SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO

Experience Study for the Five-Year Period Ending June 30, 2025

Prepared as of June 30, 2025

CavMac
Actuarial Consulting Services

April 3, 2026

Board of Trustees
School Employees Retirement System of Ohio
300 East Broad Street, Suite 100
Columbus, OH 43215-3746

Dear Members of the Board:

We are pleased to submit the results of a study of the economic and demographic experience for the School Employees Retirement System of Ohio (SERS). The purpose of this investigation is to assess the reasonability of the actuarial assumptions for the System. This investigation covers the five-year period from July 1, 2020 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 experience study includes all active members, retired members, and beneficiaries of deceased members. Mortality and disability rates were studied separately for males and females. Incidences of withdrawal, retirement and compensation increases were investigated without regard to gender. The System's experience was liability weighted for observed incidents of withdrawal, retirement and pre- and post-mortality. For these assumptions specifically, this approach provides a materially different analysis from a headcount only approach. Where experience data is liability weighted, the analysis of trends provide a better measure of the actual and expected impact assumptions have on the System's liability.

This report shows comparisons between the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. Tables and graphs are used to show the actual rates of separation from service, the expected rates of separation from service, the actual mortality rates, the expected mortality rates, the expected salary increase rates, and the actual salary increase rates. Where changes to assumptions are recommended, the proposed rates of separation from service, rates of mortality, and salary increase rates are provided.

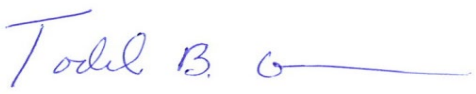
The recommended rates of separation from service, rates of mortality, and salary increase rates are shown in Appendix D of this report. In the actuary's judgment, the recommended rates are suitable for use until further experience indicates that modifications are needed.

Actuarial assumptions and methods are used to measure and allocate future costs. Changing assumptions or methods will not change the actual cost of future benefits, but rather, the actuarial valuation measures associated with the future payments. This report also provides the adequacy of the contribution rates set in the Ohio Revised Code under the recommendations.

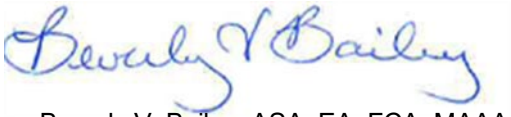
In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

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

Respectfully submitted,



Todd B. Green ASA, EA, FCA, MAAA
President



Beverly V. Bailey, ASA, EA, FCA, MAAA
Senior Actuary

Alisa Bennett, FSA, FCA, EA, MAAA
President & Consulting Actuary

Jessica Fain, EA, ACA, MAAA
Senior Actuary

TBG:BVB:AB:JF\dv

S:\2026\Ohio SERS\Experience Study\Ohio SERS Experience Study 2020-2025.docx

TABLE OF CONTENTS

SECTION I – SUMMARY OF RESULTS

The following summarizes the findings and recommendations with regard to the assumptions utilized by the School Employees Retirement System of Ohio (SERS). Explanations for the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the three economic assumptions used in the actuarial valuation and their current and proposed rates. We recommend a slight increase in the assumed rate of price inflation and an increase in the assumed rate of real wage growth. For the assumed rate of return on assets we recommend maintaining 7.00%. Since the assets for the Health Care Plan are invested in the same manner as the Basic Benefits Plan, we recommend using 7.00% for funding purposes for both the Basic Benefits Plan and the Health Care Plan. Since the health care trend assumption steps down to an ultimate rate of price inflation plus 2%, the increase in the price inflation assumption increases the ultimate health care trend from 4.40% to 4.50%.

Item	Current	Proposed
Price Inflation	2.40%	2.50%
Investment Return	7.00%	7.00%
Real Wage Growth	0.85%	1.00%
Cost-of-Living-Adjustments	2.00%	2.50%

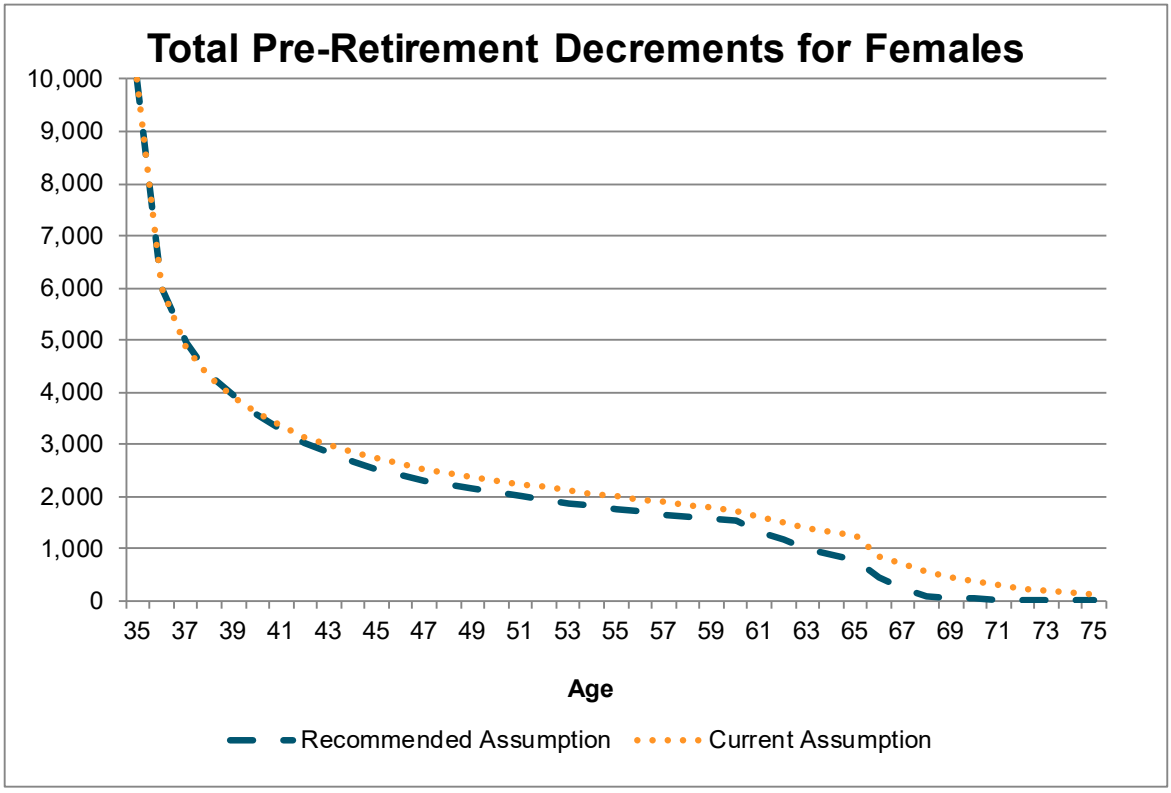
Recommended Demographic Assumption Changes

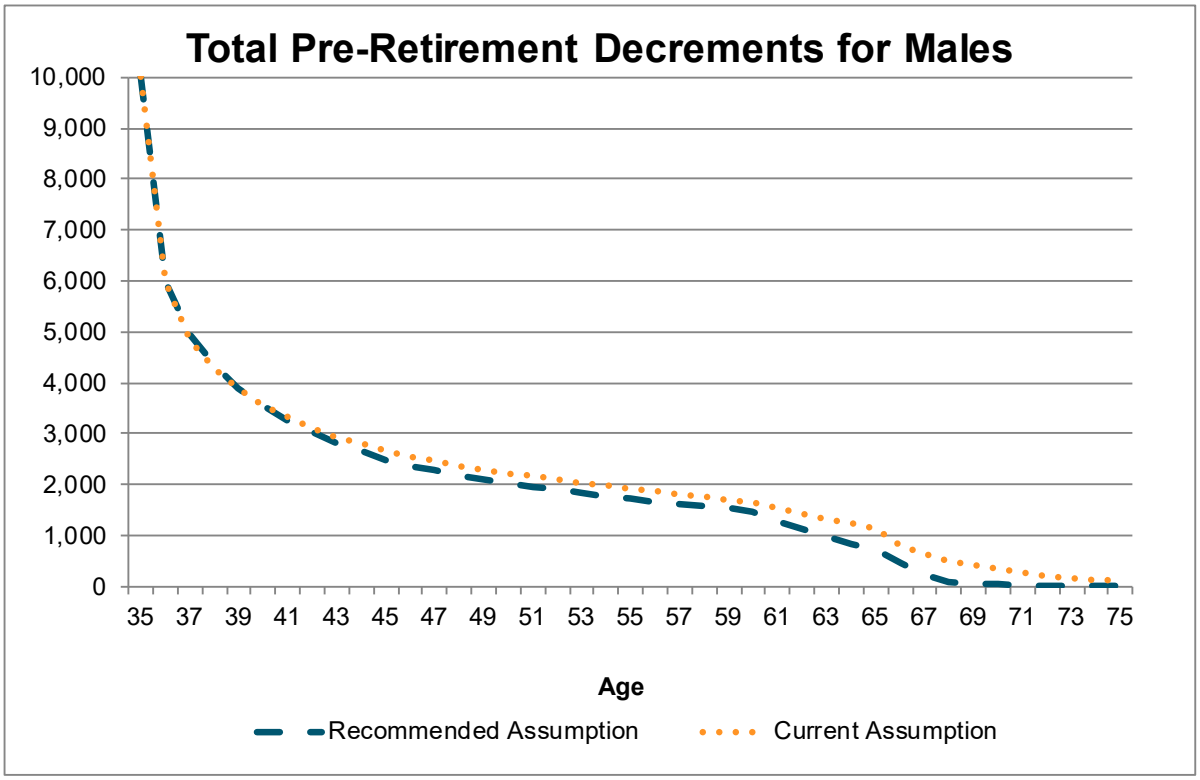
The table below lists the demographic assumptions that we recommend be changed based on the experience of the last five years.

Assumption Changes
Adjust rates of withdrawal
Adjust rates of disability retirements
Adjust rates of pre-retirement, post-retirement and disabled mortality
Adjust rates of service retirement
Adjust assumed rates of compensation increase
Adjust rates of future over age 65 retiree Medicare coverage
Adjust rates of Health Care Discount Program Qualification
Adjust aging factors

Demographic Impact

The charts on the following page detail the demographic impact of changing decrements for male and female active participants who are 35 years old. As one can see, the results of the experience study modify anticipated behavior of the workforce. Overall, the recommendation increase the withdrawals prior to retirement and increases retirements once members are eligible for retirement.


Total Pre-Retirement Decrements for Females
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75
Age
Recommended Assumption
Current Assumption


Total Pre-Retirement Decrements for Males
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75
Age
Recommended Assumption
Current Assumption

SECTION I – SUMMARY OF RESULTS

Financial Impact

The tables below highlight the impact on the Basic Benefits Plan and the Retiree Health Care Plan based on the recommended changes noted on the previous page. The tables show the change in the unfunded accrued liability (UAL) and funded status for both Plans of the System as of June 30, 2025. Further cost impact information is provided in Section VI.

BASIC BENEFITS VALUATION

Valuation As of June 30, 2025	Before Change Current Demographic Assumptions Investment Rate of Return = 7.00%	After Change Proposed Demographic Assumptions Investment Rate of Return = 7.00%
UAL	$5,161,765,991	$6,138,641,208
Funded Status		
All Basic Benefits	79.00%	75.98%
Pension Benefits	78.90%	75.87%
Medicare Part B	85.16%	82.87%
Post Retirement Death Benefits	82.59%	80.79%
Amortization Period	19 Years	19 to 20 Years Layered Bases

HEALTH CARE VALUATION

Valuation As of June 30, 2025	Before Change Current Demographic Assumptions Investment Rate of Return = 7.00%	After Change Proposed Demographic Assumptions Investment Rate of Return = 7.00%
UAL	$783,775,027	$651,289,843
Funded Status	54.53%	59.07%
Solvency Period	2064	2065

SECTION II – ECONOMIC ASSUMPTIONS

There are three economic assumptions used in performing the actuarial valuation for the School Employees Retirement System of Ohio (SERS). The assumptions are:

- Price Inflation
- Investment Return
- Wage Inflation

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 27, *"Selection of Economic Assumptions for Measuring Pension Obligations,"* which provides guidance to actuaries in selecting economic assumptions – primarily, investment return, discount rate, post-retirement benefit increases, inflation, and compensation increases for the purpose of measuring benefit obligations under defined benefit plans. Professional judgment is used to estimate possible future economic outcomes based on a mixture of past experience and future expectations. In setting the assumption, the actuary should consider several factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data, and an estimate of the actuary's expectation about future experience. Finally, the actuary's recommendation should have no significant bias. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

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

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

Item	Current	Proposed
Real Rate of Return	4.82%	4.72%
Price Inflation	2.40	2.50
Administrative Expenses	(0.22)	(0.22)
Investment Return	7.00%	7.00%
Price Inflation	2.40%	2.50%
Real Wage Growth	0.85	1.00
Wage Inflation	3.25%	3.50%

SECTION II – ECONOMIC ASSUMPTIONS

Price Inflation

Background: Price inflation is used as a component for the investment rate of return assumption and the rate of wage inflation assumption. It is important that the price inflation assumption be consistently applied throughout the economic assumptions utilized in an actuarial valuation. This is called for in ASOP No. 27 and is also required to meet the parameters for determining pension liabilities and expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68.

The current price inflation assumption is 2.40% per year.

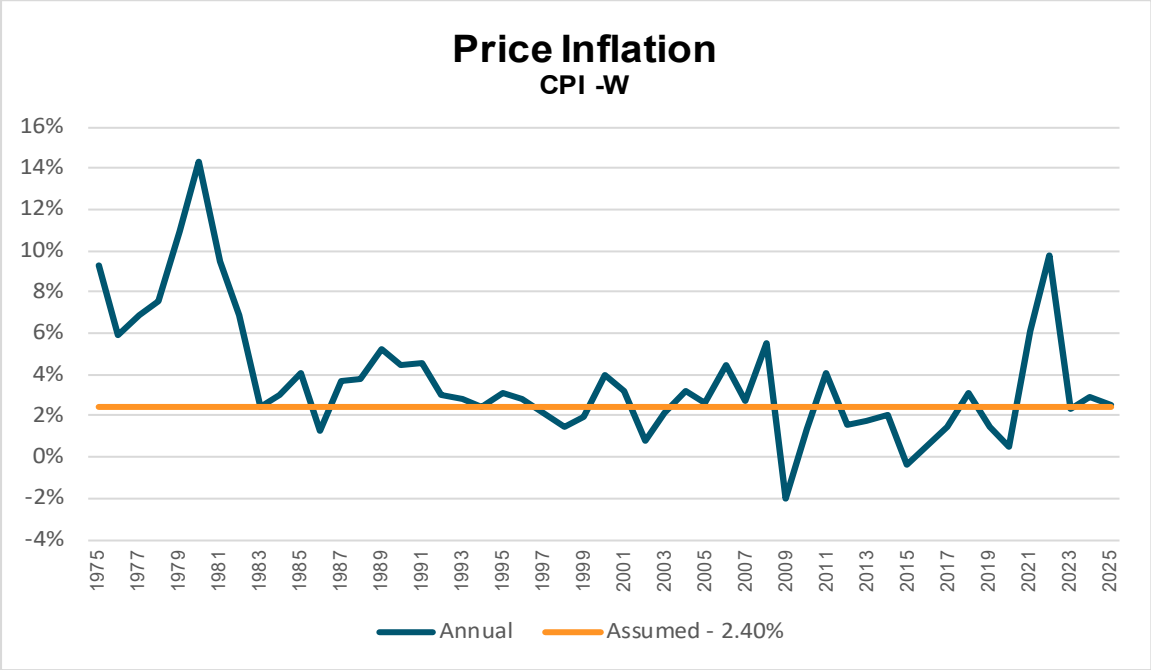
Past Experience: The Consumer Price Index, US City Average, All Urban Wage Earners and Clerical Workers, CPI (W), has been used as the basis for reviewing historical levels of price inflation. The level of that index in June of each of the last 50 years is provided in Appendix A.

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

Period	Average Annual Rate of Inflation
2020 – 2025	4.71%
2015 – 2025	3.06%
2005 – 2025	2.64%
1995 – 2025	2.57%
1985 – 2025	2.74%
1975 – 2025	3.60%
1926 – 2025	2.94%

Over the historic periods analyzed, the average annual rate of increase in the CPI-W has exceeded 2.40%. It is important to note that the years of elevated inflation occurring from 1973 to 1982 have a significant upward impact on averages calculated over periods that include those rates, and should be considered in context when interpreting long-term trends. Similarly, the recent spike in inflation experienced in the post-pandemic period of 2021 through 2023 — while notable — was widely characterized by industry experts and economists as largely transitory in nature, driven by supply chain disruptions, fiscal stimulus, and pent-up consumer demand rather than entrenched structural forces, and has since shown meaningful reversion toward longer-term norms. Since 1926, the average annual rate of inflation was 2.94%, providing a broader historical anchor that encompasses multiple inflationary regimes and economic cycles.

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



Additional information to consider is measuring the spread on inflation-protected treasury bills (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities and the inflation indexed nominal yield on TIPS of the same maturity is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the period to maturity. The table below provides the calculation of the breakeven rate of inflation as of June 30, 2025 over various periods.

Years to Maturity	Bond Nominal Yield	TIPS Nominal Yield	Breakeven Rate of Inflation
10	4.24%	1.95%	2.29%
20	4.79%	2.32%	2.47%
30	4.78%	2.51%	2.27%

The bond market's expectation for the rate of inflation is significantly lower than historical average annual rates. Additionally, based upon information provided from the "Survey of Professional Forecasters" published by the Philadelphia Federal Reserve Bank, the median expected annual rate of inflation for the 10 years beginning January 1, 2026 is 2.30%.

SECTION II – ECONOMIC ASSUMPTIONS

Recommendation: It is difficult to accurately predict inflation. Current economic forecasts and the bond market suggest lower inflation over the next thirty years (which is a shorter time period than appropriate for our purposes) when compared to the historical averages. In the 2025 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75-year cost projections on an intermediate inflation assumption of 2.40%. While near-term inflation forecasts have moderated below 2.50%, we recommend a long-term assumed inflation rate of 2.50% for valuation purposes.

Price Inflation Assumption	
Current	2.40%
Recommended	2.50%

SECTION II – ECONOMIC ASSUMPTIONS

Investment Return

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

The current assumption is 7.00%, consisting of a price inflation assumption of 2.40% and a real rate of return assumption of 4.60%. The return is net of all investment and administrative expenses.

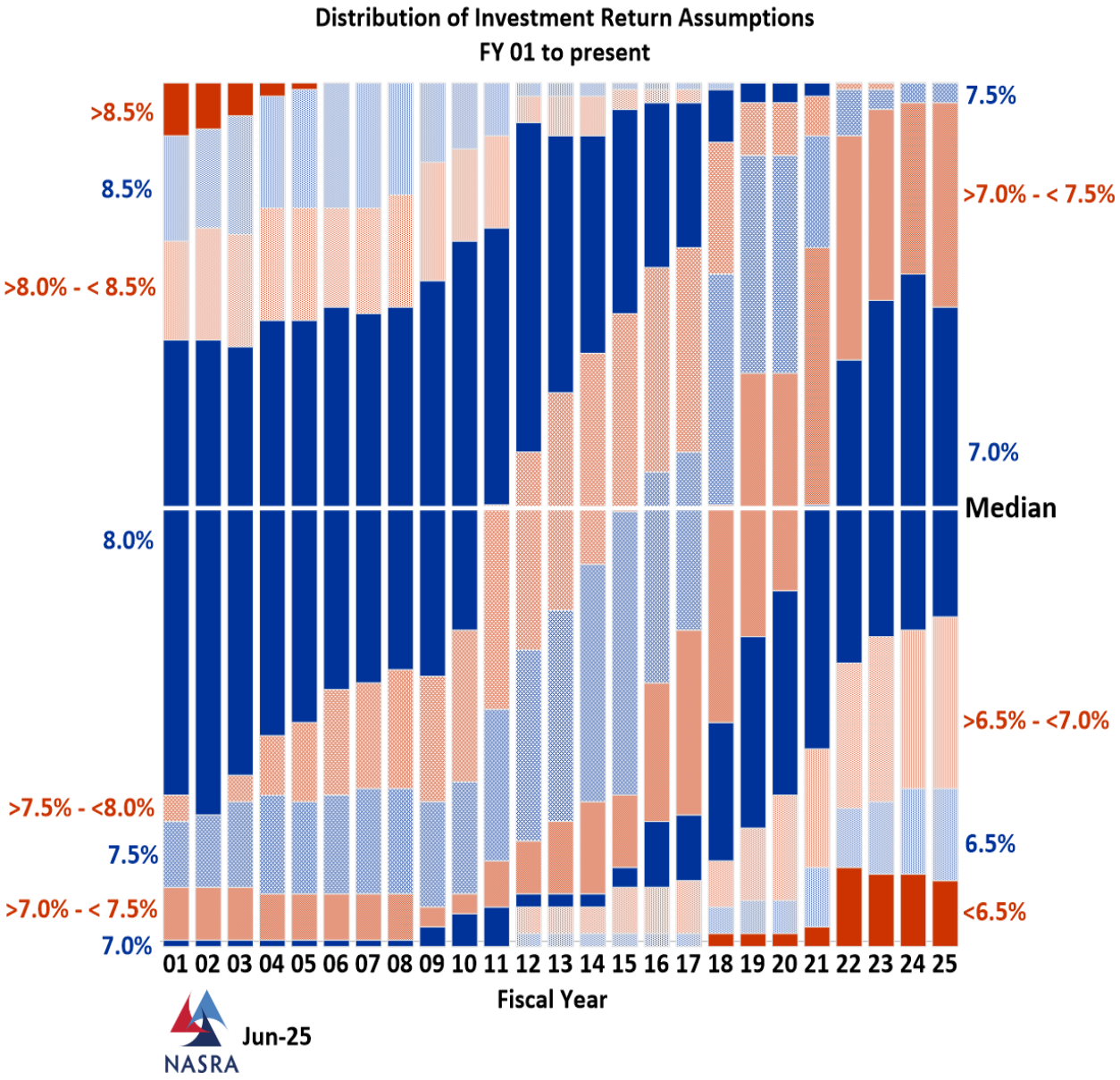
Past Experience: The actuarial value of assets of the System are developed using a widely accepted asset-smoothing methodology that fully recognizes investment gains and losses over a four-year period. The recent experience for the retirement funds over the last five years is shown in the table below.

Nominal Total Rate of Return		
Year Ending 6/30	Market Value	Actuarial Value
2021	27.83%	10.80%
2022	-2.04%	8.31%
2023	6.63%	7.83%
2024	9.46%	9.30%
2025	10.55%	6.21%
Average	10.49%	8.49%

Actuaries are guided not to materially rely on short-term historical returns when developing an assumption for expected future returns. We primarily base the development of the investment return assumption on the forward-looking capital market assumptions. We use a "building block" approach which develops an assumed real rate of investment return and adds an assumed rate of inflation and administrative expenses separately to arrive at the nominal investment rate of return recommendation based largely on the Board's target asset allocation.

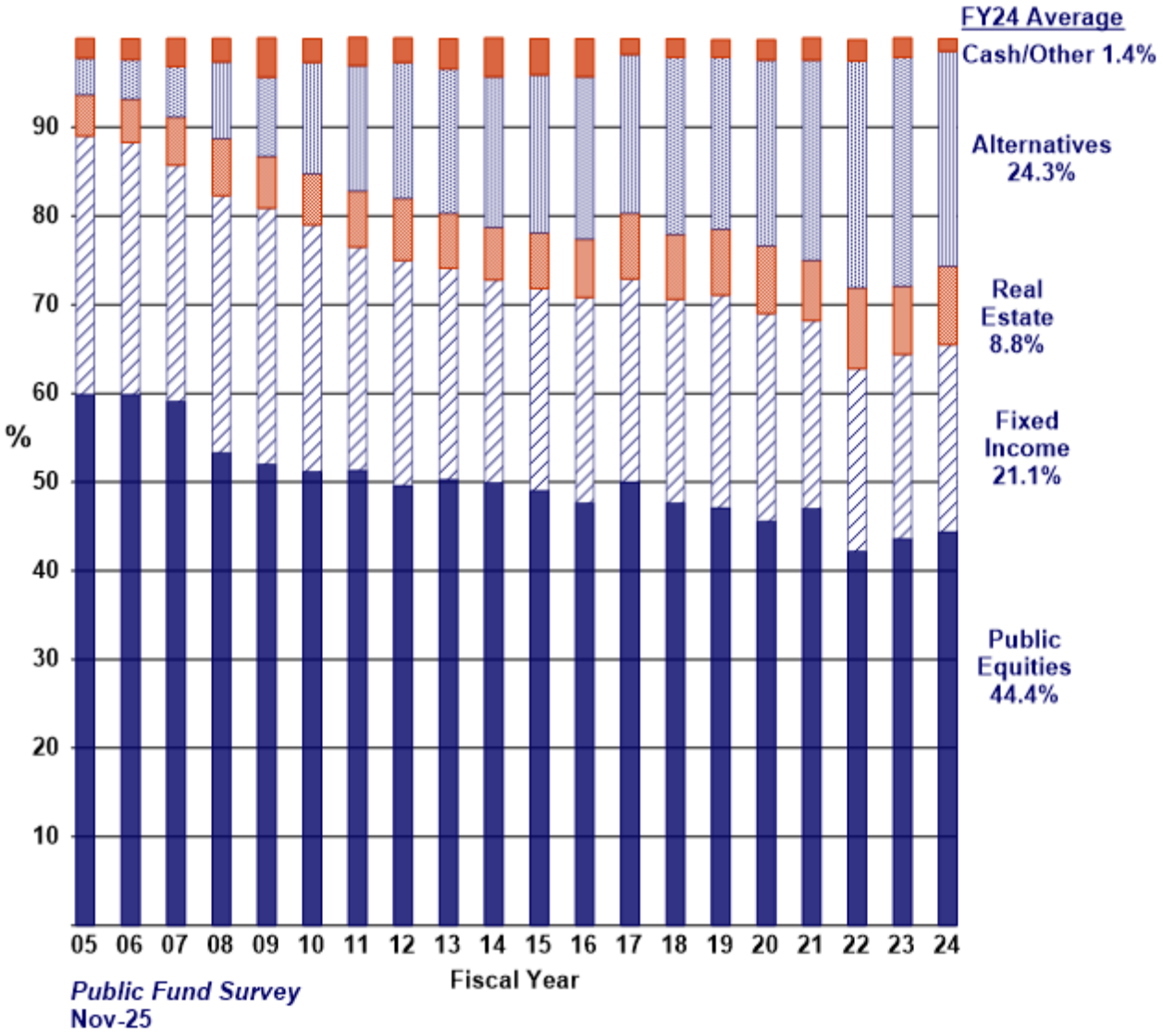
Peer System Comparison

While we do not recommend that the selection of an investment return assumption be based on the assumptions used by other systems, it does provide relevant additional information to consider. The following graph shows the change in the distribution of the investment return assumption from fiscal year 2001 through June of 2025 for 120+ large public retirement systems included in the National Association of State Retirement Administrators (NASRA) Public System Survey. It is worth noting that the median investment return assumption is 7.00%.



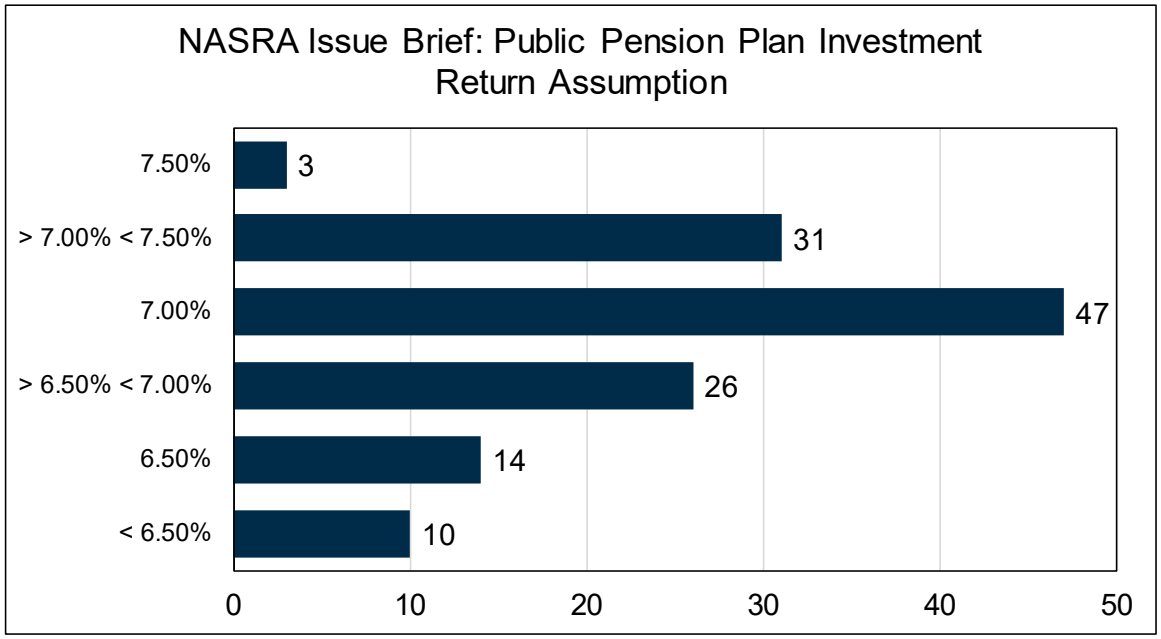
SECTION II – ECONOMIC ASSUMPTIONS

The assumed rate of return is heavily influenced by each Systems' asset allocation. The average asset allocation for the systems in the Public Fund Survey is 1.4% cash, 44.4% equities, 21.1% fixed income, 8.8% real estate, and 24.3% alternative investments which has an impact on the expected return of the systems. Note the increased allocation to alternative investment classes since 2006. The target asset allocation for the SERS is 40% equities, 19% alternatives, 20% global real assets, 18% fixed income and 3% cash; however, realized allocations may deviate from these benchmarks from time to time because of differential asset class performance and the implementation of tactical positioning strategies. The chart below shows the asset allocation for 120+ large public retirement systems included in the NASRA Public Fund Survey since 2005.



SECTION II – ECONOMIC ASSUMPTIONS

Review of the *NASRA Issue Brief: Public Pension Plan Investment Return Assumptions* update as of June 2025 indicates the median assumed return is 7.00% while the mean is 6.91% and demonstrates a continued trend in declining assumed rates of investment return.



Capital Market Analysis: The current capital market assumptions and target asset allocations are shown in Appendix B. An analysis performed by the SERS investment consultant, Wilshire, produced short-term and long-term results. The results of the Wilshire analysis are shown below.

SERS Policy Allocation			
Return Period	Real Return	Assumed Inflation	Total Return
10-Year Expected Return	3.52%	2.50%	6.02%
20-Year Expected Return	4.04%	2.50%	6.54%
30-Year Expected Return	4.57%	2.50%	7.07%

It is important to note that capital market analysis can be quite volatile from year to year and from investment consultant to investment consultant. In the section that follows, a similar analysis using the capital market assumptions in the *Survey of Capital Market Assumptions: 2025 Edition* published by Horizon Actuarial Services, LLC.

SECTION II – ECONOMIC ASSUMPTIONS

Using the capital market assumptions, we performed a statistical analysis which yielded the following percentile ranking of real rates of return over various time horizons. The following table provides a summary of the statistical analysis performed.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5th	25th	50th	75th	95th
1	5.91%	12.20%	-12.89%	-2.62%	5.22%	13.69%	27.09%
5	5.36%	5.41%	-3.30%	1.64%	5.22%	8.92%	14.49%
10	5.29%	3.82%	-0.88%	2.67%	5.22%	7.83%	11.69%
20	5.25%	2.70%	0.87%	3.41%	5.22%	7.05%	9.76%
30	5.24%	2.21%	1.65%	3.74%	5.22%	6.72%	8.91%
50	5.23%	1.71%	2.44%	**4.07%**	5.22%	**6.38%**	8.07%

The chart above is based on the capital market assumptions noted in the Survey. We utilize those assumptions to produce the percentile ranks of expected returns over longer future time periods. Focusing on the longer time spans, the analysis indicates that over the next 50 years there is a 25% likelihood that real return will average below 4.07% and a 25% likelihood they will be above 6.38%. In other words, there is a 50% likelihood the real returns will be between 4.07% and 6.38%.

SECTION II – ECONOMIC ASSUMPTIONS

Administrative Expenses ($ thousands): The investment return is assumed to be net of administrative and investment expenses. The investment return information we have been provided is net of investment-related expenses. The table below compares, for the last five years, the administrative expense levels during the fiscal year to the market value of assets for the system at the end of the fiscal years. All dollar amounts are in thousands.

FY Ending June 30	Administrative Expenses	Market Value of Assets	Expense Ratio
2021	$22,849	$18,440,377	0.12%
2022	32,492	17,574,265	0.18
2023	41,017	18,265,587	0.22
2024	41,856	19,520,989	0.21
2025	45,537	21,081,566	0.22

Over the five-year period, the administrative expense ratio averaged approximately 0.19%; however, fiscal years 2021 and 2022 are not reflective of normalized operations, as those years benefited from credits to OPEB expense resulting from GASB-required entries associated with changes made by OPERS to their healthcare plan. Fiscal years 2023, 2024, and 2025 represent a more appropriate basis for projection, as they reflect the System's proportionate share of GASB OPEB expenses in a typical operating environment. Accordingly, we recommend adopting a long-term administrative expense ratio of 0.22%, representing the three-year average of the most recent fiscal years, for inclusion in the net investment return assumption.

Recommendation: The analysis provided by the investment consultant yielded a median real rate of return of 4.57%. The average long-term capital market assumptions published in the Survey of Capital Market Assumptions 2025 Edition by Horizon Actuarial Services, LLC, yielded a median real return of 5.22%. We recommend the long-term real rate of return assumption of 4.72% which reflects granting more credibility to the investment consultant and results in no change to the current assumed rate of return of 7.00%. The table below summarizes our recommended assumed rate of return based on the building block approach which consists of components for the assumed long-term real rate of return combined with the recommended inflation and administrative expenses.

Item	Current	Recommended
Real Rate of Return	4.82%	4.72%
Inflation	2.40%	2.50
Administrative Expenses	(0.22)	(0.22)
Net Investment Return	7.00%	7.00%

The impact of this recommendation is shown in more detail in Section VI.

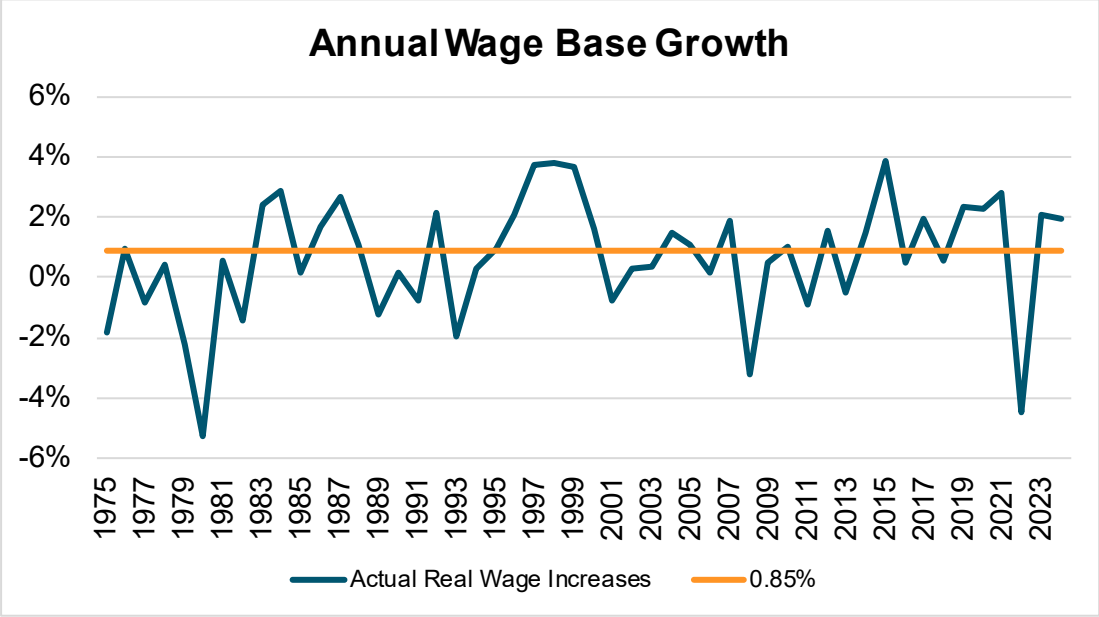
Wage Inflation

Background: The assumed future increases in salaries consist of an inflation component and a component for promotion and longevity, often called merit increases. Merit increases are generally age and/or service-related and will be studied in the demographic assumption section of the report. Wage inflation normally is above price inflation, which reflects the overall return on labor in the economy. The current wage inflation assumption is 3.25%, or 0.85% above price inflation.

Past Experience: The Social Security Administration publishes data on wage growth in the United States. Appendix C shows the last 50 calendar years' data. As we did in our analysis of inflation, in the table below, we show the wage inflation and a comparison with the price inflation over various time periods. Since updated wage data is only available through 2024, we use that year as the end point.

Period	Wage Inflation	Price Inflation	Real Wage Growth
2014-2024	4.16%	2.83%	1.33%
2004-2024	3.42	2.59	0.83
1994-2024	3.66	2.52	1.14
1984-2024	3.73	2.77	0.96
1974-2024	4.42	3.72	0.70

Thus, over the last 50 years, annual real wage growth has averaged 0.70%. The graph below shows the annual increases in real wage growth over the entire 50-year period.



SECTION II – ECONOMIC ASSUMPTIONS

Recommendation: As with price inflation, we again look at the 2025 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75-year cost projections on an intermediate national wage growth assumption 1.13% greater than the price inflation assumption of 2.5%. We concur in general with a range of 0.53% - 1.73% and favor the middle of the range based on the evidence of real wage growth in the salary data we analyzed. It is worth noting that the National Average Wage Index (NAWI) reflects earnings across the entire U.S. workforce, encompassing private-sector industries such as technology, finance, and professional services, which tend to carry higher compensation levels than general government employment. As a result, direct comparisons between NAWI growth and government worker wage trends should be interpreted with caution, as the broader index is inherently skewed upward by high-earning private-sector cohorts that are not representative of the government workforce composition. When benchmarking assumptions for government employee compensation, a more conservative wage growth rate — modestly below the NAWI — may better reflect the actual experience of the relevant employee population. As a result, we recommend use of a 1.00% per year rate at the current time.

Wage Inflation Assumption		
	Current	Recommended
Real Wage Growth	0.85%	1.00%
Inflation	2.40	2.50
Total	3.25%	3.50%

Cost-of-Living Adjustments

Background: Cost-of -Living Adjustments (COLAs) to the monthly benefits provided to eligible retirees and beneficiaries are established by the Board annually in consideration of the actuarial condition of the System. COLAs are provided beginning with the 4th anniversary of their retirement at the rate established by the Board for the applicable calendar year. The rate of the annual COLA is determined as the annual rate of increase in the Consumer Price Index (CPI-W), but not less than 0% and capped at 2.5%. The annual COLA rate is applied to the base pension amount to determine the amount of increase in the pension benefit. In addition, the Board has the authority to award or suspend the COLA, or to adjust the COLA above or below CPI-W; however, any adjustment above or below CPI-W could only be enacted if the system's actuary determines it would not materially impair the fiscal integrity of the system, or is necessary to preserve the fiscal integrity of the system The current assumption is an annual rate of 2.00% based primarily on the current inflation assumption of 2.40%.

Past Experience: The Board approved a COLA rate of 2.5% for eligible recipients 2022 – 2025 and 0.5% for eligible recipients in 2021 based on the rate of increase in the CPI.

Recommendation: We recommend increasing the assumed cost-of-living adjustment (COLA) rate from 2.00% per annum to 2.50% per annum which is consistent with the plan's long-term inflation assumption. Pursuant to Actuarial Standard of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, the COLA assumption should be internally consistent with the inflation assumption, as cost-of-living adjustments are by nature linked to changes in the general price level.

Cost of Living Rate Assumption	
Current COLA Rate Assumption	2.00%
Recommended COLA Rate Assumption	2.50%

SECTION III – DEMOGRAPHIC ASSUMPTIONS

There are several demographic assumptions used in the actuarial valuations performed for the School Employees Retirement System of Ohio. They are:

- Rates of Withdrawal
- Rates of Disability Retirement
- Rates of Service Retirement
- Rates of Post-retirement Mortality
- Rates of Post-retirement Disabled Mortality
- Rates of Pre-Retirement Mortality
- Rates of Salary Increase for Merit and Promotions

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

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (June 30, 2020 through June 30, 2025) with what was expected to happen based on the assumptions used in the most recent actuarial valuations.

Studies of demographic experience generally involve three steps:

- First, the number of members changing membership status, called decrements, during the study is tabulated by age, duration, sex, group, and membership class (active, retired, etc.).
- Next, the number of members expected to change status is calculated by multiplying certain membership statistics, called exposure, by the expected rates of decrement.
- Finally, for observed incidents of disability the number of actual disability retirements is compared with the number of expected disability retirements. The System's experience was liability weighted for observed incidents of withdrawal, retirement and pre- and post-mortality. When performing a liability weighted analysis, the actuarial liability attributed to the number of actual decrements is compared to the actuarial liability attributed to the number of expected decrements. These comparisons, called the actual to expected ratios (A/E Ratio) and are expressed as a percentages.

In general, if the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, sex, or duration deviates significantly from the expected pattern, new assumptions are considered. Recommended revisions are normally not an exact representation of the experience during the observation period. Professional judgment is required to set assumptions for future experience from past trends, including a determination of the amount of weight to assign to the most recent experience.

The remainder of this section presents the results of the demographic study. We have prepared 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.

Rates of Withdrawal

The rates of withdrawal adopted by the Board 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 assumption utilizes a service-based approach that sets the withdrawal rates based on years of service. Withdrawal experience was investigated without regard to gender.

The analysis of the actual withdrawal experience for all members over the five-year period indicates an overall actual/expected ratio of 120%. This ratio indicates that more members withdrew during the study period than expected. The table on the next page shows in detail the actual/expected ratio by years of service and in total.

Termination rates for members with higher liability will have a greater influence on the liabilities of the System. As a result, we liability weighted the experience to better reflect the impact of the current assumption on liability measures. The liability is approximated by using the member's Present Value of Future Benefits to estimate the member's benefit level. The exposure and actual occurrences are then multiplied by the individual present value of future benefits to provide the liability-weighted experience. We find the liability-weighted experience to better correlate to the impact of actual and expected rates of withdrawal on the valuation results.

The liability-weighted analysis of the actual withdrawal experience over the five-year period indicated that more members withdrew prior to becoming eligible for retirement than anticipated and yielded an actual/expected ratio of 120%.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

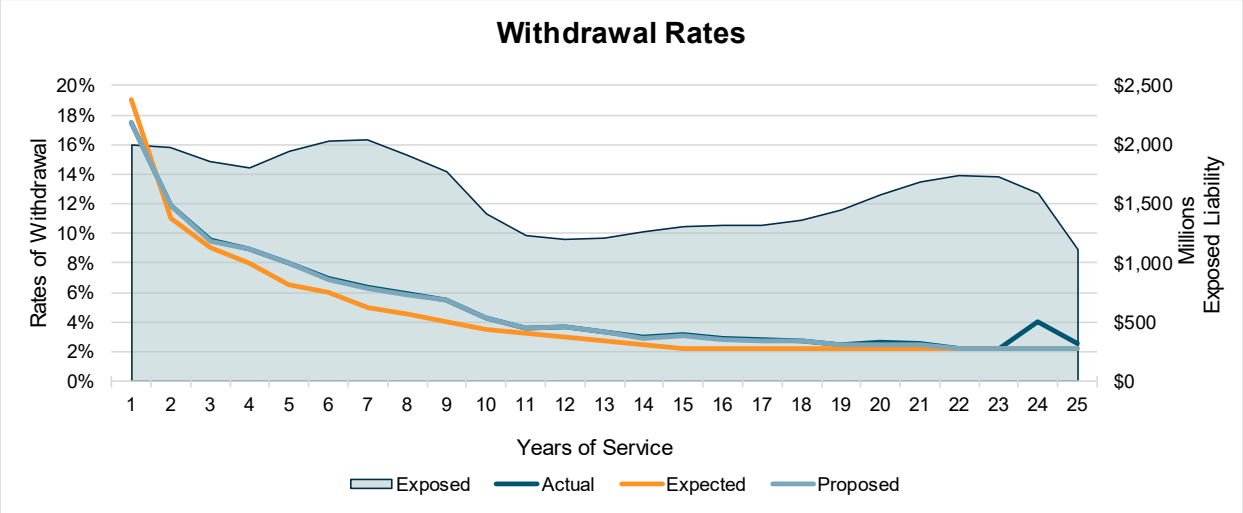
Years of Service	Liability Weighted Amounts of Withdrawal Experience (in $)		
	Actual	Expected	Ratio Actual/Expected
Less than 1	494,237,920	364,824,180	1.35
1	349,487,687	379,317,136	0.92
2	234,767,955	216,914,833	1.08
3	176,814,150	166,980,824	1.06
4	160,804,894	144,199,326	1.12
5	155,917,097	126,184,036	1.24
6	140,662,716	121,560,419	1.16
7	128,689,233	101,766,702	1.26
8	112,710,967	86,136,775	1.31
9	97,659,473	70,854,337	1.38
10	61,003,851	49,531,341	1.23
11	44,394,505	39,899,956	1.11
12	44,376,123	35,862,967	1.24
13	40,742,051	33,226,100	1.23
14	37,414,766	31,675,731	1.18
15	41,653,151	29,406,985	1.42
16	37,765,199	29,720,639	1.27
17	36,694,308	29,575,208	1.24
18	37,072,591	30,562,796	1.21
19	35,679,020	32,533,732	1.10
20	41,771,795	35,549,561	1.18
21	43,544,826	37,938,423	1.15
22	38,819,163	39,090,681	0.99
23	38,661,037	38,812,243	1.00
24 +	240,357,755	129,953,715	1.85
TOTAL	2,871,702,232	2,402,078,646	1.20

Findings and Recommendations

The data reflects a general increase in the rates of withdrawal. As a result, we recommend adjusting withdrawal rates to more closely reflect the actual experience. The complete tables of recommended withdrawal rates are shown in Appendix D.

The liability-weighted exposure amounts are the total of individual's Present Value of Future Benefits who were subject to termination based upon years of service during the experience period. More attention should be given to areas of higher exposures versus areas of lower exposures when recommending changes to the assumed withdrawal rates.

The actual average withdrawal rates by years of service during the past five years, the current assumed withdrawal rates, and the recommended withdrawal rates are shown on the left axis. The right axis provides the liability-weighted exposure.



The actual/expected ratios based on the recommended assumptions are shown in the table on the following page. The overall ratio has been decreased from 120% to 110%.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Years of Service	Liability Weighted Amounts of Withdrawal Experience (in $)		
	Actual	Proposed	Ratio Actual/Proposed
Less than 1	494,237,920	364,824,180	1.35
1	349,487,687	349,371,047	1.00
2	234,767,955	234,662,410	1.00
3	176,814,150	176,257,536	1.00
4	160,804,894	160,421,750	1.00
5	155,917,097	155,303,429	1.00
6	140,662,716	139,794,482	1.01
7	128,689,233	128,226,045	1.00
8	112,710,967	111,020,732	1.02
9	97,659,473	97,424,713	1.00
10	61,003,851	60,852,791	1.00
11	44,394,505	44,196,874	1.00
12	44,376,123	44,230,992	1.00
13	40,742,051	39,871,320	1.02
14	37,414,766	36,743,848	1.02
15	41,653,151	40,516,291	1.03
16	37,765,199	36,985,684	1.02
17	36,694,308	35,490,249	1.03
18	37,072,591	36,675,355	1.01
19	35,679,020	36,148,592	0.99
20	41,771,795	39,499,512	1.06
21	43,544,826	42,153,803	1.03
22	38,819,163	39,090,681	0.99
23	38,661,037	38,812,243	1.00
24 +	240,357,755	129,953,715	1.85
TOTAL	2,871,702,232	2,618,528,274	1.10

Rates of Disability Retirement

The rates of disability used in the actuarial valuation project the percentage of employees expected to become disabled each year.

Disability experience was investigated separately for males and females on a headcount basis.

The analysis of the actual disability experience for male and female members over the five-year experience period yields an actual/expected ratio of 43% and 61% respectively. The table below details the actual/expected ratio by age group and in total, for males and females separately.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

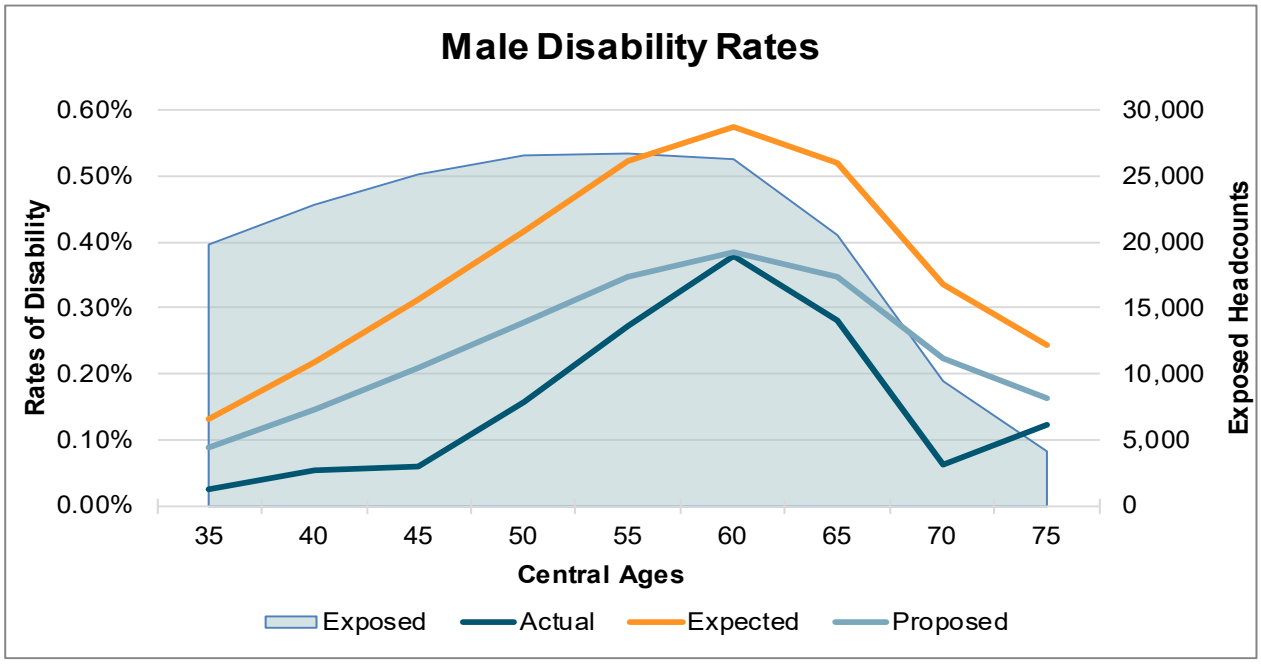
	Disability Experience					
	Males			Females		
Age Group	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
Under 23	0	2.96	0.00	0	1.75	0.00
23 - 27	0	8.80	0.00	0	3.61	0.00
28 - 32	0	15.12	0.00	3	9.50	0.32
33 - 37	5	25.89	0.19	5	25.03	0.20
38 - 42	12	49.45	0.24	14	58.23	0.24
43 - 47	15	79.10	0.19	30	108.55	0.28
48 - 52	42	110.81	0.38	76	198.22	0.38
53 - 57	73	140.16	0.52	210	309.46	0.68
58 - 62	100	151.37	0.66	299	327.84	0.91
63 - 67	58	106.54	0.54	115	153.38	0.75
68 & Over	13	41.99	0.31	7	44.71	0.16
TOTAL	318	732.19	0.43	759	1,240.28	0.61

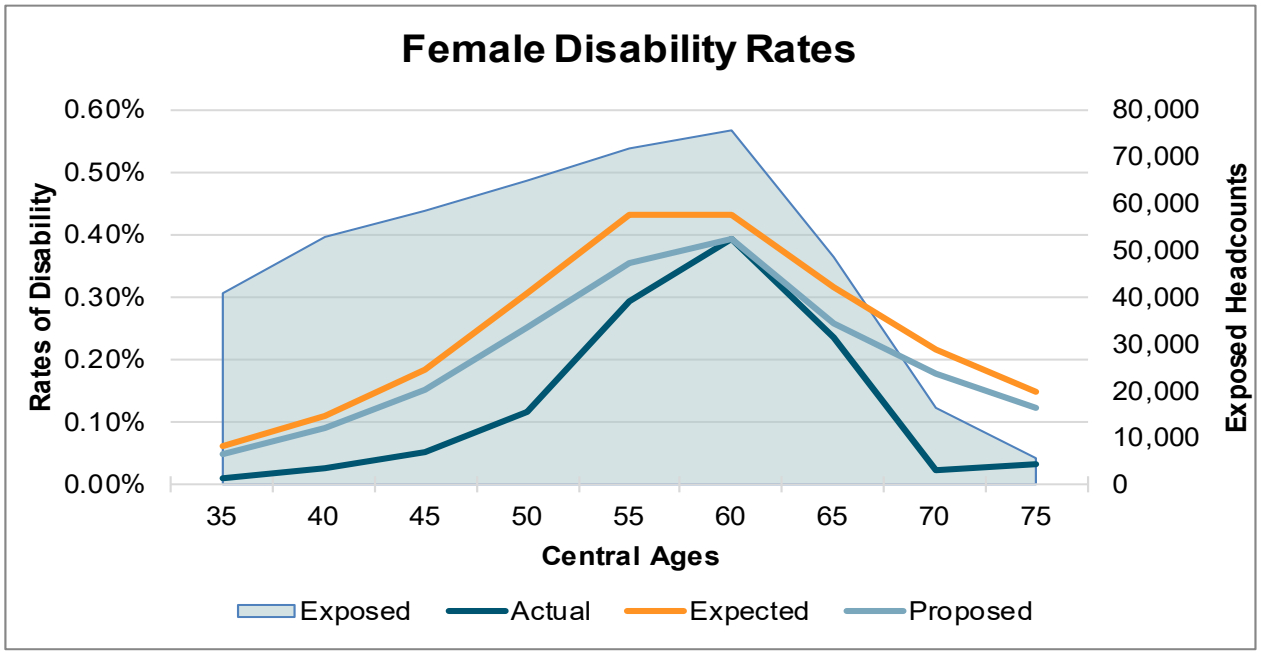
Findings and Recommendations

During the period under investigation, the actual rates of disability retirement were less than expected over most age groups. We prefer maintaining a significant margin in these rates the incidence rates are small, but the liability associated with an occurrence can be large. The complete table of recommended disability rates is shown in Appendix D.

The right axis of the charts below represents the number of exposed lives. The exposed lives are the total number of individuals who were subject to disability retirement based upon the member's age during the experience period.

The actual average disability rates by years of service during the past five years, the current assumed disability rates, and the recommended disability rates are shown on the left axis. Headcount exposures are provided on the right axis.





The actual/expected ratios based on the recommended assumptions are shown in the table below. The ratios increased from 43% to 65% for males and increased from 61% to 72% for females.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

	Disability Experience					
	Males			Females		
			Ratio			Ratio
Age Group	Actual	Proposed	Actual/Proposed	Actual	Proposed	Actual/Proposed
Under 23	0	1.97	0.00	0	1.44	0.00
23 - 27	0	5.87	0.00	0	2.97	0.00
28 - 32	0	10.08	0.00	3	7.82	0.38
33 - 37	5	17.26	0.29	5	20.60	0.24
38 - 42	12	32.97	0.36	14	47.92	0.29
43 - 47	15	52.73	0.28	30	89.34	0.34
48 - 52	42	73.87	0.57	76	163.14	0.47
53 - 57	73	93.44	0.78	210	254.69	0.82
58 - 62	100	100.91	0.99	299	299.00	1.00
63 - 67	58	71.03	0.82	115	126.23	0.91
68 & Over	13	27.99	0.46	7	36.80	0.19
TOTAL	318	488.13	0.65	759	1,049.94	0.72

Rates of Retirement

The retirement rates used in the actuarial valuation project the percentage of employees expected to retire during the upcoming year. The Plan provides for two types of retirements based on different eligibility requirements. The first one is for a normal retirement benefit. The second one is for an early retirement benefit which is reduced. Separate decrements have been developed for each type of retirement benefit.

Effective August 1, 2017, the age and service requirements for normal and early retirement were increased. Members with 25 years of service at that time are grandfathered and members with less than 25 years of service at that time are non-grandfathered.

Below are the retirement eligibilities for both grandfathered and non-grandfathered members.

Grandfathered	Non-Grandfathered
Normal Retirement	
Age 65 with 5 Years of Service	Age 67 with 10 Years of Service
30 Years of Service	Age 57 with 30 Years of Service
Early Retirement	
Age 60 with 5 Years of Service	Age 62 with 10 Years of Service
Age 55 with 25 Years of Service	Age 60 with 25 Years of Service

In our analysis, we utilized a liability-weighted approach as was used to analyze withdrawal liability. The exposure and actual occurrences are then multiplied by the member's present value of future benefits to provide the weighted experience. This approach is particularly insightful as those members who have higher compensation levels are more likely to retire earlier than members who have lower compensation levels. While we reviewed experience on both a count and liability-weighted basis, we have found the liability-weighted experience a better fit for setting the retirement assumption.

Retirement experience was observed for the following categories:

- Normal Retirements – at First Eligibility
- Retirements After First Eligibility
- Reduced Early Retirements with less than 25 Years of Service
- Reduced Early Retirements with 25 or more Years of Service

Normal Retirement – at First Eligibility

In this section we analyzed retirement experience on a liability-weighted basis for members who first become eligible to retire upon obtaining age 65 and 5 years of service or 30 years of service regardless of age for those who are grandfathered and age 67 and 10 years of service or age 57 and 30 years of service for those who are non-grandfathered.

The analysis of the actual retirement experience over the five-year period yields an actual/expected ratio of 121% for those with grandfathered eligibility and 136% for those with non-grandfathered eligibility.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Liability Weighted Amounts of Age Based Retirements (in $) First Eligible for an Unreduced Benefit						
	Grandfathered Retirement Current Rates			Non-Grandfathered Retirement Current Rates		
Age	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
45 & Under	0	0	0.00	0	0	0.00
46	0	0	0.00	0	0	0.00
47	0	0	0.00	0	0	0.00
48	2,585,869	780,270	3.31	0	0	0.00
49	4,706,552	1,561,786	3.01	0	0	0.00
50	4,351,413	1,466,232	2.97	0	0	0.00
51	3,286,835	1,113,349	2.95	0	0	0.00
52	5,426,634	2,487,229	2.18	0	0	0.00
53	4,026,082	2,675,166	1.50	0	0	0.00
54	9,737,379	2,840,380	3.43	0	0	0.00
55	14,406,504	5,853,508	2.46	0	0	0.00
56	6,075,999	6,452,310	0.94	0	0	0.00
57	7,398,668	7,447,778	0.99	10,224,956	6,227,917	1.64
58	8,414,774	8,129,932	1.04	20,502,712	9,357,038	2.19
59	6,943,407	7,707,641	0.90	19,038,494	8,079,178	2.36
60	12,547,238	10,558,979	1.19	19,701,585	11,458,076	1.72
61	11,985,981	10,615,615	1.13	16,796,208	15,106,557	1.11
62	14,397,313	11,118,900	1.29	23,328,106	18,204,997	1.28
63	14,638,437	11,717,386	1.25	23,985,379	22,051,031	1.09
64	15,863,769	12,544,124	1.26	21,850,340	19,434,170	1.12
65	24,038,814	35,628,815	0.67	26,648,849	16,715,736	1.59
66	0	40,554	0.00	18,786,372	13,076,669	1.44
67	0	0	0.00	216,719,049	162,636,343	1.33
68	0	0	0.00	3,487,521	2,632,526	1.32
69	0	0	0.00	1,523,101	1,524,928	1.00
70	0	0	0.00	1,683,539	1,267,633	1.33
71	0	0	0.00	1,625,947	1,159,176	1.40
72	0	0	0.00	1,210,057	967,871	1.25
73	0	0	0.00	878,615	626,073	1.40
74	0	0	0.00	697,429	577,290	1.21
75 & Over	0	0	0.00	1,372,851	4,813,830	0.29
TOTAL	170,831,667	140,739,954	1.21	430,061,111	315,917,037	1.36

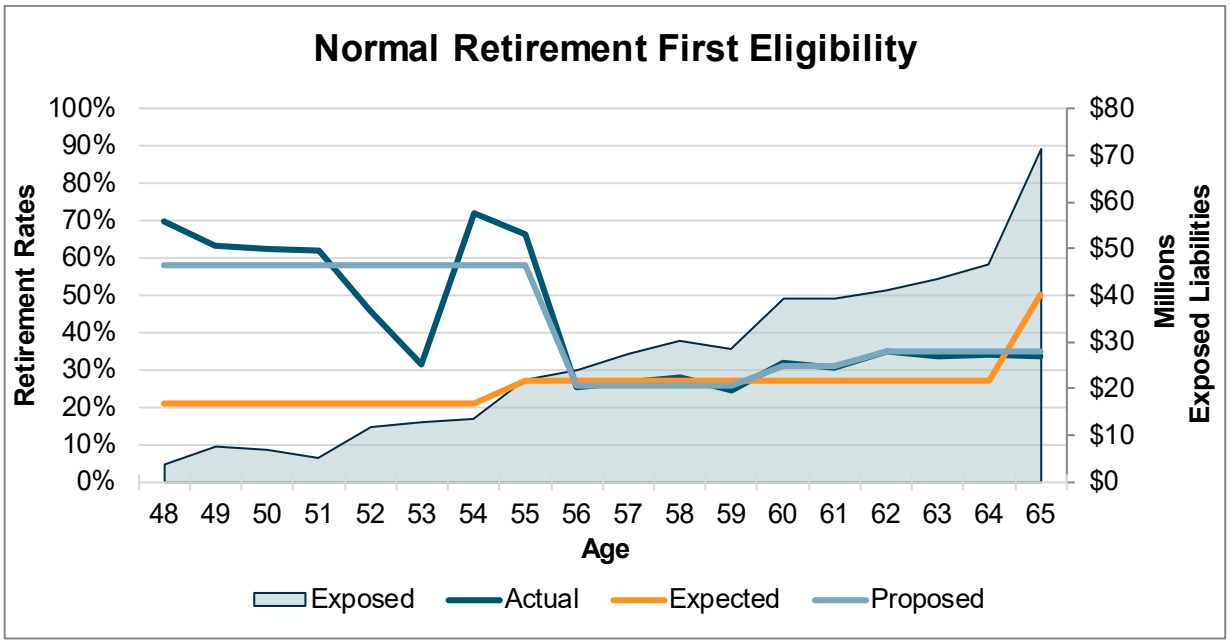
Findings and Recommendations

We recommend revising the normal retirement rates at first eligibility for both grandfathered and non-grandfathered participants to more closely reflect actual experience. The complete tables of recommended retirement rates are shown in Appendix D.

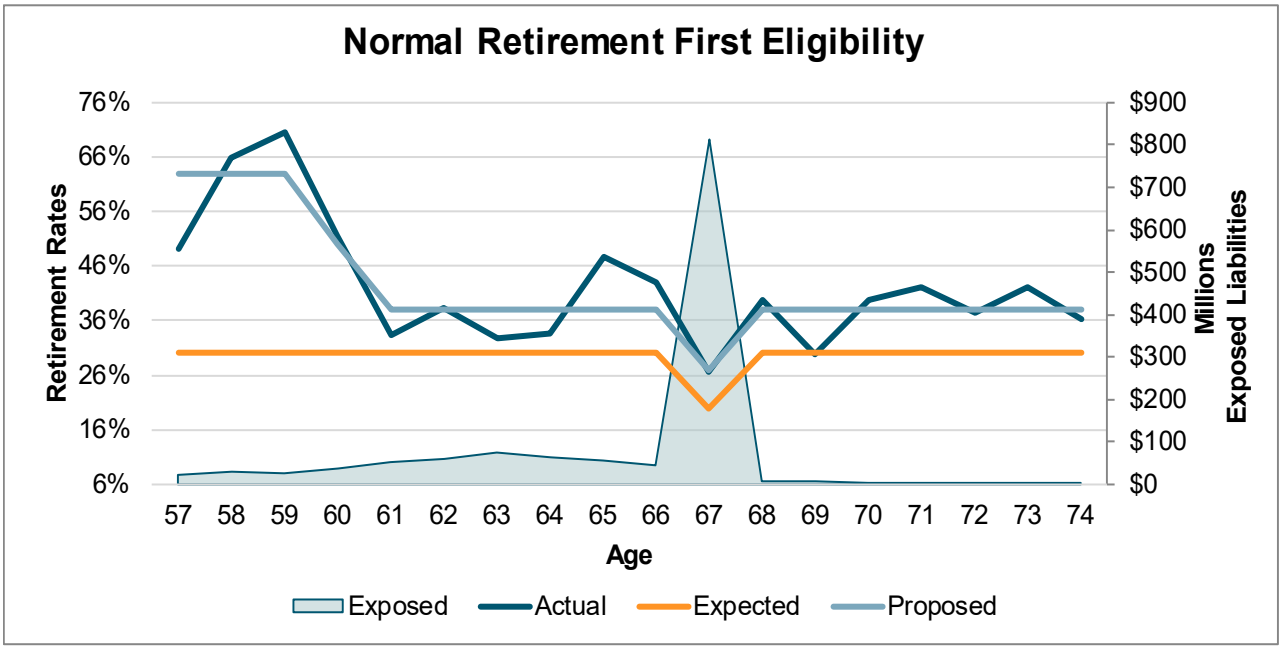
The actual/expected ratios based on the recommended assumptions are 99% compared to 121% for those with grandfathered eligibility under the current assumption and 98% compared to 136% for non-grandfathered eligibility under the current assumptions.

The assumption should provide a better fit to experience, especially at the high exposure ages. The actual average retirement rates by age and years of service during the past five years, the current assumed retirement rates, and the recommended retirement rates are shown on the left axis. The right axis of the charts below and on the following page represents the liability-weighted exposure amounts.

GRANDFATHERED PARTICIPANTS



NON-GRANDFATHERED PARTICIPANTS



The following table shows in detail the actual/expected ratios by individual age and total based on the recommended rates of retirement.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Annual Benefit Amounts of Age Based Retirements First Eligible for an Unreduced Benefit						
	Grandfathered Retirement			Non-Grandfathered Retirement		
	Proposed Rates			Proposed Rates		
Age	Actual	Proposed	Ratio Actual/Proposed	Actual	Proposed	Ratio Actual/Proposed
45 & Under	0	0	0.00	0	0	0.00
46	0	0	0.00	0	0	0.00
47	0	0	0.00	0	0	0.00
48	2,585,869	2,155,031	1.20	0	0	0.00
49	4,706,552	4,313,505	1.09	0	0	0.00
50	4,351,413	4,049,592	1.07	0	0	0.00
51	3,286,835	3,074,963	1.07	0	0	0.00
52	5,426,634	6,869,489	0.79	0	0	0.00
53	4,026,082	7,388,553	0.54	0	0	0.00
54	9,737,379	7,844,860	1.24	0	0	0.00
55	14,406,504	12,574,203	1.15	0	0	0.00
56	6,075,999	6,213,336	0.98	0	0	0.00
57	7,398,668	7,171,935	1.03	10,224,956	13,078,625	0.78
58	8,414,774	7,828,823	1.07	20,502,712	19,649,781	1.04
59	6,943,407	7,422,173	0.94	19,038,494	16,966,274	1.12
60	12,547,238	12,123,272	1.03	19,701,585	19,096,793	1.03
61	11,985,981	12,188,299	0.98	16,796,208	19,134,972	0.88
62	14,397,313	14,413,389	1.00	23,328,106	23,059,662	1.01
63	14,638,437	15,189,204	0.96	23,985,379	27,931,305	0.86
64	15,863,769	16,260,902	0.98	21,850,340	24,616,616	0.89
65	24,038,814	24,940,170	0.96	26,648,849	21,173,265	1.26
66	0	0	0.00	18,786,372	16,563,781	1.13
67	0	0	0.00	216,719,049	219,559,064	0.99
68	0	0	0.00	3,487,521	3,334,533	1.05
69	0	0	0.00	1,523,101	1,931,575	0.79
70	0	0	0.00	1,683,539	1,605,669	1.05
71	0	0	0.00	1,625,947	1,468,289	1.11
72	0	0	0.00	1,210,057	1,225,970	0.99
73	0	0	0.00	878,615	793,025	1.11
74	0	0	0.00	697,429	731,234	0.95
75 & Over	0	0	0.00	1,372,851	4,813,830	0.29
TOTAL	170,831,667	172,021,699	0.99	430,061,111	436,734,263	0.98

Retirement Subsequent to First Eligibility

In this section we analyzed retirement experience for members beginning the years after becoming eligible to retire upon obtaining age 65 and 5 years of service or 30 years of service regardless of age for those with grandfathered eligibility and obtaining age 67 and 10 years of service or age 57 and 30 years of service for those with non-grandfathered eligibility.

The analysis of the actual retirement experience over the five-year period yields an actual/expected ratio of 92% for those with grandfathered eligibility and 110% for those with non-grandfathered eligibility.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Liability Weighted Amounts of Age Based Retirements (in $) Eligible for an Unreduced Benefit						
	Grandfathered Retirement Current Rates			Non-Grandfathered Retirement Current Rates		
Age	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
45 & Under	0	70,531	0.00	0	0	0.00
46	0	76,995	0.00	0	0	0.00
47	0	87,109	0.00	0	0	0.00
48	0	266,064	0.00	0	0	0.00
49	1,127,287	855,747	1.32	0	0	0.00
50	546,237	3,499,293	0.16	0	0	0.00
51	7,057,778	6,977,958	1.01	0	0	0.00
52	5,722,475	9,044,748	0.63	0	0	0.00
53	8,630,042	13,384,030	0.64	0	0	0.00
54	16,470,101	18,022,347	0.91	0	0	0.00
55	16,453,775	21,922,417	0.75	0	0	0.00
56	19,860,369	29,224,266	0.68	0	0	0.00
57	32,981,325	37,025,412	0.89	7,529,814	4,318,550	1.74
58	48,343,676	41,760,343	1.16	14,543,380	5,609,493	2.59
59	42,043,135	45,554,078	0.92	16,166,931	6,630,037	2.44
60	51,044,975	51,908,287	0.98	15,261,323	6,073,039	2.51
61	54,724,612	55,542,002	0.99	12,901,004	6,579,387	1.96
62	61,707,159	58,236,728	1.06	9,575,597	7,179,932	1.33
63	62,905,666	61,839,746	1.02	14,788,038	7,339,627	2.01
64	63,790,128	64,821,107	0.98	10,747,689	7,592,301	1.42
65	111,338,746	115,928,721	0.96	19,722,999	8,589,698	2.30
66	121,390,275	88,268,112	1.38	14,345,089	5,412,195	2.65
67	76,205,024	92,590,574	0.82	13,642,541	4,458,823	3.06
68	65,599,566	80,055,001	0.82	170,208,949	99,972,335	1.70
69	49,860,075	69,261,694	0.72	79,880,481	64,509,468	1.24
70	46,746,583	61,698,974	0.76	67,803,508	46,989,433	1.44
71	41,515,108	51,077,816	0.81	48,520,108	31,954,945	1.52
72	36,339,582	42,937,257	0.85	30,092,247	23,195,259	1.30
73	25,689,675	33,936,874	0.76	21,787,624	18,784,319	1.16
74	22,300,811	27,931,254	0.80	18,576,245	15,392,579	1.21
75 & Over	0	0	0.00	49,167,040	207,424,497	0.24
TOTAL	1,090,394,184	1,183,805,485	0.92	635,260,606	578,005,917	1.10

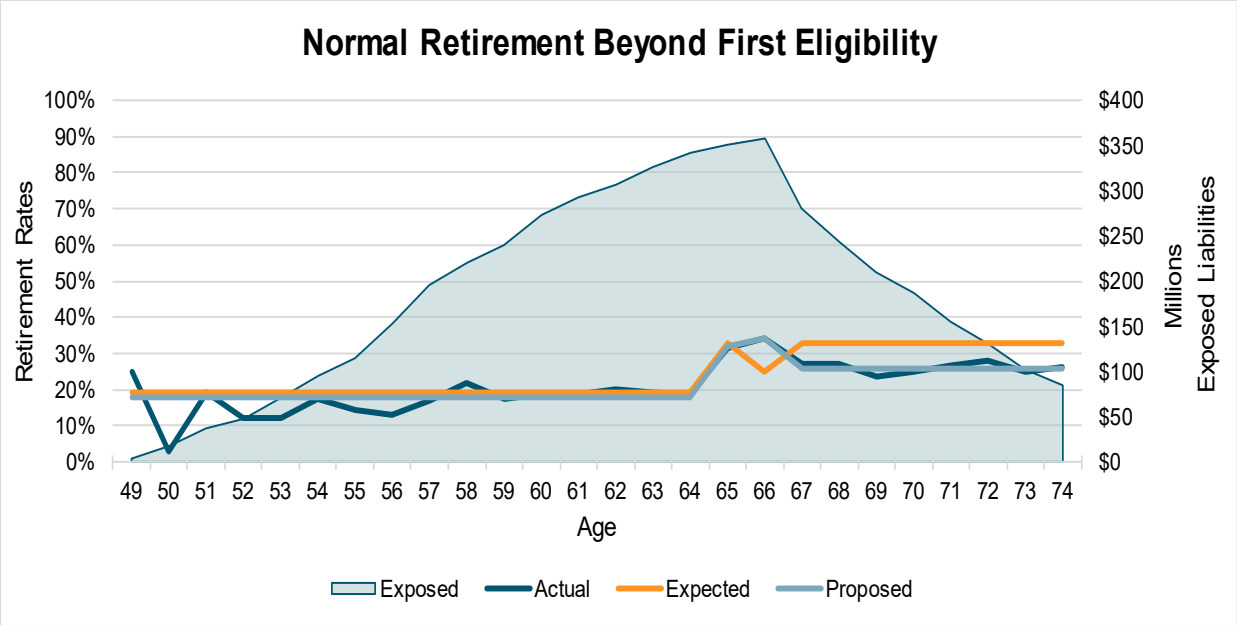
Findings and Recommendations

We recommend revising the normal retirement rates to more closely reflect actual experience. The complete tables of recommended retirement rates are shown in Appendix D.

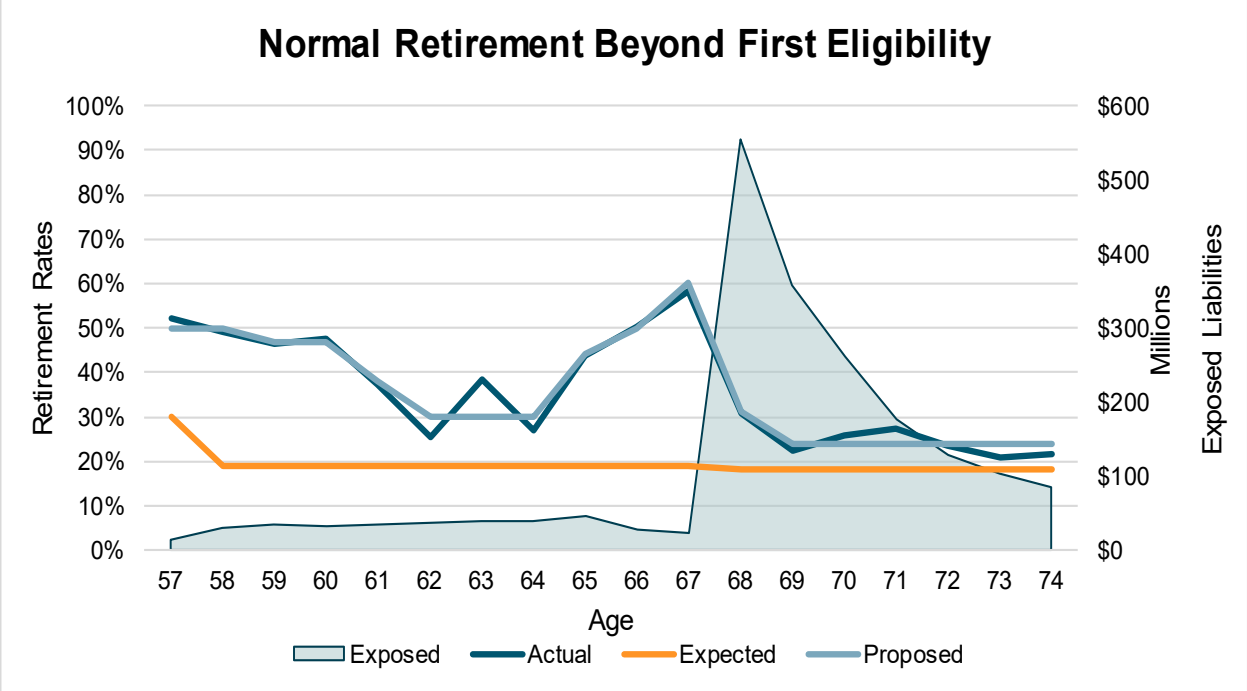
The actual/expected ratios based on the recommended assumptions are 100% compared to 92% for grandfathered eligibility under the current assumption and 80% compared to 110% for non-grandfathered eligibility under the current assumptions.

The chart shows actual average retirement rates by age and years of service during the past five years, the current assumed retirement rates, and the recommended retirement rates are shown on the left axis. The right axis of the charts below represents the amounts of weighted exposure.

GRANDFATHERED PARTICIPANTS



NON-GRANDFATHERED PARTICIPANTS



The table below shows in detail the actual/expected ratios by individual age and total based on the recommended rates of retirement.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Annual Benefit Amounts of Age Based Retirements Eligible for an Unreduced Benefit						
	Grandfathered Retirement			Non-Grandfathered Retirement		
	Proposed Rates			Proposed Rates		
			Ratio			Ratio
Age	Actual	Proposed	Actual/Proposed	Actual	Proposed	Actual/Proposed
45 & Under	0	66,819	0.00	0	0	0.00
46	0	72,942	0.00	0	0	0.00
47	0	82,524	0.00	0	0	0.00
48	0	252,060	0.00	0	0	0.00
49	1,127,287	810,707	1.39	0	0	0.00
50	546,237	3,315,119	0.16	0	0	0.00
51	7,057,778	6,610,697	1.07	0	0	0.00
52	5,722,475	8,568,709	0.67	0	0	0.00
53	8,630,042	12,679,607	0.68	0	0	0.00
54	16,470,101	17,073,803	0.96	0	0	0.00
55	16,453,775	20,768,606	0.79	0	0	0.00
56	19,860,369	27,686,147	0.72	0	0	0.00
57	32,981,325	35,076,707	0.94	7,529,814	7,197,584	1.05
58	48,343,676	39,562,430	1.22	14,543,380	14,761,825	0.99
59	42,043,135	43,156,495	0.97	16,166,931	16,400,617	0.99
60	51,044,975	49,176,272	1.04	15,261,323	15,022,781	1.02
61	54,724,612	52,618,739	1.04	12,901,004	13,158,774	0.98
62	61,707,159	55,171,637	1.12	9,575,597	11,336,735	0.84
63	62,905,666	58,585,022	1.07	14,788,038	11,588,885	1.28
64	63,790,128	61,409,470	1.04	10,747,689	11,987,843	0.90
65	111,338,746	112,415,729	0.99	19,722,999	19,891,933	0.99
66	121,390,275	121,359,583	1.00	14,345,089	14,242,618	1.01
67	76,205,024	72,950,149	1.04	13,642,541	14,080,492	0.97
68	65,599,566	63,073,637	1.04	170,208,949	172,174,577	0.99
69	49,860,075	54,569,819	0.91	79,880,481	86,012,625	0.93
70	46,746,583	48,611,313	0.96	67,803,508	62,652,577	1.08
71	41,515,108	40,243,128	1.03	48,520,108	42,606,594	1.14
72	36,339,582	33,829,354	1.07	30,092,247	30,927,011	0.97
73	25,689,675	26,738,143	0.96	21,787,624	25,045,759	0.87
74	22,300,811	22,006,443	1.01	18,576,245	20,523,439	0.91
75 & Over	0	0	0.00	49,167,040	207,424,497	0.24
TOTAL	1,090,394,184	1,088,541,811	1.00	635,260,606	797,037,165	0.80

Early Retirement

In this section we analyzed retirement experience for members who were eligible for a reduced retirement upon obtaining age 60 and 5 years of service or obtaining age 55 and 25 years of service for those with grandfathered eligibility and obtaining age 62 and 10 years of service or obtaining age 60 and 25 years of service for those with non-grandfathered but prior to becoming eligible for an unreduced retirement. The analysis was conducted in two categories, the first was members with less than 25 years of service and the second was members with 25 or more years of service. Again, the experience was liability weighted.

The analysis of the actual retirement experience over the five-year period yields an actual/expected ratio of 64% for grandfathered members and 159% for non-grandfathered members.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

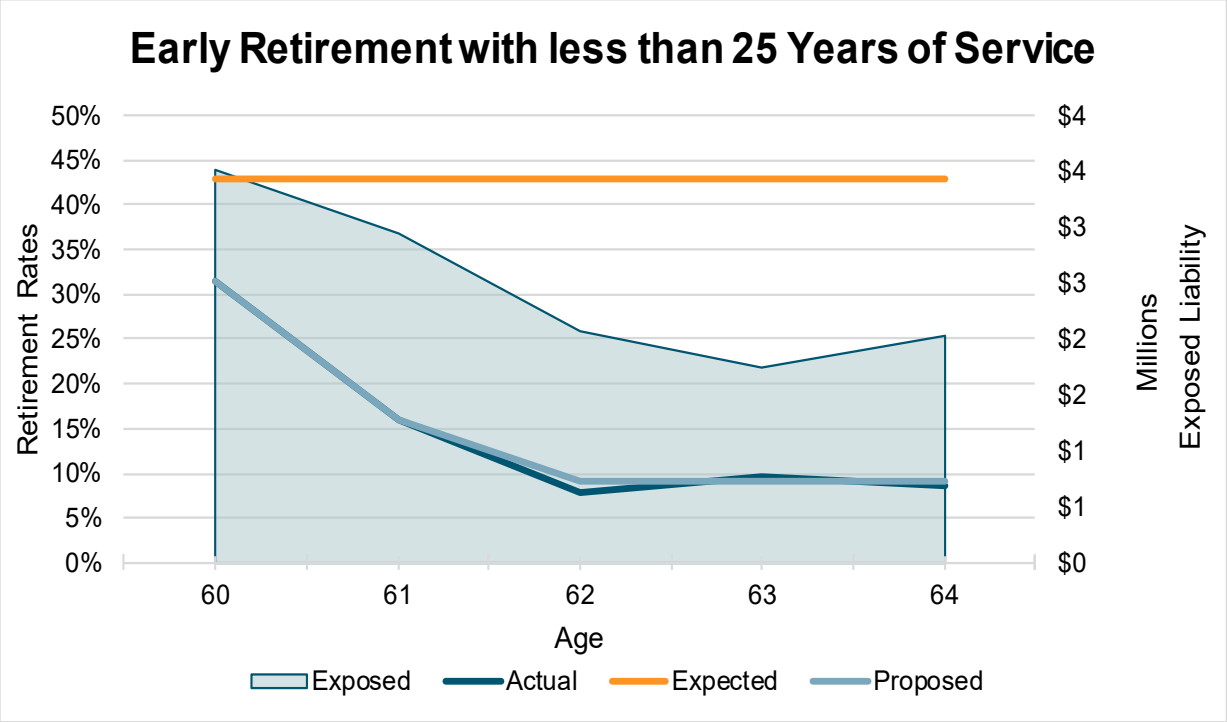
Liability Weighted Amounts of Age Based Retirements (in $) Eligible for an Reduced Benefit						
	Grandfathered Retirement			Non-Grandfathered Retirement		
	Current Rates			Current Rates		
			Ratio			Ratio
Age	Actual	Expected	Actual/Expected	Actual	Expected	Actual/Expected
45 & Under	0	0	0.00	0	0	0.00
46	0	0	0.00	0	0	0.00
47	0	0	0.00	0	0	0.00
48	0	0	0.00	0	0	0.00
49	0	0	0.00	0	0	0.00
50	0	0	0.00	0	0	0.00
51	0	0	0.00	0	0	0.00
52	0	0	0.00	0	0	0.00
53	0	0	0.00	0	0	0.00
54	0	0	0.00	0	0	0.00
55	31,493	968,852	0.03	0	0	0.00
56	0	1,504,367	0.00	0	0	0.00
57	457,538	1,478,247	0.31	0	0	0.00
58	1,305,212	1,939,274	0.67	0	0	0.00
59	2,666,409	2,526,990	1.06	0	0	0.00
60	4,567,632	5,906,656	0.77	47,037,999	18,740,499	2.51
61	3,767,555	5,478,549	0.69	67,244,672	34,136,580	1.97
62	2,516,231	5,403,948	0.47	144,502,385	67,430,507	2.14
63	3,866,575	5,004,241	0.77	175,173,516	92,131,627	1.90
64	3,586,875	5,236,637	0.68	152,167,883	82,502,612	1.84
65	0	0	0.00	264,345,852	210,763,267	1.25
66	0	0	0.00	214,716,542	162,563,361	1.32
67	0	0	0.00	0	0	0.00
68	0	0	0.00	0	0	0.00
69	0	0	0.00	0	0	0.00
70	0	0	0.00	0	0	0.00
71	0	0	0.00	0	0	0.00
72	0	0	0.00	0	0	0.00
73	0	0	0.00	0	0	0.00
74	0	0	0.00	0	0	0.00
75 & Over	0	0	0.00	0	0	0.00
TOTAL	22,765,520	35,447,763	0.64	1,065,188,848	668,268,453	1.59

Findings and Recommendations

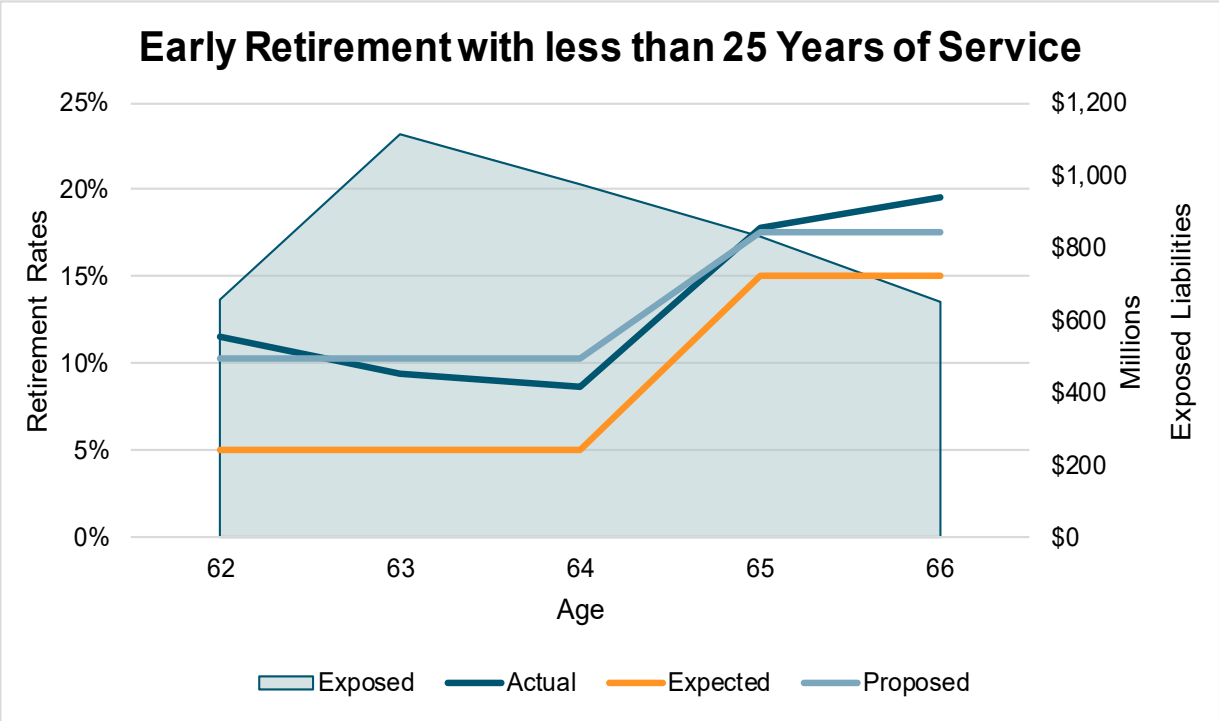
We recommend revising the early retirement rates to more closely reflect actual experience. The complete tables of recommended retirement rates are shown in Appendix D.

The actual average retirement rates by age and years of service during the past five years, the current assumed retirement rates, and the recommended retirement rates are shown on the left axis. The right axis of the charts below represents the amount of weighted exposure.

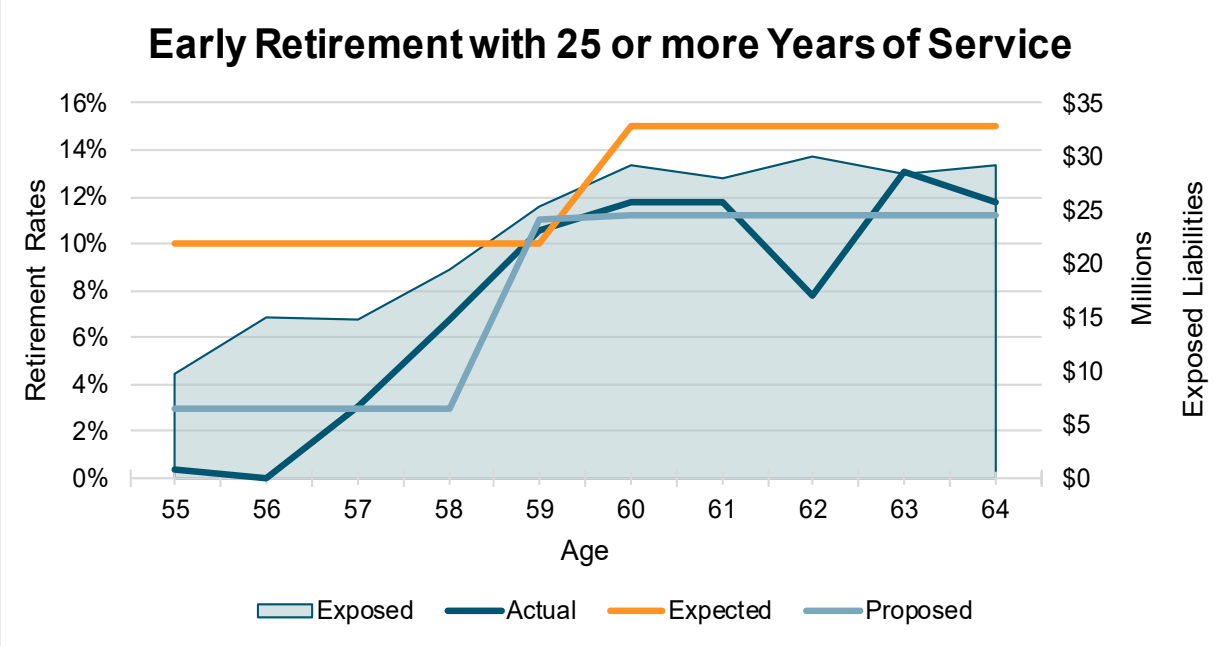
GRANDFATHERED PARTICIPANTS



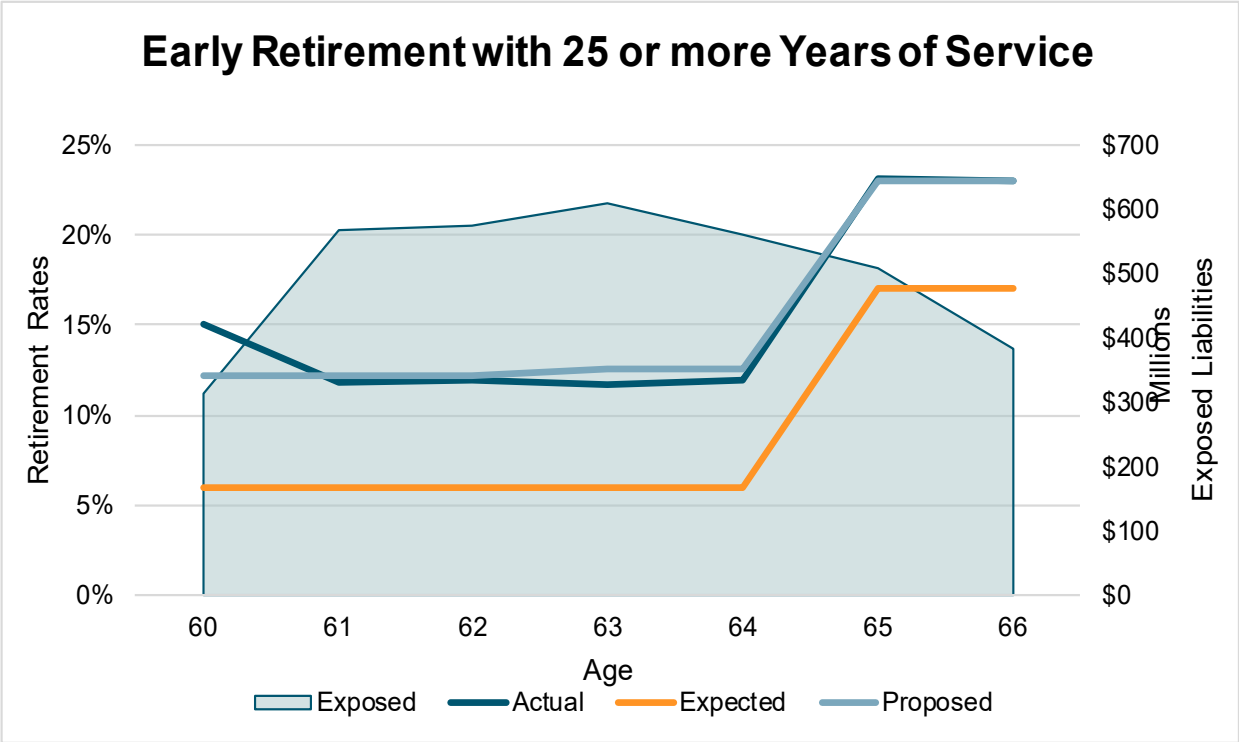
NON-GRANDFATHERED PARTICIPANTS



GRANDFATHERED PARTICIPANTS



NON-GRANDFATHERED PARTICIPANTS



The actual/expected ratios based on the recommended assumptions are 99% for grandfathered eligibility compared to 64% under the current assumptions, and 100% for non-grandfathered compared to 159% under the current assumptions.

SECTION III – DEMOGRAPHIC ASSUMPTIONS

The table on the following page details the actual/expected ratios by individual age and total based on the recommended rates of retirement.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Annual Benefit Amounts of Age Based Retirements Eligible for a Reduced Benefit						
	Grandfathered Retirement			Non-Grandfathered Retirement		
	Proposed Rates			Proposed Rates		
			Ratio			Ratio
Age	Actual	Proposed	Actual/Proposed	Actual	Proposed	Actual/Proposed
45 & Under	0	0	0.00	0	0	0.00
46	0	0	0.00	0	0	0.00
47	0	0	0.00	0	0	0.00
48	0	0	0.00	0	0	0.00
49	0	0	0.00	0	0	0.00
50	0	0	0.00	0	0	0.00
51	0	0	0.00	0	0	0.00
52	0	0	0.00	0	0	0.00
53	0	0	0.00	0	0	0.00
54	0	0	0.00	0	0	0.00
55	31,493	290,656	0.11	0	0	0.00
56	0	451,310	0.00	0	0	0.00
57	457,538	443,474	1.03	0	0	0.00
58	1,305,212	581,782	2.24	0	0	0.00
59	2,666,409	2,779,689	0.96	0	0	0.00
60	4,567,632	4,403,596	1.04	47,037,999	38,261,852	1.23
61	3,767,555	3,629,763	1.04	67,244,672	69,695,517	0.96
62	2,516,231	3,572,088	0.70	144,502,385	137,944,604	1.05
63	3,866,575	3,347,949	1.15	175,173,516	190,088,171	0.92
64	3,586,875	3,455,852	1.04	152,167,883	170,251,321	0.89
65	0	0	0.00	264,345,852	261,955,338	1.01
66	0	0	0.00	214,716,542	201,778,634	1.06
67	0	0	0.00	0	0	0.00
68	0	0	0.00	0	0	0.00
69	0	0	0.00	0	0	0.00
70	0	0	0.00	0	0	0.00
71	0	0	0.00	0	0	0.00
72	0	0	0.00	0	0	0.00
73	0	0	0.00	0	0	0.00
74	0	0	0.00	0	0	0.00
75 & Over	0	0	0.00	0	0	0.00
TOTAL	22,765,520	22,956,161	0.99	1,065,188,848	1,069,975,437	1.00

Rates of Non-Disabled Post-Retirement 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.

The Society of Actuaries periodically publishes mortality tables derived from large, national studies. In recent years, they have tended to publish families of tables, allowing actuaries to select a table that is based on a subset of data most similar to that of the data the actuary is trying to value. In early 2025, the Society released a set of tables based solely on public plan data. This family of tables, called the PUB-2016 tables, includes tables based not only on the gender and status factors already noted, but also on the type of membership (teachers, public safety, and general government), as well as further breakdowns based on those members who were above or below the median benefit amounts. Because most other recent families of tables had excluded public sector data, the PUB-2016 tables are expected to be quite useful for valuing the benefits for public retirement systems like SERS.

The post-retirement mortality rates used in the actuarial valuation project the percentage of retirees who are expected to die in a given future year. This assumption is a very material assumption and has the most significant impact of all demographic assumptions on liability projections. An important note in the examination of mortality is an observed correlation that life expectancy is greater for retirees with higher benefits than retirees with lower benefits. Because the goal of an actuarial valuation is to model the expected benefit payments to be provided by a system and the liability associated with these payments, actuaries increasingly analyze mortality experience on a benefit-weighted basis rather than simply considering headcounts (number of members dying).

Based upon the long-term trend of mortality improvement, actuaries seek to account for future improvements in longevity, either by generationally projecting future improvements or by maintaining a sufficient margin in expected rates of mortality to allow for future improvement. Since the prior experience study, the mortality basis for the System has used a generationally projected mortality improvement approach.

The analysis of the actual post-retirement mortality experience over the five-year experience study period yields actual/expected ratios of 105% and 108% respectively for males and females. The table below details the actual/expected ratios by individual age group and total.

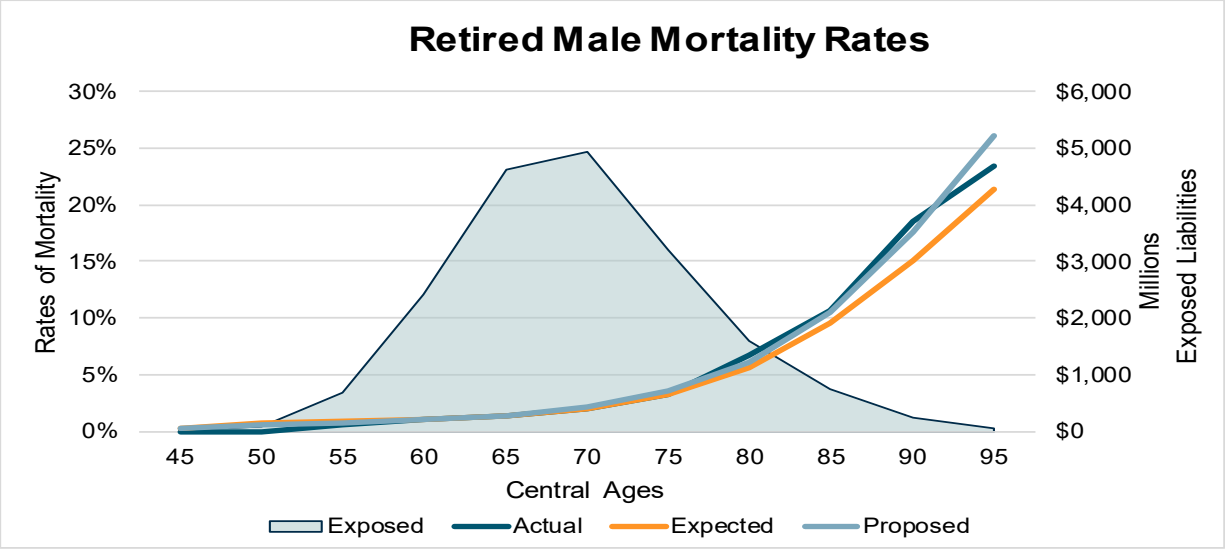
EXPERIENCE UNDER CURRENT ASSUMPTIONS

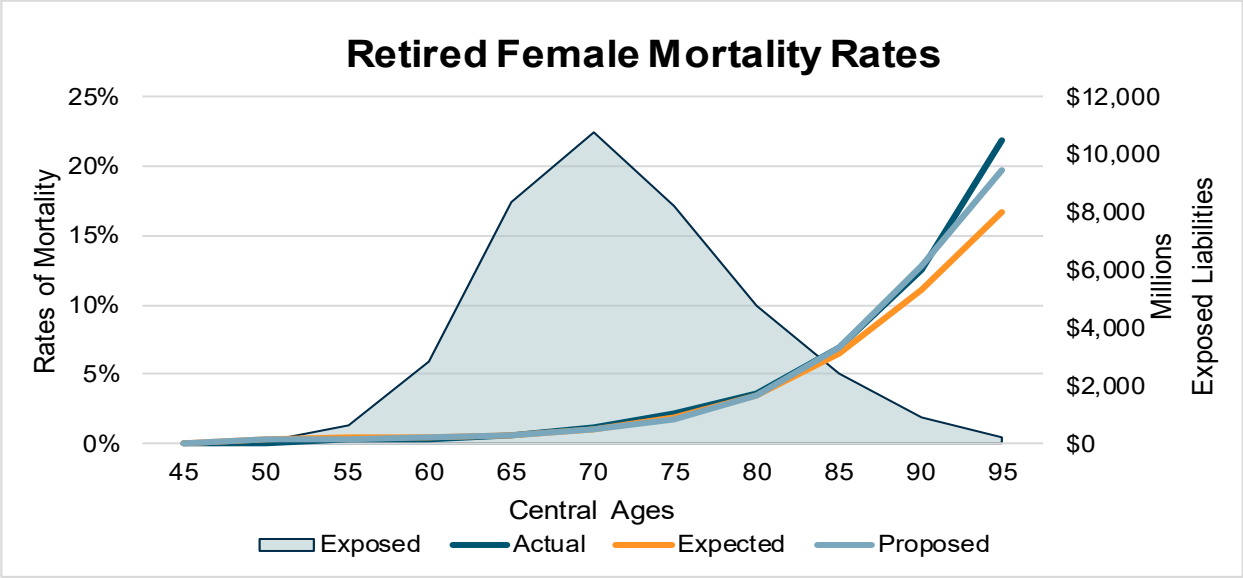
Age Group	Annual Benefit Amounts of Post-Retirement Mortality					
	Males			Females		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
50 - 54	0	532,737	0.00	0	282,151	0.00
55 - 59	3,994,927	6,190,392	0.65	2,094,967	2,748,314	0.76
60 - 64	23,689,177	26,668,587	0.89	10,686,376	13,969,150	0.76
65 - 69	64,228,862	63,462,252	1.01	54,081,539	56,905,117	0.95
70 - 74	95,139,265	99,858,131	0.95	121,651,550	116,759,292	1.04
75 - 79	103,305,244	103,392,345	1.00	178,158,124	155,912,008	1.14
80 - 84	105,199,756	87,694,172	1.20	174,063,732	164,763,834	1.06
85 - 89	77,960,279	69,732,677	1.12	170,420,485	158,324,466	1.08
90 - 94	44,663,297	36,153,051	1.24	116,043,787	102,946,265	1.13
95 - 99	11,891,979	10,836,202	1.10	49,982,023	38,296,423	1.31
100 & Over	2,314,111	1,856,796	1.25	10,179,748	7,898,939	1.29
TOTAL	532,386,896	506,377,343	1.05	887,362,330	818,805,958	1.08

Findings and Recommendations

Experience indicates that overall, more liability has been released than expected during the study period. The table currently in use is the PUB-2010 General Employee Amount Weighted Below-Median Healthy Retiree mortality table projected to 2017 with ages set forward 1 year and adjusted 94.20% for males and set forward 2 years and adjusted 81.35% for females. We recommend the use of the PUB-2016 General Employee Amount Weighted Below-Median Healthy Retiree mortality table projected to 2023 with ages set forward 1 year for males. Future improvement in mortality rates is reflected by applying the MP-2021 projection scale generationally.

The actual average mortality rates by age during the past five years, the current assumed mortality rates, and the recommended weighted mortality rates are shown on the left axis. The right axis of the charts below represents the weighted exposure. The weighted exposure amounts are the total number of individuals who were subject to mortality rates at specific age weighted by the amount of benefits paid during at that age.





The actual/expected ratios based on the recommended assumptions are 98% for males compared to 99% under the current assumptions and 108% for females compared to 108% under the current assumptions.

The following table details the actual/expected ratios by individual age and total based on the recommended rates of mortality.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Age Group	Males			Females		
	Actual	Proposed	Ratio Actual/Proposed	Actual	Proposed	Ratio Actual/Proposed
50 - 54	0	488,990	0.00	0	207,969	0.00
55 - 59	3,994,927	5,603,030	0.71	2,094,967	2,160,031	0.97
60 - 64	23,689,177	25,658,837	0.92	10,686,376	12,529,969	0.85
65 - 69	64,228,862	66,667,597	0.96	54,081,539	52,940,031	1.02
70 - 74	95,139,265	104,455,277	0.91	121,651,550	107,889,249	1.13
75 - 79	103,305,244	110,159,201	0.94	178,158,124	149,306,555	1.19
80 - 84	105,199,756	93,884,441	1.12	174,063,732	165,706,636	1.05
85 - 89	77,960,279	74,923,757	1.04	170,420,485	166,181,087	1.03
90 - 94	44,663,297	40,363,510	1.11	116,043,787	112,179,974	1.03
95 - 99	11,891,979	12,555,647	0.95	49,982,023	43,046,319	1.16
100 & Over	2,314,111	1,687,952	1.37	10,179,748	6,616,709	1.54
TOTAL	532,386,896	536,448,238	0.99	887,362,330	818,764,529	1.08

Rates of Contingent Survivor Post-Retirement Mortality

The contingent survivor mortality rates used in the actuarial valuations project the percentage of survivors who are expected to die in the upcoming year for all members. Mortality for survivors of retirees is expected to differ from that of other retirees. Experience is again weighted by benefit amount.

The analysis of contingent survivor mortality over the five-year experience study period yields actual/expected ratio of 113% and 114% respectively for survivors of male and female retirees. The table below shows the actual/expected ratios by age groups and in total.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Age Group	Annual Benefit Amounts of Contingent Survivor Mortality					
	Males			Females		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
50 - 54	738,735	210,972	3.50	1,984,944	457,426	4.34
55 - 59	1,805,757	551,826	3.27	1,303,615	1,157,431	1.13
60 - 64	2,494,841	1,253,814	1.99	5,095,508	2,907,394	1.75
65 - 69	2,813,027	3,451,524	0.82	6,866,028	6,473,903	1.06
70 - 74	5,061,095	6,348,804	0.80	14,214,542	10,063,887	1.41
75 - 79	12,448,209	9,484,356	1.31	19,697,299	15,558,830	1.27
80 - 84	9,809,311	10,198,482	0.96	21,448,603	19,594,715	1.09
85 - 89	11,846,480	10,328,676	1.15	22,807,301	23,685,409	0.96
90 - 94	8,484,795	6,842,956	1.24	20,070,064	20,284,480	0.99
95 - 99	2,815,177	2,681,044	1.05	11,233,075	9,336,192	1.20
100 & Over	422,017	457,677	0.92	1,669,817	1,763,150	0.95
TOTAL	58,739,446	51,810,132	1.13	126,390,796	111,282,817	1.14

Findings and Recommendations

We recommend PUB-2016 General Amount Weighted Below-Median Contingent Survivor mortality table projected to 2023 with ages set forward 2 years for males and set forward 1 year for females. Future improvement in mortality rates is reflected by applying the MP-2021 projection scale generationally.

The actual/expected ratios based on the recommended assumptions are 104% for males compared to 113% under the current assumptions and 127% for females compared to 114% under the current assumptions.

SECTION III – DEMOGRAPHIC ASSUMPTIONS

The following table details the actual/expected ratios by individual age and total based on the recommended rates of mortality.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Age Group	Males			Females		
	Actual	Proposed	Ratio Actual/Proposed	Actual	Proposed	Ratio Actual/Proposed
50 - 54	738,735	177,056	4.17	1,984,944	265,307	7.48
55 - 59	1,805,757	490,470	3.68	1,303,615	706,924	1.84
60 - 64	2,494,841	1,211,257	2.06	5,095,508	2,008,125	2.54
65 - 69	2,813,027	3,512,401	0.80	6,866,028	5,163,627	1.33
70 - 74	5,061,095	6,507,915	0.78	14,214,542	8,726,255	1.63
75 - 79	12,448,209	9,942,475	1.25	19,697,299	13,999,280	1.41
80 - 84	9,809,311	11,175,886	0.88	21,448,603	18,086,596	1.19
85 - 89	11,846,480	11,806,072	1.00	22,807,301	22,050,527	1.03
90 - 94	8,484,795	8,103,305	1.05	20,070,064	18,938,851	1.06
95 - 99	2,815,177	3,039,786	0.93	11,233,075	8,716,840	1.29
100 & Over	422,017	475,162	0.89	1,669,817	1,235,151	1.35
TOTAL	58,739,446	56,441,785	1.04	126,390,796	99,897,484	1.27

Rates of Disabled Post-Retirement Mortality

The disability mortality rates used in the actuarial valuations project the percentage of disabled retirees who are expected to die in the upcoming year for all members. Mortality for disabled retirees is expected to be higher than mortality for non-disabled retirees.

The analysis of the actual disabled mortality over the five-year experience study period yields actual/expected ratio of 123% and 119% respectively for disabled male and female retirees. The table below shows the actual/expected ratios by age groups and in total.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

	Annual Benefit Amounts of Post-Disablement Mortality					
	Males			Females		
Age Group	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
Under 35	0	0	0.00	0	8,604	0.00
35 - 39	500,690	13,974	35.83	245,530	30,710	8.00
40 - 44	457,102	75,496	6.05	0	94,360	0.00
45 - 49	939,315	343,582	2.73	1,407,975	469,102	3.00
50 - 54	2,314,685	1,322,829	1.75	3,841,938	1,897,437	2.02
55 - 59	6,358,860	4,653,608	1.37	7,988,956	5,156,954	1.55
60 - 64	15,675,517	11,148,600	1.41	18,633,308	12,954,791	1.44
65 - 69	16,627,949	16,134,156	1.03	21,226,438	17,800,853	1.19
70 - 74	16,199,215	13,349,603	1.21	15,678,802	14,643,506	1.07
75 - 79	12,159,353	9,146,213	1.33	13,949,790	12,544,953	1.11
80 - 84	5,271,463	5,249,406	1.00	9,339,360	10,055,906	0.93
85 - 89	2,354,175	2,565,303	0.92	6,782,204	6,817,368	0.99
90 - 94	868,204	756,172	1.15	2,886,562	2,921,084	0.99
95 & Over	131,347	145,425	0.90	797,816	749,201	1.06
TOTAL	79,857,876	64,904,367	1.23	102,778,680	86,144,828	1.19

Findings and Recommendations

We recommend adopting the PUB-2016 General Headcount Weighted Disabled Retiree mortality table projected to 2023 with ages set forward 4 years for males and females. Future improvement in mortality rates is reflected by applying the MP-2021 projection scale generationally.

The actual/expected ratios based on the recommended assumptions are 147% for males compared to 123% under the current assumptions and 135% for females compared to 119% under the current assumptions.

The following table details the actual/expected ratios by individual age and total based on the recommended rates of mortality.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Age Group	Annual Benefit Amounts of Post-Disablement Mortality					
	Males			Females		
	Actual	Proposed	Ratio Actual/Proposed	Actual	Proposed	Ratio Actual/Proposed
Under 35	0	0	0.00	0	4,134	0.00
35 - 39	500,690	9,562	52.36	245,530	14,217	17.27
40 - 44	457,102	50,255	9.10	0	44,202	0.00
45 - 49	939,315	220,973	4.25	1,407,975	227,584	6.19
50 - 54	2,314,685	899,744	2.57	3,841,938	1,093,486	3.51
55 - 59	6,358,860	3,696,139	1.72	7,988,956	3,918,666	2.04
60 - 64	15,675,517	9,146,155	1.71	18,633,308	10,493,411	1.78
65 - 69	16,627,949	12,596,427	1.32	21,226,438	14,241,509	1.49
70 - 74	16,199,215	10,999,803	1.47	15,678,802	12,758,620	1.23
75 - 79	12,159,353	8,397,303	1.45	13,949,790	12,445,517	1.12
80 - 84	5,271,463	5,035,400	1.05	9,339,360	10,023,786	0.93
85 - 89	2,354,175	2,489,556	0.95	6,782,204	6,890,377	0.98
90 - 94	868,204	752,461	1.15	2,886,562	3,077,329	0.94
95 & Over	131,347	146,917	0.89	797,816	781,202	1.02
TOTAL	79,857,876	54,440,695	1.47	102,778,680	76,014,040	1.35

Rates of Pre-Retirement Mortality

The rates of pre-retirement mortality are used in the actuarial valuation to project the percentage of employees who are expected to terminate due to death.

Findings and Recommendations

As is typical with most large public pension plans, a small number of deaths occur amongst the active member population during the experience period. The data is not sufficient to recommend a change in the actuarial assumption for pre-retirement mortality that would be expected to accurately predict mortality rates in the future for the active membership. As a result, we recommend the assumed rates of pre-retirement mortality reflect an assumption similar to the assumed rates of post-retirement mortality. We recommend adopting the PUB-2016 General Employee Amount Weighted Below-Median mortality table. Future improvement in mortality rates is reflected by applying the MP-2021 projection scale generationally.

Rates of Salary Increase Due to Merit and Promotion

Under the "building block" approach recommended in ASOP No. 27, this assumption is composed of three components: inflation, productivity (real wage increases), and merit/promotion. The inflation and productivity components are combined to produce the assumed rates of wage inflation. The rate represents the "across the board" average annual increase in salaries shown in the experience data. The merit component includes the additional increases in salary due to performance, seniority, promotions, etc.

The table below shows the actual/expected ratios for total salary increases over the five-year period.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Years of Service	Salaries End of Year		
	Actual	Expected	Ratio Actual/Expected
Under 1	1,939,813	1,988,471	0.976
1	1,195,976	1,223,970	0.977
2	1,028,428	1,046,737	0.983
3	910,483	921,010	0.989
4	899,609	908,392	0.990
5	879,097	885,752	0.992
6	825,521	831,662	0.993
7	733,136	736,437	0.996
8	640,911	643,850	0.995
9	551,026	554,298	0.994
10	466,928	466,009	1.002
11	429,488	431,712	0.995
12	419,858	421,489	0.996
13	424,282	425,008	0.998
14	420,426	420,692	0.999
15	415,718	416,192	0.999
16	400,372	400,090	1.001
17	398,037	398,855	0.998
18 & Up	4,364,080	4,345,066	1.004
TOTAL	17,343,189	17,465,692	0.993

SECTION III – DEMOGRAPHIC ASSUMPTIONS

Utilizing the "building block" approach, the first step in developing the merit-based rates of increase is to remove the wage inflation component experienced during the investigation period from the actual salary rates of increase. The average annual rate of inflation over the five-year period ending June 30, 2025 was 4.71% and the current assumed real rate of wage inflation (wage inflation above price inflation or CPI) was 0.85%. These combined equal an annual rate of wage inflation of 5.56% over the five-year period. This was 2.31% greater than the assumed wage inflation of 3.25%.

Upon reviewing salary increase experience across the workforce, increases appear relatively uniform across all age groups, with no statistically discernible variation that would suggest a distinct merit-driven component separate from general wage growth. In a compensation structure where merit increases operate independently of across-the-board adjustments, one would expect to observe a measurable pattern of higher increases concentrated among younger or mid-career employees — reflecting performance-based progression and step advancement — tapering as employees approach salary maturity. The absence of such a pattern in the observed data suggests that merit and general increases are either applied uniformly or are indistinguishable in their aggregate effect, making it impossible to isolate and separately quantify a merit component for actuarial assumption-setting purposes. Accordingly, a single composite salary scale assumption is more appropriate than attempting to decompose increases into general and merit components.

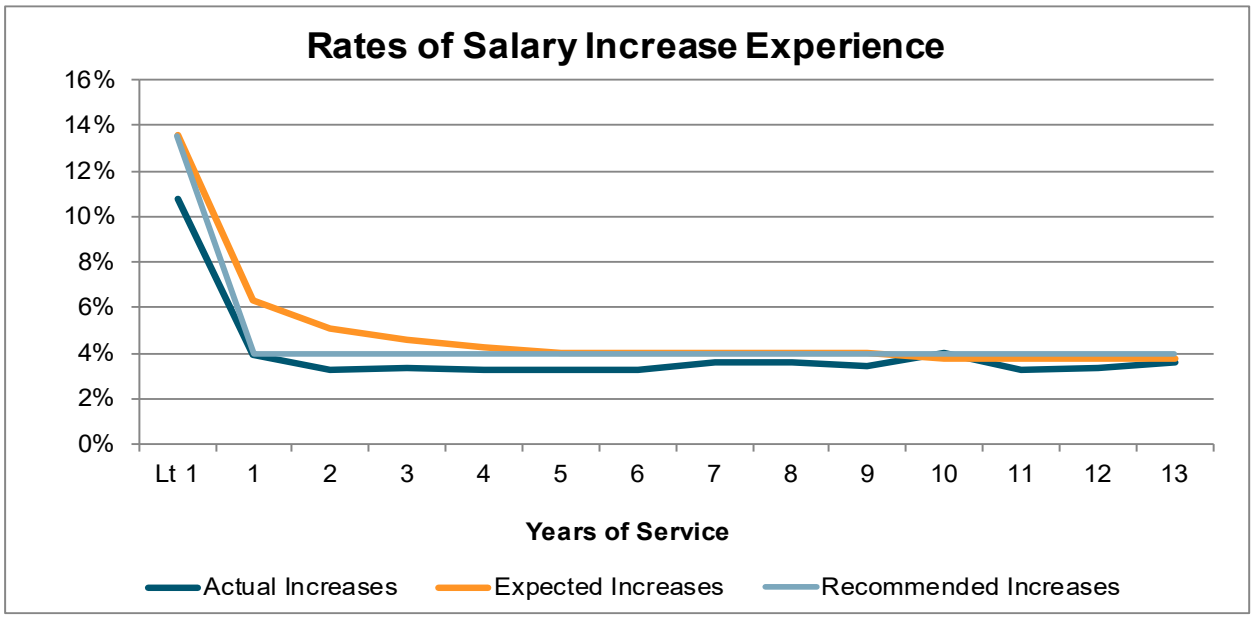
The table below shows the actual salary increases for the experience period. It should be noted that the pattern of increases is consistent with the experience study for the five year period ended June 30, 2020.

Years of Service	Actual Rate
Under 1	10.80%
1	3.92%
2	3.22%
3	3.35%
4	3.27%
5	3.24%
6	3.26%
7	3.56%
8	3.55%
9	3.41%
10	3.97%
11	3.23%
12	3.36%
13	3.59%
14	3.70%
15	3.65%
16	3.58%
17	3.30%
18 & Up	3.70%

Findings and Recommendations

Based on the analysis above we are recommending a single composite salary scale at all years of service with no change for a member with less than one year of service. The complete tables of recommended total compensation increase rates are shown in Appendix D.

The following graph shows a comparison of actual, current (expected), and proposed rates of total salary increases by years of service.



The actual/expected ratio based on the recommended assumption is shown in the table below. The total actual/expected ratio is 99% compared to 99% under the current assumption.

Years of Service	Salaries End of Year (in thousands)		
	Actual	Proposed	Ratio Actual/Proposed
Under 1	1,939,813	1,988,471	0.976
1	1,195,976	1,196,953	0.999
2	1,028,428	1,036,206	0.992
3	910,483	916,247	0.994
4	899,609	905,932	0.993
5	879,097	885,544	0.993
6	825,521	831,466	0.993
7	733,136	736,265	0.996
8	640,911	643,700	0.996
9	551,026	554,168	0.994
10	466,928	467,059	1.000
11	429,488	432,685	0.993
12	419,858	422,438	0.994
13	424,282	425,965	0.996
14	420,426	421,640	0.997
15	415,718	417,129	0.997
16	400,372	401,991	0.996
17	398,037	400,750	0.993
18 & Up	4,364,080	4,376,629	0.997
TOTAL	17,343,189	17,461,239	0.993

SECTION IV – OTHER ACTUARIAL ASSUMPTIONS AND METHODS

Percent Married: Currently 80% of members are assumed to be married with the husband three years older than the wife. This is a common and reasonable assumption, and we recommend maintaining this assumption.

Re-hired Retirees: The number of re-hired retirees has increased over the investigation period from 12,987 to 13,094. This result combined with the fact that a portion of employer contributions on re-hired retiree payroll is used to finance the unfunded accrued liability (UAL) suggests there is no material impact on the payroll growth assumption utilized in the actuarial valuation to determine the UAL contribution rate. Therefore, no specific re-hired retiree assumption is deemed necessary.

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 four-year smoothing method that recognizes in each year 25% of the difference between the actual market value of assets and the expected market 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.

Payroll Growth Assumption: The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period and requires a payroll growth assumption to determine the required stable rate of payroll required to fully amortize the UAAL over the amortization period. The current payroll growth rate is based on the wage inflation assumptions of 1.75%. Since 2017, total payroll has grown by 4.60% per year. Based on our most recent open-group projections of the System, the expected longer-term future rate of growth tends toward 2.0% annually. We recommend maintaining the current assumption of 1.75%

Amortization Method: The Unfunded Actuarial Accrued Liability (UAAL) can be amortized either as one single amount, or as components or “layers”, each with a separate amortization base, payment and period. If the UAAL is amortized as one amount, the UAAL is recalculated each year in the valuation and experience gains/losses or other changes in the UAAL are folded into the single UAAL amortization base. The amortization payment is then the total UAAL divided by an amortization factor for the applicable amortization period.

If separate amortization bases are maintained, the UAAL is composed of multiple amortization bases, each with its own payment schedule and remaining amortization period. In each valuation, the unexpected change in the UAAL is established as a new amortization base over the appropriate amortization period beginning on that valuation date. The UAAL is then the sum of all of the outstanding amortization bases on the valuation date and the UAAL payment is the sum of all of the amortization payments on the existing amortization bases. This approach provides transparency in that the current UAAL is paid off over a fixed period of time and the remaining components of the UAAL are clearly identified. Adjustments to the UAAL in future years are also separately identified in each future year.

SECTION IV – OTHER ACTUARIAL ASSUMPTIONS AND METHODS

Recommendation: We recommend 20-Year layered amortization beginning with the June 30, 2026 valuation composed of:

- Initial June 30, 2025 UAAL amortized over a closed 19-year period
- Subsequent changes in the UAAL amortized over closed 20-year periods from the valuation date it is measured.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

I. Economic Assumptions

For the Health Care Plan, we assume the same long-term rate of return as for the Basic Benefits Plan, which we are recommending remain at 7.00%. The long-term rate of return is used to project Health Care Fund solvency for both the actuarial valuation and for GASB purposes. GASB 74/75 prescribes a specific methodology for the solvency test that depends on the bond rate as of the measurement date, which changes every year. However, with the implementation of GASB 74/75, accounting standards have been separated from funding and we calculate an Actuarially Determined Employer Contribution (ADEC) for funding purposes. ASOP 27 states that the investment return assumption should reflect the anticipated returns on the plan's current and future assets. Since the Health Care Fund assets are invested in the same manner as the assets for the Basic Benefits Plan, we recommend that the Health Care Fund use 7.00% as the assumed rate of return for calculating the ADEC for funding purposes. We will continue to apply the applicable bond rate and the GASB crossover test at each measurement date for the GASB Total OPEB liability (TOL), but we recommend the ADEC be calculated at 7.00% as a measure of the contribution that would be necessary if the Fund were to fund actuarially from year to year.

Health Care Cost Trend Rates

In addition to the three economic assumptions used in all the actuarial valuations performed for Ohio SERS, the Health Care Cost Trend Rates reflect the change in per capita health claims rates over time due to the following factors:

- medical inflation
- utilization
- plan design
- technology improvements

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, *"Measuring Retiree Group Benefit Obligations,"* which provides guidance to actuaries in selecting economic assumptions for measuring obligations of post-retirement plans other than pensions. The actuary should not consider aging of the covered population when selecting the trend assumption for projecting future costs, but should consider the following key components in setting the health care cost trend rate as noted in ASOP No. 6:

- inflation
- medical inflation
- definition of covered charges
- frequency of services
- leveraging caused by plan design features not explicitly modeled
- plan participation

When setting assumptions for projecting medical and prescription drug costs, CavMac assumes the health benefit plan cost trend rates will decrease from an initial rate to an ultimate level. Our methodology for setting the initial trend rate includes the use of published annual health care inflation surveys in conjunction with actual plan experience, where credible. The initial trend rate assumption is subject to continued update and review with each valuation performed given the volatile nature of medical and prescription drug costs.

There are various approaches used to determine the timing and level of decreases to the ultimate trend rate. The assumed decrease in medical and prescription drug trend rates reflects the belief that health care inflation cannot indefinitely outstrip the growth rate of employer budgets and the overall economy. As a standard of practice, CavMac typically assumes a grading period of five to ten years, depending on the level of change (i.e., larger differences between the initial trend rate and the ultimate trend rate are assumed to require a longer reduction period). For the ultimate trend assumption, CavMac typically assumes an ultimate trend rate of price inflation +2.0%. As with any standard of practice, the specifics of each plan are reviewed to ensure there is nothing unusual that would necessitate a long-term trend rate that is either higher or lower than what is typical. It appears to be reasonable to continue to use an ultimate rate of price inflation +2.0%, which with the recommended price inflation will be 4.50%, as there appears to be nothing unusual about Ohio SERS' medical plans that would necessitate a long-term trend that is either higher or lower than what is typically used for this type of calculation.

Background: In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 6. Currently, the short-term health care trend rates are set on an annual basis based on the information and data as previously described, with an ultimate trend rate of price inflation plus excess cost growth that is reached after an appropriate grading period.

Recommendation: Continue to update the short-term health care trends annually and base the health care trends on Ohio SERS' experience and demographics while considering the projected trend from external sources. Use an ultimate trend rate of price inflation + 2.0%, or 4.50%.

Age Related Morbidity Factors

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, *"Measuring Retiree Group Benefit Obligations,"* states that in general, for health coverage, benefit costs vary by age and, with some limited exceptions, the actuary should use age specific costs in the development of the initial per capita costs and in the projection of future benefit plan costs.

Our most recent assumption for age-related claims cost increases uses the relative value factors that were developed from the Society of Actuaries' June 2013 research report Health Care Costs—From Birth to Death by Dale Yamamoto. The Yamamoto study includes age-based cost curves split by gender and applicable to pre-65 and over 65 (Medicare eligible) ages. For the Medicare eligible population, the analysis reviews cost relativities of both the Medicare total allowed charge and the Medicare net allowed amount. The report states: "The Medicare net allowed amount is determined as the difference of the Medicare total allowed amount and the Medicare benefit payment. This is, in essence, the amount of costs that may be considered allowable charges for any private supplemental plan (e.g., employer-sponsored integrated plan, individual Medicare supplement or Medigap plan)." Currently we are using the Yamamoto factors for the Medicare total allowed amount since the SERS plan is richer than the standard Medicare plan upon which the Medicare benefit payment is based. However, since Medicare reimbursements are risk rated and intended to remove the impact of aging and chronic disease conditions and the majority of Medicare costs are with prescription drugs, which have been recently overhauled with the Inflation Reduction Act (IRA), we recommend using the Yamamoto study Medicare net allowed factors, which are flatter at the higher ages. This is particularly important for SERS going forward as projected retirement ages are skewing higher, even past first Medicare eligibility age of 65.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

Background: In our opinion, the age-based morbidity assumptions recommended in this report have been developed in accordance with ASOP No. 6. Currently, we use the relative value factors that were developed from the Society of Actuaries' June 2013 research report Health Care Costs—From Birth to Death by Dale Yamamoto. The Yamamoto study includes age-based cost curves split by gender and applicable to pre-65 and over 65 (Medicare eligible) ages.

Recommendation: Continue to use the Yamamoto age-based morbidity relative value factors but update the factors for Medicare-eligible retiree from the total allowed factors to the net allowed factors.

COVID and Federal Legislation

We are recommending no specific assumption changes attributable to the COVID-19 pandemic at this time due to the level of uncertainty regarding the impact on plan costs going forward. Given the uncertainty regarding COVID-19 (e.g., the impact of routine care being deferred, direct COVID-19 treatment and prevention costs, changes in contribution and budget projections), continued monitoring of the impact on the Plan's liability will be required and changes, if necessary, will be made annually at the time that experience develops.

We are recommending no specific assumption changes attributable to the Affordable Care Act (ACA) and the Inflation Reduction Act (IRA) at this time. Review of the information currently available did not identify any specific provisions of the legislation that are anticipated to directly impact results other than plan design features and fees currently mandated by the ACA and incorporated in the plan designs, which are included in the current baseline claims costs, and the changes to Medicare due to the IRA, which are included in our baseline Medicare costs and trend assumption. Continued monitoring of the impact on the Plan's liability due to this and other legislation, if applicable, will be required.

Recommendation: No changes but continued monitoring.

Amortization Method

The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period using the payroll growth assumption to determine the required stable rate of payroll required to fully amortize the UAAL over the amortization period. Currently the amortization period for the Retiree Health Care valuation is an open 30 year period, meaning the UAAL is re-amortized every year over a new 30 year period and will never be paid off. The Actuarially Determined Employer Contribution is calculated in each annual valuation and compared to the actual employer contributions which are equal to the 1.50% of payroll surcharge ***plus*** any amount from the 14.00% fixed contribution rate that is not allocated to the Basic Benefits Plan, which is frequently 0.00%.

Since the plan is not funded actuarially, the Health Care Plan is primarily interested in plan solvency which is exhibited in the valuation report along with sensitivity measures showing the impact on solvency due to such factors as unexpected heath care cost increases, particularly for Medicare eligible retirees, and lower than expected investment return due to market downturns or underfunding.

However, since GASB 74 explicitly requires the calculation and disclosure of an Actuarially Determined Employer Contribution (ADEC), and since a 30 year open amortization period will never pay off the UAAL, we recommend changing to a 30 year closed amortization period. This will have no impact on the current valuation, but will impact future valuation as the amortization period steps down by one year in every subsequent valuation.

Recommendation: Change amortization method for the Retiree Health Care Plan from 30 year open to 30 year closed.

II. Coverage Assumptions

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, "Measuring Retiree Group Benefit Obligations", which provides guidance to actuaries in selecting coverage assumptions for measuring obligations of post-retirement plans other than pensions. The "Coverage Assumptions" section includes the key components the actuary should consider in setting the coverage assumptions per ASOP No. 6:

- Plan Participation
- Spouse Coverage Eligibility

Retirement Health Care Participation Rates

SERS requires individuals to contribute toward the cost of health care to maintain coverage based on service at retirement, disability status, Medicare eligibility, plan choice, and the coverage tier elected. Some eligible individuals may not elect to be covered, especially if they have coverage available through a spouse or previous employer. The rates of participation are based on experiential data, where available and credible. These rates are considered when selecting the participation assumption for future retirees, as well as the plan eligibility rules, plan choices, and the change in retiree contribution rates over time.

Since plan participation may vary in the future due to anticipated retiree contribution levels and plan choices, the appropriateness of participation rates for both current and future retirees needs to be considered. The availability to opt in and out of the plan at the time of open enrollment also needs to be considered.

Participation rates vary based on type of retirement: service or disability. Thus, the participation rates vary based on this status.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

The following tables shows the percentage of eligible service and disabled retirees who retired before age 65 over the last 5 years who elected plan coverage, split by service at retirement.

Years of Service	% of Pre-65 Service Retirees Electing Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
1.5 - 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 - 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10 - 14	3%	2%	3%	6%	6%	4%	25%	25%
15 - 19	5%	4%	6%	6%	9%	5%	25%	25%
20 - 24	18%	17%	17%	19%	22%	18%	45%	45%
25 - 29	41%	41%	40%	40%	39%	40%	50%	50%
30 - 34	56%	54%	53%	52%	52%	54%	75%	75%
35 and Over	72%	67%	67%	65%	64%	68%	90%	90%

Years of Service	% of Pre-65 Disabled Retirees Electing Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
1.5 - 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 - 9	4%	5%	5%	4%	3%	4%	25%	25%
10 - 14	13%	12%	8%	7%	6%	9%	25%	25%
15 - 19	13%	14%	12%	11%	11%	12%	45%	45%
20 - 24	19%	21%	22%	19%	17%	20%	50%	50%
25 - 29	34%	31%	39%	37%	38%	35%	75%	75%
30 - 34	57%	54%	51%	48%	48%	53%	75%	75%
35 and Over	79%	75%	73%	73%	72%	75%	90%	90%

While certain service groups for the pre-65 population exhibited participation below the assumed levels, overall participation patterns remain stable and generally consistent with expectations when viewed across service bands. Participation for higher service groups aligns with the expectation that retirees with greater service are more likely to elect benefits, and the observed pattern continues to support an increasing likelihood of participation with higher service.

The pre-65 participation assumption is used to project the proportion of eligible retirees expected to elect coverage under the pre-65 medical plan. Based on participation experience summarized above, no material deviation from the current assumption is observed for the pre-65 population. Although some variation exists by service group, overall participation levels and the relationship between service and participation remain consistent with the current assumption.

Recommendation: We recommend no change to the pre-65 retiree participation assumption at this time.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

The following tables shows the percentage of eligible service and disabled retirees who retired after age 65 over the last 5 years who elected plan coverage, split by service at retirement.

Years of Service	% of Service Retirees Retiring After Age 65 Electing Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
1.5 - 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 - 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10 - 14	13%	13%	14%	13%	13%	13%	25%	25%
15 - 19	21%	20%	20%	20%	19%	20%	45%	45%
20 - 24	52%	52%	51%	50%	48%	50%	70%	70%
25 - 29	70%	69%	68%	67%	65%	67%	75%	75%
30 - 34	80%	79%	78%	77%	76%	78%	85%	85%
35 and Over	84%	83%	83%	82%	81%	83%	90%	90%

Years of Service	% of Disabled Retirees Retiring After Age 65 Electing Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
1.5 - 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 - 9	33%	50%	0%	0%	0%	12%	70%	70%
10 - 14	33%	50%	33%	60%	60%	50%	70%	70%
15 - 19	20%	14%	17%	0%	0%	10%	70%	70%
20 - 24	18%	23%	25%	33%	25%	24%	75%	75%
25 - 29	5%	0%	13%	33%	57%	15%	75%	75%
30 - 34	0%	50%	50%	None	100%	50%	85%	85%
35 and Over	None	None	None	None	None	None	90%	90%

While certain service groups for the post-65 population exhibited participation below the assumed levels, overall participation patterns remain stable and generally consistent with expectations when viewed across service bands. Participation for higher service groups aligns with the expectation that retirees with greater service are more likely to elect benefits, and the observed pattern continues to support an increasing likelihood of participation with higher service.

The post-65 participation assumption is used to project the proportion of eligible retirees expected to elect coverage under the post-65 medical plan. Based on participation experience summarized above, no material deviation from the current assumption is observed for the post-65 population. Although some variation exists by service group, overall participation levels and the relationship between service and participation remain consistent with the current assumption.

Recommendation: We recommend no change to the post-65 retiree participation assumption at this time.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

The following tables shows the percentage of eligible deferred retirement members who began their retirement benefit over the last 5 years who elected plan coverage, split by service at retirement.

Years of Service	% of Deferred Vested Who Begin Collecting Pre-65 Electing Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
1.5 - 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 - 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10 - 14	0%	4%	0%	0%	3%	1%	50%	50%
15 - 19	2%	2%	4%	4%	2%	3%	50%	50%
20 - 24	13%	12%	19%	20%	24%	18%	50%	50%
25 - 29	0%	36%	50%	100%	50%	50%	50%	50%
30 - 34	75%	75%	67%	67%	100%	77%	50%	50%
35 and Over	100%	None	None	100%	50%	80%	50%	50%

Years of Service	% of Deferred Vested Who Begin Collecting Post-65 Electing Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
1.5 - 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5 - 9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10 - 14	4%	3%	9%	2%	3%	4%	50%	50%
15 - 19	16%	24%	11%	9%	8%	11%	50%	50%
20 - 24	38%	36%	32%	37%	31%	34%	50%	50%
25 - 29	29%	25%	38%	44%	42%	38%	50%	50%
30 - 34	67%	None	100%	40%	80%	72%	50%	50%
35 and Over	None	None	100%	100%	80%	91%	50%	50%

Recommendation: Based on the actual participation experience over the last five years, split out by years of service at retirement, we recommend not adjusting the current participation assumptions for deferred vested retirees.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

The following tables shows the percentage of eligible members who retired before age 65, were initially waiving medical coverage, and later elected medical coverage once they attained age 65, or earlier.

Retirees Initially Under Age 65 and Waiving Insurance Who Turn Age 65 During the Experience Period		
Experience Period: 7/1/2020 - 6/30/2025		
Elects Coverage At Age 65 or Earlier		1,193
Does Not Elect Coverage		7,315
Total		8,508
	% Elect	14.0%
	Current	15.0%
	Proposed	15.0%

Recommendation: Based on the actual participation experience over the last five years, we recommend not adjusting the current waive election participation assumption.

SECTION V – OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

The following tables shows the percentage of eligible disabled retirees who retired before age 65, elected coverage, and were eligible for Medicare benefits before age 65.

Disabled Retirees Under Age 65	
Experience Period: 7/1/2020 - 6/30/2025	
Eligible for Medicare Coverage	2,102
Not Eligible for Medicare Coverage	11,381
Total	13,483
% Under 65 Eligible for Medicare	15.6%
Current	15.0%
Proposed	15.0%

Recommendation: Based on the actual participation experience over the last five years, we recommend not adjusting the current pre-65 Medicare eligibility assumption for disabled retirees.

Spouse Coverage Rates

SERS requires individuals to contribute toward the cost of spousal health care to maintain coverage based on service at retirement, Medicare eligibility, plan choice, and the coverage tier elected. Participant costs to cover a spouse are significantly higher than for single coverage. Therefore, some eligible individuals may not elect to cover a spouse, even if they choose coverage for themselves.

The schedule below lists the percentage of the spouse premium paid by spouses of retirees:

Service Retiree, Disability Recipient, or Member's Qualified Service	Spouse Premium Contribution Percentage
1.5 – 24	100.0%
25 – 29	90.0
30 and over	80.0

The rates of participation are based on actual data. These rates are considered when selecting the spouse coverage assumption for future retirees, as well as the plan eligibility rules, plan choices, and the change in retiree contribution rates over time.

Spouse Coverage Assumption

Current rates: 25% Male retirees who participate cover a spouse; 25% Female retirees who participate cover a spouse

Proposed rates: 25% Male retirees who participate cover a spouse; 25% Female retirees who participate cover a spouse

Retiree Gender	% of Pre-65 Members Electing Spousal Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
Male	10.1%	9.6%	9.8%	11.6%	12.9%	10.5%	25%	25%
Female	10.8%	10.6%	10.0%	11.0%	11.6%	10.8%	25%	25%
Total	10.5%	10.2%	10.0%	11.2%	12.0%	10.7%	25%	25%

Retiree Gender	% of Post-65 Members Electing Spousal Coverage							
	2021	2022	2023	2024	2025	Total	Current	Proposed
Male	21.5%	21.3%	21.1%	20.8%	20.4%	21.1%	25%	25%
Female	14.4%	14.3%	14.4%	14.6%	14.7%	14.5%	25%	25%
Total	15.8%	15.8%	15.8%	15.9%	15.9%	15.8%	25%	25%

Recommendation: Based on the actual participation experience over the last five years, split out by gender, we recommend not changing from the current spouse participation assumption that 25% of participating male retirees cover spouses and 25% of participating female retirees cover spouses.

Non-Spousal Dependent Coverage

Retiree Coverage of Non-Spouse Dependents			
Experience Period: 7/1/2020 - 6/30/2025			
		Subscriber Under Age 65	Subscriber Age 65 or Older
Retirees or Beneficiary Subscribers		19,787	189,753
Covered Non-Spouse Dependents		672	594
Avg No. Per Subscriber		0.034	0.003
	Current	0.0%	0.0%
	Proposed	0.0%	0.0%

Recommendation: Based on the actual participation experience over the last five years, we recommend not adjusting the current assumptions for future non-spousal dependent coverage.

Plan Election

The following table shows the distribution of plans elected by retirees only over the last 5 years.

Non-Medicare Participants		
Experience Period: 7/1/2020 - 6/30/2025		
	Full Period	Past 2 Years
SERS Marketplace Wraparound HRA	1,934	931
PPO Plan	18,214	4,562
Total	20,148	5,493
% Elect Wraparound HRA	9.6%	16.9%
	Current	20.0%
	Proposed	20.0%
Details on PPO Plan Election		
	Full Period	Past 2 Years
Aetna Choice POS II	17,484	4,383
AultCare PPO	730	179
Total	18,214	4,562
% Elect Aetna Choice POS II	96.0%	96.1%
	Current	96.0%
	Proposed	96.0%

This assumption is used to project the distribution of retirees among the available Pre-Medicare health care plan options. The recent retiree plan election experience compared to the current assumption is generally consistent with expectations.

Recommendation: We recommend keeping the current future retiree plan election assumption at this time for pre-Medicare participants.

Medicare Coverage

Medicare Participants				
Experience Period: 7/1/2020 - 6/30/2025				
	Subscribers	% Covered	Current	Proposed
No Medicare Coverage at Age 65	360	0.1%	1.0%	0.0%
Full Medicare	356,577	98.2%	98.0%	100.0%
Medicare Part B Only	6,020	1.7%	1.0%	0.0%
Total	362,957			

This assumption is used to project the distribution of retirees over 65 who have no Medicare coverage, full Medicare coverage, or Medicare Part B only. Although there are current retirees age 65 or over who have no Medicare coverage or Medicare Part B only, we note that beginning April 1, 1986, mandatory Medicare coverage was implemented for state and local government employees hired or rehired after that date. Therefore, future retirees should be fully covered by Medicare.

Recommendation: We recommend using the actual data regarding Medicare coverage for current over-65 retirees, but adjusting the assumption for future retirees or for retirees who are currently under age 65 to assume that 100% will be eligible for full Medicare at age 65.

Health Care Premium Discount Program

If at least one family member is enrolled in a SERS Medicare plan, a participant may qualify, based on household size and income, for the Ohio SERS Health Care Premium Discount Program. Those who qualify will receive a 25% reduction in the monthly SERS health care premium for medical and prescription drugs.

Household Size	Qualifying Income as of 2026
1	27,388
2	37,013
3	46,638
4	56,263
5	65,888

Retirees with at Least One Family Member Enrolled in a SERS Medicare Plan		
Experience Period: 7/1/2020 - 6/30/2025		
Qualify for Health Care Premium Discount Program		6,473
Does Not Qualify		182,678
Total		189,151
	% Who Will Qualify	3.4%
	Current	0.0%
	Proposed	3.0%

Recommendation: Based on the actual participation experience over the last five years, we recommend including a 3% assumption for future retirees qualify at Medicare eligibility.

SECTION VI – SUMMARY AND COST OF CHANGES

As a result of the experience investigation, we are recommending revised rates of withdrawal, disability, pre-retirement mortality, service retirement, and assumed compensation increases for active members.

We have also provided recommendations for the economic assumptions to use for the Basic Benefit Plan. Since the assets for the Health Care Plan are invested in the same manner as the Basic Benefits Plan, we recommend using 7.00% for funding purposes for both the Basic Benefits Plan and the Health Care Plan.

When these proposed assumption changes are applied to the June 30, 2025 valuation, the results will change. The change in results represents the financial impact of adopting the proposed assumptions. The impact on the Basic Benefit Plan is shown in the table below. The impact on the Retiree Health Care Plan is shown in the table on the following page.

BASIC BENEFIT PLAN

	Valuation 6/30/2025	Assumption Changes
Employer Contribution Rate:		
Normal Rate	0.75%	1.01%
UAAL	8.99%	10.66%
Total Employer Rate	9.74%	11.67%
Actuarial accrued liability	$24,584,159,753	$25,561,034,970
Actuarial value of assets	$19,422,393,762	$19,422,393,762
UAAL	$5,161,765,991	$6,138,641,208
Amortization Period	19 Years	20-19 Years

RETIREE HEALTH CARE PLAN

	Valuation 6/30/2025	Assumption Changes
Employer Contribution Rate:		
Normal Rate	1.52%	1.40%
UAAL	1.08%	0.90%
Total Required Employer Rate	2.60%	2.30%
Actuarial accrued liability	$1,723,587,498	$1,591,102,314
Actuarial value of assets	$939,812,471	$939,812,471
UAAL	$783,775,027	$651,289,843
Solvency Period	2064	2065
Amortization Period	30	30

APPENDIX A – HISTORICAL JUNE CPI (W) INDEX

Year	CPI (W)	Year	CPI (W)
1974	49.30	2000	169.20
1975	53.90	2001	174.60
1976	57.10	2002	175.90
1977	61.00	2003	179.60
1978	65.60	2004	185.30
1979	72.80	2005	190.10
1980	83.20	2006	198.60
1981	91.10	2007	203.91
1982	97.40	2008	215.22
1983	99.80	2009	210.97
1984	102.80	2010	213.84
1985	107.00	2011	222.52
1986	108.40	2012	226.04
1987	112.40	2013	230.00
1988	116.70	2014	234.70
1989	122.80	2015	233.80
1990	128.30	2016	235.29
1991	134.10	2017	238.81
1992	138.10	2018	246.20
1993	142.00	2019	249.75
1994	145.40	2020	251.05
1995	149.90	2021	266.41
1996	154.10	2022	292.54
1997	157.40	2023	299.39
1998	159.70	2024	308.05
1999	162.80	2025	315.95

APPENDIX B – CAPITAL MARKET ASSUMPTIONS AND ASSET ALLOCATION

Rates of Return and Standard Deviation by Asset Class*

Asset Class	Real Return	Standard Deviation
US Equity - Large Cap	5.88%	16.54%
Non US Equity Developed Market	6.55%	18.20%
Non US Equity Emerging Market	8.22%	23.43%
Private Equity	9.73%	22.18%
US Corporate Bonds - Core	2.87%	6.22%
Real Estate	5.18%	16.24%
Infrastructure	6.24%	14.86%
Private Debt/Private Credit	6.30%	11.75%
Cash Equivalents	1.20%	1.47%

Asset Class Correlation Coefficients

	US Equity Large Cap	Non-US Equity Developed	Non-US Equity Emerging	Private Equity	US Corporate Bonds - Core	Real Estate	Infrastructure	Private Debt	Cash Equivalents
US Equity - Large Cap	1.00	0.82	0.71	0.76	0.32	0.55	0.65	0.58	-0.01
Non US Equity Developed Market	0.82	1.00	0.80	0.68	0.32	0.48	0.67	0.57	0.00
Non US Equity Emerging Market	0.71	0.80	1.00	0.64	0.29	0.42	0.61	0.54	0.00
Private Equity	0.76	0.68	0.64	1.00	0.21	0.48	0.57	0.63	-0.04
US Corporate Bonds - Core	0.32	0.32	0.29	0.21	1.00	0.27	0.34	0.22	0.19
Real Estate	0.55	0.48	0.42	0.48	0.27	1.00	0.48	0.41	0.03
Infrastructure	0.65	0.67	0.61	0.57	0.34	0.48	1.00	0.51	0.04
Private Debt/Credit	0.58	0.57	0.54	0.63	0.22	0.41	0.51	1.00	-0.04
Cash Equivalents	-0.01	0.00	0.00	-0.04	0.19	0.03	0.04	-0.04	1.00

Asset Allocation Targets

Asset Class	Allocation Percentage
Global Equities	
US Equities - Large Cap	22.00%
Non US Equity Developed Market	12.00%
Non US Equity Emerging Market	6.00%
Global Private Equity	14.00%
Global Fixed Income	18.00%
Global Real Estate	13.00%
Global Infrastructure	7.00%
Global Private Debt/Credit	5.00%
Cash Equivalents	3.00%

** Survey of Capital Market Assumptions: 2025 Edition*

APPENDIX C – SOCIAL SECURITY ADMINISTRATION WAGE INDEX

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1974	$8,030.76		2000	$32,154.82	5.53%
1975	8,630.92	7.47%	2001	32,921.92	2.39
1976	9,226.48	6.90	2002	33,252.09	1.00
1977	9,779.44	5.99	2003	34,064.95	2.44
1978	10,556.03	7.94	2004	35,648.55	4.65
1979	11,479.46	8.75	2005	36,952.94	3.66
1980	12,513.46	9.01	2006	38,651.41	4.60
1981	13,773.10	10.07	2007	40,405.48	4.54
1982	14,531.34	5.51	2008	41,334.97	2.30
1983	15,239.24	4.87	2009	40,711.61	-1.51
1984	16,135.07	5.88	2010	41,673.83	2.36
1985	16,822.51	4.26	2011	42,979.61	3.13
1986	17,321.82	2.97	2012	44,321.67	3.12
1987	18,426.51	6.38	2013	44,888.16	1.28
1988	19,334.04	4.93	2014	46,481.52	3.55
1989	20,099.55	3.96	2015	48,098.63	3.48
1990	21,027.98	4.62	2016	48,642.15	1.13
1991	21,811.60	3.73	2017	50,321.89	3.45
1992	22,935.42	5.15	2018	52,145.80	3.62
1993	23,132.67	0.86	2019	54,099.99	3.75
1994	23,753.53	2.68	2020	55,628.60	2.83
1995	24,705.66	4.01	2021	60,575.07	8.89
1996	25,913.90	4.89	2022	63,795.13	5.32
1997	27,426.00	5.84	2023	66,621.80	4.43
1998	28,861.44	5.23	2024	69,846.57	4.84
1999	30,469.84	5.57			

APPENDIX D – RECOMMENDED RATES OF WITHDRAWAL AND SALARY INCREASES

Years of Service	Rates of Withdrawal	Rates of Salary Increases
Less than 1	40.00%	13.58%
1	17.50%	4.00%
2	11.90%	4.00%
3	9.50%	4.00%
4	8.90%	4.00%
5	8.00%	4.00%
6	6.90%	4.00%
7	6.30%	4.00%
8	5.80%	4.00%
9	5.50%	4.00%
10	4.30%	4.00%
11	3.60%	4.00%
12	3.70%	4.00%
13	3.30%	4.00%
14	3.20%	4.00%
15	3.10%	4.00%
16	2.80%	4.00%
17	2.70%	4.00%
18	2.70%	4.00%
19	2.50%	4.00%
20	2.50%	4.00%
21	2.50%	4.00%
22	2.25%	4.00%
23	2.25%	4.00%
24 +	2.25%	4.00%

APPENDIX D – RECOMMENDED RATES OF RETIREMENTS

Age	Grandfathered				Non-Grandfathered			
	Reduced	Reduced (55/25)	First Eligible Unreduced	Subsequent Unreduced	Reduced	Reduced (60/25)	First Eligible Unreduced	Subsequent Unreduced
45			32.00%	18.00%				
46			32.00%	18.00%				
47			32.00%	18.00%				
48			58.00%	18.00%				
49			58.00%	18.00%				
50			58.00%	18.00%				
51			58.00%	18.00%				
52			58.00%	18.00%				
53			58.00%	18.00%				
54			58.00%	18.00%				
55		3.00%	58.00%	18.00%				
56		3.00%	26.00%	18.00%				
57		3.00%	26.00%	18.00%			63.00%	50.00%
58		3.00%	26.00%	18.00%			63.00%	50.00%
59		11.00%	26.00%	18.00%			63.00%	47.00%
60	31.50%	11.25%	31.00%	18.00%		12.25%	50.00%	47.00%
61	16.00%	11.25%	31.00%	18.00%		12.25%	38.00%	38.00%
62	9.00%	11.25%	35.00%	18.00%	10.25%	12.25%	38.00%	30.00%
63	9.00%	11.25%	35.00%	18.00%	10.25%	12.50%	38.00%	30.00%
64	9.00%	11.25%	35.00%	18.00%	10.25%	12.50%	38.00%	30.00%
65			35.00%	32.00%	17.50%	23.00%	38.00%	44.00%
66			35.00%	34.00%	17.50%	23.00%	38.00%	50.00%
67			35.00%	26.00%			27.00%	60.00%
68			35.00%	26.00%			38.00%	31.00%
69			35.00%	26.00%			38.00%	24.00%
70			35.00%	26.00%			38.00%	24.00%
71			35.00%	26.00%			38.00%	24.00%
72			35.00%	26.00%			38.00%	24.00%
73			35.00%	26.00%			38.00%	24.00%
74			35.00%	26.00%			38.00%	24.00%
75			100.00%	100.00%			100.00%	100.00%

APPENDIX D – RECOMMENDED RATES OF DISABILITY

Age	Rates of Disability		Age	Rates of Disability	
	Male	Females		Male	Females
20	0.013%	0.008%	48	0.250%	0.212%
21	0.016%	0.009%	49	0.264%	0.232%
22	0.019%	0.009%	50	0.278%	0.251%
23	0.022%	0.009%	51	0.292%	0.272%
24	0.024%	0.010%	52	0.306%	0.293%
25	0.027%	0.010%	53	0.320%	0.314%
26	0.032%	0.013%	54	0.334%	0.335%
27	0.036%	0.016%	55	0.349%	0.356%
28	0.040%	0.019%	56	0.356%	0.364%
29	0.045%	0.022%	57	0.363%	0.371%
30	0.049%	0.025%	58	0.370%	0.379%
31	0.057%	0.030%	59	0.377%	0.387%
32	0.064%	0.035%	60	0.384%	0.395%
33	0.072%	0.040%	61	0.376%	0.368%
34	0.080%	0.045%	62	0.369%	0.341%
35	0.087%	0.051%	63	0.361%	0.314%
36	0.099%	0.059%	64	0.354%	0.287%
37	0.110%	0.067%	65	0.346%	0.260%
38	0.122%	0.075%	66	0.322%	0.243%
39	0.133%	0.083%	67	0.297%	0.227%
40	0.145%	0.091%	68	0.272%	0.211%
41	0.158%	0.103%	69	0.248%	0.194%
42	0.170%	0.115%	70	0.223%	0.178%
43	0.183%	0.128%	71	0.211%	0.167%
44	0.196%	0.140%	72	0.199%	0.156%
45	0.209%	0.153%	73	0.187%	0.146%
46	0.223%	0.172%	74	0.174%	0.135%
47	0.237%	0.192%	75	0.162%	0.124%

APPENDIX D – SUMMARY OF CHANGES

Summary of Changes	
Actuarial Methods	
Actuarial Cost Method	No change
Actuarial Value of Assets	No change
Payroll Growth Assumption	No change
Amortization Method	
Pension	Change to layered amortization
Retiree Health Care Plan	Change to closed amortization period
Economic Assumptions	
Investment Return	No change
Price Inflation	Increased from 2.40% to 2.50%
Wage Inflation	Increased from 3.25% to 3.50%
Real Wage Growth	Increased from 0.85% to 1.00%
Cost-of-Living Adjustments	Increased from 2.00% to 2.50%
Administrative Expenses	No change
Health Care Cost Trend Rates	
Initial	No change in methodology to set on yearly basis
Ultimate	Use ultimate trend rate of price inflation + 2.00%, or 4.50%

APPENDIX D – SUMMARY OF CHANGES

Summary of Changes	
Demographic Assumptions	
Rates of Withdrawal	Updated rates of withdrawal
Rates of Disability Retirement	Updated rates of disability
Rates of Service Retirement	Updated rates of retirement
Mortality	Updated to Pub-2016 family of mortality tables projected generationally with MP 2021 projection scale
Salary Increase	Updated assumed salary increases
Percent Married	No change
Spousal Age Difference	No change
Re-Hired Retirees	No change

Summary of Changes	
OPEB Specific	
Age Related Morbidity Factors	Update Medicare-eligible retiree factors to net allowed
Plan Participation	
Service Retirement	No change
Disabled Retirement	No change
Retirement from Deferred Status	No change
Spousal Coverage	No change
Non-Spousal Dependent Coverage	No change
Waived Participation at Age 65	No change
Plan Election	
Non-Medicare	No change
Medicare	Assume 100% of Future Retirees or Retiree Under the Age of 65 will be Eligible for Full Medicare at age 65
Premium Discount Program Eligibility	Change to 3%