



**Montana Public Employees' Retirement Board
Experience Study Results
Five-Year Period Ending June 30, 2025**

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What is an Experience Study?

- An actuarial experience study compares actual plan experience with the assumptions used in each defined benefit plan's actuarial valuation.
- These assumptions affect liabilities and contribution rates because future benefit payments depend on uncertain levels, including:
 - When benefits begin,
 - How much is paid,
 - How long payments continue, and
 - How much investment income the plans are expected to generate over time to fund these benefit payments.
- For this review, actual valuation results for fiscal years 2021 through 2025 were compared with expected results under the current assumptions.
- A key measurement tool for demographic assumptions is the actual-to-expected, or A/E ratio.

Main Point: An experience study helps determine whether the assumptions used in the valuations still reasonably reflect how the plans are actually performing.



Why Do We Perform an Experience Study?

- The study helps determine whether actuarial assumptions and methods should be retained or revised.
- MPERB generally performs an experience study every four years.
 - *Recommendations from this review will first be reflected in the June 30, 2026 valuations.*
- The study does not change the true cost of promised benefits; it improves how those costs are measured, allocated, and funded over time.
- Past experience provides stronger guidance for some assumptions, such as mortality and retirement patterns, than for others, such as investment return.
- Assumption setting involves both analysis and judgment: actuaries review the data, assess whether trends are credible and likely to continue, and avoid overreacting to short-term results.

Main Point: An experience study is one of the Board's key governance tools to test whether its actuarial assumptions still match real plan experience closely enough to support sound funding decisions.



Selection and Structure of Assumptions

Economic Assumptions	Demographic Assumptions
Price Inflation	Withdrawal Rates
Investment Return	Disability Rates
Real Wage Growth	Retirement Rates
General Wage Growth	Mortality Rates
Payroll Growth	Salary Increases

- **Economic assumptions** estimate the financial environment in which the plans operate, including inflation, investment return, wage growth, and payroll growth.
- **Demographic assumptions** estimate how members are expected to behave and how long benefits are expected to be paid, including retirement, withdrawal, disability, mortality, and salary patterns.
- Together, these assumptions shape when benefits are expected to begin, how much is expected to be paid, how long those payments are expected to continue, and what level of investment return the plans are expected to earn over time to help fund those benefits.



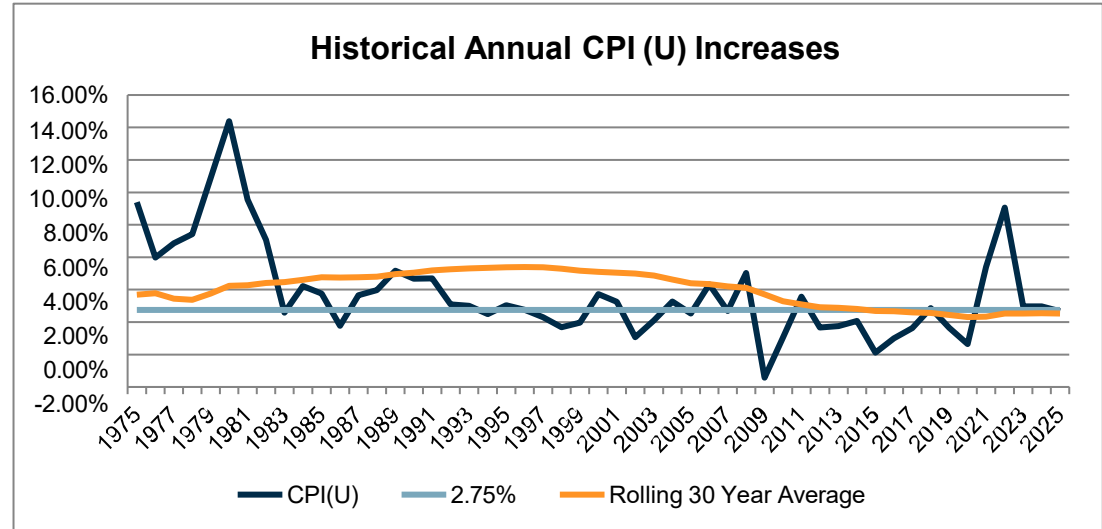
Economic Assumptions – Summary of Recommendations

Assumption	Current Assumption	Adopted Assumption
Price Inflation	2.75%	No change
Investment Return	7.30%	No change
Real Wage Growth	0.75%	1.00%
General Wage Growth	3.50%	3.75%
Payroll Growth - PERS, SRS, GWPORS, MPORS, FURS	3.25%	No change
Payroll Growth – JRS	3.25%	3.00%
Payroll Growth – HPORS	3.25%	2.25%



Economic Assumptions: Price Inflation

- The inflation assumption underlies most economic assumptions, including payroll growth and investment return.
- Historical inflation has varied significantly; the median historical rate shown in annual CPI increases is 2.9%.
- Market estimates of future inflation are also inferred from the spread between nominal Treasury yields and TIPS yields.
- Social Security's intermediate inflation assumption is 2.4%, with a fully modeled 75-year range of 1.8% to 3.0%.



As of 06/30/2025	10-Year	20-Year	30-Year
Treasury Yield	4.24%	4.79%	4.78%
TIPS Yield	1.95%	2.32	2.51%
Breakeven Inflation	2.29%	2.47%	2.27%

Adopted Recommendation: Retain the current price inflation assumption at **2.75%**, as historical CPI and recent volatility supports keeping **2.75%** as a reasonable long-term assumption consistent with ASOP 27.



Economic Assumptions: Investment Return

- **Background:** The investment return assumption is central to valuing each system because it is used to discount all projected future benefit payments back to a present value.
- A higher or lower assumed return directly changes the reported liabilities and unfunded actuarial accrued liabilities (“UAAL”) for each system, and, in turn, influences the calculated funded ratio and the length of time needed to amortize any unfunded liability.
- It also serves as the benchmark against which actual investment performance is measured when assessing whether current statutory contribution rates are sufficient over the long-term to fund each plan.
- MPERB’s investment return assumption is developed and evaluated under ASOP No. 27 using a “building block” framework that combines an assumed long-term price inflation rate (2.75%) with expected real returns by asset class.

Investment
Return



Real Rate
of Return

Price
Inflation



Economic Assumptions: Investment Return

- MPERB's actuary first establishes a long-term inflation assumption; in this study, that assumption is **2.75%** per year.
- The analysis also incorporates the target asset allocation selected by the Montana Board of Investments (MBOI) for the pension funds, shown at right for the Consolidated Asset Pension Pool (CAPP).
- For each type of investment, our actuary brings in an independent forecast of how much each asset class is expected to earn above inflation over the long term. "Above inflation" is called a **real rate of return**.
- These real return forecasts come from a broad industry survey, the *Horizon 2025 Capital Market Assumptions*, which combines the views of many well-known investment firms.
- Then they compute a weighted average:
 - Take each asset class's real return, multiply it by that asset class's share of the portfolio, and add up those components to get one blended expected real return for the entire portfolio given the current mix.
 - For example, 22% in large U.S. stocks, 12% in international stocks, 13% in core bonds, 12% in private equity, and so on, all combined into a single long-run "above inflation" number.

Asset Class	Target Allocation
US Equity – Large Cap	22.3%
US Equity - Small/Mid Cap	4.3%
Non-US Equity - Developed	11.9%
Non-US Equity - Emerging	3.4%
US Corporate Bonds - Core	13.4%
US Corporate Bonds - Long	0.0%
US Corporate Bonds - High Yield	3.3%
Non-US Debt - Developed	2.5%
Non-US Debt - Emerging	1.2%
US Treasuries (Cash	2.6%
TIPS (Inflation-Protected)	0.2%
Real Estate	11.9%
Hedge Funds	0.0%
Commodities	2.8%
Infrastructure	3.1%
Private Equity	12.5%
Private Debt	4.7%
Total	100.0%



Economic Assumptions: Investment Return

- Once they have the portfolio's expected real return, our actuary converts it to the more familiar nominal return by adding the **2.75%** inflation assumption to get a gross nominal return and then they subtract **0.07%** for expected administrative expenses, so that the net investment return is approximately:
 - **Net Investment Return = blended real return + 2.75% (inflation) – 0.07% (expenses).**
- At this stage, they perform a “reasonableness assessment” of the 7.30% assumption—evaluating not only its mathematical soundness but also its consistency with real-world experience and risk—by examining two key factors:
 - **What CAPP has actually earned historically**
 - They review long-term historical returns that MBOI has achieved, both on a market-value basis and on a smoothed actuarial basis.
 - This helps them see whether 7.30% is wildly out-of-line with what has actually happened.
 - **Stochastic Modeling based on Horizon's long-term blended real-return assumption:**
 - MPERB's actuary uses Horizon's long-term blended real-return assumption as the central input, but then runs a stochastic capital-market model (with expected returns, volatilities, and correlations by asset class) to generate real-return percentiles across multiple horizons (1, 5, 10, 20, 30, 50 years).
 - From that stochastic output, MPERB's actuary takes the long-run real-return percentiles (for example, 3.94%, 5.08%, 6.23%), adds the 2.75% inflation assumption, subtracts a 0.07% administrative expense load, and thereby converts them into the nominal net return percentile.

Economic Assumptions: Investment Return

Real Return Distribution Under Stochastic Modeling

Time Span In Years	Mean Return	Standard Deviation	Real Returns by Percentile				
			5 th	25 th	50 th	75 th	95 th
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%

- Using the ASOP No. 27 building-block approach and the projection results, the system's return assumption is based on the 50th percentile real return over 50 years, plus the inflation assumption and minus the expense assumption; the table below shows the 25th, 50th, and 75th percentile ranges.

Item	25 th Percentile	50 th Percentile	75 th 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%

- The stochastic model indicates a 50th-percentile net return of 7.76%, but MPERB's actuary recommended keeping the assumed net return at 7.30%. This lower assumption builds in a margin for adverse deviation, implying there is now roughly a **60% probability** that actual long-term returns will meet or exceed the 7.30% over the modeled 50-year horizon.



Economic Assumptions: Investment Return

- The chart below shows the actual fiscal year (June 30) net market returns for the MPERB portfolio for the last 10 years. Despite significant volatility in the results from year to year, the actual geometric (compound) return was between 7.43% and 7.90% for market returns.

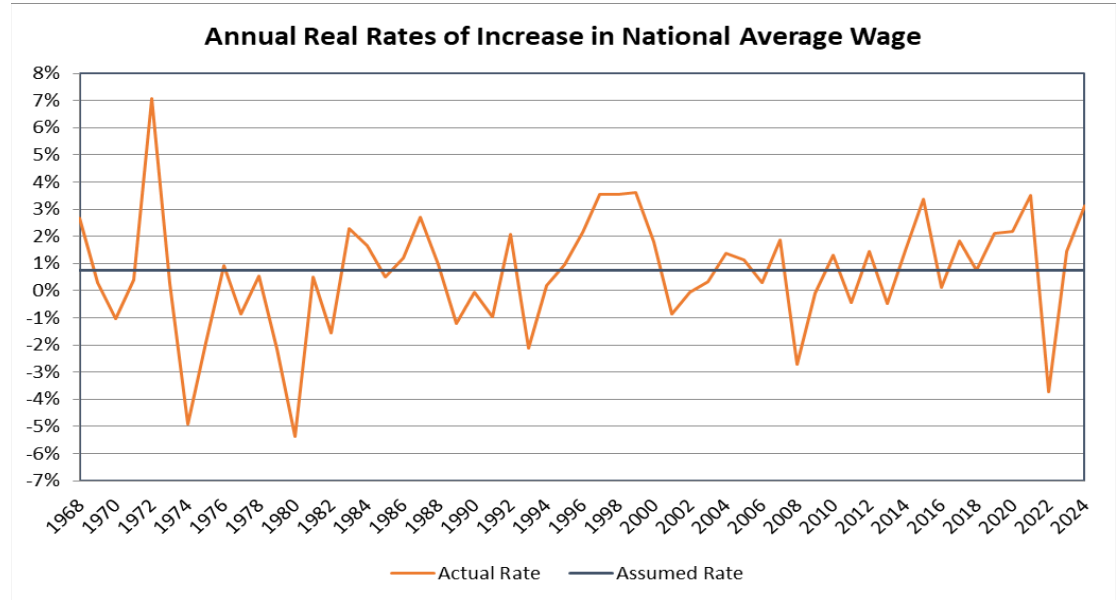
As of 6/30	PERS	JRS	SRS	GWPORS	HPORS	MPORS	FURS	VFCA
2016	2.02%	2.06%	2.06%	2.11%	2.04%	2.13%	2.15%	1.84%
2017	11.93%	11.91%	11.95%	11.92%	11.87%	11.56%	11.56%	11.51%
2018	8.90%	8.88%	8.83%	8.81%	8.86%	8.65%	8.63%	8.68%
2019	5.65%	5.64%	5.70%	5.72%	5.63%	5.42%	5.44%	5.41%
2020	2.73%	2.72%	2.71%	2.70%	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%

Adopted Recommendation: Retain the current investment return assumption at **7.30%**, as long-term historical portfolio returns and the broader reasonableness analysis support 7.30% as a prudent long-term assumption under ASOP No. 27.

Economic Assumptions: Real Wage Growth

- An individual member's expected salary increase has three components: inflation, real wage growth, and merit/longevity wage growth.
- Real wage growth represents wage increases above inflation for the group as a whole, driven by productivity and competitive pressures.
- Social Security's intermediate assumption for real wage growth is 1.1%.

Adopted Recommendation: Increase the real wage growth assumption from 0.75% to **1.00%**, as longer-term historical wage experience and the Social Security benchmark support 1.00% as a reasonable and prudent long-term assumption.



Period	Wage Inflation	Price Inflation	Real Wage Growth
2014-2024	4.16%	2.85%	1.31%
2004-2024	3.42%	2.57%	0.85%
1994-2024	3.66%	2.53%	1.13%
1984-2024	3.73%	2.80%	0.93%
1974-2024	4.42%	3.77%	0.65%
1964-2024	4.65%	3.93%	0.72%



Economic Assumptions: General Wage Growth

- General wage growth reflects the long-term increase in pay levels across the system and is made up of **price inflation plus real wage growth**.
- With inflation retained at 2.75% and real wage growth increased to 1.00%, the recommended general wage growth assumption increases from 3.50% to 3.75%.
- Historical wage inflation over longer periods has generally supported a rate in this range, with 30-year and 40-year averages of **3.66%** and **3.73%**, respectively.

Wage Inflation Assumption	
Current	3.50%
Real Wage Growth	1.00%
Price Inflation	2.75%
Total	3.75%

Period	Wage Inflation	Price Inflation	Real Wage Growth
2014-2024	4.16%	2.85%	1.31%
2004-2024	3.42%	2.57%	0.85%
1994-2024	3.66%	2.53%	1.13%
1984-2024	3.73%	2.80%	0.93%
1974-2024	4.42%	3.77%	0.65%
1964-2024	4.65%	3.93%	0.72%

Adopted Recommendation: Increase the general wage growth assumption from 3.50% to **3.75%**, as the updated inflation and real wage growth assumptions support 3.75% and longer-term wage history remains consistent with that rate.



Economic Assumptions: Payroll Growth

- The total payroll growth assumption reflects the expected change in the aggregate covered payroll of the entire active membership of a plan from one year to the next.
- It is driven not only by individual salary increases but also by changes in the composition and size of the workforce — including new hires entering the plan, terminations and retirements leaving the plan, and shifts in the demographic mix of active members.
- The study compared the payroll growth assumption to each system's actual covered payroll experience over a 10-year and 15-year period ending June 30, 2025. Over this period, aggregate covered payroll grew at average annual rates as shown below:

	PERS	SRS	MPORS	HPORS	FURS	GWPORS	JRS
10-Year Average	3.71%	5.76%	5.20%	2.50%	7.34%	4.77%	3.09%

	HPORS	JRS
15-Year Average	2.22%	3.08%

- While year-to-year payroll growth exhibited some volatility, for most systems the long-term trend came in at or above the previously assumed rate of 3.25%. HPORS and JRS exhibited covered payroll over the 10-year and 15-year period that was below the assumed 3.25%.

Adopted Recommendation: Retain the **3.25%** payroll growth assumption for PERS, SRS, GWPORS, MPORS, and FURS, while adopting plan-specific assumptions of **3.00%** for JRS and **2.25%** for HPORS to better reflect their lower long-term payroll growth experience.



Summary of Demographic Assumptions

Assumption
Withdrawal Rates Will an employee work long enough to vest and what monthly benefit will be owed to them?
Disability Rates Will an employee have to leave the workforce due to a disability?
Retirement Rates When will the employee retire and start collecting benefits?
Mortality Rates How long will monthly benefits be paid?
Salary Increases What salary will an employee's benefit at retirement be based on?

- A key measurement tool for demographic assumptions is the actual-to-expected, or A/E ratio.
- An A/E ratio near 100 % indicates that the assumption is tracking closely with actual experience within our plans. A ratio meaningfully above 100 % means experience came in higher than expected, while a ratio meaningfully below 100 % means it came in lower than expected.



How are A/E Ratios Calculated?

- The actual-to-expected (A/E) ratio compares what actually happened during the study period to what the demographic assumptions said we would expect to happen.
- For demographic assumptions, the “expected” count is derived by applying the Board’s adopted rates to the relevant member group, such as retirement, withdrawal, disability, or mortality rates.
- **Example:** In PERS, the withdrawal assumption is stated as a rate per 1,000 members by service; for example, the rate for members with 0–1 year of service is 350 per 1,000, which means we would expect about 35%, or 350 out of 1,000, to leave covered employment during that year.

Withdrawal Rates Per 1,000 Members By Service										
SERVICE										
0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11
350	270	180	140	110	110	100	90	80	70	65
11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20+	
60	55	50	50	45	40	35	30	28	25	

- If there were 2,000 active PERS members in that service group, the assumption would produce 700 expected withdrawals for that group during the year.
 - If actual withdrawals for that same group were 630, the A/E ratio would be 630 divided by 700, or 90%.
- An A/E ratio of 100% means actual experience matched the assumption; above 100% means more members retired than expected, and below 100% means fewer members retired than expected.



Demographic Assumptions: Withdrawal Rates

- Most systems show A/E ratios above 100% under the current withdrawal assumption, indicating actual withdrawals were generally higher than expected.
- The adopted assumption improves alignment for several systems, including bringing results closer to 100%.
- VFCA moves slightly closer to 100% under the adopted assumption, while JRS remains N/A because no withdrawal assumption is applied.

System	A/E Ratio (Current Assumption)	A/E Ratio (New 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%

Adopted Recommendation: Adopt revised system-specific withdrawal assumptions to better reflect observed termination patterns and bring expected withdrawals closer to actual experience across the plans.



Demographic Assumptions: Disability Rates

- Disability retirements were lower than expected during the study period, with an A/E ratio of **6.21%** for **PERS/JRS** and **67.23%** for **Public Safety**.
- Overall, the current disability assumption appears to **overestimate** the number of disability retirements.
- At the same time, disability experience remains inherently **unpredictable** and should be interpreted cautiously, because incidence is low but individual cases can produce significant liability losses and skew results.
- Although disability retirements were fewer than expected, actuarial valuations still showed more losses than gains during the study period because a small number of high-impact disability cases can materially affect results.
- Public safety disability experience was combined across plans to improve credibility, reflecting the limited volume and volatility of disability data.

System	Actual	Disability Count (Expected)	A/E Ratio
PERS & JRS	33	531.4	6.21%
Public Safety	30	44.6	67.23%

Adopted Recommendation: Retain the current disability rate assumptions, while recognizing that recent disability incidence came in below expected levels. Because disability events are infrequent and highly volatile, the experience study supports caution against overreacting to short-term results.



Demographic Assumptions: Retirement Rates

- Retirement assumptions determine when members are expected to start benefits.
- The study compared actual retirements with expected retirements under the current assumptions.
- Experience differed by system, showing that some current assumptions need refinement.
- Recommended rates better reflect recent retirement behavior.
- Revised assumptions generally bring A/E ratios closer to 100 percent.

System	A/E Ratio (Current Assumption)	A/E Ratio (New 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%

Adopted Recommendation: Adopt revised retirement rate assumptions by system to better reflect recent retirement patterns. The updated assumptions generally improve alignment between expected and actual retirements and bring most A/E ratios closer to 100%



Demographic Assumptions: Mortality

- New set of public plan mortality tables published in 2025 (Pub-2016 tables)
- Recommendation was to move to the newest family of mortality tables

Adopted Retiree Mortality Table:

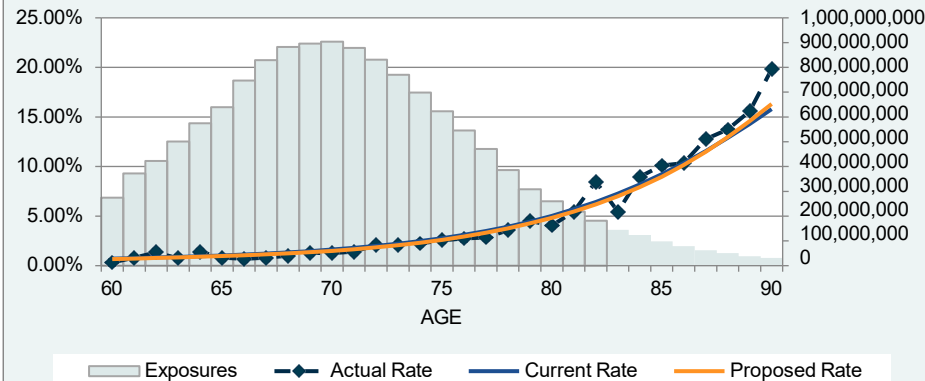
- **General Employee Plans (PERS and JRS)** - Pub-2016 General Amount Weighted Healthy Retiree Mortality Table, set forward 1 year for males and females and further adjusted in PERS only at 104% (males), 103% (females).
- **Public Safety Plans (FURS, GWPORS, HPORS, MPORS, SRS, and VFCA)** - Pub-2016 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)

Service Retirees Mortality - Males



Males

Current Assumption A/E Ratio: 94.4%

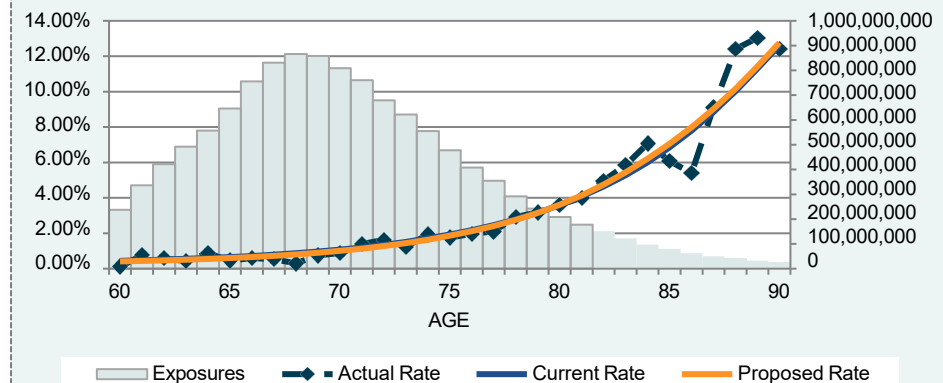
Adopted Assumption: A/E Ratio: 99.0%

Females

Current Assumption A/E Ratio: 96.1%

Adopted Assumption: A/E Ratio: 98.6%

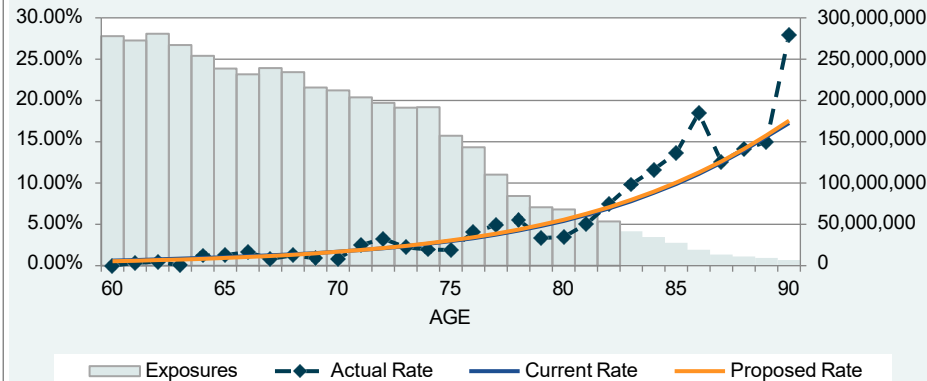
Service Retirees Mortality - Females





Retiree Mortality (Public Safety Employees)

Service Retirees Mortality - Males



Males

Current Assumption A/E Ratio: 102.5%

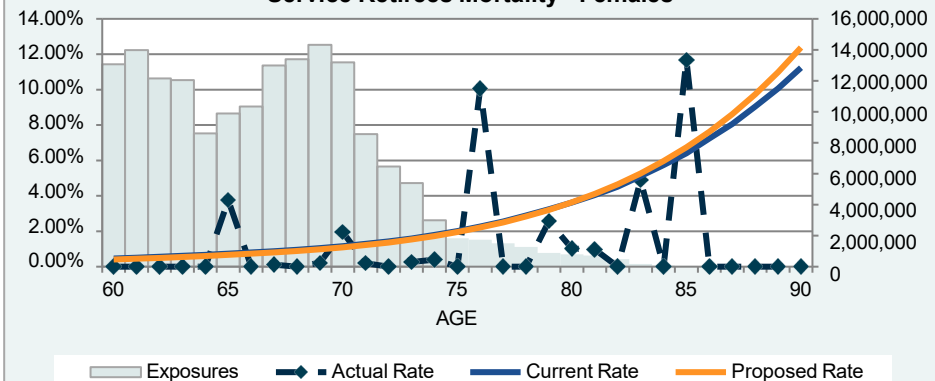
Adopted Assumption: A/E Ratio: 102.9%

Females

Current Assumption A/E Ratio: 46.7%

Adopted Assumption: A/E Ratio: 49.8%

Service Retirees Mortality - Females



Other Mortality Assumptions

➤ **Adopted Active Mortality Table**

- General Employee Plans (PERS and JRS) – PUB-2016 General Employee Mortality Table
- Public Safety Plans - Pub-2016 Public Safety Employee Mortality Table
- Future mortality improvements projected generationally using scale MP-2021

➤ **Adopted Disabled Mortality 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 – Pub-2016 Public Safety Amount Weighted Disabled Retiree Mortality Table, set forward 2 years for males
- No mortality improvement

➤ **Adopted Beneficiary Mortality 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 – 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



Demographic Assumptions: Salary Increases

- Salary increase assumptions have two parts: a 3.75% general wage growth assumption and a separate merit/promotion component that varies by age or service.

PERS Assumed Salary Increases										
Service	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-15	16+
Merit	6.25%	4.75%	3.75%	3.25%	2.75%	2.25%	1.75%	1.25%	0.75%	0.25%
+3.75%	10.00%	8.50%	7.50%	7.00%	6.50%	6.00%	5.50%	5.00%	4.50%	4.00%

- Most systems showed A/E ratios slightly above 100%, meaning actual salary growth was modestly higher than assumed.

Salaries End of 5 Years (in thousands)							
System	Actual	Expected	A/E Ratio	System	Actual	Expected	A/E Ratio
PERS	\$6,317,614	\$6,101,712	103.54%	SRS	\$432,984	\$415,227	104.28%
JRS	\$40,220	\$40,465	99.39%	GWPORS	\$265,308	\$257,050	103.21%
HPORS	\$73,168	\$70,104	104.37%	MPORS	\$270,325	\$261,971	103.19%
FURS	\$310,195	\$297,624	104.22%				

Adopted Recommendation: Adopt revised salary increase assumptions that combine a 3.75% general wage growth assumption with updated merit scales by age or service. The revised merit scales better reflect observed salary progression, including stronger early- and mid-career growth and flatter increases at later career stages.



Impact of Assumption Changes On UAAL

Retirement Plan	Mortality	Retirement	Termination	Salary Scale	Total UAAL Change	Funded Ratio Before	Funded Ratio After
PERS	\$291,102	\$27,686,605	\$1,093,475	\$44,499,764	\$73,570,946	74.48%	73.93%
PERS-LTDP	\$33,644	\$(8,048)	\$0	\$(5,969)	\$19,627	809.05%	798.89%
JRS	\$(189,539)	\$0	\$0	\$155,681	(\$33,858)	183.77%	183.85%
SRS	\$(3,472,961)	\$1,011,593	\$884,255	\$6,148,989	\$4,571,876	81.94%	81.43%
GWPORS	\$(1,403,263)	\$2,973,842	\$(674,928)	\$3,822,389	\$4,718,040	92.33%	91.27%
HPORS	\$(2,350,902)	\$619,198	\$(40,266)	\$1,110,772	(\$661,198)	76.31%	76.48%
MPORS	\$(5,236,175)	\$3,598,216	\$(128,086)	\$5,134,504	\$3,368,459	74.60%	74.32%
FURS	\$(4,960,708)	\$(1,165,577)	\$1,561,966	\$5,998,480	\$1,434,161	84.18%	84.04%
VFCA	\$(328,026)	\$(264,993)	\$425,853	\$0	(\$167,166)	100.62%	100.90%

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



Impact of Assumption Changes On UAAL

Retirement Plan	Amortization Period Before	Mortality	Retirement	Termination	Salary Scale	Payroll Growth	Amortization Period After
PERS	23	0	0	0	+4	0	27
PERS-LTDP	0	0	0	0	0	0	0
JRS	0	0	0	0	0	0	0
SRS	17	-1	1	-1	+4	0	20
GWPORS	16	-3	+1	-2	+10	0	22
HPORS	22	-2	+1	0	+3	+1	25
MPORS	18	0	+1	0	+4	0	23
FURS	8	-1	0	0	+1	0	8
VFCA	0	0	0	0	0	0	0

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