GRS | **Gabriel Roeder Smith & Company**
Consultants & Actuaries

OHIO PUBLIC EMPLOYEES RETIREMENT SYSTEM
5-YEAR EXPERIENCE STUDY
JANUARY 1, 2011 THROUGH DECEMBER 31, 2015

GRS

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October 31, 2016

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

Ladies and Gentlemen:

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.

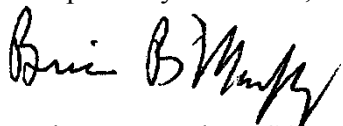The signing actuaries are independent of the plan sponsor.

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, 2011 through December 31, 2015*, and was carried out using generally accepted actuarial principles and techniques.
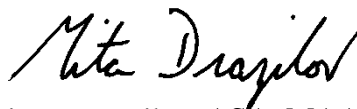
We believe that the proposed actuarial assumptions that are the result of this investigation represent a reasonable estimate of the future experience of OPERS based upon the data reviewed in the study and general trends among Public Employee Retirement Systems.

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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Mita D. Drazilov, ASA, MAAA

BBM/MDD:rmn

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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 necessary to fund the pension defined benefits provided by OPERS,
- Determine the number of years required to amortize the unfunded actuarial accrued liabilities based upon established contribution rates, and
- 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 quitting 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

- Long-term rates of investment return to be generated by the assets of the System.
- Long-term rates of growth of total payroll.
- Patterns of merit & longevity pay increases to active members.

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 Use of outdated assumptions can lead to:

- Understated costs resulting in either an inability to pay benefits when due, or sharp increases in required contributions at some point in the future.
- Overstated costs resulting in either benefit levels that are kept below the level that could be supported by the computed rate, or 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. Actuarial assumptions were last revised following the December 31, 2010 annual actuarial valuation.

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.

No mathematical credibility procedure was utilized in the selection of the proposed non-economic assumptions. 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 (i.e., if circumstances dictate that future experience is expected to deviate from the past experience due to a benefit change, economic or employment changes, etc.).

SUMMARY OF FINDINGS

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 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. 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 "head count" 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 death and disability is typically not a decision at all, rather an event that happens to someone.

Withdrawal Rates: A "withdrawal" or a quit is a separation from OPERS covered employment without entitlement to an immediate monthly benefit. For age based withdrawal (i.e., five or more years of service), experience was found to be more highly correlated with the liability weighted method described on page 4. Overall experience was close to expected. Rates for most ages were raised slightly for State and Local members. Rates for the age based tables were raised less than they otherwise would have been for the pension valuation due to the reflection of the liability weighted results. No changes were made to the rates for Public Safety and Law Enforcement members.

For service based withdrawal (i.e., service less than five years), the traditional method based on counts was used. Service based withdrawal rates were raised slightly for all groups except for male Law Enforcement members. Overall, this has a downward effect on the computed amortization period.

Disability Rates: Due to the changes that resulted from Senate Bill 343, experience was analyzed for calendar years 2013 through 2015. Experience for all groups was lower than assumed. A decrease in rates is recommended for all groups, males and females. Disability rates for Public Safety were set equal to the rates for Law Enforcement as experience was limited. Overall, this has a downward effect on the computed amortization period.

Retirement Experience: Rates were analyzed for those eligible for reduced retirement and unreduced retirement. In most groups, both unreduced and reduced retirements occurred slightly more frequently than current assumptions would expect. With the implementation of Senate Bill 343 and HCPP 3.0, members had increased incentive to retire during the years of Study. As a result, we believe the increased retirements over the past 5 years is not a reflection of long-term retirement trends and recommend no changes to the current retirement rates. In the last study, rates were set closely to actual experience over the five-year period.

Mortality Among Healthy Retirees: Post-retirement mortality is an important, but relatively stable ingredient in cost calculations. This assumption should be updated from time to time to reflect longevity improvements.

Another consideration is that Actuarial Standard of Practice (ASOP) No. 35 has recently been revised with regard to the Mortality assumption. ASOP No. 35 Disclosure Section 4.1.1 now states, "The disclosure of the mortality assumption should contain sufficient detail to permit another qualified actuary to understand the provision made for future mortality improvement. If the actuary assumes zero mortality improvement after the measurement date, the actuary should state that no provision was made for future mortality improvement." The current rates include such margin in the tables by assuming rates lower than those actually observed (referred to as a static improvement assumption).

The proposed rates take a different approach and assume that future mortality rates will continue to decline with each generation. For this "generational" approach, we remove any static margin from the base tables and apply a mortality improvement scale to project rates getting lower 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.

The approach we have taken is based on the RPEC_2014 model described by the Society of Actuaries (SOA). The base mortality tables we select from are the RP-2014 mortality tables. That is, our starting point was the RP-2014 tables adjusted for mortality improvement back to the observation period base year of 2006. The improvement scales we consider are the 2-dimensional MP-2015 mortality improvement scales. It is anticipated that the SOA will release new improvement scales annually. For purposes of OPERS valuations, we recommend maintaining the MP-2015 improvement scales until the next experience study.

The first step in this procedure is to select the appropriate version of the RP-2014 mortality tables for the aggregate OPERS population of healthy retirees.

We reviewed the mortality experience of healthy male and female retirees during the 5-year period. The results are shown on pages D-5 and D-7. The plan experienced more deaths than projected by the present assumptions.

We compared the experience of the male healthy retiree to the RP-2014 adjusted tables. We observed that the male healthy retiree OPERS population has not experienced the same level of mortality improvement as that incorporated in the RP-2014 mortality table. We recommend adopting the RP-2014 Healthy Annuitant mortality table for males, adjusted for mortality improvement back to the observation period base year of 2006, and then establish the base year as 2015. We also observed that the female healthy retiree OPERS population has not experienced the same level of mortality improvement as that incorporated in the RP-2014 mortality table. We recommend adopting the RP-2014 Healthy Annuitant mortality table for females, adjusted for mortality improvement back to the observation period base year of 2006, and then establish the base year as 2010.

Mortality Among Disabled Retirees: Disabled mortality experience during the study period was not sufficient to be credible. We recommend adopting the RP-2014 disabled mortality tables, adjusted for mortality improvement back to the observation period base year of 2006, and then establish the base year as 2015 for males and 2010 for females.

Mortality Among Active Members (Death-In-Service): Active mortality experience during the study period was not sufficient to be credible. We recommend adopting the RP-2014 Employees mortality tables, adjusted for mortality improvement back to the observation period base year of 2006, and then establish the base year as 2015 for males and 2010 for females.

Mortality Improvement Scale: The mortality improvement scale recommended to be applicable to the recommended mortality tables is the MP-2015 mortality improvement scale from the Society of Actuaries' MP-2015 report.

Economic assumptions include **long-term 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:
- Philadelphia Federal Reserve quarterly survey of Society of Professional Forecasters
- Comparison of Treasury yields and Treasury Inflation Protected Securities (TIPS)
- Future capital market expectations of eight investment consultants that GRS monitors

Sources considered in the analysis of the investment return assumption included:
- Future capital market expectations of eight 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) both nationally and for OPERS

Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we monitor forward-looking expectations developed by several major investment consulting firms. The eight investment consultants that GRS monitors are Wilshire, PCA, RV Kuhns, BNY Mellon, JP Morgan, Aon, NEPC and Mercer.

Current economic assumptions for the System are as follows:

Investment Return – Pension	8.00%
Wage Inflation	3.75%
Price Inflation	3.00%
Annual COLA Increase for Affected Retirees	2.80%
Investment Return – Retiree Health	6.50%
GASB Discount Rate – Retiree Health	5.00%

Note that the investment return assumption of 8.00% is currently net of investment expenses based upon a passive investment strategy *and net of administrative expenses*. Given OPERS's administrative expenses, this assumption corresponds to an approximate investment return assumption of 8.10%, *gross of administrative expenses*.

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standards 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 has been revised since the last time an Experience Study was performed for OPERS. The adopted revision of ASOP No. 27 (applicable to valuation dates on or after September 30, 2014) 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 historical and current economic data that is relevant as of the valuation date;

(d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and

(e) It has 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 and disclosed under Section 3.5.1, or when alternative assumptions are used for the assessment of risk.

The revised ASOP No. 27 has significantly reduced the range of economic assumptions that can be deemed reasonable for actuarial valuation purposes.

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 table below shows the average price inflation over various periods, ending December 2015:

Periods Ending December 2015	Average Annual Increase in CPI-U
Last five (5) years	1.53%
Last ten (10) years	1.86
Last fifteen (15) years	2.07
Last twenty (20) years	2.18
Last twenty-five (25) years	2.30
Last thirty (30) years	2.61

As the table shows, recent experience, both short-term and long-term, has been below the current assumption of 3.0%.

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. Their recent forecast, from the second quarter of 2016, is for inflation over the following ten years to average 2.20%. This is a decrease from the survey results from the fourth quarter of 2011, which was for inflation over the following ten years to average 2.50%.

Another source of information about future price inflation is the market for US Treasury bonds. The December 31, 2015 yield for a 20-year inflation indexed Treasury bond (20-year TIPS) was 1.07% plus actual inflation. The yield for a non-indexed 20-year Treasury bond was 2.67%. The difference between these two yields, 1.60%, gives an approximate measure of the market's expectation of price inflation over the next 20 years.

ECONOMIC ASSUMPTIONS – PRICE INFLATION AND COLA (CONCLUDED)

In the process of developing capital market expectations for asset classes, investment consultants use an underlying price inflation assumption. For the eight investment consultants that GRS monitors, the average of price inflation assumptions used in their capital market expectations was 2.15%. The highest price inflation assumption was 2.50% and the lowest was 1.56%. For OPERS's investment consultant (i.e., NEPC), their short-term (5 to 7 years) price inflation assumption is 2.25% and their long-term (30 years) prince inflation assumption is 2.75%.

Based upon the reviewed data, we recommend that the Board adopt a price inflation assumption of 2.50%.

Based upon a price inflation assumption of 2.50% 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 2.15% be used to value this provision.**

ECONOMIC ASSUMPTIONS – INVESTMENT RETURN

The investment return assumption is the actuarial assumption that has the largest impact on actuarial valuation results. As more of the actuarial accrued liabilities are related to non-active members, the nominal (as opposed to real) investment return assumption becomes a more prominent factor. Since one of OPERS's fundamental financial objectives is the receipt of level contributions over time, the discount rate assumption is set equal to the investment return assumption (with perhaps an adjustment for conservatism).

Presented below are the asset allocations used in our analysis. The asset allocations are based upon OPERS' target asset allocations for the Pension and Retiree Health programs.

Asset Class	Defined Benefit Pension Asset Allocation	Defined Benefit Health Care Asset Allocation
Equities		
US Large Cap	11.15%	12.20%
US Small Cap	11.15	12.20
Developed International	9.30	10.25
Emerging Markets	9.30	10.25
Fixed Income		
US Core Bonds	5.00	8.50
US Government Bonds	6.00	8.50
US High Yield Bonds	6.00	6.00
TIPS	6.00	11.00
Other		
Real Estate	10.00	6.00
Hedge Funds	8.00	6.00
Private Equity	10.00	0.00
Additional Alternatives	8.10	9.10

Based upon the asset allocation presented on the previous page, future return expectations of the investment consultants that GRS monitors were analyzed. The analysis was based upon the following:

(1) Since capital market expectations reported by the investment consultants are already net of passive investment expenses, no expense assumption was used. To the extent that OPERS incurs investment expenses for active management, it is assumed that OPERS will earn at least enough investment return to offset the investment expenses associated with active management.

(2) To allow for better consistency with the requirements of GASB Statement No. 67, administrative expenses other than investment expenses will be funded through an addition to the normal cost. This means that the investment return assumption will be net of passive investment expenses, but gross of administrative expenses. Administrative expenses for the prior 5 calendar years is displayed below:

Defined Benefit – Pension – Administrative Expense History ($ in Millions)			
Calendar Year	**Traditional Plan Admin Expenses**	**Traditional Plan Payroll**	**% of Payroll**
2011	$73	$12,103	0.60%
2012	$76	$11,884	0.64%
2013	$75	$12,000	0.63%
2014	$81	$12,300	0.66%
2015	$83	$12,575	0.66%

Defined Benefit – Retiree Health – Administrative Expense History ($ in Millions)			
Calendar Year	**Defined Benefit Plan Health Care Expenses**	**Traditional and Combined Plan Payroll**	**% of Payroll**
2011	$17	$12,399	0.14%
2012	$20	$12,193	0.17%
2013	$22	$12,331	0.18%
2014	$24	$12,654	0.19%
2015	$27	$12,950	0.21%

(3) We recommend that a normal cost contribution of 0.67% of payroll be included in the annual Traditional Plan pension valuation and 0.20% in the annual Retiree Health valuation to reflect administrative expenses.

(4) Results presented in the following tables are based upon a price inflation assumption of 2.50% (i.e., GRS's preferred price inflation assumption).

Presented below are the results of our investment return analysis for the Defined Benefit Pension Plan:

Defined Benefit Pension Plan

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	7.19%	2.50%	4.69%	2.50%	7.19%	0.00%	7.19%	12.82%
2	6.93%	2.20%	4.73%	2.50%	7.23%	0.00%	7.23%	11.06%
3	6.68%	1.56%	5.12%	2.50%	7.62%	0.00%	7.62%	11.00%
4	7.52%	2.26%	5.26%	2.50%	7.76%	0.00%	7.76%	11.28%
5	7.58%	2.25%	5.33%	2.50%	7.83%	0.00%	7.83%	12.80%
6	7.60%	2.25%	5.35%	2.50%	7.85%	0.00%	7.85%	13.20%
7	7.42%	2.00%	5.42%	2.50%	7.92%	0.00%	7.92%	12.22%
8	8.38%	2.20%	6.18%	2.50%	8.68%	0.00%	8.68%	12.51%
Average	**7.41%**	**2.15%**	**5.26%**	**2.50%**	**7.76%**	**0.00%**	**7.76%**	**12.11%**

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return 40th	50th	60th	Probability of exceeding 7.50%
(1)	(2)	(3)	(4)	(5)
1	5.71%	6.43%	7.15%	35.35%
2	6.05%	6.67%	7.29%	36.74%
3	6.45%	7.06%	7.68%	42.89%
4	6.54%	7.18%	7.81%	44.85%
5	6.37%	7.08%	7.80%	44.13%
6	6.31%	7.05%	7.79%	43.87%
7	6.55%	7.23%	7.92%	46.08%
8	7.27%	7.97%	8.67%	56.69%
Average	**6.41%**	**7.08%**	**7.76%**	**43.82%**

Defined Benefit Pension Plan

The preferred investment return assumption in the actuarial community is the forward-looking expected geometric return (i.e., 50th percentile). Based upon the average of each of the investment consultants' expectations, this would lead to an investment return assumption of 7.08%. A less preferred investment return assumption, but still reasonable assumption, is the forward-looking expected arithmetic return (i.e., expected nominal return). Based on the average of each of the investment consultants' expectations, this would lead to an investment return assumption of 7.76%.

OPERS's investment consultant has provided their outlook of expected annual returns over the next 30 years based upon their capital market assumptions. Their outlook over the next 16 years is less than the current investment return assumption of 8.00%, with years 17 through 30 exceeding the current assumption. The resulting geometric average of the 30-year returns is 8.00%. However, (1) given that a significant portion of OPERS's liabilities is associated with benefit payments in the next 10 to 15 years, and (2) given the progression of NEPC's expected returns, this would suggest reducing the current assumption.

Based upon the results of our analysis, and given the current investment return assumption of 8.0%, we have provide the Board three investment return assumptions for the Board's consideration, in order of our preference: 7.25%, 7.50% and 7.65%. A 7.65% investment return assumption may be considered reasonable, based upon a price inflation assumption of 2.50%, but aggressive. In addition, the selection of 7.65% as the investment return assumption would leave very little margin for actuarial standards reasonability purposes in future years if capital market expectations are lowered from their current levels. In other words, if capital market assumptions are lowered from current levels, it may become necessary to lower the investment return assumption yet further prior to the next experience study.

Presented below are the results of our investment return analysis for the Defined Benefit Health Care Plan:

Defined Benefit Health Care Plan

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	6.59%	2.50%	4.09%	2.50%	6.59%	0.00%	6.59%	11.42%
2	6.34%	2.20%	4.14%	2.50%	6.64%	0.00%	6.64%	10.06%
3	5.83%	1.56%	4.27%	2.50%	6.77%	0.00%	6.77%	8.83%
4	6.74%	2.25%	4.49%	2.50%	6.99%	0.00%	6.99%	11.33%
5	6.84%	2.25%	4.59%	2.50%	7.09%	0.00%	7.09%	11.45%
6	6.67%	2.00%	4.66%	2.50%	7.16%	0.00%	7.16%	11.01%
7	6.98%	2.26%	4.72%	2.50%	7.22%	0.00%	7.22%	10.05%
8	7.46%	2.20%	5.26%	2.50%	7.76%	0.00%	7.76%	10.67%
Average	6.68%	2.15%	4.53%	2.50%	7.03%	0.00%	7.03%	10.60%

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return 40th	50th	60th	Probability of exceeding 6.50%
(1)	(2)	(3)	(4)	(5)
1	5.34%	5.98%	6.62%	41.86%
2	5.60%	6.17%	6.74%	44.13%
3	5.91%	6.41%	6.90%	48.09%
4	5.76%	6.40%	7.03%	48.35%
5	5.84%	6.48%	7.13%	49.68%
6	5.98%	6.60%	7.22%	51.63%
7	6.19%	6.76%	7.32%	54.56%
8	6.63%	7.23%	7.83%	62.20%
Average	5.91%	6.50%	7.10%	50.06%

Defined Benefit Health Care Plan

The preferred investment return assumption in the actuarial community is the forward-looking expected geometric return (i.e., 50th percentile). Based upon the average of each of the investment consultants' expectations, this would lead to an investment return assumption of 6.50%. A less preferred investment return assumption, but still reasonable assumption, is the forward-looking expected arithmetic return (i.e., expected nominal return). Based on the average of each of the investment consultants' expectations, this would lead to an investment return assumption of 7.03%.

For the Retiree Health program, we are recommending that the 6.50% investment return assumption remain unchanged. Given the new GASB Statements (i.e., 74 and 75) that are going to be applicable to the Retiree Health program, the above assumption will be used in combination with a prescribed municipal rate to determine the discount rate for accounting purposes.

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 difference between the increase in National Average Earnings and price inflation over various periods, ending December 2015:

Periods Ending December 2015	Difference Between Increase in National Average Earnings and CPI
Last five (5) years	1.3%
Last ten (10) years	0.7
Last fifteen (15) years	0.6
Last twenty (20) years	1.2
Last twenty-five (25) years	1.0
Last thirty (30) years	0.9

We are generally comfortable with the wage inflation assumption exceeding the price inflation assumption by 0.50% to 1.00%. Given our preferred price inflation assumption of 2.50%, our preferred assumption is for the wage inflation assumption to exceed the price inflation assumption by 0.75%. **This would result in a wage inflation assumption of 3.25%.**

Payroll Growth. The table below shows the annual increase in OPERS payroll over various periods, ending December 2015:

Periods Ending December 2015	Annual Increase in OPERS Payroll
Last five (5) years	0.79%
Last ten (10) years	0.93
Last fifteen (15) years	1.61

The above shows that recent OPERS experience has lagged the current payroll growth assumption of 3.75%. However, 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 3.25%.**

Pay Increase Rates (portion related to the employee's age and seniority): Experience was analyzed by both age and service. The current age-based structure was deemed appropriate given the experience. Actual merit and seniority increases were somewhat greater than assumed at younger ages, and less than assumed at older ages. Small adjustments were made to the merit and seniority rates to reflect this trend.

STATE

Age Group Beginning of Year	Number	Merit/Seniority % Increase		
			Sample Values*	
		Actual	Current	Proposed
Under 25	55,603	17.44 %	5.00 %	5.00 %
25-29	42,342	4.81 %	3.90 %	4.40 %
30-34	46,889	2.23 %	2.40 %	2.70 %
35-39	44,047	1.18 %	2.00 %	2.20 %
40-44	54,116	0.35 %	1.60 %	1.70 %
45-49	63,425	(0.42)%	1.30 %	1.10 %
50-54	66,566	(0.84)%	1.00 %	0.80 %
55-59	52,952	(1.04)%	0.80 %	0.60 %
60-64	28,333	(1.34)%	0.60 %	0.30 %
65 & Over	10,640	(1.44)%	0.00 %	0.00 %
Total	464,913			

* 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	72,242	13.22 %	5.00 %	5.00 %
25-29	56,209	6.89 %	3.90 %	4.40 %
30-34	73,248	3.33 %	2.40 %	2.70 %
35-39	82,754	1.98 %	2.00 %	2.10 %
40-44	105,379	1.23 %	1.60 %	1.55 %
45-49	121,981	0.70 %	1.30 %	1.10 %
50-54	135,976	0.23 %	1.00 %	0.80 %
55-59	120,979	0.03 %	0.80 %	0.60 %
60-64	73,433	(0.28)%	0.60 %	0.30 %
65 & Over	46,632	(0.12)%	0.00 %	0.00 %
Total	888,833			

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

PUBLIC SAFETY

Age Group Beginning of Year	Number	Merit/Seniority % Increase		
			Sample Values*	
		Actual	Current	Proposed
Under 25	32	19.32 %	7.50 %	7.50 %
25-29	64	3.02 %	5.50 %	5.50 %
30-34	58	1.99 %	2.50 %	2.50 %
35-39	61	0.55 %	1.00 %	1.70 %
40-44	65	(2.42)%	0.75 %	1.30 %
45-49	31	(0.63)%	0.50 %	1.00 %
50-54	31	(0.68)%	0.50 %	0.90 %
55-59	24	(1.59)%	0.50 %	0.40 %
60-64	10	(2.63)%	0.50 %	0.40 %
65 & Over	4	10.61 %	0.00 %	0.00 %
Total	380			

* *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	583	17.98 %	7.50 %	7.50 %
25-29	2,965	6.57 %	5.50 %	5.50 %
30-34	4,934	1.80 %	2.50 %	2.50 %
35-39	6,945	0.53 %	1.00 %	1.70 %
40-44	8,566	(0.09)%	0.75 %	1.30 %
45-49	5,867	(0.58)%	0.50 %	1.00 %
50-54	3,178	(0.17)%	0.50 %	0.90 %
55-59	1,780	(0.93)%	0.50 %	0.40 %
60-64	650	(0.85)%	0.50 %	0.40 %
65 & Over	156	(1.03)%	0.00 %	0.00 %
Total	35,624			

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

EFFECT ON OVERALL RESULTS AND CONTRIBUTION RATES

EFFECT ON OVERALL PENSION RESULTS AND CONTRIBUTION RATES

Presented on the following page are the December 31, 2015 actuarial valuation results based on the proposed demographic assumptions and three sets of proposed alternate economic assumptions:

- Investment Return / Wage Inflation / Price Inflation / Cost-of-Living Adjustment
- Alternate 1 – 7.65% / 3.25% / 2.50% / 2.15%
- Alternate 2 – 7.50% / 3.25% / 2.50% / 2.15%
- Alternate 3 – 7.25% / 3.25% / 2.50% / 2.15%

Computed amortization period results are shown under various scenarios:

- Different future retiree health contribution scenarios
    - 2% in 2016, 3% in 2017 and 4% in 2018 and thereafter (i.e., the scenario upon which the December 31, 2015 valuation was based)
    - 2% in 2016, 3% in 2017 and thereafter
    - 2% in 2016, 2% in 2017 and thereafter
    - 2% in 2016, 1% in 2017 and thereafter
    - 2% in 2016, 0% in 2017 and thereafter
- Different measures of unfunded actuarial accrued liability
    - Funding value of assets
    - Market value of assets

EFFECT ON PENSION VALUATION RESULTS
AS OF DECEMBER 31, 2015

		(1)	(2)	(3)
Demographic Assumptions	**Current**	**Proposed**	**Proposed**	**Proposed**
Investment Return Assumption	**8.00%**	**7.65%**	**7.50%**	**7.25%**
Wage Inflation Assumption	**3.75%**	**3.25%**	**3.25%**	**3.25%**
Price Inflation Assumption	**3.00%**	**2.50%**	**2.50%**	**2.50%**
Cost of Living Adjustment (COLA) Assumption	**2.80%**	**2.15%**	**2.15%**	**2.15%**
Defined Benefit Actuarial Results				
Normal Cost as a % of Payroll	12.99%	13.49%	13.86%	14.49%
Actuarial Accrued Liability (AAL)				
Active	$ 32,406	$ 33,005	$ 33,788	$ 35,147
Deferred/Inactive	2,588	2,569	2,581	2,602
Retired	56,839	60,017	60,808	62,169
Total	$ 91,832	$ 95,592	$ 97,177	$ 99,918
Funding Value (FV) of Assets	$ 78,061	$ 78,061	$ 78,061	$ 78,061
Unfunded AAL (UAAL)	$ 13,771	$ 17,531	$ 19,116	$ 21,857
Amortization Years (Funding Value of Assets basis) *	**19**	**36**	**49**	**N/A**
with 3% Health Contribution in 2017+	**16**	**28**	**35**	**59**
with 2% Health Contribution in 2017+	**14**	**22**	**27**	**40**
with 1% Health Contribution in 2017+	**12**	**19**	**23**	**31**
with 0% Health Contribution in 2017+	**11**	**17**	**20**	**26**
Amortization Years (Market Value of Assets basis) *	**28**	**67**	**N/A**	**N/A**
with 3% Health Contribution in 2017+	**23**	**42**	**58**	**N/A**
with 2% Health Contribution in 2017+	**19**	**32**	**40**	**64**
with 1% Health Contribution in 2017+	**17**	**26**	**31**	**44**
with 0% Health Contribution in 2017+	**15**	**22**	**26**	**35**

* With 2% Health Contribution in 2016, 3% in 2017, and 4% thereafter.

DETAILED RESULTS

WITHDRAWAL EXPERIENCE

SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
STATE MALE MEMBERS
2011-2015

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	21,491	40,884	0.5257	0.4500	0.5000	18,398	20,442
1	14,223	37,859	0.3757	0.3000	0.3500	11,358	13,251
2	4,083	17,919	0.2279	0.1700	0.2000	3,046	3,584
3	2,139	12,518	0.1709	0.1200	0.1500	1,502	1,878
4	1,337	10,002	0.1337	0.1000	0.1200	1,000	1,200
Totals	43,273	119,182	0.3631	0.2962	0.3386	35,304	40,355
Ref				751	1034		

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
2011-2015

Years of Service

— Experience Rates   — Current Assumptions   — Proposed Assumptions

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
STATE MALE MEMBERS
2011-2015

Age	Withdrawals	Exposure	Experience Rates Weighted By		Sample Rates*				Expected Withdrawals			
					Current Rates Weighted By		Proposed Rates Weighted By		Current Withdrawals Weighted By		Proposed Withdrawals Weighted By	
			Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.0900	0.0900	0.1200	0.1000	-	-	-	-
20-24	49	232	0.2112	0.1564	0.0900	0.0900	0.1200	0.1000	19	19	25	21
25-29	449	4,067	0.1104	0.0859	0.0680	0.0600	0.0780	0.0700	269	239	310	275
30-34	840	11,283	0.0744	0.0621	0.0530	0.0460	0.0580	0.0500	592	515	655	568
35-39	818	14,373	0.0569	0.0437	0.0380	0.0330	0.0440	0.0380	556	481	635	546
40-44	846	20,094	0.0421	0.0289	0.0300	0.0250	0.0330	0.0270	601	504	665	545
45-49	742	24,925	0.0298	0.0190	0.0230	0.0190	0.0250	0.0190	586	490	639	493
50-54	637	25,331	0.0251	0.0166	0.0210	0.0190	0.0230	0.0180	538	481	589	459
55-59	486	14,794	0.0329	0.0294	0.0210	0.0190	0.0230	0.0180	311	281	340	266
Totals	4,867	115,099	0.0423	0.0250	N/A	0.0262	0.0335	0.0276	3,472	3,010	3,858	3,173
Ref					1201	1202	1386	1387				

			Population	Liability								
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.

197 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
2011-2015

Legend: Experience Rates (Liability Weighted) — Current Assumptions — Proposed Assumptions

X-axis (Age): 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59

Y-axis (Probability of Withdrawal): 0.00, 0.05, 0.10, 0.15

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
STATE MALE MEMBERS
2011-2015
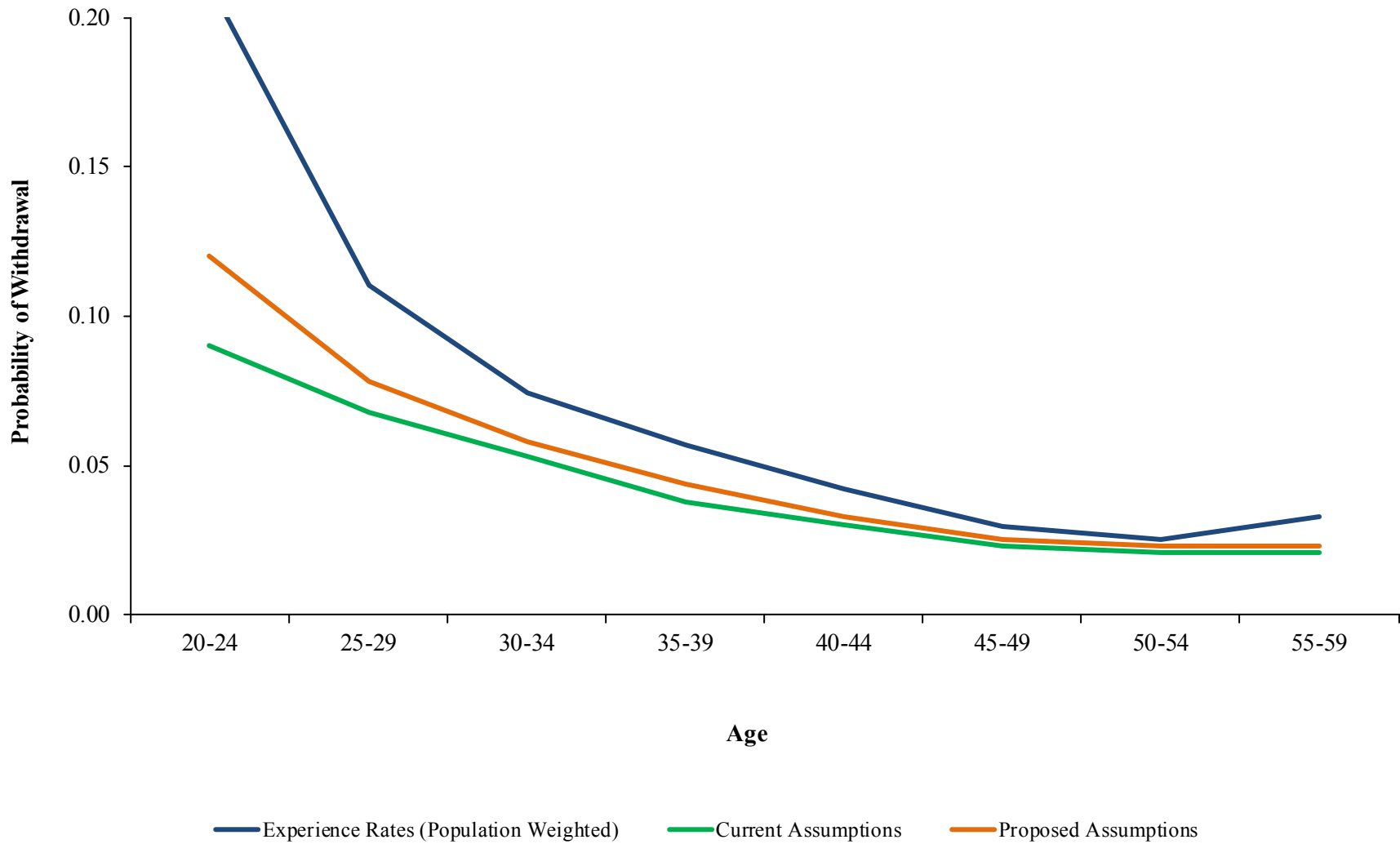
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
STATE FEMALE MEMBERS
2011-2015

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	26,680	51,316	0.5199	0.4500	0.5000	23,092	25,658
1	16,165	44,445	0.3637	0.3000	0.3500	13,334	15,556
2	5,408	22,673	0.2385	0.1800	0.2000	4,081	4,535
3	2,982	16,371	0.1822	0.1300	0.1500	2,128	2,456
4	1,814	12,994	0.1396	0.1000	0.1200	1,299	1,559
Totals	53,049	147,799	0.3589	0.2973	0.3367	43,934	49,764
Ref				755	1034		

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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
STATE FEMALE MEMBERS
2011-2015

| | | | Experience Rates Weighted By | | Sample Rates* | | | | Expected Withdrawals | | | |
| | | | | | Current Rates Weighted By | | Proposed Rates Weighted By | | Current Withdrawals Weighted By | | Proposed Withdrawals Weighted By | |
Age	Withdrawals	Exposure	Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.0900	0.0900	0.1200	0.1000	-	-	-	-
20-24	78	256	0.3047	0.1852	0.0900	0.0900	0.1200	0.1000	22	22	29	25
25-29	647	4,814	0.1344	0.1062	0.0800	0.0780	0.1000	0.0880	376	360	462	402
30-34	1,149	13,597	0.0845	0.0665	0.0680	0.0590	0.0750	0.0630	901	796	1,016	855
35-39	1,050	16,833	0.0624	0.0472	0.0460	0.0410	0.0540	0.0430	792	698	920	733
40-44	1,046	21,888	0.0478	0.0310	0.0340	0.0280	0.0400	0.0290	761	629	885	644
45-49	950	28,145	0.0338	0.0194	0.0300	0.0230	0.0320	0.0210	850	663	918	616
50-54	958	30,787	0.0311	0.0201	0.0280	0.0230	0.0300	0.0210	866	708	931	647
55-59	839	21,230	0.0395	0.0321	0.0270	0.0230	0.0300	0.0210	576	488	637	446
Totals	6,717	137,550	0.0488	0.0280	N/A	0.0317	0.0422	0.0318	5,144	4,364	5,798	4,368
Ref					871	1203	1388	1389				

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.

248 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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
STATE FEMALE MEMBERS
2011-2015

— Experience Rates (Population Weighted)   — Current Assumptions   — Proposed Assumptions
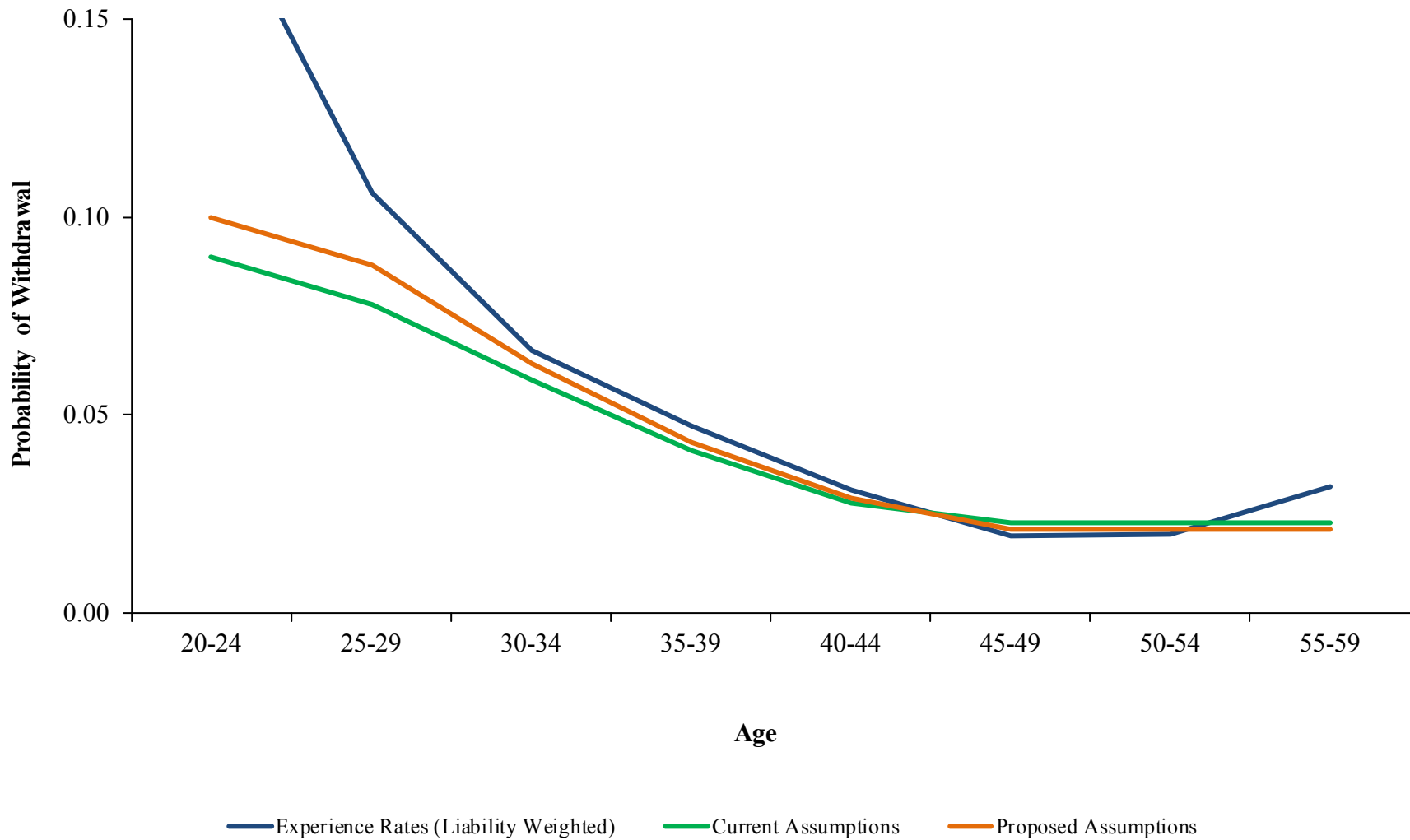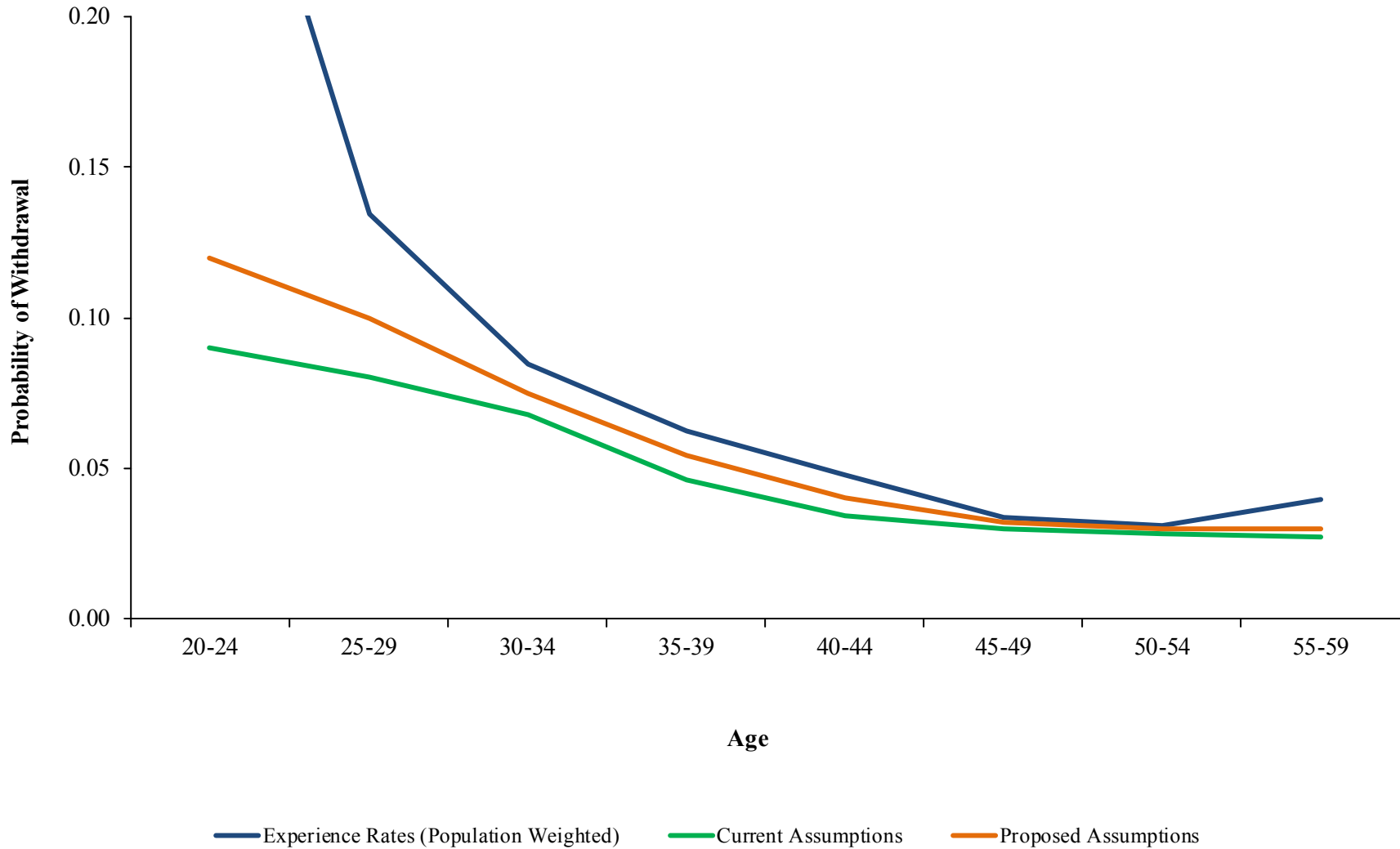
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
LOCAL MALE MEMBERS
2011-2015

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	17,693	45,052	0.3927	0.4000	0.4000	18,021	18,021
1	16,792	58,111	0.2890	0.2600	0.2700	15,109	15,690
2	6,180	32,336	0.1911	0.1600	0.1800	5,174	5,820
3	3,522	24,645	0.1429	0.1100	0.1300	2,711	3,204
4	2,366	19,069	0.1241	0.1000	0.1100	1,907	2,098
Totals	46,553	179,213	0.2598	0.2395	0.2502	42,922	44,833
Ref				752	1035		

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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LOCAL MALE MEMBERS
2011-2015

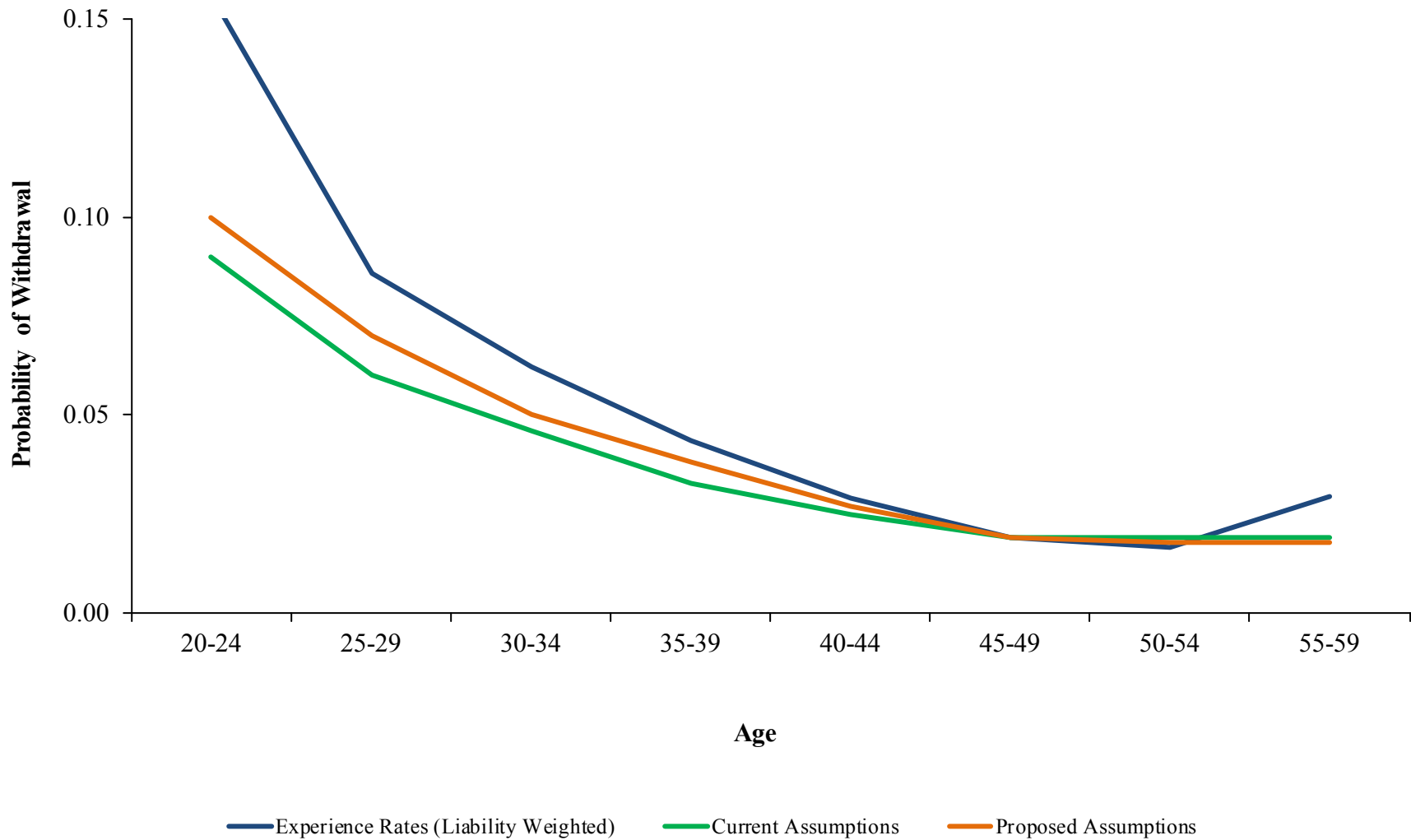| Age | Withdrawals | Exposure | Experience Rates Weighted By | | Sample Rates* | | | | Expected Withdrawals | | | |
| | | | | | Current Rates Weighted By | | Proposed Rates Weighted By | | Current Withdrawals Weighted By | | Proposed Withdrawals Weighted By | |
			Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.1000	0.0800	0.1100	0.1000	-	-	-	-
20-24	144	761	0.1892	0.1255	0.1000	0.0800	0.1100	0.1000	70	56	78	68
25-29	760	7,604	0.0999	0.0661	0.0700	0.0590	0.0850	0.0630	527	444	625	476
30-34	1,196	18,691	0.0640	0.0470	0.0550	0.0480	0.0600	0.0470	1,016	881	1,123	871
35-39	1,225	25,955	0.0472	0.0326	0.0400	0.0340	0.0430	0.0330	1,048	892	1,138	870
40-44	1,405	36,148	0.0389	0.0244	0.0300	0.0250	0.0350	0.0250	1,100	929	1,263	916
45-49	1,447	45,232	0.0320	0.0180	0.0250	0.0230	0.0280	0.0210	1,156	1,050	1,296	964
50-54	1,475	50,257	0.0293	0.0170	0.0250	0.0230	0.0270	0.0200	1,256	1,156	1,363	1,011
55-59	1,458	36,150	0.0403	0.0287	0.0250	0.0230	0.0270	0.0200	904	831	976	723
Totals	9,110	220,798	0.0413	0.0231	N/A	0.0283	0.0356	0.0267	7,077	6,239	7,862	5,899
Ref					1204	1205	1390	1391				

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.*

931 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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LOCAL MALE MEMBERS
2011-2015

Legend: Experience Rates (Population Weighted) — Current Assumptions — Proposed Assumptions

X-axis: Age
Y-axis: Probability of Withdrawal
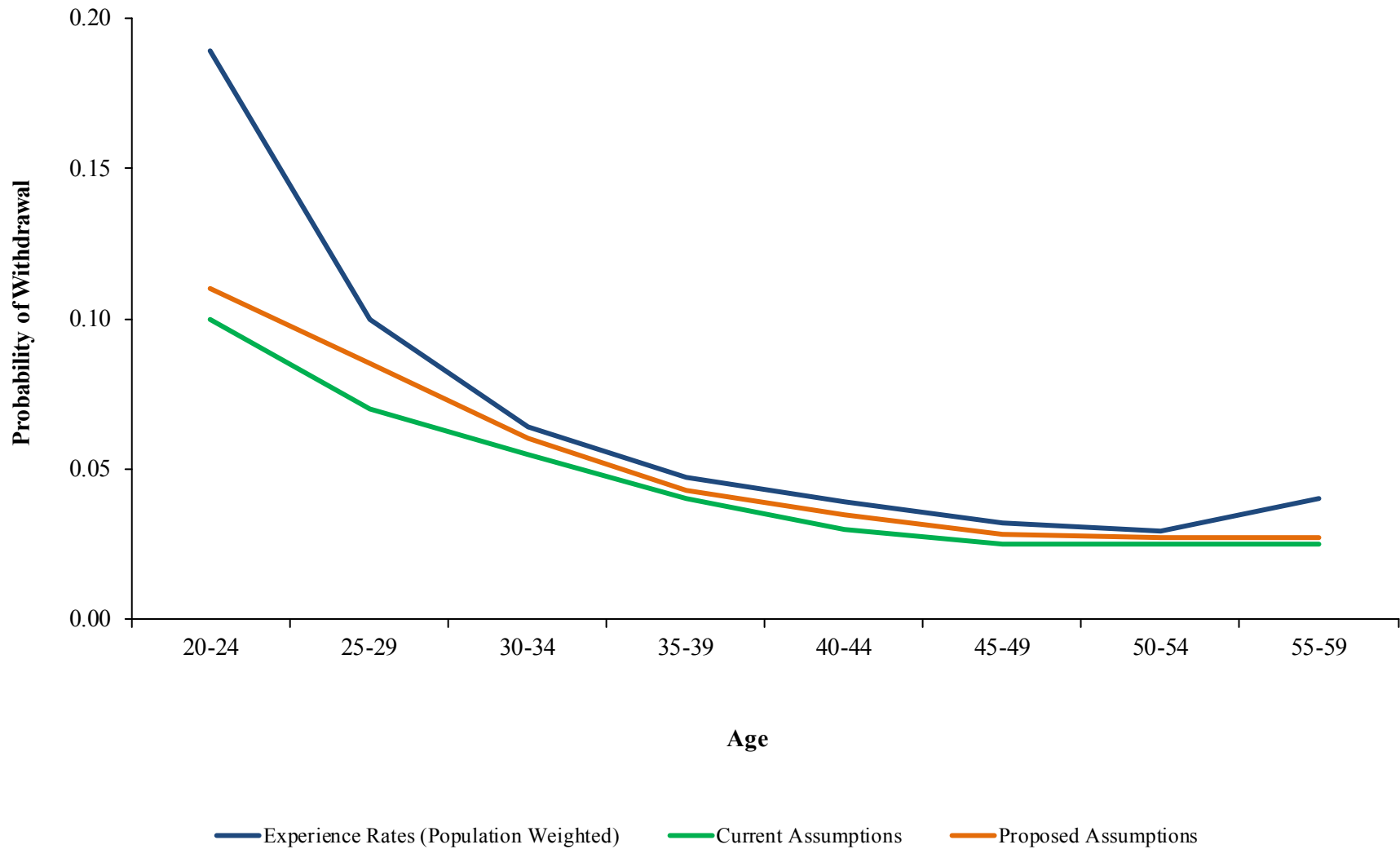
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
LOCAL FEMALE MEMBERS
2011-2015

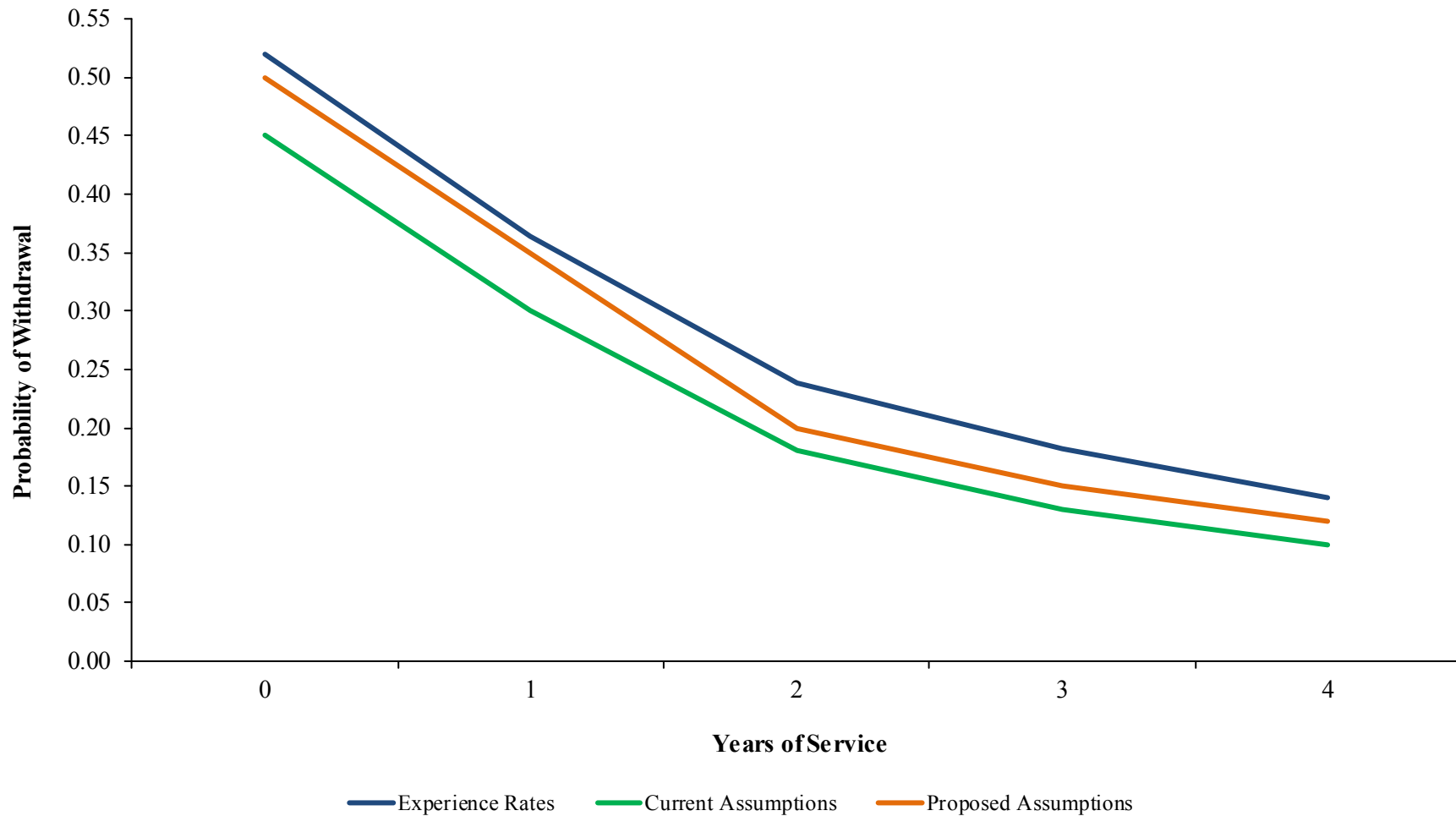| Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	19,557	51,102	0.3827	0.4000	0.4000	20,441	20,441
1	17,733	63,301	0.2801	0.2600	0.2700	16,458	17,091
2	7,080	36,118	0.1960	0.1700	0.1800	6,140	6,501
3	4,354	27,837	0.1564	0.1300	0.1300	3,619	3,619
4	2,892	22,982	0.1258	0.1000	0.1100	2,298	2,528
Totals	51,616	201,340	0.2564	0.2432	0.2492	48,956	50,180
Ref				754	1035		

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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LOCAL FEMALE MEMBERS
2011-2015

Age	Withdrawals	Exposure	Experience Rates Weighted By		Sample Rates* Current Rates Weighted By		Proposed Rates Weighted By		Expected Withdrawals Current Withdrawals Weighted By		Proposed Withdrawals Weighted By	
			Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.0900	0.0950	0.1100	0.1100	-	-	-	-
20-24	217	1,027	0.2113	0.1696	0.0900	0.0950	0.1100	0.1100	90	92	109	105
25-29	975	8,321	0.1172	0.0907	0.0800	0.0750	0.0950	0.0820	646	609	759	664
30-34	1,878	23,890	0.0786	0.0638	0.0640	0.0590	0.0700	0.0610	1,514	1,391	1,671	1,443
35-39	1,984	33,853	0.0586	0.0429	0.0490	0.0430	0.0530	0.0430	1,662	1,458	1,809	1,465
40-44	2,211	45,624	0.0485	0.0312	0.0370	0.0300	0.0420	0.0300	1,718	1,410	1,935	1,404
45-49	2,179	54,385	0.0401	0.0234	0.0320	0.0260	0.0360	0.0250	1,764	1,439	1,981	1,390
50-54	2,416	61,524	0.0393	0.0231	0.0310	0.0260	0.0340	0.0250	1,907	1,600	2,106	1,538
55-59	2,189	49,573	0.0442	0.0332	0.0300	0.0260	0.0340	0.0250	1,493	1,289	1,685	1,239
Totals	14,049	278,197	0.0505	0.0301	N/A	0.0334	0.0433	0.0332	10,794	9,288	12,055	9,248
Ref					873	1206	1392	1393				

|		
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.

814 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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LOCAL FEMALE MEMBERS
2011-2015

Legend: Experience Rates (Population Weighted) — Current Assumptions — Proposed Assumptions
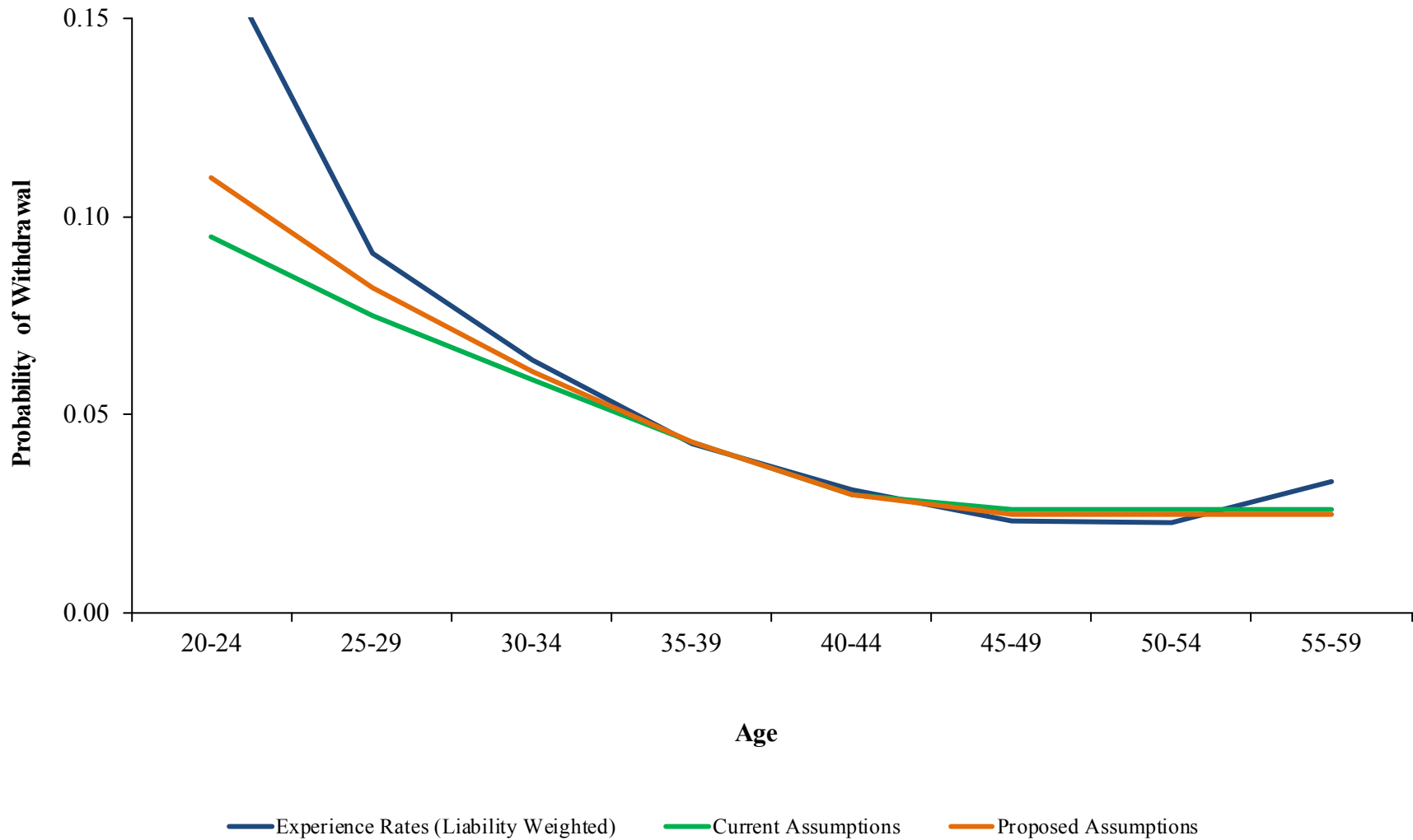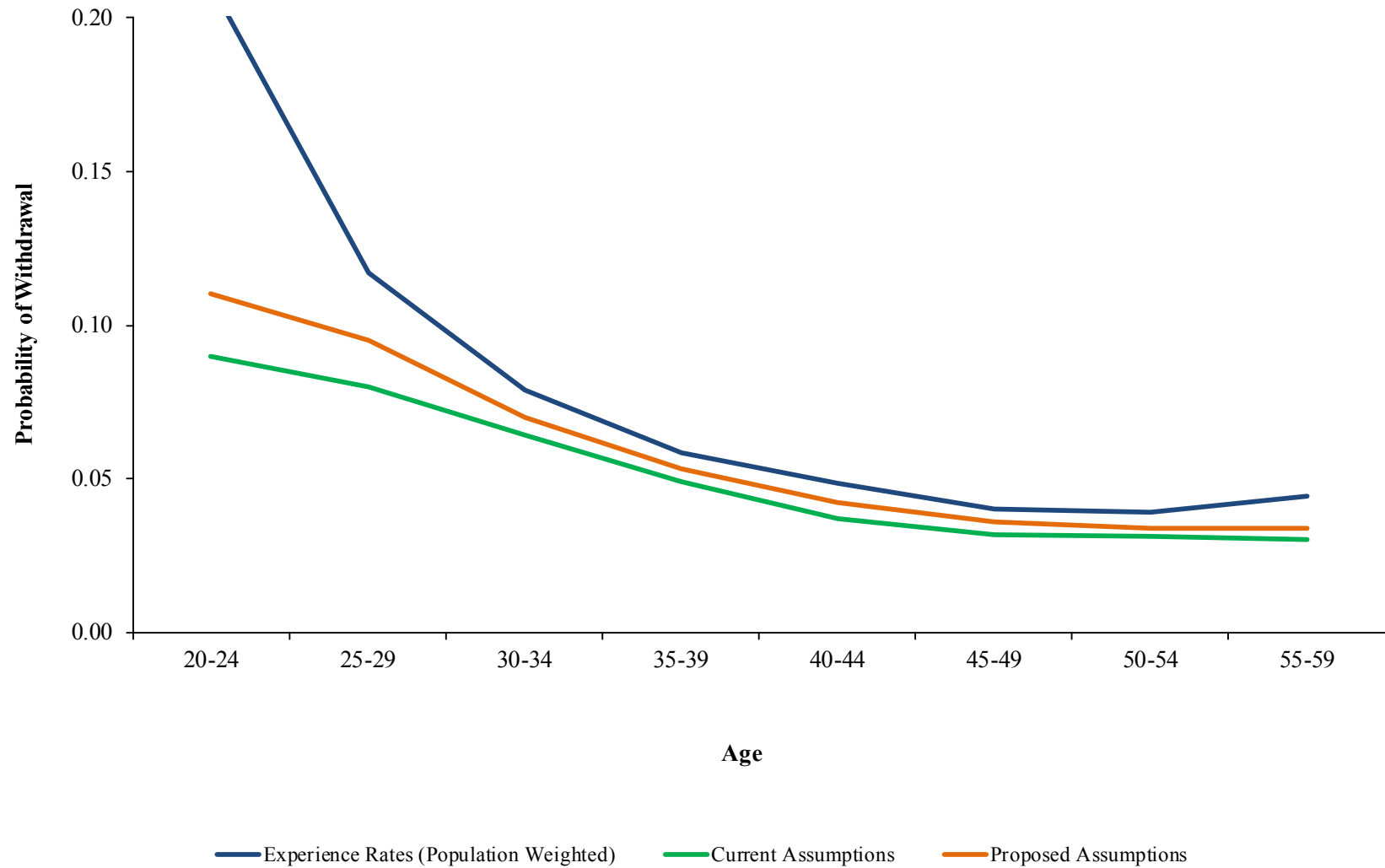
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015

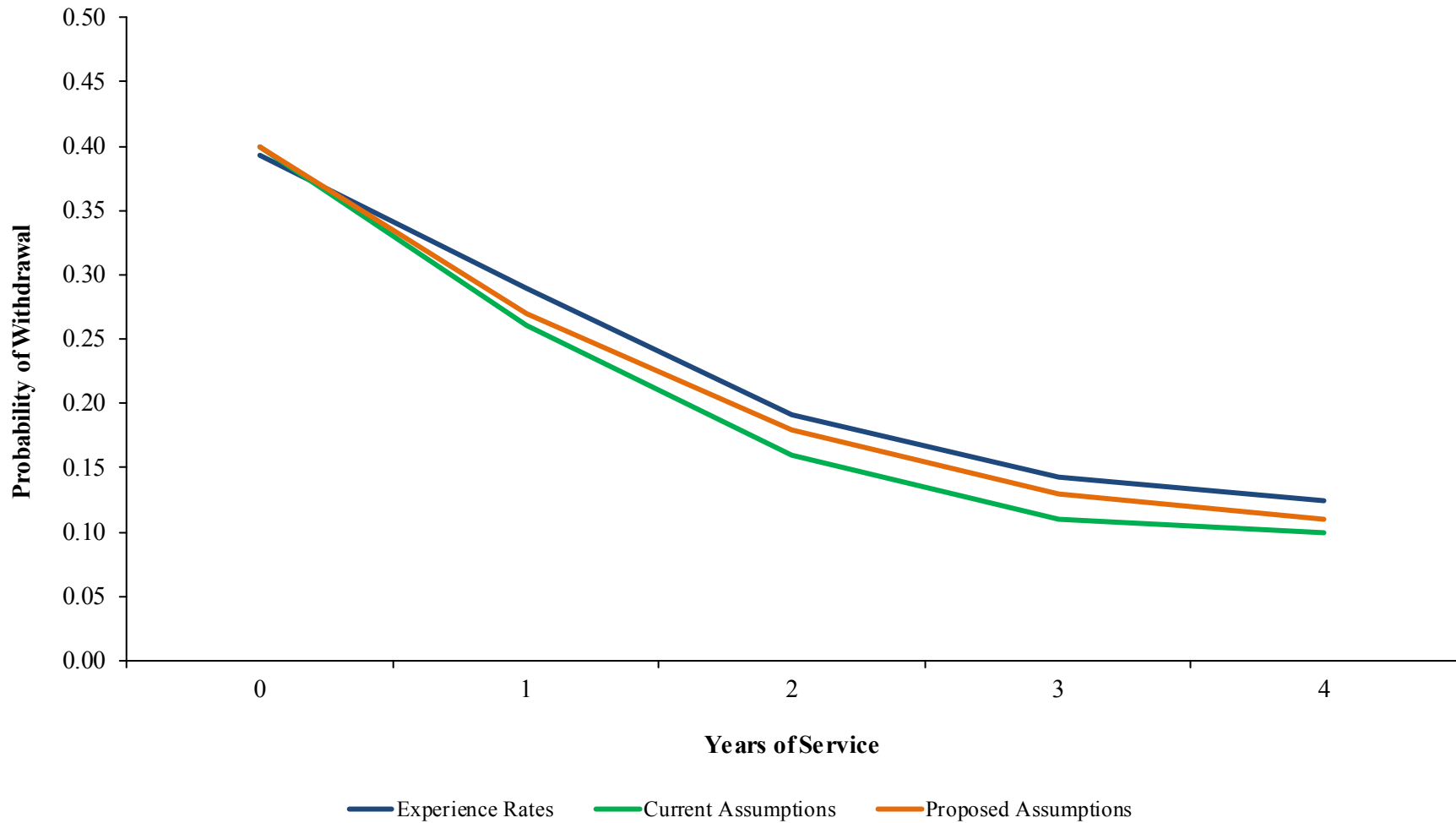| Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	2	10	0.2000	0.1900	0.2000	2	2
1	6	28	0.2143	0.1700	0.1900	5	5
2	6	32	0.1875	0.1000	0.1500	3	5
3	7	33	0.2121	0.1000	0.1500	3	5
4	3	29	0.1034	0.1000	0.1000	3	3
Totals	24	132	0.1818	0.1212	0.1515	16	20
Ref				756	1036		

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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015

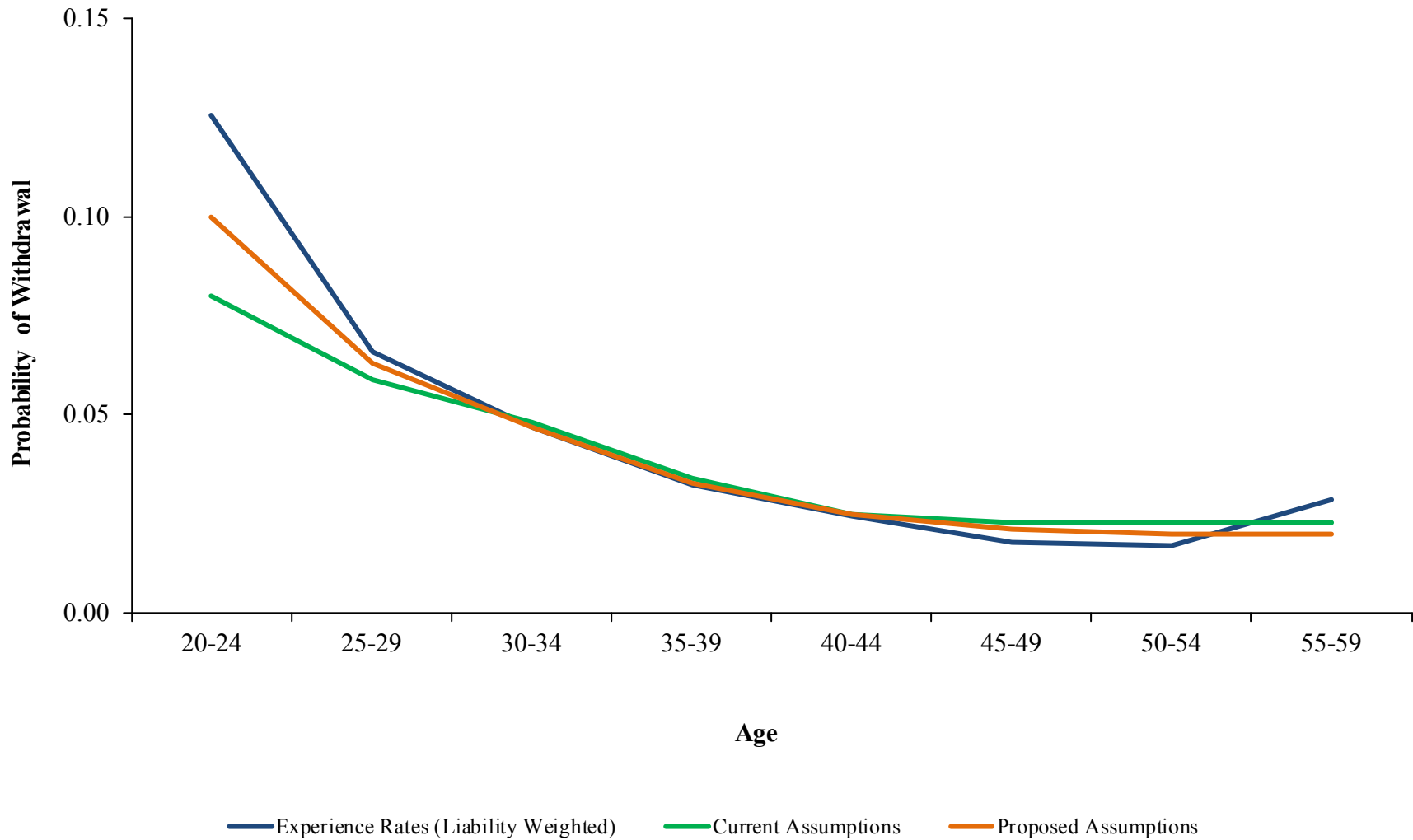| | | | Experience Rates Weighted By | | Sample Rates* | | | | Expected Withdrawals | | | |
| | | | | | Current Rates Weighted By | | Proposed Rates Weighted By | | Current Withdrawals Weighted By | | Proposed Withdrawals Weighted By | |
Age	Withdrawals	Exposure	Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.1000	0.1000	0.1000	0.1000	-	-	-	-
20-24	-	3	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	-	-	-	-
25-29	4	13	0.3077	0.3028	0.1000	0.1000	0.1000	0.1000	1	1	1	1
30-34	6	42	0.1429	0.1210	0.0800	0.0800	0.0800	0.0800	3	3	3	3
35-39	1	49	0.0204	0.0157	0.0500	0.0500	0.0500	0.0500	2	2	2	2
40-44	1	57	0.0175	0.0238	0.0250	0.0250	0.0250	0.0250	2	2	2	2
45-49	2	30	0.0667	0.1101	0.0200	0.0200	0.0200	0.0200	1	1	1	1
50-54	2	19	0.1053	0.0925	0.0200	0.0200	0.0200	0.0200	-	-	-	-
55-59	-	15	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
Totals	16	228	0.0702	0.0585	N/A	0.0395	0.0395	0.0395	9	9	9	9
Ref					1211	1211	1211	1211				

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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015
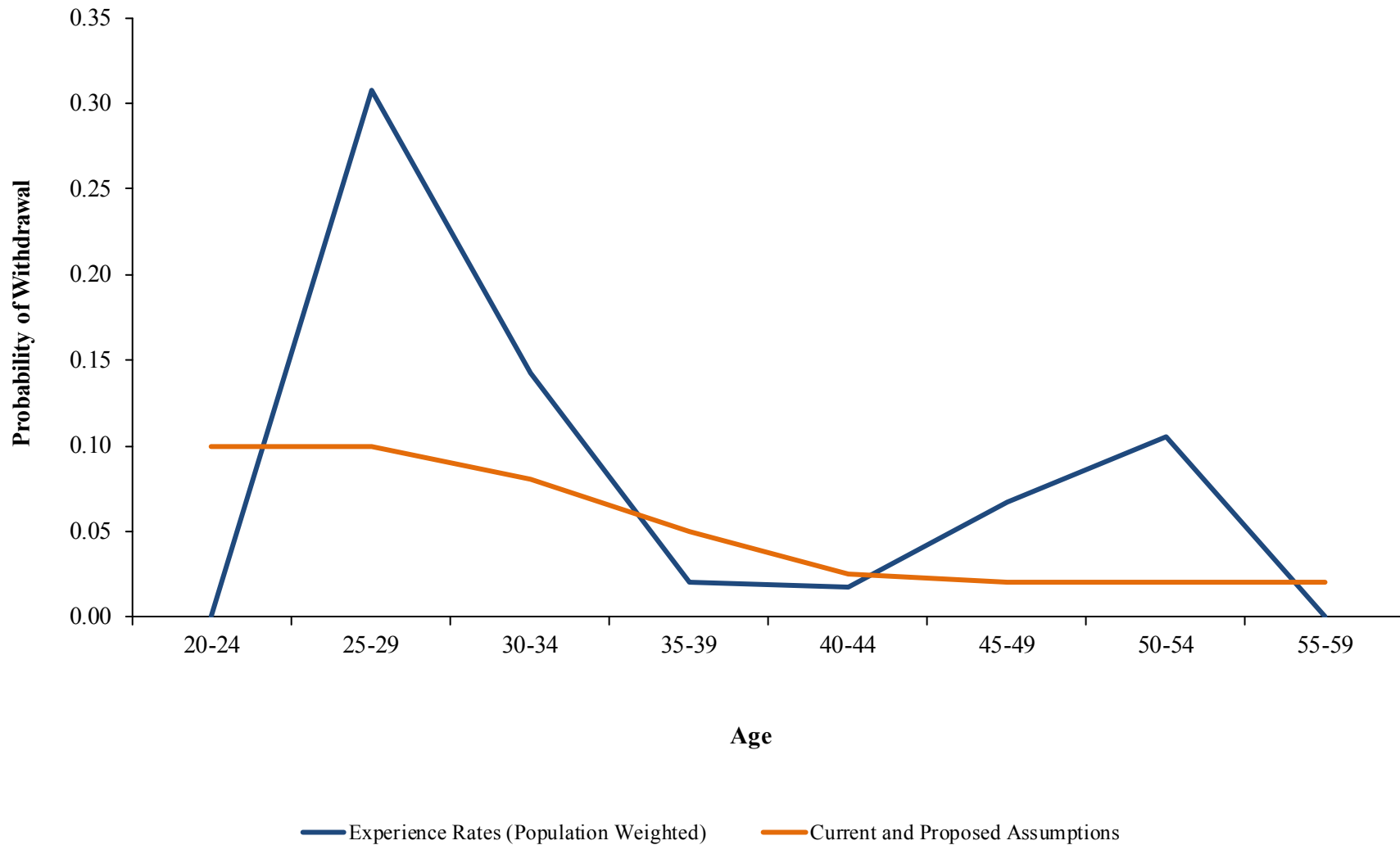
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	1	6	0.1667	0.1900	0.2000	1	1
1	2	9	0.2222	0.1700	0.1900	2	2
2	1	4	0.2500	0.1000	0.1500	-	1
3	-	1	0.0000	0.1000	0.1500	-	-
4	-	1	0.0000	0.1000	0.1000	-	-
Totals	4	21	0.1905	0.1429	0.1905	3	4
Ref				756	1036		

2006-2010 Experience Study   0.2353
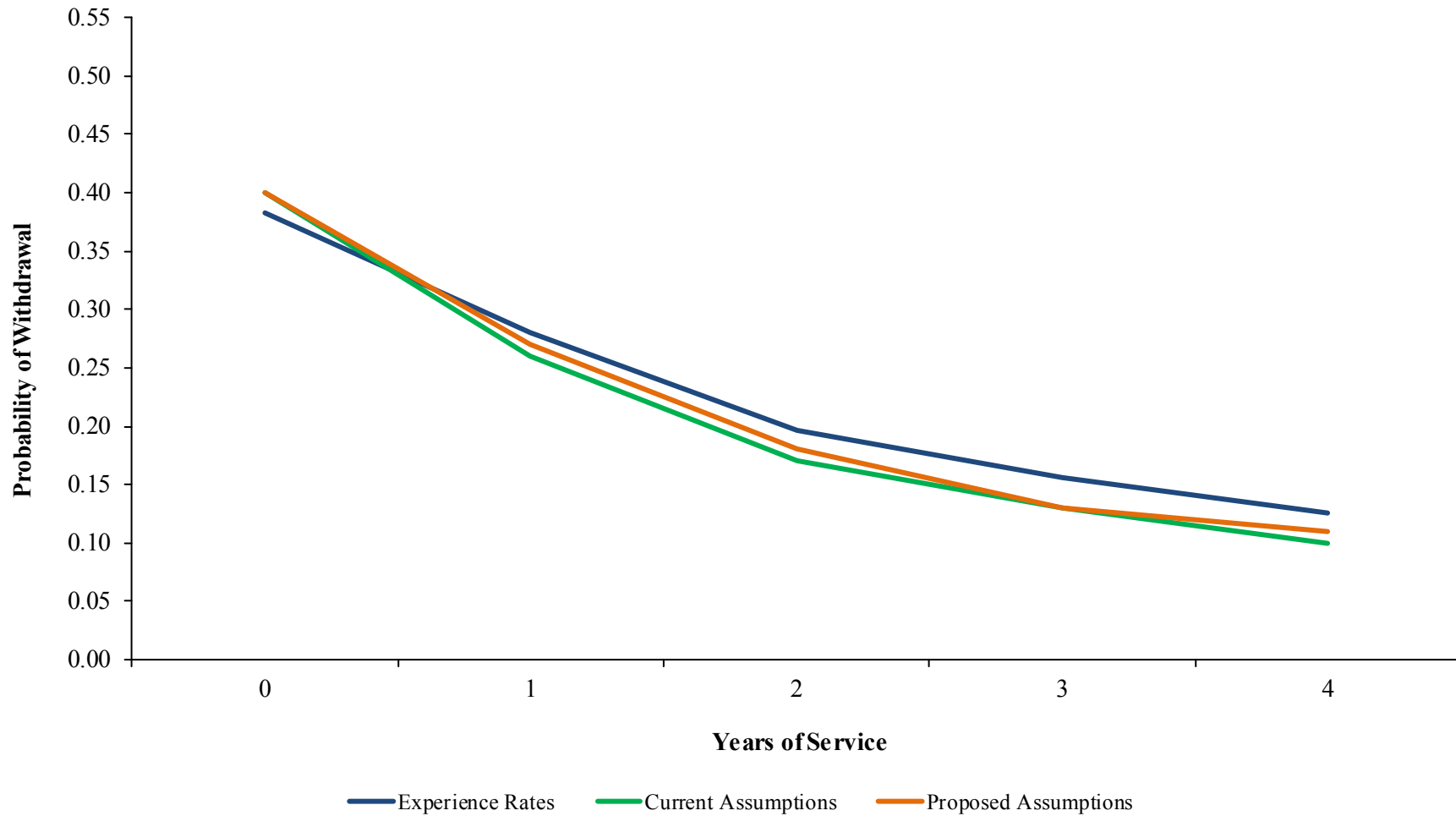2001-2005 Experience Study   0.1404

SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

| Age | Withdrawals | Exposure | Experience Rates Weighted By | | Sample Rates* | | | | Expected Withdrawals | | | |
| | | | | | Current Rates Weighted By | | Proposed Rates Weighted By | | Current Withdrawals Weighted By | | Proposed Withdrawals Weighted By | |
			Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
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	-	-	N\A	N\A	0.1000	0.1000	0.1000	0.1000	-	-	-	-
30-34	-	2	0.0000	0.0000	0.0800	0.0800	0.0800	0.0800	-	-	-	-
35-39	1	2	0.5000	0.5304	0.0500	0.0500	0.0500	0.0500	-	-	-	-
40-44	-	3	0.0000	0.0000	0.0250	0.0250	0.0250	0.0250	-	-	-	-
45-49	1	5	0.2000	0.0546	0.0200	0.0200	0.0200	0.0200	-	-	-	-
50-54	-	6	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
55-59	-	4	0.0000	0.0000	0.0200	0.0200	0.0200	0.0200	-	-	-	-
Totals	2	22	0.0909	0.0373	N/A	0.0000	0.0000	0.0000	-	-	-	-
Ref					1211	1211	1211	1211				

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
2011-2015

Experience Rates (Liability Weighted) —— Current and Proposed Assumptions
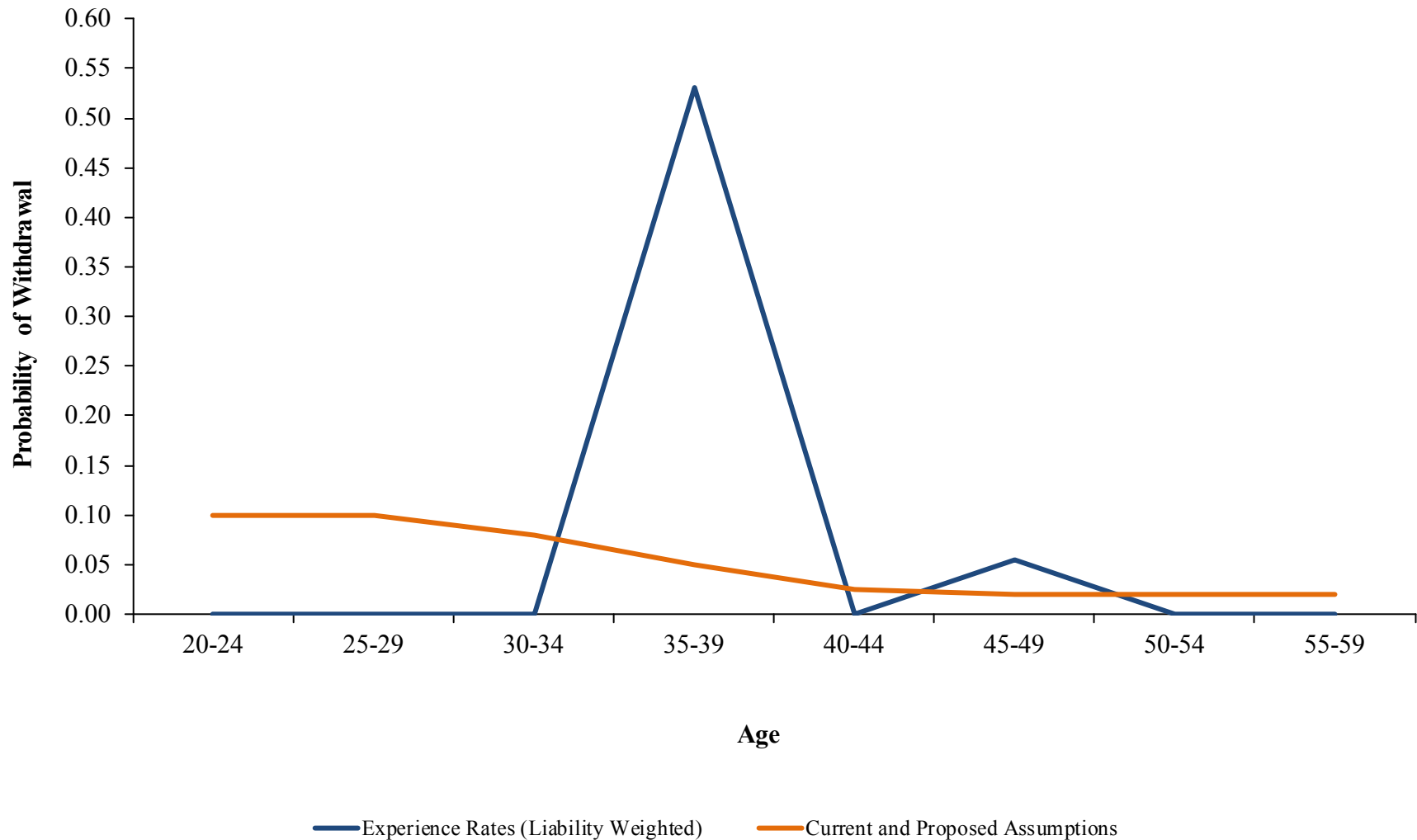
AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015
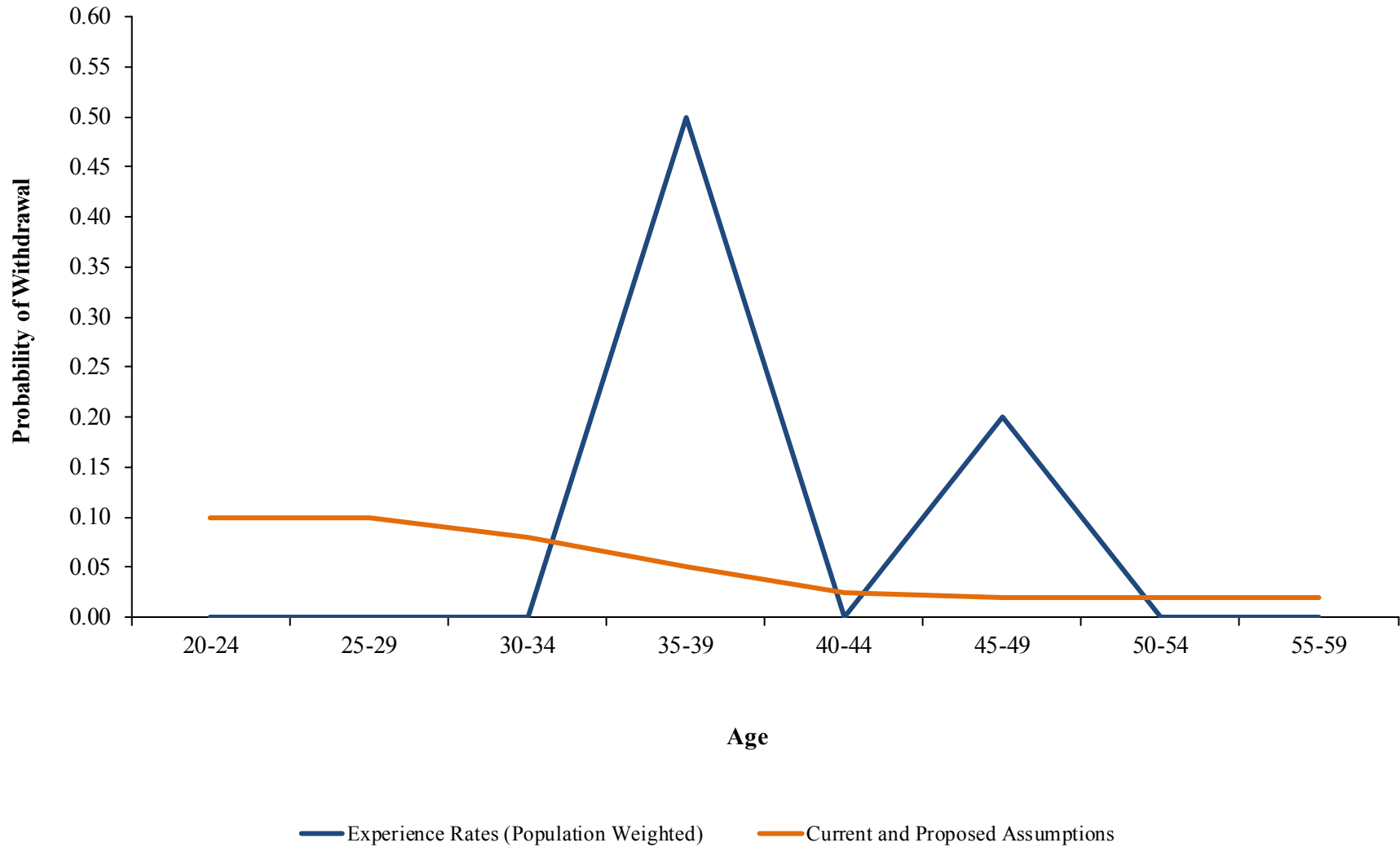
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2006-2010

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	66	350	0.1886	0.1600	0.1600	56	56
1	82	851	0.0964	0.1000	0.1000	85	85
2	88	922	0.0954	0.0800	0.0800	74	74
3	65	949	0.0685	0.0600	0.0600	57	57
4	50	964	0.0519	0.0500	0.0500	48	48
Totals	351	4,036	0.0870	0.0793	0.0793	320	320
Ref				753	753		

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
2011-2015

Legend: Experience Rates — Current and Proposed Assumptions

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2011-2015

| Age | Withdrawals | Exposure | Experience Rates Weighted By | | Sample Rates* | | | | Expected Withdrawals | | | |
| | | | | | Current Rates Weighted By | | Proposed Rates Weighted By | | Current Withdrawals Weighted By | | Proposed Withdrawals Weighted By | |
			Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.0450	0.0450	0.0450	0.0450	-	-	-	-
20-24	1	11	0.0909	0.0708	0.0450	0.0450	0.0450	0.0450	-	-	-	-
25-29	34	981	0.0347	0.0292	0.0290	0.0290	0.0290	0.0290	28	28	28	28
30-34	98	3,398	0.0288	0.0232	0.0250	0.0250	0.0250	0.0250	83	83	83	83
35-39	107	5,622	0.0190	0.0157	0.0190	0.0190	0.0190	0.0190	105	105	105	105
40-44	92	7,487	0.0123	0.0086	0.0120	0.0120	0.0120	0.0120	96	96	96	96
45-49	75	5,093	0.0147	0.0113	0.0120	0.0120	0.0120	0.0120	61	61	61	61
50-54	28	1,951	0.0144	0.0116	0.0120	0.0120	0.0120	0.0120	23	23	23	23
55-59	12	947	0.0127	0.0093	0.0120	0.0120	0.0120	0.0120	11	11	11	11
Totals	447	25,490	0.0175	0.0120	N/A	0.0160	0.0160	0.0160	407	407	407	407
Ref					876	876	876	876				

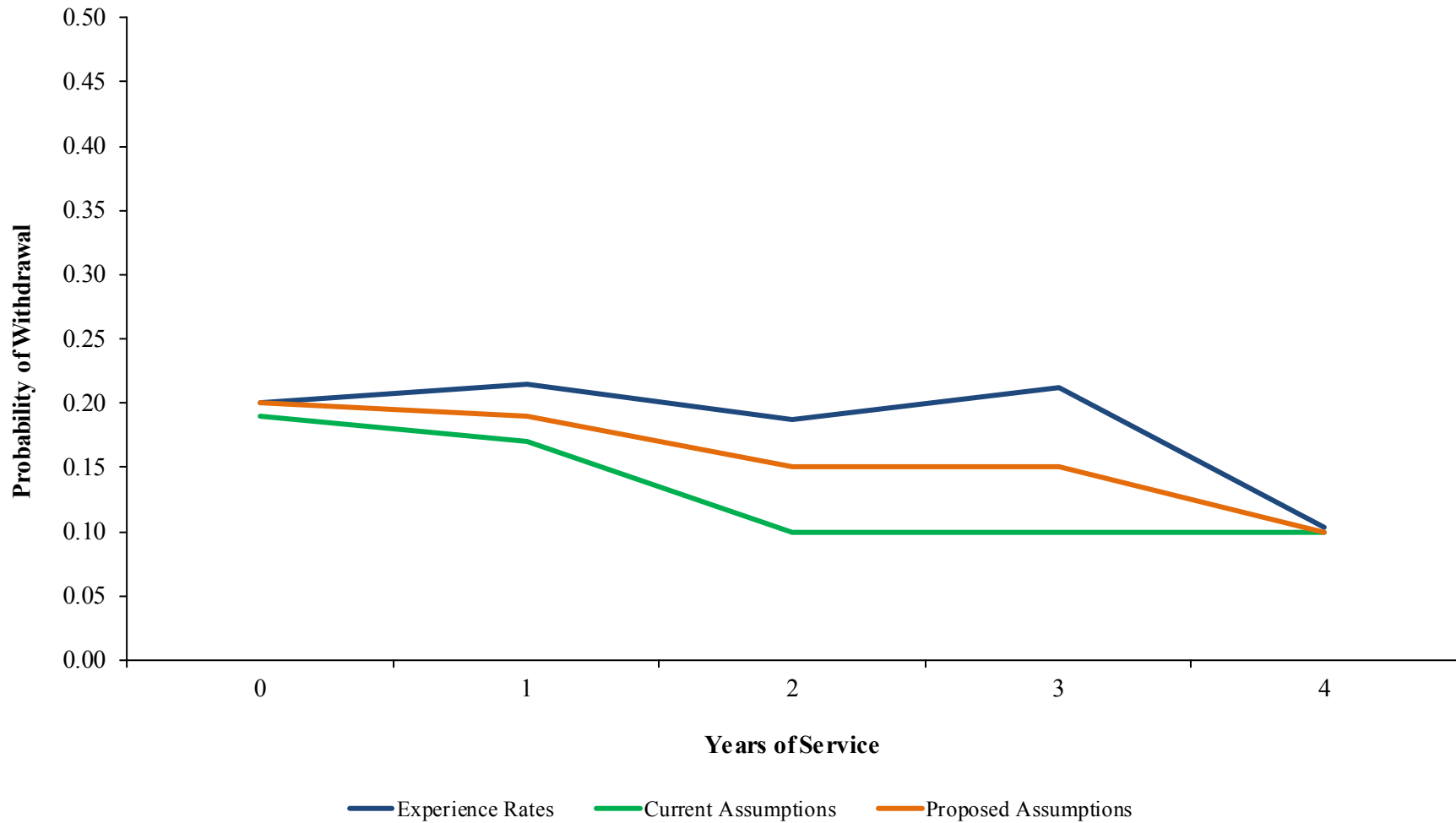| 2006-2010 Experience Study	0.0188	0.0170
2001-2005 Experience Study	0.0176	N/A

Sample rates are taken from the midpoint of age group.

12 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
2011-2015

Legend: Experience Rates (Liability Weighted) — Current and Proposed Assumptions

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2011-2015

Experience Rates (Population Weighted) ——— Current and Proposed Assumptions
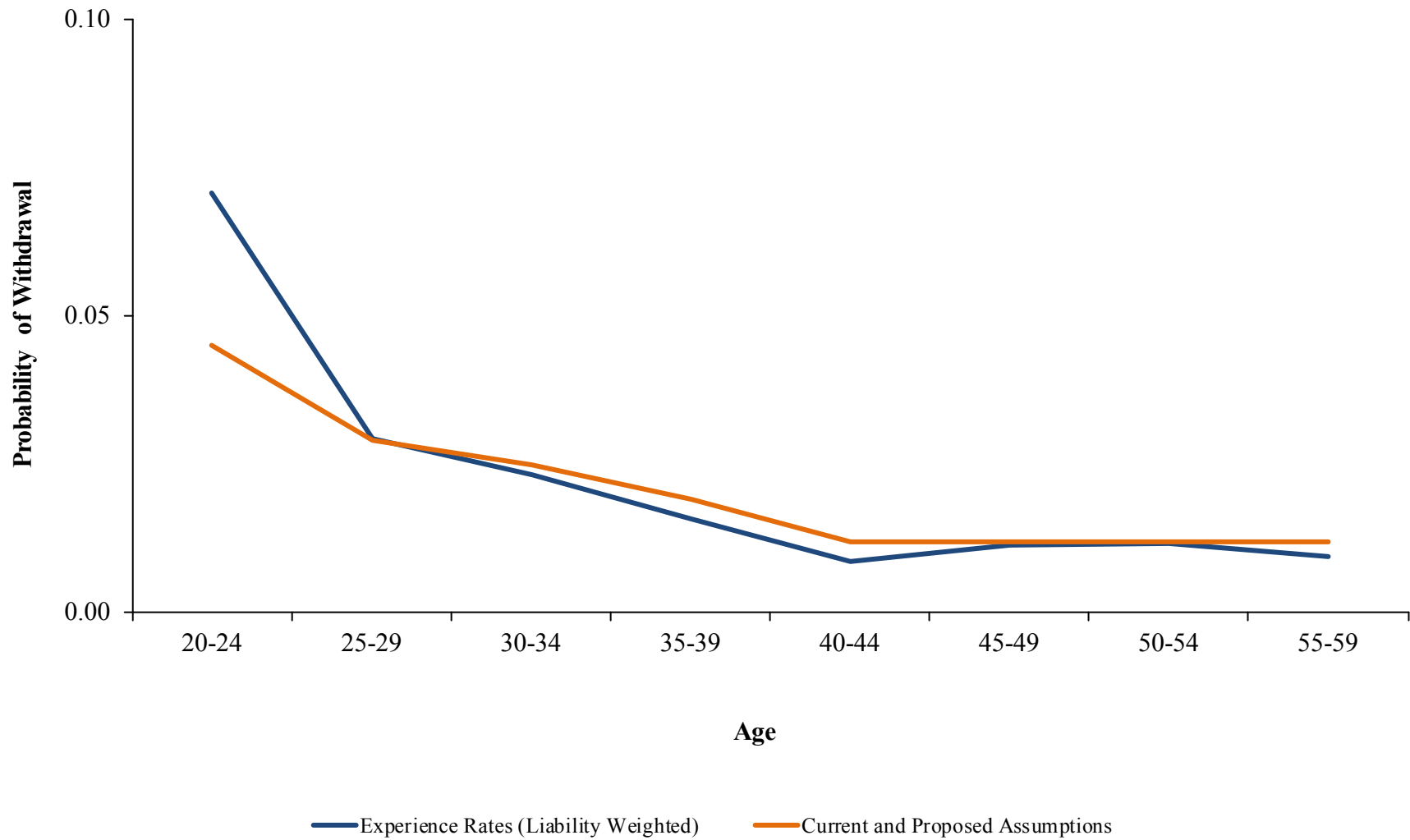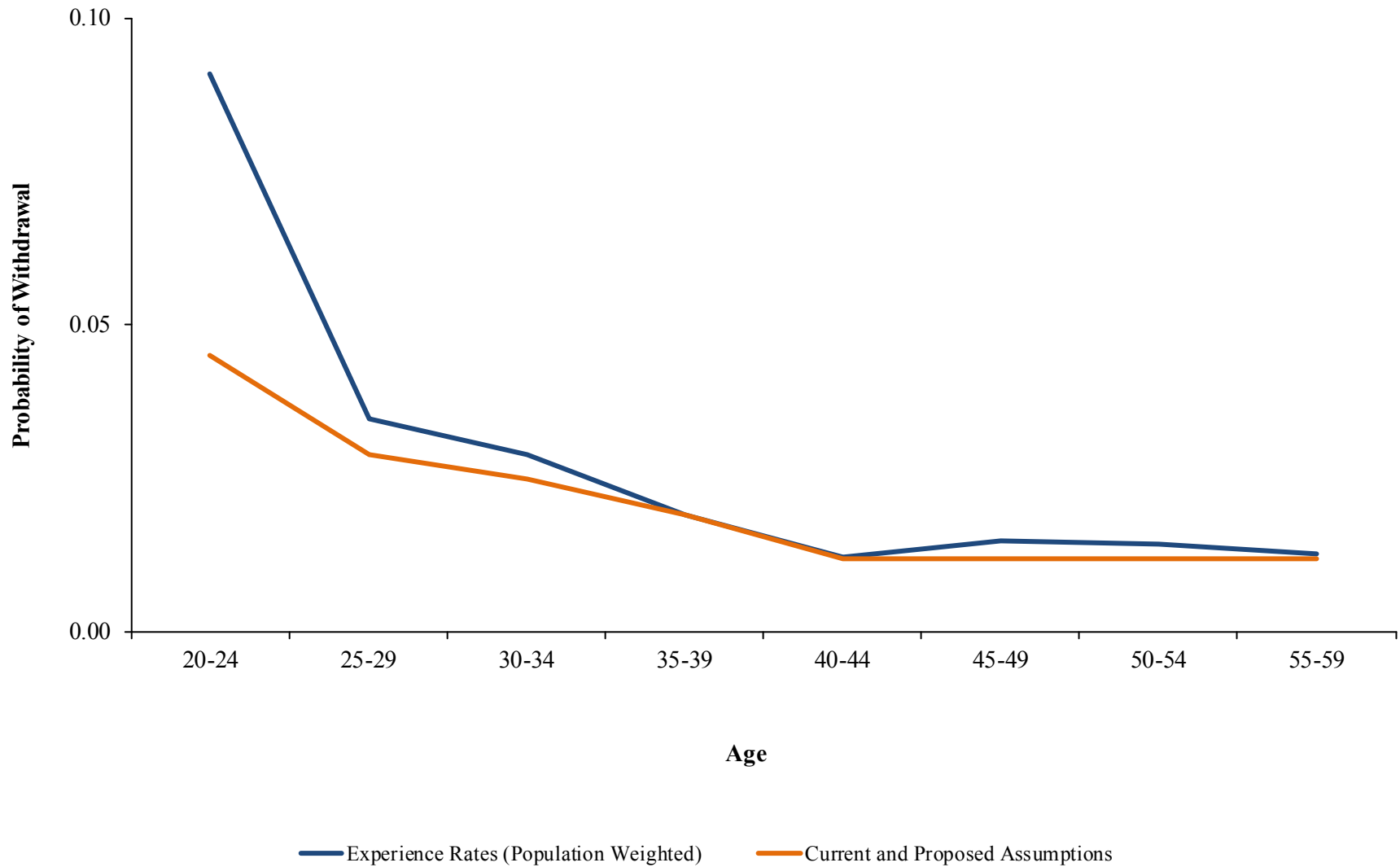
SERVICE BASED WITHDRAWAL (YEARS OF SERVICE LESS THAN 5) EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

Service	Withdrawals	Exposure	Experience Rates	Sample Rates		Expected Withdrawals	
				Current	Proposed	Current	Proposed
0	21	69	0.3043	0.1600	0.2000	11	14
1	15	113	0.1327	0.1200	0.1200	14	14
2	14	126	0.1111	0.0800	0.0900	10	11
3	6	133	0.0451	0.0700	0.0600	9	8
4	10	137	0.0730	0.0700	0.0600	10	8
Totals	66	578	0.1142	0.0934	0.0952	54	55
Ref				445	1037		

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
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

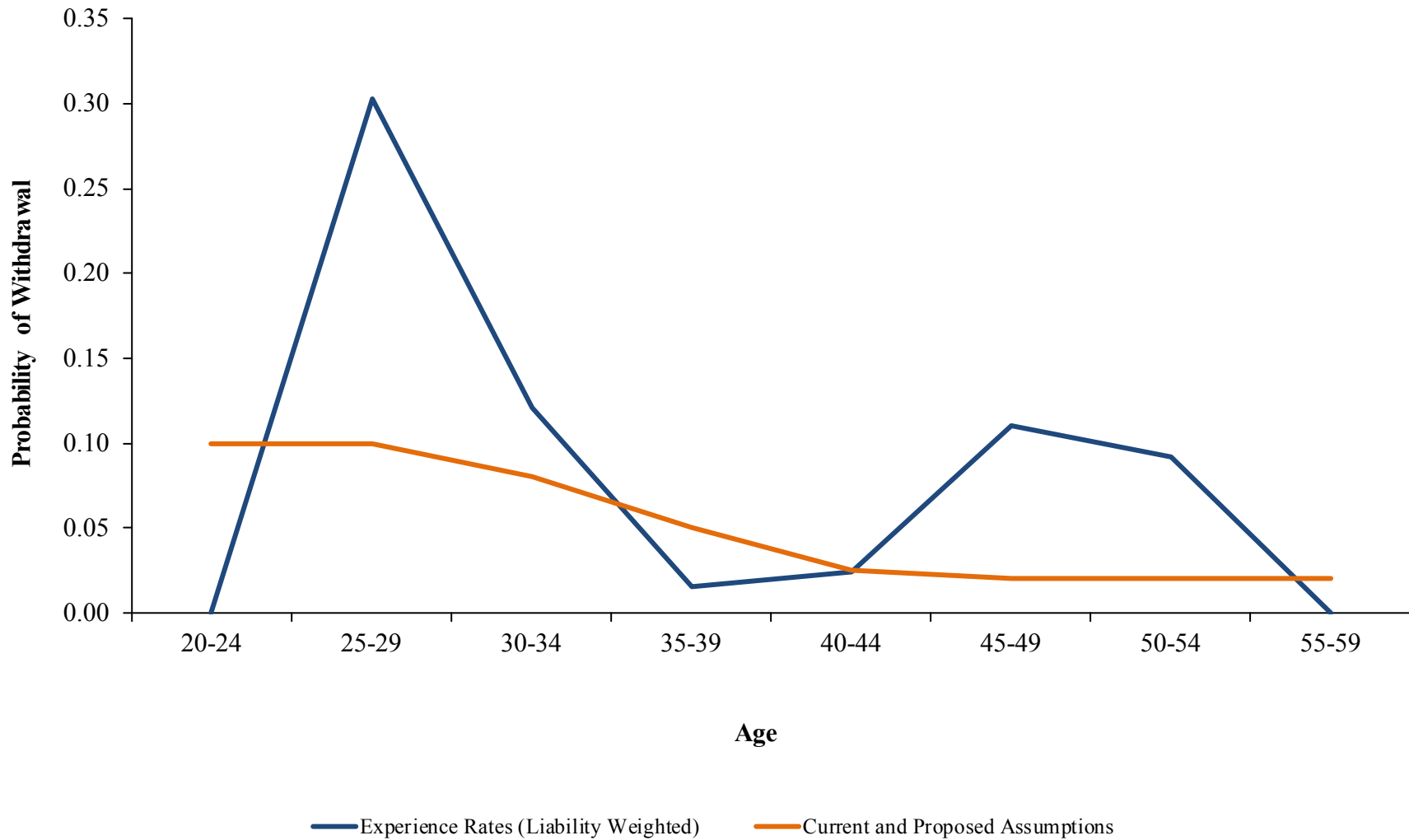| Age | Withdrawals | Exposure | Experience Rates Weighted By | | Sample Rates* | | | | Expected Withdrawals | | | |
					Current Rates Weighted By		Proposed Rates Weighted By		Current Withdrawals Weighted By		Proposed Withdrawals Weighted By	
			Population	Liability	Population	Liability	Population	Liability	Population	Liability	Population	Liability
Under 20	-	-	N\A	N\A	0.0500	0.0500	0.0500	0.0500	-	-	-	-
20-24	-	-	N\A	N\A	0.0500	0.0500	0.0500	0.0500	-	-	-	-
25-29	4	103	0.0388	0.0314	0.0300	0.0300	0.0300	0.0300	3	3	3	3
30-34	20	513	0.0390	0.0367	0.0270	0.0270	0.0270	0.0270	14	14	14	14
35-39	12	764	0.0157	0.0143	0.0200	0.0200	0.0200	0.0200	15	15	15	15
40-44	21	884	0.0238	0.0149	0.0130	0.0130	0.0130	0.0130	12	12	12	12
45-49	9	657	0.0137	0.0117	0.0120	0.0120	0.0120	0.0120	8	8	8	8
50-54	5	356	0.0140	0.0175	0.0120	0.0120	0.0120	0.0120	4	4	4	4
55-59	3	213	0.0141	0.0074	0.0120	0.0120	0.0120	0.0120	3	3	3	3
Totals	74	3,490	0.0212	0.0155	N/A	0.0169	0.0169	0.0169	59	59	59	59
Ref					575	575	575	575				

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
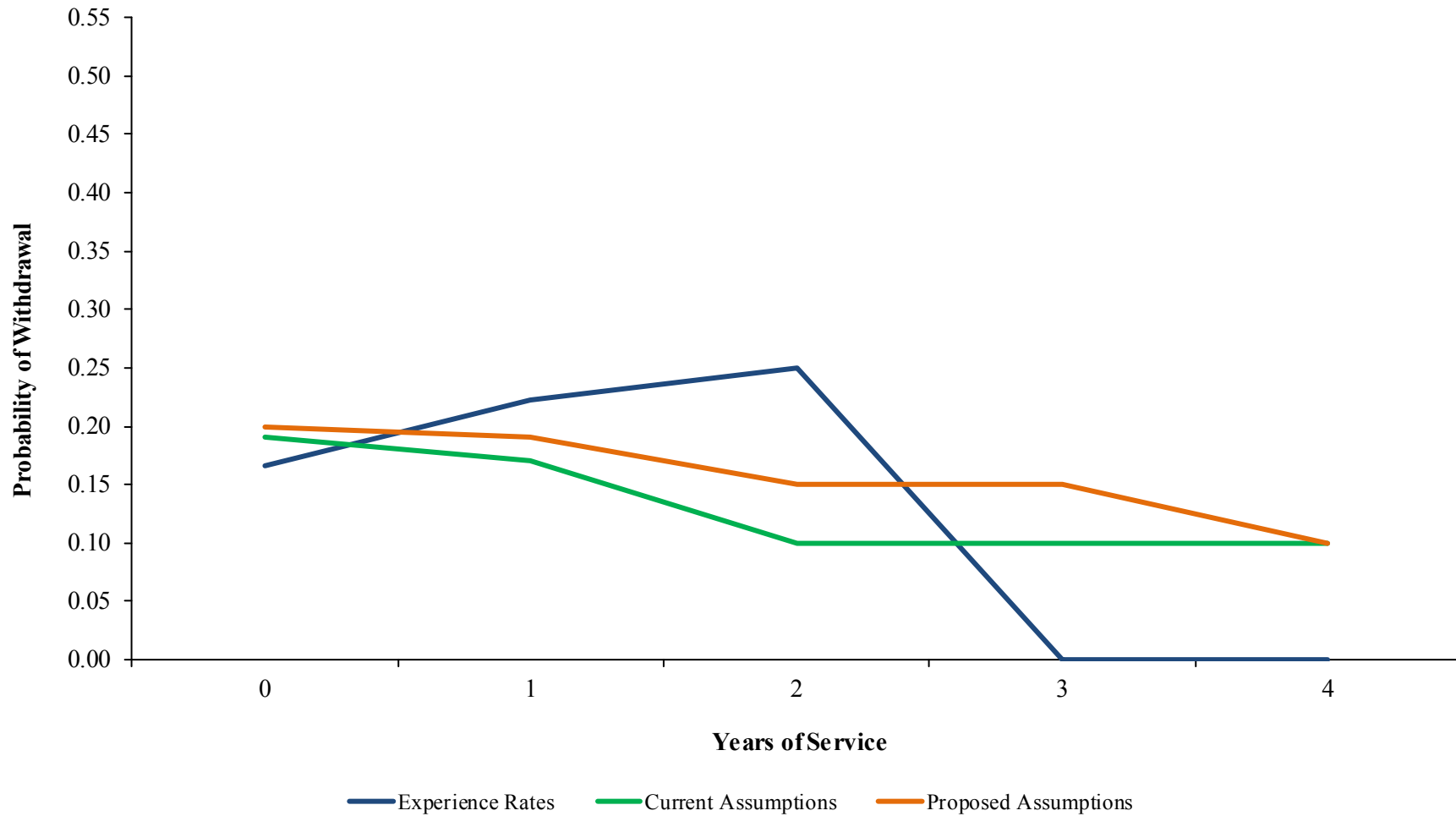# LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

AGE BASED WITHDRAWAL (YEARS OF SERVICE 5 AND UP) EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

Legend:
- Experience Rates (Population Weighted)
- Current and Proposed Assumptions
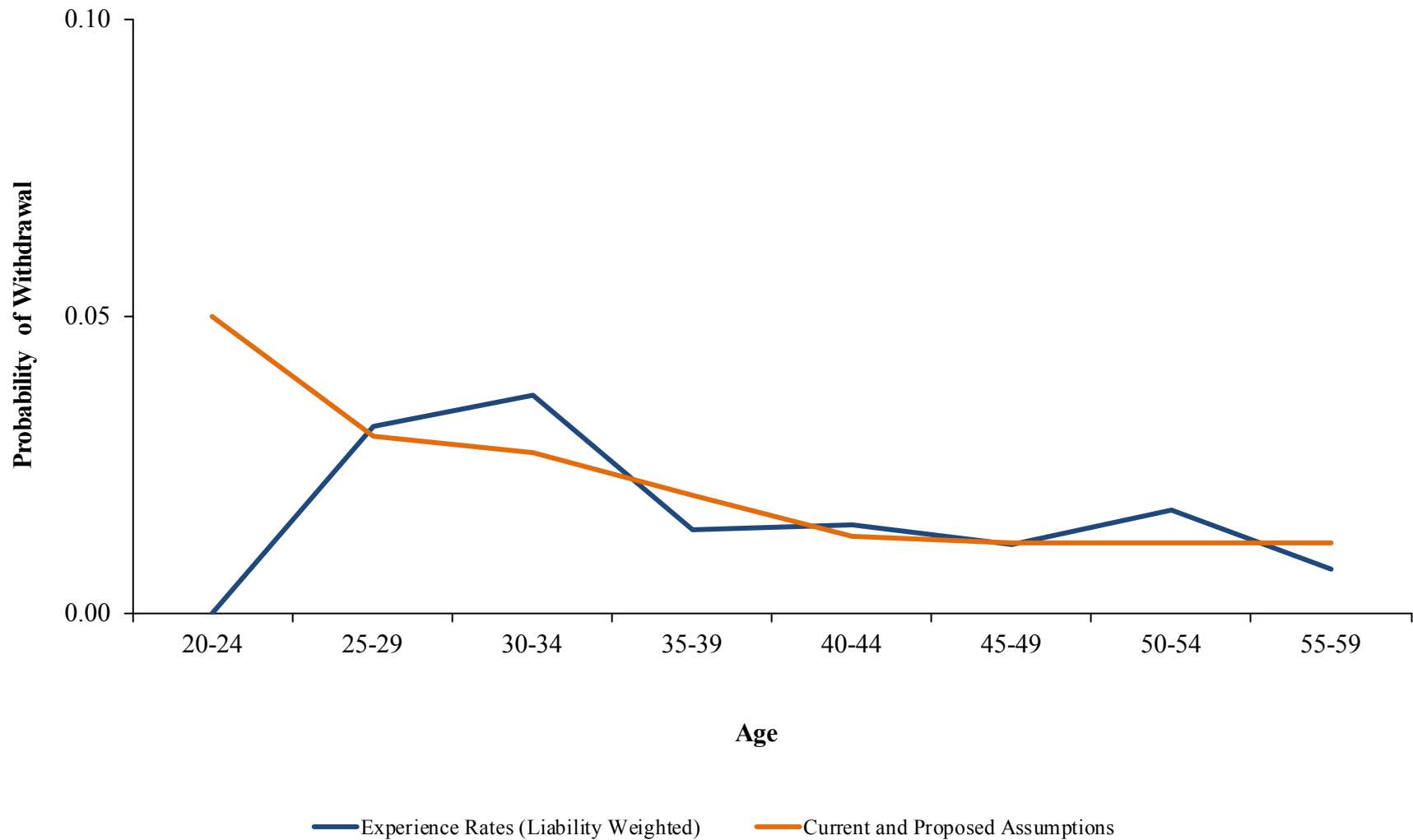
DISABILITY EXPERIENCE

DISABILITY EXPERIENCE
STATE MALE MEMBERS
2011-2015

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0012	0.0010	-	-
20-24	-	135	0.0000	0.0012	0.0010	-	-
25-29	-	2,328	0.0000	0.0012	0.0010	3	2
30-34	5	6,740	0.0007	0.0016	0.0010	12	8
35-39	11	8,533	0.0013	0.0032	0.0020	28	18
40-44	29	11,439	0.0025	0.0048	0.0035	56	41
45-49	68	14,311	0.0048	0.0065	0.0055	93	79
50-54	105	15,027	0.0070	0.0081	0.0075	126	117
55-59	104	8,627	0.0121	0.0129	0.0125	114	102
Totals	322	67,140	0.0048	0.0064	0.0055	432	367
Ref				385	1092		

2006-2010 Experience Study	0.0080
2001-2005 Experience Study	0.0093

Sample rates are taken from the midpoint of age group.

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

DISABILITY EXPERIENCE
STATE MALE MEMBERS
2011-2015

DISABILITY EXPERIENCE
STATE FEMALE MEMBERS
2011-2015

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0012	0.0010	-	-
20-24	-	152	0.0000	0.0012	0.0010	-	-
25-29	-	2,774	0.0000	0.0012	0.0010	4	3
30-34	3	8,199	0.0004	0.0016	0.0010	15	9
35-39	15	10,128	0.0015	0.0032	0.0020	33	21
40-44	29	12,484	0.0023	0.0048	0.0035	61	45
45-49	65	16,172	0.0040	0.0065	0.0055	105	89
50-54	87	18,112	0.0048	0.0081	0.0075	153	142
55-59	131	12,409	0.0106	0.0129	0.0125	164	147
Totals	330	80,430	0.0041	0.0067	0.0057	535	456
Ref				385	1092		

2006-2010 Experience Study	0.0075
2001-2005 Experience Study	0.0092

Sample rates are taken from the midpoint of age group.

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

DISABILITY EXPERIENCE
STATE FEMALE MEMBERS
2011-2015
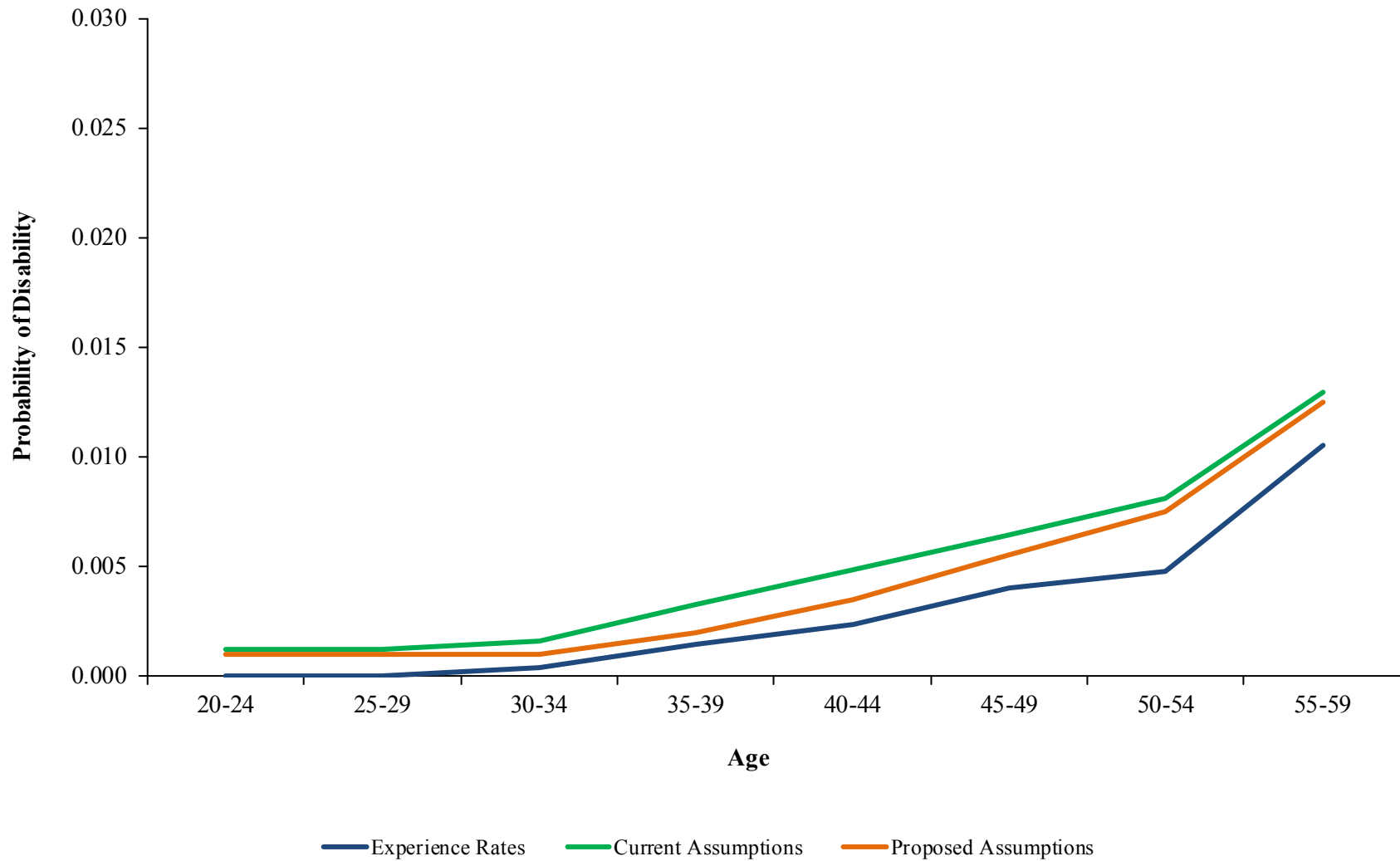
DISABILITY EXPERIENCE
LOCAL MALE MEMBERS
2011-2015

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0011	0.0010	-	-
20-24	-	409	0.0000	0.0011	0.0010	-	-
25-29	-	4,286	0.0000	0.0011	0.0010	5	4
30-34	7	10,924	0.0006	0.0016	0.0010	19	12
35-39	14	15,199	0.0009	0.0027	0.0015	42	24
40-44	34	20,795	0.0016	0.0040	0.0025	86	56
45-49	72	25,983	0.0028	0.0057	0.0045	151	121
50-54	163	29,299	0.0056	0.0083	0.0075	248	218
55-59	205	21,158	0.0097	0.0124	0.0100	253	205
Totals	495	128,053	0.0039	0.0063	0.0050	804	640
Ref				333	1093		

2006-2010 Experience Study	0.0061
2001-2005 Experience Study	0.0073

Sample rates are taken from the midpoint of age group.

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

DISABILITY EXPERIENCE
LOCAL MALE MEMBERS
2011-2015
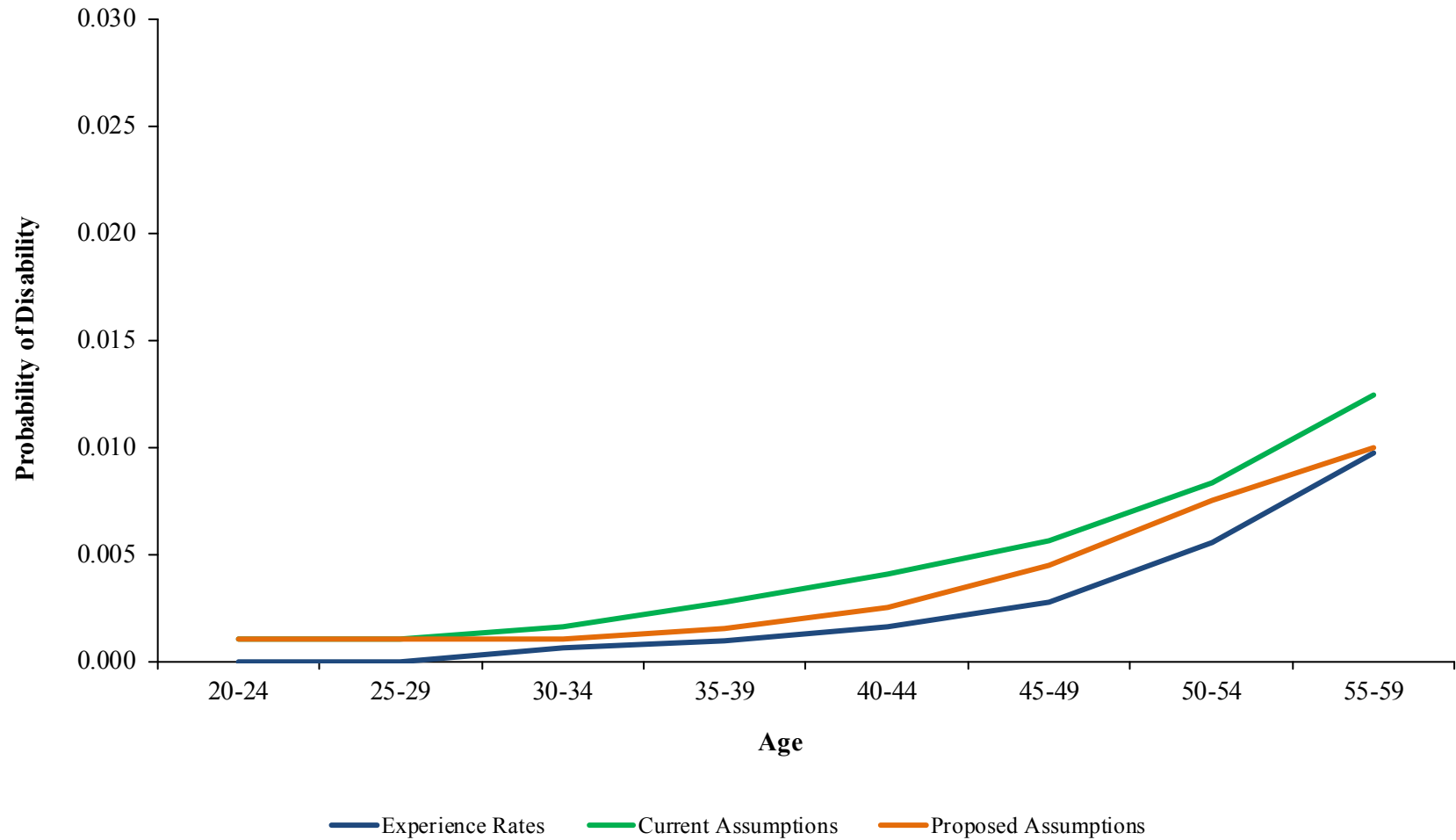
DISABILITY EXPERIENCE
LOCAL FEMALE MEMBERS
2011-2015

| Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
20-24	-	529	0.0000	0.0010	0.0010	1	1
25-29	-	4,682	0.0000	0.0010	0.0010	5	5
30-34	8	13,528	0.0006	0.0011	0.0010	17	14
35-39	14	19,754	0.0007	0.0020	0.0010	41	22
40-44	42	26,309	0.0016	0.0031	0.0020	81	53
45-49	64	31,424	0.0020	0.0040	0.0030	132	99
50-54	159	35,600	0.0045	0.0061	0.0050	222	185
55-59	221	29,093	0.0076	0.0090	0.0085	263	235
Totals	508	160,919	0.0032	0.0047	0.0038	762	614
Ref				334	1094		

2006-2010 Experience Study	0.0047
2001-2005 Experience Study	0.0060

Sample rates are taken from the midpoint of age group.

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

DISABILITY EXPERIENCE
LOCAL FEMALE MEMBERS
2011-2015
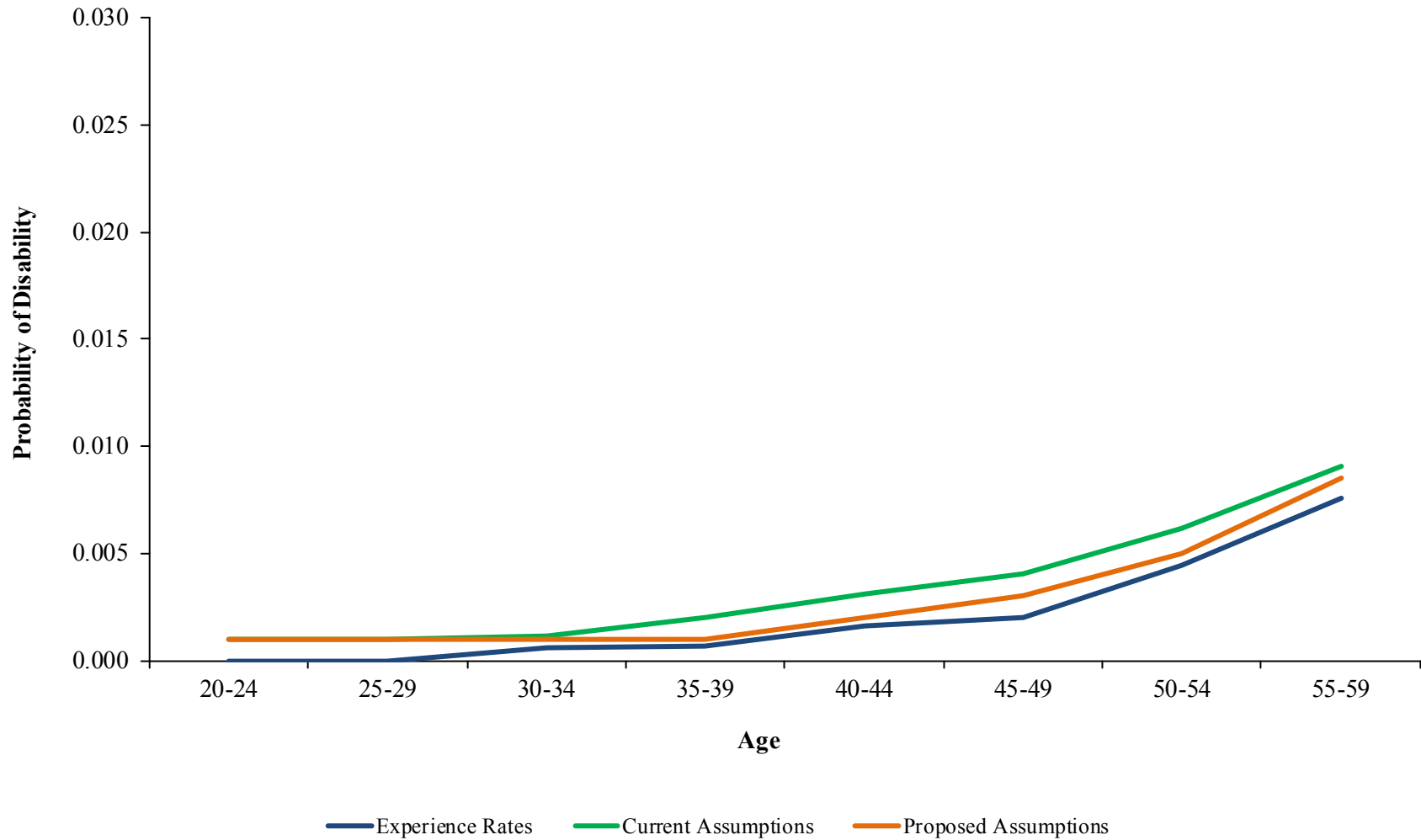
DISABILITY EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0012	0.0020	-	-
20-24	-	2	0.0000	0.0015	0.0020	-	-
25-29	-	10	0.0000	0.0028	0.0020	-	-
30-34	-	22	0.0000	0.0049	0.0025	-	-
35-39	-	34	0.0000	0.0072	0.0040	-	-
40-44	-	36	0.0000	0.0090	0.0060	-	-
45-49	-	16	0.0000	0.0129	0.0090	-	-
50-54	-	14	0.0000	0.0197	0.0190	-	-
55-59	-	8	0.0000	0.0263	0.0260	-	-
Totals	-	149	0.0000	0.0000	0.0000	-	-
Ref				699	1095		

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
2011-2015

DISABILITY EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
20-24	-	-	N\A	0.0034	0.0060	-	-
25-29	-	-	N\A	0.0034	0.0060	-	-
30-34	-	2	0.0000	0.0052	0.0060	-	-
35-39	-	-	N\A	0.0112	0.0060	-	-
40-44	-	1	0.0000	0.0129	0.0105	-	-
45-49	-	3	0.0000	0.0181	0.0160	-	-
50-54	-	3	0.0000	0.0215	0.0250	-	-
55-59	-	3	0.0000	0.0344	0.0275	-	-
Totals	-	12	0.0000	0.0000	0.0000	-	-
Ref				743	1096		

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
2011-2015
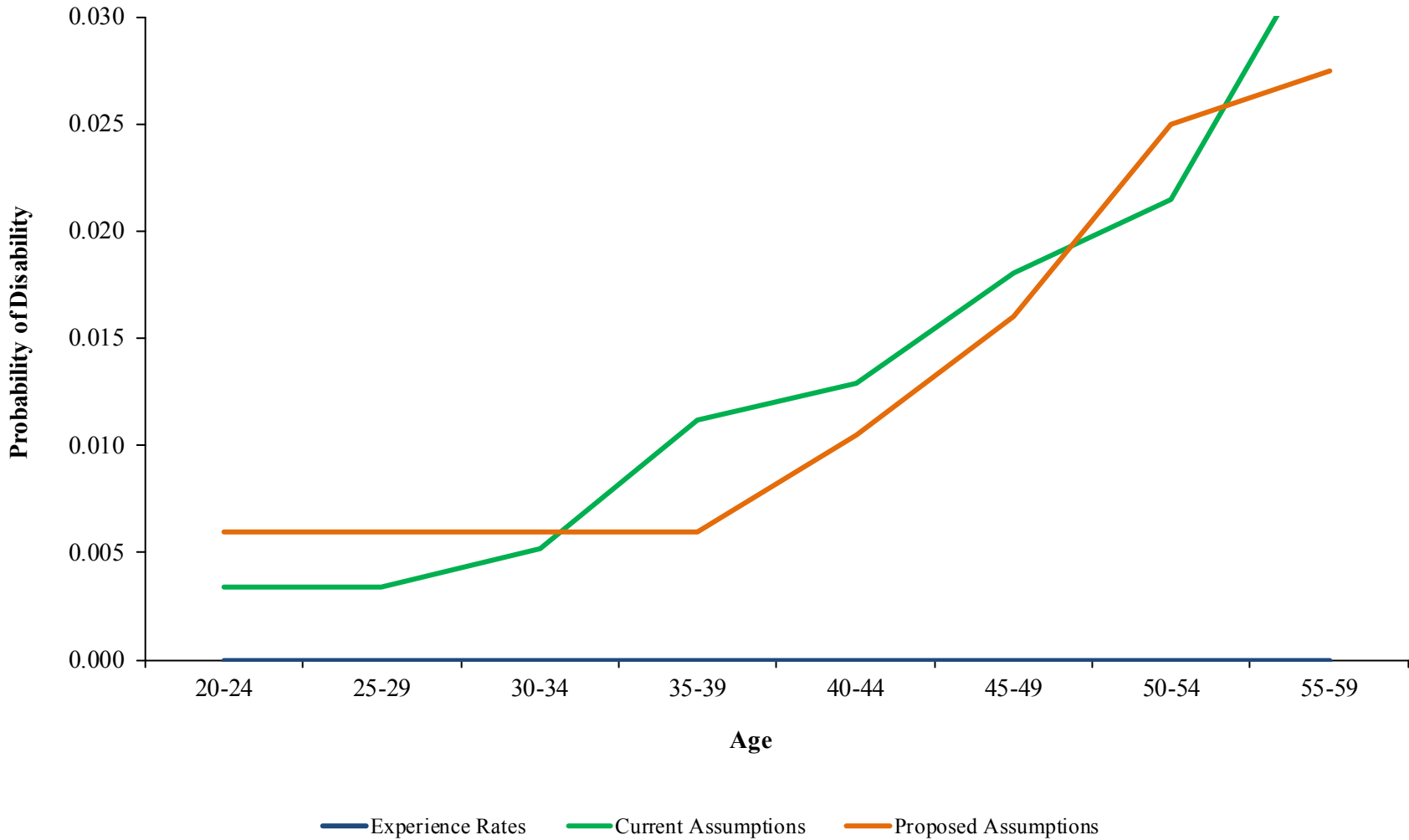
DISABILITY EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2011-2015

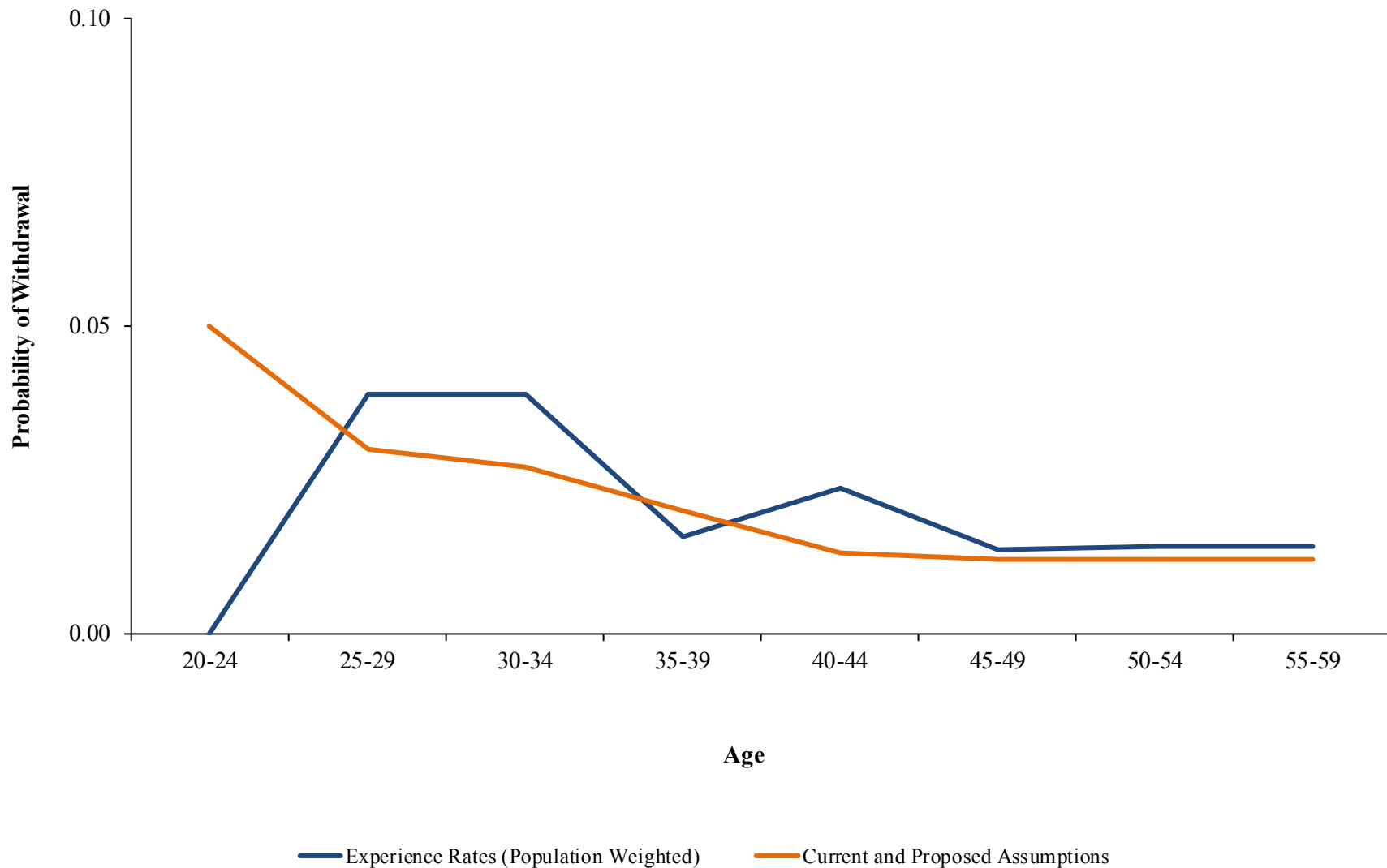| Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
Under 20	-	-	N\A	0.0012	0.0020	-	-
20-24	-	9	0.0000	0.0015	0.0020	-	-
25-29	1	570	0.0018	0.0028	0.0020	2	1
30-34	4	1,867	0.0021	0.0049	0.0025	9	5
35-39	4	3,202	0.0012	0.0072	0.0040	23	13
40-44	20	4,473	0.0045	0.0090	0.0060	41	28
45-49	24	3,221	0.0075	0.0129	0.0090	40	30
50-54	22	1,185	0.0186	0.0197	0.0190	23	21
55-59	14	549	0.0255	0.0263	0.0260	14	14
Totals	89	15,274	0.0058	0.0103	0.0077	157	117
Ref				699	1095		

2006-2010 Experience Study	0.0103
2001-2005 Experience Study	0.0156

Sample rates are taken from the midpoint of age group.

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

DISABILITY EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2011-2015
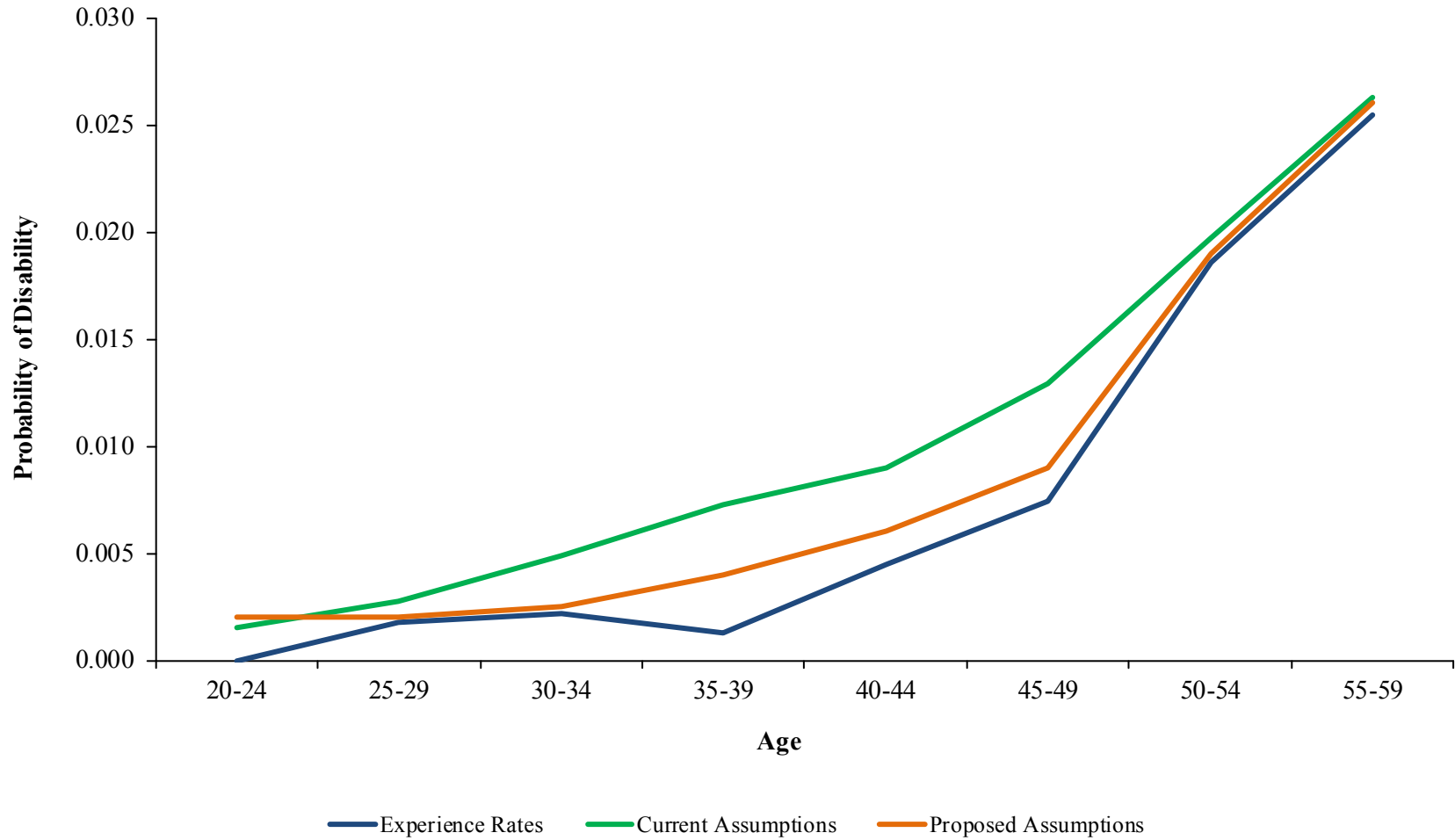
DISABILITY EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

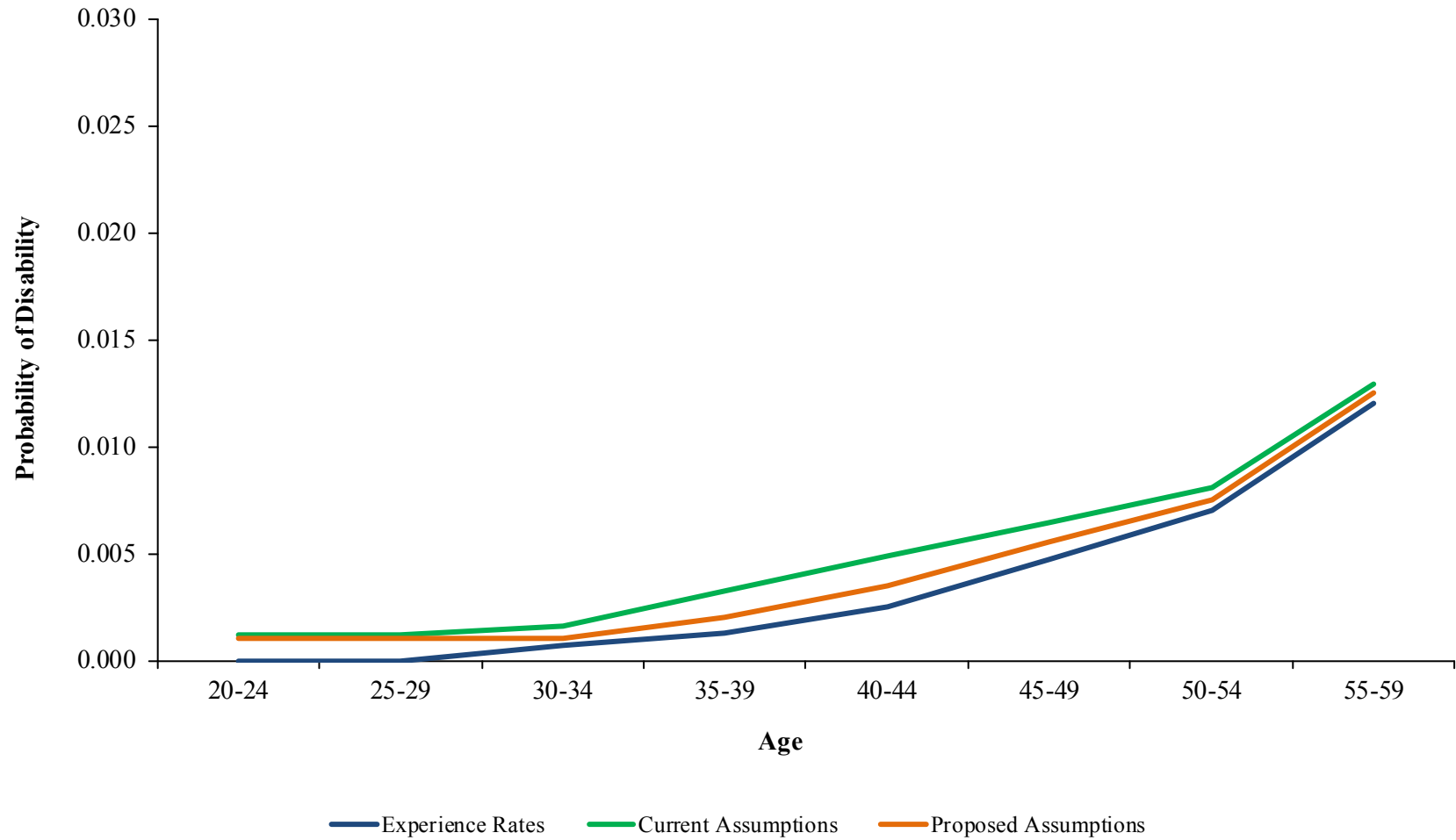| Age	Disabilities	Exposure	Experience Rates	Sample Rates*		Expected Disabilities	
				Current	Proposed	Current	Proposed
20-24	-	-	N\A	0.0034	0.0060	-	-
25-29	-	65	0.0000	0.0034	0.0060	-	-
30-34	2	271	0.0074	0.0052	0.0060	2	2
35-39	1	439	0.0023	0.0112	0.0060	5	3
40-44	5	529	0.0095	0.0129	0.0105	7	6
45-49	5	393	0.0127	0.0181	0.0160	7	6
50-54	7	209	0.0335	0.0215	0.0250	5	5
55-59	-	136	0.0000	0.0344	0.0275	4	4
Totals	20	2,066	0.0097	0.0150	0.0131	31	27
Ref				743	1096		

2006-2010 Experience Study	0.0183
2001-2005 Experience Study	0.0254

Sample rates are taken from the midpoint of age group.

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

DISABILITY EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015
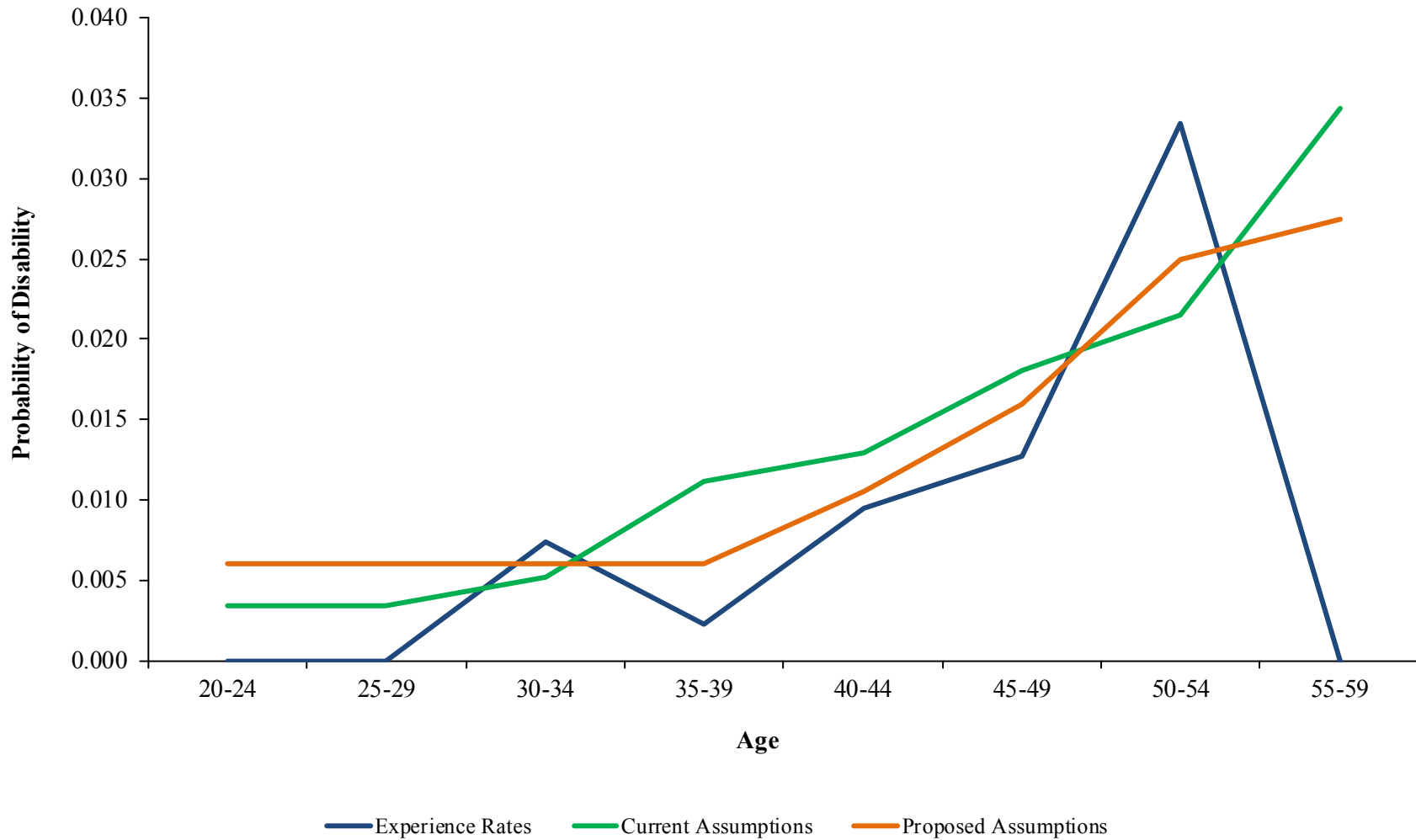
NORMAL & EARLY RETIREMENT EXPERIENCE

NORMAL AGE-BASED RETIREMENT EXPERIENCE
STATE MALE MEMBERS – ATTAINING AGE 65 PRIOR TO 30 YEARS OF SERVICE
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
65	376	1,408	0.2670	0.2200	0.2200	310	310
66	262	991	0.2644	0.2200	0.2200	218	218
67	159	704	0.2259	0.2000	0.2000	141	141
68	127	544	0.2335	0.2000	0.2000	109	109
69	80	385	0.2078	0.2000	0.2000	77	77
70	68	308	0.2208	0.2000	0.2000	62	62
71	49	238	0.2059	0.2000	0.2000	48	48
72	39	186	0.2097	0.1500	0.1500	28	28
73	42	144	0.2917	0.1500	0.1500	22	22
74	19	97	0.1959	0.1500	0.1500	15	15
75	13	92	0.1413	0.1500	0.1500	14	14
76	12	83	0.1446	0.1500	0.1500	12	12
77	13	63	0.2063	0.1500	0.1500	9	9
78	9	52	0.1731	0.1500	0.1500	8	8
79	15	50	0.3000	0.1500	0.1500	8	8
80	6	28	0.2143	0.2500	0.2500	7	7
81	3	22	0.1364	0.2500	0.2500	6	6
82	3	16	0.1875	0.2500	0.2500	4	4
83	6	16	0.3750	0.2500	0.2500	4	4
84	2	10	0.2000	0.2500	0.2500	3	3
85	6	10	0.6000	1.0000	1.0000	10	10
Totals	1,309	5,447	0.2403			1,115	1,115

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
2011-2015

NORMAL SERVICE-BASED RETIREMENT EXPERIENCE
STATE MALE MEMBERS – ATTAINING 30 YEARS OF SERVICE PRIOR TO AGE 65
2006-2010

Service	Retirements	Exposure	Experience Rates	Sample Rates Current	Sample Rates Proposed	Expected Retirements Current	Expected Retirements Proposed
30	1,347	2,975	0.4528	0.3700	0.3700	1,101	1,101
31	502	1,614	0.3110	0.2800	0.2800	452	452
32	311	1,149	0.2707	0.2400	0.2400	276	276
33	208	910	0.2286	0.2400	0.2400	218	218
34	163	696	0.2342	0.2400	0.2400	167	167
35	136	513	0.2651	0.2400	0.2400	123	123
36	91	365	0.2493	0.2400	0.2400	88	88
37	60	276	0.2174	0.2400	0.2400	66	66
38	53	197	0.2690	0.2400	0.2400	47	47
39	31	138	0.2246	0.2400	0.2400	33	33
40	31	109	0.2844	0.3500	0.3500	38	38
41	23	79	0.2911	0.3500	0.3500	28	28
42	14	54	0.2593	0.3500	0.3500	19	19
43	10	31	0.3226	0.3500	0.3500	11	11
44	11	23	0.4783	0.3500	0.3500	8	8
45	3	8	0.3750	0.2500	0.2500	2	2
46	1	6	0.1667	0.2500	0.2500	2	2
47	3	4	0.7500	0.2500	0.2500	1	1
48	2	3	0.6667	0.2500	0.2500	1	1
49	1	9	0.1111	0.2500	0.2500	2	2
50	-	-	N\A	1.0000	1.0000	-	-
Totals	3,001	9,159	0.3277			2,683	2,683

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 137 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
2011-2015

EARLY RETIREMENT EXPERIENCE
STATE MALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
55	109	1,140	0.0956	0.1000	0.1000	114	114
56	87	1,017	0.0855	0.1000	0.1000	102	102
57	67	918	0.0730	0.1000	0.1000	92	92
58	84	869	0.0967	0.1000	0.1000	87	87
59	62	819	0.0757	0.1000	0.1000	82	82
60	343	3,310	0.1036	0.1000	0.1000	331	331
61	292	2,889	0.1011	0.1000	0.1000	289	289
62	344	2,512	0.1369	0.1500	0.1500	377	377
63	279	2,036	0.1370	0.1500	0.1500	305	305
64	246	1,690	0.1456	0.1500	0.1500	254	254
Totals	1,913	17,200	0.1112	0.1182	0.1182	2,033	2,033

2006-2010 Experience Study   0.1136
2001-2005 Experience Study   0.1192

EARLY RETIREMENT EXPERIENCE
STATE MALE MEMBERS
2011-2015
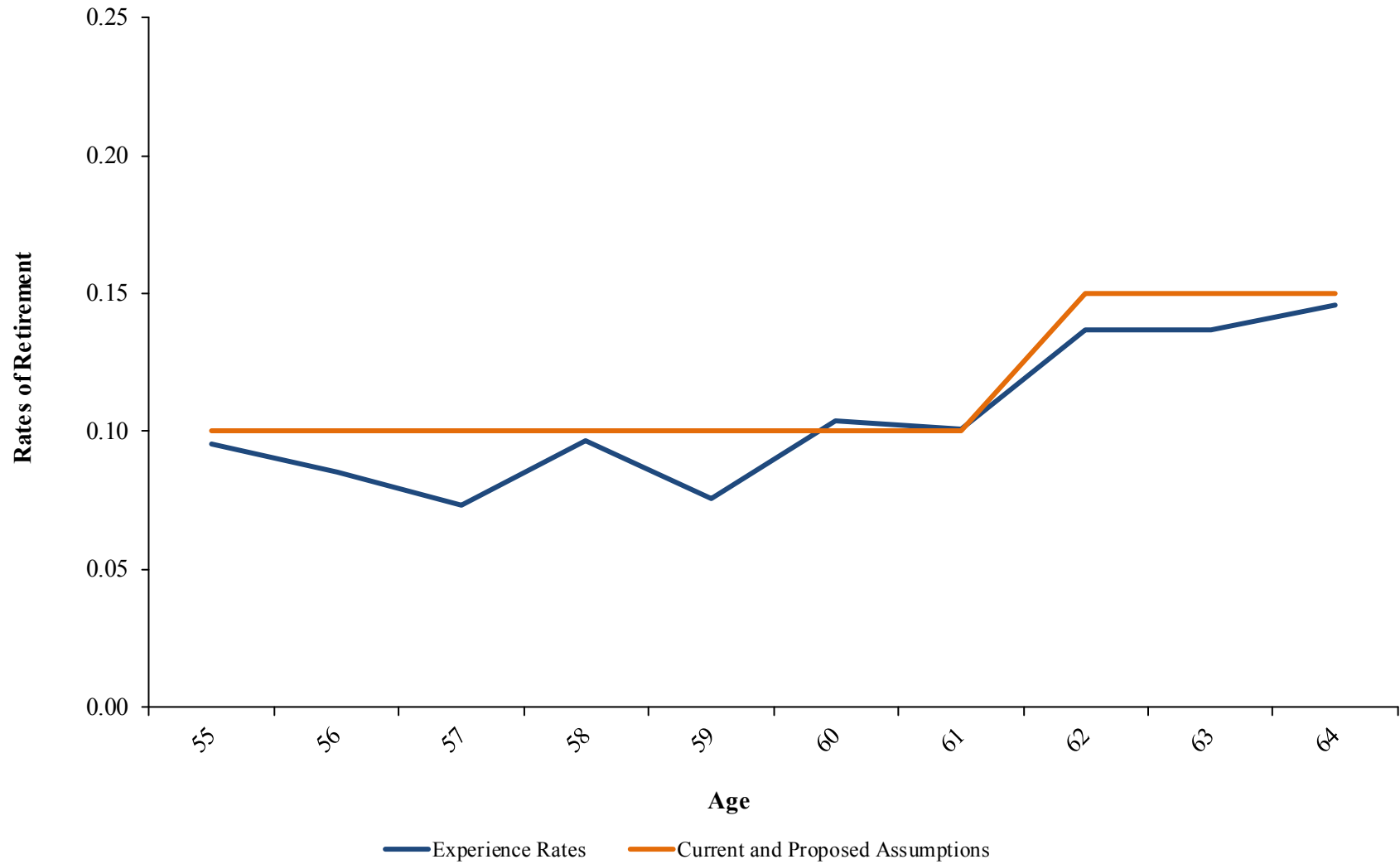
Age

— Experience Rates   — Current and Proposed Assumptions

NORMAL AGE-BASED RETIREMENT EXPERIENCE
STATE FEMALE MEMBERS – ATTAINING AGE 65 PRIOR TO 30 YEARS OF SERVICE
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
65	493	1,855	0.2658	0.2200	0.2200	408	408
66	331	1,328	0.2492	0.2200	0.2200	292	292
67	234	946	0.2474	0.2000	0.2000	189	189
68	162	712	0.2275	0.2000	0.2000	142	142
69	122	510	0.2392	0.2000	0.2000	102	102
70	104	386	0.2694	0.2000	0.2000	77	77
71	65	280	0.2321	0.2000	0.2000	56	56
72	59	238	0.2479	0.2000	0.2000	48	48
73	48	180	0.2667	0.2000	0.2000	36	36
74	28	128	0.2188	0.2000	0.2000	26	26
75	20	110	0.1818	0.2000	0.2000	22	22
76	26	96	0.2708	0.2000	0.2000	19	19
77	23	74	0.3108	0.2500	0.2500	19	19
78	11	51	0.2157	0.2500	0.2500	13	13
79	6	39	0.1538	0.2500	0.2500	10	10
80	3	26	0.1154	0.2500	0.2500	7	7
81	5	23	0.2174	0.2500	0.2500	6	6
82	6	15	0.4000	0.2500	0.2500	4	4
83	1	8	0.1250	0.2500	0.2500	2	2
84	1	6	0.1667	0.2500	0.2500	2	2
85	7	12	0.5833	1.0000	1.0000	12	12
Totals	1,755	7,023	0.2499			1,492	1,492

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
2011-2015
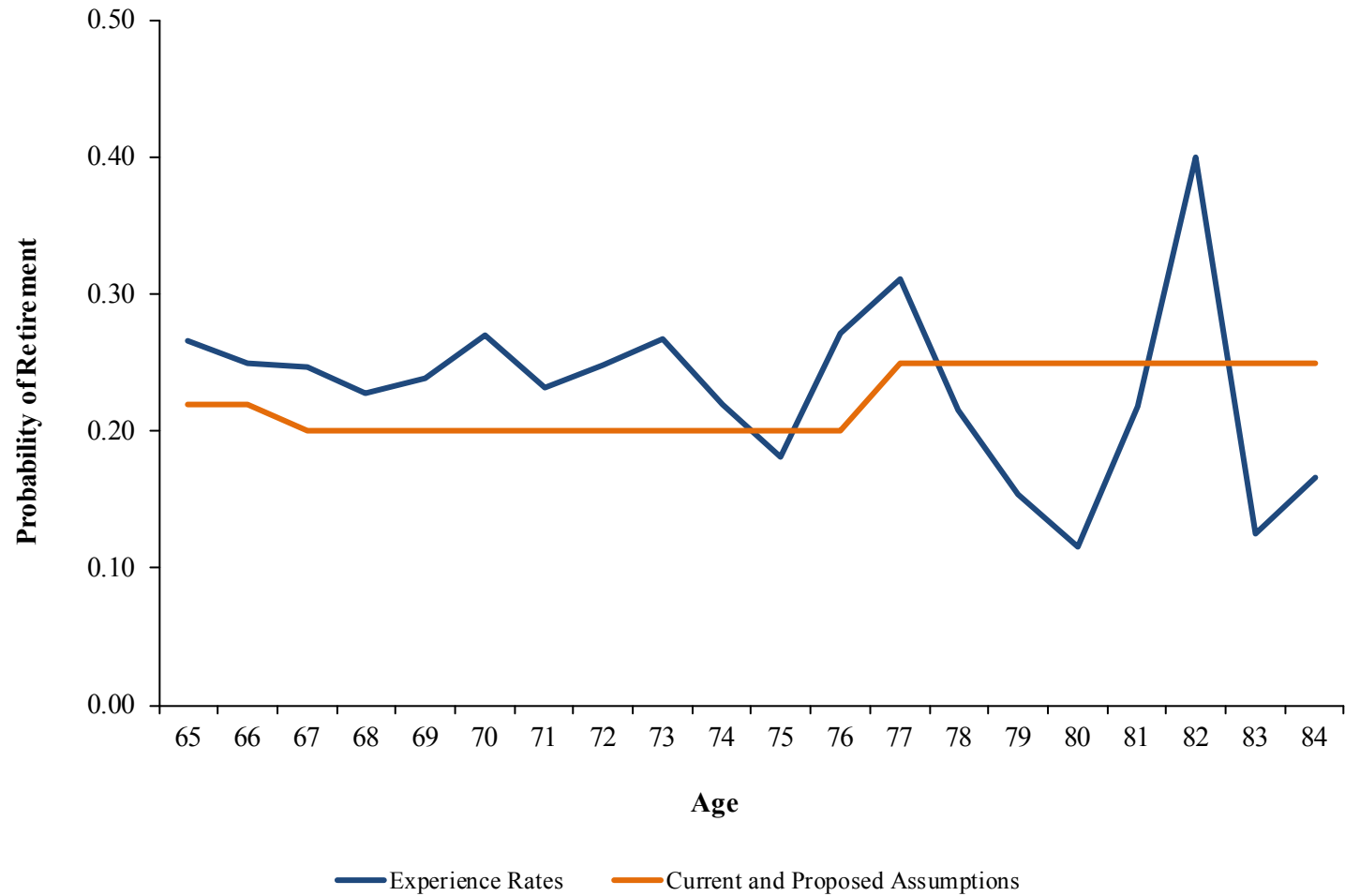
NORMAL SERVICE-BASED RETIREMENT EXPERIENCE
STATE FEMALE MEMBERS – ATTAINING 30 YEARS OF SERVICE PRIOR TO AGE 65
2011-2015

Service	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
30	1,380	2,916	0.4733	0.4000	0.4000	1,166	1,166
31	567	1,633	0.3472	0.3300	0.3300	539	539
32	289	1,136	0.2544	0.2600	0.2600	295	295
33	243	908	0.2676	0.2600	0.2600	236	236
34	183	711	0.2574	0.2600	0.2600	185	185
35	135	499	0.2705	0.2600	0.2600	130	130
36	75	323	0.2322	0.2600	0.2600	84	84
37	65	233	0.2790	0.2600	0.2600	61	61
38	48	156	0.3077	0.2600	0.2600	41	41
39	20	108	0.1852	0.2600	0.2600	28	28
40	27	83	0.3253	0.3300	0.3300	27	27
41	13	56	0.2321	0.3300	0.3300	18	18
42	10	37	0.2703	0.3300	0.3300	12	12
43	10	28	0.3571	0.3300	0.3300	9	9
44	6	18	0.3333	0.3300	0.3300	6	6
45	4	13	0.3077	0.2500	0.2500	3	3
46	1	9	0.1111	0.2500	0.2500	2	2
47	1	5	0.2000	0.2500	0.2500	1	1
48	1	4	0.2500	0.2500	0.2500	1	1
49	5	21	0.2381	0.2500	0.2500	5	5
50	-	-	N/A	1.0000	1.0000	-	-
Totals	3,083	8,897	0.3465			2,849	2,849

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 143 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
2011-2015

Legend: Experience Rates; Current and Proposed Assumptions

EARLY RETIREMENT EXPERIENCE
STATE FEMALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
55	146	1,259	0.1160	0.1000	0.1000	126	126
56	117	1,089	0.1074	0.1000	0.1000	109	109
57	99	1,005	0.0985	0.1000	0.1000	101	101
58	94	977	0.0962	0.1000	0.1000	98	98
59	107	939	0.1140	0.1100	0.1100	103	103
60	569	4,612	0.1234	0.1200	0.1200	553	553
61	443	3,942	0.1124	0.1300	0.1300	512	512
62	451	3,348	0.1347	0.1500	0.1500	502	502
63	420	2,710	0.1550	0.1500	0.1500	407	407
64	309	2,190	0.1411	0.1500	0.1500	329	329
Totals	2,755	22,071	0.1248	0.1287	0.1287	2,840	2,840

2006-2010 Experience Study	0.1245
2001-2005 Experience Study	0.1328

EARLY RETIREMENT EXPERIENCE
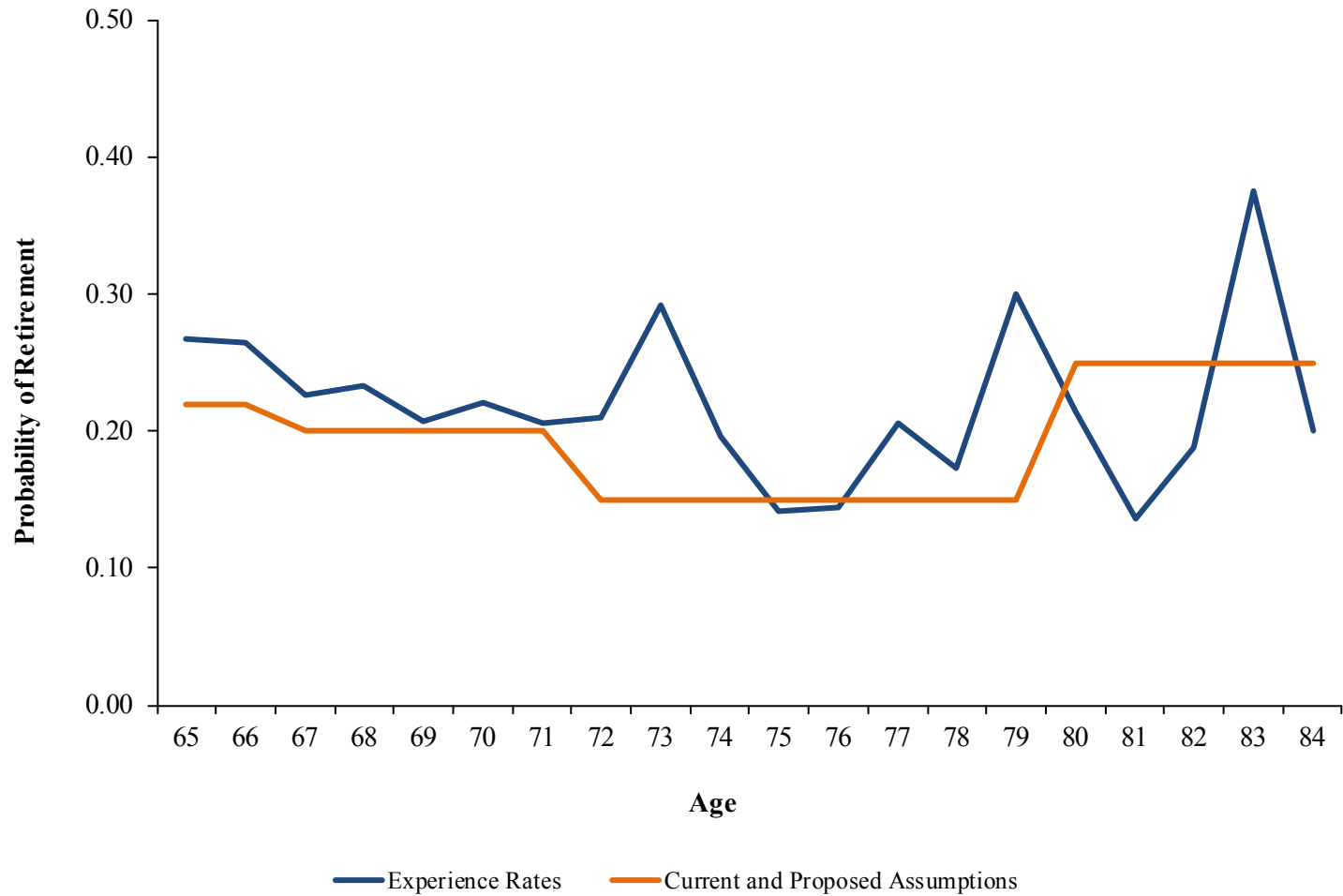## STATE FEMALE MEMBERS
2011-2015
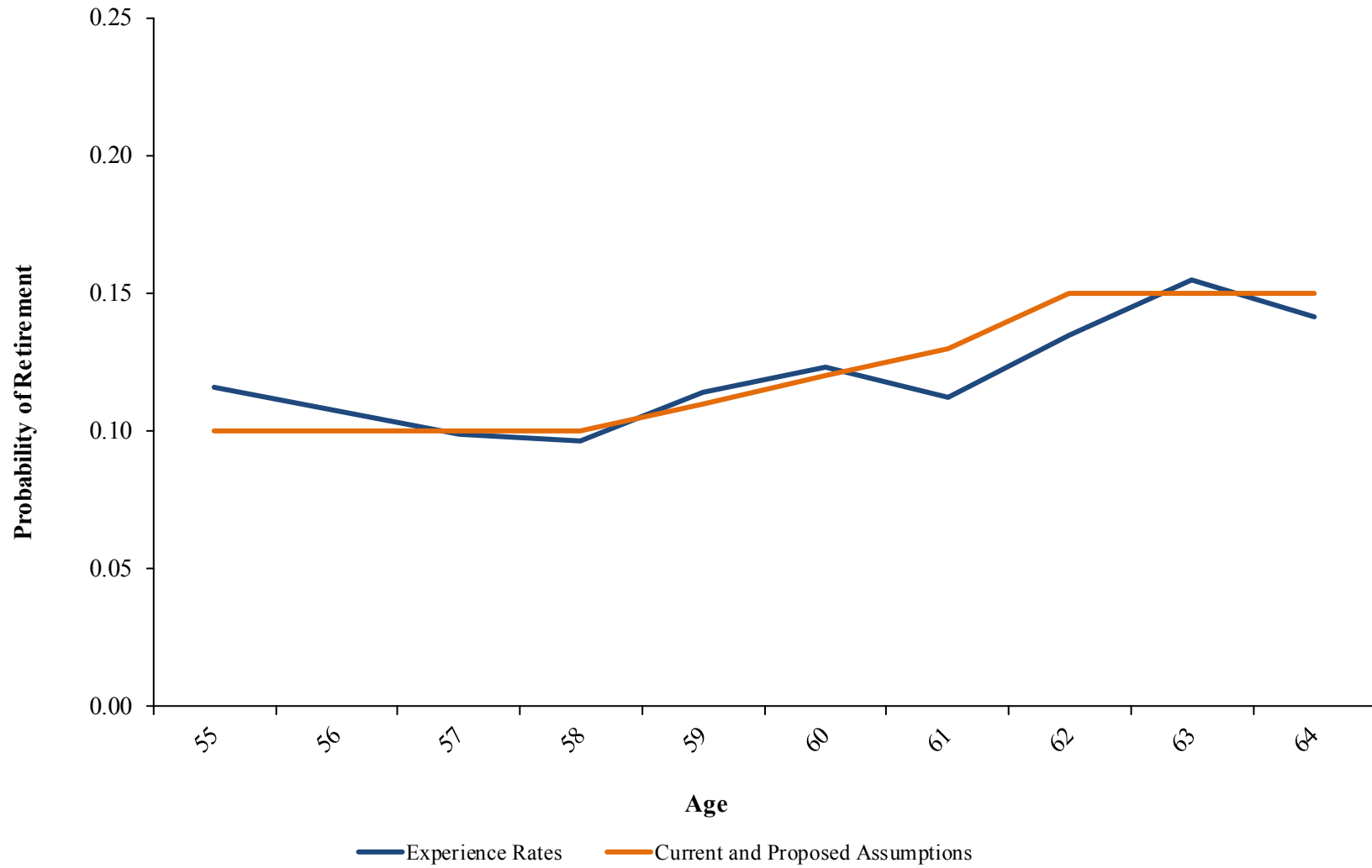
NORMAL AGE-BASED RETIREMENT EXPERIENCE
LOCAL MALE MEMBERS – ATTAINING AGE 65 PRIOR TO 30 YEARS OF SERVICE
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates Current	Sample Rates Proposed	Expected Retirements Current	Expected Retirements Proposed
65	788	4,269	0.1846	0.2000	0.2000	854	854
66	760	3,391	0.2241	0.2000	0.2000	678	678
67	464	2,588	0.1793	0.1500	0.1500	388	388
68	359	2,176	0.1650	0.1500	0.1500	326	326
69	245	1,808	0.1355	0.1500	0.1500	271	271
70	277	1,606	0.1725	0.1500	0.1500	241	241
71	212	1,385	0.1531	0.1500	0.1500	208	208
72	188	1,223	0.1537	0.1500	0.1500	183	183
73	162	1,091	0.1485	0.1500	0.1500	164	164
74	147	939	0.1565	0.1500	0.1500	141	141
75	140	839	0.1669	0.1500	0.1500	126	126
76	145	727	0.1994	0.1500	0.1500	109	109
77	106	627	0.1691	0.1500	0.1500	94	94
78	88	532	0.1654	0.1500	0.1500	80	80
79	82	490	0.1673	0.1500	0.1500	74	74
80	83	415	0.2000	0.2000	0.2000	83	83
81	83	325	0.2554	0.2000	0.2000	65	65
82	44	236	0.1864	0.2000	0.2000	47	47
83	40	222	0.1802	0.2000	0.2000	44	44
84	36	172	0.2093	0.2000	0.2000	34	34
85	124	185	0.6703	1.0000	1.0000	185	185
Totals	4,573	25,246	0.1811			4,395	4,395

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
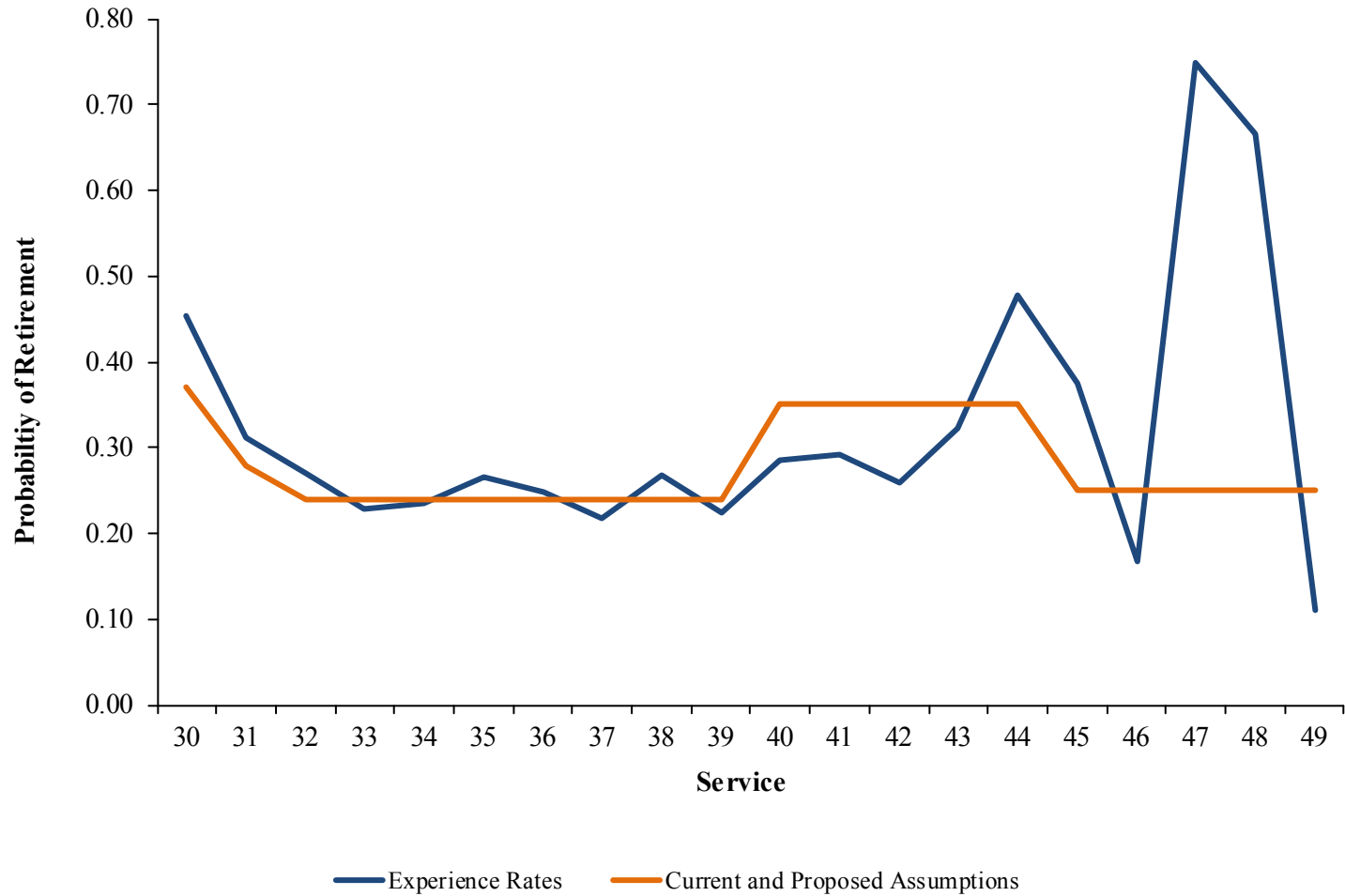## 2011-2015
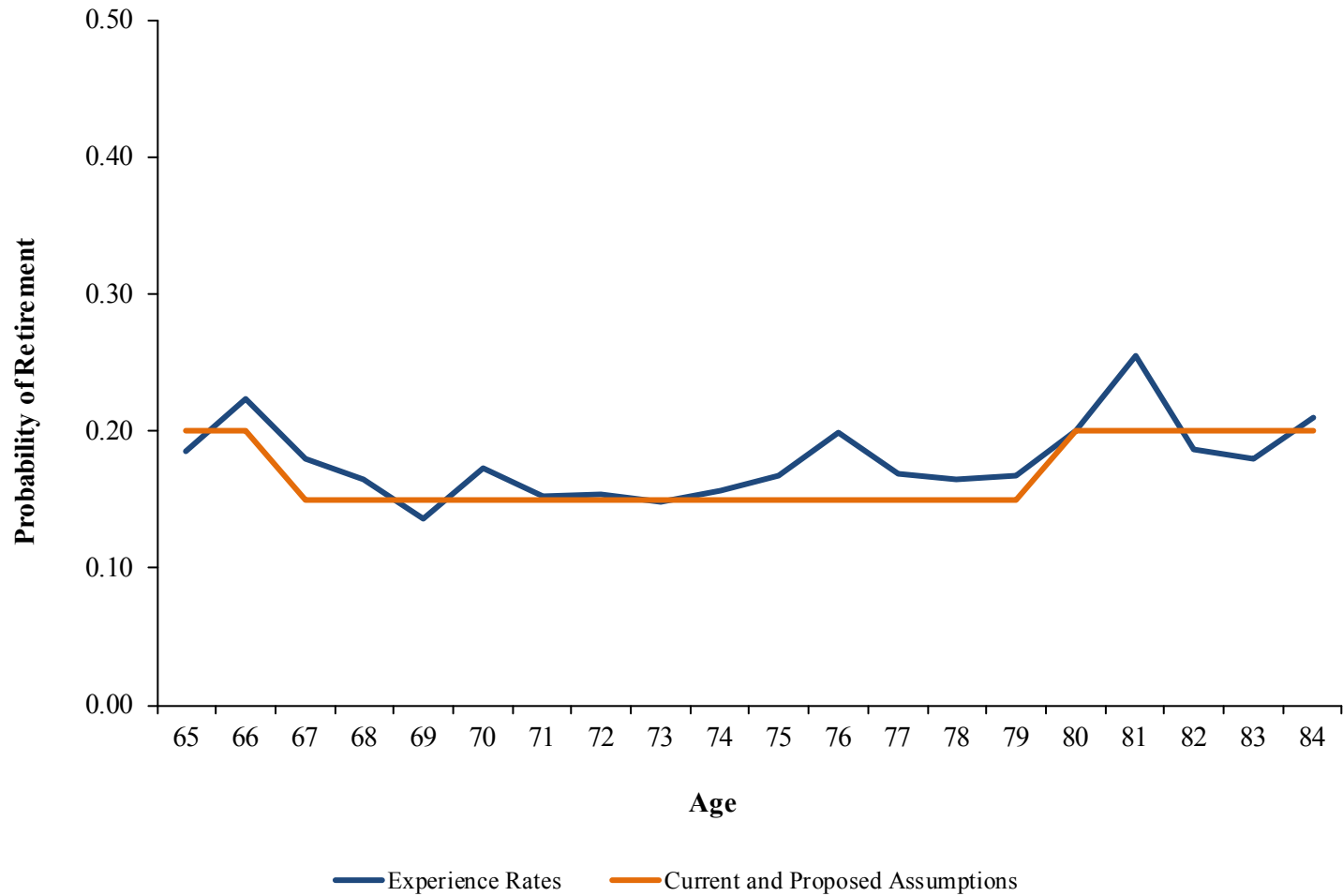
NORMAL SERVICE-BASED RETIREMENT EXPERIENCE
LOCAL MALE MEMBERS – ATTAINING 30 YEARS OF SERVICE PRIOR TO AGE 65
2011-2015

Service	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
30	1,706	4,433	0.3848	0.3500	0.3500	1,552	1,552
31	854	2,742	0.3115	0.2600	0.2600	713	713
32	481	1,941	0.2478	0.2300	0.2300	446	446
33	346	1,582	0.2187	0.2300	0.2300	364	364
34	310	1,298	0.2388	0.2300	0.2300	299	299
35	233	968	0.2407	0.2300	0.2300	223	223
36	172	735	0.2340	0.2300	0.2300	169	169
37	160	603	0.2653	0.2300	0.2300	139	139
38	112	426	0.2629	0.2300	0.2300	98	98
39	79	296	0.2669	0.2300	0.2300	68	68
40	75	226	0.3319	0.3200	0.3200	72	72
41	36	144	0.2500	0.3200	0.3200	46	46
42	23	101	0.2277	0.3200	0.3200	32	32
43	22	74	0.2973	0.3200	0.3200	24	24
44	20	47	0.4255	0.3200	0.3200	15	15
45	4	24	0.1667	0.3200	0.3200	8	8
46	4	18	0.2222	0.2500	0.2500	5	5
47	3	10	0.3000	0.2500	0.2500	3	3
48	2	7	0.2857	0.2500	0.2500	2	2
49	9	20	0.4500	0.2500	0.2500	5	5
50	-	-	N\A	1.0000	1.0000	-	-
Totals	4,651	15,695	0.2963			4,283	4,283

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 267 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
2011-2015

EARLY RETIREMENT EXPERIENCE
LOCAL MALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
55	166	2,031	0.0817	0.0900	0.0900	183	183
56	129	1,823	0.0708	0.0900	0.0900	164	164
57	106	1,743	0.0608	0.0900	0.0900	157	157
58	112	1,601	0.0700	0.0900	0.0900	144	144
59	114	1,444	0.0789	0.0900	0.0900	130	130
60	680	7,961	0.0854	0.0900	0.0900	716	716
61	577	7,086	0.0814	0.0900	0.0900	638	638
62	781	6,391	0.1222	0.1300	0.1300	831	831
63	692	5,571	0.1242	0.1400	0.1400	780	780
64	613	4,886	0.1255	0.1200	0.1200	586	586
Totals	3,970	40,537	0.0979	0.1068	0.1068	4,329	4,329

2006-2010 Experience Study   0.0996
2001-2005 Experience Study   0.0956

EARLY RETIREMENT EXPERIENCE
LOCAL MALE MEMBERS
2011-2015
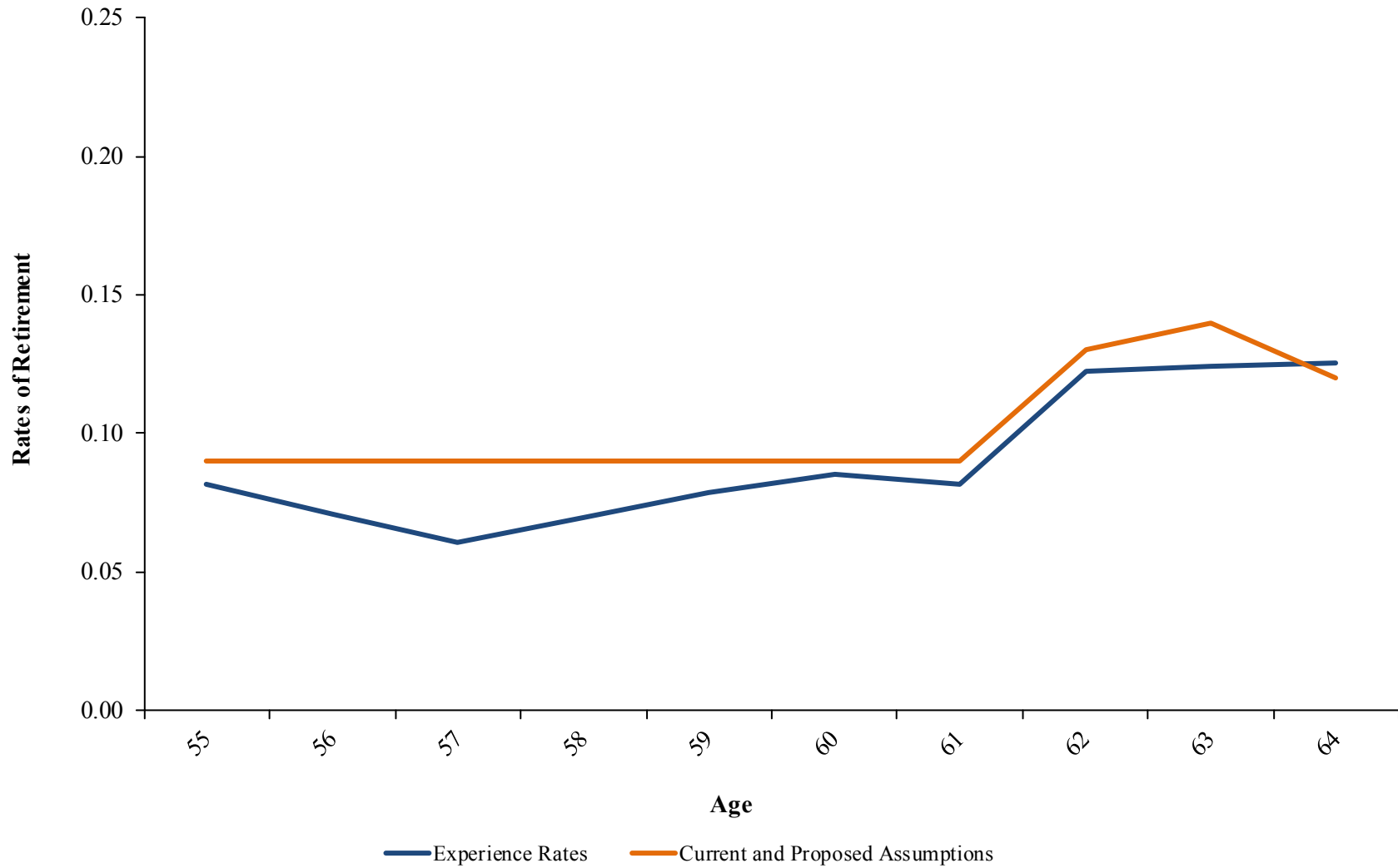
NORMAL AGE-BASED RETIREMENT EXPERIENCE
LOCAL FEMALE MEMBERS – ATTAINING AGE 65 PRIOR TO 30 YEARS OF SERVICE
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates Current	Sample Rates Proposed	Expected Retirements Current	Expected Retirements Proposed
65	1,187	4,918	0.2414	0.2000	0.2000	984	984
66	846	3,584	0.2360	0.2000	0.2000	717	717
67	572	2,655	0.2154	0.2000	0.2000	531	531
68	394	2,051	0.1921	0.1700	0.1700	349	349
69	321	1,585	0.2025	0.1700	0.1700	269	269
70	271	1,244	0.2178	0.1700	0.1700	211	211
71	203	1,026	0.1979	0.1700	0.1700	174	174
72	171	886	0.1930	0.1700	0.1700	151	151
73	145	746	0.1944	0.1700	0.1700	127	127
74	119	606	0.1964	0.1700	0.1700	103	103
75	91	493	0.1846	0.1700	0.1700	84	84
76	80	410	0.1951	0.1700	0.1700	70	70
77	63	330	0.1909	0.1700	0.1700	56	56
78	42	258	0.1628	0.1700	0.1700	44	44
79	45	224	0.2009	0.2200	0.2200	49	49
80	37	168	0.2202	0.2200	0.2200	37	37
81	23	139	0.1655	0.2200	0.2200	31	31
82	25	116	0.2155	0.2200	0.2200	26	26
83	17	82	0.2073	0.2200	0.2200	18	18
84	26	81	0.3210	0.2200	0.2200	18	18
85	52	73	0.7123	1.0000	1.0000	73	73
Totals	4,730	21,675	0.2182			4,122	4,122

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
2011-2015
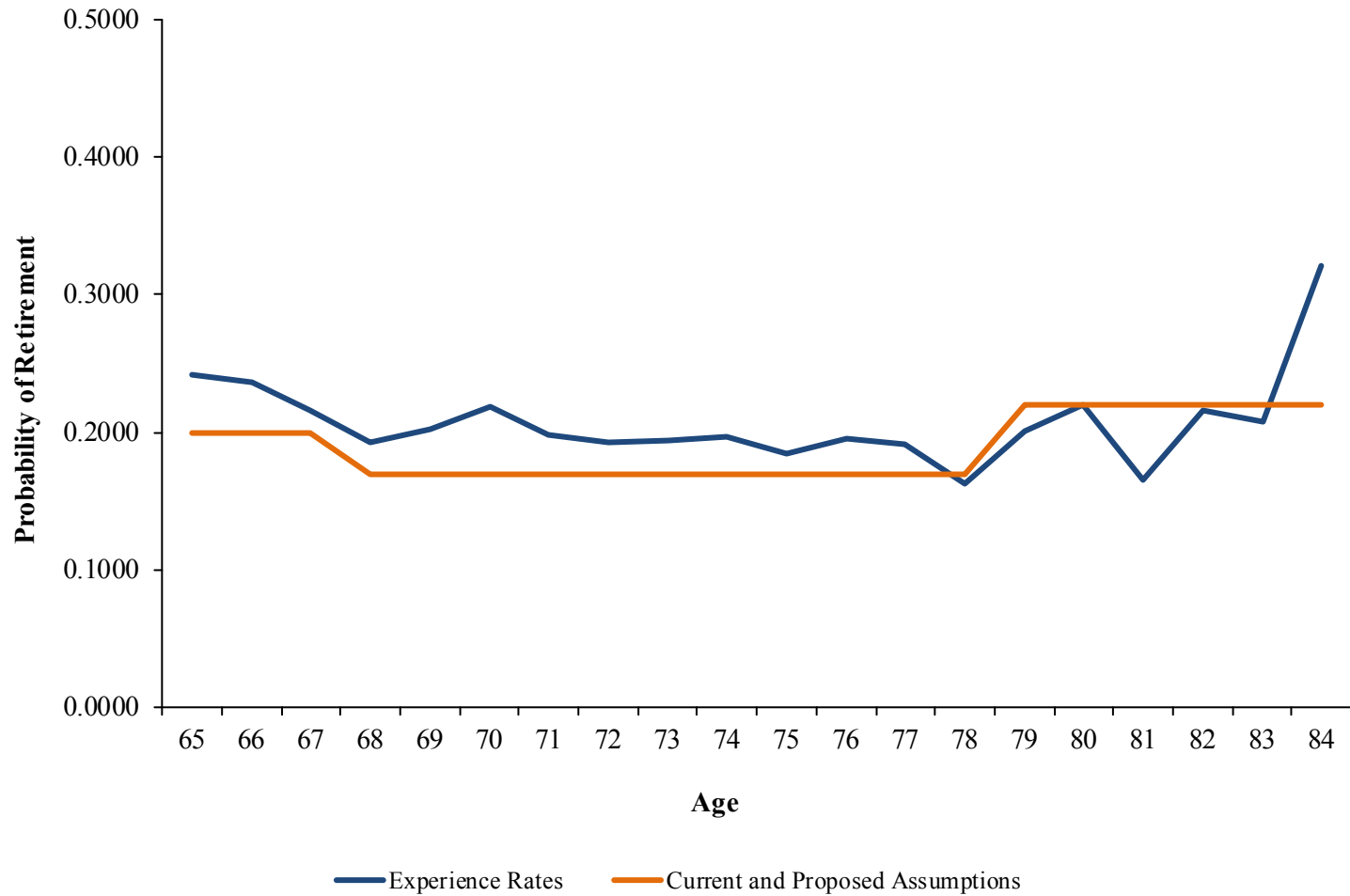
NORMAL SERVICE-BASED RETIREMENT EXPERIENCE
LOCAL FEMALE MEMBERS – ATTAINING 30 YEARS OF SERVICE PRIOR TO AGE 65
2011-2015

Service	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
30	1,672	4,066	0.4112	0.3500	0.3500	1,423	1,423
31	806	2,414	0.3339	0.3000	0.3000	724	724
32	448	1,684	0.2660	0.2400	0.2400	404	404
33	319	1,269	0.2514	0.2400	0.2400	305	305
34	251	1,026	0.2446	0.2400	0.2400	246	246
35	209	810	0.2580	0.2400	0.2400	194	194
36	152	605	0.2512	0.2400	0.2400	145	145
37	108	413	0.2615	0.2400	0.2400	99	99
38	73	296	0.2466	0.2400	0.2400	71	71
39	37	209	0.1770	0.2400	0.2400	50	50
40	33	157	0.2102	0.2400	0.2400	38	38
41	23	109	0.2110	0.2400	0.2400	26	26
42	16	79	0.2025	0.2400	0.2400	19	19
43	12	43	0.2791	0.2000	0.2000	9	9
44	10	35	0.2857	0.2000	0.2000	7	7
45	4	21	0.1905	0.2000	0.2000	4	4
46	4	17	0.2353	0.2000	0.2000	3	3
47	4	14	0.2857	0.2000	0.2000	3	3
48	2	13	0.1538	0.2000	0.2000	3	3
49	7	40	0.1750	0.2000	0.2000	8	8
50	-	-	N/A	1.0000	1.0000	-	-
Totals	4,190	13,320	0.3146			3,781	3,781

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 251 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
2011-2015

EARLY RETIREMENT EXPERIENCE
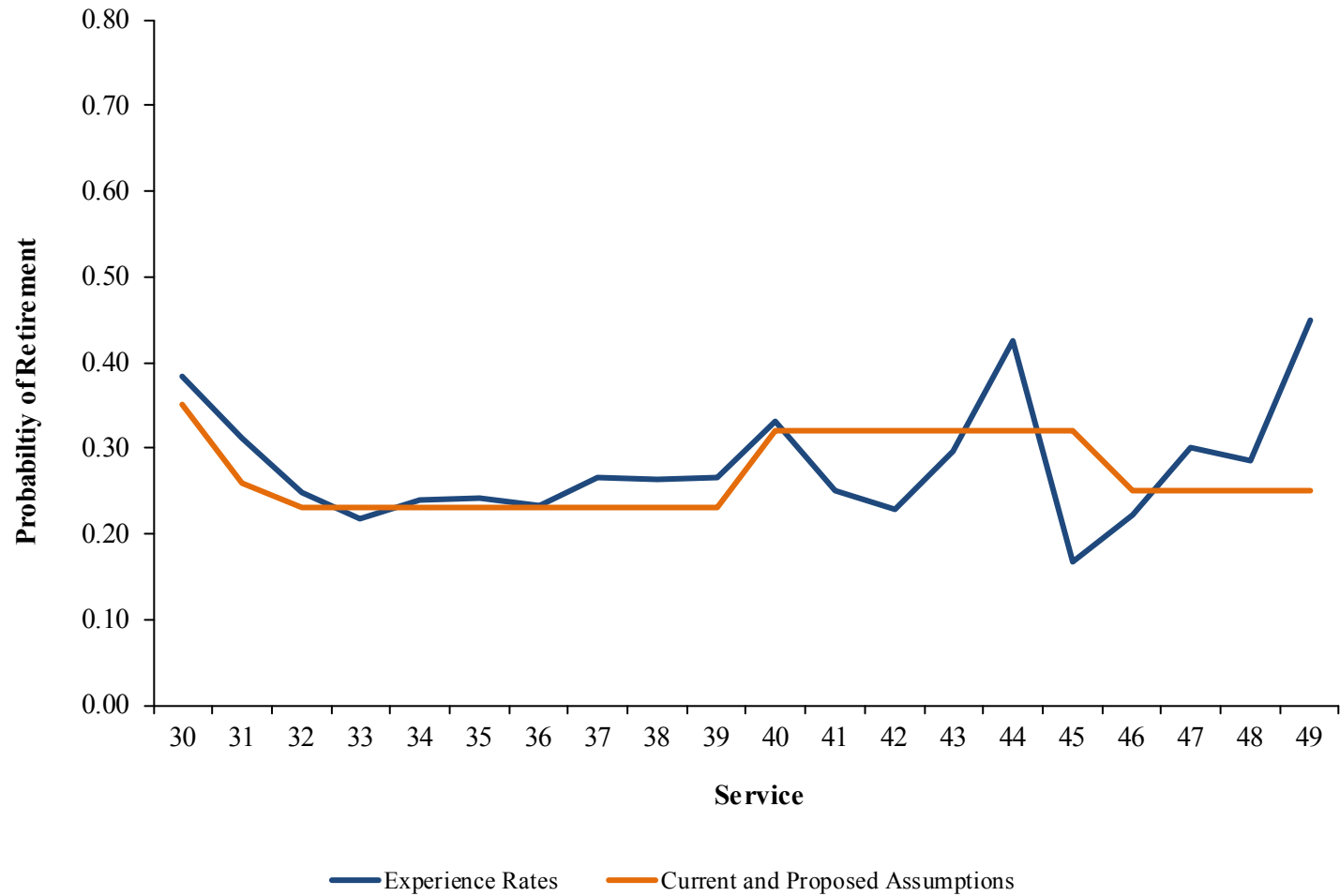## LOCAL FEMALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
55	188	1,857	0.1012	0.1100	0.1100	204	204
56	151	1,703	0.0887	0.1100	0.1100	187	187
57	148	1,599	0.0926	0.1100	0.1100	176	176
58	156	1,535	0.1016	0.1100	0.1100	169	169
59	165	1,524	0.1083	0.1100	0.1100	168	168
60	1,271	10,441	0.1217	0.1100	0.1100	1,149	1,149
61	903	8,963	0.1007	0.1200	0.1200	1,076	1,076
62	1,092	7,862	0.1389	0.1300	0.1300	1,022	1,022
63	889	6,733	0.1320	0.1400	0.1400	943	943
64	848	5,912	0.1434	0.1500	0.1500	887	887
Totals	5,811	48,129	0.1207	0.1243	0.1243	5,981	5,981

2006-2010 Experience Study	0.1206
2001-2005 Experience Study	0.1218

EARLY RETIREMENT EXPERIENCE
LOCAL FEMALE MEMBERS
2011-2015
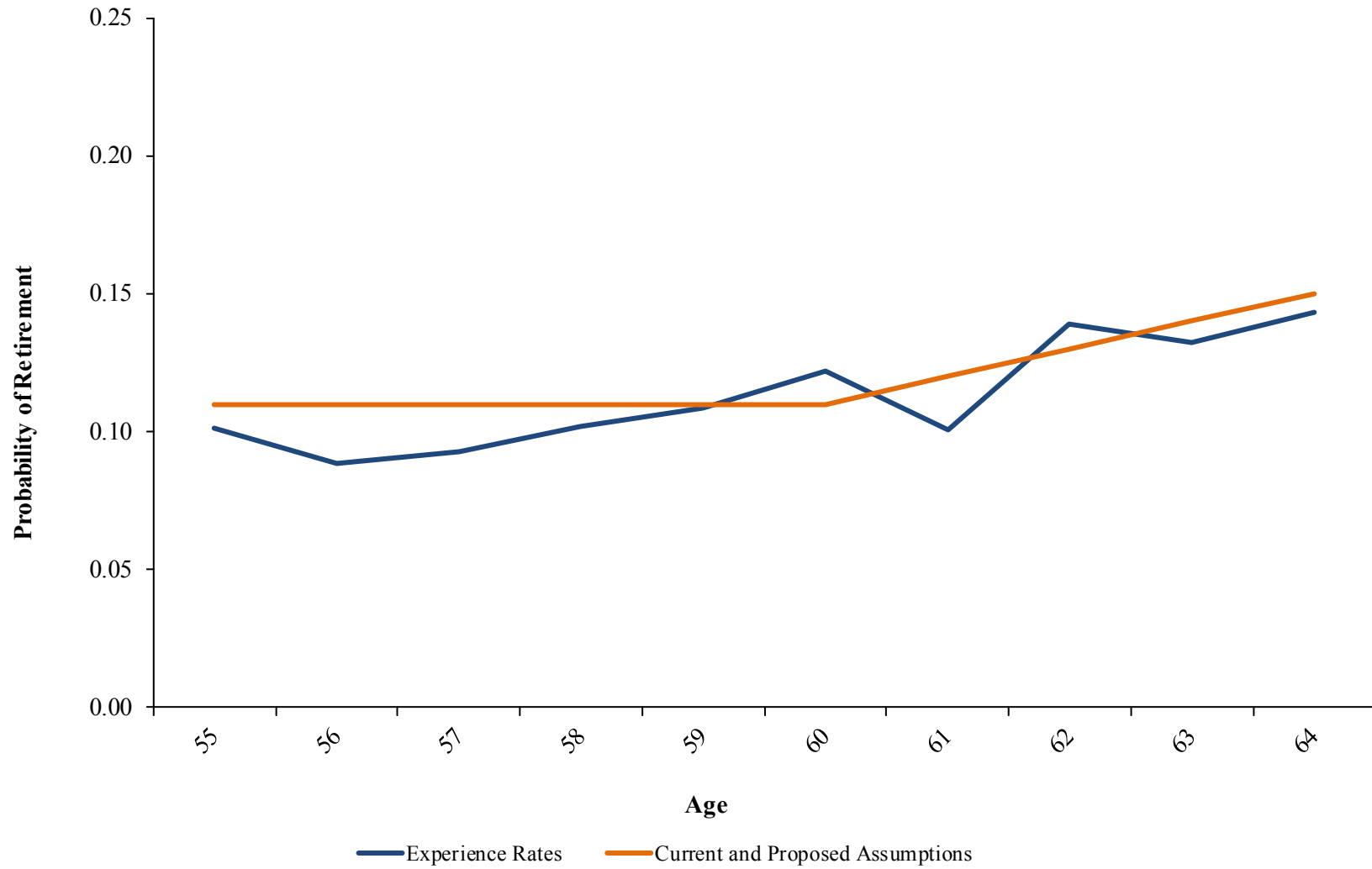
Experience Rates — Current and Proposed Assumptions

NORMAL RETIREMENT EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates Current	Proposed	Expected Retirements Current	Proposed
52	-	1	0.0000	0.3000	0.3000	-	-
53	-	-	N\A	0.3000	0.3000	-	-
54	-	-	N\A	0.2500	0.2500	-	-
55	-	-	N\A	0.2500	0.2500	-	-
56	-	1	0.0000	0.2500	0.2500	-	-
57	-	1	0.0000	0.2500	0.2500	-	-
58	-	1	0.0000	0.2000	0.2000	-	-
59	-	1	0.0000	0.2000	0.2000	-	-
60	-	-	N\A	0.3500	0.3500	-	-
61	-	-	N\A	0.3500	0.3500	-	-
62	2	2	1.0000	0.3500	0.3500	1	1
63	-	-	N\A	0.3500	0.3500	-	-
64	-	-	N\A	0.3500	0.3500	-	-
65	-	-	N\A	0.3500	0.3500	-	-
66	-	-	N\A	0.3500	0.3500	-	-
67	-	-	N\A	0.3500	0.3500	-	-
68	-	-	N\A	0.3500	0.3500	-	-
69	-	-	N\A	0.3500	0.3500	-	-
70	-	-	N\A	1.0000	1.0000	-	-
71	-	-	N\A	1.0000	1.0000	-	-
72	-	1	0.0000	1.0000	1.0000	1	1
73	-	1	0.0000	1.0000	1.0000	1	1
74	-	-	N\A	1.0000	1.0000	-	-
75 & Over	-	-	N\A	1.0000	1.0000	-	-
Totals	2	9	0.2222	0.3333	0.3333	3	3

2006-2010 Experience Study   0.3182
2001-2005 Experience Study   0.3264

NORMAL RETIREMENT EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015
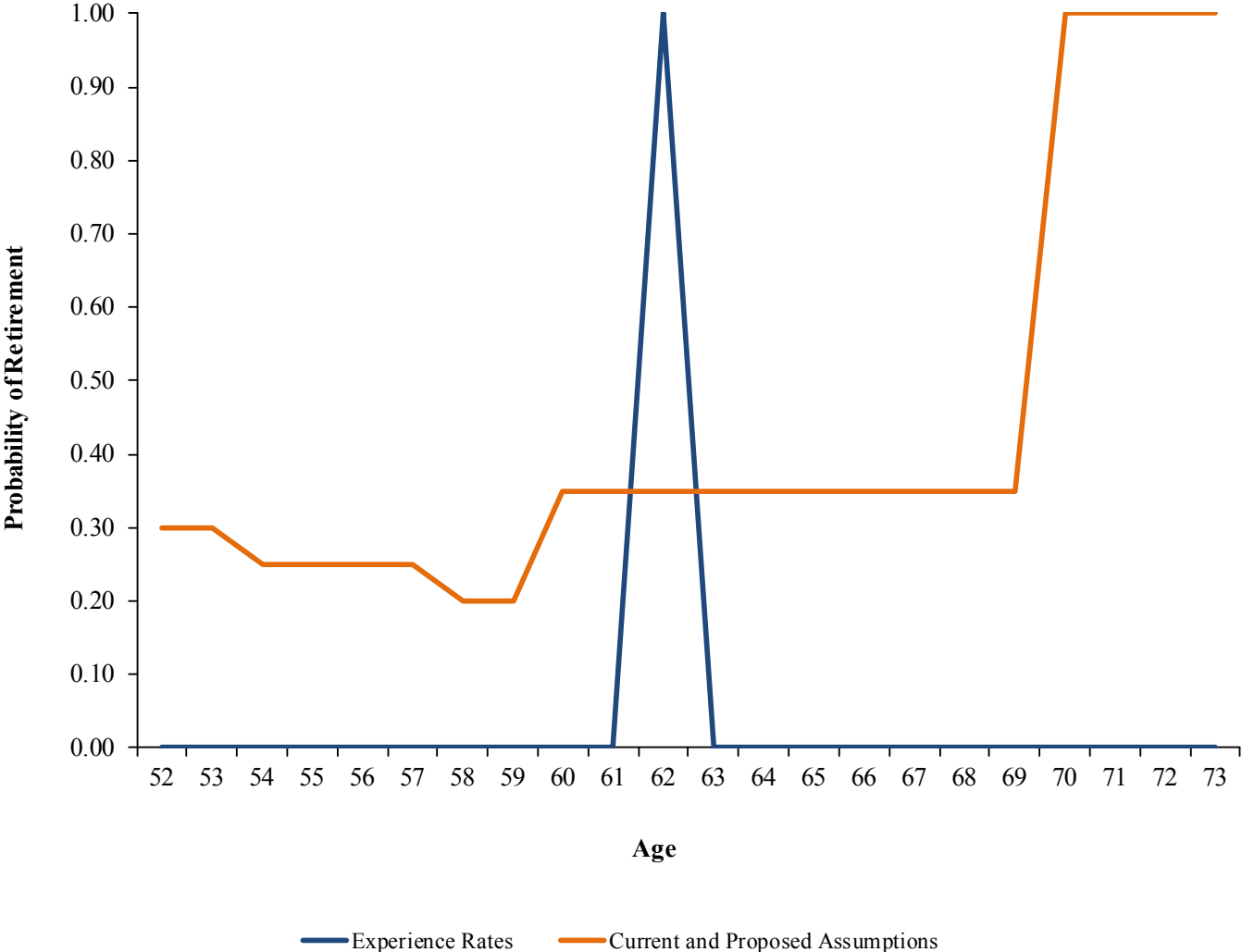
EARLY RETIREMENT EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
48	-	1	0.0000	0.0800	0.0800	-	0
49	-	1	0.0000	0.0800	0.0800	-	0
50	-	-	N\A	0.0800	0.0800	-	-
51	1	1	1.0000	0.0800	0.0800	-	0
Totals	1	3	0.3333	0.0000	0.0800	-	0

2006-2010 Experience Study   0.0000
2001-2005 Experience Study   0.2009

EARLY RETIREMENT EXPERIENCE
PUBLIC SAFETY MALE MEMBERS
2011-2015
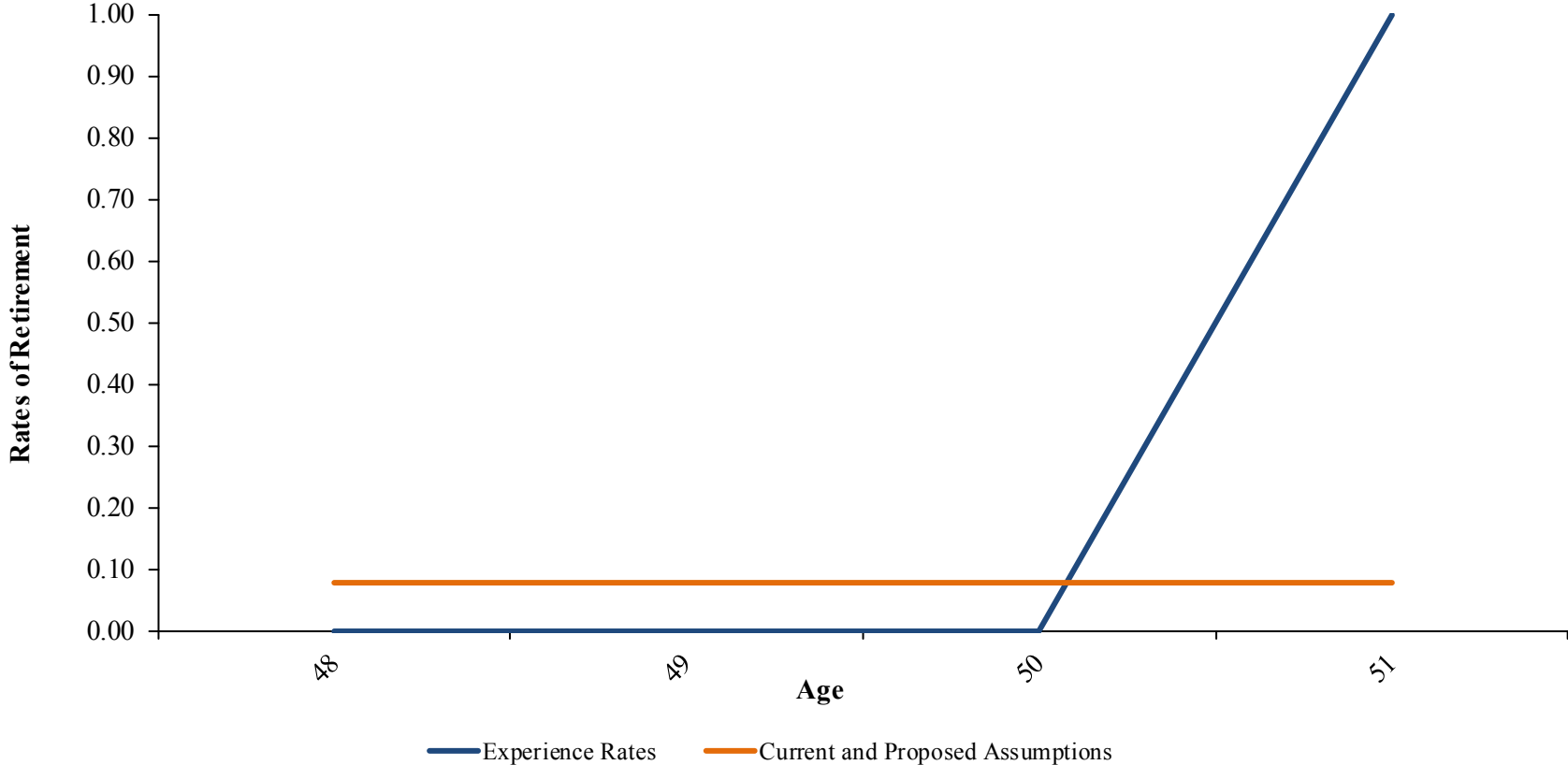
NORMAL RETIREMENT EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates Current	Sample Rates Proposed	Expected Retirements Current	Expected Retirements Proposed
52	0	1	0.0010	0.3000	0.3000	-	-
53	-	1	0.0000	0.3000	0.3000	-	-
54	-	1	0.0000	0.2500	0.2500	-	-
55	-	-	N\A	0.2500	0.2500	-	-
56	-	-	N\A	0.2500	0.2500	-	-
57	-	-	N\A	0.2500	0.2500	-	-
58	-	-	N\A	0.2000	0.2000	-	-
59	-	-	N\A	0.2000	0.2000	-	-
60	-	-	N\A	0.3500	0.3500	-	-
61	-	-	N\A	0.3500	0.3500	-	-
62	-	-	N\A	0.3500	0.3500	-	-
63	-	-	N\A	0.3500	0.3500	-	-
64	-	-	N\A	0.3500	0.3500	-	-
65	-	-	N\A	0.3500	0.3500	-	-
66	-	-	N\A	0.3500	0.3500	-	-
67	-	-	N\A	0.3500	0.3500	-	-
68	-	-	N\A	0.3500	0.3500	-	-
69	-	-	N\A	0.3500	0.3500	-	-
70	-	-	N\A	1.0000	1.0000	-	-
71	-	-	N\A	1.0000	1.0000	-	-
72	-	-	N\A	1.0000	1.0000	-	-
73	-	-	N\A	1.0000	1.0000	-	-
74	-	-	N\A	1.0000	1.0000	-	-
75 & Over	-	-	N\A	1.0000	1.0000	-	-
Totals	0	3	0.0003	0.0000	0.0000	-	-

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

NORMAL RETIREMENT EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

Experience Rates — Current and Proposed Assumptions

EARLY RETIREMENT EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
48	-	-	N\A	0.0800	0.0800	-	-
49	-	-	N\A	0.0800	0.0800	-	-
50	-	-	N\A	0.0800	0.0800	-	-
51	-	-	N\A	0.0800	0.0800	-	-
Totals	-	-	N\A	N/A	N/A	-	-

2006-2010 Experience Study   N/A
2001-2005 Experience Study   0.0000

EARLY RETIREMENT EXPERIENCE
PUBLIC SAFETY FEMALE MEMBERS
2011-2015
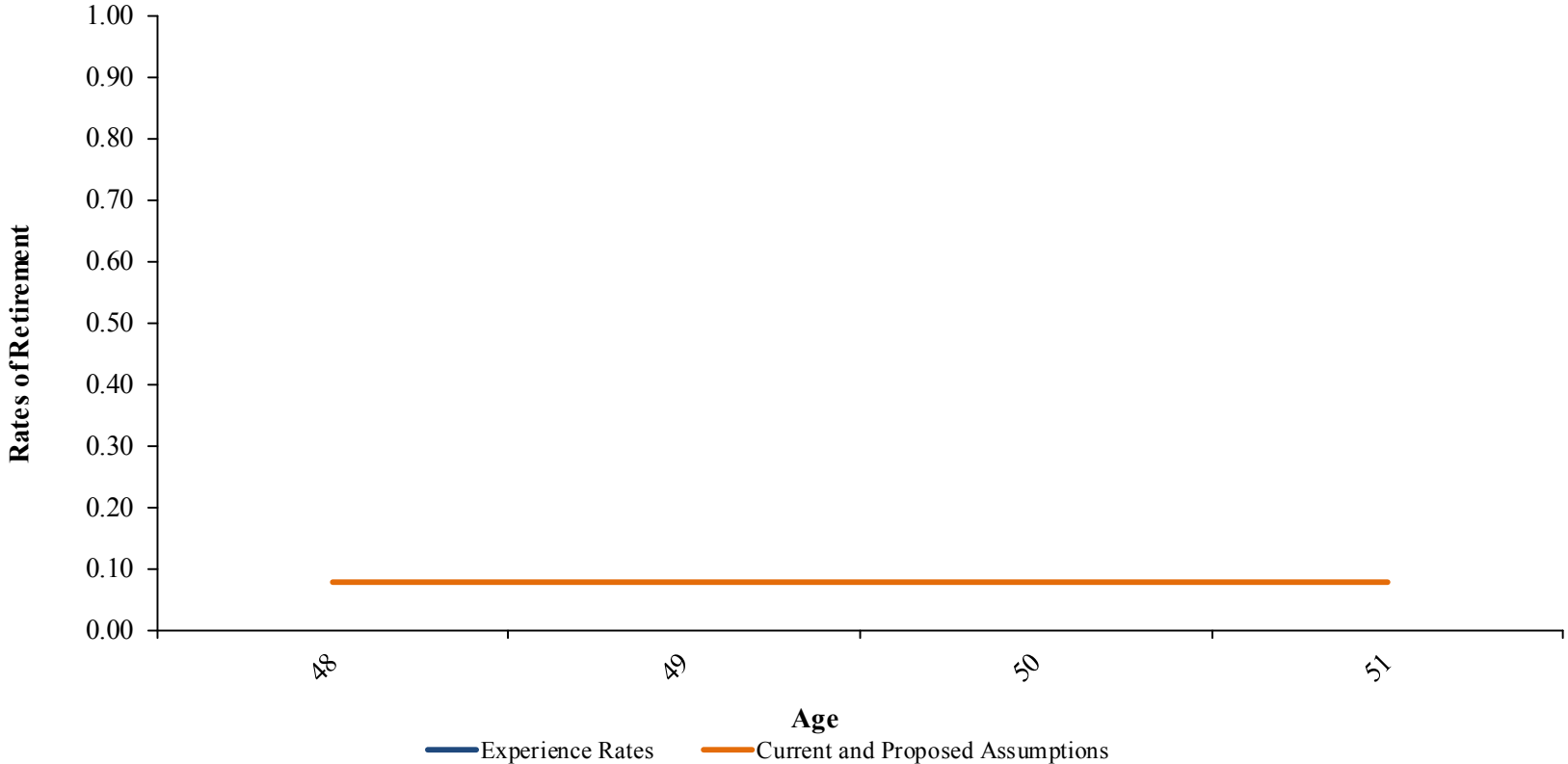
NORMAL RETIREMENT EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
48	83	297	0.2795	0.2000	0.2000	59	59
49	68	294	0.2313	0.2000	0.2000	59	59
50	70	291	0.2405	0.2000	0.2000	58	58
51	62	282	0.2199	0.2000	0.2000	56	56
52	83	281	0.2954	0.2000	0.2000	56	56
53	63	266	0.2368	0.2000	0.2000	53	53
54	68	247	0.2753	0.2000	0.2000	49	49
55	49	214	0.2290	0.2000	0.2000	43	43
56	54	197	0.2741	0.2300	0.2300	45	45
57	47	187	0.2513	0.2300	0.2300	43	43
58	44	156	0.2821	0.2500	0.2500	39	39
59	30	122	0.2459	0.2500	0.2500	31	31
60	33	103	0.3204	0.3000	0.3000	31	31
61	41	90	0.4556	0.2500	0.2500	23	23
62	28	133	0.2105	0.2500	0.2500	33	33
63	21	96	0.2188	0.2500	0.2500	24	24
64	19	75	0.2533	0.2500	0.2500	19	19
65	19	48	0.3958	0.2500	0.2500	12	12
66	16	38	0.4211	0.2500	0.2500	10	10
67	9	30	0.3000	0.2500	0.2500	8	8
68	6	14	0.4286	0.2500	0.2500	4	4
69	4	11	0.3636	0.2500	0.2500	3	3
70	2	7	0.2857	1.0000	1.0000	7	7
71	-	2	0.0000	1.0000	1.0000	2	2
72	2	4	0.5000	1.0000	1.0000	4	4
73	2	5	0.4000	1.0000	1.0000	5	5
74	2	3	0.6667	1.0000	1.0000	3	3
75 & Over	2	1	2.0000	1.0000	1.0000	1	1
Totals	927	3,494	0.2653	0.2232	0.2232	780	780

2006-2010 Experience Study	0.2169
2001-2005 Experience Study	0.2259

Not included in the Law Enforcement Male retirements listed in the above chart are two 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 RETIREMENT EXPERIENCE
LAW ENFORCEMENT MALE MEMBERS
2011-2015
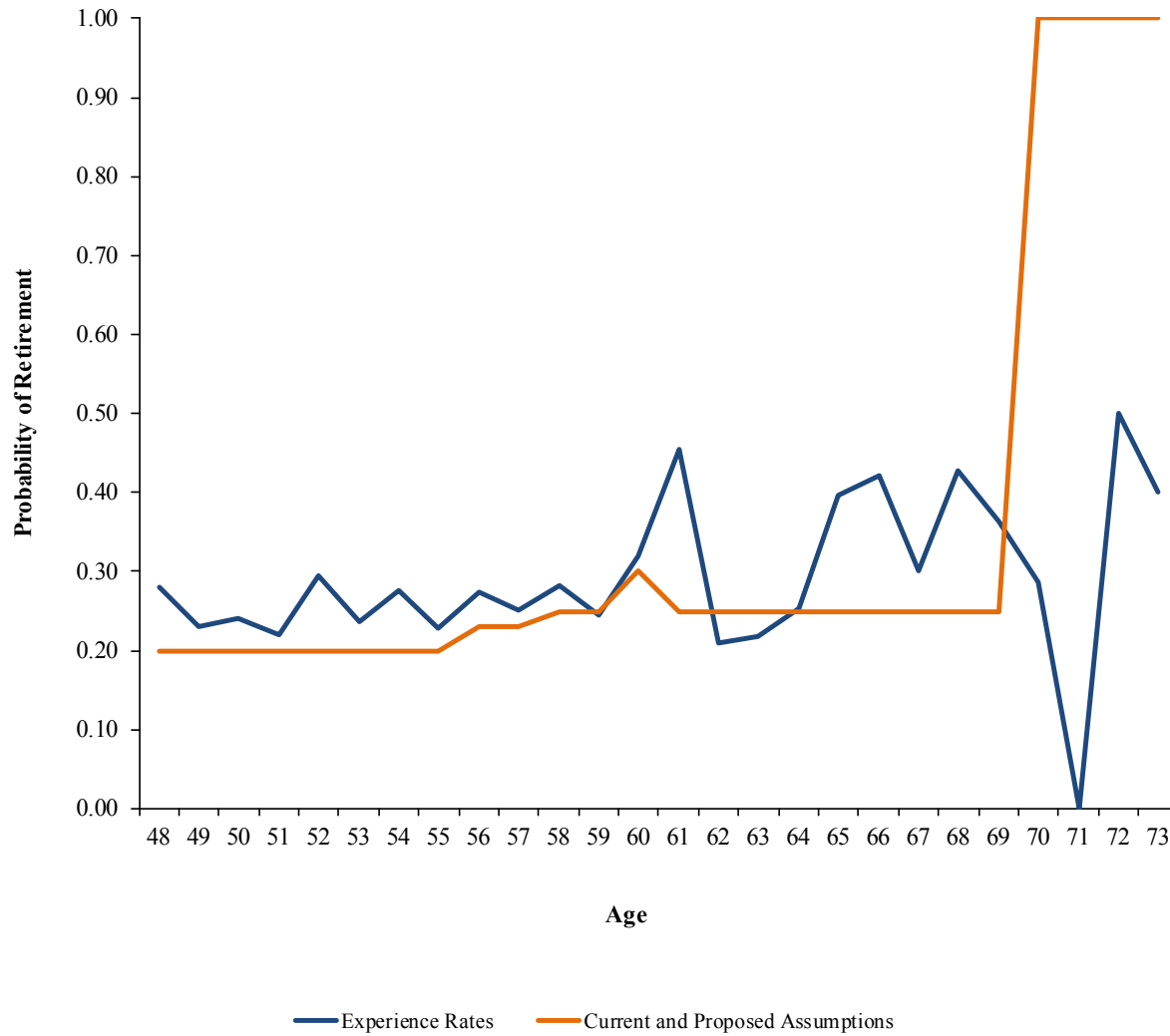
NORMAL RETIREMENT EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

Age	Retirements	Exposure	Experience Rates	Sample Rates		Expected Retirements	
				Current	Proposed	Current	Proposed
48	7	27	0.2593	0.2000	0.2000	5	5
49	5	29	0.1724	0.2000	0.2000	6	6
50	9	36	0.2500	0.2000	0.2000	7	7
51	6	29	0.2069	0.2000	0.2000	6	6
52	12	31	0.3871	0.2000	0.2000	6	6
53	8	25	0.3200	0.2000	0.2000	5	5
54	6	25	0.2400	0.2000	0.2000	5	5
55	11	25	0.4400	0.2000	0.2000	5	5
56	2	27	0.0741	0.2300	0.2300	6	6
57	8	27	0.2963	0.2300	0.2300	6	6
58	9	24	0.3750	0.2500	0.2500	6	6
59	3	13	0.2308	0.2500	0.2500	3	3
60	5	14	0.3571	0.3000	0.3000	4	4
61	2	5	0.4000	0.2500	0.2500	1	1
62	9	20	0.4500	0.2500	0.2500	5	5
63	4	17	0.2353	0.2500	0.2500	4	4
64	2	10	0.2000	0.2500	0.2500	3	3
65	2	5	0.4000	0.2500	0.2500	1	1
66	-	3	0.0000	0.2500	0.2500	1	1
67	1	4	0.2500	0.2500	0.2500	1	1
68	1	2	0.5000	0.2500	0.2500	1	1
69	1	1	1.0000	0.2500	0.2500	-	-
70	-	-	N\A	1.0000	1.0000	-	-
71	-	-	N\A	1.0000	1.0000	-	-
72	-	-	N\A	1.0000	1.0000	-	-
73	-	-	N\A	1.0000	1.0000	-	-
74	-	-	N\A	1.0000	1.0000	-	-
75 & Over	-	-	N\A	1.0000	1.0000	-	-
Totals	113	399	0.2832	0.2180	0.2180	87	87

2006-2010 Experience Study   0.2023
2001-2005 Experience Study   0.2133

NORMAL RETIREMENT EXPERIENCE
LAW ENFORCEMENT FEMALE MEMBERS
2011-2015

Legend: Experience Rates, Current and Proposed Assumptions
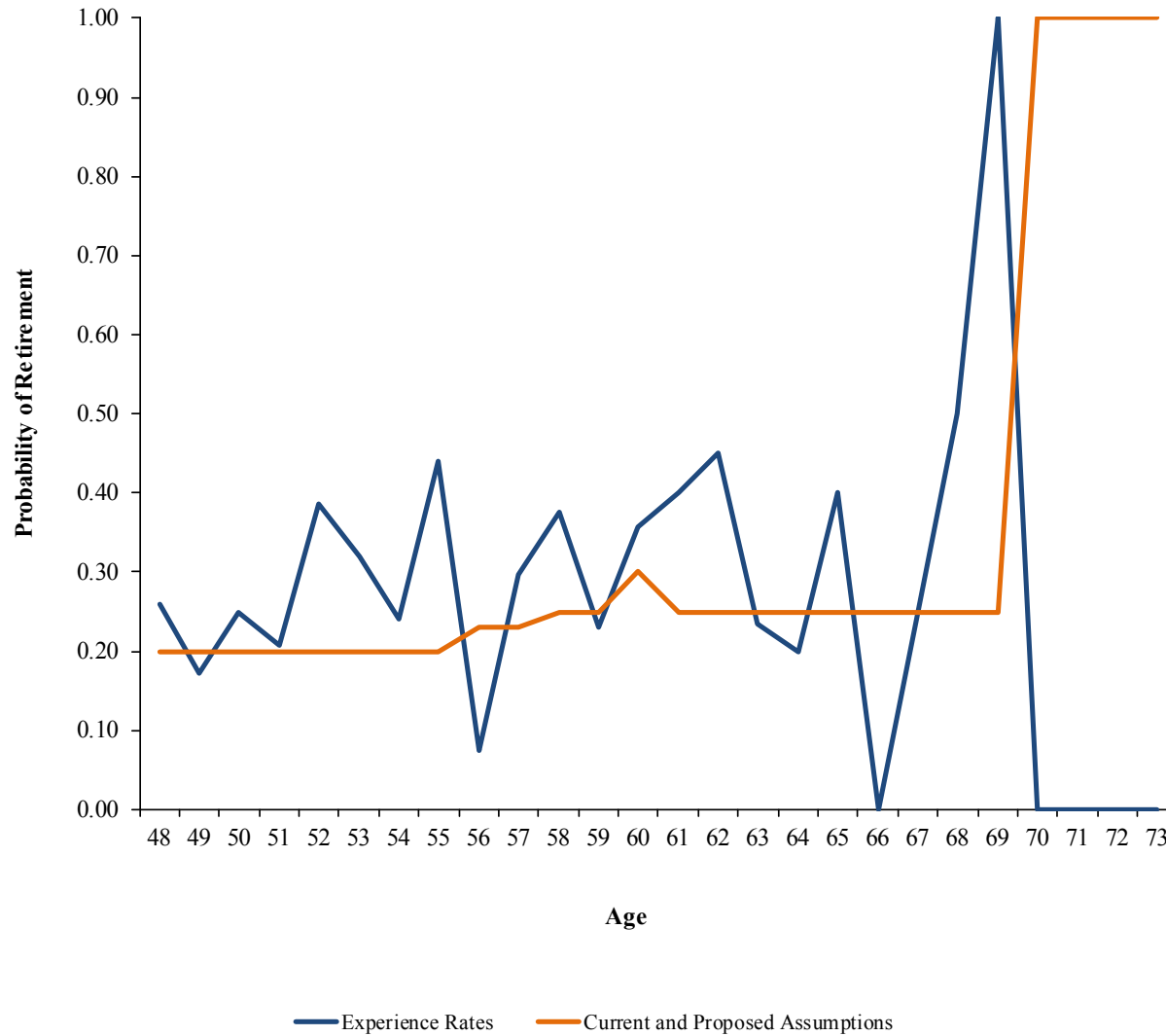
MORTALITY EXPERIENCE

DEATH-IN-SERVICE EXPERIENCE
MALE MEMBERS
2011-2015

Age	Deaths	Exposure	Experience Rates	Sample Rates*		Expected Deaths	
				Current	Proposed	Current	Proposed
20-24	16	1,007	0.0159	0.0003	0.0006	-	1
25-29	16	12,665	0.0013	0.0003	0.0005	4	6
30-34	31	33,414	0.0009	0.0005	0.0005	17	17
35-39	39	45,999	0.0008	0.0008	0.0006	38	29
40-44	66	63,786	0.0010	0.0011	0.0009	71	58
45-49	102	76,446	0.0013	0.0016	0.0016	121	115
50-54	192	85,678	0.0022	0.0024	0.0025	206	202
55-59	239	75,626	0.0032	0.0042	0.0036	320	271
60-64	228	50,442	0.0045	0.0079	0.0065	390	317
65-69	170	19,228	0.0088	0.0145	0.0123	265	220
70-74	95	7,024	0.0135	0.0246	0.0215	169	143
Totals	1,194	471,315	0.0025	0.0034	0.0029	1,601	1,379
Ref				506	2133		

Sample rates are taken from the midpoint of age group.

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

DEATH-IN-SERVICE EXPERIENCE
MALE MEMBERS
2011-2015
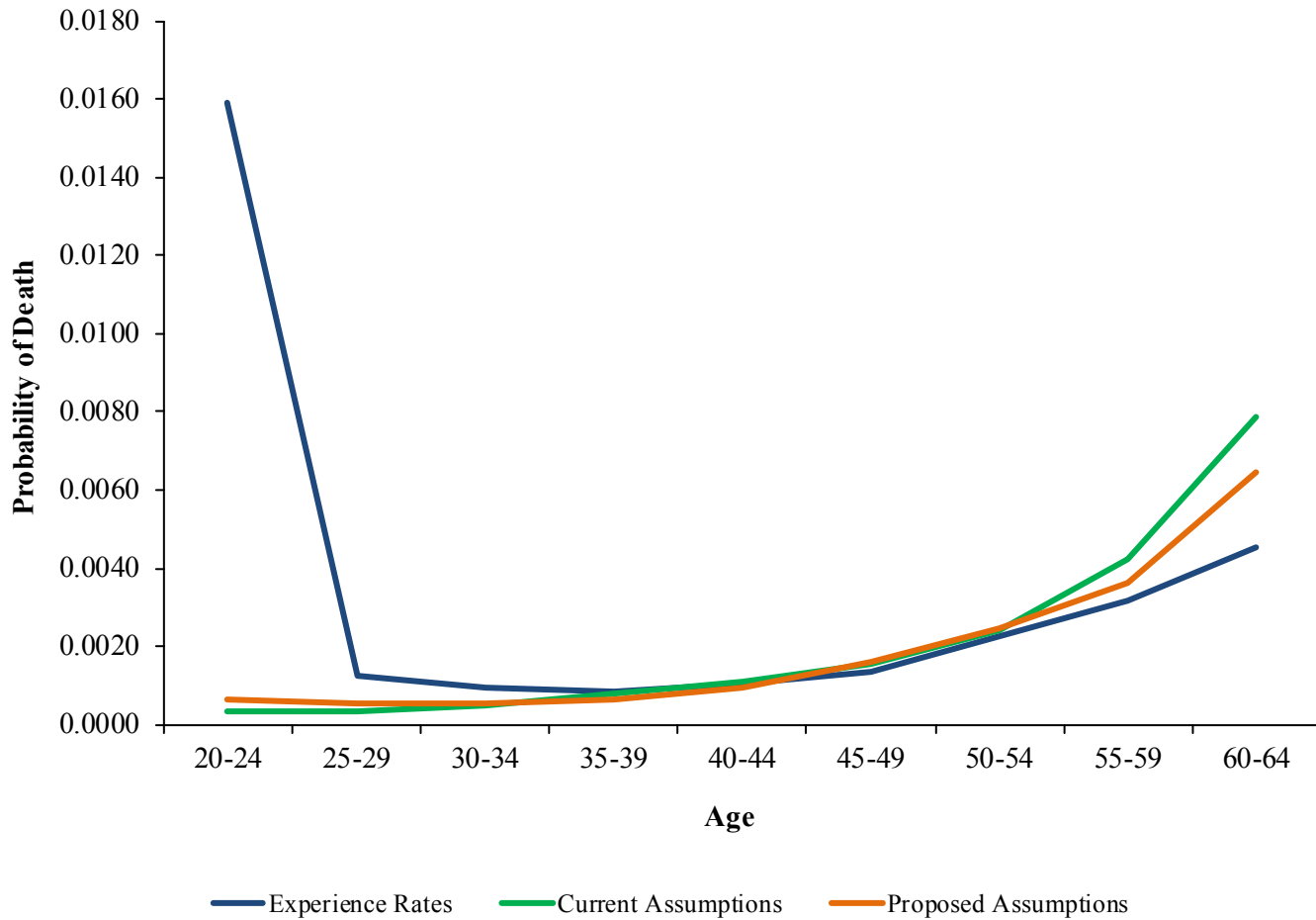
DEATH-IN-SERVICE EXPERIENCE
FEMALE MEMBERS
2011-2015

Age	Deaths	Exposure	Experience Rates	Sample Rates*		Expected Deaths	
				Current	Proposed	Current	Proposed
20-24	6	1,283	0.0047	0.0001	0.0002	-	-
25-29	7	13,238	0.0005	0.0001	0.0002	2	3
30-34	15	38,002	0.0004	0.0002	0.0002	9	9
35-39	22	51,452	0.0004	0.0003	0.0003	17	19
40-44	39	68,399	0.0006	0.0005	0.0005	33	40
45-49	66	84,033	0.0008	0.0007	0.0008	59	77
50-54	127	99,538	0.0013	0.0011	0.0013	116	135
55-59	152	92,802	0.0016	0.0024	0.0021	217	195
60-64	135	60,934	0.0022	0.0045	0.0033	268	202
65-69	81	20,896	0.0039	0.0083	0.0053	163	110
70-74	38	5,749	0.0066	0.0137	0.0089	76	53
Totals	688	536,326	0.0013	0.0018	0.0016	960	843
Ref				455	2134		

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

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

DEATH-IN-SERVICE EXPERIENCE
FEMALE MEMBERS
2011-2015

SUMMARY OF MALE MORTALITY EXPERIENCE
SERVICE RETIREES
2011-2015

Age	Deaths	Exposure	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates* Current	Sample Rates* Proposed	Expected Deaths Current	Expected Deaths Proposed
50-54	35	10,573	0.003310	0.002433	0.001870	0.005582	21	60
55-59	169	32,349	0.005224	0.004930	0.003498	0.006856	119	227
60-64	502	60,539	0.008292	0.007259	0.006797	0.009762	435	610
65-69	1,018	68,740	0.014809	0.013234	0.012993	0.015655	880	1,076
70-74	1,340	54,161	0.024741	0.022822	0.021172	0.025474	1,158	1,383
75-79	1,853	43,441	0.042656	0.038726	0.037910	0.041800	1,657	1,815
80-84	2,338	32,353	0.072265	0.066950	0.071969	0.070028	2,304	2,262
85-89	2,434	19,678	0.123691	0.118972	0.126647	0.119940	2,440	2,313
90-94	1,568	7,627	0.205585	0.199463	0.214172	0.201000	1,553	1,465
95-99	443	1,440	0.307639	0.303790	0.302487	0.292792	417	401
100-104	46	107	0.429907	0.436698	0.390269	0.391658	40	40
105-109	2	4	0.500000	0.502474	0.420000	0.476511	2	2
Totals	11,748	331,012	0.035491	0.018019	0.033310	0.035207	11,026	11,654

Sample rates are taken from the midpoint of age group.

SUMMARY OF MALE MORTALITY EXPERIENCE
SERVICE RETIREES
2011-2015

Legend: Experience Rates - Population Weighted — Experience Rates - Liability Weighted — Current Assumptions — Proposed Assumptions

X-axis: Age (50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85-89, 90-94, 95-99)

Y-axis: Probability of Death (0.00 to 0.35)

SUMMARY OF FEMALE MORTALITY EXPERIENCE
SERVICE RETIREES
2011-2015

Age	Deaths	Exposure	Experience Rates (Population)	Experience Rates (Liability)	Sample Rates*		Expected Deaths	
					Current	Proposed	Current	Proposed
50-54	36	10,188	0.003534	0.002938	0.001522	0.003087	17	33
55-59	101	30,210	0.003343	0.003054	0.003146	0.004413	99	137
60-64	395	63,154	0.006255	0.005929	0.006022	0.006950	401	453
65-69	649	78,089	0.008311	0.007953	0.011003	0.011069	860	867
70-74	971	63,718	0.015239	0.015114	0.018322	0.017823	1,163	1,135
75-79	1,375	46,966	0.029276	0.028632	0.029635	0.029009	1,380	1,360
80-84	1,789	34,809	0.051395	0.051061	0.048916	0.049474	1,711	1,729
85-89	2,363	24,931	0.094782	0.093182	0.088916	0.087657	2,176	2,160
90-94	1,938	12,069	0.160577	0.158957	0.148426	0.150907	1,743	1,760
95-99	892	3,432	0.259907	0.250167	0.210976	0.233777	691	764
100-104	168	461	0.364425	0.355503	0.254498	0.332471	113	144
105-109	16	32	0.500000	0.560994	0.322725	0.427600	10	13
Totals	10,693	368,059	0.029052	0.013844	0.028159	0.028677	10,364	10,555

Sample rates are taken from the midpoint of age group.

SUMMARY OF FEMALE MORTALITY EXPERIENCE
SERVICE RETIREES
2011-2015

Legend: Experience Rates - Population Weighted — Experience Rates - Liability Weighted — Current Assumptions — Proposed Assumptions
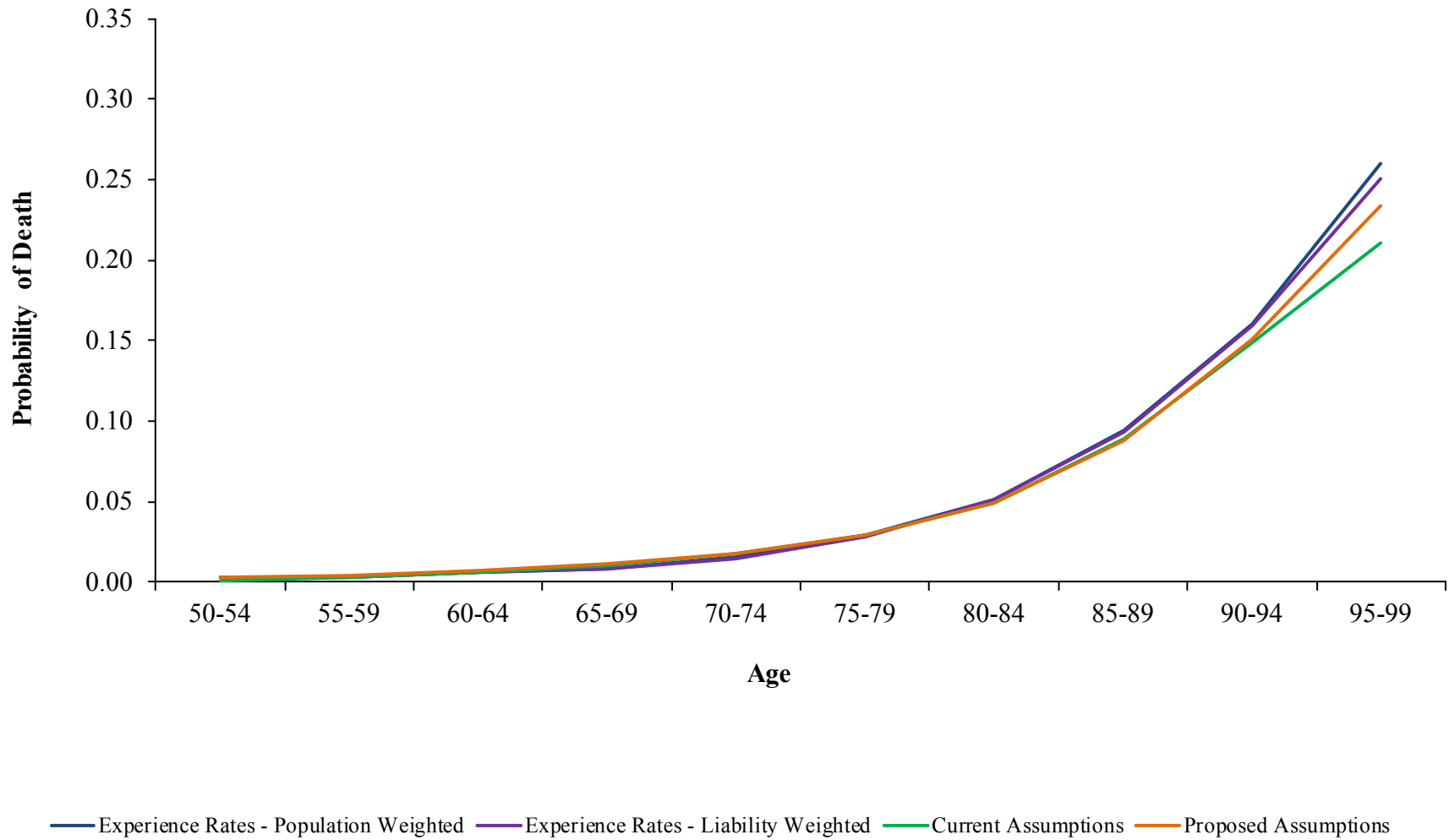
SUMMARY OF MALE MORTALITY EXPERIENCE
DISABILITY RETIREES
2011-2015

Age	Deaths	Exposure	Experience Rates	Sample Rates*		Expected Deaths	
				Current	Proposed	Current	Proposed
40-44	11	1,780	0.006180	0.008940	0.018721	16	35
45-49	34	4,528	0.007509	0.012761	0.023950	60	109
50-54	87	9,032	0.009632	0.018596	0.025627	171	231
55-59	193	12,853	0.015016	0.024922	0.025989	322	337
60-64	239	12,708	0.018807	0.031920	0.031215	406	398
65-69	245	8,826	0.027759	0.042402	0.041930	371	366
70-74	183	4,650	0.039355	0.058674	0.057131	270	263
75-79	138	2,695	0.051206	0.081352	0.079099	217	211
80-84	108	1,369	0.078890	0.112553	0.112417	152	151
85-89	72	555	0.129730	0.157166	0.165439	85	89
90-94	29	149	0.194631	0.219359	0.242633	31	35
95-99	4	13	0.307692	0.277664	0.319444	3	4
Totals	1,343	59,158	0.022702	0.035566	0.037679	2,104	2,229

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

SUMMARY OF MALE MORTALITY EXPERIENCE
DISABILITY RETIREES
2011-2015
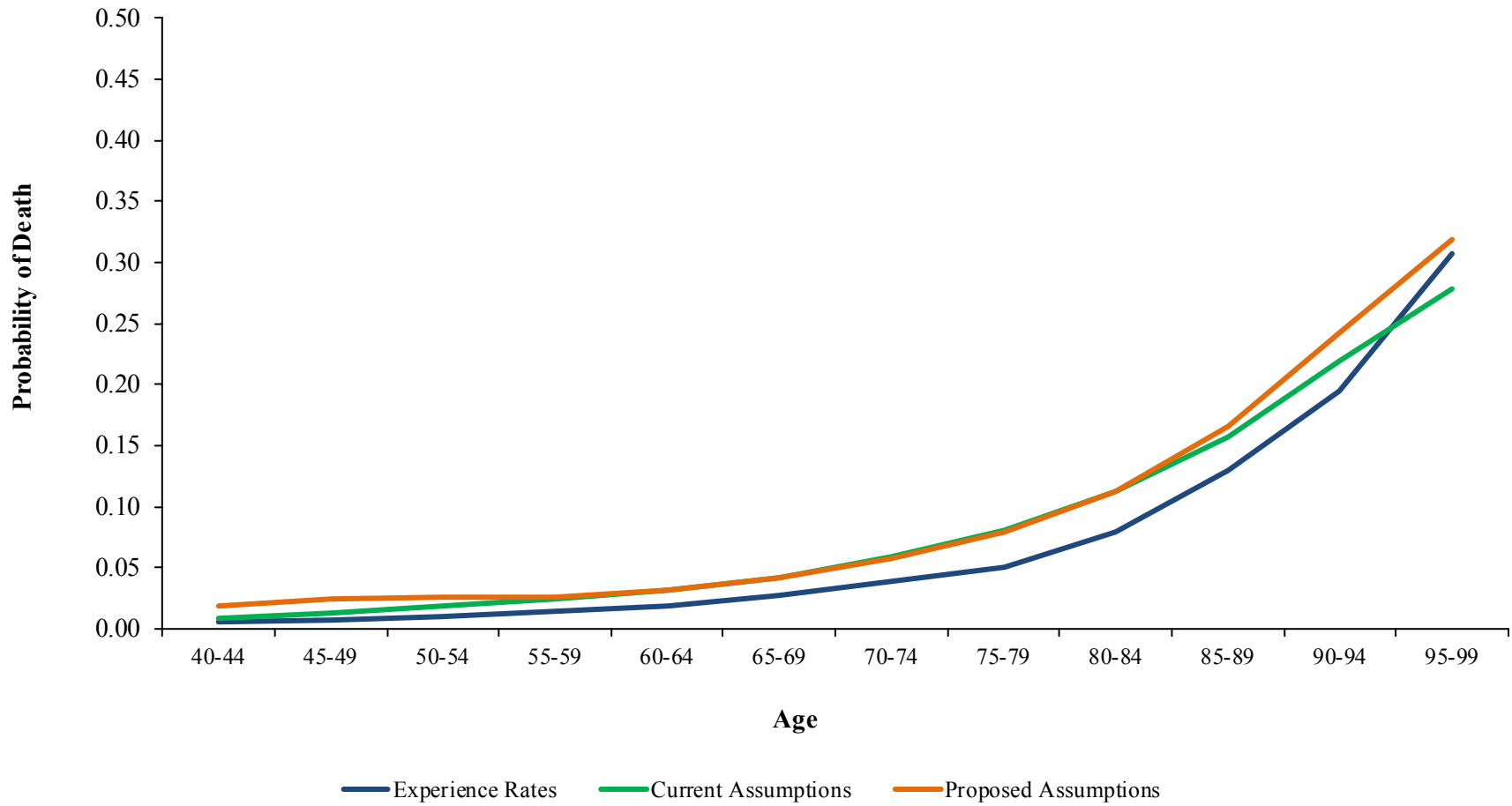
SUMMARY OF FEMALE MORTALITY EXPERIENCE
DISABILITY RETIREES
2011-2015

Age	Deaths	Exposure	Experience Rates	Sample Rates*		Expected Deaths	
				Current	Proposed	Current	Proposed
40-54	13	1,518	0.008564	0.007450	0.008486	11	13
45-59	32	4,009	0.007982	0.008959	0.010757	37	44
50-54	85	7,861	0.010813	0.013456	0.013106	108	104
55-59	164	11,861	0.013827	0.018654	0.016508	223	197
60-64	202	12,928	0.015625	0.024080	0.020628	312	267
65-69	238	9,260	0.025702	0.031325	0.026591	288	245
70-74	214	5,450	0.039266	0.042851	0.037200	231	201
75-79	168	2,857	0.058803	0.059545	0.054579	168	154
80-84	137	1,676	0.081742	0.082298	0.081804	137	136
85-89	102	845	0.120710	0.114512	0.121673	94	100
90-94	38	233	0.163090	0.159924	0.175685	37	40
95-99	10	53	0.188679	0.215240	0.248400	11	13
Totals	1,403	58,551	0.023962	0.028300	0.025858	1,657	1,514

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

SUMMARY OF FEMALE MORTALITY EXPERIENCE
DISABILITY RETIREES
2011-2015
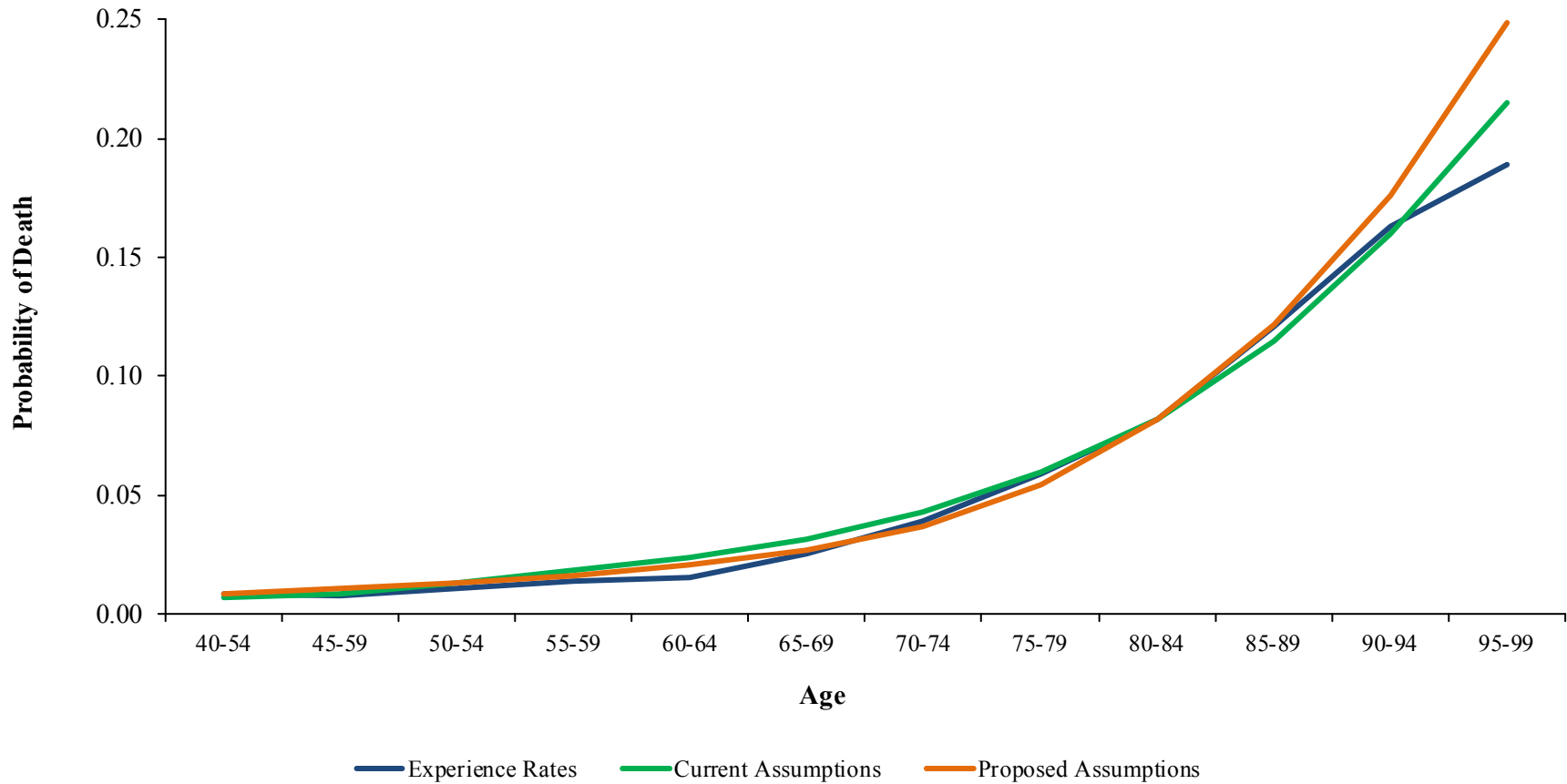
MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

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.

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 (0.80)% factor is applied to State active member liabilities (other than for refunds) and a (1.00)% 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 E-3)**

Miscellaneous Loads:

- A load of approximately 0.35% 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 E-3)**
- A load of approximately 1% of Combined Plan payroll is included in the Combined Plan computed normal cost to recognize expected administrative expenses.
- Approximately $3 million was added to the Combined Plan actuarial accrued liability to reflect assumed future transfers out of Combined Plan assets to repay start-up loans.

Transition Groups Under Senate Bill #343:

A member's transition group (i.e., Group A, Group B, or Group C) was determined as of the valuation date based upon the assumption (for transition group determination only) that active members would continue in active service.

Cost-of-Living Adjustments:

For individuals retiring after January 7, 2013, cost-of-living adjustments were assumed to be 3% for calendar years 2013 through 2018 and 2.8% thereafter.

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.

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.

Part-Time Service Credit Accrual

It is assumed active members will accrue 1 full year of service per additional year active in the System. A study of the prior two years was conducted on members who were active at the beginning and end of year to determine the average service accrual during the year. The computation was weighted by members' annualized salary used for valuation purposes:

Calendar Year	Average Service Accrued (Years)
2015	0.9719
2014	0.9724

No change is recommended to be made to the Part-Time Service Credit Accrual load of (0.80)% to State and (1.00)% to Local active members.

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, 2015 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	$2,072
Alternate Method	1,861
Difference (as % of Valuation)	(10.2)%

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

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

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

PROPOSED DISABILITY RATES

Age	State		Local		Law Enforcement and Public Safety	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
20	0.10%	0.10%	0.10%	0.10%	0.20%	0.60%
21	0.10	0.10	0.10	0.10	0.20	0.60
22	0.10	0.10	0.10	0.10	0.20	0.60
23	0.10	0.10	0.10	0.10	0.20	0.60
24	0.10	0.10	0.10	0.10	0.20	0.60
25	0.10	0.10	0.10	0.10	0.20	0.60
26	0.10	0.10	0.10	0.10	0.20	0.60
27	0.10	0.10	0.10	0.10	0.20	0.60
28	0.10	0.10	0.10	0.10	0.21	0.60
29	0.10	0.10	0.10	0.10	0.22	0.60
30	0.10	0.10	0.10	0.10	0.23	0.60
31	0.10	0.10	0.10	0.10	0.24	0.60
32	0.10	0.10	0.10	0.10	0.25	0.60
33	0.12	0.12	0.11	0.10	0.28	0.60
34	0.14	0.14	0.12	0.10	0.31	0.60
35	0.16	0.16	0.13	0.10	0.34	0.60
36	0.18	0.18	0.14	0.10	0.37	0.60
37	0.20	0.20	0.15	0.10	0.40	0.60
38	0.23	0.23	0.17	0.12	0.44	0.69
39	0.26	0.26	0.19	0.14	0.48	0.78
40	0.29	0.29	0.21	0.16	0.52	0.87
41	0.32	0.32	0.23	0.18	0.56	0.96
42	0.35	0.35	0.25	0.20	0.60	1.05
43	0.39	0.39	0.29	0.22	0.66	1.16
44	0.43	0.43	0.33	0.24	0.72	1.27
45	0.47	0.47	0.37	0.26	0.78	1.38
46	0.51	0.51	0.41	0.28	0.84	1.49
47	0.55	0.55	0.45	0.30	0.90	1.60
48	0.59	0.59	0.51	0.34	1.10	1.78
49	0.63	0.63	0.57	0.38	1.30	1.96
50	0.67	0.67	0.63	0.42	1.50	2.14
51	0.71	0.71	0.69	0.46	1.70	2.32
52	0.75	0.75	0.75	0.50	1.90	2.50
53	0.85	0.85	0.80	0.57	2.04	2.55
54	0.95	0.95	0.85	0.64	2.18	2.60
55	1.05	1.05	0.90	0.71	2.32	2.65
56	1.15	1.15	0.95	0.78	2.46	2.70
57	1.25	1.25	1.00	0.85	2.60	2.75
58	1.25	1.25	1.00	0.85	2.60	2.75
59	1.25	1.25	1.00	0.85	2.60	2.75

PROPOSED RATES OF SALARY INCREASES
MERIT AND LONGEVITY

Age	State	Local	Law Enforcement and Public Safety
20	5.00%	5.00%	5.00%
21	5.00	5.00	5.00
22	5.00	5.00	5.00
23	4.88	4.88	4.88
24	4.76	4.76	4.76
25	4.64	4.64	4.64
26	4.52	4.52	4.52
27	4.40	4.40	4.40
28	4.06	4.06	4.04
29	3.72	3.72	3.68
30	3.38	3.38	3.32
31	3.04	3.04	2.96
32	2.70	2.70	2.60
33	2.60	2.58	2.42
34	2.50	2.46	2.24
35	2.40	2.34	2.06
36	2.30	2.22	1.88
37	2.20	2.10	1.70
38	2.10	1.99	1.62
39	2.00	1.88	1.54
40	1.90	1.77	1.46
41	1.80	1.66	1.38
42	1.70	1.55	1.30
43	1.58	1.46	1.24
44	1.46	1.37	1.18
45	1.34	1.28	1.12
46	1.22	1.19	1.06
47	1.10	1.10	1.00
48	1.04	1.04	0.98
49	0.98	0.98	0.96
50	0.92	0.92	0.94
51	0.86	0.86	0.92
52	0.80	0.80	0.90
53	0.76	0.76	0.80
54	0.72	0.72	0.70
55	0.68	0.68	0.60
56	0.64	0.64	0.50
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

PROPOSED AGE-BASED RETIREMENT RATES
UNREDUCED – TRANSITION GROUP A

Age	State Male	State Female	Local Male	Local Female	Public Safety Male	Public Safety Female	Law Enforcement Male	Law Enforcement Female
48							20.00%	20.00%
49							20.00	20.00
50							20.00	20.00
51							20.00	20.00
52					30.00%	30.00%	20.00	20.00
53					30.00	30.00	20.00	20.00
54					25.00	25.00	20.00	20.00
55					25.00	25.00	20.00	20.00
56					25.00	25.00	23.00	23.00
57					25.00	25.00	23.00	23.00
58					20.00	20.00	25.00	25.00
59					20.00	20.00	25.00	25.00
60					35.00	35.00	30.00	30.00
61					35.00	35.00	25.00	25.00
62					35.00	35.00	25.00	25.00
63					35.00	35.00	25.00	25.00
64					35.00	35.00	25.00	25.00
65	22.00%	22.00%	20.00%	20.00%	35.00	35.00	25.00	25.00
66	22.00	22.00	20.00	20.00	35.00	35.00	25.00	25.00
67	20.00	20.00	15.00	20.00	35.00	35.00	25.00	25.00
68	20.00	20.00	15.00	17.00	35.00	35.00	25.00	25.00
69	20.00	20.00	15.00	17.00	35.00	35.00	25.00	25.00
70	20.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
71	20.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
72	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
73	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
74	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
75	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
76	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
77	15.00	25.00	15.00	17.00	100.00	100.00	100.00	100.00
78	15.00	25.00	15.00	17.00	100.00	100.00	100.00	100.00
79	15.00	25.00	15.00	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

PROPOSED AGE-BASED RETIREMENT RATES
UNREDUCED – TRANSITION GROUP B

Age	State Male	State Female	Local Male	Local Female	Public Safety Male	Public Safety Female	Law Enforcement Male	Law Enforcement Female
48								
49								
50							20.00%	20.00%
51							20.00	20.00
52							20.00	20.00
53							20.00	20.00
54					25.00%	25.00%	20.00	20.00
55					25.00	25.00	20.00	20.00
56					25.00	25.00	20.00	20.00
57					25.00	25.00	20.00	20.00
58					20.00	20.00	23.00	23.00
59					20.00	20.00	23.00	23.00
60					35.00	35.00	25.00	25.00
61					35.00	35.00	25.00	25.00
62					35.00	35.00	30.00	30.00
63					35.00	35.00	25.00	25.00
64					35.00	35.00	25.00	25.00
65					35.00	35.00	25.00	25.00
66	22.00%	22.00%	20.00%	20.00%	35.00	35.00	25.00	25.00
67	22.00	22.00	20.00	20.00	35.00	35.00	25.00	25.00
68	20.00	20.00	15.00	20.00	35.00	35.00	25.00	25.00
69	20.00	20.00	15.00	17.00	35.00	35.00	25.00	25.00
70	20.00	20.00	15.00	17.00	100.00	100.00	25.00	25.00
71	20.00	20.00	15.00	17.00	100.00	100.00	25.00	25.00
72	20.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
73	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
74	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
75	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
76	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
77	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
78	15.00	25.00	15.00	17.00	100.00	100.00	100.00	100.00
79	15.00	25.00	15.00	17.00	100.00	100.00	100.00	100.00
80	15.00	25.00	15.00	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

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							20.00%	20.00%
53							20.00	20.00
54							20.00	20.00
55							20.00	20.00
56					25.00%	25.00%	20.00	20.00
57					25.00	25.00	20.00	20.00
58					20.00	20.00	20.00	20.00
59					20.00	20.00	20.00	20.00
60					35.00	35.00	23.00	23.00
61					35.00	35.00	23.00	23.00
62					35.00	35.00	25.00	25.00
63					35.00	35.00	25.00	25.00
64					35.00	35.00	30.00	30.00
65					35.00	35.00	25.00	25.00
66					35.00	35.00	25.00	25.00
67	22.00%	22.00%	20.00%	20.00%	35.00	35.00	25.00	25.00
68	22.00	22.00	20.00	20.00	35.00	35.00	25.00	25.00
69	20.00	20.00	15.00	20.00	35.00	35.00	25.00	25.00
70	20.00	20.00	15.00	17.00	100.00	100.00	25.00	25.00
71	20.00	20.00	15.00	17.00	100.00	100.00	25.00	25.00
72	20.00	20.00	15.00	17.00	100.00	100.00	25.00	25.00
73	20.00	20.00	15.00	17.00	100.00	100.00	25.00	25.00
74	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
75	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
76	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
77	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
78	15.00	20.00	15.00	17.00	100.00	100.00	100.00	100.00
79	15.00	25.00	15.00	17.00	100.00	100.00	100.00	100.00
80	15.00	25.00	15.00	17.00	100.00	100.00	100.00	100.00
81	15.00	25.00	15.00	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

PROPOSED SERVICE-BASED RETIREMENT RATES
UNREDUCED – TRANSITION GROUP A

Service	State Male	State Female	Local Male	Local Female
30	37.00%	40.00%	35.00%	35.00%
31	28.00	33.00	26.00	30.00
32	24.00	26.00	23.00	24.00
33	24.00	26.00	23.00	24.00
34	24.00	26.00	23.00	24.00
35	24.00	26.00	23.00	24.00
36	24.00	26.00	23.00	24.00
37	24.00	26.00	23.00	24.00
38	24.00	26.00	23.00	24.00
39	24.00	26.00	23.00	24.00
40	35.00	33.00	32.00	24.00
41	35.00	33.00	32.00	24.00
42	35.00	33.00	32.00	24.00
43	35.00	33.00	32.00	20.00
44	35.00	33.00	32.00	20.00
45	25.00	25.00	32.00	20.00
46	25.00	25.00	25.00	20.00
47	25.00	25.00	25.00	20.00
48	25.00	25.00	25.00	20.00
49	25.00	25.00	25.00	20.00
50	100.00	100.00	100.00	100.00

PROPOSED SERVICE-BASED RETIREMENT RATES
UNREDUCED – TRANSITION GROUP B

	State		Local	
Service	Male	Female	Male	Female
31	37.00%	40.00%	35.00%	35.00%
32	28.00	33.00	26.00	30.00
33	24.00	26.00	23.00	24.00
34	24.00	26.00	23.00	24.00
35	24.00	26.00	23.00	24.00
36	24.00	26.00	23.00	24.00
37	24.00	26.00	23.00	24.00
38	24.00	26.00	23.00	24.00
39	24.00	26.00	23.00	24.00
40	24.00	26.00	23.00	24.00
41	35.00	33.00	32.00	24.00
42	35.00	33.00	32.00	24.00
43	35.00	33.00	32.00	24.00
44	35.00	33.00	32.00	20.00
45	35.00	33.00	32.00	20.00
46	25.00	25.00	32.00	20.00
47	25.00	25.00	25.00	20.00
48	25.00	25.00	25.00	20.00
49	25.00	25.00	25.00	20.00
50	25.00	25.00	25.00	20.00
51	100.00	100.00	100.00	100.00

PROPOSED SERVICE-BASED RETIREMENT RATES
UNREDUCED – TRANSITION GROUP C

55&32 Condition Year of Eligibility	State		Local	
	Male	Female	Male	Female
1	37.00%	40.00%	35.00%	35.00%
2	28.00	33.00	26.00	30.00
3	24.00	26.00	23.00	24.00
4	24.00	26.00	23.00	24.00
5	24.00	26.00	23.00	24.00
6	24.00	26.00	23.00	24.00
7	24.00	26.00	23.00	24.00
8	24.00	26.00	23.00	24.00
9	24.00	26.00	23.00	24.00
10	24.00	26.00	23.00	24.00
11	35.00	33.00	32.00	24.00
12	35.00	33.00	32.00	24.00
13	35.00	33.00	32.00	24.00
14	35.00	33.00	32.00	20.00
15	35.00	33.00	32.00	20.00
16	25.00	25.00	32.00	20.00
17	25.00	25.00	25.00	20.00
18	25.00	25.00	25.00	20.00
19	25.00	25.00	25.00	20.00
20	25.00	25.00	25.00	20.00
21	100.00	100.00	100.00	100.00

PROPOSED RETIREMENT RATES
REDUCED – TRANSITION GROUP A

Age	State Male	State Female	Local Male	Local Female	Public Safety Male & Female
48					8.00%
49					8.00
50					8.00
51					8.00
52					8.00
53					
54					
55	10.00%	10.00%	9.00%	11.00%	
56	10.00	10.00	9.00	11.00	
57	10.00	10.00	9.00	11.00	
58	10.00	10.00	9.00	11.00	
59	10.00	11.00	9.00	11.00	
60	10.00	12.00	9.00	11.00	
61	10.00	13.00	9.00	12.00	
62	15.00	15.00	13.00	13.00	
63	15.00	15.00	14.00	14.00	
64	15.00	15.00	12.00	15.00	

PROPOSED RETIREMENT RATES
REDUCED – TRANSITION GROUP B

	State		Local		Public Safety	Law Enforcement
Age	Male	Female	Male	Female	Male & Female	Male & Female
48					8.00%	8.00%
49					8.00	8.00
50					8.00	
51					8.00	
52					8.00	
53						
54						
55	10.00%	10.00%	9.00%	11.00%		
56	10.00	10.00	9.00	11.00		
57	10.00	10.00	9.00	11.00		
58	10.00	10.00	9.00	11.00		
59	10.00	11.00	9.00	11.00		
60	10.00	12.00	9.00	11.00		
61	10.00	13.00	9.00	12.00		
62	15.00	15.00	13.00	13.00		
63	15.00	15.00	14.00	14.00		
64	15.00	15.00	12.00	15.00		
65	15.00	15.00	12.00	15.00		

PROPOSED RETIREMENT RATES
REDUCED – TRANSITION GROUP C

Age	State Male	State Female	Local Male	Local Female	Public Safety Male & Female	Law Enforcement Male & Female
48						8.00%
49						8.00
50						8.00
51						8.00
52					8.00%	8.00
53					8.00	
54					8.00	
55					8.00	
56						
57	10.00%	10.00%	9.00%	11.00%		
58	10.00	10.00	9.00	11.00		
59	10.00	10.00	9.00	11.00		
60	10.00	10.00	9.00	11.00		
61	10.00	11.00	9.00	11.00		
62	10.00	12.00	9.00	11.00		
63	10.00	13.00	9.00	12.00		
64	15.00	15.00	13.00	13.00		
65	15.00	15.00	14.00	14.00		
66	15.00	15.00	12.00	15.00		

PROPOSED PRE-RETIREMENT MORTALITY RATES*

Age	% Dying Next Year	
	Male	Female
20	0.0510%	0.0167%
21	0.0552%	0.0165%
22	0.0587%	0.0162%
23	0.0599%	0.0162%
24	0.0594%	0.0162%
25	0.0545%	0.0162%
26	0.0510%	0.0173%
27	0.0486%	0.0179%
28	0.0472%	0.0187%
29	0.0468%	0.0196%
30	0.0470%	0.0210%
31	0.0480%	0.0226%
32	0.0495%	0.0244%
33	0.0514%	0.0264%
34	0.0534%	0.0285%
35	0.0557%	0.0306%
36	0.0581%	0.0327%
37	0.0611%	0.0352%
38	0.0648%	0.0378%
39	0.0694%	0.0408%
40	0.0750%	0.0439%
41	0.0814%	0.0474%
42	0.0890%	0.0514%
43	0.0982%	0.0560%
44	0.1088%	0.0612%
45	0.1207%	0.0673%
46	0.1342%	0.0741%
47	0.1487%	0.0817%
48	0.1643%	0.0897%
49	0.1807%	0.0984%
50	0.1979%	0.1082%
51	0.2159%	0.1188%
52	0.2351%	0.1306%
53	0.2539%	0.1435%
54	0.2741%	0.1577%
55	0.2967%	0.1731%
56	0.3231%	0.1898%
57	0.3548%	0.2076%
58	0.3932%	0.2266%
59	0.4396%	0.2468%
60	0.4954%	0.2682%
61	0.5616%	0.2914%
62	0.6392%	0.3163%
63	0.7291%	0.3438%
64	0.8320%	0.3741%
65	0.9486%	0.4075%
Ref	#2133sb0x1	#2134sb0x1

* *Applicable to calendar year 2015. Rates in future years are determined by the above rates and the MP-2015 projection scale.*

PROPOSED STANDARD POST-RETIREMENT MORTALITY RATES*

Age	% Dying Next Year		Age	% Dying Next Year	
	Male	**Female**		**Male**	**Female**
50	0.3951%	0.2769%	81	5.1604%	4.4376%
51	0.4293%	0.2897%	82	5.7578%	4.9594%
52	0.4648%	0.3054%	83	6.4305%	5.5537%
53	0.4984%	0.3245%	84	7.1892%	6.2287%
54	0.5324%	0.3474%	85	8.0389%	6.9877%
55	0.5676%	0.3743%	86	8.9890%	7.8409%
56	0.6043%	0.4059%	87	10.0511%	8.7924%
57	0.6430%	0.4423%	88	11.2315%	9.8456%
58	0.6836%	0.4837%	89	12.5394%	11.0043%
59	0.7266%	0.5306%	90	13.9905%	12.2857%
60	0.7729%	0.5826%	91	15.5215%	13.6643%
61	0.8232%	0.6402%	92	17.0957%	15.1198%
62	0.8784%	0.7030%	93	18.6882%	16.6347%
63	0.9408%	0.7709%	94	20.2903%	18.1975%
64	1.0112%	0.8452%	95	21.8937%	19.8047%
65	1.0912%	0.9256%	96	23.6917%	21.5605%
66	1.1825%	1.0146%	97	25.5391%	23.3825%
67	1.2856%	1.1128%	98	27.4496%	25.2683%
68	1.4028%	1.2220%	99	29.4224%	27.2189%
69	1.5362%	1.3428%	100	31.4356%	29.2123%
70	1.6862%	1.4768%	101	33.4720%	31.2268%
71	1.8542%	1.6246%	102	35.4865%	33.2471%
72	2.0428%	1.7873%	103	37.4840%	35.2589%
73	2.2537%	1.9668%	104	39.4352%	37.2187%
74	2.4890%	2.1653%	105	41.3091%	39.1421%
75	2.7511%	2.3856%	106	43.1302%	41.0023%
76	3.0455%	2.6311%	107	44.8460%	42.7643%
77	3.3750%	2.9074%	108	46.4784%	44.4408%
78	3.7454%	3.2204%	109	48.0281%	46.0140%
79	4.1619%	3.5744%	110	100.0000%	100.0000%
80	4.6325%	3.9772%	Ref	#2135sb0x1	#2136sb0x1

*   *Applicable to calendar year 2015. Rates in future years are determined by the above rates and the MP-2015 projection scale.*

PROPOSED SUBSTANDARD POST-DISABILITY MORTALITY RATES*

	% Dying Next Year			% Dying Next Year	
Age	Male	Female	Age	Male	Female
50	1.9828%	1.2670%	81	8.5562%	8.0954%
51	2.0583%	1.2978%	82	9.2430%	8.7689%
52	2.1342%	1.3346%	83	9.9996%	9.5039%
53	2.1957%	1.3796%	84	10.8357%	10.3005%
54	2.2541%	1.4344%	85	11.7531%	11.1578%
55	2.3131%	1.5001%	86	12.7593%	12.0789%
56	2.3733%	1.5773%	87	13.8640%	13.0626%
57	2.4375%	1.6659%	88	15.0693%	14.0995%
58	2.5039%	1.7647%	89	16.3802%	15.1893%
59	2.5730%	1.8733%	90	17.8093%	16.3474%
60	2.6462%	1.9882%	91	19.2287%	17.6078%
61	2.7241%	2.1097%	92	20.6368%	18.9572%
62	2.8087%	2.2349%	93	22.0287%	20.3756%
63	2.9056%	2.3636%	94	23.4054%	21.8453%
64	3.0144%	2.4987%	95	24.7596%	23.3573%
65	3.1394%	2.6391%	96	26.3034%	24.9467%
66	3.2828%	2.7907%	97	27.8638%	26.5814%
67	3.4435%	2.9559%	98	29.4526%	28.2655%
68	3.6253%	3.1385%	99	31.0717%	29.9859%
69	3.8305%	3.3405%	100	32.7099%	31.7410%
70	4.0570%	3.5662%	101	34.3741%	33.5037%
71	4.3065%	3.8159%	102	36.0579%	35.2858%
72	4.5814%	4.0904%	103	37.7841%	37.0775%
73	4.8823%	4.3928%	104	39.5397%	38.8527%
74	5.2106%	4.7246%	105	41.3091%	40.6353%
75	5.5673%	5.0865%	106	43.1302%	42.4082%
76	5.9590%	5.4820%	107	44.8460%	44.0618%
77	6.3866%	5.9157%	108	46.4784%	45.6191%
78	6.8553%	6.3899%	109	48.0281%	47.0587%
79	7.3690%	6.9087%	110	100.0000%	100.0000%
80	7.9361%	7.4742%	Ref	#2137sb0x1	#2138sb0x1

Applicable to calendar year 2015. Rates in future years are determined by the above rates and the MP-2015 projection scale.

October 31, 2016

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

Re: OPERS 2011-2015 Experience Study

Dear Karen:

Enclosed are 10 copies of the experience study.

Please call if you have any questions.

Sincerely,

Mita D. Drazilov, ASA, MAAA

MDD:rmn
Enclosures