

# Oklahoma Firefighters Pension and Retirement System

Actuarial Assumption Experience Study

July 1, 2013 to June 30, 2018

June 21, 2019



**OKLAHOMA FIREFIGHTERS**  
**PENSION & RETIREMENT SYSTEM**

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# Agenda

Experience Review Process

Review of Demographic Assumptions

Review of Economic Assumptions

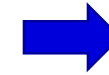
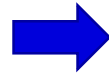
Review of Methods

Cost Impact of Proposed Changes

# The Valuation Process

## Input

- Census Data
- Asset Data
- Benefit Provisions
- **Actuarial Assumptions**
- Funding Methodology



## Results

- Actuarial Value of Assets
- Accrued Liability
- Actuarial Gain/Loss
- Funded Ratio
- Contribution Requirement

Contributions are set by statute. Actuarial valuations are performed each year to assess the status of the System. The valuation utilizes assumptions about future events that are recommended by the actuary and adopted by the Board.

# Experience Review Process

- Based on experience for the period July 1, 2013 to June 30, 2018
- Compare experience (what actually happened) with current actuarial assumptions
- Guidance is provided in Actuarial Standard of Practice (ASOP) No. 27 and ASOP No. 35
- Make recommendations based on:
  - Observed experience during the study
  - Plan specific factors that could impact future behavior
  - National trends
  - Estimate of future experience
  - Professional judgement
- Will implement the Board approved changes in the July 1, 2019 valuation

# Demographic Assumptions

- Mortality
- Retirement
- Disability
- Withdrawal
- Marriage Assumption

# Mortality Assumption

Mortality was studied for the following:

- Pre-Retirement Male
- Post-Retirement Healthy Male Retirees
- Post-Retirement Healthy Female Surviving Spouses (do not have reliable data for spouses while member is alive)
- Post-Retirement Disabled Male Retirees
- Paid and Volunteer firefighters were studied together

# Mortality Assumption

The following table summarizes the experience over the past five years:

Group	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
Active Male	58,839	45	84	54%
Retiree Male	31,771	1,005	864	116%
Beneficiary Female	10,176	502	452	111%
Disabled Male	9,013	274	220	125%

- The number of pre-retirement deaths was less than expected
- The number of post-retirement deaths was more than expected
- The experience is not fully credible, but there was enough experience to be considered partially credible
- Experience seems to suggest that firefighters are healthier than average while active, but may experience higher than average mortality once retired

# Mortality Assumption

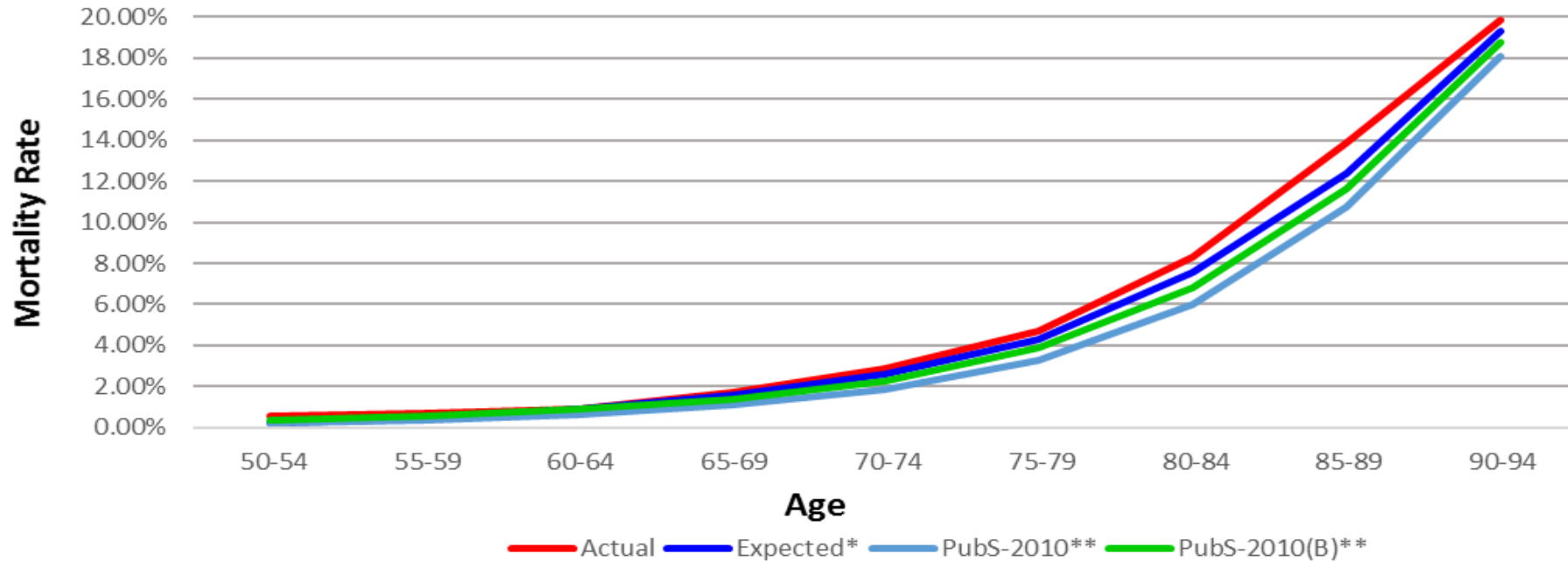
The current assumption is the RP-2000 Combined Blue Collar table with generational mortality improvement using Scale AA (no improvement for Disabled lives).

Since the last experience study, the Society of Actuaries has issued new tables:

- RP-2014 – Does not include data from public safety plans
- Pub-2010 – table for public sector plans
  - Split between Teachers, Public Safety, and General Employees
  - Split between Active Employees, Retirees, Disabled Members, and Surviving Spouses
  - Also split into Above and Below Median
  - The Public Safety table is not split between firefighters and police
- MP-2014 – Mortality improvement scale
  - Updated each year, MP-2018 is most recent



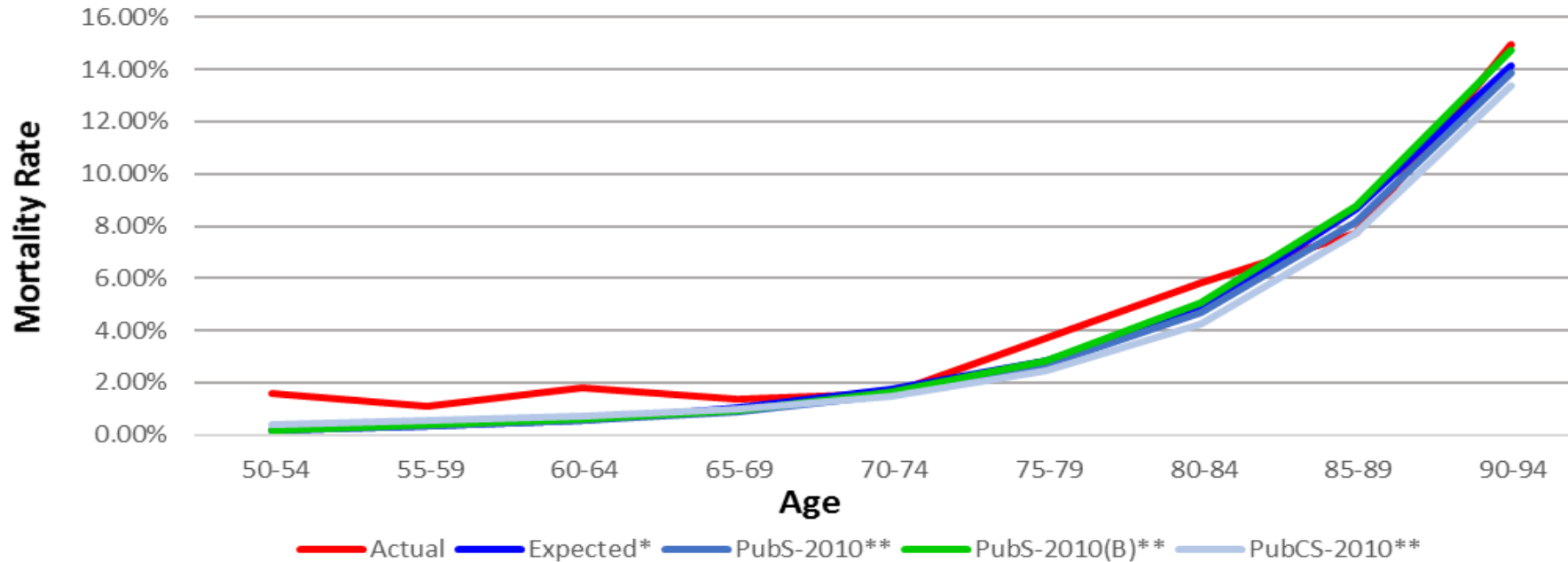
# Post-Retirement Mortality – Healthy Male



**Deaths**  
 Actual: 1,005  
 Expected: 864  
 Proposed: 798

More deaths than expected, but not enough experience for full credibility.  
**Recommendation:** Update to Pub-2010 Safety Below Median Table to reflect updated table.  
 Below Median adjustment accounts for mortality trends in geographic region and for firefighters.

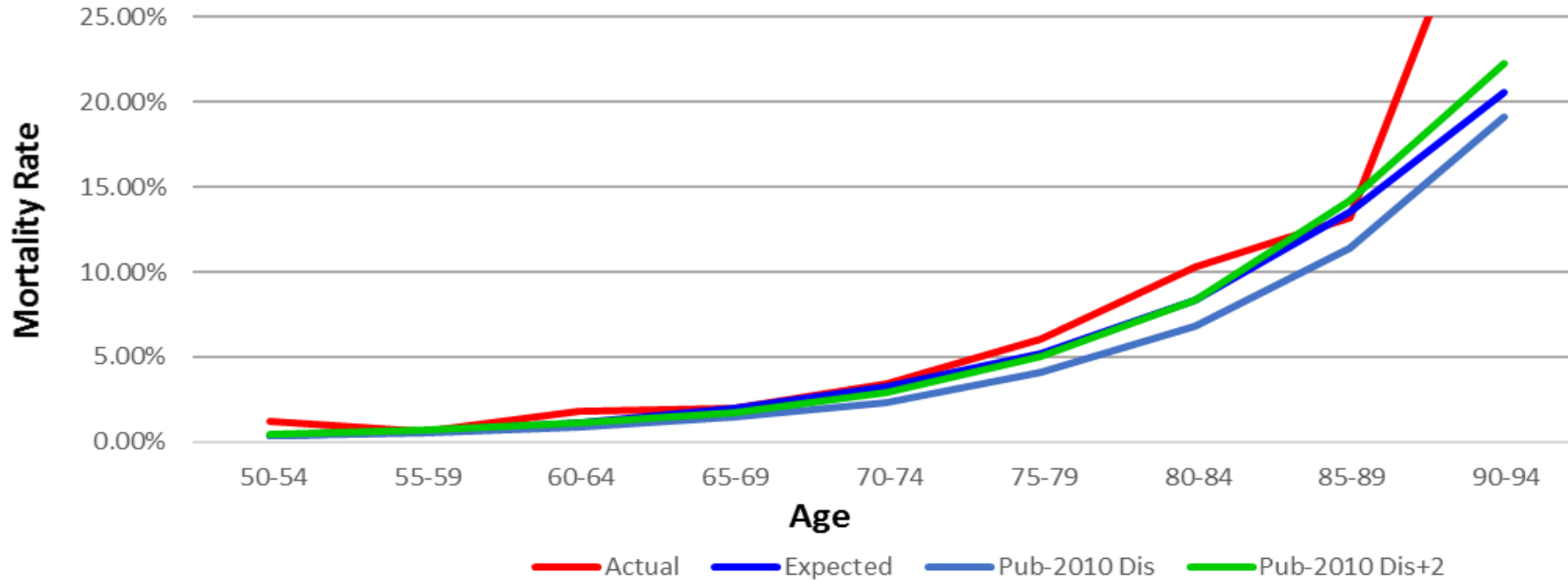
# Post-Retirement Mortality – Healthy Female



**Deaths**  
 Actual: 502  
 Expected: 452  
 Proposed: 464

More deaths than expected, but not enough experience for full credibility. Only have experience data for surviving spouses.  
**Recommendation:** Update to Pub-2010 Safety Below Median Table to reflect updated table and to account for mortality trends in geographic region - consistent with male table.

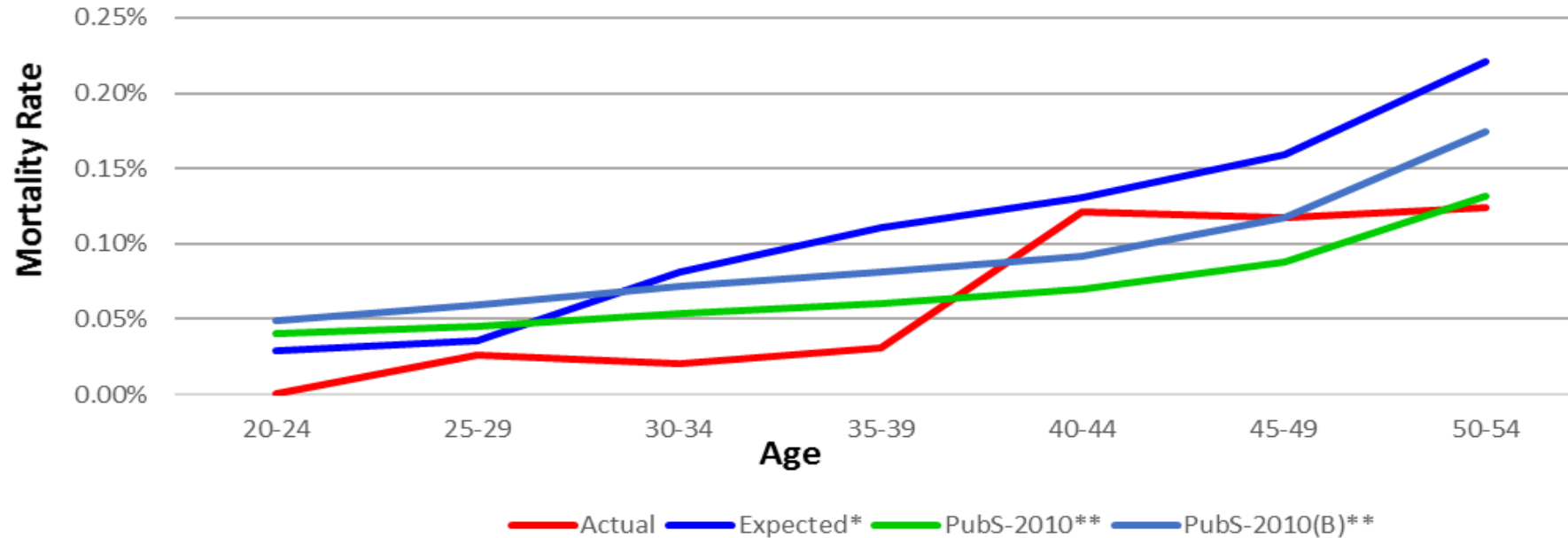
# Post-Retirement Mortality – Disabled Male



**Deaths**  
Actual: 274  
Expected: 220  
Proposed: 215

More deaths than expected, but not enough experience for full credibility.  
**Recommendation:** Update to Pub-2010 Safety Disability Table set forward two years to reflect updated table and to account for mortality trends in geographic region. Update female disabled retirement mortality assumption to be consistent with male.

# Pre-Retirement Mortality – Male



**Deaths**  
 Actual: 45  
 Expected: 84  
 Proposed: 47

Fewer deaths than expected, only 45 deaths so experience is not credible.  
**Recommendation:** Update to Pub-2010 Safety Table to reflect updated table and to account for mortality trends in geographic region. Update female assumption to be consistent with male.

# Mortality Improvement Assumption

- Actuarial Standard of Practice No. 35 states that the actuary should “include an assumption as to expected mortality improvement after the measurement date.”
- The current assumption is to use Scale AA with generational mortality improvement.
- Since the last experience study, the Society of Actuaries (SOA) conducted a mortality study and determined that the overall rates of mortality improvement in the US have differed from those predicted by Scale AA. In November 2014, the SOA released projection scale MP-2014 and has updated that scale each year. The most recent scale is MP-2018.
- There are alternate viewpoints on the use of these scales. There are those that believe that they are unduly conservative with unrealistic mortality improvement rates. Emerging experience since the data was collected by the SOA seems to support that contention (the scale published each year has projected slower improvement than the previous one).
- However, the MP scales are based on the most recent data and reflect best estimate of future mortality improvement

**Recommendation:** Use the MP-2018 scale to project the recommended tables for healthy lives forward from 2010 on a generational basis. We may want to consider updating the scale each year if the SOA continues to issue annual updates to it.

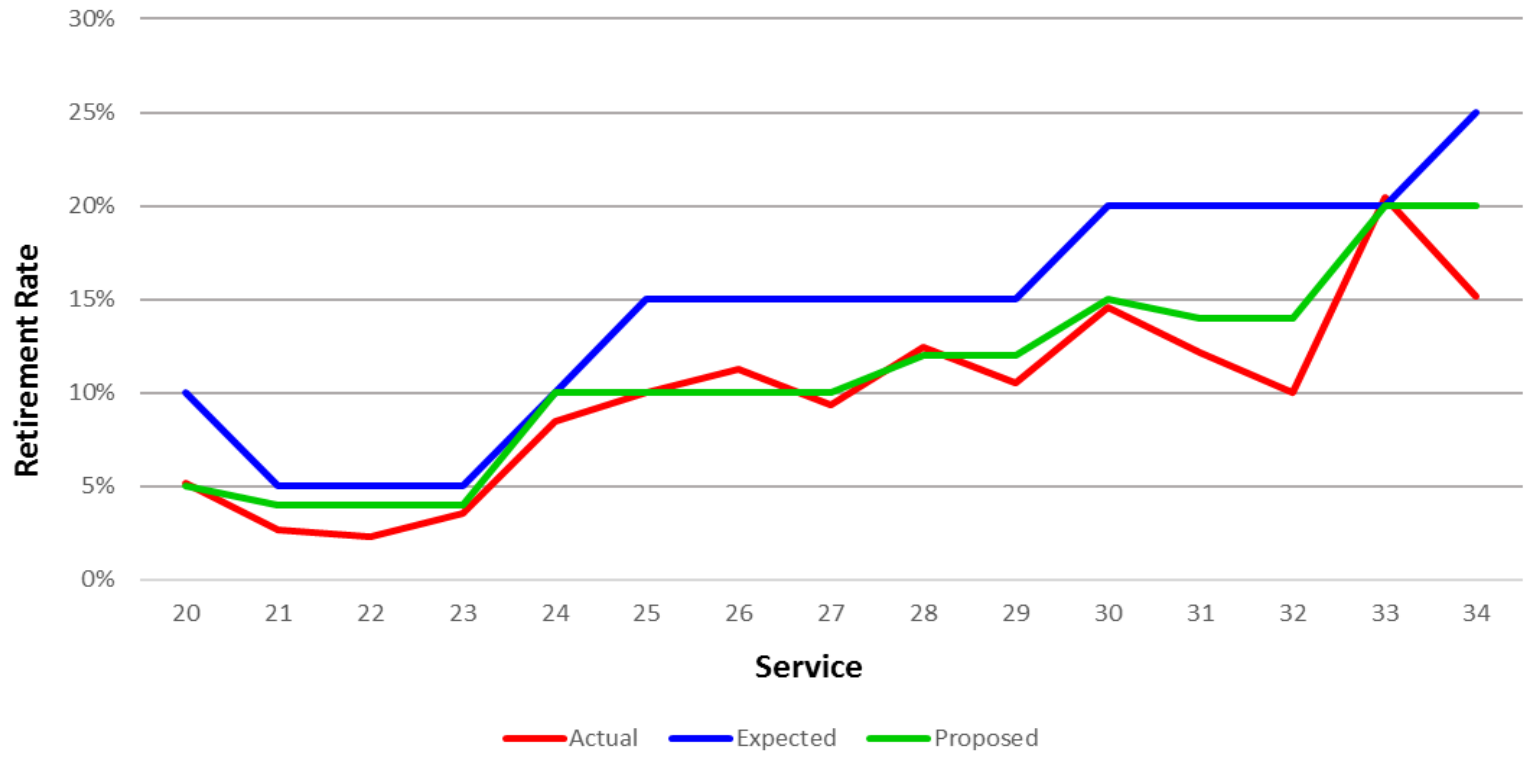
# Retirement Assumption

- Current retirement rates are based on a member's years of service
- The rates represent when the member is expected to actually leave active service (i.e. not Back DROP date)
- 100% of members who retire once they have been eligible for 5 or more years are assumed to elect to retroactively DROP for the maximum 5 years
- The following table summarizes the retirement experience over the last five years:

<b>Group</b>	<b>Exposures</b>	<b>Actual Retirements</b>	<b>Expected Retirements</b>	<b>Ratio of Actual to Expected</b>
Paid	4,315	363	574	63%
Volunteer	2,790	434	603	72%

- Significantly fewer retirements than expected for both groups
- Employees are working longer

# Retirement - Paid

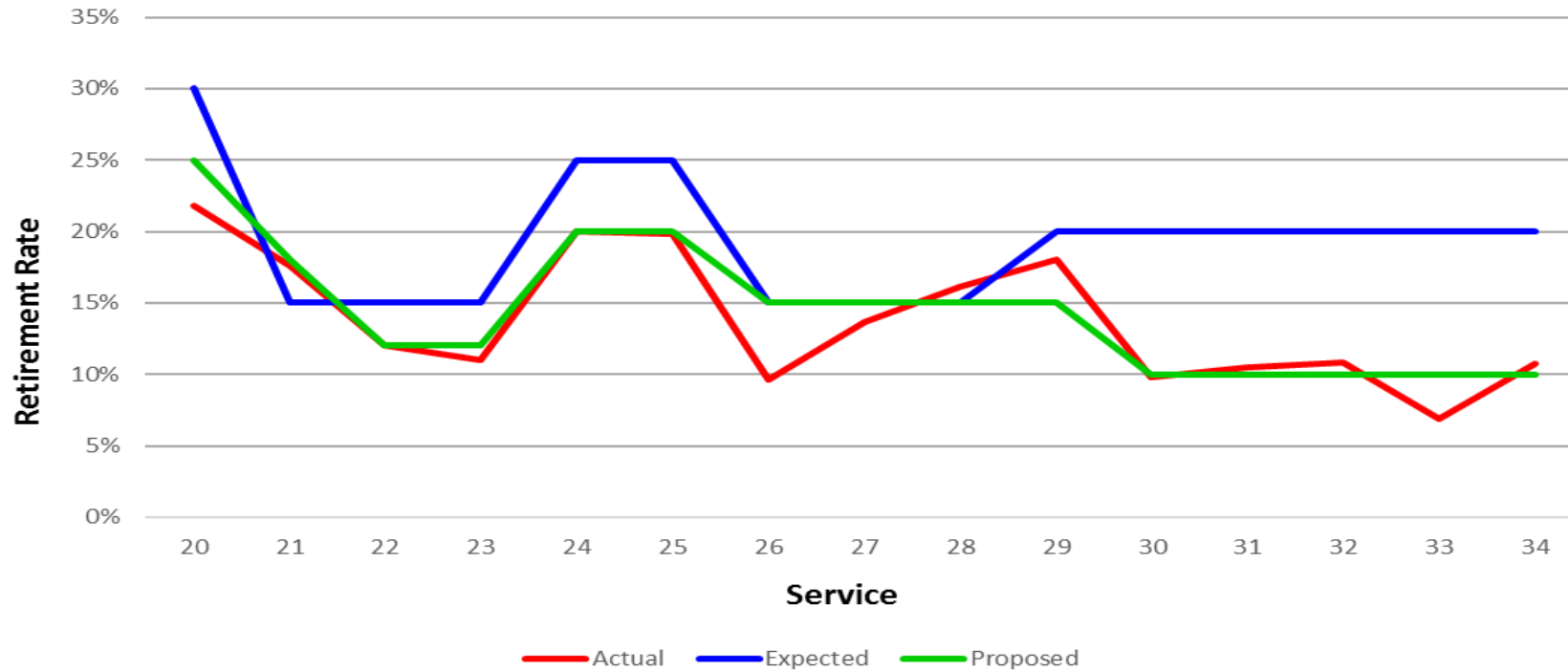


**Retirements**  
 Actual: 363  
 Expected: 574  
 Proposed: 451

**Avg Svc at Ret**  
 Expected: 27.0 years  
 Proposed: 28.4 years

Fewer retirements than expected, Back DROP is fully phased in.  
**Recommendation:** Update rates to reflect later retirements and longer service. No experience for post-2013 members – adjust these rates to reflect later retirement for them.

# Retirement - Volunteer



**Retirements**  
Actual: 434  
Expected: 603  
Proposed: 531

**Avg Svc at Ret**  
Expected: 23.8 years  
Proposed: 24.5 years

Fewer retirements than expected, Back DROP is fully phased in.  
**Recommendation:** Update rates to reflect later retirements and longer service. No experience for post-2013 members – adjust these rates to reflect later retirement for them.



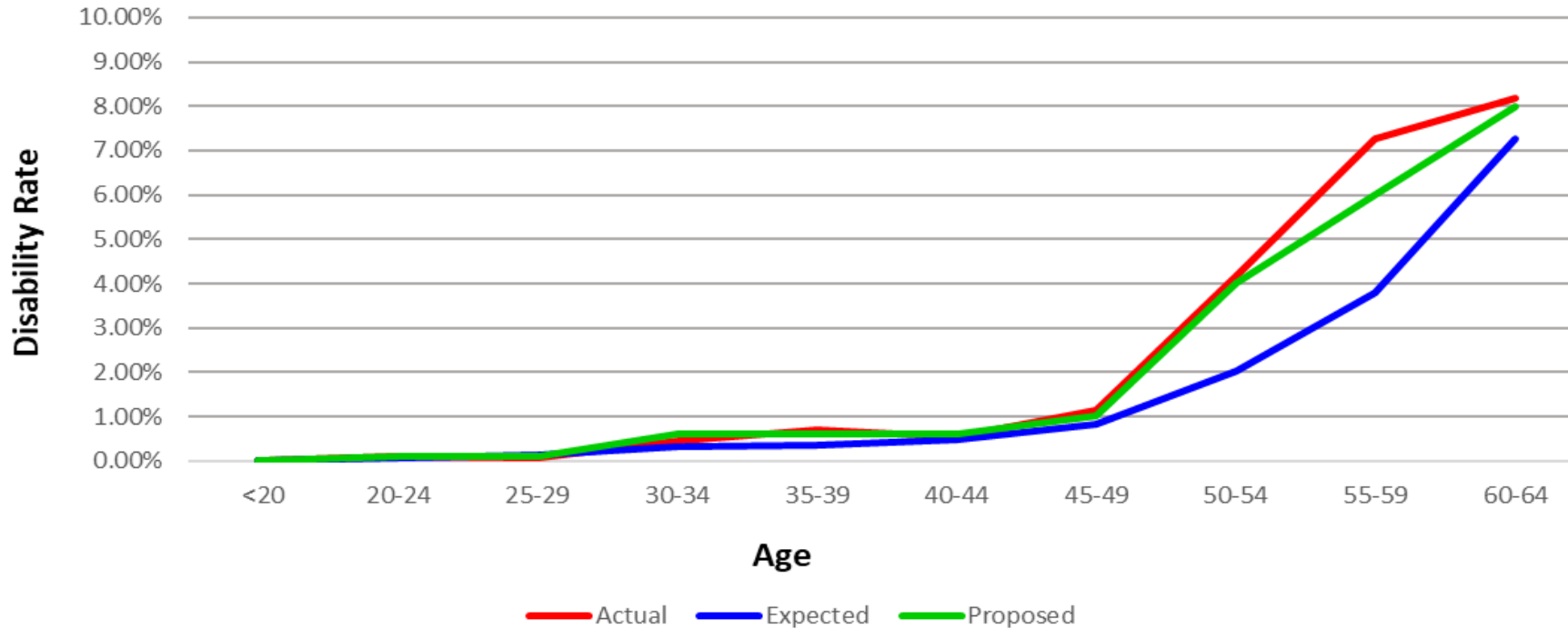
# Disability Assumption

- Current disability rates are based on a member's age and include both duty and non-duty related disability
- The following table summarizes the disability experience over the last five years:

Group	Exposures	Actual Disability	Expected Disability	Ratio of Actual to Expected
Paid	20,778	292	171	171%
Volunteer	41,149	32	73	44%

- Significantly more disability retirements for paid and significantly fewer disability retirements for volunteers
- Paid – 20% assumed to be non-duty and 80% assumed to be duty
- Volunteer – 33% assumed to be non-duty and 67% assumed to be duty

# Disability - Paid

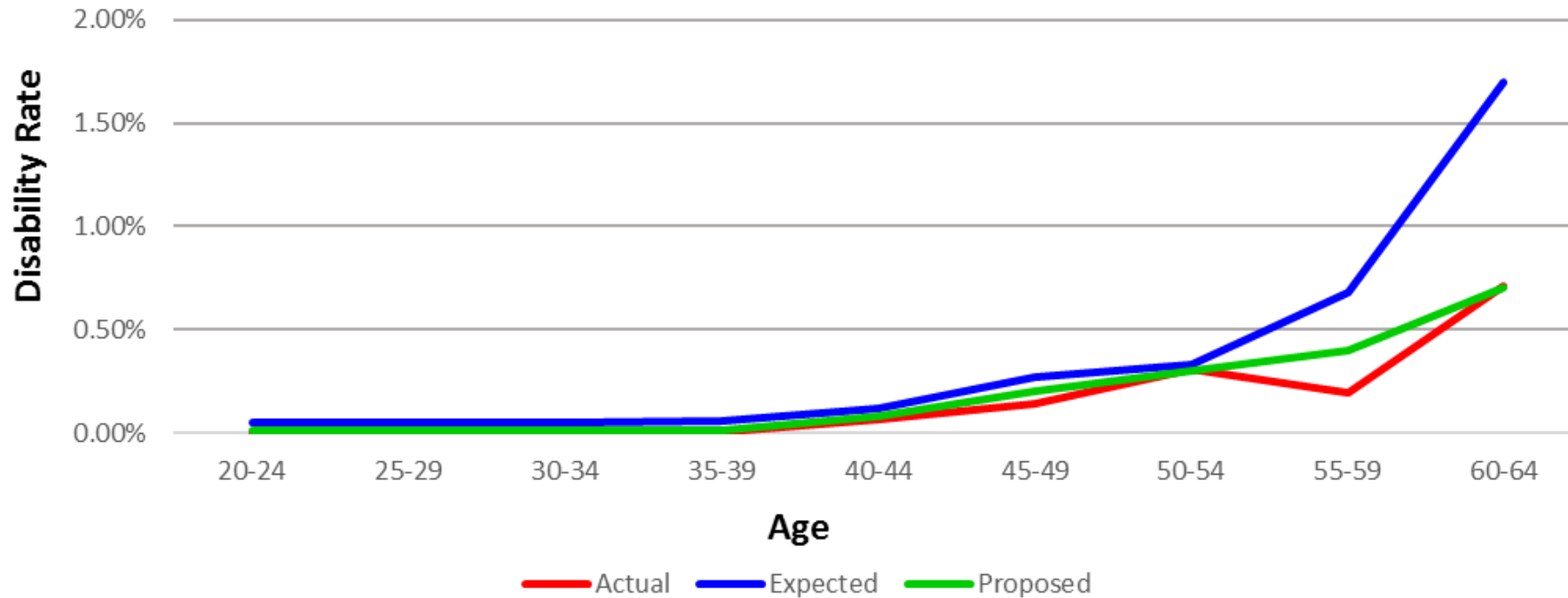


**Disability**  
Actual: 292  
Expected: 171  
Proposed: 273

**Proposed**  
Duty: 95%  
Non-Duty: 5%

More disabilities than expected.  
**Recommendation:** Update rates to reflect higher rate of disability. Adjust Duty/Non-Duty percentage based on recent experience and input from the System.

# Disability - Volunteer



**Disability**  
Actual: 32  
Expected: 73  
Proposed: 42

**Proposed**  
Duty: 60%  
Non-Duty: 40%

Fewer disabilities than expected.  
**Recommendation:** Update rates to reflect higher rate of disability. Adjust Duty/Non-Duty percentage based on recent experience and input from the System.

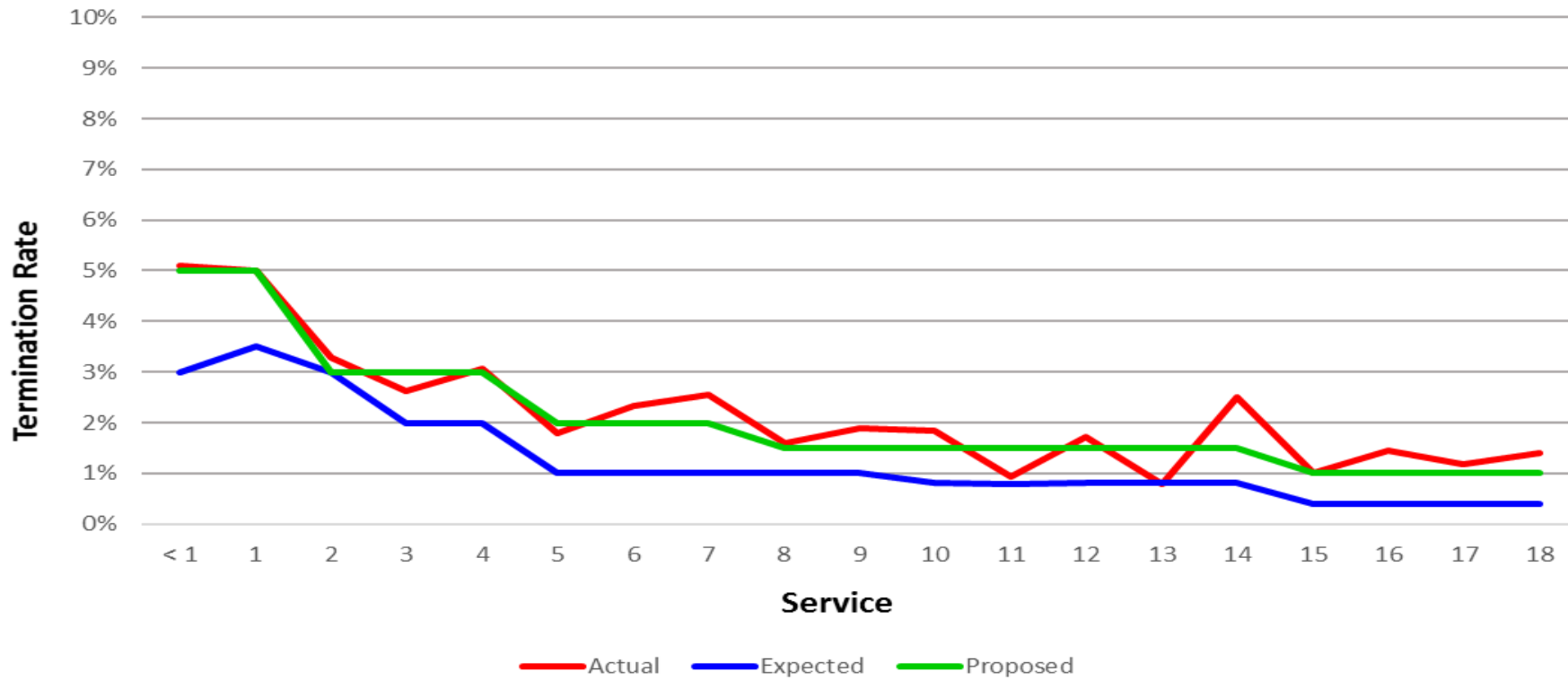
# Termination Assumption

- Current termination rates are based on a member's years of service
- The following table summarizes the termination experience over the last five years:

<b>Group</b>	<b>Exposures</b>	<b>Actual Terminations</b>	<b>Expected Terminations</b>	<b>Ratio of Actual to Expected</b>
Paid	16,463	405	220	184%
Volunteer	38,359	4,535	3,646	124%

- Significantly more terminations for both groups

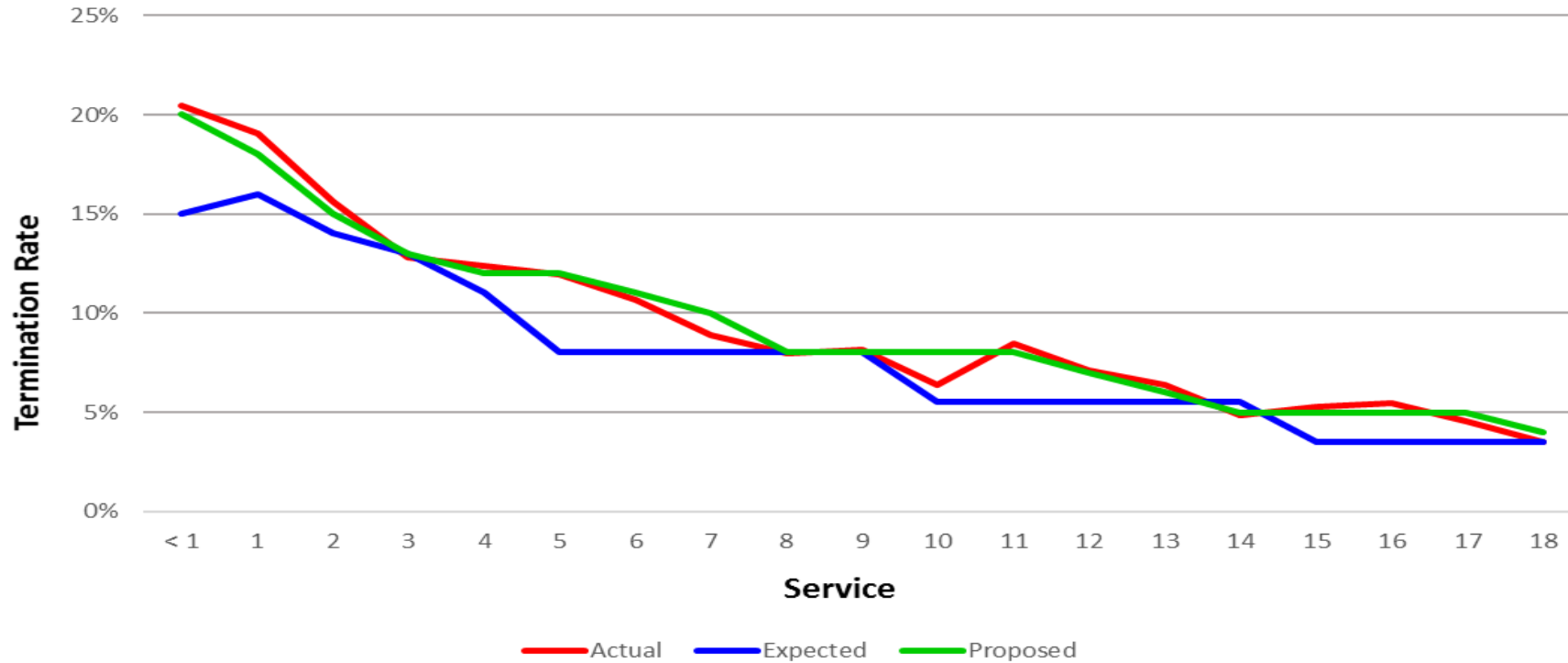
# Termination - Paid



**Terminations**  
Actual: 405  
Expected: 220  
Proposed: 350

More terminations than expected.  
**Recommendation:** Update rates to reflect higher rate of termination.

# Termination - Volunteer



**Terminations**  
Actual: 4,535  
Expected: 3,646  
Proposed: 4,262

More terminations than expected.  
**Recommendation:** Update rates to reflect higher rate of termination.

# Marriage Assumption

- Current assumption
  - 85% of firefighters are married at retirement
  - Males are 3 years older than females
- The retirement benefit is paid as an unreduced 100% Joint & Survivor annuity if the firefighter is married
- The assumption is used for future retirees as well as current retirees
- National averages indicate a higher percent married when an unreduced Joint & Survivor annuity is offered

**Recommendation:** Increase percent marriage assumption to 90%. No change to age difference assumption.

# Economic Assumptions

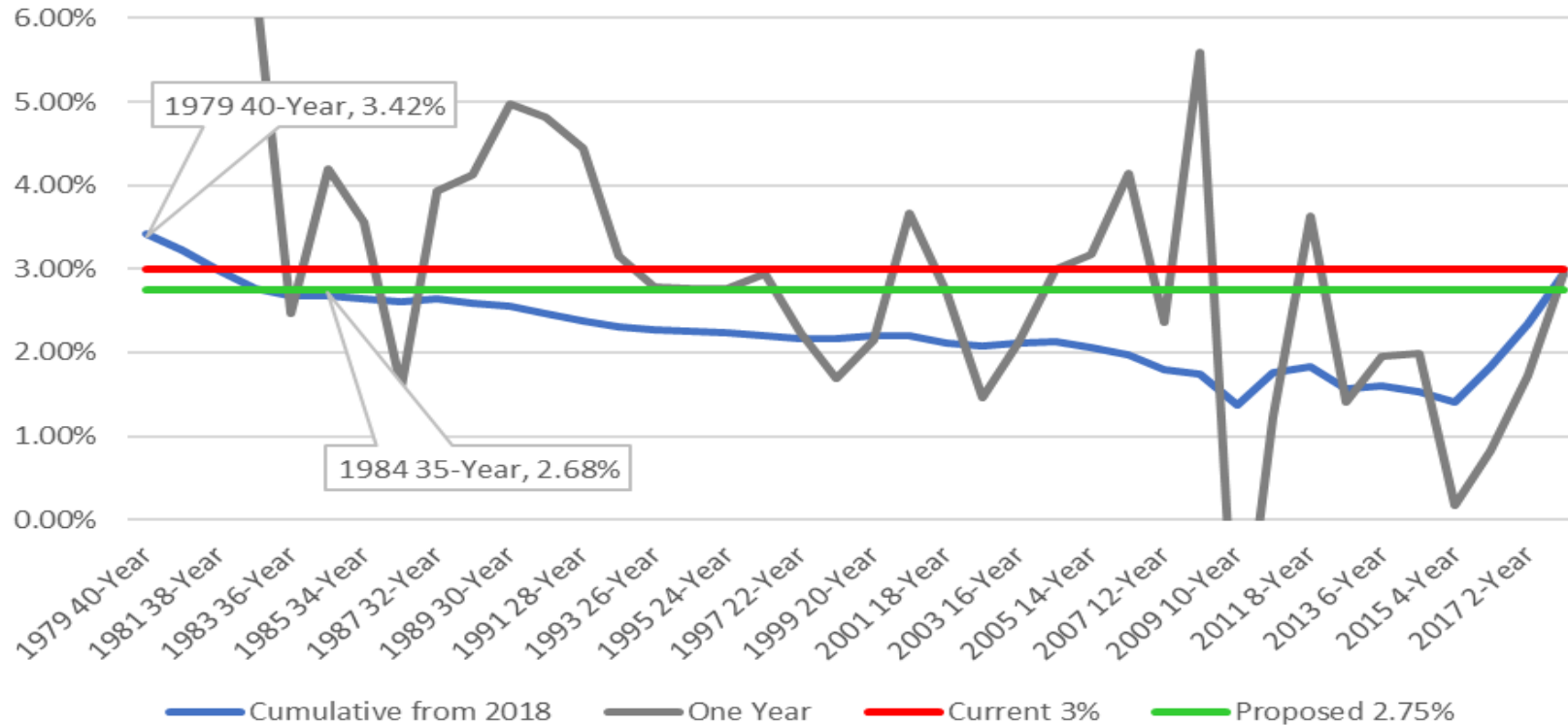
- Inflation
- Pay Increase
- Investment Return
- Reserve for DROP Crediting Rate
- COLA



# Inflation Assumption

- Impacts other economic assumptions
  - Investment Return
  - Pay increases
  - COLAs
- Current inflation environment is at an historic low
- Historical trend is important, but future inflation rate not necessarily tied to past results
- The average inflation rate assumed by state plans in the February 2019 National Association of State Retirement Administrators (NASRA) survey was 2.80% for fiscal year 2017 (most recent year available).
- Last year the one-year CPI-U rate was 2.95%, the cumulative 35-year rate was 2.68%, and the cumulative 40-year rate was 3.42%,
- The following graph shows the one-year and cumulative (to 2018) CPI-U rates for the past 40 years

# Inflation Assumption



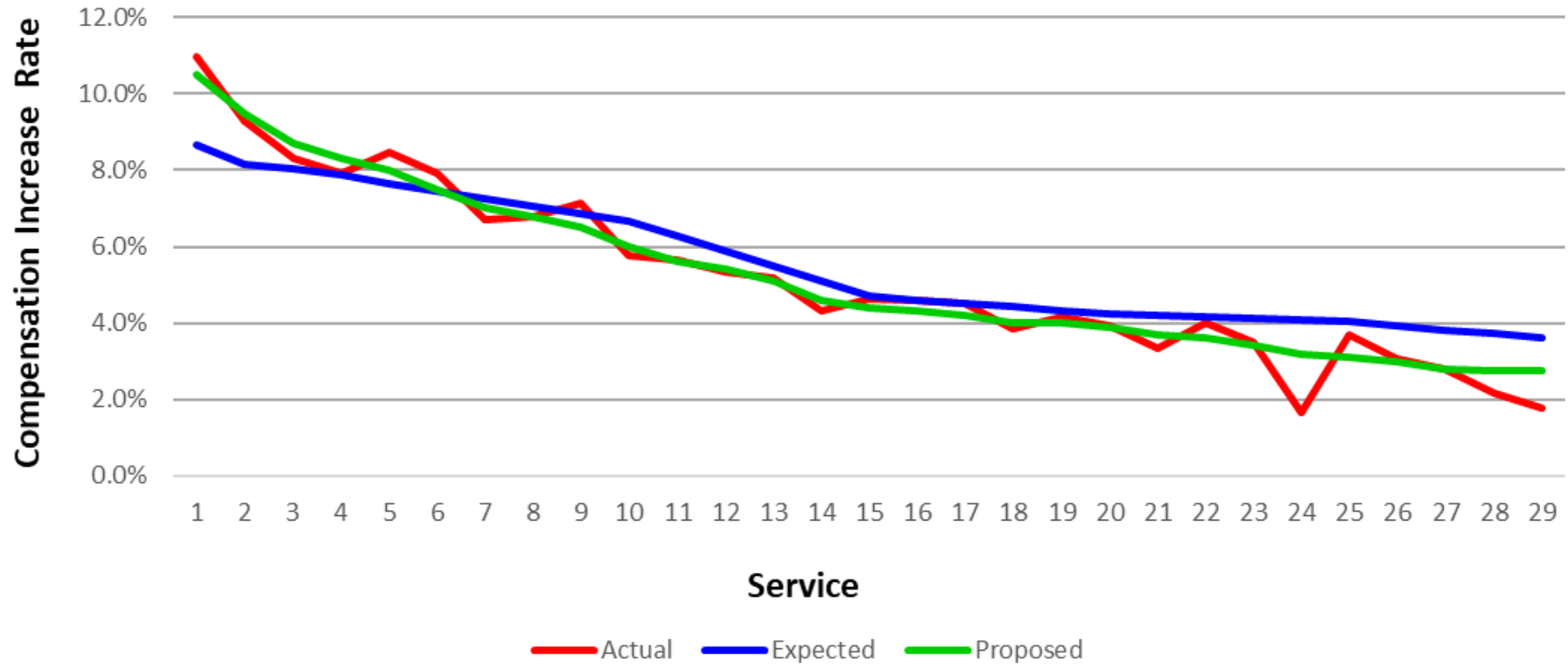
**OASDI Trustee Report  
Projection for 2016-2018**  
 Low Cost: 2.0%  
 Intermediate: 2.6%  
 High Cost: 3.2%

Cumulative 35-year rate about 2.7%, cumulative 40-year rate over 3.4%.  
**Recommendation:** Lower inflation assumption to 2.75%

# Pay Increase Assumption

- Current pay increase assumption is based on service with higher rates in the early years of employment that decreases to an ultimate rate of 3.5%
- Pay increases for:
  - Across the board increases
  - Merit
  - Longevity
  - Promotion
  - Inflation
- Actual year-to-year salary experience was studied for the five year period
- In general, actual pay increases were higher than assumed in the first few years of service and lower than assumed in the later years
- Increase in the later years have been below inflation

# Pay Increase Assumption



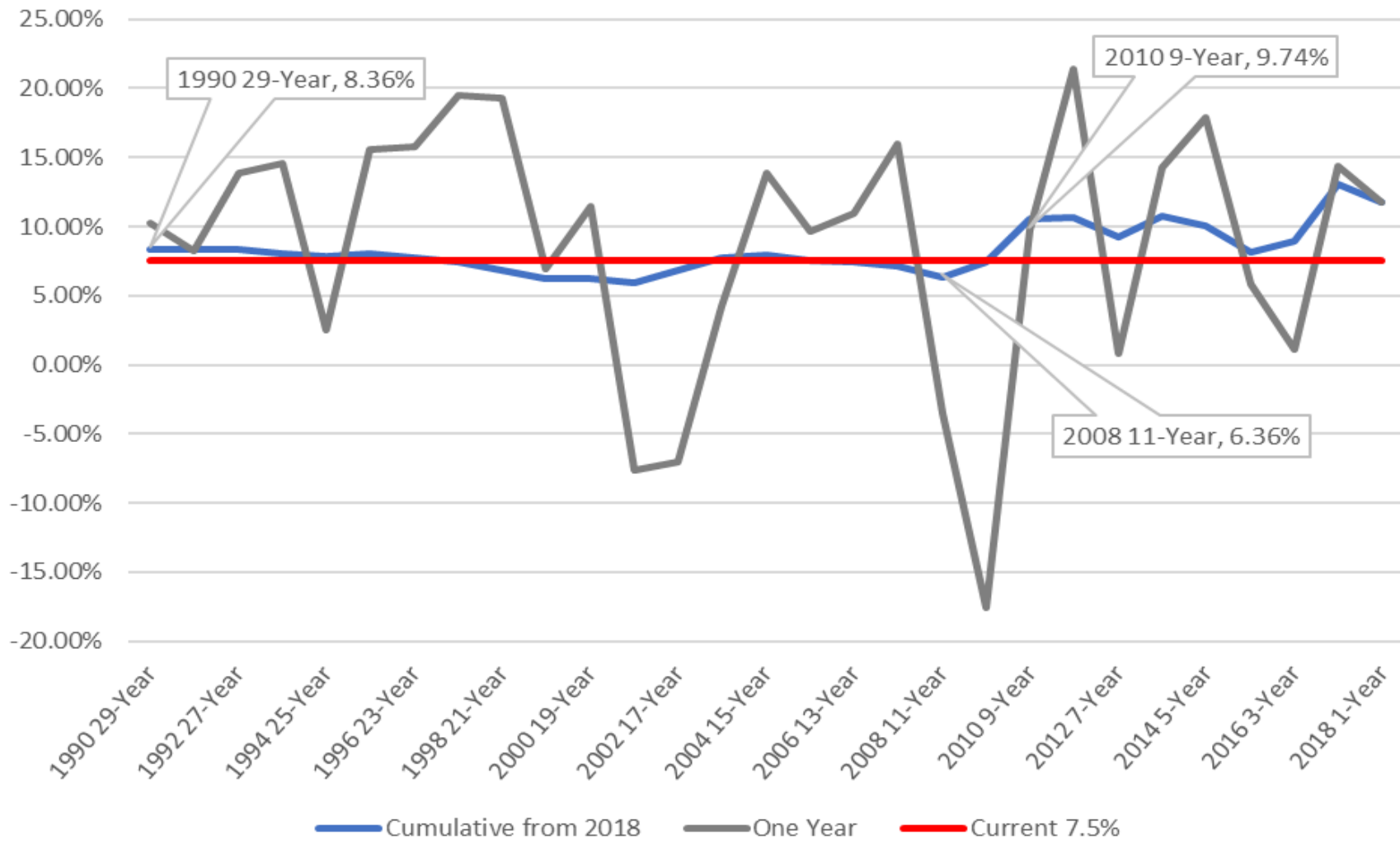
Raises assumed to be the inflation assumption of 2.75% after 28 years of service.

Higher increases than assumed in first few years, lower increases than assumed in later years.  
**Recommendation:** Adjust rates to reflect experience. Ultimate rate of 2.75% at 30 years.

# Investment Return Assumption

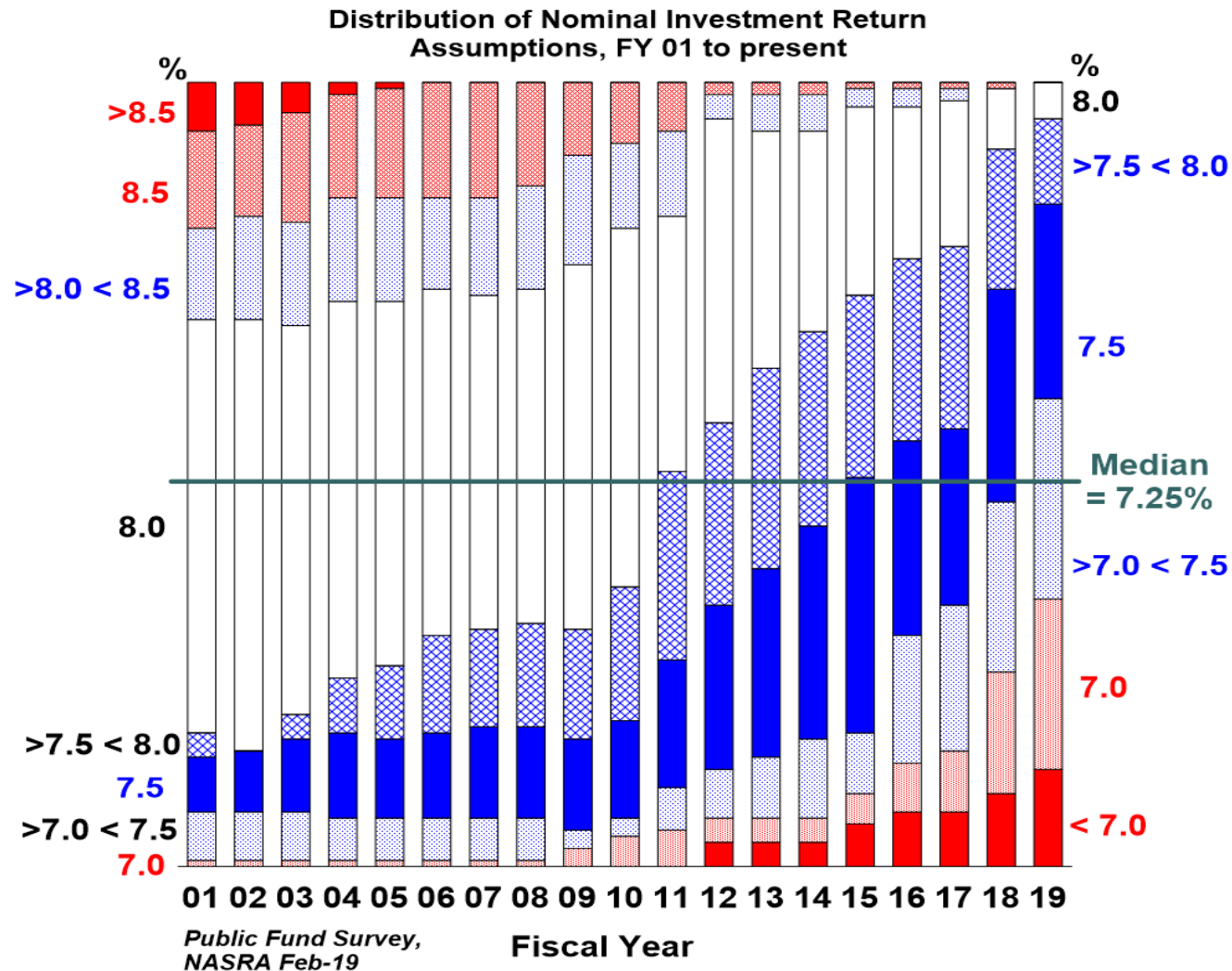
- Made up of two components:
  - Inflation
  - Real Investment Return
- A reasonable range is developed, then refined to a “best-estimate” specific point
- In developing the range and the assumption we consider:
  - The System’s asset allocation
  - Historical returns of the System’s major asset classes
  - Projected returns of the System’s major asset classes
  - Assumptions used by other large state plans
- The following graph shows the one-year and cumulative investment returns for the System for the past 29 years

# Investment Return Assumption – Historical Returns



The cumulative return from 2018 has been greater than the assumed return of 7.5% for 19 of the last 29 years

# Investment Return Assumption – Comparison to Peers



The median assumed return has decreased from 8.0% in FY01 and 7.5% in FY18 to 7.25% in FY19

**FY2019 Assumptions:**  
 22% of plans assume a 7.0% rate  
 26% use a rate > 7% and < 7.5%  
 25% of plans assume a 7.5% rate

# Investment Return Assumption – Asset Allocation

## J.P. Morgan Market Assumptions

Asset Class	Target	Projected Real Return*	Weighted Return
Domestic Equity	47%	6.25%	2.94%
International Equity	15%	4.00%	0.60%
Domestic Fixed Income	13%	2.50%	0.33%
Global Fixed Income	7%	2.75%	0.19%
Real Estate	10%	4.25%	0.43%
Other Assets**	8%	4.87%	0.39%
Total Real Return			4.88%
Inflation			2.75%
Total return			7.63%



# Investment Return Assumption – Asset Allocation AndCO Market Assumptions

Asset Class	Target	Projected Real Return*	Weighted Return
Domestic Equity	47%	7.50%	3.53%
International Equity	15%	8.50%	1.28%
Domestic Fixed Income	13%	2.50%	0.33%
Global Fixed Income	7%	3.50%	0.25%
Real Estate	10%	4.50%	0.45%
Other Assets**	8%	6.33%	0.51%
Total Real Return			6.33%
Inflation			2.75%
Total return			9.08%

# Investment Return Assumption

- Based on historical returns, 7.5% has been an appropriate assumption
- Based on the NASRA survey, 25% of state-wide plans that responded to the survey use a 7.5% assumption
  - At 26%, slightly more plans use a return between 7% and 7.5%
- Projected returns can vary significantly
  - Based on purpose of projections
  - Based on projected investment horizon (pension plan's are longer than most projections)
  - Based on underlying assumptions about future returns
  - Based on the model being used
- The System's investment policy, target asset allocation, performance history, and projected returns do not provide evidence for a significant change in the projected asset return

**Recommendation:** No proposed change to the assumption at this time. Continue to monitor investment environment for evidence of significant change in achievable returns.

# Reserve for DROP Crediting Rate

- DROP accounts credited with 2% below actual return for the System, with a minimum guarantee equal to the assumed asset return (currently 7.5%) while in Active DROP.
- After retirement:
  - Same rate for those hired before November 1, 2013
  - 1% below actual return with no guarantee for those hired November 1, 2013 and later
- DROP accounts subject to the guarantee are assumed to grow at 10.45% per year, a 2.95% spread over the assumed rate of 7.5%.
  - The accounts for current retirees are assumed to be withdrawn over an average of 10 years
  - The accounts for members assumed to enter DROP in the future are assumed to be withdrawn over an average of 20 years
- DROP accounts not subject to the guarantee are assumed to be withdrawn at retirement.

**Recommendation:** No proposed change to the assumption at this time.

# Cost of Living Increases

- Current COLA assumptions:
  - No COLA assumed for most members
  - Members who retired with 20 years of service prior to May 26, 1983 (“Baker” lawsuit) are assumed to receive an annual increase equal to inflation
- Oklahoma Pension Legislation Actuarial Analysis Act passed in 2011 requires that COLAs be funded at the time they are granted
- No COLAs granted since that legislation enacted
- A COLA was considered in 2019, but not granted
  - Will likely be seriously considered again next year

**Recommendation:** No proposed change to the assumption at this time, other than the update to inflation assumption. Monitor the legislature to see if they return to a pattern of granting unfunded COLAs on a regular basis. If so, will need to change COLA assumption.

# Methods

- Cost Method
- Asset Valuation Method

# Cost Method

- The System uses Entry Age Normal to calculate Accrued Liabilities and Normal Cost
  - The Normal Cost is a Level Percent of Pay for Paid Firefighters funding valuation
  - The Normal Cost is a Level Dollar amount for Volunteer Firefighters funding valuation
  - The Normal Cost is a Level Percent of Pay for Paid and Volunteer Firefighters GASB 67 and 68 valuations (required)
- Spreads the cost for benefits as a level percent of pay (or level dollar amount) from the date the member was hired, to the date the member is assumed to retire
- Extremely common method for public sector plans, and required for GASB 67 and 68 calculations

**Recommendation:** No proposed change to the method.

# Asset Valuation Method

- The System uses an asset smoothing method for the funding valuation
  - If the actual asset return is different from what the return would have been using the assumed rate of rate of return, a gain or loss is created
  - The gain or loss is recognized over 5 years
  - The smoothed asset value is constrained to 80% and 120% of the market value of assets
  - GASB 67 and 68 requires the use of the market value of assets
- The gain or loss is calculated by:
  - Projecting the prior year smoothed asset value at the assumed rate
  - Adding in any unrecognized gains or losses
  - Comparing to the current year market value of assets
- This method will produce small gains or losses even in years where the assumed return is earned

**Recommendation:** Update the method to project the prior year market value of assets at the assumed return and compare to the current year market value of assets to determine the gain or loss.

# Cost Impact of Proposed Changes



## Cost Impact

Had the proposed assumptions and methods been reflected for the July 1, 2018 actuarial valuation, the impact would have been

In million \$	Current	Proposed	Difference	% Change
Accrued Liability	\$3,845.6	\$3,821.9	(\$23.7)	-0.6%
Actuarial Value of Assets	\$2,619.2	\$2,619.2		
Funded Percentage	68.1%	68.5%	(0.6%)	
Unfunded Liability	\$1,226.4	\$1,202.7	(\$23.7)	
Amortization	\$104.7	\$102.7	(\$2.0)	-1.9%
Normal Cost	\$68.7	\$65.9	(\$2.8)	-4.1%
Budgeted Expenses	\$3.7	\$3.7		
Total Required Contribution	\$177.1	\$172.3	(\$4.8)	-2.7%

# Certification

Unless noted, the assumptions, methods, data, and plan provisions used in this presentation are the same as those provided in our July 1, 2018 actuarial valuation report for the System. There are additional minor assumptions used in the valuation that are not specifically noted in this presentation. There are no recommended changes for those assumptions.

The information contained in this report was prepared for the internal use of the Oklahoma Firefighters Pension and Retirement System and its associated advisors. As significantly different results from those contained in this presentation may be needed for other purposes, this report should not be distributed to any outside party without the express written consent of RHI.

As these results are based on a single set of assumptions, actual results could be materially different in the future if actual plan experience differs significantly from the underlying valuation basis. Differences could occur for a number of reasons such as plan experience differing from the underlying demographic and economic assumptions, or changes in the plan provisions other than those measured. Due to the limited scope of this presentation, an analysis of the potential range of such future measurements has not been performed.

The undersigned have met the “Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States” and are available to respond to any questions regarding the information contained in this report or to provide further details or explanations.

David Kent, FSA, EA, MAAA

Senior Consultant

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Solved.**