Montana Public Employees' Retirement Administration

Experience Study Review

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Background

- Assumptions have a significant impact on the calculation of liabilities and actuarial contribution rates
  - Benefit payments are dependent on number of contingent events that are unknown
  - Actuaries use assumptions to determine information about future benefit payments including when, how much, and how long
  - Assumptions will impact the allocation of costs so generally set neither overly conservative or aggressive
- Assumptions are just that – assumptions. If actual experience differs from the assumption over time, the costs will differ also as the valuation process captures actual experience
- Assumptions are long-term estimates

Purpose of Experience Study

- Evaluate whether to retain or change the current set of assumptions and actuarial methods
- Generally performed every 5 years for MPERA
  - New assumptions will first be used in the June 30, 2026 valuation
- Assumptions do not affect the true cost of the plan which is the actual benefit payments paid from the trust fund

Our philosophy:

- Don’t overreact: if experience is credible, we tend to move part of the way toward actual experience
- Anticipate trends if expected to continue e.g., mortality improvements
- Simplify when possible: ignore factors that don’t improve the accuracy of the liability measurement

Experience Studies

- Compare actual experience during study period (Fiscal years 2021 through 2025) with expected results based on current assumptions
  - Key measurement tool: Actual/Expected Ratio or A/E Ratio
- Past experience provides strong guidance for some assumptions (like mortality) and weak guidance for others (like investment return)
- Assumption setting involves both science and art
  - Objective (science): number crunching of actual and expected numbers of members and rates of occurrence
  - Subjective (art): interpreting the information and deciding on appropriate changes
  - Professional judgement is involved
- The Covid pandemic likely had an impact during this study period and was considered in making recommended changes

Funding Policy: Actuarial Methods

Actuarial Method	Current	Recommended
Actuarial Cost Method	Entry age normal	No change
Asset Valuation Method	4-year smoothing of the difference between actual and expected return on market value not less than 80% of market value or more than 120%	No change
Amortization of Unfunded Actuarial Accrued Liability	Level percent of payroll over the amortization period as a single base	No change

Selection of Assumptions

What Are They?

Economic

- Price Inflation
- Investment Return
- Real Wage Growth
- General Wage Growth
- Payroll Growth

Demographic

- Withdrawal
- Refund Election
- Disability
- Retirement
- Mortality
- Salary Increases

Who Selects Them?

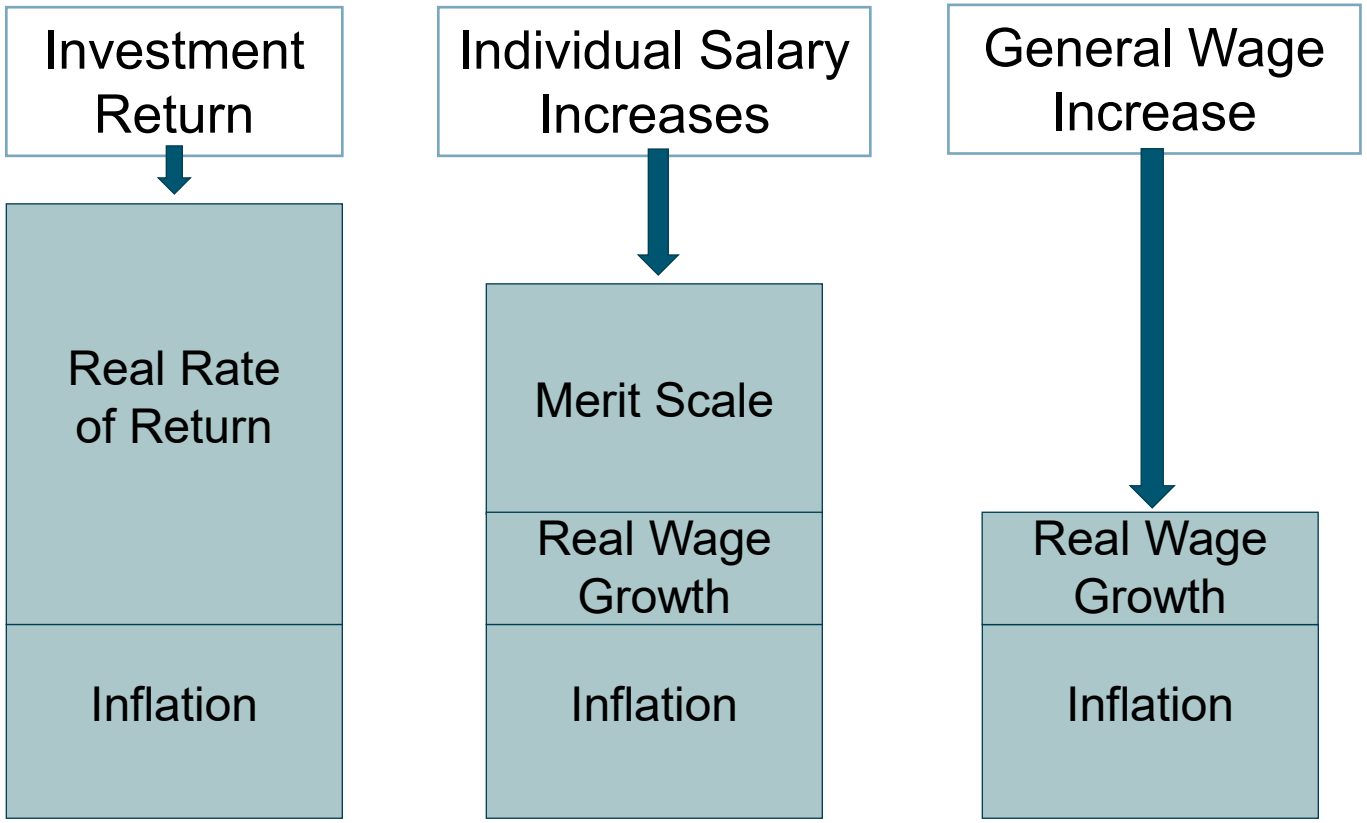
Economic

- Board
- Actuary
- Other Advisors

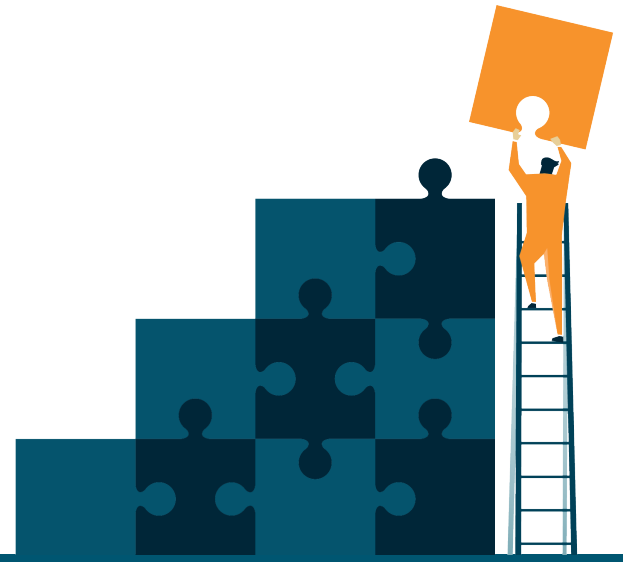
Demographic

- Board Approves
- Mostly Actuary Since Data Driven

Economic Assumptions Building Block Method

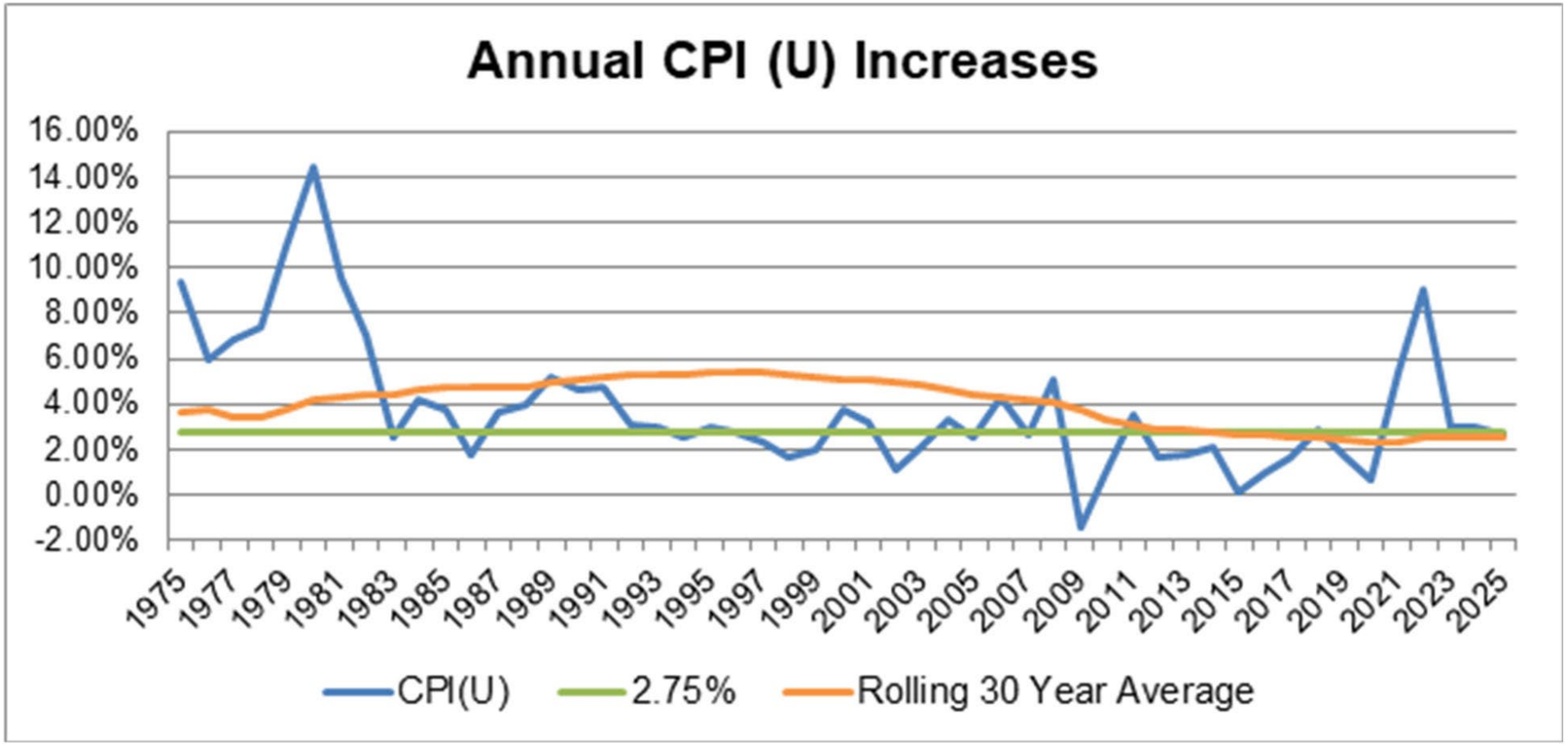


Note: inflation assumption and real wage growth should be consistent in all assumptions.
Some margin for adverse deviation in the assumption is acceptable.
Administrative expenses are also reflected in the Investment Return assumption.



Price Inflation Assumption

- Current Assumption: 2.75%



Price Inflation Assumption

Bond Market expectations:

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

Social Security expectations: 1.8% - 3.0%

Horizon Survey: 2.2% - 2.7%

- **Recommend retaining 2.75% assumption**

Investment Return Assumption

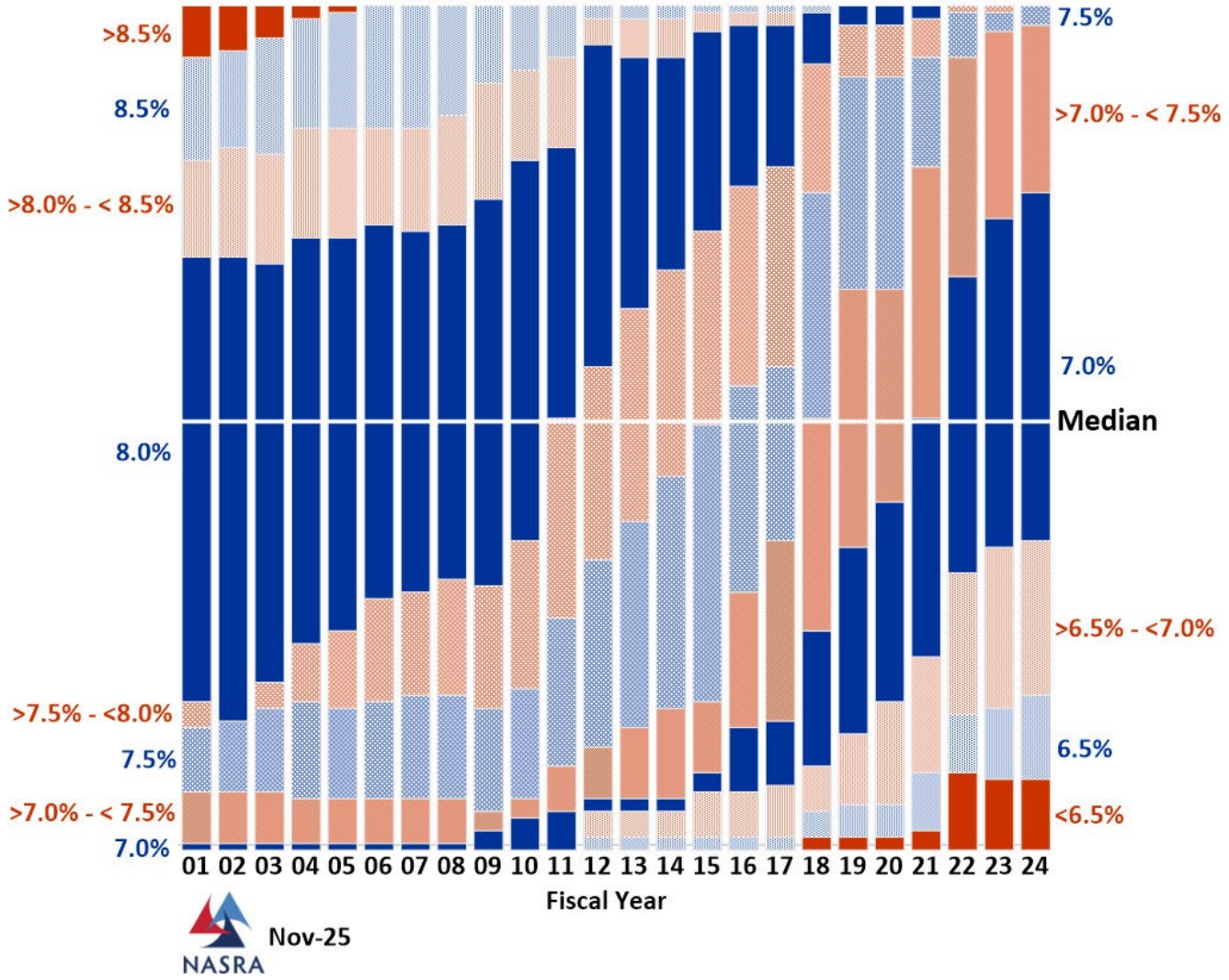
- Using the “building block” approach, the investment return assumption is composed of two components
  - Rate of price inflation (previously discussed)
  - Real rate of return
- The investment return assumption is net of investment and administrative expenses
- Current assumption is 7.30%
  - 2.75% inflation + 4.55% real return
- Asset allocation is the key factor in setting this assumption
  - Portfolios that take risk are generally expected to be rewarded with higher returns, along with potentially greater volatility
- Most powerful assumption in the valuation
  - Small changes can have large impact on liabilities and contribution rates

Historical Investment Returns

Market Value Rate of Return								
Year Ending 6/30	PERS	JRS	SRS	GWPORS	HPORS	MPORS	FURS	VFCA
2016	2.02%	2.06%	2.06%	2.11%	2.04%	2.13%	2.15%	1.84%
2017	11.93%	11.91%	11.95%	11.92%	11.87%	11.56%	11.56%	11.51%
2018	8.90%	8.88%	8.83%	8.81%	8.86%	8.65%	8.63%	8.68%
2019	5.65%	5.64%	5.70%	5.72%	5.63%	5.42%	5.44%	5.41%
2020	2.73%	2.72%	2.71%	2.70%	2.66%	2.65%	2.64%	2.66%
2021	27.80%	27.69%	27.82%	27.66%	27.80%	27.07%	27.04%	26.93%
2022	(4.18)%	(4.21)%	(4.26)%	(4.30)%	(4.24)%	(4.21)%	(4.24)%	(3.98)%
2023	8.35%	8.39%	8.56%	8.40%	8.37%	8.21%	8.27%	7.41%
2024	8.94%	8.99%	9.03%	9.08%	9.05%	8.95%	8.96%	7.93%
2025	9.39%	9.43%	9.40%	9.39%	9.42%	9.15%	9.14%	8.49%
Average	7.87%	7.87%	7.90%	7.87%	7.87%	7.69%	7.69%	7.43%

Current assumption is 7.30%, net of investment and administrative expenses

Public Plan Trends



The median investment return assumption has been 7.00% for the past few years, down from 8.00% during the 2010's.

Future Expectations

Time Span In Years	Mean Return	Standard Deviation	Real Returns by Percentile				
			5th	25th	50th	75th	95th
1	5.76%	12.13%	-12.93%	-2.72%	5.08%	13.50%	26.80%
5	5.21	5.38	-3.40	1.52	5.08	8.76	14.24
10	5.15	3.80	-0.99	2.55	5.08	7.67	11.51
20	5.11	2.69	0.75	3.28	5.08	6.90	9.59
30	5.10	2.19	1.53	3.61	5.08	6.57	8.74
50	5.09	1.70	2.32	**3.94**	5.08	**6.23**	7.91

50% probability that the long-term real rate of return will be between 3.94% and 6.23%.

Administrative Expenses

FY Ending June 30	Administrative Expenses	Market Value of Assets	Expense Ratio
2021	$6,892,166	$9,516,857,085	0.07%
2022	5,852,785	8,848,775,865	0.07
2023	6,552,466	9,294,227,134	0.07
2024	6,887,873	9,927,609,658	0.07
2025	7,016,626	10,549,731,478	0.07

Recommend a long-term administrative expense ratio of 0.07% be included in the investment return assumption.

Investment Return Assumption

Based on 2025 Horizon Survey

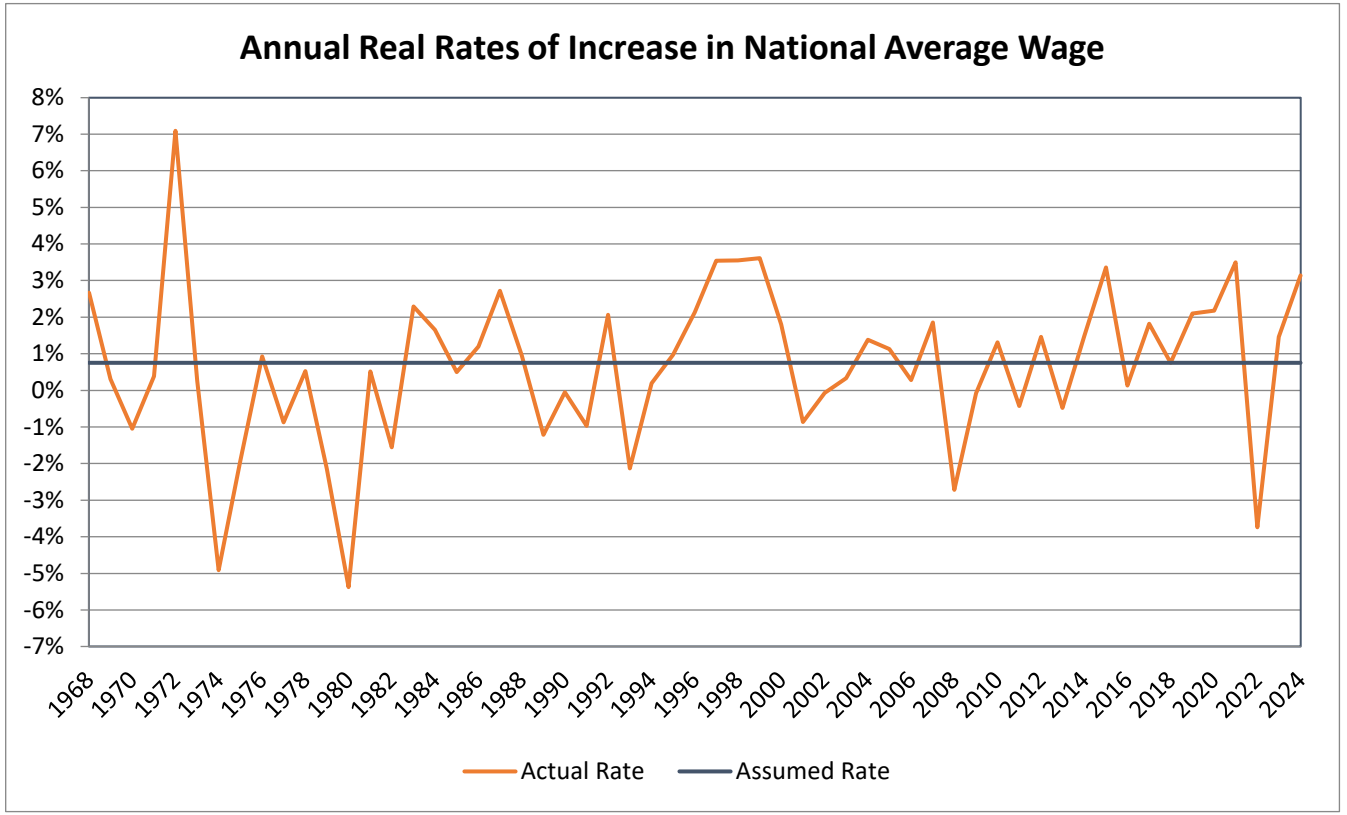
	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return	3.94%	5.08%	6.23%
Inflation	2.75%	2.75%	2.75%
Administrative Expenses	(0.07)%	(0.07)%	(0.07)%
Net Investment Return	6.62%	7.76%	8.91%

Current assumption of 7.30% provides a 60% chance of meeting or exceeding the assumed rate of return.

- **Recommend retaining 7.30% assumption**

General Wage Growth Assumption

- Typically consists of price inflation and real wage growth (standard of living increase)
- Current assumption is 3.50% (2.75% inflation + 0.75% real wage growth)
- National Average Wage actual experience
  - Last 10 years, general wage inflation 1.31% (4.16% wage inflation – 2.85% price inflation)
  - Last 30 years, general wage inflation 1.13% (3.66% wage inflation – 2.53% price inflation)
- **Recommendation: Increase from 3.50% to 3.75% (2.75% inflation + 1.00% real wage growth)**



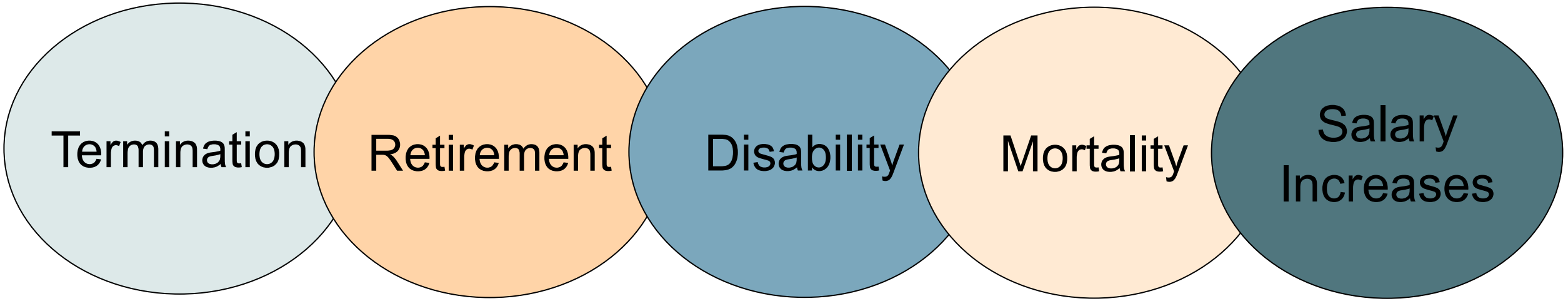
Payroll Growth Assumption

- Payroll growth assumption
  - Does not impact the Actuarial Accrued Liability or Funded Ratio
  - Used only to determine the amortization payment on the Unfunded Actuarial Accrued Liability (UAAL)
- Current assumption is 3.25% for all systems
- Impacted by three factors
  1. The size of the group (number of active members)
  2. The general wage increase assumption
  3. Historical growth in total payroll
- Annual increase over the past 5 and 10 years was at or above 3.25% for all systems except HPORS and JRS
- Recommendations
  1. Maintaining 3.25% assumption for PERS, FURS, GWPORS, MPORS, and SRS
  2. Reducing the assumption to 3.00% for HPORS
  3. Reducing the assumption to 2.25% for JRS

Recommended Economic Assumption Changes

	Current Assumptions	Proposed Assumptions
Price Inflation	2.75%	2.75%
Investment Return	7.30%	7.30%
Real Wage Growth	0.75%	1.00%
General Wage Growth	3.50%	3.75%
Payroll Growth	3.25%	3.25% (3.00% HPORS, 2.25% JRS)

Demographic Actuarial Assumptions



Will an employee work long enough to vest and what monthly benefit will be owed to him?

When will the employee retire and start collecting benefits?

Will an employee have to leave the workforce due to a disability?

How long will monthly benefits be paid?

What salary will an employee's benefit at retirement be based on?

Measuring Demographic Experience

- Compare what actually happened to individual members with what was expected to happen based on the actuarial assumptions

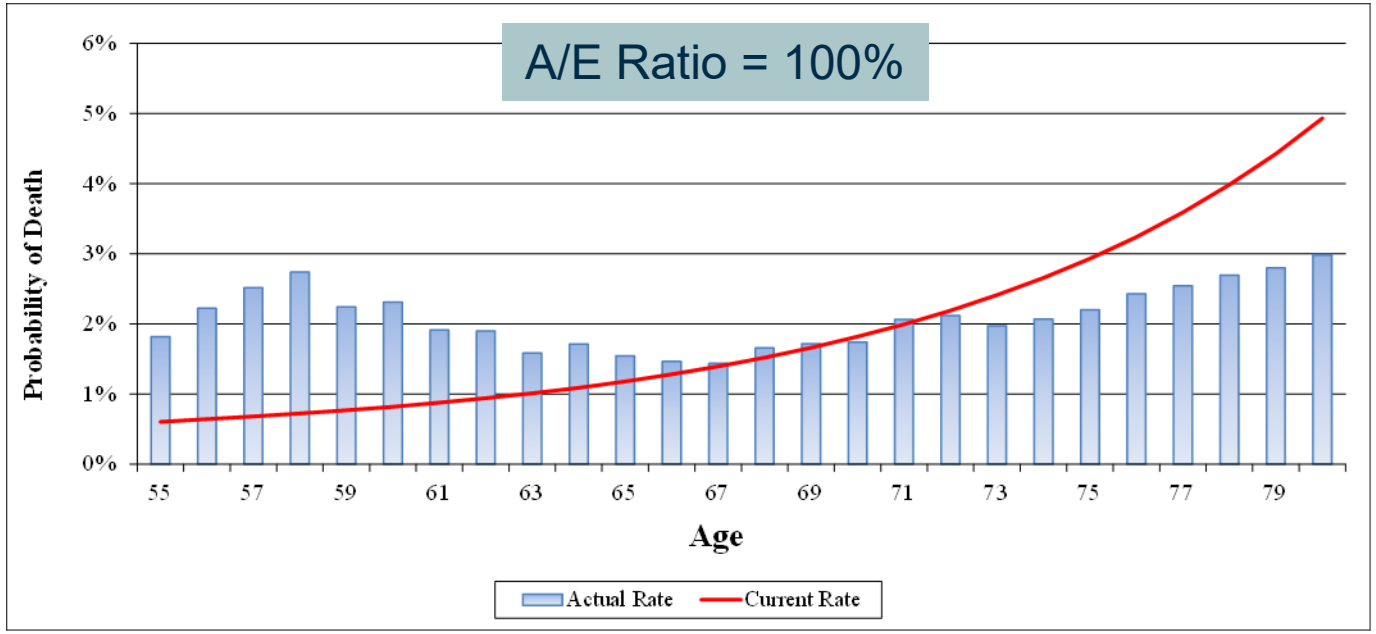
- Key evaluation tool is actual decrements/expected decrements (called A/E ratio)
  - Decrement is a change in a member's status during the study period (e.g., retirement, termination, death)

- Professional judgment is needed when setting assumptions

Evaluating the Demographic Experience

- Generally, the closer A/E ratio is to 100%, the better the current assumption anticipated the experience

- Even if overall A/E ratio is close to 100%, pattern of the actual experience may vary significantly from the assumption, indicating a need for change

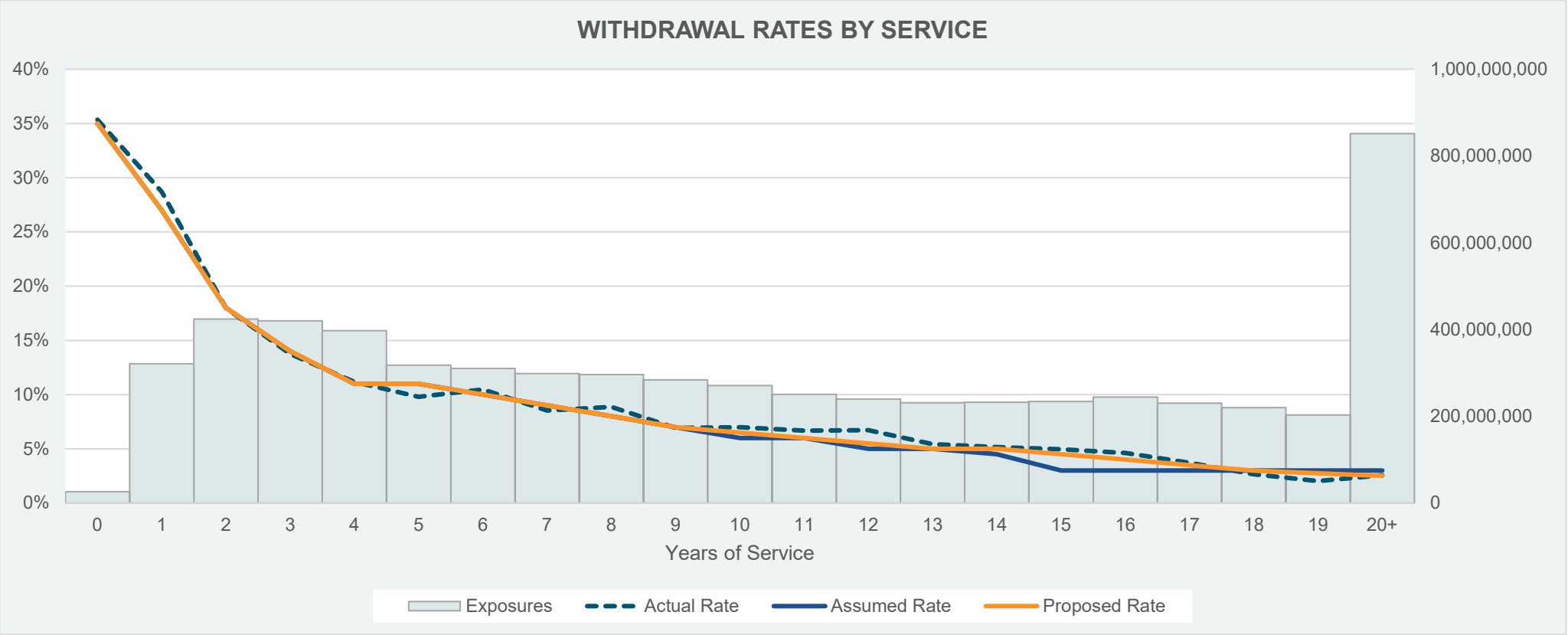


Withdrawal

- Anticipates a member terminating directly from active status prior to be becoming eligible for a retirement benefit
- Studied without regard to gender and based on years of service
- Liability weighted analysis was performed
  - Members who have a higher liability have a larger impact on the gains and losses that occur in the annual valuation

Withdrawal (PERS)

- **Recommend adjusting rates** to better fit experience (orange line)



Current Assumption A/E Ratio: 103.4%
Proposed Assumption A/E Ratio: 102.3%

Withdrawal

	A/E Ratio (Current Assumption)	A/E Ratio (Recommended Assumption)
PERS	103.44%	102.28%
JRS	N/A	N/A
HPORS	144.30%	140.25%
SRS	111.39%	104.84%
GWPORS	117.17%	107.22%
MPORS	134.15%	133.30%
FURS	154.81%	115.08%
VFCA	94.58%	96.33%

- **Recommend adjusting rates** to better fit experience

Election of a Deferred Benefit or Refund

- Vested members who terminate active employment have the option to
  - Take a distribution of their member contributions
  - Leave their contributions with the system and draw a benefit in the future

- Assumption is needed because the choice impacts the system

- Current assumption: Members select the most valuable option (refund or deferred benefit)

- **Recommended assumption: No change to current assumption**

Disability

- Anticipates disability directly from active status
- Studied based on age
- Headcount weighted analysis was performed
  - Liability-weighted results can often be distorted by lower salaries in the years leading up to a disability

Disability

	Actual	Expected	A/E Ratio
PERS & JRS	33	532	6.21%
Public Safety	30	45	67.23%

- Study showed fewer actual disabilities than expected
- However, actuarial valuations have shown more actuarial losses than gains for disability during the study period
  - We believe this may be due to a few individuals with large losses skewing the data
  - Prior study showed a reasonable match to the assumption
- We recommend no changes to the current assumption

Retirement

- Anticipates retirement directly from active status
- Studies without regard to gender and based on age and years of service
- Liability weighted analysis was performed
  - Members who have a higher liability have a larger impact on the gains and losses that occur in the annual valuation
- Retirement type are analyzed separately
  - Early Retirement (reduced benefit)
  - Normal Retirement (unreduced benefit)

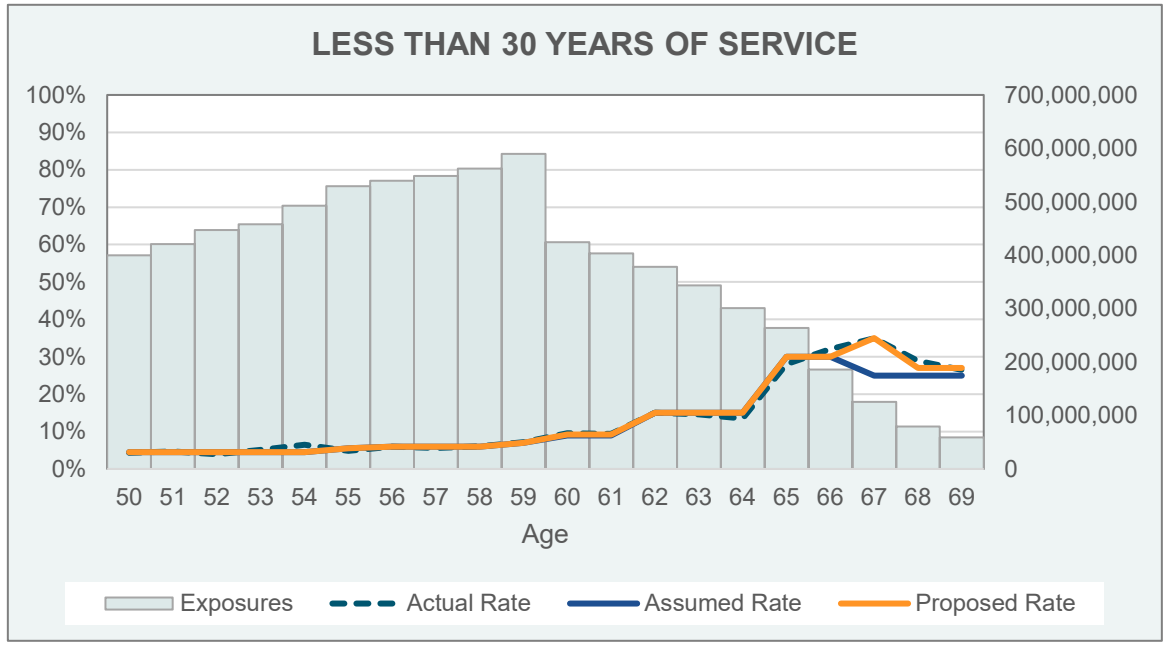
Retirement (PERS)

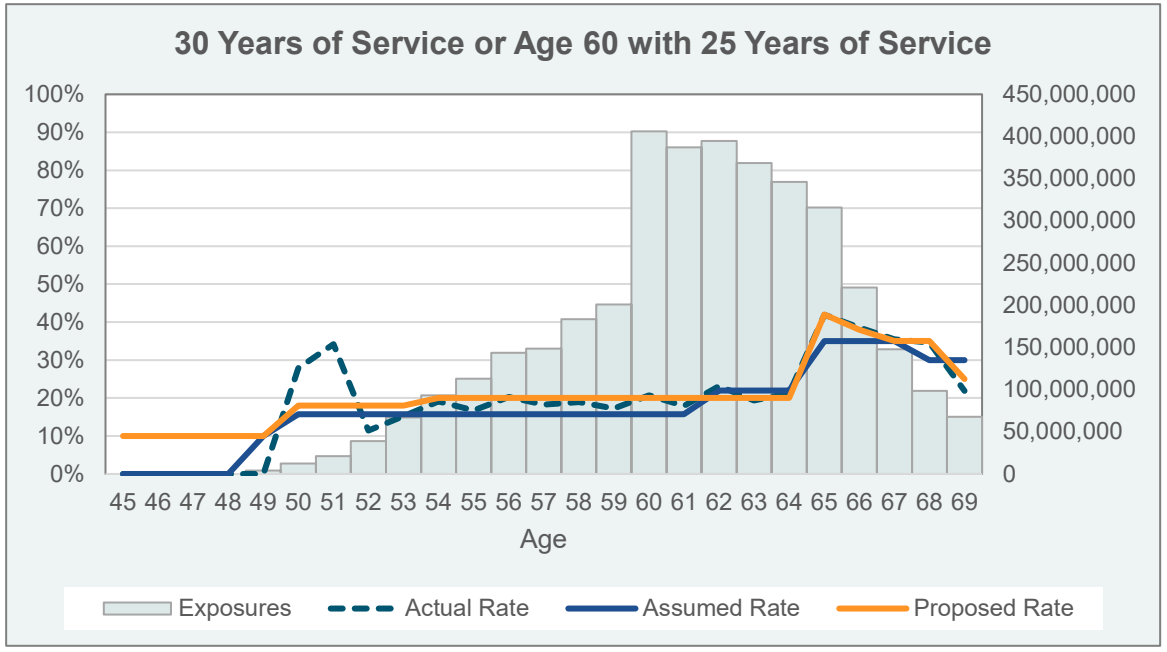
- Retirement experience investigated separately for members with
  - Less than 30 years of service
  - 30 or more years of service or who were at least age 60 with at least 25 years of service
- Experience yielded actual/expected ratios of 106.3%
- Recommend:
  - Adjusting the assumed rates to reflect recent experience.
  - Recommended assumptions produce an actual/expected ratio of 99.7%

Retirement (PERS)

Less than 30 Years of Service
Current Assumption A/E Ratio: 102.6%
Proposed Assumption A/E Ratio: 100.1%

30 Years of Service or Age 60 with 25 Years of Service
Current Assumption A/E Ratio: 109.4%
Proposed Assumption A/E Ratio: 99.4%





Retirement

	A/E Ratio (Current Assumption)	A/E Ratio (Recommended Assumption)
PERS	106.3%	99.7%
JRS	64.9%	64.9%
HPORS	104.3%	105.6%
SRS	99.5%	108.1%
GWPORS	104.6%	99.1%
MPORS	119.4%	99.8%
FURS	86.7%	97.7%
VFCA	82.6%	94.4%

- **Recommend adjusting rates to better fit experience for all plans except JRS**

Mortality

- Critical assumption from a cost perspective because it anticipates the duration of benefit payments
  - If people live longer, benefits are paid longer, and it increases the liabilities and costs of the system

- May adjust tables in order to better fit the actual experience
  - Age setback or set forward
  - Benefit size (Below or Above Median)
  - Scaling factors

Current Mortality Assumptions

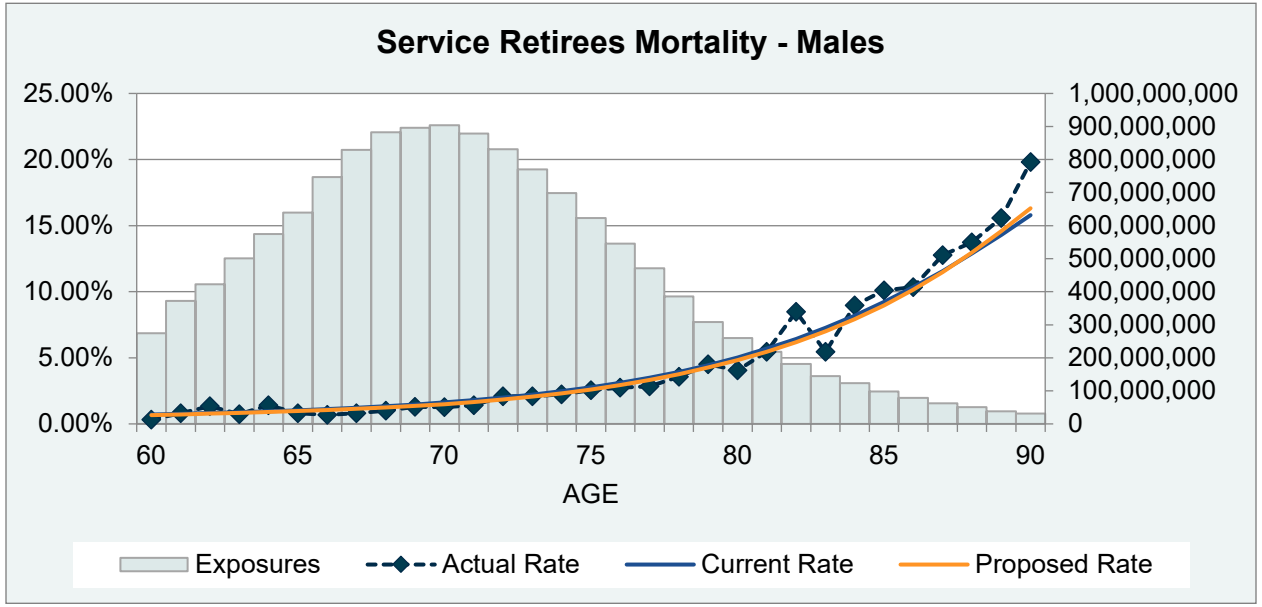
- Current Retiree Mortality Tables
  - General Employee Plans (PERS and JRS) - Pub-2010 General Amount Weighted Healthy Retiree Mortality Table, table projected to 2021 set forward one year and adjusted 104% for males and 103% for females.
  - Public Safety Plans (FURS, GWPORS, HPORS, MPORS, SRS, and VFCA) - PUB-2010 Safety Amount Weighted Healthy Retiree mortality table projected to 2021 set forward one year and adjusted 105% for males and with no adjustment for females.

- Future mortality improvements projected using Scale MP-2021

Recommended Mortality Assumptions

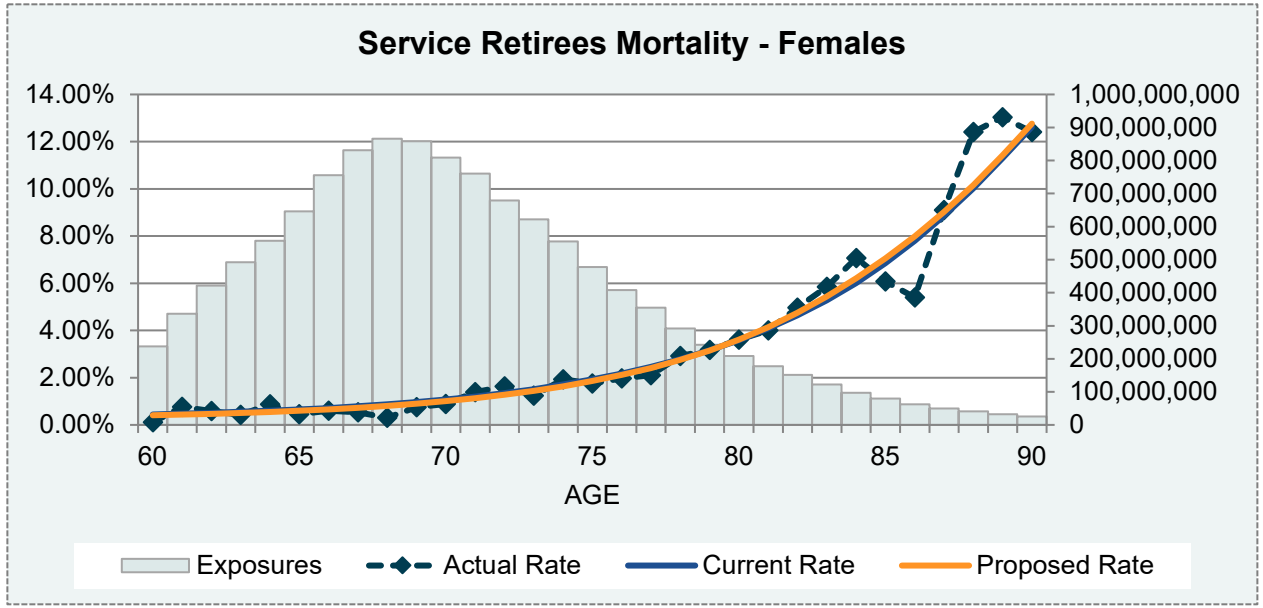
- New set of public plan mortality tables published in 2025 (Pub-2016 tables)
- Our recommendation is to move to the newest family of mortality tables
- Recommendation for Retiree Mortality Tables
  - General Employee Plans (PERS and JRS) - Pub-2016 General Amount Weighted Healthy Retiree Mortality Table, set forward 1 year for males and females
  - Public Safety Plans (FURS, GWPORS, HPORS, MPORS, SRS, and VFCA) - Pub-2016 Public Safety Amount Weighted Healthy Retiree Mortality Table, set forward 2 years for males and no adjustment for females
- Future mortality improvements projected generationally using Scale MP-2021 (most recent)

Retiree Mortality (General Employees)

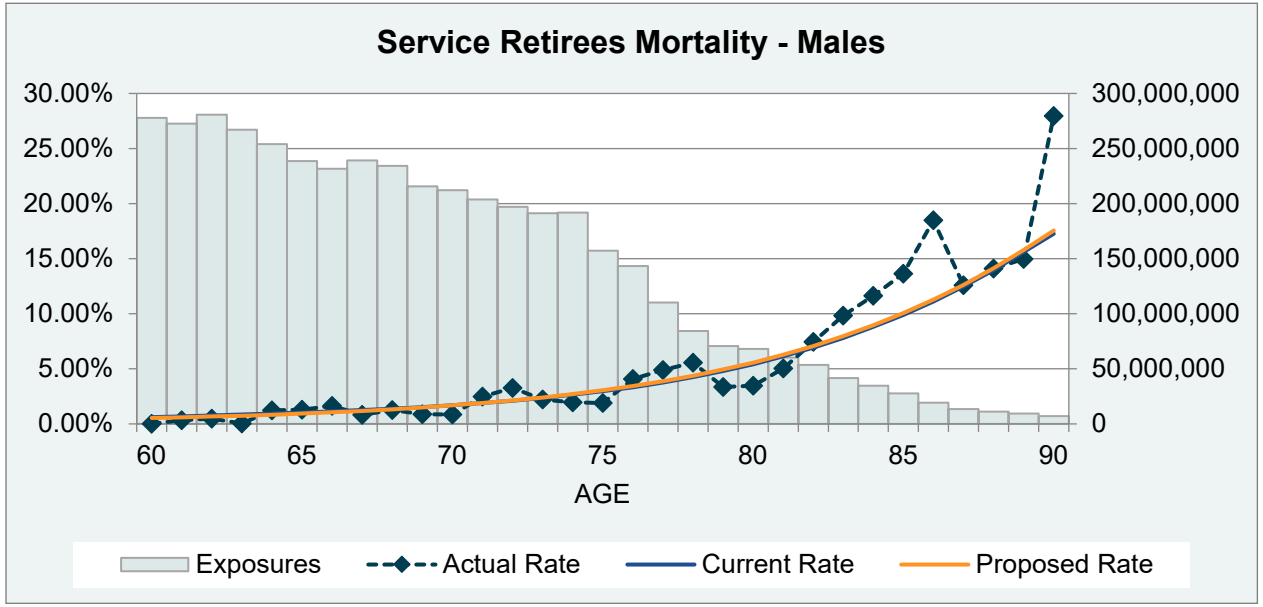


Males
Current Assumption A/E Ratio: 94.4%
Proposed Assumption A/E Ratio: 99.0%

Females
Current Assumption A/E Ratio: 96.1%
Proposed Assumption A/E Ratio : 98.6%

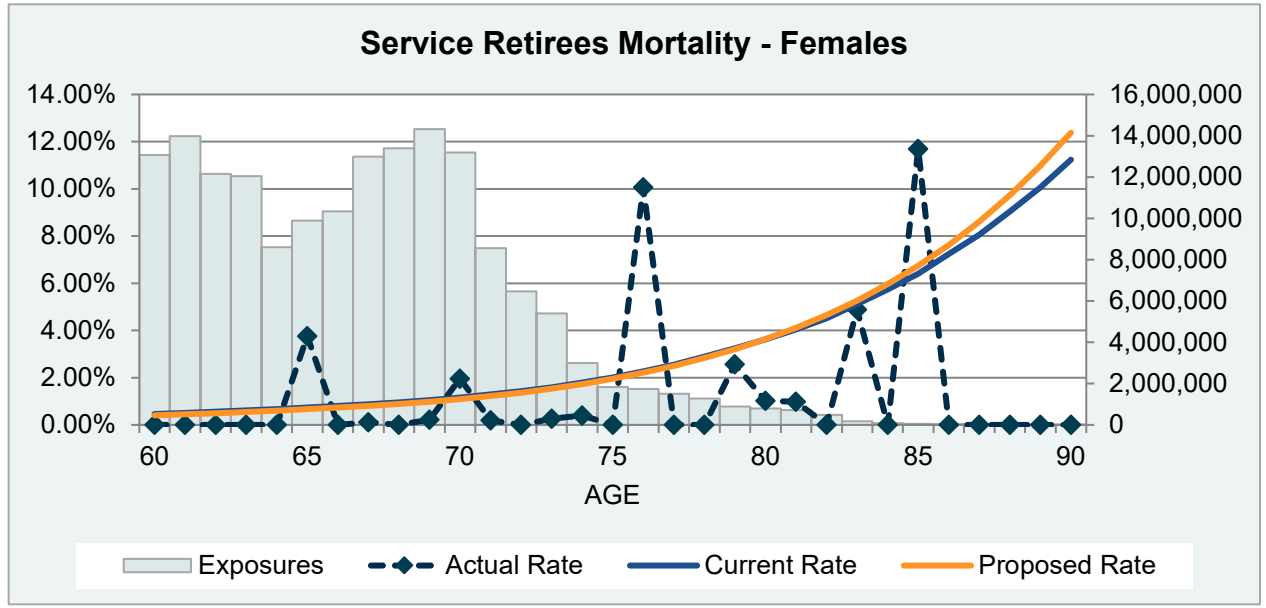


Retiree Mortality (Public Safety Employees)



Males
Current Assumption A/E Ratio: 102.5%
Proposed Assumption A/E Ratio: 102.9%

Females
Current Assumption A/E Ratio: 46.7%
Proposed Assumption A/E Ratio : 49.8%



Other Mortality Assumptions

- Our recommendation is to use the same Amount Weighted Pub-2016 family of mortality tables for Actives, Disabled and Beneficiaries

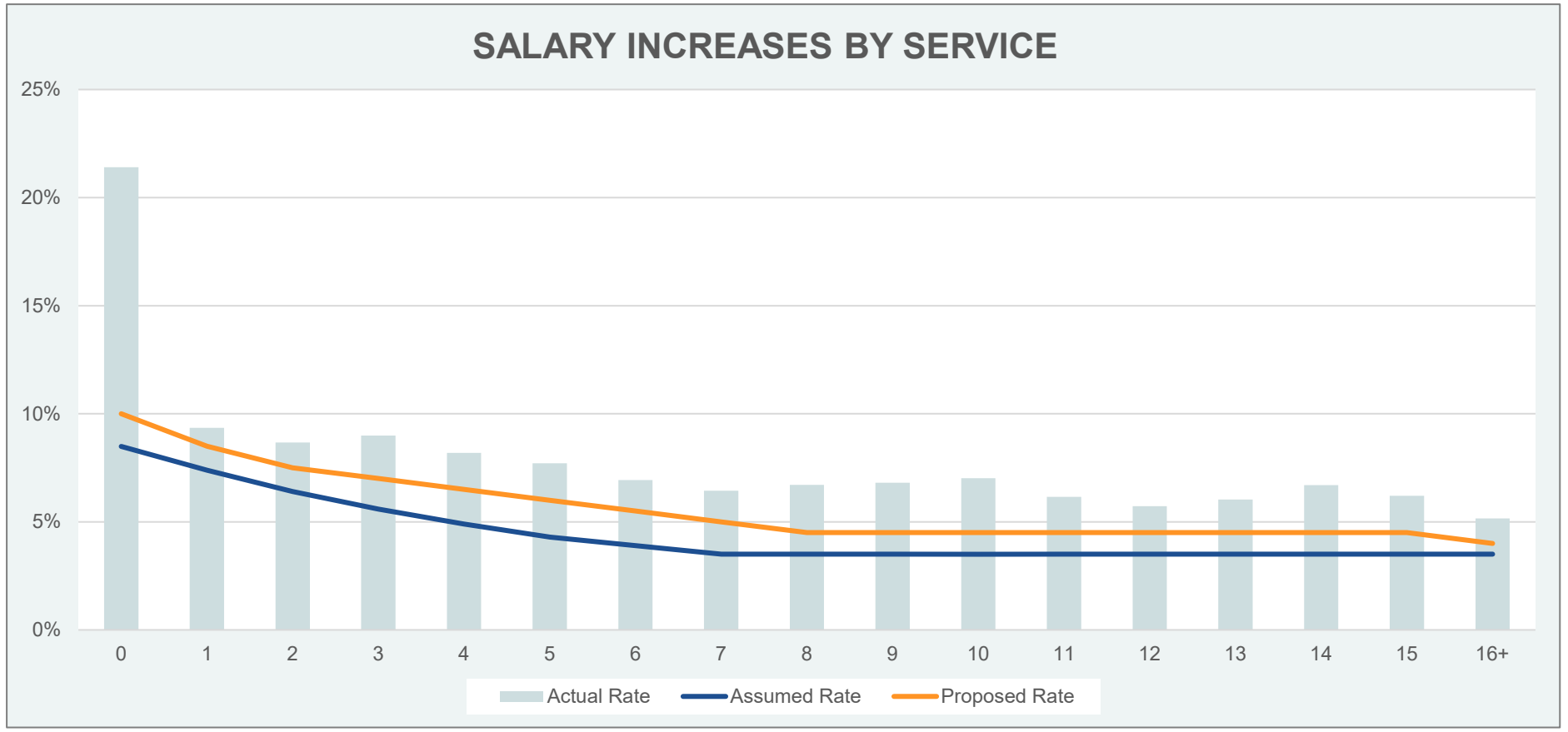
- **Recommendation for Active Base Table**
  - General Employee Plans (PERS and JRS) – PUB-2016 General Employee Mortality Table
  - Public Safety Plans (FURS, GWPORS, HPORS, MPORS, SRS, and VFCA) - Pub-2016 Public Safety Employee Mortality Table
  - Future mortality improvements projected generationally using scale MP-2021
- **Recommendation for Disabled Base Table**
  - General Employee Plans (PERS and JRS) – PUB-2016 General Amount Weighted Disabled Retiree mortality tables set forward 1 year for males and females
  - Public Safety Plans (FURS, GWPORS, HPORS, MPORS, SRS, and VFCA) - Pub-2016 Public Safety Amount Weighted Disabled Retiree Mortality Table, set forward 2 years for males
  - No mortality improvement
- **Recommendation for Beneficiary Base Table**
  - General Employee Plans (PERS and JRS) - Pub-2016 General Amount Weighted Retiree Contingent Survivor Mortality Table, set forward 1 year for males and females
  - Public Safety Plans (FURS, GWPORS, HPORS, MPORS, SRS, and VFCA) - Pub-2016 Public Safety Amount Weighted Contingent Survivor Mortality Table, set forward 2 years for males
  - Future mortality improvements projected generationally using scale MP-2021

Individual Salary Increase Assumption

- Consists of two pieces
  - General wage inflation assumption (previously recommended to increase to 3.75%)
  - Merit scale: varies by age or, more commonly, service and reflects individual performance (longevity and promotion)

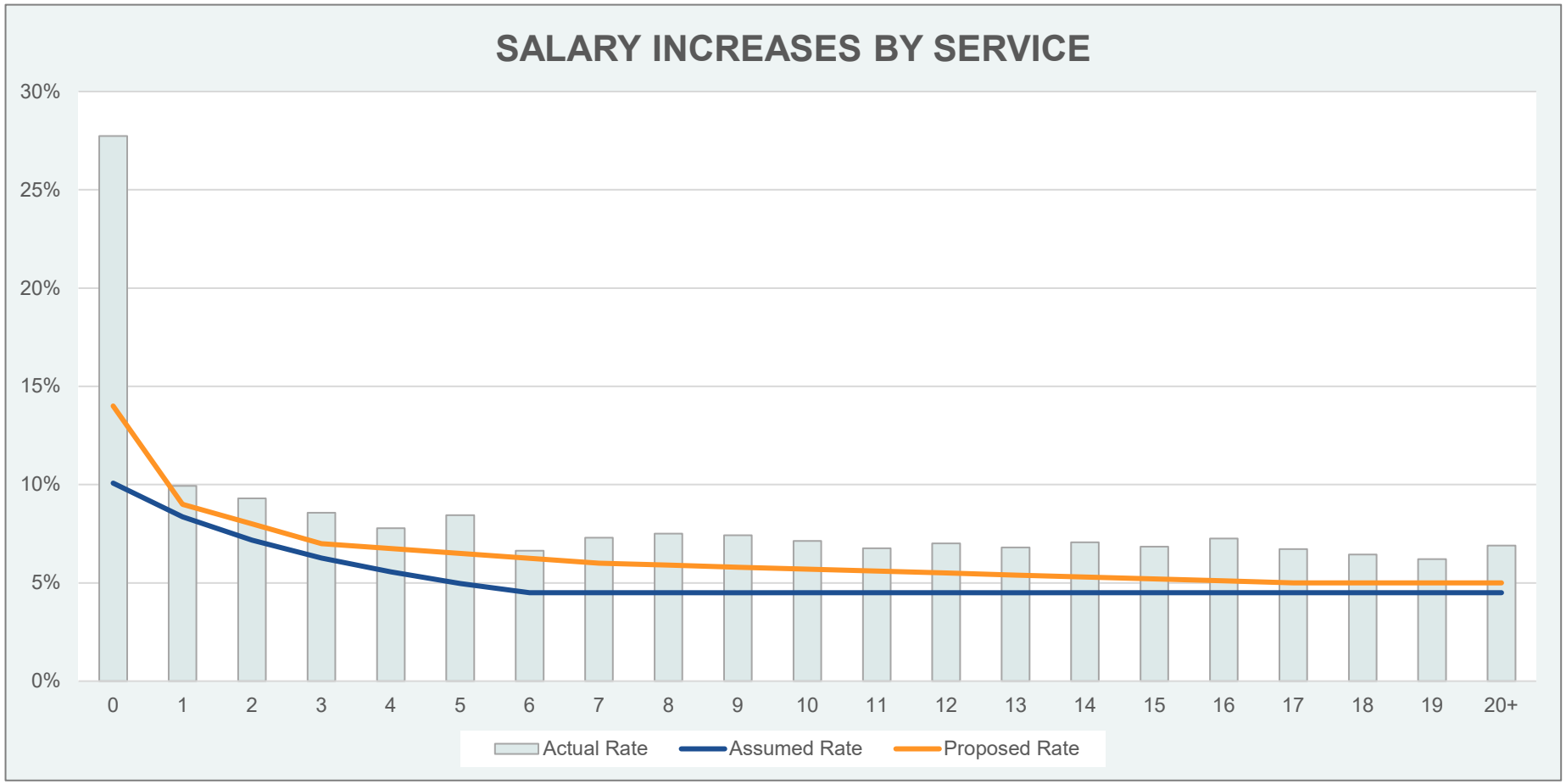
- Final analysis is performed separately for General Employees (PERS) and Public Safety Employees (FURS, GWPORS, HPORS, MPORS, and SRS)
  - Also studied individually for public safety groups, but not enough evidence to warrant separate assumptions

Individual Salary Increase Assumption (PERS)



Recommend the total salary increase assumption be increased (general wage increase by 0.25% and merit increase varies by years of service).

Individual Salary Increase Assumption (Public Safety)



Recommend the total salary increase assumption be increased (general wage increase by 0.25% and merit increase varies by years of service).

Other Assumptions

- Marriage Assumption
  - No change to 100% marriage assumption
  - No change to age difference assumption (husband 3 years older than wife)

- Interest on Member Contributions
  - No change to current assumption of 2.50%

Recommended Demographic Assumption Changes

Retirement Plan	Assumption Changes
Public Employees' Retirement System	Mortality, Retirement, Withdrawal, Merit Scale
Public Employees' Retirement System Long-Term Disability Plan	Mortality, Retirement, Withdrawal, Merit Scale
Judges' Retirement System	Mortality
Sheriffs' Retirement System	Mortality, Retirement, Withdrawal, Merit Scale
Game Wardens' and Peace Officers' Retirement System	Mortality, Retirement, Withdrawal, Merit Scale
Highway Patrol Officers' Retirement System	Mortality, Retirement, Withdrawal, Merit Scale
Municipal Police Officers' Retirement System	Mortality, Retirement, Withdrawal, Merit Scale
Firefighters' United Retirement System	Mortality, Retirement, Withdrawal, Merit Scale
Volunteer Firefighters' Compensation Act	Mortality, Retirement, Withdrawal

Impact of Recommendations

Impact of Changes on the Unfunded Accrued Liability

Retirement Plan	Before Changes	After Changes	Change
Public Employees' Retirement System	$2,551,626,554	$2,625,197,500	$73,570,946
Public Employees' Retirement System Long-Term Disability Plan	(10,937,715)	(10,918,088)	$19,627
Judges' Retirement System	(65,471,518)	(65,505,376)	($33,858)
Sheriffs' Retirement System	131,511,698	136,083,574	$4,571,876
Game Wardens' and Peace Officers' Retirement System	31,112,992	35,831,032	$4,718,040
Highway Patrol Officers' Retirement System	72,357,558	71,696,360	($661,198)
Municipal Police Officers' Retirement System	229,982,936	233,351,395	$3,368,459
Firefighters' United Retirement System	144,839,872	146,274,033	$1,434,161
Volunteer Firefighters' Compensation Act	(365,884)	(533,050)	($167,166)

Note: the impact of the assumption changes, as measured in the June 30, 2026 valuation, will be different than that shown here.

Impact of Recommendations

Impact of Changes on the Funded Ratio

Retirement Plan	Before Changes	After Changes	Change
Public Employees' Retirement System	74.48%	73.93%	(0.55)%
Public Employees' Retirement System Long-Term Disability Plan	809.05%	798.89%	(10.16)%
Judges' Retirement System	183.77%	183.85%	0.08%
Sheriffs' Retirement System	81.94%	81.43%	(0.51)%
Game Wardens' and Peace Officers' Retirement System	92.33%	91.27%	(1.06)%
Highway Patrol Officers' Retirement System	76.31%	76.48%	0.17%
Municipal Police Officers' Retirement System	74.60%	74.32%	(0.28)%
Firefighters' United Retirement System	84.18%	84.04%	(0.14)%
Volunteer Firefighters' Compensation Act	100.62%	100.90%	0.28%

Note: the impact of the assumption changes, as measured in the June 30, 2026 valuation, will be different than that shown here.

Impact of Recommendations

Impact of Changes on the Amortization Period

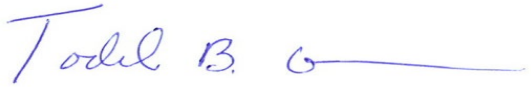
Retirement Plan	Before Changes	After Changes	Change
Public Employees' Retirement System	23	27	4
Public Employees' Retirement System Long-Term Disability Plan	0	0	No Change
Judges' Retirement System	0	0	No Change
Sheriffs' Retirement System	17	20	3
Game Wardens' and Peace Officers' Retirement System	16	22	6
Highway Patrol Officers' Retirement System	22	25	3
Municipal Police Officers' Retirement System	18	23	5
Firefighters' United Retirement System	8	8	No Change
Volunteer Firefighters' Compensation Act	0	0	No Change

Note: the impact of the assumption changes, as measured in the June 30, 2026 valuation, will be different than that shown here.

Actuarial Certification

We, Todd B. Green, ASA , and Bryan K. Hoge, FSA, are consulting actuaries with Cavanaugh Macdonald Consulting, LLC (CavMac). We are members of the American Academy of Actuaries, Associates or Fellows of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. We are available to answer any questions or provide additional information as needed.

Sincerely,



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

Bryan K. Hoge, FSA, EA, FCA, MAAA
Principal and Consulting Actuary


THANK
YOU