERS uses standard mortality tables adjusted to best fit the patterns of mortality among its retirees. The recommended mortality rates are based on the PubG-2010 amount-weighted healthy retiree mortality tables and the PubG-2010 amount-weighted disabled retiree mortality tables, adjusted by 95% to reflect SCERS experience and assume generational mortality improvement based on the MP-2021 Ultimate projection scale.

In previous actuarial valuations, we have used the same mortality assumptions for beneficiaries as we used for service retirees. We recommend continuing this practice, as the data related to service retirees is more statistically significant and there is no reason to believe that the mortality of beneficiaries should be significantly different from that of service retirees of the same sex.

The recommended mortality assumptions, including the improvement scale, were adopted at the March 2022 Board meeting.

Exhibits 5-1 through 5-3 show the actual and expected rates of mortality among service and disability retirees as follows:

Exhibit 5-1: Mortality Among Service Retirees – Males

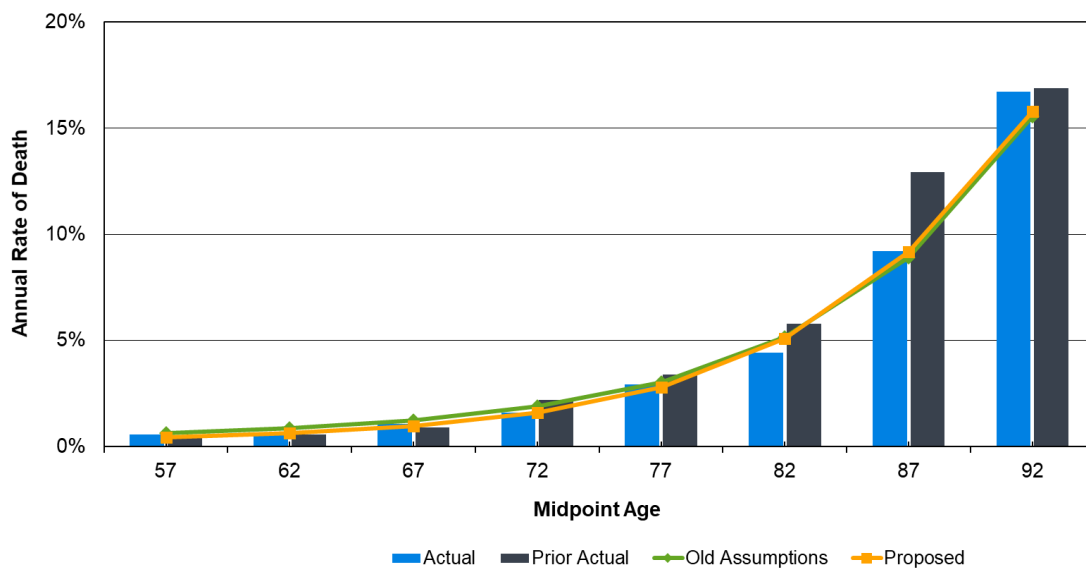
Exhibit 5-2: Mortality Among Service Retirees – Females

Exhibit 5-3: Mortality Among Disabled Retirees – Males and Females

Exhibits 5-1 and 5-2 are shown on a benefit-weighted basis while Exhibit 5-3 is shown on a headcount basis.

Exhibit 5-1

Mortality Among Service Retirees – Males



	Old Assumptions	Actual	Proposed
Total ¹	\$813	\$763	\$745
Actual / Expected	94%		102%

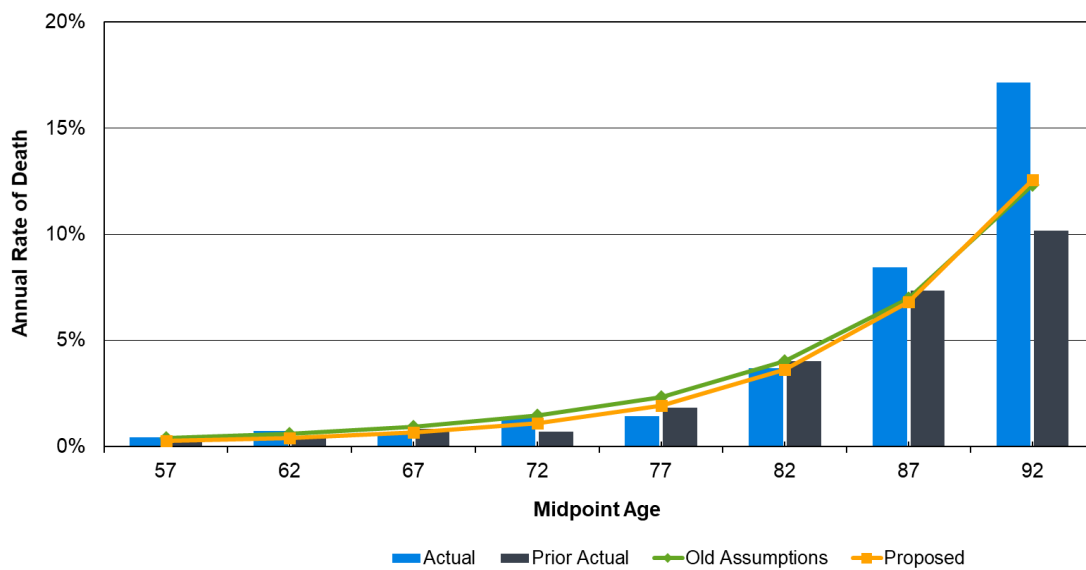
1. Weighted by benefit in \$1,000s.

Expected mortality: RP-2014 Mortality Table for Males, adjusted by 95%, projected with MP-2014 Ultimate projection scale (Generational)

Proposed mortality: PubG-2010 Mortality Table for Males, adjusted by 95%, projected with MP-2021 Ultimate projection scale (Generational)

Exhibit 5-2

Mortality Among Service Retirees – Females



	Old Assumptions	Actual	Proposed
Total ¹	\$370	\$338	\$304
Actual / Expected	91%		111%

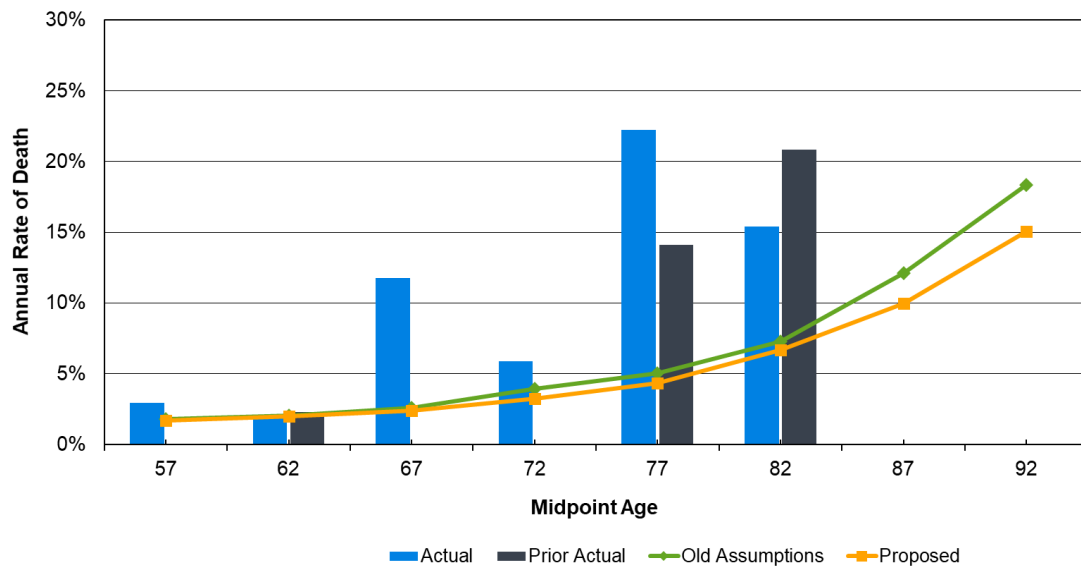
1. Weighted by benefit in \$1,000s.

Expected mortality: RP-2014 Mortality Table for Females, adjusted by 95%, projected with MP-2014 Ultimate projection scale (Generational)

Proposed mortality: PubG-2010 Mortality Table for Females, adjusted by 95%, projected with MP-2021 Ultimate projection scale (Generational)

Exhibit 5-3

Mortality Among Disabled Retirees – Males and Females



	Old Assumptions	Actual	Proposed
Total Count	7	14	6
Actual / Expected	200%		233%

Expected mortality: RP-2014 Disabled Mortality Table for Males and Females, adjusted by 95%, projected with MP-2014 Ultimate projection scale (Generational)

Proposed mortality: PubG-2010 Disabled Mortality Table for Males and Females, adjusted by 95%, projected with MP-2021 Ultimate projection scale (Generational)

6. Service Retirements

Exhibits 6-1 through 6-4 show the actual and expected rates of service retirement. Our analysis of rates of service retirement was by attained age. We study the retirement rates for members eligible to retire with a reduced benefit separately from the rates for members eligible to retire with a full 2% (1.75% for Plan 2) formula benefit. Additionally, we also study unreduced retirements split by years of service.

Exhibits 6-1 through 6-4 study retirements for the following eligibility groups:

Exhibit 6-1: Reduced Benefits – Male

Exhibit 6-2: Reduced Benefits – Female

Exhibit 6-3: Full Benefits – Males

Exhibit 6-4: Full Benefits – Females

Results – Reduced Benefits

The requirements for early retirement with a reduced benefit in Plan 1 are age 52 with 20 years of service, age 57 with 10 years of service, or age 62 with five years of service. Exhibits 6-1 and 6-2 show the rates of retirement for members eligible to retire with a reduced benefit. The actual pattern and number of retirements was generally lower than expected over the study period, with the total number of reduced retirements equal to 85% of the expected number.

Retirements with Reduced Benefits			
Gender	Actual	Expected	Act/Exp
Male	106	143	74%
Female	111	112	99%
Total	217	255	85%

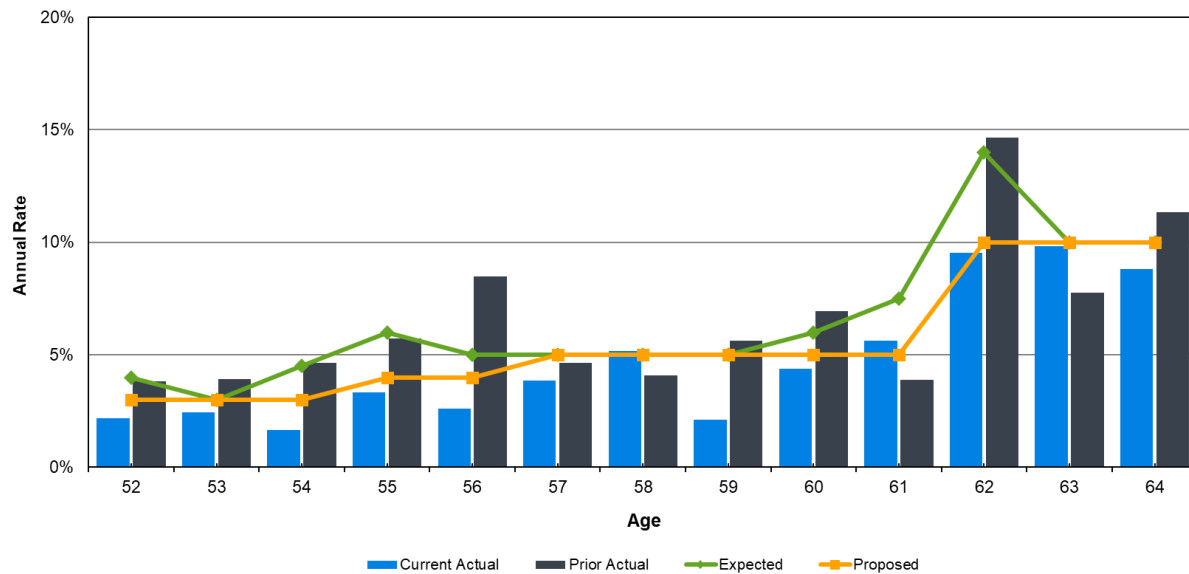
Recommendation – Reduced Benefits

Based on the results of the study, we are recommending small reductions in most of the ages. In making our recommendation, we considered the results of both the current and prior investigation of experience studies (as shown in the graphs below). The proposed rates result in an Actual-to-Proposed ratio of 92%, as shown in the following table, and are shown in Exhibits 6-1 and 6-2. The recommended rates were adopted at the March 2022 Board meeting.

Retirements with Reduced Benefits			
Gender	Actual	Proposed	Act/Prop
Male	106	124	85%
Female	111	112	99%
Total	217	236	92%

Exhibit 6-1

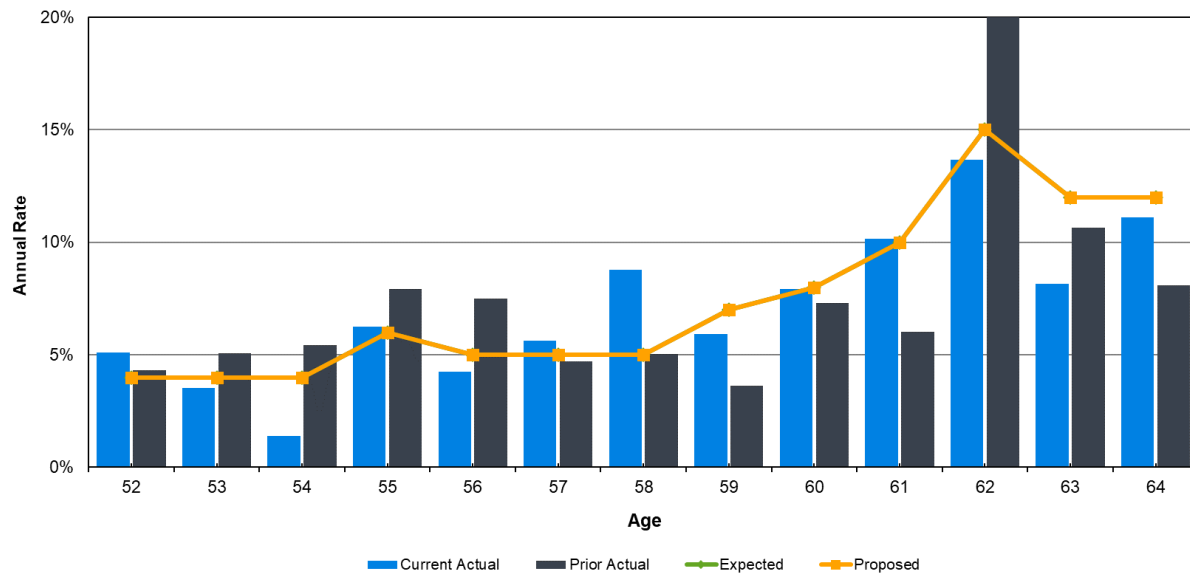
Retirement with Reduced Benefits – Males



Current Actual			
All Ages	Old Assumptions	Actual	Proposed
Total Count	143	106	124
Actual / Expected	74%		85%

Exhibit 6-2

Retirement with Reduced Benefits – Females

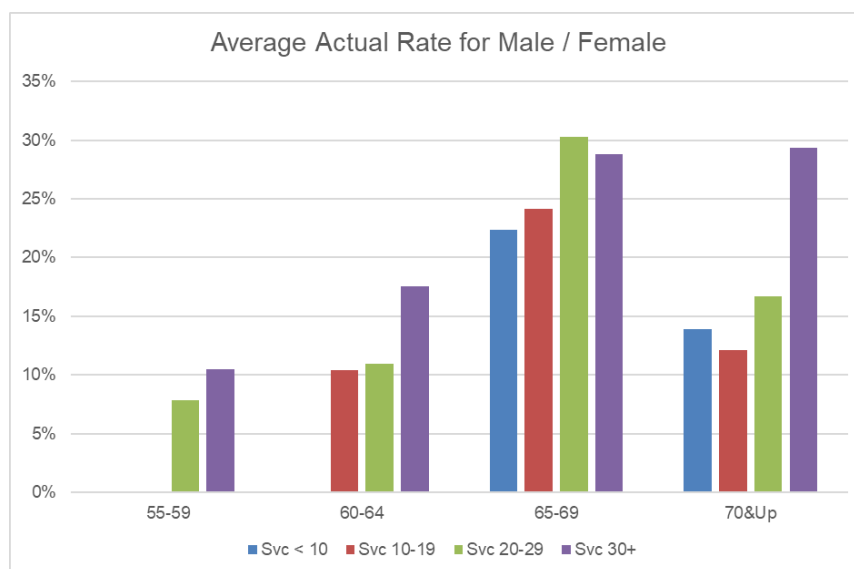


Current Actual			
All Ages	Old Assumptions	Actual	Proposed
Total Count	112	111	112
Actual / Expected	99%		99%

Results – Unreduced Benefits

Members who are eligible for the full 2% (1.75% for Plan 2) service benefit with no reduction have higher assumed retirement rates than those only eligible for reduced benefits. This is consistent with the results of this study as shown in Exhibits 6-3 and 6-4 (full benefits) when compared to Exhibits 6-1 and 6-2 (reduced benefits).

In previous studies, we split the group eligible for unreduced benefits into those with less than and those with more than 30 years of service. For this study, we reviewed those with less than 10 years of service, 10-19 years of service, 20-29 years of service and 30 or more years of service. The following graph shows the results split by age and service: Note that due to the age and service requirements for the unreduced benefits, there are some age/service combinations where there are no results for the group (such as ages 55-59 with less than 20 years of service).



In general, the actual number of retirements was less than that projected by the current assumptions.

Retirements with Unreduced Benefits			
Gender	Actual	Expected	Act/Exp
Male	490	718	68%
Female	423	563	75%
Total	913	1,281	71%

Recommendation – Unreduced Benefits

We are recommending reducing the rates of unreduced retirement to partially reflect recent experience. Based on the results split by age and service, we are recommending rates of retirement based on both the age and service of the member. The recommended rates were adopted at the March 2022 Board meeting.

A comparison of the actual and proposed retirements under the recommended assumptions is shown in the table below.

Retirements with Unreduced Benefits			
Gender	Actual	Proposed	Act/Prop
Male	490	571	86%
Female	423	456	93%
Total	913	1,027	89%

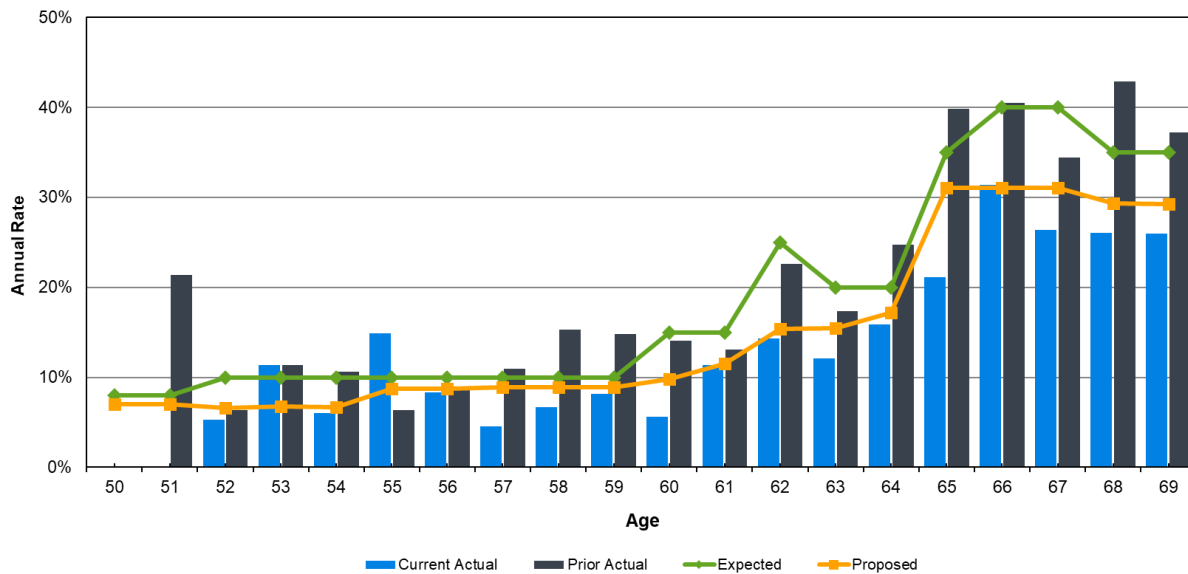
Recommendation – Plan 2

The prior analysis and recommendations were for Plan 1. For Plan 2, we do not have any retirement experience to analyze. Based on our experience working with other systems with multiple plans of benefits, we expect the plan with the lower benefits to have lower retirement ages at the younger ages.

Our recommendation for Plan 2 is to continue to use 80% of the Plan 1 retirement rates at ages less than 62. At age 62 and later, we recommend using the same retirement rates for Plan 1 and Plan 2. The recommended rates were adopted at the March 2022 Board meeting.

Exhibit 6-3

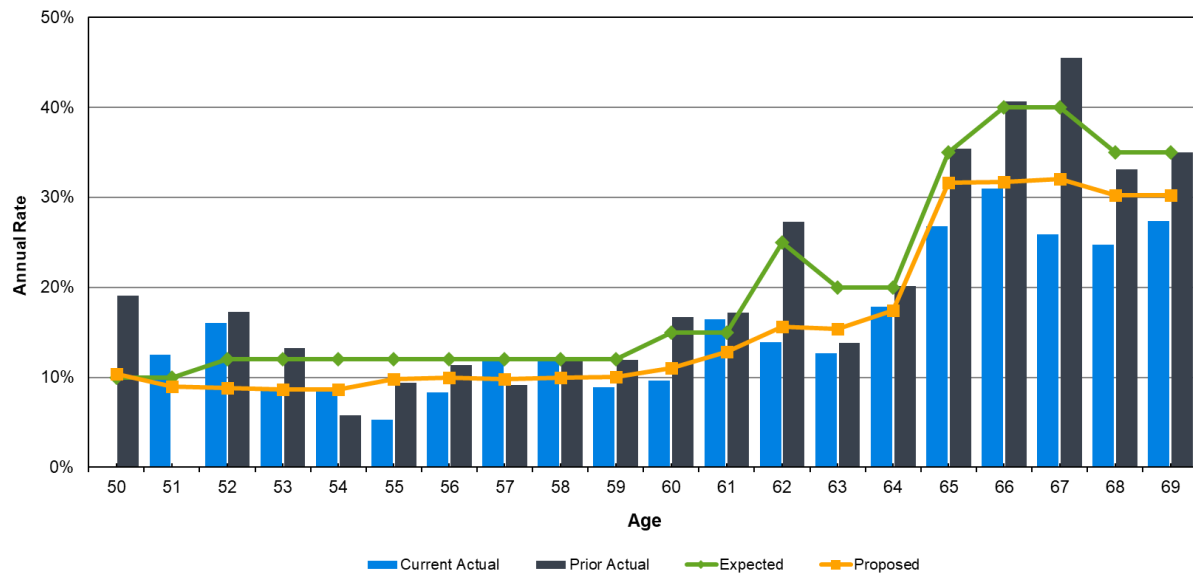
Retirement with Unreduced Benefits – Males



Current Actual			
All Ages	Old Assumptions	Actual	Proposed
Total Count	718	490	571
Actual / Expected	68%		86%

Exhibit 6-4

Retirement with Unreduced Benefits – Females



Current Actual			
All Ages	Old Assumptions	Actual	Proposed
Total Count	563	423	456
Actual / Expected	75%		93%

7. Disability Retirement

Results

The City's Long-Term Disability (LTD) Insurance benefits are reduced by any disability retirement benefits payable by the System. As a result, almost all disabled members elect to receive full 100% LTD benefits and delay receiving retirement benefits until normal service retirement age is reached. The result is very few disabilities occur within SCERS and the overall financial impact of this assumption on the System is very small.

Over the four-year study period, there were two disability retirements compared to five expected.

Recommendation

We are recommending a small reduction to the disability assumption because of the low number of disability retirements each year. Because of the extremely small size of this group, it is possible that the actual rates of disability retirement may show greater variance from year to year than most assumptions. However, as discussed above, the impact of this assumption on the valuation is very small. The recommended rates were adopted at the March 2022 Board meeting.

Disability Retirement				
Actual	Expected	Act/Exp	Proposed	Act/Prop
2	5	40%	3	67%

8. Other Terminations of Employment

Results

This section of the report summarizes the results of our study of terminations of employment for reasons other than death, service retirement, or disability. Rates of termination vary by years of service – the greater the years of service, the less likely a member is to terminate employment.

The current assumptions also vary by gender, with females having a slightly higher probability of terminating than males.

Overall, the actual number of terminations was greater than the number projected by the current assumptions (136% of expected).

Termination - All Years of Service ⁽¹⁾			
Gender	Actual	Expected	Act/Exp
Male	795	515	154%
Female	800	660	121%
Total	1,595	1,175	136%

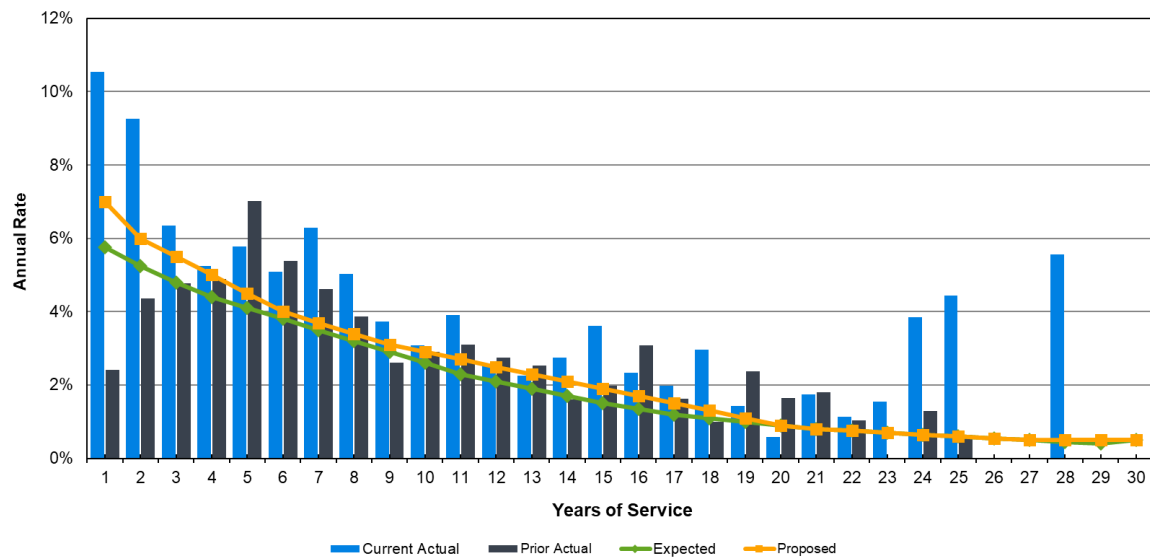
1. Experience for members with <1 year of service excluded.

Recommendation

Some of the termination experience, particularly in 2021, was likely influenced by the effects of the pandemic, so we only gave partial credibility to the experience. We have recommended no adjustments to the rates of assumed termination for females and a slight increase to the rates of assumed termination for males, as shown in Exhibits 8-1 and 8-2. The recommended rates were adopted at the March 2022 Board meeting.

Exhibit 8-1

Termination by Years of Service – Males

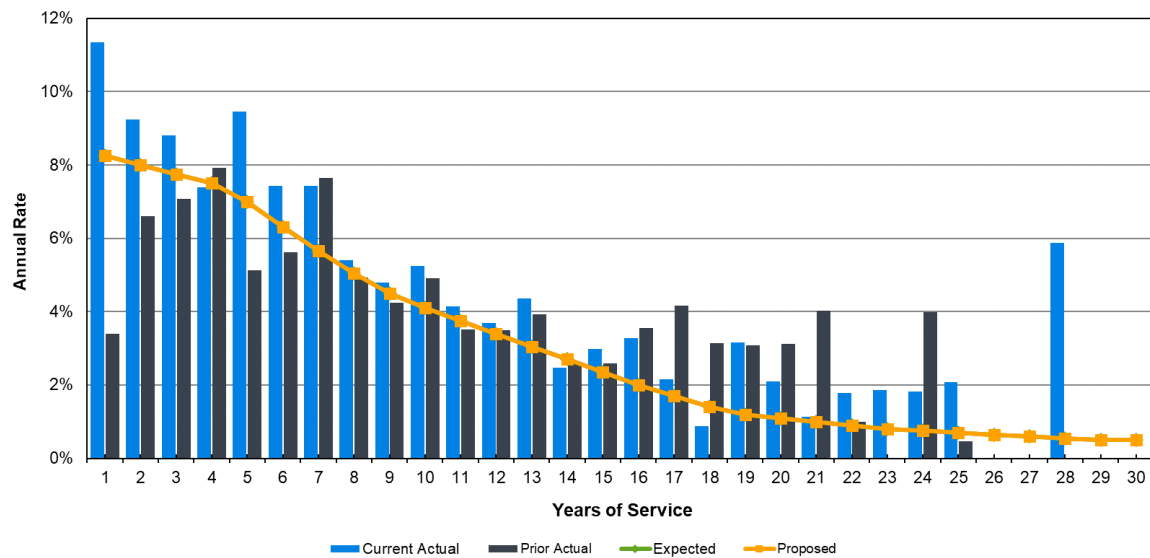


Excluding Service less than One			
	Expected	Actual	Proposed
Total Count	515	795	589
Actual / Expected	154%		135%

Service of 10 Years or More			
	Expected	Actual	Proposed
Total Count	84	132	99
Actual / Expected	157%		133%

Exhibit 8-2

Termination by Years of Service – Females



Excluding Service less than One			
	Expected	Actual	Proposed
Total Count	660	800	660
Actual / Expected	121%		121%

Service of 10 Years or More			
	Expected	Actual	Proposed
Total Count	94	120	94
Actual / Expected	128%		128%

9. Probability of Refund upon Vested Termination

This section of the report deals with the rates at which employees elect a refund of their contributions upon termination of service. It only considers vested members who are not yet eligible for service retirement. Under the current assumptions, members who terminate at younger ages have a greater probability of electing to withdraw their contributions. All non-vested members are assumed to take a refund of their contributions at termination.

Results

Exhibit 9-1 summarizes the results of our study. Overall, the number of refunds for members with less than 20 years of service is 48% of what the assumptions predicted.

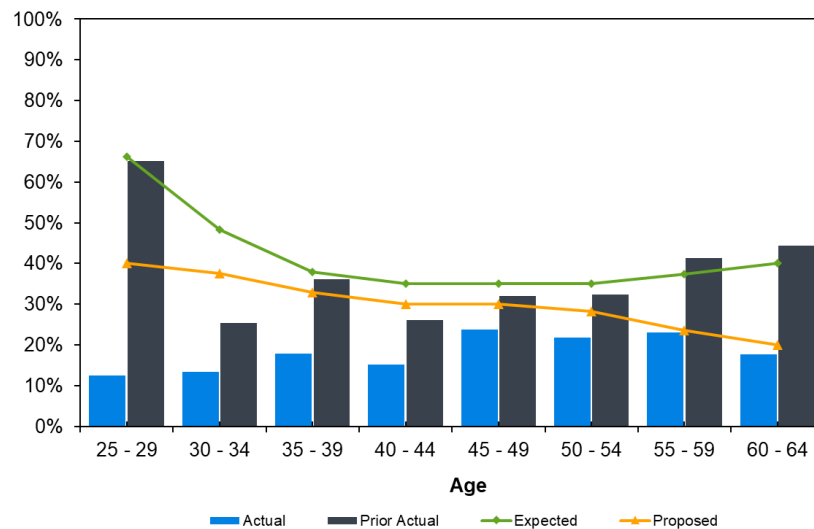
We use a separate assumption for the probability of refund among members who terminate with 20 or more years of service. Among this group, the actual number of refunds was 0% of the expected number, but it was based on a small sample size (zero actual refunds, versus two expected).

Recommendation

Based on the experience from both the current and the prior experience studies, we are recommending reductions to the assumed rates at which members withdraw their contributions in the System for ages. We are recommending a decrease for the rate of refund for members with 20 or more years of service from 20% to 10%. The recommended rates were adopted at the March 2022 Board meeting.

Exhibit 9-1

Probability of Refund upon Vested Termination – Males and Females



	Less than 20 Years of Service		
	Expected	Actual	Proposed
Total Count	232	112	185
Actual / Expected	48%		61%

	20 Years or More of Service		
	Expected	Actual	Proposed
Total Count	4	0	2
Actual / Expected	0%		0%

10. Miscellaneous Assumptions

In addition to the assumptions described in the previous sections, there are a number of other assumptions that are needed to complete the actuarial valuation. In this section, we discuss these assumptions along with any recommended changes. These assumptions were adopted at the March 2022 Board meeting.

- **Probability of Marriage or Registered Domestic Partner:** Currently, 60% of active members are assumed to have a spouse or eligible domestic partner for purposes of the SCERS' death benefit. We recommend no change to this assumption. We do not receive information regarding actual death from active status with eligible beneficiary. This assumption has a very minor impact on the valuation, and we believe the continued use of 60% is reasonable and consistent with the assumptions used by other systems.
- **Mortality Tables used for Optional Factors:** Currently, the factors for conversion at retirement between optional benefit forms are calculated based on mortality tables that reflect the 2021 valuation mortality assumption base tables, with static projection to 2025 and a 50%/50% male/female unisex blend. We recommend the mortality tables for optional factors be updated to reflect the adopted adjustments (95% of the PubG-2010 Healthy Retired Mortality tables) to male and female service retiree mortality. We recommend a fully generational projection to 2025 based on age 60 (using MP-2021 Ultimate projection scale) and the 50%/50% male/female blend continue to be used. The base age of 60 means that for ages less than 60, mortality is projected to 2025 which is 15 years from the 2010 base table. For members over age 60, mortality is projected with the additional number of years from age 60. For example, age 65 will be projected from 2010 to 2025 and then an additional 5 years past age 60 for 20 total years of projection. This is to reflect generational mortality assuming an age 60 retirement age.
- **Portability:** Currently there is no assumption included in the valuation for portability. Portability, that is if a member works for SCERS and has dual membership with another reciprocal system (such as the state of Washington), can affect the member's SCERS retirement benefit. Specifically, it can affect the member's retirement eligibility, the benefit multiplier used in the service retirement benefit, and the final average salary used in the service retirement benefit. We are recommending reflecting the cost of portability by adjusting the compensation used to value current and future deferred vested members by wage growth plus merit ($3.35\% + 0.50\% = 3.85\%$).

11. Actuarial Methods

In addition to the assumptions used in the valuation, we reviewed the actuarial methods. We are not recommending any changes to these assumptions. These methods were adopted at the March 2022 Board meeting.

- **Cost Method:** The actuarial valuation is prepared using the entry age actuarial cost method. We believe that this cost method is appropriate for SCERS' valuation. It is also the cost method that is required for financial reporting under GASB Statements 67 and 68. We recommend no change. Note that this is by far the most popular method used for public sector retirement systems, as it results in more stability in normal costs and provides a level allocation of costs over each individual's working lifetime.
- **Level Percent of Pay vs. Level Dollar:** A significant majority of public pension systems fund on a level percent of pay basis, as SCERS does. A minority use the level dollar approach. Using the level dollar method results in higher calculated contribution rates in the short term and ultimately a higher level of funding.
- **Valuation of Assets:** SCERS uses a five-year smoothing method to determine the actuarial value of assets used in the valuation. We believe this is an appropriate method for variable contribution rate plans.

For reference, five-year asset smoothing is the most common asset smoothing period among public systems (based on the Public Fund Survey).

Appendix A Summary of Proposed Assumptions

This section of the report describes the actuarial procedures and assumptions to be used in the January 1, 2022 valuation. These assumptions were adopted by the SCERS Board at its March 2022 meeting.

The actuarial assumptions used in the valuation are intended to estimate the future experience of the members of the System and of the System itself in areas that affect the projected benefit flow and anticipated investment earnings. Any variations in future experience from that expected from these assumptions will result in corresponding changes in the estimated costs of the System's benefits. Table A-1 summarizes the actuarial assumptions.

Table A-2 presents expected annual salary increases for various years of service. Tables A-3 through A-6 show rates of decrement for service retirement, disability, mortality, and other terminations of employment. Table A-7 shows probabilities of refund upon termination.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets, and (b) the actuarial present value of future normal costs is called the unfunded actuarial accrued liability or UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consist of financial information; records of age, sex, service, salary, contribution rates and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data were supplied by the System and are accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Employer Contributions

The employer actuarial contribution rate is determined as of the prior year's valuation such that the combined member and employer contribution rate is sufficient to amortize the UAAL over a closed 30-year period beginning January 1, 2013. The amortization payment is based on a level percent of pay.

Administrative Expense

The annual contribution assumed to be necessary to meet general administrative expenses of the System, excluding investment expenses, is 0.80% of members' salaries. This figure is included in the calculation of the normal cost rate.

Valuation of Assets

The assets are valued using a five-year smoothing method based on the difference between the expected market value and the actual market value of the assets in each year. The expected market value is the prior year's market value increased with the net increase in the cash flow, all increased with interest during the past fiscal year at the expected investment return rate assumption.

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 6.75%. This rate is compounded annually and is net of investment expenses.

Postretirement Benefit Increases

Postretirement benefit increases include:

- Automatic 1.5% Annual COLA – This benefit applies to all members. Annual increases of 1.5% are assumed as this provision is not affected by actual inflation.
- 65% Restoration of Purchasing Power (ROPP) – The member's benefit is the greater of 65% of the annual initial benefit adjusted for CPI or their applicable benefit. This minimum benefit is available to all retirees and beneficiaries. The financial impact of the ROPP benefit is valued assuming an annual price inflation rate of 2.60%. To account for uncertainty in the value of this benefit, the benefit is assumed to begin 31 years after retirement, which is earlier than it is projected to begin based on 2.60% inflation and a 1.5% annual COLA.

Additional contingent COLA increases that were adopted in 2001, but not effective until the System reaches at least a 100% funding ratio, are not included in the valuation results.

Valuation Services

The salary for the year immediately preceding the valuation year is equal to the member's earnings for that year with the following adjustments:

- Annualized pay for members who entered in the year preceding the valuation year.
- For members on leave, the salary is calculated as the hourly pay rate multiplied by 2,088 hours.

Future Salaries

Table A-2 illustrates the rates of future salary increases assumed for the purpose of the valuation. Increases are assumed to occur at the beginning of the year. In addition to increases in salary due to promotions and longevity, this scale includes an assumed 3.35% per annum rate of increase in the general wage level of the membership.

Service Retirement

Table A-3 shows the annual assumed rates of retirement among members eligible for unreduced service retirement or reduced service retirement.

Disability

The rates of disability used in this valuation are illustrated in Table A-4. It is assumed that one-third of all disabilities are duty related and two-thirds occur while off duty. Only the duty related assumption is used prior to 10 years of service.

Mortality

The mortality rates used in this valuation are illustrated in Table A-5. A written description of each table used is included in Table A-1.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability, or retirement are shown for representative ages in Table A-6. Note that this assumption only applies to members who terminate and are not yet eligible for retirement.

Probability of Refund

Terminating members may forfeit a vested right to a deferred benefit if they elect a refund of their accumulated contributions. Table A-7 gives the assumed probability that, at selected ages, a terminating member will elect to receive a refund of his accumulated contributions instead of a deferred benefit.

If a member terminates with more than 20 years of service, there is assumed to be a 10% probability that the member will elect a refund.

Note that the probability of refund assumption only applies to members who terminate with a vested benefit and are not yet eligible for retirement.

Interest on Member Contributions

Interest on member contributions made prior to January 1, 2012 is assumed to accrue at a rate of 5.75% per annum, compounded annually. Interest on member contributions made on or after January 1, 2012 is assumed to accrue at 3.85%.

Portability

The cost of portability with other public retirement systems is reflected in this valuation by adjusting the compensation used to value current and future deferred vested members by wage growth plus merit ($3.35\% + 0.50\% = 3.85\%$).

Probability of Marriage

60% of active members are assumed to be married or have a registered domestic partner.

Commencement for Terminated Vested Members

Vested members who terminate but elect to leave their contributions in the System are assumed to commence receiving benefits at age 62.

Table A-1
Summary of Valuation Assumptions
January 1, 2021

Economic Assumptions	
Price inflation	2.60 %
General wage increases	3.35
Investment return	6.75
Increase in membership	0.25
Interest on member accounts	5.75/3.85 ⁽¹⁾
Demographic Assumptions	
Salary increases due to promotion and longevity	Table A-2
Retirement	Table A-3
Disability	Table A-4
Mortality ⁽²⁾ among contributing members	Table A-5
Males: PubG-2010 Employee Table for Males, adjusted by 95%	
Females: PubG-2010 Employee Table for Females, adjusted by 95%	
Mortality ⁽²⁾ among service retired members and beneficiaries	Table A-5
Males: PubG-2010 Retired Mortality Table for Males, adjusted by 95%	
Females: PubG-2010 Retired Mortality Table for Females, adjusted by 95%	
Mortality ⁽²⁾ among disabled members	Table A-5
Males: PubG-2010 Disabled Mortality Table for Males, adjusted by 95%	
Females: PubG-2010 Disabled Mortality Table for Females, adjusted by 95%	
Other terminations of employment	Table A-6
Probabilities of refund on termination	Table A-7

1. Member contributions made prior to January 1, 2012 are assumed to accrue interest at 5.75%; contributions made on or after that date are assumed to accrue at 3.85%.

2. All mortality tables are generational using the MP-2021 Ultimate Projection Scale to reflect future mortality improvement.

Table A-2

Future Salaries – Plans 1 and 2

Years of Service	Annual Rate of Increase	
	Promotion and Longevity	Total ⁽¹⁾
0 to 1	4.25%	7.74%
1 to 2	3.25	6.71
2 to 3	2.50	5.93
3 to 4	1.75	5.16
4 to 5	1.25	4.64
5 to 6	1.00	4.38
6 to 7	0.90	4.28
7 to 8	0.80	4.18
8 to 9	0.72	4.09
9 to 10	0.65	4.02
10 to 11	0.60	3.97
11 to 12	0.55	3.92
12 to 13	0.50	3.87
13 to 14	0.45	3.82
14 to 15	0.40	3.76
15 to 16	0.35	3.71
16 to 17	0.33	3.69
17 to 18	0.31	3.67
18 to 19	0.29	3.65
19 to 20	0.27	3.63
20 to 21	0.25	3.61
21 to 22	0.25	3.61
22 to 23	0.25	3.61
23 to 24	0.25	3.61
24 to 25	0.25	3.61
25 and over	0.25	3.61

1. Total rate shown reflects compounded effect of merit increase and assumed wage growth of 3.35%.

Table A-3a

Retirement – Plan 1⁽¹⁾

Annual Probability – Males					
Age	Eligible for Reduced Benefits	Eligible for Full Benefits			
	Years of Credited Service				
	All years	Less than 10 years	10-19 years	20-29 years	30 or more years
Less than 50	0.0%	4.8%	4.8%	5.4%	6.9%
50	3.0	5.6	5.6	6.3	8.1
51	3.0	5.6	5.6	6.3	8.1
52	3.0	5.6	5.6	6.3	8.1
53	3.0	5.6	5.6	6.3	8.1
54	3.0	5.6	5.6	6.3	8.1
55	4.0	7.2	7.2	8.1	10.4
56	4.0	7.2	7.2	8.1	10.4
57	5.0	7.2	7.2	8.1	10.4
58	5.0	7.2	7.2	8.1	10.4
59	5.0	7.2	7.2	8.1	10.4
60	5.0	8.0	8.0	9.0	11.5
61	5.0	9.6	9.6	10.8	13.8
62	10.0	12.8	12.8	14.4	18.4
63	10.0	12.8	12.8	14.4	18.4
64	10.0	14.4	14.4	16.2	20.7
65		28.8	28.8	32.0	35.2
66		28.8	28.8	32.0	35.2
67		28.8	28.8	32.0	35.2
68		27.0	27.0	30.0	33.0
69		27.0	27.0	30.0	33.0
70		27.0	27.0	30.0	33.0
71		27.0	27.0	30.0	33.0
72		27.0	27.0	30.0	33.0
73		27.0	27.0	30.0	33.0
74		27.0	27.0	30.0	33.0
75		(2)	(2)	(2)	(2)

1. For Plan 2, 80% of Plan 1 retirement rates are assumed at ages less than 62. The same retirement rates for ages 62 and later are assumed for Plan 1 and Plan 2.

2. Immediate retirement is assumed for everyone person age 75 or over.

Table A-3b

Retirement – Plan 1⁽¹⁾

Annual Probability – Females					
Age	Eligible for Reduced Benefits	Eligible for Full Benefits			
	Years of Credited Service				
	All years	Less than 10 years	10-19 years	20-29 years	30 or more years
Less than 50	0.0%	6.4%	6.4%	7.2%	9.2%
50	4.0	7.2	7.2	8.1	10.4
51	4.0	7.2	7.2	8.1	10.4
52	4.0	7.2	7.2	8.1	10.4
53	4.0	7.2	7.2	8.1	10.4
54	4.0	7.2	7.2	8.1	10.4
55	6.0	8.0	8.0	9.0	11.5
56	5.0	8.0	8.0	9.0	11.5
57	5.0	8.0	8.0	9.0	11.5
58	5.0	8.0	8.0	9.0	11.5
59	7.0	8.0	8.0	9.0	11.5
60	8.0	8.8	8.8	9.9	12.7
61	10.0	10.4	10.4	11.7	15.0
62	15.0	12.8	12.8	14.4	18.4
63	12.0	12.8	12.8	14.4	18.4
64	12.0	14.4	14.4	16.2	20.7
65		28.8	28.8	32.0	35.2
66		28.8	28.8	32.0	35.2
67		28.8	28.8	32.0	35.2
68		27.0	27.0	30.0	33.0
69		27.0	27.0	30.0	33.0
70		27.0	27.0	30.0	33.0
71		27.0	27.0	30.0	33.0
72		27.0	27.0	30.0	33.0
73		27.0	27.0	30.0	33.0
74		27.0	27.0	30.0	33.0
75		(2)	(2)	(2)	(2)

1. For Plan 2, 80% of Plan 1 retirement rates are assumed at ages less than 62. The same retirement rates for ages 62 and later are assumed for Plan 1 and Plan 2.

2. Immediate retirement is assumed for everyone person age 75 or over.

Table A-4

Disability – Plans 1 and 2⁽¹⁾

Annual Rates		
Age	Male	Female
20	0.00%	0.00%
25	0.00	0.00
30	0.00	0.00
35	0.00	0.00
40	0.03	0.03
45	0.03	0.03
50	0.04	0.04
55	0.05	0.05
60	0.06	0.06
65	0.00	0.00

1. It is assumed that one-third of all disabilities are duty related and two-thirds are non-duty related. Only the duty related assumption is used prior to 10 years of service.

Table A-5
Mortality – Plans 1 and 2

Age	Annual Probability ⁽¹⁾					
	Contributing Members		Members Retired for Service and Beneficiaries of Members		Disabled Members	
	Males	Females	Males	Females	Males	Females
22	0.03 %	0.01 %	0.03 %	0.01 %	0.33 %	0.18 %
27	0.03	0.01	0.03	0.01	0.29	0.19
32	0.04	0.02	0.04	0.02	0.37	0.29
37	0.05	0.03	0.05	0.03	0.49	0.46
42	0.07	0.04	0.07	0.04	0.72	0.72
47	0.11	0.06	0.11	0.06	1.16	1.11
52	0.17	0.09	0.33	0.23	1.73	1.51
57	0.24	0.14	0.47	0.30	2.17	1.74
62	0.35	0.21	0.68	0.43	2.54	1.95
67	0.52	0.34	1.05	0.72	3.19	2.33
72	N/A	N/A	1.81	1.27	4.13	3.08
77	N/A	N/A	3.19	2.25	5.62	4.44
82	N/A	N/A	5.75	4.06	8.14	6.79
87	N/A	N/A	10.20	7.59	11.97	10.46
92	N/A	N/A	16.86	13.53	18.17	14.85

Annual Projected Mortality Improvement

Age	All Groups
62 & Less	1.35 %
67	1.28
72	1.21
77	1.14
82	1.01
87	0.77
92	0.54
97	0.36
102	0.26
107	0.16
112	0.06
115	-

1. Mortality rates are those applicable for the fiscal year beginning in 2010. Annual projected improvements are assumed in the following years under the schedule shown. For example, the annual mortality rate for an 82-year old male in fiscal year beginning in 2021 is 5.1419% calculated as follows:

Age 82 rate in 2021 = Age 82 rate in 2010 with 11 years improvement

= 5.7494% x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) x (100.0% - 1.01%) = 5.1419%

Table A-6

**Other Terminations of Employment Among Members
Not Eligible to Retire – Plans 1 and 2**

Years of Service	Annual Rates	
	Males	Females
0 to 1	8.0%	8.5%
1 to 2	7.0	8.3
2 to 3	6.0	8.0
3 to 4	5.5	7.8
4 to 5	5.0	7.5
5 to 6	4.5	7.0
6 to 7	4.0	6.3
7 to 8	3.7	5.7
8 to 9	3.4	5.1
9 to 10	3.1	4.5
10 to 11	2.9	4.1
11 to 12	2.7	3.8
12 to 13	2.5	3.4
13 to 14	2.3	3.1
14 to 15	2.1	2.7
15 to 16	1.9	2.4
16 to 17	1.7	2.0
17 to 18	1.5	1.7
18 to 19	1.3	1.4
19 to 20	1.1	1.2
20 to 21	0.9	1.1
21 to 22	0.8	1.0
22 to 23	0.8	0.9
23 to 24	0.7	0.8
24 to 25	0.7	0.8
25 to 26	0.6	0.7
26 to 27	0.6	0.7
27 to 28	0.5	0.6
28 to 29	0.5	0.6
30 or more	0.5	0.5

Table A-7

Probability of Refund – Plans 1 and 2

Age	Probabilities of Refund upon Termination ⁽¹⁾
25	40.0%
30	40.0
35	35.0
40	30.0
45	30.0
50	30.0
55	25.0
60	20.0

1. If service is 20 or more years at termination, probability of refund is equal to 10%.