Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

Iowa Peace Officers' Retirement System
Discussion of Demographic Assumptions

June 20, 2022

Cavanaugh Macdonald Consulting

Experience Study Timeline

- ➢ **April meeting**
  - Education about the purpose and process of experience studies
  - Discussion and presentation of relevant data for economic assumptions
  - Discuss actuarial methods (actuarial cost method, asset smoothing method, amortization of the unfunded actuarial liability)
  - Preliminary recommendations and feedback from Board. Identification of any additional information desired for next meeting

- ➢ **June meeting**
  - Follow up discussion on economic assumptions, if needed
  - Discuss findings on demographic assumptions and any recommendations for change

- ➢ **July meeting**
  - Board action to adopt assumptions for the 2022 valuation

Background on Assumptions

➢ **Future benefit payments represent the liability of the system and ultimate funding target**

- 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 impact the allocation of costs over time so usually are neither intended to be overly conservative or aggressive

➢ **Assumptions are just that – assumptions.**

- If actual experience differs from the assumption over time, the costs will differ also.
- This variance is captured each year in the valuation process and the contribution rates are adjusted accordingly.

Purpose of Experience Study

➢ Provides the basis for analyzing existing assumptions and developing any recommended changes

➢ Actuary's role is to perform the analysis and make recommendations for each assumption

➢ As fiduciaries, the Board is responsible for the selection of actuarial assumptions
  ▪ Board can adopt all, none, or some of actuary's recommendations
  ▪ Assumptions do not affect the true cost of the System which is the actual benefits paid from the trust

➢ Compare actual experience during study period with expected results based on current assumptions, particularly for demographic assumptions.

➢ Past experience provides strong guidance for some assumptions (like mortality) and weak guidance for others (like investment return)

➢ 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

Experience Studies

➢ Generally performed every five years, but can be sooner at the discretion of the Board

- Last study period covered July 1, 2011 to June 30, 2016
- Economic assumptions reviewed in early 2020
- This study period covers July 1, 2016 to June 30, 2021

➢ Evaluate all actuarial assumptions and actuarial methods used in the valuation process

➢ New assumptions will be implemented in the June 30, 2022 actuarial valuation

Selection of Assumptions

What Are They?

Economic

- Price Inflation
- Investment Return
- Escalator/COLA
- General Wage Increase
- Individual Salary Increases
- Covered Payroll Growth

Demographic

- Retirement Rates
- Disability
- Termination of employment
- Mortality

Who Selects Them?

Economic

- Board
- Actuary
- Investment Consultant
- Other Advisors

Demographic

- Board Approves
- Mostly Actuary since data driven

Our focus today is on the demographic assumptions

Measuring Demographic Experience

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

➤ Assess credibility – amount of weight assigned to the recent experience
  - Length of study period
  - Unusual events during study period
  - Size of the group (smaller = less credibility)

➤ Key evaluation tool is actual decrements/expected decrements (called Actual/Expected or A/E ratio)
  - "Decrement" is a change in the member's status (e.g., retirement, termination, death)

Measuring Demographic Experience
(Count vs Liability Basis)

Count Basis

➤ **Step 1:** Determine <u>number of members</u> changing membership status (decrements) during study period, tabulated by groupings that may include age, duration, gender and plan

➤ **Step 2:** Determine <u>number of members</u> expected to change status by multiplying membership statistics (called exposures) by the expected rates of decrement

➤ **Step 3:** Compare <u>number</u> of actual decrements to <u>number</u> of expected decrements, called the Actual to Expected Ratio (expressed as %)

Liability Basis

➤ Same steps as Count Basis, but results are based on the estimated liability (salary and service) of members instead of the count of members

Measuring Demographic Experience (Example)

➢ 10 members eligible to retire at age 55

➢ Actuarial assumption is 10% retire at age 55

Count	Salary	Service	Liability Weighted
8	$ 80,000	22	$ 5,600,000
2	100,000	29	2,400,000
10			8,000,000

➢ Actual Experience: 1 member with $100,000 and 29 years retires

	Count Basis	Liability Weighted
Exposure	10	$8,000,000
Expected Decrement	1	800,000
Actual Decrement	1	1,200,000
Actual/Expected Ratio	100%	150%

Evaluating the Results of Demographic Experience

➢ Generally, the closer the Actual/Expected ratio is to 100%, the better the current assumption anticipated the overall experience. However, the pattern of the actual experience may vary significantly from the assumption indicating a need for change even if the A/E ratio is 100%.

A/E Ratio = 100%
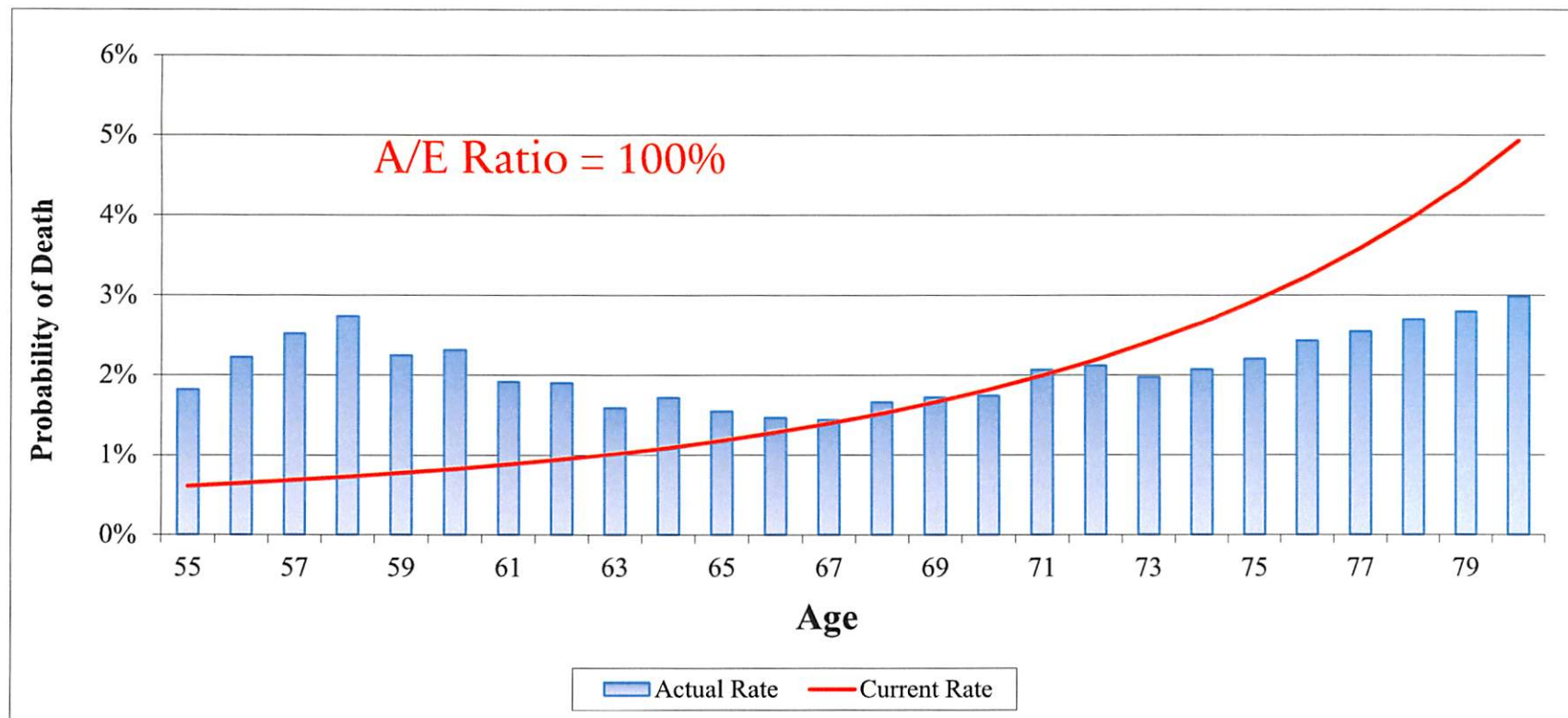
General Cost Impact of Assumption Change

➢ General cost impact of each change in isolation

Assumption	Change in Assumption	Typical Effect On Liabilities/Costs
Mortality	Decrease (longer life expectancy)	Increase
Retirement	Retire Later	Decrease
Disability	Lower Disability	Decrease
Termination	Decrease	Increase

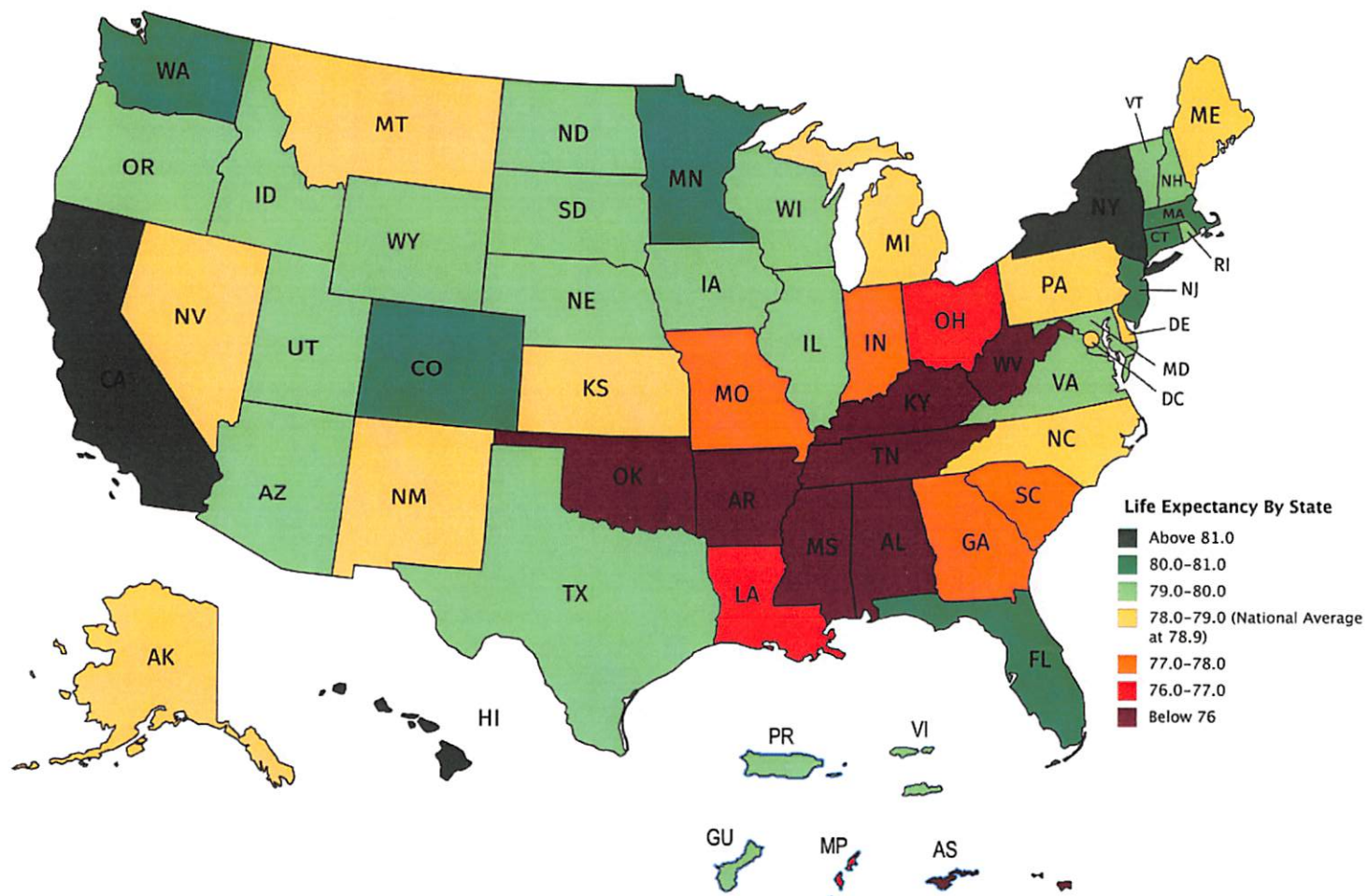Mortality varies by many
factors including:
- geography,
- marital status,
- education,
- income and
- gender.

Mortality Assumption

➤ 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

➤ Our focus is on mortality at key retirement ages (55-85), not life expectancy at birth which is typically used in the press

➤ May adjust tables in order to better fit the actual experience

- Age setback or set forward
- Benefit size (Below or Above Median)
- Scaling factors

Life Expectancy By State
- Above 81.0
- 80.0–81.0
- 79.0–80.0
- 78.0–79.0 (National Average at 78.9)
- 77.0–78.0
- 76.0–77.0
- Below 76

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Note: life expectancy at birth

Mortality Assumption

➢ Two components of the valuation mortality assumption
  - Current mortality rates (referred to as the "base table")
  - Future mortality improvements

➢ Current mortality rates/Base table
  - Start with a standard table, usually a recent table
  - Tables may be adjusted to better fit the observed data
  - Credibility is determined based on number of deaths and exposures, as well as professional judgement

➢ Future mortality improvements
  - Actuaries must <u>consider</u> future mortality improvements in recommending a mortality assumption.

Reflecting Future Mortality Improvements

➢ While there has been improvement in the past, differences of opinion exist about the future

➢ Some believe mortality improvements will continue at the current rate or even accelerate

- Assumes medical advancements will occur to help slow or even reverse the aging process

➢ Others believe the recent rate of mortality improvement cannot continue

- Obesity and related health issues
- Biomechanical limits on human lifespan
- Impact of Covid/other pandemics over long term

➢ We believe it is prudent for pension funding to reflect some improvement in mortality in the future

Generational Mortality Improvements

➢ Currently use the "generational" approach which projects mortality improvements directly each year in the future by reducing the probability of death at most ages

➢ As a result, younger members are expected to have the most improvement in longevity, i.e., longer life expectancy

➢ Cost impact of improving mortality is smooth as it is reflected in the members' expected lifetime.

➢ Adjustments to the mortality assumption in the future are expected to be smaller in future years (more fine-turning) so avoids "spikes" in costs

Current POR Mortality Assumption

➢ RP-2014 Mortality Table, with 1 year setback for males, on generational basis

  ▪ Future mortality improvements using Scale MP-2016

➢ Disabled Mortality: RP-2014 Mortality Table with 4 year age set-forward, projected with Scale MP-2016

➢ Actual/Expected ratio should be near 100% as future mortality improvements are reflected directly in the valuation software

  ▪ Limited credibility due to size of group

Actual Mortality Experience

➤ Experience indicates actual deaths in study period (ages 60 to 85) were lower than expected (A/E Ratio is lower than 100%). However, 5 less deaths in 5 years is a relatively close fit.

| Actual	Expected	A/E Ratio Count	Benefit-Weighted
71	76	93%	88%

➤ Fewer deaths than expected means less liability was released than anticipated (actuarial loss).

➤ Analysis indicates some adjustment may be appropriate especially at younger ages

  ▪ A/E ratio for males was 88% on a benefit-weighted basis
  ▪ Insufficient data for female retirees so female assumption will follow what is used for males

Mortality Assumption

- For the first time (2019), the Society of Actuaries published a set of mortality tables, based solely on public plan data (Pub-2010 Mortality Tables)
  - Different tables by occupation: Teachers, Public Safety and General Employees
  - Above-Median, Median, and Below-Median
  - Key resource for the selection of mortality assumptions for public plans

- We recommend moving to the Pub-2010 Public Safety mortality tables
  - Appropriate for the POR population
  - Some additional adjustments may be necessary to better fit the assumption to the actual experience

Actual Mortality Experience
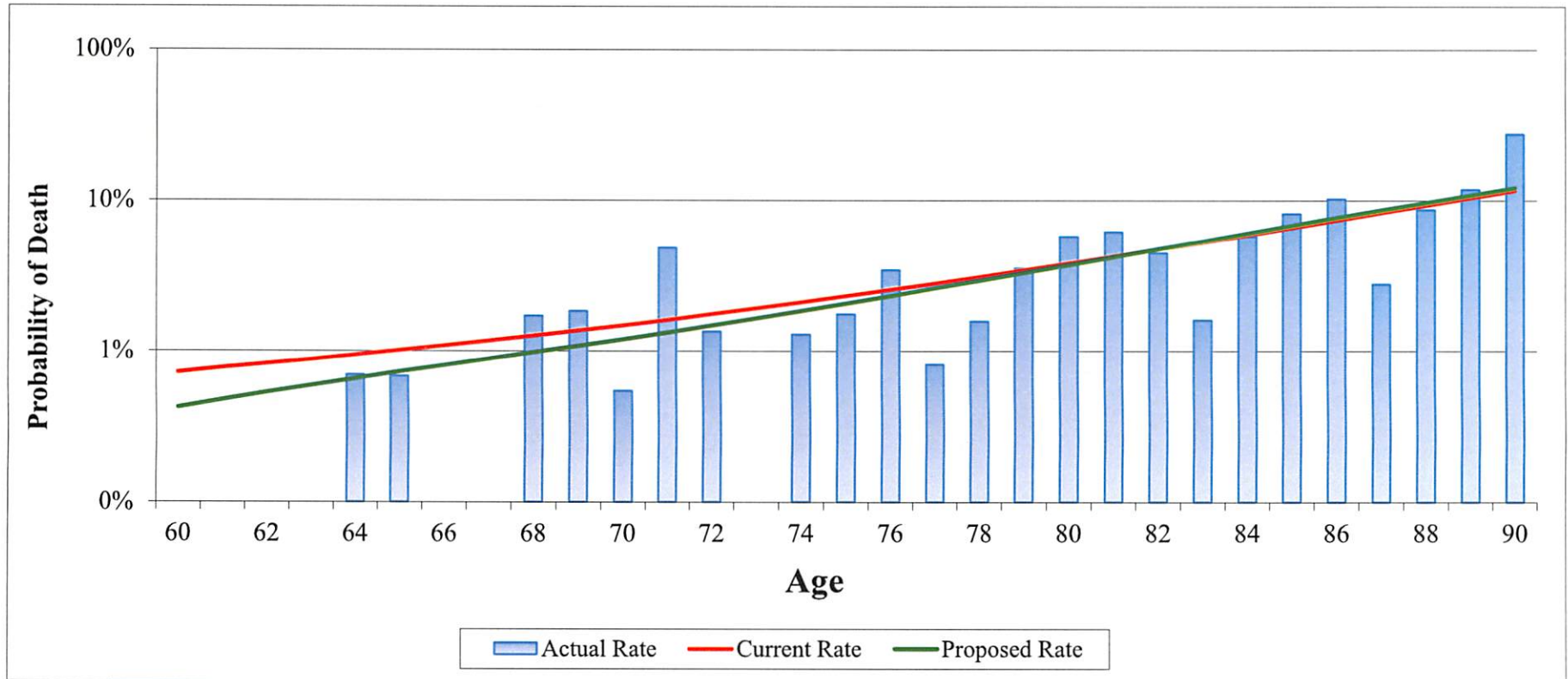
	A/E Ratio Count	A/E Ratio Liability
Current Assumption	93%	88%
Proposed Assumption*	101%	98%

* Pub-2010 Public Safety Median Mortality Table with 2-year age setback.

Recommended Mortality Assumptions

- ➢ Recommendation for healthy retiree mortality assumption
  - Pub-2010 Public Safety Median Table with a two-year age setback is a good fit, particularly given the size of the group
  - Recommend modeling future mortality improvements using the MP-2021 Scale

- ➢ Beneficiary Mortality Assumption
  - Insufficient data to analyze actual experience
  - Recommend using Pub-2010 Contingent Survivor Mortality Table with two-year age setback and MP-2021 Scale

- ➢ Disabled Member Mortality Assumption
  - Insufficient data to analyze actual experience
  - Recommend using the Pub-2010 Disabled Mortality Table with two-year setback and MP-2021 Scale

Retirement Rates

➢ Retirement eligibility is age 55 with at least 22 years of service

- Early retirement with reduced benefits available at age 50 but not commonly used by members

➢ Current assumption varies by both age and service

- Lower rates for under 30 years of service
- Higher rates if 30 or more years of service

Retirement Rates

- ➢ Based on data and input from POR staff, retirement behavior is heavily driven by service
  - Currently, many members reach age 55 before they hit 32 years of service
  - This dynamic could change in the future as members joined the force at younger ages
  - Will continue to monitor actual behavior in future experience studies and adjust the assumption if needed.

- ➢ Consider simplifying the assumption by moving to an assumption based solely on years of service

Recommended Retirement Rates
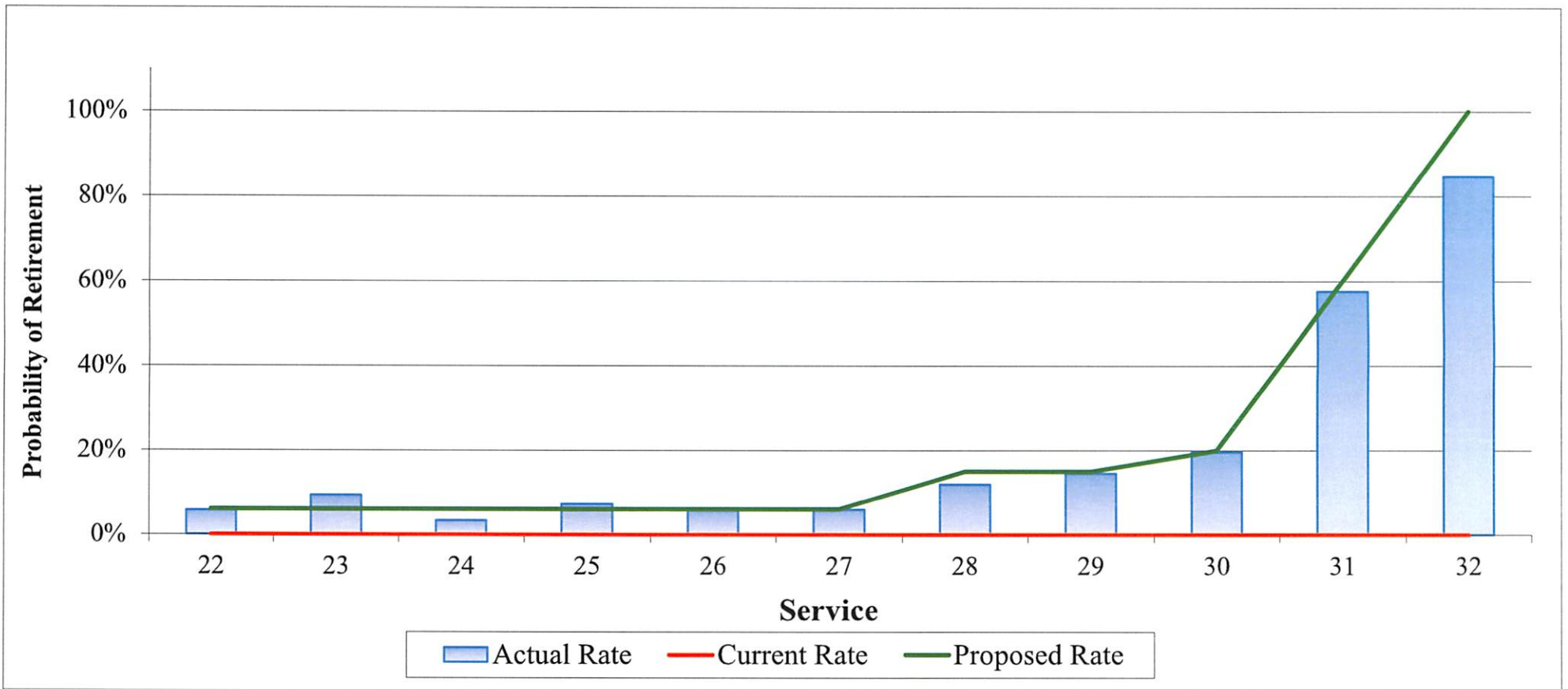
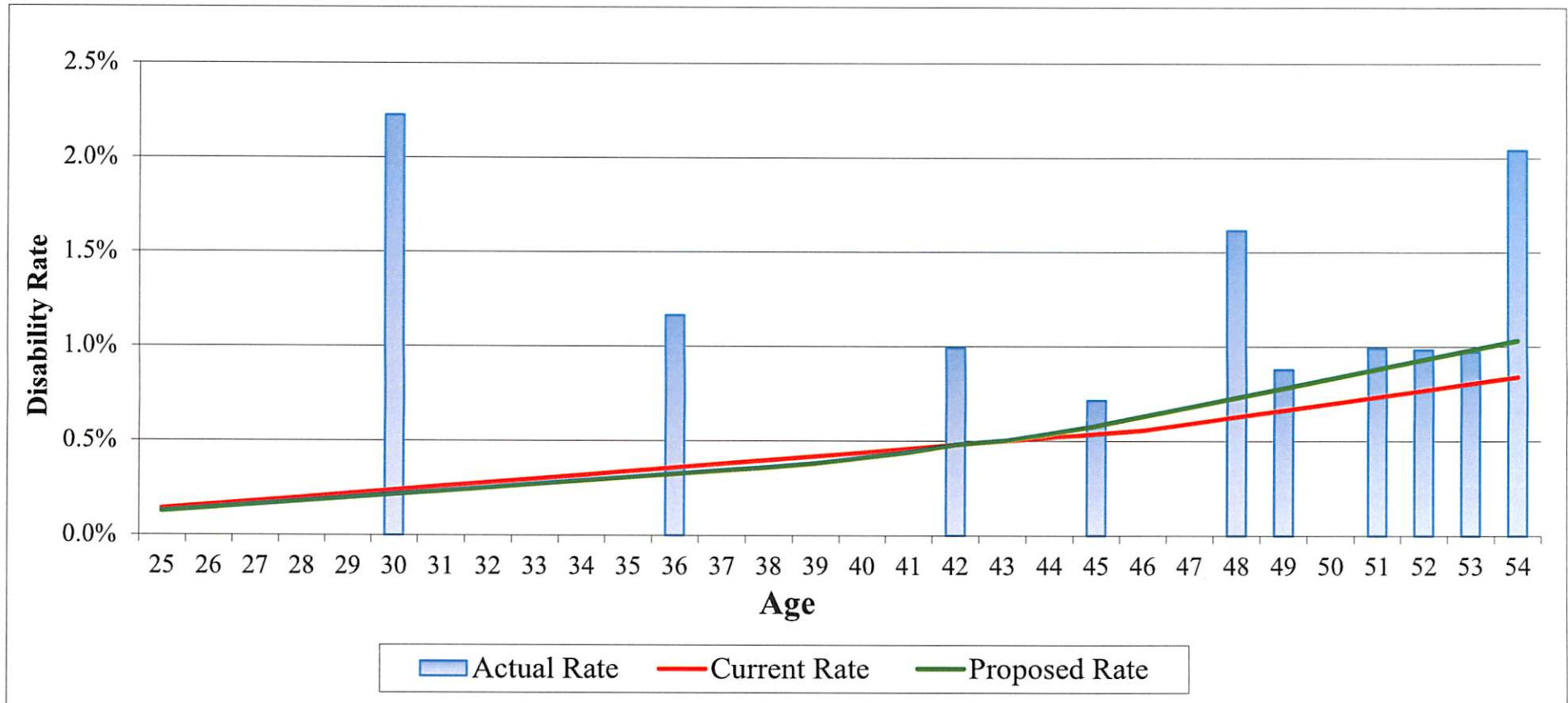A/E ratio on proposed assumption is 93%.

Disabilities

➤ Results:

Study Period	Actual	Expected	A/E Ratio
2011 - 2016	11	14	79%
2017-2021	12	13	92%

➤ Small probabilities applied to small number of active members – volatility is to be expected

➤ Limited credibility due to size of group

➤ Recommend small changes to better fit the actual experience at older ages

➤ Recommend retaining the current assumption that 80% of disabilities are accidental

Disability Experience

A/E ratio on the proposed assumption is 86%, but the fit has improved.

Termination of Employment

- ➤ Termination rates much lower than prior study period
- ➤ Looking back over last three studies indicates significant variation
  - Possibly due to state budget conditions, labor market, changes in leadership, number of new hires and other factors.

Study Period	Actual	Expected	A/E Ratio
FY 2006 - 2011	29	42	69%
FY 2011 - 2016	42	27	154%
FY 2017 - 2021	12	25	49%

- ➤ With significant change since prior study, we want to move incrementally and then reevaluate in the next study.

Termination of Employment
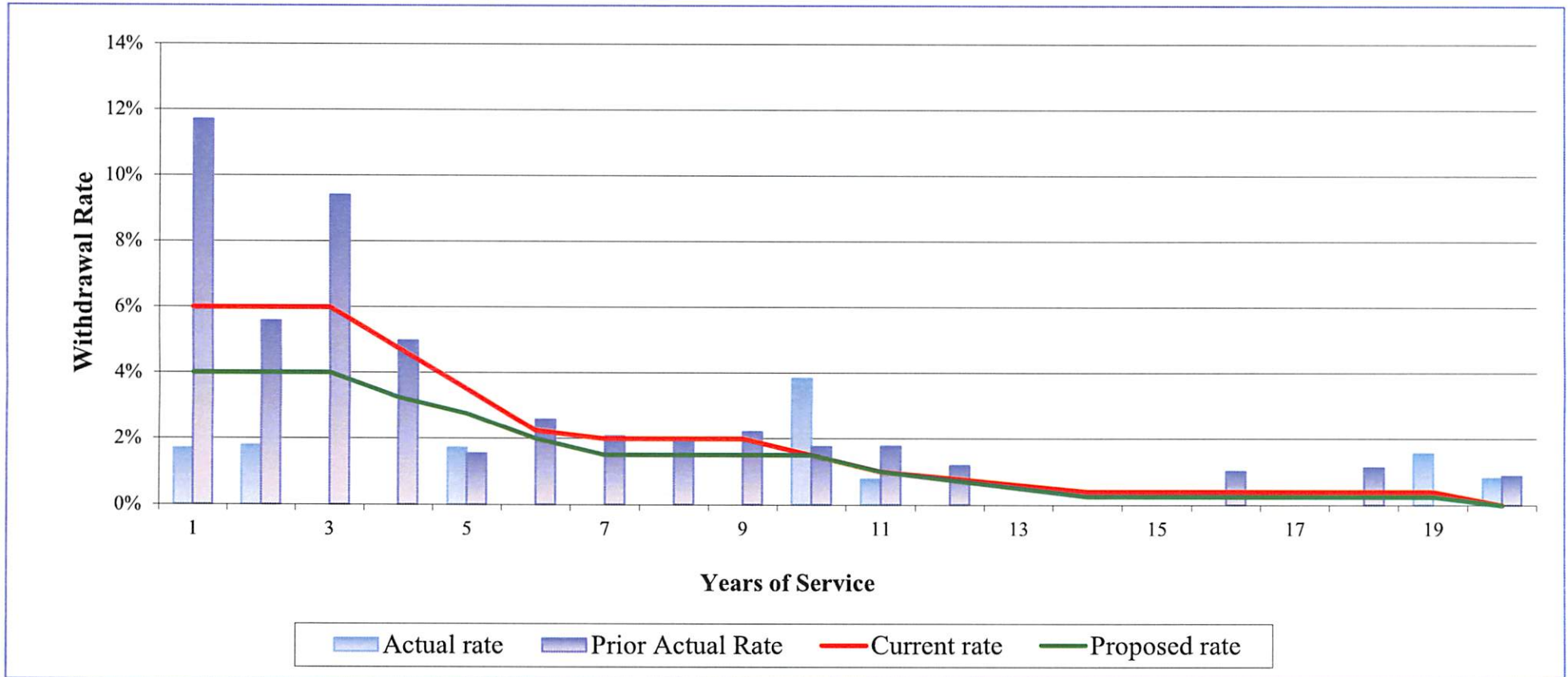
	A/E Ratio	
	Count	**Liability-Weighted**
Proposed Assumption	52%	69%

Salary Increase

- Two components
  - Merit (promotion/longevity)
  - General wage growth

- In economic assumption review in April, we recommended the general wage growth assumption remain at 3.50%

- To analyze the merit salary increase assumption, we study total increase in salary and adjust for differences in actual versus expected general wage increases

- Current assumption is service-based
  - Commonly used approach
  - Expect merit scale to generally decline as service increases

Actual Total Salary Experience

FYE	Actual	Expected	Difference
2017	5.05%	4.91%	0.14%
2018	3.66%	4.84%	(1.18%)
2019	4.43%	4.88%	(0.45%)
2020	4.18%	4.87%	(0.69%)
2021	5.23%	4.81%	0.42%
2017-2021	4.51%	4.86%	(0.35%)

➢ POR actual general wage growth over this period was about 3.00%. The general wage increase assumption is 3.50% so a difference of around 0.50% would be expected. Actual difference is 0.35%

Salary Increase Assumption
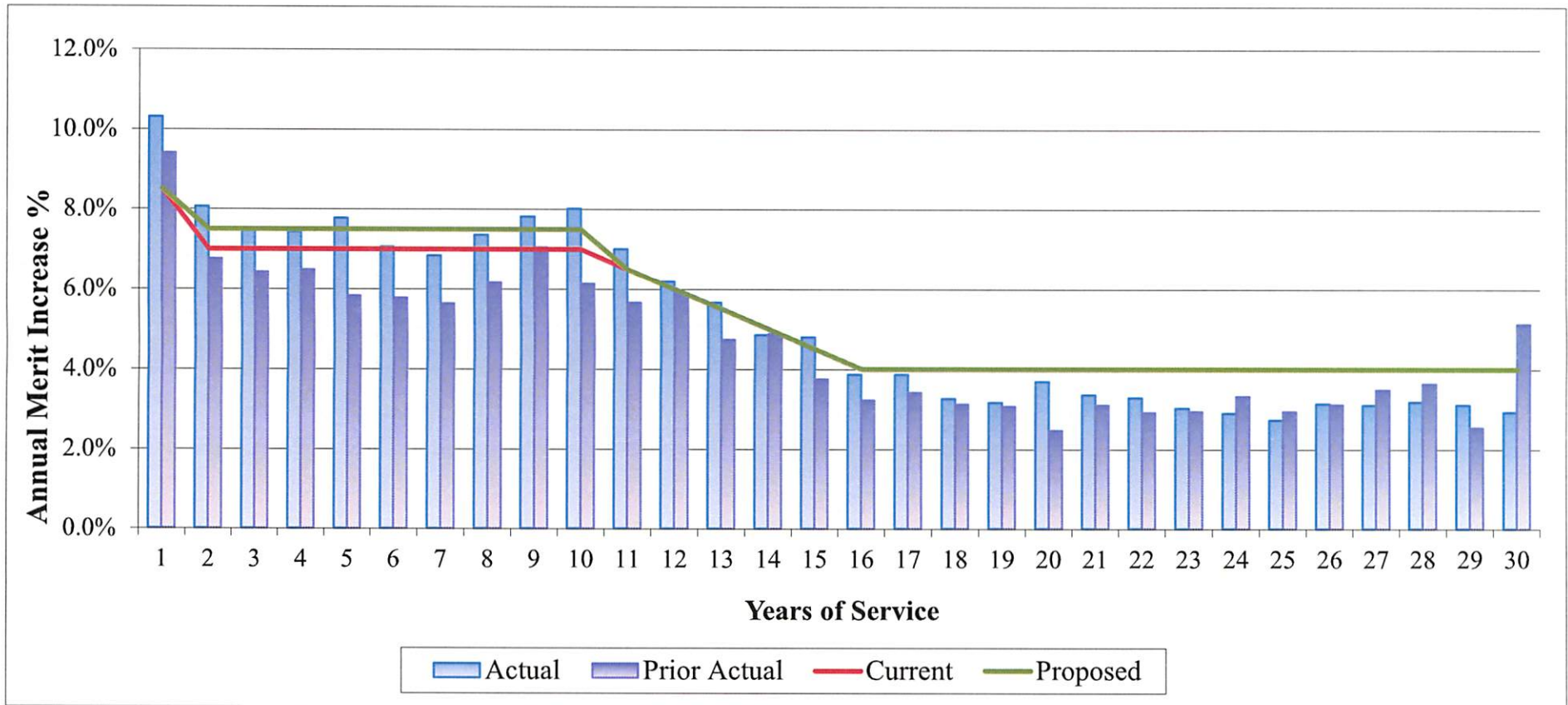
We are recommending some adjustment to the salary increase assumption in the first 10 years of service, partially reflecting the actual experience observed.

Salary Merit Scale

➤ Recommend retain service-based assumption, but with some adjustments to improve the fit at the shorter durations

➤ Keep some margin for adverse deviation in short term given tight labor market and high price inflation

- Recommended assumption results in total salary increase of 4.96%, a slight increase from current assumption.

- Higher actual salary increases than expected impact both active liability and retiree liability (due to escalator).

- Is more margin necessary in the short term? Possibly assume higher increases over the next ten years due to high inflation and tight labor market.

Recap of Recommended Changes to the Demographic Assumptions

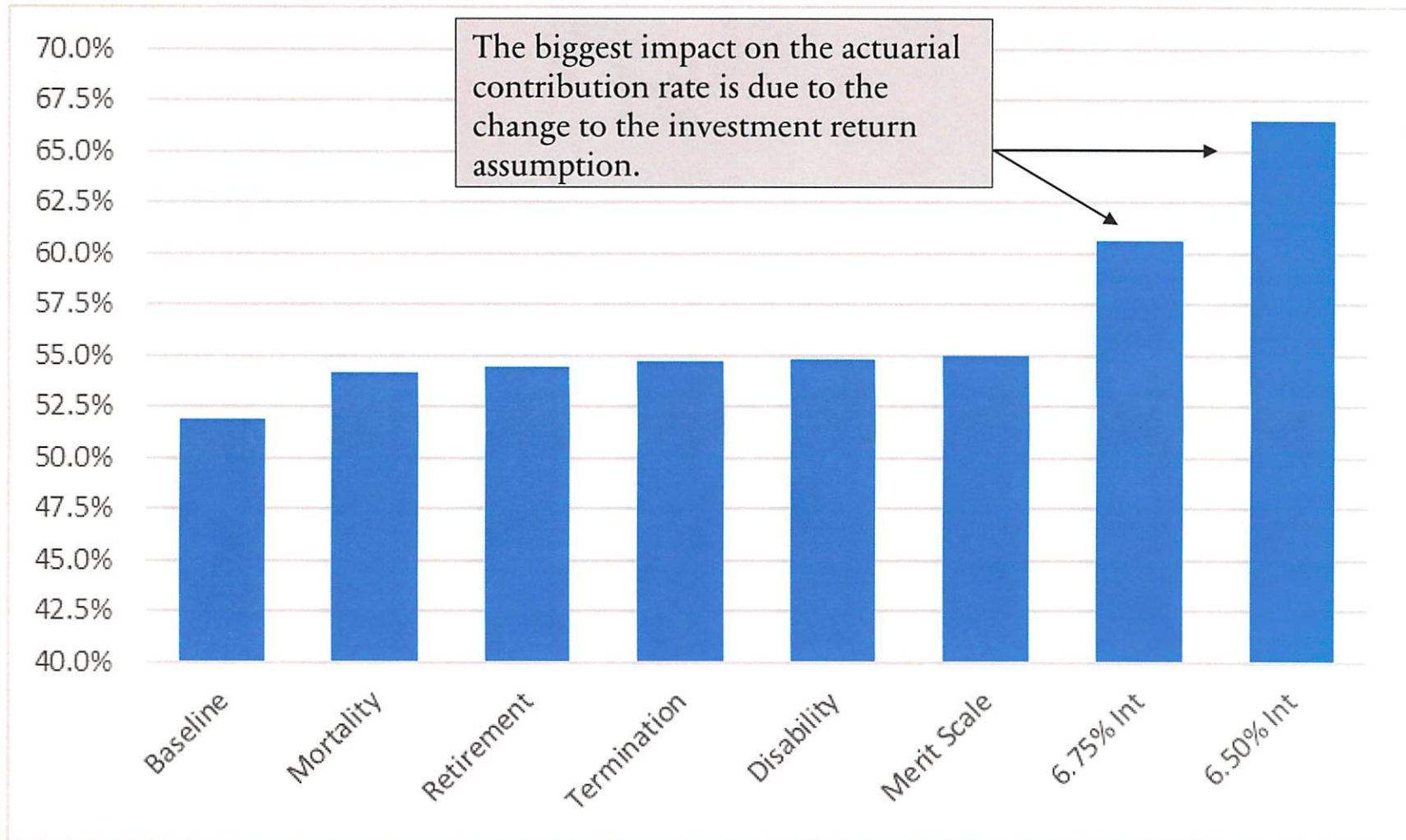| Assumption	Current	Recommended
Mortality	RP 2014 Table (-1 Males). Scale MP 2016.	Pub-2010 Safety Table (-2 Males and Females). Scale MP 2021.
Retirement	Based on age and more/less than 30 YOS	Move to pure service-based assumption
Disability	Age-based rates	Adjust rates to better fit actual experience
Termination	Service-based rates	Modify rates incrementally to reflect actual experience
Merit Salary Scale	Service-based assumption	Increase at shorter durations

Recommended Set of Economic Assumptions

Assumption	Current	Recommended
Price inflation	2.50%	2.50%
Productivity	1.00%	1.00%
General wage inflation*	3.50%	3.50%
Post-retirement escalator	3.50%	3.50%
Payroll growth**	2.75%	2.75%
Investment return	7.00%	6.25% to 6.75%

* Used in developing the individual salary increase assumption and the post-retirement escalator increase assumption.

**Does not impact funding results. Only used to calculate the UAAL amortization payments.

Impact on Actuarial Contribution Rate

The biggest impact on the actuarial contribution rate is due to the change to the investment return assumption.

Note: the cost impact of each assumption change is dependent on the order in which the changes are considered.

Cost Impact* ($ in Thousands)

July 1, 2021 Actuarial Valuation

	Current Assumption	Demographic Changes	With 6.75% Assumption
Actuarial Liability	$780,150	$796,217	$822,427
Actuarial Assets	658,081	658,081	658,081
Unfunded Actuarial Liability	$122,069	$138,136	$164,345
Increase in UAL		$16,067	$42,276
Funded Ratio	84.4%	82.7%	80.0%
Employer Contribution:			
Actuarial Contribution	40.47%	43.57%	49.22%
Statutory Contribution	37.00%	37.00%	37.00%
Supplemental State	10.18%	10.18%	10.18%
Contribution Difference	(6.71%)	(3.61%)	2.04%

* Estimated using the July 1, 2021 actuarial valuation. Actual impact on July 1, 2022 valuation will be somewhat different. The $5 million supplemental State contribution stops once the System is 85% funded.

Cost Impact* ($ in Thousands)

July 1, 2021 Actuarial Valuation

	Current Assumption	Demographic Changes	With 6.50% Assumption
Actuarial Liability	$780,150	$796,217	$850,030
Actuarial Assets	658,081	658,081	658,081
Unfunded Actuarial Liability	$122,069	$138,136	$191,948
Increase in UAL		$16,067	$69,879
Funded Ratio	84.4%	82.7%	77.4%
Employer Contribution:			
Actuarial Contribution	40.47%	43.57%	55.09%
Statutory Contribution	37.00%	37.00%	37.00%
Supplemental State	10.18%	10.18%	10.18%
Contribution Difference	(6.71%)	(3.61%)	7.91%

* Estimated using the July 1, 2021 actuarial valuation. Actual impact on July 1, 2022 valuation will be somewhat different. The $5 million supplemental State contribution stops once the System is 85% funded.

Next Steps

- ➢ All of the experience study data and analysis has been presented. Includes a lot of heavy technical information to consider.

  - Time needed to contemplate the recommended changes
  - Is there any additional data or analysis the Board would specifically like to see for July meeting?

- ➢ Proposed schedule

  - July: review recommendations, additional discussion and Board action
  - Will have estimated 2022 valuation results, using modeling tool from 2021 valuation, if estimated return for FY 2022 is available