



Vermont State Employees' Retirement System

Experience Review

July 1, 2014 through June 30, 2019

October 2020 / Matt Strom / Kathy Riley

Actuarial Certification

This experience study of the Vermont State Employees' Retirement System for the five year period ending June 30, 2019 was prepared in accordance with generally accepted actuarial principles and practices. This study was completed at the request of the Board to review and update, as necessary, the assumptions used in the actuarial valuation. This document should not be shared, copied or quoted, in whole or in part, without the consent of Segal, except to the extent otherwise required by law.

The census information on which this experience study was based was prepared by the Office of the State Treasurer for use in the annual valuations.

The actuarial calculations were directed under the supervision of Kathleen Riley, FSA, MAAA, EA, and Matthew Strom, FSA, MAAA, EA. 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. To the best of our knowledge, the information supplied in this experience study is complete and accurate. Further, in our opinion, the recommended assumptions are reasonably related to the experience of and the expectations for the System.

Agenda

Overview

Summary of Recommended Assumptions

Cost Impact

Analysis:

- Economic Assumptions
- Demographic Assumptions

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 five years
- Last full VSERS experience study was conducted in 2016 for the 5-year period ending June 30, 2014
 - Subsequently, a review of certain economic assumptions (investment return, inflation, and COLA) and a review of the mortality assumption were prepared in 2017
- Current study is based on the 5-year period July 1, 2014 through June 30, 2019

Actuarial Standards of Practice No. 27 and 35 provide guidance on best practices for performing assumption-setting analysis

- Each assumption should be “reasonable”

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

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

Overview: Actuarial Assumptions

Economic

- Inflation
- Investment return
- Salary increase
- Payroll growth
- COLA

Demographic

- Death after retirement
- Death in active service
- Retirement
- Termination
- Disability

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.

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	2.50%	2.30%	N/A
Investment Return	7.50%	7.15% ¹	Increase
Salary Scale	Merit/seniority rates (including productivity) based on age plus inflation	Minor increases to the merit and seniority (and productivity) portion of individual salary increases based on years from hire plus the revised inflation assumption	Slight Increase
Payroll Growth	3.50%	No change	N/A
COLA	2.55% for Groups A/C/D and Group F members who retired before July 1, 2008; 1.40% for Group F members who retired after July 1, 2008	2.40% for Groups A/C/D and Group F members who retired before July 1, 2008; 1.35% for Group F members who retired after July 1, 2008	Slight Decrease

¹ A range of reasonable investment return assumptions was first identified (7.00% to 7.25%). Within the reasonable range, 7.15% was proposed because it results in a similar confidence level as the current assumption when last studied. However, we believe that choosing the lowest end of the reasonable range, and, therefore, increasing the associated confidence level, is preferable. During the discussions regarding this and related presentations, it was also noted that the target asset allocation on which our analysis was based had not yet been reached and would not be reached for several years. As a result, all Boards, including VPIC, approved an investment return assumption of 7.00%.

Summary of Demographic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Healthy Post-Retirement Mortality - Retirees	Groups A & F: 101% of RP-2006 blended 30% Blue Collar Annuitant, 70% Healthy Annuitant with generational projection using scale SSA-2017	Groups A & F: 109% of PubG-2010 General Healthy Retiree Amount-Weighted with generational projection using scale MP-2019	Increase
	Group C: RP-2006 Blue Collar Annuitant with generational projection using Scale SSA-2017	Group C: 40% of PubS-2010 Public Safety Retiree Amount-Weighted Above Median, 60% of PubS-2010 Public Safety Retiree Amount-Weighted with generational projection using scale MP-2019.	Increase
	Group D: RP-2006 Healthy Annuitant with generational projection using Scale SSA-2017	Group D: PubG-2010 General Healthy Retiree Amount-Weighted Above Median with generational projection using scale MP-2019	Increase
Healthy Post-Retirement Mortality - Beneficiaries	Same as Retirees mortality above	Groups A & F: Pub-2010 Contingent Survivor Amount-Weighted with generational projection using MP-2019	Slight Decrease
		Group C: 40% of Pub-2010 Contingent Survivor Amount-Weighted Above Median, 60% of Pub-2010 Contingent Survivor Amount-Weighted with generational projection using MP-2019	Slight Decrease
		Group D: Pub-2010 Contingent Survivor Amount-Weighted Above Median with generational projection using MP-2019	Slight Decrease

Summary of Demographic Assumptions

Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Disabled Post-Retirement Mortality	RP-2006 Disabled Mortality Table with generational projection using Scale SSA-2017	PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table with generational projection using scale MP-2019	Slight Increase
Active Mortality	Groups A & F: 101% of RP-2006 blended 30% Blue Collar Employee, 70% Healthy Employee with generational projection using scale SSA-2017	Groups A & F: 60% of PubG-2010 General Employee Amount-Weighted Above Median, 40% of PubG-2010 General Employee Amount-Weighted with generational projection using scale MP-2019	Slight Increase
	Group C: Rp-2006 Blue Collar Employee with generational projection using Scale SSA-2017	Group C: PubS-2010 Public Safety Employee Amount-Weighted with generational projection using scale MP-2019	Slight Increase
	Group D: RP-2006 Healthy Employee with generational projection using Scale SSA-2017	Group D: 70% of PubG-2010 General Employee Amount-Weighted Above Median, 30% of PubG-2010 General Employee with generational projection using scale MP-2019	Slight Increase

Summary of Demographic Assumptions

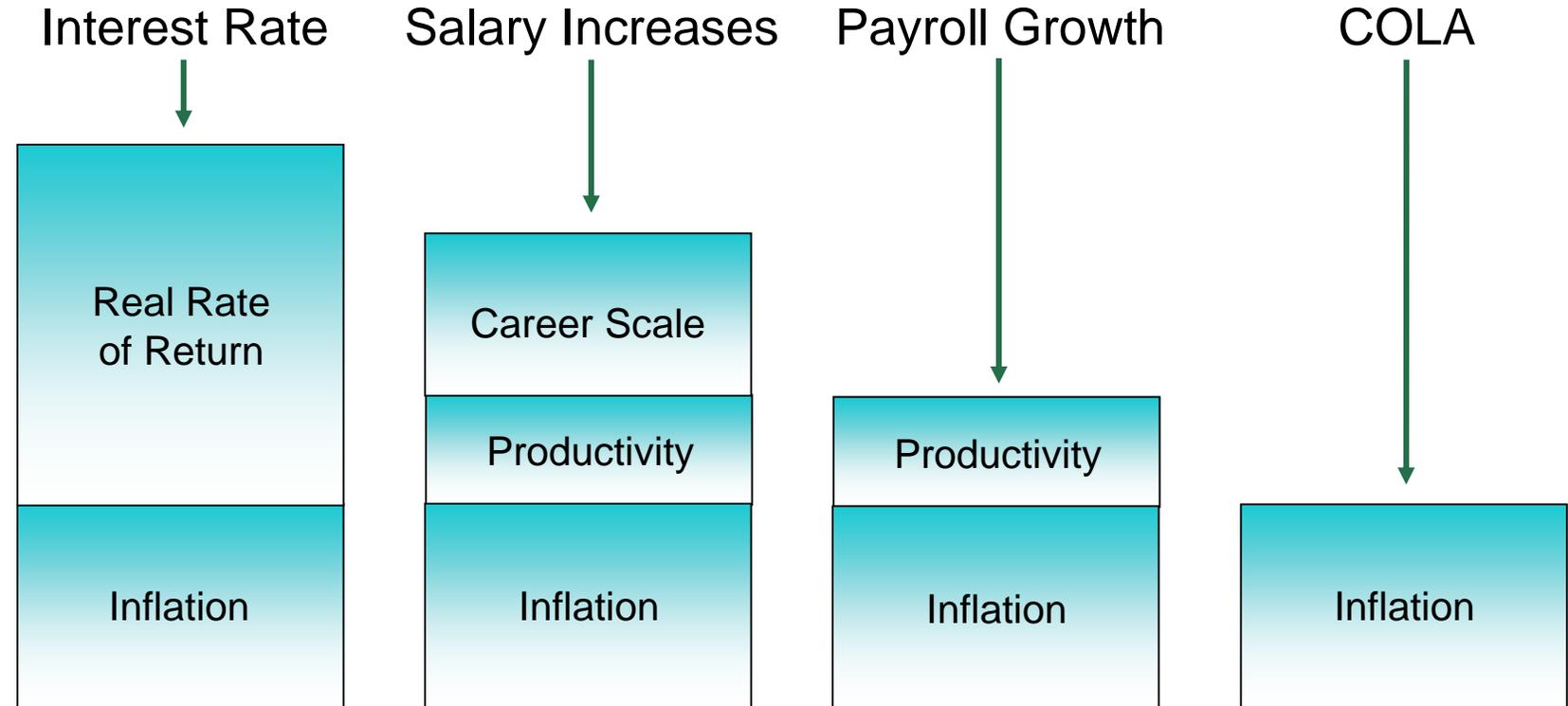
Assumption	Current	Proposed	Impact on Actuarially Determined Contribution
Active Retirement	Groups A, C, and D: Assumed to retire when first eligible	Groups A, C, and D: No changes	N/A
	Group F: Gender distinct age-based rates	Group F: Increase current rates for both males and females	Slight Increase
Inactive Retirement	All deferred members assumed to retire at Normal Retirement Age with a deferred vested benefit	Add a rate of 10% from ERA for each year until NRA, then 100% at NRA	Slight Increase
Termination	Groups A and D: Age-based, unisex rates with higher rates assumed during the first 10 years of service	Groups A and D: No changes	N/A
	Group C: service-based, sex-distinct rates, and are net of rehires	Group C: Reduce current rates by 25% for both males and females	Slight Increase
	Group F: Age-based, unisex select and ultimate rates with higher rates during the first 10 years of service.	Group F: Reduce the ultimate rates for 10+ years of service by roughly 14% and reduce the higher, select rates for each of the first 10 years of service	Slight Increase
Disability Retirement	Groups A, D, and F: Gender distinct age-based rates	Groups A, D, and F: Increase current rates by 5.5%	Slight Increase
	Group C: Gender distinct age-based rates	Group C: No changes	N/A
Spouse Information	Groups A & D: 75.4% male members and 64.0% female members are married Groups C: 73.3% male members and 61.0% female members are married Groups F: 71.4% male members and 63.1% female members are married Male spouses are three years older than female spouses, and 100% of spouses are opposite gender	No changes	N/A

Cost Impact (Based on the June 30, 2019 Actuarial Valuation)

Description	Current Assumptions	All Proposed Demographic Assumptions	All Proposed Demographic and Economic Assumptions Including 7.00%
Actuarial Accrued Liability	\$2,780.0M	\$2,846.1M	\$2,996.8M
<i>Change from prior column</i>		<i>+66.1M</i>	<i>+150.7M</i>
<i>Cumulative change</i>		<i>+66.1M</i>	<i>+216.8M</i>
Actuarial Value of Assets	\$1,964.5M	\$1,964.5M	\$1,964.5M
Unfunded Actuarial Accrued Liability	\$815.5M	\$881.6M	\$1,032.3M
Funded Percentage	70.7%	69.0%	65.6%
<i>Change from prior column</i>		<i>-1.7%</i>	<i>-3.4%</i>
<i>Cumulative change</i>		<i>-1.7%</i>	<i>-5.1%</i>
Normal Cost	\$53.2M	\$59.3M	\$67.7M
<i>Change from prior column</i>		<i>+6.1M</i>	<i>+8.4M</i>
<i>Cumulative change</i>		<i>+6.1M</i>	<i>+14.5M</i>
Actuarially Determined Contribution for FY 2021	\$83.9M	\$95.8M	\$113.6M
<i>Change from prior column</i>		<i>+11.9M</i>	<i>+17.8M</i>
<i>Cumulative change</i>		<i>+11.9M</i>	<i>+29.7M</i>

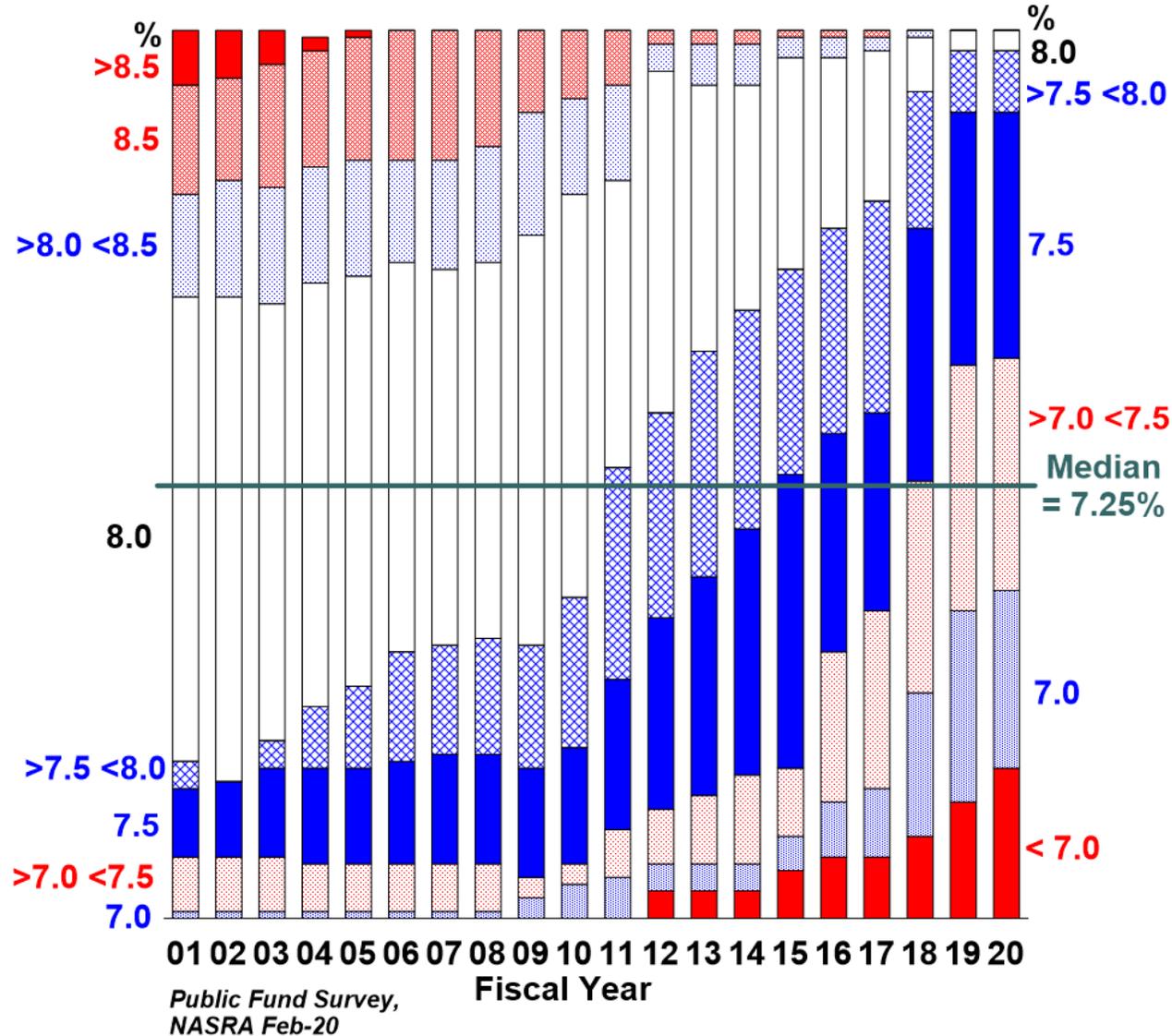
Basis for Setting Economic Assumptions

Each economic assumption has 2 or 3 components



Each component should be consistent across all economic assumptions, but may include a provision for adverse deviation.

Distribution of Historical Return Assumptions



Since 2001, the median investment return assumption has been moving downward and this trend is expected to continue as more systems complete experience review cycles.

Assumed Rate of Inflation

Inflation represents the annual increase in the cost of living

The current inflation assumption is 2.50%

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

Segal's recommendation is to lower the assumption from 2.50% to 2.30%, based on:

- The average 20-year inflation assumption from the 2019 Horizon Survey of Capital Market Expectations is 2.29%;
- The market's expectation of inflation is similar over 20-year and 30-year time horizons; and
- The Philadelphia Federal Reserve Bank Survey of Professional Forecasters 10-year outlook (2.20%) is consistent with the 10-year average from the Horizon Survey (2.21%).

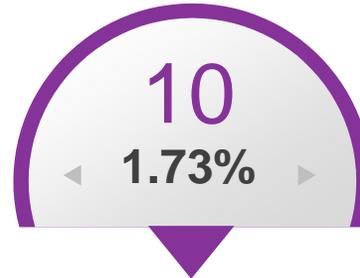
Assumed Rate of Inflation (*continued*)

As of June 30, 2019, the historical national inflation (CPI-U) averages are:



5-year Average

The most recent 5-year average increase in CPI-U is 1.45%



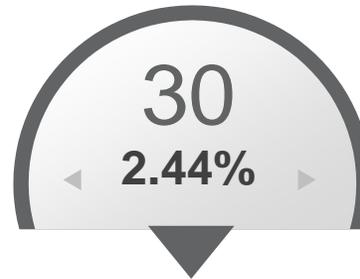
10-year Average

The most recent 10-year average increase in CPI-U is 1.73%



20-year Average

The most recent 20-year average increase in CPI-U is 2.19%



30-year Average

The most recent 30-year average increase in CPI-U is 2.44%

Assumed Rate of Inflation (*continued*)

In addition to historical inflation, other metrics to consider are current market expectations and estimates from professional forecasters and economists

By observing the difference between the yields on US Treasury bonds with and without inflation indexing, we can calculate the rate of inflation that investors expect. As of June 2019, the yields on 10-year, 20-year, and 30-year Treasury bonds were as follows:

	10-Year	20-Year	30-Year
Non-inflation indexed:	2.07%	2.36%	2.57%
Inflation indexed:	0.37%	0.59%	0.79%
Delta:	1.70%	1.77%	1.78%

- The differences ranging between 1.70% to 1.78% represent the financial market's current expectations of inflation over the next 10 to 30 years

Assumed Rate of Inflation (*continued*)

Source	10-Year	20-Year
Federal Reserve Bank of Philadelphia Fourth Quarter 2019 Survey of Professional Forecasters	2.20%	
2019 Horizon Survey of Capital Market Expectations	2.21%	2.29%
NEPC	2.25%*	
Segal Marco Advisors	2.00%	2.00%

*2.25% is the 2019 NEPC 5-7 year inflation assumption

We recommend that the Board lower the inflation assumption from 2.50% to 2.30%

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 7.50% consists of three components:

- Inflation*: 2.50%
- Real rate of return: 5.05%
- Adjustment for conservatism: (0.05%)

Our approach is to analyze inflation and real return separately

*The proposed inflation assumption is 2.30%

Basis for Expected Real Rate of Return

We have based our analysis of the expected real rate of return on the Horizon Survey of Capital Market Assumptions (2019 Edition)

- This survey compiles and averages the capital market assumptions of 34 investment consultants (including NEPC and Segal Marco Advisors)
 - 16 respondents provided assumptions for “long term”, or 20 years
- Expected arithmetic returns are used to determine the expected returns by asset class
- The 20-year expected geometric portfolio real rate of return was generated from the 50th percentile of 5,000 simulated portfolio return trials

Geometric Real Rate of Return

	Asset Class	20-Year Horizon Annual Arithmetic Real Return	Target Allocation ¹	Weighted Real Return
Equity	US Large Cap	6.05%	11.63%	0.70%
	US Small Cap	7.23%	10.63%	0.77%
	International Developed	7.01%	14.59%	1.02%
	Emerging Markets	9.38%	6.15%	0.58%
	Private Equity	10.53%	10.00%	1.05%
Fixed/Alternative	US Core	2.17%	20.00%	0.43%
	International Debt Emerging	4.47%	4.00%	0.18%
	TIPS	1.40%	3.00%	0.04%
	Real Estate	5.65%	8.00%	0.45%
	Hedge Funds	4.32%	10.00%	0.43%
	Infrastructure	6.17%	2.00%	0.12%
	Total		100%	5.79%
	Adjustment to Geometric			(0.54%)
	Geometric Real Rate of Return²			5.25%

¹ Several equity classes include a portion of the target allocation to Global Equity.

² Geometric Real Rate of Return is the compounded 50th percentile return over 20 years. Arithmetic returns represent the expected return for a single year. Geometric returns take into account year-over-year compounding over the 20 year period.

Adjustment for Current Market Outlook

From 2019 to 2020, the investment market outlook changed and many investment consultants lowered their expectations

- Capital market assumptions from the Horizon Survey are aggregated based on investment consultant expectations from Q1 2019
- As an example, using VPIC's target allocation, the change in 50th percentile return based on Segal Marco Advisors capital market assumptions between January 2019 and January 2020 is a decrease of 0.32%
- We recommend an additional downward adjustment to the expected real rate of return to reflect the change in market outlook since early 2019

Geometric real rate of return	5.25%
Less adjustment for update in market outlook from January 2019 to January 2020	<u>(0.30%)</u>
Modified real rate of return	4.95%

Assumed Rate of Return Alternatives

Over a 20-year period, the Fund is expected to earn an annual real rate of return of at least 4.95% half of the time

- Lowering the expected real rate of return to 4.85% will increase the likelihood of meeting the expectation over a 20-year period to 51.3%

Component	Current	50/50: 7.25%	7.15%	7.00%
Inflation	2.50%	2.30%	2.30%	2.30%
Real Rate of Return	5.05%	4.95%	4.95%	4.95%
Adjustment for Adverse Deviation	(0.05%)	(0.00%)	(0.10%)	(0.25%)
Total	7.50%	7.25%	7.15%	7.00%
Confidence Level*	51%	50.0%	51.3%	53.1%

* The Confidence Level indicates the likelihood that expectations will be met over a 20-year period. An increase in the confidence level indicates that the plan is more likely to meet the expected rate of return.

We recommend that the Board lower the return assumption from 7.50% to 7.15%¹ to maintain a confidence level consistent with how the current assumption was set. A lower assumption such as 7.00% would increase that confidence level to 53.1%.

¹ A range of reasonable investment return assumptions was first identified (7.00% to 7.25%). Within the reasonable range, 7.15% was proposed because it results in a similar confidence level as the current assumption when last studied. However, we believe that choosing the lowest end of the reasonable range, and, therefore, increasing the associated confidence level, is preferable. During the discussions regarding this and related presentations, it was also noted that the target asset allocation on which our analysis was based had not yet been reached and would not be reached for several years. As a result, all Boards, including VPIC, approved an investment return assumption of 7.00%.

Assumed Rate 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

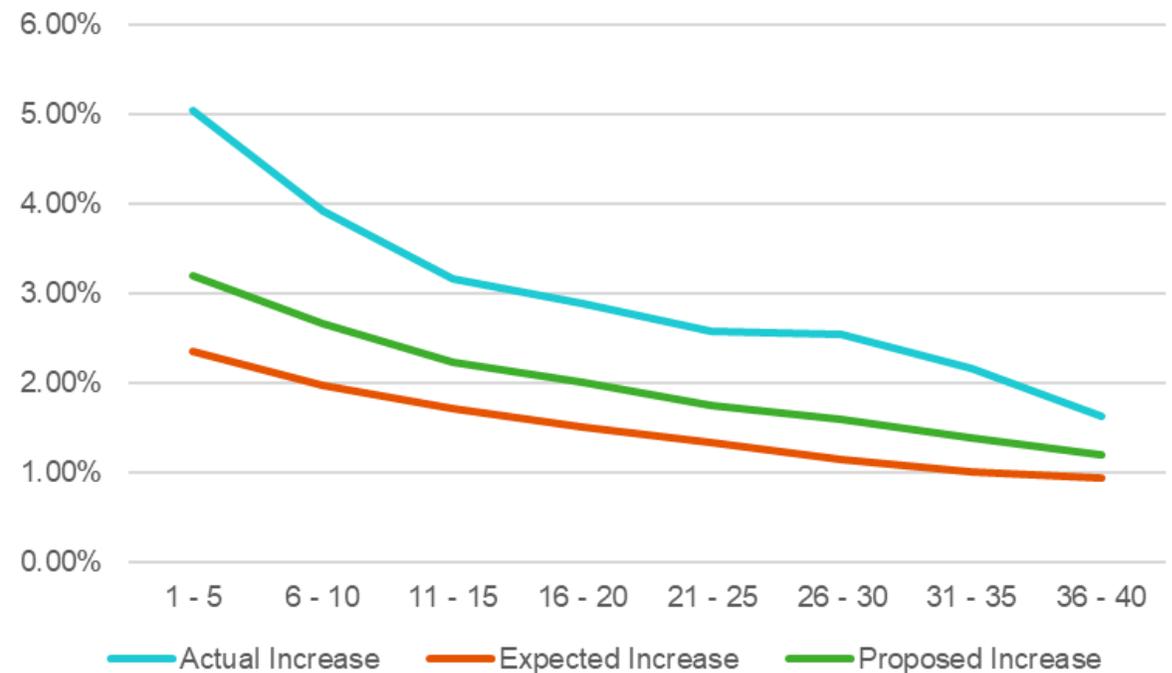
Since merit and seniority increases are unique to each retirement system, it is appropriate to base this assumption on recent experience

- We study the merit and seniority increases (plus productivity) separately from inflation
- Between 2014 and 2019, inflation averaged 1.5%

Assumed Rates of Salary Increase (*continued*)

The following table compares the actual and expected individual salary increases over the past 5 years, adjusted to remove actual annual inflation of about 1.5% over the experience period:

Years from Hire	Actual Increase	Expected Increase	Proposed Increase
1 - 5	5.04%	2.36%	3.19%
6 - 10	3.92%	1.98%	2.66%
11 - 15	3.17%	1.71%	2.24%
16 - 20	2.89%	1.51%	2.01%
21 - 25	2.57%	1.34%	1.76%
26 - 30	2.55%	1.15%	1.60%
31 - 35	2.16%	1.01%	1.40%
36 - 40	1.63%	0.94%	1.21%
Total	3.66%	1.81%	2.43%



Based on this experience, we recommend increases to the merit and seniority (and productivity) portion of individual salary increases throughout all years from hire.

Assumed Rate of Payroll Growth

The payroll growth assumption is used to project covered payroll to determine the employer normal cost for the two fiscal years following the valuation year for budgeting purposes

A higher payroll growth assumption is more conservative

- A higher assumption relative to actual experience results in an otherwise larger employer normal cost

The current payroll growth assumption of 3.50% consists of the following components:

Inflation	2.50%
Productivity	0.50%
Plan-specific adjustment	<u>0.50%</u>
Total payroll growth	3.50%

Assumed Rate of Payroll Growth (*continued*)

As the recommended 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 June 2019:

- The 20-year average of the National Average Wage is 3.0%
- The 20-year average inflation is 2.2%
- Therefore, productivity has averaged about 0.8% over the last 20 years

We recommend a slight increase of 0.2% to the productivity component (from 0.5% to 0.7%), to bring this assumption more in line with national average wage growth over the last 20 years

Assumed Rate of Payroll Growth (*continued*)

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

Year Ended June 30	Annualized Payroll (\$ in Millions)	Active Members
2019	\$527.6	8,443
2014	437.7	8,325
2009	404.5	8,095
2004	336.6	8,079
2000	266.5	7,836
• 5-year average:	3.8%	0.3%
• 10-year average:	2.8%	0.4%
• 15-year average:	3.1%	0.3%
• 19-year average:	3.7%	0.4%

Payroll increases have averaged nearly 3.3%/year since 2000, adjusting for headcount

Assumed Rate of Payroll Growth *(continued)*

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

Component	Current	Recommended
Inflation	2.50%	2.30%
Productivity	0.50%	0.70%
Plan-specific adjustment	<u>0.50%</u>	<u>0.50%</u>
Total payroll growth	3.50%	3.50%

We recommend no change to the 3.50% payroll growth assumption

Assumed COLA Increases

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

VSERS contains the following COLA provisions:

- Equal to **CPI**, but not less than **1%**¹ or more than **5%** (Groups A/C/D)
- Equal to **one-half of CPI until 1/1/2014**, 100% of CPI thereafter, but not less than **1%**¹ or more than **5%** (Group F)

We studied expected future COLAs based on stochastic projections of the recommended 2.30% inflation assumption, subject to the above parameters

As a result, we recommend the following COLA assumptions:

- Groups A/C/D and Group F members who retired before July 1, 2008: 2.40% (currently 2.55%)
- Group F members who retired after July 1, 2008: 1.35% (currently 1.40%)

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

Overview: How Mortality Assumption Is Set

Review past experience

Compare past experience (“actual”) with assumptions (“expected”)

- Examine both headcounts and benefit-weighted experience

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

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
- 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

For purposes of comparing actual experience to expected, Pub-2010 mortality rates have been projected to 2016, the mid-point of the experience period, with scale MP-2019

Death After Retirement (*continued*)

There are 3 separate versions of each of the Pub-2010 table classifications: Baseline, Above Median, and Below Median.

The Pub-2010 report includes an “*Income Percentile Amounts by Gender, Job Category, and Status*” table showing the median income between Employees, Retirees, and Contingent Survivors from the underlying dataset.

- In order to determine which Pub-2010 table(s) should be applied, we separated the data by group/status/gender and identified the portion of members above/below the respective median amounts
- Using these results, we recommended the Pub-2010 table variations that most accurately fits the data

The current assumptions are separated between Groups A & F, Group C, and Group D. For these groups, the following tables are used:

- Groups A & F: 101% of RP-2006 blended 30% Blue Collar Annuitant, 70% Healthy Annuitant with generational projection using scale SSA-2017
- Group C: RP-2006 Blue Collar Annuitant with generational projection using Scale SSA-2017
- Group D: RP-2006 Healthy Annuitant with generational projection using Scale SSA-2017

Death After Retirement (*continued*)

Over the experience period, there were fewer actual deaths than expected for all groups of retirees and Group D beneficiaries, while there were more than expected deaths for beneficiaries in Groups A, C, and F

Recommend updating base tables to appropriate Pub-2010 mortality tables, with adjustments for above/below median groups and for VSERS-specific experience where “credible” data exists

- PubG-2010/PubS-2010 Retiree Tables based on general employee/public safety datasets ages 55 through 120 (baseline, above median, and below median)
- PubG-2010/PubS-2010 Employee Tables based on general employee/public safety datasets ages 18 through 80 (baseline, above median, and below median)
- PubNS-2010/PubS-2010 Non-Safety/Safety Disabled Retiree Tables based on general employee/public safety datasets
- Pub-2010 Contingent Survivor Tables based on entire dataset of contingent annuitants (baseline, above median, and below median)

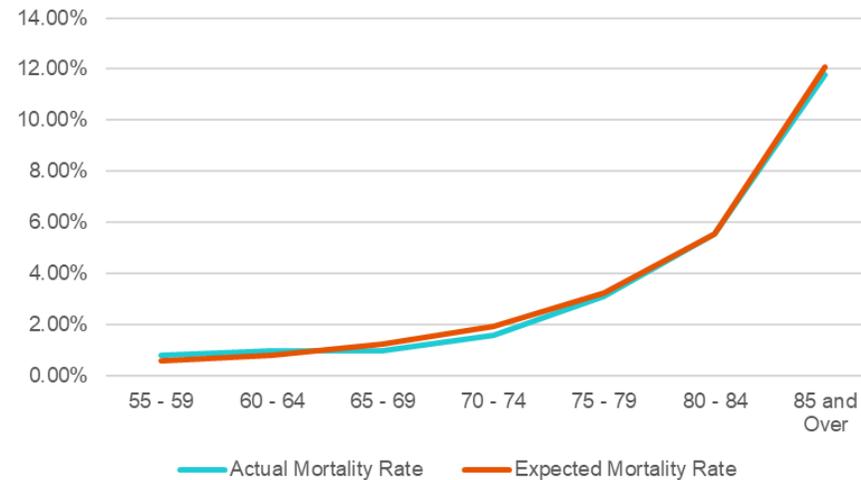
Death After Retirement (*continued*)

Recommend reflecting future mortality improvement by applying Projection Scale MP-2019 on a generational basis

- The Social Security Administration Office of the Chief Actuary has recently released its report on long-range demographic assumptions used in the 2020 Trustees report. The report includes a projection of mortality improvement, which is used to generate projection scale SSA-2020. This scale reflects historical U.S. population mortality data, while MP-2019 reflects historical pensioner mortality data.

Analysis – Groups A & F – Healthy Retiree Mortality (Unisex)

Actual Versus Expected Experience, Benefit-Weighted Basis



Basis	Exposures	Actual Deaths/Benefits for Participants who Died	Expected	Actual to Expected***
Counts	25,363	703*	693	101%
Benefits**	\$437,987	\$9,563	\$10,134	94%

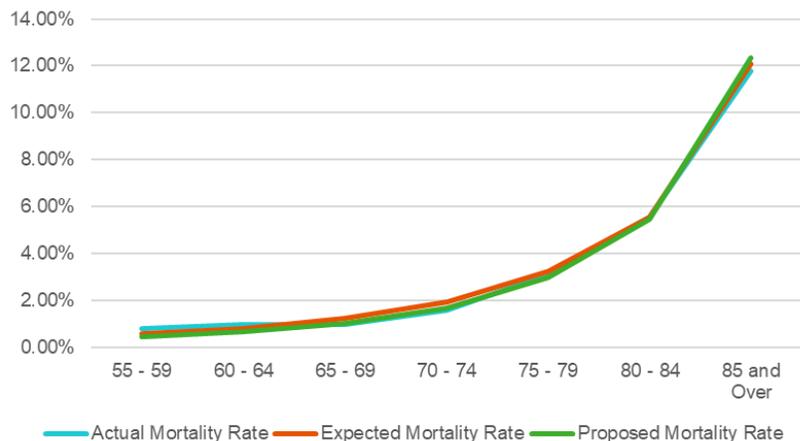
* 703 actual deaths in the observation period yields partial credibility of 81%

** Based on annual benefits in thousands of dollars

*** Actual to Expected ratios indicate how well the actual experience aligns with the current assumptions. The closer the ratio is to 100%, the closer the current assumptions align with the actual experience.

Analysis – Groups A & F – Healthy Retiree Mortality (Unisex)

Actual Versus Proposed Experience, Benefit-Weighted Basis



On a benefit-weighted basis, unadjusted PubG-2010 Retiree Table results in a reduction of \$8,564,000 in benefits due to the proposed assumption

- Credibility-weighted adjustment (81%) results in a reduction of \$9,369,000 in benefits due to the proposed assumption

Recommend 109% of PubG-2010 Retiree Table

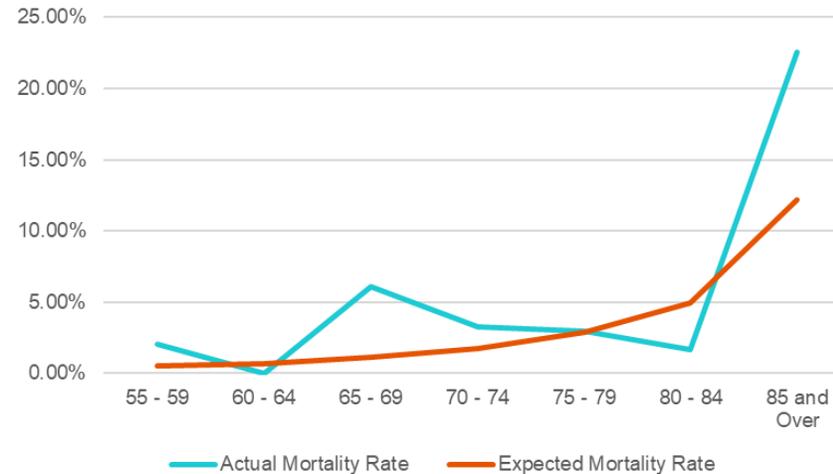
Basis	Exposures	Actual Benefits for Participants who Died	Proposed	Actual to Proposed**
Benefits*	\$437,987	\$9,563	\$9,335	102%

* Based on annual benefits in thousands of dollars

**Actual to Proposed ratios indicate how well the actual experience aligns with the proposed assumptions. The closer the ratio is to 100%, the closer the proposed assumptions align with the actual experience.

Analysis – Groups A & F – Beneficiary Mortality (Unisex)

Actual Versus Expected Experience, Benefit-Weighted Basis



Basis	Exposures	Actual Deaths/Benefits for Participants who Died	Expected	Actual to Expected***
Counts	2,551	123*	105	117%
Benefits**	\$5,422	\$303	\$186	163%

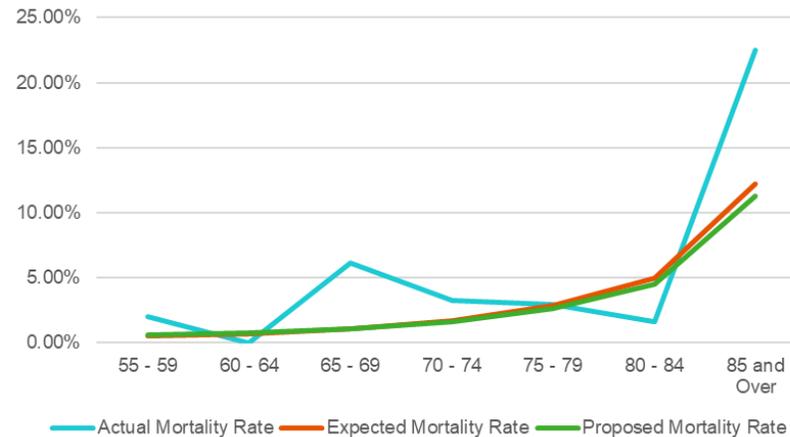
* 123 actual deaths in the observation period yields partial credibility of 34%

** Based on annual benefits in thousands of dollars

*** Actual to Expected ratios indicate how well the actual experience aligns with the current assumptions. The closer the ratio is to 100%, the closer the current assumptions align with the actual experience.

Analysis – Groups A & F – Beneficiary Mortality (Unisex)

Actual Versus Proposed Experience, Benefit-Weighted Basis



On a benefit weighted basis, unadjusted Pub-2010 Contingent Survivor Table results in a reduction of \$174,000 in benefits due to the proposed assumption

- The limited actual experience is insufficient to warrant making an adjustment to the published table

Recommend using the unadjusted Pub-2010 Contingent Survivor Table

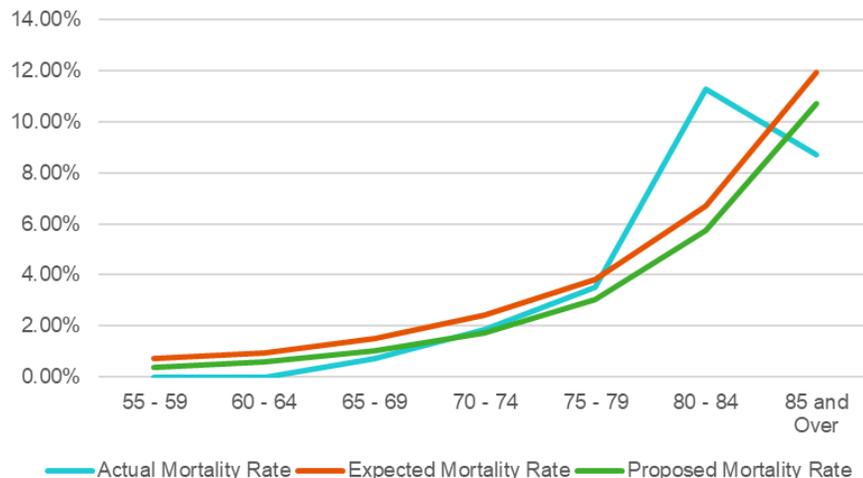
Basis	Exposures	Actual Benefits for Participants who Died	Proposed	Actual to Proposed**
Benefits*	\$5,422	\$303	\$174	175%

* Based on annual benefits in thousands of dollars

**Actual to Proposed ratios indicate how well the actual experience aligns with the proposed assumptions. The closer the ratio is to 100%, the closer the proposed assumptions align with the actual experience.

Analysis – Group C – Healthy Retiree Mortality (Unisex)

Actual Versus Proposed Experience, Benefit-Weighted Basis



Adjusted median benefits from the Pub-2010 Safety dataset were \$39,200 for males and \$31,000 for females

From the VSERS dataset, the following percentage of members had benefit amounts above/below the median

	Number	Percentage
Total	316	
Above	218	69%
Below	98	31%

To determine the adjustments to the tables, 31% of the 69% above-median benefit amounts are combined with 31% of the below-median amounts to form a “homogenous” group representing 62% of retired members. The remaining 38% are weighted above-median.

Recommend using 40% of the Above Median PubS-2010 Retiree Table and 60% of the PubS-2010 Retiree Table

- The limited actual experience is insufficient to warrant making an adjustment to the published table

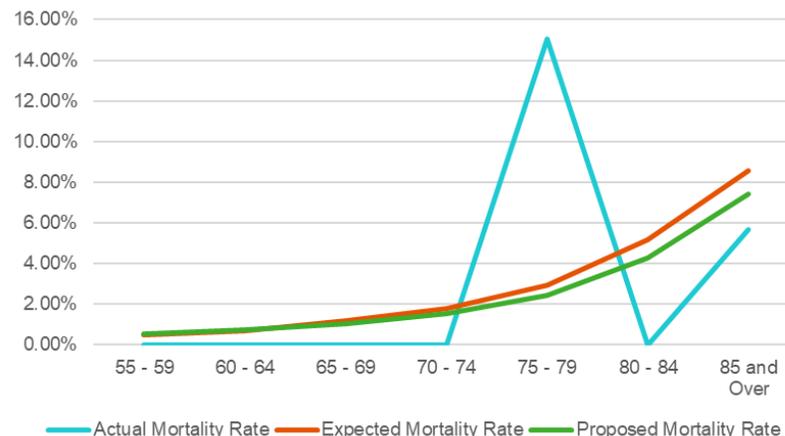
Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Benefits*	\$70,679	\$885	\$1,293	68%	\$959	92%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Group C – Beneficiary Mortality (Unisex)

Actual Versus Proposed Experience, Benefit-Weighted Basis



Recommend using 40% of the Above Median Pub-2010 Contingent Survivor Table and 60% of the Pub-2010 Contingent Survivor Table

- The limited actual experience is insufficient to warrant making an adjustment to the published tables

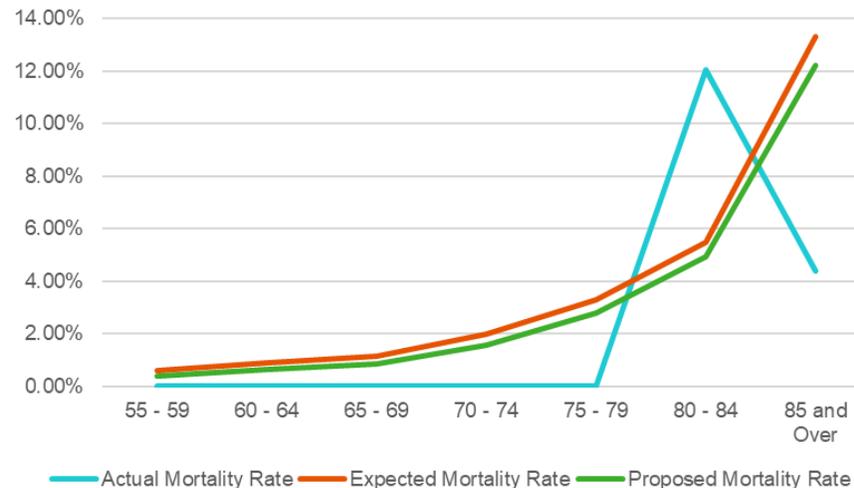
Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Benefits*	\$1,513	\$50	\$49	103%	\$42	120%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Group D – Healthy Retiree Mortality (Unisex)

Actual Versus Proposed Experience, Benefit-Weighted Basis



Recommend using the Unadjusted Above Median PubG-2010 Healthy Retiree Table

- The limited actual experience is insufficient to warrant making an adjustment to the published table

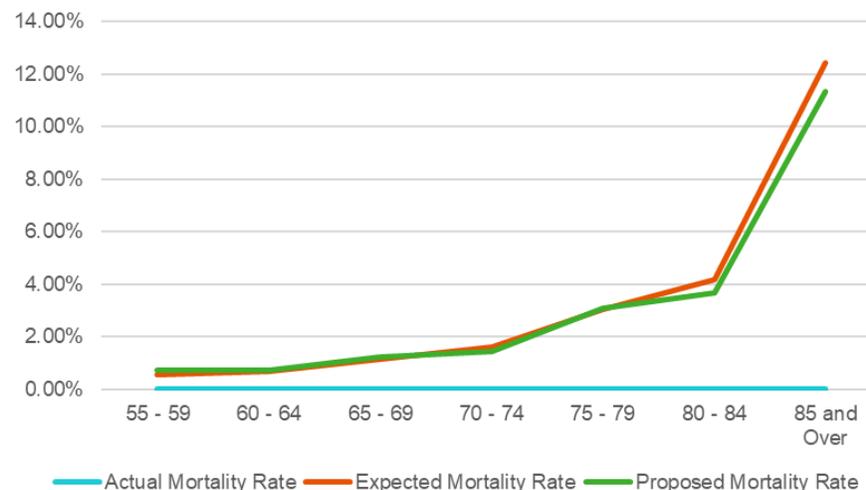
Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Benefits*	\$16,490	\$337	\$671	50%	\$585	58%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Group D – Beneficiary Mortality (Unisex)

Actual Versus Proposed Experience, Benefit-Weighted Basis



Recommend using the Unadjusted Above Median Pub-2010 Contingent Survivor Table

- The limited actual experience is insufficient to warrant making an adjustment to the published table

Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Benefits*	\$390	\$0	\$24	0%	\$22	0%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Healthy Retiree & Beneficiary Mortality

- The Appendix includes information on actual and expected experience separately for males and females
- Because each group individually yields less credibility, the experience has been combined to determine the credibility weighting factor that was used

Death After Retirement (Disabled)

Mortality experience for disabled annuitants has been consistent with the current assumption

- The ratio of actual to expected deaths on a benefit-weighted basis is 97%

We recommend updating to the unadjusted “non-safety” version of the Pub-2010 mortality table for disabled retirees

- The limited actual experience is insufficient to warrant making an adjustment to the published table

Recommend accounting for future mortality improvement by applying Projection Scale MP-2019 on a generational basis

Actual Versus Proposed Experience, Benefits-Weighted Basis, Unisex

Basis	Exposures	Actual Deaths/ Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Counts	1,964	86	75	114%		
Benefits*	\$83,150	\$2,942	\$3,022	97%	\$2,468	119%

* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

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 include separate mortality tables for active and retired members

- For active members, there are separate tables for Groups A & F, Group C, and Group D
- Since we are using the new PubG-2010/PubS-2010 Retiree Tables for retired lives, we recommend using the PubG-2010/PubS-2010 Employee Tables for active members
 - No adjustments to the published tables, given the limited credibility of the groups

Death While In Active Service (*continued*)

Similar to the Death after Retirement analysis:

- In order to determine which PubG-2010/PubS-2010 table(s) should be applied, we separated the data by group/status/gender and identified the portion of members above/below the respective median amounts.
- We then used these amounts to recommend which of the PubG-2010/PubS-2010 tables would most accurately represent the data.

For Groups A and F, we recommend using 60% of the Above Median PubG-2010 Employee Table and 40% of the PubG-2010 Employee Table

For Group C, we recommend using the unadjusted PubS-2010 Employee Table

For Group D, we recommend using the 70% of the Above Median PubG-2010 Employee Table and 30% of the PubG-2010 Employee Table

Retirement Eligibilities

Eligibility criteria for retirement differs by group:

- Group A
- Group C
- Group D
- Group F

	Unreduced Benefits	Reduced Benefits
Group A	Age 65 with 5 years of service for members hired after July 1, 2004; or age 62 with 20 years of service	Age 55 with 5 years of service, or 30 years of service
Group C	Age 55	Age 50 with 20 years of service
Group D	Age 62 with 5 years of service	Age 55 with 5 years of service, or 30 years of service
Group F	Age 65 or a sum of age plus service greater than or equal to 87 for members hired after June 30, 2008; or age 62 or 30 years of service	Age 55 with 5 years of service

Active Member Retirements

Current rates:

- For Groups A, C, and D, members are assumed to retire when first eligible
- For Group F, there are age based rates that vary depending on gender

We have analyzed retirement experience on a benefit-weighted basis for males and females separately

Active Retirements – Groups A, C, and D

All members:

- The limited actual experience for these groups is insufficient to warrant making changes to the current assumption*

Exposures*	Actual Benefits for Participants who Retired*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$302	\$93	\$302	31%	\$302	31%

Recommend leaving these rates unchanged

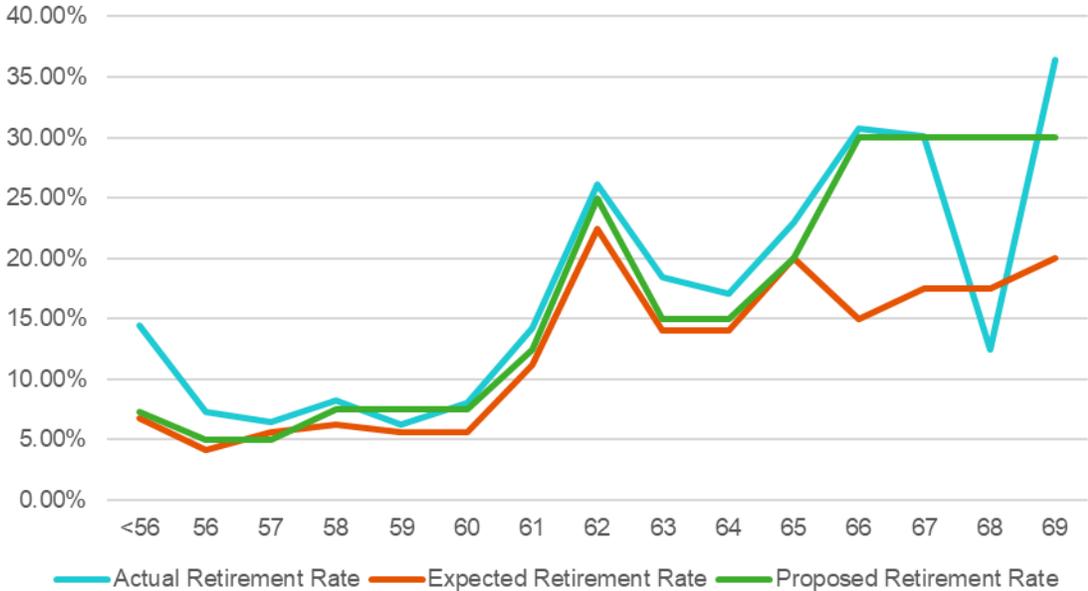
* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Active Retirements – Group F

Females:

– There were more retirements than expected



Exposures*	Actual Benefits for Participants who Retired*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$108,062	\$15,214	\$10,820	141%	\$13,042	117%

Recommend increasing the rates at most ages

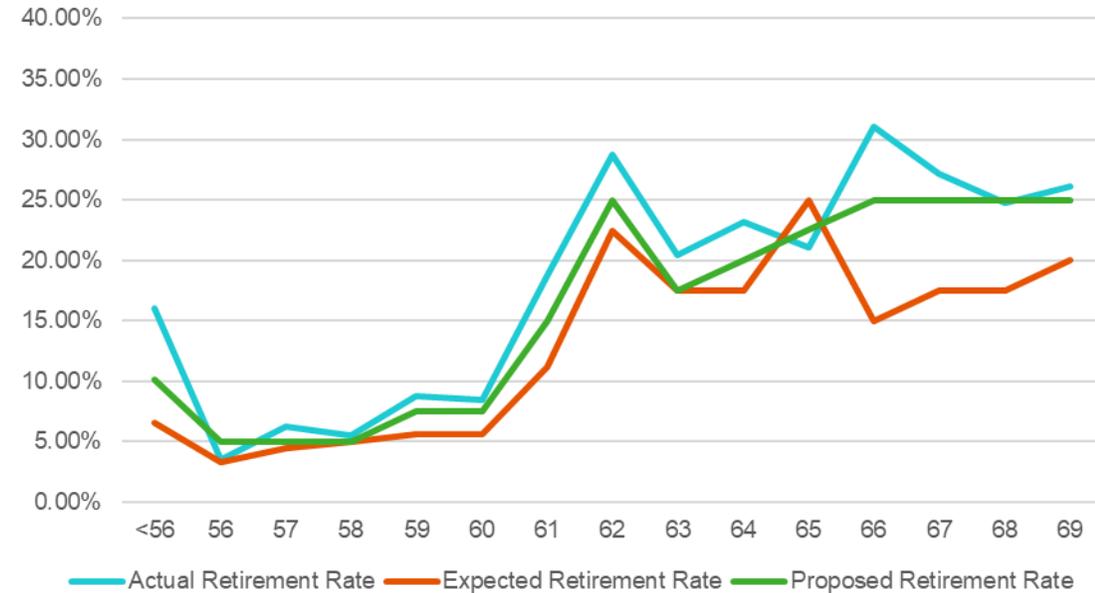
* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Active Retirements – Group F

Males:

- There were more retirements than expected



Exposures*	Actual Benefits for Participants who Retired*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$103,609	\$15,734	\$10,905	144%	\$13,366	118%

Recommend increasing the rates at most ages

* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Inactive Vested Retirements

The current assumption is that 100% of inactive vested members will retire at normal retirement age (NRA)

We have analyzed inactive vested (IV) retirement experience on a benefit-weighted basis

- Actual experience has shown that a material number of people have retired from inactive status earlier than their NRA, so we recommend implementing IV retirement rates that better match the actual experience

Summary of Experience:

- Limited IV retirement experience available
- Of \$4,289,000 in benefits from IV members eligible to commence early with reduced benefits, \$815,000 actually retired
- Of \$1,125,000 in benefits from IV members eligible to commence normal retirement benefits, \$773,000 actually retired
- We recommend adjusting the current IV retirement rates to 20% for each early retirement age (ERA) until NRA, then 100% of the remaining inactive vested members retire at NRA

Termination

Experience shows that fewer active members are terminating prior to retirement than expected

Current rates:

- Groups A and D: age-based, unisex rates with higher rates assumed during the first 10 years of service
- Group C: service-based, sex-distinct rates
- Group F: age-based, unisex select and ultimate rates with higher rates assumed during the first 10 years of service

The current rates represent “total” turnover and a liability “load” is used to hold additional liability for terminating members to offset potential losses due to rehires

The current combination of turnover rates and liability loads has been generating net experience losses for many years

We recommend a change in methodology that should reduce experience losses from turnover in the future

- Recommended rates are determined net of rehires and no liability loads are applied

The graphs that follow show the actual, expected, and proposed termination rates based on age

Termination – Group A

Unisex:

- Limited actual experience for these groups is insufficient to warrant making changes to the current assumption

Exposures*	Actual Benefits for Participants who Terminated*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$0	\$0	\$0	N/A	\$0	N/A

Recommend leaving these rates unchanged

* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Termination – Group D

Unisex:

- Limited actual experience for these groups is insufficient to warrant making changes to the current assumption

Exposures*	Actual Benefits for Participants who Terminated*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$1,165	-\$4	\$25	-17%	\$25	-17%

Recommend leaving these rates unchanged

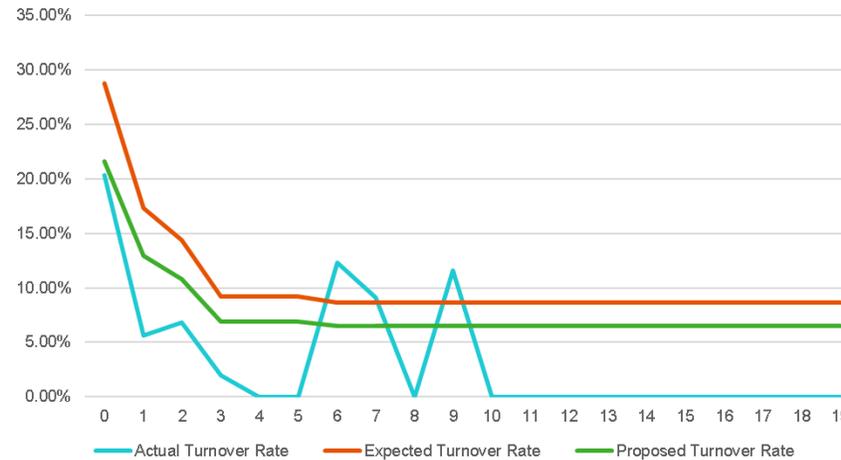
* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Termination – Group C

Service Based Rates (<20 Years of Service) – Females:

- There were less terminations than expected



Exposures*	Actual Benefits for Participants who Terminated*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$4,203	\$50	\$369	14%	\$277	18%

Recommend reducing the current rates by 25%

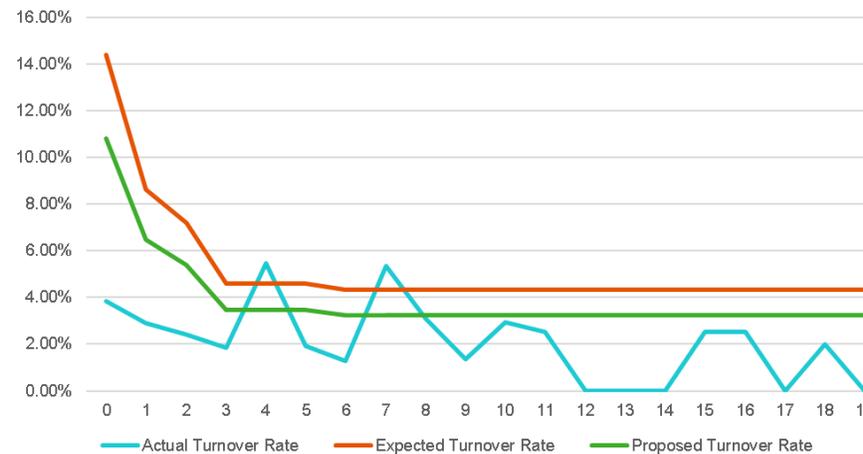
* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Termination – Group C

Service Based Rates (<20 Years of Service) – Males:

- There were less terminations than expected



Exposures*	Actual Benefits for Participants who Terminated*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$32,415	\$497	\$1,424	35%	\$1,068	46%

Recommend reducing the current rates by 25%

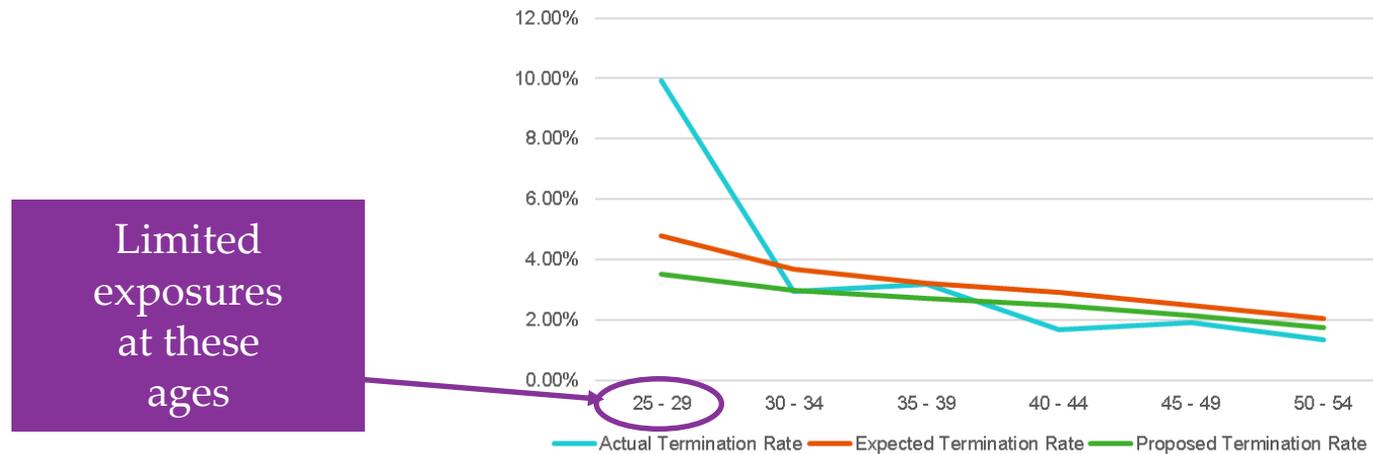
* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Termination – Group F

Age Based Rates (10-29 Years of Service) – Unisex:

- There were less terminations than expected



Exposures*	Actual Benefits for Participants who Terminated*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$168,124	\$3,504	\$4,217	83%	\$3,599	97%

Recommend reducing the current ultimate rates for all ages by roughly 14%

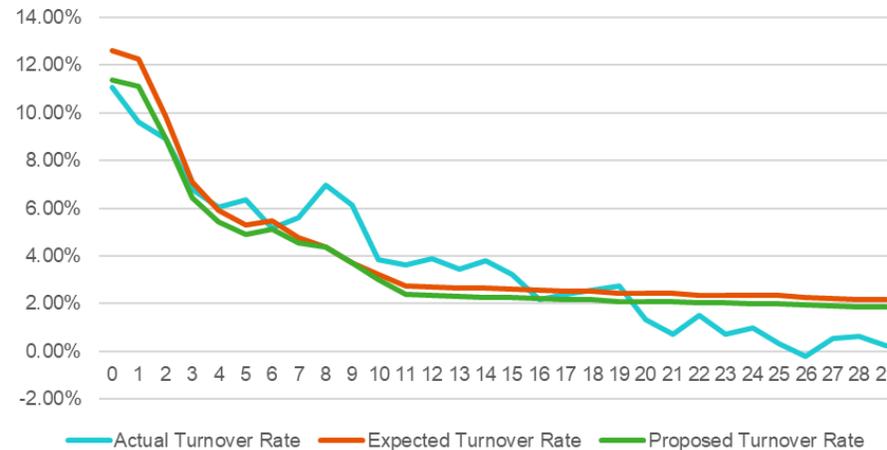
* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Termination – Group F

Service Based Rates (<30 Years of Service) – Unisex:

- There were less terminations than expected



Exposures*	Actual Benefits for Participants who Terminated*	Expected*	Actual to Expected**	Proposed*	Actual to Proposed**
\$222,202	\$7,051	\$7,399	95%	\$6,624	106%

Recommend reducing the higher, select rates for each of the first 10 years of service

* Based on annual benefits in thousands of dollars

** Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Disability Retirement

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

The current disability retirement assumptions are separated between: Group C and Groups A, D, and F

Group C:

- \$172k in benefits from active members were expected to start receiving a disability pension; and
- \$186k in benefits from active members actually started receiving a disability pension

We recommend leaving the current rates related to disability retirement unchanged

Groups A, D, and F:

- \$885k in benefits from active members were expected to start receiving a disability pension; and
- \$983k in benefits from active members actually started receiving a disability pension

We recommend a 5.5% increase to the current rates related to disability retirement

Spouse Information

Current assumptions:

- Percent Married
 - Groups A and D: 75.4% of male members and 64.0% of female members are married
 - Group C: 73.3% of male members and 61.0% of female members are married
 - Group F: 71.4% of male members and 63.1% 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

We reviewed actual election information from the data and the percentages are slightly lower than the current assumptions of 75.4%/64.0%, 73.3%/61.0%, and 71.4%/63.1%. However, the same assumptions are 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



Appendix

Assumed Rates of Salary Increase *(continued)*

The following tables show the total current and proposed individual salary increase assumption by years from hire, including the current inflation assumption of 2.50% and proposed inflation assumption of 2.30%:

Years from Hire	Current Total Salary Increase Rate	Proposed Total Salary Increase Rate	Years from Hire	Current Total Salary Increase Rate	Proposed Total Salary Increase Rate	Years from Hire	Current Total Salary Increase Rate	Proposed Total Salary Increase Rate
1	5.01%	5.55%	15	4.12%	4.42%	29	3.59%	3.86%
2	4.92%	5.55%	16	4.07%	4.38%	30	3.56%	3.82%
3	4.81%	5.55%	17	4.03%	4.34%	31	3.54%	3.78%
4	4.74%	5.43%	18	4.00%	4.30%	32	3.52%	3.74%
5	4.70%	5.31%	19	3.96%	4.25%	33	3.49%	3.70%
6	4.62%	5.19%	20	3.93%	4.20%	34	3.50%	3.66%
7	4.54%	5.07%	21	3.90%	4.15%	35	3.50%	3.62%
8	4.48%	4.95%	22	3.86%	4.10%	36	3.48%	3.58%
9	4.44%	4.86%	23	3.83%	4.05%	37	3.48%	3.54%
10	4.36%	4.77%	24	3.81%	4.02%	38	3.47%	3.50%
11	4.31%	4.68%	25	3.78%	3.99%	39	3.50%	3.45%
12	4.25%	4.59%	26	3.73%	3.96%	40+	3.26%	3.40%
13	4.22%	4.50%	27	3.67%	3.93%			
14	4.15%	4.46%	28	3.63%	3.90%			

Active Retirement

The following tables show the proposed active retirement rates for all members in Groups A, C, D, and F:

Groups A, C, and D – Unisex

Age	Proposed Active Retirement Rate
First Year Eligible for Retirement	100%

Group F – Females

Age	Proposed Active Retirement Rate
40-54	10.00%
55	5.00%
56	5.00%
57	5.00%
58	7.50%
59	7.50%
60	7.50%
61	12.50%
62	25.00%
63	15.00%
64	15.00%
65	20.00%

Group F – Females (continued)

Age	Proposed Active Retirement Rate
66	30.00%
67	30.00%
68	30.00%
69	30.00%
70+	100.00%

Group F – Males

Age	Proposed Active Retirement Rate
40-52	20.00%
53	15.00%
54	15.00%
55	5.00%
56	5.00%
57	5.00%
58	5.00%
59	7.50%

Group F – Males (continued)

Age	Proposed Active Retirement Rate
60	7.50%
61	15.00%
62	25.00%
63	17.50%
64	20.00%
65	22.50%
66	25.00%
67	25.00%
68	25.00%
69	25.00%
70+	100.00%

Inactive Retirement

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

All Groups

Eligibility	Proposed Inactive Retirement Rate
Early Retirement Age	20%
Normal Retirement Age	100%

Disability Retirement – Groups A, D, and F

The following tables show the proposed disability retirement rates for members in all Groups A, D, and F:

Age	Proposed Disability Retirement Rate
20	0.0111%
21	0.0121%
22	0.0132%
23	0.0140%
24	0.0148%
25	0.0158%
26	0.0167%
27	0.0174%
28	0.0185%
29	0.0193%
30	0.0204%
31	0.0214%
32	0.0227%
33	0.0241%
34	0.0256%
35	0.0272%
36	0.0293%
37	0.0317%
38	0.0341%
39	0.0372%

Age	Proposed Disability Retirement Rate
40	0.0406%
41	0.0446%
42	0.0491%
43	0.0541%
44	0.0599%
45	0.0665%
46	0.0736%
47	0.0818%
48	0.0907%
49	0.1008%
50	0.1055%
51	0.1243%
52	0.1377%
53	0.1524%
54	0.1686%
55	0.1862%
56	0.2055%
57	0.2266%
58	0.2493%
59	0.2738%

Age	Proposed Disability Retirement Rate
60	0.3005%
61	0.3289%
62	0.3598%
63	0.3930%
64	0.4286%
65	0.4640%
66	0.4995%
67	0.5352%
68	0.5708%
69	0.6061%
70	0.6418%
71	0.6773%
72	0.7127%
73	0.7483%
74	0.7839%
75-80	0.8192%

Disability Retirement – Group C

The following tables show the proposed disability retirement rates for members in all Group C:

Age	Proposed Disability Retirement Rate
20	0.0540%
21	0.0590%
22	0.0635%
23	0.0680%
24	0.0725%
25	0.0770%
26	0.0810%
27	0.0855%
28	0.0895%
29	0.0940%
30	0.0990%
31	0.1045%
32	0.1100%
33	0.1170%
34	0.1240%
35	0.1325%
36	0.1425%
37	0.1535%
38	0.1665%
39	0.1810%

Age	Proposed Disability Retirement Rate
40	0.1980%
41	0.2175%
42	0.2390%
43	0.2640%
44	0.2920%
45	0.3235%
46	0.3590%
47	0.3985%
48	0.4425%
49	0.4910%
50	0.5455%
51	0.6050%
52	0.6710%
53	0.7430%
54	0.8220%
55	0.9080%
56	1.0020%
57	1.1040%
58	1.2150%
59	1.3345%

Age	Proposed Disability Retirement Rate
60	1.4640%
61	1.6040%
62	1.7540%
63	1.9155%
64	2.0890%
65	2.2620%
66	2.4355%
67	2.6085%
68	2.7820%
69	2.9550%
70	3.1285%
71	3.3015%
72	3.4750%
73	3.6480%
74	3.8215%
75-80	3.9945%

Termination – Groups A and D

The following tables show the proposed termination rates for members in Groups A and D:

Groups A and D – Unisex

Age	Proposed Termination Rate
15-20	6.4510%
21	6.0596%
22	5.7170%
23	5.4138%
24	5.1527%
25	4.9066%
26	4.7062%
27	4.5031%
28	4.3056%
29	4.1165%
30	3.9275%
31	3.7459%
32	3.6280%
33	3.5119%
34	3.3836%

Groups A and D – Unisex (continued)

Age	Proposed Termination Rate
35	3.2826%
36	3.2255%
37	3.2021%
38	3.1346%
39	3.1038%
40	3.0392%
41	2.9878%
42	2.9474%
43	2.8567%
44	2.7575%
45	2.6920%
46	2.6208%
47	2.4935%
48	2.4176%
49	2.3353%

Groups A and D – Unisex (continued)

Age	Proposed Termination Rate
50	2.2464%
51	2.1641%
52	2.0732%
53	1.9759%
54	1.8935%

Termination – Group C

The following tables show the proposed termination rates for male and female members in Group C:

Groups C – Male

Age	Proposed Termination Rate
0	10.800%
1	6.480%
2	5.400%
3	3.456%
4	3.456%
5	3.456%
6-19	3.240%

Groups C – Female

Age	Proposed Termination Rate
0	21.600%
1	12.960%
2	10.800%
3	6.912%
4	6.912%
5	6.912%
6-19	6.480%

Termination – Group F

The following tables show the proposed termination rates and increase factors for members in Group F:

Group F – 0-9 Years of Service - Unisex

Age	Proposed Termination Rate
15-20	8.4083%
21	7.8932%
22	7.4538%
23	7.0599%
24	6.7115%
25	6.3933%
26	6.1358%
27	5.8631%
28	5.6055%
29	5.3631%
30	5.1207%
31	4.8783%
32	4.7268%
33	4.5753%
34	4.4087%

Group F – 0-9 Years of Service – Unisex (continued)

Age	Proposed Termination Rate
35	4.2723%
36	4.1966%
37	4.1663%
38	4.0905%
39	4.0451%
40	3.9542%
41	3.8936%
42	3.8481%
43	3.7269%
44	3.5906%
45	3.5148%
46	3.4088%
47	3.2573%
48	3.1512%
49	3.0452%

Group F – 0-9 Years of Service – Unisex (continued)

Age	Proposed Termination Rate
50	2.9240%
51	2.8179%
52	2.6967%
53	2.5755%
54	2.4695%

Service	Proposed Increase Factor
0	2.850
1	2.800
2	2.300
3	1.750
4	1.550
5	1.350
6	1.300
7	1.175
8	1.150
9	1.515

Termination – Group F

The following tables show the proposed termination rates for members in group F:

Group F – 10-29 Years of Service - Unisex

Age	Proposed Termination Rate
15-20	5.55%
21	5.21%
22	4.92%
23	4.66%
24	4.43%
25	4.22%
26	4.05%
27	3.87%
28	3.70%
29	3.54%
30	3.38%
31	3.22%
32	3.12%
33	3.02%
34	2.91%

Group F – 10-29 Years of Service – Unisex
(continued)

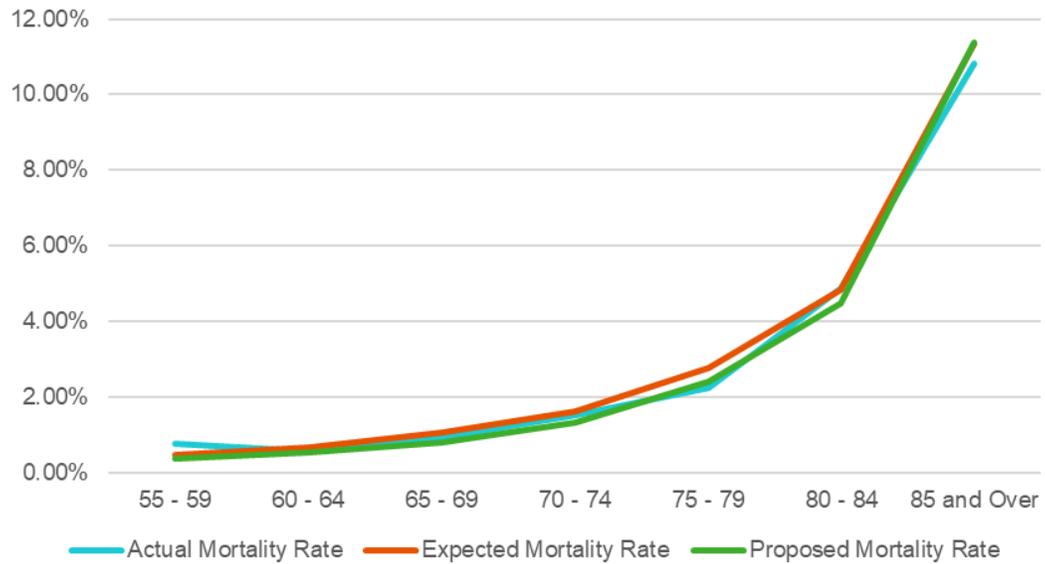
Age	Proposed Termination Rate
35	2.82%
36	2.77%
37	2.75%
38	2.70%
39	2.67%
40	2.61%
41	2.57%
42	2.54%
43	2.46%
44	2.37%
45	2.32%
46	2.25%
47	2.15%
48	2.08%
49	2.01%

Group F – 10-29 Years of Service – Unisex
(continued)

Age	Proposed Termination Rate
50	1.93%
51	1.86%
52	1.78%
53	1.70%
54	1.63%

Analysis – Groups A & F – Healthy Retiree Mortality (Female)

Actual Versus Proposed Experience, Benefit-Weighted Basis



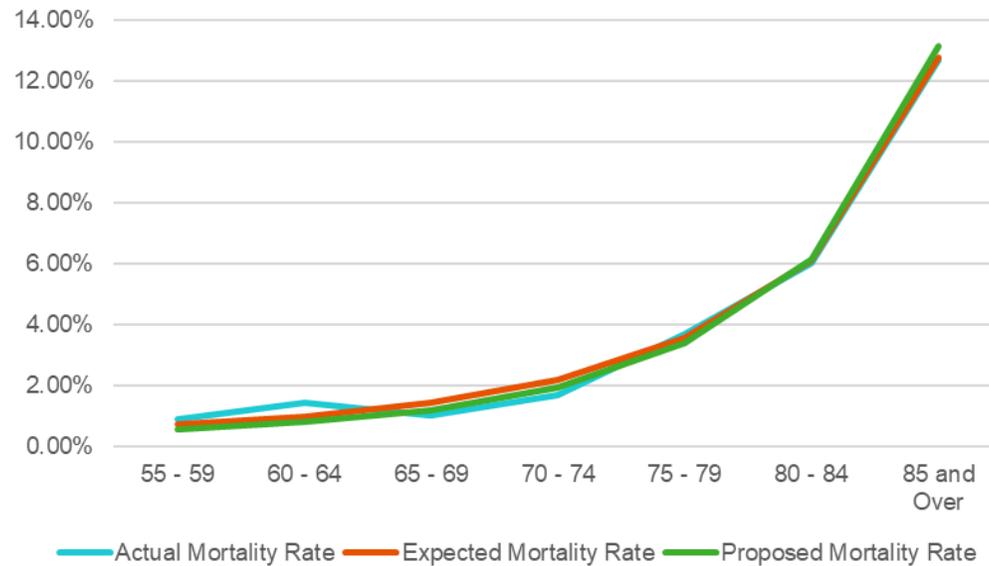
Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Counts	12,657	314	319	99%		
Benefits*	\$193,118	\$3,580	\$3,812	94%	\$3,373	106%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Groups A & F – Healthy Retiree Mortality (Male)

Actual Versus Proposed Experience, Benefit-Weighted Basis



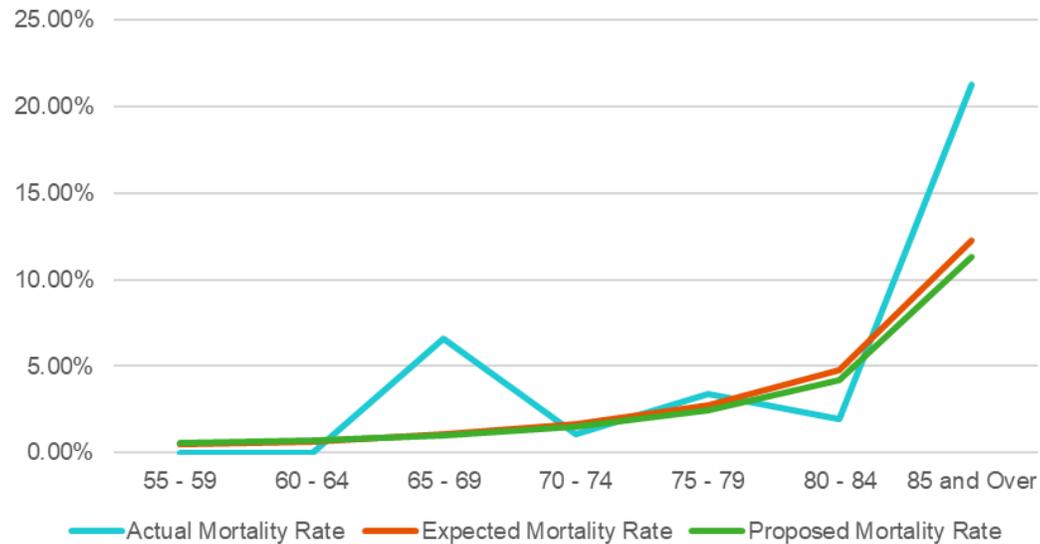
Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Counts	12,706	389	374	104%		
Benefits*	\$244,869	\$5,984	\$6,322	95%	\$5,963	100%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Groups A & F – Beneficiary Mortality (Female)

Actual Versus Proposed Experience, Benefit-Weighted Basis



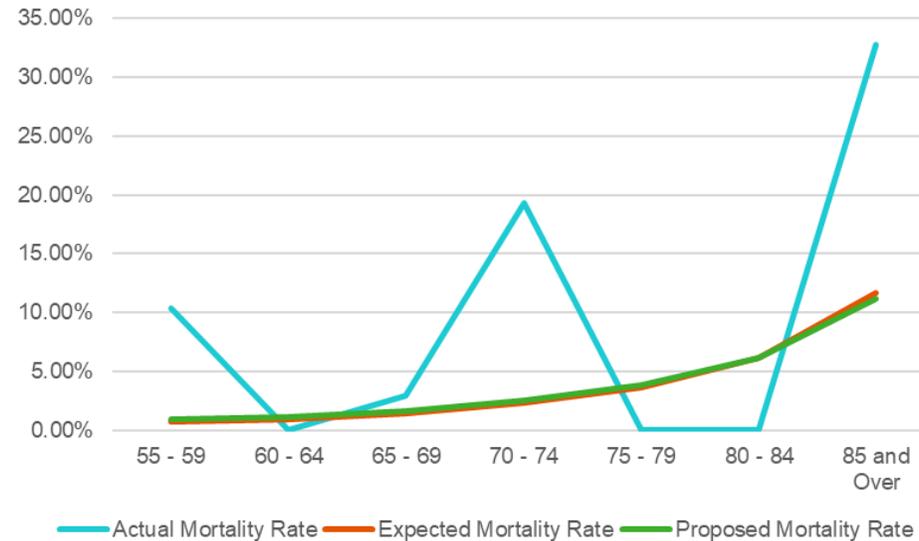
Basis	Exposures	Actual Benefits for Participants who Died		Actual to Expected**	Proposed	Actual to Proposed**
		Counts	Expected	Proposed		Proposed
Counts	2,172	99	90	110%		
Benefits*	\$4,662	\$237	\$159	149%	\$147	162%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Analysis – Groups A & F – Beneficiary Mortality (Male)

Actual Versus Proposed Experience, Benefit-Weighted Basis



Basis	Exposures	Actual Benefits for Participants who Died	Expected	Actual to Expected**	Proposed	Actual to Proposed**
Counts	379	24	15	159%		
Benefits*	\$761	\$66	\$26	250%	\$27	243%

* Based on annual benefits in thousands of dollars

**Actual to Expected/Proposed ratios indicate how well the actual experience aligns with the current/proposed assumptions. The closer the ratio is to 100%, the closer the current/proposed assumptions align with the actual experience.

Inactive/Deferred Methodology Change

Current Methodology:

All Active members who terminate become Inactive, then Inactive members become Deferred after remaining Inactive for at least 5 years

- *Active Members*: Liability based on accrued benefit
- *Inactive Members*: Liability based on 250% of the accumulated contributions
- *Deferred Members*: Liability based on accrued benefit

Consistently experiencing large turnover losses for prior actives and unexpected gains for prior Inactives who return-to-work (due to the 250% load), resulting in net experience losses

Proposed Methodology:

All Active members or Inactive members who terminate/are terminated with at least 5 years of service become immediately Deferred

- *Active Members*: Liability based on accrued benefit
- *Inactive Members*: Liability based on 100% of the accumulated contributions (remove the additional load)
- *Deferred Members*: Liability based on accrued benefit

Produces small turnover gains for prior actives and losses for prior Inactives who return-to-work (due to removing 250% load)