Ohio Public Employees Retirement System

5-Year Experience Study
January 1, 2016 Through December 31, 2020

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October 28, 2021

The Board of Trustees
Ohio Public Employees
Retirement System
Columbus, Ohio 43215

Dear Board Members,

The results of the 5-year ***investigation of experience*** of the Ohio Public Employees Retirement System (OPERS) are presented in this report. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities of OPERS.

The report presents specific recommendations with respect to non-economic assumptions and presents a range of potential choices for the economic assumptions. Non-economic activities (rates of turnover, retirement, etc.) tend to be generally stable and are subject to measurement by the actuary. Economic activities (inflation, investment return) tend to be unstable and are not really subject to direct measurement. We believe that the Board should select the economic assumptions from within ranges that the Board and the actuary deem reasonable.

This report should not be relied on for any purpose other than those described above. It was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The signing actuaries are independent of the plan sponsor.

The investigation was based upon the statistical data furnished for annual actuarial valuations, and upon supplemental information furnished by OPERS staff, concerning members who died, withdrew, became disabled or retired during the last 5 years, and on published economic historical data as well as future market expectations.

The investigation covered the 5-year period from ***January 1, 2016 through December 31, 2020***, and was carried out using generally accepted actuarial principles and techniques.

We believe that the proposed actuarial assumptions that are the result of this investigation represent a reasonable estimate of the future experience of OPERS based upon the data reviewed in the study and general trends among Public Employee Retirement Systems.

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Brian B. Murphy and Mita D. Drazilov are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,

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SECTION I

INTRODUCTION

Introduction

Each year as of December 31, the liabilities of the Ohio Public Employees Retirement System (OPERS) are valued. The purposes of the valuation are as follows:

- Measure the financial position of OPERS,
- Assist the Board in establishing employer and employee contribution rates subject to statutory limits,
- Assist the Board in establishing the employer rate allocation between pension and retiree health,
- Determine the number of years required to amortize the unfunded actuarial accrued liabilities based upon established contribution rates,
- Provide actuarial reporting and disclosure information for the System's financial report, and
- Analyze the experience of the System over the past year.

In order to perform the valuation, assumptions must be made regarding the future experience of the System with regard to the following risk areas:

Non-Economic Assumptions

- Rates of withdrawal among active members.
- Rates of disability among active members.
- Rates of retirement among active members.
- Rates of mortality among active members, retirants and beneficiaries.

Economic Assumptions

- Rates of investment return to be generated by the assets of the System.
- Rates of growth of total payroll.
- Patterns of merit & longevity pay increases to active members.
- Price inflation and underlying COLA increase assumption for certain retirees.
- Wage inflation

Introduction (Concluded)

Assumptions should be carefully chosen and continually monitored. Continued use of outdated assumptions can lead to:

- Understated measurements resulting in:
  - An overly optimistic representation of the amortization period required to amortize the unfunded actuarial accrued liability,
  - A misallocation of resources between the pension and retiree health plans,
  - Sharp increases in required contributions at some point in the future leading to a large burden on future taxpayers, and
  - In extreme cases, an inability to pay benefits when due and benefit reductions.

- Overstated measurements resulting in:
  - An overly pessimistic representation of the amortization period required to amortize the unfunded actuarial accrued liability,
  - A misallocation of resources between the pension and retiree health plans,
  - Benefit levels that are kept below the level that could be supported by the employer and member contribution rates, and
  - An unnecessarily large burden on the current generation of members, employers and taxpayers.

A single set of assumptions will not be suitable indefinitely. Things change, and our understanding of things (whether or not they are changing) also changes.

In recognition of this, the assumptions used to value the actuarial liabilities of OPERS are studied in depth every five years. The package of assumptions is then adjusted to reflect basic experience trends -- but not random year-to-year fluctuations. The last 5-year Experience Study was performed following the December 31, 2015 annual actuarial valuation.

The Actuary is generally responsible for recommending the primary demographic assumptions used in the actuarial valuation, making use of specialized training and experience. The Actuary and other professionals can provide guidance concerning the choice of the primary economic assumptions.

A sound procedure is that the actuary suggests reasonable alternatives for economic assumptions that are consistent with the Actuarial Standards of Practice, followed by discussion involving the Actuary, the Board, and sometimes other professionals. The Board then makes a final choice from the various reasonable alternatives presented.

SECTION II

DESCRIPTION OF THE EXPERIENCE STUDY

Description of the Experience Study

An important ingredient for the annual valuations is the census of current active members, deferred members and benefit recipients. Key items of interest include:

- Status
- Date of birth
- Date of departure (from active status)
- Reason for departure
- Credited service
- Annual pay

Six years of active member, deferred member and retiree data submissions were used for the Experience Study. From this data we determined which members left active service each year and the reason they left service (retirement, withdrawal, disability, etc.).

The tables and charts in this report show the "rate" of employment termination due to some cause. As an example, consider 100 members age 55 and eligible for normal retirement. If 30 of the members actually retire, the "rate of retirement" is 0.30 (30 divided by 100).

“Exposure” means the number of members who can potentially terminate membership within a given year, due to a particular cause. For example, for retirement, the exposure is the number of members eligible to retire in a given year (in the above example there were 100 exposures).

The OPERS active population consists of three Transition Groups: Group A, Group B and Group C. With the exception of retirement rates, all current actuarial assumptions are the same for each Transition Group. Given the limited amount of retirement experience for Transition Groups B and C, retirement experience was not separately analyzed by Transition Group. Actual proposed retirement rates by Transition Group are presented in Section X.

No mathematical credibility procedure was utilized in the selection of the proposed non-economic assumptions with the exception of post-retirement mortality. When actual experience is different from projected experience, we generally propose new actuarial assumptions which are between the present assumptions and the actual experience. In some circumstances, more weight is given to the experience that occurred during the investigation period, especially if this experience is consistent with that observed during the previous investigation period. There may be times when the actuary may propose new actuarial assumptions that are not reflective of recent past experience (e.g., if circumstances dictate that future experience is expected to deviate from the past experience due to a benefit change, economic or employment changes, etc.).

SECTION III

SUMMARY OF FINDINGS

Summary of Findings – Non-Economic Assumptions

Introduction

In general, the present assumptions provide a reasonable match to the experience of the past five years and recommended adjustments to assumptions are relatively minor. Tabular results are presented for the following divisions: State Males, State Females, Local Males, Local Females, Public Safety Males, Public Safety Females, Law Enforcement Males, and Law Enforcement Females. Comments on specific assumptions are provided on the following pages.

We have included a column in some of our tables entitled "experience rates weighted by liability". This represents the crude rate of decrement on a liability weighted basis as opposed to strictly a number count basis. For example, the liability weighted age based withdrawal rates were found to be more highly correlated with gains and losses in the pension program than with more common "population" weighted rates. This makes some intuitive sense, since termination decisions are often made based on how much the members have to gain or lose if they change jobs, whereas disability, for example, is typically not a decision at all, rather an event that happens to someone. For some decrements (e.g., post-retirement mortality), a proxy for liability weighting is benefit weighting.

Withdrawal Rates

A "withdrawal" or a quit is a separation from OPERS covered employment without entitlement to an immediate monthly benefit. For the withdrawal assumption analysis, data from calendar years 2018 (due to an inactive member status account update) and 2020 (due to Covid-19) was excluded.

The withdrawal assumption was analyzed based both on age and service. The use of a select (i.e., first 5 years of service) and ultimate (i.e., age based for service greater than 5 years) approach is still reasonable. In conjunction with the past couple of 5-year Experience Studies:

(1) Population weighted service based withdrawal rates are used for pension and health.
(2) Liability weighted age based withdrawal rates are used for pension.
(3) Population weighted age based withdrawal rates are used for health.

In general, liability weighted withdrawal experience matched reasonably well with assumed experience for age based pension rates for all divisions. Population weighted withdrawal experience also matched reasonably well with assumed experience for age based health rates and service based pension and health rates for all divisions. Therefore, no changes to either the service based or age based withdrawal rates are being recommended for any division.

Further detail for the withdrawal rates analysis may be found in Section V.

Summary of Findings – Non-Economic Assumptions (Continued)

Disability Rates

Significant changes were made to the disability benefit provisions as a result of the Alternate Plan Design (APD). Reductions in disability rates were made at the time of APD adoption and as a result of the last Experience Study. However, the number of disabilities continued to be significantly less than assumed over the 5-year period generating actuarial gains. Therefore, reductions in the disability rates are being recommended for all the divisions.

Further detail for the disability rates analysis may be found in Section VI.

Retirement Rates

The retirement assumption was analyzed both for normal (i.e., unreduced) and early (i.e., reduced) retirements. The differences between liability weighted results and population weighted results were more significant for unreduced retirement than for reduced retirement. Unreduced retirement was analyzed by both an age based basis (e.g., 65/5 for Group A, 66/5 for Group B and 67/5 for Group C) and a mostly service based basis (e.g., 30 and out for Group A, 55/31 or 32 and out for Group B and 55/32 for Group C).

The following provides a brief summary of the changes to retirement rates by division:

(1) Unreduced retirement rates
    a. Age based
        i. State and Local – Modest increase in rates
        ii. Public Safety – Modest decrease in rates
        iii. Law Enforcement – Modest decrease in rates at younger ages and modest increases at older ages
    b. Service based
        i. State and Local – Modest decrease in rates
(2) Reduced retirement rates
    a. All Divisions – Decrease in rates

Further detail for the retirement rates analysis may be found in Section VII.

Summary of Demographic Experience (Retirement, Withdrawal and Disability)

The following tables are summaries of the actual demographic (i.e., non-economic) experience during the Experience Study period for the State, Local Government, Public Safety and Law Enforcement divisions. In addition, expected results under both the current and proposed decrement rates are shown. The row showing expected results relates to the type of analysis that the proposed rates were ultimately based upon.

Summary of Findings – Non-Economic Assumptions (Continued)

A. State Division

Decrement Risk Area	Males			Females		
		Expected			Expected	
	Actual	Current	Proposed	Actual	Current	Proposed
Normal Retirement						
Age based						
Population Weighted	1,441			1,998		
Liability Weighted	1,575	1,394	1,439	2,208	1,751	1,990
Service based						
Population Weighted	2,450			2,498		
Liability Weighted	2,365	3,095	2,687	2,370	3,306	2,635
Early Retirement						
Population Weighted	951			1,347		
Liability Weighted	850	2,064	1,020	1,257	2,893	1,635
Withdrawal [1]						
First 5 years						
Population Weighted	24,109	23,649	23,649	29,199	29,129	29,129
After 5 years						
Population Weighted (Health Only)	2,498	1,992	1,992	3,755	3,006	3,006
Liability Weighted (Pension Only)	1,437	1,641	1,641	2,140	2,273	2,273
Disability						
Population Weighted	255	528	369	286	642	387

[1] *Covers the 2016, 2017 and 2019 calendar years.*

B. Local Government Division

Decrement Risk Area	Males			Females		
		Expected			Expected	
	Actual	Current	Proposed	Actual	Current	Proposed
Normal Retirement						
Age based						
Population Weighted	4,452			5,077		
Liability Weighted	6,085	4,569	5,764	6,143	4,531	5,522
Service based						
Population Weighted	3,790			3,863		
Liability Weighted	3,715	4,667	4,252	3,797	4,625	4,102
Early Retirement						
Population Weighted	2,118			3,177		
Liability Weighted	2,025	4,313	2,494	3,014	6,061	3,743
Withdrawal [1]						
First 5 years						
Population Weighted	26,715	26,576	26,576	30,942	30,982	30,982
After 5 years						
Population Weighted (Health Only)	4,745	3,839	3,839	7,085	5,674	5,674
Liability Weighted (Pension Only)	2,772	2,881	2,881	4,121	4,341	4,341
Disability						
Population Weighted	481	882	516	437	819	512

[1] *Covers the 2016, 2017 and 2019 calendar years.*

Summary of Findings – Non-Economic Assumptions (Continued)

C. Public Safety Division

Decrement Risk Area	Males			Females		
		Expected			Expected	
	Actual	Current	Proposed	Actual	Current	Proposed
Normal Retirement						
Age based						
Population Weighted	5			3		
Liability Weighted	6	4	3	2	1	-
Early Retirement						
Population Weighted	-			-		
Liability Weighted	-	-	-	-	-	-
Withdrawal [1]						
First 5 years						
Population Weighted	17	10	10	3	1	1
After 5 years						
Population Weighted (Health Only)	12	3	3	-	-	-
Liability Weighted (Pension Only)	8	3	3	-	-	-
Disability						
Population Weighted	1	-	-	-	-	-

[1] *Covers the 2016, 2017 and 2019 calendar years.*

D. Law Enforcement Division

Decrement Risk Area	Males			Females		
		Expected			Expected	
	Actual	Current	Proposed	Actual	Current	Proposed
Normal Retirement						
Age based						
Population Weighted	746			81		
Liability Weighted	700	958	833	72	107	94
Early Retirement						
Population Weighted	12			-		
Liability Weighted	12	42	21	-	4	2
Withdrawal [1]						
First 5 years						
Population Weighted	314	275	275	40	51	51
After 5 years						
Population Weighted (Health Only)	365	227	227	58	32	32
Liability Weighted (Pension Only)	245	227	227	49	32	32
Disability						
Population Weighted	127	186	143	23	40	23

[1] *Covers the 2016, 2017 and 2019 calendar years.*

Summary of Findings – Non-Economic Assumptions (Continued)

Mortality Rates

Post-retirement mortality is an important, but relatively stable ingredient in cost calculations. This assumption should reflect longevity improvements. Prior to the last 5-year Experience Study, post-retirement mortality rates included such margin by assuming rates lower than those actually observed (referred to as a static improvement assumption). Beginning with the last 5-year Experience Study, the proposed post-retirement mortality rates took a different approach and assumed that future mortality rates will continue to decline with each generation. (This was done for pre-retirement mortality rates also.) For this "generational" approach, we removed any static margin from the base tables and applied a mortality improvement scale to project mortality rates each year in the future. This means that next year's 65-year-old will have a slightly longer life expectancy than this year's, etc. We have continued this approach with this Experience Study.

OPERS experience was analyzed and the results of the analysis are presented in Section VIII. Unlike the other decrements, nationally published tables in combination with OPERS experience is generally considered. The Society of Actuaries (SOA) published new tables called the Pub-2010 tables in early 2019. As opposed to the RP-2014 mortality tables which are based upon private sector pension plan mortality experience, the Pub-2010 mortality tables are based upon public sector pension plan mortality experience. Therefore, our new proposed assumptions are based upon the Pub-2010 mortality tables.

Mortality Among Healthy Retirees: For post-retirement mortality, the PubG-2010 Retiree Mortality Table (i.e., General) male mortality rates and the PubS-2010 Retiree Mortality Table (i.e., Public Safety) male mortality rates are very similar. Therefore, we believe using a version of the PubG-2010 Retiree Mortality Tables for all divisions is reasonable and less administratively complex.

For healthy retirees, we use the limited fluctuation credibility procedure to determine the appropriate scaling factor of the base mortality tables (i.e., PubG-2010 Retiree Mortality Table) for each gender on a liability weighted basis. In each case, the Z-factor is computed based on the experience of the group (i.e., all divisions for OPERS) being studied. This Z-factor is a measure of the credibility of the pertinent group.

The Best Fit is the ratio of actual to expected deaths using the base table. The final scale is then determined as the weighted average of the Best Fit and 100% based on the Z-factor. In the case of OPERS post-retirement healthy mortality, the Z-factors for both the male and female members were 100%, suggesting that the data for these groups were fully credible in total. Based upon an analysis of the liability weighted experience rates at the age bands with higher exposure (i.e., 60 through 80), the Best Fit for these groups would be to scale the base PubG-2010 tables by approximately 115% for both males and females. Data from calendar year 2020 was excluded due to Covid-19. Approximately 10% more deaths than expected occurred during that calendar year.

Summary of Findings – Non-Economic Assumptions (Continued)

Presented below is a table that shows the results of our credibility analysis:

	Deaths Needed for Full Credibility	Observed Deaths	Z-Factor	Best Fit	Final Scale Factor
Healthy Male Retirees	2,261	10,316	100.00%	115%	115%
Healthy Female Retirees	2,337	9,451	100.00%	115%	115%

Mortality Among Disabled Retirees: Disabled mortality experience during the study period was not sufficient to be credible. We recommend adopting the PubNS-2010 Disabled Retiree Mortality Tables with a proposed table multiplier of 100%.

Mortality Among Active Members (Death-In-Service): Active mortality experience during the study period was not sufficient to be credible. However, based upon division experience and actuarial professional judgement, we recommend adopting 130% of the Pub-2010 General Employee Mortality tables for the State and Local Government divisions and 170% of the Pub-2010 Safety Employee Mortality tables for the Public Safety and Law Enforcement divisions.

Mortality Improvement Scale: The SOA also publishes annual mortality improvement scales referred to as MP improvement scales. We are proposing updating the mortality improvement scale from the currently used MP-2015 projection scale to the MP-2020 mortality improvement scale.

Further detail for the mortality rates analysis may be found in Section VIII.

Summary of Mortality Experience

The following table is a summary of the actual mortality experience during the Experience Study period for OPERS. In addition, expected results under both the current and proposed mortality rates are shown. The row showing expected results relates to the type of analysis that the proposed rates were ultimately based upon.

	Males			Females		
		Expected			Expected	
Decrement Risk Area	Actual	Current	Proposed	Actual	Current	Proposed
Pre-Retirement Mortality						
Population Weighted	1,015			570		
Liability Weighted	838	1,055	873	505	591	571
Post-Retirement Healthy Members						
Population Weighted	10,316			9,451		
Liability Weighted	9,661	10,067	9,576	9,136	9,212	9,075
Post-Retirement Disabled Members						
Population Weighted	1,273	1,808	1,461	1,419	1,290	1,244

Summary of Findings – Non-Economic Assumptions (Concluded)

The table below shows the life expectancy in years at sample ages by gender under the current and proposed assumptions for healthy retirees turning that sample age in calendar years 2020 and 2030:

Life Expectancy Determined by Age in Given Future Year								
	Current Mortality Assumptions				Proposed Mortality Assumptions			
	Year 2020		Year 2030		Year 2020		Year 2030	
Age	Male	Female	Male	Female	Male	Female	Male	Female
50	34.0	37.4	35.0	38.4	33.9	36.9	34.8	37.7
55	29.2	32.4	30.2	33.4	29.1	31.9	29.9	32.7
60	24.6	27.6	25.5	28.5	24.4	27.2	25.3	27.9
65	20.2	23.0	21.1	23.9	20.1	22.5	20.8	23.2
70	16.2	18.7	16.9	19.5	15.9	18.1	16.5	18.6
75	12.5	14.7	13.1	15.4	12.1	13.9	12.6	14.4
80	9.2	11.1	9.8	11.6	8.8	10.3	9.2	10.7

Economic Assumptions – Introduction

Economic assumptions include rates of investment return (net of investment expenses based upon a passive investment strategy; sometimes net of administrative expenses), price inflation, wage inflation (the across-the-board portion of salary increases), pay increases due to merit and seniority, payroll growth assumption, and the assumed annual Cost-of-Living Adjustment (COLA) increases in future years for affected retirees and beneficiaries. Unlike demographic activities, economic activities do not lend themselves to analysis solely on the basis of internal historical patterns because both salary increases and investment return are affected more by external forces; namely inflation (both wage and price), general productivity changes and the local economic environment which defy accurate long-term prediction. Estimates of economic activities are generally selected on the basis of the expectations in an inflation-free environment and then both long-term rates of investment return and wage inflation are increased by some provision for long-term price inflation.

If price inflation and/or productivity increases are lower than expected, it will probably result in both actual rates of salary increases and investment return below the assumed rates. Salaries increasing at rates less than expected produce lower liabilities. However, actual investment return below the assumed rate of investment return (whether due to manager performance, change in the mix of assets, or general market conditions) results in lower than expected asset amounts.

Sources considered in the analysis of the price inflation assumption included:

- Congressional Budget Office
- Philadelphia Federal Reserve quarterly survey of Society of Professional Forecasters
- Comparison of Treasury yields and Treasury Inflation Protected Securities (TIPS)
- Federal Reserve Bank of Cleveland inflation expectations

Sources considered in the analysis of the investment return assumption included:

- Future capital market expectations of twelve investment consultants that GRS monitors, including OPERS's investment consultant.

Sources considered in the analysis of the wage inflation, merit and seniority and payroll growth assumptions included:

- Actual OPERS experience over the last 5 years (i.e., merit and seniority pay increases)
- Historical observations of inflation statistics (both price and wage and the relationship between them) both nationally and for OPERS

Economic Assumptions – Introduction (Continued)

The current economic assumptions are presented below:

(1) Price Inflation – 2.50%
(2) Post-retirement cost of living allowance – 2.15%
(3) Investment Return (Pension) – 7.20%
    a. Net of investment expenses
(4) Investment Return (Retiree Health) – 6.00%
    a. Net of investment expenses
    b. The retiree health investment return assumption only affects the accounting valuation results
    c. For planning purposes in estimating the solvency period and the self-funding rate, a prescribed 4.00% assumption is used
(5) Wage Inflation – 3.25%
(6) Payroll growth assumption (for amortization purposes) – 3.25%
(7) Age based merit and seniority salary increase rates by division

Economic Assumptions – ASOP No. 27

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standard of Practice (ASOP) No. 27. The standard requires that the selected economic assumptions be consistent with each other. That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions. ASOP No. 27 (Doc. No. 197) adopted by the Actuarial Standards Board (ASB) in June 2020 defines a reasonable economic assumption as an assumption that has the following characteristics:

(a) It is appropriate for the purpose of the measurement;
(b) It reflects the actuary's professional judgment;
(c) It takes into account current and historical data that is relevant to selecting the assumption for the measurement date, to the extent such relevant data is reasonably available;
(d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data (if any), or a combination thereof; and
(e) It is expected to have no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included (as discussed in Section 3.5.1) or when alternative assumptions are used for the assessment of risk, in accordance with ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*.

Economic Assumptions – Price Inflation and COLA

Price inflation underlies both the wage inflation and investment return assumptions. Since price inflation underlies the wage inflation assumption and the investment return assumption, we recommend that a specific price inflation assumption be adopted in conjunction with this Experience Study.

The Congressional Budget Office provides an inflation expectation for the next 10 years. *The Budget and Economic Outlook: 2021 to 2031* report released in February 2021 indicates a 2.29% expectation.

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. Their 10-year inflation expectation from the second quarter of 2021 is for inflation to average 2.30%.

A comparison of nominal Treasury yields and TIPS provide an approximation for market price inflation expectations over various time horizons:

(1) 10-year expectation of 2.34% (August 27, 2021)
(2) 20-year expectation of 2.39% (July 2021)
(3) 30-year expectation of 2.23% (July 2021)

The Federal Reserve Bank of Cleveland inflation expectations as of June 1, 2021 are presented below:

(1) 10-year expectation of 1.60%
(2) 20-year expectation of 1.82%
(3) 30-year expectation of 2.00%

Based upon the reviewed data, we recommend a modest reduction in the price inflation assumption from 2.50% to 2.35%.

Based upon a price inflation assumption of 2.35% and a standard deviation of 1.50%, we performed a stochastic analysis of 500,000 trials of inflation results. Based upon the provision that affects certain retirees of COLA increases being the lesser of 3.00% or the increase in CPI, **we are recommending a COLA assumption of 2.05% be used to value this provision.** The COLA assumption does not affect the actual CPI indexed COLAs that affected OPERS' retirees receive. Actual COLAs are based upon actual experience.

Economic Assumptions – Investment Return (Introduction)

The pension investment return assumption is the actuarial assumption that has the largest effect on the pension actuarial valuation results. Since one of OPERS' fundamental financial objectives is the receipt of level contributions as a % of payroll over time to finance the additional benefits that members accrue, the discount rate assumption is based upon the investment return assumption.

The retiree health investment return assumption is of less significance since it only affects the accounting valuation results. The Board's retiree health funding policy is based upon a prescribed investment return assumption of 4.00%.

Factors in the determination of a reasonable investment return assumption include:

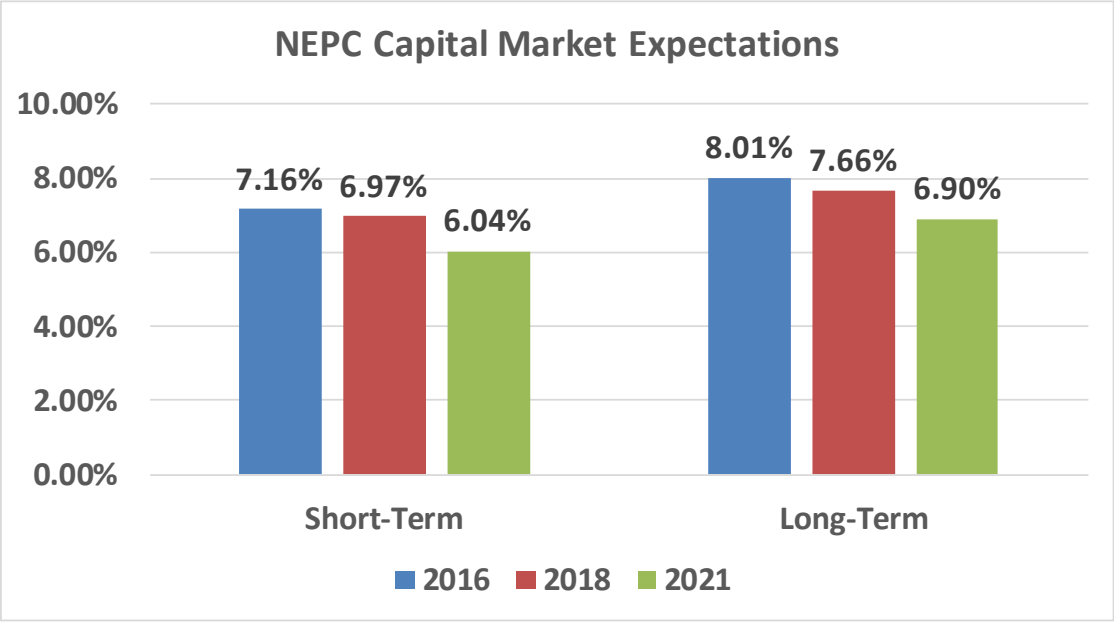
(1) System's asset allocation
(2) Forward-looking capital market expectations
    a. Capital market expectations of plan's investment consultant
    b. Capital market expectations of other investment consultants
(3) Differences between short-term (i.e., 10 years) and long-term (i.e., 20-30 years) expectations
(4) System's expected pattern of plan payments over time
(5) The use and implications of using a 1-year expected return versus using the median expected return

Economic Assumptions – Pension Investment Return

Presented below is OPERS' current target pension asset allocation:

Asset	DB Policy
Public Equity	**44%**
US Equity	21%
Non-US Equity	23%
Public Fixed Income	**25%**
Core Bonds	11%
US Treasury	3%
High Yield	2%
EM Debt	5%
Securitized Debt	1%
TIPS	3%
Total Alternatives	**26%**
Private Equity	12%
Real Estate	10%
Opportunistic	3%
Commodities	1%
Risk Parity	**5%**
Total	**100%**

Presented below are the short-term (i.e., 10 years) and long-term (i.e., 30 years) expected compound returns for the OPERS pension portfolio based upon the capital market expectations of the plan's investment consultant (i.e., NEPC). The results are based upon the target asset allocation and capital market expectations at the time of the analysis.



Economic Assumptions – Pension Investment Return (Continued)

Based upon OPERS' current target pension asset allocation, future return expectations of various investment consultants (including OPERS current investment consultant) were analyzed using the GRS Capital Market Assumptions Modeler (CMAM). Capital market expectations are already net of passive investment expenses. (A contribution for administrative expenses is included in the normal cost: 0.40% of payroll for Traditional pension and 1.00% of payroll for Combined pension.). Final expected nominal investment return results from the GRS CMAM are based upon a 2.35% price inflation assumption.

Presented below are the short-term (i.e., 10 years) and long-term (i.e., 20 to 30 years) expected returns for the OPERS pension portfolio based upon the capital market expectations of the investment consultants included in the GRS CMAM:

Summary of GRS 2021 CMAM Analysis - Pension	
10-Year Capital Market Expectations Average of 12 Investment Consultants	
1-Year Expected Return	6.68%
Standard Deviation of 1-Year Expected Return	12.73%
Short Term Expected Median Return (i.e., 50th Percentile)	5.93%
20 to 30 Year Capital Market Expectations Average of 6 Investment Consultants	
Long Term Expected Median Return (i.e., 50th Percentile)	7.01%

It should be noted that investment consultants' capital market expectations in 2021 are approximately on average 30 to 50 basis points less than any year since 2017.

One of the factors is selecting an appropriate pension investment return assumption is the expected pattern of pension benefits over time. It is true that OPERS is a long-term investor. However, OPERS has significant liability commitments coming due in the next 10 to 15 years. The total present value of all future pension benefits (PVFB) for the plan population as of December 31, 2020 is approximately $130 billion. Approximately 25% of that PVFB is associated with benefit payments in the first 5 years, 45% in the first 10 years and 61% in the first 15 years. Actual investment returns over the next 10 to 15 years are very important to OPERS. Based upon that observation, we tend to put more weight on the short-term expectations, but we do recognize the rationale for reflecting long-term expectations.

Economic Assumptions – Pension Investment Return (Concluded)

The preferred assumption in the actuarial community is the expected median return (i.e., 50th percentile) over a particular time horizon. Based on the average of the calendar year 2021 results for each of the investment consultants, this would lead to an investment return assumption of 5.93% (based upon short-term expectations) and 7.01% (based upon long-term expectations).

A less preferred and more aggressive assumption is the expected 1-year return. Based on the average of the calendar year 2021 results for each of the investment consultants, this would lead to an investment return assumption of 6.68%. Given that this selection method is less preferred, we would limit the use of this method to using the lesser of short-term and long-term expectations.

Based upon our analysis, we recommend that the Board lower the pension investment return assumption to 7.00% or lower. Selecting a 7.00% investment return assumption would essentially give full credibility to the calendar year 2021 long-term expectations. Our preferred pension investment return assumption is 6.50%. This is based upon giving more weight to the investment consultants' 10-year expectations, but giving some weight to longer 20- to 30-year expectations. It also gives recognition to the fact that calendar year 2021 expectations are significantly less than the expectations in recent past years.

In addition to showing the pension valuation results based a 7.00% and 6.50% pension investment return assumption, we have also shown results based upon a pension investment return assumption of 6.90% (at Staff's request) and 6.75%. Please note that all actuarial assumptions have to be reasonable at each valuation date. There is a greater chance that the investment return assumption would have to be revisited prior to the next Experience Study if it is selected near the upper end of the pension investment return assumptions we have presented for adoption.

Economic Assumptions – Health Investment Return

Presented below is OPERS' current target retiree health asset allocation:

Asset	HC Policy
Public Equity	**50%**
US Equity	25%
Non-US Equity	25%
Public Fixed Income	**34%**
Core Bonds	17%
US Treasury	2%
High Yield	4%
EM Debt	2%
Securitized Debt	2%
TIPS	7%
Total Alternatives	**14%**
REITS	7%
Opportunistic	3%
Commodities	4%
Risk Parity	**2%**
Total	**100%**

Based upon OPERS' current target retiree health asset allocation, future return expectations of various investment consultants (including OPERS current investment consultant) were analyzed using the GRS CMAM. Capital market expectations are already net of passive investment expenses. (A contribution for administrative expenses is included in the normal cost and the self-funding rate: 0.20% of payroll). Final expected nominal investment return results from the GRS CMAM are based upon a 2.35% price inflation assumption.

Economic Assumptions – Health Investment Return (Concluded)

Presented below are the short-term (i.e., 10 years) and long-term (i.e., 20 to 30 years) expected returns for the OPERS retiree health portfolio based upon the capital market expectations of the investment consultants included in the GRS CMAM:

Summary of GRS 2021 CMAM Analysis - Health	
10-Year Capital Market Expectations Average of 12 Investment Consultants	
1-Year Expected Return	5.72%
Standard Deviation of 1-Year Expected Return	11.19%
Short Term Expected Median Return (i.e., 50th Percentile)	5.13%
20 to 30 Year Capital Market Expectations Average of 6 Investment Consultants	
Long Term Expected Median Return (i.e., 50th Percentile)	6.14%

It should be noted that investment consultants' capital market expectations in 2021 are approximately on average 30 to 50 basis points less than any year since 2017.

Based upon our analysis, we recommend that the Board adopt a retiree health investment return assumption no higher than 6.00%. Selecting a 6.00% investment return assumption would essentially give full credibility to the calendar year 2021 long-term expectations. Our preferred retiree health investment return assumption is 5.50%. This is based upon giving more weight to the investment consultants' 10-year expectations, but giving some weight to longer 20- to 30-year expectations. It also gives recognition to the fact that calendar year 2021 expectations are significantly less than the expectations in recent past years.

Economic Assumptions – Wage Inflation and Payroll Growth

Wage Inflation. Wage inflation consists of two components, 1) a portion due to pure price inflation (i.e., increases due to changes in the CPI), and 2) increases in average salary levels in excess of pure price inflation (i.e., increases due to changes in productivity levels, supply and demand in the labor market and other macroeconomic factors). The table below shows the annual compound rate of average salary increase rate of OPERS members (working for approximately 3,700 employers) over various periods:

Period	Average Salary Increase Rate of OPERS Members
5 years ending December 31, 2005	3.5%
5 years ending December 31, 2010	2.1
5 years ending December 31, 2015	1.5
4 years* ending December 31, 2020	3.2

** Calendar year 2018 was excluded due to the inactive member account status update.*

We are generally comfortable with the wage inflation assumption exceeding the price inflation assumption by 0.25% to 1.00%. Based upon the recent actual experience of total wage inflation, and given current price inflation assumptions, we are generally trending towards the lower end of this range. Given our preferred price inflation assumption of 2.35%, our preferred assumption is for the wage inflation assumption to exceed the price inflation assumption by 0.40%. **This would result in a wage inflation assumption of 2.75%.** If all actuarial assumptions are met, and both the number of active members and their age and service characteristics remain relatively constant, it is expected that payroll growth will be the same as wage inflation. **Therefore, we recommend a payroll growth assumption of 2.75% for amortization purposes.**

Economic Assumptions – Merit and Seniority Pay Increases

Pay Increase Rates (portion related to the employee's age and seniority): Total pay increases for an individual consist of a portion due to wage inflation and a portion due to an individual's on the job performance (i.e., merit and seniority). The merit and seniority portion of the pay increase assumption was analyzed over the Experience Study period. The current age based structure of the assumption was deemed appropriate based upon the analysis. Minor increases are being recommended based upon the experience of the last 5 years. In combination with the wage inflation assumption reduction, a member's total salary increase assumption was not increased.

Economic Assumptions - Merit and Seniority Pay Increases (Continued)

STATE

Age Group Beginning of Year	Number	Merit/Seniority % Increase		
			Sample Values*	
		Actual	Current	Proposed
Under 25	47,272	13.43 %	5.00 %	5.50 %
25-29	41,620	6.11 %	4.40 %	4.90 %
30-34	44,984	4.14 %	2.70 %	3.20 %
35-39	44,204	3.07 %	2.20 %	2.70 %
40-44	43,740	2.48 %	1.70 %	2.10 %
45-49	53,093	1.81 %	1.10 %	1.40 %
50-54	56,170	1.23 %	0.80 %	0.90 %
55-59	50,643	0.77 %	0.60 %	0.60 %
60-64	32,378	0.38 %	0.30 %	0.30 %
65 & Over	13,450	0.07 %	0.00 %	0.00 %
Total	427,554			

** Sample values are selected from mid-point of age group.*

LOCAL

Age Group Beginning of Year	Number	Merit/Seniority % Increase		
			Sample Values*	
		Actual	Current	Proposed
Under 25	52,327	12.15 %	5.00 %	5.50 %
25-29	57,410	6.94 %	4.40 %	4.90 %
30-34	67,454	4.02 %	2.70 %	3.20 %
35-39	75,869	2.83 %	2.10 %	2.50 %
40-44	83,278	2.11 %	1.55 %	1.90 %
45-49	103,775	1.46 %	1.10 %	1.40 %
50-54	110,553	0.93 %	0.80 %	0.90 %
55-59	109,472	0.49 %	0.60 %	0.60 %
60-64	80,044	0.11 %	0.30 %	0.30 %
65 & Over	52,625	(0.13)%	0.00 %	0.00 %
Total	792,807			

** Sample values are selected from mid-point of age group.*

Economic Assumptions - Merit and Seniority Pay Increases (Concluded)

PUBLIC SAFETY

Age Group Beginning of Year	Number	Merit/Seniority % Increase		
			Sample Values*	
		Actual	Current	Proposed
Under 25	17	6.94 %	7.50 %	8.00 %
25-29	34	0.98 %	5.50 %	6.00 %
30-34	46	2.17 %	2.50 %	3.00 %
35-39	35	1.01 %	1.70 %	1.70 %
40-44	50	(1.06)%	1.30 %	1.30 %
45-49	38	0.02 %	1.00 %	0.80 %
50-54	22	1.01 %	0.90 %	0.70 %
55-59	23	(0.11)%	0.40 %	0.40 %
60-64	17	(0.23)%	0.40 %	0.40 %
65 & Over	9	1.77 %	0.00 %	0.00 %
Total	291			

** Sample values are selected from mid-point of age group.*

LAW ENFORCEMENT

Age Group Beginning of Year	Number	Merit/Seniority % Increase		
			Sample Values*	
		Actual	Current	Proposed
Under 25	995	16.59 %	7.50 %	8.00 %
25-29	4,101	7.64 %	5.50 %	6.00 %
30-34	4,975	4.04 %	2.50 %	3.00 %
35-39	5,522	1.72 %	1.70 %	1.70 %
40-44	6,893	1.26 %	1.30 %	1.30 %
45-49	7,998	0.72 %	1.00 %	0.80 %
50-54	4,056	0.68 %	0.90 %	0.70 %
55-59	1,820	0.46 %	0.40 %	0.40 %
60-64	765	0.32 %	0.40 %	0.40 %
65 & Over	205	0.23 %	0.00 %	0.00 %
Total	37,330			

** Sample values are selected from mid-point of age group.*

SECTION IV

EFFECT ON PENSION AND RETIREE HEALTH RESULTS

Description of Results

Presented on IV-2 are the December 31, 2020 actuarial valuation results of defined benefit allowances for the Traditional, Combined and Member Directed Plans. Results are based on the proposed demographic assumptions, proposed merit and seniority increases, and four sets of proposed alternate economic assumptions:

- Investment Return / Wage Inflation / Price Inflation / Cost-of-Living Adjustment
- Alternate 1 – 7.00% / 2.75% / 2.35% / 2.05%
- Alternate 2 – 6.90% / 2.75% / 2.35% / 2.05%
- Alternate 3 – 6.75% / 2.75% / 2.35% / 2.05%
- Alternate 4 – 6.50% / 2.75% / 2.35% / 2.05%

The computed unfunded actuarial accrued liability and years to amortize the unfunded actuarial accrued liability are shown both based upon a funding value basis and a market value basis.

Presented on IV-3 are the December 31, 2020 actuarial valuation results of Retiree Health Benefits. Results are based on the proposed demographic assumptions, proposed merit and seniority increases, and two sets of proposed alternate economic assumptions:

- Investment Return / Wage Inflation / Price Inflation
- Alternate 1 – 6.00% / 2.75% / 2.35%
- Alternate 2 – 5.50% / 2.75% / 2.35%

The computed unfunded actuarial accrued liability is shown both based upon a funding value basis and a market value basis.

Effect on Pension Valuation Results as of December 31, 2020

	12/31/2020 Valuation	Alternate Scenarios (1)	(2)	(3)	(4)
Demographic Assumptions	**Current**	**Proposed**	**Proposed**	**Proposed**	**Proposed**
Merit & Seniority Increase Assumptions	**Current**	**Proposed**	**Proposed**	**Proposed**	**Proposed**
Pension Investment Return Assumption	**7.20%**	**7.00%**	**6.90%**	**6.75%**	**6.50%**
Wage Inflation Assumption	**3.25%**	**2.75%**	**2.75%**	**2.75%**	**2.75%**
Price Inflation Assumption	**2.50%**	**2.35%**	**2.35%**	**2.35%**	**2.35%**
Cost-of-Living Adjustment (COLA) Assumption	**2.15%**	**2.05%**	**2.05%**	**2.05%**	**2.05%**
Defined Benefit Actuarial Results					
Normal Cost as a % of Payroll	14.50%	14.12%	14.41%	14.83%	15.59%
Actuarial Accrued Liability (AAL)					
Active	$ 38,557	$ 38,671	$ 39,297	$ 40,262	$ 41,941
Deferred/Inactive	2,997	3,104	3,128	3,165	3,232
Retired	71,818	72,204	72,817	73,753	75,364
Total	$ 113,372	$ 113,978	$ 115,241	$ 117,181	$ 120,536
Funding Value (FV) of Assets	$ 93,969	$ 93,969	$ 93,969	$ 93,969	$ 93,969
Market Value (MV) of Assets	$ 98,853	$ 98,853	$ 98,853	$ 98,853	$ 98,853
Unfunded AAL (UAAL) - FV Basis	$ 19,402	$ 20,009	$ 21,272	$ 23,212	$ 26,567
Unfunded AAL (UAAL) - MV Basis	$ 14,519	$ 15,125	$ 16,389	$ 18,328	$ 21,683
Amortization Years to Fully Amortize UAAL (FV Basis)	**18**	**18**	**21**	**26**	**37**
Amortization Years if Reset Funding Value to Market Value	**12**	**12**	**14**	**17**	**25**

Effect on Retiree Health Valuation Results as of December 31, 2020

	12/31/2020 Valuation	Alternate Scenarios (1)	Alternate Scenarios (2)
Demographic Assumptions	**Current**	**Proposed**	**Proposed**
Merit & Seniority Increase Assumptions	**Current**	**Proposed**	**Proposed**
Retiree Health Investment Return Assumption	**6.00%**	**6.00%**	**5.50%**
Wage Inflation Assumption	**3.25%**	**2.75%**	**2.75%**
Price Inflation Assumption	**2.50%**	**2.35%**	**2.35%**
Retiree Health Actuarial Results			
Normal Cost as a % of Payroll	1.30%	1.35%	1.51%
Actuarial Accrued Liability (AAL)			
Active	$ 4,176	$ 4,055	$ 4,398
Deferred/Inactive	107	93	102
Retired	7,131	7,067	7,323
Total	$ 11,414	$ 11,215	$ 11,823
Funding Value (FV) of Assets	$ 12,386	$ 12,386	$ 12,386
Market Value (MV) of Assets	$ 13,227	$ 13,227	$ 13,227
Unfunded AAL (UAAL) - FV Basis	$ (972)	$ (1,171)	$ (563)
Unfunded AAL (UAAL) - MV Basis	$ (1,813)	$ (2,012)	$ (1,404)
Solvency Period from December 31, 2020*	**25 years**	**25 years**	**25 years**
Self Funding Rate*	**2.1%**	**2.2%**	**2.2%**

** Based upon 4.00% Investment Return Assumption.*

SECTION V

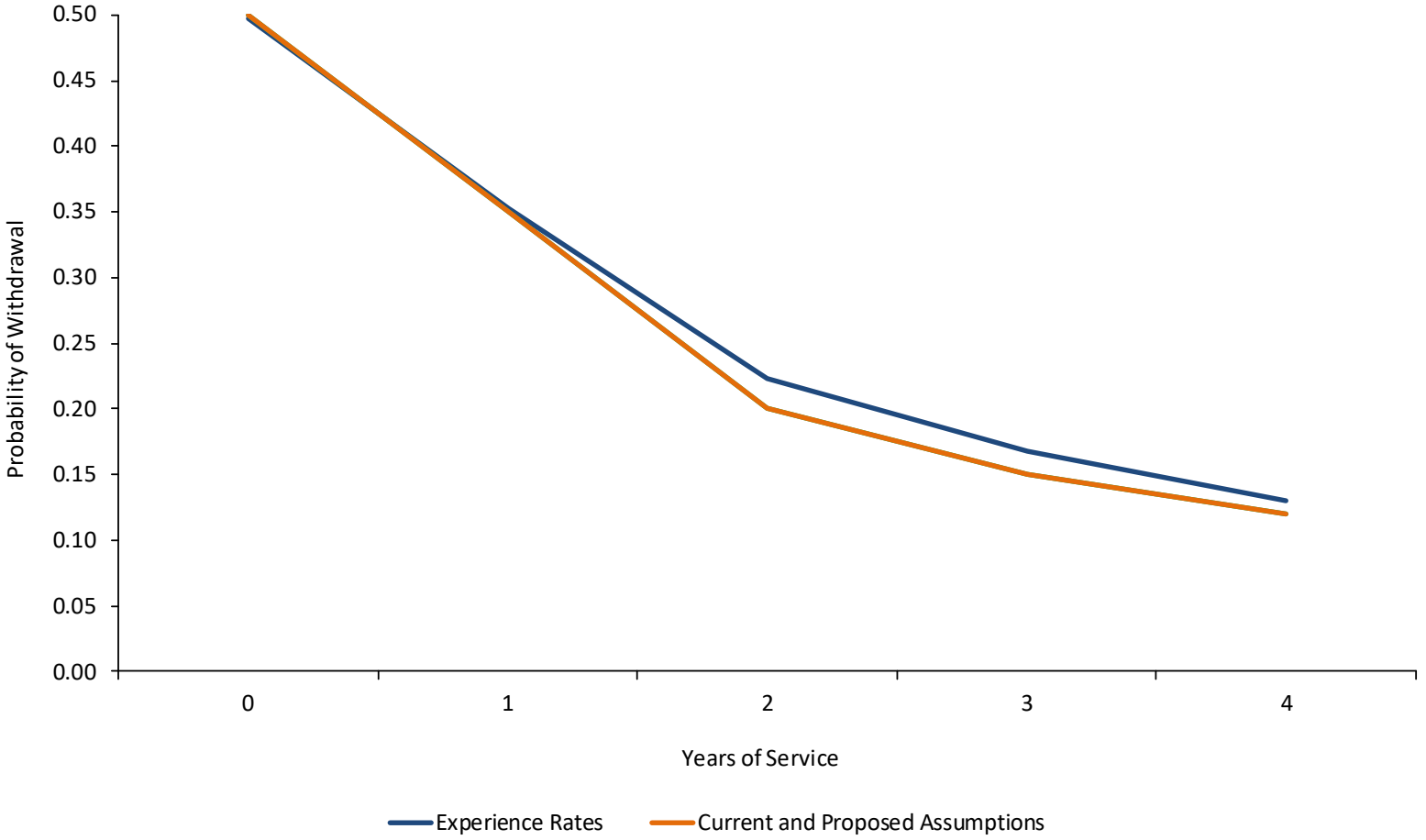
DETAILED RESULTS – WITHDRAWAL EXPERIENCE

Service Based Withdrawal (Years of Service Less Than 5) Experience
STATE Male Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	12,086	24,274	0.4979	0.5000	0.5000	12,137	12,137
1	7,575	21,445	0.3532	0.3500	0.3500	7,506	7,506
2	2,398	10,721	0.2237	0.2000	0.2000	2,144	2,144
3	1,263	7,551	0.1673	0.1500	0.1500	1,133	1,133
4	787	6,071	0.1296	0.1200	0.1200	729	729
Totals	24,109	70,062	0.3441	0.3375	0.3375	23,649	23,649
			Ref	1034	1034		

2011-2015 Experience Study	0.3631
2006-2010 Experience Study	0.3083
2001-2005 Experience Study	0.2852

Service Based Withdrawal (Years of Service Less Than 5) Experience
STATE Male Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
STATE Male Members
2016, 2017 & 2019

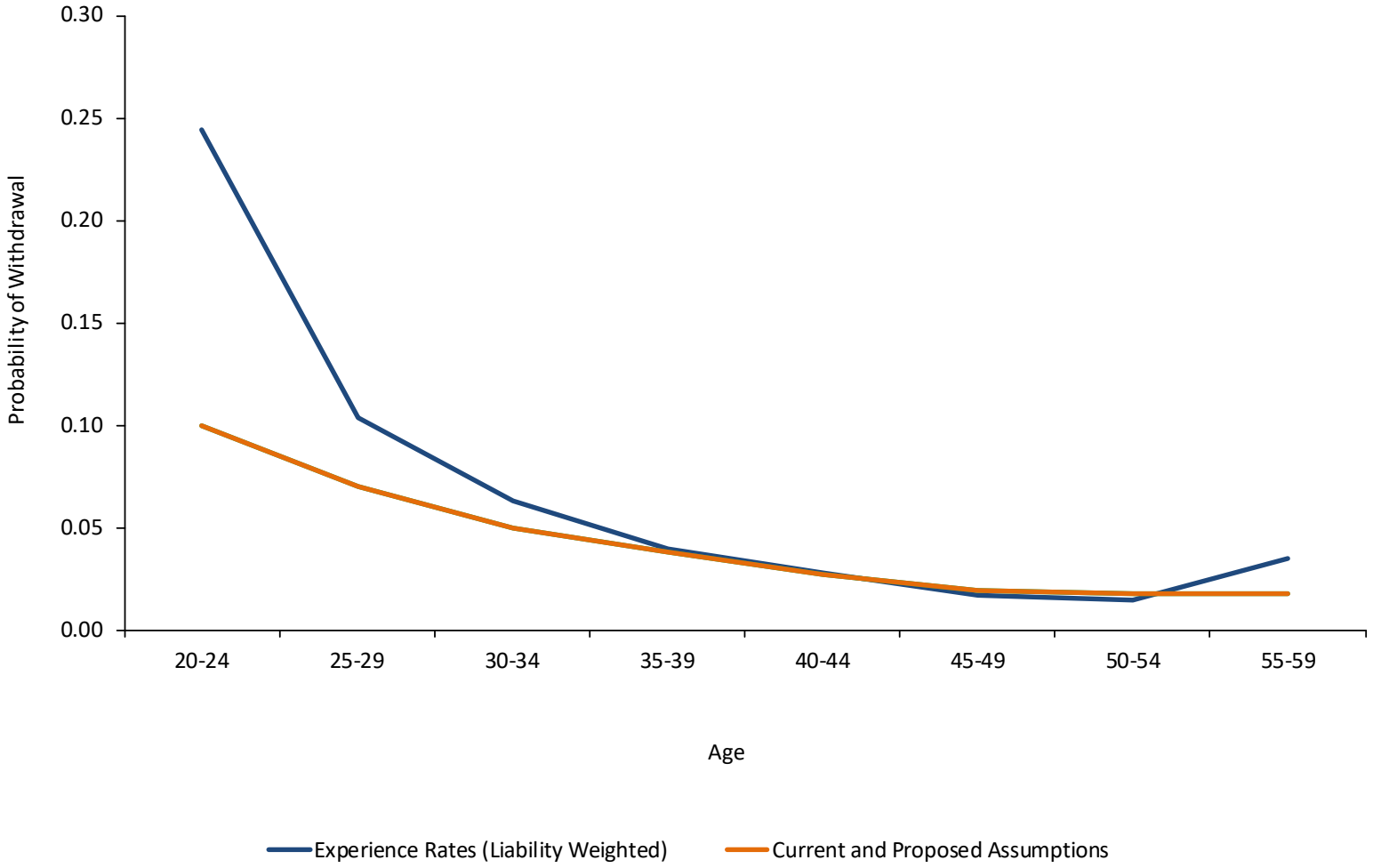
Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.1200	0.1000	0.1200	0.1000	-	-	-	-
20-24	28	90	0.3111	0.2444	0.1200	0.1000	0.1200	0.1000	9	8	9	8
25-29	256	2,040	0.1255	0.1037	0.0780	0.0700	0.0780	0.0700	154	137	154	137
30-34	480	6,141	0.0782	0.0628	0.0580	0.0500	0.0580	0.0500	357	309	357	309
35-39	436	8,284	0.0526	0.0396	0.0440	0.0380	0.0440	0.0380	366	315	366	315
40-44	364	9,284	0.0392	0.0277	0.0330	0.0270	0.0330	0.0270	309	253	309	253
45-49	371	12,567	0.0295	0.0168	0.0250	0.0190	0.0250	0.0190	322	248	322	248
50-54	303	12,925	0.0234	0.0145	0.0230	0.0180	0.0230	0.0180	300	234	300	234
55-59	260	7,599	0.0342	0.0348	0.0230	0.0180	0.0230	0.0180	175	137	175	137
Totals	2,498	58,930	0.0424	0.0244	0.0338	0.0278	0.0338	0.0278	1,992	1,641	1,992	1,641
				Ref	1386	1387	1386	1387				
Liability Weighted	1,437											

2011-2015 Experience Study	0.0423	0.0250
2006-2010 Experience Study	0.0301	0.0216
2001-2005 Experience Study	0.0301	N/A

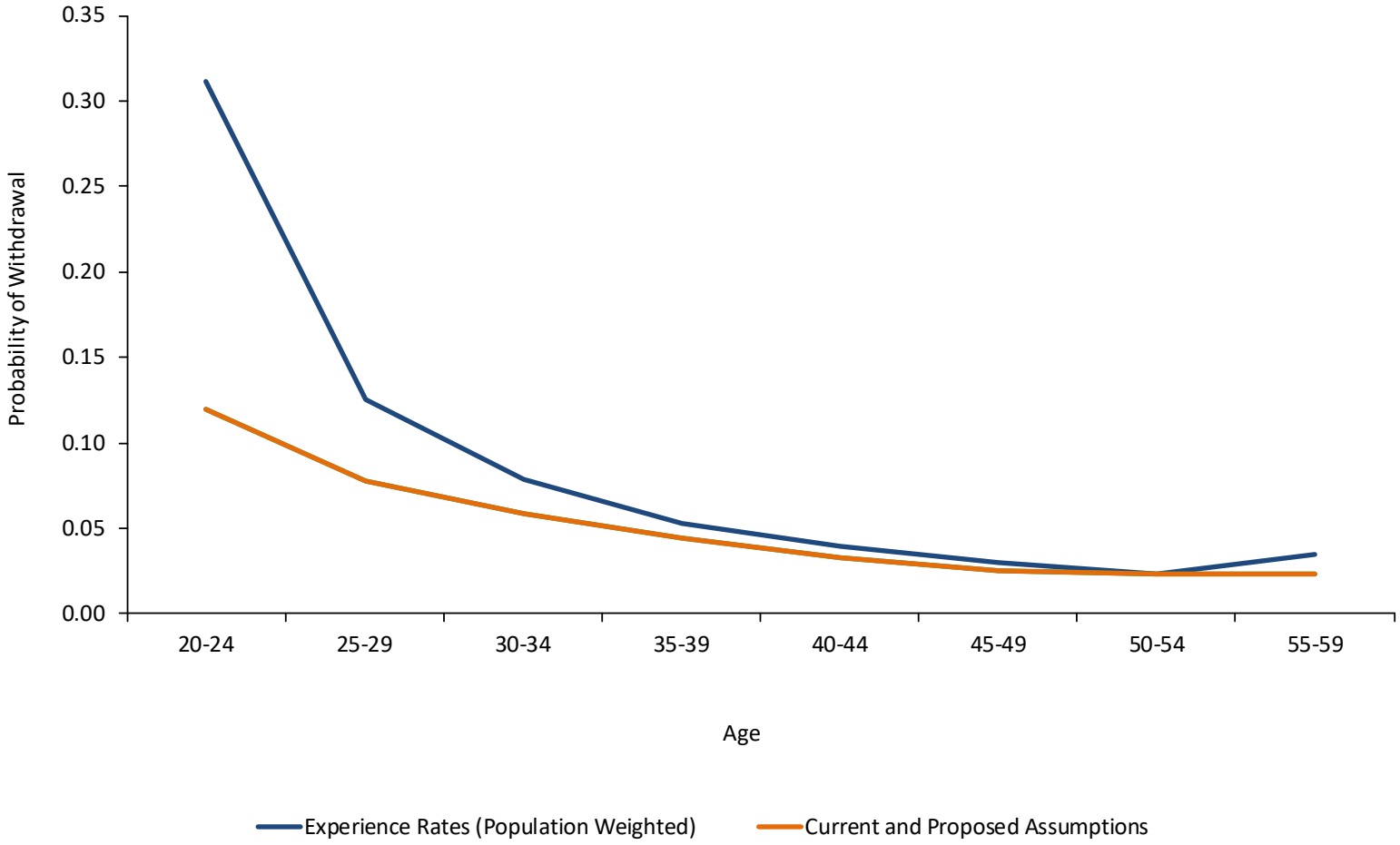
** Sample rates are taken from the midpoint of age group.*

148 members not shown in the above chart withdrew from service with no pension benefit at age 60 or older.

Age Based Withdrawal (Years of Service 5 and Up) Experience
STATE Male Members (Liability Weighted)
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
STATE Male Members (Population Weighted)
2016, 2017 & 2019

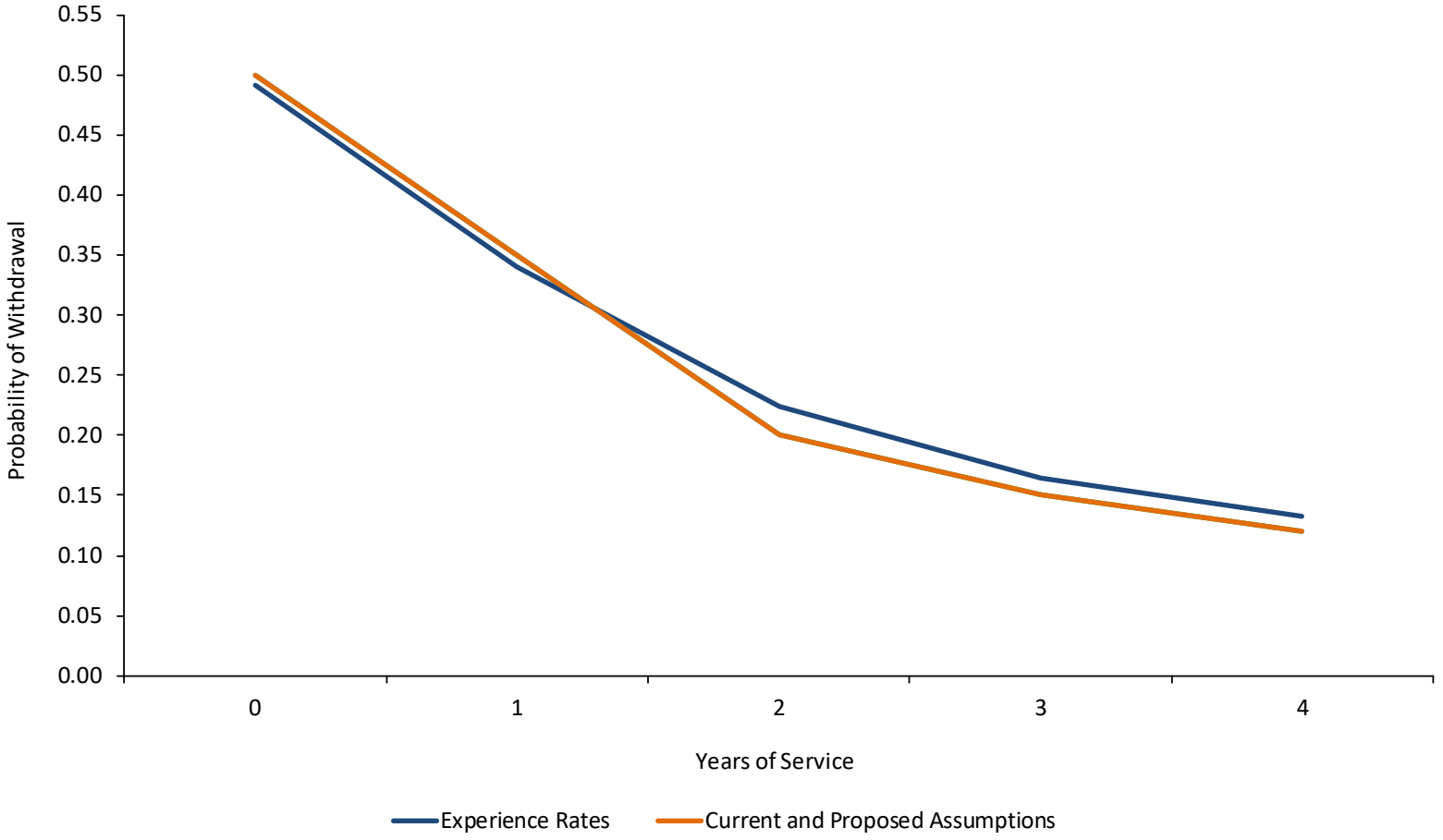


Service Based Withdrawal (Years of Service Less Than 5) Experience
STATE Female Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	14,765	30,037	0.4916	0.5000	0.5000	15,019	15,019
1	8,845	25,973	0.3405	0.3500	0.3500	9,091	9,091
2	2,964	13,201	0.2245	0.2000	0.2000	2,640	2,640
3	1,602	9,716	0.1649	0.1500	0.1500	1,457	1,457
4	1,023	7,681	0.1332	0.1200	0.1200	922	922
Totals	29,199	86,608	0.3371	0.3363	0.3363	29,129	29,129
			Ref	1034	1034		

2011-2015 Experience Study	0.3589
2006-2010 Experience Study	0.3135
2001-2005 Experience Study	0.2785

Service Based Withdrawal (Years of Service Less Than 5) Experience
STATE Female Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
STATE Female Members
2016, 2017 & 2019

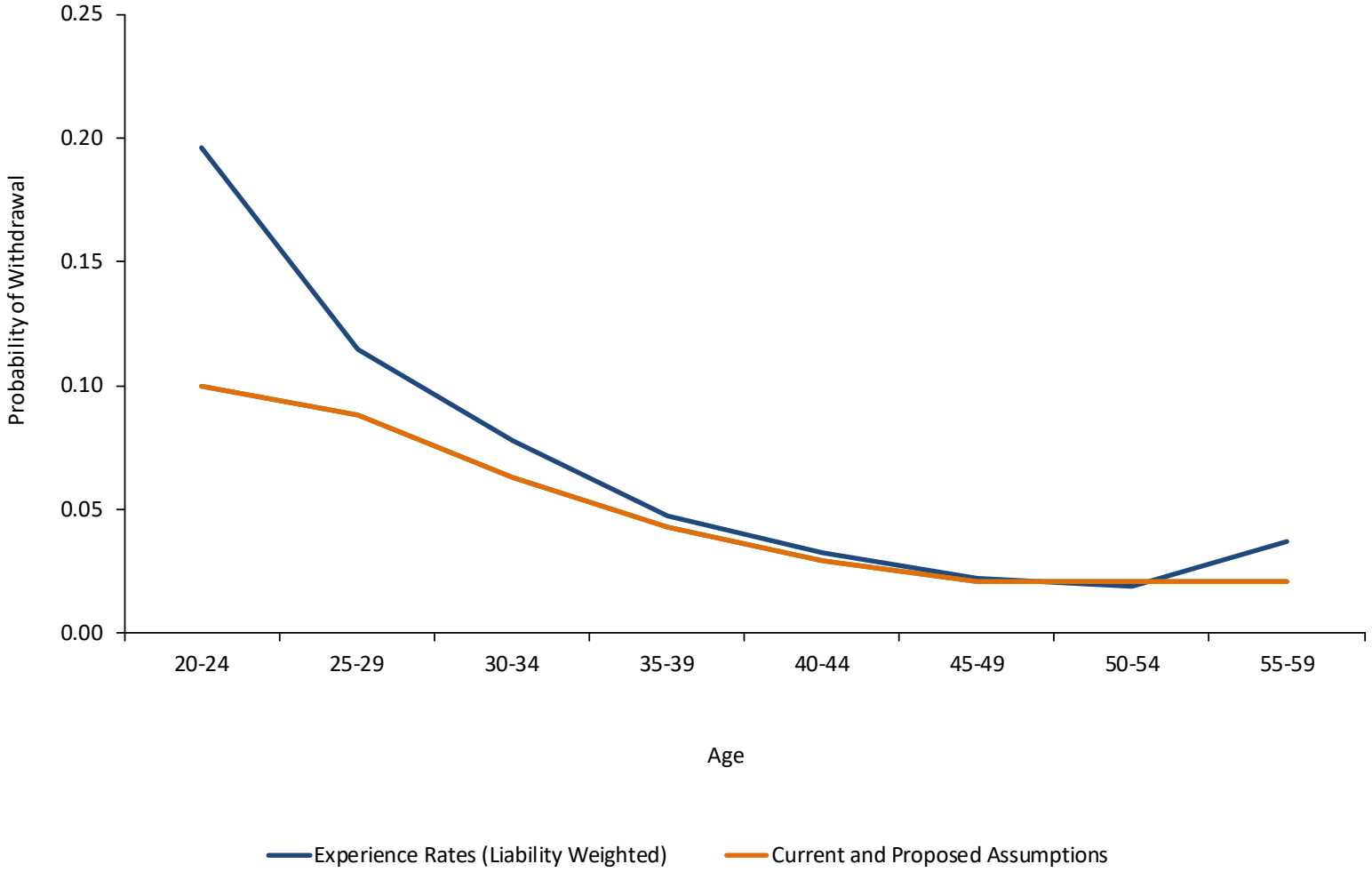
Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.1200	0.1000	0.1200	0.1000	-	-	-	-
20-24	21	79	0.2658	0.1962	0.1200	0.1000	0.1200	0.1000	9	8	9	8
25-29	354	2,503	0.1414	0.1148	0.1000	0.0880	0.1000	0.0880	239	208	239	208
30-34	725	7,401	0.0980	0.0778	0.0750	0.0630	0.0750	0.0630	552	465	552	465
35-39	652	9,922	0.0657	0.0474	0.0540	0.0430	0.0540	0.0430	543	432	543	432
40-44	510	10,608	0.0481	0.0324	0.0400	0.0290	0.0400	0.0290	431	314	431	314
45-49	529	13,953	0.0379	0.0220	0.0320	0.0210	0.0320	0.0210	455	305	455	305
50-54	506	15,104	0.0335	0.0189	0.0300	0.0210	0.0300	0.0210	457	317	457	317
55-59	458	10,680	0.0429	0.0370	0.0300	0.0210	0.0300	0.0210	320	224	320	224
Totals	3,755	70,250	0.0535	0.0305	0.0428	0.0324	0.0428	0.0324	3,006	2,273	3,006	2,273
Liability Weighted	2,140			Ref	1388	1389	1388	1389				

2011-2015 Experience Study	0.0488	0.0280
2006-2010 Experience Study	0.0364	0.0247
2001-2005 Experience Study	0.0357	N/A

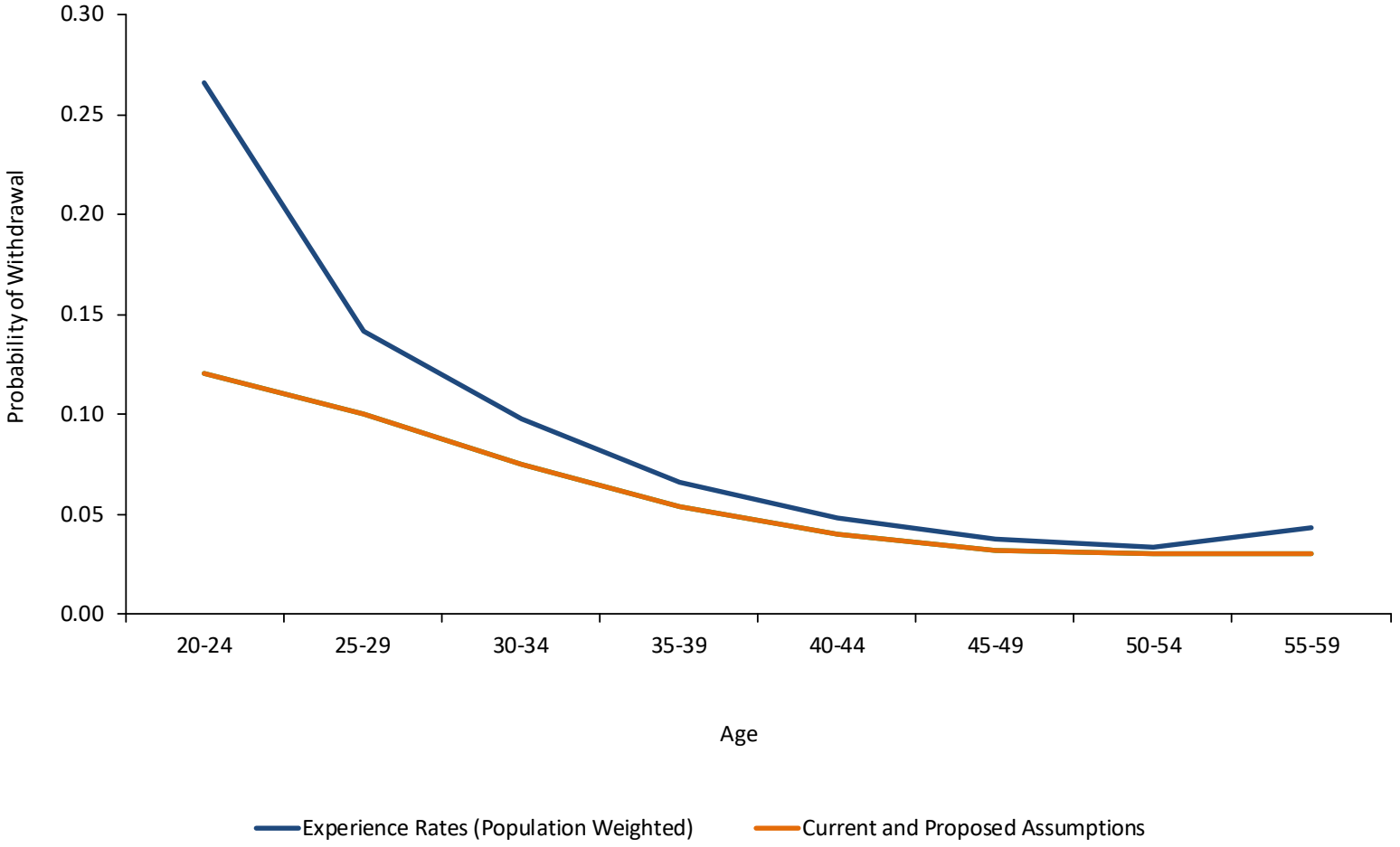
** Sample rates are taken from the midpoint of age group.*

201 members not shown in the above chart withdrew from service with no pension benefit at age 60 or older.

Age Based Withdrawal (Years of Service 5 and Up) Experience
STATE Female Members (Liability Weighted)
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
STATE Female Members (Population Weighted)
2016, 2017 & 2019

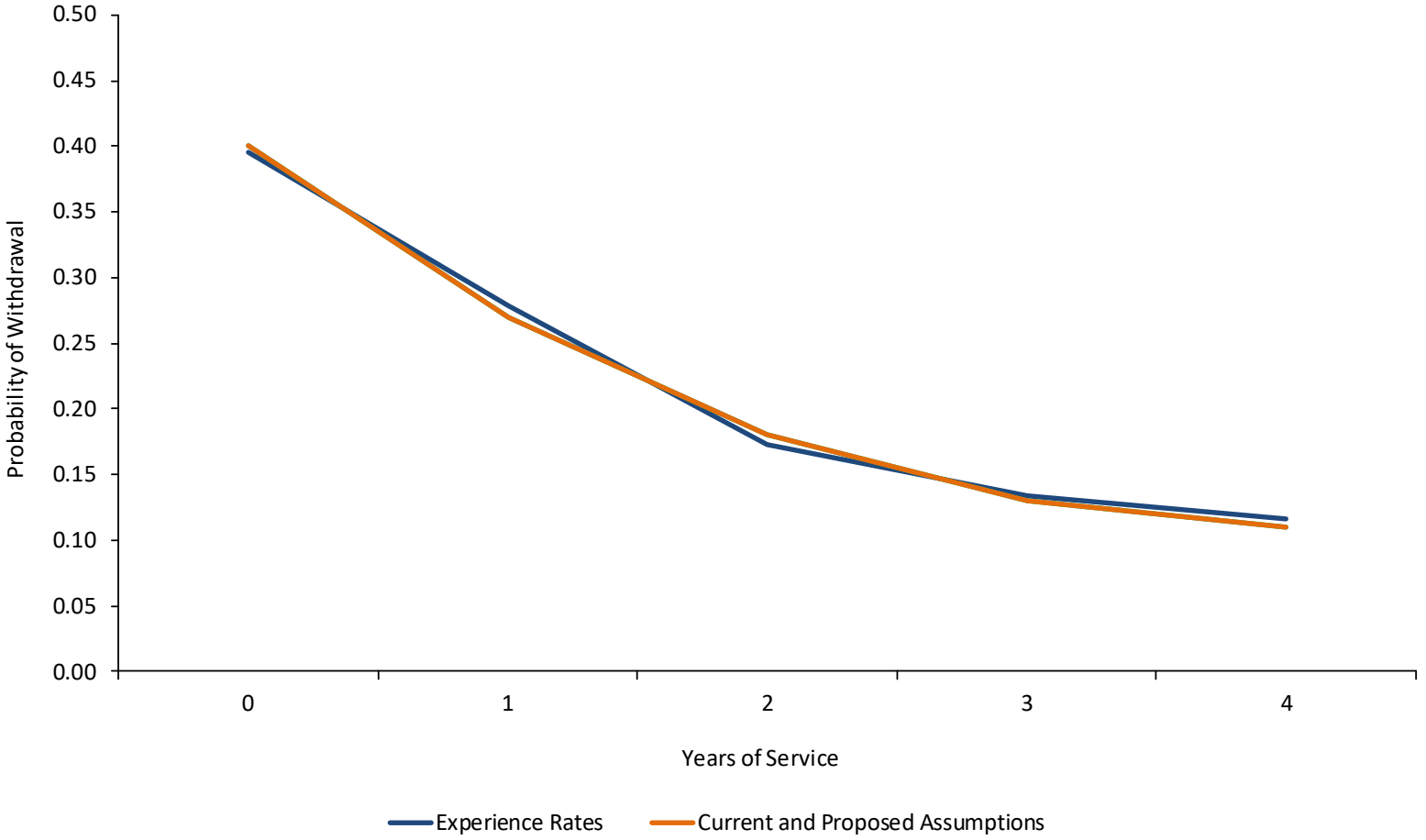


Service Based Withdrawal (Years of Service Less Than 5) Experience
LOCAL Male Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	10,867	27,505	0.3951	0.4000	0.4000	11,002	11,002
1	9,157	32,859	0.2787	0.2700	0.2700	8,872	8,872
2	3,349	19,390	0.1727	0.1800	0.1800	3,490	3,490
3	2,014	15,093	0.1334	0.1300	0.1300	1,962	1,962
4	1,328	11,360	0.1169	0.1100	0.1100	1,250	1,250
Totals	26,715	106,207	0.2515	0.2502	0.2502	26,576	26,576
			Ref	1035	1035		

2011-2015 Experience Study	0.2598
2006-2010 Experience Study	0.2438
2001-2005 Experience Study	0.2395

Service Based Withdrawal (Years of Service Less Than 5) Experience
LOCAL Male Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LOCAL Male Members
2016, 2017 & 2019

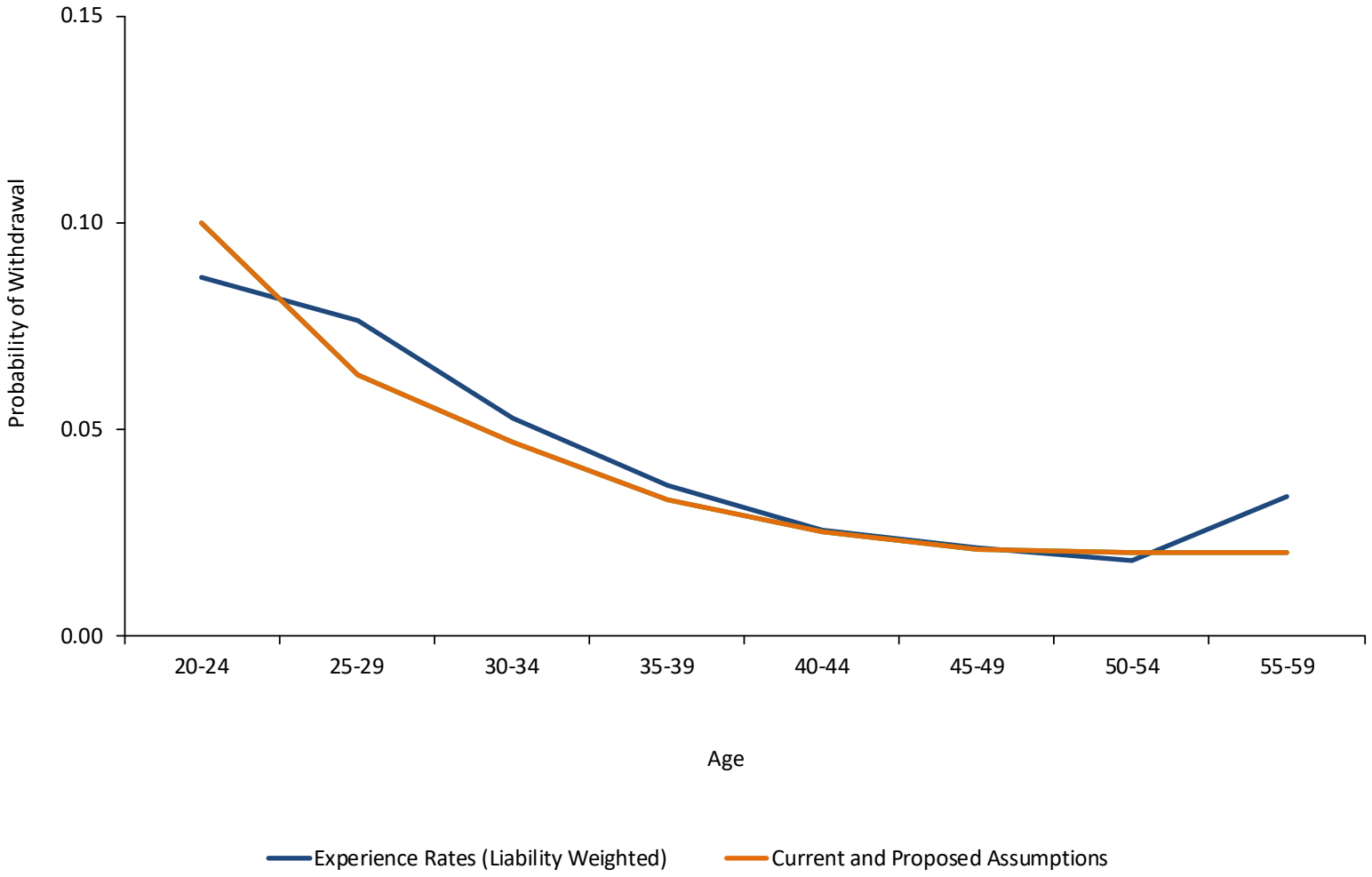
Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.1100	0.1000	0.1100	0.1000	-	-	-	-
20-24	36	277	0.1300	0.0867	0.1100	0.1000	0.1100	0.1000	28	25	28	25
25-29	365	3,475	0.1050	0.0764	0.0850	0.0630	0.0850	0.0630	285	217	285	217
30-34	656	9,326	0.0703	0.0529	0.0600	0.0470	0.0600	0.0470	559	434	559	434
35-39	672	13,588	0.0495	0.0364	0.0430	0.0330	0.0430	0.0330	595	455	595	455
40-44	685	16,637	0.0412	0.0257	0.0350	0.0250	0.0350	0.0250	582	422	582	422
45-49	814	22,584	0.0360	0.0213	0.0280	0.0210	0.0280	0.0210	647	481	647	481
50-54	754	24,360	0.0310	0.0180	0.0270	0.0200	0.0270	0.0200	661	490	661	490
55-59	763	17,856	0.0427	0.0335	0.0270	0.0200	0.0270	0.0200	482	357	482	357
Totals	4,745	108,103	0.0439	0.0256	0.0355	0.0267	0.0355	0.0267	3,839	2,881	3,839	2,881
Liability Weighted	2,772			Ref	1390	1391	1390	1391				

2011-2015 Experience Study	0.0413	0.0231
2006-2010 Experience Study	0.0358	0.0237
2001-2005 Experience Study	0.0357	N/A

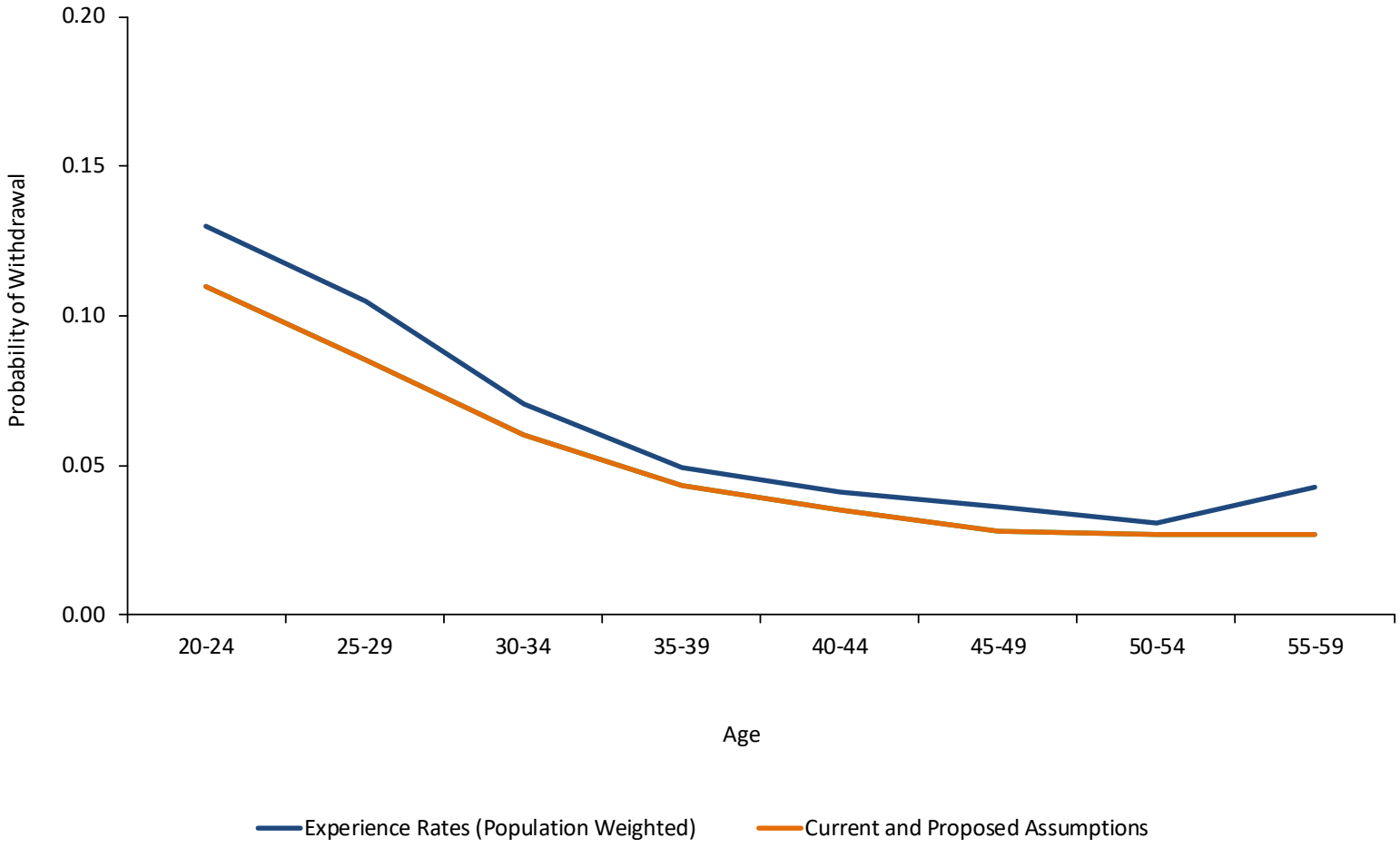
** Sample rates are taken from the midpoint of age group.*

600 members not shown in the above chart withdrew from service with no pension benefit at age 60 or older.

Age Based Withdrawal (Years of Service 5 and Up) Experience
LOCAL Male Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LOCAL Male Members
2016, 2017 & 2019

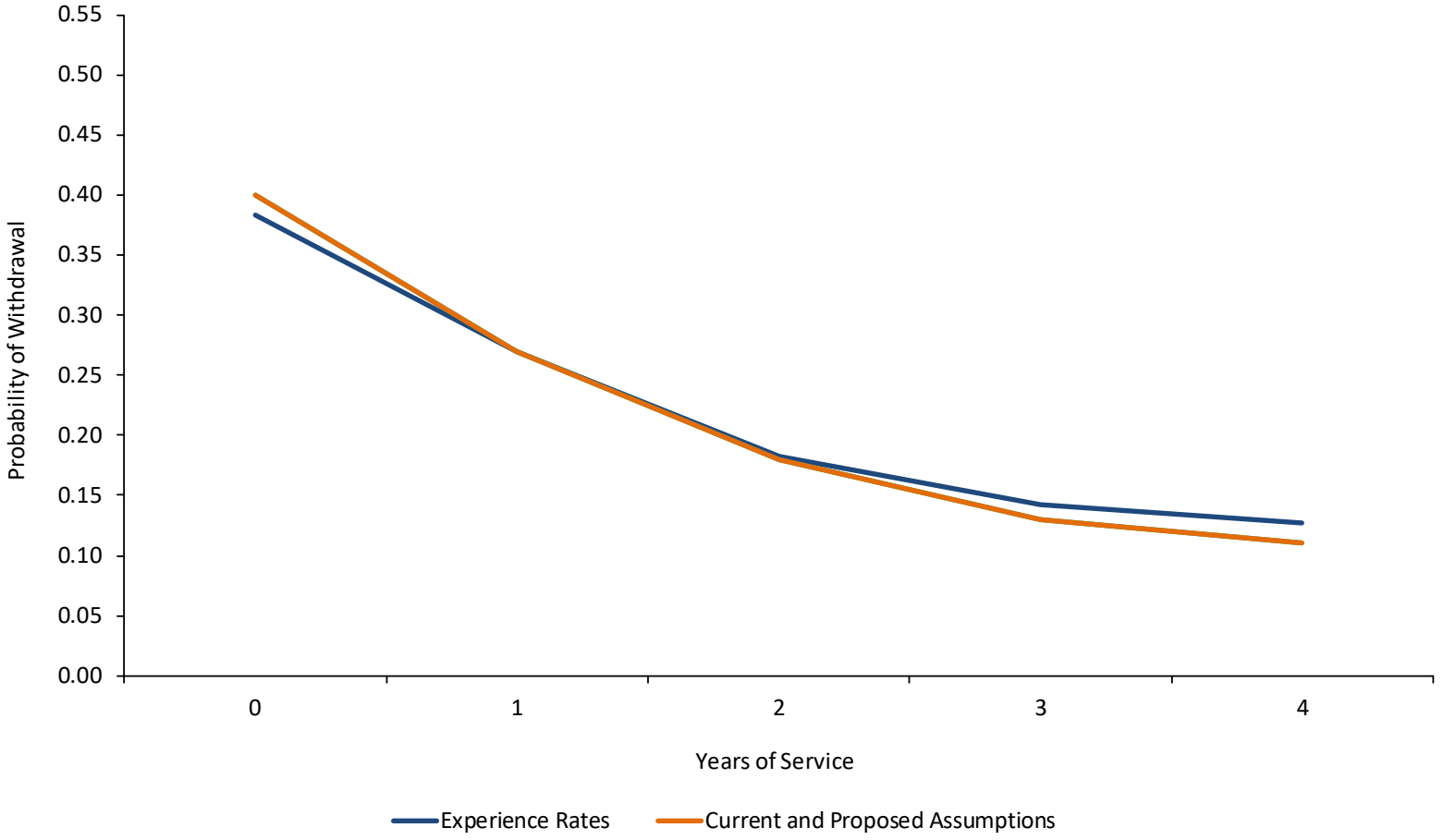


Service Based Withdrawal (Years of Service Less Than 5) Experience
LOCAL Female Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	12,162	31,732	0.3833	0.4000	0.4000	12,693	12,693
1	10,206	37,896	0.2693	0.2700	0.2700	10,232	10,232
2	4,236	23,174	0.1828	0.1800	0.1800	4,171	4,171
3	2,599	18,307	0.1420	0.1300	0.1300	2,380	2,380
4	1,739	13,695	0.1270	0.1100	0.1100	1,506	1,506
Totals	30,942	124,804	0.2479	0.2482	0.2482	30,982	30,982
			Ref	1035	1035		

2011-2015 Experience Study	0.2564
2006-2010 Experience Study	0.2440
2001-2005 Experience Study	0.2368

Service Based Withdrawal (Years of Service Less Than 5) Experience
LOCAL Female Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LOCAL Female Members
2016, 2017 & 2019

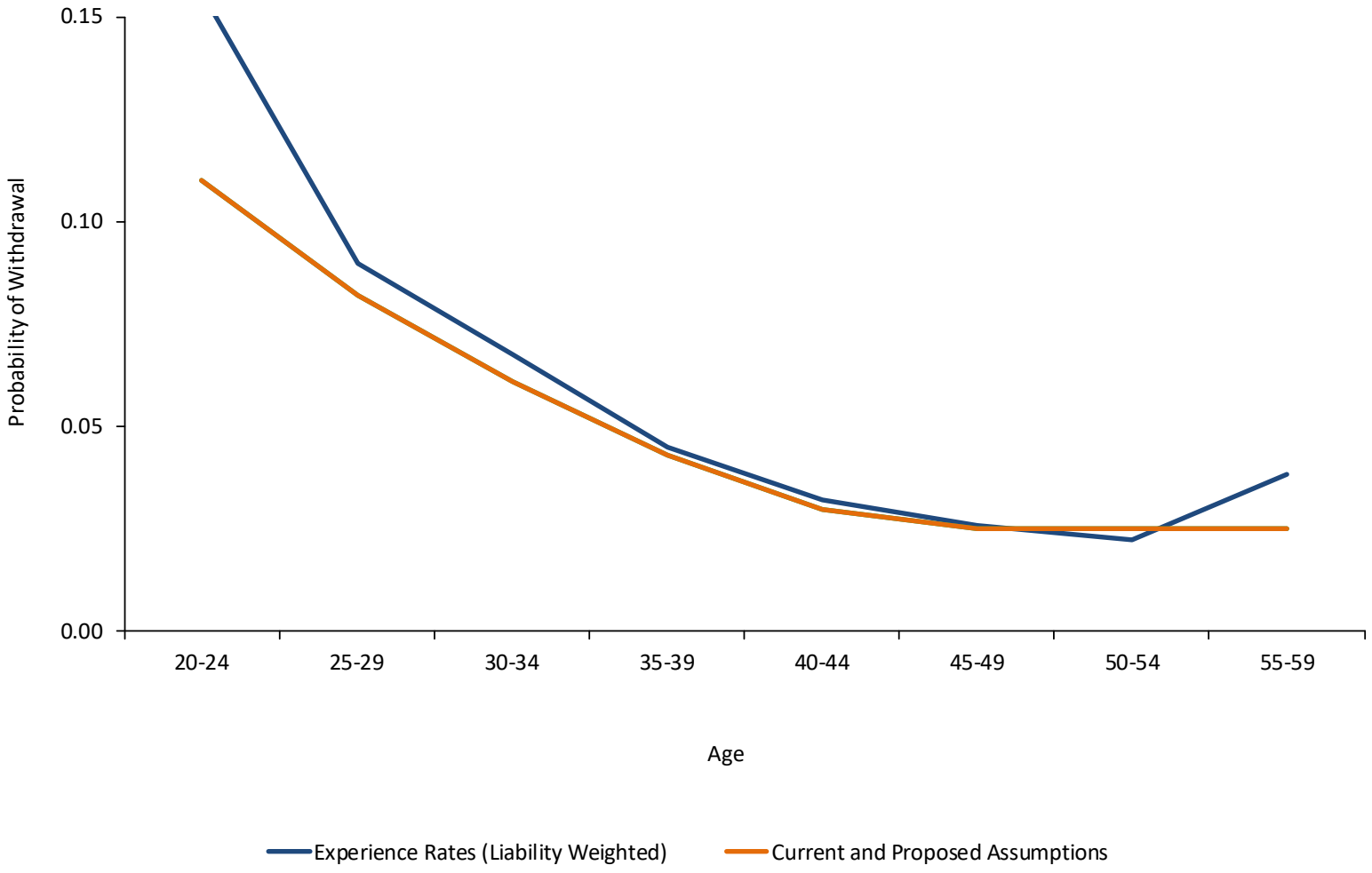
Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.1100	0.1100	0.1100	0.1100	-	-	-	-
20-24	63	310	0.2032	0.1563	0.1100	0.1100	0.1100	0.1100	33	32	33	32
25-29	442	3,701	0.1194	0.0900	0.0950	0.0820	0.0950	0.0820	337	294	337	294
30-34	933	10,720	0.0870	0.0676	0.0700	0.0610	0.0700	0.0610	750	648	750	648
35-39	1,006	16,383	0.0614	0.0451	0.0530	0.0430	0.0530	0.0430	875	708	875	708
40-44	1,067	20,647	0.0517	0.0320	0.0420	0.0300	0.0420	0.0300	877	637	877	637
45-49	1,209	27,370	0.0442	0.0257	0.0360	0.0250	0.0360	0.0250	997	700	997	700
50-54	1,189	29,089	0.0409	0.0224	0.0340	0.0250	0.0340	0.0250	996	727	996	727
55-59	1,176	23,793	0.0494	0.0383	0.0340	0.0250	0.0340	0.0250	809	595	809	595
Totals	7,085	132,013	0.0537	0.0312	0.0430	0.0329	0.0430	0.0329	5,674	4,341	5,674	4,341
Liability Weighted	4,121			Ref	1392	1393	1392	1393				

2011-2015 Experience Study	0.0505	0.0301
2006-2010 Experience Study	0.0434	0.0290
2001-2005 Experience Study	0.0421	N/A

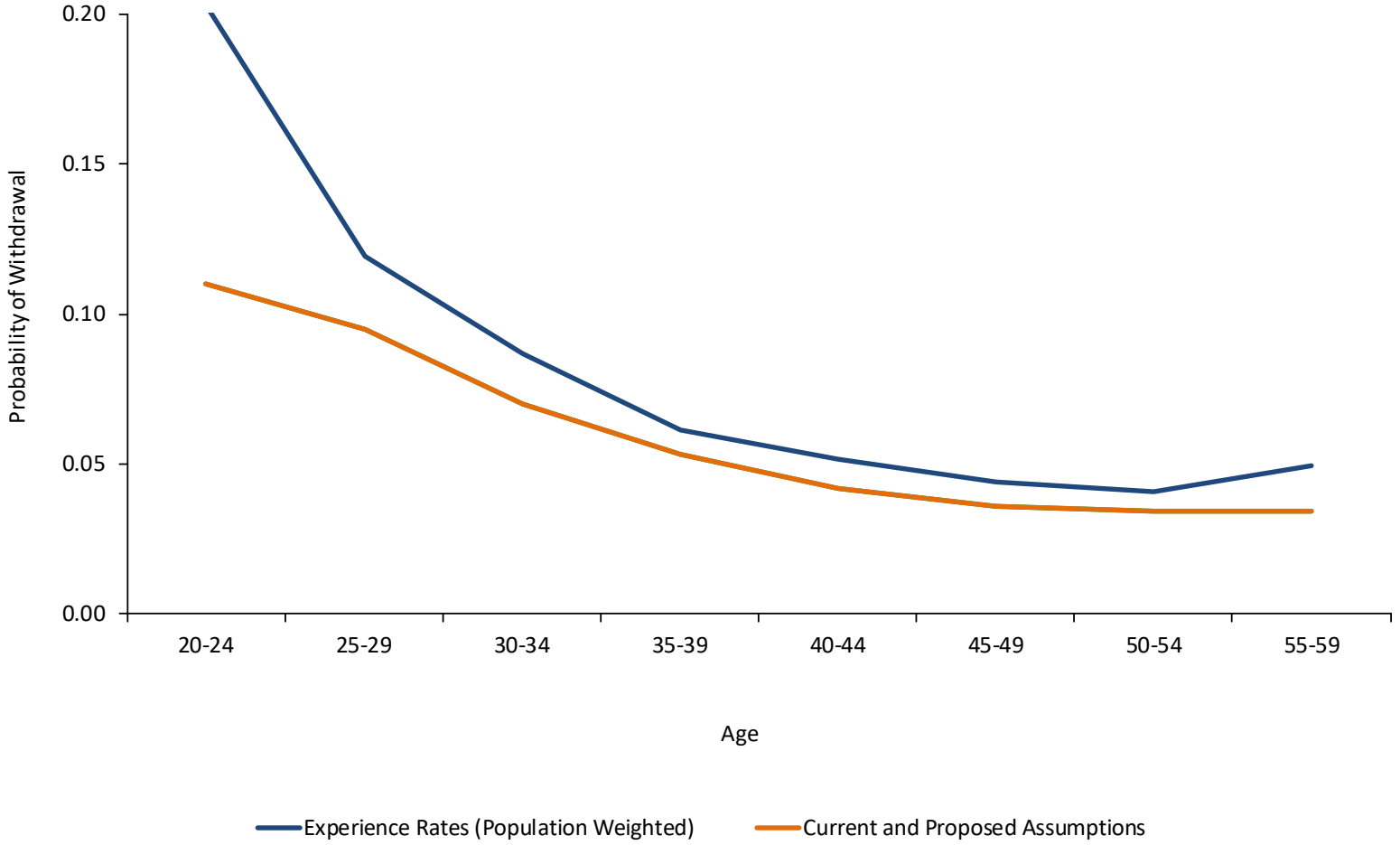
** Sample rates are taken from the midpoint of age group.*

649 members not shown in the above chart withdrew from service with no pension benefit at age 60 or older.

Age Based Withdrawal (Years of Service 5 and Up) Experience
LOCAL Female Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LOCAL Female Members
2016, 2017 & 2019

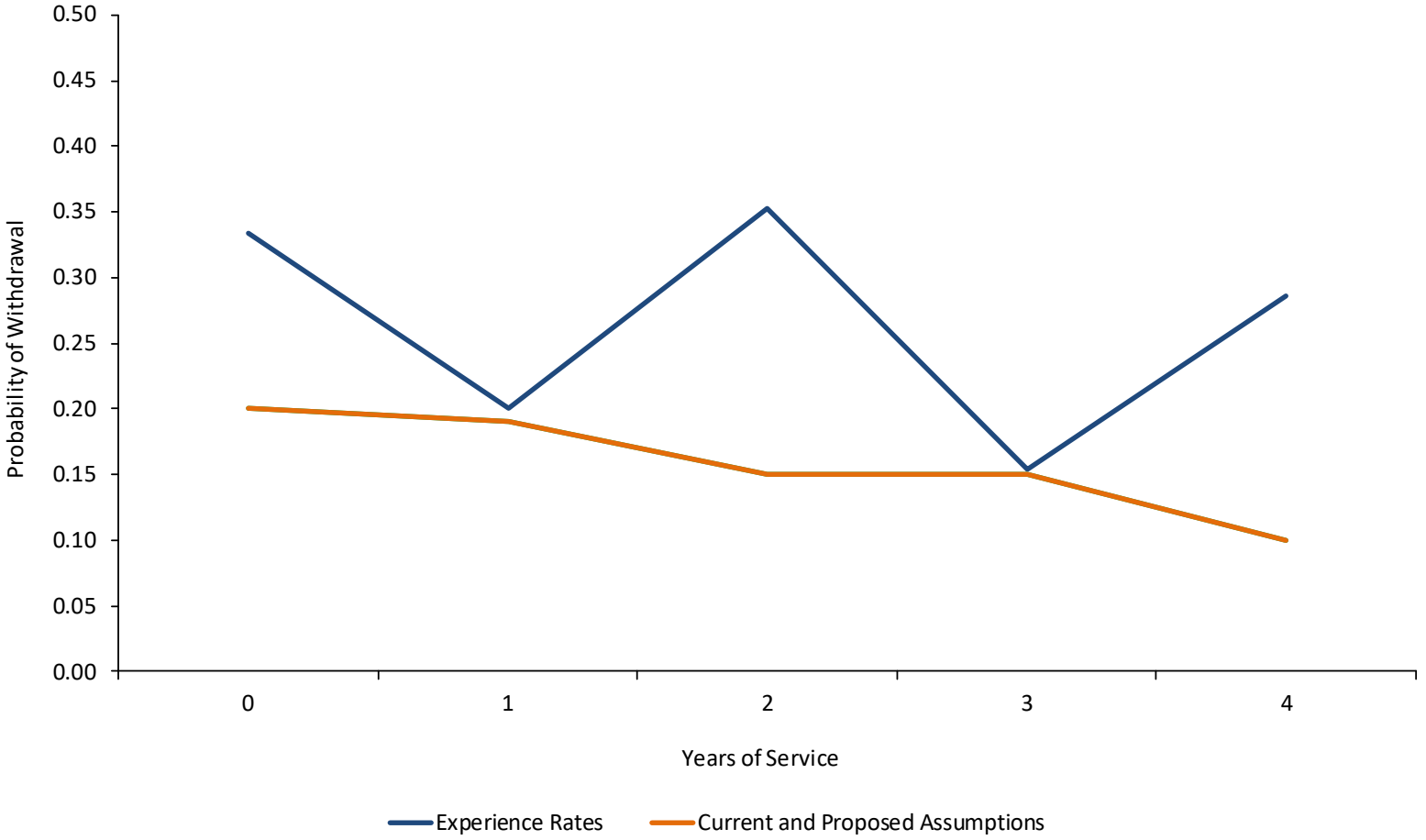


Service Based Withdrawal (Years of Service Less Than 5) Experience
PUBLIC SAFETY Male Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	2	6	0.3333	0.2000	0.2000	1	1
1	3	15	0.2000	0.1900	0.1900	3	3
2	6	17	0.3529	0.1500	0.1500	3	3
3	2	13	0.1538	0.1500	0.1500	2	2
4	4	14	0.2857	0.1000	0.1000	1	1
Totals	17	65	0.2615	0.1538	0.1538	10	10
			Ref	1036	1036		

2011-2015 Experience Study	0.1818
2006-2010 Experience Study	0.1611
2001-2005 Experience Study	0.1048

Service Based Withdrawal (Years of Service Less Than 5) Experience
PUBLIC SAFETY Male Members
2016, 2017 & 2019



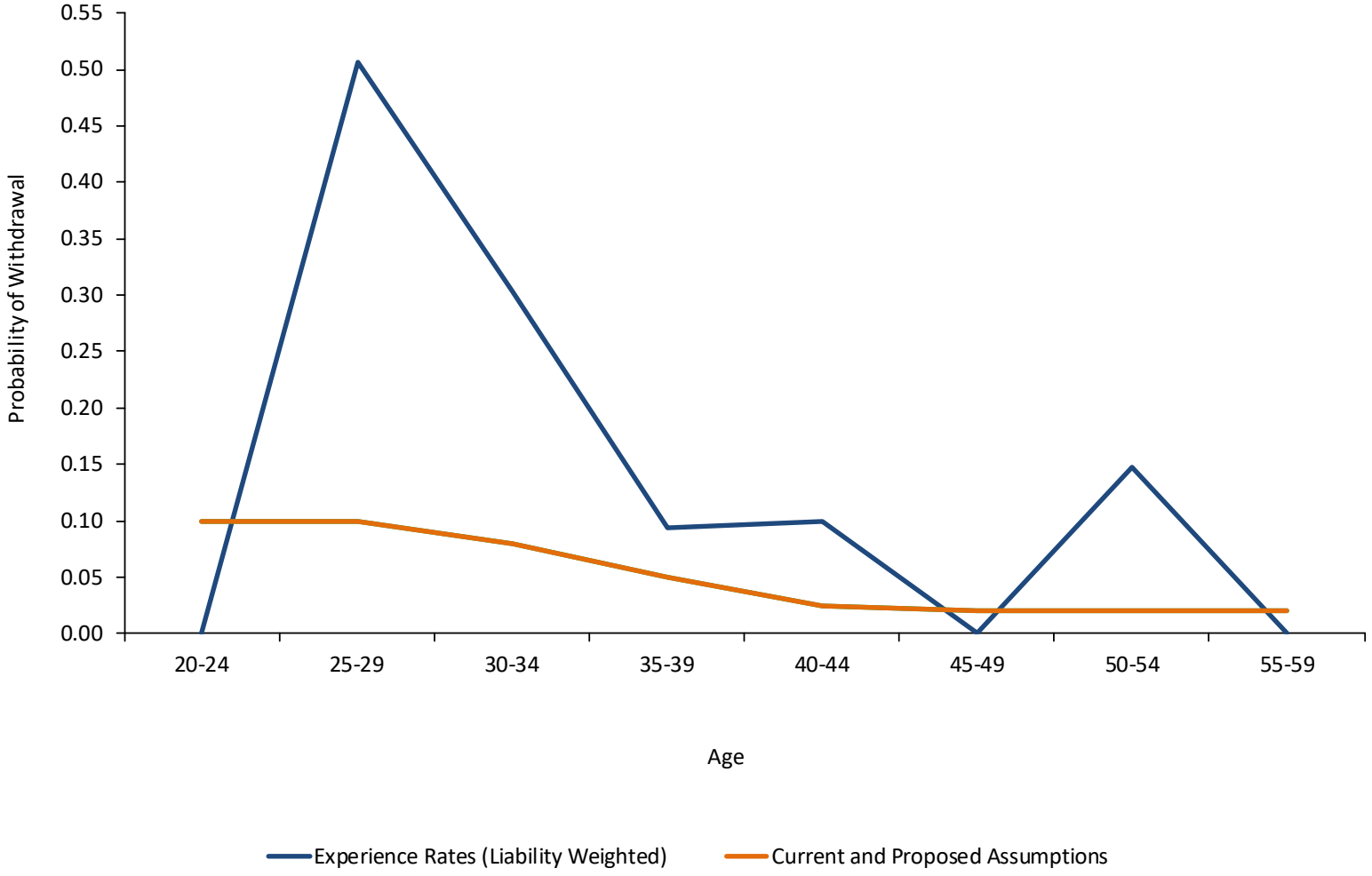
Age Based Withdrawal (Years of Service 5 and Up) Experience
PUBLIC SAFETY Male Members
2016, 2017 & 2019

Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.1000	0.1000	0.1000	0.1000	-	-	-	-
20-24	-	-	N\A	N\A	0.1000	0.1000	0.1000	0.1000	-	-	-	-
25-29	2	4	0.5000	0.5070	0.1000	0.1000	0.1000	0.1000	-	-	-	-
30-34	4	13	0.3077	0.3036	0.0800	0.0800	0.0800	0.0800	1	1	1	1
35-39	2	20	0.1000	0.0944	0.0500	0.0500	0.0500	0.0500	1	1	1	1
40-44	3	28	0.1071	0.0998	0.0250	0.0250	0.0250	0.0250	1	1	1	1
45-49	-	19	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
50-54	1	8	0.1250	0.1481	0.0200	0.0200	0.0200	0.0200	-	-	-	-
55-59	-	6	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
Totals	12	98	0.1224	0.0853	0.0306	0.0306	0.0306	0.0306	3	3	3	3
Liability Weighted	8			Ref	1211	1211	1211	1211				

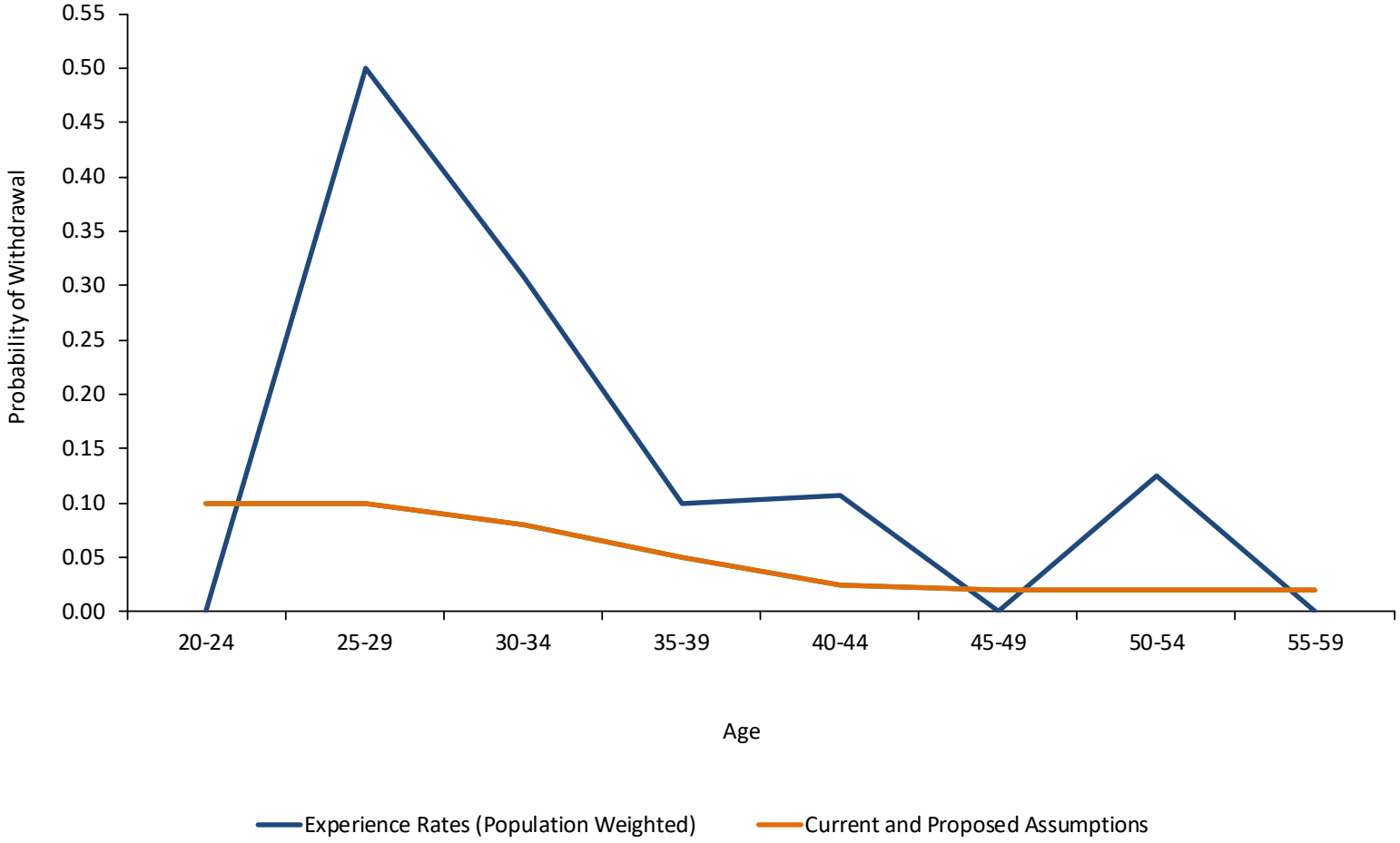
2011-2015 Experience Study	0.0702	0.0585
2006-2010 Experience Study	0.0613	0.0430
2001-2005 Experience Study	0.0322	N/A

** Sample rates are taken from the midpoint of age group.*

Age Based Withdrawal (Years of Service 5 and Up) Experience
PUBLIC SAFETY Male Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
PUBLIC SAFETY Male Members
2016, 2017 & 2019

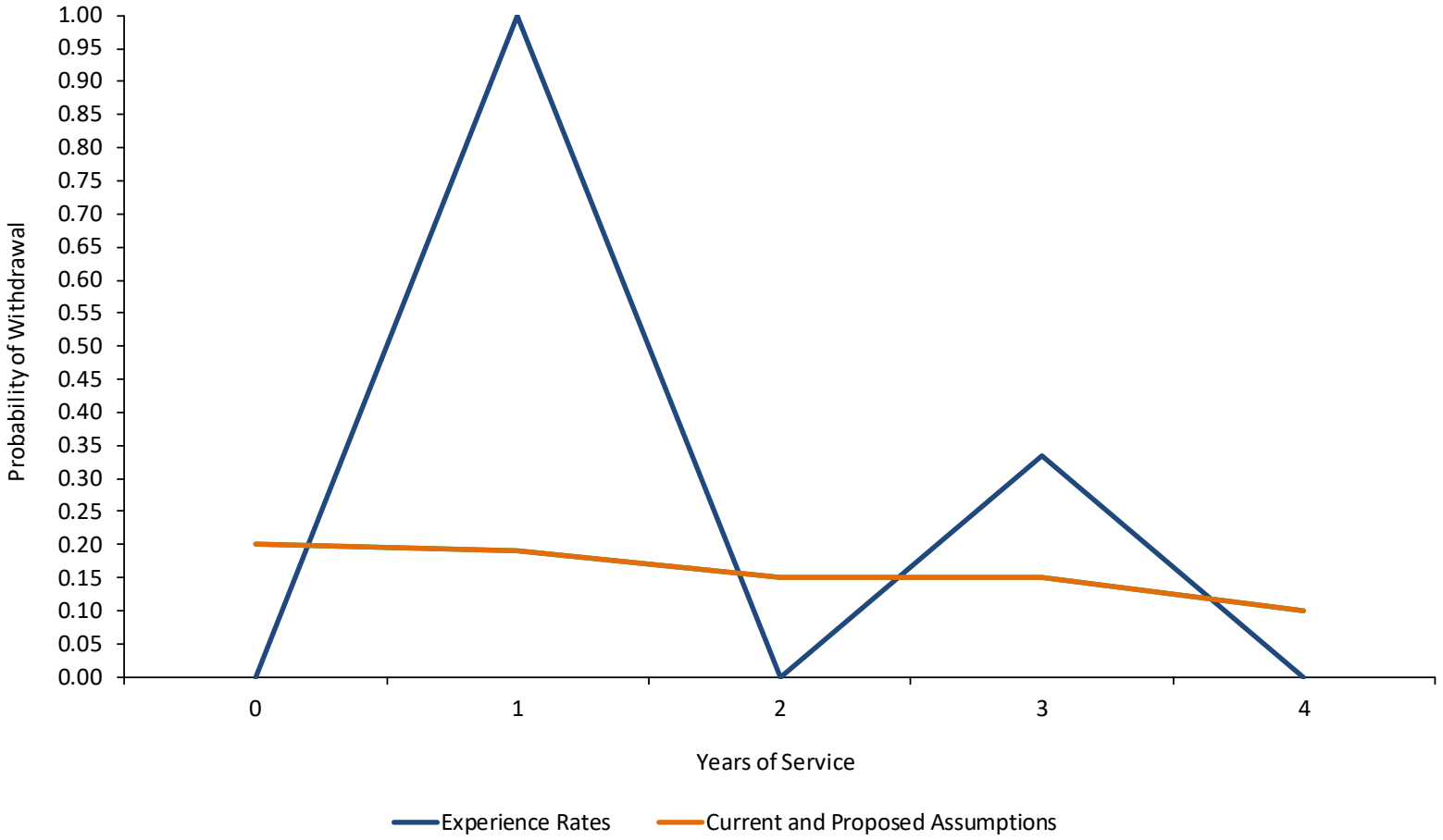


Service Based Withdrawal (Years of Service Less Than 5) Experience
PUBLIC SAFETY Female Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	-	-	N\A	0.2000	0.2000	-	-
1	2	2	1.0000	0.1900	0.1900	-	-
2	-	6	0.0000	0.1500	0.1500	1	1
3	1	3	0.3333	0.1500	0.1500	-	-
4	-	2	0.0000	0.1000	0.1000	-	-
Totals	3	13	0.2308	0.0769	0.0769	1	1
			Ref	1036	1036		

2011-2015 Experience Study	0.1905
2006-2010 Experience Study	0.2353
2001-2005 Experience Study	0.1404

Service Based Withdrawal (Years of Service Less Than 5) Experience
PUBLIC SAFETY Female Members
2016, 2017 & 2019



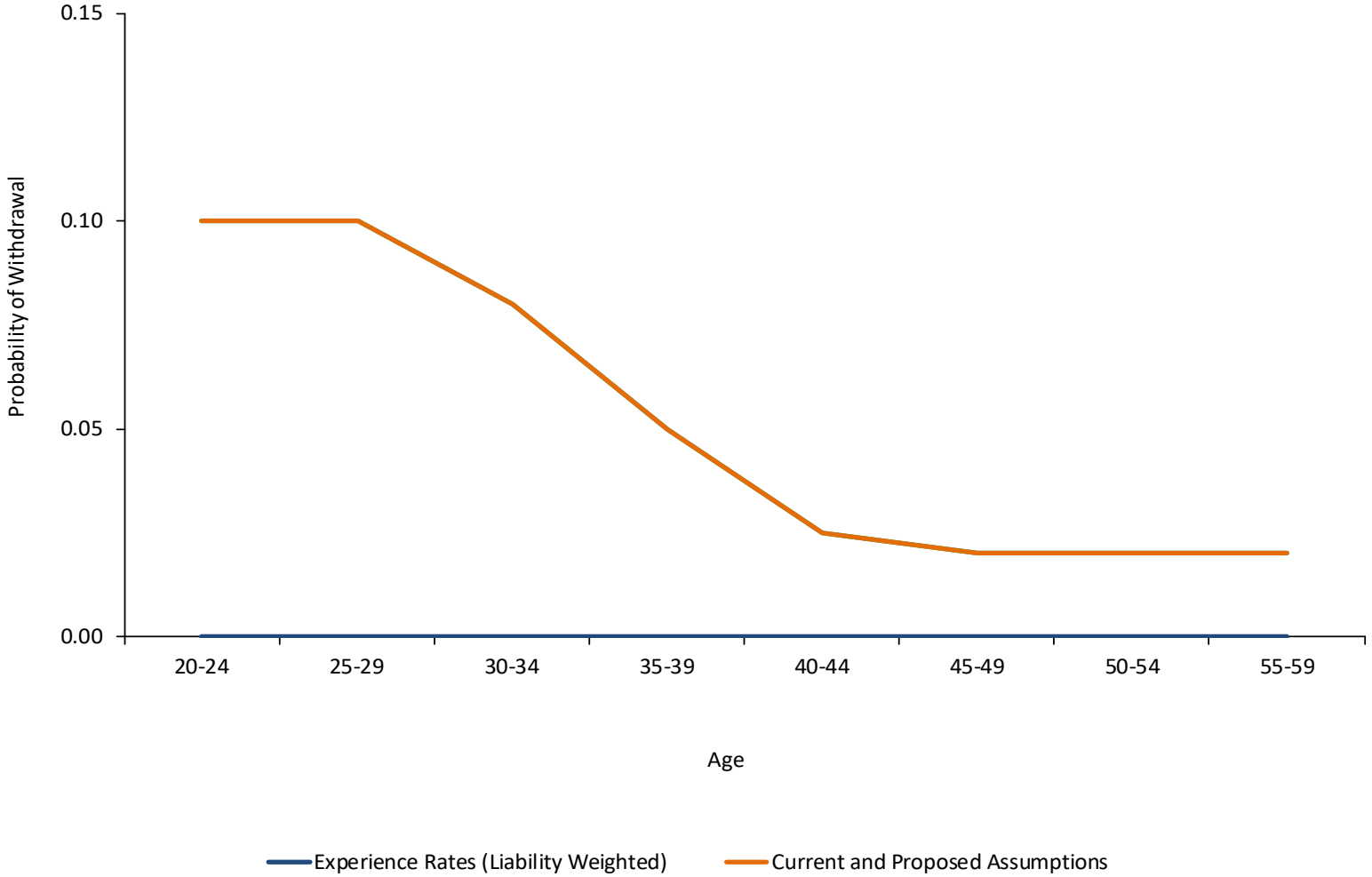
Age Based Withdrawal (Years of Service 5 and Up) Experience
PUBLIC SAFETY Female Members
2016, 2017 & 2019

Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.1000	0.1000	0.1000	0.1000	-	-	-	-
20-24	-	-	N\A	N\A	0.1000	0.1000	0.1000	0.1000	-	-	-	-
25-29	-	1	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	-	-	-	-
30-34	-	4	0.0000	0.0000	0.0800	0.0800	0.0800	0.0800	-	-	-	-
35-39	-	1	0.0000	0.0000	0.0500	0.0500	0.0500	0.0500	-	-	-	-
40-44	-	-	N\A	N\A	0.0250	0.0250	0.0250	0.0250	-	-	-	-
45-49	-	1	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
50-54	-	-	N\A	N\A	0.0200	0.0200	0.0200	0.0200	-	-	-	-
55-59	-	2	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
Totals	-	9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-	-	-	-
Liability Weighted	-			Ref	1211	1211	1211	1211				

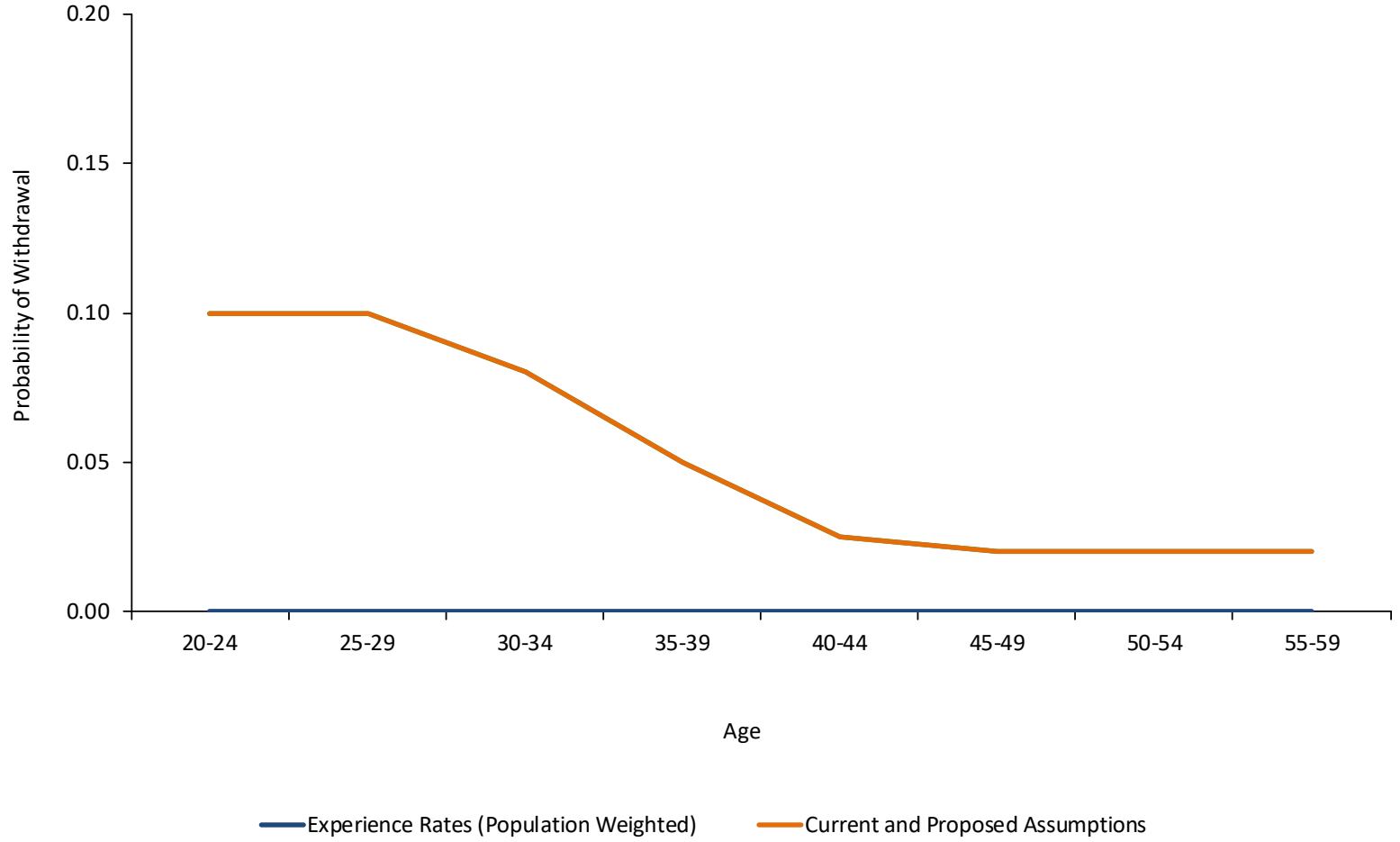
2011-2015 Experience Study	0.0909	0.0373
2006-2010 Experience Study	0.0833	0.0643
2001-2005 Experience Study	0.0417	N/A

** Sample rates are taken from the midpoint of age group.*

Age Based Withdrawal (Years of Service 5 and Up) Experience
PUBLIC SAFETY Female Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
PUBLIC SAFETY Female Members
2016, 2017 & 2019

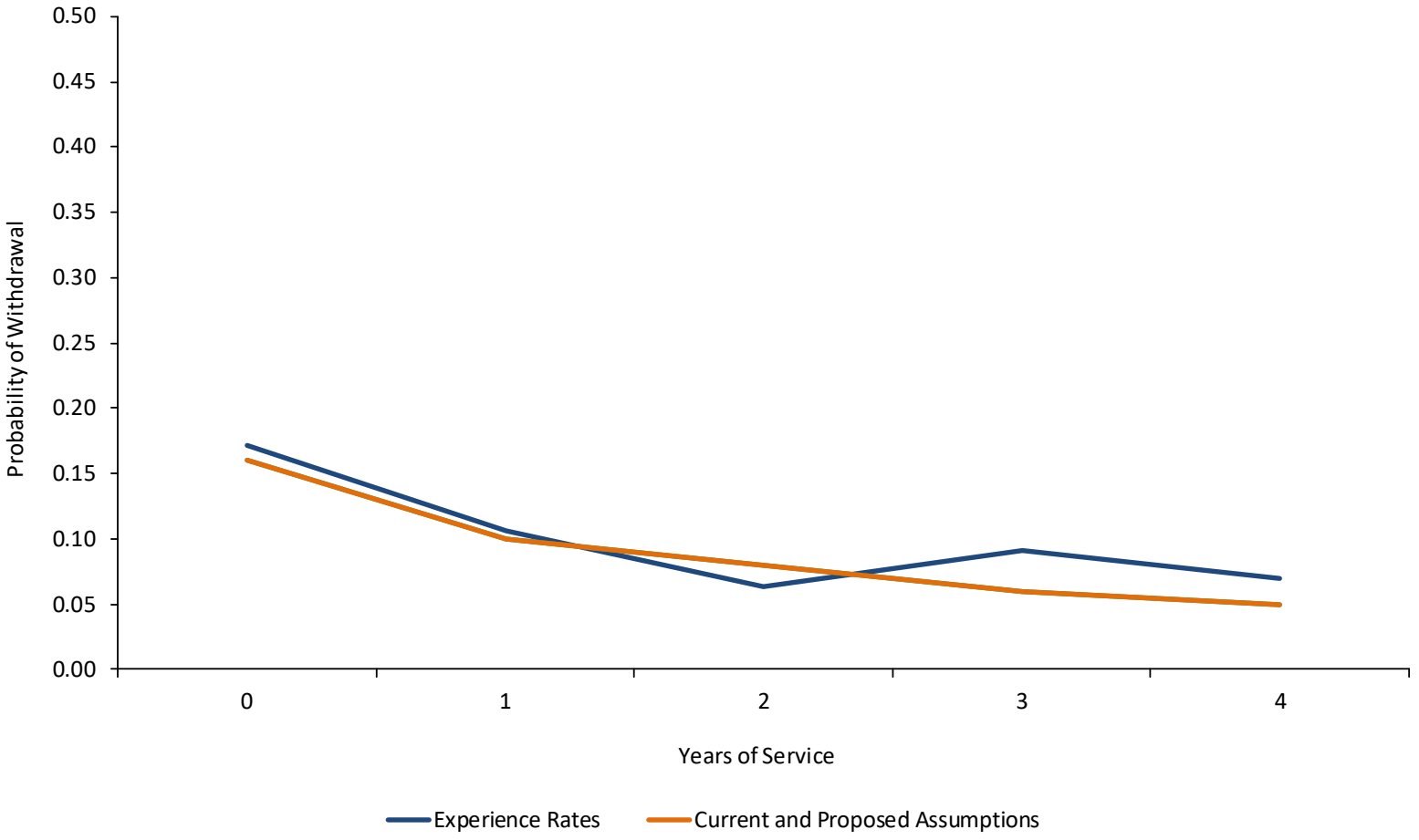


Service Based Withdrawal (Years of Service Less Than 5) Experience
LAW ENFORCEMENT Male Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	43	251	0.1713	0.1600	0.1600	40	40
1	76	714	0.1064	0.1000	0.1000	71	71
2	53	831	0.0638	0.0800	0.0800	66	66
3	80	877	0.0912	0.0600	0.0600	53	53
4	62	893	0.0694	0.0500	0.0500	45	45
Totals	314	3,566	0.0881	0.0771	0.0771	275	275
			Ref	753	753		

2011-2015 Experience Study	0.0870
2006-2010 Experience Study	0.0827
2001-2005 Experience Study	0.0693

Service Based Withdrawal (Years of Service Less Than 5) Experience
LAW ENFORCEMENT Male Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LAW ENFORCEMENT Male Members
2016, 2017 & 2019

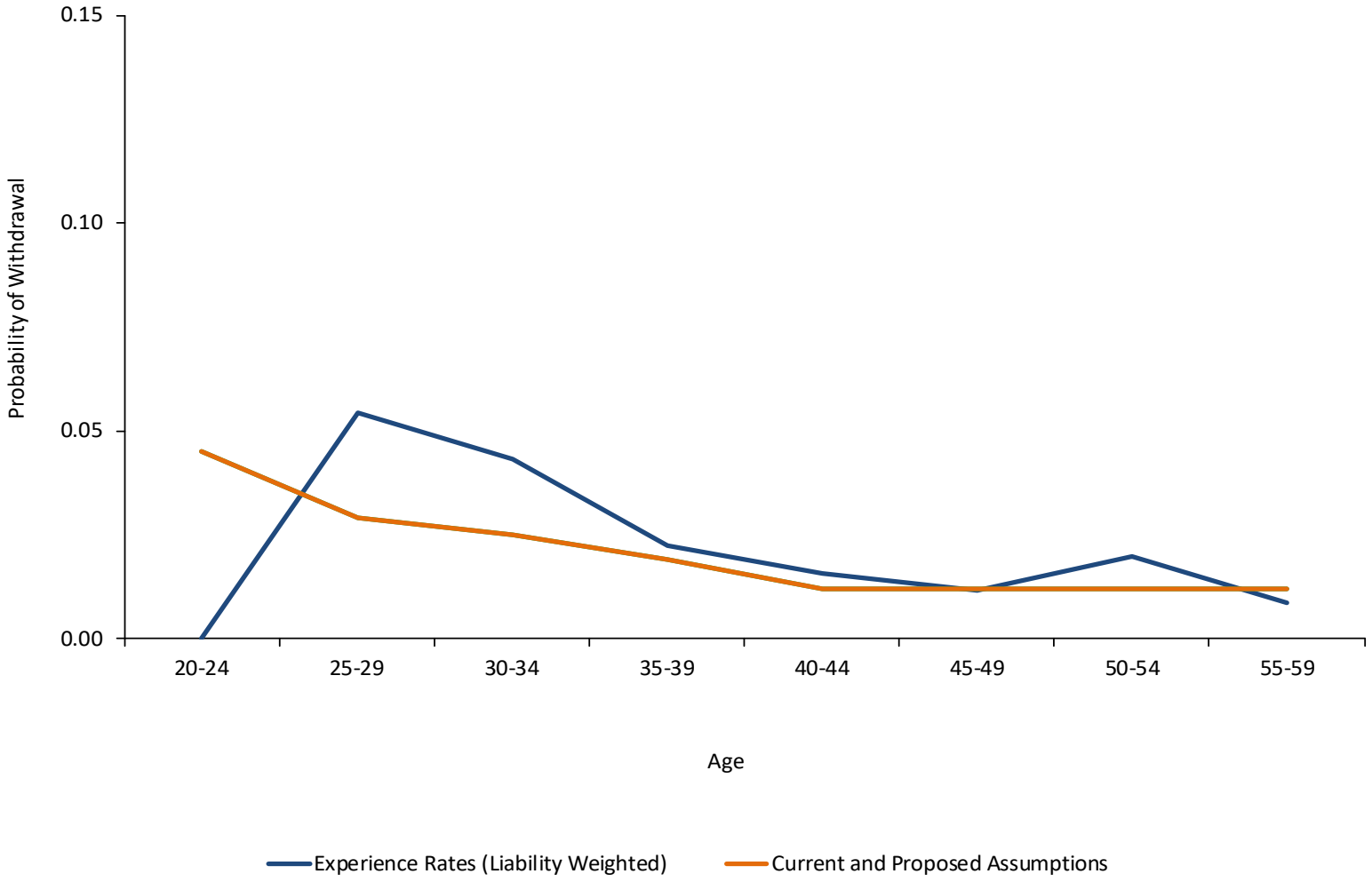
Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.0450	0.0450	0.0450	0.0450	-	-	-	-
20-24	-	10	0.0000	0.0000	0.0450	0.0450	0.0450	0.0450	-	-	-	-
25-29	39	632	0.0617	0.0543	0.0290	0.0290	0.0290	0.0290	18	18	18	18
30-34	95	1,929	0.0492	0.0433	0.0250	0.0250	0.0250	0.0250	47	47	47	47
35-39	71	2,633	0.0270	0.0222	0.0190	0.0190	0.0190	0.0190	49	49	49	49
40-44	67	3,562	0.0188	0.0158	0.0120	0.0120	0.0120	0.0120	45	45	45	45
45-49	54	3,804	0.0142	0.0114	0.0120	0.0120	0.0120	0.0120	46	46	46	46
50-54	32	1,348	0.0237	0.0196	0.0120	0.0120	0.0120	0.0120	16	16	16	16
55-59	7	506	0.0138	0.0085	0.0120	0.0120	0.0120	0.0120	6	6	6	6
Totals	365	14,424	0.0253	0.0170	0.0157	0.0157	0.0157	0.0157	227	227	227	227
Liability Weighted	245			Ref	876	876	876	876				

2011-2015 Experience Study	0.0175	0.0120
2006-2010 Experience Study	0.0188	0.0170
2001-2005 Experience Study	0.0176	N/A

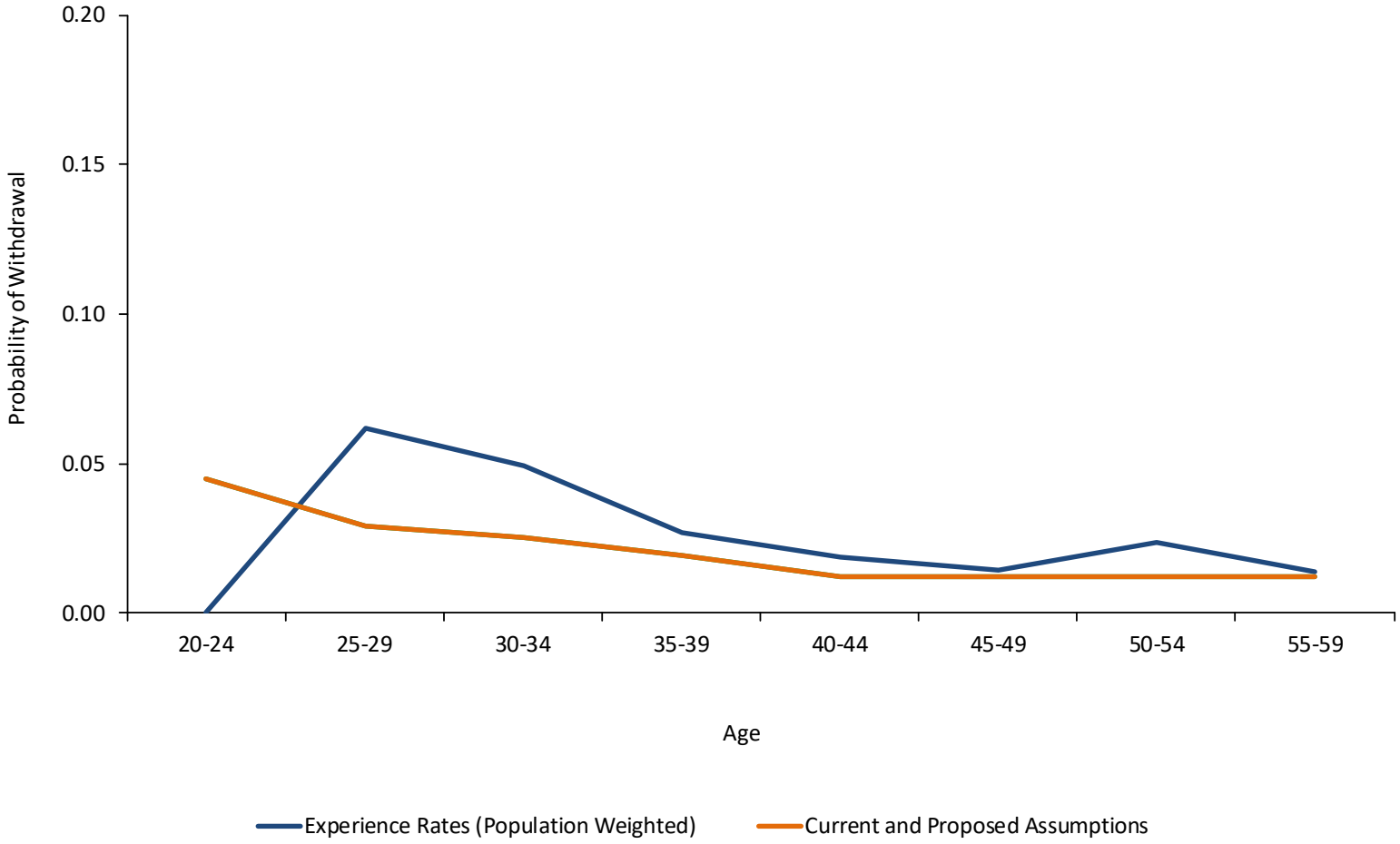
** Sample rates are taken from the midpoint of age group.*

8 members not shown in the above chart withdrew from service with no pension benefit at age 60 or older.

Age Based Withdrawal (Years of Service 5 and Up) Experience
LAW ENFORCEMENT Male Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LAW ENFORCEMENT Male Members
2016, 2017 & 2019

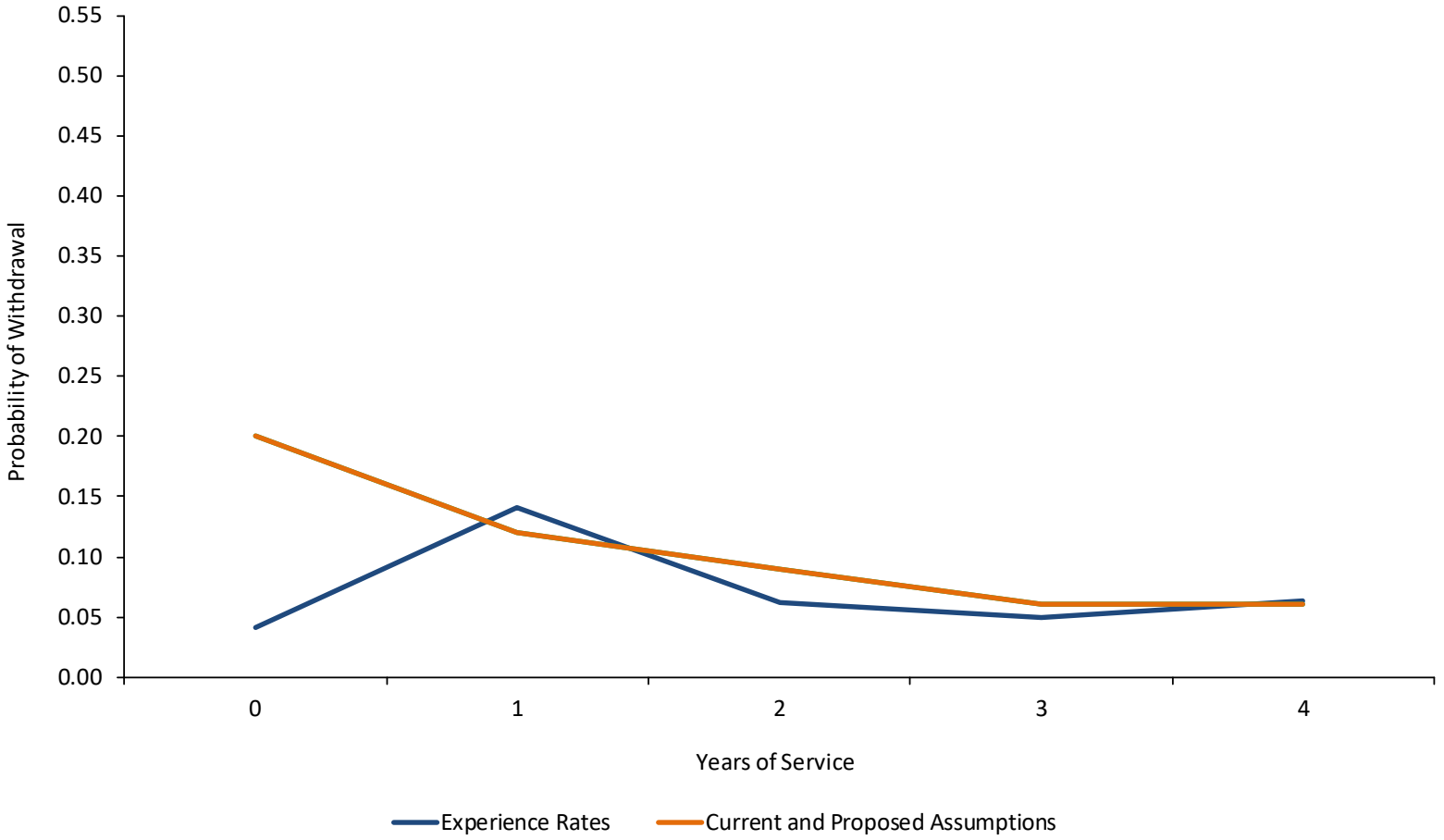


Service Based Withdrawal (Years of Service Less Than 5) Experience
LAW ENFORCEMENT Female Members
2016, 2017 & 2019

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	2	48	0.0417	0.2000	0.2000	10	10
1	16	113	0.1416	0.1200	0.1200	14	14
2	8	129	0.0620	0.0900	0.0900	12	12
3	6	122	0.0492	0.0600	0.0600	7	7
4	8	127	0.0630	0.0600	0.0600	8	8
Totals	40	539	0.0742	0.0946	0.0946	51	51
			Ref	1037	1037		

2011-2015 Experience Study	0.1142
2006-2010 Experience Study	0.0840
2001-2005 Experience Study	0.0985

Service Based Withdrawal (Years of Service Less Than 5) Experience
LAW ENFORCEMENT Female Members
2016, 2017 & 2019



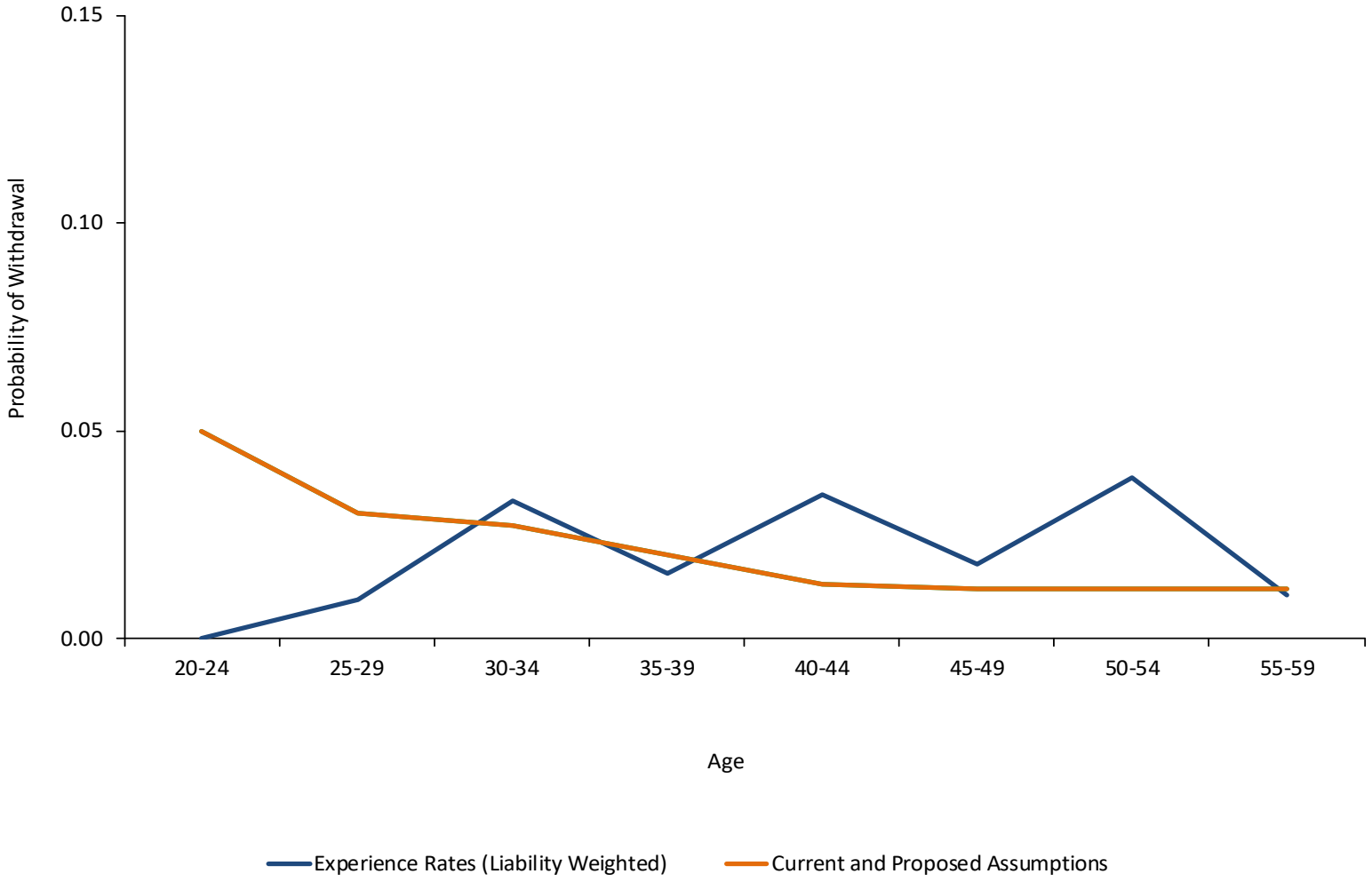
Age Based Withdrawal (Years of Service 5 and Up) Experience
LAW ENFORCEMENT Female Members
2016, 2017 & 2019

Age	Population Weighted Withdrawals	Population Weighted Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates		Proposed Rates		Current Withdrawals		Proposed Withdrawals	
			Population	Liability	Health	Pension	Health	Pension	Health	Pension	Health	Pension
Under 20	-	-	N\A	N\A	0.0500	0.0500	0.0500	0.0500	-	-	-	-
20-24	-	1	0.0000	0.0000	0.0500	0.0500	0.0500	0.0500	-	-	-	-
25-29	1	90	0.0111	0.0094	0.0300	0.0300	0.0300	0.0300	3	3	3	3
30-34	12	238	0.0504	0.0332	0.0270	0.0270	0.0270	0.0270	6	6	6	6
35-39	7	361	0.0194	0.0157	0.0200	0.0200	0.0200	0.0200	7	7	7	7
40-44	21	477	0.0440	0.0347	0.0130	0.0130	0.0130	0.0130	6	6	6	6
45-49	9	461	0.0195	0.0179	0.0120	0.0120	0.0120	0.0120	6	6	6	6
50-54	7	214	0.0327	0.0388	0.0120	0.0120	0.0120	0.0120	3	3	3	3
55-59	1	106	0.0094	0.0106	0.0120	0.0120	0.0120	0.0120	1	1	1	1
Totals	58	1,948	0.0298	0.0251	0.0164	0.0164	0.0164	0.0164	32	32	32	32
				Ref	575	575	575	575				
Liability Weighted	49											

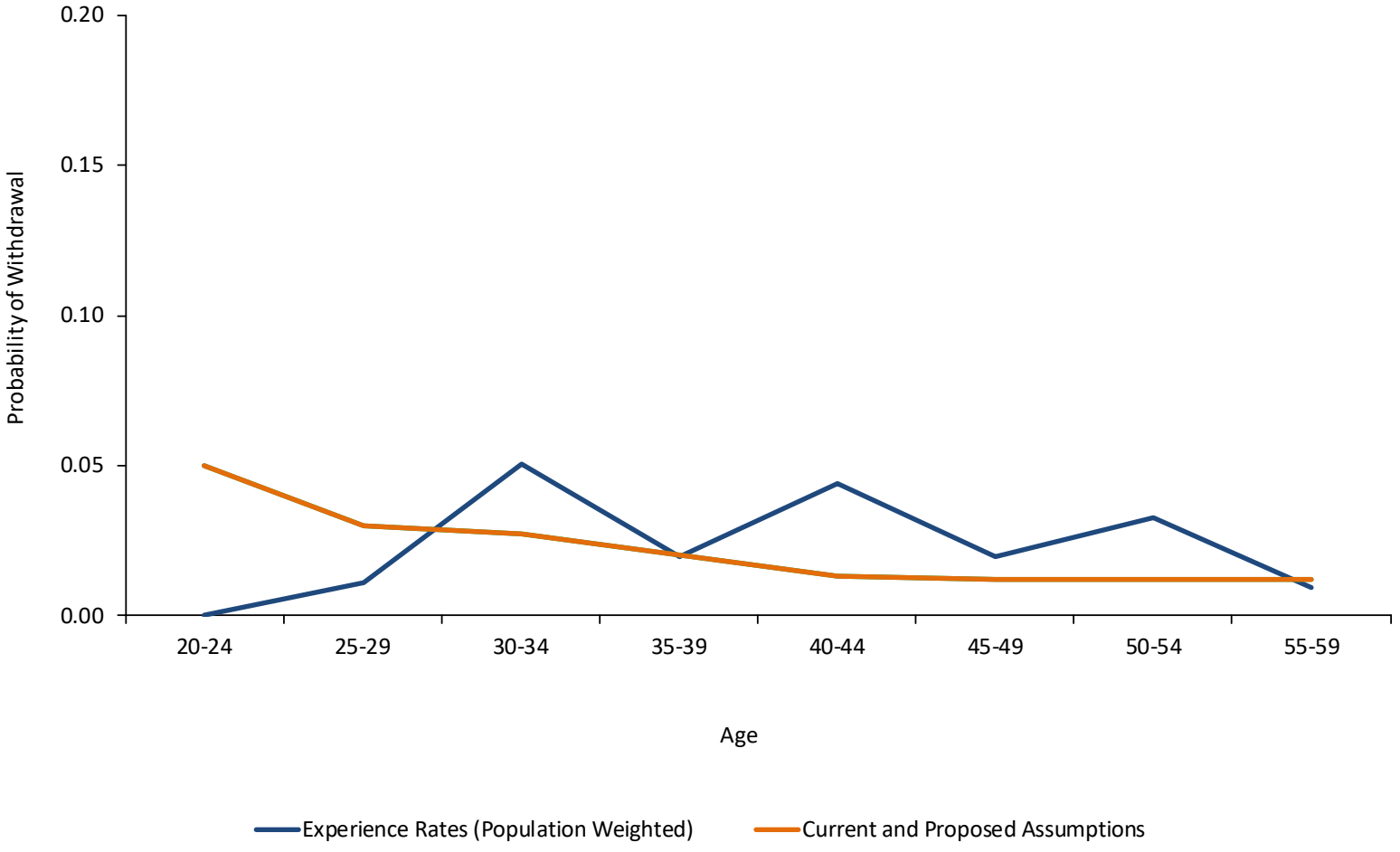
2011-2015 Experience Study	0.0212	0.0155
2006-2010 Experience Study	0.0213	0.0203
2001-2005 Experience Study	0.0191	N/A

** Sample rates are taken from the midpoint of age group.*

Age Based Withdrawal (Years of Service 5 and Up) Experience
LAW ENFORCEMENT Female Members
2016, 2017 & 2019



Age Based Withdrawal (Years of Service 5 and Up) Experience
LAW ENFORCEMENT Female Members
2016, 2017 & 2019



SECTION VI

DETAILED RESULTS – DISABILITY EXPERIENCE

Disability Experience
STATE Male Members
2016-2020

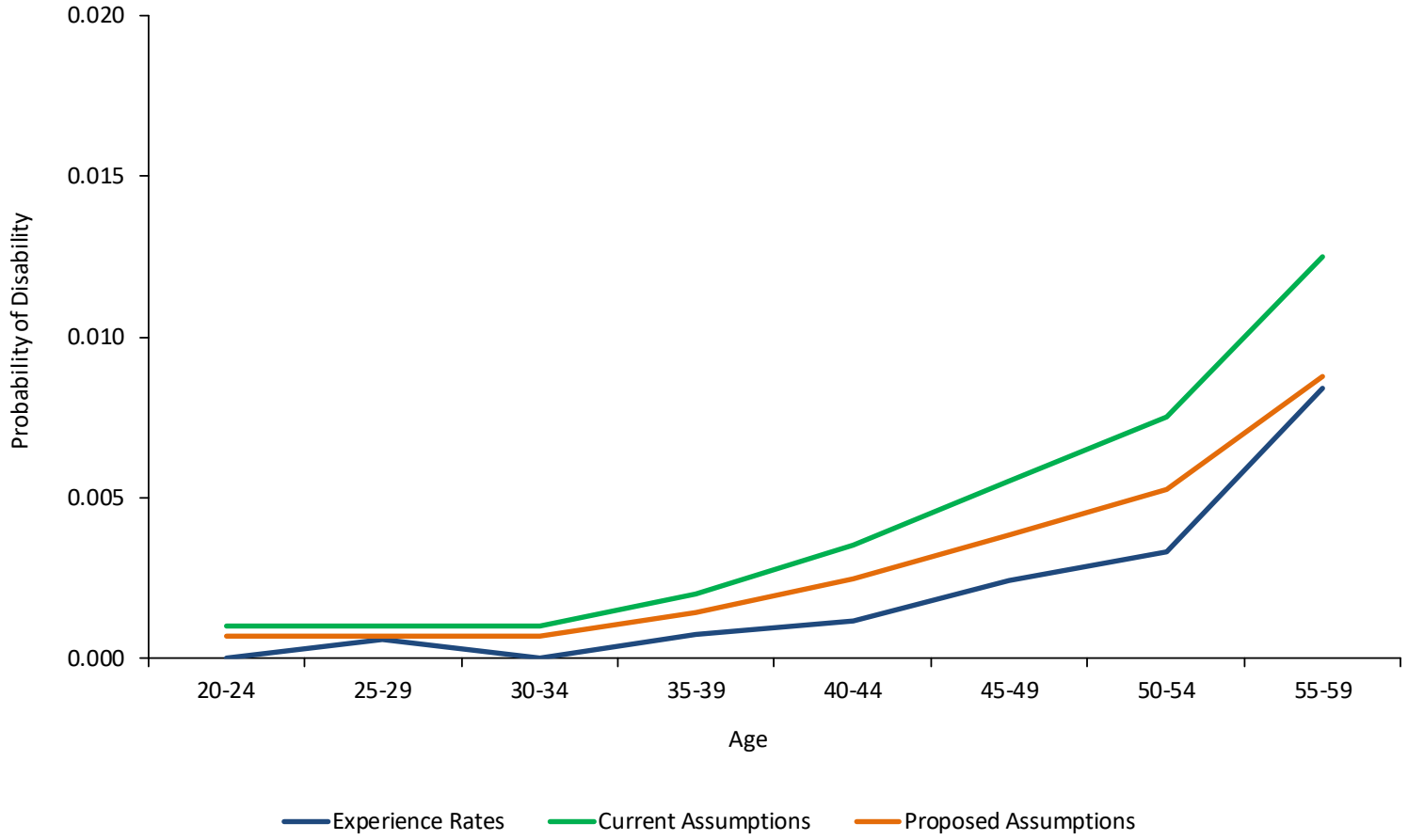
Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0010	0.0007	-	-
20-24	-	138	0.0000	0.0010	0.0007	-	-
25-29	2	3,489	0.0006	0.0010	0.0007	3	2
30-34	-	10,289	0.0000	0.0010	0.0007	12	8
35-39	10	13,924	0.0007	0.0020	0.0014	29	20
40-44	18	15,398	0.0012	0.0035	0.0025	55	39
45-49	49	20,305	0.0024	0.0055	0.0039	113	79
50-54	71	21,434	0.0033	0.0075	0.0053	168	117
55-59	105	12,501	0.0084	0.0125	0.0088	148	104
Totals	255	97,478	0.0026	0.0054	0.0038	528	369
			Ref	1092	1092		

2011-2015 Experience Study	0.0048
2006-2010 Experience Study	0.0080
2001-2005 Experience Study	0.0093

** Sample rates are taken from the midpoint of age group.*

76 members not shown in the above chart retired under disability provisions at age 60 or older.

Disability Experience
STATE Male Members
2016-2020



Disability Experience
STATE Female Members
2016-2020

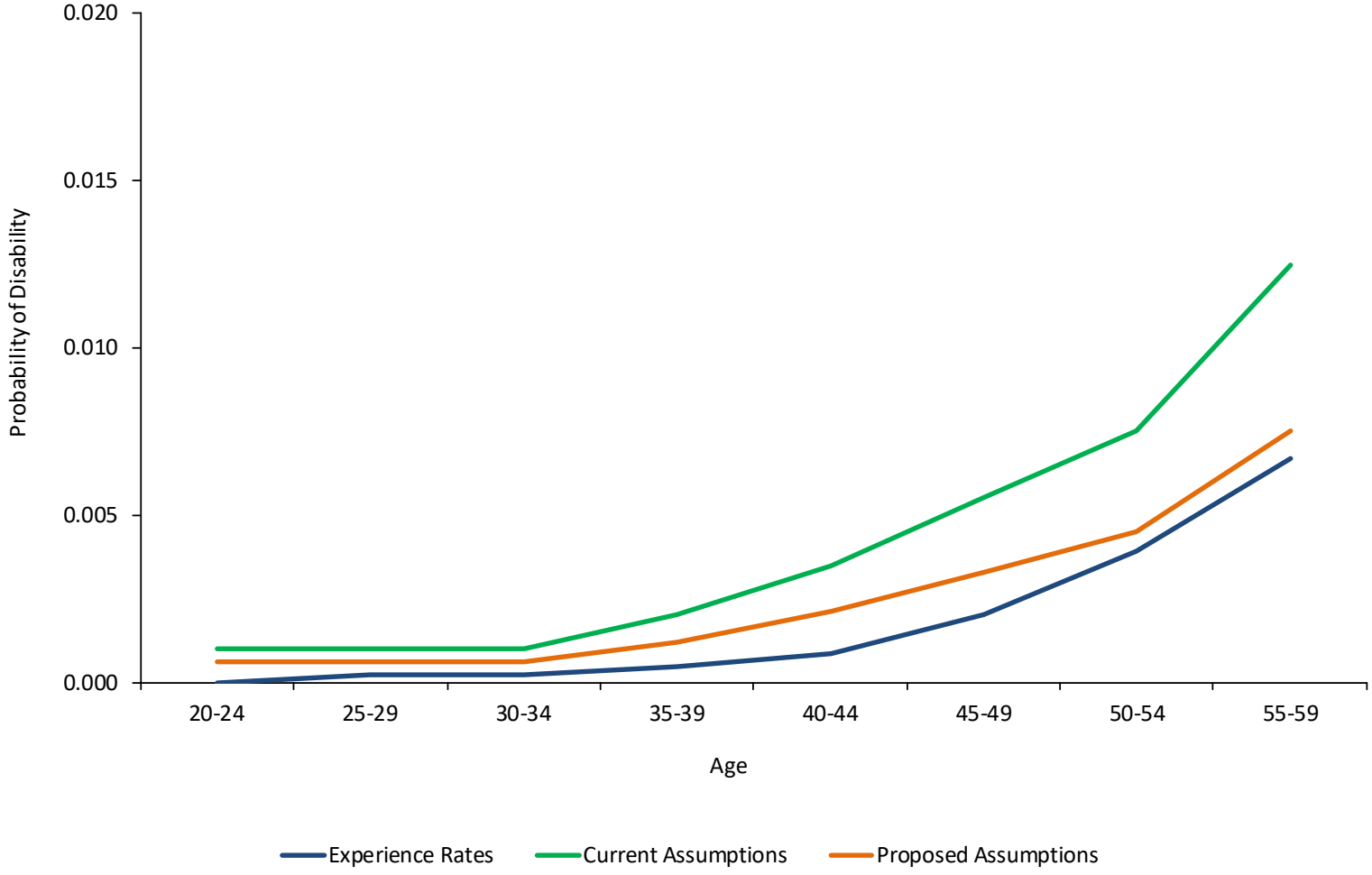
Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	35	0.0000	0.0010	0.0006	-	-
20-24	-	122	0.0000	0.0010	0.0006	-	-
25-29	1	4,260	0.0002	0.0010	0.0006	4	3
30-34	3	12,466	0.0002	0.0010	0.0006	14	9
35-39	8	16,665	0.0005	0.0020	0.0012	34	21
40-44	15	17,806	0.0008	0.0035	0.0021	64	38
45-49	46	22,556	0.0020	0.0055	0.0033	125	75
50-54	97	24,781	0.0039	0.0075	0.0045	195	117
55-59	116	17,330	0.0067	0.0125	0.0075	206	124
Totals	286	116,021	0.0025	0.0055	0.0033	642	387
			Ref	1092	1092		

2011-2015 Experience Study	0.0041
2006-2010 Experience Study	0.0075
2001-2005 Experience Study	0.0092

** Sample rates are taken from the midpoint of age group.*

81 members not shown in the above chart retired under disability provisions at age 60 or older.

Disability Experience
STATE Female Members
2016-2020



Disability Experience
LOCAL Male Members
2016-2020

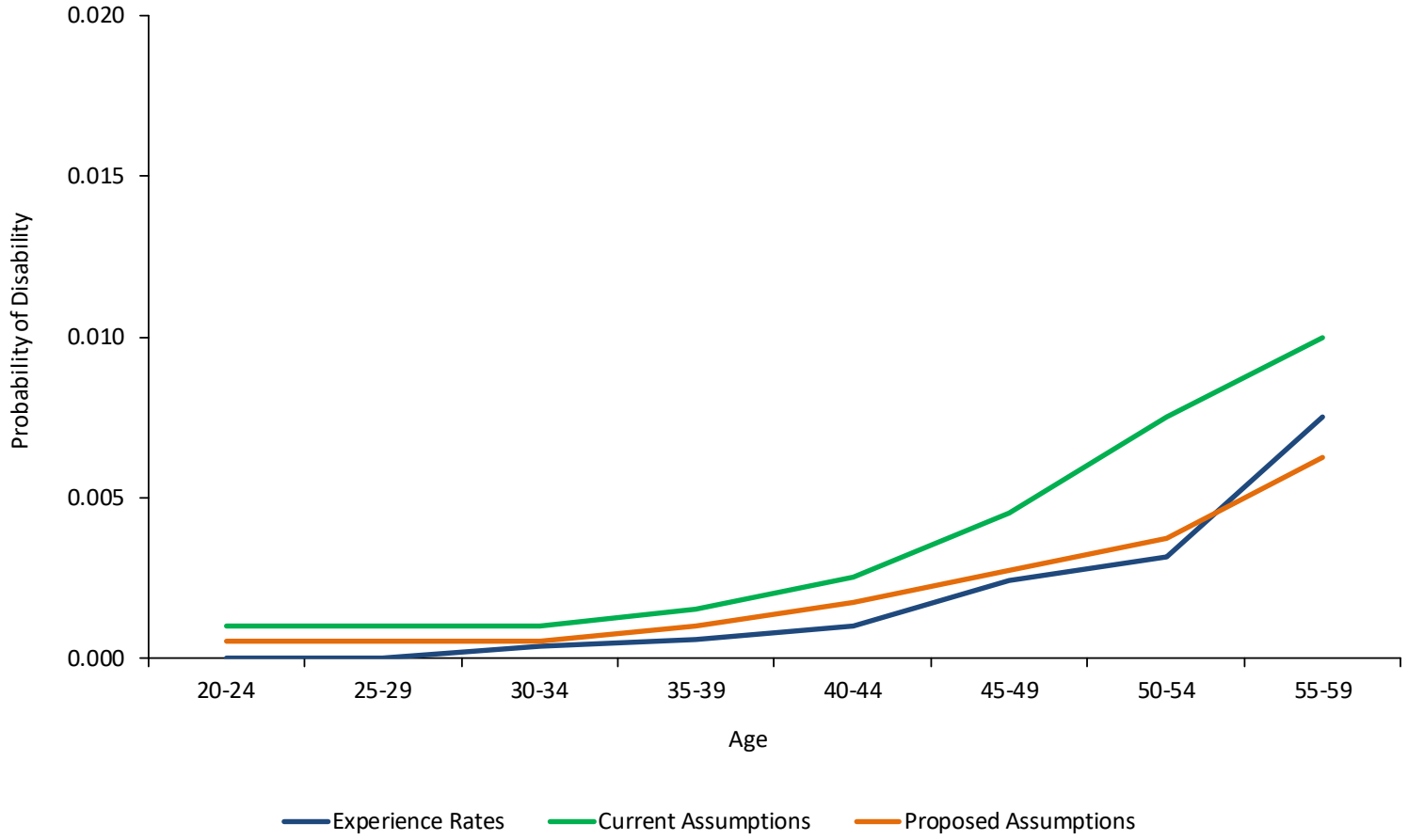
Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0010	0.0005	-	-
20-24	-	484	0.0000	0.0010	0.0005	-	-
25-29	-	5,883	0.0000	0.0010	0.0005	6	3
30-34	6	15,628	0.0004	0.0010	0.0005	17	9
35-39	13	22,580	0.0006	0.0015	0.0010	36	24
40-44	28	27,443	0.0010	0.0025	0.0018	73	49
45-49	89	36,608	0.0024	0.0045	0.0028	171	101
50-54	126	39,865	0.0032	0.0075	0.0038	297	157
55-59	219	29,108	0.0075	0.0100	0.0063	282	173
Totals	481	177,599	0.0027	0.0050	0.0029	882	516
			Ref	1093	1092		

2011-2015 Experience Study	0.0039
2006-2010 Experience Study	0.0061
2001-2005 Experience Study	0.0073

** Sample rates are taken from the midpoint of age group.*

151 members not shown in the above chart retired under disability provisions at age 60 or older.

Disability Experience
LOCAL Male Members
2016-2020



Disability Experience
LOCAL Female Members
2016-2020

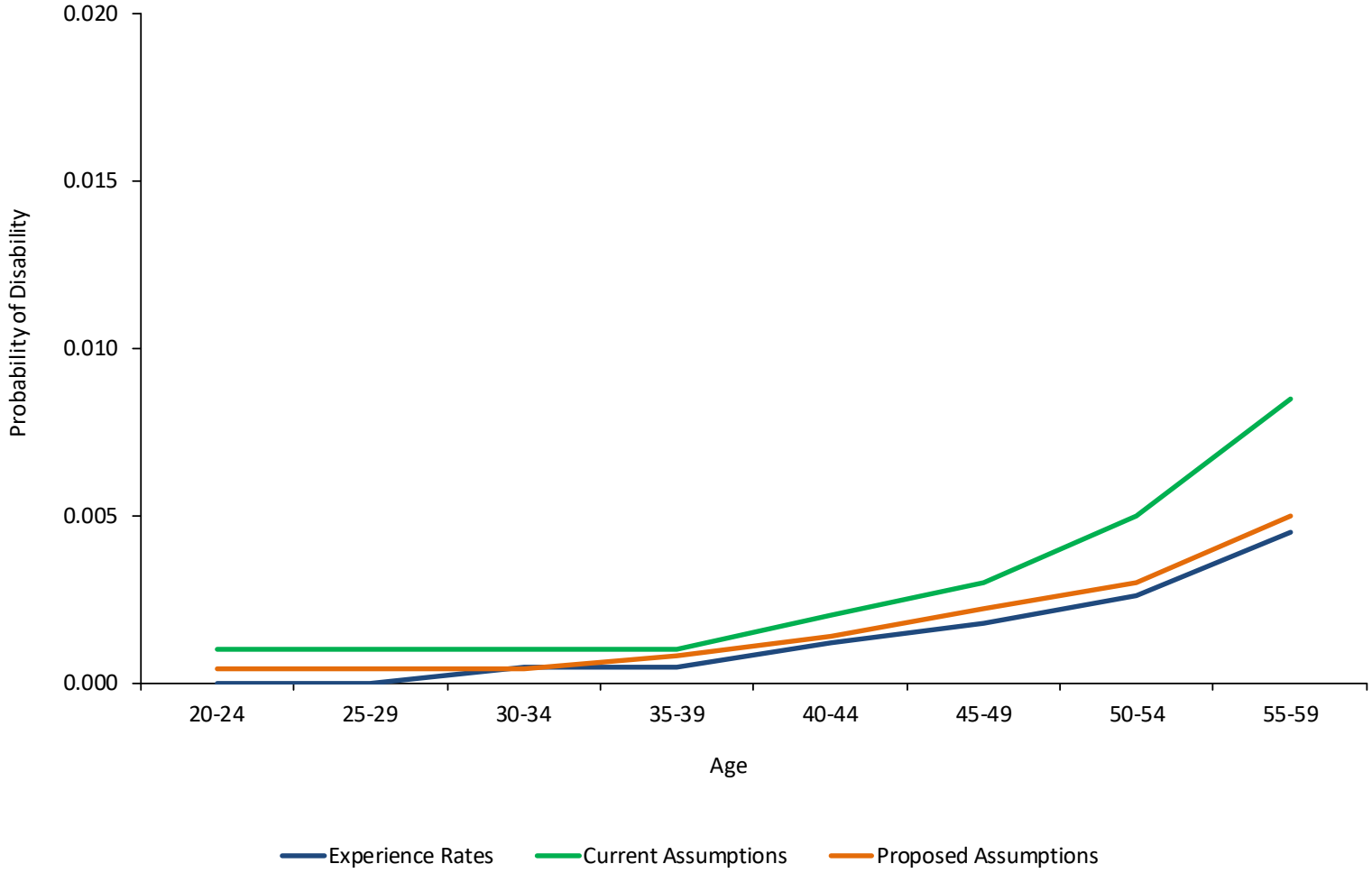
Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0010	0.0004	-	-
20-24	-	472	0.0000	0.0010	0.0004	-	-
25-29	-	6,304	0.0000	0.0010	0.0004	6	3
30-34	8	17,945	0.0004	0.0010	0.0004	18	8
35-39	13	26,957	0.0005	0.0010	0.0008	31	23
40-44	41	33,768	0.0012	0.0020	0.0014	68	48
45-49	78	44,256	0.0018	0.0030	0.0022	139	98
50-54	125	47,611	0.0026	0.0050	0.0030	247	150
55-59	172	38,310	0.0045	0.0085	0.0050	310	182
Totals	437	215,623	0.0020	0.0038	0.0024	819	512
			Ref	1094	1092		

2011-2015 Experience Study	0.0032
2006-2010 Experience Study	0.0047
2001-2005 Experience Study	0.0060

** Sample rates are taken from the midpoint of age group.*

160 members not shown in the above chart retired under disability provisions at age 60 or older.

Disability Experience
LOCAL Female Members
2016-2020



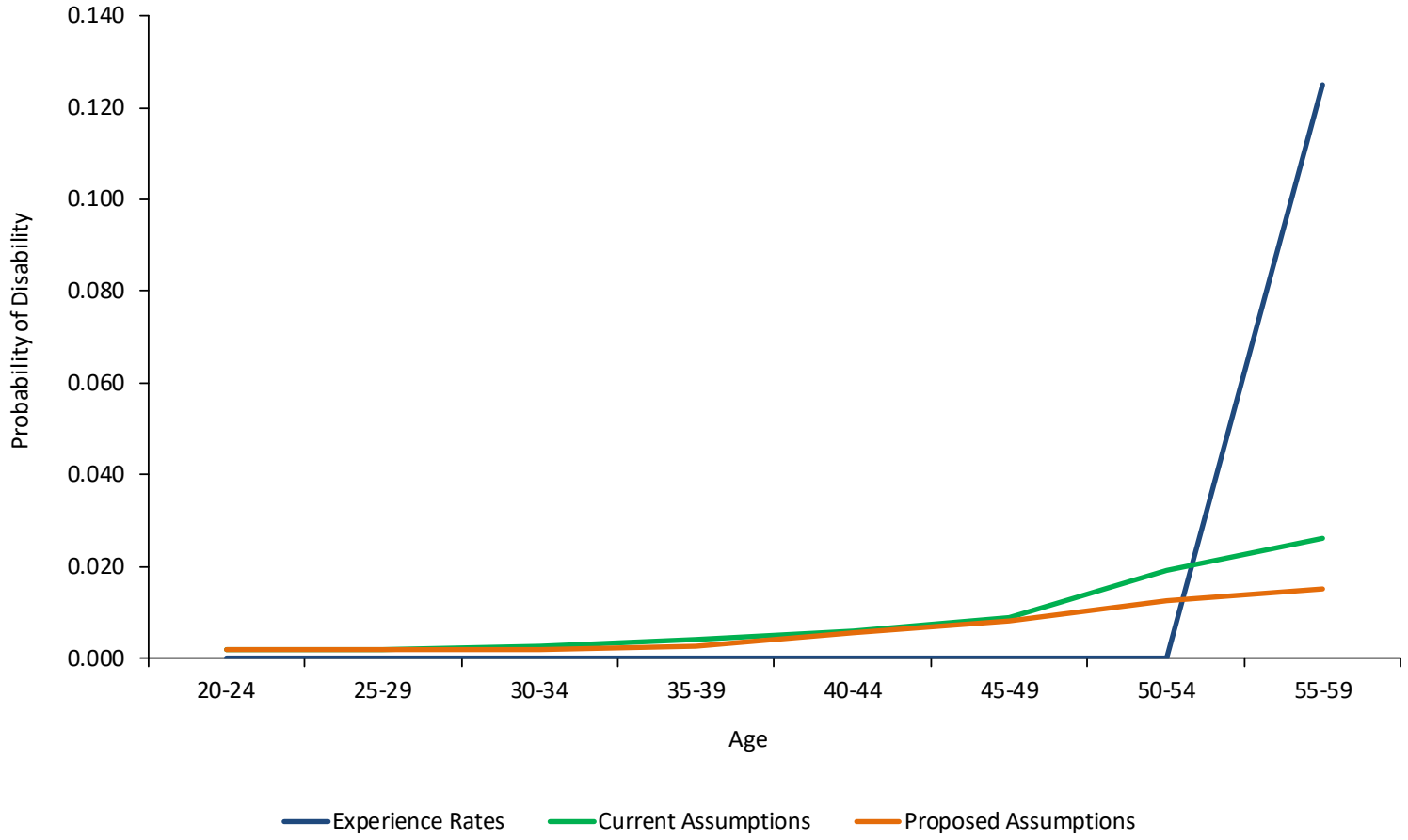
Disability Experience
PUBLIC SAFETY Male Members
2016-2020

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0020	0.0020	-	-
20-24	-	-	N\A	0.0020	0.0020	-	-
25-29	-	6	0.0000	0.0020	0.0020	-	-
30-34	-	20	0.0000	0.0025	0.0020	-	-
35-39	-	30	0.0000	0.0040	0.0025	-	-
40-44	-	41	0.0000	0.0060	0.0055	-	-
45-49	-	36	0.0000	0.0090	0.0080	-	-
50-54	-	12	0.0000	0.0190	0.0125	-	-
55-59	1	8	0.1250	0.0260	0.0150	-	-
Totals	1	153	0.0065	0.0000	0.0000	-	-
			Ref	1095	1221		

2011-2015 Experience Study	0.0000
2006-2010 Experience Study	0.0030
2001-2005 Experience Study	0.0143

** Sample rates are taken from the midpoint of age group.*

Disability Experience
PUBLIC SAFETY Male Members
2016-2020



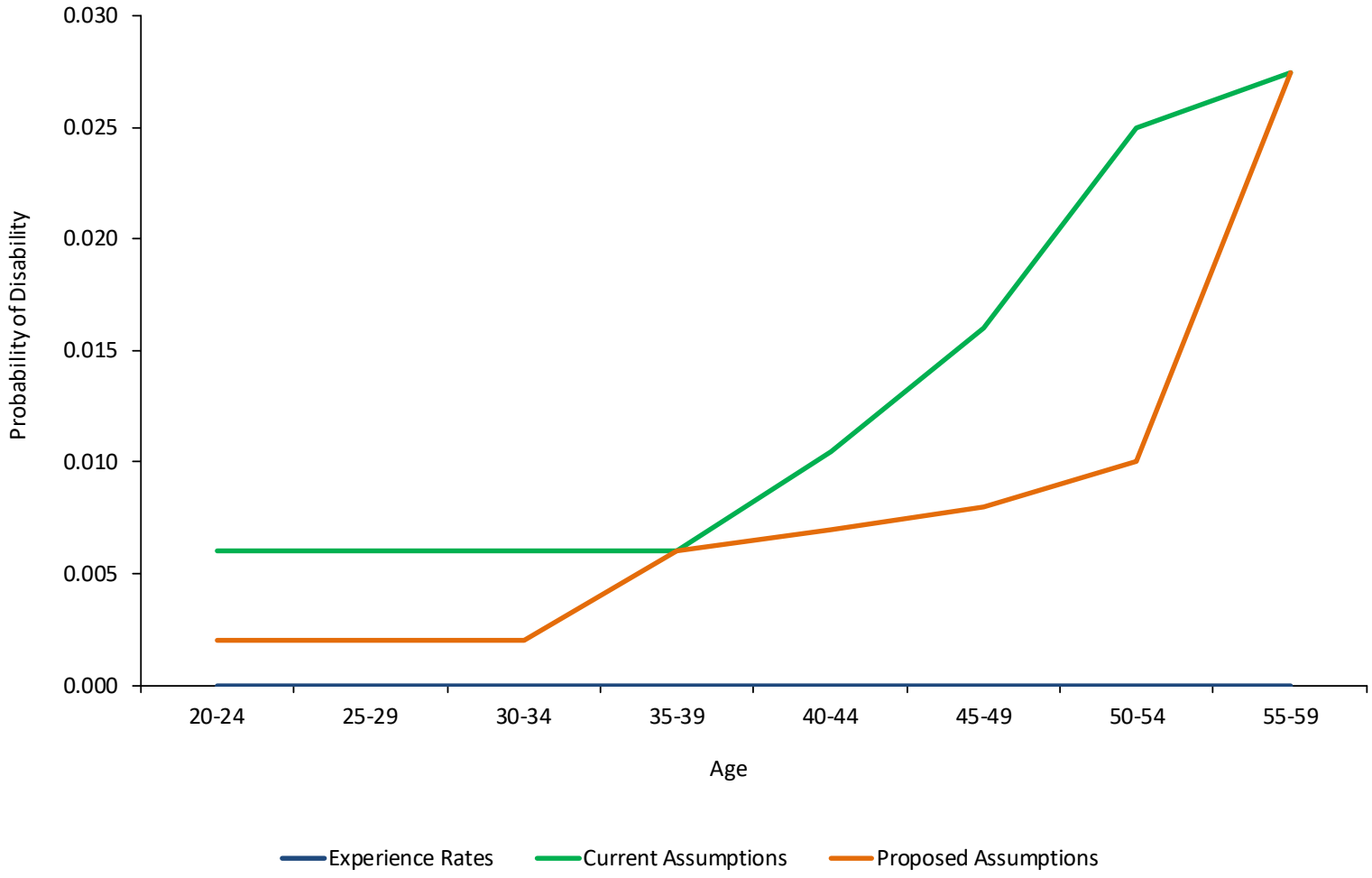
Disability Experience
PUBLIC SAFETY Female Members
2016-2020

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0060	0.0020	-	-
20-24	-	-	N\A	0.0060	0.0020	-	-
25-29	-	2	0.0000	0.0060	0.0020	-	-
30-34	-	7	0.0000	0.0060	0.0020	-	-
35-39	-	2	0.0000	0.0060	0.0060	-	-
40-44	-	-	N\A	0.0105	0.0070	-	-
45-49	-	1	0.0000	0.0160	0.0080	-	-
50-54	-	-	N\A	0.0250	0.0100	-	-
55-59	-	3	0.0000	0.0275	0.0275	-	-
Totals	-	15	0.0000	0.0000	0.0000	-	-
			Ref	1096	1222		

2011-2015 Experience Study	0.0000
2006-2010 Experience Study	0.0263
2001-2005 Experience Study	0.0104

** Sample rates are taken from the midpoint of age group.*

Disability Experience
PUBLIC SAFETY Female Members
2016-2020



Disability Experience
LAW ENFORCEMENT Male Members
2016-2020

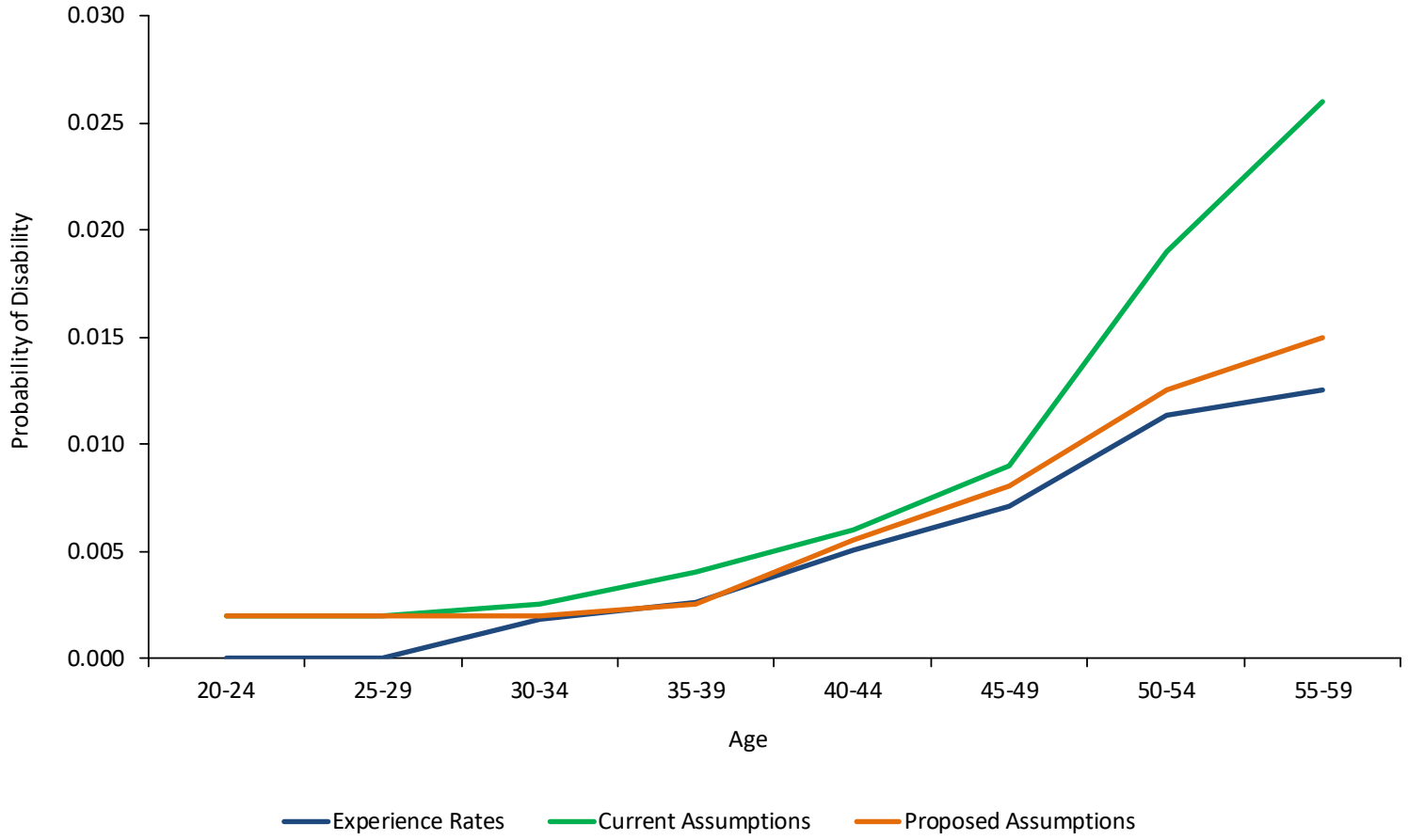
Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0020	0.0020	-	-
20-24	-	20	0.0000	0.0020	0.0020	-	-
25-29	-	1,094	0.0000	0.0020	0.0020	2	2
30-34	6	3,311	0.0018	0.0025	0.0020	9	7
35-39	11	4,278	0.0026	0.0040	0.0025	18	12
40-44	29	5,779	0.0050	0.0060	0.0055	36	32
45-49	44	6,174	0.0071	0.0090	0.0080	58	50
50-54	26	2,288	0.0114	0.0190	0.0125	41	27
55-59	11	880	0.0125	0.0260	0.0150	22	13
Totals	127	23,824	0.0053	0.0078	0.0060	186	143
			Ref	1095	1221		

2011-2015 Experience Study	0.0058
2006-2010 Experience Study	0.0103
2001-2005 Experience Study	0.0156

** Sample rates are taken from the midpoint of age group.*

5 members not shown in the above chart retired under disability provisions at age 60 or older.

Disability Experience
LAW ENFORCEMENT Male Members
2016-2020



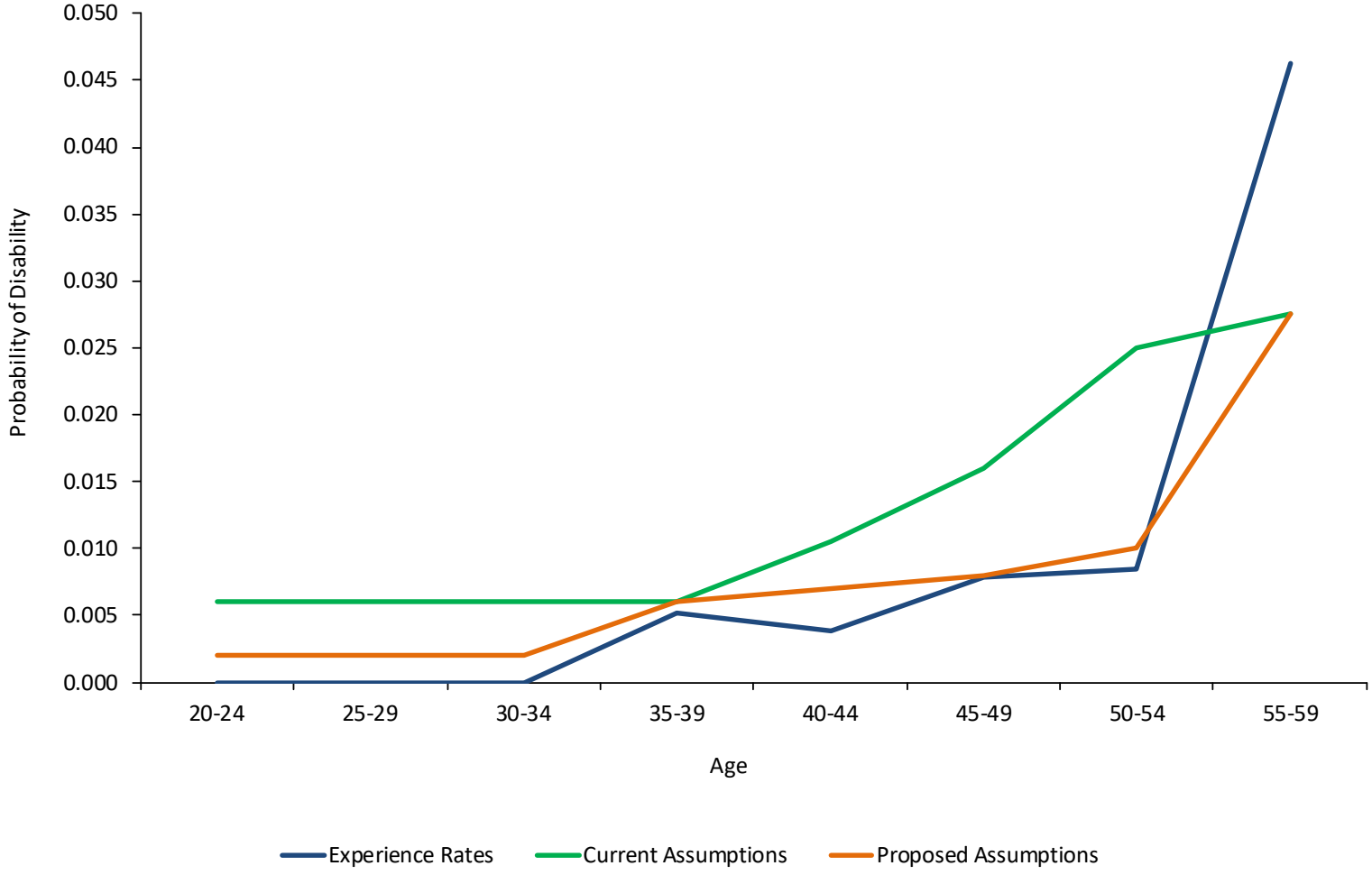
Disability Experience
LAW ENFORCEMENT Female Members
2016-2020

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0060	0.0020	-	-
20-24	-	1	0.0000	0.0060	0.0020	-	-
25-29	-	155	0.0000	0.0060	0.0020	1	-
30-34	-	413	0.0000	0.0060	0.0020	2	1
35-39	3	583	0.0051	0.0060	0.0060	4	3
40-44	3	772	0.0039	0.0105	0.0070	8	5
45-49	6	766	0.0078	0.0160	0.0080	12	6
50-54	3	354	0.0085	0.0250	0.0100	8	4
55-59	8	173	0.0462	0.0275	0.0275	5	4
Totals	23	3,217	0.0071	0.0124	0.0071	40	23
			Ref	1096	1222		

2011-2015 Experience Study	0.0097
2006-2010 Experience Study	0.0183
2001-2005 Experience Study	0.0254

** Sample rates are taken from the midpoint of age group.*

Disability Experience
LAW ENFORCEMENT Female Members
2016-2020



SECTION VII

DETAILED RESULTS – NORMAL AND EARLY RETIREMENT EXPERIENCE

Normal Age Based Retirement Experience
STATE Male Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
65	415	1,674	0.2479	0.2641	0.2200	0.2200	368	368
66	257	1,207	0.2129	0.2168	0.2200	0.2200	266	266
67	193	935	0.2064	0.2142	0.2007	0.2000	188	187
68	153	674	0.2270	0.2600	0.2008	0.2000	135	135
69	91	534	0.1704	0.1841	0.2000	0.2000	107	107
70	78	402	0.1940	0.2113	0.2000	0.2000	80	80
71	55	314	0.1752	0.2125	0.2000	0.2000	63	63
72	47	248	0.1895	0.1991	0.1518	0.2000	38	50
73	38	197	0.1929	0.1883	0.1513	0.2000	30	39
74	28	146	0.1918	0.2345	0.1500	0.2000	22	29
75	17	92	0.1848	0.2351	0.1500	0.2000	14	18
76	12	80	0.1500	0.2406	0.1500	0.2000	12	16
77	11	72	0.1528	0.2300	0.1500	0.2000	11	14
78	9	53	0.1698	0.2459	0.1500	0.2000	8	11
79	3	40	0.0750	0.1213	0.1500	0.2000	6	8
80	5	50	0.1000	0.0880	0.2380	0.2500	12	13
81	9	37	0.2432	0.4315	0.2473	0.2500	9	9
82	6	25	0.2400	0.3950	0.2500	0.2500	6	6
83	3	19	0.1579	0.3197	0.2500	0.2500	5	5
84	3	11	0.2727	0.3989	0.3182	0.2500	4	3
85	8	12	0.6667	0.6850	1.0000	1.0000	12	12
Totals	1,441	6,822	0.2112	0.2308	0.2044	0.2109	1,394	1,439
				Ref	2094	3256		
Liability Weighted	1,575							

2011-2015 Experience Study	0.2403
2006-2010 Experience Study	0.2042
2001-2005 Experience Study	N/A

Normal Age Based Retirement Experience
STATE Male Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

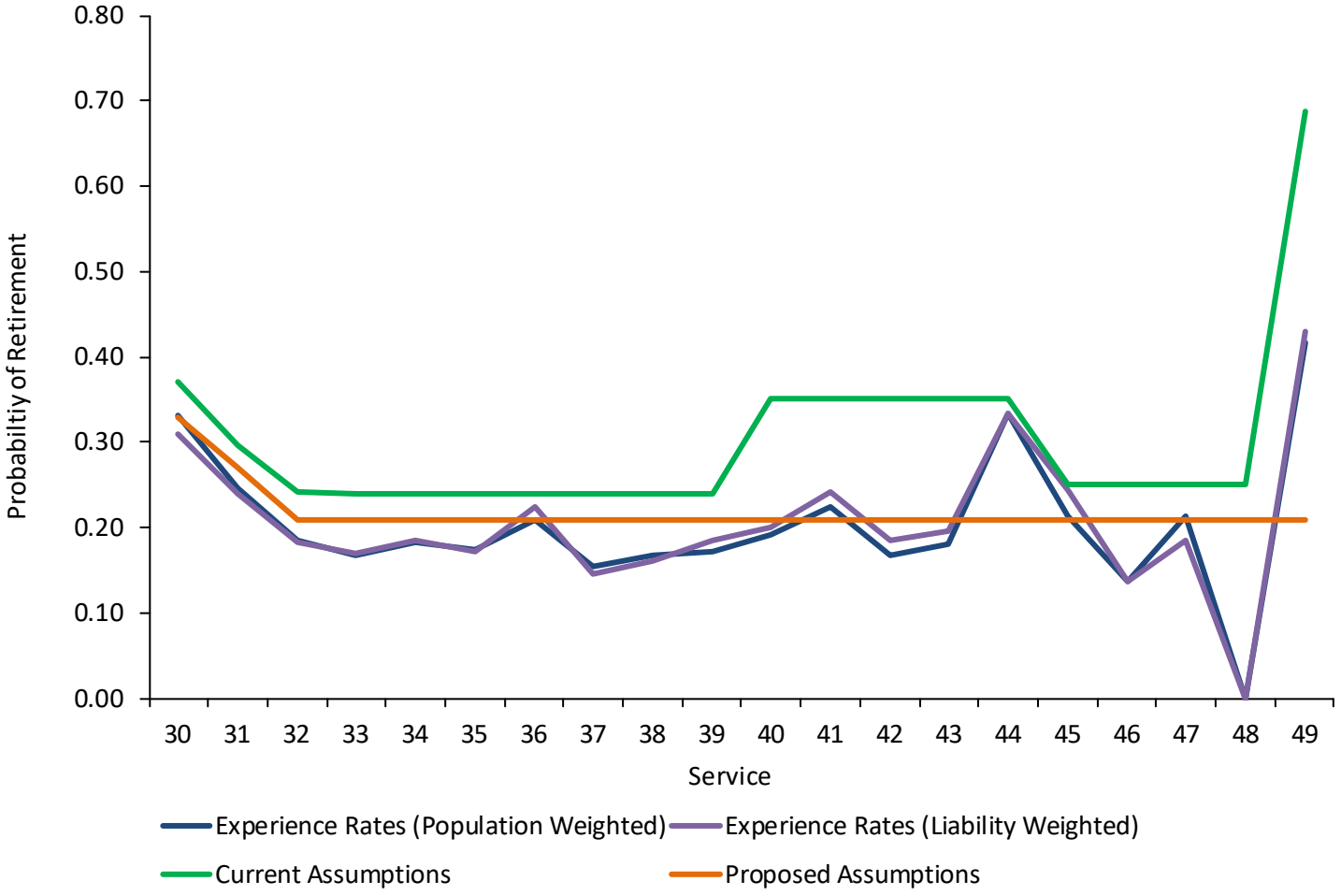
Normal Service Based Retirement Experience
STATE Male Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

Service	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
30	764	2,305	0.3315	0.3104	0.3700	0.3300	853	761
31	528	2,143	0.2464	0.2395	0.2969	0.2700	636	579
32	288	1,566	0.1839	0.1817	0.2421	0.2100	379	329
33	195	1,164	0.1675	0.1697	0.2400	0.2100	279	244
34	165	903	0.1827	0.1856	0.2400	0.2100	217	190
35	121	698	0.1734	0.1728	0.2400	0.2100	168	147
36	105	505	0.2079	0.2233	0.2400	0.2100	121	106
37	58	375	0.1547	0.1466	0.2400	0.2100	90	79
38	55	327	0.1682	0.1598	0.2400	0.2100	78	69
39	43	250	0.1720	0.1851	0.2400	0.2100	60	53
40	34	178	0.1910	0.2003	0.3500	0.2100	62	37
41	30	134	0.2239	0.2416	0.3500	0.2100	47	28
42	17	102	0.1667	0.1845	0.3500	0.2100	36	21
43	13	72	0.1806	0.1957	0.3500	0.2100	25	15
44	17	51	0.3333	0.3339	0.3500	0.2100	18	11
45	6	28	0.2143	0.2437	0.2500	0.2100	7	6
46	3	22	0.1364	0.1375	0.2500	0.2100	6	5
47	3	14	0.2143	0.1841	0.2500	0.2100	4	3
48	-	6	0.0000	0.0000	0.2500	0.2100	2	1
49	5	12	0.4167	0.4298	0.6875	0.2100	8	3
50+	N/A	N/A	N/A	N/A	1.0000	1.0000	N/A	N/A
Totals	2,450	10,855	0.2257	0.2178	0.2851	0.2475	3,095	2,687
				Ref	2091	3260		
Liability Weighted	2,365							

2011-2015 Experience Study	0.3277
2006-2010 Experience Study	0.2915
2001-2005 Experience Study	N/A

Not included in the State Male retirements listed in the prior two charts are 62 individuals who retired with unreduced retirement benefits but, according to our data, did not meet the eligibility conditions for unreduced benefits. These members likely made use of the Early Retirement Incentive Program, Service Purchases, or other like programs.

Normal Service Based Retirement Experience
STATE Male Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

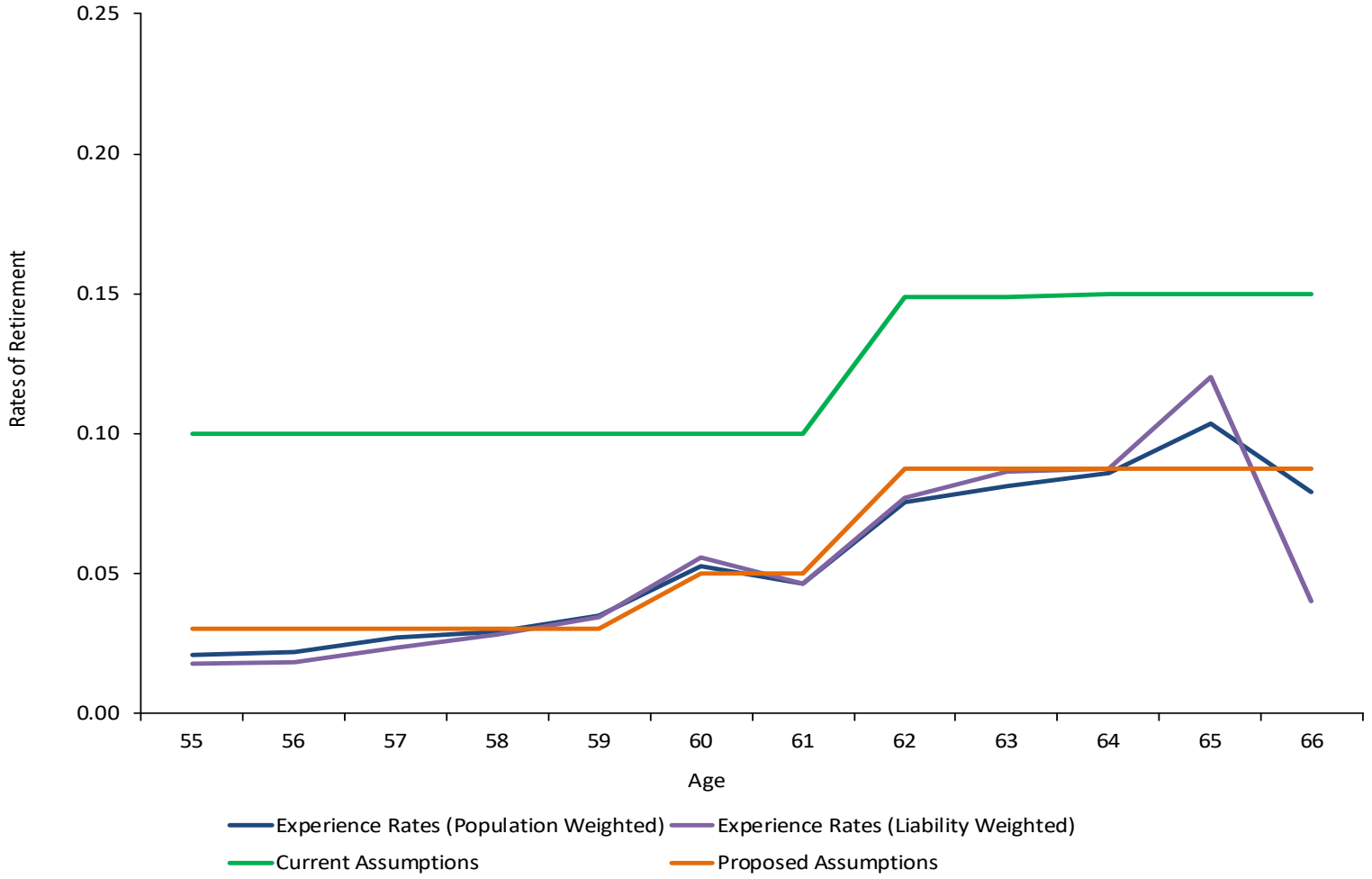


Early Retirement Experience
STATE Male Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
55	26	1,248	0.0208	0.0178	0.1000	0.0300	125	37
56	24	1,091	0.0220	0.0182	0.1000	0.0300	109	33
57	25	929	0.0269	0.0233	0.1000	0.0300	93	28
58	26	885	0.0294	0.0280	0.1000	0.0300	89	27
59	28	799	0.0350	0.0344	0.1000	0.0300	80	24
60	151	2,886	0.0523	0.0559	0.1000	0.0500	289	144
61	122	2,629	0.0464	0.0463	0.1000	0.0500	263	131
62	191	2,527	0.0756	0.0772	0.1486	0.0875	375	221
63	181	2,236	0.0809	0.0862	0.1487	0.0875	333	196
64	168	1,955	0.0859	0.0873	0.1500	0.0875	293	171
65	6	58	0.1034	0.1200	0.1500	0.0875	9	5
66	3	38	0.0789	0.0401	0.1500	0.0875	6	3
Totals	951	17,281	0.0550	0.0492	0.1194	0.0590	2,064	1,020
				Ref	2085	3253		
Liability Weighted	850							

2011-2015 Experience Study	0.1112
2006-2010 Experience Study	0.1136
2001-2005 Experience Study	0.1192

Early Retirement Experience
STATE Male Members
2016-2020



Normal Age Based Retirement Experience
STATE Female Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
65	618	2,202	0.2807	0.3066	0.2200	0.2500	484	551
66	387	1,553	0.2492	0.2677	0.2200	0.2500	342	388
67	267	1,136	0.2350	0.2561	0.2005	0.2500	228	284
68	182	832	0.2188	0.2407	0.2003	0.2200	167	183
69	135	641	0.2106	0.2353	0.2000	0.2200	128	141
70	107	497	0.2153	0.2394	0.2000	0.2200	99	109
71	85	364	0.2335	0.2540	0.2000	0.2200	73	80
72	55	258	0.2132	0.2178	0.2000	0.2200	52	57
73	31	190	0.1632	0.1918	0.2000	0.2200	38	42
74	18	135	0.1333	0.1688	0.2000	0.2200	27	30
75	28	109	0.2569	0.3001	0.2000	0.2500	22	27
76	23	82	0.2805	0.3303	0.2000	0.2500	16	21
77	12	65	0.1846	0.2549	0.2469	0.2500	16	16
78	11	46	0.2391	0.2057	0.2489	0.2500	11	12
79	8	34	0.2353	0.3654	0.2500	0.2500	9	9
80	5	30	0.1667	0.2544	0.2500	0.2500	8	8
81	6	27	0.2222	0.2414	0.2500	0.2500	7	7
82	3	23	0.1304	0.1902	0.2500	0.2500	6	6
83	6	21	0.2857	0.3237	0.2500	0.2500	5	5
84	5	16	0.3125	0.3397	0.2500	0.2500	4	4
85	6	10	0.6000	0.8301	1.0000	1.0000	10	10
Totals	1,998	8,271	0.2416	0.2669	0.2117	0.2406	1,751	1,990
				Ref	2095	3257		
Liability Weighted	2,208							

2011-2015 Experience Study	0.2499
2006-2010 Experience Study	0.2136
2001-2005 Experience Study	N/A

Normal Age Based Retirement Experience
STATE Female Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

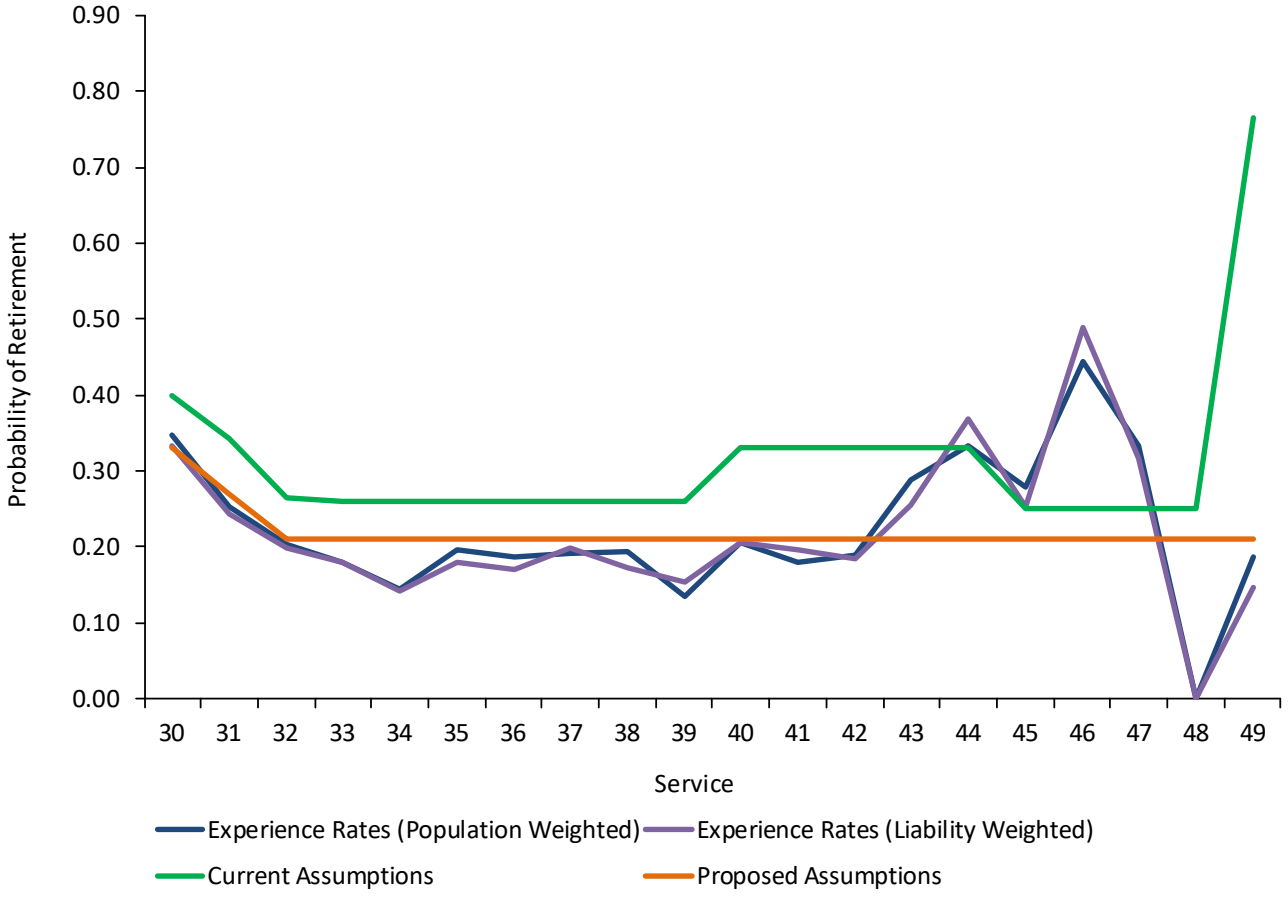
Normal Service Based Retirement Experience
STATE Female Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

Service	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
30	859	2,479	0.3465	0.3332	0.4000	0.3300	992	818
31	565	2,237	0.2526	0.2432	0.3433	0.2700	768	604
32	314	1,552	0.2023	0.1975	0.2645	0.2100	410	326
33	198	1,104	0.1793	0.1800	0.2600	0.2100	287	232
34	115	802	0.1434	0.1421	0.2600	0.2100	209	168
35	116	595	0.1950	0.1798	0.2600	0.2100	155	125
36	84	449	0.1871	0.1696	0.2600	0.2100	117	94
37	67	349	0.1920	0.1985	0.2600	0.2100	91	73
38	51	262	0.1947	0.1728	0.2600	0.2100	68	55
39	28	207	0.1353	0.1535	0.2600	0.2100	54	43
40	33	161	0.2050	0.2060	0.3300	0.2100	53	34
41	18	100	0.1800	0.1967	0.3300	0.2100	33	21
42	14	74	0.1892	0.1834	0.3300	0.2100	24	16
43	13	45	0.2889	0.2564	0.3300	0.2100	15	9
44	9	27	0.3333	0.3676	0.3300	0.2100	9	6
45	5	18	0.2778	0.2528	0.2500	0.2100	5	4
46	4	9	0.4444	0.4896	0.2500	0.2100	2	2
47	2	6	0.3333	0.3166	0.2500	0.2100	2	1
48	-	5	0.0000	0.0000	0.2500	0.2100	1	1
49	3	16	0.1875	0.1464	0.7656	0.2100	12	3
50+	N/A	N/A	N/A	N/A	1.0000	1.0000	N/A	N/A
Totals	2,498	10,497	0.2380	0.2258	0.3149	0.2510	3,306	2,635
				Ref	2093	3260		
Liability Weighted	2,370							

2011-2015 Experience Study	0.3465
2006-2010 Experience Study	0.3267
2001-2005 Experience Study	N/A

Not included in the State Female retirements listed in the prior two charts are 54 individuals who retired with unreduced retirement benefits but, according to our data, did not meet the eligibility conditions for unreduced benefits. These members likely made use of the Early Retirement Incentive Program, Service Purchases, or other like programs.

Normal Service Based Retirement Experience
STATE Female Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

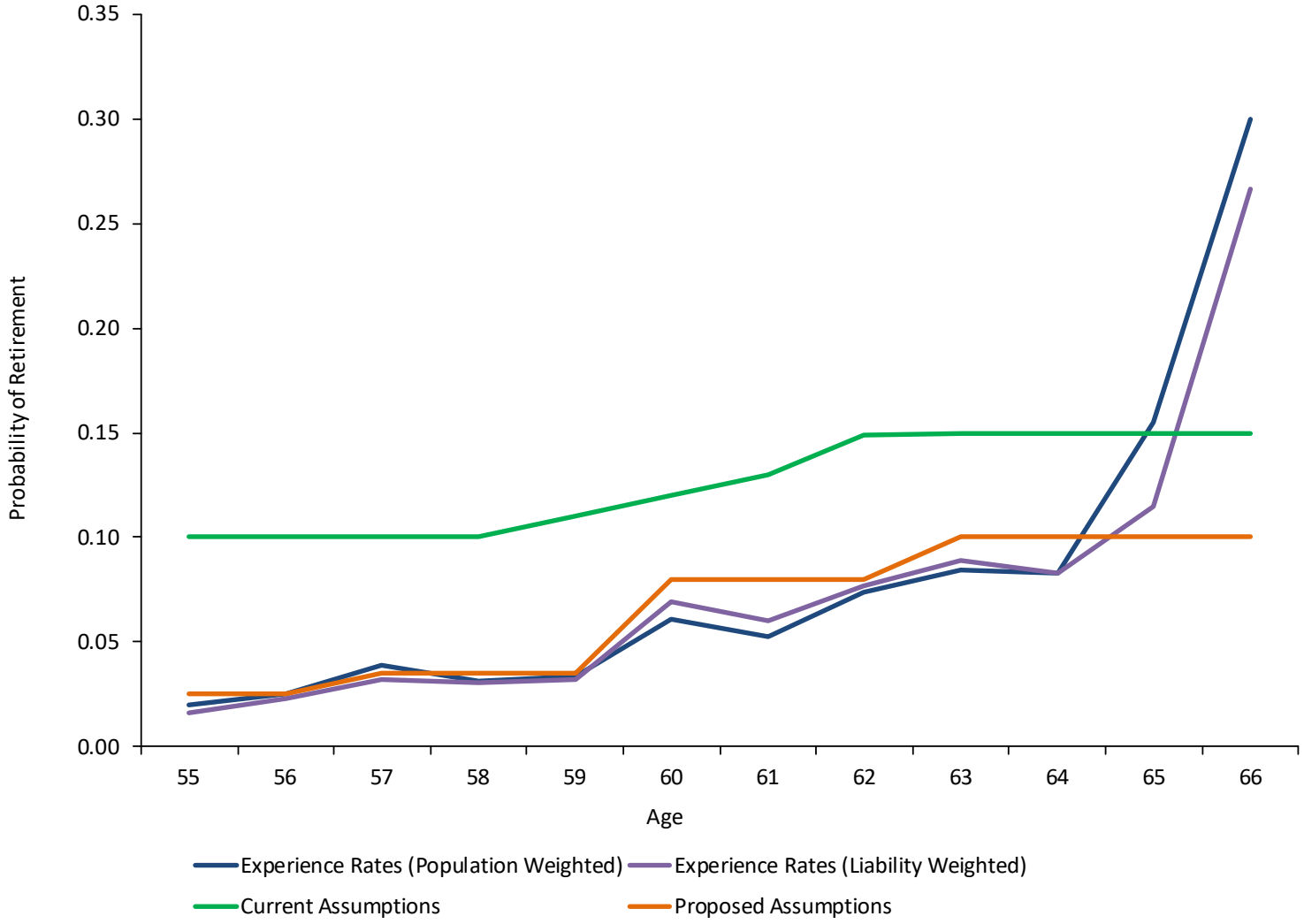


Early Retirement Experience
STATE Female Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
55	25	1,248	0.0200	0.0164	0.1000	0.0250	125	31
56	29	1,151	0.0252	0.0230	0.1000	0.0250	115	29
57	43	1,099	0.0391	0.0319	0.1000	0.0350	110	38
58	31	984	0.0315	0.0303	0.1000	0.0350	98	34
59	32	943	0.0339	0.0319	0.1100	0.0350	104	33
60	251	4,101	0.0612	0.0693	0.1200	0.0800	492	328
61	193	3,683	0.0524	0.0603	0.1300	0.0800	479	295
62	257	3,472	0.0740	0.0772	0.1492	0.0800	518	278
63	254	3,009	0.0844	0.0886	0.1495	0.1000	450	301
64	214	2,589	0.0827	0.0828	0.1500	0.1000	388	259
65	9	58	0.1552	0.1148	0.1500	0.1000	9	6
66	9	30	0.3000	0.2665	0.1500	0.1000	5	3
Totals	1,347	22,367	0.0602	0.0562	0.1293	0.0731	2,893	1,635
				Ref	2086	3254		
Liability Weighted	1,257							

2011-2016 Experience Study	0.1248
2006-2010 Experience Study	0.1245
2001-2005 Experience Study	0.1328

Early Retirement Experience
STATE Female Members
2016-2020

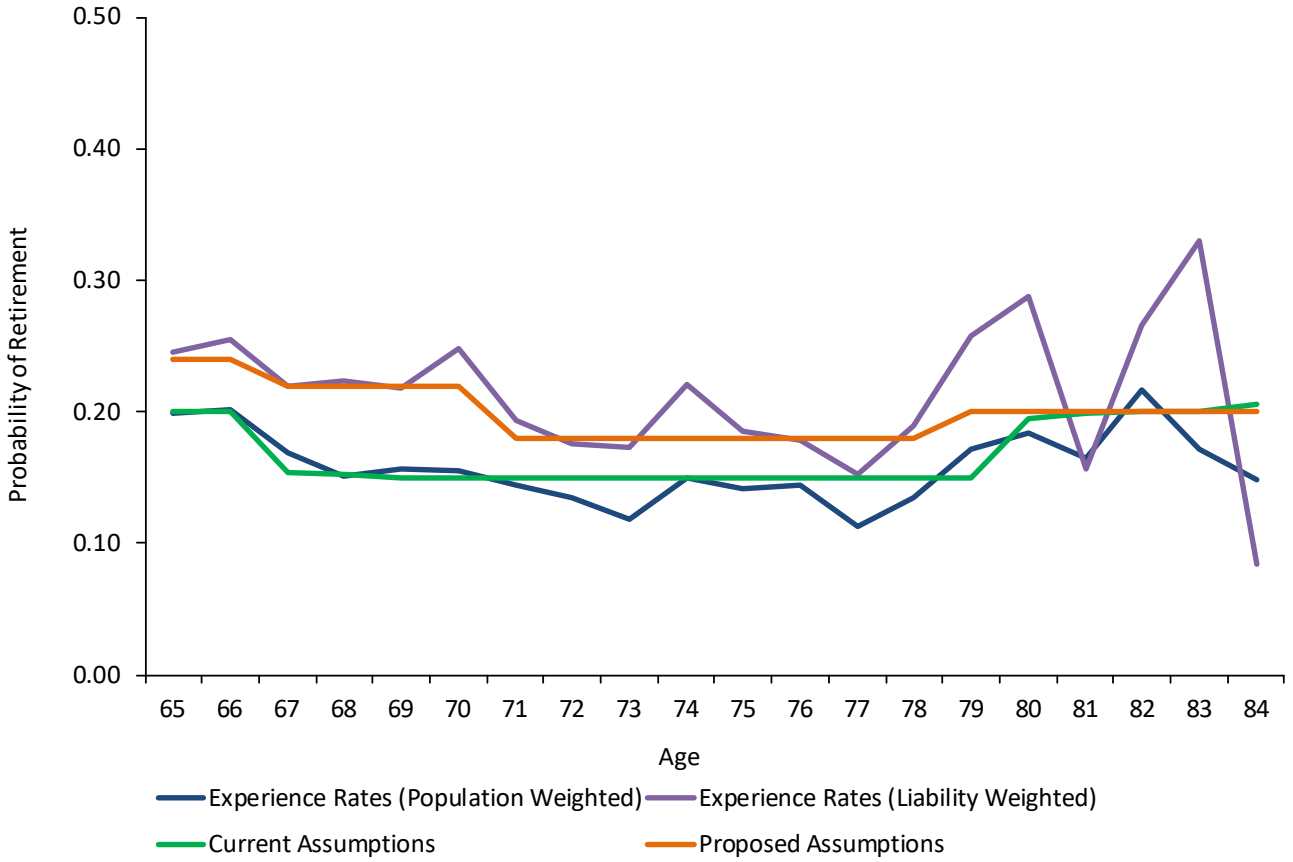


Normal Age Based Retirement Experience
LOCAL Male Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
65	857	4,308	0.1989	0.2457	0.2000	0.2400	862	1,034
66	711	3,525	0.2017	0.2545	0.2000	0.2400	705	846
67	488	2,893	0.1687	0.2191	0.1533	0.2200	444	636
68	368	2,429	0.1515	0.2233	0.1525	0.2200	370	534
69	336	2,151	0.1562	0.2185	0.1500	0.2200	323	473
70	289	1,862	0.1552	0.2484	0.1500	0.2200	279	410
71	218	1,517	0.1437	0.1929	0.1500	0.1800	228	273
72	173	1,286	0.1345	0.1762	0.1500	0.1800	193	231
73	135	1,143	0.1181	0.1726	0.1500	0.1800	171	206
74	146	977	0.1494	0.2212	0.1500	0.1800	147	176
75	115	814	0.1413	0.1854	0.1500	0.1800	122	147
76	102	706	0.1445	0.1783	0.1500	0.1800	106	127
77	64	569	0.1125	0.1519	0.1500	0.1800	85	102
78	62	460	0.1348	0.1891	0.1500	0.1800	69	83
79	68	395	0.1722	0.2580	0.1500	0.2000	59	79
80	58	316	0.1835	0.2878	0.1948	0.2000	62	63
81	43	261	0.1648	0.1567	0.1983	0.2000	52	52
82	51	235	0.2170	0.2665	0.2000	0.2000	47	47
83	30	175	0.1714	0.3306	0.2000	0.2000	35	35
84	21	142	0.1479	0.0835	0.2056	0.2000	29	28
85	117	182	0.6429	0.6208	1.0000	1.0000	182	182
Totals	4,452	26,346	0.1690	0.2309	0.1734	0.2188	4,569	5,764
				Ref	2096	3258		
Liability Weighted	6,085							

2011-2015 Experience Study	0.1811
2006-2010 Experience Study	0.1670
2001-2005 Experience Study	N/A

Normal Age Based Retirement Experience
LOCAL Male Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020



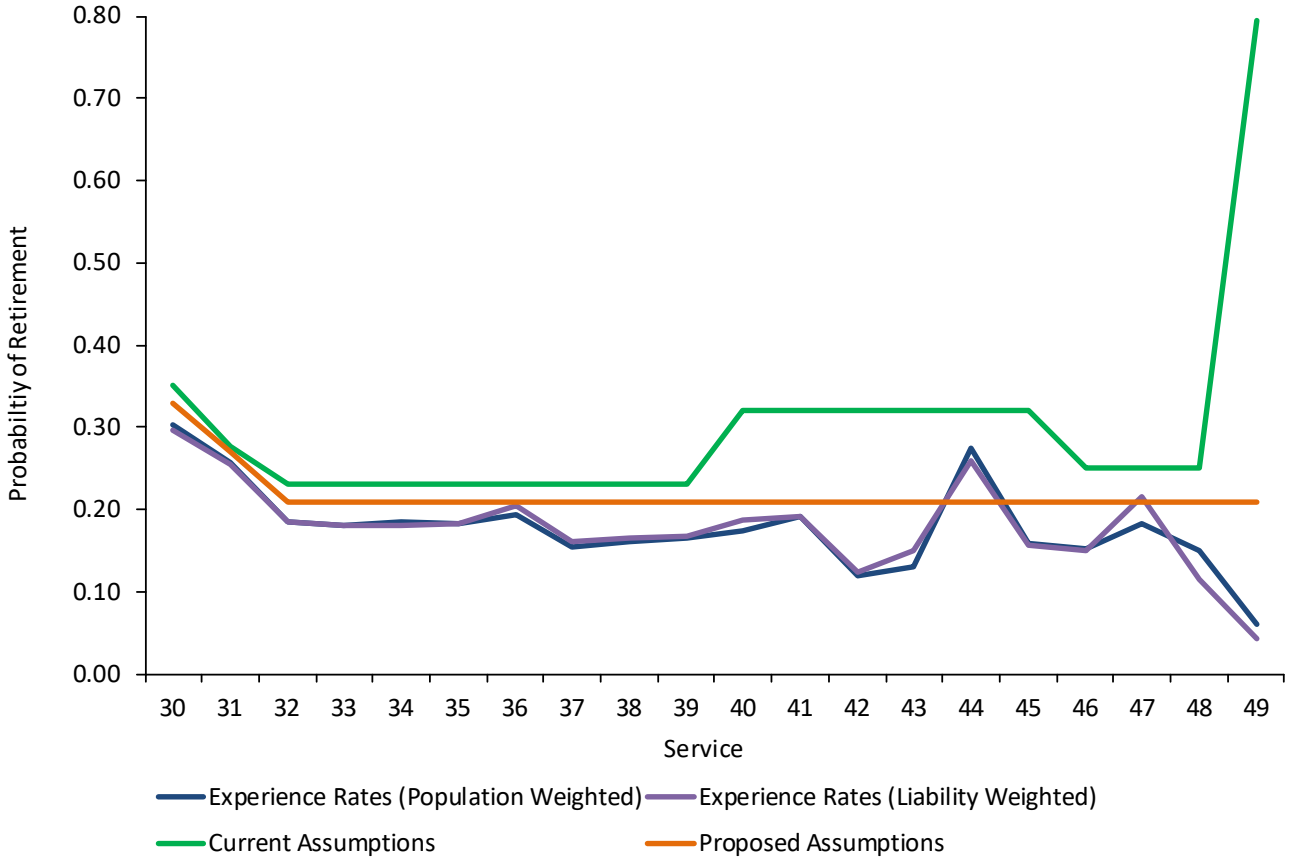
Normal Service Based Retirement Experience
LOCAL Male Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

Service	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
30	1,102	3,636	0.3031	0.2957	0.3500	0.3300	1,273	1,200
31	880	3,430	0.2566	0.2547	0.2765	0.2700	948	926
32	441	2,379	0.1854	0.1843	0.2315	0.2100	551	500
33	317	1,764	0.1797	0.1806	0.2300	0.2100	406	370
34	248	1,343	0.1847	0.1813	0.2300	0.2100	309	282
35	194	1,064	0.1823	0.1831	0.2300	0.2100	245	223
36	155	796	0.1947	0.2043	0.2300	0.2100	183	167
37	95	613	0.1550	0.1604	0.2300	0.2100	141	129
38	87	541	0.1608	0.1652	0.2300	0.2100	124	114
39	74	449	0.1648	0.1666	0.2300	0.2100	103	94
40	59	338	0.1746	0.1869	0.3200	0.2100	108	71
41	47	246	0.1911	0.1918	0.3200	0.2100	79	52
42	21	176	0.1193	0.1243	0.3200	0.2100	56	37
43	16	122	0.1311	0.1495	0.3200	0.2100	39	26
44	26	95	0.2737	0.2596	0.3200	0.2100	30	20
45	10	63	0.1587	0.1564	0.3200	0.2100	20	13
46	7	46	0.1522	0.1494	0.2500	0.2100	12	10
47	6	33	0.1818	0.2159	0.2500	0.2100	8	7
48	3	20	0.1500	0.1158	0.2500	0.2100	5	4
49	2	33	0.0606	0.0425	0.7955	0.2100	26	7
50+	N/A	N/A	N/A	N/A	1.0000	1.0000	N/A	N/A
Totals	3,790	17,187	0.2205	0.2161	0.2715	0.2474	4,667	4,252
				Ref	2098	3260		
Liability Weighted	3,715							

2011-2015 Experience Study	0.2963
2006-2010 Experience Study	0.2726
2001-2005 Experience Study	N/A

Not included in the Local Male retirements listed in the prior two charts are 154 individuals who retired with unreduced retirement benefits but, according to our data, did not meet the eligibility conditions for unreduced benefits. These members likely made use of the Early Retirement Incentive Program, Service Purchases, or other like programs.

Normal Service Based Retirement Experience
LOCAL Male Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

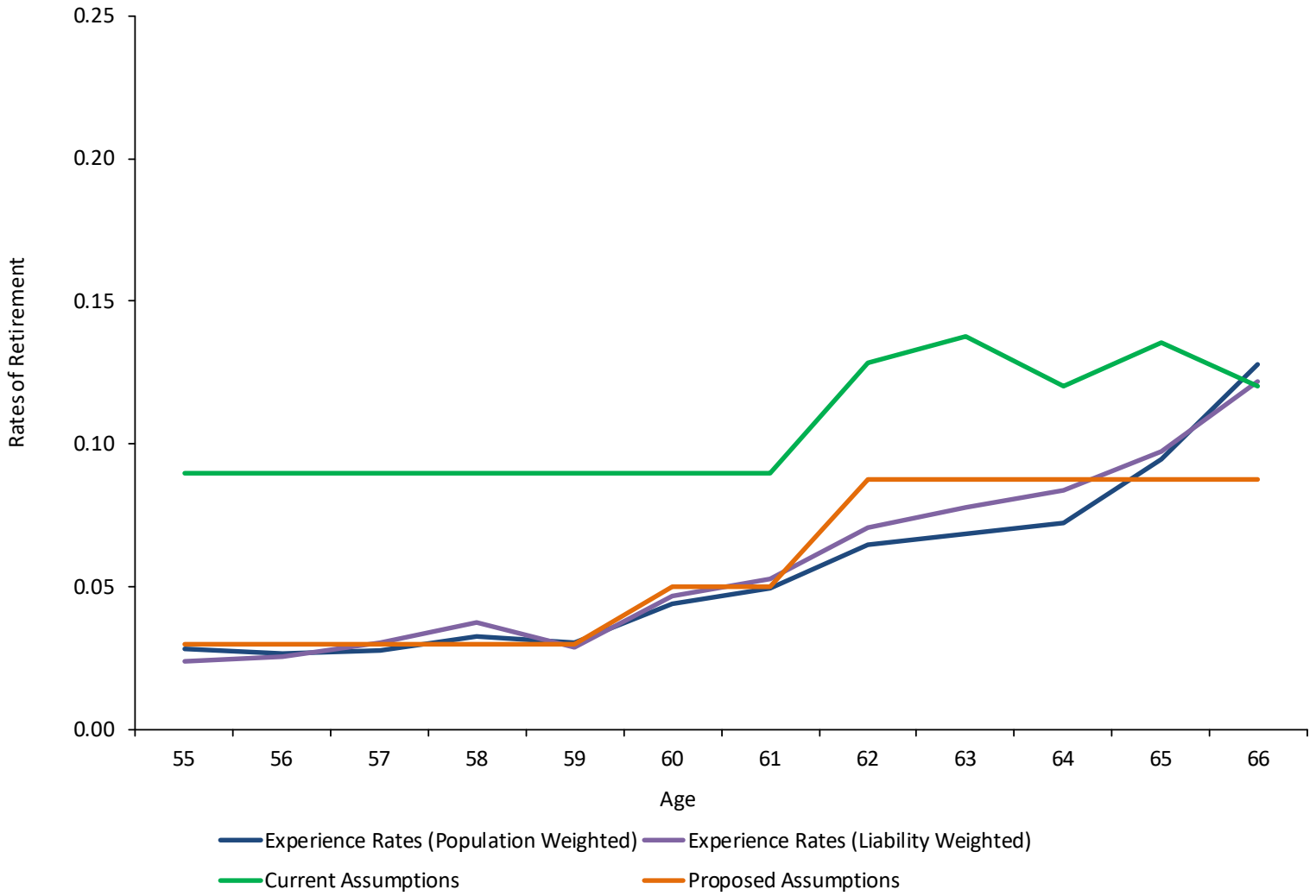


Early Retirement Experience
LOCAL Male Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
55	59	2,091	0.0282	0.0237	0.0900	0.0300	188	63
56	52	1,956	0.0266	0.0256	0.0900	0.0300	176	59
57	50	1,795	0.0279	0.0301	0.0900	0.0300	162	54
58	54	1,658	0.0326	0.0374	0.0900	0.0300	149	50
59	47	1,544	0.0304	0.0286	0.0900	0.0300	139	46
60	304	6,937	0.0438	0.0467	0.0900	0.0500	624	347
61	323	6,535	0.0494	0.0525	0.0900	0.0500	588	327
62	413	6,371	0.0648	0.0706	0.1283	0.0875	818	557
63	396	5,763	0.0687	0.0776	0.1376	0.0875	793	504
64	367	5,078	0.0723	0.0837	0.1205	0.0875	612	444
65	29	306	0.0948	0.0972	0.1354	0.0875	41	27
66	24	188	0.1277	0.1218	0.1200	0.0875	23	16
Totals	2,118	40,222	0.0527	0.0503	0.1072	0.0620	4,313	2,494
				Ref	2087	3253		
Liability Weighted	2,025							

2011-2015 Experience Study	0.0979
2006-2010 Experience Study	0.0996
2001-2005 Experience Study	0.0956

Early Retirement Experience
LOCAL Male Members
2016-2020



Normal Age Based Retirement Experience
LOCAL Female Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
65	1,319	5,300	0.2489	0.2855	0.2000	0.2500	1,060	1,325
66	891	3,901	0.2284	0.2630	0.2000	0.2500	780	975
67	652	3,055	0.2134	0.2429	0.2000	0.2200	611	672
68	466	2,348	0.1985	0.2364	0.1714	0.2200	402	517
69	392	1,946	0.2014	0.2618	0.1711	0.2200	333	428
70	287	1,522	0.1886	0.2232	0.1700	0.2200	259	335
71	243	1,181	0.2058	0.2772	0.1700	0.2200	201	260
72	159	901	0.1765	0.2202	0.1700	0.2200	153	198
73	126	713	0.1767	0.2262	0.1700	0.2200	121	157
74	99	571	0.1734	0.2317	0.1700	0.2200	97	126
75	75	470	0.1596	0.2071	0.1700	0.1800	80	85
76	60	401	0.1496	0.1984	0.1700	0.1800	68	72
77	56	353	0.1586	0.1607	0.1700	0.1800	60	64
78	50	291	0.1718	0.2139	0.1700	0.1800	49	52
79	44	229	0.1921	0.2360	0.2176	0.2200	50	50
80	38	184	0.2065	0.3275	0.2189	0.2200	40	40
81	20	145	0.1379	0.1689	0.2200	0.2200	32	32
82	22	117	0.1880	0.2032	0.2200	0.2200	26	26
83	20	94	0.2128	0.2834	0.2200	0.2200	21	21
84	17	75	0.2267	0.2153	0.2304	0.2200	17	17
85	41	70	0.5857	0.6113	1.0000	1.0000	70	70
Totals	5,077	23,867	0.2127	0.2574	0.1898	0.2314	4,531	5,522
				Ref	2097	3259		
Liability Weighted	6,143							

2011-2015 Experience Study	0.2182
2006-2010 Experience Study	0.1891
2001-2005 Experience Study	N/A

Normal Age Based Retirement Experience
LOCAL Female Members – Attaining Age 65 Prior to 30 Years of Service
2016-2020

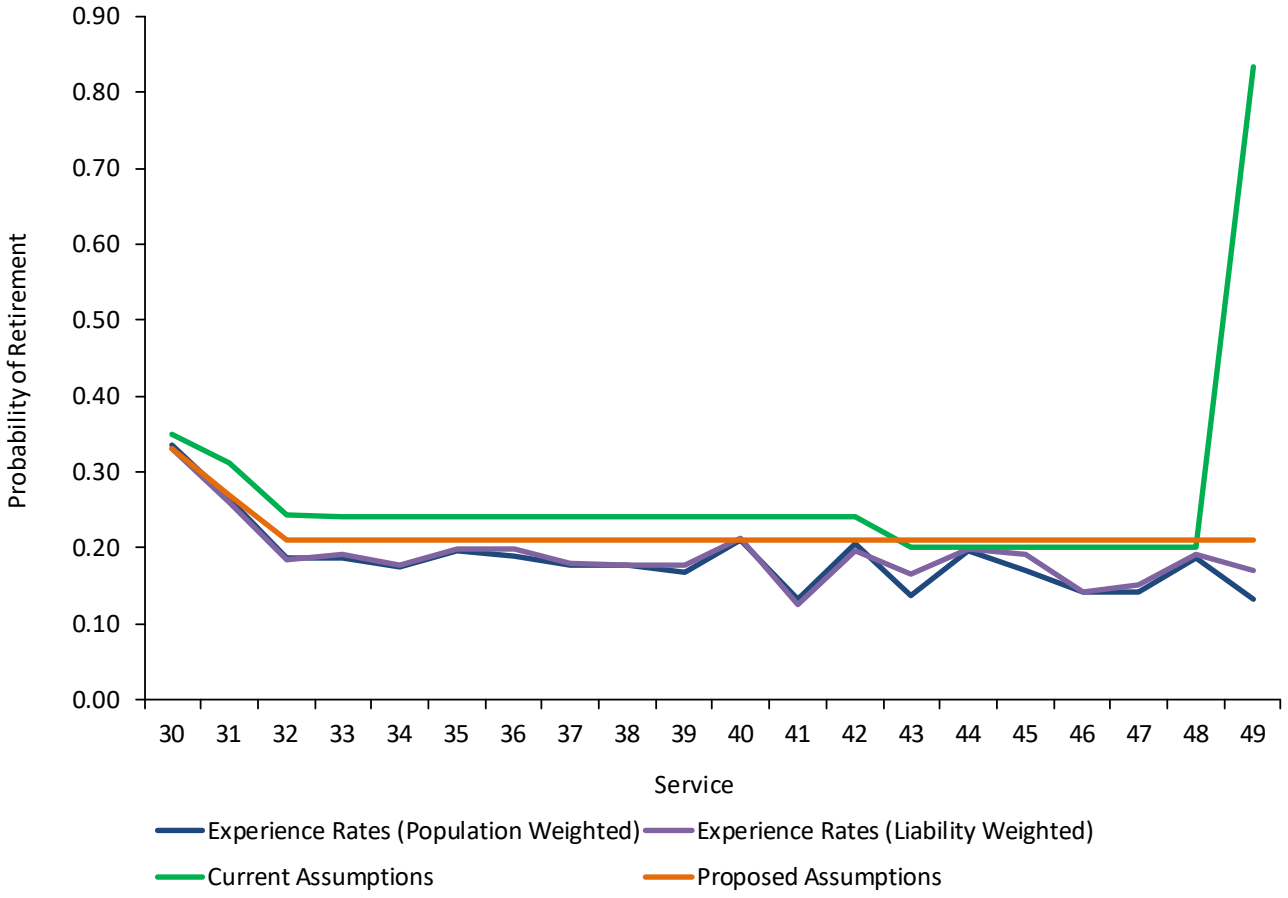
Normal Service Based Retirement Experience
LOCAL Female Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

Service	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
30	1,255	3,727	0.3367	0.3312	0.3500	0.3300	1,304	1,230
31	931	3,523	0.2643	0.2608	0.3114	0.2700	1,097	951
32	430	2,297	0.1872	0.1842	0.2438	0.2100	560	482
33	314	1,681	0.1868	0.1906	0.2400	0.2100	403	353
34	220	1,252	0.1757	0.1784	0.2400	0.2100	300	263
35	185	943	0.1962	0.1982	0.2400	0.2100	226	198
36	128	681	0.1880	0.1984	0.2400	0.2100	163	143
37	95	538	0.1766	0.1787	0.2400	0.2100	129	113
38	78	440	0.1773	0.1762	0.2400	0.2100	106	92
39	55	329	0.1672	0.1762	0.2400	0.2100	79	69
40	57	272	0.2096	0.2128	0.2400	0.2100	65	57
41	25	190	0.1316	0.1255	0.2400	0.2100	46	40
42	29	141	0.2057	0.1951	0.2400	0.2100	34	30
43	15	109	0.1376	0.1656	0.2000	0.2100	22	23
44	16	82	0.1951	0.1995	0.2000	0.2100	16	17
45	10	59	0.1695	0.1925	0.2000	0.2100	12	12
46	6	42	0.1429	0.1413	0.2000	0.2100	8	9
47	4	28	0.1429	0.1523	0.2000	0.2100	6	6
48	3	16	0.1875	0.1921	0.2000	0.2100	3	3
49	7	53	0.1321	0.1696	0.8340	0.2100	44	11
50+	N/A	N/A	N/A	N/A	1.0000	1.0000	N/A	N/A
Totals	3,863	16,403	0.2355	0.2315	0.2820	0.2501	4,625	4,102
				Ref	2099	3260		
Liability Weighted	3,797							

2011-2015 Experience Study	0.3146
2006-2010 Experience Study	0.2883
2001-2005 Experience Study	N/A

Not included in the Local Female retirements listed in the prior two charts are 113 individuals who retired with unreduced retirement benefits but, according to our data, did not meet the eligibility conditions for unreduced benefits. These members likely made use of the Early Retirement Incentive Program, Service Purchases, or other like programs.

Normal Service Based Retirement Experience
LOCAL Female Members – Attaining 30 Years of Service Prior to Age 65
2016-2020

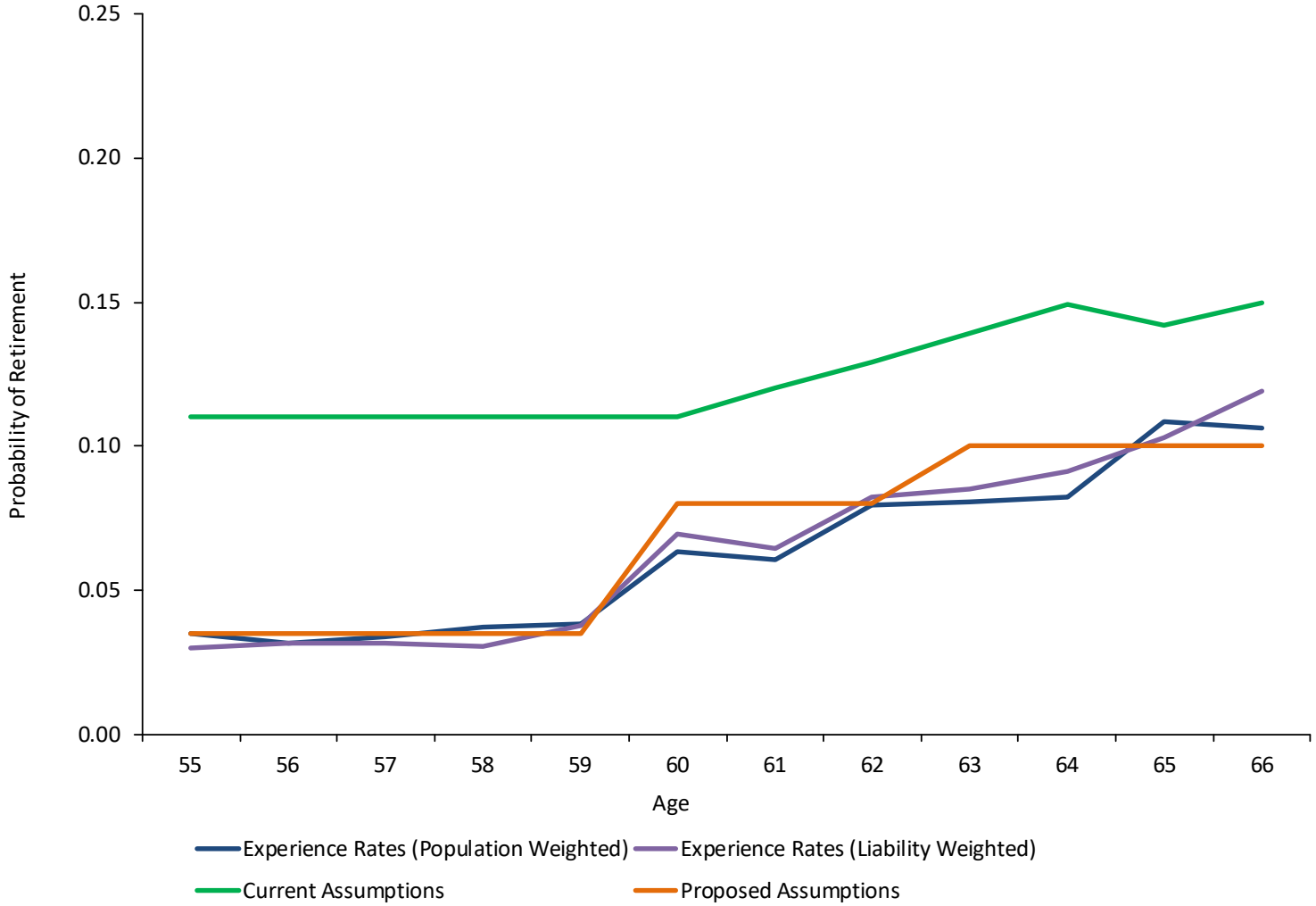


Early Retirement Experience
LOCAL Female Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
55	76	2,162	0.0352	0.0299	0.1100	0.0350	238	76
56	62	1,958	0.0317	0.0318	0.1100	0.0350	215	69
57	62	1,837	0.0338	0.0315	0.1100	0.0350	202	64
58	65	1,756	0.0370	0.0307	0.1100	0.0350	193	61
59	67	1,764	0.0380	0.0374	0.1100	0.0350	194	62
60	583	9,179	0.0635	0.0693	0.1100	0.0800	1,010	734
61	515	8,509	0.0605	0.0642	0.1200	0.0800	1,021	681
62	636	8,026	0.0792	0.0825	0.1293	0.0800	1,038	642
63	566	7,023	0.0806	0.0852	0.1393	0.1000	978	702
64	505	6,149	0.0821	0.0913	0.1493	0.1000	918	615
65	25	230	0.1087	0.1028	0.1421	0.1000	33	23
66	15	141	0.1064	0.1193	0.1500	0.1000	21	14
Totals	3,177	48,734	0.0652	0.0618	0.1244	0.0768	6,061	3,743
				Ref	2088	3255		
Liability Weighted	3,014							

2011-2016 Experience Study	0.1207
2006-2010 Experience Study	0.1206
2001-2005 Experience Study	0.1218

Early Retirement Experience
LOCAL Female Members
2016-2020

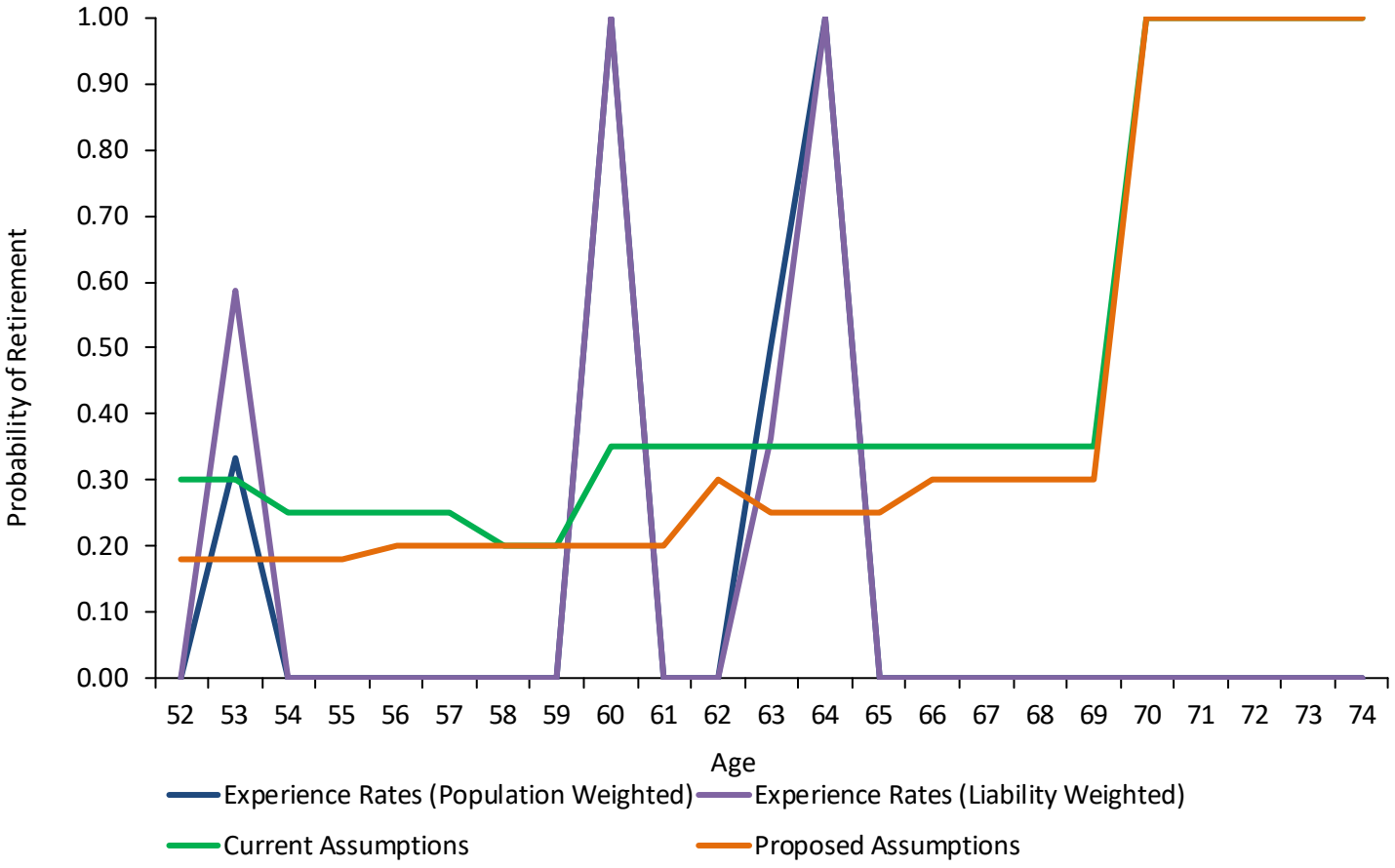


Normal Retirement Experience
PUBLIC SAFETY Male Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
52	-	1	0.0000	0.0000	0.3000	0.1800	-	-
53	1	3	0.3333	0.5870	0.3000	0.1800	1	1
54	-	2	0.0000	0.0000	0.2500	0.1800	1	-
55	-	1	0.0000	0.0000	0.2500	0.1800	-	-
56	-	1	0.0000	0.0000	0.2500	0.2000	-	-
57	-	1	0.0000	0.0000	0.2500	0.2000	-	-
58	-	1	0.0000	0.0000	0.2000	0.2000	-	-
59	-	-	N\A	N\A	0.2000	0.2000	-	-
60	1	1	1.0000	1.0000	0.3500	0.2000	-	-
61	-	-	N\A	N\A	0.3500	0.2000	-	-
62	-	2	0.0000	0.0000	0.3500	0.3000	1	1
63	1	2	0.5000	0.3638	0.3500	0.2500	1	1
64	1	1	1.0000	1.0000	0.3500	0.2500	-	-
65	-	-	N\A	N\A	0.3500	0.2500	-	-
66	-	-	N\A	N\A	0.3500	0.3000	-	-
67	-	-	N\A	N\A	0.3500	0.3000	-	-
68	-	-	N\A	N\A	0.3500	0.3000	-	-
69	-	-	N\A	N\A	0.3500	0.3000	-	-
70	-	-	N\A	N\A	1.0000	1.0000	-	-
71	-	-	N\A	N\A	1.0000	1.0000	-	-
72	1	-	N\A	N\A	1.0000	1.0000	-	-
73	-	-	N\A	N\A	1.0000	1.0000	-	-
74	-	-	N\A	N\A	1.0000	1.0000	-	-
75 & Over	-	-	N\A	N\A	1.0000	1.0000	-	-
Totals	5	16	0.3125	0.3507	0.2500	0.1875	4	3
				Ref	1334	3261		
Liability Weighted	6							

2011-2015 Experience Study	0.2222
2006-2010 Experience Study	0.3182
2001-2005 Experience Study	0.3264

Normal Retirement Experience
PUBLIC SAFETY Male Members
2016-2020

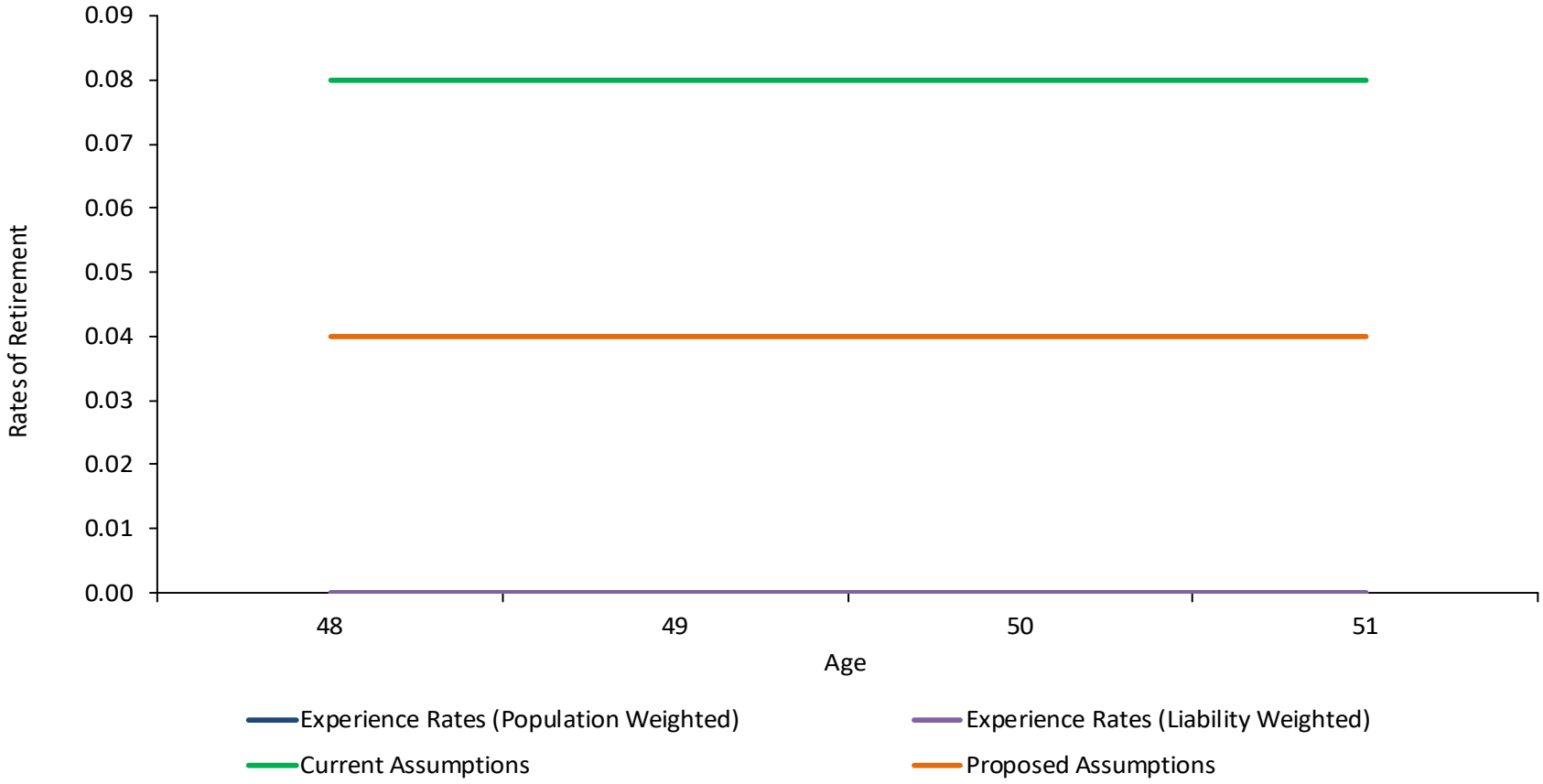


Early Retirement Experience
PUBLIC SAFETY Male Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
48	-	-	N\A	N\A	0.0800	0.0400	-	-
49	-	-	N\A	N\A	0.0800	0.0400	-	-
50	-	2	0.0000	0.0000	0.0800	0.0400	-	-
51	-	2	0.0000	0.0000	0.0800	0.0400	-	-
Totals	-	4	0.0000	0.0000	0.0000	0.0000	-	-
Liability Weighted	-			Ref	1496	1200		

2011-2015 Experience Study	0.3333
2006-2010 Experience Study	0.0000
2001-2005 Experience Study	0.2009

Early Retirement Experience
PUBLIC SAFETY Male Members
2016-2020

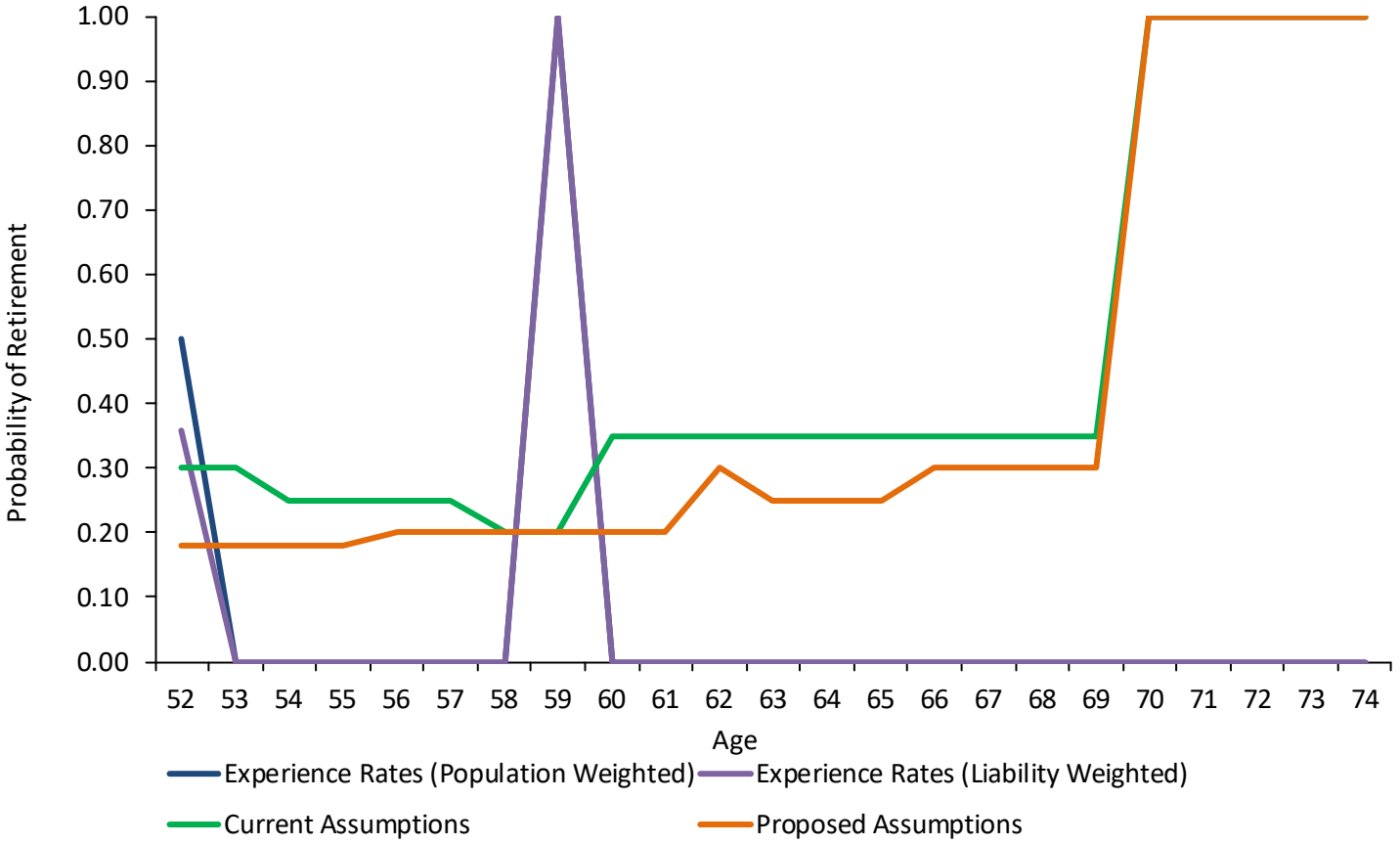


Normal Retirement Experience
PUBLIC SAFETY Female Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
52	1	2	0.5000	0.3594	0.3000	0.1800	1	-
53	-	-	N\A	N\A	0.3000	0.1800	-	-
54	-	-	N\A	N\A	0.2500	0.1800	-	-
55	-	1	0.0000	0.0000	0.2500	0.1800	-	-
56	-	1	0.0000	0.0000	0.2500	0.2000	-	-
57	-	1	0.0000	0.0000	0.2500	0.2000	-	-
58	-	1	0.0000	0.0000	0.2000	0.2000	-	-
59	1	1	1.0000	1.0000	0.2000	0.2000	-	-
60	-	-	N\A	N\A	0.3500	0.2000	-	-
61	1	-	N\A	N\A	0.3500	0.2000	-	-
62	-	-	N\A	N\A	0.3500	0.3000	-	-
63	-	-	N\A	N\A	0.3500	0.2500	-	-
64	-	-	N\A	N\A	0.3500	0.2500	-	-
65	-	-	N\A	N\A	0.3500	0.2500	-	-
66	-	-	N\A	N\A	0.3500	0.3000	-	-
67	-	-	N\A	N\A	0.3500	0.3000	-	-
68	-	-	N\A	N\A	0.3500	0.3000	-	-
69	-	-	N\A	N\A	0.3500	0.3000	-	-
70	-	-	N\A	N\A	1.0000	1.0000	-	-
71	-	-	N\A	N\A	1.0000	1.0000	-	-
72	-	-	N\A	N\A	1.0000	1.0000	-	-
73	-	-	N\A	N\A	1.0000	1.0000	-	-
74	-	-	N\A	N\A	1.0000	1.0000	-	-
75 & Over	-	-	N\A	N\A	1.0000	1.0000	-	-
Totals	3	7	0.4286	0.3097	0.1429	0.0000	1	-
				Ref	1334	3261		
Liability Weighted	2							

2011-2015 Experience Study	0.0000
2006-2010 Experience Study	0.0000
2001-2005 Experience Study	0.3077

Normal Retirement Experience
PUBLIC SAFETY Female Members
2016-2020

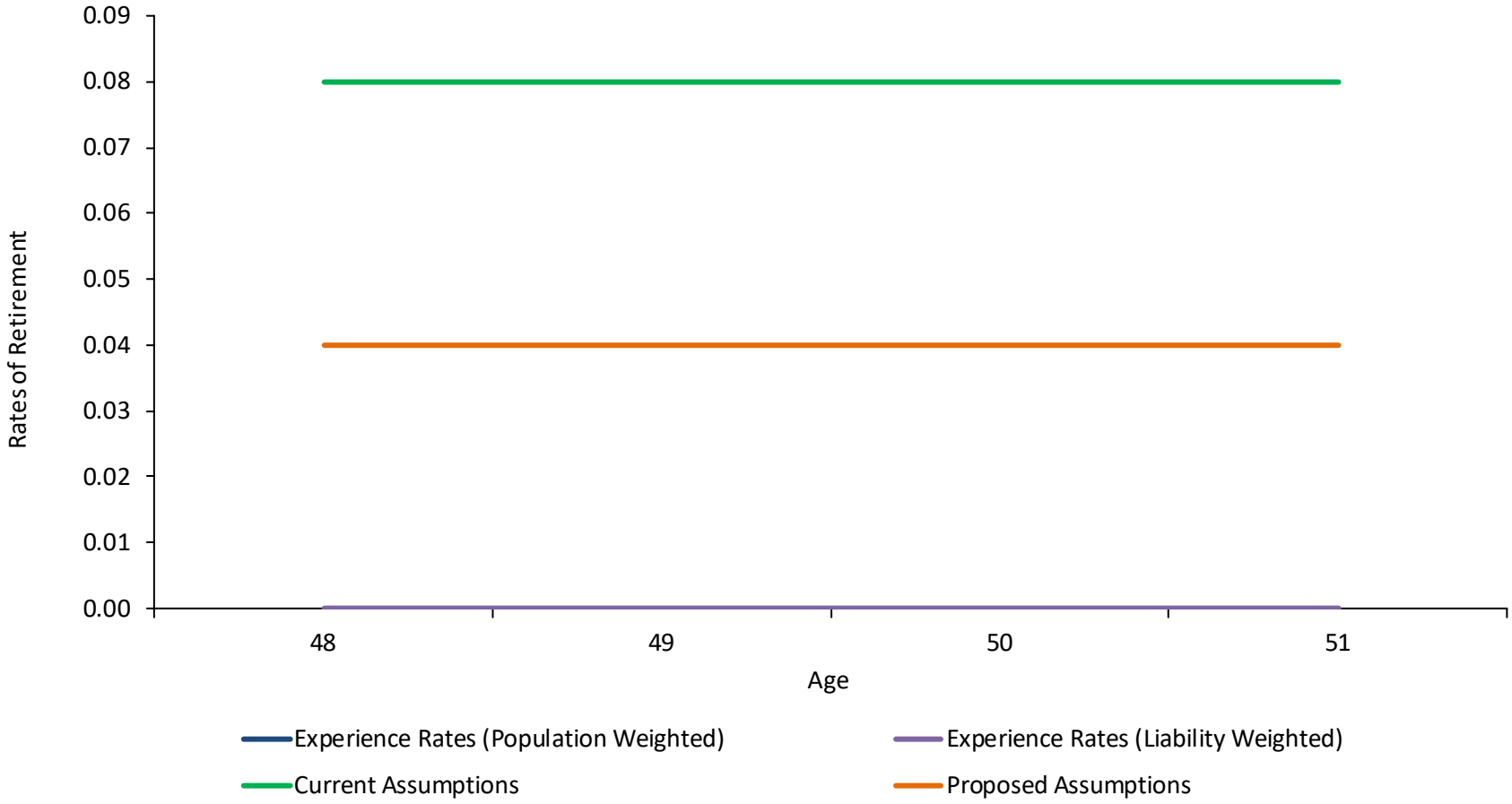


Early Retirement Experience
PUBLIC SAFETY Female Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
48	-	1	0.0000	0.0000	0.0800	0.0400	-	-
49	-	1	0.0000	0.0000	0.0800	0.0400	-	-
50	-	2	0.0000	0.0000	0.0800	0.0400	-	-
51	-	2	0.0000	0.0000	0.0800	0.0400	-	-
Totals	-	6	0.0000	0.0000	0.0000	0.0000	-	-
Liability Weighted	-			Ref	1496	1200		

2011-2016 Experience Study	N\A
2006-2010 Experience Study	N/A
2001-2005 Experience Study	0.0000

Early Retirement Experience
PUBLIC SAFETY Female Members
2016-2020

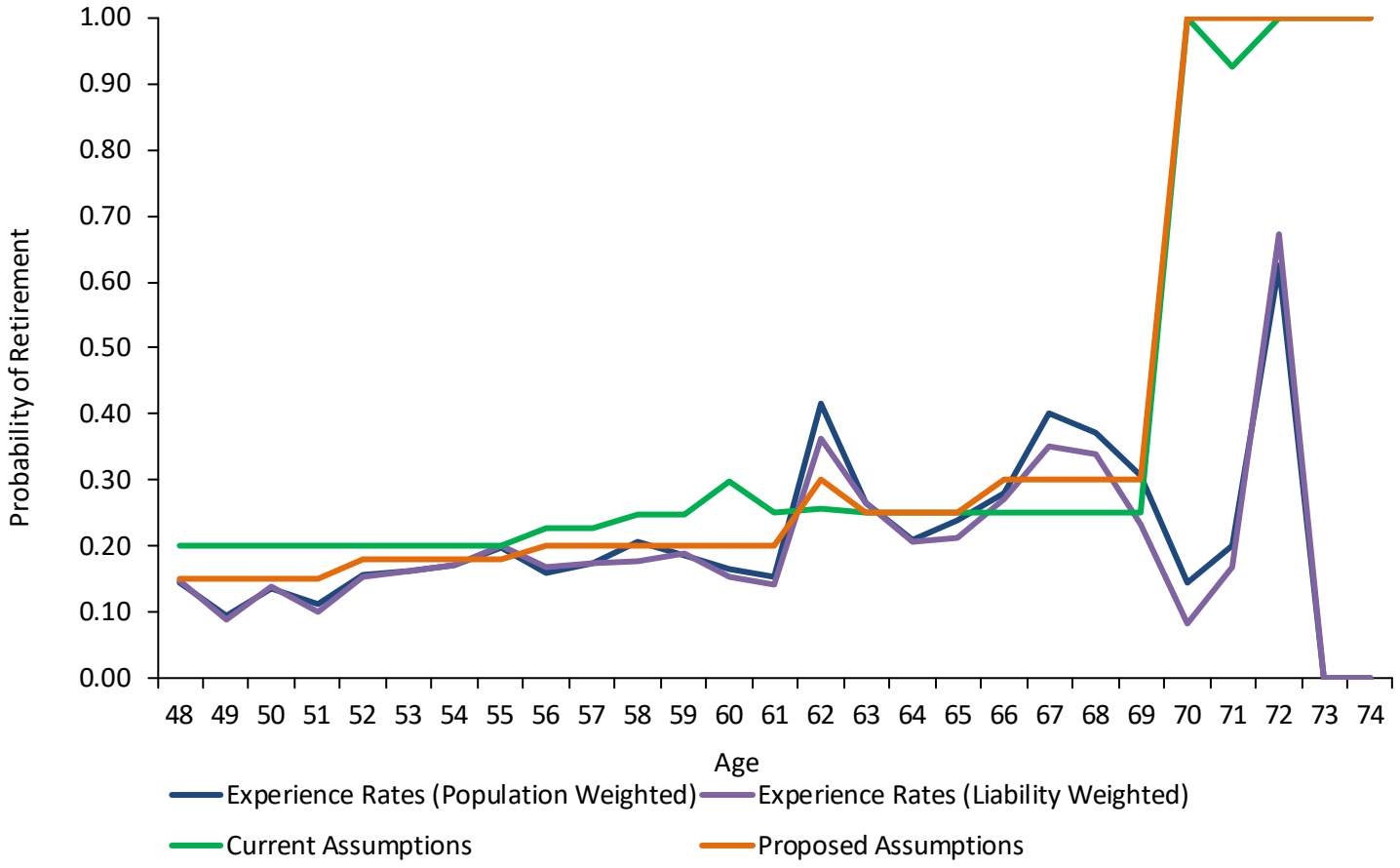


Normal Retirement Experience
LAW ENFORCEMENT Male Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
48	31	217	0.1429	0.1487	0.2000	0.1500	43	33
49	28	301	0.0930	0.0873	0.2000	0.1500	60	45
50	70	522	0.1341	0.1372	0.2000	0.1500	104	78
51	49	437	0.1121	0.1008	0.2000	0.1500	87	66
52	56	361	0.1551	0.1530	0.2000	0.1800	72	65
53	53	326	0.1626	0.1617	0.2000	0.1800	65	59
54	47	276	0.1703	0.1709	0.2000	0.1800	55	50
55	52	263	0.1977	0.2002	0.2000	0.1800	53	47
56	37	234	0.1581	0.1683	0.2262	0.2000	53	47
57	35	200	0.1750	0.1739	0.2255	0.2000	45	40
58	36	174	0.2069	0.1766	0.2477	0.2000	43	35
59	27	146	0.1849	0.1876	0.2485	0.2000	36	29
60	21	128	0.1641	0.1517	0.2969	0.2000	38	26
61	17	111	0.1532	0.1423	0.2500	0.2000	28	22
62	63	152	0.4145	0.3639	0.2569	0.3000	39	46
63	30	113	0.2655	0.2639	0.2500	0.2500	28	28
64	18	86	0.2093	0.2076	0.2500	0.2500	22	22
65	18	75	0.2400	0.2114	0.2500	0.2500	19	19
66	18	64	0.2813	0.2704	0.2500	0.3000	16	19
67	16	40	0.4000	0.3520	0.2500	0.3000	10	12
68	10	27	0.3704	0.3387	0.2500	0.3000	7	8
69	4	13	0.3077	0.2330	0.2500	0.3000	3	4
70	1	7	0.1429	0.0815	1.0000	1.0000	7	7
71	2	10	0.2000	0.1670	0.9250	1.0000	9	10
72	5	8	0.6250	0.6730	1.0000	1.0000	8	8
73	-	1	0.0000	0.0000	1.0000	1.0000	1	1
74	-	3	0.0000	0.0000	1.0000	1.0000	3	3
75 & Over	2	4	0.5000	0.5821	1.0000	1.0000	4	4
Totals	746	4,299	0.1735	0.1628	0.2228	0.1938	958	833
					2084	3261		
Liability Weighted	700							

2011-2015 Experience Study	0.2653
2006-2010 Experience Study	0.2169
2001-2005 Experience Study	0.2259

Normal Retirement Experience
LAW ENFORCEMENT Male Members
2016-2020

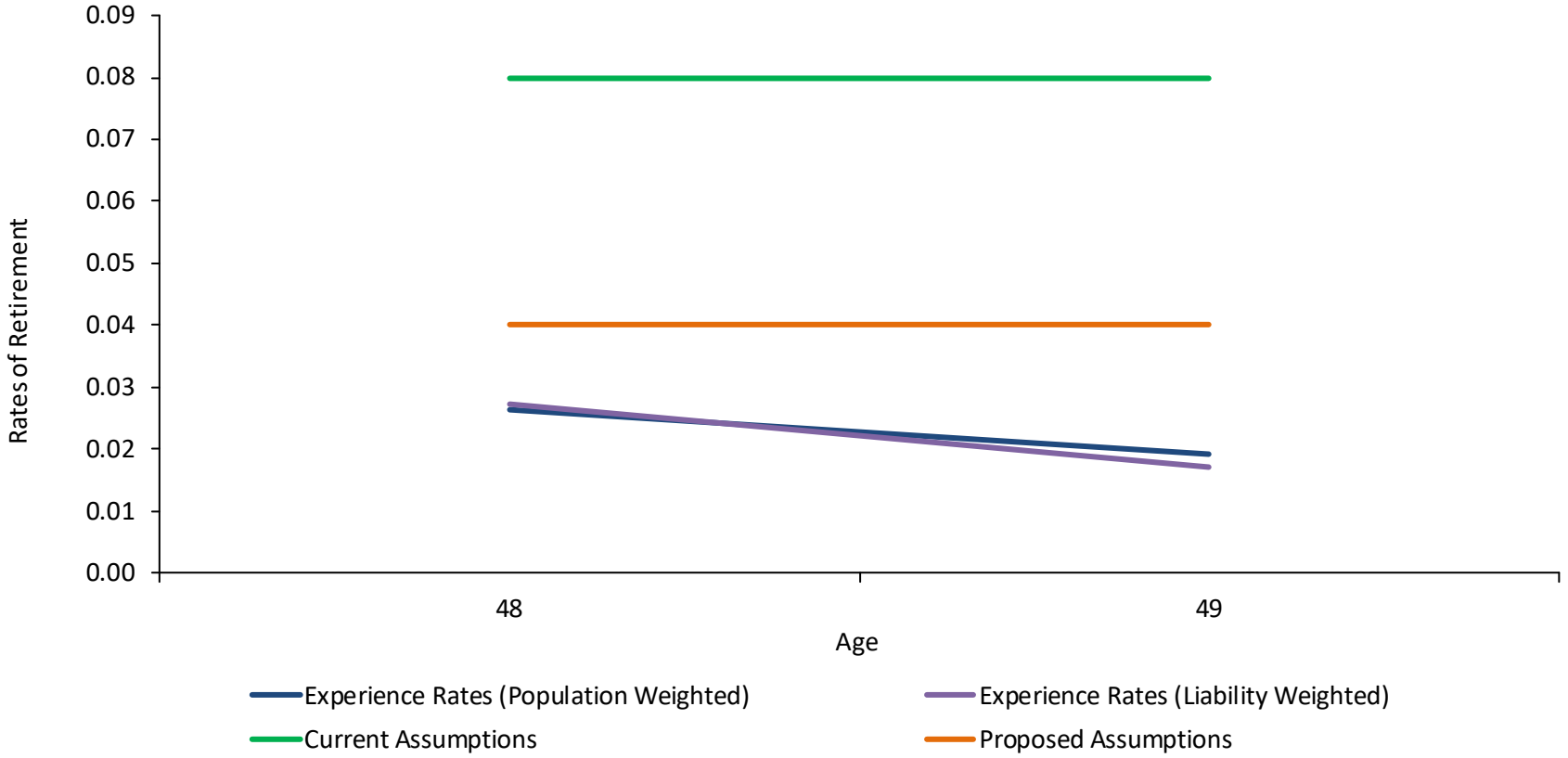


Early Retirement Experience
LAW ENFORCEMENT Male Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
48	7	266	0.0263	0.0272	0.0800	0.0400	21	11
49	5	260	0.0192	0.0170	0.0800	0.0400	21	10
Totals	12	526	0.0228	0.0221	0.0798	0.0399	42	21
					1496	1200		
Liability Weighted	12							

2011-2015 Experience Study	N/A
2006-2010 Experience Study	N/A
2001-2005 Experience Study	N/A

Early Retirement Experience
LAW ENFORCEMENT Male Members
2016-2020

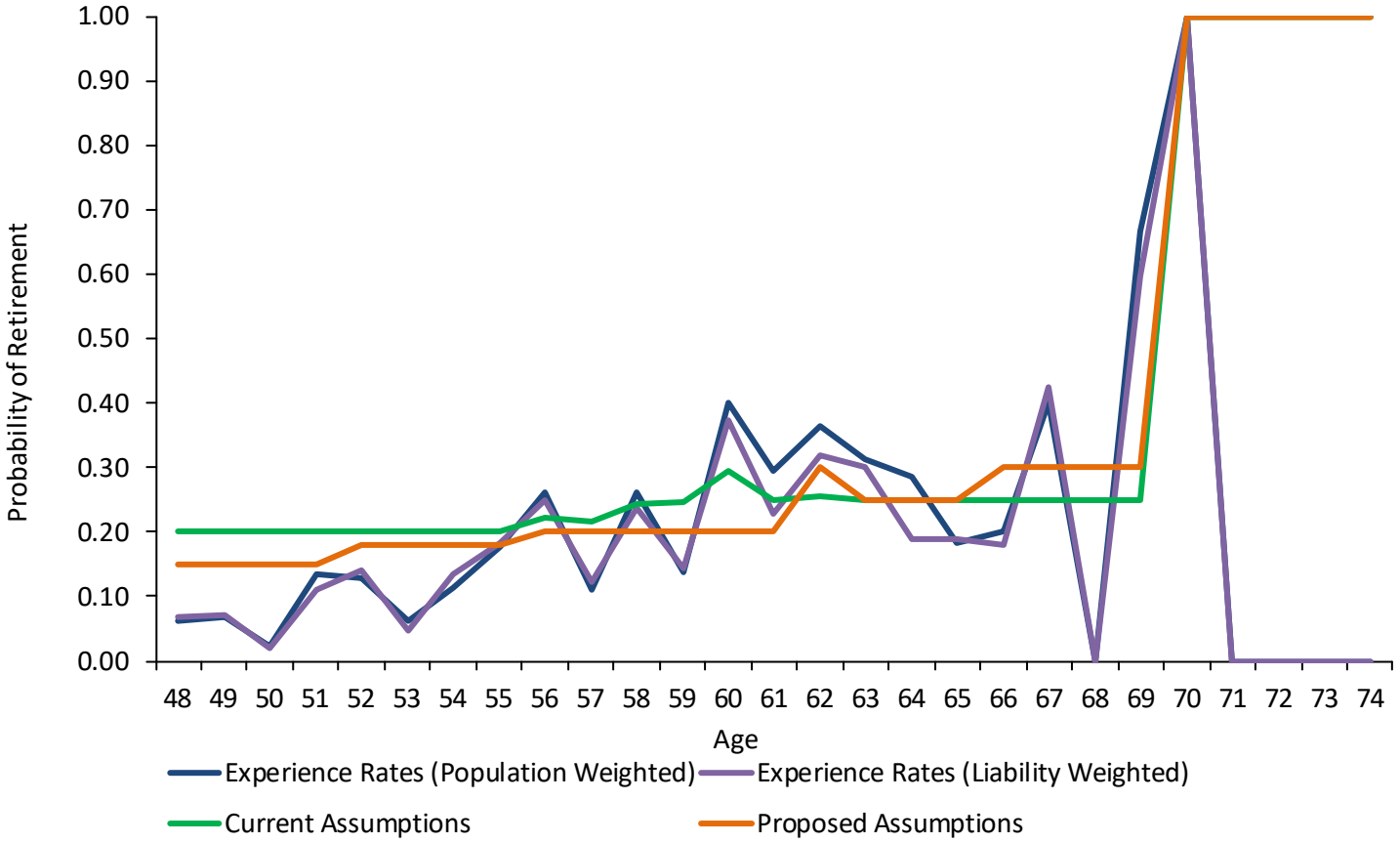


Normal Retirement Experience
LAW ENFORCEMENT Female Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
48	1	16	0.0625	0.0670	0.2000	0.1500	3	2
49	2	29	0.0690	0.0700	0.2000	0.1500	6	4
50	1	47	0.0213	0.0208	0.2000	0.1500	9	7
51	6	45	0.1333	0.1100	0.2000	0.1500	9	7
52	5	39	0.1282	0.1413	0.2000	0.1800	8	7
53	2	32	0.0625	0.0471	0.2000	0.1800	6	6
54	4	35	0.1143	0.1362	0.2000	0.1800	7	6
55	5	28	0.1786	0.1827	0.2000	0.1800	6	5
56	5	19	0.2632	0.2497	0.2221	0.2000	4	4
57	3	27	0.1111	0.1223	0.2167	0.2000	6	5
58	6	23	0.2609	0.2384	0.2430	0.2000	6	5
59	3	22	0.1364	0.1450	0.2455	0.2000	5	4
60	8	20	0.4000	0.3727	0.2950	0.2000	6	4
61	5	17	0.2941	0.2288	0.2500	0.2000	4	3
62	8	22	0.3636	0.3180	0.2545	0.3000	6	7
63	5	16	0.3125	0.3021	0.2500	0.2500	4	4
64	4	14	0.2857	0.1893	0.2500	0.2500	4	4
65	2	11	0.1818	0.1878	0.2500	0.2500	3	3
66	1	5	0.2000	0.1814	0.2500	0.3000	1	2
67	2	5	0.4000	0.4252	0.2500	0.3000	1	2
68	-	4	0.0000	0.0000	0.2500	0.3000	1	1
69	2	3	0.6667	0.5977	0.2500	0.3000	1	1
70	1	1	1.0000	1.0000	1.0000	1.0000	1	1
71	-	-	N\A	N\A	1.0000	1.0000	-	-
72	-	-	N\A	N\A	1.0000	1.0000	-	-
73	-	-	N\A	N\A	1.0000	1.0000	-	-
74	-	-	N\A	N\A	1.0000	1.0000	-	-
75 & Over	-	-	N\A	N\A	1.0000	1.0000	-	-
Totals	81	480	0.1688	0.1497	0.2229	0.1958	107	94
					2084	3261		
Liability Weighted	72							

2011-2015 Experience Study	0.2832
2006-2010 Experience Study	0.2023
2001-2005 Experience Study	0.2133

Normal Retirement Experience
LAW ENFORCEMENT Female Members
2016-2020

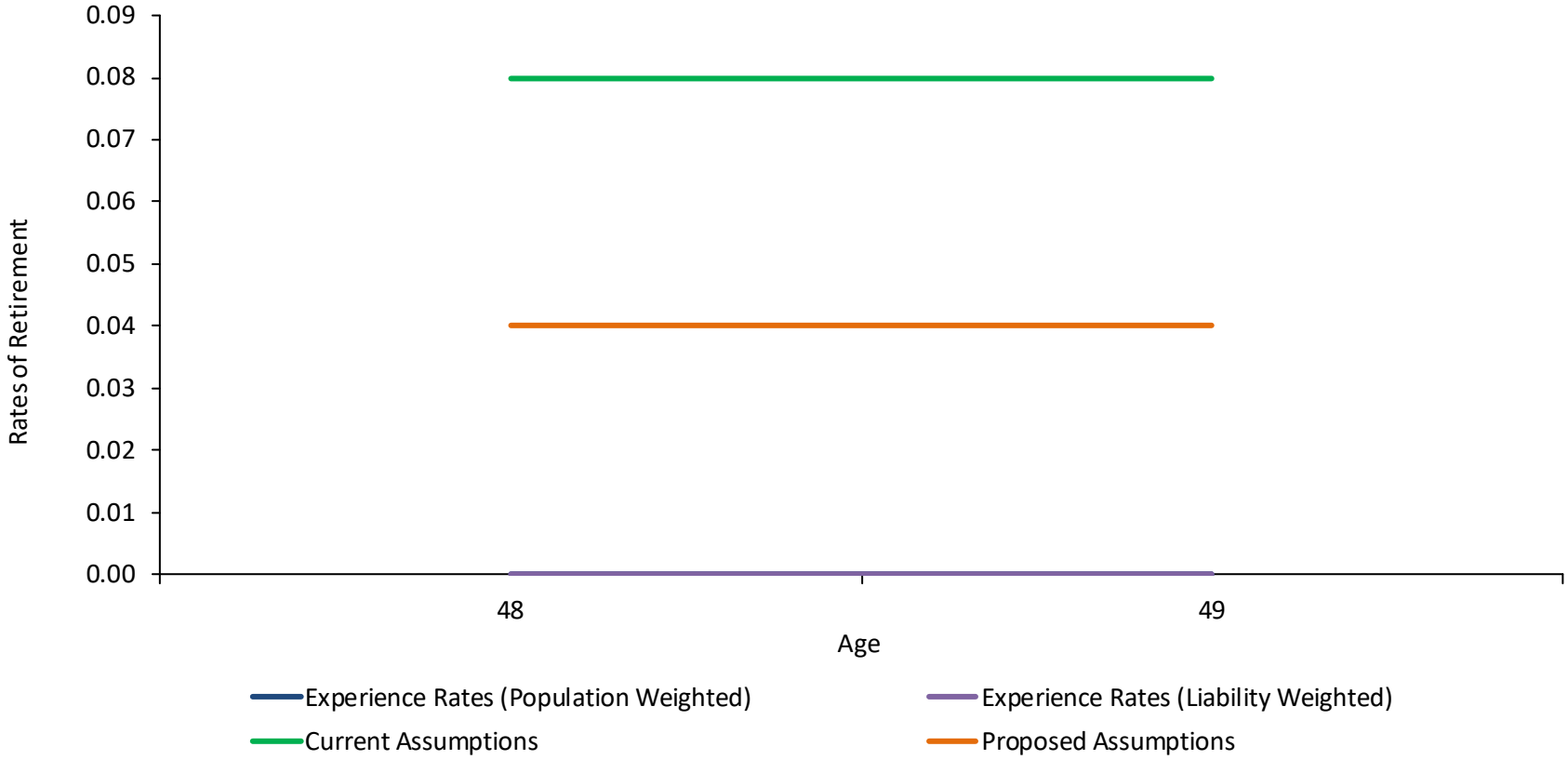


Early Retirement Experience
LAW ENFORCEMENT Female Members
2016-2020

Age	Retirements (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates		Expected Retirements	
					Current	Proposed	Current	Proposed
48	-	25	0.0000	0.0000	0.0800	0.0400	2	1
49	-	25	0.0000	0.0000	0.0800	0.0400	2	1
Totals	-	50	0.0000	0.0000	0.0800	0.0400	4	2
Liability Weighted	-				1496	1200		

2011-2016 Experience Study	N/A
2006-2010 Experience Study	N/A
2001-2005 Experience Study	N/A

Early Retirement Experience
LAW ENFORCEMENT Female Members
2016-2020



SECTION VIII

DETAILED RESULTS – MORTALITY EXPERIENCE

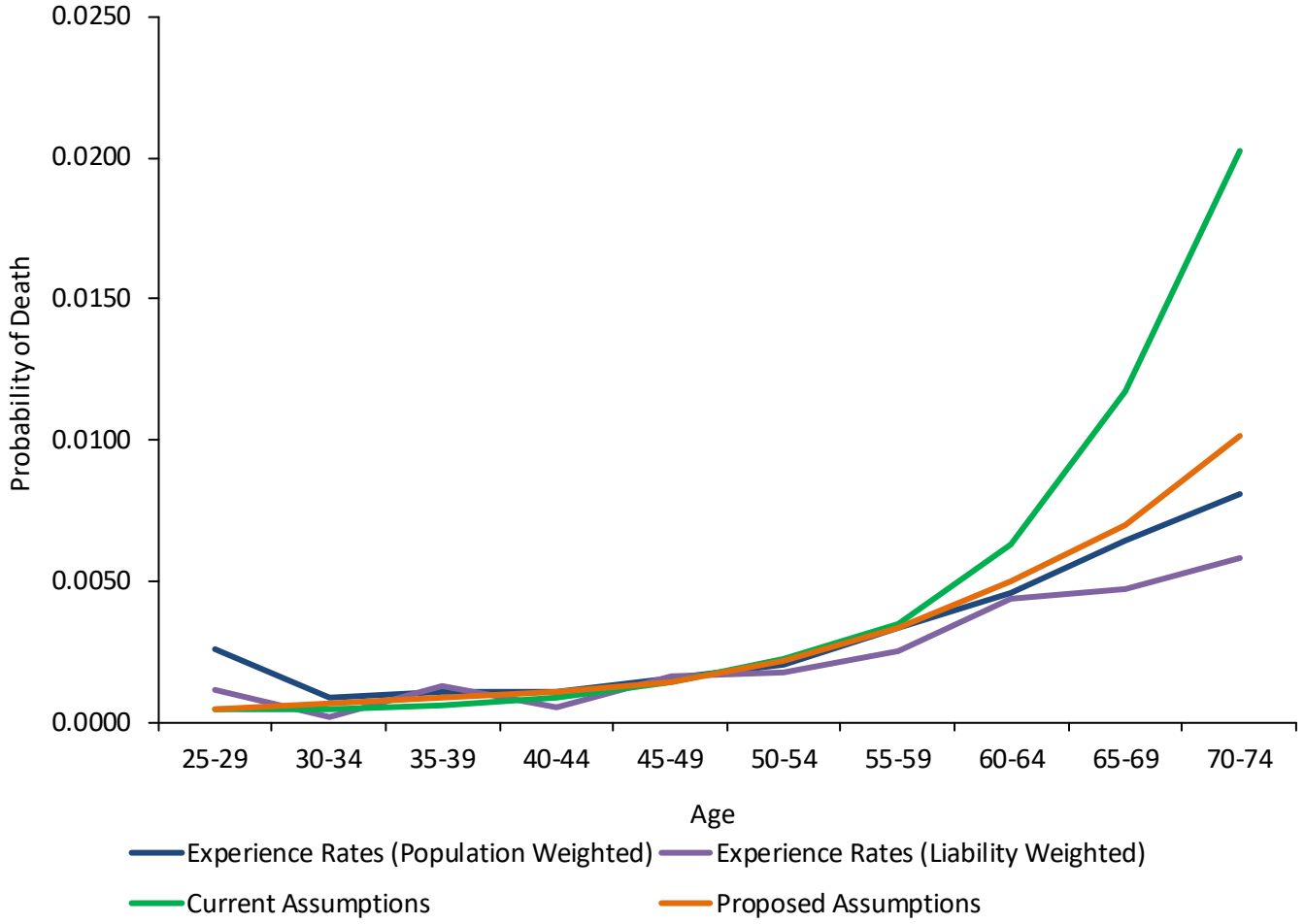
Death-in-Service Experience
STATE Male Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	7	114	0.0614	0.0161	0.0005	0.0004	-	-
25-29	7	2,737	0.0026	0.0012	0.0005	0.0005	1	1
30-34	7	8,213	0.0009	0.0002	0.0005	0.0007	4	5
35-39	12	11,112	0.0011	0.0013	0.0006	0.0008	7	9
40-44	13	12,303	0.0011	0.0005	0.0008	0.0011	11	13
45-49	26	16,740	0.0016	0.0016	0.0014	0.0014	24	25
50-54	39	18,963	0.0021	0.0017	0.0022	0.0022	43	42
55-59	59	17,558	0.0034	0.0025	0.0035	0.0034	61	59
60-64	56	12,285	0.0046	0.0044	0.0063	0.0050	77	61
65-69	30	4,678	0.0064	0.0047	0.0117	0.0069	52	31
70-74	9	1,118	0.0081	0.0058	0.0202	0.0102	21	11
Totals	265	105,821	0.0025	0.0024	0.0028	0.0024	301	257
Liability Weighted	254							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

7 members not shown in the above chart died while employed under age 20 or at age 75 or older.

Death-in-Service Experience
STATE Male Members
2016-2019



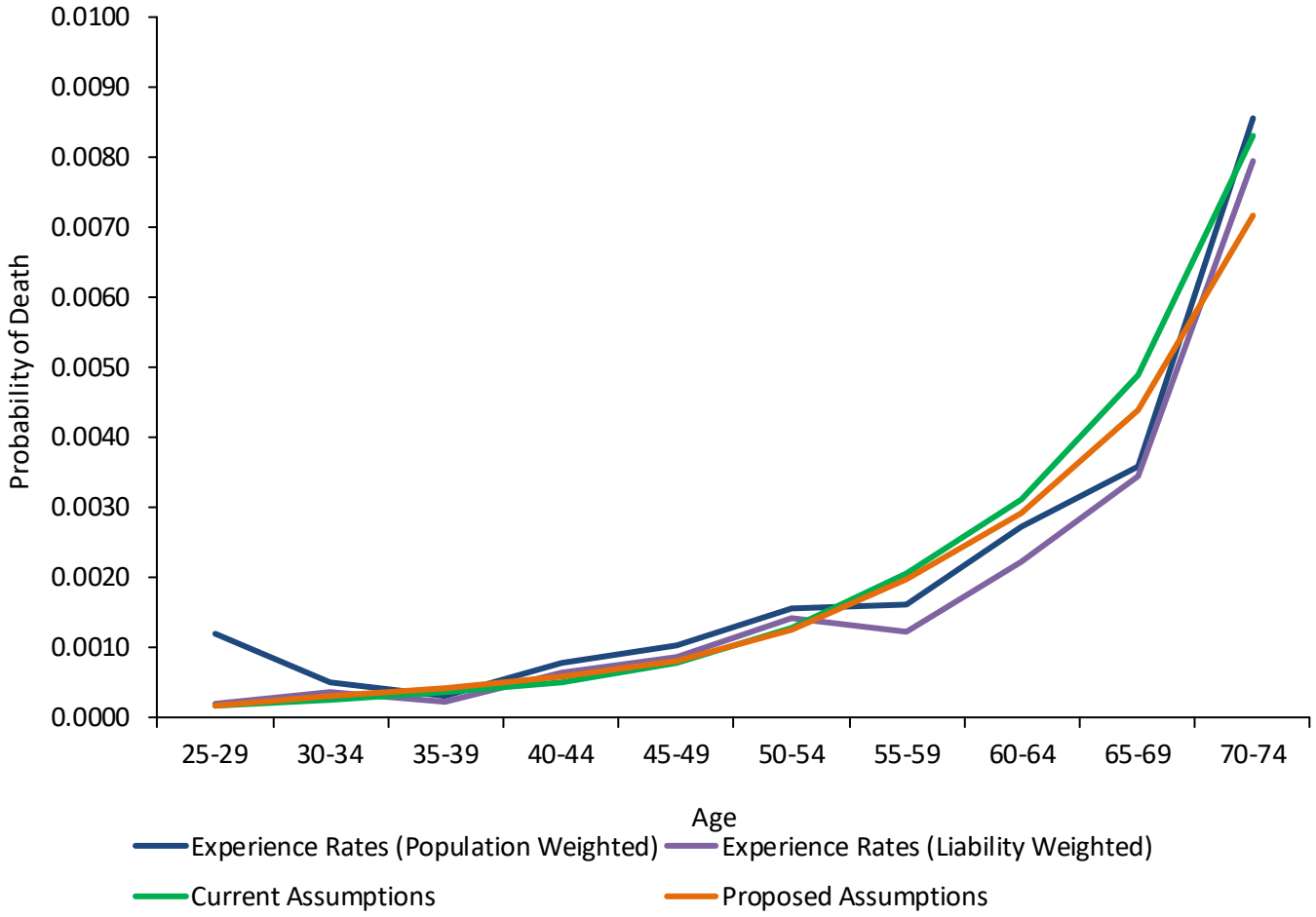
Death-in-Service Experience
STATE Female Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	6	100	0.0600	0.0030	0.0002	0.0002	-	-
25-29	4	3,370	0.0012	0.0002	0.0002	0.0002	1	1
30-34	5	9,867	0.0005	0.0003	0.0002	0.0003	2	3
35-39	4	13,292	0.0003	0.0002	0.0004	0.0004	5	6
40-44	11	14,186	0.0008	0.0006	0.0005	0.0006	7	8
45-49	19	18,602	0.0010	0.0009	0.0008	0.0008	15	15
50-54	34	21,936	0.0015	0.0014	0.0013	0.0013	28	28
55-59	35	21,911	0.0016	0.0012	0.0021	0.0020	45	43
60-64	43	15,718	0.0027	0.0022	0.0031	0.0029	48	45
65-69	20	5,586	0.0036	0.0034	0.0049	0.0044	26	23
70-74	10	1,166	0.0086	0.0080	0.0083	0.0072	9	8
Totals	191	125,734	0.0015	0.0014	0.0015	0.0014	186	180
Liability Weighted	181							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

4 members not shown in the above chart died while employed under age 20 or at age 75 or older.

Death-in-Service Experience
STATE Female Members
2016-2019



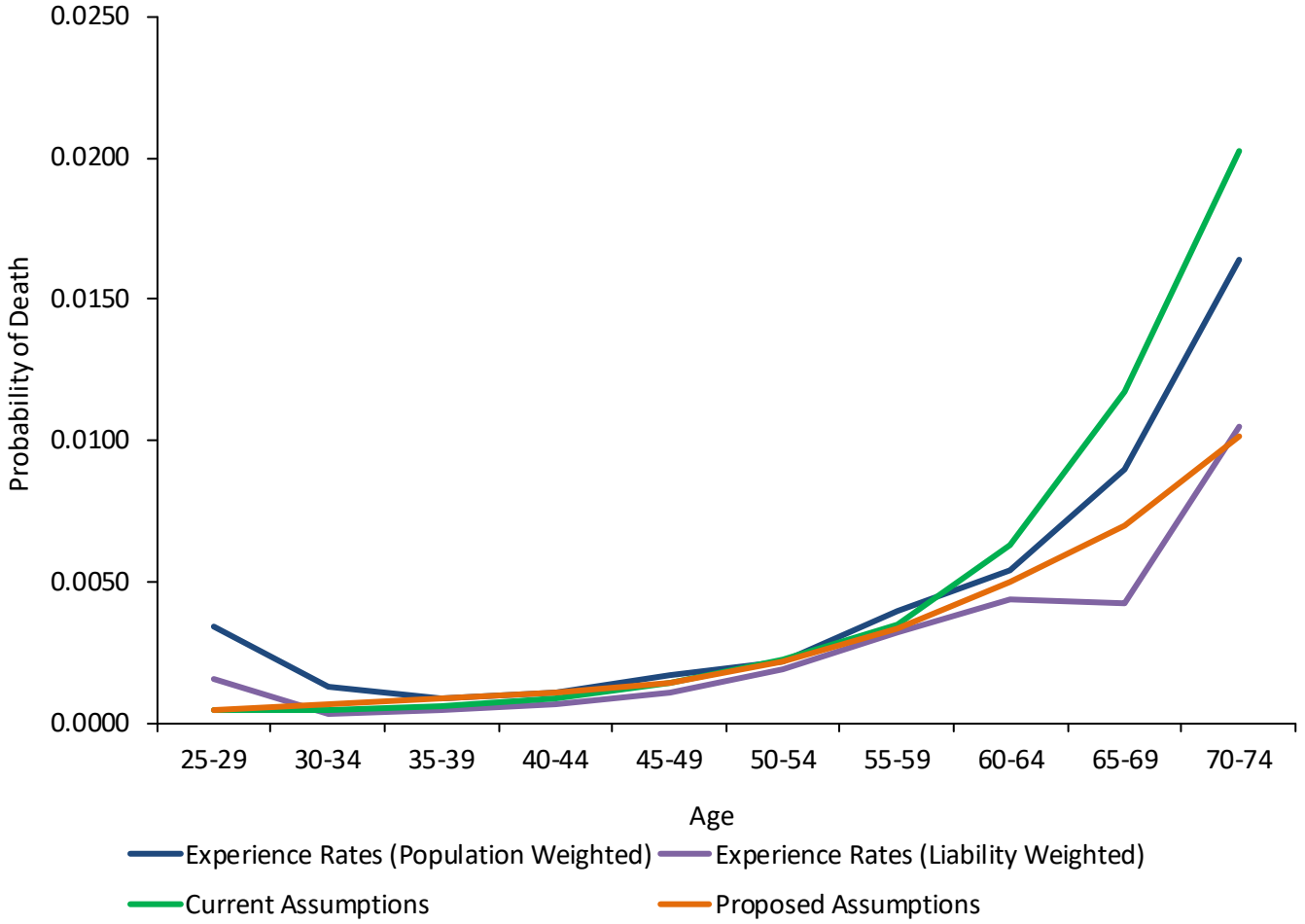
Death-in-Service Experience
LOCAL Male Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	9	392	0.0230	0.0053	0.0005	0.0004	-	-
25-29	16	4,670	0.0034	0.0015	0.0005	0.0005	2	2
30-34	16	12,465	0.0013	0.0003	0.0005	0.0007	6	8
35-39	16	18,117	0.0009	0.0005	0.0006	0.0008	11	15
40-44	24	22,062	0.0011	0.0007	0.0008	0.0011	19	24
45-49	52	30,234	0.0017	0.0010	0.0014	0.0014	43	44
50-54	76	34,693	0.0022	0.0019	0.0022	0.0022	79	76
55-59	142	36,200	0.0039	0.0032	0.0035	0.0034	128	122
60-64	156	28,866	0.0054	0.0044	0.0063	0.0050	181	143
65-69	119	13,279	0.0090	0.0042	0.0117	0.0069	150	90
70-74	85	5,183	0.0164	0.0105	0.0202	0.0102	102	52
Totals	711	206,161	0.0034	0.0026	0.0035	0.0028	721	576
Liability Weighted	536							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

93 members not shown in the above chart died while employed under age 20 or at age 75 or older.

Death-in-Service Experience
LOCAL Male Members
2016-2019



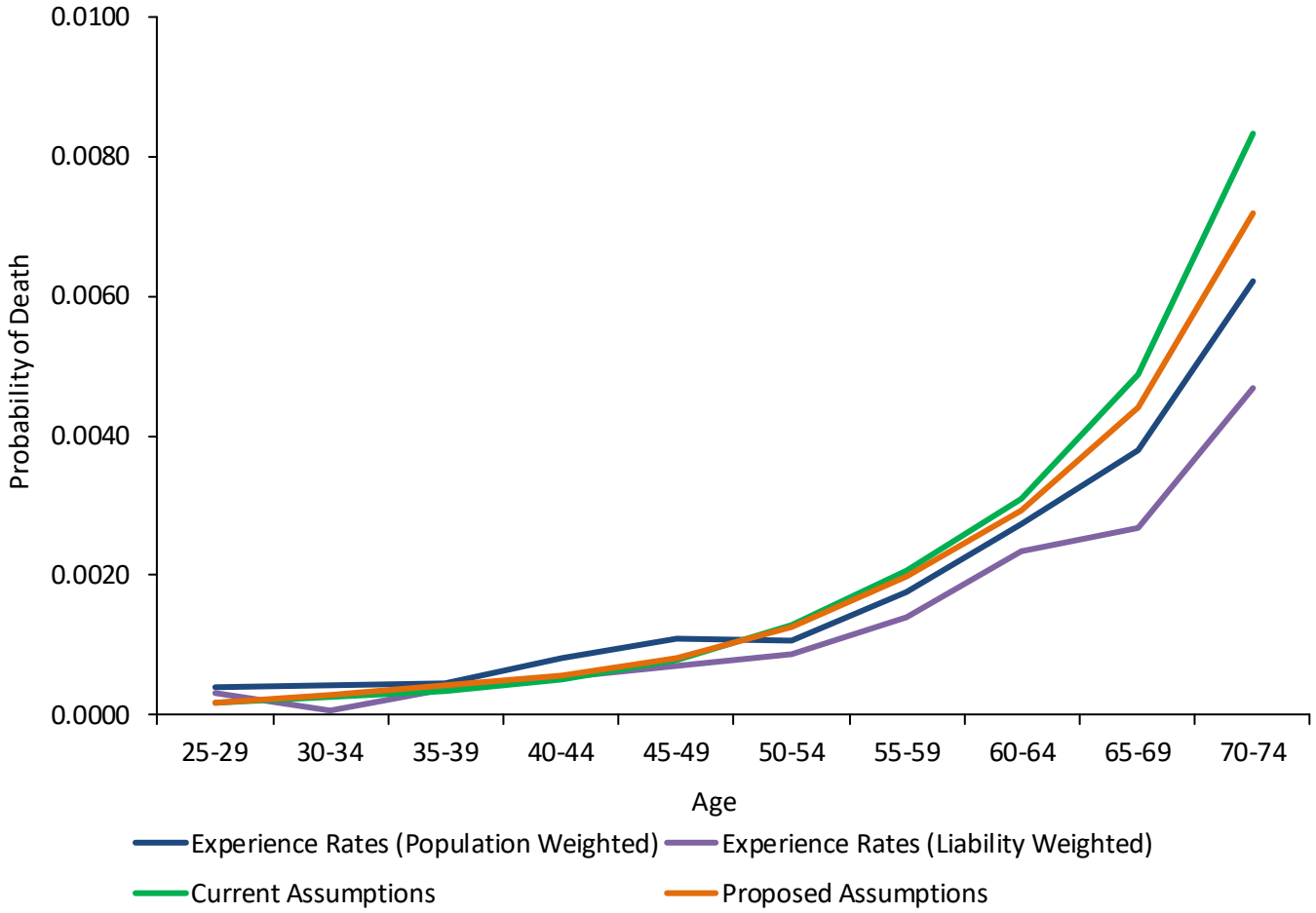
Death-in-Service Experience
LOCAL Female Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	3	405	0.0074	0.0015	0.0002	0.0002	-	-
25-29	2	5,005	0.0004	0.0003	0.0002	0.0002	1	1
30-34	6	14,254	0.0004	0.0001	0.0002	0.0003	4	4
35-39	10	21,821	0.0005	0.0004	0.0004	0.0004	8	9
40-44	22	27,304	0.0008	0.0005	0.0005	0.0006	14	16
45-49	40	36,589	0.0011	0.0007	0.0008	0.0008	29	30
50-54	44	41,220	0.0011	0.0009	0.0013	0.0013	53	53
55-59	78	44,170	0.0018	0.0014	0.0021	0.0020	91	88
60-64	95	34,782	0.0027	0.0023	0.0031	0.0029	107	101
65-69	53	13,950	0.0038	0.0027	0.0049	0.0044	65	59
70-74	24	3,854	0.0062	0.0047	0.0083	0.0072	31	26
Totals	377	243,354	0.0015	0.0013	0.0017	0.0016	403	387
Liability Weighted	322							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

33 members not shown in the above chart died while employed under age 20 or at age 75 or older.

Death-in-Service Experience
LOCAL Female Members
2016-2019

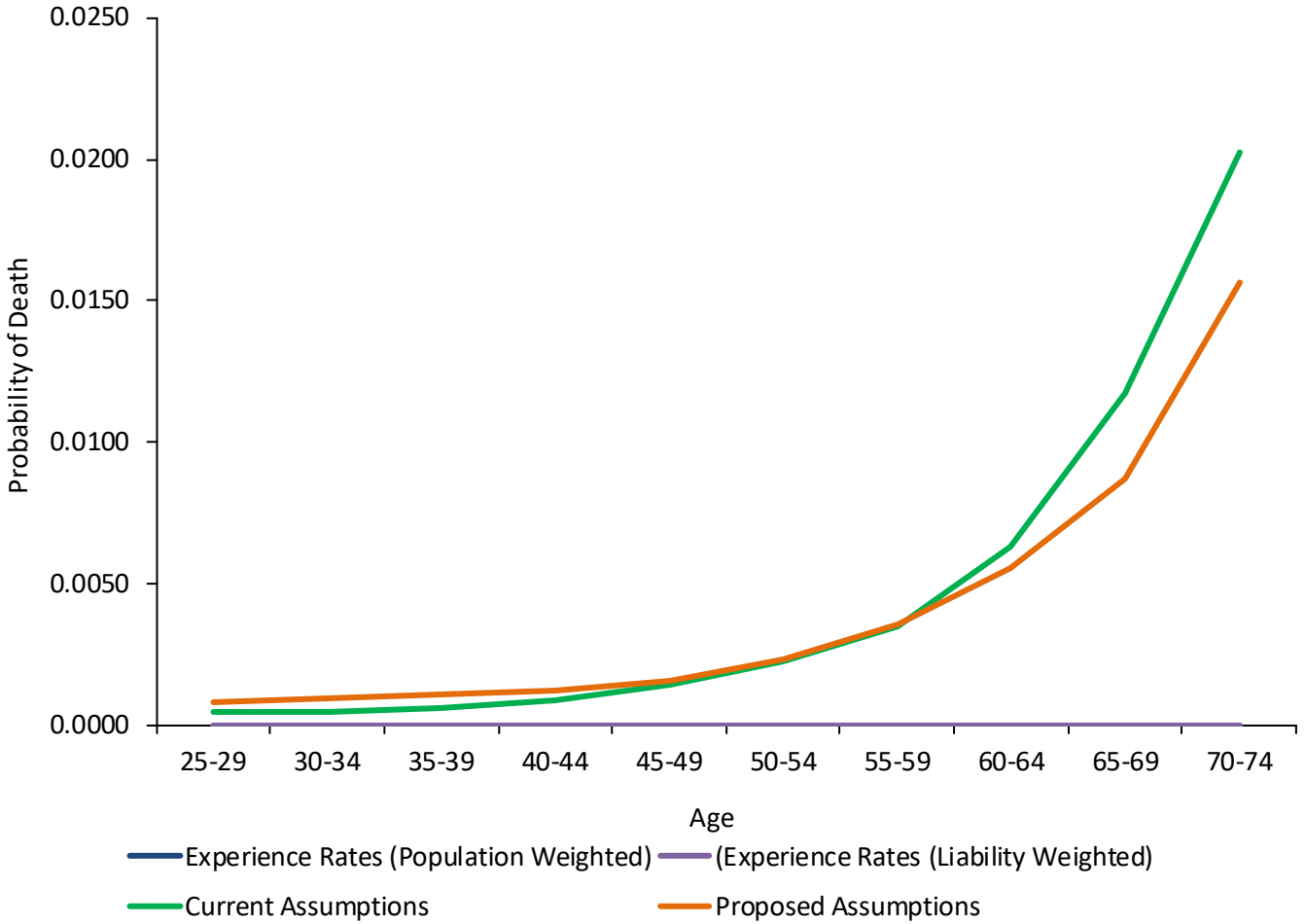


Death-in-Service Experience
PUBLIC SAFETY Male Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	-	-	N\A	N\A	0.0005	0.0007	-	-
25-29	-	6	0.0000	0.0000	0.0005	0.0008	-	-
30-34	-	17	0.0000	0.0000	0.0005	0.0009	-	-
35-39	-	27	0.0000	0.0000	0.0006	0.0010	-	-
40-44	-	38	0.0000	0.0000	0.0008	0.0012	-	-
45-49	-	26	0.0000	0.0000	0.0014	0.0015	-	-
50-54	-	17	0.0000	0.0000	0.0022	0.0023	-	-
55-59	-	10	0.0000	0.0000	0.0035	0.0035	-	-
60-64	-	8	0.0000	0.0000	0.0063	0.0055	-	-
65-69	-	6	0.0000	0.0000	0.0117	0.0087	-	-
70-74	-	2	0.0000	0.0000	0.0202	0.0156	-	-
Totals	-	157	0.0000	0.0000	0.0000	0.0000	-	-
Liability Weighted	-							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Death-in-Service Experience
PUBLIC SAFETY Male Members
2016-2019

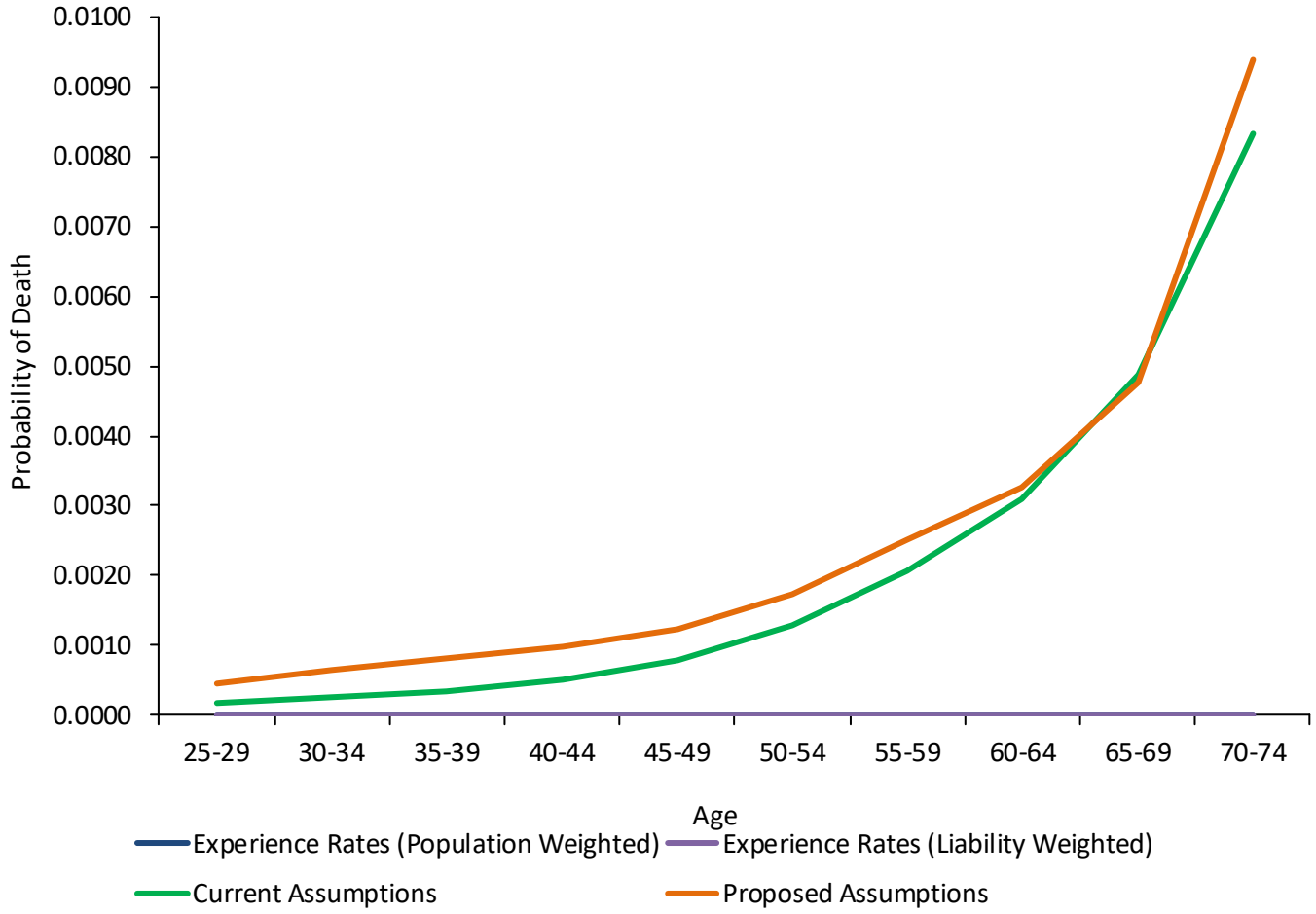


Death-in-Service Experience
PUBLIC SAFETY Female Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	-	-	N\A	N\A	0.0002	0.0003	-	-
25-29	-	2	0.0000	0.0000	0.0002	0.0004	-	-
30-34	-	6	0.0000	0.0000	0.0002	0.0006	-	-
35-39	-	1	0.0000	0.0000	0.0004	0.0008	-	-
40-44	-	-	N\A	N\A	0.0005	0.0010	-	-
45-49	-	3	0.0000	0.0000	0.0008	0.0012	-	-
50-54	-	5	0.0000	0.0000	0.0013	0.0017	-	-
55-59	-	7	0.0000	0.0000	0.0021	0.0025	-	-
60-64	-	6	0.0000	0.0000	0.0031	0.0033	-	-
65-69	-	-	N\A	N\A	0.0049	0.0048	-	-
70-74	-	-	N\A	N\A	0.0083	0.0094	-	-
Totals	-	30	0.0000	0.0000	0.0000	0.0000	-	-
Liability Weighted	-							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Death-in-Service Experience
PUBLIC SAFETY Female Members
2016-2019

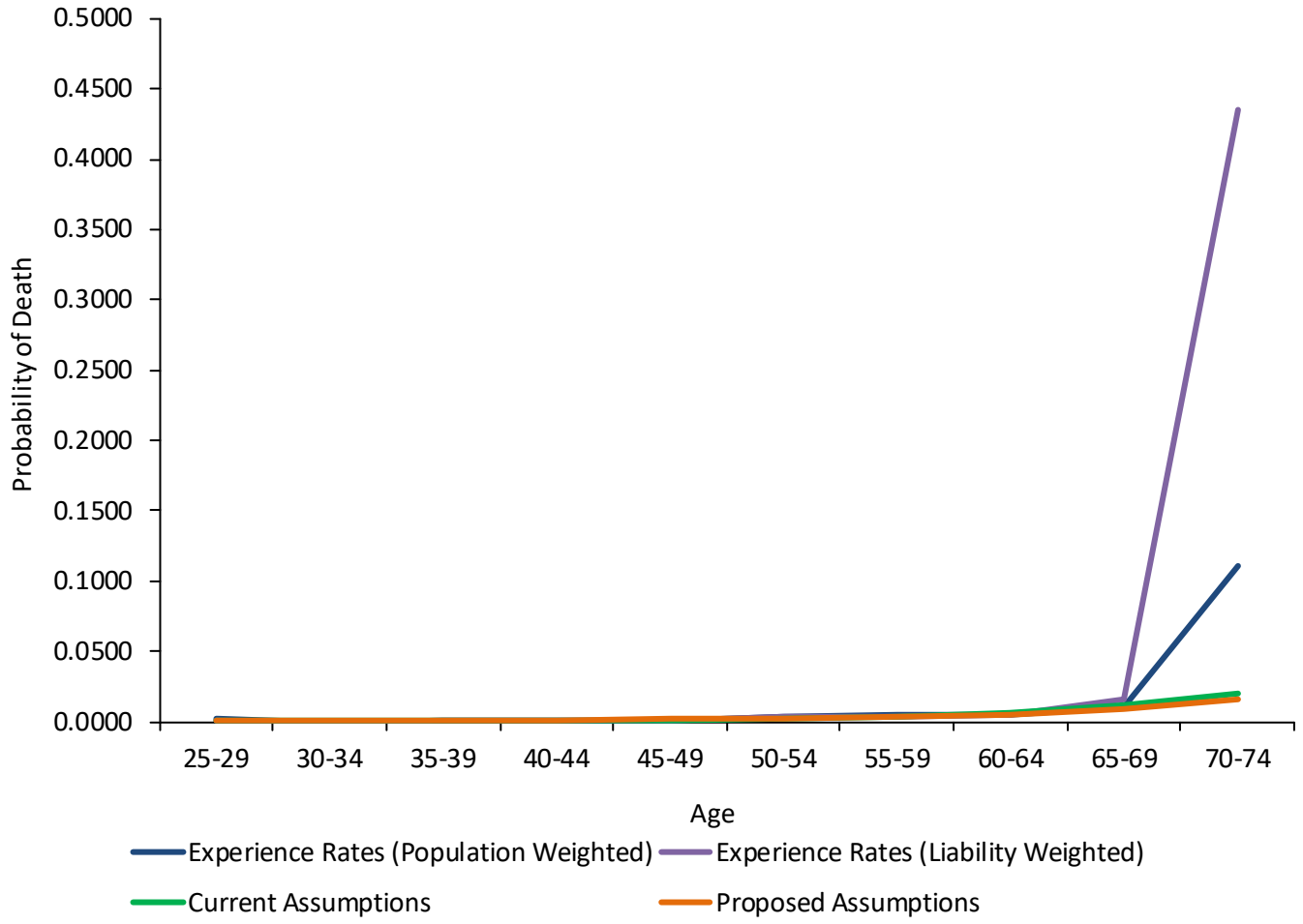


Death-in-Service Experience
LAW ENFORCEMENT Male Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	1	15	0.0667	0.0271	0.0005	0.0007	-	-
25-29	2	854	0.0023	0.0008	0.0005	0.0008	-	1
30-34	-	2,606	0.0000	0.0000	0.0005	0.0009	1	2
35-39	3	3,471	0.0009	0.0007	0.0006	0.0010	2	4
40-44	2	4,734	0.0004	0.0007	0.0008	0.0012	4	6
45-49	7	5,873	0.0012	0.0013	0.0014	0.0015	8	9
50-54	10	3,169	0.0032	0.0031	0.0022	0.0023	7	7
55-59	7	1,470	0.0048	0.0039	0.0035	0.0035	5	5
60-64	4	721	0.0055	0.0047	0.0063	0.0055	4	4
65-69	2	190	0.0105	0.0153	0.0117	0.0087	2	2
70-74	1	9	0.1111	0.4350	0.0202	0.0156	-	-
Totals	39	23,112	0.0017	0.0021	0.0014	0.0017	33	40
Liability Weighted	48							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Death-in-Service Experience
LAW ENFORCEMENT Male Members
2016-2019

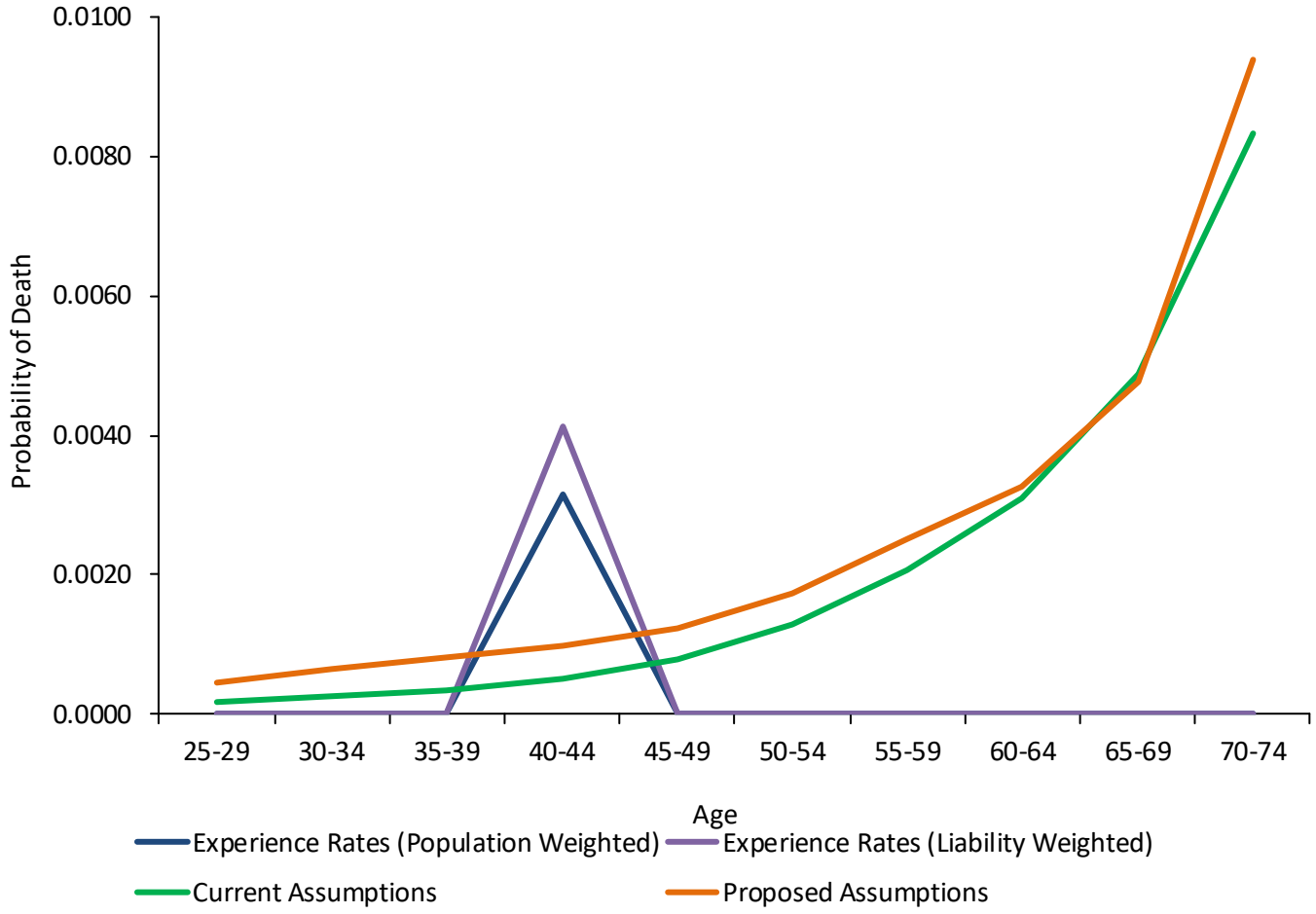


Death-in-Service Experience
LAW ENFORCEMENT Female Members
2016-2019

Age	Deaths (Population)	Exposure (Population)	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
20-24	-	1	0.0000	0.0000	0.0002	0.0003	-	-
25-29	-	120	0.0000	0.0000	0.0002	0.0004	-	-
30-34	-	316	0.0000	0.0000	0.0002	0.0006	-	-
35-39	-	475	0.0000	0.0000	0.0004	0.0008	-	-
40-44	2	633	0.0032	0.0041	0.0005	0.0010	-	1
45-49	-	701	0.0000	0.0000	0.0008	0.0012	1	1
50-54	-	426	0.0000	0.0000	0.0013	0.0017	1	1
55-59	-	227	0.0000	0.0000	0.0021	0.0025	-	1
60-64	-	133	0.0000	0.0000	0.0031	0.0033	-	-
65-69	-	20	0.0000	0.0000	0.0049	0.0048	-	-
70-74	-	-	N\A	N\A	0.0083	0.0094	-	-
Totals	2	3,052	0.0007	0.0008	0.0007	0.0013	2	4
Liability Weighted	2							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Death-in-Service Experience
LAW ENFORCEMENT Female Members
2016-2019

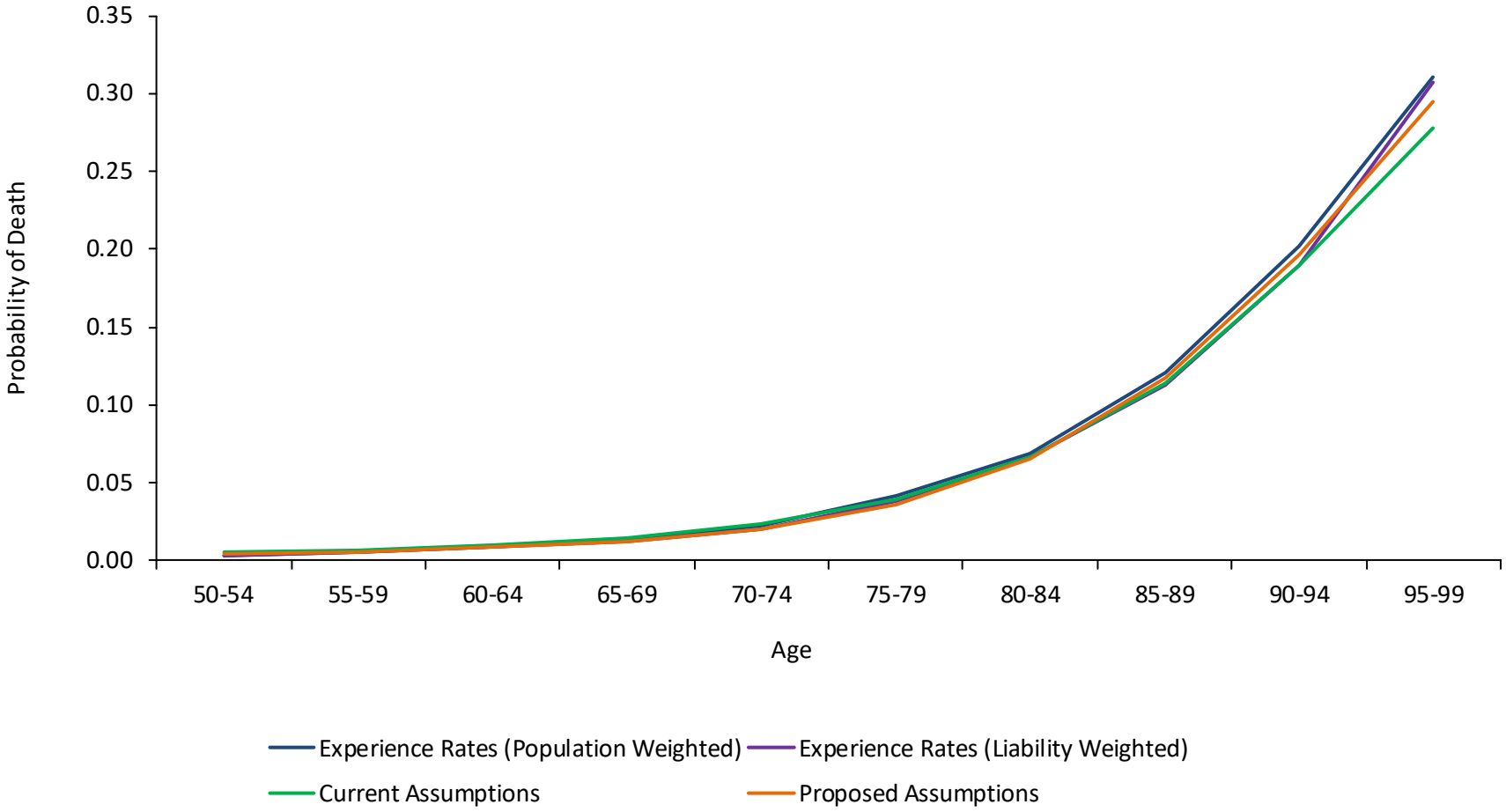


Summary of Male Mortality Experience
Service Retirees
2016-2019

Age	Deaths	Exposure	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
50-54	18	5,193	0.003466	0.002858	0.005099	0.003803	28	21
55-59	128	21,691	0.005901	0.005167	0.006603	0.005803	149	130
60-64	439	47,475	0.009247	0.008410	0.009524	0.008489	469	412
65-69	973	71,662	0.013578	0.012539	0.014874	0.012423	1,089	909
70-74	1,280	57,843	0.022129	0.020335	0.023914	0.020450	1,377	1,173
75-79	1,654	39,943	0.041409	0.037731	0.039268	0.036039	1,579	1,436
80-84	1,912	27,739	0.068928	0.066743	0.066021	0.065612	1,826	1,806
85-89	2,007	16,670	0.120396	0.112976	0.113409	0.117812	1,865	1,930
90-94	1,399	6,915	0.202314	0.189373	0.189940	0.196159	1,254	1,301
95-99	455	1,465	0.310580	0.306667	0.277861	0.295106	384	407
100-104	51	130	0.392308	0.460771	0.377176	0.410154	46	50
105-109	-	3	0.000000	0.000000	0.465599	0.517860	1	1
Totals	10,316	296,729	0.034766	0.019532	0.033927	0.032272	10,067	9,576
Liability Weighted	9,661							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Summary of Male Mortality Experience
Service Retirees
2016-2019

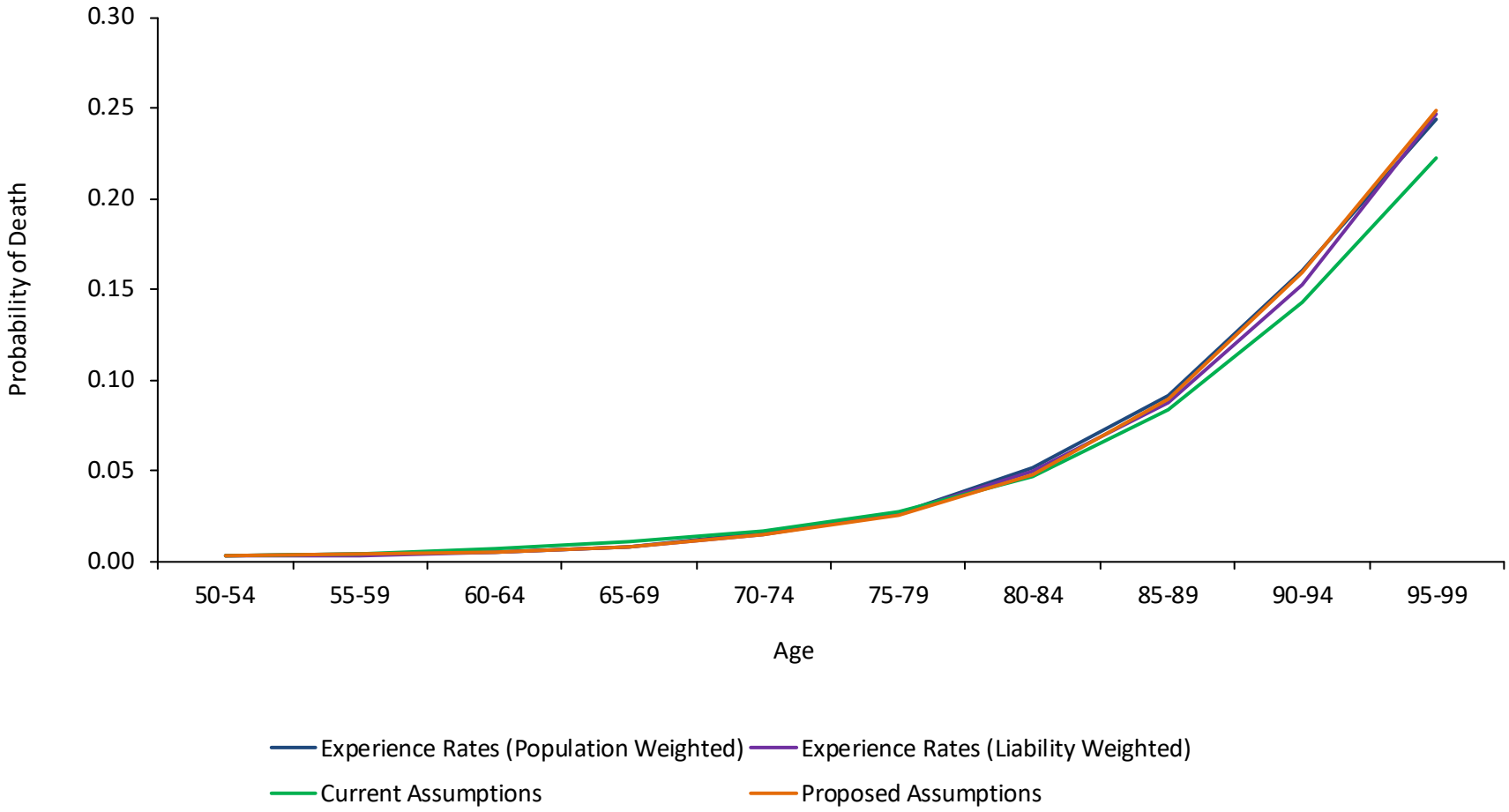


Summary of Female Mortality Experience
Service Retirees
2016-2019

Age	Deaths	Exposure	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
50-54	12	4,386	0.002736	0.002654	0.002966	0.002817	14	13
55-59	77	21,319	0.003612	0.003253	0.004376	0.003865	97	84
60-64	281	52,975	0.005304	0.005376	0.006682	0.005277	369	289
65-69	666	80,937	0.008229	0.007607	0.010334	0.008173	853	676
70-74	1,059	67,870	0.015603	0.015022	0.016636	0.014185	1,127	959
75-79	1,271	48,177	0.026382	0.026154	0.027357	0.025720	1,317	1,233
80-84	1,604	31,427	0.051039	0.049558	0.047051	0.047406	1,472	1,478
85-89	1,830	19,964	0.091665	0.086974	0.083406	0.089172	1,656	1,768
90-94	1,703	10,637	0.160102	0.152545	0.142878	0.158975	1,470	1,633
95-99	770	3,163	0.243440	0.246503	0.222081	0.248907	671	753
100-104	162	509	0.318271	0.315431	0.320371	0.364642	154	175
105-109	16	32	0.500000	0.565387	0.417976	0.482695	12	14
Totals	9,451	341,396	0.027683	0.014169	0.026983	0.026582	9,212	9,075
Liability Weighted	9,136							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Summary of Female Mortality Experience
Service Retirees
2016-2019

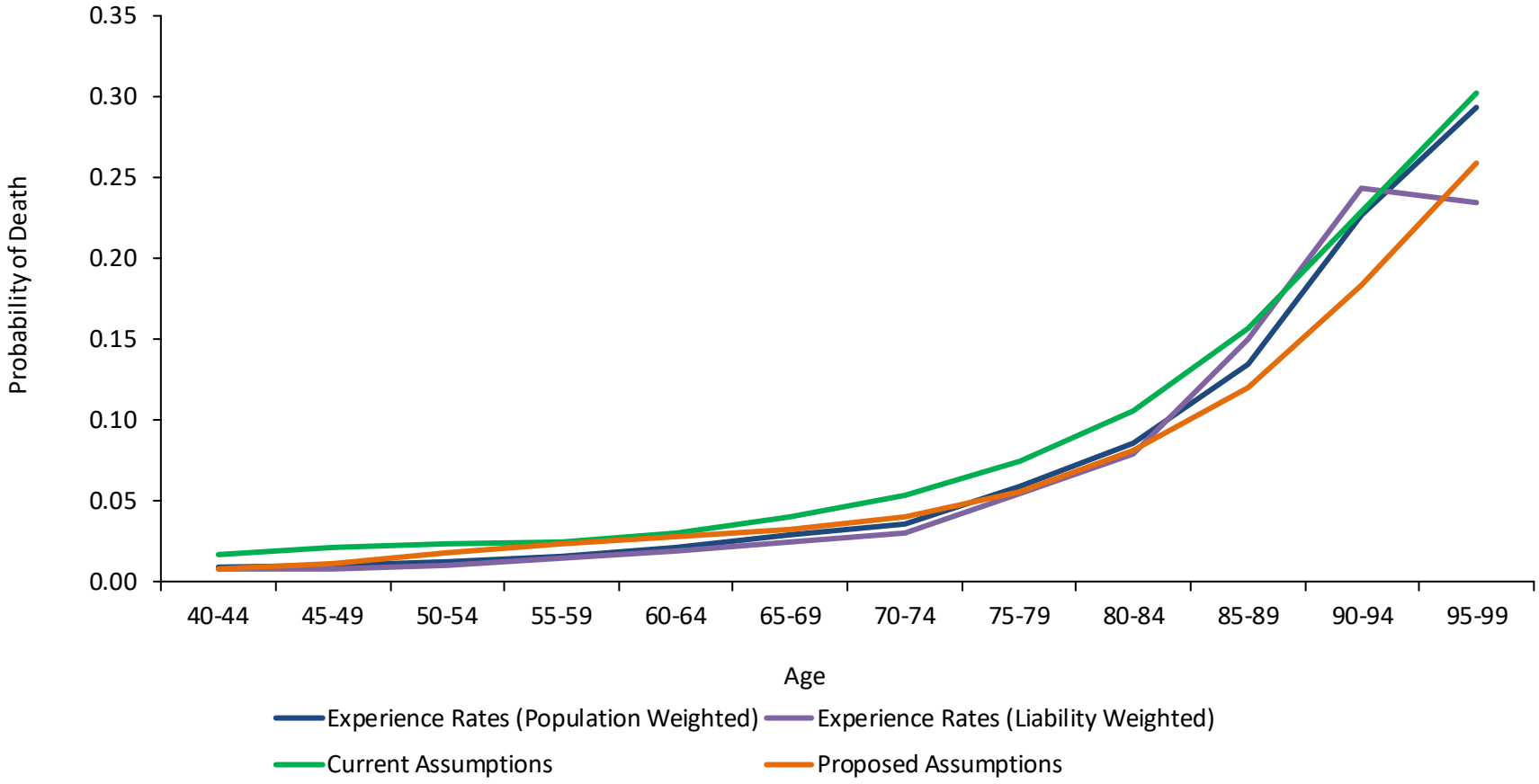


Summary of Male Mortality Experience
Disability Retirees
2016-2019

Age	Deaths	Exposure	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
40-44	7	775	0.009032	0.007288	0.016796	0.008108	14	7
45-49	25	2,433	0.010275	0.008301	0.021152	0.011624	52	29
50-54	60	4,960	0.012097	0.010046	0.023412	0.017377	117	88
55-59	136	8,680	0.015668	0.014267	0.025030	0.023149	220	202
60-64	227	10,682	0.021251	0.019228	0.030455	0.027714	327	296
65-69	251	8,792	0.028549	0.024502	0.039840	0.032691	350	287
70-74	192	5,357	0.035841	0.030238	0.053633	0.040573	284	216
75-79	150	2,534	0.059195	0.054851	0.074308	0.055208	186	138
80-84	115	1,343	0.085629	0.078753	0.105983	0.080744	140	106
85-89	71	526	0.134981	0.149974	0.156430	0.120313	80	62
90-94	34	150	0.226667	0.243561	0.229282	0.183848	33	26
95-99	5	17	0.294118	0.234854	0.303154	0.259408	5	4
Totals	1,273	46,249	0.027525	0.020023	0.039093	0.031590	1,808	1,461
Liability Weighted	1,146							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Summary of Male Mortality Experience
Disability Retirees
2016-2019

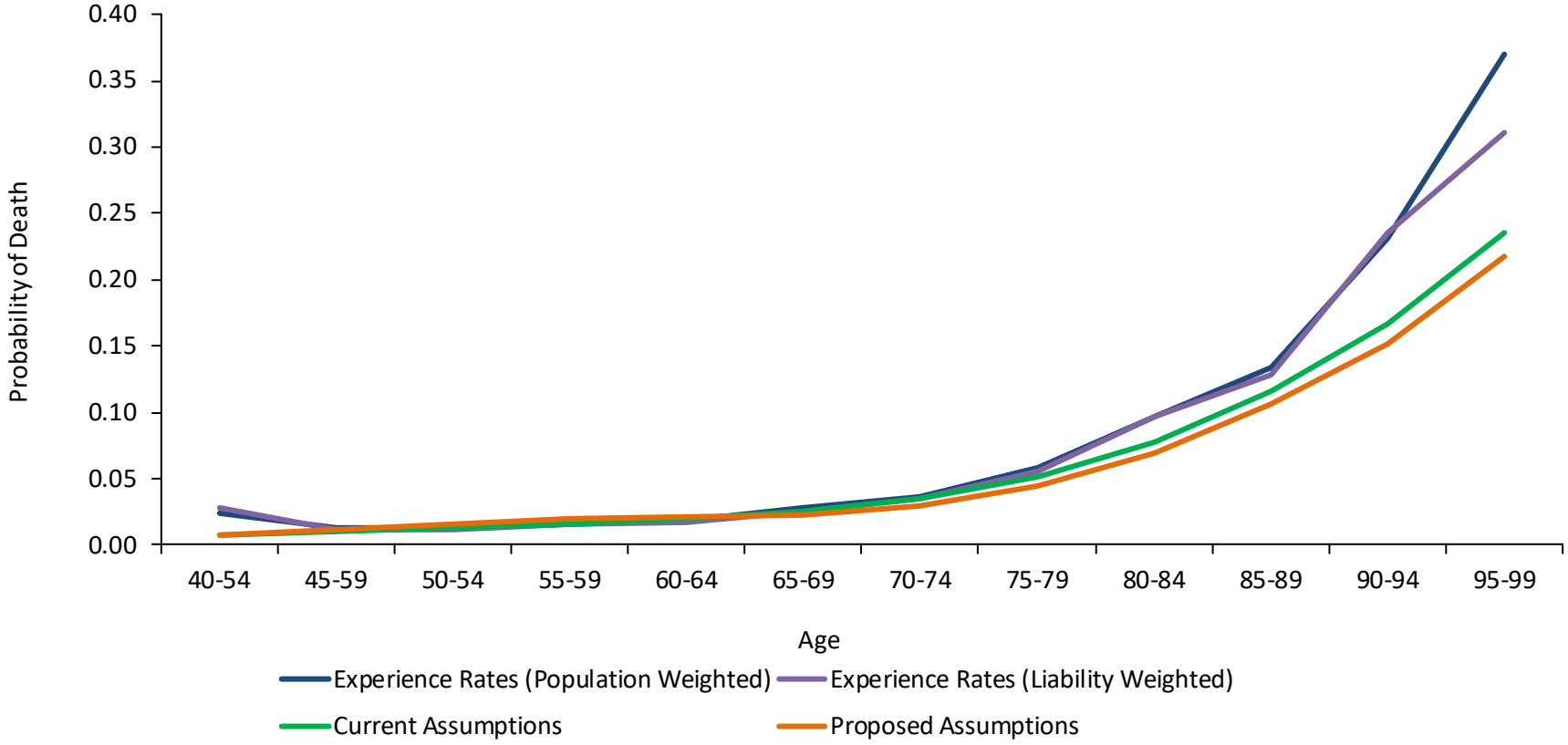


Summary of Female Mortality Experience
Disability Retirees
2016-2019

Age	Deaths	Exposure	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
40-54	16	649	0.024653	0.028497	0.007959	0.007703	5	5
45-59	27	2,036	0.013261	0.012124	0.009869	0.011086	21	23
50-54	60	4,592	0.013066	0.011358	0.012593	0.015806	59	74
55-59	123	7,927	0.015517	0.016412	0.016368	0.019373	131	153
60-64	191	10,560	0.018087	0.016986	0.019835	0.020730	211	219
65-69	261	9,360	0.027885	0.025979	0.024823	0.022911	234	216
70-74	220	6,053	0.036346	0.034412	0.034724	0.029928	208	180
75-79	188	3,239	0.058043	0.055233	0.051471	0.044182	163	141
80-84	142	1,466	0.096862	0.096801	0.077797	0.068929	112	99
85-89	103	766	0.134465	0.128059	0.115773	0.106929	87	80
90-94	68	294	0.231293	0.235332	0.166337	0.151793	47	43
95-99	20	54	0.370370	0.310914	0.235972	0.218054	12	11
Totals	1,419	46,996	0.030194	0.022187	0.027449	0.026470	1,290	1,244
Liability Weighted	1,361							

** Sample rates are taken from the midpoint of age group applicable to calendar year 2017.*

Summary of Female Mortality Experience
Disability Retirees
2016-2019



SECTION IX

DETAILED RESULTS – MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

Miscellaneous and Technical Assumptions

Marriage Assumption:	70% of males and 60% of females are assumed to be married for purposes of death-in-service benefits for State and Local members. 90% of males and 90% of females are assumed to be married for purposes of death-in-service benefits for Law members. Male spouses are assumed to be three years older than female spouses for active member valuation purposes. In retired or inactive cases where spouse information is needed, but not available, the three-year age difference is also assumed.
Pay Increase Timing:	Beginning of year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Final Average Salary:	For present value of future benefit purposes, final average salary was calculated in accordance with pay increase assumptions, but was not permitted to fall below the final average salary reported in the data.
Decrement Timing:	Decrements are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and mortality decrements do not operate during the first 5 years of service. The withdrawal decrement does not operate for members eligible to retire.
Death after Disability:	Death after disability benefits were approximated by assuming that the disability benefit would be paid as a joint and 35% survivor benefit for people in the original disability plan and as a joint and 20% survivor benefit for people in the post 1992 plan.
Service Credit Accruals:	It is assumed that members accrue one year of service credit per year. A (0.40)% factor is applied to State active member liabilities (other than for refunds) and a (0.50)% factor is applied to Local active member liabilities (other than for refunds) to recognize that a portion of the membership is part time. **See Page IX-3.**
Minimum Earnable Salary:	A (1.00)% factor is applied to State and Local active member liabilities (other than for refunds) to recognize the minimum amount that members must earn each month to qualify for full service credit. The minimum earnable salary for calendar year 2021 was $684.86 per month.
Qualified Excess Benefit Arrangement (QEBA):	Benefit amounts, if any, in excess of the IRC §415(b) limits are paid through a QEBA and are included in the actuarial valuation results.

Miscellaneous and Technical Assumptions (Continued)

Miscellaneous Loads:

- A load of approximately 0.47% of payroll is included in the computed normal cost to recognize subsidized service purchases.
- Law active accrued liabilities for retirement are reduced by 10% to recognize that total service reported is not entirely Law service, and that non-Law service cannot be used to satisfy Law eligibility conditions. **See Page IX-3.**
- A load of approximately 0.40% of Traditional Plan and 1.00% of Combined Plan payroll is included in the Traditional and Combined Plan computed normal costs to recognize expected administrative expenses.

Transition Groups Under Senate Bill #343: If the transition group data field was populated and it was A or B, the OPERS provided transition group was used. For all other records (i.e., the provided transition group was C or blank), the member's transition group was estimated based upon first eligibility of retirement (assuming future service accruals for active members).

Cost-of-Living Adjustments: For individuals retiring after January 7, 2013, cost-of-living adjustments were assumed to be 0.50% for calendar year 2021 and 2.15% thereafter. Increases assumed to occur on anniversary of benefit effective date.

Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon contribution rates presented in the Summary of Benefits, and the actual payroll payable at the time contributions are made.

Other Contributions: For amortization purposes, it was assumed that payroll for mitigating contributions (i.e., 3.50% from the Combined and Member Directed Plans and 2.44% from the Alternate Retirement Plan) and payroll for reemployed retirees will grow at the assumed 3.25% wage inflation assumption.

Benefit Service: Exact fractional service is used to determine the amount of benefit payable.

Normal Form of Benefit: The assumed normal form of benefit is a straight life benefit, except where otherwise noted.

Missing Member Data and Member Data Adjustments: Active and inactive records with missing dates of birth, if any, were given dates of birth that resulted in an entry age of 30 based upon the reported service. Active and inactive records with missing gender codes, if any, were assumed to be female. For active members with less than 6 months of service credit and a reported annualized salary greater than $200,000, the annual salary used for valuation purposes was the greater of the member's reported FAS and non-annualized gross salary.

Miscellaneous and Technical Assumptions (Concluded)

Part-Time Service Credit Accrual

It is assumed active members will accrue 1 full year of service per additional year active in the System. For the December 31, 2018 Actuarial Valuation, this assumption was reduced in conjunction with an inactive member status account update. A study of calendar year 2019 was conducted on members who were active at the beginning and end of year to determine the average service accrual during the year. Below is the computation weighted by members' annualized salary used for valuation purposes (as it compares to the same study conducted in 2015). This computation was also conducted for 2019 weighting by members' present value of future benefits.

Calendar Year	Average Service Accrued (Years) – Salary Weighted	Average Service Accrued (Years) – PVFB Weighted
2015	0.9719	
2019	0.9771	0.9965

Given the limited experience (i.e., 2019) since the update to inactive member statuses, no change is recommended to the Part-Time Service Credit Accrual load of (0.40)% to State and (0.50)% to Local active members at this time.

Law Enforcement

Active Law Enforcement liabilities for retirement were reduced by 10% to recognize service that is reported in data that is not in fact Law Enforcement Service. Non-Law Enforcement Service cannot be used to satisfy Law Enforcement Eligibility Conditions. A study of Law Enforcement Members as of the December 31, 2020 Actuarial Valuation was conducted under the following conditions:

1. For members with Entry Ages into the System (current age less current service) of greater than 35 years:
    a. *Valuation Method* – Valued benefits (using all service) under Law provisions.
    b. *Alternate Method* – Valued benefits under Local assumptions and benefits.
2. For members with Entry Ages into the System of less than or equal to 35 years:
    a. *Valuation Method* – Valued benefits (using all service) under Law provisions.
    b. *Alternate Method* – Valued benefits (using only law service) under Law provisions and added 2 times State and Local Accumulated Contribution balances adjusted for interest and discounting (estimated amounts that would be refunded from State and Local plans at date of retirement from Law Enforcement).

Comparing **1a.+2a.** with **1b.+2b.** estimates the amount of liability that is overstated as a result of non-Law Enforcement service being included in the Law Enforcement service during the actuarial valuation process. Results were as follows:

Scenario	Liability ($ in Millions)
Valuation Method	$2,796
Alternate Method	2,510
Difference (as % of Valuation)	(10.2)%

No change is recommended to be made to the Law Enforcement Load of -10%.

SECTION X

DETAILED RESULTS – COMPLETE LISTS OF PROPOSED DEMOGRAPHIC ASSUMPTIONS

Proposed Withdrawal Rates
(Population Weighted)

Age	Years of Service	State		Local		Public Safety		Law Enforcement	
		Male	Female	Male	Female	Male	Female	Male	Female
	0	50.00%	50.00%	40.00%	40.00%	20.00%	20.00%	16.00%	20.00%
	1	35.00	35.00	27.00	27.00	19.00	19.00	10.00	12.00
	2	20.00	20.00	18.00	18.00	15.00	15.00	8.00	9.00
	3	15.00	15.00	13.00	13.00	15.00	15.00	6.00	6.00
	4	12.00	12.00	11.00	11.00	10.00	10.00	5.00	6.00
20	5 & Over	12.00	12.00	11.00	11.00	10.00	10.00	4.50	5.00
21		12.00	12.00	11.00	11.00	10.00	10.00	4.50	5.00
22		12.00	12.00	11.00	11.00	10.00	10.00	4.50	5.00
23		11.16	11.60	10.50	10.70	10.00	10.00	4.18	4.60
24		10.32	11.20	10.00	10.40	10.00	10.00	3.86	4.20
25		9.48	10.80	9.50	10.10	10.00	10.00	3.54	3.80
26		8.64	10.40	9.00	9.80	10.00	10.00	3.22	3.40
27		7.80	10.00	8.50	9.50	10.00	10.00	2.90	3.00
28		7.40	9.50	8.00	9.00	9.60	9.60	2.82	3.00
29		7.00	9.00	7.50	8.50	9.20	9.20	2.74	2.90
30		6.60	8.50	7.00	8.00	8.80	8.80	2.66	2.90
31		6.20	8.00	6.50	7.50	8.40	8.40	2.58	2.80
32		5.80	7.50	6.00	7.00	8.00	8.00	2.50	2.70
33		5.52	7.08	5.66	6.66	7.40	7.40	2.38	2.60
34		5.24	6.66	5.32	6.32	6.80	6.80	2.26	2.50
35		4.96	6.24	4.98	5.98	6.20	6.20	2.14	2.30
36		4.68	5.82	4.64	5.64	5.60	5.60	2.02	2.10
37		4.40	5.40	4.30	5.30	5.00	5.00	1.90	2.00
38		4.18	5.12	4.14	5.08	4.50	4.50	1.76	1.90
39		3.96	4.84	3.98	4.86	4.00	4.00	1.62	1.70
40		3.74	4.56	3.82	4.64	3.50	3.50	1.48	1.50
41		3.52	4.28	3.66	4.42	3.00	3.00	1.34	1.40
42		3.30	4.00	3.50	4.20	2.50	2.50	1.20	1.30
43		3.14	3.84	3.36	4.08	2.40	2.40	1.20	1.30
44		2.98	3.68	3.22	3.96	2.30	2.30	1.20	1.30
45		2.82	3.52	3.08	3.84	2.20	2.20	1.20	1.30
46		2.66	3.36	2.94	3.72	2.10	2.10	1.20	1.30
47		2.50	3.20	2.80	3.60	2.00	2.00	1.20	1.20
48		2.46	3.16	2.78	3.56	2.00	2.00	1.20	1.20
49		2.42	3.12	2.76	3.52	2.00	2.00	1.20	1.20
50		2.38	3.08	2.74	3.48	2.00	2.00	1.20	1.20
51		2.34	3.04	2.72	3.44	2.00	2.00	1.20	1.20
52		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
53		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
54		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
55		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
56		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
57		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
58		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
59+		2.30	3.00	2.70	3.40	2.00	2.00	1.20	1.20
	Ref	1034	1034	1035	1035	1036	1036	753	1037
		1386x1	1388x1	1390x1	1392x1	1211x1	1211x1	876x1	575x1

Proposed Withdrawal Rates
(Liability Weighted)

Age	Years of Service	State		Local	
		Male	Female	Male	Female
20	5 & Over	10.00%	10.00%	10.00%	11.00%
21		10.00	10.00	10.00	11.00
22		10.00	10.00	10.00	11.00
23		9.40	9.76	9.26	10.44
24		8.80	9.52	8.52	9.88
25		8.20	9.28	7.78	9.32
26		7.60	9.04	7.04	8.76
27		7.00	8.80	6.30	8.20
28		6.60	8.30	5.98	7.78
29		6.20	7.80	5.66	7.36
30		5.80	7.30	5.34	6.94
31		5.40	6.80	5.02	6.52
32		5.00	6.30	4.70	6.10
33		4.76	5.90	4.42	5.74
34		4.52	5.50	4.14	5.38
35		4.28	5.10	3.86	5.02
36		4.04	4.70	3.58	4.66
37		3.80	4.30	3.30	4.30
38		3.58	4.02	3.14	4.04
39		3.36	3.74	2.98	3.78
40		3.14	3.46	2.82	3.52
41		2.92	3.18	2.66	3.26
42		2.70	2.90	2.50	3.00
43		2.54	2.74	2.42	2.90
44		2.38	2.58	2.34	2.80
45		2.22	2.42	2.26	2.70
46		2.06	2.26	2.18	2.60
47		1.90	2.10	2.10	2.50
48		1.88	2.10	2.08	2.50
49		1.86	2.10	2.06	2.50
50		1.84	2.10	2.04	2.50
51		1.82	2.10	2.02	2.50
52		1.80	2.10	2.00	2.50
53		1.80	2.10	2.00	2.50
54		1.80	2.10	2.00	2.50
55		1.80	2.10	2.00	2.50
56		1.80	2.10	2.00	2.50
57		1.80	2.10	2.00	2.50
58		1.80	2.10	2.00	2.50
59+		1.80	2.10	2.00	2.50
	Ref	1387x1	1389x1	1391x1	1393x1

Proposed Disability Rates

Age	State		Local		Public Safety & Law Enforcement	
	Male	Female	Male	Female	Male	Female
20	0.07%	0.06%	0.05%	0.04%	0.20%	0.20%
21	0.07	0.06	0.05	0.04	0.20	0.20
22	0.07	0.06	0.05	0.04	0.20	0.20
23	0.07	0.06	0.05	0.04	0.20	0.20
24	0.07	0.06	0.05	0.04	0.20	0.20
25	0.07	0.06	0.05	0.04	0.20	0.20
26	0.07	0.06	0.05	0.04	0.20	0.20
27	0.07	0.06	0.05	0.04	0.20	0.20
28	0.07	0.06	0.05	0.04	0.20	0.20
29	0.07	0.06	0.05	0.04	0.20	0.20
30	0.07	0.06	0.05	0.04	0.20	0.20
31	0.07	0.06	0.05	0.04	0.20	0.20
32	0.07	0.06	0.05	0.04	0.20	0.20
33	0.08	0.07	0.06	0.05	0.21	0.28
34	0.10	0.08	0.07	0.06	0.22	0.36
35	0.11	0.10	0.08	0.06	0.23	0.44
36	0.13	0.11	0.09	0.07	0.24	0.52
37	0.14	0.12	0.10	0.08	0.25	0.60
38	0.16	0.14	0.12	0.09	0.31	0.62
39	0.18	0.16	0.13	0.10	0.37	0.64
40	0.20	0.17	0.15	0.12	0.43	0.66
41	0.22	0.19	0.16	0.13	0.49	0.68
42	0.25	0.21	0.18	0.14	0.55	0.70
43	0.27	0.23	0.20	0.16	0.60	0.72
44	0.30	0.26	0.22	0.17	0.65	0.74
45	0.33	0.28	0.24	0.19	0.70	0.76
46	0.36	0.31	0.26	0.20	0.75	0.78
47	0.39	0.33	0.28	0.22	0.80	0.80
48	0.41	0.35	0.30	0.24	0.89	0.84
49	0.44	0.38	0.32	0.25	0.98	0.88
50	0.47	0.40	0.34	0.27	1.07	0.92
51	0.50	0.43	0.36	0.28	1.16	0.96
52	0.53	0.45	0.38	0.30	1.25	1.00
53	0.60	0.51	0.43	0.34	1.30	1.35
54	0.67	0.57	0.48	0.38	1.35	1.70
55	0.74	0.63	0.53	0.42	1.40	2.05
56	0.81	0.69	0.58	0.46	1.45	2.40
57	0.88	0.75	0.63	0.50	1.50	2.75
58	0.88	0.75	0.63	0.50	1.60	2.75
59+	0.88	0.75	0.63	0.50	1.70	2.75
Ref	1092x0.7	1092x0.6	1092x0.5	1092x0.4	1221x1	1222x1

Proposed Rates of Salary Increases
Merit and Longevity

Age	State	Local	Law Enforcement and Public Safety
20	5.50%	5.50%	8.00%
21	5.50	5.50	8.00
22	5.50	5.50	8.00
23	5.38	5.38	7.60
24	5.26	5.26	7.20
25	5.14	5.14	6.80
26	5.02	5.02	6.40
27	4.90	4.90	6.00
28	4.56	4.56	5.40
29	4.22	4.22	4.80
30	3.88	3.88	4.20
31	3.54	3.54	3.60
32	3.20	3.20	3.00
33	3.10	3.06	2.74
34	3.00	2.92	2.48
35	2.90	2.78	2.22
36	2.80	2.64	1.96
37	2.70	2.50	1.70
38	2.58	2.38	1.62
39	2.46	2.26	1.54
40	2.34	2.14	1.46
41	2.22	2.02	1.38
42	2.10	1.90	1.30
43	1.96	1.80	1.20
44	1.82	1.70	1.10
45	1.68	1.60	1.00
46	1.54	1.50	0.90
47	1.40	1.40	0.80
48	1.30	1.30	0.78
49	1.20	1.20	0.76
50	1.10	1.10	0.74
51	1.00	1.00	0.72
52	0.90	0.90	0.70
53	0.84	0.84	0.64
54	0.78	0.78	0.58
55	0.72	0.72	0.52
56	0.66	0.66	0.46
57	0.60	0.60	0.40
58	0.54	0.54	0.40
59	0.48	0.48	0.40
60	0.42	0.42	0.40
61	0.36	0.36	0.40
62	0.30	0.30	0.40
63	0.24	0.24	0.32
64	0.18	0.18	0.24
65	0.12	0.12	0.16
66	0.06	0.06	0.08
67+	0.00	0.00	0.00
Ref	573	574	575

Proposed Age Based Retirement Rates
Unreduced – Transition Group A

Age	State		Local		Public Safety		Law Enforcement	
	Male	Female	Male	Female	Male	Female	Male	Female
48							15.00%	15.00%
49							15.00	15.00
50							15.00	15.00
51							15.00	15.00
52					18.00%	18.00%	18.00	18.00
53					18.00	18.00	18.00	18.00
54					18.00	18.00	18.00	18.00
55					18.00	18.00	18.00	18.00
56					20.00	20.00	20.00	20.00
57					20.00	20.00	20.00	20.00
58					20.00	20.00	20.00	20.00
59					20.00	20.00	20.00	20.00
60					20.00	20.00	20.00	20.00
61					20.00	20.00	20.00	20.00
62					30.00	30.00	30.00	30.00
63					25.00	25.00	25.00	25.00
64					25.00	25.00	25.00	25.00
65	22.00%	25.00%	24.00%	25.00%	25.00	25.00	25.00	25.00
66	22.00	25.00	24.00	25.00	30.00	30.00	30.00	30.00
67	20.00	25.00	22.00	22.00	30.00	30.00	30.00	30.00
68	20.00	22.00	22.00	22.00	30.00	30.00	30.00	30.00
69	20.00	22.00	22.00	22.00	30.00	30.00	30.00	30.00
70	20.00	22.00	22.00	22.00	100.00	100.00	100.00	100.00
71	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
72	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
73	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
74	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
75	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
76	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
77	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
78	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
79	20.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
80	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
81	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
82	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
83	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
84	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
85	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ref	3256	3257	3258	3259	3261	3261	3261	3261

Proposed Age Based Retirement Rates
Unreduced – Transition Group B

Age	State		Local		Public Safety		Law Enforcement	
	Male	Female	Male	Female	Male	Female	Male	Female
48								
49								
50							15.00%	15.00%
51							15.00	15.00
52							15.00	15.00
53							15.00	15.00
54					18.00%	18.00%	18.00	18.00
55					18.00	18.00	18.00	18.00
56					20.00	20.00	18.00	18.00
57					20.00	20.00	18.00	18.00
58					20.00	20.00	20.00	20.00
59					20.00	20.00	20.00	20.00
60					20.00	20.00	20.00	20.00
61					20.00	20.00	20.00	20.00
62					30.00	30.00	20.00	20.00
63					25.00	25.00	20.00	20.00
64					25.00	25.00	30.00	30.00
65					25.00	25.00	25.00	25.00
66	22.00%	25.00%	24.00%	25.00%	30.00	30.00	25.00	25.00
67	22.00	25.00	24.00	25.00	30.00	30.00	25.00	25.00
68	20.00	25.00	22.00	22.00	30.00	30.00	30.00	30.00
69	20.00	22.00	22.00	22.00	30.00	30.00	30.00	30.00
70	20.00	22.00	22.00	22.00	100.00	100.00	30.00	30.00
71	20.00	22.00	22.00	22.00	100.00	100.00	30.00	30.00
72	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
73	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
74	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
75	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
76	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
77	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
78	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
79	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
80	20.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
81	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
82	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
83	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
84	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
85	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ref	3256	3257	3258	3259	3261	3261	3261	3261

Proposed Age Based Retirement Rates
Unreduced – Transition Group C

Age	State (67&5 Condition)		Local (67&5 Condition)		Public Safety		Law Enforcement	
	Male	Female	Male	Female	Male	Female	Male	Female
48								
49								
50								
51								
52							15.00%	15.00%
53							15.00	15.00
54							15.00	15.00
55							15.00	15.00
56					20.00%	20.00%	18.00	18.00
57					20.00	20.00	18.00	18.00
58					20.00	20.00	18.00	18.00
59					20.00	20.00	18.00	18.00
60					20.00	20.00	20.00	20.00
61					20.00	20.00	20.00	20.00
62					30.00	30.00	20.00	20.00
63					25.00	25.00	20.00	20.00
64					25.00	25.00	20.00	20.00
65					25.00	25.00	20.00	20.00
66					30.00	30.00	30.00	30.00
67	22.00%	25.00%	24.00%	25.00%	30.00	30.00	25.00	25.00
68	22.00	25.00	24.00	25.00	30.00	30.00	25.00	25.00
69	20.00	25.00	22.00	22.00	30.00	30.00	25.00	25.00
70	20.00	22.00	22.00	22.00	100.00	100.00	30.00	30.00
71	20.00	22.00	22.00	22.00	100.00	100.00	30.00	30.00
72	20.00	22.00	22.00	22.00	100.00	100.00	30.00	30.00
73	20.00	22.00	18.00	22.00	100.00	100.00	30.00	30.00
74	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
75	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
76	20.00	22.00	18.00	22.00	100.00	100.00	100.00	100.00
77	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
78	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
79	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
80	20.00	25.00	18.00	18.00	100.00	100.00	100.00	100.00
81	20.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
82	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
83	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
84	25.00	25.00	20.00	22.00	100.00	100.00	100.00	100.00
85	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ref	3256	3257	3258	3259	3261	3261	3261	3261

Proposed Service Based Retirement Rates
Unreduced – Transition Group A

Service	State		Local	
	Male	Female	Male	Female
30	33.00%	33.00%	33.00%	33.00%
31	27.00	27.00	27.00	27.00
32	21.00	21.00	21.00	21.00
33	21.00	21.00	21.00	21.00
34	21.00	21.00	21.00	21.00
35	21.00	21.00	21.00	21.00
36	21.00	21.00	21.00	21.00
37	21.00	21.00	21.00	21.00
38	21.00	21.00	21.00	21.00
39	21.00	21.00	21.00	21.00
40	21.00	21.00	21.00	21.00
41	21.00	21.00	21.00	21.00
42	21.00	21.00	21.00	21.00
43	21.00	21.00	21.00	21.00
44	21.00	21.00	21.00	21.00
45	21.00	21.00	21.00	21.00
46	21.00	21.00	21.00	21.00
47	21.00	21.00	21.00	21.00
48	21.00	21.00	21.00	21.00
49	21.00	21.00	21.00	21.00
50	100.00	100.00	100.00	100.00
Ref	3260	3260	3260	3260

Proposed Service Based Retirement Rates
Unreduced – Transition Group B

Service	State		Local	
	Male	Female	Male	Female
31	33.00%	33.00%	33.00%	33.00%
32	27.00	27.00	27.00	27.00
33	21.00	21.00	21.00	21.00
34	21.00	21.00	21.00	21.00
35	21.00	21.00	21.00	21.00
36	21.00	21.00	21.00	21.00
37	21.00	21.00	21.00	21.00
38	21.00	21.00	21.00	21.00
39	21.00	21.00	21.00	21.00
40	21.00	21.00	21.00	21.00
41	21.00	21.00	21.00	21.00
42	21.00	21.00	21.00	21.00
43	21.00	21.00	21.00	21.00
44	21.00	21.00	21.00	21.00
45	21.00	21.00	21.00	21.00
46	21.00	21.00	21.00	21.00
47	21.00	21.00	21.00	21.00
48	21.00	21.00	21.00	21.00
49	21.00	21.00	21.00	21.00
50	21.00	21.00	21.00	21.00
51	100.00	100.00	100.00	100.00
Ref	3260	3260	3260	3260

Proposed Service Based Retirement Rates
Unreduced – Transition Group C

55&32 Condition Year of Eligibility	State		Local	
	Male	Female	Male	Female
1	33.00%	33.00%	33.00%	33.00%
2	27.00	27.00	27.00	27.00
3	21.00	21.00	21.00	21.00
4	21.00	21.00	21.00	21.00
5	21.00	21.00	21.00	21.00
6	21.00	21.00	21.00	21.00
7	21.00	21.00	21.00	21.00
8	21.00	21.00	21.00	21.00
9	21.00	21.00	21.00	21.00
10	21.00	21.00	21.00	21.00
11	21.00	21.00	21.00	21.00
12	21.00	21.00	21.00	21.00
13	21.00	21.00	21.00	21.00
14	21.00	21.00	21.00	21.00
15	21.00	21.00	21.00	21.00
16	21.00	21.00	21.00	21.00
17	21.00	21.00	21.00	21.00
18	21.00	21.00	21.00	21.00
19	21.00	21.00	21.00	21.00
20	21.00	21.00	21.00	21.00
21	100.00	100.00	100.00	100.00
Ref	3260	3260	3260	3260

Proposed Retirement Rates
Reduced – Transition Group A

Age	State		Local		Public Safety
	Male	Female	Male	Female	Male & Female
48					4.00%
49					4.00
50					4.00
51					4.00
52					
53					
54					
55	3.00%	2.50%	3.00%	3.50%	
56	3.00	2.50	3.00	3.50	
57	3.00	3.50	3.00	3.50	
58	3.00	3.50	3.00	3.50	
59	3.00	3.50	3.00	3.50	
60	5.00	8.00	5.00	8.00	
61	5.00	8.00	5.00	8.00	
62	8.75	8.00	8.75	8.00	
63	8.75	10.00	8.75	10.00	
64	8.75	10.00	8.75	10.00	
Ref	3253	3254	3253	3255	1200

Proposed Retirement Rates
Reduced – Transition Group B

Age	State		Local		Public Safety	Law Enforcement
	Male	Female	Male	Female	Male & Female	Male & Female
48					4.00%	4.00%
49					4.00	4.00
50					4.00	
51					4.00	
52					4.00	
53					4.00	
54						
55	3.00%	2.50%	3.00%	3.50%		
56	3.00	2.50	3.00	3.50		
57	3.00	3.50	3.00	3.50		
58	3.00	3.50	3.00	3.50		
59	3.00	3.50	3.00	3.50		
60	5.00	8.00	5.00	8.00		
61	5.00	8.00	5.00	8.00		
62	8.75	8.00	8.75	8.00		
63	8.75	10.00	8.75	10.00		
64	8.75	10.00	8.75	10.00		
65	15.00	15.00	12.00	15.00		
Ref	3253	3254	3253	3255	1200	1200

Proposed Retirement Rates
Reduced – Transition Group C

Age	State		Local		Public Safety	Law Enforcement
	Male	Female	Male	Female	Male & Female	Male & Female
48						4.00%
49						4.00
50						4.00
51						4.00
52					4.00%	
53					4.00	
54					4.00	
55					4.00	
56						
57	3.00%	2.50%	3.00%	3.50%		
58	3.00	2.50	3.00	3.50		
59	3.00	3.50	3.00	3.50		
60	3.00	3.50	3.00	3.50		
61	3.00	3.50	3.00	3.50		
62	5.00	8.00	5.00	8.00		
63	5.00	8.00	5.00	8.00		
64	8.75	8.00	8.75	8.00		
65	8.75	10.00	8.75	10.00		
66	8.75	10.00	8.75	10.00		
Ref	3253	3254	3253	3255	1200	1200

Proposed Pre-Retirement Mortality Rates*

State & Local		
	% Dying Next Year	
Age	Male	Female
20	0.0478%	0.0176%
21	0.0473%	0.0165%
22	0.0443%	0.0155%
23	0.0426%	0.0143%
24	0.0408%	0.0131%
25	0.0404%	0.0134%
26	0.0445%	0.0152%
27	0.0472%	0.0169%
28	0.0514%	0.0187%
29	0.0540%	0.0207%
30	0.0581%	0.0241%
31	0.0621%	0.0257%
32	0.0659%	0.0290%
33	0.0694%	0.0306%
34	0.0727%	0.0335%
35	0.0771%	0.0363%
36	0.0810%	0.0387%
37	0.0844%	0.0425%
38	0.0887%	0.0443%
39	0.0923%	0.0476%
40	0.0970%	0.0504%
41	0.1011%	0.0545%
42	0.1063%	0.0571%
43	0.1113%	0.0610%
44	0.1175%	0.0649%
45	0.1251%	0.0702%
46	0.1342%	0.0757%
47	0.1435%	0.0815%
48	0.1560%	0.0878%
49	0.1690%	0.0958%
50	0.1826%	0.1044%
51	0.1997%	0.1147%
52	0.2175%	0.1256%
53	0.2372%	0.1382%
54	0.2579%	0.1511%
55	0.2818%	0.1667%
56	0.3077%	0.1819%
57	0.3366%	0.1979%
58	0.3667%	0.2144%
59	0.3979%	0.2323%
60	0.4308%	0.2518%
61	0.4648%	0.2711%
62	0.4993%	0.2917%
63	0.5355%	0.3150%
64	0.5719%	0.3411%
65	0.6100%	0.3692%
Ref	#2723sb0x1.3 ps964byr10pyr17	#2724sb0x1.3 ps965byrpyr17

Public Safety & Law Enforcement		
	% Dying Next Year	
Age	Male	Female
20	0.0694%	0.0282%
21	0.0706%	0.0306%
22	0.0702%	0.0311%
23	0.0700%	0.0337%
24	0.0700%	0.0362%
25	0.0699%	0.0389%
26	0.0738%	0.0416%
27	0.0775%	0.0444%
28	0.0814%	0.0491%
29	0.0852%	0.0518%
30	0.0865%	0.0564%
31	0.0898%	0.0590%
32	0.0926%	0.0632%
33	0.0952%	0.0673%
34	0.0972%	0.0709%
35	0.1008%	0.0741%
36	0.1039%	0.0770%
37	0.1040%	0.0813%
38	0.1078%	0.0831%
39	0.1108%	0.0867%
40	0.1134%	0.0898%
41	0.1156%	0.0926%
42	0.1210%	0.0972%
43	0.1244%	0.1001%
44	0.1297%	0.1047%
45	0.1369%	0.1098%
46	0.1443%	0.1151%
47	0.1537%	0.1227%
48	0.1639%	0.1294%
49	0.1776%	0.1382%
50	0.1924%	0.1496%
51	0.2079%	0.1617%
52	0.2275%	0.1744%
53	0.2479%	0.1875%
54	0.2691%	0.2028%
55	0.2944%	0.2179%
56	0.3238%	0.2343%
57	0.3538%	0.2516%
58	0.3890%	0.2659%
59	0.4272%	0.2824%
60	0.4663%	0.2973%
61	0.5088%	0.3108%
62	0.5544%	0.3264%
63	0.6008%	0.3410%
64	0.6477%	0.3565%
65	0.6987%	0.3718%
Ref	#2721sb0x1.7 ps964byr10pyr17	#2722sb0x1.7 ps965byrpyr17

** Applicable to calendar year 2017. Rates in future years are determined by the above rates and the MP-2020 projection scale.*

Proposed Standard Post-Retirement Mortality Rates*

Age	% Dying Next Year	
	Male	Female
50	0.3233%	0.2468%
51	0.3501%	0.2627%
52	0.3803%	0.2817%
53	0.4132%	0.3014%
54	0.4507%	0.3217%
55	0.4906%	0.3427%
56	0.5339%	0.3641%
57	0.5803%	0.3865%
58	0.6288%	0.4084%
59	0.6815%	0.4329%
60	0.7348%	0.4598%
61	0.7900%	0.4914%
62	0.8489%	0.5277%
63	0.9096%	0.5710%
64	0.9767%	0.6192%
65	1.0526%	0.6763%
66	1.1402%	0.7419%
67	1.2423%	0.8173%
68	1.3608%	0.9059%
69	1.4982%	1.0088%
70	1.6567%	1.1265%
71	1.8369%	1.2626%
72	2.0450%	1.4185%
73	2.2803%	1.5957%
74	2.5501%	1.7973%
75	2.8576%	2.0250%
76	3.2065%	2.2813%
77	3.6039%	2.5720%
78	4.0551%	2.9012%
79	4.5671%	3.2744%
80	5.1496%	3.7005%
81	5.8108%	4.1862%
82	6.5612%	4.7406%
83	7.4012%	5.3727%
84	8.3421%	6.0950%
85	9.3864%	6.9186%

Age	% Dying Next Year	
	Male	Female
86	10.5317%	7.8571%
87	11.7812%	8.9172%
88	13.1428%	10.1047%
89	14.6137%	11.4116%
90	16.1927%	12.8339%
91	17.8640%	14.3350%
92	19.6159%	15.8975%
93	21.4367%	17.5239%
94	23.3208%	19.2117%
95	25.2658%	20.9694%
96	27.3415%	22.8707%
97	29.5106%	24.8907%
98	31.7374%	27.0169%
99	34.0329%	29.2665%
100	36.3531%	31.6114%
101	38.6866%	34.0256%
102	41.0154%	36.4642%
103	43.3052%	38.9088%
104	45.5414%	41.3290%
105	47.7054%	43.7084%
106	49.7838%	46.0227%
107	51.7860%	48.2695%
108	53.6783%	50.4237%
109	55.4822%	52.4705%
110	56.9046%	54.4063%
111	57.0130%	56.2245%
112	57.1387%	57.2188%
113	57.2590%	57.3105%
114	57.3794%	57.4081%
115	57.4942%	57.4942%
116	57.5000%	57.5000%
117	57.5000%	57.5000%
118	57.5000%	57.5000%
119	57.5000%	57.5000%
120	100.0000%	100.0000%
Ref	#2705sb0x1.15 ps964byr10pyr17	#2706sb0x1.15 ps965byr10pyr17

** Applicable to calendar year 2017. Rates in future years are determined by the above rates and the MP-2020 projection scale.*

Proposed Substandard Post-Disability Mortality Rates*

Age	% Dying Next Year	
	Male	Female
50	1.5139%	1.4339%
51	1.6232%	1.5047%
52	1.7377%	1.5806%
53	1.8553%	1.6599%
54	1.9744%	1.7399%
55	2.0925%	1.8150%
56	2.2072%	1.8819%
57	2.3149%	1.9373%
58	2.4162%	1.9807%
59	2.5112%	2.0125%
60	2.6007%	2.0366%
61	2.6856%	2.0544%
62	2.7714%	2.0730%
63	2.8609%	2.0950%
64	2.9543%	2.1243%
65	3.0517%	2.1643%
66	3.1565%	2.2189%
67	3.2691%	2.2911%
68	3.3930%	2.3835%
69	3.5293%	2.4985%
70	3.6826%	2.6375%
71	3.8578%	2.8015%
72	4.0573%	2.9928%
73	4.2834%	3.2107%
74	4.5391%	3.4608%
75	4.8303%	3.7435%
76	5.1549%	4.0614%
77	5.5208%	4.4182%
78	5.9288%	4.8168%
79	6.3853%	5.2607%
80	6.8923%	5.7527%
81	7.4553%	6.2961%
82	8.0744%	6.8929%
83	8.7490%	7.5491%
84	9.4844%	8.2647%
85	10.2750%	9.0472%

Age	% Dying Next Year	
	Male	Female
86	11.1229%	9.8618%
87	12.0313%	10.6929%
88	13.0127%	11.5375%
89	14.2419%	12.3913%
90	15.5979%	13.2759%
91	16.9855%	14.1980%
92	18.3848%	15.1793%
93	19.7902%	16.2456%
94	21.2119%	17.4108%
95	22.6700%	18.6925%
96	24.2511%	20.1582%
97	25.9408%	21.8054%
98	27.7270%	23.5698%
99	29.6305%	25.4706%
100	31.6114%	27.4882%
101	33.6405%	29.5875%
102	35.6656%	31.7080%
103	37.6567%	33.8337%
104	39.6012%	35.9383%
105	41.4830%	38.0073%
106	43.2903%	40.0197%
107	45.0313%	41.9735%
108	46.6768%	43.8467%
109	48.2454%	45.6265%
110	49.4823%	47.3098%
111	49.5765%	48.8909%
112	49.6858%	49.7555%
113	49.7904%	49.8352%
114	49.8951%	49.9201%
115	49.9950%	49.9950%
116	50.0000%	50.0000%
117	50.0000%	50.0000%
118	50.0000%	50.0000%
119	50.0000%	50.0000%
120	100.0000%	100.0000%
Ref	#2711sb0x1 ps964byr10pyr17	#2712sb0x1 ps965byr10pyr17

** Applicable to calendar year 2017. Rates in future years are determined by the above rates and the MP-2020 projection scale.*

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October 28, 2021

Ms. Karen E. Carraher
Executive Director
Ohio Public Employees Retirement System
277 East Town Street
Columbus, Ohio 43215

Re: OPERS 2016-2020 Experience Study

Dear Karen:

Enclosed are 10 copies of the experience study.

Please call if you have any questions.

Sincerely,

Gabriel, Roeder, Smith & Company

Mita D. Drazilov, ASA, MAAA

MDD:sc
Enclosures

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