# Teachers' Retirement System of the State of Montana

# Experience Study Review

May 8, 2026

Bryan K. Hoge, FSA, EA, FCA, MAAA

CavMac
Actuarial Consulting Services

# 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 4 years for MT TRS
  - New assumptions will first be used in the July 1, 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?

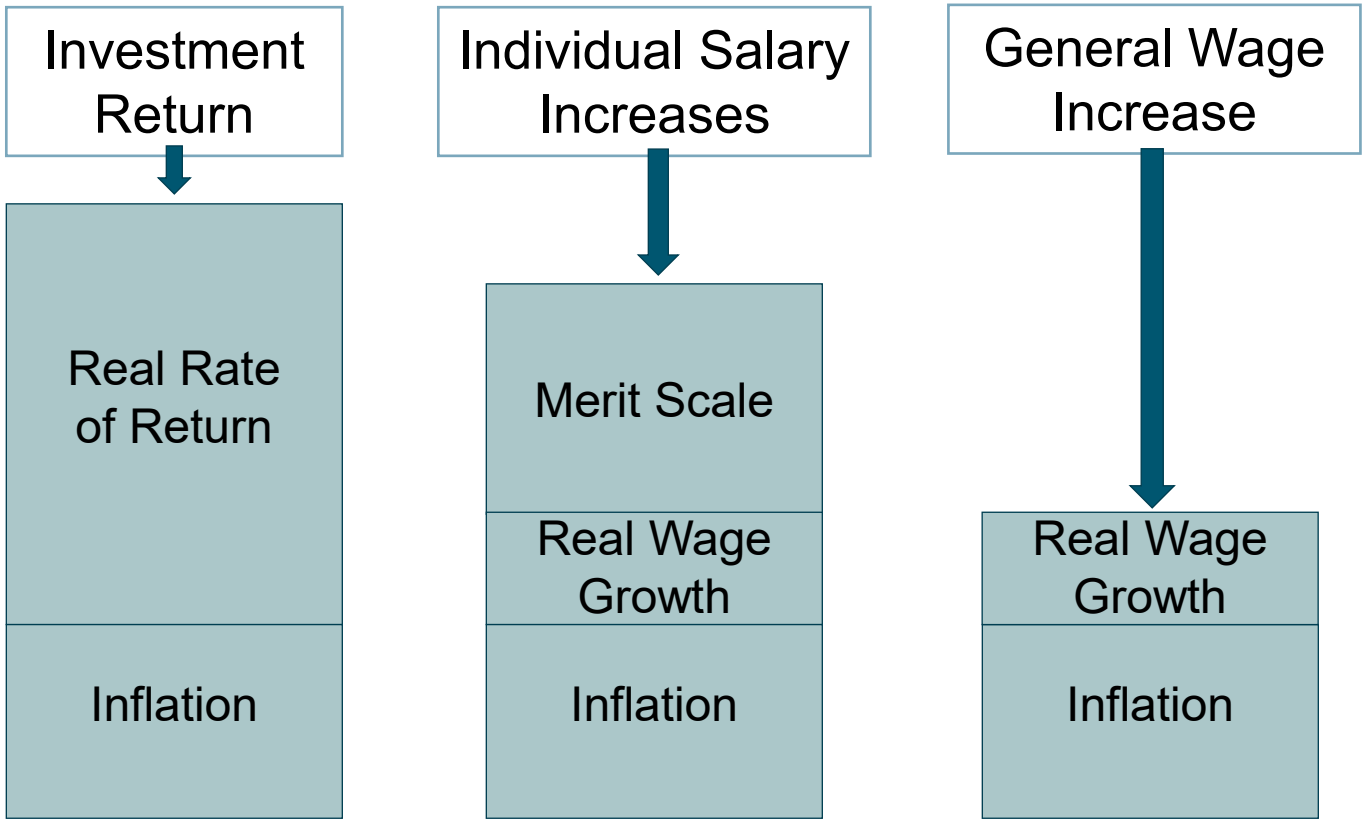
### Economic

- Board
- Actuary
- Other Advisors

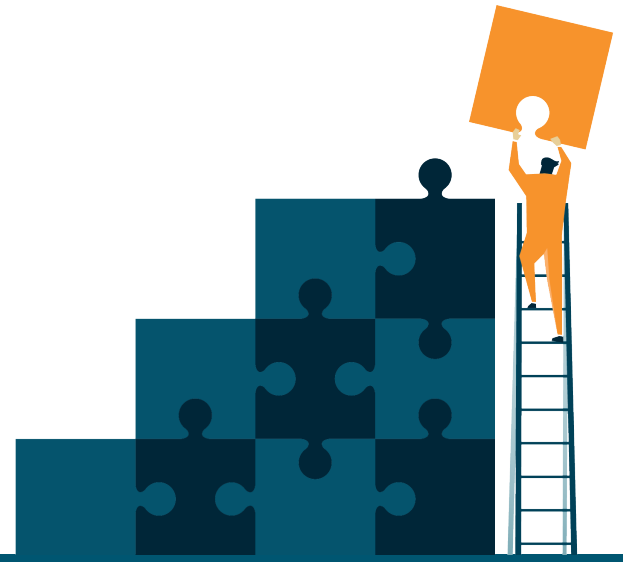
### Demographic

- Board Approves
- Mostly Actuary Since Data Driven

# Economic Assumptions Building Block Method

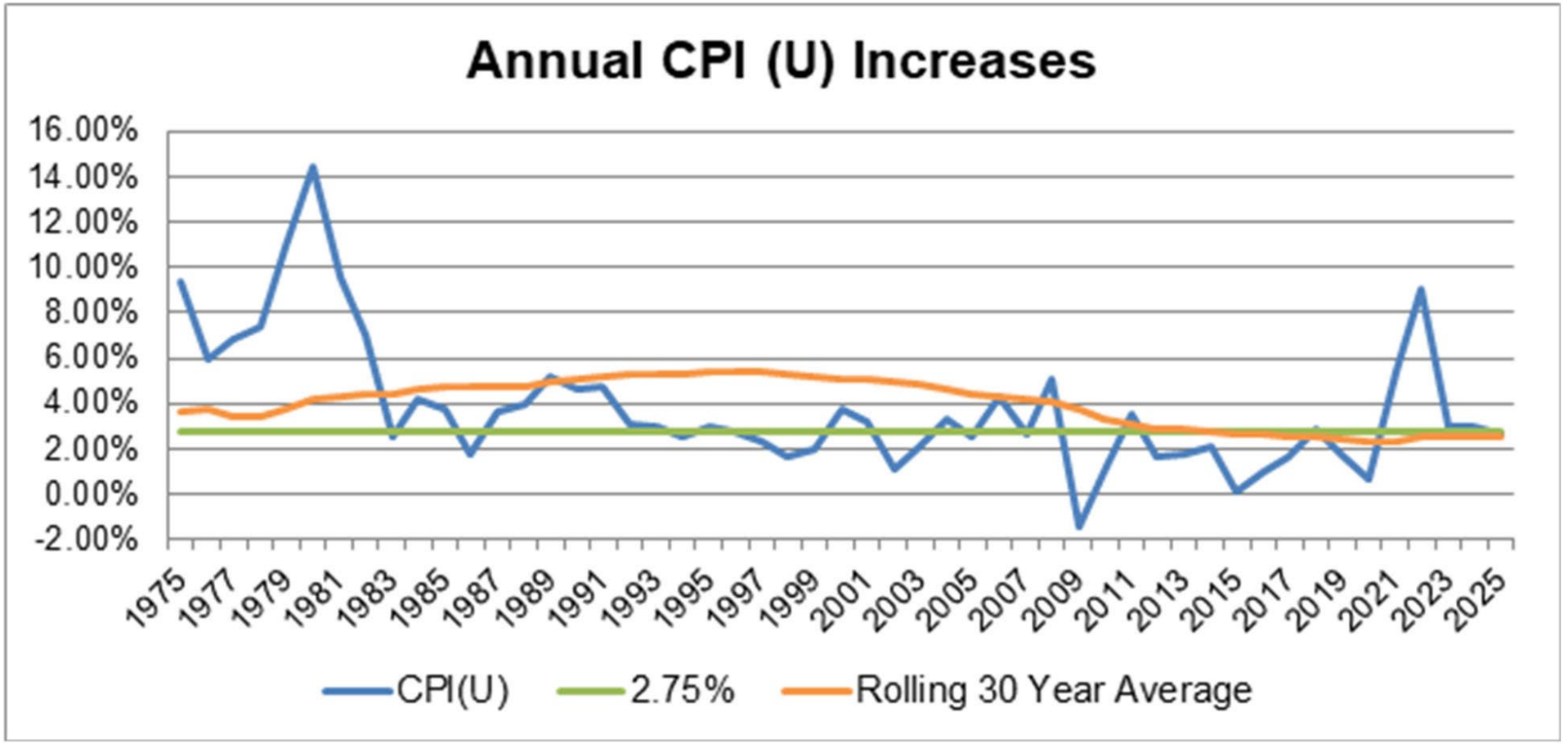



Note: inflation assumption and real wage growth should be consistent in all assumptions.
Some margin for adverse deviation in the assumption is acceptable.
Administrative expenses are also reflected in the Investment Return assumption.



# 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%

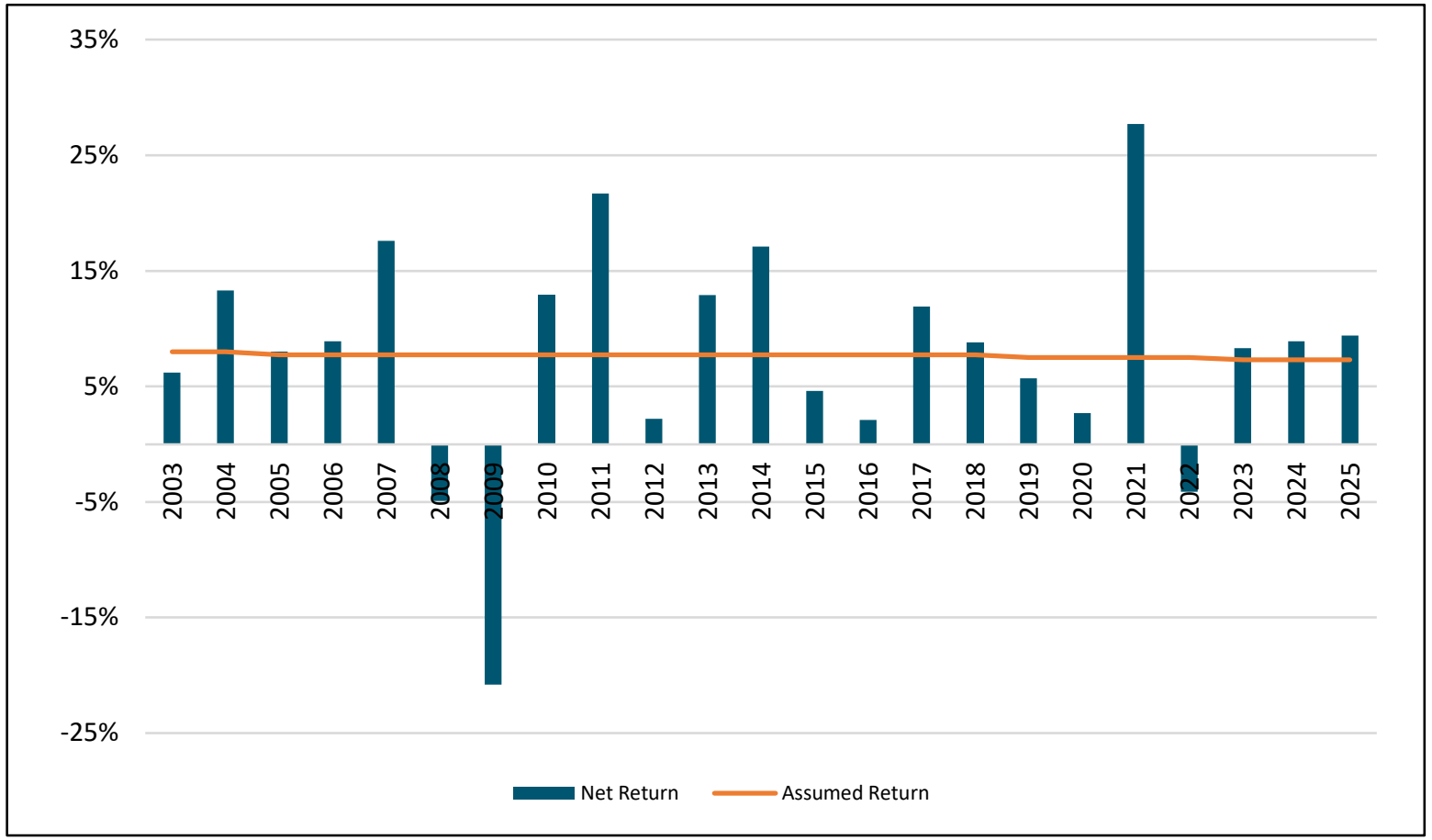
Horizon Survey: 2.2% - 2.7%

- **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

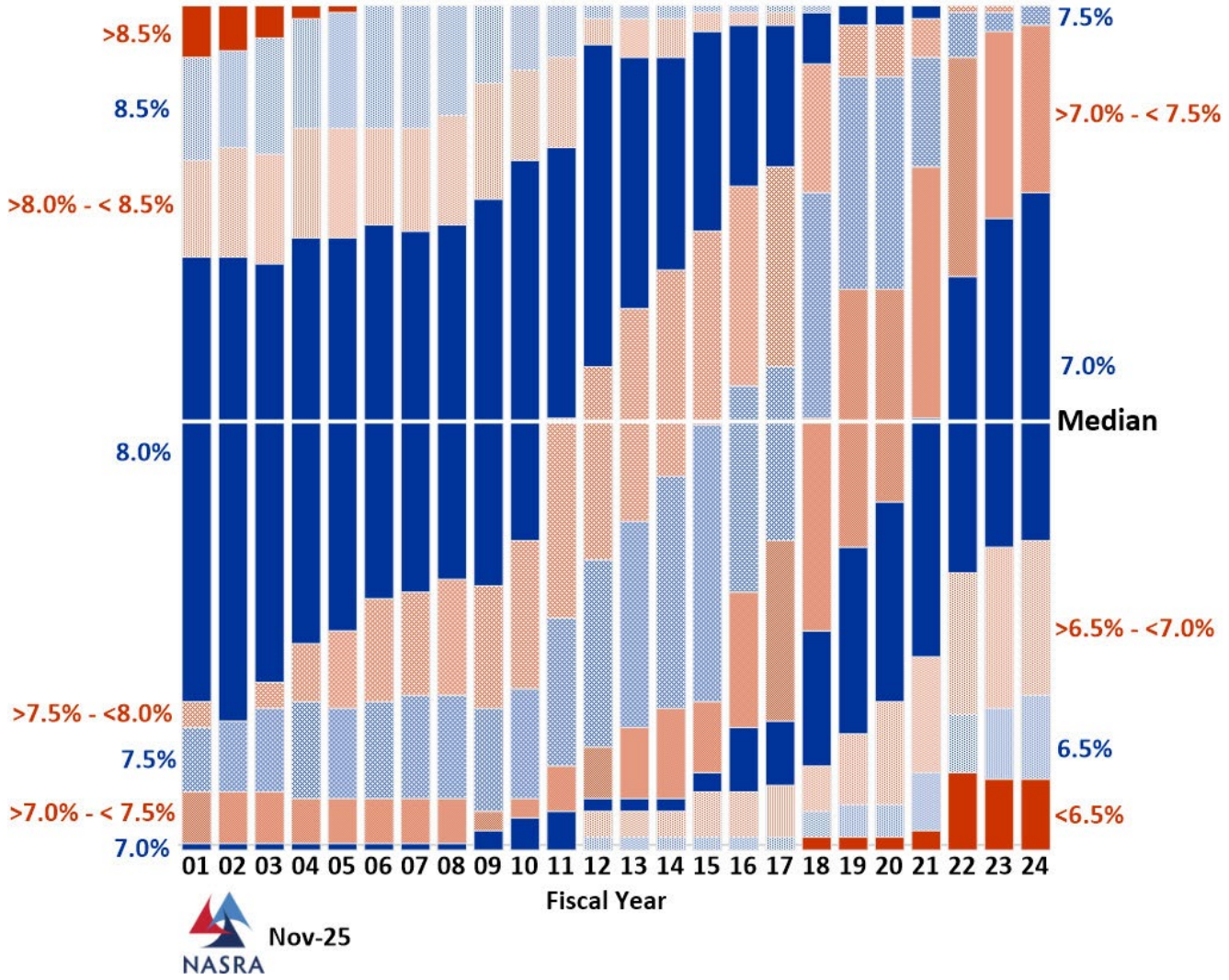
# Historical Investment Returns




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

| Period | Average Return |
|---|---|
| 20-year | 7.2% |
| 15-year | 9.0% |
| 10-year | 7.9% |
| 5-year | 9.6% |

# 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 | $3,936,633 | $5,116,849,108 | 0.08% |
| 2022 | 3,555,107 | 4,724,449,484 | 0.08 |
| 2023 | 3,745,792 | 4,920,843,113 | 0.08 |
| 2024 | 3,696,391 | 5,151,867,830 | 0.07 |
| 2025 | 3,671,746 | 5,416,892,548 | 0.07 |

Recommend a long-term administrative expense ratio of 0.08% be included in the investment return assumption.

# Investment Return Assumption

## Based on 2025 Horizon Survey

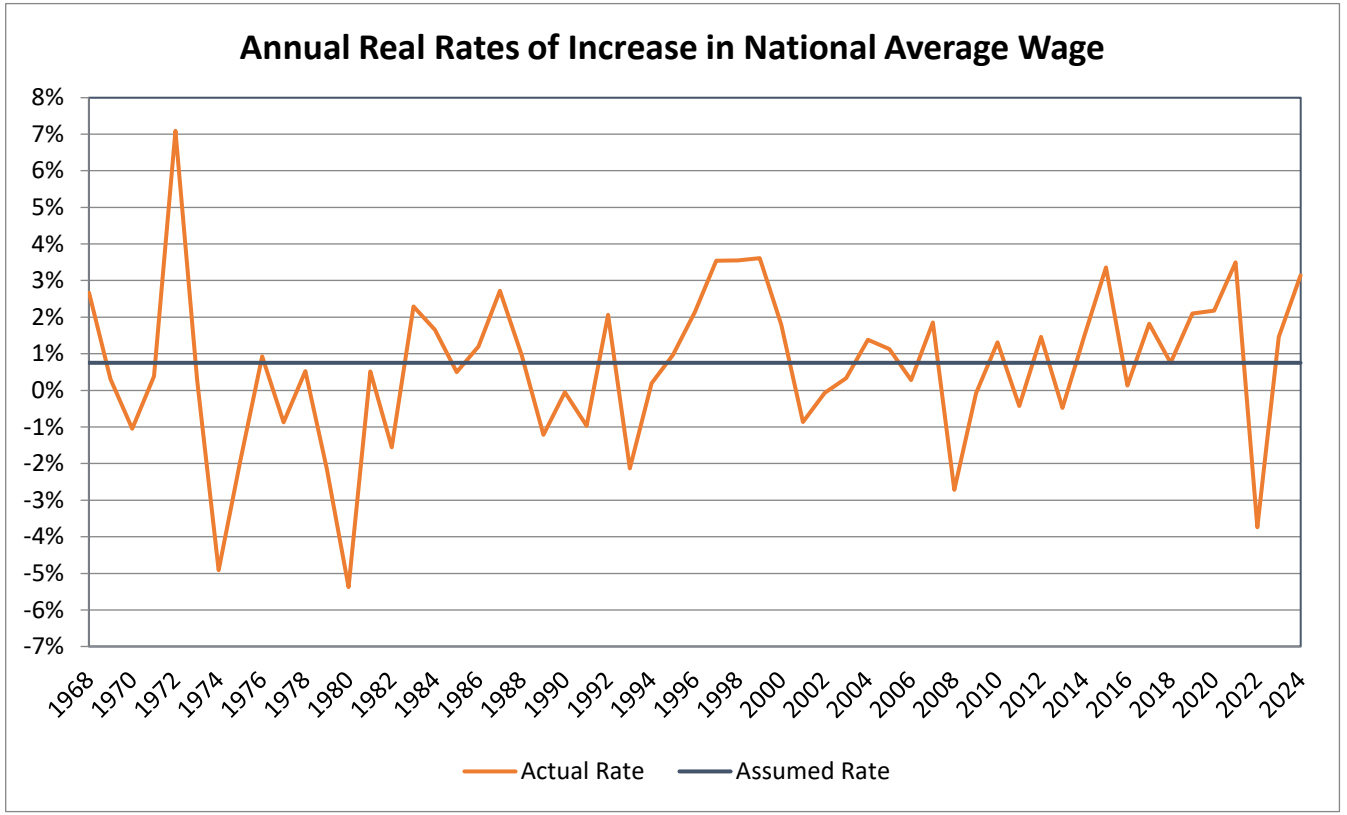
| | 25th Percentile | 50th Percentile | 75th Percentile |
|---|---|---|---|
| Real Rate of Return | 3.94% | 5.08% | 6.23% |
| Inflation | 2.75% | 2.75% | 2.75% |
| Administrative Expenses | (0.08)% | (0.08)% | (0.08)% |
| Net Investment Return | 6.61% | 7.75% | 8.90% |

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)**



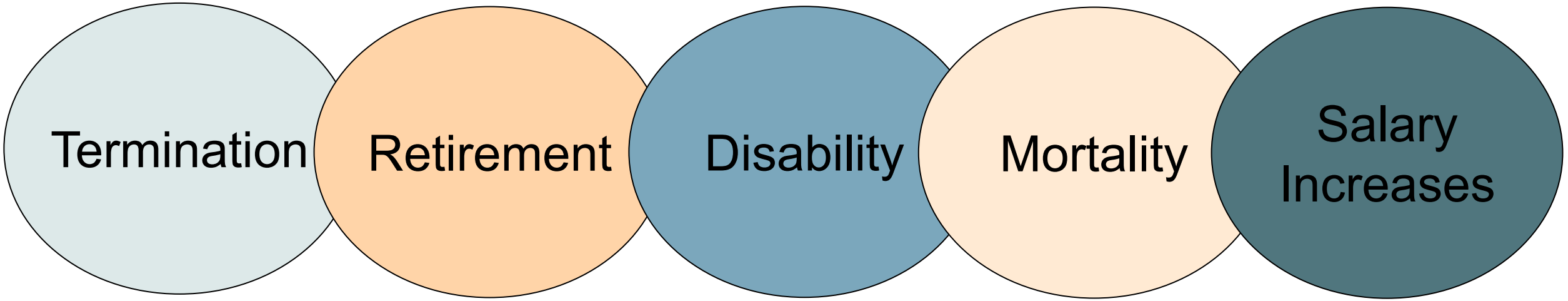
# Payroll Growth Assumption

- 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%
- 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 10 years was 3.03%
- Recommend decreasing the payroll growth assumption from 3.25% to 3.00%

# 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% | 3.00% |

# 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

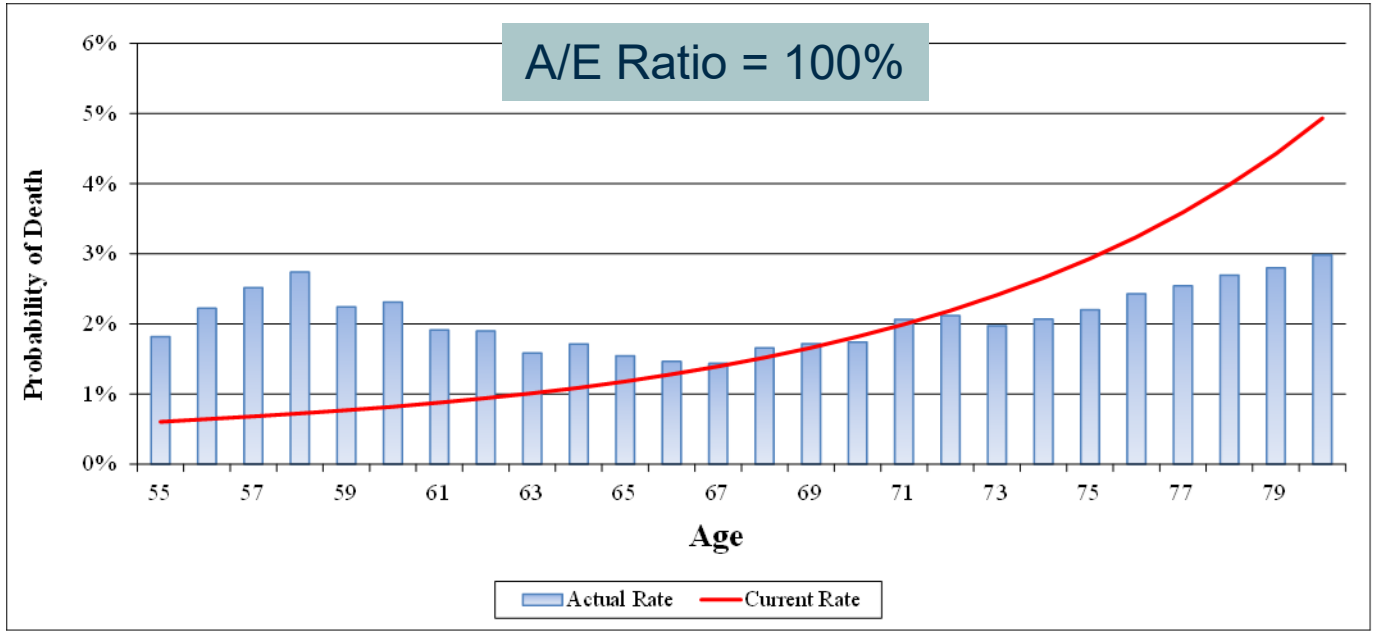
- Key evaluation tool is actual decrements/expected decrements (called A/E ratio)
  - Decrement is a change in a member's status during the study period (e.g., retirement, termination, death)

- 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

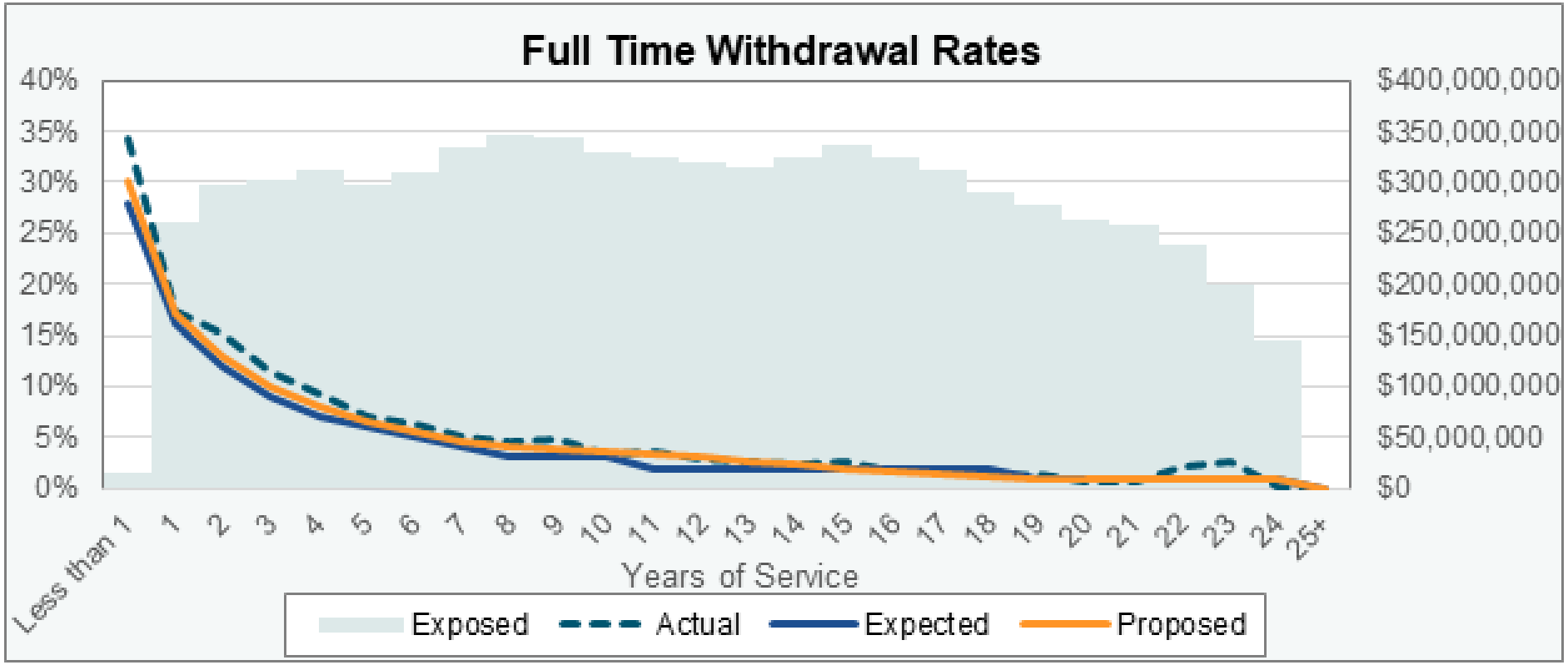


# Withdrawal

- Anticipates a member terminating directly from active status prior to be becoming eligible for a retirement benefit
- Studied separately for full-time/part-time members 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 (Full Time)

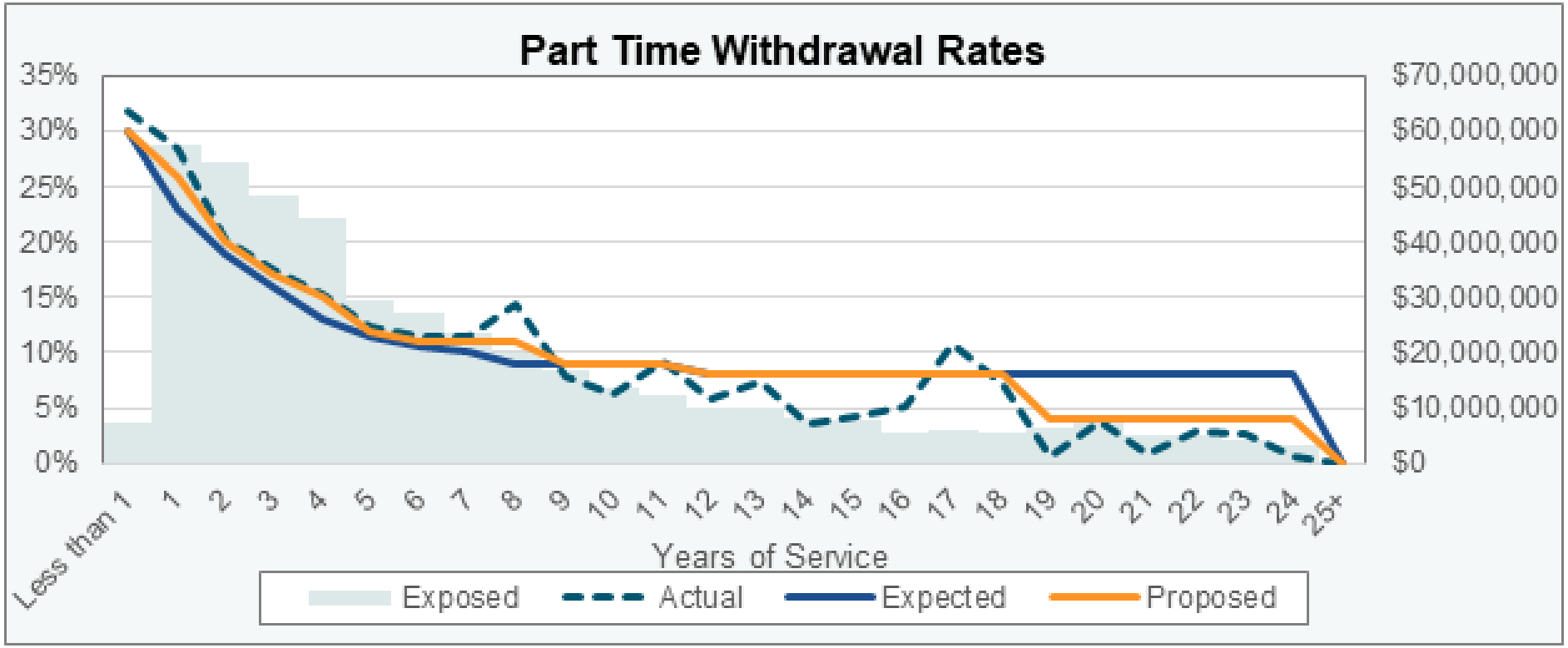
- **Recommend adjusting rates** to better fit experience (orange line)




Current Assumption A/E Ratio: 124%
Proposed Assumption A/E Ratio: 112%

# Withdrawal (Part Time)

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




Current Assumption A/E Ratio: 107%
Proposed Assumption A/E Ratio: 101%

# 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: All members elect a deferred benefit

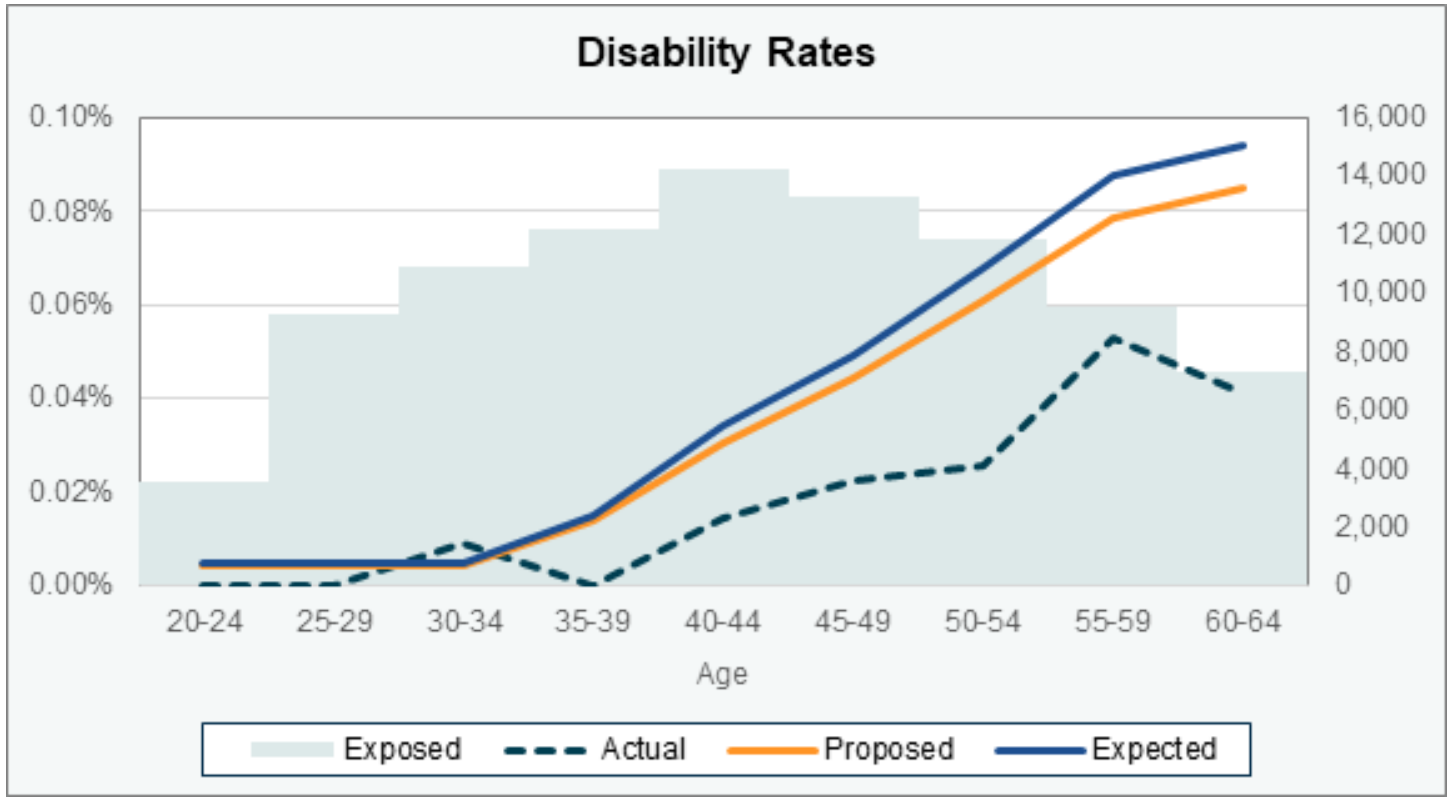
- **Recommended assumption: All members will elect the most valuable option (refund or deferred benefit)**

# 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

- **Recommend adjusting rates** to move part way to observed experience (orange line)




Only 83 disability retirements during study period (expected 127).

Recommend reducing rates by 10%.

Current Assumption A/E Ratio: 43%
Proposed Assumption A/E Ratio: 48%

# 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)
  - Unreduced Retirement (first eligible for unreduced benefit)
  - Unreduced Retirement (beyond first eligibility for unreduced benefit)

# Retirement

- Current Assumption based on age and by
  - Early Retirement (reduced benefit)
  - Unreduced Retirement (first eligible for unreduced benefit)
  - Unreduced Retirement (beyond first eligibility for unreduced benefit)
- Data shows limited value in separating First/Beyond First assumption
- Recommend:
  - Eliminating First Eligible assumption
  - No change to Early Retirement rates
  - Minor adjustments to Normal Retirement rates

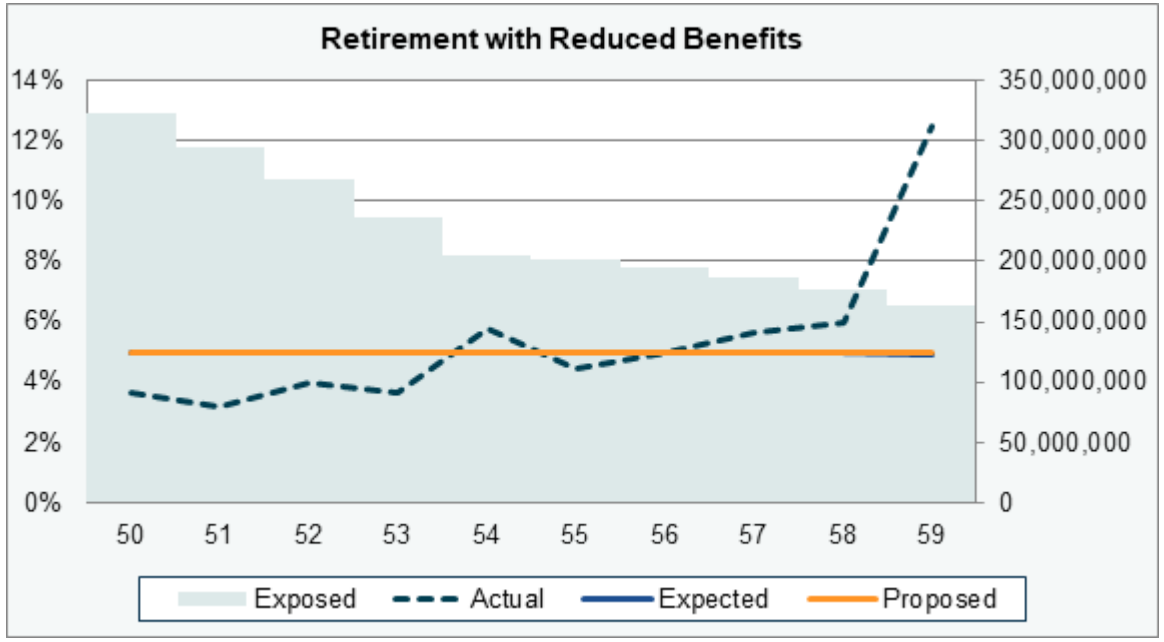
# Retirement

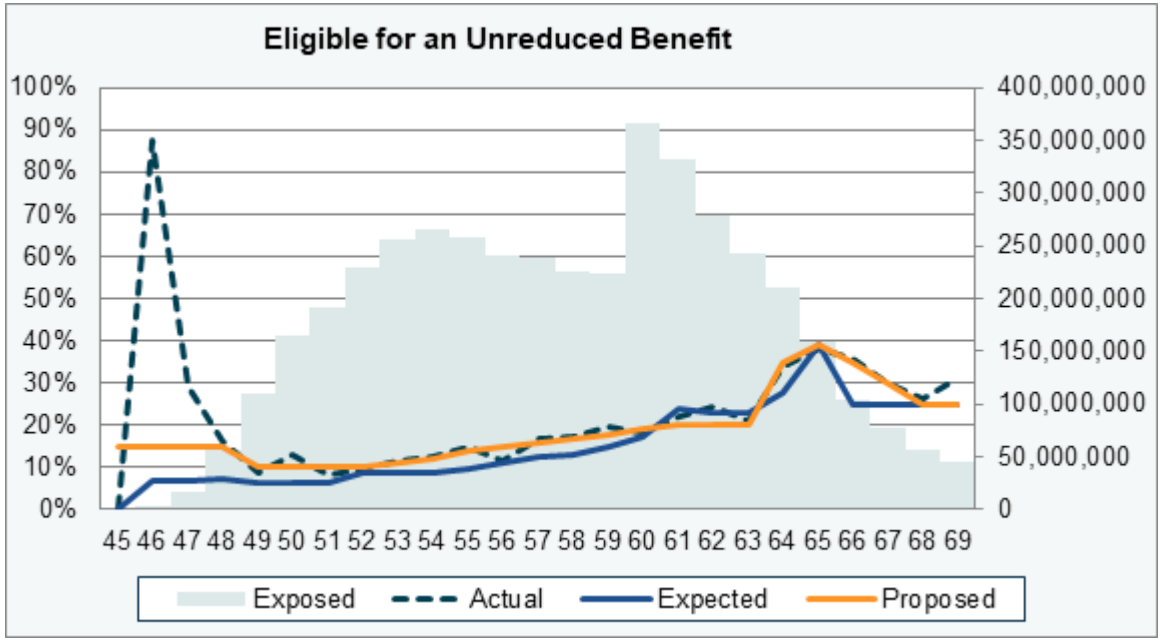
## Early Retirement

Current Assumption A/E Ratio: 100%
Proposed Assumption A/E Ratio: 100%

## Unreduced Retirement

Current Assumption A/E Ratio: 118%
Proposed Assumption A/E Ratio: 104%



# 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

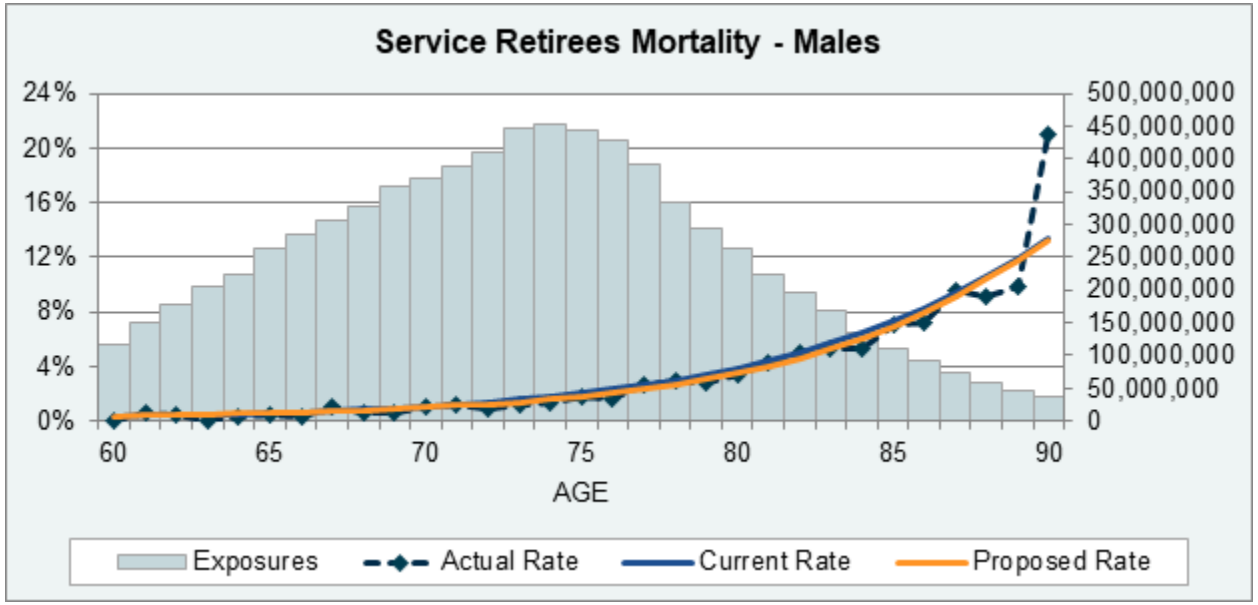
- Current Retiree Mortality Tables
  - Males:  102% of Pub-2010 Teacher Amount Weighted Healthy Retiree Mortality Table
  - Females:  103% of Pub-2010 Teacher Amount Weighted Healthy Retiree Mortality Table

- Future mortality improvements projected using Scale MP-2021

# Recommended Mortality Assumptions

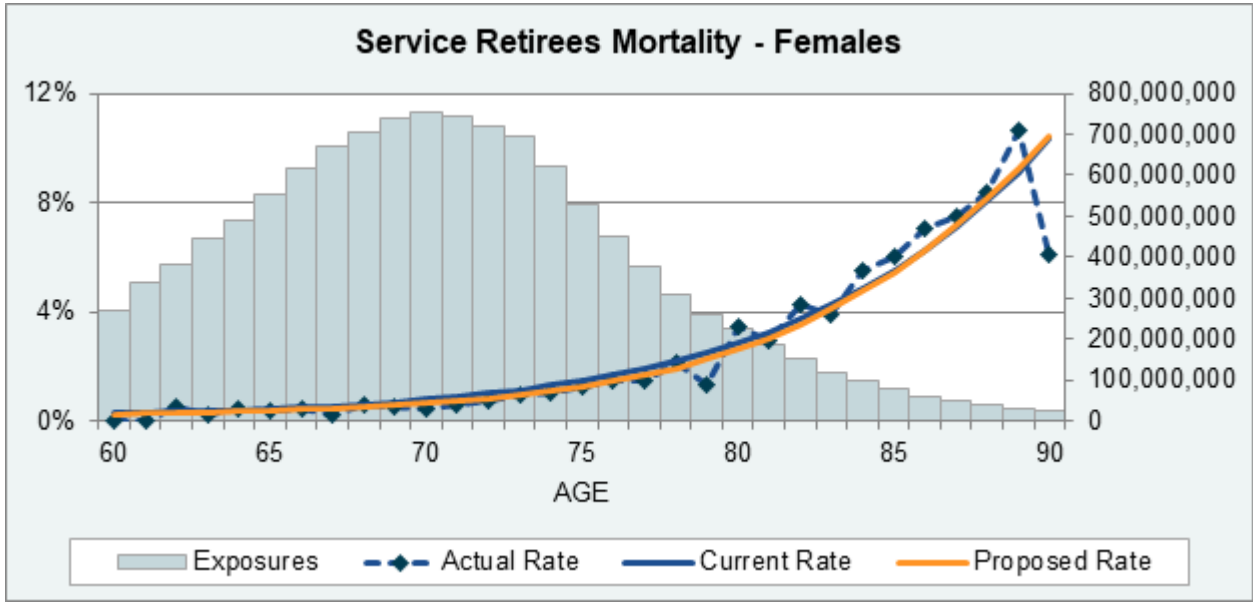
- New set of public plan mortality tables published in 2025 (Pub-2016 tables)
- Our recommendation is to move to the newest family of mortality tables
- Recommendation for Retiree Mortality Tables
  - Pub-2016 Teacher Amount Weighted Retiree Mortality Table, without adjustments
- Future mortality improvements projected generationally using Scale MP-2021 (most recent)

# Retiree Mortality




**Males**
Current Assumption A/E Ratio: 90.6%
Proposed Assumption A/E Ratio: 96.8%

**Females**
Current Assumption A/E Ratio: 87.5%
Proposed Assumption A/E Ratio : 96.7%



# 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**
  - Teacher Employee Mortality Table, projected generationally using scale MP-2021

- **Recommendation for Disabled Base Table**
  - Non-Safety Disabled Retiree Mortality Table, without mortality improvement

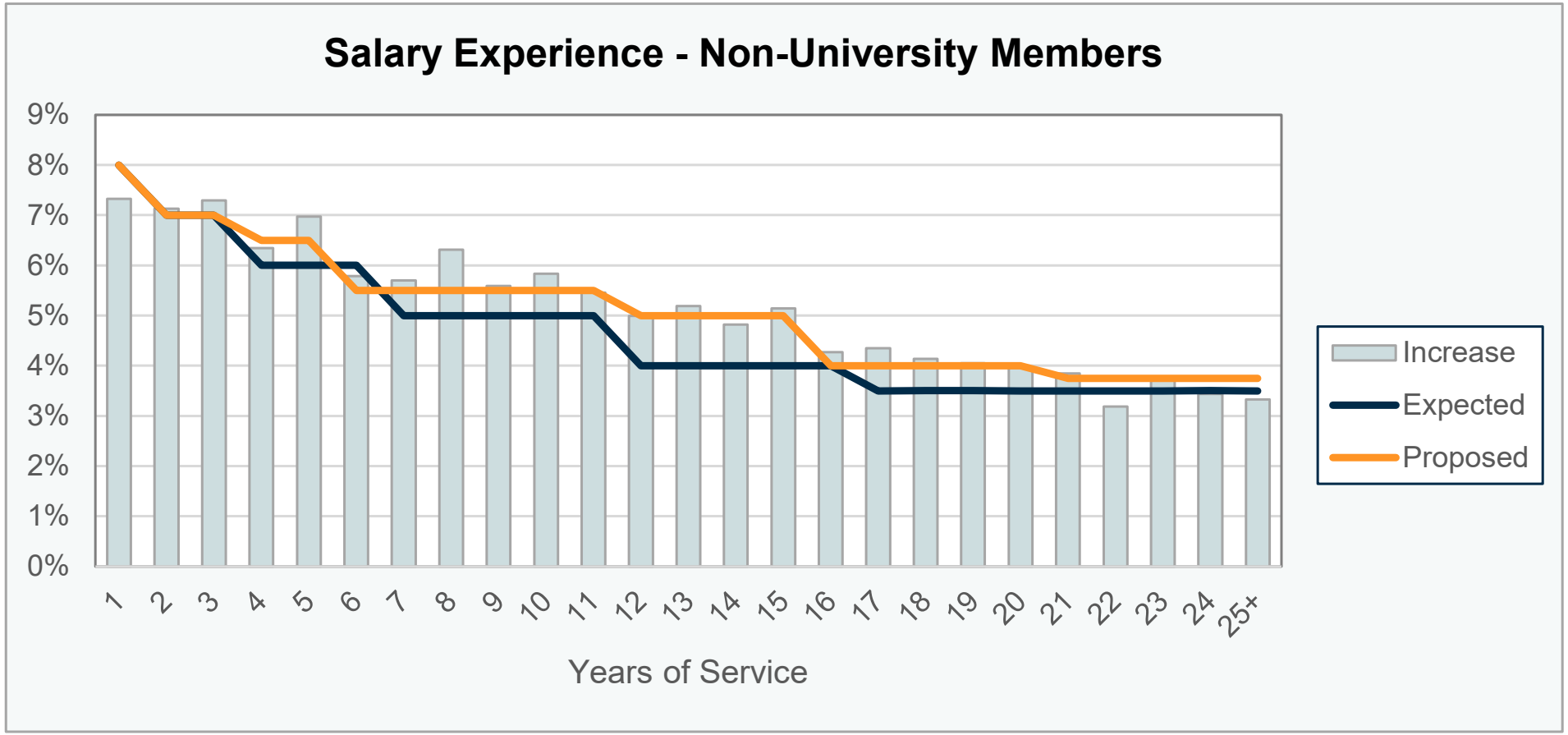
- **Recommendation for Beneficiary Base Table**
  - Contingent Survivor Mortality Table, projected generationally using scale MP-2021

# 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)

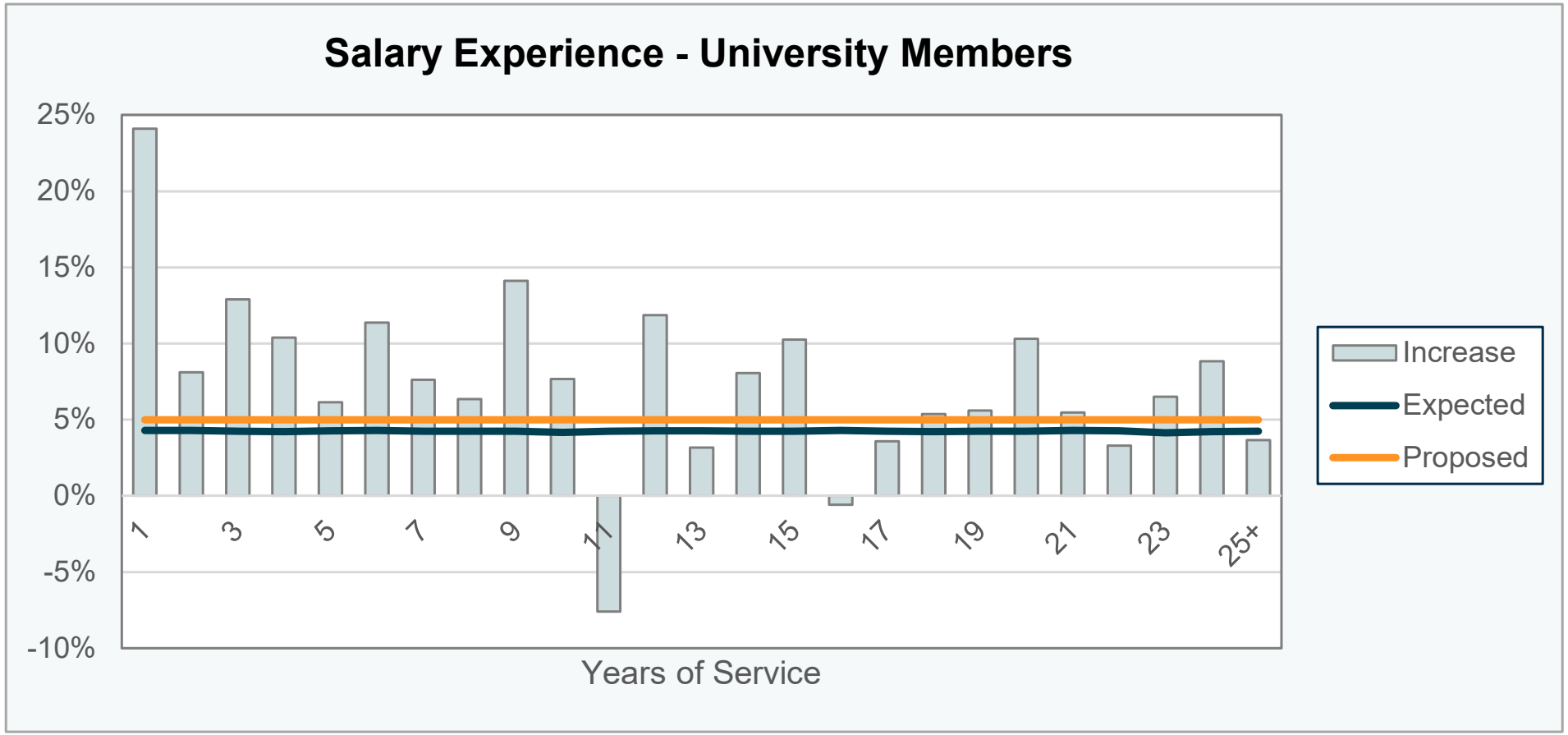
- Analysis is performed separately for University and Non-University

# Individual Salary Increase Assumption




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

# Individual Salary Increase Assumption




**Recommend the total salary increase assumption be increased from 4.25% to 5.00%.**

# Other Assumptions

- Marriage Assumption
  - No change to age difference assumption (spouse assumed to be same age as the eligible member)

- Interest on Member Contributions
  - No change to current assumption of 2.00%

# Recommended Demographic Assumption Changes

| | Current Assumptions | Proposed Assumptions |
|---|---|---|
| **Mortality** | | |
| - Base Tables | Pub-2010 Teacher Members | Pub-2016 Teacher Members |
| - Mortality Improvement | MP-2021; none for disabled | MP-2021; none for disabled |
| - Adjustments | 102% scaling for male retirees and 103% for female retirees | None |
| **Retirement** | | |
| - Early | 5.0% | No change |
| - First Eligible | Vary by age | Eliminate Assumption |
| - Unreduced | Vary by age | Increase rates at most ages |
| **Termination** | Service-based tables | Minor adjustments for both full time and part time |
| **Disability** | Vary by age | 10% reduction in rates |
| **Salary** | Vary by service | Increase rates at most ages |

# Cost Impact Using 6/30/25 Valuation

## Comparison of Valuation Results and Costs

| | 6/30/25 Valuation | | |
|---|---|---|---|
| | Baseline | All Changes | Difference |
| Actuarial Accrued Liability ($M) | 7,202 | 7,326 | 124 |
| Actuarial Value of Assets ($M) | 5,289 | 5,289 | 0 |
| Unfunded Actuarial Accrued Liability (UAAL) ($M) | 1,913 | 2,037 | 124 |
| Funded Ratio | 73.4% | 72.2% | (1.2%) |
| Normal Cost Rate | 2.65% | 3.27% | 0.62% |
| UAAL Amortization Rate | 9.31% | 8.69% | (0.62%) |
| Total Contribution Rate | 11.96% | 11.96% | 0.00% |
| Amortization Period | 21 | 25 | 4 |

Note: the impact of the assumption changes, as measured in the July 1, 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