City of Fresno Employees
Retirement System

Actuarial Experience Study

Analysis of Actuarial Experience During the Period July 1, 2021 to June 30, 2024

Segal

Segal

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June 3, 2025

Board of Retirement
City of Fresno Employees Retirement System
2828 Fresno Street, Suite 201
Fresno, CA 93721-1327

Re: Review of actuarial assumptions for the June 30, 2025 actuarial valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience for the City of Fresno Employees Retirement System. This study utilizes the census data for the period July 1, 2021 to June 30, 2024 as well as prior periods for some assumptions, examines other relevant inputs, and provides the proposed actuarial assumptions to be used in the June 30, 2025 valuation.

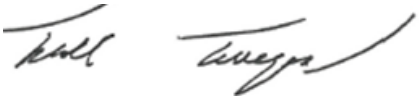
The review of the economic assumptions for use in the June 30, 2025 valuation is provided in a separate report.

The actuarial calculations were completed under the supervision of Andy Yeung, ASA, MAAA, FCA, Enrolled Actuary. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

Segal makes no representation or warranty as to the future status of the Plan and does not guarantee any particular result. This document does not constitute legal, tax, accounting or investment advice or create or imply a fiduciary relationship. The Board is encouraged to discuss any issues raised in this report with the Plan's legal, tax and other advisors before taking, or refraining from taking, any action.

We look forward to reviewing this report with you and answering any questions you may have.

Sincerely,



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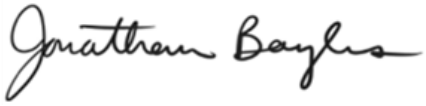

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Section 1: Introduction, Summary and Recommendations

To project the cost and liabilities of the Retirement System, assumptions are made about all future events that could affect the amount and timing of the benefits to be paid and the assets to be accumulated. Each year, actual experience is compared against the projected experience, and to the extent there are differences, the future contribution requirement is adjusted.

If assumptions are modified, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions means that year's experience is treated as temporary and that, over the long run, experience will return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important in maintaining adequate funding while paying the promised benefit amounts to participants already retired and to those near retirement. The actuarial assumptions used do not determine the "actual cost" of the plan. The actual cost is determined solely by the benefits and administrative expenses paid out, offset by investment income received. However, it is desirable to estimate as closely as possible what the actual cost will be so as to permit an orderly method for setting aside contributions today to provide benefits in the future, and to maintain equity among generations of participants and taxpayers.

This study was undertaken in order to review the demographic actuarial assumptions and to compare the actual experience with that expected under the current assumptions during the three-year experience period July 1, 2021 to June 30, 2024. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27 "Selection of Assumptions for Measuring Pension Obligations." This Standard of Practice provides guidance for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected future experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for merit and promotion salary increases, retirement from active employment, DROP election, pre-retirement mortality, healthy life post-retirement mortality, disabled life post-retirement mortality, termination (refund and deferred vested retirement), disability, and election of optional forms of benefit at retirement.

Our recommendations for the major actuarial assumption categories are as follows:

Pg #	Actuarial Assumption Category	Recommendation
13	**Individual Salary increases:** Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary salary increases • Real "across-the-board" salary increases • Merit and promotion increases	Adjust the merit and promotion rates of salary increase as developed in *Section 3(C)* to reflect past experience. The recommended total rates of salary increase anticipate higher increases than the current assumptions. The review of the inflationary and real "across-the-board" increase components of the salary increase assumption is provided as part of our review of economic actuarial assumptions for the June 30, 2025 actuarial valuation.

Pg #	Actuarial Assumption Category	Recommendation
17	**Mortality rates - healthy:** The probability of dying at each age for non-disabled members. Mortality rates are used to anticipate life expectancies.	**Healthy retirees** *Current base table*: Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table with rates increased by 5% for males and females *Recommended base table:* Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 10% for males and females **Beneficiaries** *Current base table for beneficiaries not in pay status at the valuation:* Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table with rates increased by 5% for males and females *Recommended base table for beneficiaries not in pay status at the valuation:* Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 10% for males and females For the purposes of the actuarial valuation (for funding and financial reporting), when calculating the liability for the continuance to a beneficiary of a surviving member we recommend that the General Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the member. *Current base table for beneficiaries in pay status at the valuation:* Pub-2010 Contingent Survivor Amount-Weighted Mortality Table with rates increased by 5% for males and females *Recommended base table for beneficiaries in pay status at the valuation:* Pub-2016 Contingent Survivor Amount-Weighted Above-Median Mortality Table with rates increased by 10% for males and females **Pre-retirement mortality** *Current base table:* Pub-2010 General Employee Amount-Weighted Mortality Table *Recommended base table:* Pub-2016 General Employee Amount-Weighted Above-Median Mortality Table **Mortality projection** *Current and recommended projection:* All recommended tables are projected generationally with the two-dimensional mortality improvement scale MP-2021. This is the most recent projection

Pg #	Actuarial Assumption Category	Recommendation
		scale, as an updated projection scale was not published in 2022 nor 2023. **Mortality for member contribution rates and optional forms:** Adjust the mortality rates to those developed in Section 4(A) for member contribution rates. A discussion of mortality rates for optional forms is also provided in *Section 4(A).* In selecting the version of the mortality tables in this experience study, we are recommending the above-median version to reflect the level of retirement income and salary received by the retired and active members relative to those amounts reported for use in developing the Pub-2016 mortality tables.
24	**Mortality rates – disabled:** The probability of dying at each age for disabled members. Mortality rates are used to project life expectancies.	**Disabled retirees** *Current base table:* Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table with rates decreased by 5% for males and females *Recommended base table:* Pub-2016 Non-Safety Disabled Retiree Amount-Weighted Mortality Table **Mortality projection** *Current and recommended projection:* All recommended tables are projected generationally with the two-dimensional mortality improvement scale MP-2021. This is the most recent projection scale, as an updated projection scale was not published in 2022 nor 2023.
27	**Disability incidence rates:** The probability of becoming disabled at each age.	Adjust the disability rates to those developed in *Section 4(C)*. Overall, the expected incidence of disability remains approximately the same.
30	**Termination rates:** The probability of leaving employment at each age and receiving either a refund of member contributions or a deferred vested retirement benefit.	Adjust the current termination rates to those developed in *Section 4(D)* to reflect slightly higher incidence of termination at various ages.

Pg #	Actuarial Assumption Category	Recommendation
35	**Retirement rates:** The probability of retirement at each age at which participants are eligible to retire. **Other Retirement Related Assumptions including:** • Retirement age for deferred vested members • Future reciprocal members and reciprocal salary increases • Percent married and spousal age differences for members not yet retired • Election of optional forms of benefit at retirement	For active members, adjust the current retirement rates to those developed in *Section 4(E)*. For deferred vested members, increase the assumed retirement age from 56 to 57. Increase the salary increase assumption from 3.75% to 4.00% for those deferred vested reciprocal members who elect to leave their contributions on deposit (based on expected salary increase assumptions for active members with 20 or more years of service). For active and deferred vested members, decrease the percent married at retirement assumption from 80% to 75% for males and maintain the assumption at 55% for females. Maintain the spouse age difference assumption that male retirees are three years older than their spouses and female retirees are two years younger than their spouses. Adjust the percentages of married male and female members assumed to elect the Unmodified Option, Option 2 (A/B), and Option 3 (A/B) at retirement or DROP entry.
41	**DROP Assumptions:** The probability of electing to enter DROP at each age at which participants are eligible and the duration of DROP participation.	Adjust the current DROP election rates to those developed in Section *(4)(F)*. Increase the assumption that members remain in DROP from 6 years to 7 years.

Section 1: Introduction, Summary and Recommendations

We have estimated the impact of the recommended assumption changes as if they had been applied to the June 30, 2024 actuarial valuation. The table below presents an overview of the resulting changes to employer and member contribution rates, as well as to the unfunded actuarial liability and funded ratio. More details can be found in *Section 5*, where the impacts are shown separately for the recommended merit and promotion salary scale changes (see Section 3) as well as for the recommended mortality and other demographic assumption changes (see Section 4). Although economic assumptions are discussed in a separate report, no changes are currently being proposed; therefore, no impact is shown for economic assumptions.

Cost Impact of All Recommended Assumptions (Without Considering Any Impact on Surplus Distribution) Based on June 30, 2024 Actuarial Valuation

Valuation Result	Total Estimated Impact
Average employer normal cost rate	Increase of 0.48% of payroll
Average member contribution rate	Increase of 0.42% of payroll
Actuarial accrued liability	Decrease of $6.3 million
Employer UAAL contribution rate (If less than 100% funded)	Decrease of 0.14% of payroll
Funded ratio	Increase of 0.47%

Section 2 provides some background on the basic principles and methodology used for the experience study and for the review of the economic and demographic actuarial assumptions. A detailed discussion of each assumption and reasons for the proposed changes are found in *Section 3* for the economic assumptions and *Section 4* for the demographic assumptions. The cost impact of the proposed changes is detailed in *Section 5*.

Section 2: Background and Methodology

In this report, we analyzed the demographic ("non-economic") assumptions. Our analysis of the "economic" assumptions for the June 30, 2025 valuation is provided in a separate report. Demographic assumptions include the probabilities of certain events occurring in the population of members, referred to as "decrements," e.g., termination from service, disability retirement, service retirement, DROP election, and death before and after retirement. In addition to decrements, other demographic assumptions reviewed in this study include the percentage of members with an eligible spouse, domestic partner or beneficiary, spousal age difference, merit and promotion salary increases, and election of optional forms of benefit at retirement.

Demographic assumptions

In order to determine the probability of an event occurring, we examine the "decrements" and "exposures" of that event. For example, taking termination from service, we compare the number of employees who actually terminate in a certain age and/or service category (i.e., the number of "decrements") with those who could have terminated (i.e., the number of "exposures"). So if there were 500 active employees in the 20-24 age group at the beginning of the year and 50 of them left during the year, we would say the probability of termination in that age group is 50 ÷ 500 or 10%.

The reliability of the resulting probability is highly dependent on both the number of decrements and the number of exposures. For example, if there are only a few people in a high age category at the beginning of the year (number of exposures), we would not lend as much credibility to the probability of termination developed for that age category, especially if it is out of line with the pattern shown for the other age groups. Similarly, if we are considering the death decrement, there may be a large number of exposures in the age 20-24 category, but very few decrements (actual deaths); therefore, we would not be able to rely heavily on the probability developed for that category.

One reason we use several years of experience for such a study is to have more exposures and decrements, and therefore more statistical reliability. Another reason for using several years of data is to smooth out fluctuations that may occur from one year to the next. However, we also calculate the rates on a year-to-year basis to check for any trend that may be developing in the later years.

Section 3: Economic Assumptions

A. Inflation

The inflation assumption is reviewed in a separate reported titled “Review of Economic Actuarial Assumptions for the June 30, 2025 Actuarial Valuation.”

B. Investment return

The investment return assumption is reviewed in a separate reported titled “Review of Economic Actuarial Assumptions for the June 30, 2025 Actuarial Valuation.”

C. Merit and promotion salary increases

Salary increases impact plan costs in two ways:

1. Increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and
2. Increasing total active member payroll which in turn generates lower UAAL contribution rates (if any) as a percent of payroll.

These two impacts are discussed separately below.

The System's retirement benefits are determined in large part by a member's compensation just prior to retirement or election to participate in the DROP. For that reason, it is important to anticipate salary increases that employees will receive over their careers. As an employee progresses through his or her career, increases in pay are expected to come from three sources:

1. **Inflationary increases;**
2. **Real "across-the-board" pay increases;** and
3. **Merit and promotion increases**: As the name implies, these increases come from an employee's career advancement. This form of pay increase differs from the previous two, since it is specific to the individual. We continue to recommend service-specific merit and promotion increase assumptions.

   The annual merit and promotion increases are determined by measuring the actual increases received by members over the experience period, net of the inflationary and real "across the board" pay increases. Increases are measured for all current active non-DROP and DROP members. This is accomplished by:

   a. Measuring each continuing member's actual salary increase over each year of the experience period on a salary-weighted basis, with higher weights assigned to experience from members with larger salaries;
   b. Excluding any members with increases of more than 50% or decreases of more than 10% during any particular year;
   c. Categorizing these increases into groups by years of service;
   d. Removing the wage inflation component[1] from these increases (assumed to be equal to the increase in the members' average salary during the year);
   e. Averaging these annual increases over the experience period; and
   f. Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility."

   To be consistent with the other economic assumptions, these merit and promotion assumptions should be used in combination with the total 3.00% assumed inflation and real "across-the-board" increases.

   Due to the high variability of the actual salary increases, we have analyzed this assumption using data for the past nine years. We believe that with experience from the current and

[1] The average wage inflation components from 2021-2024, 2018-2021, and 2015-2018 are 3.62%, 3.59%, and 2.19%, respectively.

prior periods, we have a more reasonable representation of potential future merit and promotion salary increases over the long term.

The following table shows the actual average merit and promotion increases by years of service over the three-year period from July 1, 2021 through June 30, 2024 along with the actual average increases based on the three-year period from the two prior experience studies (recalculated for all active non-DROP and DROP members on a salary-weighted basis). These actual increases were reduced by the actual average inflation plus "across-the-board" increase (i.e., wage inflation, estimated as the increase in average salaries) for each year during the nine-year experience period. The current and proposed assumptions are also shown.

Merit and Promotion Salary Increase Rates

Years of Service	Current Assumption	2021-2024 Actual Average	2018-2021 Actual Average	2015-2018 Actual Average	Proposed Assumption
Less than 1	8.50%	16.57%	10.88%	8.53%	10.00%
1 – 2	6.25%	9.62%	5.89%	7.75%	6.50%
2 – 3	4.75%	8.53%	5.02%	5.63%	5.50%
3 – 4	4.25%	7.66%	4.70%	5.10%	5.00%
4 – 5	3.50%	6.56%	4.46%	4.45%	4.00%
5 – 6	2.50%	6.07%	3.08%	4.83%	3.00%
6 – 7	1.75%	4.90%	1.90%	3.24%	2.25%
7 – 8	1.50%	5.07%	1.86%	3.27%	2.25%
8 – 9	1.50%	3.80%	3.75%	4.43%	2.25%
9 – 10	1.50%	6.51%	2.61%	2.57%	2.25%
10 – 11	1.25%	4.48%	3.16%	2.25%	1.75%
11 – 12	1.25%	5.74%	1.02%	2.99%	1.75%
12 – 13	1.25%	4.41%	1.01%	3.01%	1.75%
13 – 14	1.25%	3.18%	1.51%	2.23%	1.75%
14 – 15	1.25%	3.45%	2.14%	2.99%	1.75%
15 – 16	1.00%	3.87%	2.34%	2.42%	1.50%
16 – 17	1.00%	3.81%	1.57%	2.84%	1.50%
17 – 18	1.00%	2.82%	1.01%	2.52%	1.50%
18 – 19	1.00%	4.49%	1.00%	1.79%	1.50%
19 – 20	1.00%	4.11%	1.19%	1.91%	1.50%
20 and over	0.75%	2.96%	1.12%	1.69%	1.00%

Chart 1 compares the actual merit and promotion increase experience with the current and proposed assumptions. The chart also shows the actual merit and promotion increases based on averages over the current three-year period as well as over a nine-year period, including the previous two three-year experience periods. This is discussed on the next page.

Section 3: Economic Assumptions

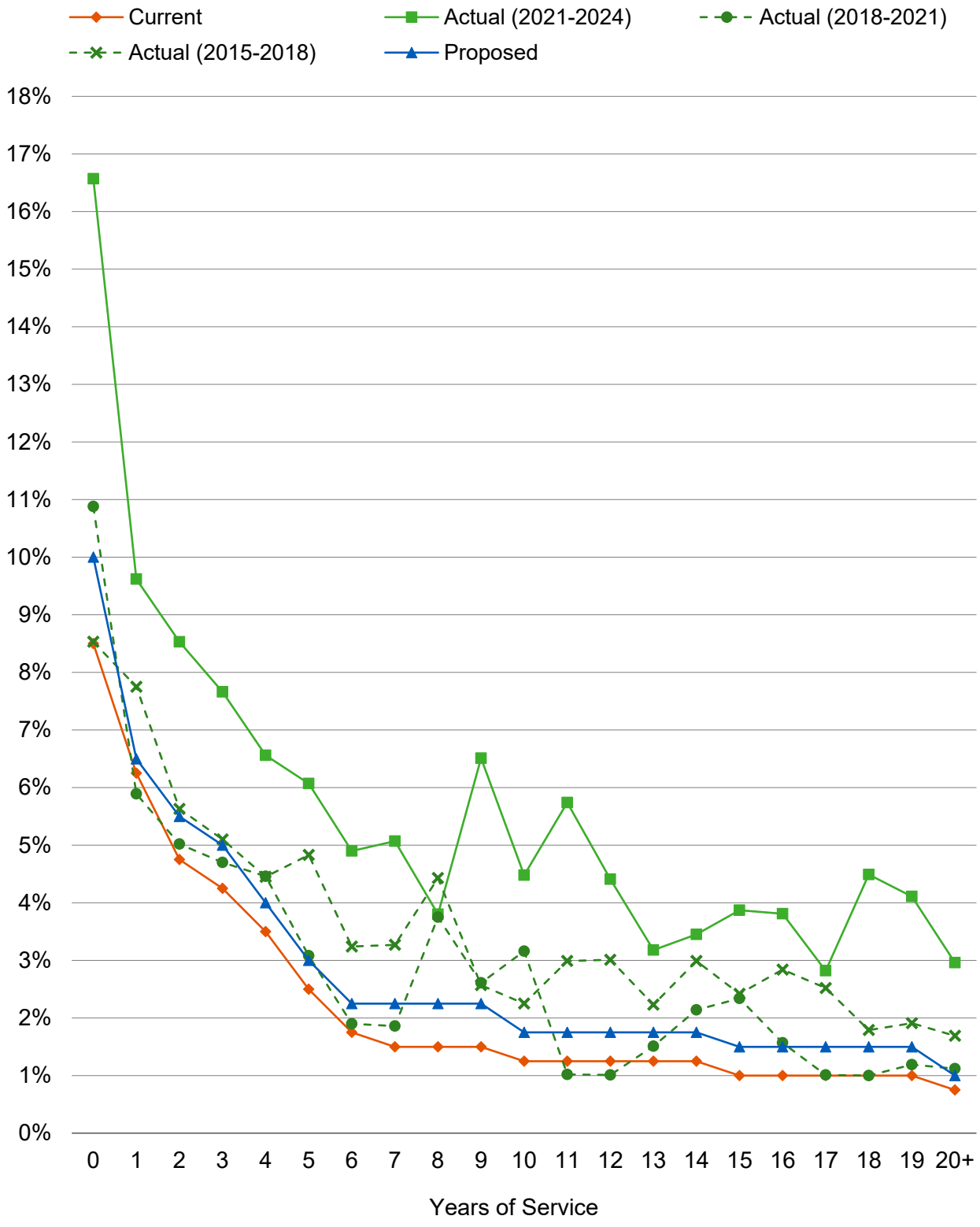
The System has experienced a mix of salary gains and losses over the past nine valuations, meaning that actual salary increases have been both lower and higher than assumed in various years.

In proposing changes, we considered whether the experience has shown a consistent trend, either toward gains or losses, within specific service bands. For example, for members with less than one year of service, our current assumption of 8.50% has understated actual experience across each of the 3-year averages. We are recommending a change to 10.00% taking into consideration the actual experience during 2018-2021 (of 10.88%) and the lower actual experience during 2015-2018 (of 8.53%).

Based on experience over the last nine years, **we are recommending increases in the merit and promotion salary increases for most service bands.** We will continue to monitor this experience to determine if further increases are warranted.

Section 3: Economic Assumptions

Chart 1: Merit and Promotion Salary Increase Rates



Section 4: Demographic Assumptions

A. Mortality rates – healthy

The "healthy" mortality rates project the life expectancy of a member who retires from service (i.e., did not retire on a disability pension). Similarly, the "healthy" pre-retirement (employee) mortality rates project the likelihood a member will live to retirement.

In 2019, the Retirement Plans Experience Committee (RPEC) of the SOA published the first family of mortality tables based exclusively on public sector pension plan experience in the United States referred to as the Pub-2010 Public Retirement Plans Mortality Tables (Pub-2010). In January 2025, RPEC released an exposure draft of updated mortality experience for public retirement plans, referred to as the Pub-2016 Public Retirement Plans Mortality Tables (Pub-2016)[1], which has recently been formally approved by the SOA. **For this experience study, we are recommending a switch from the Pub-2010 mortality tables to the recently updated Pub-2016 mortality tables for all mortality related assumptions.**

Within the Pub-2010 and Pub-2016 families of mortality tables, separate sets are provided by job category: General, Safety, and Teachers. Each job category includes tables developed using the full dataset, and in some cases subsets for below-median and above-median income groups based on benefit amounts for retirees and salary levels for employees. In addition to the tables themselves, the accompanying RPEC analysis continues to find that benefit amounts and salaries are the most significant predictors of mortality differences within each category. Accordingly, the Pub-2010 and Pub-2016 tables also include "amount-weighted" versions, where greater statistical weight is assigned to experience from annuitants and employees with higher benefit amounts and salaries. This approach supports more credible mortality estimates when applying the tables to valuation populations.

In the prior experience study, we adopted mortality assumptions based on the total dataset versions of the Pub-2010 tables. However, after comparing the System's current average salaries and retirement benefits to the study population underlying the Pub-2016 tables, we found closer alignment with the 75th percentile values, which represent the median of the above-median subgroup. In contrast, in prior studies, when comparing the System's then average salaries and retirement benefits to the study population underlying the Pub-2010 tables, we found a relatively closer alignment with the 50th percentile values, i.e. the median of the total group. As a result, **we are recommending the use of the amount-weighted tables from the Pub-2016 family, including the above-median versions where available, with adjustments to reflect the System's own experience as described elsewhere in this report.**

In addition to selecting appropriate base tables, we continue to recommend the use of generational mortality, which applies projected improvements in mortality for each future year. For example, a participant reaching age 65 next year is expected to have slightly lower mortality

[1] The Pub-2016 family of mortality tables have been developed without experience from the COVID-19 pandemic.

than someone reaching the same age this year. This approach reflects anticipated improvements in life expectancy over time and is now a standard practice in actuarial valuations.

RPEC periodically publishes updated mortality improvement scales. The most recent available as of the date of this report is the two-dimensional MP-2021 improvement scale.[1] **We recommend continuing to use the MP-2021 scale and applying it generationally so that each future year has its own table reflecting projected improvements.**

To incorporate more of the System's experience in our analysis, we used a 15-year period of mortality data. This includes data from the current experience study period (July 1, 2021 through June 30, 2024) as well as the four prior study periods: July 1, 2018 through June 30, 2021; July 1, 2015 through June 30, 2018; July 1, 2012 through June 30, 2015; and July 1, 2009 through June 30, 2012.

Even with fifteen years of experience, the data remains only partially credible, particularly under the recommended amount-weighted approach, which accounts for the wide range of retiree benefit amounts. In 2008, the Society of Actuaries published guidance recommending that mortality assumptions be adjusted for credibility. Under this approach, full credibility for a headcount-weighted mortality table requires just over 1,000 deaths[2], which corresponds to a 90% confidence level that actual experience will fall within 5% of the expected value.

For the System, the number of actual deaths differs for each cohort and varies from 9 deaths for active females to 476 deaths for healthy retiree males over the 15-year study period. In our recommended assumptions, we have adjusted the Pub-2016 mortality tables to fit the System's experience based on the partial credibility for each cohort.

Post-retirement mortality (service retirements)

The current mortality table used for post-retirement mortality is the Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected generationally with the two-dimensional mortality improvement scale MP-2021.

The following table shows the observed benefit-weighted deaths for heathy retired members based on the actual experience during the 15-year period. Also shown are the expected benefit-weighted deaths under the current and proposed assumptions. This information is shown separately by gender.

As discussed, we continue to recommend the use of a generational mortality table, which incorporates a more explicit assumption for future mortality improvement. Accordingly, the goal is to start with a mortality table that closely matches the current experience (without a margin for future mortality improvement), and then reflect mortality improvement by projecting lower

[1] We understand that RPEC generally publishes an update to their mortality improvement scale annually based on the newest available mortality data. However, the mortality data observed during 2020 was severely impacted by the COVID-19 pandemic, and RPEC elected not to release a new mortality improvement scale for 2022, 2023, or 2024 that would have incorporated the substantially higher mortality observed in 2020. Therefore, MP-2021 remains the most recently published mortality improvement scale.

[2] The number of deaths needed for full credibility for an "amount" weighted mortality table is generally higher and based on the dispersion of the benefit amount for a given retiree group.

mortality rates in future years. As shown in the table below, the proposed mortality tables have an actual to expected ratio of 106% after adjustments for partial credibility. In future years the ratios should remain around these levels as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

Healthy Retiree Mortality Experience – Benefit Weighted

($ in thousands)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$1,100.7	$1,127.2	$1,074.0
Female	210.7	239.8	215.5
Total	**$1,311.4**	**$1,367.0**	**$1,289.5**
Actual / Expected	**104%**		**106%[1]**

Notes:

1. Experience shown above is weighted by annual benefit amounts for deceased members.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

Based on standard statistical theory, the data used in our analysis is only partially credible under the recommended "amount-weighted" basis when dispersion of retirees' benefit amounts is considered. Therefore, the proposed mortality tables reflect only a partial adjustment for the actual System's experience.

We recommend updating the mortality tables used for post-retirement mortality to the Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 2 compares the actual to expected deaths on an amount-weighted basis for service retirement members over the 15-year period for the current and proposed assumptions.

Chart 3 shows the life expectancies (i.e., expected future lifetime) under the current and proposed tables for service retirement members on an amount-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age in 2025. In practice, assumed life expectancies will increase in accordance with the mortality improvement scale.

[1] If we used the benchmark Pub-2016 General Healthy Retiree table without any adjustment, the proposed actual to expected ratio would be 117%.

Beneficiary mortality

The current mortality tables used for beneficiary mortality is as follows:

- **Beneficiaries not in pay status as of valuation:** Pub-2010 General Healthy Retiree Amount-Weighted Table (separate tables for males and females) with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Beneficiaries in pay status as of valuation:** Pub-2010 Contingent Survivor Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

The Pub-2016 Contingent Survivor mortality tables (as well as the Pub-2010 Contingent Survivor mortality tables) are developed based only on beneficiary data **after** the death of the member. This is consistent with the data that we have available for the System's beneficiaries and we have confirmed that the Pub-2016 Contingent Survivor mortality rates are comparable to System's actual mortality experience for beneficiaries.

Because the Contingent Survivor mortality tables reflect beneficiary mortality experience only **after** the death of the member, in the prior study we recommended the use of two separate mortality tables for beneficiaries, based on the pay status of the beneficiary. In particular, we recommended that the General Healthy Retiree mortality tables be used for beneficiary mortality (both before and after the expected death of the member) when calculating the liability for the continuance to a beneficiary of a surviving member. Upon the actual death of the member (i.e., for all beneficiaries in pay status as of the valuation date), we recommended that the Contingent Survivor mortality tables, adjusted for System experience, be used. We note that the use of different mortality tables (before and after the death of the member) has been found by the RPEC to be reasonable.

The following table shows the observed benefit-weighted deaths for beneficiaries based on the actual experience during the 15 years studied. Also shown are the expected benefit-weighted deaths under the current and proposed assumptions. This information is shown separately by gender. As shown in the table below, the proposed mortality table has an actual to expected ratio of 104% after adjustments for partial credibility. In future years the ratios should remain around these levels as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

Beneficiary Mortality Experience – Benefit Weighted
($ in thousands)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$14.4	$10.9	$15.6
Female	353.3	392.5	371.6
Total	**$367.7**	**$403.5**	**$387.2**
Actual / Expected	**110%**		**104%[1]**

Notes:

1. Experience shown above is weighted by annual benefit amounts for deceased beneficiaries.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

The proposed mortality table reflects current experience to the extent that the experience is credible based on standard statistical theory. For the System, there is less data available for beneficiaries, so we have combined the beneficiary data for the Employees and Fire and Police Systems so that the data could be given slightly more credibility.

We recommend updating the mortality table used for beneficiary mortality to the following:

- **Beneficiaries not in pay status as of valuation:** Pub-2016 General Healthy Retiree Amount-Weighted Above Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Beneficiaries in pay status as of valuation:** Pub-2016 Contingent Survivor Amount-Weighted Above Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

As noted above, we continued to recommend the use of separate mortality tables for beneficiaries before and after the **actual** death of the member.

[1] If we used the benchmark Pub-2016 Contingent Survivor table without any adjustment, the proposed actual to expected ratio would be 115%.

Pre-retirement mortality

The current mortality tables used for pre-retirement mortality is the Pub-2010 General Employee Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021. We have observed that there have only been a total of 47 pre-retirement deaths in the System over the 15-year study period, and therefore there is not enough data to perform a credible analysis.

We recommend updating the mortality tables used for pre-retirement mortality to the Pub-2016 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Mortality table for member contributions and optional forms of payment

There are administrative reasons why a generational mortality table is more difficult to implement for determining member contributions and optional forms of payment.

For determining member contributions, one emerging practice is to approximate the use of a generational mortality table by the use of a static table with projection of the mortality improvement from the measurement year over a period that is close to the duration of the benefit payments for active members. However, for determining optional forms of payment, based on preliminary discussions we have with the System staff and the vendor maintaining the pension administration System, we may not have any issues implementing the generational mortality table.

We recommend updating the mortality tables used for determining member contributions to the Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected 30 years (from 2016) with the two-dimensional mortality improvement scale MP-2021, weighted 65% male and 35% female for the member, and the Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected 30 years (from 2016) with the two-dimensional mortality improvement scale MP-2021, weighted 35% male and 65% female for the beneficiary.

We will continue to have discussions with the System and its vendor following the Board's adoption of the assumptions recommended in this study before we finalize the recommended assumptions for use in in determining the optional forms of payment.

Chart 2: Post-Retirement Benefit-Weighted Deaths ($ in thousands)

Non Disabled Members (June 30, 2009 through June 30, 2024)

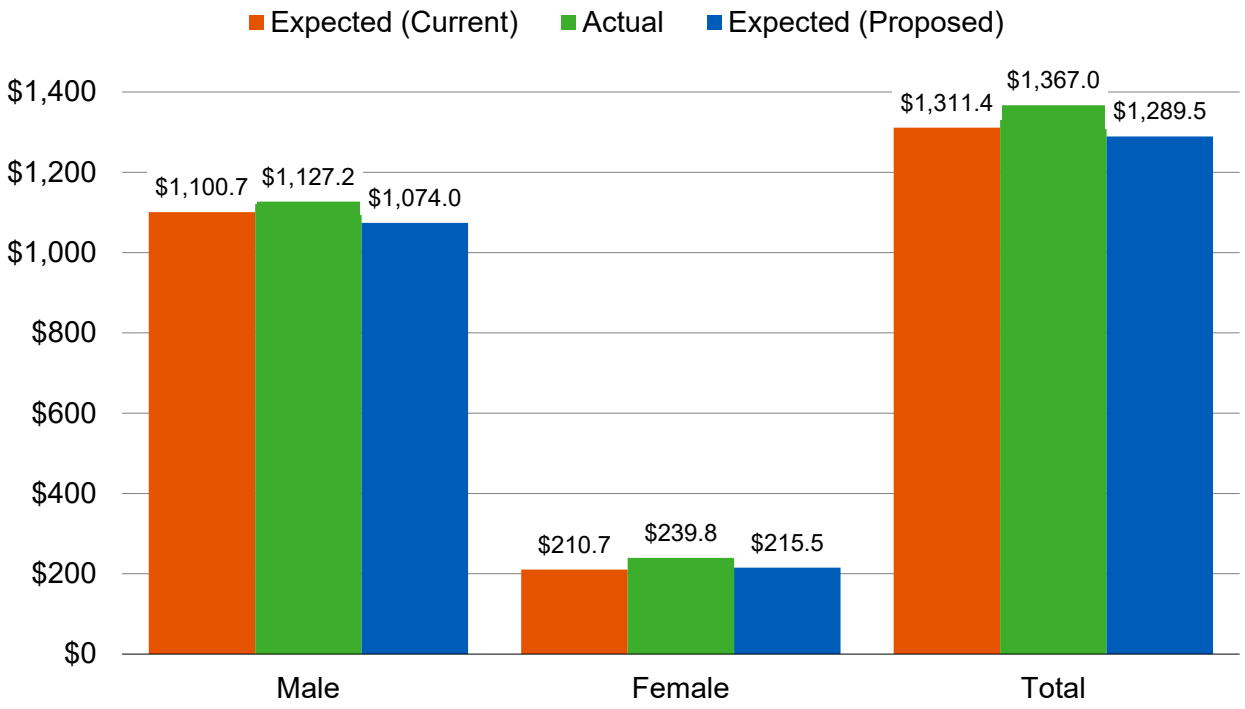
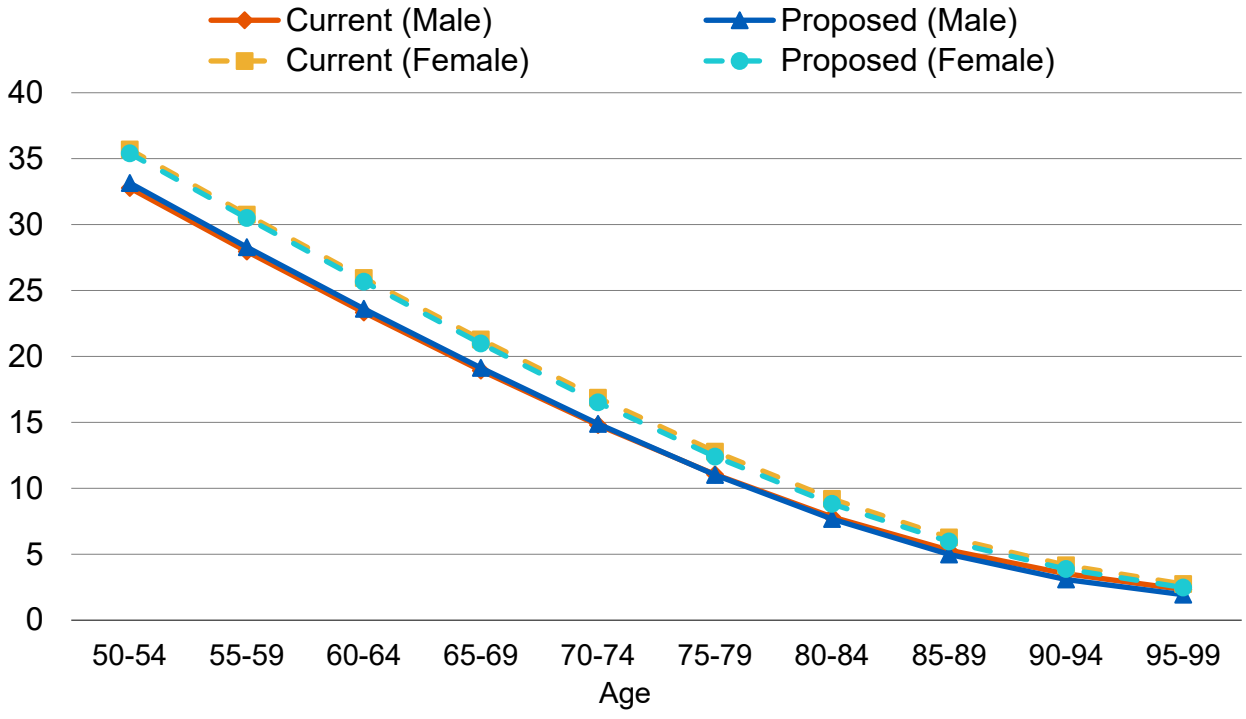


Chart 3: Benefit-Weighted Life Expectancies for Age in 2025

Non-Disabled Members



B. Mortality rates – disabled

Since mortality rates for disabled members can vary from those of healthy members, a different mortality assumption is often used.

The current mortality table used for disabled mortality is the Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates decreased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

The following table shows the observed benefit-weighted deaths for disability retired members based on the actual experience during the 15 years studied. Also shown are the expected benefit-weighted deaths under the current and proposed assumptions. This information is shown separately by gender.

The proposed mortality tables have an actual to expected ratio of 94%, after adjustments for partial credibility. In future years the ratios should remain around these levels as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

Disabled Retiree Mortality Experience – Benefit Weighted
($ in thousands)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$120.9	$103.8	$109.7
Female	10.5	7.4	9.3
Total	**$131.4**	**$111.2**	**$118.9**
Actual / Expected	**85%**		**94%**

Notes:

1. Experience shown above is weighted by annual benefit amounts for deceased members.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

Similar to mortality rates for service retirees, the proposed mortality tables reflect current experience to the extent that the experience is credible based on standard statistical theory. For the System, there is less data available for disabled retirees, so it is given little credibility and the proposed tables are only slightly adjusted.

We recommend updating the mortality tables used for disabled mortality to the Pub-2016 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males

and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 4 compares the actual to expected deaths on an amount-weighted basis for disabled members over the 15-year period for the current and proposed assumptions.

Chart 5 shows the life expectancies (i.e., expected future lifetime) under the current and proposed tables for disabled members on an amount-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age in 2025. In practice, assumed life expectancies will increase in accordance with the mortality improvement scale.

Chart 4: Post-Retirement Benefit-Weighted Deaths ($ in thousands)

Disabled Members (July 1, 2009 through June 30, 2024)

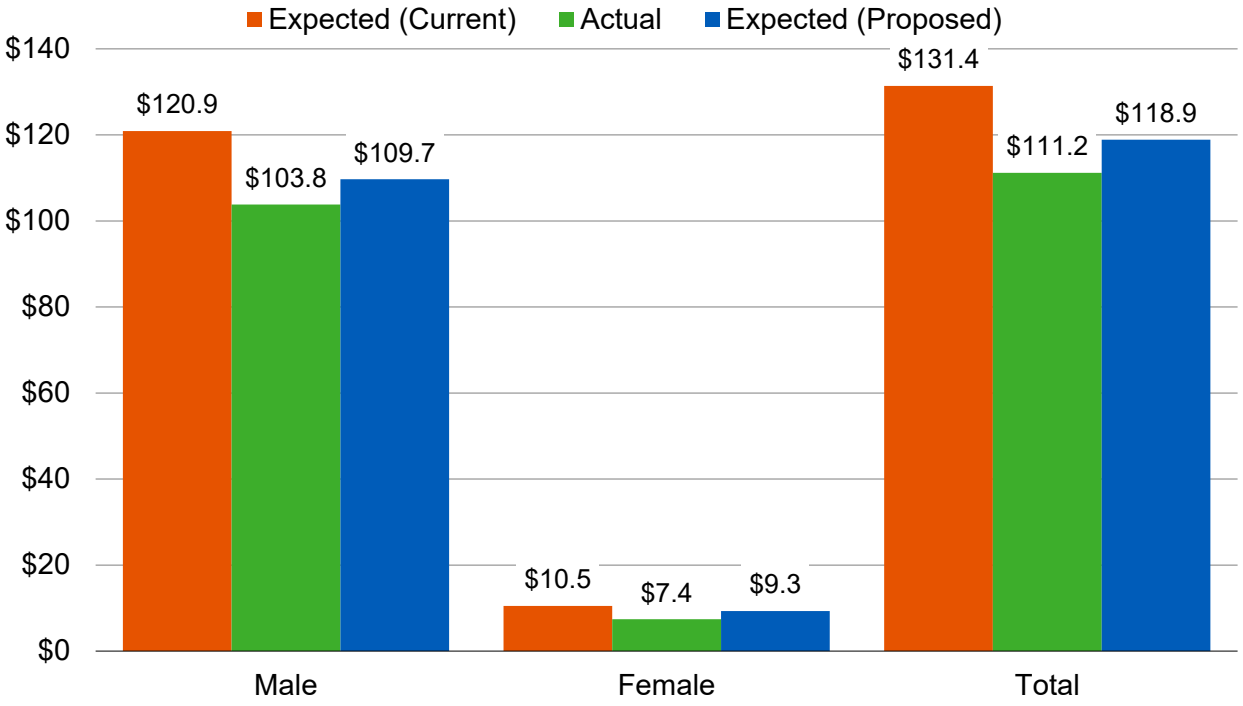
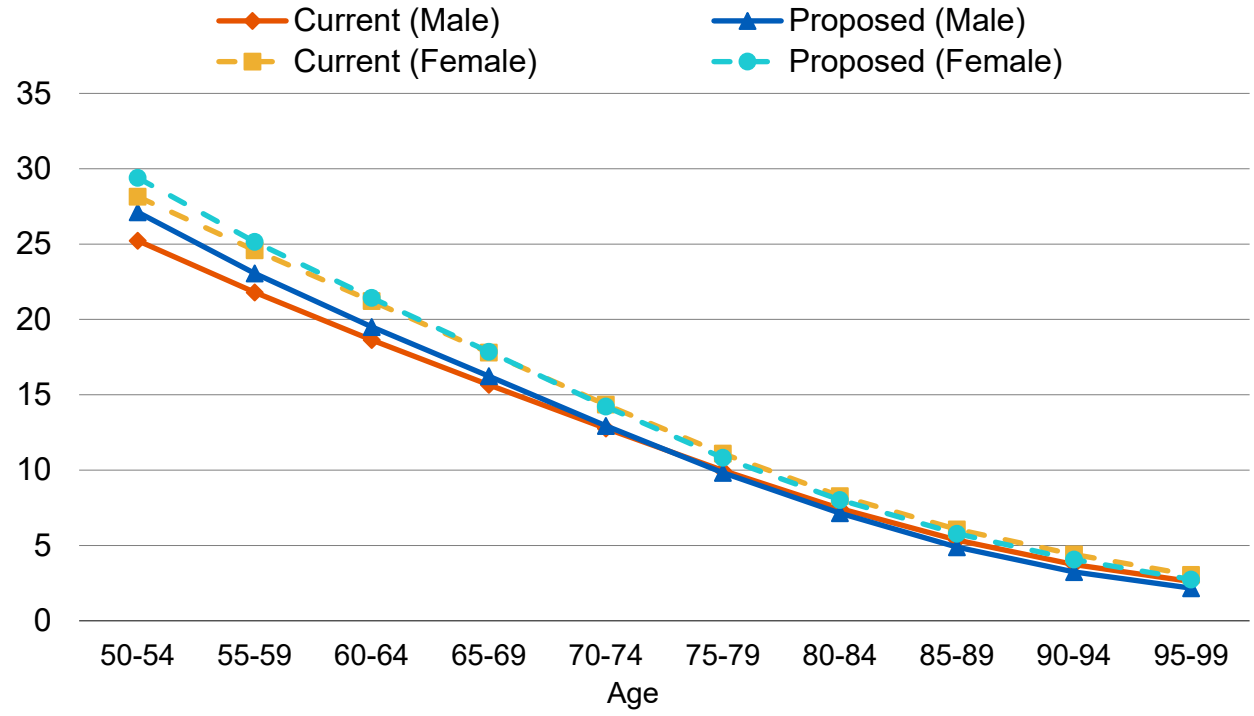


Chart 5: Benefit-Weighted Life Expectancies for Age in 2025

Disabled Members



C. Disability incidence rates

When a member becomes disabled, he or she may be entitled to a pension that may not depend on the member's years of service. We have determined the rates of disability incidence by comparing by age the actual disability incidence to the number of actives who could have become disabled, excluding actives who have not yet met the eligibility requirement of ten years of service, since these members would either receive a refund of contributions or a deferred service retirement benefit.

The following summarizes the actual incidence of disabilities over the past three years compared to the current and proposed assumptions for disability incidence:

Disability Incidence Rates (%)

Age	Current Rate	Actual Rate	Proposed Rate
20 – 24	0.00	Not observed	0.00
25 – 29	0.00	Not observed	0.00
30 – 34	0.00	0.00	0.00
35 – 39	0.30	0.00	0.20
40 – 44	0.30	0.00	0.20
45 – 49	0.30	0.29	0.30
50 – 54	0.70	0.23	0.50
55 – 59	1.20	1.31	1.30
60 – 64	3.10	3.43	3.10
65 – 69	3.10	2.41	3.10
70 and over	7.00	5.56	6.30

Based upon the recent experience, we have increased the rates at some ages while decreasing rates at other ages. Overall, the expected incidence of disability remains approximately the same.

In preparing both our current and prior experience studies, we have included some members who transitioned from vested terminated or service retired status to disability retirement, even if their official disability dates fall outside the three-year study period. This approach is intended to account for delays in the processing and approval of disability retirement applications.

To reasonably reflect this timing lag, we begin by considering all such disability retirements (i.e. all those appearing in the data as disabled for the first time after a prior vested terminated or service retired status). We then exclude a portion based on assumed delays of one, two, or three years between the onset of disability and the final approval. The table below summarizes the number of cases that would be excluded under each of these assumptions.

Section 4: Demographic Assumptions

Number of Members to be Excluded

One-Year Lag (With Date of Retirement prior to July 1, 2020)	Two-Year Lag (With Date of Retirement prior to July 1, 2019)	Three-Year Lag (With Date of Retirement prior to July 1, 2018)
8	5	3

We believe it is prudent to continue assuming a two-year lag in the disability application process, pending the availability of additional data in future experience studies. Accordingly, we have adjusted the reported incidence of disability over the three-year study period by excluding only those cases with official disability dates prior to July 1, 2019, which is two years before the start of the study period. This results in a reduction of 5 cases from the actual disability retirements reported to us.

Chart 6 compares actual to expected disabilities for over the past three years for the current and proposed assumptions.

Chart 7 shows the actual disability incidence rates over the past three years compared to the current and proposed assumptions.

Section 4: Demographic Assumptions

Chart 6: Actual Number of Disability Retirements Compared to Expected

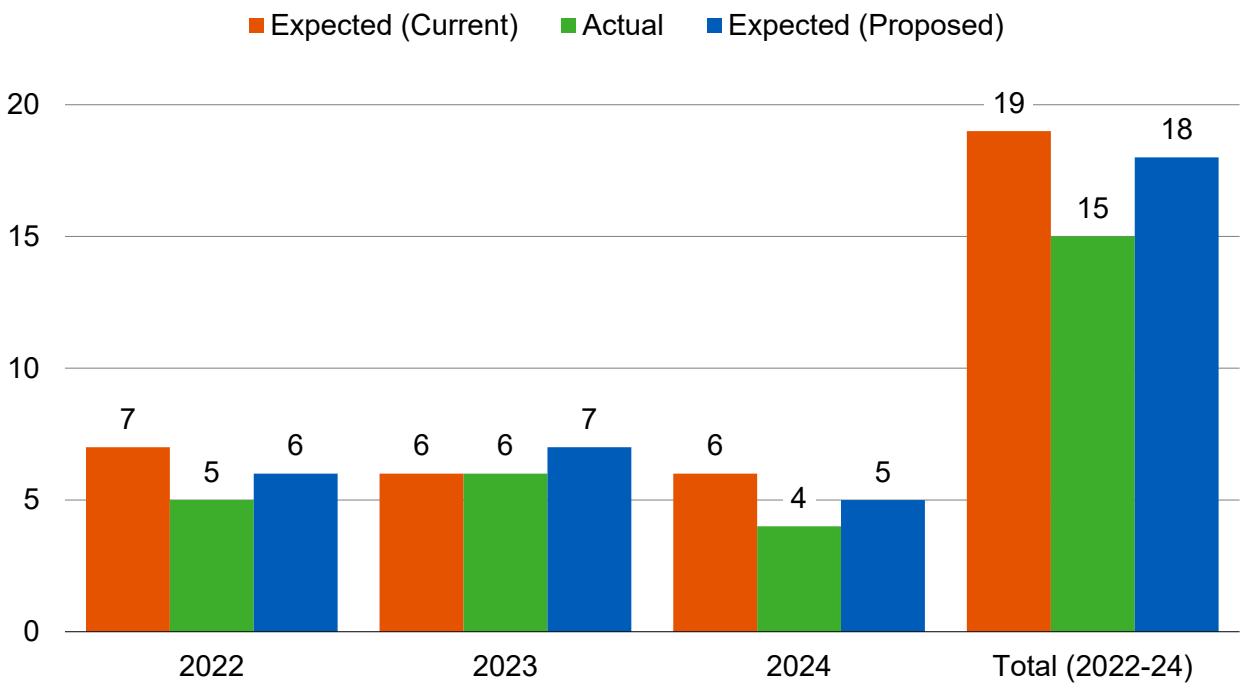
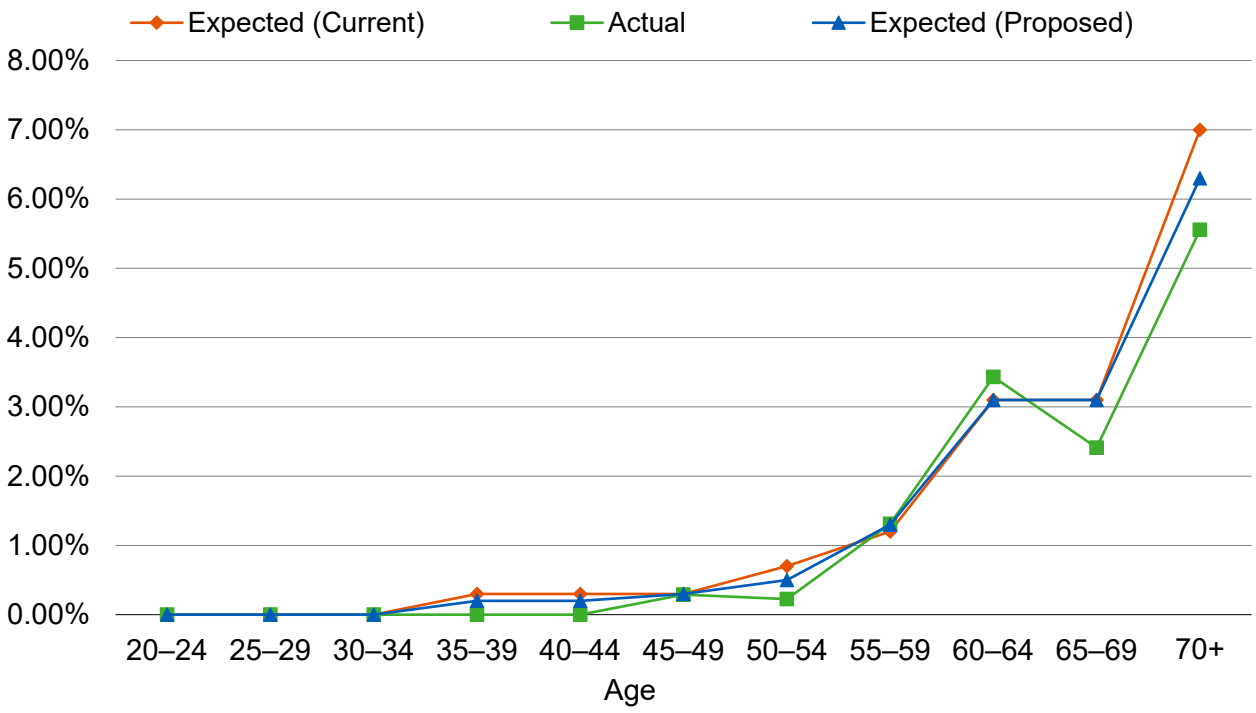


Chart 7: Disability Incidence Rates



D. Termination rates

Termination rates include all terminations for reasons other than death, disability, or retirement. Under the current assumptions there is an overall incidence of termination assumed, combined with a separate assumption for the percent of members who would elect to withdraw their contributions (ordinary withdrawal) versus a deferred retirement benefit (vested termination). **With this study, we continue to recommend that this same assumption structure be used.**

Currently, the assumed termination rates are a function of both a member's age and service for members with fewer than five years of service, and a function of a member's age for members with five or more years of service. We continue to believe that termination rates correlate better with age and service for members with fewer than five years of service and correlate well with age for members with five or more years of service.

The current termination rates, termination experience (total) over the last three years, and proposed termination rates are shown in the following tables. Please note that we have excluded any members that were eligible for retirement.

Current Rates of Termination (%)

Age	0 – 1 Years of Service	1 – 2 Years of Service	2 – 3 Years of Service	3 – 4 Years of Service	4 – 5 Years of Service	5+ Years of Service
20 – 24	15.00	15.00	13.00	12.00	12.00	12.00
25 – 29	13.00	10.00	10.00	10.00	10.00	8.00
30 – 34	13.00	8.00	7.00	7.00	6.00	6.00
35 – 39	13.00	7.00	6.00	6.00	5.00	5.00
40 – 44	13.00	6.00	5.00	5.00	3.00	3.00
45 – 50	13.00	6.00	5.00	5.00	3.00	3.00
50+	13.00	6.00	5.00	5.00	3.00	Not Calculated

Actual Rates of Termination (%)

Age	0 – 1 Years of Service	1 – 2 Years of Service	2 – 3 Years of Service	3 – 4 Years of Service	4 – 5 Years of Service	5+ Years of Service
20 – 24	18.18	12.00	57.14	0.00	33.33	Not Observed
25 – 29	16.67	14.66	13.89	4.00	8.33	16.00
30 – 34	16.28	9.60	9.85	8.80	8.26	6.13
35 – 39	13.89	10.06	5.36	9.57	4.51	4.61
40 – 44	19.86	8.33	11.46	1.14	6.90	4.74
45 – 50	10.00	3.64	11.11	1.89	2.67	3.04
50+	17.35	2.27	4.00	5.56	0.00	Not Observed

Section 4: Demographic Assumptions

Proposed Rates of Termination (%)

Age	0 – 1 Years of Service	1 – 2 Years of Service	2 – 3 Years of Service	3 – 4 Years of Service	4 – 5 Years of Service	5+ Years of Service
20 – 24	17.00	15.00	14.00	12.00	12.00	12.00
25 – 29	15.00	11.00	11.00	9.00	8.00	9.00
30 – 34	15.00	9.00	8.00	7.00	7.00	6.00
35 – 39	14.00	8.00	6.00	6.00	5.00	5.00
40 – 44	14.00	7.00	6.00	5.00	4.00	4.00
45 – 50	13.00	6.00	6.00	5.00	3.00	3.00
50+	13.00	5.00	5.00	5.00	2.00	Not Calculated

It is important to note that not every age and service category has enough exposures and/or decrements to make the results in that category statistically credible.

We will also continue to assume that termination rates are zero at any age where members are eligible to retire. In other words, at those ages, members will either retire in accordance with the retirement rate assumptions or continue working, rather than terminate and defer their benefit. This mainly applies at the highest age categories since most members in those categories are eligible to retire and so have been excluded from our review of this experience.

We have adjusted the termination rates at certain years of service and ages. Overall, the termination rates have increased slightly.

In addition, when a Tier 2 member terminates employment before retirement, they have two options regarding their accumulated contributions. They may elect to receive an immediate refund of their employee contributions, or they may leave their contributions on deposit with the System in order to receive a deferred vested benefit when they reach eligibility for retirement. The assumption about which path members are likely to take can have a meaningful impact on projected plan liabilities, particularly for members with longer service. The current refund rate assumptions, observed refund behavior over the last three years, and proposed refund rate assumptions are shown in the table below.

For members with fewer than five years of service, we recommend a modest reduction in the assumed refund rate from 90.0% to 80.0%.

For members with five or more years of service, we recommend a modest reduction in the assumed refund rate from 40.0% to 35.0%.

Section 4: Demographic Assumptions

Proportion of Total Termination Assumed to Receive Refunds (%)

Years of Service	Current Rate	Actual Rate	Proposed Rate
0 – 4	90.0	79.5	85.0
5 or more	40.0	26.7	35.0

Chart 8 compares actual to expected terminations over the past three years for both the current and proposed assumptions.

Chart 9 shows the average by years of service of actual termination rates over the past three years compared to the current and proposed assumptions.

Chart 10 shows the average by age of actual termination rates over the past three years compared to the current and proposed assumptions.

Chart 8: Actual Number of Terminations
Compared to Expected

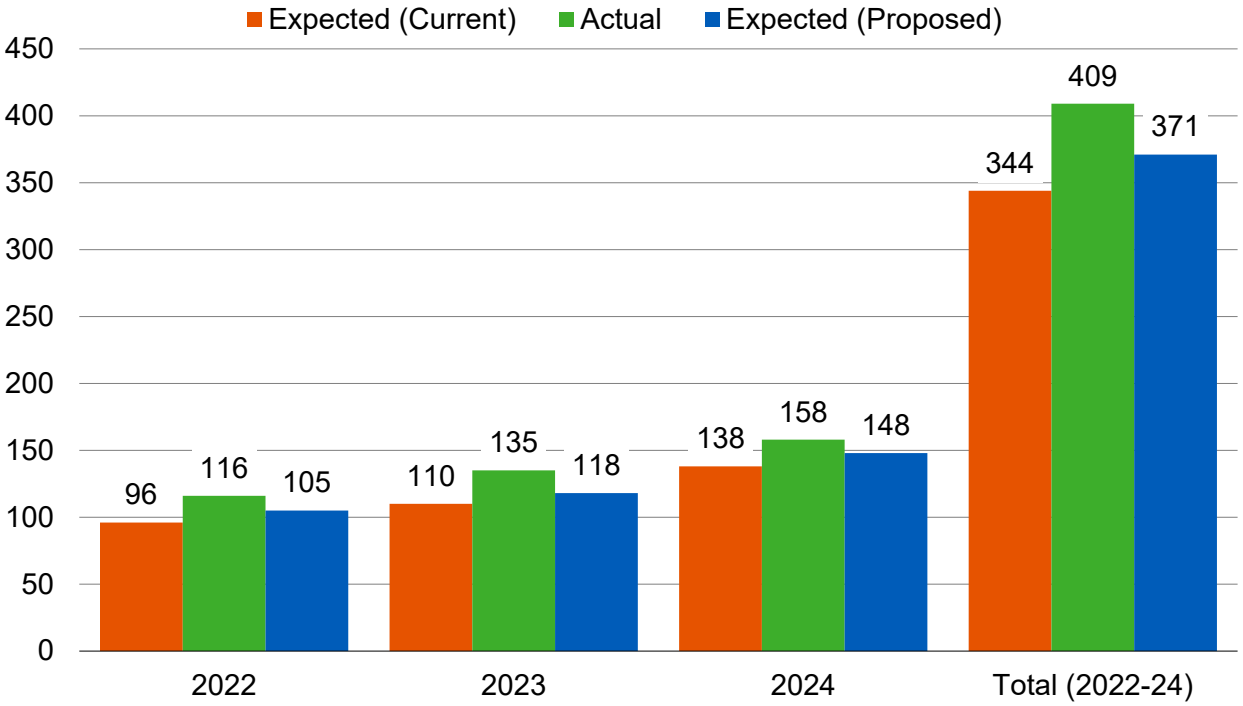


Chart 9: Average Termination Rates
By Years of Service

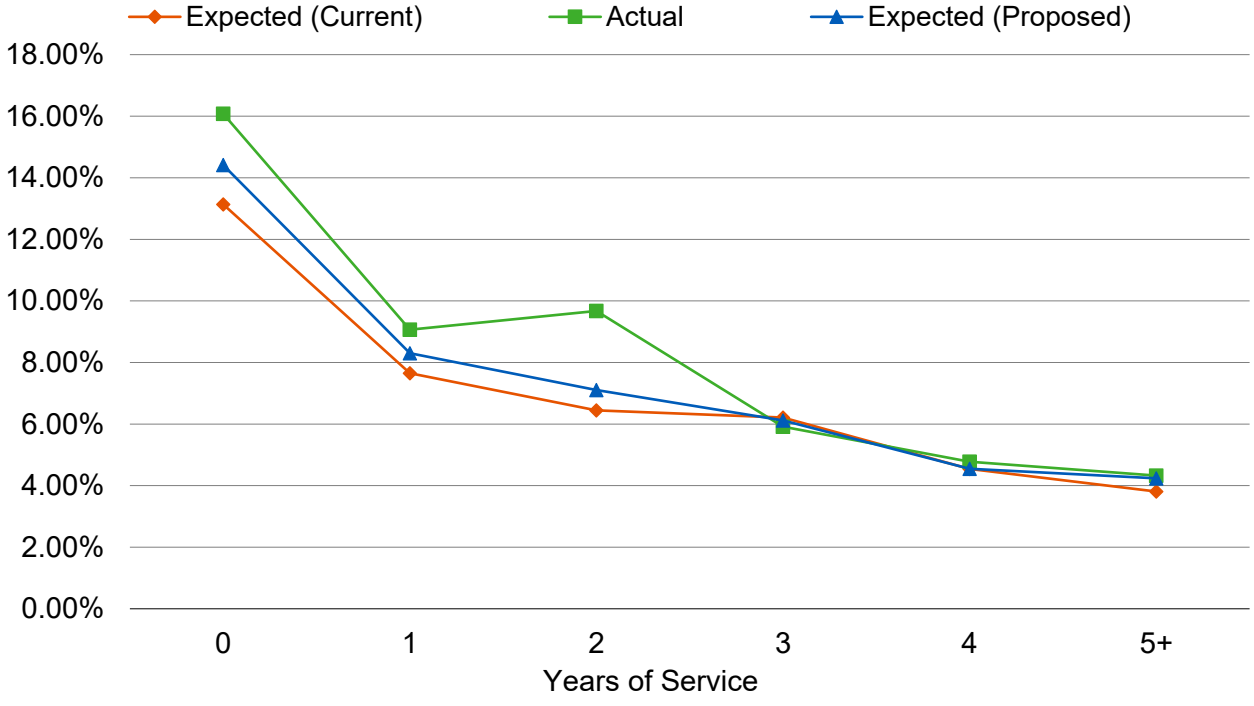
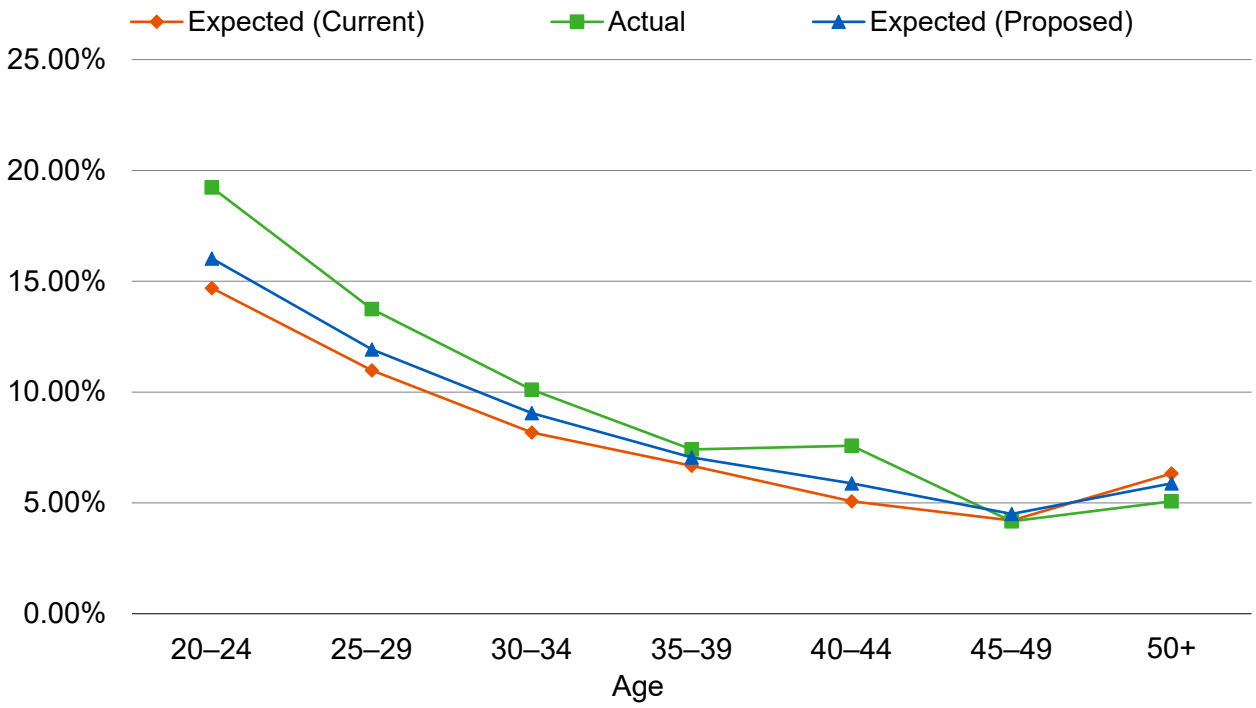


Chart 10: Average Termination Rates
By Age



E. Retirement rates

The age at which a member retires from service (i.e., who did not retire on a disability pension) will affect both the amount of the benefits that will be paid to that member as well as the period over which funding must take place.

Currently, the assumed retirement rates are a function of only member's age. Our experience review analyzed recent years' retirement experience both as a function of age and years of service in relation to the probability of retirement. Our review concludes that the retirement rates correlate with age but less so with years of service. Therefore, we continue to recommend that retirement rates continue to be structured as a function age only.

The table on the following page shows the observed service retirement rates based on the actual experience over the past three years. The observed service retirement rates were determined by comparing those members who actually retired from service to those eligible to retire from service. Also shown are the current rates assumed and the rates we propose.

Consistent with the prior experience study, for actives over age 55, the actual retirement experience was only a reflection of those members who never elected to participate in the DROP. However, effective January 28, 2008, actives may retire or participate in the DROP as early as age 50 with an actuarially reduced early retirement benefit.

Consistent with the prior experience study, we are excluding experience for actives who elected the DROP before age 55 when setting the retirement rates for members between 50 and 54. This is because, unlike with retirement rates, we found a significant relationship between DROP election rates and years of service, and believe this experience is better reflected by the age and service-based rate structure we are proposing for DROP elections discussed later in this report.

Section 4: Demographic Assumptions

Retirement Rates (%)

Age	Current Rate	Actual Rate	Proposed Rate
50	1.00	1.67	1.00
51	1.00	0.00	1.00
52	1.75	1.68	1.75
53	1.75	1.69	1.75
54	1.75	0.78	1.75
55	4.50	10.48	4.50
56	3.00	3.66	3.00
57	3.00	7.94	3.00
58	4.00	0.00	4.00
59	4.00	1.16	4.00
60	5.50	3.85	5.50
61	5.50	7.69	5.50
62	10.00	14.75	10.00
63	9.00	4.08	9.00
64	15.00	12.24	15.00
65	20.00	7.50	20.00
66	25.00	15.63	25.00
67	25.00	24.00	25.00
68	25.00	20.83	25.00
69	30.00	33.33	30.00
70	60.00	12.50	40.00
71	60.00	66.67	40.00
72	60.00	50.00	40.00
73	60.00	0.00	40.00
74	60.00	100.00	40.00
75 and over	100.00	28.57	100.00

As shown above, we are recommending decreases in the retirement rates at certain ages.

Chart 11 on the following page compares actual to expected retirements over the past three years for both the current and proposed assumptions.

Chart 12 on the following page compares actual experience with the current and proposed rates of retirement.

Chart 11: Actual Number of Retirements
Compared to Expected

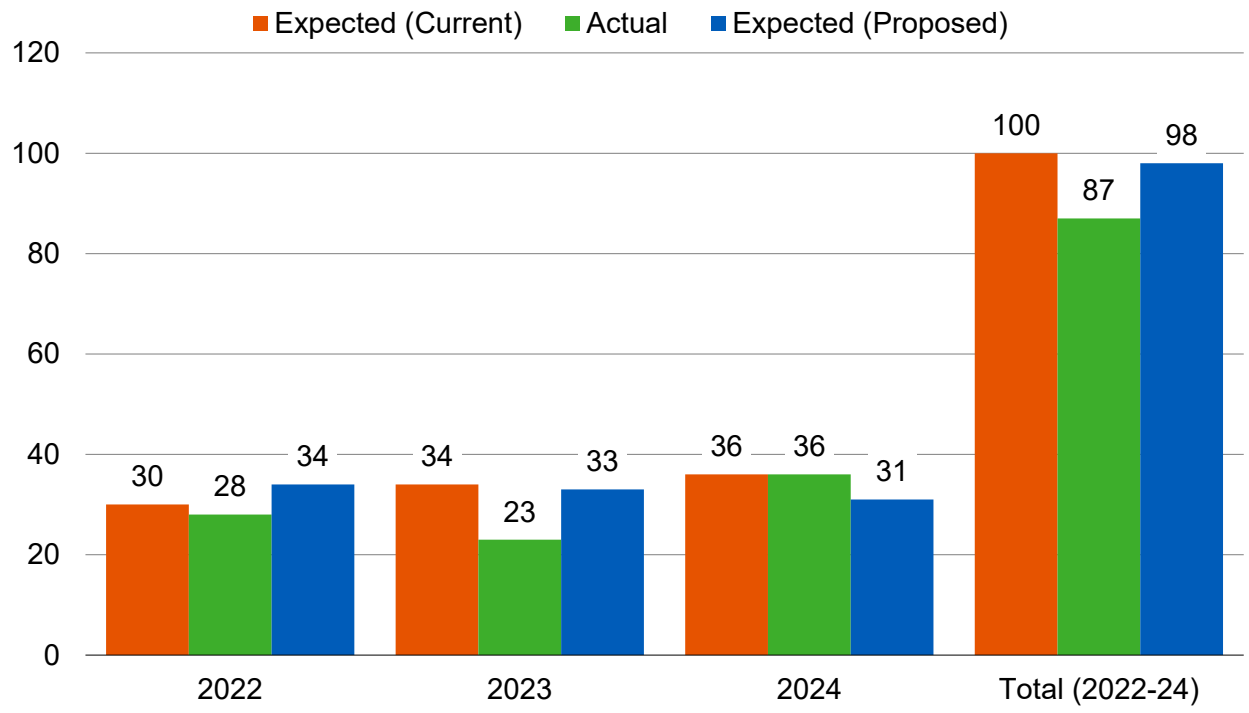
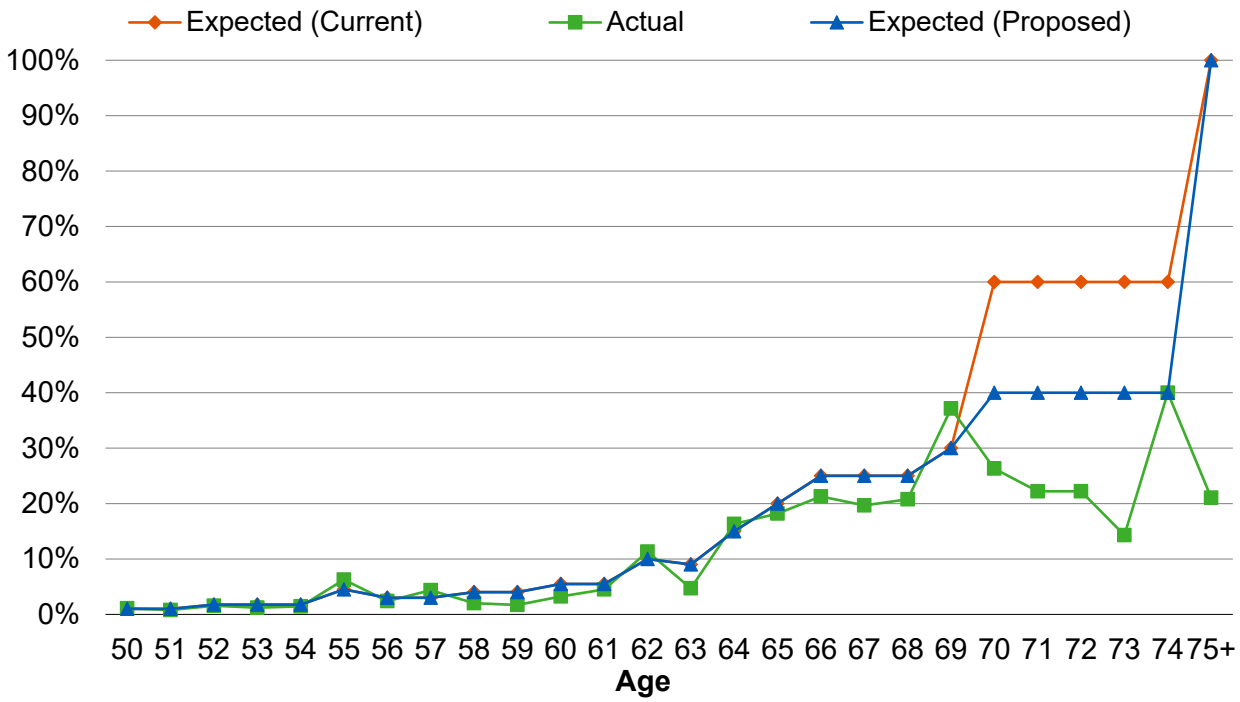


Chart 12: Retirement Rates



Deferred vested members

In the prior experience study, deferred vested members were assumed to retire at age 56. Over the last three years, 56 members retired from deferred vested status with an average age at retirement of 57.4. In the last study, there were 37 members who retired from deferred vested status with an average age at retirement of 57.1.

Based on this experience, we recommend increasing the assumed retirement age to 57.

Reciprocity

Due to the distinctive design of the plan which requires that the salary rate from the most recent salary resolution prior to the date of retirement be used in determining final average salary for deferred vested members, in effect there is already an implicit assumption in the valuation that 100% of all deferred vested members will receive benefits as though they were on reciprocity. For that reason, an explicit reciprocity assumption is not necessary.

The annual salary increase assumption is based on the ultimate merit and promotion salary increase assumptions together with the 2.50% inflation and 0.50% real "across the board" salary increase assumptions that are recommended in a separate report. This assumption is utilized to anticipate salary increases from termination from the System to the expected date of retirement.

We recommend maintaining the annual salary increase assumption for current and future deferred vested members of 4.00% (i.e., 2.50% inflation plus 0.50% "across the board" plus 1.00% merit and promotion).

Survivor continuance and optional forms of benefit

In prior valuations, it was assumed that 80% of all active and inactive male members and 55% of all active and inactive (non-retired) female members would be married or have an eligible domestic partner or beneficiary when they retired. We reviewed experience for members who retired or entered DROP during the three-year period and determined the actual percentage of these new retirees that had an eligible spouse or eligible domestic partner or beneficiary at the time of retirement. The results of that analysis are shown below.

New Retirees – Actual Percent with Eligible Spouse or Domestic Partner or Beneficiary and Selected Option with Continuance

Year Ending June 30	Male members	Female members
2022	72%	48%
2023	75%	50%
2024	64%	78%
Total	**70%**	**57%**

Based on the experience of members who retired over the past three years, approximately 70% of both male members and 57% of female members were considered to have an eligible spouse or domestic partner at the time of retirement. Accordingly, **we recommend decreasing the**

current assumption for male members from 80% to 75%, and maintaining the assumption for female members at 55%.

Pursuant to Section 3-554 of the Municipal Code, a member may elect to receive an optional form of benefit at retirement that is the actuarial equivalent of his or her unmodified retirement allowance in the form of a lesser retirement allowance payable throughout life, with one of the six options stipulated in the Code. It has been the System's longstanding practice to use only the current investment return and mortality assumptions, and without considering the value of the future COLA benefits as stipulated in the Code, in determining the actuarially equivalent optional forms of benefit.

The code section requirement of excluding the COLA assumption in calculating benefit amounts under optional forms of payment results in higher benefit amounts payable under Options 2A, 2B, 3A and 3B[1] as compared to the benefit amount that would result if the COLA assumption were included. This is because the value of the future COLAs expected to be paid over both the lives of the member and the beneficiary are proportionately greater than the value of the future COLAs expected to be paid over just the member's life. Since members (and their survivors) actually do receive COLAs, this Code requirement results in a slight subsidy to members whenever they elect those options.

As we first pointed out in setting the contribution rates starting in the June 30, 2018 valuation, the Code requirement of excluding the COLA assumption in the optional forms of benefit calculations means that there would be a small actuarial loss when a member retires and elects one of the options mentioned and starts collecting COLA benefits. Since it would be preferable to avoid known actuarial losses by anticipating such elections, in the June 30, 2018 valuation we introduced an assumption to anticipate election of the different optional forms of benefit at retirement.

The following tables show the observed percentages of election of optional forms of benefit for male and female members with survivors over the last three years. Also shown are the current percentages assumed and the percentages we propose.

Election of Optional Forms of Benefit at Retirement

Male Members with Survivor

Age	Current Assumption	Actual System Experience	Proposed Assumption
Unmodified	35%	44.3%	40%
Option 2 (A/B)	45%	47.8%	45%
Option 3 (A/B)	20%	8.0%	15%

[1] Option 2A and Option 3A provide 100% and 50% continuance, respectively, of the member's modified allowance, payable to the designated beneficiary upon the member's death. Option 2B and Option 3B provide 100% and 75% continuance, respectively, of the member's modified allowance, payable to the spouse/domestic partner upon the member's death.

Election of Optional Forms of Benefit at Retirement

Female Members with Survivor

Age	Current Assumption	Actual System Experience	Proposed Assumption
Unmodified	70%	61.5%	70%
Option 2 (A/B)	20%	30.8%	20%
Option 3 (A/B)	10%	7.7%	10%

We recommend changing the percentages of married male members assumed to elect the Unmodified Option and Option 3 (A/B) while maintaining the percentage assumed to elect Option 2 (A/B) at retirement or DROP entry. For married female members, we recommend maintaining the percentage assumed to elect each of the three options at retirement or DROP entry.

For non-married members, it is assumed that they will elect the unmodified option. **We recommend no change to this assumption based on 100% of unmarried members electing the unmodified option over the last three years.**

Since the present value of the survivor's benefit is dependent on the survivor's age and sex, we must also have assumptions for the age and sex of the survivor. Based on the experience for members who retired during the current three-year period (results shown in the table below) and studies done for other retirement systems, **we recommend the following:**

1. Since more than 85% of the survivors are actually the opposite sex, even with the inclusion of domestic partners and other eligible beneficiaries, we will continue to assume that for all active and inactive members, the survivor's sex is the opposite of the member's.
2. The current and proposed assumption for the age of the survivor for all active and inactive members are shown below. These assumptions will continue to be monitored in future experience studies.

Survivor's Age as Compared to Member's Age

Member Sex	Current Assumption	Actual System Experience	Proposed Assumption
Male	3 years older	3.1 years older	3 years older
Female	2 years younger	2.4 years younger	2 years younger

We recommend maintaining the spouse age difference assumptions and that the spouse is the opposite sex of the member.

F. DROP election rates

In past experience studies, we concluded that the DROP election rates correlate better with age and years of service rather years since first eligible for participation in the DROP. Based on the current analysis, we continue to recommend using a structure that applies different sets of election rates by age and service band.

The tables below show the current drop election rates, the actual rates observed over the last 3 years, and the proposed rates for the various service bands.

DROP Election Rates (%)

For 5 to 9 Years of Service

Age	Current Rate	Actual Rate	Proposed Rate
50	0.00	0.00	0.00
51	0.00	0.00	0.00
52	0.00	0.00	0.00
53	0.00	0.00	0.00
54	0.00	0.00	0.00
55	1.00	0.00	0.00
56	1.00	0.00	0.00
57	1.00	0.00	0.00
58	1.00	0.00	0.00
59	1.00	0.00	0.00
60	1.00	0.00	0.00
61	1.00	0.00	0.00
62	1.00	0.00	0.00
63	1.00	0.00	0.00
64	1.00	0.00	0.00
65	1.00	0.00	0.00
66	1.00	0.00	0.00
67	1.00	0.00	0.00
68	1.00	0.00	0.00
69	1.00	0.00	0.00
70	1.00	0.00	0.00
71 & Over	0.00	0.00	0.00

DROP Election Rates (%)

For 10 to 14 Years of Service

Age	Current Rate	Actual Rate	Proposed Rate
50	0.00	0.00	0.00
51	0.00	0.00	0.00
52	0.00	0.00	0.00
53	0.00	0.00	0.00
54	0.00	0.00	0.00
55	10.00	6.25	8.00
56	5.00	0.00	4.00
57	5.00	0.00	4.00
58	5.00	0.00	4.00
59	5.00	0.00	4.00
60	5.00	5.88	4.00
61	5.00	5.00	4.00
62	5.00	0.00	4.00
63	5.00	10.00	4.00
64	5.00	0.00	4.00
65	5.00	11.11	4.00
66	5.00	0.00	4.00
67	5.00	0.00	4.00
68	5.00	66.67	4.00
69	5.00	0.00	4.00
70	5.00	0.00	4.00
71 & Over	0.00	0.00	4.00

DROP Election Rates (%)

For 15 to 19 Years of Service

Age	Current Rate	Actual Rate	Proposed Rate
50	1.50	0.00	1.00
51	1.50	0.00	1.00
52	1.50	2.56	1.00
53	1.50	2.94	1.00
54	10.00	0.00	8.00
55	35.00	26.09	30.00
56	20.00	5.88	15.00
57	20.00	13.64	15.00
58	20.00	11.54	15.00
59	18.00	14.29	16.00
60	18.00	17.39	18.00
61	18.00	0.00	18.00
62	10.00	5.56	5.00
63	10.00	0.00	5.00
64	10.00	0.00	5.00
65	10.00	0.00	5.00
66	10.00	11.11	5.00
67	10.00	0.00	5.00
68	10.00	0.00	5.00
69	10.00	0.00	5.00
70	10.00	0.00	5.00
71 & Over	0.00	0.00	0.00

DROP Election Rates (%)

For 20 to 24 Years of Service

Age	Current Rate	Actual Rate	Proposed Rate
50	2.50	0.00	2.00
51	2.50	0.00	2.00
52	5.00	0.00	4.00
53	5.00	0.00	4.00
54	30.00	0.00	25.00
55	40.00	25.71	35.00
56	35.00	28.57	30.00
57	30.00	0.00	25.00
58	30.00	18.18	25.00
59	30.00	14.29	25.00
60	30.00	0.00	25.00
61	30.00	0.00	25.00
62	15.00	28.57	20.00
63	15.00	0.00	5.00
64	15.00	0.00	5.00
65	10.00	33.33	20.00
66	10.00	0.00	5.00
67	10.00	0.00	5.00
68	10.00	0.00	5.00
69	10.00	0.00	5.00
70	10.00	0.00	5.00
71 & Over	0.00	0.00	0.00

DROP Election Rates (%)
For 25+ Years of Service

Age	Current Rate	Actual Rate	Proposed Rate
50	2.50	0.00	2.00
51	2.50	0.00	2.00
52	15.00	0.00	10.00
53	15.00	0.00	10.00
54	45.00	13.33	45.00
55	50.00	50.00	50.00
56	35.00	57.14	35.00
57	30.00	33.33	25.00
58	30.00	0.00	30.00
59	10.00	42.86	10.00
60	10.00	33.33	10.00
61	10.00	50.00	10.00
62	10.00	Not observed	10.00
63	10.00	0.00	10.00
64	10.00	0.00	10.00
65	10.00	40.00	10.00
66	10.00	0.00	10.00
67	10.00	0.00	10.00
68	10.00	0.00	10.00
69	10.00	Not observed	10.00
70	10.00	Not observed	10.00
71 & Over	0.00	0.00	0.00

We have adjusted the DROP Retirement rates at certain ages for the various service bands. Overall, the DROP Retirement rates have decreased from the last study.

After reviewing the rates at which members elect to enter the DROP, we next review the assumption regarding how long members remain in DROP once enrolled. While election rates inform when members begin participation in DROP, the length of time they remain in DROP affects when they ultimately retire and begin collecting benefits directly from the System.

It is currently assumed that members stay in DROP for an average of 6 years. However, recent experience suggests that this may no longer reflect actual behavior. Among members who retired from DROP in the past three years, the average participation period was approximately 7.0 years.[1] This is notably higher than the long-term average observed in prior years, which frequently fell below 6 years.

The consistent increase in participation duration over recent years suggests a sustained change in member behavior rather than a short-term fluctuation. In light of this trend, **we recommend**

[1] Increasing from a low of 6.2 years in 2021/22 to 7.3 years in 2022/23 and 7.5 years in 2023/24.

increasing the assumed DROP participation period from 6 years to 7 years to better align with current experience.

Chart 13 compares actual to expected DROP elections over the past three years for both the current and proposed assumptions.

Chart 14 shows the average actual DROP election rates by age for the service band from 5 to 9 years of service over the past three years compared to the current and proposed assumptions.

Chart 15 shows the average actual DROP election rates by age for the service band from 10 to 14 years of service over the past three years compared to the current and proposed assumptions.

Chart 16 shows the average actual DROP election rates by age for the service band for 15 to 19 years of service over the past three years compared to the current and proposed assumptions.

Chart 17 shows the average actual DROP election rates by age for the service band from 20 to 24 years of service over the past three years compared to the current and proposed assumptions.

Chart 18 shows the average actual DROP election rates by age for the service band for 25 years of service and above over the past three years compared to the current and proposed assumptions.

Chart 13: Actual Number of DROP Elections
Compared to Expected (July 1, 2021 through June 30, 2024)

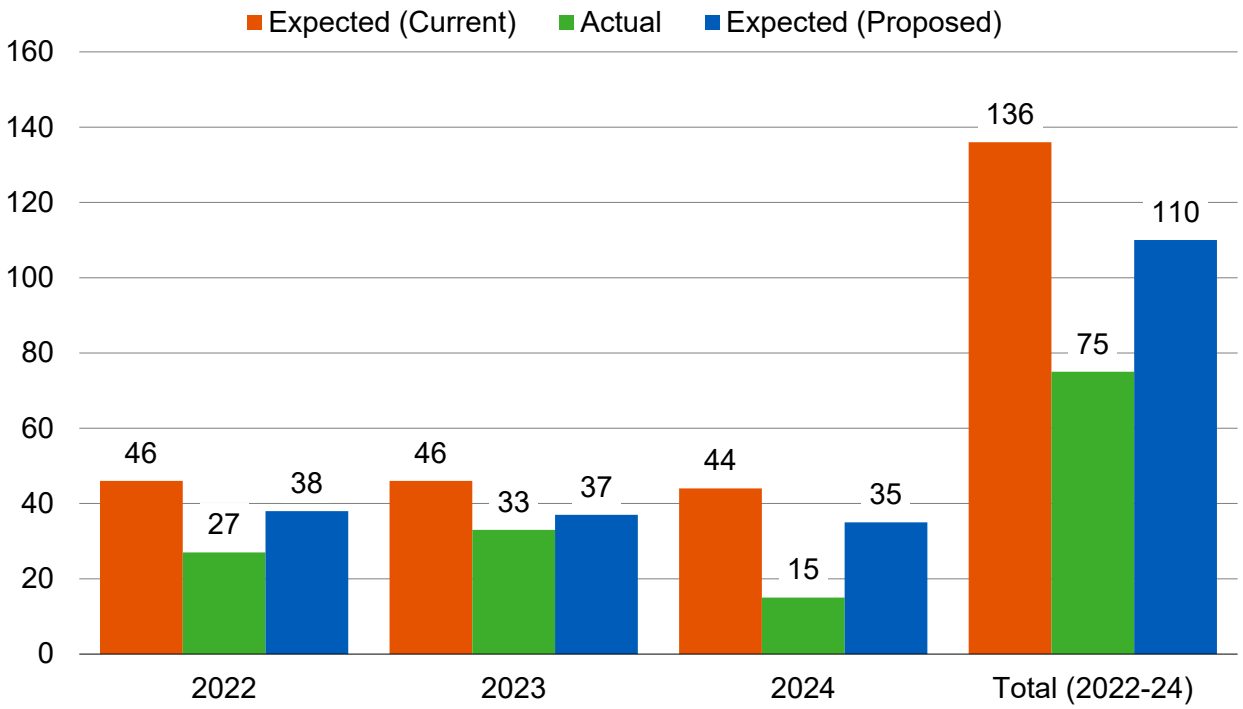


Chart 14: Average DROP Election Rates
For 5 to 9 Years of Service

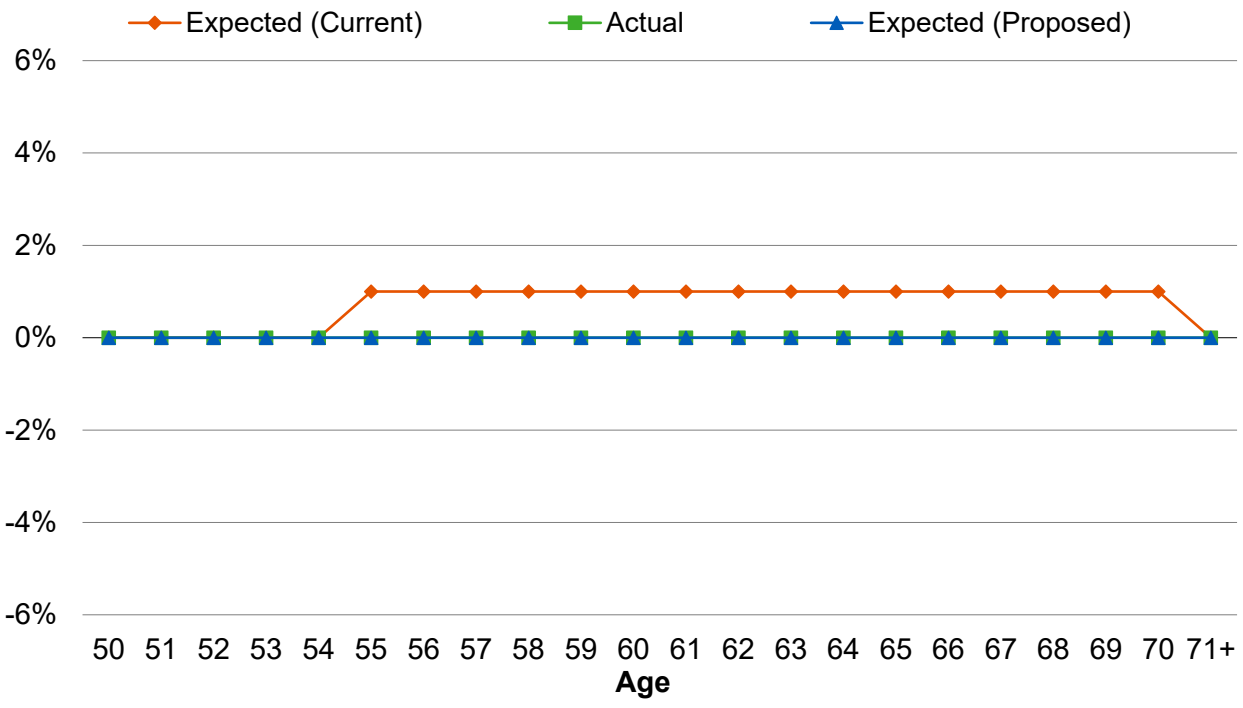


Chart 15: Average DROP Election Rates

For 10 to 14 Years of Service

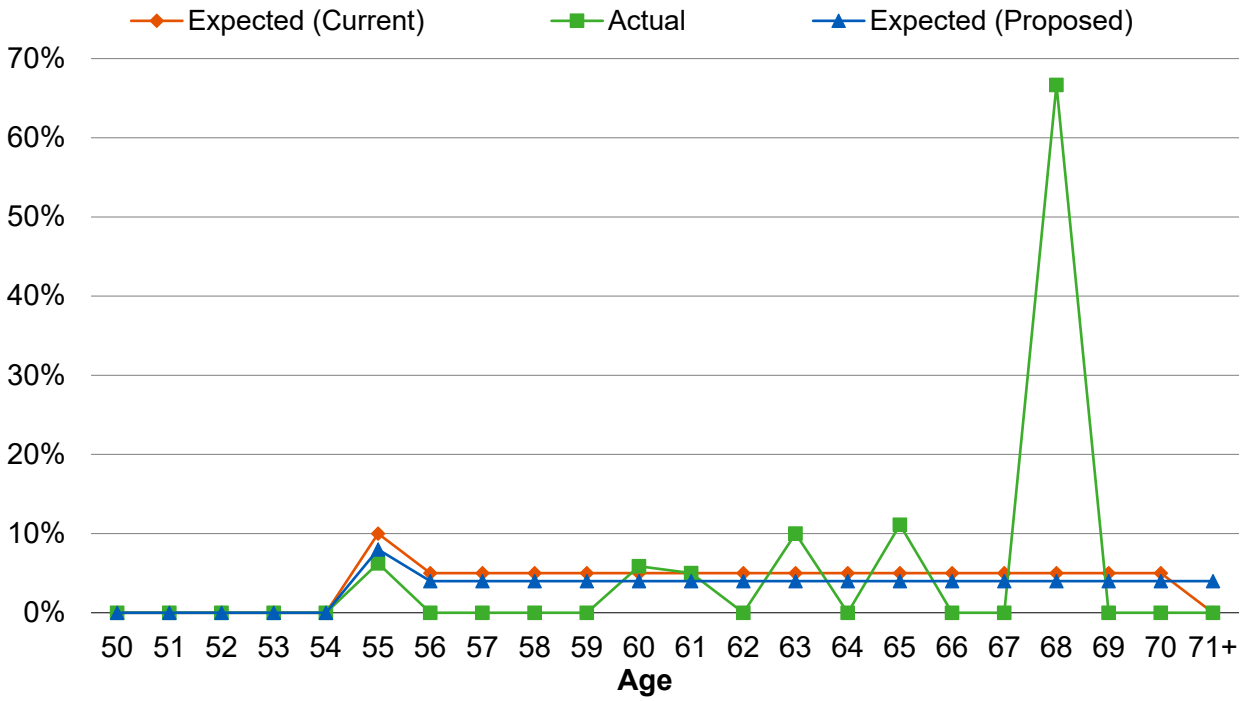


Chart 16: Average DROP Election Rates
For 15 to 19 Years of Service

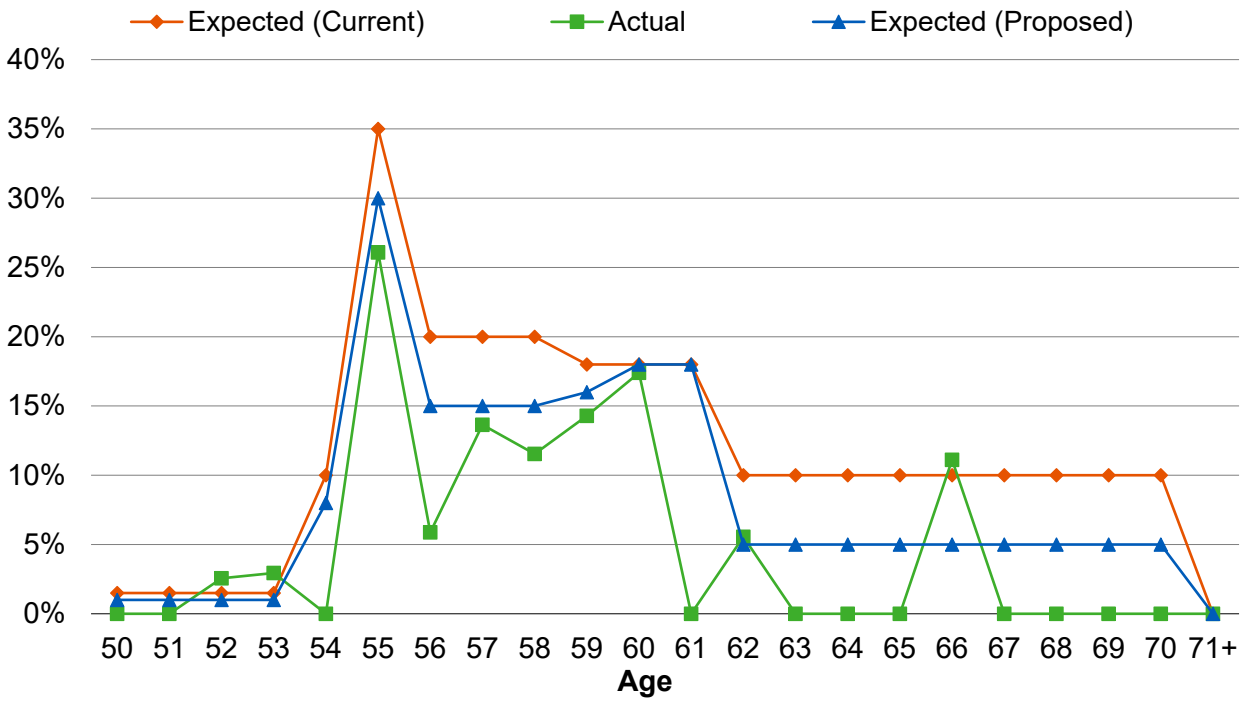


Chart 17: Average DROP Election Rates
For 20 to 24 Years of Service

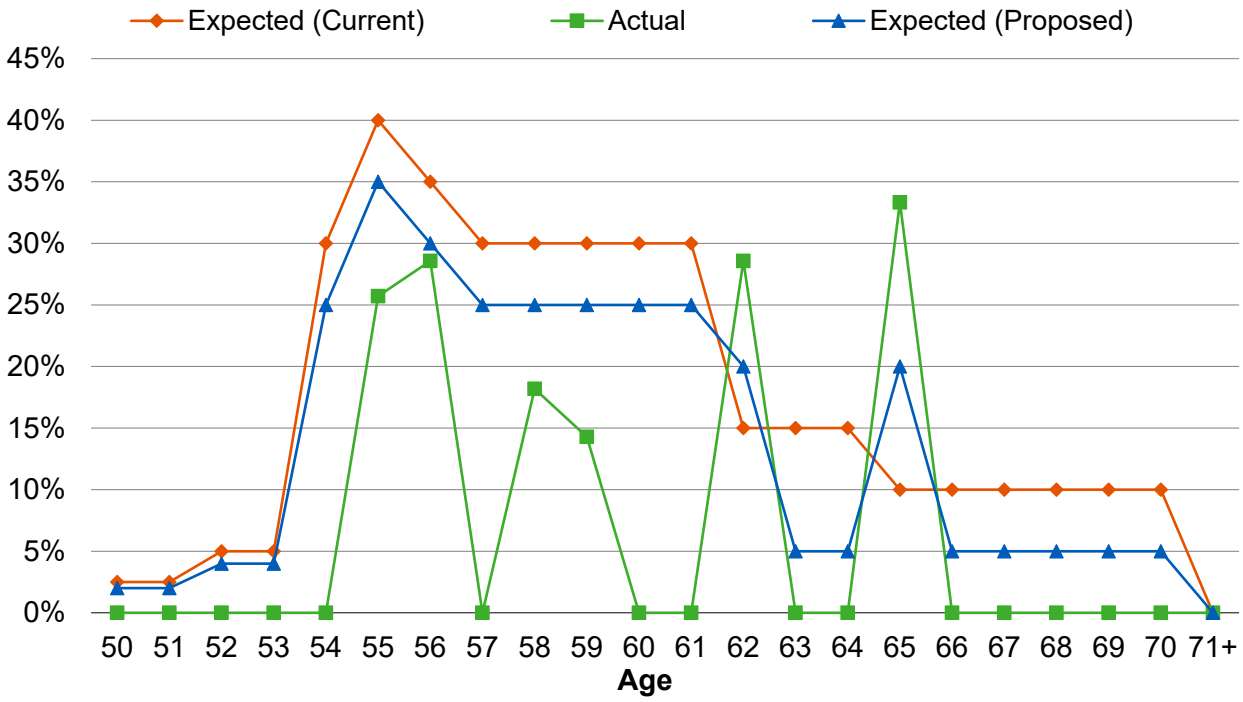
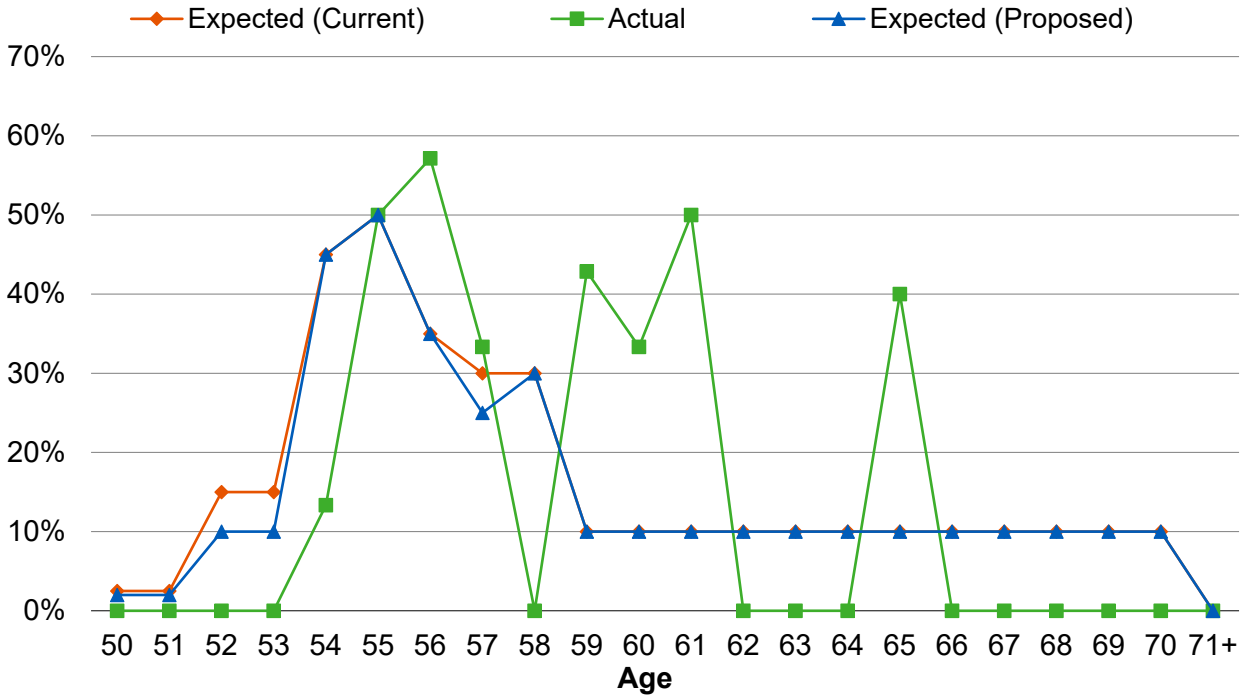


Chart 18: Average DROP Election Rates

For 25+ Years of Service



Section 5: Cost Impact

We have estimated the impact of all recommended assumption changes as if they had been applied to the June 30, 2024 actuarial valuation. The table below presents the resulting changes to employer and member contribution rates, as well as to the unfunded actuarial liability and funded ratio. To provide additional clarity, the impacts are shown separately for the recommended merit and promotion salary scale changes (see Section 3) as well as for the recommended mortality and other demographic assumption changes (see Section 4). Although economic assumptions are discussed in a separate report, no changes are currently being proposed; therefore, no impact is shown for economic assumptions.

Cost Impact of the Recommended Assumptions (Without Considering Any Impact on Surplus Distribution) Based on June 30, 2024 Actuarial Valuation

Assumption	Impact on Average Employer Normal Cost Rate	Impact on Average Member Contribution Rate
Change due to salary scale	0.63%	0.43%
Change due to mortality	(0.02%)	0.07%
Change due to length of time members remain in DROP	(0.29%)	(0.01%)
Change due to other demographic assumptions	0.16%	(0.07%)
Total change in average rate	**0.48%**	**0.42%**
Estimated increase in annual amount ($ in '000s)	**$1,316[1]**	**$1,040[2]**

Assumption	Impact on UAAL	As a % of Projected Payroll[3]	Impact on Funded Ratio (VVA[4] Basis)
Change due to salary scale	$6.3 million	0.19%	(0.48%)
Change due to mortality	(3.7) million	(0.10%)	0.28%
Change due to length of time members remain in DROP	(7.8) million	(0.20%)	0.59%
Change due to other demographic assumptions	(1.1) million	(0.03%)	0.08%
Total change	**$(6.3) million**	**(0.14%)**	**0.47%**

[1] Calculated using payroll for all active employees (including employees in DROP)
[2] Calculated using payroll for active non-DROP employees
[3] Calculated using payroll for all active employees (including employees in DROP) and a 25-year amortization period consistent with the Retirement System's policy that would apply if the System were not in an overfunded position.
[4] Valuation value of assets.

Section 5: Cost Impact

Component	Cost Impact
Employer normal cost rate	0.48%
Employer UAAL rate[1]	(0.14%)
Total Employer rate	**0.34%**
Total Member rate	**0.42%**

[1] Calculated using payroll for all active employees (including employees in DROP) and a 25-year amortization period consistent with the Retirement System's policy that would apply if the System were not in an overfunded position.

Appendix A: Current Actuarial Assumptions

Economic assumptions

Merit and promotion salary increases

The annual rate of compensation increase includes:

- Inflation at 2.50%, plus
- "Across-the-board" salary increase of 0.50% per year, plus
- Merit and promotion increase based on years of service:

Merit and Promotion Increases (%)

Years of Service	Annual Increase
Less than 1	12.00
1 – 2	7.00
2 – 3	6.00
3 – 4	5.50
4 – 5	4.50
5 – 6	4.00
6 – 7	2.75
7 – 8	2.50
8 – 9	2.25
9 – 10	2.00
10 – 11	2.00
11 – 12	2.00
12 – 13	2.00
13 – 14	1.75
14 – 15	1.75
15 – 16	1.75
16 – 17	1.75
17 – 18	1.50
18 – 19	1.50
19 – 20	1.50
20 and over	1.00

Appendix A: Current Actuarial Assumptions

Demographic assumptions

Post-retirement mortality rates

Healthy

- Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Disabled

- Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females with rates decreased by 5%, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Beneficiary

- **Beneficiaries not currently in pay status:**
  - Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Beneficiaries in pay status:**
  - Pub-2010 General Contingent Survivor Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Pre-retirement mortality rates

- Pub-2010 General Employee Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Appendix A: Current Actuarial Assumptions

Pre-Retirement Mortality Rates (%) — Before Generational Projection from 2010

Age	Male	Female
20	0.04	0.01
25	0.02	0.01
30	0.03	0.01
35	0.04	0.02
40	0.06	0.03
45	0.09	0.05
50	0.13	0.08
55	0.19	0.11
60	0.28	0.17
65	0.41	0.27
70	0.61	0.44

Note that generational projections beyond the base year (2010) are not reflected in the above mortality rates.

Mortality rates for member contributions

- **Healthy Members:**
  - Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected 30 years with the two-dimensional mortality improvement scale MP-2021, weighted 65% male and 35% female

Mortality rates for optional forms of benefit

- **Healthy members:**
  - Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected 20 years with the two-dimensional mortality improvement scale MP-2021[1], weighted 65% male and 35% female.
- **Beneficiaries:**
  - Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5%, projected 20 years with the two-dimensional mortality improvement scale MP-2021[1], weighted 35% male and 65% female.
- **Disabled members:**
  - Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) projected 20 years with the two-dimensional mortality improvement scale MP-2021[1], weighted 65% male and 35% female.

[1] Based on discussions with the System and its vendor maintaining the pension administration software, there are some administrative issues that need to be resolved before we can recommend a generational scale to anticipate future mortality improvement.

Appendix A: Current Actuarial Assumptions

Disability incidence rates

Disability Incidence Rates (%)

Age	Rate
20	0.00
25	0.00
30	0.00
35	0.30
40	0.30
45	0.30
50	0.70
55	1.20
60	3.10
65	3.10
70	7.00

Appendix A: Current Actuarial Assumptions

Termination rates

Rates (%)

Age	Less Than 1 Year of Service	1 Year of Service	2 Years of Service	3 Years of Service	4 Years of Service	5 & Above Years of Service
20-24	15.00	15.00	13.00	12.00	12.00	12.00
25-29	13.00	10.00	10.00	10.00	10.00	8.00
30-34	13.00	8.00	7.00	7.00	6.00	6.00
35-39	13.00	7.00	6.00	6.00	5.00	5.00
40-44	13.00	6.00	5.00	5.00	3.00	3.00
45-49	13.00	6.00	5.00	5.00	3.00	3.00
50+	13.00	6.00	5.00	5.00	3.00	Not Calculated

- **Members with less than five years of service:** 90% of members are assumed to elect a withdrawal of contributions. The remaining members are assumed to elect a deferred vested benefit. No termination is assumed after a member is assumed to retire.
- **Members with five or more years of service:** 40% of members are assumed to elect a withdrawal of contributions. The remaining members are assumed to elect a deferred vested benefit. No termination is assumed after a member is assumed to retire.

Appendix A: Current Actuarial Assumptions

Retirement rates

Retirement Rates (%)

Age	Rate
50	1.00
51	1.00
52	1.75
53	1.75
54	1.75
55	4.50
56	3.00
57	3.00
58	4.00
59	4.00
60	5.50
61	5.50
62	10.00
63	9.00
64	15.00
65	20.00
66	25.00
67	25.00
68	25.00
69	30.00
70	60.00
71	60.00
72	60.00
73	60.00
74	60.00
75 and over	100.00

Appendix A: Current Actuarial Assumptions

DROP assumptions

Rates (%)

Age	5-9 Years of Service	10-14 Years of Service	15-19 Years Years of Service	20-24 Years Years of Service	25 and Above Years of Service
50	0.00	0.00	1.50	2.50	2.50
51	0.00	0.00	1.50	2.50	2.50
52	0.00	0.00	1.50	5.00	15.00
53	0.00	0.00	1.50	5.00	15.00
54	0.00	0.00	10.00	30.00	45.00
55	1.00	10.00	35.00	40.00	50.00
56	1.00	5.00	20.00	35.00	35.00
57	1.00	5.00	20.00	30.00	30.00
58	1.00	5.00	20.00	30.00	30.00
59	1.00	5.00	18.00	30.00	10.00
60	1.00	5.00	18.00	30.00	10.00
61	1.00	5.00	18.00	30.00	10.00
62	1.00	5.00	10.00	15.00	10.00
63	1.00	5.00	10.00	15.00	10.00
64	1.00	5.00	10.00	15.00	10.00
65	1.00	5.00	10.00	10.00	10.00
66	1.00	5.00	10.00	10.00	10.00
67	1.00	5.00	10.00	10.00	10.00
68	1.00	5.00	10.00	10.00	10.00
69	1.00	5.00	10.00	10.00	10.00
70	1.00	5.00	10.00	10.00	10.00
71 and Over	0.00	0.00	0.00	0.00	0.00

- Members are assumed to remain in DROP for 6 years.

Appendix A: Current Actuarial Assumptions

Retirement age and benefit for deferred vested members

For current deferred vested members, the retirement assumption is age 56.

We assume that no future deferred vested members will continue to work for a reciprocal employer. However, we assume there will be a 3.50% compensation increase per annum.

Future benefit accruals

1.0 year of service per year.

Unknown data for members

Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.

Inclusion of deferred vested members

All deferred vested members are included in the valuation.

Percent with survivor

80% of male members and 55% of female members.

Age of spouse

Male members are three years older than their spouses.

Female members are two years younger than their spouses.

Election of Optional Forms of Benefit at Retirement

Type of Option	Male Members with Survivor	Female Members with Survivor	Members without Survivor
Unmodified	35%	70%	100%
Option 2 (A/B)	45%	20%	
Option 3 (A/B)	20%	10%	

Appendix B: Proposed Actuarial Assumptions

Economic assumptions

Merit and Promotion Salary Increases

The annual rate of compensation increase includes:

- Inflation at 2.50%, plus
- "Across-the-board" salary increase of 0.50% per year, plus
- Merit and promotion increase based on years of service:

Merit and Promotion Increases (%)

Years of Service	Annual Increase
Less than 1	10.00
1 – 2	6.50
2 – 3	5.50
3 – 4	5.00
4 – 5	4.00
5 – 6	3.00
6 – 7	2.25
7 – 8	2.25
8 – 9	2.25
9 – 10	2.25
10 – 11	1.75
11 – 12	1.75
12 – 13	1.75
13 – 14	1.75
14 – 15	1.75
15 – 16	1.50
16 – 17	1.50
17 – 18	1.50
18 – 19	1.50
19 – 20	1.50
20 and over	1.00

Appendix B: Proposed Actuarial Assumptions

Demographic assumptions

Post-retirement mortality rates

Healthy

- Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Disabled

- Pub-2016 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Beneficiary

- **Beneficiaries not currently in pay status:**
  - Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Beneficiaries in pay status:**
  - Pub-2016 General Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Pre-retirement mortality rates

- Pub-2016 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Appendix B: Proposed Actuarial Assumptions

Pre-Retirement Mortality Rates (%) — Before Generational Projection from 2016

Age	Male	Female
20	0.02	0.01
25	0.03	0.01
30	0.03	0.01
35	0.04	0.02
40	0.05	0.04
45	0.08	0.05
50	0.12	0.08
55	0.18	0.12
60	0.28	0.18
65	0.42	0.28
70	0.65	0.43

Note that generational projections beyond the base year (2016) are not reflected in the above mortality rates.

Mortality rates for member contributions

- **Healthy Members:**
  - Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2021, weighted 65% male and 35% female

Mortality rates for optional forms of benefit

- **Healthy members:**
  - Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2021, weighted 65% male and 35% female.
- **Beneficiaries:**
  - Pub-2016 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2021, weighted 35% male and 65% female.
- **Disabled members:**
  - Pub-2016 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) weighted 65% male and 35% female, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Appendix B: Proposed Actuarial Assumptions

Disability incidence rates

Disability Incidence Rates (%)

Age	Rate
20	0.00
25	0.00
30	0.00
35	0.12
40	0.20
45	0.26
50	0.42
55	0.98
60	2.38
65	3.10
70	5.02

Appendix B: Proposed Actuarial Assumptions

Termination rates

Rates (%)

Age	Less Than 1 Year of Service	1 Year of Service	2 Years of Service	3 Years of Service	4 Years of Service	5 & Above Years of Service
20-24	17.00	15.00	14.00	12.00	12.00	12.00
25-29	15.00	11.00	11.00	9.00	8.00	9.00
30-34	15.00	9.00	8.00	7.00	7.00	6.00
35-39	14.00	8.00	6.00	6.00	5.00	5.00
40-44	14.00	7.00	6.00	5.00	4.00	4.00
45-49	13.00	6.00	6.00	5.00	3.00	3.00
50+	13.00	5.00	5.00	5.00	2.00	Not Calculated

- **Members with less than five years of service:** 85% of members are assumed to elect a withdrawal of contributions. The remaining members are assumed to elect a deferred vested benefit. No termination is assumed after a member is assumed to retire.
- **Members with five or more years of service:** 35% of members are assumed to elect a withdrawal of contributions. The remaining members are assumed to elect a deferred vested benefit. No termination is assumed after a member is assumed to retire.

Appendix B: Proposed Actuarial Assumptions

Retirement rates

Retirement Rates (%)

Age	Rate
50	1.00
51	1.00
52	1.75
53	1.75
54	1.75
55	4.50
56	3.00
57	3.00
58	4.00
59	4.00
60	5.50
61	5.50
62	10.00
63	9.00
64	15.00
65	20.00
66	25.00
67	25.00
68	25.00
69	30.00
70	40.00
71	40.00
72	40.00
73	40.00
74	40.00
75 and over	100.00

Appendix B: Proposed Actuarial Assumptions

DROP assumptions

Rates (%)

Age	5-9 Years of Service	10-14 Years of Service	15-19 Years Years of Service	20-24 Years Years of Service	25 and Above Years of Service
50	0.00	0.00	1.00	2.00	2.00
51	0.00	0.00	1.00	2.00	2.00
52	0.00	0.00	1.00	4.00	10.00
53	0.00	0.00	1.00	4.00	10.00
54	0.00	0.00	8.00	25.00	45.00
55	0.00	8.00	30.00	35.00	50.00
56	0.00	4.00	15.00	30.00	35.00
57	0.00	4.00	15.00	25.00	25.00
58	0.00	4.00	15.00	25.00	30.00
59	0.00	4.00	16.00	25.00	10.00
60	0.00	4.00	18.00	25.00	10.00
61	0.00	4.00	18.00	25.00	10.00
62	0.00	4.00	5.00	20.00	10.00
63	0.00	4.00	5.00	5.00	10.00
64	0.00	4.00	5.00	5.00	10.00
65	0.00	4.00	5.00	20.00	10.00
66	0.00	4.00	5.00	5.00	10.00
67	0.00	4.00	5.00	5.00	10.00
68	0.00	4.00	5.00	5.00	10.00
69	0.00	4.00	5.00	5.00	10.00
70	0.00	4.00	5.00	5.00	10.00
71 and Over	0.00	0.00	0.00	0.00	0.00

- Members are assumed to remain in DROP for 7 years.

Appendix B: Proposed Actuarial Assumptions

Retirement age and benefit for deferred vested members

For current deferred vested members, the retirement assumption is age 57.

We assume that no future deferred vested members will continue to work for a reciprocal employer. However, we assume there will be a 4.00% compensation increase per annum.

Future benefit accruals

1.0 year of service per year.

Unknown data for members

Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.

Inclusion of deferred vested members

All deferred vested members are included in the valuation.

Percent with survivor

75% of male members and 55% of female members.

Age of spouse

Male members are three years older than their spouses.

Female members are two years younger than their spouses.

Election of optional forms of benefit at retirement

Type of Option	Male Members with Survivor	Female Members with Survivor	Members without Survivor
Unmodified	40%	70%	100%
Option 2 (A/B)	45%	20%	
Option 3 (A/B)	15%	10%	

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