Vermont Municipal Employees' Retirement System

Actuarial Experience Review

July 1, 2019, through June 30, 2022

September 2023 / Matt Strom / Kathy Riley / Patryk Tabernacki / Austin Miller

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Actuarial Certification

We are pleased to submit this report on the actuarial experience of the Vermont Municipal Employees' Retirement System for the three-year period ending June 30, 2022. This investigation is the basis for our recommendation of the assumptions and methods to be used for the June 30, 2023, actuarial valuation.

All current actuarial assumptions and methods were reviewed as part of this study. Some of our recommendations reflect changes to the assumptions and methods used in the June 30, 2022, actuarial valuation while other current assumptions and methods remain appropriate.

Our analysis was conducted in accordance with generally accepted actuarial principles as prescribed by the Actuarial Standards Board (ASB) and the American Academy of Actuaries. Additionally, the development of all assumptions contained herein is in accordance with ASB Actuarial Standard of Practice (ASOP) No. 27 (Selection of Economic Assumptions for Measuring Pension Obligations) and ASOP No. 35 (Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations).

The undersigned actuary is experienced with performing experience studies for large public-sector pension plans and is qualified to render the opinions contained in this report. To the best of my knowledge, the information supplied in this experience study is complete and accurate. Further, in my opinion, the recommended assumptions are reasonably related to the experience of and the expectations for the System.

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Matthew A. Strom, FSA, MAAA, EA
Senior Vice President and Actuary

September 18, 2023
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Date

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Agenda

Overview and Executive Summary

Analysis:

- Economic Assumptions

- Demographic Assumptions

Summary of Recommended Assumptions

Cost Impact

Appendix

Overview: Purpose of an Experience Study

An experience study provides the basis for developing recommended assumptions to be used in the annual actuarial valuation

- Performed on a periodic basis, typically every three-to-five years

- Last VMERS experience study reviewed demographic and economic assumptions over the **five-year** period ending June 30, 2019

- Current study is based on the **three-year**[1] period from July 1, 2019, through June 30, 2022

Segal's role is to make appropriate recommendations to the Board for each assumption

- The assumptions are the Board's assumptions, and the Board can adopt all, none, or some of the recommendations of the actuary

- Segal's recommendations will follow the guidance of the applicable Actuarial Standards of Practice. Assumptions should be reasonable individually and in the aggregate (ASOP No. 27 and 35).

- The Vermont Pension Investment Commission (VPIC) has authority over setting the inflation and investment return assumptions. The inflation and investment return assumptions were recommended by VPIC's actuary, GRS, and were adopted by VPIC during their meeting on July 25, 2023.

[1] To increase the credibility of the data set, five years of historical data (July 1, 2017, through June 30, 2022) were studied for pre- and post-retirement mortality.

Overview: How Assumptions Are Set

Review past experience ("actual") and compare with assumptions ("expected")

Determine trends – make judgments about the future

Develop component parts of each assumption

- Maintain internal consistency

Keep in mind:

- No "right" answer

- Assumptions are long-term in nature

- Assumptions do not directly affect the payment of benefits, only the timing of contributions

Overview: Actuarial Assumptions

Economic

- Inflation[1]
- Investment return[1]
- Salary increase[2]
- Payroll growth[2]
- COLA[2]
- Administrative expense

Demographic

- Death after retirement
- Death in active service
- Retirement
- Termination before retirement
- Disability incidence
- Other miscellaneous

Actuaries make assumptions as to when and why a member will leave active service and estimate the amount, duration and present value of the pension benefits paid.

[1] The inflation and investment return assumptions were recommended by VPIC's actuary, GRS, and adopted by VPIC during their July 25, 2023, meeting.
[2] The salary increase, payroll growth, and COLA assumptions reflect the inflation assumption referenced above.

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Executive Summary

Five-Year History of Gain/(Loss)

Based on changes adopted from prior experience study →

$ in thousands	2018	2019	2020	2021	2022
Investments	−$5,266	−$14,044	−$11,256	$21,858	−$2,913
Admin expenses	N/A	N/A	N/A	N/A	145
Demographics					
• Turnover	−$4,430	−$3,644	−$6,643	−$1,910	$8,420
• Retirement	−8,275	−6,418	−4,895	−2,674	−3,611
• Mortality	408	−1,150	−3,822	516	217
• Disability retirement	−628	59	−108	−193	−53
• Salary/service	754	1,849	5,013	1,670	−10,248
• COLA experience	−80	1,463	3,060	−4,281	−7,224
• Miscellaneous	−5,121	−4,408	−2,305	408	−5,611
• Subtotal	−$17,372	−$12,250	−$9,701	−$6,464	−$18,110
Total	**−$22,638**	**−$26,294**	**−$20,957**	**$15,394**	**−$20,877**

Due to rounding, values shown here may not sum as expected

Lower assumed rates of turnover resulted in a small loss as well as a gain

- Recommend additional changes to turnover rates

Previous modifications to rates of retirement resulted in smaller losses

- Recommend appropriate changes to retirement rates

Larger than expected salary increases drove liability losses in FY22

- Recommend changes to the salary scale that result in net increases

Executive Summary *(continued)*

Five-year history of benefits released due to post-retirement mortality ($ in thousands)

Post-retirement Mortality

■ Expected ■ Actual[1] ■ Proposed

	Expected	Actual[1]	Proposed
A/B Retirees	$2,587	$1,882	$2,433
C/D Retirees	$667	$453	$583
Beneficiaries	$278	$241	$288
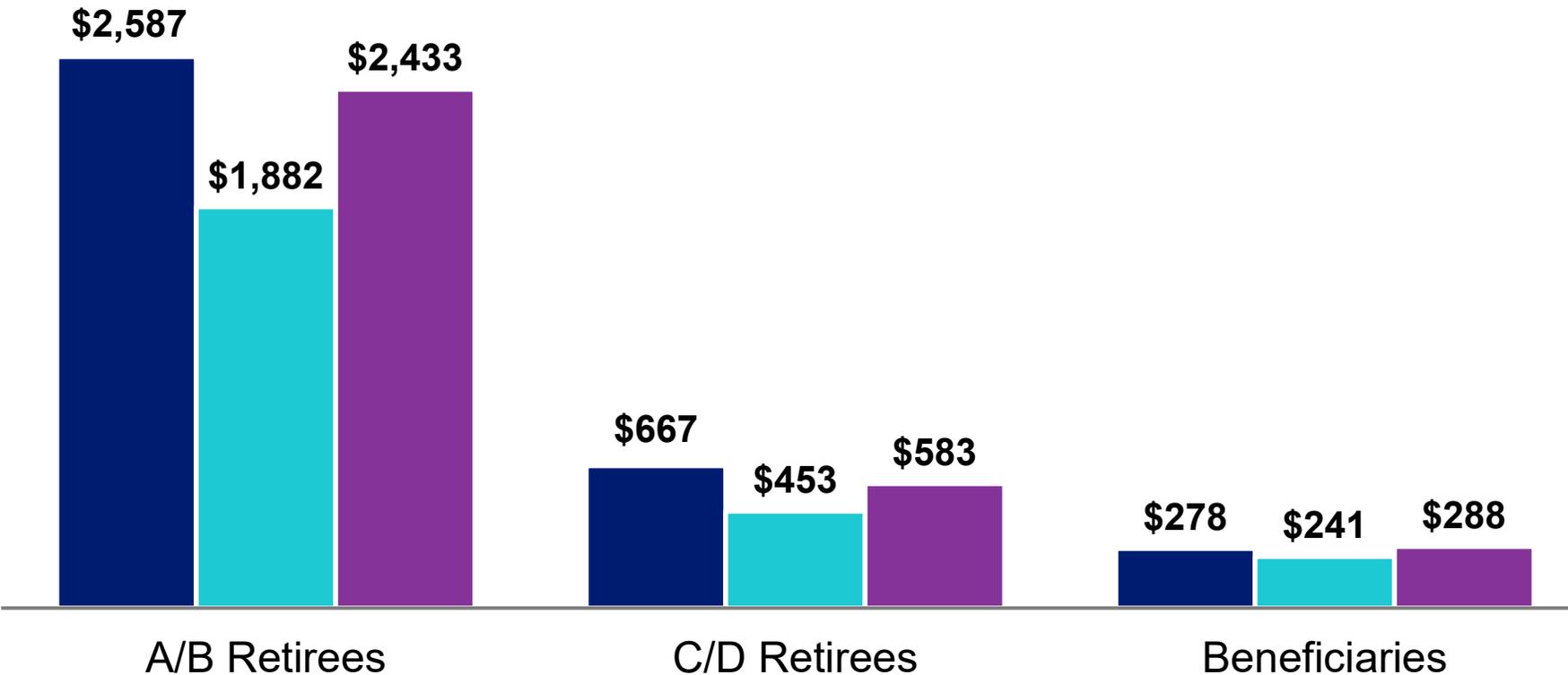
Actual amounts have been adjusted[1] to approximate the level of mortality expected in the absence of the pandemic

- $2.58M actual benefits released were lower than the $3.53M expected

Proposed tables of Pub-2010 General mortality rates for Groups A, B and C (Below Median table for Groups A/B) and Pub-2010 Safety for Group D, Contingent Survivor mortality rates for beneficiaries, with rates for Groups A/B adjusted for "credible" actual experience[2]; updated mortality improvement scale

- Net impact is a slight increase in liabilities and contributions

[1] Adjusted based on data from the CDC related to observed "excess mortality" (all causes) relative to expected
[2] If/where applicable

Executive Summary *(continued)*

VPIC elected to maintain the current investment return assumption of 7.00% per year

- Segal has independently reviewed this assumption and believes 7.00% continues to be reasonable

VPIC elected to maintain the current inflation assumption of 2.30% per year

- Segal has independently reviewed this assumption and believes 2.30% continues to be reasonable

Expected COLAs are primarily driven by assumed inflation, subject to applicable provisions

- Holding inflation steady, we recommend no changes to the following COLA assumptions:
  - Group A – 1.10% (no change)
  - Groups B/C/D – 1.20% (no change)

Administrative expenses are assumed to equal 0.40% of projected payroll

- Current assumption has tracked closely; however, increases to staff warrant a slight increase in this assumption from 0.40% to 0.45%

Executive Summary *(continued)*

**Estimated cost impact of recommended assumption changes
Based on the June 30, 2022, actuarial valuation**
($ in millions)

	Before Changes (Baseline)	Reflecting Mortality	Reflecting Mortality and Salary Scale	Reflecting Mortality, Salary Scale, and All Other Assumptions
Present Value of Future Benefits	$1,462.8	$1,476.5	$1,493.8	$1,466.0
% Change		0.9%	1.2%	-1.9%
Cumulative		0.9%	2.1%	0.2%
Actuarial Accrued Liability	$1,159.3	$1,170.5	$1,174.4	$1,163.0
% Change		1.0%	0.3%	-1.0%
Cumulative		1.0%	1.3%	0.3%
Total Normal Cost[1]	$43.8	$44.2	$45.0	$43.7
% Change		0.9%	1.8%	-2.9%
Cumulative		0.9%	2.7%	-0.2%
Funded Percentage	77.0%	76.3%	76.1%	76.8%
Delta		-0.7%	-0.2%	0.7%
Cumulative		-0.7%	-0.9%	-0.2%
Actuarially Determined Contribution (ADC) for FY24	$43.7	$45.1	$46.2	$44.0
% Change		3.2%	2.4%	-4.8%
Cumulative		3.2%	5.7%	0.7%

Due to rounding, values shown here may not sum as expected

[1] Total normal cost as of July 1, 2022, adjusted for timing

Executive Summary *(continued)*

Estimated cost impact of recommended assumption changes
Based on the June 30, 2022, actuarial valuation
($ in millions)

	Before Changes (Baseline)	Reflecting Mortality	Reflecting Mortality and Salary Scale	Reflecting Mortality, Salary Scale, and All Other Assumptions
Total – ADC Rate for FY24	11.352%	11.709%	11.985%	11.407%
Delta		0.357%	0.276%	-0.578%
Cumulative		0.357%	0.633%	0.055%
Group A – ADC Rate for FY24	7.078%	7.467%	7.641%	7.442%
Delta		0.389%	0.174%	-0.199%
Cumulative		0.389%	0.563%	0.364%
Group B – ADC Rate for FY24	11.371%	11.706%	11.974%	11.267%
Delta		0.335%	0.268%	-0.707%
Cumulative		0.335%	0.603%	-0.104%
Group C – ADC Rate for FY24	15.279%	16.100%	16.466%	16.185%
Delta		0.821%	0.366%	-0.281%
Cumulative		0.821%	1.187%	0.906%
Group D – ADC Rate for FY24	17.652%	16.502%	17.021%	14.956%
Delta		-1.150%	0.519%	-2.065%
Cumulative		-1.150%	-0.631%	-2.696%

Due to rounding, values shown here may not sum as expected

[1] Total normal cost as of July 1, 2022, adjusted for timing

Basis for Setting Economic Assumptions

Most economic assumptions have 2 or 3 components
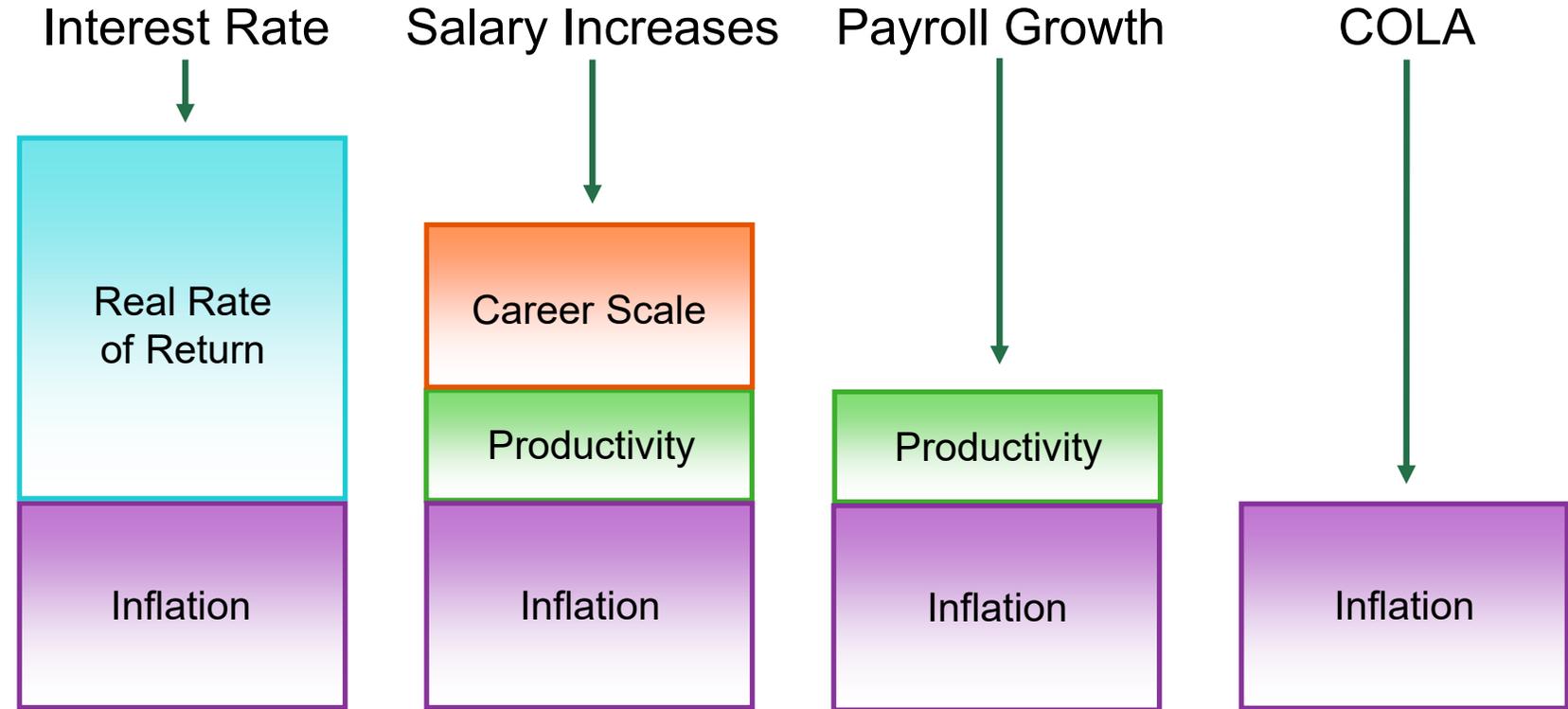
Each component should be consistent across all economic assumptions, but may include a provision for adverse deviation.

Assumed Rate of Inflation

Inflation represents the annual increase in the cost of living and reflects long-term expectations

The current inflation assumption is 2.30%

- Inflation is a component of the following economic assumptions:
  - Investment return
  - Individual salary increases
  - Payroll growth
  - Cost-of-living-adjustments

VPIC's actuary, GRS, recommended maintaining the current inflation assumption of 2.30% and this recommendation was adopted by VPIC during their meeting on July 25, 2023.

Assumed Rate of Inflation

Our analysis of inflation is based on a review of historical inflation as well as expectations of the future

Historical national inflation (CPI-U) averages are:

As of	1-year	5-year	10-year	20-year	30-year	50-year
06/30/2023	2.97%	3.90%	2.71%	2.57%	2.52%	3.94%
06/30/2022	9.06%	3.88%	2.59%	2.53%	2.53%	4.00%

- Indicators for expectations of future inflation:
  - The Philadelphia Federal Reserve Bank Survey of Professional Forecasters 10-year outlook is 2.36% as of Q2 2023 (down from 2.80% as of Q2 2022)
  - The median 20-year inflation assumption from the 2023 Horizon Survey of Capital Market Expectations is 2.46% (nearly unchanged from 2.44% from the 2022 Horizon Survey)
  - Spread between yields on 20-year and 30-year US Treasury bonds with and without inflation indexing is 2.50% and 2.23% as of June 30, 2023, respectively
  - 2022 OASDI Trustees Report's intermediate inflation assumption is 2.40% (unchanged from 2020 report)

We believe continued use of an inflation assumption of 2.30% is reasonable

Assumed Rate of Investment Return

The investment return is a principal assumption used in any actuarial valuation and is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plan

The current investment return assumption of 7.00% consists of three components:

- Inflation[1]: 2.30%

- Real rate of return: 4.95%

- Adjustment for conservatism: (0.25%)

VPIC's actuary, GRS, recommended maintaining the current investment return assumption of 7.00% and this recommendation was adopted by VPIC during their meeting on July 25, 2023.

[1] The inflation assumption of 2.30% was adopted by VPIC during their meeting on July 25, 2023.

Assumed Rate of Investment Return

Our analysis is based on Segal Marco Advisors 2023 capital market assumptions and VPIC's current target asset allocation

Asset Classes	SMA 20-Year Horizon Arithmetic Real Return[1]	Target Allocation	Weighted Real Return
Domestic Equity	6.91%	22.78%	1.57%
International Equity	7.21%	14.93%	1.08%
Emerging Equity	8.71%	6.29%	0.55%
Core Fixed Income	1.61%	19.00%	0.31%
Emerging Debt	6.71%	2.00%	0.07%
Real Estate	3.61%	8.00%	0.29%
Commodities	5.71%	5.00%	0.29%
Short Term	0.71%	2.00%	0.01%
Private Credit	6.31%	10.00%	0.63%
Private Equity	9.96%	10.00%	1.00%
Total		**100.00%**	**5.79%**
Adjustment to Geometric			(0.71%)
Geometric Real Rate of Return[1]			**5.08%**

Component	Current Rate (7.00%)
Inflation	2.30%
Geometric Real Rate of Return	5.08%
Total Expected Rate of Return	7.38%
Adjustment[2]	(0.38%)
Total	7.00%
Confidence Level	56%

We believe continued use of an investment return assumption of 7.00% is reasonable

[1] Reflecting assumed inflation of 2.30%
[2] Adjusting the real rate of return for adverse deviation increases the likelihood of meeting the expectation over a 20-year period. For example, the 38 basis point reduction increases the likelihood of meeting the expectation from 50% to 56%.

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Assumed Rates of Individual Salary Increase

In order to project future benefits, salaries are projected forward over the expected career for each active member

Individual member salary increase components:

- Inflation

- Productivity

- Merit and seniority increases

Since merit and seniority increases are unique to each retirement system, it is appropriate to base this assumption on recent experience

- We study the merit and seniority increases (plus productivity) separately from inflation

- Between 2018 and 2020 inflation averaged 1.72%, which does not include inflation of 5.39% in 2021
  - This assumes that the effects of 2021 inflation are not yet reflected in the historical salary data over the study period

Assumed Rates of Salary Increase *(continued)*

The following table compares the actual and expected individual salary increases over the past 3 years. This table is <u>adjusted to remove actual annual inflation</u> of about 1.72% over the experience period; however, this analysis excludes participants with less than 1 year of service:

Service	Expected Increase	Actual Increase	Proposed Increase
1 – 4	3.40%	4.42%	3.80%
5 – 9	2.45%	3.64%	3.12%
10 – 14	2.20%	2.93%	2.61%
15 – 19	2.20%	2.70%	2.45%
20 – 24	2.20%	2.44%	2.32%
25 – 29	2.20%	1.89%	2.07%
30+	2.20%	1.59%	1.88%
Total	**2.67%**	**3.48%**	**3.06%**
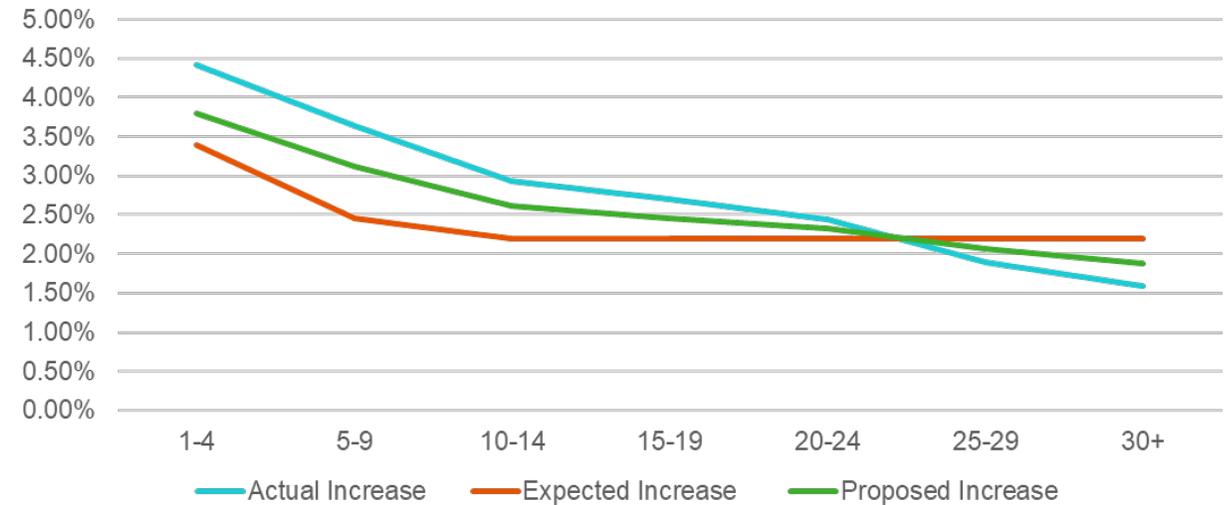
Including the inflation assumption of 2.30%, the total proposed salary increase assumption will average 5.36% per year (a net increase from the current average expected rate of 4.97%)

Based on this experience, we recommend slight **increases** to the non-inflationary portion of individual salary increases for most service amounts. Productivity is included above for purposes of the salary scale analysis.

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Assumed Rate of Payroll Growth

The amortization of the unfunded actuarial accrued liability (UAAL) is calculated as a level percentage of payroll over a closed period of time

The amortization amount is expected to increase each year as payroll increases (i.e., amortization payments are back loaded)

A lower payroll growth assumption is more conservative

- A lower assumption results in larger amortization payments (e.g., 0% would equate to level dollar)

The current payroll growth assumption of 3.00% consists of the following components:

Inflation	2.30%
Productivity	0.70%
Total payroll growth	3.00%

Assumed Rate of Payroll Growth *(continued)*

As the adopted inflation component is 2.30%, we need to examine the productivity component

Productivity can be measured as the excess of the increase in the National Average Wage over inflation. As of 2022:

- The 20-year average of the National Average Wage is 3.1%

- The 20-year average inflation is 2.3%

- Therefore, productivity has averaged about 0.8% over the last 20 years

We have no reason to believe that continued use of the 0.70% productivity component is inappropriate going forward

Assumed Rate of Payroll Growth *(continued)*

The following table summarizes the System's historical payroll and active population growth:

Year Ended June 30	Annualized Payroll ($ in Millions)	Active Members
2022	$355.7	8,059
2017	274.8	7,302
2012	215.1	6,606
2007	162.3	6,166
2002	99.2	4,924
• 5-year average:	5.3%	2.0%
• 10-year average[1]:	5.2%	2.0%
• 15-year average[1]:	5.4%	1.8%
• 20-year average[1]:	6.6%	2.5%

Payroll increases have averaged around 3.3%/year and 3.2%/year over the last five and ten years, respectively, adjusting for headcount

[1] The 2015 payroll/active member figures were based on estimates as no actuarial valuation was performed that year

Assumed Rate of Payroll Growth *(continued)*

The following table summarizes the components of the current and recommended payroll growth assumption:

Component	Current	Recommended
Inflation	2.30%	2.30%
Productivity	0.70%	0.70%
Total payroll growth	3.00%	3.00%

We recommend no change to the 3.00% payroll growth assumption

Assumed COLA Increases

Cost of Living Adjustments (COLAs) are generally linked to inflation

VMERS contains the following COLA provisions:

- Group A:
  - The lesser of (50% of **CPI**, 2%). If **CPI** is less than 0%, then no increase[1]

- Groups B/C/D:
  - The lesser of (50% of **CPI**, 3%). If **CPI** is less than 0%, then no increase[1]

[1] Per statute, the COLA will be 0% in years that follow a year with negative CPI, subject to applicable offset of future increases.

Assumed COLA Increases *(continued)*

We studied expected future COLAs based on stochastic projections of the adopted 2.30% inflation assumption, subject to the parameters on the prior slide

As a result, we recommend the following COLA assumptions:

- Group A:
  - 1.10% (no change)

- Groups B/C/D:
  - 1.20% (no change)

Administrative Expenses

Current assumption:

- 0.40% of projected payroll is added to normal cost

Year Ended June 30	Administrative Expenses[1]	Projected Payroll[1]	Percentage
2022	$1.303	$348.8	0.373%
2021	1.249	344.1	0.363%
2020	1.354	321.4	0.421%
Total	**$3.906**	**$1,014.3**	**0.385%**

Due to rounding, values shown here may not sum as expected

Actual administrative expenses have emerged reasonably close to 0.40% of projected payroll

Additional staff expected to increase VMERS-related expenses[2] by approximately $155,000 per year

- Or roughly 0.046% of $338,100,000 average projected payroll

Therefore, we recommend increasing this assumption from 0.40% to 0.45% of projected payroll

[1] Dollars in millions
[2] Allocated portion of expected total administrative expense increase of approximately $750,000 per year

Overview: How Mortality Assumption Is Set

Review past experience

Compare past experience ("actual") with assumptions ("expected")

- Examine on a "benefit-weighted" basis as opposed to a "headcount-weighted" basis

Determine appropriate standardized table as basis for new assumption

Assess credibility of data set and calculate weighting factor

- Actual experience can be the assumption basis for fully-credible data
- Partially-credible data is blended with standardized table
- Typically, we assume 1,082 deaths needed in a subgroup to be considered fully-credible
  - 90% confident that results are within a range of 5% around the mean
- *Solely for mortality purposes, we included experience from July 1, 2017, through June 30, 2022 (five-year period) in order to increase the overall credibility of the data analyzed*

The mortality analysis was adjusted for COVID-19

- Adjustments of 96%, 90%, and 82% were applied to actual experience in 2020, 2021, and 2022, respectively, based on data from the CDC related to observed "excess mortality" (all causes) relative to expected
  - These adjustments approximate the level of mortality VMERS would have experienced in 2020, 2021, and 2022 in the absence of the pandemic

Adjusting for Excess Mortality

Actual Retiree Deaths Relative to Expected[1], Headcount Basis – Total

Legend:
- Actual Deaths
- Adjusted Actual
- Expected Deaths
- Actual Rate
- Expected Rate
- 2015 and 2016 experience has been included here for illustrative purposes

Actual deaths for years beginning July 1, 2019, 2020, and 2021 were lower than expected, but expressed as a rate of mortality, experience has not been highly consistent over the last seven years. This type of variability may persist until the size of the retiree population is larger.

Years where excess mortality likely exist – primarily the Plan Years beginning July 1, 2020, and July 1, 2021 in this case – can be adjusted[2] to approximate "pandemic-less" data

- A 96% adjustment factor is applied to experience beginning July 1, 2019 to capture the partial year impact

- "Full-year" adjustment factors of 90% and 82% are applied to experience years beginning July 1, 2020, and 2021, respectively

Then "adjusted actual" experience can be used to develop recommended adjustments to the base table under the premise that a pandemic-like event will not persist

[1] Expected deaths for all years is estimated based on the current mortality table
2 Adjustment factors based on data from the CDC related to observed "excess mortality" (all causes) relative to expected

Death After Retirement

Our analysis uses a benefit-weighted approach, which weights the probability of death with each annuitant's pension benefit

- This methodology takes into consideration any correlation between the health of the annuitant and the size of the benefit

In 2019, the Society of Actuaries published a series of Pub-2010 mortality tables derived from public plan experience

- Three broad classifications based on teachers, public safety, and general employees

- Three separate versions of each of the table classifications: Baseline, Above Median, and Below Median

- Contingent annuitant mortality studied separately from retiree mortality
  - Contingent annuitant mortality is generally worse than retiree mortality

- Separate mortality tables for "healthy" annuitants and those members retiring with a disability pension

In order to determine which Pub-2010 table(s) should be applied, we separate the data by group, status and gender and recommended the Pub-2010 table variation that most accurately fits the data

Death After Retirement (*continued*)

The current assumptions are the following:

- Healthy Post-Retirement – Retirees:

    – Groups A/B/C: 104% of 40% PubG-2010 General Healthy Retiree Amount-Weighted Below Median Table and 60% of PubG-2010 General Healthy Retiree Amount-Weighted Table

    – Group D: PubG-2010 General Healthy Retiree Amount-Weighted Table

- Healthy Post-Retirement – Beneficiaries:

    – Groups A/B/C: 70% Pub-2010 Contingent Survivor Amount-Weighted Below-Median Table and 30% of Pub-2010 Contingent Survivor Amount-Weighted Table

    – Group D: Pub-2010 Contingent Survivor Amount-Weighted Table

- Disabled Post-Retirement:

    – All Groups: PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Table

- All rates are projected generationally using the MP-2019 mortality improvement scale

Death After Retirement (*continued*)

Over the five-year experience period, there were fewer actual retiree, beneficiary, and disabled deaths than expected

Recommend updating the current base tables, while applying adjustments based on experience where "credible" data exists. Specifically, we recommend the following:

- Healthy Post-Retirement – Retirees:

  – Groups A and B: PubG-2010 General Healthy Retiree Amount-Weighted Below Median[1] Table for males and females <u>with</u> credibility adjustments of 90% and 87%, respectively, of the rates for all ages

  – Group C: PubG-2010 General Healthy Retiree Amount-Weighted Table <u>with no</u> credibility adjustments

  – Group D: PubS-2010 Public Safety Retiree Amount-Weighted Below-Median[2] Table <u>with no</u> credibility adjustments

- Healthy Post-Retirement – Beneficiaries:

  – All Groups: Pub-2010 Contingent Survivor Amount-Weighted Below-Median[3] Table <u>with no</u> credibility adjustments

[1] Most (91%) Group A/B retirees have benefit amounts below the median amount from the Pub-2010 general retiree dataset when adjusted for the passage of time
[2] Most (88%) Group D retirees have benefit amounts below the median amount from the Pub-2010 public safety retiree dataset when adjusted for the passage of time
[3] Most (83%) beneficiaries have benefit amounts below the median amount from the Pub-2010 contingent survivor dataset when adjusted for the passage of time

Death After Retirement (*continued*)

- Disabled Post-Retirement:

    – Groups A/B/C: PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Table <u>with no</u> credibility adjustments

    – Group D: PubS-2010 Safety Disabled Retiree Amount-Weighted Table <u>with no</u> credibility adjustments

- Update the mortality projection scale to MP-2021 to reflect future improvements in mortality for all groups

Healthy Post-Retirement – Retirees Groups A/B – Male

Actual Versus Expected Experience, Benefit-Weighted Basis – Groups A/B – Male
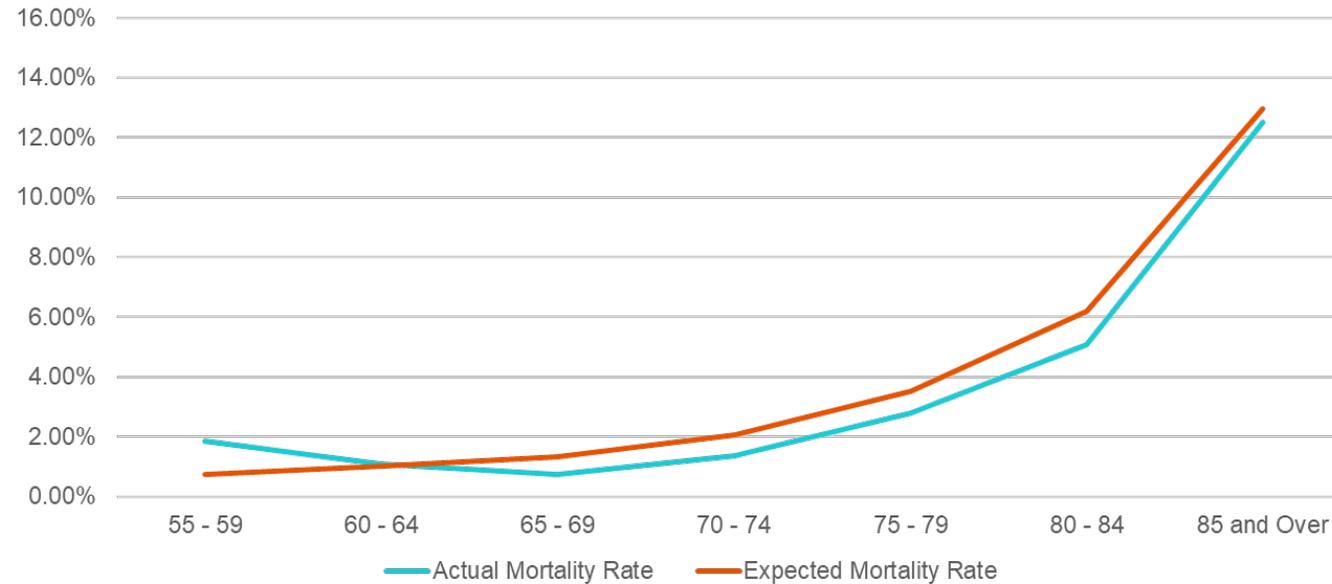
Basis	Exposures	Actual Deaths	Expected	Actual to Expected
Counts	4,790	140[1]	150	93%
Benefits	$55,269[2]	$1,177[2]	$1,462[2]	80%

[1] 140 actual (adjusted) deaths in the observation period yields partial credibility of 36%
[2] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Retirees Groups A/B – Male

Actual Versus Proposed Experience, Benefit-Weighted Basis – Groups A/B – Male
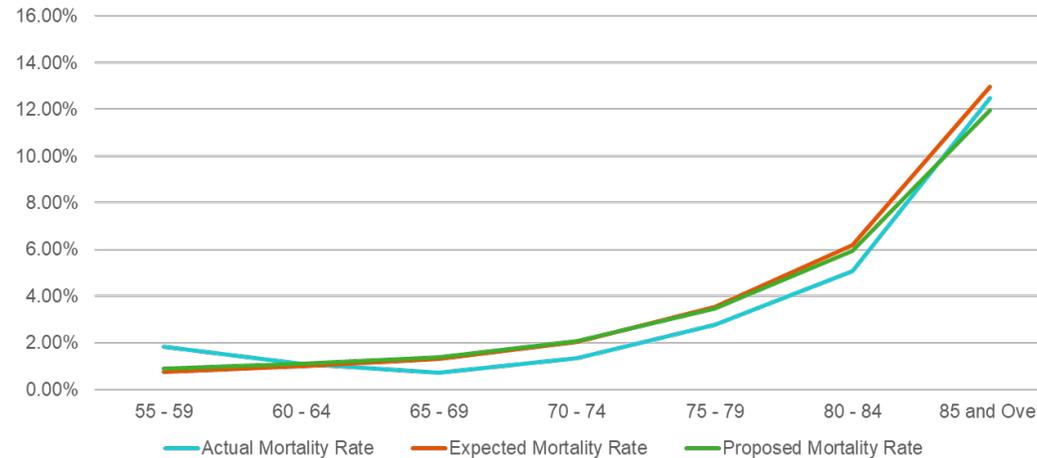
On a benefit-weighted basis, unadjusted PubG-2010 Retiree Below Median Table (male) results in a reduction of $1,611,000 in benefits due to the proposed assumption

- Credibility-weighted adjustment (36%) results in a reduction of $1,450,000 in benefits

Recommend 90% of PubG-2010 Retiree Below Median Table (male), which results in $1,450,000 proposed reduction

Basis	Exposures	Actual Deaths	Proposed Deaths	Actual to Proposed
Benefits	$55,269[1]	$1,177[1]	$1,450[1]	81%

[1] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Retirees Groups A/B – Female

Actual Versus Expected Experience, Benefit-Weighted Basis – Groups A/B – Female
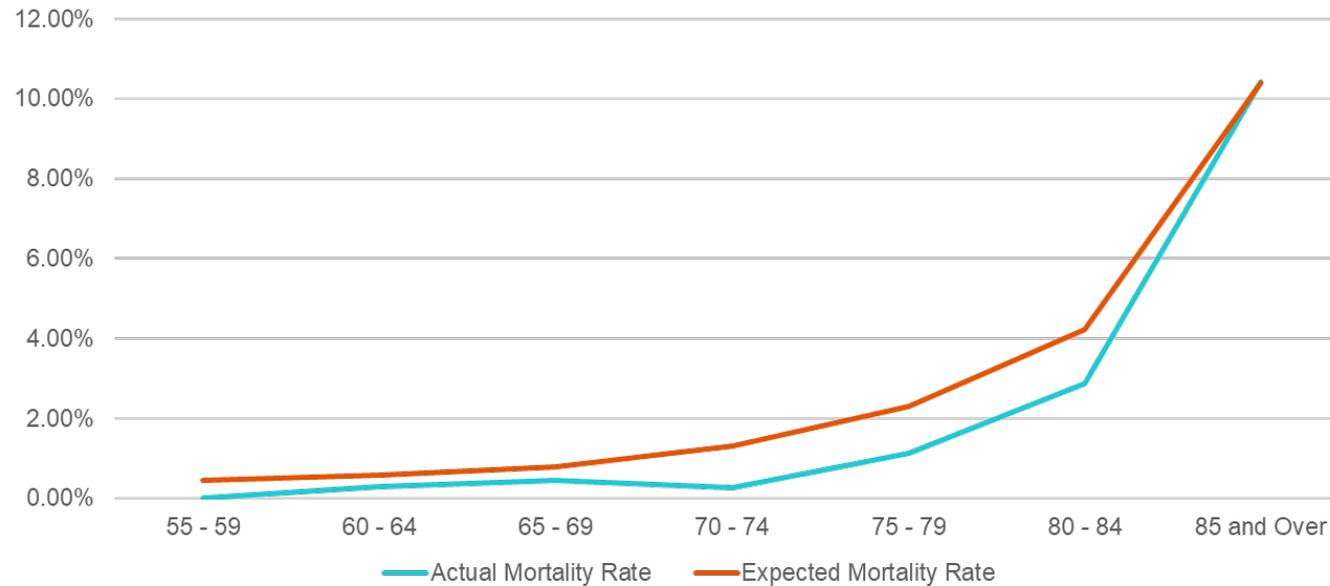
Basis	Exposures	Actual Deaths	Expected	Actual to Expected
Counts	8,672	126[1]	191	66%
Benefits	$59,120[2]	$706[2]	$1,125[2]	63%

[1] 126 actual (adjusted) deaths in the observation period yields partial credibility of 34%
[2] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Retirees Groups A/B – Female

Actual Versus Proposed Experience, Benefit-Weighted Basis – Groups A/B – Female
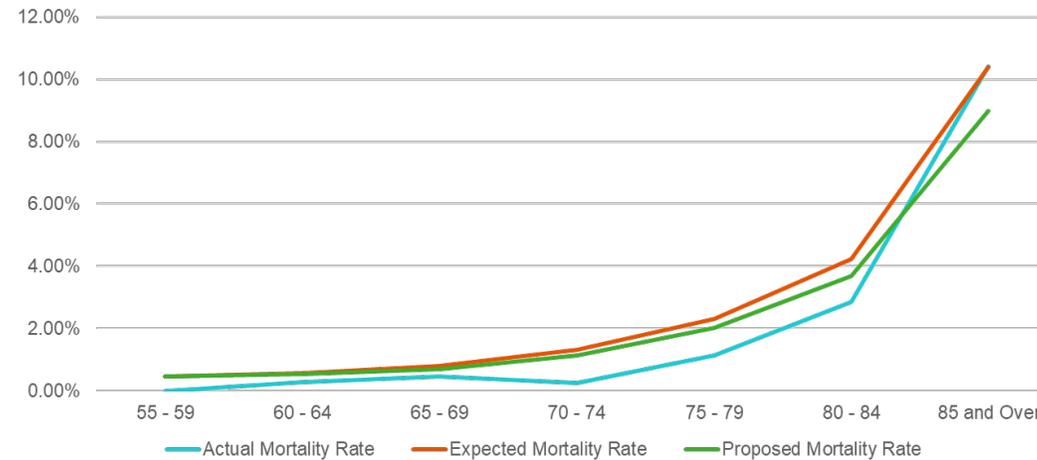
On a benefit-weighted basis, unadjusted PubG-2010 Retiree Below Median Table (female) results in a reduction of $1,130,000 in benefits due to the proposed assumption

- Credibility-weighted adjustment (34%) results in a reduction of $983,000 in benefits

Recommend 87% of PubG-2010 Retiree Below Median Table (female), which results in $983,000 proposed reduction

Basis	Exposures	Actual Deaths	Proposed Deaths	Actual to Proposed
Benefits	$59,120[1]	$706[1]	$983[1]	72%

[1] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Retirees Group C – Unisex

Actual Versus Expected Experience, Benefit-Weighted Basis – Group C – Unisex
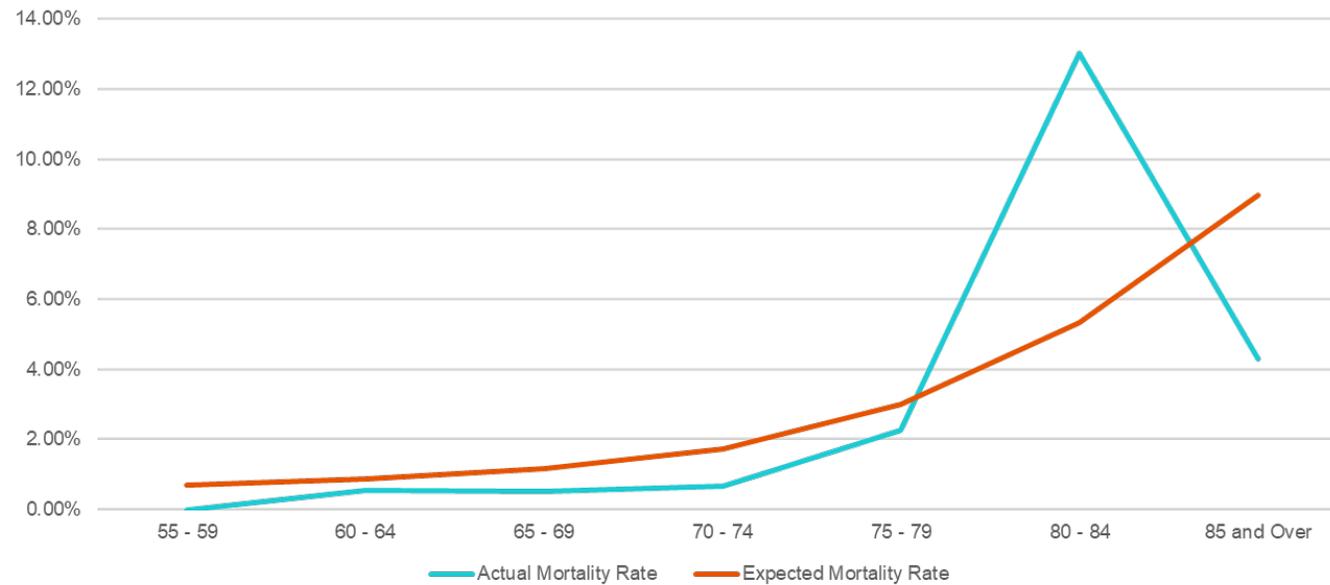
Basis	Exposures	Actual Deaths	Expected	Actual to Expected
Counts	1,865	25[1]	33	76%
Benefits	$40,090[2]	$453[2]	$614[2]	74%

[1] 25 actual (adjusted) deaths in the observation period yields partial credibility of 15%
[2] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Retirees Group C – Unisex

### Actual Versus Proposed Experience, Benefit-Weighted Basis – Group C – Unisex
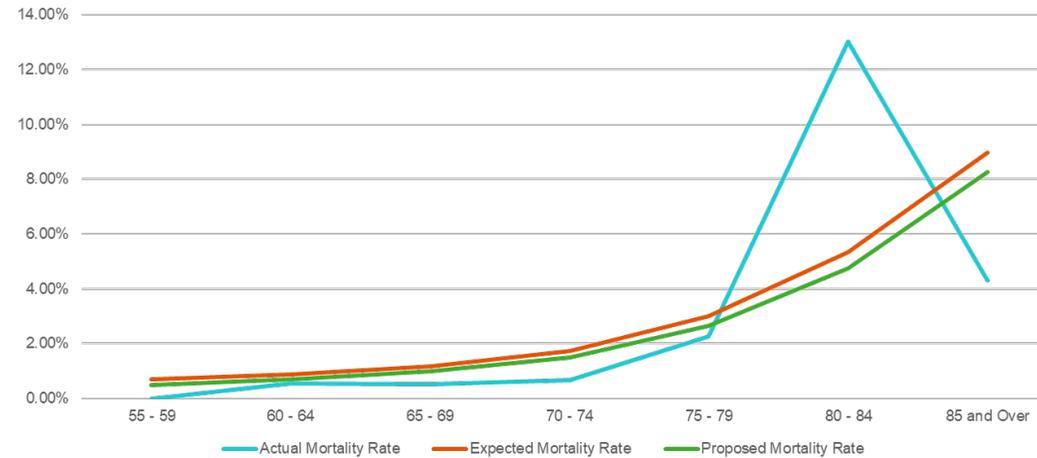
On a benefit-weighted basis, unadjusted PubG-2010 Retiree Table results in a reduction of $519,000 in benefits due to the proposed assumption

- 25 actual deaths in the observation period does not yield enough partial credibility to warrant further adjustment

Recommend unadjusted (due to limited experience) PubG-2010 Retiree Table, which results in $519,000 proposed reduction

Basis	Exposures	Actual Deaths	Proposed Deaths	Actual to Proposed
Benefits	$40,090[1]	$453[1]	$519[1]	87%

[1] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Retirees Group D – Unisex

Actual Versus Expected Experience, Benefit-Weighted Basis – Group D – Unisex
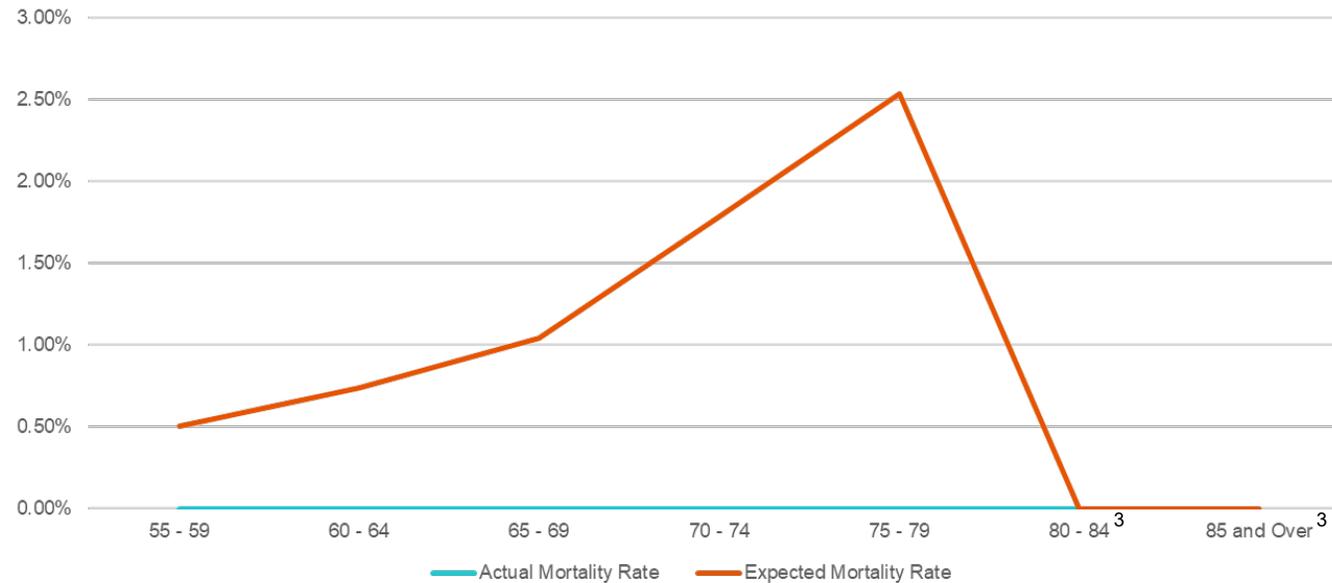
Basis	Exposures	Actual Deaths	Expected	Actual to Expected
Counts	263	0[1]	2	0%
Benefits	$7,030[2]	$0[2]	$53[2]	0%

[1] 0 actual (adjusted) deaths in the observation period yields partial credibility of 0%
[2] Based on annual benefits in thousands of dollars
[3] There are no exposures in this age cohort

Healthy Post-Retirement – Retirees Group D – Unisex

Actual Versus Proposed Experience, Benefit-Weighted Basis – Group D – Unisex
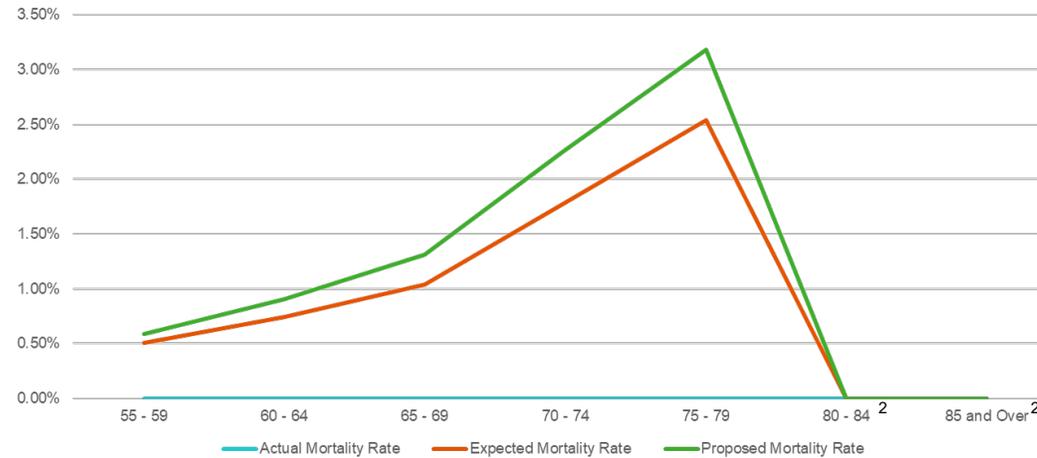
On a benefit-weighted basis, unadjusted PubS-2010 Retiree Below Median Table results in a reduction of $65,000 in benefits due to the proposed assumption

- 0 actual deaths in the observation period does not yield enough partial credibility to warrant further adjustment

Recommend unadjusted (due to limited experience) PubS-2010 Retiree Below Median Table, which results in $65,000 proposed reduction

Basis	Exposures	Actual Deaths	Proposed Deaths	Actual to Proposed
Benefits	$7,030[1]	$0[1]	$65[1]	0%

[1] Based on annual benefits in thousands of dollars
[2] There are no exposures in this age cohort

Healthy Post-Retirement – Beneficiaries All Groups – Unisex

Actual Versus Expected Experience, Benefit-Weighted Basis – All Groups – Unisex
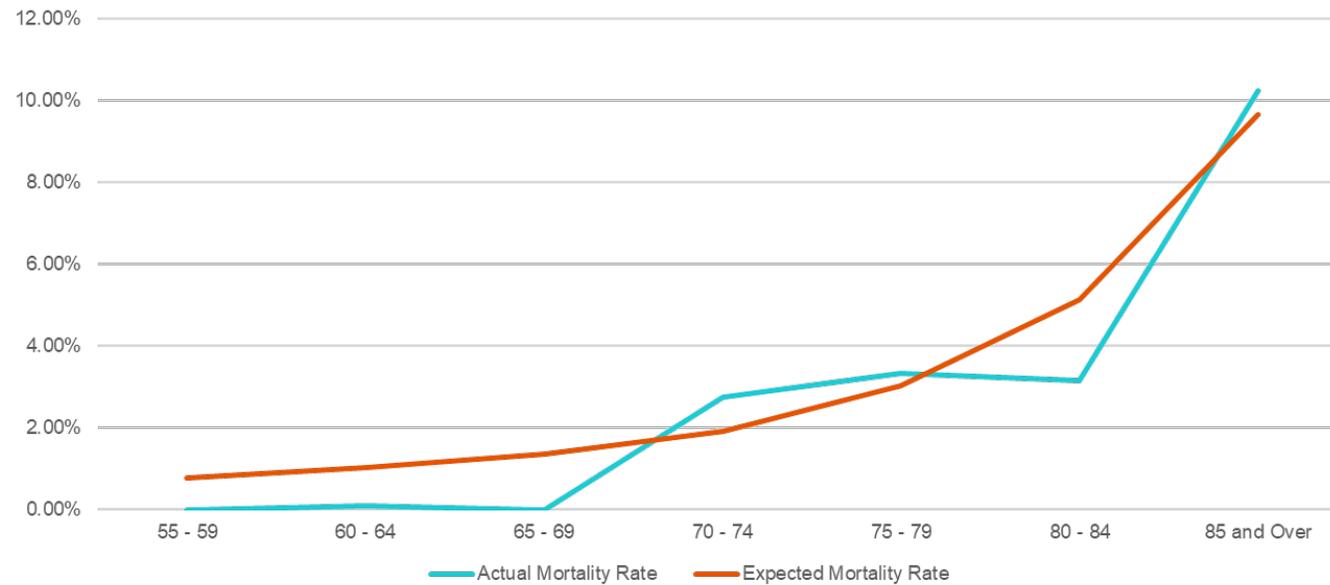
Basis	Exposures	Actual Deaths	Expected	Actual to Expected
Counts	1,197	45[1]	46	99%
Benefits	$8,474[2]	$241[2]	$278[2]	87%

[1] 45 actual (adjusted) deaths in the observation period yields partial credibility of 21%
[2] Based on annual benefits in thousands of dollars

Healthy Post-Retirement – Beneficiaries All Groups – Unisex

Actual Versus Proposed Experience, Benefit-Weighted Basis – All Groups – Unisex
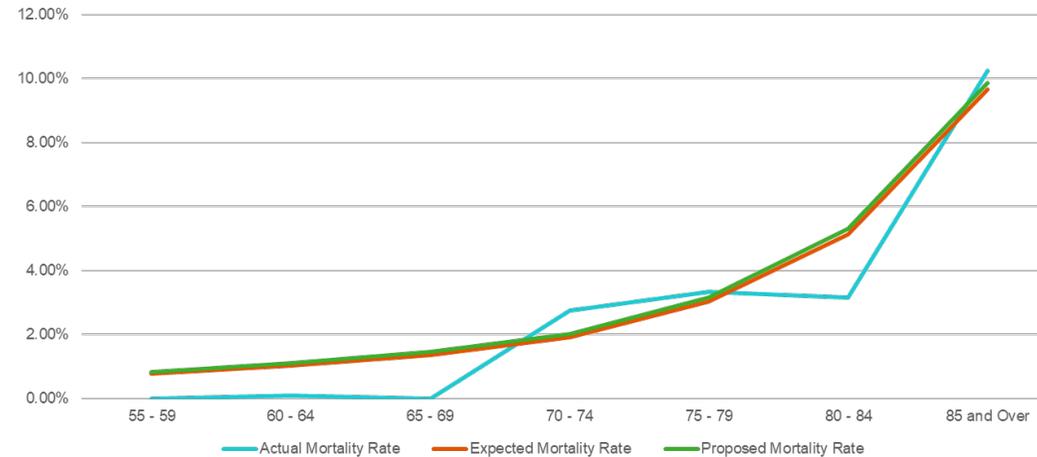
On a benefit-weighted basis, unadjusted Pub-2010 Contingent Survivor Below Median Table results in a reduction of $288,000 in benefits due to the proposed assumption

- 45 actual deaths in the observation period does not yield enough partial credibility to warrant further adjustment

Recommend unadjusted (due to limited experience) Pub-2010 Contingent Survivor Below Median Table, which results in $288,000 proposed reduction

Basis	Exposures	Actual Deaths	Proposed Deaths	Actual to Proposed
Benefits	$8,474[1]	$241[1]	$288[1]	84%

[1] Based on annual benefits in thousands of dollars

Disabled Post-Retirement Groups A/B/C – Unisex

The current mortality table for all disabled lives in Groups A, B, and C is the PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table.

Mortality experience for disabled annuitants in Groups A, B, and C has been less than the current assumption

- The ratio of actual to expected deaths on a benefit-weighted basis is 63%

- Based on 9 actual deaths over the five-year study period

We recommend:

- **Maintaining the current mortality table with no credibility adjustments (the limited actual experience is insufficient to warrant making an adjustment to the published table)**

- **Updating the mortality projection scale to MP-2021**

Gender	Exposures[1]	Actual Deaths[1]	Expected Deaths[1]	Actual to Expected	Proposed Deaths[1]	Actual to Proposed
Male	$1,851	$13	$49	25%	$49	26%
Female	$971	$34	$26	130%	$26	132%

[1] Based on annual benefits in thousands of dollars

Disabled Post-Retirement Group D – Unisex

The current mortality table for all disabled lives in Group D is the PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table.

Mortality experience for disabled annuitants in Group D has been less than the current assumption

- The ratio of actual to expected deaths on a benefit-weighted basis is 0%

- Based on 0 actual deaths over the five-year study period

We recommend:

- **Updating to use the PubS-2010 Safety Disabled Retiree Amount-Weighted Mortality Table with no credibility adjustments (the limited actual experience is insufficient to warrant making an adjustment to the published table)**

- **Updating the mortality projection scale to MP-2021**

Gender	Exposures[1]	Actual Deaths[1]	Expected Deaths[1]	Actual to Expected	Proposed Deaths[1]	Actual to Proposed
Male	$454	$0	$9	0%	$2	0%
Female	$0	$0	$0	0%	$0	0%

[1] Based on annual benefits in thousands of dollars

Death While In Active Service

Mortality rates applied to active members

- Very few members die in active service

  – Liability associated with active death is a small percentage of the total liability

  – Plan experience is insufficient to set assumption

The current assumptions are the following:

- Groups A/B/C: 40% of PubG-2010 General Employee Amount-Weighted Below Median Table, 60% of PubG-2010 General Employee Amount-Weighted Table

- Group D: PubG-2010 General Employee Amount-Weighted Above Median Table

- All rates are projected generationally using the MP-2019 scale

Death While In Active Service *(continued)*

We recommend the following:

- Groups A/B: 60% of PubG-2010 General Employee Amount-Weighted Below Median[1] Table, 40% of PubG-2010 General Employee Amount-Weighted Table, <u>with no</u> credibility adjustments

- Group C: PubG-2010 General Employee Amount-Weighted Table <u>with no</u> credibility adjustments

- Group D: PubS-2010 Public Safety Employee Amount-Weighted Below Median[2] Table <u>with no</u> credibility adjustments

- Update the mortality projection scale to MP-2021

[1] A large portion (80%) of Group A/B actives have salaries below the median amount from the Pub-2010 general employee dataset when adjusted for the passage of time. 20% of the 80% below median salary group are combined with the 20% having salaries above the median amount to form a "homogenous" group representing 40% of Group A/B actives. The remaining 60% are weighted below median.
[2] Most (90%) Group D actives have salaries below the median amount from the Pub-2010 public safety employee dataset when adjusted for the passage of time

Active Retirements

Current rates:

- Group A: Sex-distinct rates that vary based on members' age
- Group B: Sex-distinct rates that vary based on members' age
- Group C: Unisex rates that vary based on members' age
- Group D: Unisex rates that vary based on members' age and service amounts

Eligibility criteria for retirement differs by group, age, and service. We analyzed retirement experience on a benefit-weighted basis for the following groups:

- Group A
  – Males and females separately
- Group B
  – Males and females separately
- Group C
  – Unisex
- Group D
  – Unisex

Active Retirements – Group A – Male

Group A - Male:

– Overall, slightly fewer retirements than expected
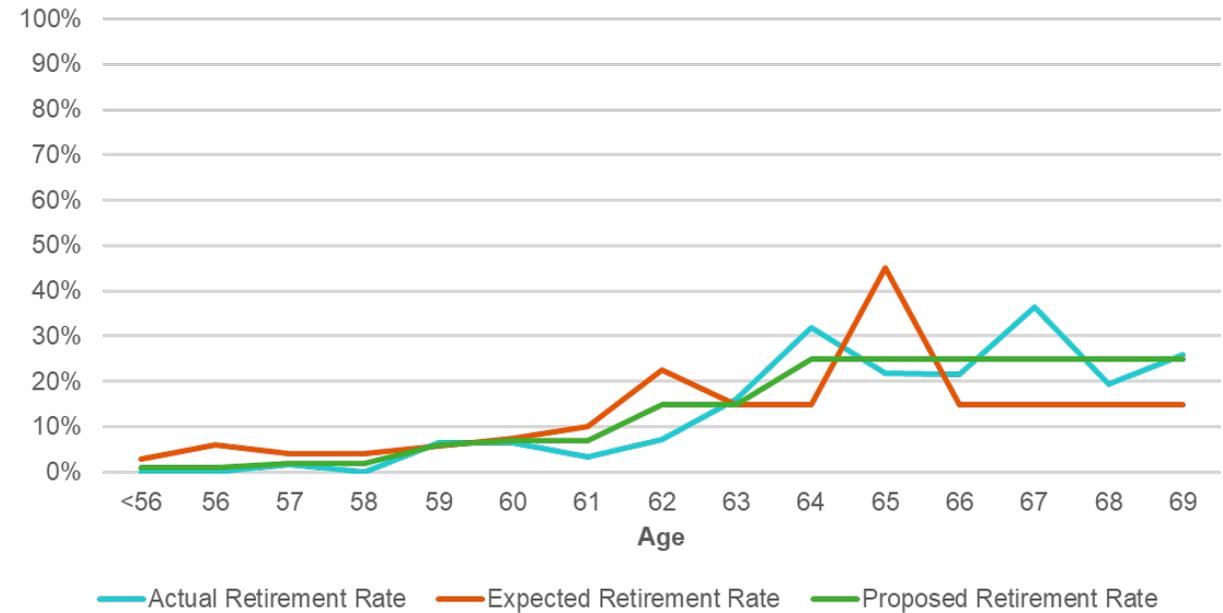
– Fewer retirements at some ages

| | Actual | Expected | Actual to | Proposed | Actual to |
Exposures[1]	Retirements[1]	Retirements[1]	Expected	Retirements[1]	Proposed
$5,069	$506	$590	86%	$547	92%

Recommend modifying rates to better match actual experience

[1] Based on annual benefits in thousands of dollars

Active Retirements – Group A – Female

Group A - Female:

– Overall, fewer retirements than expected
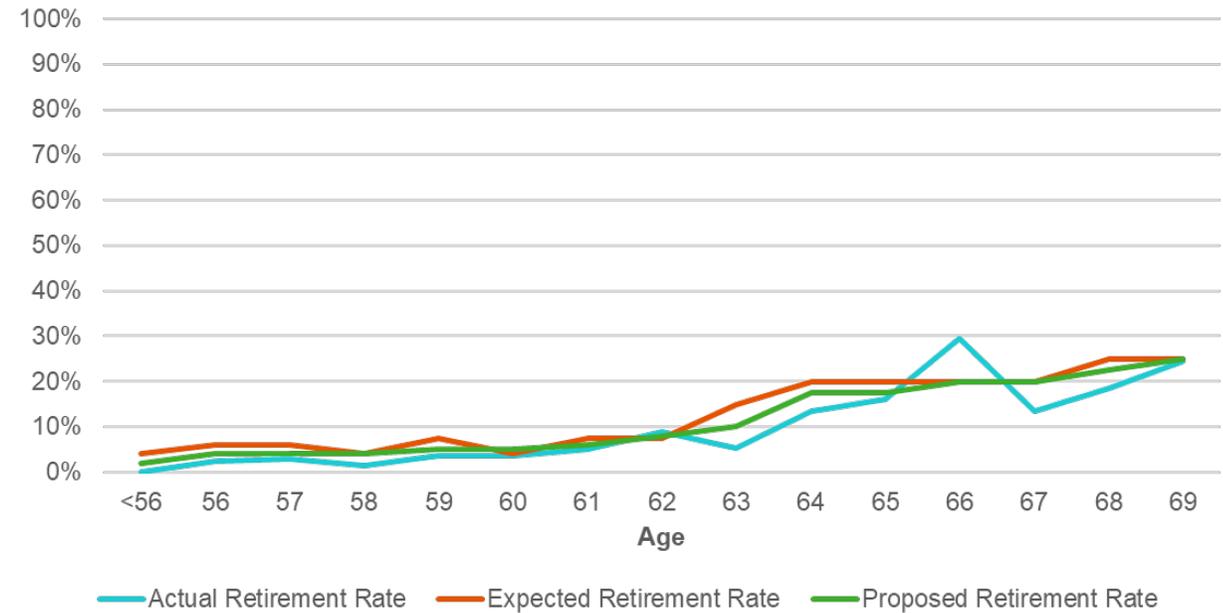
– Fewer retirements at most ages

Actual Retirement Rate — Expected Retirement Rate — Proposed Retirement Rate

Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
$10,524	$836	$1,129	74%	$982	85%

Recommend decreasing rates to better match actual experience

[1] Based on annual benefits in thousands of dollars

Active Retirements – Group B – Male

Group B - Male:

– Overall, fewer retirements than expected
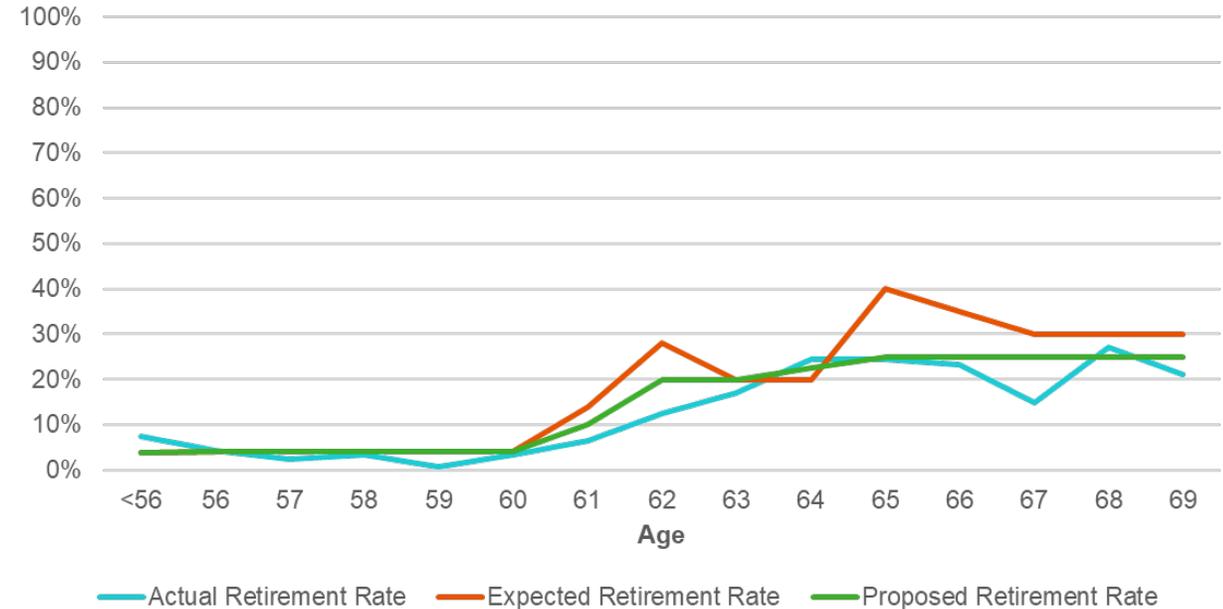
– Fewer retirements at most ages

Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
$20,383	$1,894	$2,685	71%	$2,232	85%

Recommend decreasing rates to better match actual experience

[1] Based on annual benefits in thousands of dollars

Active Retirements – Group B – Female

Group B - Female:

– Overall, slightly fewer retirements than expected
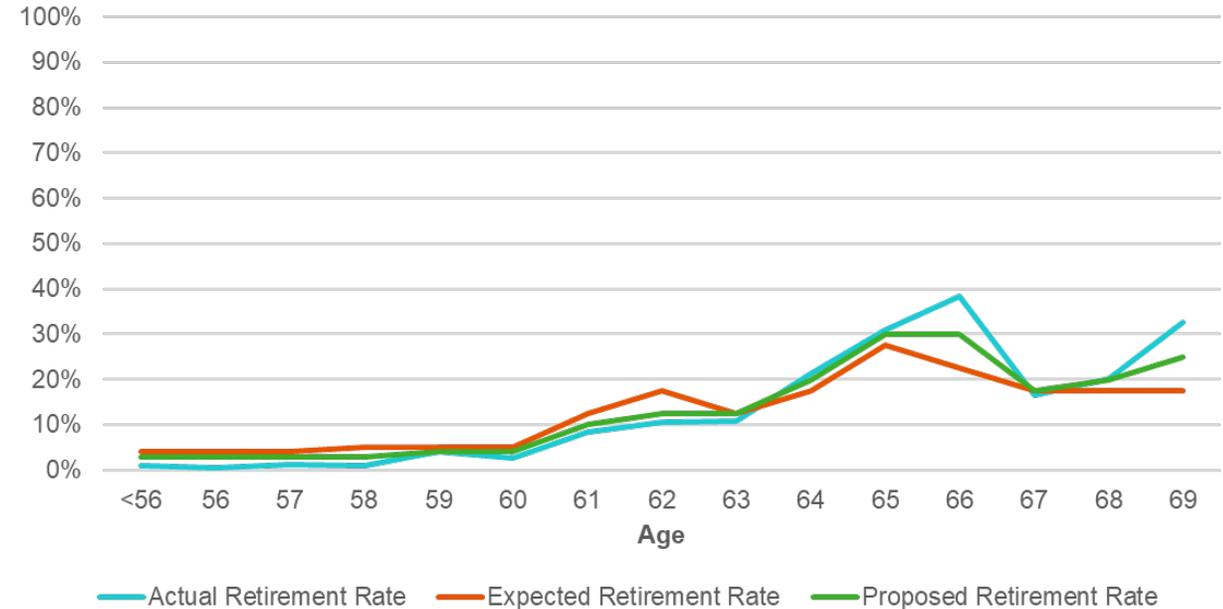
– Fewer retirements at some ages


Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
$20,438	$1,994	$2,243	89%	$2,124	94%

Recommend modifying rates to better match actual experience

[1] Based on annual benefits in thousands of dollars

Active Retirements – Group C – Unisex

Group C - Unisex:

– Overall, slightly fewer retirements than expected
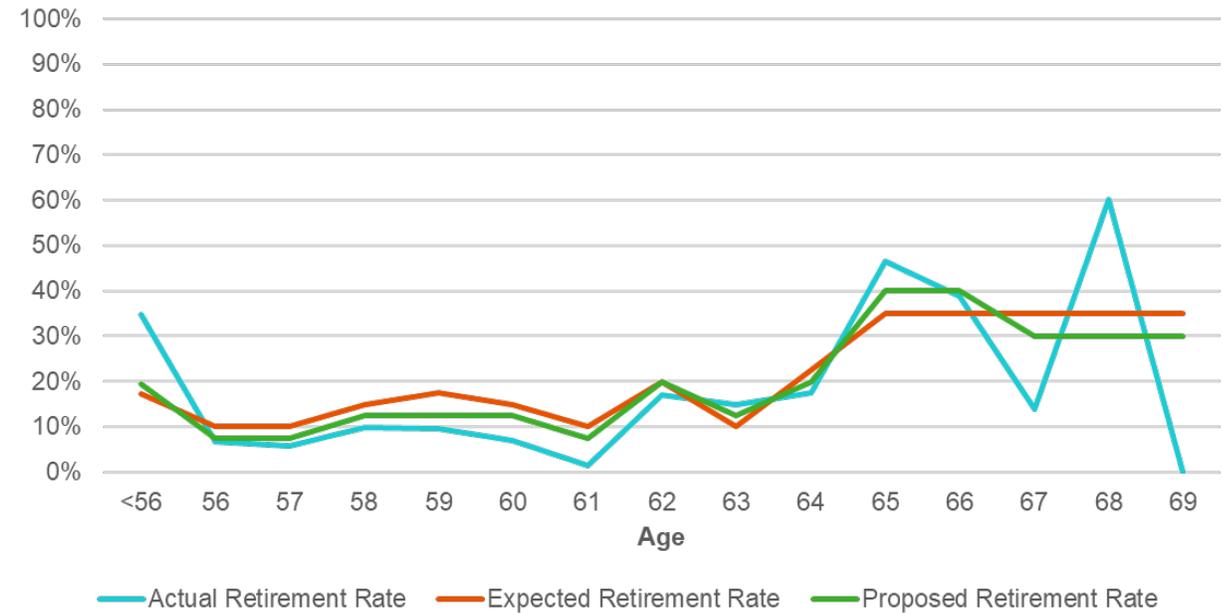
– Fewer retirements at some ages

Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
$10,996	$1,803	$1,901	95%	$1,782	101%

Recommend modifying rates to better match actual experience

[1] Based on annual benefits in thousands of dollars

Active Retirements – Group D – Unisex

Group D - Unisex:

– Overall, slightly more retirements than expected

– More retirements at some ages
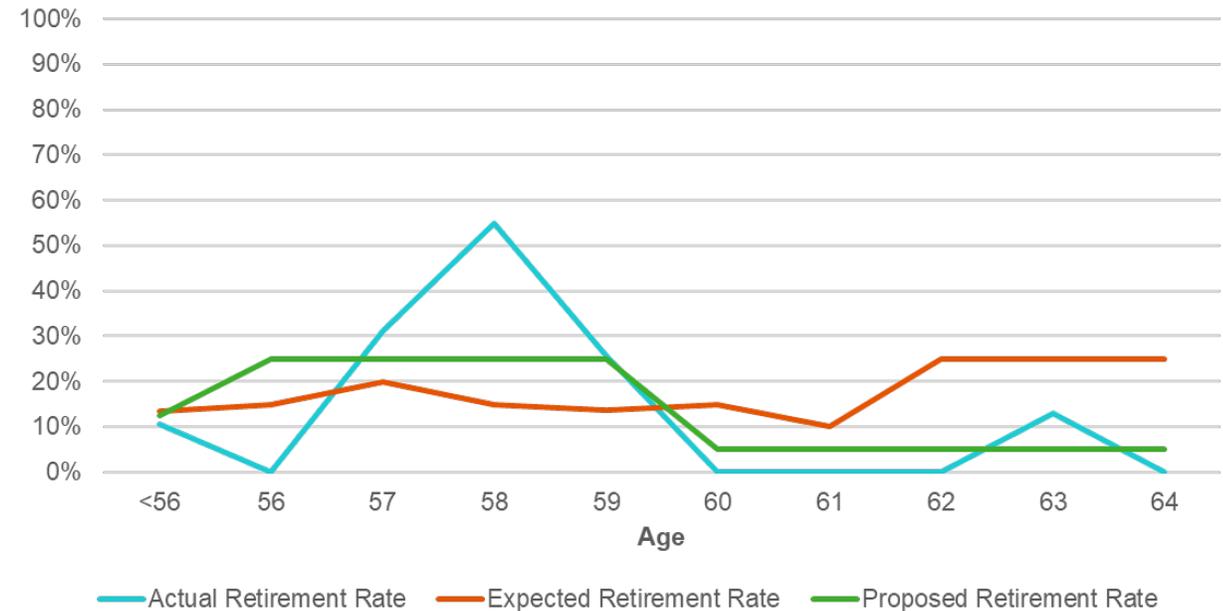
Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
$1,893	$294	$285	103%	$288	102%

Due to relatively limited experience, we recommend applying a single set of age-based rates for all Group D members, with various modifications to better match actual experience

[1] Based on annual benefits in thousands of dollars

Inactive Vested Retirements – Pre-NRA

The current assumptions are as follows:

- 10% of inactive vested members are assumed to retire from Early Retirement Age (ERA) until Normal Retirement Age (NRA)

We have analyzed inactive vested retirement experience on a unisex, benefit-weighted basis. Experience shows that slightly more inactive vested members are retiring before their NRA than expected. However, due to limited and sporadic experience, we recommend maintaining the current pre-NRA rate of 10%.
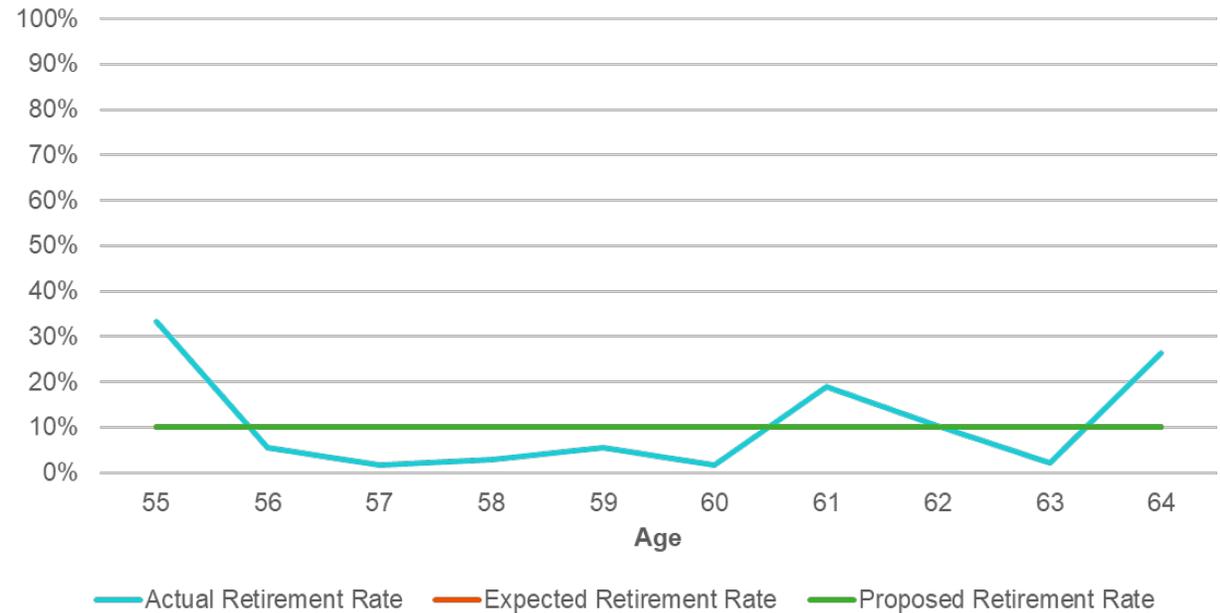
Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
$5,755	$693	$575	120%	$575	120%

[1] Based on annual benefits in thousands of dollars

Inactive Vested Retirements – Post-NRA

The current assumptions are as follows:

- 100% of inactive vested members are assumed to retire after reaching their NRA

For Inactive Vested members that have reached/surpassed their Normal Retirement Age, there was very limited experience available during the three-year experience period.

Recommend maintaining the post-NRA inactive vested retirement rate of 100%

Termination Before Retirement

Experience shows that more active members are terminating prior to retirement than expected, in aggregate.

Current rates are service-based and sex-distinct and are applied to all groups

- The current turnover rates generated a moderate net experience loss in 2020, a lesser net experience loss in 2021, and a moderate net experience gain in 2022

We have analyzed termination experience on a headcount-weighted basis. When analyzing the experience separately for each group, the experience for Group A appears to be similar to the experience for Group B, and the experience for Group C appears to be similar to the experience for Group D.

We recommend applying the termination rates on a unisex basis and having separate assumptions based upon group as follows:

- Groups A and B

- Groups C and D

- Adjust the termination rates to better fit experience where applicable

Termination Before Retirement Groups A and B – Unisex

Groups A and B – Unisex:

– Overall, slightly more terminations than expected

– More terminations at most service amounts

Recommend applying the termination rates on a unisex basis to all members in Groups A and B, and slightly increasing the termination rates to better fit experience where applicable
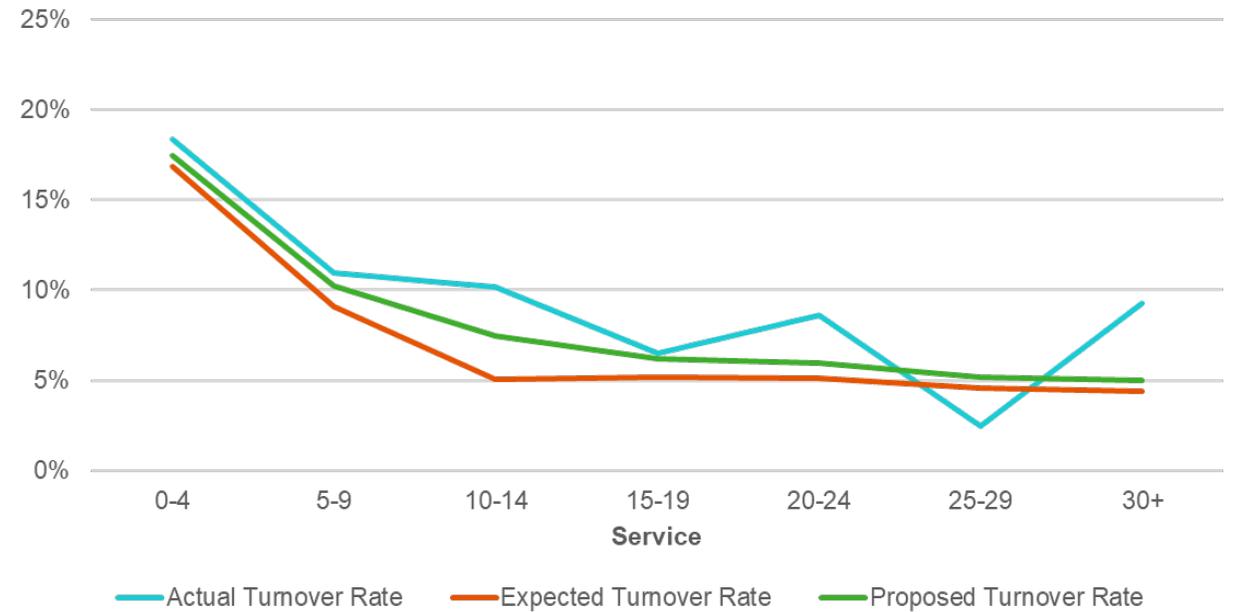
Exposures	Actual Terminations	Expected Terminations	Actual to Expected	Proposed Terminations	Actual to Proposed
14,692	2,210	1,924	115%	2,058	107%

Termination Before Retirement Groups C and D – Unisex

Groups C and D – Unisex:

- Overall, slightly fewer terminations than expected

- Fewer terminations at some service amounts

Recommend applying the termination rates on a unisex basis to all members in Groups C and D, and slightly decreasing the termination rates to better fit experience where applicable
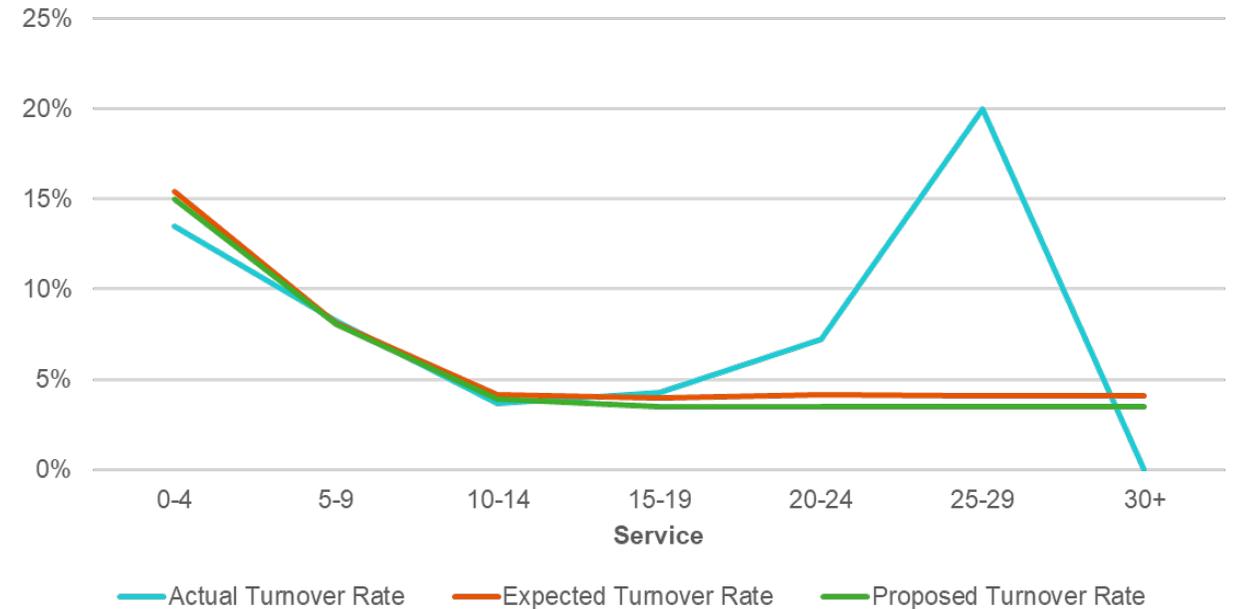
Exposures	Actual Terminations	Expected Terminations	Actual to Expected	Proposed Terminations	Actual to Proposed
2,869	271	292	93%	282	96%

Disability Retirement

Experience over the prior three years shows that more active members retired under a disability pension than expected.

The current disability retirement assumptions are sex-distinct, based on age, and applied to members in all groups. We have analyzed disability retirement experience on a benefit-weighted basis. When analyzing the experience separately for each group, the experience for Group A appears to be similar to the experience for Group B, and the experience for Group C appears to be similar to the experience for Group D.

We recommend applying separate assumptions based upon group as follows:

- Groups A and B

- Groups C and D

- Adjust the disability retirement rates to better fit experience where applicable

Disability Retirements Groups A and B – Males

Groups A and B – Males:

– Overall, substantially more disabilities than expected

Recommend applying separate disability retirement rates for male members in Groups A and B, and increasing the rates uniformly by 90% for all ages
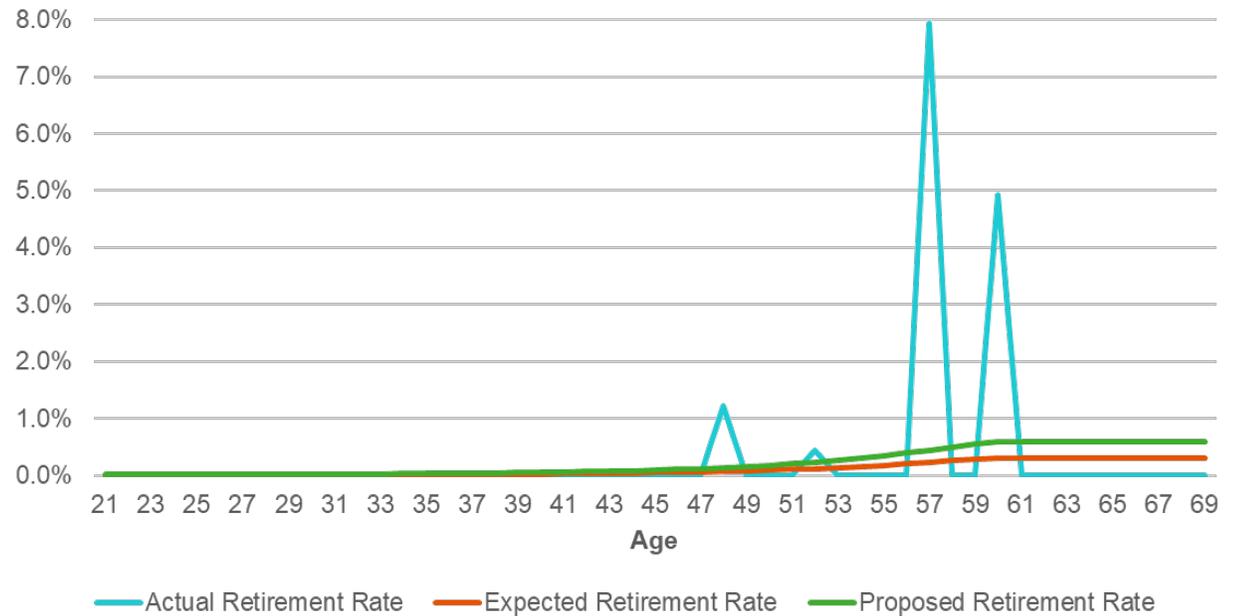
	Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
	$28,914	$86	$31	275%	$60	145%

[1] Based on annual benefits in thousands of dollars

Disability Retirements Groups A and B – Females

Groups A and B – Females:

– Overall, more disabilities than expected

Recommend applying separate disability retirement rates for female members in Groups A and B, and increasing the rates uniformly by 20% for all ages

	Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
	$33,032	$33	$23	141%	$28	117%

[1] Based on annual benefits in thousands of dollars

Disability Retirements Groups C and D – Males

Groups C and D – Males:

– Overall, more disabilities than expected

Recommend applying separate disability retirement rates for male members in Groups C and D, and increasing the rates uniformly by 15% for all ages
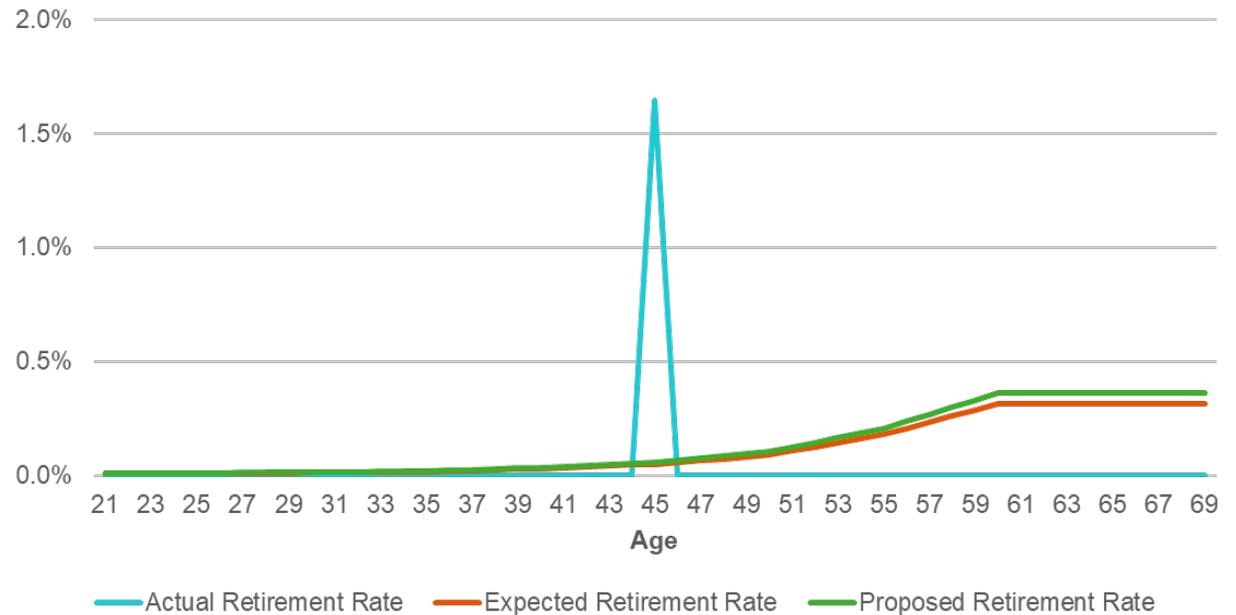
	Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
	$28,796	$23	$18	128%	$21	111%

[1] Based on annual benefits in thousands of dollars

Disability Retirements Groups C and D – Females

Groups C and D – Females:

– Overall, fewer disabilities than expected

Recommend applying separate disability retirement rates for female members in Groups C and D, and decreasing the rates uniformly by 50% for all ages

	Exposures[1]	Actual Retirements[1]	Expected Retirements[1]	Actual to Expected	Proposed Retirements[1]	Actual to Proposed
	$6,146	$0	$2	0%	$1	0%

[1] Based on annual benefits in thousands of dollars

Spouse Information

Current assumptions:

- 85% of male members and 50% of female members are married

- Male spouses are three years older than female spouses

- 100% of spouses are opposite gender

We have limited information on marital status and spouse information

We reviewed actual election information from the data and the percentages are slightly lower than the current assumption of 85%/50%. However, the same assumption is used to value pre-retirement death benefits, which is based on actual marital status at the time of death.

Therefore, we recommend no change to these assumptions

Summary of Assumption Impact

Assumption	Description	Impact on Liability/Cost	Impact on Gain/Loss
Inflation	The rate at which price levels are rising and purchasing power is falling	The impact that inflation has on liability and cost varies by each economic assumption	The impact that inflation has on gain/loss varies by each economic assumption
Investment Return	Based on invested plan asset categories and assumed rates of return for each asset class	Higher assumption causes lower liability and cost	Higher than anticipated actuarial return will create actuarial gains
Salary Increases	The expected rate of future salary increases for employees at various ages or years from hire	Higher assumption causes higher liability and cost	Higher than anticipated salary increases to actives will create actuarial losses
Payroll Growth	Used to project covered payroll to estimate the employer normal cost for budgeting purposes	Higher assumption causes higher cost, but has no impact on liability	Payroll growth has no impact on gain/loss
COLA	An annual increase in benefits to counteract inflation	Higher assumption causes higher liability and cost	Higher than anticipated COLAs will create actuarial losses
Mortality	The probability of dying within one year at each age	Lower mortality increases liability and cost	Higher than anticipated mortality will create actuarial gains
Retirement	The age (or ages) when employees are expected to retire	Earlier assumed retirement usually increases liability and cost	If more members retired later in their careers, this could result in gains. Generally, losses result when a member retires earlier without a full actuarial reduction. Other scenarios may result in gains/losses.
Termination	The expected rate of termination for employees at various ages or years from hire	Greater assumed termination decreases liability and cost	Higher than anticipated terminations will likely result in actuarial gains
Disability	The age (or ages) when employees are expected to become disabled	Greater incidence of disability usually slightly increases liability and cost	Greater incidence of disability than anticipated will likely result in slight actuarial losses

Summary of Economic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Inflation[1]	2.30%	No change	N/A
Investment Return[1]	7.00%	No change	N/A
Salary Scale[2]	Merit/seniority rates (including productivity) based on service plus inflation	Slight increases to the merit and seniority (and productivity) portion of individual salary increases for most service amounts	Slight Increase
Payroll Growth[2]	3.00%	No change	N/A
COLA[2]	Group A: • 1.10% Groups B/C/D: • 1.20%	Group A: • No change Groups B/C/D: • No change	N/A
Administrative Expenses	0.40% of projected payroll is added to normal cost	0.45% of projected payroll is added to normal cost	Slight Increase

[1] The inflation and investment return assumptions were recommended by VPIC's actuary, GRS, and adopted by VPIC during their July 25, 2023, meeting.
[2] The salary scale, payroll growth, and COLA assumptions reflect the inflation assumption referenced above.

Summary of Demographic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Healthy Post-Retirement Mortality - Retirees	Groups A/B/C: 104% of 40% PubG-2010 General Healthy Retiree Amount-Weighted Below Median and 60% of PubG-2010 General Healthy Retiree Amount-Weighted, with generational projection using scale MP-2019 Group D: PubG-2010 General Healthy Retiree Amount-Weighted, with generational projection using scale MP-2019	Groups A/B: PubG-2010 General Healthy Retiree Amount-Weighted Below Median for males and females with credibility adjustments of 90% and 87%, respectively, of the rates for all ages, with generational projection using scale MP-2021 Group C: PubG-2010 General Healthy Retiree Amount-Weighted, with generational projection using scale MP-2021 Group D: PubS-2010 Public Safety Retiree Amount-Weighted Below-Median, with generational projection using scale MP-2021	Slight Increase
Healthy Post-Retirement Mortality - Beneficiaries	Groups A/B/C: 70% Pub-2010 Contingent Survivor Amount-Weighted Below-Median and 30% of Pub-2010 Contingent Survivor Amount-Weighted, with generational projection using scale MP-2019 Group D: Pub-2010 Contingent Survivor Amount-Weighted, with generational projection using scale MP-2019	All Groups: Pub-2010 Contingent Survivor Amount-Weighted Below-Median, with generational projection using scale MP-2021	Slight Increase
Disabled Post-Retirement Mortality	All Groups: PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted, with generational projection using scale MP-2019	Groups A/B/C: PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted, with generational projection using scale MP-2021 Group D: PubS-2010 Safety Disabled Retiree Amount-Weighted Table, with generational projection using scale MP-2021	Slight Increase

Summary of Demographic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Active Mortality	Groups A/B/C: 40% of PubG-2010 General Employee Amount-Weighted Below Median, 60% of PubG-2010 General Employee Amount-Weighted, with generational projection using scale MP-2019	Groups A/B: 60% of PubG-2010 General Employee Amount-Weighted Below Median, 40% of PubG-2010 General Employee Amount-Weighted, with generational projection using scale MP-2021 Group C: PubG-2010 General Employee Amount-Weighted, with generational projection using scale MP-2021	Slight Increase
	Group D: PubG-2010 General Employee Amount-Weighted Above Median, with generational projection using scale MP-2019	Group D: PubS-2010 Public Safety Employee Amount-Weighted Below Median, with generational projection using scale MP-2021	
Active Retirement	Group A: Sex-distinct rates that vary based on members' age	Group A: Modify rates to better match actual experience	Slight Decrease
	Group B: Sex-distinct rates that vary based on members' age	Group B: Modify rates to better match actual experience	
	Group C: Unisex rates that vary based on members' age	Group C: Modify rates to better match actual experience	
	Group D: Unisex rates that vary based on members' age and service amounts	Group D: Use a single set of age-based rates and modify rates to better match actual experience	

Summary of Demographic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Inactive Retirement	All Groups: Assumed to retire 10% of the time each year from Early Retirement Age until Normal Retirement Age, then 100% of the time at Normal Retirement Age	No changes	N/A
Termination	All Groups: Gender distinct service-based rates	Groups A/B: Applying rates on a unisex basis to all members in Groups A and B, and slightly increase rates to better fit experience where applicable Groups C/D: Applying rates on a unisex basis to all members in Groups C and D, and slightly decrease rates to better fit experience where applicable	Slight Decrease
Disability Retirement	All Groups: Gender distinct age-based rates	Groups A/B: Applying rates on a gender distinct basis to all members in Groups A and B, and modify rates to better fit experience where applicable Groups C/D: Applying rates on a gender distinct basis to all members in Groups C and D, and modify rates to better fit experience where applicable	Slight Increase
Spouse Information	85% male members and 50% female members are married, male spouses are three years older than female spouses, and 100% of spouses are opposite gender	No changes	N/A

Segal

Cost Impact
(Based on the June 30, 2022, Actuarial Valuation, $ in Millions)

	Before Changes (Baseline)	Reflecting Mortality	Reflecting Mortality and Salary Scale	Reflecting Mortality, Salary Scale, and All Other Assumptions
Present Value of Future Benefits	$1,462.8	$1,476.5	$1,493.8	$1,466.0
% Change		0.9%	1.2%	-1.9%
Cumulative		0.9%	2.1%	0.2%
Actuarial Accrued Liability	$1,159.3	$1,170.5	$1,174.4	$1,163.0
% Change		1.0%	0.3%	-1.0%
Cumulative		1.0%	1.3%	0.3%
Total Normal Cost[1]	$43.8	$44.2	$45.0	$43.7
% Change		0.9%	1.8%	-2.9%
Cumulative		0.9%	2.7%	-0.2%
Funded Percentage	77.0%	76.3%	76.1%	76.8%
Delta		-0.7%	-0.2%	0.7%
Cumulative		-0.7%	-0.9%	-0.2%
Actuarially Determined Contribution (ADC) for FY24	$43.7	$45.1	$46.2	$44.0
% Change		3.2%	2.4%	-4.8%
Cumulative		3.2%	5.7%	0.7%

Due to rounding, values shown here may not sum as expected

[1] Total normal cost as of July 1, 2022, adjusted for timing

Cost Impact
(Based on the June 30, 2022, Actuarial Valuation, $ in Millions)

	Before Changes (Baseline)	Reflecting Mortality	Reflecting Mortality and Salary Scale	Reflecting Mortality, Salary Scale, and All Other Assumptions
Total – ADC Rate for FY24	11.352%	11.709%	11.985%	11.407%
Delta		0.357%	0.276%	-0.578%
Cumulative		0.357%	0.633%	0.055%
Group A – ADC Rate for FY24	7.078%	7.467%	7.641%	7.442%
Delta		0.389%	0.174%	-0.199%
Cumulative		0.389%	0.563%	0.364%
Group B – ADC Rate for FY24	11.371%	11.706%	11.974%	11.267%
Delta		0.335%	0.268%	-0.707%
Cumulative		0.335%	0.603%	-0.104%
Group C – ADC Rate for FY24	15.279%	16.100%	16.466%	16.185%
Delta		0.821%	0.366%	-0.281%
Cumulative		0.821%	1.187%	0.906%
Group D – ADC Rate for FY24	17.652%	16.502%	17.021%	14.956%
Delta		-1.150%	0.519%	-2.065%
Cumulative		-1.150%	-0.631%	-2.696%

Due to rounding, values shown here may not sum as expected

Appendix

Assumed Rates of Salary Increase

The following tables show the total proposed individual salary increase rates by years from hire, including the inflation assumption of 2.30%, for members in all groups:

Years from Hire	Proposed Total Salary Increase Rate	Years from Hire	Proposed Total Salary Increase Rate	Years from Hire	Proposed Total Salary Increase Rate
0	6.21%	15	4.80%	30	4.26%
1	6.21%	16	4.77%	31	4.24%
2	6.21%	17	4.75%	32	4.21%
3	6.04%	18	4.72%	33	4.18%
4	5.86%	19	4.70%	34	4.15%
5	5.69%	20	4.67%	35	4.13%
6	5.52%	21	4.65%	36	4.10%
7	5.34%	22	4.62%	37	4.07%
8	5.25%	23	4.56%	38	4.07%
9	5.15%	24	4.51%	39	4.07%
10	5.06%	25	4.46%	40+	4.07%
11	4.96%	26	4.40%		
12	4.86%	27	4.35%		
13	4.84%	28	4.32%		
14	4.82%	29	4.29%		

Active Retirement

The following tables show the proposed active retirement rates for members in Group A:

<u>**Group A - Males**</u>

Age	Proposed Active Retirement Rate
55	1.00%
56	1.00%
57	2.00%
58	2.00%
59	6.00%
60	7.00%
61	7.00%
62	15.00%
63	15.00%
64	25.00%
65	25.00%
66	25.00%
67	25.00%
68	25.00%
69	25.00%
70+	100.00%

<u>**Group A - Females**</u>

Age	Proposed Active Retirement Rate
55	2.00%
56	4.00%
57	4.00%
58	4.00%
59	5.00%
60	5.00%
61	6.00%
62	8.00%
63	10.00%
64	17.50%
65	17.50%
66	20.00%
67	20.00%
68	22.50%
69	25.00%
70+	100.00%

Active Retirement

The following tables show the proposed active retirement rates for members in Group B:

Group B - Males		Group B - Females	
Age	**Proposed Active Retirement Rate**	**Age**	**Proposed Active Retirement Rate**
55	4.00%	55	3.00%
56	4.00%	56	3.00%
57	4.00%	57	3.00%
58	4.00%	58	3.00%
59	4.00%	59	4.00%
60	4.00%	60	4.00%
61	10.00%	61	10.00%
62	20.00%	62	12.50%
63	20.00%	63	12.50%
64	22.50%	64	20.00%
65	25.00%	65	30.00%
66	25.00%	66	30.00%
67	25.00%	67	17.50%
68	25.00%	68	20.00%
69	25.00%	69	25.00%
70+	100.00%	70+	100.00%

Active Retirement

The following tables show the proposed active retirement rates for members in Group C and Group D:

Group C - Unisex

Age	Proposed Active Retirement Rate
55	22.50%
56	7.50%
57	7.50%
58	12.50%
59	12.50%
60	12.50%
61	7.50%
62	20.00%
63	12.50%
64	20.00%
65	40.00%
66	40.00%
67	30.00%
68	30.00%
69	30.00%
70+	100.00%

Group D - Unisex

Age	Proposed Active Retirement Rate
50	10.00%
51	10.00%
52	10.00%
53	10.00%
54	10.00%
55	25.00%
56	25.00%
57	25.00%
58	25.00%
59	25.00%
60	5.00%
61	5.00%
62	5.00%
63	5.00%
64	5.00%
65+	100.00%

Inactive Retirement

The following tables show the proposed inactive retirement rates for members in all groups:

<u>**All Groups**</u>

Eligibility	Proposed Inactive Retirement Rate
Early Retirement Age	10.00%
Normal Retirement Age	100.00%

Disability Retirement

The following tables show the proposed disability retirement rates for female members in Group A and Group B:

<u>Group A and Group B – Females</u>

Age	Proposed Disability Retirement Rate
20-26	0.0060%
27	0.0066%
28	0.0072%
29	0.0072%
30	0.0078%
31	0.0084%
32	0.0090%
33	0.0096%
34	0.0102%
35	0.0102%
36	0.0120%
37	0.0132%
38	0.0150%
39	0.0168%
40	0.0180%

<u>Group A and Group B – Females</u>

Age	Proposed Disability Retirement Rate
41	0.0204%
42	0.0228%
43	0.0252%
44	0.0276%
45	0.0300%
46	0.0348%
47	0.0396%
48	0.0444%
49	0.0492%
50	0.0540%
51	0.0648%
52	0.0756%
53	0.0864%
54	0.0972%
55	0.1080%

<u>Group A and Group B – Females</u>

Age	Proposed Disability Retirement Rate
56	0.1242%
57	0.1404%
58	0.1566%
59	0.1728%
60	0.1890%
61	0.1890%
62	0.1890%
63	0.1890%
64	0.1890%
65	0.1890%
66	0.1890%
67	0.1890%
68	0.1890%
69	0.1890%

Segal

Disability Retirement

The following tables show the proposed disability retirement rates for male members in Group A and Group B:

Group A and Group B – Males

Age	Proposed Disability Retirement Rate
20-26	0.0190%
27	0.0209%
28	0.0228%
29	0.0228%
30	0.0247%
31	0.0266%
32	0.0285%
33	0.0304%
34	0.0323%
35	0.0323%
36	0.0380%
37	0.0418%
38	0.0475%
39	0.0532%
40	0.0570%

Group A and Group B – Males

Age	Proposed Disability Retirement Rate
41	0.0646%
42	0.0722%
43	0.0798%
44	0.0874%
45	0.0950%
46	0.1102%
47	0.1254%
48	0.1406%
49	0.1558%
50	0.1710%
51	0.2052%
52	0.2394%
53	0.2736%
54	0.3078%
55	0.3420%

Group A and Group B – Males

Age	Proposed Disability Retirement Rate
56	0.3933%
57	0.4446%
58	0.4959%
59	0.5472%
60	0.5985%
61	0.5985%
62	0.5985%
63	0.5985%
64	0.5985%
65	0.5985%
66	0.5985%
67	0.5985%
68	0.5985%
69	0.5985%

Disability Retirement

The following tables show the proposed disability retirement rates for female members in Group C and Group D:

Group C and Group D – Females

Age	Proposed Disability Retirement Rate
20-26	0.0025%
27	0.0028%
28	0.0030%
29	0.0030%
30	0.0033%
31	0.0035%
32	0.0038%
33	0.0040%
34	0.0043%
35	0.0043%
36	0.0050%
37	0.0055%
38	0.0063%
39	0.0070%
40	0.0075%

Group C and Group D – Females

Age	Proposed Disability Retirement Rate
41	0.0085%
42	0.0095%
43	0.0105%
44	0.0115%
45	0.0125%
46	0.0145%
47	0.0165%
48	0.0185%
49	0.0205%
50	0.0225%
51	0.0270%
52	0.0315%
53	0.0360%
54	0.0405%
55	0.0450%

Group C and Group D – Females

Age	Proposed Disability Retirement Rate
56	0.0518%
57	0.0585%
58	0.0653%
59	0.0720%
60	0.0788%
61	0.0788%
62	0.0788%
63	0.0788%
64	0.0788%
65	0.0788%
66	0.0788%
67	0.0788%
68	0.0788%
69	0.0788%

Disability Retirement

The following tables show the proposed disability retirement rates for male members in Group C and Group D:

Group C and Group D – Males		Group C and Group D – Males		Group C and Group D – Males	
Age	**Proposed Disability Retirement Rate**	**Age**	**Proposed Disability Retirement Rate**	**Age**	**Proposed Disability Retirement Rate**
20-26	0.0115%	41	0.0391%	56	0.2381%
27	0.0127%	42	0.0437%	57	0.2691%
28	0.0138%	43	0.0483%	58	0.3002%
29	0.0138%	44	0.0529%	59	0.3312%
30	0.0150%	45	0.0575%	60	0.3623%
31	0.0161%	46	0.0667%	61	0.3623%
32	0.0173%	47	0.0759%	62	0.3623%
33	0.0184%	48	0.0851%	63	0.3623%
34	0.0196%	49	0.0943%	64	0.3623%
35	0.0196%	50	0.1035%	65	0.3623%
36	0.0230%	51	0.1242%	66	0.3623%
37	0.0253%	52	0.1449%	67	0.3623%
38	0.0288%	53	0.1656%	68	0.3623%
39	0.0322%	54	0.1863%	69	0.3623%
40	0.0345%	55	0.2070%		

Termination

The following tables show the proposed termination rates for members in all groups:

Group A and Group B – Unisex

Years from Hire	Proposed Termination Rate
0	18.50%
1	18.50%
2	18.50%
3	16.50%
4	14.50%
5	12.50%
6	10.50%
7	8.50%
8	8.30%
9	8.10%
10	7.90%
11	7.70%
12	7.50%
13	7.20%
14	6.90%

Group A and Group B – Unisex

Years from Hire	Proposed Termination Rate
15	6.60%
16	6.30%
17	6.00%
18	6.00%
19	6.00%
20	6.00%
21	6.00%
22	6.00%
23	5.80%
24	5.60%
25	5.40%
26	5.20%
27+	5.00%

Group C and Group D – Unisex

Years from Hire	Proposed Termination Rate
0	16.00%
1	16.00%
2	16.00%
3	14.20%
4	12.40%
5	10.60%
6	8.80%
7	7.00%
8	6.30%
9	5.60%
10	4.90%
11	4.20%
12+	3.50%

Disclosures

In preparing the results presented in this report, we have relied upon data provided by the State Treasurer's Office regarding the membership census data and financial information. While the scope of our engagement did not call for us to perform an audit or independent verification of this information, we have reviewed it for reasonableness. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information.

This review recommends assumptions to be used in the valuation to measure VMERS' financial condition as of a single date. Future actuarial measurements may differ significantly from the current measurements presented in this report due to other assumption sets. This report does not include an analysis of the potential range of such future measurements.

Segal valuation results and experience study analysis are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Raw experience study analysis of actual and expected decrements are generated by a model, which is used to develop recommended assumption changes. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuaries.

It is important to note that this experience study analysis is based on census data and information through June 30, 2022. Due to the COVID-19 pandemic, market and demographic conditions may have changed significantly since this date. VMERS' actuarial funded status does not reflect short-term fluctuations in the market or plan demographics, but rather is based on asset and liability values on the last day of a Plan Year.