

# Illinois Municipal Retirement Fund

Triennial Experience Study

2017 – 2019





November 3, 2020

Board of Trustees  
Illinois Municipal Retirement Fund  
Oak Brook, Illinois 60523

Ladies and Gentlemen:

The results of the 3-year *investigation of experience* of the Illinois Municipal Retirement Fund are presented in this report. The investigation was made for the purpose of updating the actuarial assumptions used in valuing the actuarial liabilities of IMRF in compliance with Section 7-213 of the Illinois Pension Code.

The investigation was based upon the statistical data furnished for annual actuarial valuations, and upon supplemental information furnished by IMRF staff, concerning members who died, withdrew, became disabled or retired during the last 3 years and on published economic historical data.

The investigation covered the 3-year period from **January 1, 2017 to December 31, 2019** and was carried out using generally accepted actuarial principles and techniques.

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

Brian B. Murphy, Mark Buis, and Francois Pieterse are independent of the plan sponsor and are Members of the American Academy of Actuaries (MAAA) who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Respectfully submitted,

A handwritten signature in black ink that reads "Brian B. Murphy".

Brian B. Murphy, FSA, EA, FCA, MAAA

A handwritten signature in black ink that reads "Mark Buis".

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A handwritten signature in black ink that reads "Pieterse".

Francois Pieterse, ASA, FCA, MAAA

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## Executive Summary

Statutes (40 ILCS 5/7-213) require that the actuary conduct a general review of the experience of the fund "Experience Study" at least every three years. The last review was prepared for the period from January 1, 2014 to December 31, 2016. In this report, we review the current actuarial assumptions and methods and compare them to the actual experience of the Retirement Fund for the years 2017-2019.

The table below lists each of the primary assumptions and methods that we analyzed, including our recommendations for each item, and the impact of any recommended changes on average liabilities and contribution rates.

Assumption	Recommendation	Financial Impact
Withdrawal rates	Various	Decrease
Disability rates	Lower Rates	Decrease
Pay increases due to seniority	No change	No change
Retirement rates	Various	Increase
Pre and post-retirement mortality rates	Various	Decrease
Interest rate	Lower Rate	Increase
Wage inflation	Lower Rate	Decrease
Price inflation	Lower Rate	Decrease
<b>Total</b>	<b>Various</b>	<b>Increase</b>

The overall impact on the contribution rate for various scenarios are shown on page 15. The effect on each employer will vary.

# Introduction

Each year as of December 31, the liabilities of the Illinois Municipal Retirement Fund are valued. The purpose of the valuation is to adjust the contribution rates for IMRF employers to take into account changes in participant demographics and recent financial results as well as to measure the financial soundness of the benefit programs. 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.
- Patterns of merit & longevity pay increases to active members.
- Rates of retirement among active members.
- Rates of mortality among active members, retirees and beneficiaries.

## Economic Assumptions

- Long-term rates of investment return to be generated by the assets of the Fund.
- Long-term rates of growth of total payroll also called wage inflation.
- Price Inflation.

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, Illinois statutes require that assumptions used to value the liabilities of IMRF be studied in depth every three 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, 2016 regular actuarial valuation and the interest rate assumption was last revised following the December 31, 2017 actuarial valuation.

## Summary of Findings – Non-Economic Assumptions

In general, the present assumptions provide a reasonable match to the experience of the past three years and recommended adjustments to assumptions are relatively minor. In most cases, when adjustments are indicated, the proposed assumptions give partial recognition to present assumptions as well as to results from actual experience. Complete recognition is rarely given to actual experience over a limited period. In general, the rates were moved about half way to the observed experience, except for the case of mortality which is discussed in further detail later in this report.

In most recent experience studies, we have noticed that in order to develop assumptions that reduce the size of the gain or loss in a particular decrement it is necessary to consider the relative magnitude of the liability of the members that decrement, rather than number counts alone. For example, consider a plan with only two members who are both the same age and assume member one has a liability of \$10,000 and member two has a liability of \$90,000. If one of the members leaves and forfeits all of his or her liability, the net rate of decrement is one out of two for a rate of 50%. However, the net gain or loss to the system will be 10% if member one leaves versus 90% if member two leaves.

As a result, some of our tables include a column entitled ‘liability weighted rate’ or ‘benefit weighted’. This represents the crude rate of decrement on a liability or benefit weighted basis as opposed to strictly a number count basis. The liability weighted rates were found to be most highly correlated with age based withdrawal and retirement decrements. This makes some intuitive sense, since retirement and termination decisions are often made based on how much the members have to gain or lose if they retire or change jobs, whereas death and disability is typically not a decision at all, rather an event that happens to someone. Comments on specific assumptions are provided on the following page. Tabular results are presented in summary form on page 7.

**Withdrawal Rates:** A “withdrawal” or a quit is a separation from service without entitlement to an immediate monthly benefit. For age based withdrawal, experience was found to be more highly correlated with the liability weighted method described above. Rates for the age based tables were adjusted accordingly to be closer to the liability weighted rates. For service based withdrawal, the traditional method based on counts was used. Rates for the service based tables were adjusted to move closer to actual experience. The changes in withdrawal rates had downward pressure on contribution rates.

**Disability Rates:** A disability can be either a temporary disability or a permanent disability. Disabilities are initially reported as temporary and are not reclassified as permanent until after the end of the experience period. The actuary then adjusted disability rates to bring the number of expected permanent disabilities closer to the number of actual approved permanent disabilities. The changes in disability rates had slight downward pressure on contribution rates.

## Summary of Findings – Non-Economic Assumptions (Continued)

**Pay Increase Rates** (portion related to the employee's age and seniority): These rates are difficult to analyze because of the non-homogeneous nature of the IMRF population. While actual experience varied by age and service, the overall impact was minimal and no change is recommended at this time.

**Retirement Experience:** Retirement experience was found to be highly correlated with the liability weighted method described on page 3. As such, we modified the retirement rates slightly for most groups to move closer to the liability weighted rates. As more experience emerges, we will monitor these rates to see if further adjustments are necessary. The changes in retirement assumptions were minor and had upward pressure on contribution rates for Regular members and SLEP members. Retirement data for Tier 2 members is limited and no changes were recommended for Tier 2 members at this time.

**Mortality Experience:** Post-retirement mortality is an important component in cost calculations and should be updated from time to time to reflect current and expected future longevity improvements. Pre-retirement mortality is a relatively minor component in cost calculations. The frequency of pre-retirement deaths is so low that mortality assumptions based on actual experience can only be produced for very large retirement systems, if at all.

**Actuarial Standards of Practice:** Actuarial Standards of Practice (ASOP) No. 35 Disclosure Section 4.1.1 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 mortality rates used in the valuation include a provision for future mortality improvement.

**New Mortality Tables and Projection Scale:** Recently, the Society of Actuaries (SOA) published a mortality study specific to public sector retirement systems. This very comprehensive study includes numerous mortality tables created for each classification of employee (General members, Public Safety, Teachers, Survivors, Juvenile, headcount-weighted, benefit-weighted, above median, below median). In addition, the SOA updates mortality projection scales annually – which accounts for future improvements in mortality that are expected to occur.

**Discussion:** The mortality assumption used in the annual valuation of IMRF measures the probabilities of members dying before retirement and the probability of each benefit payment being made after retirement. The mortality tables currently used in the annual valuation are an IMRF-specific mortality table based on a version of the RP-2014 Mortality Table, using projection scale MP-2017. As noted above, newer mortality tables have been released since the year 2006, reflecting declining mortality rates among retired public employees. This is reflected in the most recent published mortality tables released in 2019 by the SOA (Pub-2010 mortality tables). Since data for retirees was sufficient, IMRF Specific tables were developed for male and female healthy retirees. These tables take into account improvements in mortality that have occurred over the experience study period and exert slight upward pressure on liabilities. In addition, we are recommending updating the projection scale from MP-2017 to MP-2019.

Data for disabled retirees was insufficient to use as a basis for judgment.

## Summary of Findings – Non-Economic Assumptions (Continued)

Data for active members was insufficient to use as a basis for judgment.

**Proposal:** We recommend the following mortality tables for use in future valuations of the Retirement System; this change will increase measured liabilities:

- **Healthy Post-Retirement:** The Pub-2010, Amount-Weighted, below-median income, General, Retiree, Male (adjusted 106%) and Female (adjusted 105%) tables, and future mortality improvements projected using scale MP-2019.
- **Healthy Pre-Retirement:** The Pub-2010, Amount-Weighted, below-median income, General, Employee, Male and Female tables, and future mortality improvements projected using scale MP-2019.
- **Disability Retirement:** The Pub-2010, Amount-Weighted, below-median income, General, Disabled Retiree, Male (adjusted 100%) and Female tables, and future mortality improvements projected using scale MP-2019.



## Summary of Findings – Non-Economic Assumptions (Continued)

**Option Factors:** The calculation of retirement benefit amounts involves the computation of survivor benefit options. If a retiring member elects an optional form of benefit, the standard form of benefit is multiplied by the appropriate option factor to produce the benefit actually payable. Currently, option factors for survivor benefits are calculated using a 7.25% interest rate assumption and assumed rates of mortality. As a matter of common practice, optional benefit reduction factors are usually revised to correspond with the new interest and mortality assumptions adopted after the last experience study. The use of a fully generational mortality table can make the development of option factors more complicated. Since there are many alternatives to consider, we recommend developing a set of alternative option factors after the Board has adopted the recommended mortality table and interest rate. Consistent with past practice, any change in option factors would be adopted for retirements on or after October 1, 2021 to allow time for administrative changes.

**Other Risk Factors:** Historically, the gain/loss reports have indicated a pattern of non-decrement losses. These have been attributed to various factors, including changes in final average compensation, rehire of former employees, addition of new employers, data refinements and differences between actual, increasing service due to sick leave and estimated reserve transfers. In the 2014-2016 Experience Study, we recommended a contingency reserve of 0.25% of pay be added to the normal cost component. This change resulted in a load of 1.25% for increased service at retirement due to sick leave. After reviewing the data for the last 3 years, we recommend increasing this load from 1.25% to 1.5%. We will continue to monitor this assumption to see if future experience indicates a need for further change. We also recommend lowering the marriage assumption for males from 80% to 75% while leaving the assumption for females at 70%.

**Assumptions for Tier 2 Members:** Tier 2 members have different retirement eligibilities and benefits and will likely have different experience with regard to withdrawal, turnover, retirement and other assumptions. Currently, there is insufficient data to perform an experience review for Tier 2 retirement assumption. Current assumptions for Tier 2 are shown at the end of the report. Additionally, we recommend lowering the wage cap growth and COLA assumption for Tier 2 members from 1.35% to 1.13% (50% of the Inflation assumption, see discussion of price inflation assumption on page 10).

## Active Member Decrements Comparison of Actual, Present, and Proposed Experience

Decrement	Regular & ECO						SLEP & ECO		
	Males			Females					
	Actual	Assumed		Actual	Assumed		Actual	Assumed	
		Present	Proposed		Present	Proposed		Present	Proposed
Normal Retirement	4,736	5,337	5,439	8,708	9,379	9,686	451	421	466
Early Retirement	933	1,244	1,227	2,012	2,371	2,390	-	-	-
Withdrawals	14,430	13,112	13,481	29,905	28,458	28,581	544	355	426
Permanent Disability	35	77	57	28	81	52	2	5	4

This page compares actual total decrement experience during the 3-year experience period with experience that was assumed by the present assumption package and with experience that would have been assumed if the proposed assumptions had been in force throughout the experience period. ECO experience is blended in with Regular and SLEP experience in the above chart. The actual and assumed retirement counts include only people who retired directly from active service. People who retired after having previously separated from service with deferred vested benefits are excluded from all of the counts. Please note that due to the use of liability weighted rates, looking at people counts alone is not the best indicator for the appropriateness of a particular assumption. Assumptions for normal retirement, early retirement and withdrawal after 8 years for Regular (7 years for SLEP) use liability weighted rates.

## Summary of Findings – Economic Assumptions

Economic assumptions include **long-term rates of investment return** (net of administrative and investment expenses), **wage inflation** (the across-the-board portion of salary increases), and pay increases due to **merit and seniority**. 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, all of 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 inflation.

If 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 economic assumptions included:

- Actual system experience over the last 3 years (i.e., merit and seniority pay increases)
- Future expectations of the investment consultant for IMRF and future expectations of other investment consultants
- 2020 Social Security Trustees Report
- Historical observations of inflation statistics (both price and wage) and investment returns

Current economic assumptions for the System are as follows:

Investment Return	7.25%
Wage Inflation	3.25%
Payroll Growth	2.50%
Price Inflation	2.50%
Spread Between Investment Return and Wage Inflation	4.00%
Spread Between Investment Return and Price Inflation	4.75%

The remainder of this section addresses the economic assumptions other than pay increases due to merit and seniority. Pay increases due to merit and seniority are addressed on pages 43 to 45.

## Economic Assumptions – ASOP No. 27

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 (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.

## Summary of Findings – Economic Assumptions (Continued)

**Price Inflation.** Price inflation underlies both the wage inflation and investment return assumptions. For that reason, we recommend that a specific price inflation assumption be adopted in conjunction with this Experience Study. The current price inflation assumption is 2.5%. The chart below shows forward looking inflation expectations from various published sources as of December 31, 2019. Over the past 50 years, price inflation has averaged 3.9%. This result is heavily affected by the high inflationary period of the 1970’s and early 1980’s. During the past decade, price inflation averaged 1.8%. The 2020 Social Security Trustees report uses 2.4% as the long-range intermediate price inflation assumption. Additionally, the average future price inflation of the investment firms we surveyed is 2.1%. **Based upon the reviewed data, we recommend that the price inflation assumption be lowered from 2.5% to 2.25%.**

<b>Forward-Looking Price Inflation Forecasts<sup>a</sup></b>	
<b>Congressional Budget Office<sup>b</sup></b>	
5-Year Annual Average	2.46%
10-Year Annual Average	2.38%
<b>Federal Reserve Bank of Philadelphia<sup>c</sup></b>	
5-Year Annual Average	2.20%
10-Year Annual Average	2.20%
<b>Federal Reserve Bank of Cleveland<sup>d</sup></b>	
10-Year Expectation	1.71%
20-Year Expectation	1.93%
30-Year Expectation	2.09%
<b>Federal Reserve Bank of St. Louis<sup>e</sup></b>	
10-Year Breakeven Inflation	1.61%
20-Year Breakeven Inflation	1.81%
30-Year Breakeven Inflation	1.78%
<b>U.S. Department of the Treasury<sup>f</sup></b>	
10-Year Breakeven Inflation	1.65%
20-Year Breakeven Inflation	1.78%
30-Year Breakeven Inflation	1.87%

## Summary of Findings – Economic Assumptions (Continued)

**Wage Inflation and Payroll Growth.** 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 long-term rate of increase in National Average Earnings over the last 50 years is somewhat higher than the current IMRF assumption, although shorter term averages are below it. It is expected that, in the long run, salary increases in all parts of the country will be close to the national averages. However, few economists are forecasting a repeat of the high inflation rates experienced in the 1970s. In addition, average salaries in IMRF have risen at approximately 3.0% a year since 1989 - a slower pace than the assumed 3.5% a year, although, the active member group has increased in size, which distorts this statistic. **Given our recommendation for a 2.25% price inflation assumption, we believe a reasonable range for this assumption is from 2.5% to 3.50% a year. We recommend a change in the wage inflation assumption to 2.75% and have illustrated the approximate impact on page 15.**

Year	Annual Increase in		
	Prices (CPI-U)	Wages (NAE)	Difference
1961-1970	2.9%	4.4%	1.5%
1971-1980	8.1%	7.3%	-0.8%
1981-1990	4.5%	5.3%	0.8%
1991-2000	2.7%	4.3%	1.6%
2001-2010	2.3%	2.6%	0.3%
2011-2019	1.8%	2.9%	1.1%
3-Year Avg	2.1%	3.5%	1.4%
5-Year Avg	1.8%	3.0%	1.2%
10-Year Avg	1.8%	2.8%	1.0%
20-Year Avg	2.1%	2.9%	0.8%
30-Year Avg	2.4%	3.3%	0.9%
50-Year Avg	3.9%	4.5%	0.6%

**Payroll Growth.** The payroll growth assumption differs from the wage inflation assumption in that the payroll growth assumption is used in the amortization method to project wages for the purposes of determining the contribution rate as a percentage of total payroll, whereas the wage inflation is used to project each member's future salary for estimating retirement benefits. Historically, the payroll growth assumption has mirrored the wage inflation assumption. However, there are a couple of reasons that might cause these rates to be different. First, if there is a decline in the active population, the total payroll might not grow as fast as individual wages and vice-versa. Also, even if there is not a decline in the active population, the retirements of the baby boom generation often result in a large cohort of new hires with low wages replacing older members at higher wages, putting downward pressure on the total payroll. If this payroll growth rate is overstated, this can result in insufficient contributions. For IMRF, the average increase in total payroll was 2.3% for the last 5 years. Therefore, we recommend no change at this time to the payroll growth assumption used in the amortization factors.

## Summary of Findings – Economic Assumptions (Continued)

**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 IMRF'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 a margin for adverse deviation).

The analysis of the investment return assumption in this study is based on forward-looking measures of expected investment return outcomes for the asset classes in the System's Current Target investment policy. Our analysis is based on the GRS Capital Market Assumption Modeler (CMAM). Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we request and monitor the forward-looking capital market assumptions of several major investment firms. We update our CMAM tool annually. The capital market assumptions in the 2020 CMAM are from the following investment firms (in alphabetical order): Aon Hewitt, Blackrock, BNY Mellon, Callan, Cambridge, JPMorgan, Meketa, Mercer, NEPC, RVK, Verus, Voya and Wilshire. We believe that the benefit of performing this analysis using multiple investment firms is that it recognizes the uncertain nature of the items affecting the selection of the investment return assumption and it avoids giving undue weight to the opinion of any single investment firm.

Each investment firm provided capital market assumptions over an investment horizon of approximately 10 years. We refer to these as short-term expectations, although that terminology may not be uniform among practitioners. In general, our understanding is that the methodology for developing capital market expectations is forward-looking, as it must be for actuarial purposes. In recent times, we have observed a general decreasing trend in capital market expectations. However, we have also observed that some of the investment firms' assumption sets are dependent on the market conditions at the time they are developed. Consequently, they may be sensitive to short term market fluctuations. Some investment firms appear to be contrarian – meaning that when the market is high, future expectations are lowered and when the market is low, future expectations are raised. In particular, markets did well in 2019, which may have introduced some pessimism into the capital market expectations of certain of the firms in our 2020 data base.

A subset of 6 of the 13 investment firms also provided capital market expectations over a longer horizon – with two firms providing 20-year expectations and four firms providing 30-year expectations. In our understanding, the ten-year assumptions tend to be more data driven than the longer-term assumptions, with longer term assumptions being partly based on mean reversion. Since the true long term mean investment return is unknown and cannot be known, and finally since in most of the plans we work on, including IMRF, very significant cash flows are expected to occur within the next ten to 15 years, we tend to give more credibility to the shorter-term assumptions than to the longer-term assumptions

## Summary of Findings – Economic Assumptions (Continued)

For purposes of this study, we have reviewed the following investment allocation as described by the Wilshire Associates in their February 2020 presentation to the Board of Trustees. If there are material changes in the Current Targets, the findings in this report would need to be reconsidered.

Presented below is the approximate current asset allocation for IMRF:

Asset Class	Approximate Asset Allocation
Domestic Equity	37.0%
International Equity	18.0
Fixed Income	28.0
Real Estate	9.0
Alternative Investments	7.0
Cash Equivalents	1.0

Based upon the approximate asset allocation, future expectations of various investment firms were analyzed. Given the large drop in expectations from 2019 to 2020, we take the additional step in this study of citing results from a report issued by Horizon Actuarial Services, LLC (2020 Edition), which compiles and averages the return and risk forecasts of 39 major investment consulting firms. We mapped the Retirement System’s asset allocation to the average Horizon survey assumptions and calculated “Horizon 2020 Survey” expected geometric rates of return. Please note that Horizon Actuarial Services has not reviewed this work and has no responsibility for our results. Investment results presented are net of expensed and are based upon an expense assumption of 8 basis points.

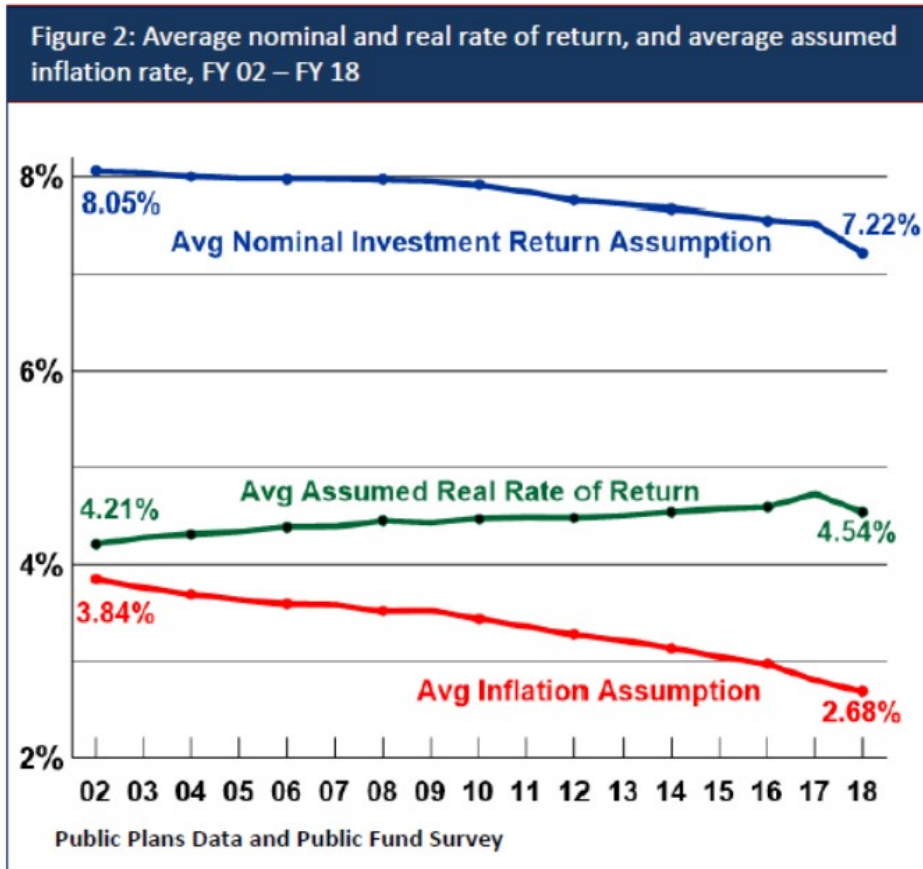
### Forward Looking Expected Geometric Returns for IMRF Portfolio

	Wilshire	GRS CMAM 2019 Survey	GRS CMAM 2020 Survey	39 Firm Average Result
10-Years	5.75%	6.32%	5.85%	6.49%
20-Years	6.85%	7.07%	6.71%	7.16%
Inflation	1.75%	2.25%	2.25%	2.25%



## Summary of Findings – Economic Assumptions (Continued)

While there is a wide range of outcomes regarding future expected return, the current assumption of 7.25% is currently above all 10 year expected geometric returns and slightly above the 20 year expected geometric returns. In addition, we also reviewed information for the most recent NASRA survey. According to this survey, the average assumed return for all Statewide Retirement Systems is 7.22% (see chart below). It is important to understand though that NASRA survey reflects national average assumed rates of return, which may not be indicative of IMRF’s asset allocation.



**Taking everything into account, while we think 7.25% can be supported for the upcoming year, we recommend consideration be given to lowering this assumption 10 to 50 basis points.** However, the analysis indicates that if the assumption remains at 7.25% it is likely that IMRF could see an extended period of failing to meet its return assumption. The result would be an erosion of the funded status, and the deferral of contributions into the future.

We have illustrated the approximate impact on contribution requirements for a change in the investment return assumption to 6.75%, 7.00% or 7.15% on page 15.

## Summary of Findings

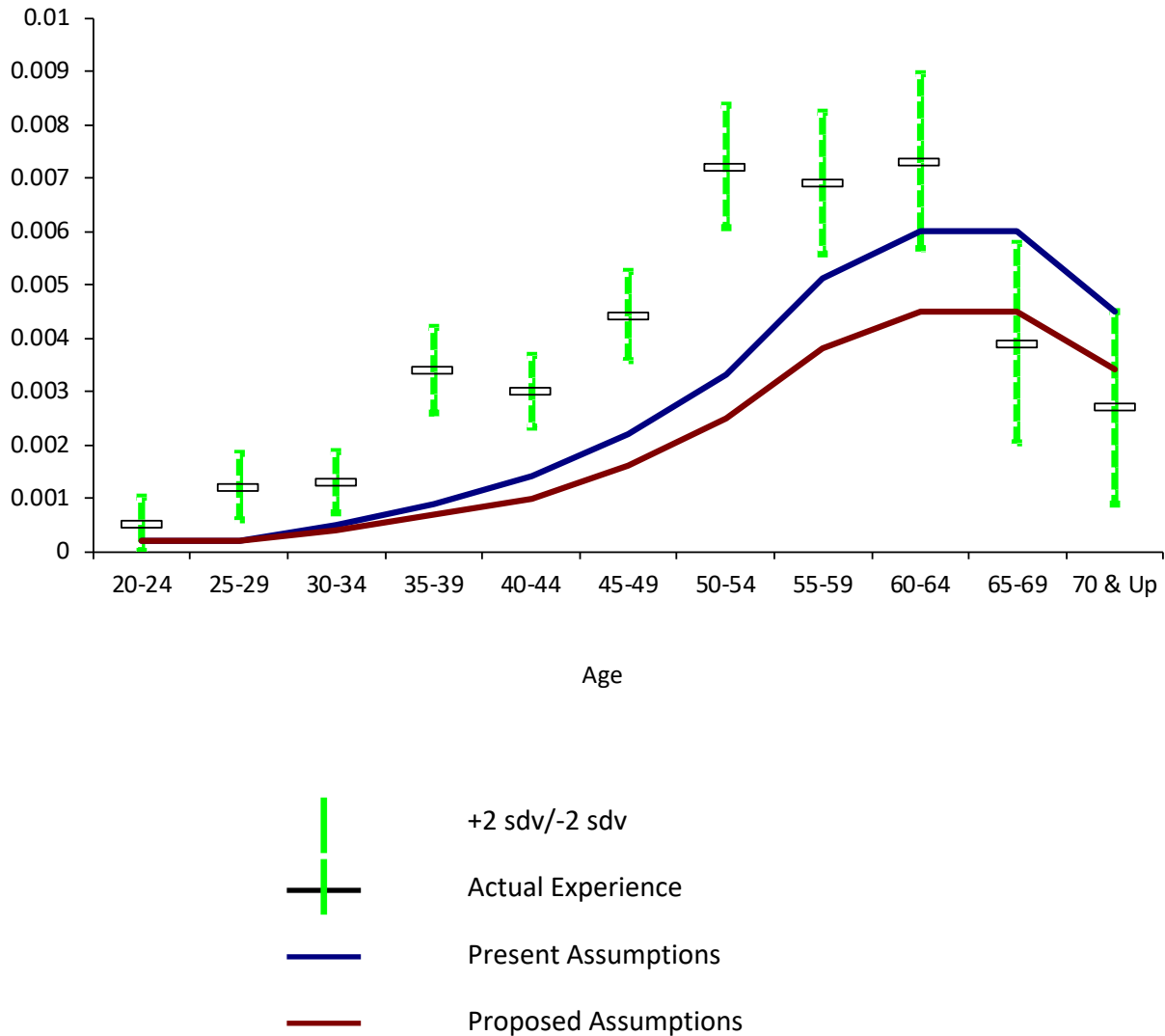
### Average Effect on Contribution Rates

#### (Results Based upon December 31, 2019 Data)

	12/31/2019 Actual Results	OPTION 1	OPTION 2	OPTION 3	OPTION 4
		Hypothetical 12/31/2020 Results*			
		Demographic Changes Only	Potential Economic Assumptions		
<b>Demographic Assumptions</b>	<b>Current</b>	<b>New: +10 bp</b>	<b>New: +10 bp</b>	<b>New: +10 bp</b>	<b>New: +10 bp</b>
Price Inflation	2.50%	2.50%	2.25%	2.25%	2.25%
Wage Inflation	3.25%	3.25%	2.75%	2.75%	2.75%
Investment Return	7.25%	7.25%	7.15%	7.00%	6.75%
<b>Regular Employers</b>					
- Contribution Rate	10.6%	10.7%	10.5%	11.4%	12.9%
<b>SLEP Employers</b>					
- Contribution Rate	23.7%	23.4%	23.2%	24.9%	28.1%
<b>Total Plan</b>					
- Funded Status	90.7%	90.1%	90.0%	89.2%	87.2%

The above results are presented as an aid in understanding the average combined effects of the changes in assumptions that have been proposed in this experience study. Results are approximate and indicate only the general direction and approximate average magnitude of the effects of the assumption changes. *Contribution rates for 2021 have already been scheduled based upon the December 31, 2019 regular valuation and are not affected by the experience study.* Each employer would be affected differently. Contribution rates for 2022 will be determined in the 2020 actuarial valuation, which will take into account all of the new assumptions and actual experience during 2020.

## Standard Deviation Graph Example



Standard Deviation graphs of the type shown above appear frequently in this report. The navy blue line represents the present assumptions used in the valuation. After experience is reviewed for a given decrement, an actual value is computed (based on actual experience) along with its standard deviation value. The green vertical bars on the graph above represent the standard deviation value. If the standard deviation value is large, this means that the group being tested is from a small population. A small group should have less influence on deriving the new proposed value than a large group. In comparison, if the standard deviation has a small value, this means the group being tested is from a large population and should have a greater impact on the decision of the proposed value.

## **WITHDRAWAL EXPERIENCE**

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## Regular Males Withdrawal Experience

There were 12,347 withdrawals and 82,173 years of exposure included in the male service-based withdrawal investigation for members with less than 8 years of service. Currently, the threshold for the service based table is 8 years. The proposed rates recommend the same threshold and slightly higher rates of withdrawal.

### Male Service-Based Withdrawals

Service Index	Withdrawals	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	2,460	9,781	0.2515	0.2450	0.2480	2,396	2,426
2	3,318	16,556	0.2004	0.1950	0.1980	3,228	3,278
3	2,122	13,545	0.1567	0.1500	0.1530	2,032	2,072
4	1,581	11,675	0.1354	0.1300	0.1330	1,518	1,553
5	1,087	9,782	0.1111	0.1025	0.1070	1,003	1,047
6	732	8,350	0.0877	0.0875	0.0875	731	731
7	589	7,189	0.0819	0.0725	0.0770	521	554
8	458	5,295	0.0865	0.0700	0.0770	371	408
9	327	4,051	0.0807			-	-
10	299	3,926	0.0762			-	-
11	272	4,108	0.0662			-	-
12	235	3,935	0.0597			-	-
13	196	3,595	0.0545			-	-
14	151	3,193	0.0473			-	-
15	143	2,825	0.0506			-	-
16	120	2,686	0.0447			-	-
17	116	2,753	0.0421			-	-
18	102	2,769	0.0368			-	-
19	92	2,656	0.0346			-	-
20	79	2,382	0.0332			-	-
21	75	2,028	0.0370			-	-
22	78	1,761	0.0443			-	-
23	51	1,502	0.0340			-	-
24	51	1,282	0.0398			-	-
25	33	1,047	0.0315			-	-
26	31	947	0.0327			-	-
27	25	921	0.0271			-	-
28	24	948	0.0253			-	-
29	29	897	0.0323			-	-
30 & over	153	2,685	0.0570			-	-
Totals (Less Than or Equal to 8)	12,347	82,173	0.1503	0.1436	0.1469	11,800	12,069

## Regular Males Withdrawal Experience

There were 2,071 withdrawals and 52,594 years of exposure included in the male age-based withdrawal investigation for members with 8 or more years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to these rates.

### Male Age-Based Withdrawals With More Than 8 Years of Service

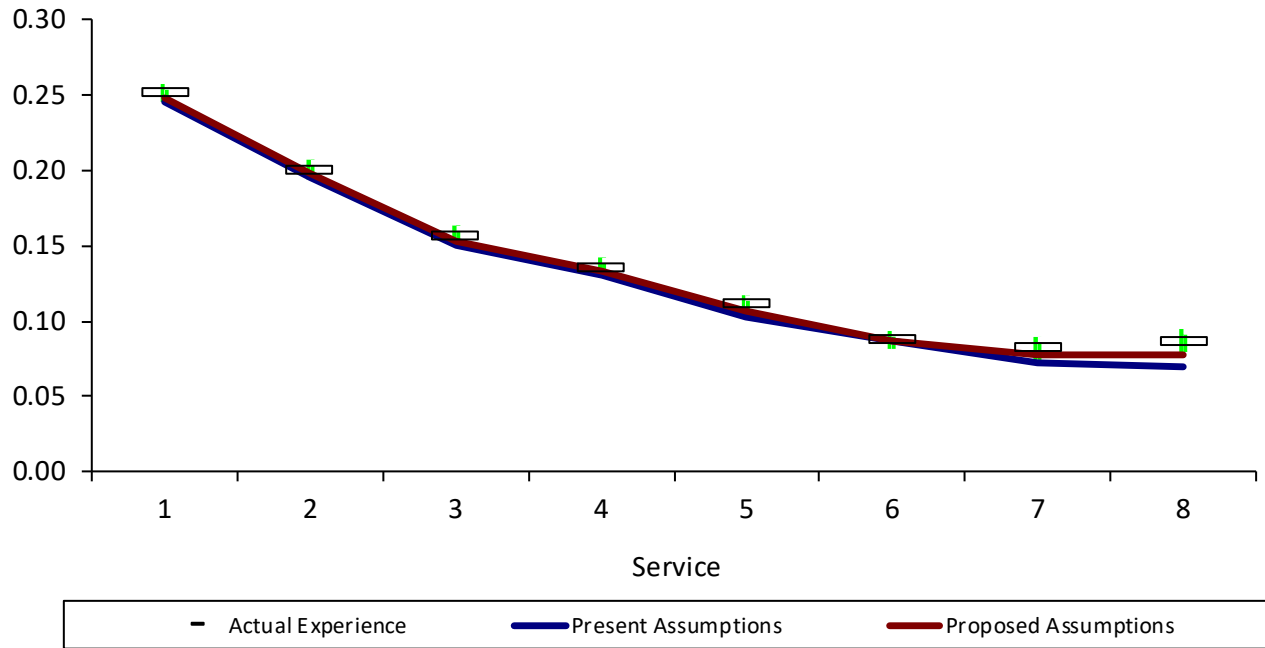
Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	31	444	0.0698	0.0557	0.0490	0.0520	21	22
30-34	268	4,121	0.0650	0.0521	0.0400	0.0460	161	182
35-39	391	8,650	0.0452	0.0340	0.0310	0.0325	271	288
40-44	415	10,489	0.0396	0.0300	0.0260	0.0280	272	292
45-49	432	12,768	0.0338	0.0241	0.0205	0.0225	267	290
50-54	534	16,122	0.0331	0.0222	0.0190	0.0200	309	327
Totals	2,071	52,594	0.0394	0.0263	0.0247	0.0266	1,301	1,401

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0394	0.0263	0.0266
<b>Previous Investigation Results</b>	0.0354	0.0236	0.0246
<b>2011-2013</b>	0.0297	0.0204	0.0232
<b>2008-2010</b>	0.0278	0.0193	0.0241

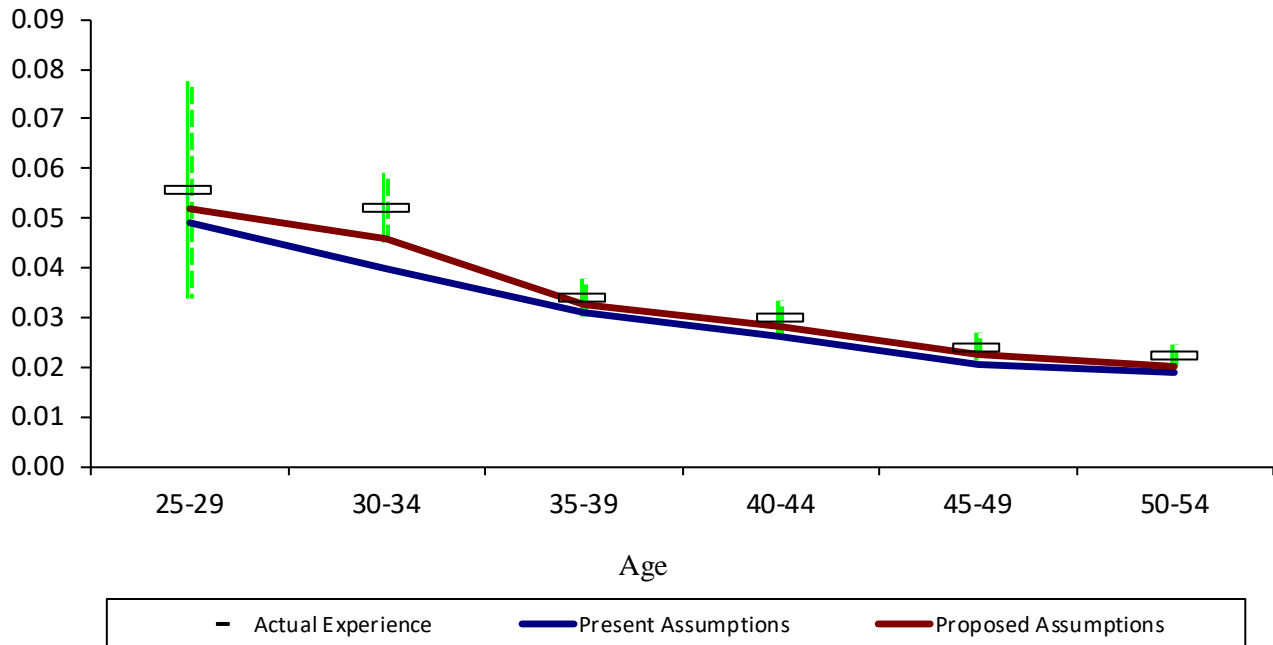
\* Sample rates are taken from midpoint of age group.

# Regular Males Withdrawal Experience

## Male Service-Based Withdrawals



## Male Age-Based Withdrawals



## Regular Females Withdrawal Experience

There were 25,716 withdrawals and 150,621 years of exposure included in the female service-based withdrawal investigation for members with less than 8 years of service. Currently, the threshold for the service based table is 8 years. The proposed rates recommend the same threshold and were adjusted slightly to be closer to actual.

### Female Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	5,648	21,055	0.2682	0.2850	0.2770	6,001	5,832
2	6,939	31,956	0.2171	0.2220	0.2200	7,094	7,030
3	4,521	25,276	0.1789	0.1775	0.1775	4,486	4,486
4	2,992	20,636	0.1450	0.1450	0.1450	2,992	2,992
5	2,118	17,007	0.1245	0.1175	0.1200	1,998	2,041
6	1,499	14,075	0.1065	0.1025	0.1045	1,443	1,471
7	1,160	11,784	0.0984	0.0850	0.0920	1,002	1,084
8	839	8,832	0.0950	0.0800	0.0880	707	777
9	742	7,103	0.1045			-	-
10	766	7,295	0.1050			-	-
11	602	7,593	0.0793			-	-
12	566	7,223	0.0784			-	-
13	506	6,204	0.0816			-	-
14	361	5,125	0.0704			-	-
15	312	4,343	0.0718			-	-
16	237	4,038	0.0587			-	-
17	238	4,006	0.0594			-	-
18	219	3,907	0.0561			-	-
19	164	3,400	0.0482			-	-
20	142	2,848	0.0499			-	-
21	103	2,252	0.0457			-	-
22	83	1,827	0.0454			-	-
23	71	1,493	0.0476			-	-
24	51	1,199	0.0425			-	-
25	52	973	0.0534			-	-
26	43	789	0.0545			-	-
27	31	714	0.0434			-	-
28	24	692	0.0347			-	-
29	31	642	0.0483			-	-
30 & over	118	1,609	0.0733			-	-
Totals (Less Than or Equal to 8)	25,716	150,621	0.1707	0.1708	0.1707	25,723	25,713



## Regular Females Withdrawal Experience

There were 4,184 withdrawals and 74,921 years of exposure included in the female age-based withdrawal investigation for members with more than 8 years of service. Age based withdrawal was found to be highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to those rates.

### Female Age-Based Withdrawals With More Than 8 Years of Service

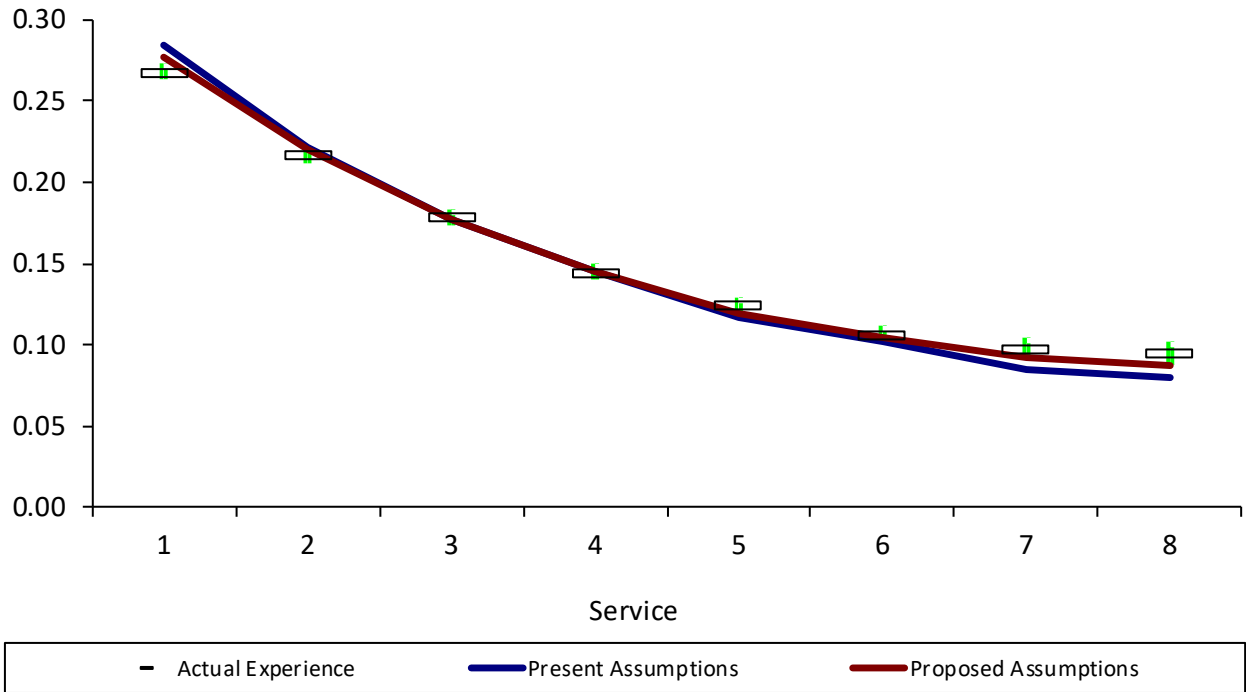
Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	39	308	0.1266	0.1231	0.0800	0.0880	23	26
30-34	324	3,740	0.0866	0.0728	0.0675	0.0700	244	253
35-39	618	9,000	0.0687	0.0507	0.0510	0.0510	460	467
40-44	749	12,275	0.0610	0.0464	0.0395	0.0430	490	525
45-49	1,074	19,366	0.0555	0.0360	0.0330	0.0345	639	672
50-54	1,380	30,232	0.0456	0.0310	0.0285	0.0300	875	921
Totals	4,184	74,921	0.0558	0.0374	0.0365	0.0382	2,731	2,864

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0558	0.0374	0.0382
<b>Previous Investigation Results</b>	0.0543	0.0369	0.0363
<b>2011-2013</b>	0.0440	0.0325	0.0327
<b>2008-2010</b>	0.0372	0.0262	0.0315

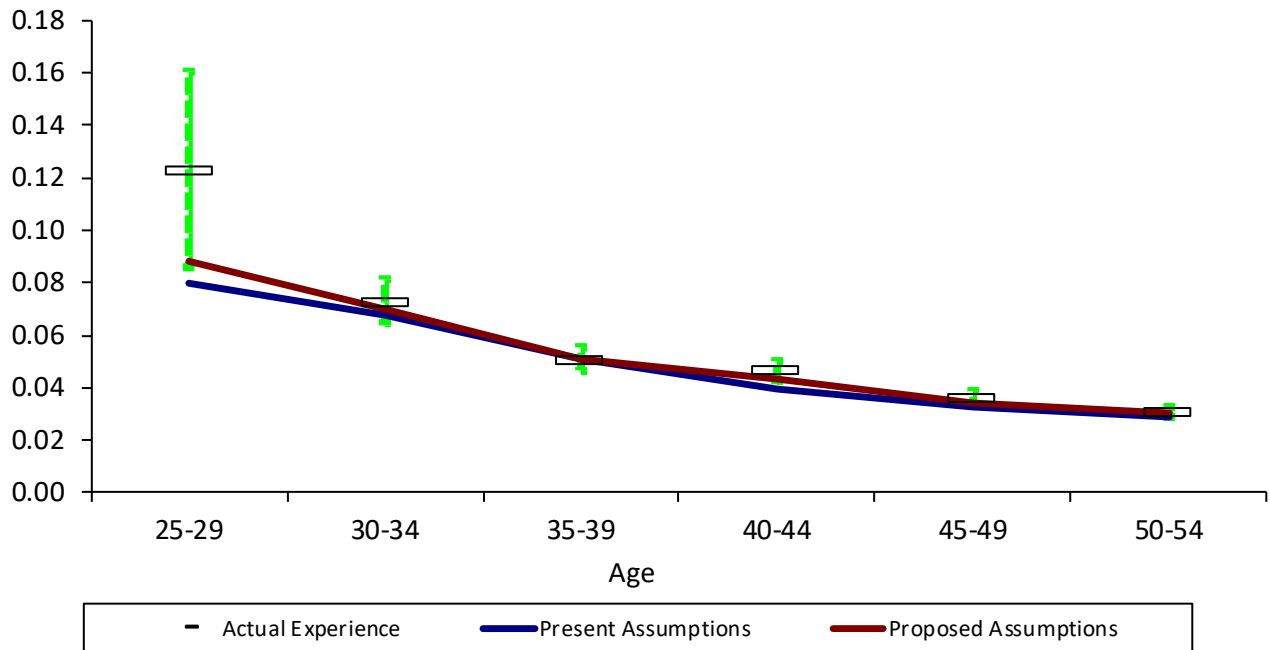
\* Sample rates are taken from midpoint of age group.

# Regular Females Withdrawal Experience

## Female Service-Based Withdrawals



## Female Age-Based Withdrawals



## SLEP Withdrawal Experience

There were 350 withdrawals and 3,452 years of exposure included in the service based withdrawal investigation for SLEP members with less than 7 years of service. Currently, the threshold for the service based table is 7 years. The proposed rates recommend the same threshold and slightly higher rates of withdrawal.

### SLEP Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	67	341	0.1965	0.1700	0.1833	58.0	62.5
2	77	634	0.1215	0.1000	0.1100	63.4	69.7
3	51	579	0.0881	0.0650	0.0800	37.6	46.3
4	69	563	0.1226	0.0620	0.0800	34.9	45.0
5	36	484	0.0744	0.0550	0.0650	26.6	31.5
6	31	453	0.0684	0.0460	0.0570	20.8	25.8
7	19	398	0.0477	0.0360	0.0410	14.3	16.3
8	17	362	0.0470			-	-
9	20	385	0.0519			-	-
10	20	455	0.0440			-	-
11	16	519	0.0308			-	-
12	25	531	0.0471			-	-
13	17	495	0.0343			-	-
14	5	490	0.0102			-	-
15	12	463	0.0259			-	-
16	4	444	0.0090			-	-
17	4	424	0.0094			-	-
18	4	426	0.0094			-	-
19	3	419	0.0072			-	-
20	12	363	0.0331			-	-
21	7	319	0.0219			-	-
22	8	266	0.0301			-	-
23	6	242	0.0248			-	-
24	1	177	0.0056			-	-
25	3	134	0.0224			-	-
26	-	102	0.0000			-	-
27	4	83	0.0482			-	-
28	3	49	0.0612			-	-
29	1	25	0.0400			-	-
30 & over	1	15	0.0667			-	-
Totals (Less Than or Equal to 7)	350	3,452	0.1014	0.0740	0.0861	255.6	297.1

## SLEP Withdrawal Experience

There were 192 withdrawals and 7,172 years of exposure included in the age based withdrawal investigation for SLEP members with more than 7 years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were lowered to be closer to these rates.

### SLEP Age-Based Withdrawals With More Than 7 Years of Service

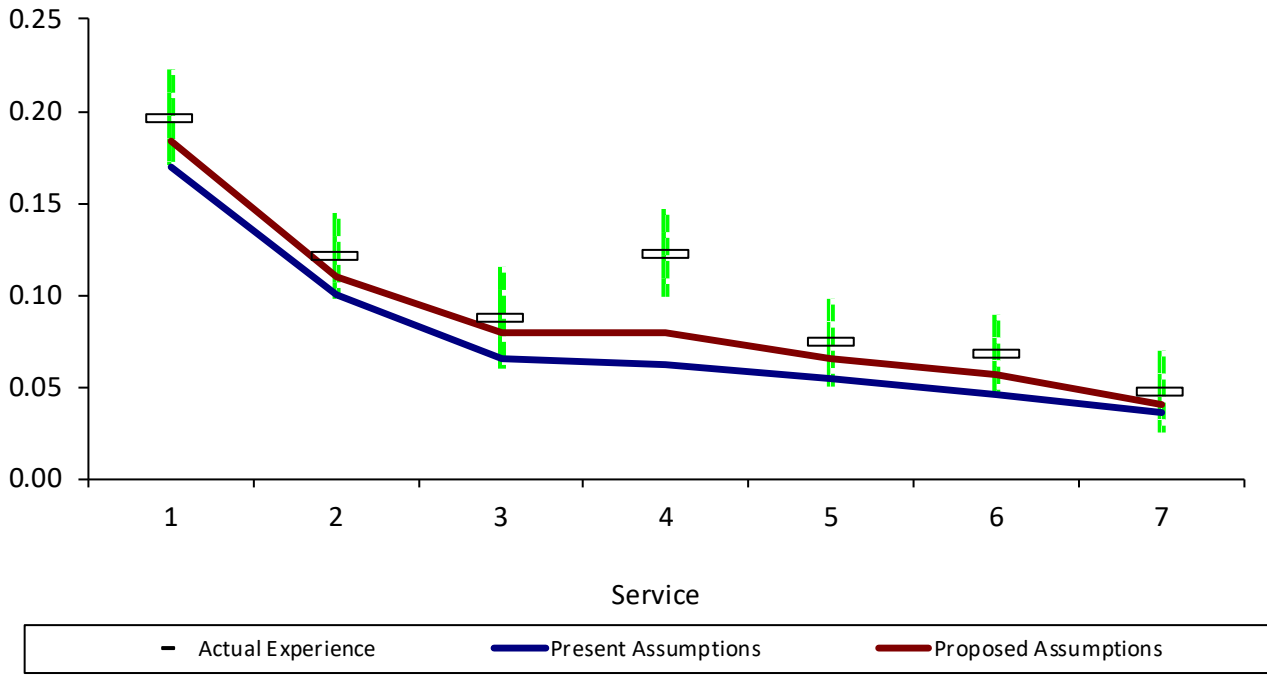
Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	4	34	0.1176	0.1040	0.0260	0.0410	0.9	1.3
30-34	40	772	0.0518	0.0470	0.0230	0.0350	16.5	24.4
35-39	41	1,618	0.0253	0.0202	0.0148	0.0175	24.7	30.8
40-44	32	1,685	0.0190	0.0157	0.0120	0.0150	20.8	25.8
45-49	47	2,256	0.0208	0.0184	0.0120	0.0150	27.1	33.8
50-54	17	521	0.0326	0.0391	0.0120	0.0150	6.2	7.8
55-59	11	286	0.0385	0.0229	0.0100	0.0150	2.9	4.3
Totals	192	7,172	0.0268	0.0209	0.0138	0.0179	99.1	128.2

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0268	0.0209	0.0179
<b>Previous Investigation Results</b>	0.0163	0.0130	0.0142
<b>2011-2013</b>	0.0157	0.0116	0.0158
<b>2008-2010</b>	0.0179	0.0130	0.0183

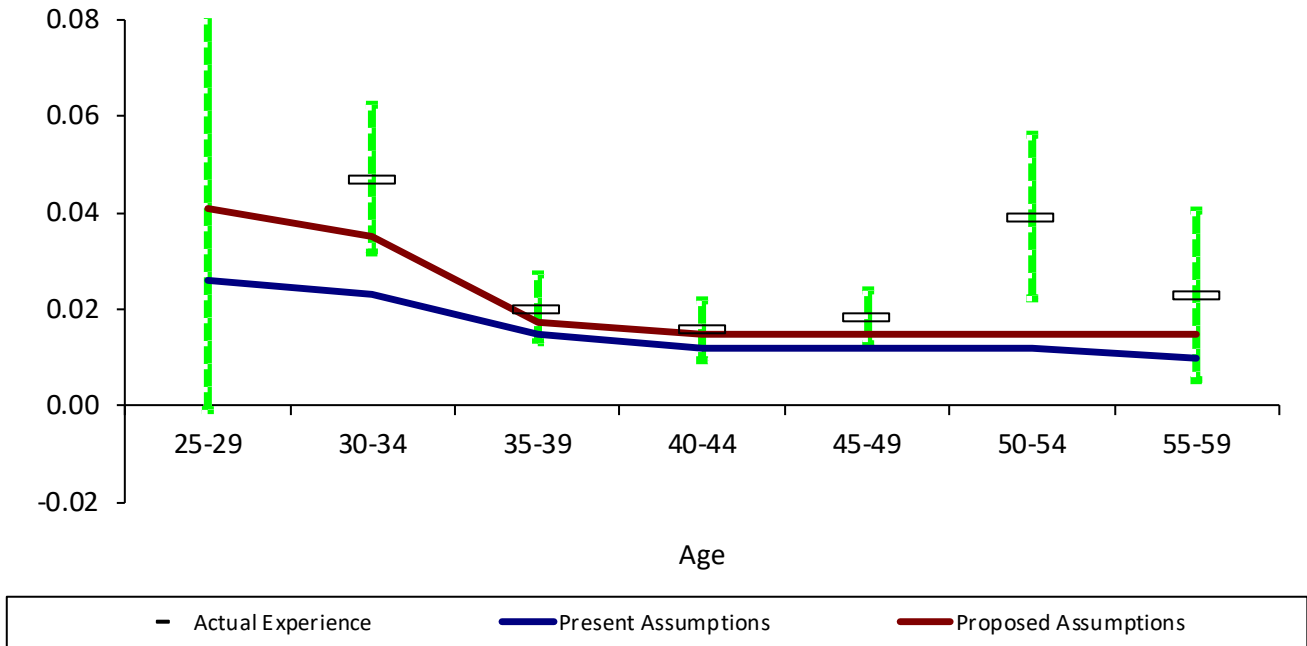
\* Sample rates are taken from midpoint of age group.

# SLEP Withdrawal Experience

## SLEP Service-Based Withdrawals



## SLEP Age-Based Withdrawals



## ECO Males Withdrawal Experience

There were 2 withdrawals and 23 years of exposure included in the male service based withdrawal investigation for ECO members with less than 8 years of service. Currently, the threshold for the service based table is 8 years.

### Male Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	-	-	N\A	0.4000	0.4000	-	-
2	-	1	0.0000	0.2000	0.2000	0.2	0.2
3	-	2	0.0000	0.1500	0.1500	0.3	0.3
4	-	2	0.0000	0.1400	0.1400	0.3	0.3
5	-	2	0.0000	0.1300	0.1300	0.3	0.3
6	-	3	0.0000	0.1200	0.1200	0.4	0.4
7	-	9	0.0000	0.1100	0.1100	1.0	1.0
8	2	4	0.5000	0.1000	0.1000	0.4	0.4
9	1	9	0.1111			-	-
10	1	8	0.1250			-	-
11	2	10	0.2000			-	-
12	-	4	0.0000			-	-
13	-	6	0.0000			-	-
14	1	2	0.5000			-	-
15	2	3	0.6667			-	-
16	-	-	N\A			-	-
17	-	3	0.0000			-	-
18	2	7	0.2857			-	-
19	1	6	0.1667			-	-
20	1	5	0.2000			-	-
21	1	-	N\A			-	-
22	-	1	0.0000			-	-
23	-	3	0.0000			-	-
24	-	3	0.0000			-	-
25	-	5	0.0000			-	-
26	-	2	0.0000			-	-
27	2	3	0.6667			-	-
28	1	-	N\A			-	-
29	-	-	N\A			-	-
30 & over	2	3	0.6667			-	-
Totals (Less Than or Equal to 8)	2	23	0.0870	0.1261	0.1261	2.9	2.9

## ECO Males Withdrawal Experience

There were 10 withdrawals and 83 years of exposure included in the male age based withdrawal investigation for ECO members with more than 8 years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to these rates.

### Male Age-Based Withdrawals With More Than 8 Years of Service

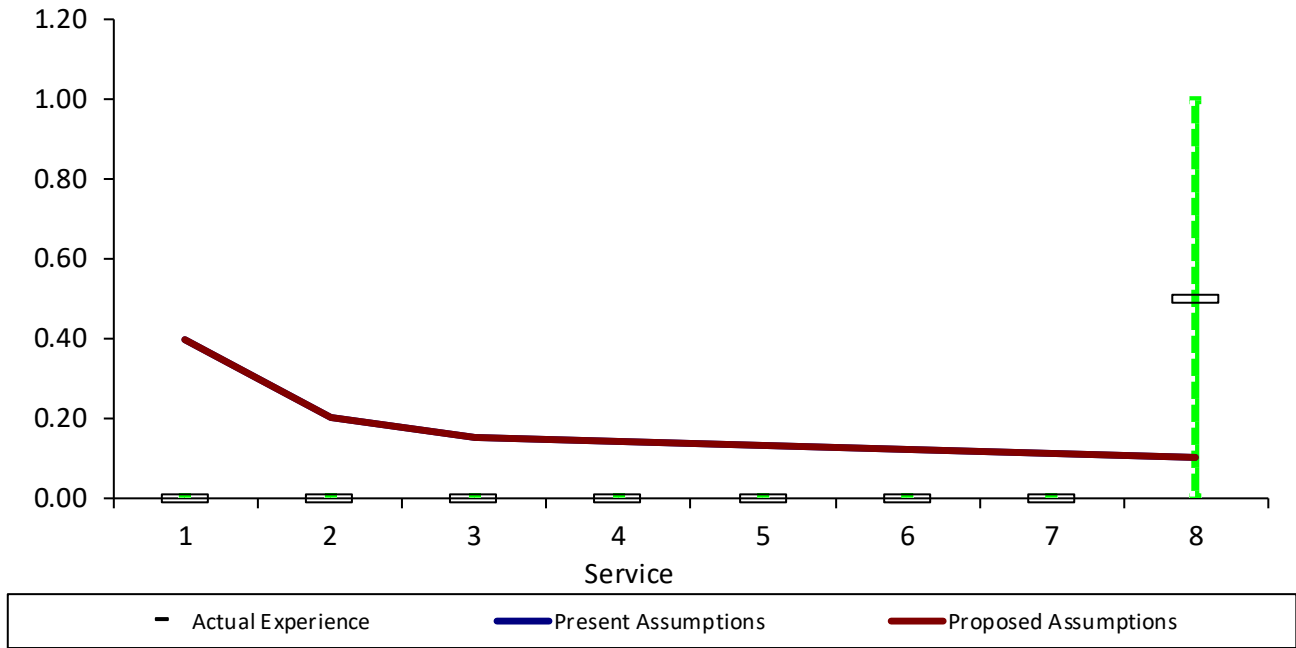
Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	-	-	0.0000	0.0000	0.0950	0.1000	-	-
30-34	-	-	0.0000	0.0000	0.0950	0.1000	-	-
35-39	2	8	0.2500	0.2531	0.0950	0.1000	0.8	0.8
40-44	4	17	0.2353	0.3701	0.0950	0.1000	1.6	1.7
45-49	-	16	0.0000	0.0000	0.0950	0.1000	1.5	1.6
50-54	4	42	0.0952	0.0735	0.0950	0.1000	4.0	4.2
Totals	10	83	0.1205	0.1251	0.0953	0.1000	7.9	8.3

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.1205	0.1251	0.1000
<b>Previous Investigation Results</b>	0.0900	0.1293	0.0960
<b>2011-2013</b>	0.1029	0.0666	0.0600
<b>2008-2010</b>	0.0846	0.0818	0.0550

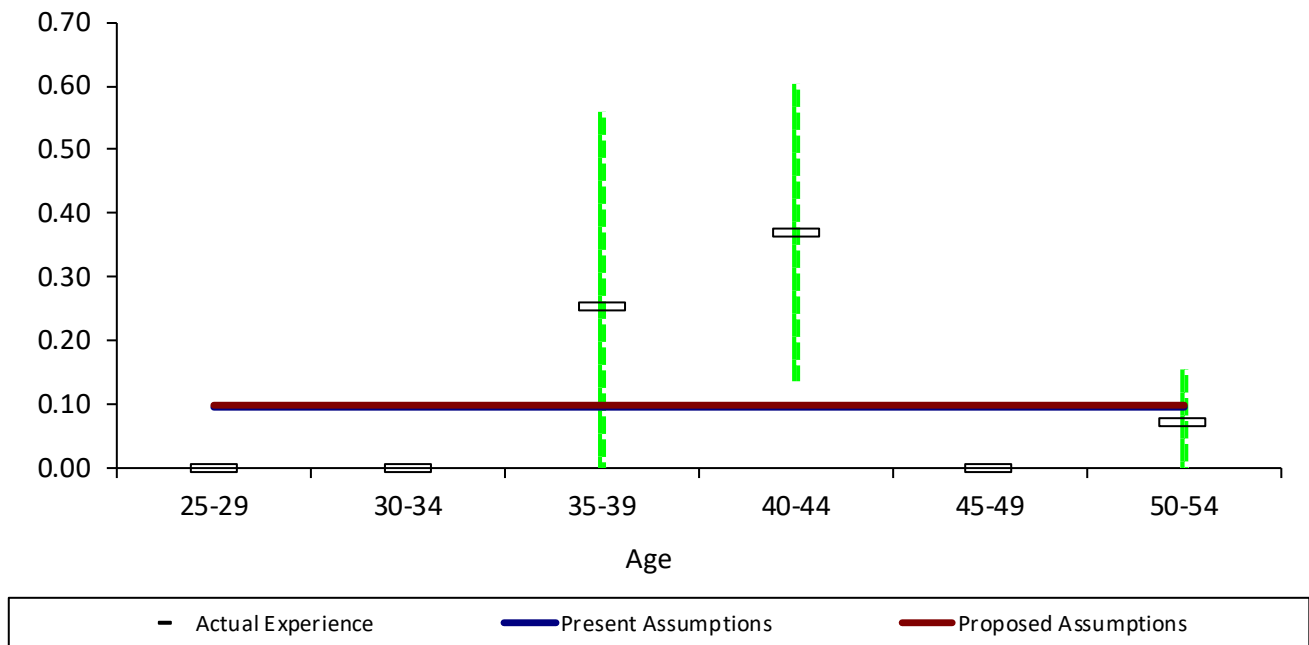
\* Sample rates are taken from midpoint of age group.

# ECO Males Withdrawal Experience

## Male Service-Based Withdrawals



## Male Age-Based Withdrawals





## ECO Females Withdrawal Experience

There were 2 withdrawals and 9 years of exposure included in the female service based withdrawal investigation for ECO members with less than 8 years of service. Currently, the threshold for the service based table is 8 years.

### Female Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	-	-	N\A	0.4000	0.4000	-	-
2	-	1	0.0000	0.2000	0.2000	0.2	0.2
3	-	-	N\A	0.1500	0.1500	-	-
4	-	-	N\A	0.1400	0.1400	-	-
5	-	-	N\A	0.1300	0.1300	-	-
6	-	-	N\A	0.1200	0.1200	-	-
7	-	5	0.0000	0.1100	0.1100	0.6	0.6
8	2	3	0.6667	0.1000	0.1000	0.3	0.3
9	2	5	0.4000			-	-
10	-	5	0.0000			-	-
11	-	5	0.0000			-	-
12	1	3	0.3333			-	-
13	-	1	0.0000			-	-
14	-	2	0.0000			-	-
15	-	4	0.0000			-	-
16	2	3	0.6667			-	-
17	-	3	0.0000			-	-
18	-	3	0.0000			-	-
19	-	1	0.0000			-	-
20	-	-	N\A			-	-
21	-	-	N\A			-	-
22	-	-	N\A			-	-
23	-	-	N\A			-	-
24	-	-	N\A			-	-
25	-	-	N\A			-	-
26	-	-	N\A			-	-
27	-	-	N\A			-	-
28	-	1	0.0000			-	-
29	-	-	N\A			-	-
30 & over	1	2	0.5000			-	-
Totals (Less Than or Equal to 8)	2	9	0.2222	0.1222	0.1222	1.1	1.1

## ECO Females Withdrawal Experience

There were 3 withdrawals and 38 years of exposure included in the female age based withdrawal investigation for ECO members with more than 8 years of service. Age based withdrawal was found to be more highly correlated with the liability weighted rates and therefore the proposed rates were increased to be closer to these rates.

### Female Age-Based Withdrawals With More Than 8 Years of Service

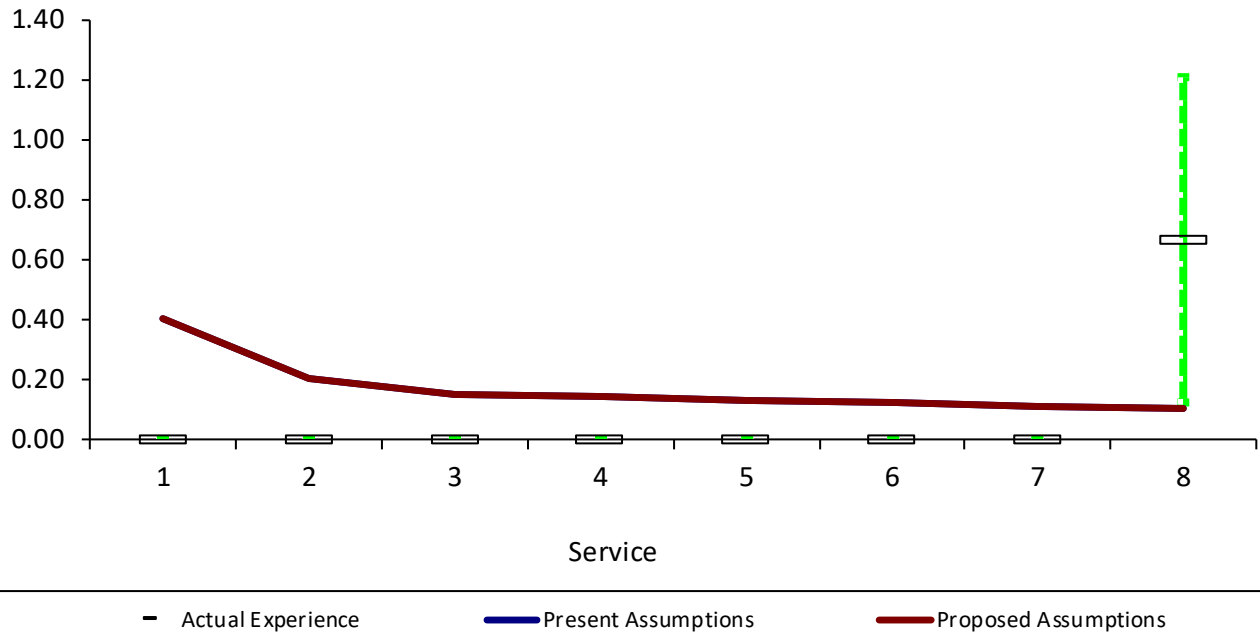
Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	-	-	0.0000	0.0000	0.0675	0.0735	-	-
30-34	-	-	0.0000	0.0000	0.0675	0.0735	-	-
35-39	-	-	0.0000	0.0000	0.0675	0.0735	-	-
40-44	-	4	0.0000	0.0000	0.0675	0.0735	0.3	0.3
45-49	2	13	0.1538	0.0565	0.0675	0.0735	0.9	1.0
50-54	1	21	0.0476	0.0806	0.0675	0.0735	1.4	1.5
Totals	3	38	0.0789	0.0661	0.0683	0.0743	2.6	2.8

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0789	0.0661	0.0743
<b>Previous Investigation Results</b>	0.1250	0.1030	0.0682
<b>2011-2013</b>	0.0722	0.0289	0.0320
<b>2008-2010</b>	0.0544	0.0494	0.0350

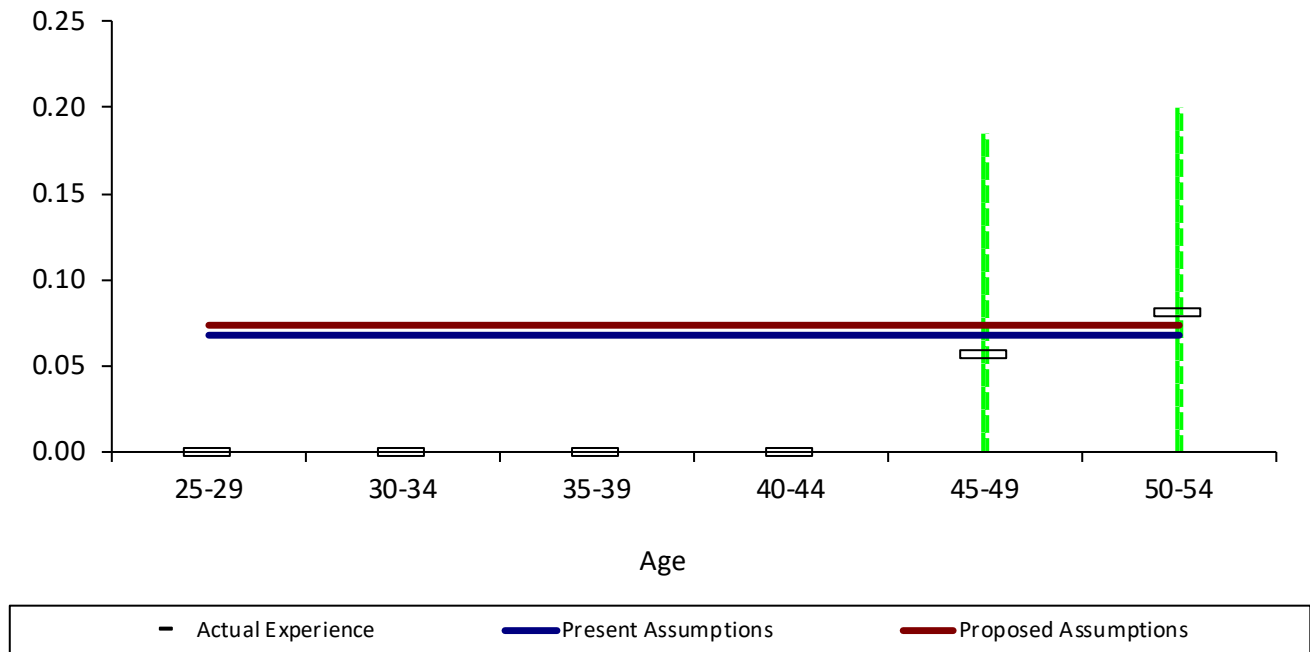
\* Sample rates are taken from midpoint of age group.

# ECO Females Withdrawal Experience

## Female Service-Based Withdrawals



## Female Age-Based Withdrawals



## ECO-SLEP Withdrawal Experience

There were 0 withdrawals and 2 years of exposure included in the service based withdrawal investigation for ECO-SLEP members with less than 7 years of service. Exposure for this group is very limited.

### Service-Based Withdrawals

Service Index	Withdrawal	Exposure	Actual Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	-	-	0.0000	0.1700	0.1700	-	-
2	-	-	0.0000	0.1000	0.1000	-	-
3	-	-	0.0000	0.0650	0.0650	-	-
4	-	-	0.0000	0.0620	0.0620	-	-
5	-	-	0.0000	0.0550	0.0550	-	-
6	-	-	0.0000	0.0460	0.0460	-	-
7	-	2	0.0000	0.0360	0.0360	0.1	0.1
8	2	2	1.0000	0.0000	0.0000	-	-
9	-	-	0.0000	0.0000	0.0000	-	-
10	-	-	0.0000	0.0000	0.0000	-	-
11	-	1	0.0000	0.0000	0.0000	-	-
12	-	1	0.0000	0.0000	0.0000	-	-
13	1	1	1.0000	0.0000	0.0000	-	-
14	-	-	0.0000	0.0000	0.0000	-	-
15	-	-	0.0000	0.0000	0.0000	-	-
16	-	-	0.0000	0.0000	0.0000	-	-
17	-	-	0.0000	0.0000	0.0000	-	-
18	1	1	1.0000	0.0000	0.0000	-	-
19	-	1	0.0000	0.0000	0.0000	-	-
20	-	-	0.0000	0.0000	0.0000	-	-
21	-	-	0.0000	0.0000	0.0000	-	-
22	-	-	0.0000	0.0000	0.0000	-	-
23	-	-	0.0000	0.0000	0.0000	-	-
24	-	-	0.0000	0.0000	0.0000	-	-
25	-	-	0.0000	0.0000	0.0000	-	-
26	-	-	0.0000	0.0000	0.0000	-	-
27	-	-	0.0000	0.0000	0.0000	-	-
28	-	-	0.0000	0.0000	0.0000	-	-
29	-	-	0.0000	0.0000	0.0000	-	-
30 & over	-	-	0.0000	0.0000	0.0000	-	-
Totals (Less Than or Equal to 7)	-	2	0.0000	0.0500	0.0500	0.1	0.1

## ECO SLEP Withdrawal Experience

There was 2 withdrawal and 6 years of exposure included in the age based withdrawal investigation for members with more than 7 years of service. Exposure is very limited for this group.

### ECO SLEP Age-Based Withdrawals With More Than 7 Years of Service

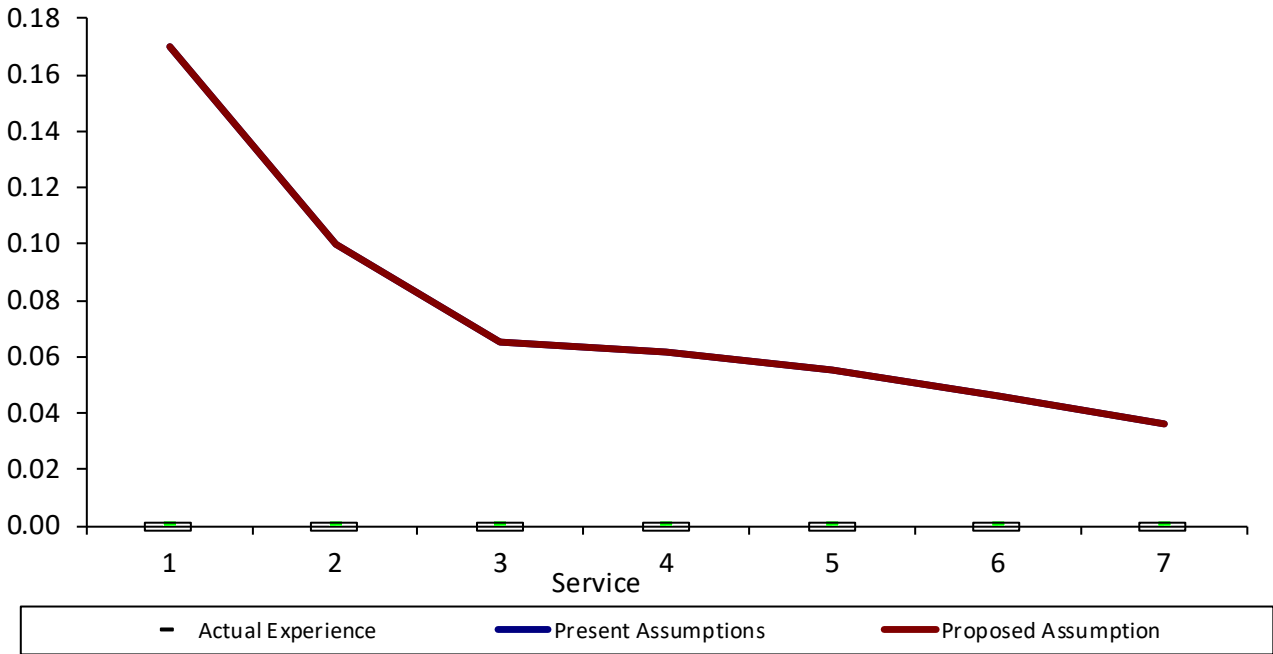
Age	Withdrawal	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Withdrawals	
			Population	Liability	Present	Proposed	Present	Proposed
25-29	-	-	0.0000	0.0000	0.0260	0.0260	-	-
30-34	-	-	0.0000	0.0000	0.0230	0.0230	-	-
35-39	-	-	0.0000	0.0000	0.0148	0.0148	-	-
40-44	-	-	0.0000	0.0000	0.0120	0.0120	-	-
45-49	-	-	0.0000	0.0000	0.0120	0.0120	-	-
50-54	2	6	0.3333	0.2329	0.0120	0.0120	0.1	0.1
Totals	2	6	0.3333	0.2329	0.0150	0.0150	0.1	0.1

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.3333	0.2329	0.0150
<b>Previous Investigation Results</b>	0.0833	0.0628	0.0150
<b>2011-2013</b>	0.0000	0.0000	0.0150
<b>2008-2010</b>	0.0417	0.0620	0.0192

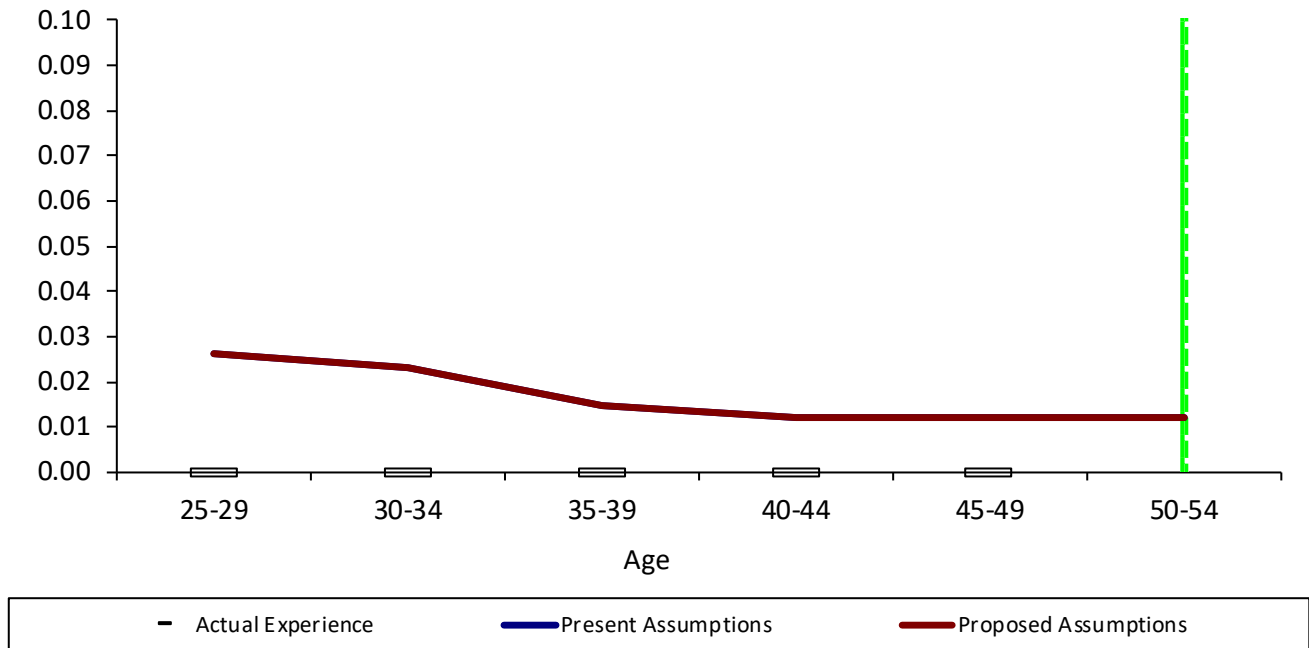
\* Sample rates are taken from midpoint of age group.

# ECO SLEP Withdrawal Experience

## ECO SLEP Service-Based Withdrawals



## ECO SLEP Age-Based Withdrawals



## **DISABILITY EXPERIENCE**

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## Regular Males – Disability Retirement Experience

There were 428 temporary disability benefit claims reported for the 3-year period and 179,139 years of exposure. However, there were approximately 35 permanent disabilities. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates		Permanent Disabilities				
			Weighted by		Sample Rates*		Actual	Expected	
			Population	Liability	Old	New		Present	Propose
Under 20	-	229	0.0000	0.0000	0.0000	0.0000		-	-
20-24	1	5,812	0.0002	0.0005	0.0000	0.0000		-	-
25-29	8	14,394	0.0006	0.0008	0.0000	0.0000		-	-
30-34	9	16,103	0.0006	0.0007	0.0001	0.0001		1	1
35-39	19	17,816	0.0011	0.0012	0.0001	0.0001		2	2
40-44	30	17,464	0.0017	0.0019	0.0002	0.0001		4	3
45-49	47	19,411	0.0024	0.0025	0.0003	0.0002		6	5
50-54	82	22,922	0.0036	0.0041	0.0005	0.0004		12	8
55-59	116	26,804	0.0043	0.0039	0.0008	0.0005		20	14
60-64	78	21,620	0.0036	0.0031	0.0009	0.0006		19	14
65-69	26	10,518	0.0025	0.0017	0.0009	0.0006		9	7
70-74	8	3,924	0.0020	0.0008	0.0007	0.0005		3	2
75 & over	4	2,122	0.0019	0.0003	0.0005	0.0003		1	1
Totals	428	179,139	0.0024	0.0030	0.0004	0.0003	35	77	57

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0002	0.0002	0.0003
<b>Previous Investigation Results</b>	0.0003	0.0003	0.0004
<b>2011-2013</b>	0.0004	0.0004	0.0005
<b>2008-2010</b>	0.0005	0.0005	0.0007

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.



## Regular Females – Disability Retirement Experience

There were 494 temporary disability benefit claims reported for the 3-year period and 317,620 years of exposure. However, there were approximately 28 permanent disabilities. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by		Permanent Disabilities				
			Population	Liability	Sample Rates*		Actual	Expected	
					Old	New		Present	Propose
Under 20	-	315	0.0000	0.0000	0.0000	0.0000	-	-	
20-24	2	7,463	0.0003	0.0002	0.0000	0.0000	-	-	
25-29	11	19,185	0.0006	0.0009	0.0000	0.0000	-	-	
30-34	16	21,700	0.0007	0.0011	0.0000	0.0000	1	1	
35-39	23	27,033	0.0009	0.0009	0.0001	0.0000	2	1	
40-44	34	31,704	0.0011	0.0017	0.0001	0.0001	3	2	
45-49	57	40,531	0.0014	0.0016	0.0001	0.0001	6	4	
50-54	93	49,113	0.0019	0.0022	0.0002	0.0002	11	8	
55-59	133	55,084	0.0024	0.0024	0.0003	0.0002	20	13	
60-64	94	42,890	0.0022	0.0020	0.0006	0.0004	25	16	
65-69	24	16,254	0.0015	0.0009	0.0006	0.0004	10	6	
70-74	4	4,601	0.0009	0.0001	0.0005	0.0003	2	1	
75 & over	3	1,747	0.0017	0.0006	0.0003	0.0002	1	-	
Totals	494	317,620	0.0016	0.0019	0.0003	0.0002	28	81	52

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0001	0.0001	0.0002
<b>Previous Investigation Results</b>	0.0002	0.0002	0.0002
<b>2011-2013</b>	0.0002	0.0002	0.0003
<b>2008-2010</b>	0.0003	0.0003	0.0004

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

## SLEP Males – Disability Retirement Experience

There were 12 temporary disability benefit claims reported for the 3-year period and 10,593 years of exposure. However, there were two permanent disabilities. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by		Permanent Disabilities				
			Population	Liability	Sample Rates*		Actual	Expected	
					Old	New		Present	Propose
Under 20	-	1	0.0000	0.0000	0.0000	0.0000	-	-	
20-24	-	142	0.0000	0.0000	0.0000	0.0000	-	-	
25-29	-	1,002	0.0000	0.0000	0.0001	0.0001	0.1	0.1	
30-34	-	1,474	0.0000	0.0000	0.0001	0.0001	0.2	0.2	
35-39	1	1,835	0.0005	0.0007	0.0002	0.0002	0.3	0.3	
40-44	2	1,661	0.0012	0.0013	0.0003	0.0002	0.4	0.4	
45-49	6	2,121	0.0028	0.0022	0.0004	0.0003	0.8	0.7	
50-54	1	1,341	0.0007	0.0003	0.0006	0.0005	0.8	0.6	
55-59	2	582	0.0034	0.0032	0.0008	0.0007	0.4	0.4	
60-64	-	321	0.0000	0.0000	0.0005	0.0005	0.2	0.1	
65-69	-	108	0.0000	0.0000	0.0004	0.0003	-	-	
70-74	-	5	0.0000	0.0000	0.0002	0.0002	-	-	
75 & over	-	-	0.0000	0.0000	0.0000	0.0000	-	-	
Totals	12	10,593	0.0011	0.0013	0.0003	0.0003	2	3.2	2.8

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0002	0.0002	0.0003
<b>Previous Investigation Results</b>	0.0001	0.0001	0.0003
<b>2011-2013</b>	0.0003	0.0003	0.0005
<b>2008-2010</b>	0.0000	0.0000	0.0007

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

## SLEP Females – Disability Retirement Experience

There were 7 temporary disability benefit claims reported for the 3-year period and 1,728 years of exposure. However, there were no permanent disabilities. The proposed rates recommend lower rates of permanent disability.

Age	Temporary Disabilities	Exposure	Actual Rates		Permanent Disabilities				
			Weighted by		Sample Rates*		Actual	Expected	
			Population	Liability	Old	New		Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0000	-	-	-
20-24	-	35	0.0000	0.0000	0.0001	0.0001	-	-	-
25-29	-	147	0.0000	0.0000	0.0003	0.0002	-	-	-
30-34	-	236	0.0000	0.0000	0.0004	0.0002	0.1	0.1	
35-39	2	280	0.0071	0.0099	0.0005	0.0004	0.2	0.1	
40-44	1	306	0.0033	0.0017	0.0008	0.0005	0.2	0.2	
45-49	3	302	0.0099	0.0071	0.0011	0.0007	0.3	0.2	
50-54	-	209	0.0000	0.0000	0.0017	0.0011	0.4	0.2	
55-59	-	145	0.0000	0.0000	0.0023	0.0015	0.3	0.2	
60-64	1	54	0.0185	0.0098	0.0016	0.0011	0.1	0.1	
65-69	-	14	0.0000	0.0000	0.0011	0.0007	-	-	
70-74	-	-	0.0000	0.0000	0.0005	0.0004	-	-	
75 & over	-	-	0.0000	0.0000	0.0000	0.0000	-	-	
Totals	7	1,728	0.0041	0.0036	0.0009	0.0006	-	1.6	1.1

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0000	0.0000	0.0006
<b>Previous Investigation Results</b>	0.0000	0.0000	0.0010
<b>2011-2013</b>	0.0000	0.0000	0.0013
<b>2008-2010</b>	0.0000	0.0000	0.0012

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

## ECO Males – Disability Retirement Experience

There were 0 temporary disability benefit claims reported for the 3-year period and 242 years of exposure. However, there were no permanent disabilities. The proposed rates recommend no changes for this group.

Age	Temporary Disabilities	Exposure	Actual Rates		Permanent Disabilities				
			Weighted by		Sample Rates*		Actual	Expected	
			Population	Liability	Old	New		Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001	-	-	-
20-24	-	-	0.0000	0.0000	0.0001	0.0001	-	-	-
25-29	-	-	0.0000	0.0000	0.0001	0.0001	-	-	-
30-34	-	2	0.0000	0.0000	0.0002	0.0002	-	-	-
35-39	-	8	0.0000	0.0000	0.0003	0.0003	-	-	-
40-44	-	18	0.0000	0.0000	0.0005	0.0005	-	-	-
45-49	-	18	0.0000	0.0000	0.0007	0.0007	-	-	-
50-54	-	44	0.0000	0.0000	0.0011	0.0011	-	-	-
55-59	-	52	0.0000	0.0000	0.0017	0.0017	0.1	0.1	0.1
60-64	-	61	0.0000	0.0000	0.0020	0.0020	0.1	0.1	0.1
65-69	-	29	0.0000	0.0000	0.0020	0.0020	0.1	0.1	0.1
70-74	-	7	0.0000	0.0000	0.0015	0.0015	-	-	-
75 & over	-	3	0.0000	0.0000	0.0010	0.0010	-	-	-
Totals	-	242	0.0000	0.0000	0.0012	0.0012	-	0.3	0.3

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0000	0.0000	0.0012
<b>Previous Investigation Results</b>	0.0000	0.0000	0.0012
<b>2011-2013</b>	0.0000	0.0000	0.0013
<b>2008-2010</b>	0.0000	0.0000	0.0014

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

## ECO Females – Disability Retirement Experience

There were 0 disability benefit claims reported for the 3-year period and 131 years of exposure. The proposed rates recommend no changes for this group.

Age	Temporary Disabilities	Exposure	Actual Rates		Permanent Disabilities				
			Weighted by		Sample Rates*		Actual	Expected	
			Population	Liability	Old	New		Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001		-	-
20-24	-	-	0.0000	0.0000	0.0001	0.0001		-	-
25-29	-	-	0.0000	0.0000	0.0001	0.0001		-	-
30-34	-	-	0.0000	0.0000	0.0001	0.0001		-	-
35-39	-	-	0.0000	0.0000	0.0002	0.0002		-	-
40-44	-	6	0.0000	0.0000	0.0003	0.0003		-	-
45-49	-	15	0.0000	0.0000	0.0004	0.0004		-	-
50-54	-	21	0.0000	0.0000	0.0008	0.0008		-	-
55-59	-	31	0.0000	0.0000	0.0011	0.0011		-	-
60-64	-	40	0.0000	0.0000	0.0020	0.0020		0.1	0.1
65-69	-	13	0.0000	0.0000	0.0020	0.0020		-	-
70-74	-	3	0.0000	0.0000	0.0015	0.0015		-	-
75 & over	-	2	0.0000	0.0000	0.0010	0.0010		-	-
Totals	-	131	0.0000	0.0000	0.0013	0.0013	-	0.1	0.1

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0000	0.0000	0.0013
<b>Previous Investigation Results</b>	0.0000	0.0000	0.0012
<b>2011-2013</b>	0.0000	0.0000	0.0011
<b>2008-2010</b>	0.0000	0.0000	0.0010

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

## ECO SLEP Males – Disability Retirement Experience

There were 0 disability benefit claims reported for the 3-year period and 27 years of exposure. The proposed rates recommend no changes for this group.

Age	Temporary Disabilities	Exposure	Actual Rates Weighted by		Permanent Disabilities				
			Population	Liability	Sample Rates*		Actual	Expected	
					Old	New		Present	Propose
Under 20	-	-	0.0000	0.0000	0.0001	0.0001		-	-
20-24	-	-	0.0000	0.0000	0.0001	0.0001		-	-
25-29	-	-	0.0000	0.0000	0.0001	0.0001		-	-
30-34	-	-	0.0000	0.0000	0.0002	0.0002		-	-
35-39	-	-	0.0000	0.0000	0.0003	0.0003		-	-
40-44	-	-	0.0000	0.0000	0.0005	0.0005		-	-
45-49	-	-	0.0000	0.0000	0.0007	0.0007		-	-
50-54	-	10	0.0000	0.0000	0.0011	0.0011		-	-
55-59	-	2	0.0000	0.0000	0.0017	0.0017		-	-
60-64	-	7	0.0000	0.0000	0.0020	0.0020		-	-
65-69	-	8	0.0000	0.0000	0.0020	0.0020		-	-
70-74	-	-	0.0000	0.0000	0.0015	0.0015		-	-
75 & over	-	-	0.0000	0.0000	0.0010	0.0010		-	-
Totals	-	27	0.0000	0.0000	0.0016	0.0016	-	-	-

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0000	0.0000	0.0016
<b>Previous Investigation Results</b>	0.0000	0.0000	0.0014
<b>2011-2013</b>	0.0000	0.0000	0.0014
<b>2008-2010</b>	0.0000	0.0000	0.0023

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

Exposures were not available for permanent disabilities. Approximate techniques were used to develop the actual number of permanent cases. These techniques did not lend themselves to allocating the cases within age groups.

## ECO SLEP Females – Disability Retirement Experience

There were 0 disability benefit claims reported for the 3-year period and 0 years of exposure.

**PAY INCREASES**

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**MERIT AND LONGEVITY PORTION**



## Regular Members

### Merit & Longevity Pay Increase Assumptions

#### Service Related Portion

Service Index	Pay Increase During the Next Year		
	Actual	Sample Values	
		Present	Proposed
1	10.62 %	7.10 %	7.10 %
2	6.57 %	6.40 %	6.40 %
3	3.93 %	3.60 %	3.60 %
4	2.96 %	2.70 %	2.70 %
5	2.66 %	2.20 %	2.20 %
6	2.42 %		
7	1.67 %		
8	1.65 %		
9	1.31 %		
10	1.23 %		
11	1.12 %		
12	0.79 %		
13	0.63 %		
14	0.55 %		
15	0.24 %		
16	0.39 %		
17	0.17 %		
18	0.04 %		
19	0.12 %		
20	0.08 %		
21	(0.03)%		
22	(0.29)%		
23	(0.13)%		
24	(0.17)%		
25	(0.02)%		
26	(0.32)%		
27	(0.14)%		
28	(0.39)%		
29	(0.30)%		
30	(0.28)%		
31	(0.23)%		
32	(0.65)%		
33	(0.54)%		
34	(0.23)%		
35	(0.24)%		
36	(0.36)%		
37	(0.58)%		
38	0.20 %		
39	(0.50)%		
40	0.00 %		

*Exposure weighted average of all ages.*

# Regular Members Merit & Longevity Pay Increase Assumptions Age Related Portion

## More Than 5 Years of Service

Age Group Beginning of Year	Pay Increase During the Next Year		
	Actual	Sample Values*	
		Present	Proposed
25-29	3.08 %	2.50 %	2.50 %
30-34	2.16 %	1.70 %	1.70 %
35-39	1.47 %	1.10 %	1.10 %
40-44	1.04 %	0.90 %	0.90 %
45-49	0.79 %	0.60 %	0.60 %
50-54	0.49 %	0.40 %	0.40 %
55-59	0.26 %	0.20 %	0.20 %
60-64	0.10 %	0.10 %	0.10 %

*\* Sample values are selected from midpoint of age group.*

# SLEP Members

## Merit & Longevity Pay Increase Assumptions

### Service Related Portion

Service Index	Total Pay Increase During the Next Year		
	Actual	Sample Values	
		Present	Proposed
1	10.52 %	11.00 %	11.00 %
2	6.80 %	8.50 %	8.50 %
3	2.97 %	4.00 %	4.00 %
4	2.99 %	3.50 %	3.50 %
5	1.90 %	3.00 %	3.00 %
6	2.85 %	2.50 %	2.50 %
7	1.82 %	2.00 %	2.00 %
8	1.57 %	1.50 %	1.50 %
9	2.37 %	1.25 %	1.25 %
10	2.13 %	1.00 %	1.00 %
11	1.40 %	0.75 %	0.75 %
12	1.97 %	0.75 %	0.75 %
13	0.50 %	0.50 %	0.50 %
14	0.25 %	0.50 %	0.50 %
15	(0.41)%	0.50 %	0.50 %
16	1.44 %	0.50 %	0.50 %
17	0.96 %	0.50 %	0.50 %
18	0.92 %	0.50 %	0.50 %
19	0.62 %	0.50 %	0.50 %
20	0.32 %	0.50 %	0.50 %
21	1.05 %	0.50 %	0.50 %
22	0.59 %	0.50 %	0.50 %
23	(0.06)%	0.50 %	0.50 %
24	(0.14)%	0.50 %	0.50 %
25	1.50 %	0.50 %	0.50 %
26	1.39 %	0.50 %	0.50 %
27	1.61 %	0.50 %	0.50 %
28	2.55 %	0.50 %	0.50 %
29	3.52 %	0.50 %	0.50 %
30	2.30 %	0.50 %	0.50 %
31	1.82 %	0.50 %	0.50 %
32	(1.46)%	0.50 %	0.50 %
33	(1.04)%	0.50 %	0.50 %
34	1.41 %	0.50 %	0.50 %
35	2.14 %	0.50 %	0.50 %
36	0.70 %	0.50 %	0.50 %
37	8.04 %	0.50 %	0.50 %
38	6.74 %	0.50 %	0.50 %
39	(9.31)%	0.50 %	0.50 %
40	(2.52)%	0.50 %	0.50 %

*Exposure weighted average of all ages.*

# **NORMAL & EARLY RETIREMENT EXPERIENCE**

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## Regular Males

### Normal Retirement Experience (Tier 1)

There were 4,708 age and service unreduced retirements and 26,542 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male Tier 1 retirement investigation. Retirement rates were found to be more highly correlated with the liability weighted rates and therefore the proposed rates were adjusted slightly at various ages.

Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	32	32	1.0000	1.0000	N/A	N/A	-	-
55	65	225	0.2889	0.2856	0.3700	0.3300	83	74
56	58	257	0.2257	0.2520	0.2800	0.2650	72	68
57	47	294	0.1599	0.1607	0.2100	0.1850	62	54
58	78	350	0.2229	0.2374	0.2100	0.2250	74	79
59	77	369	0.2087	0.2087	0.2300	0.2200	85	81
60	320	3,515	0.0910	0.1248	0.1300	0.1300	457	457
61	322	3,326	0.0968	0.1225	0.1300	0.1250	432	416
62	565	3,111	0.1816	0.2216	0.2100	0.2150	653	669
63	423	2,578	0.1641	0.2123	0.1900	0.2000	490	516
64	311	2,239	0.1389	0.1781	0.1800	0.1800	403	403
65	473	2,079	0.2275	0.2738	0.2500	0.2600	520	541
66	490	1,665	0.2943	0.3305	0.3100	0.3200	516	533
67	284	1,220	0.2328	0.2589	0.2600	0.2600	317	317
68	196	934	0.2099	0.2171	0.2400	0.2300	224	215
69	152	737	0.2062	0.2277	0.2200	0.2250	162	166
70	163	618	0.2638	0.3004	0.2200	0.2600	136	161
71	117	514	0.2276	0.2619	0.2200	0.2400	113	123
72	71	415	0.1711	0.1585	0.1900	0.1750	79	73
73	83	362	0.2293	0.2441	0.2000	0.2200	72	80
74	63	309	0.2039	0.1916	0.2100	0.2000	65	62
75 & over	350	1,425	0.2456	0.2526	0.2100	0.2300	299	328
<b>Total (55 &amp; over)</b>	<b>4,708</b>	<b>26,542</b>	<b>0.1774</b>	<b>0.2009</b>	<b>0.2002</b>	<b>0.2041</b>	<b>5,314</b>	<b>5,416</b>

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.1774	0.2009	0.2041
<b>Previous Investigation Results</b>	0.1773	0.2027	0.2003
<b>2011-2013</b>	0.1712	0.1962	0.1965
<b>2008-2010</b>	0.1775	0.1943	0.1958

## Regular Males

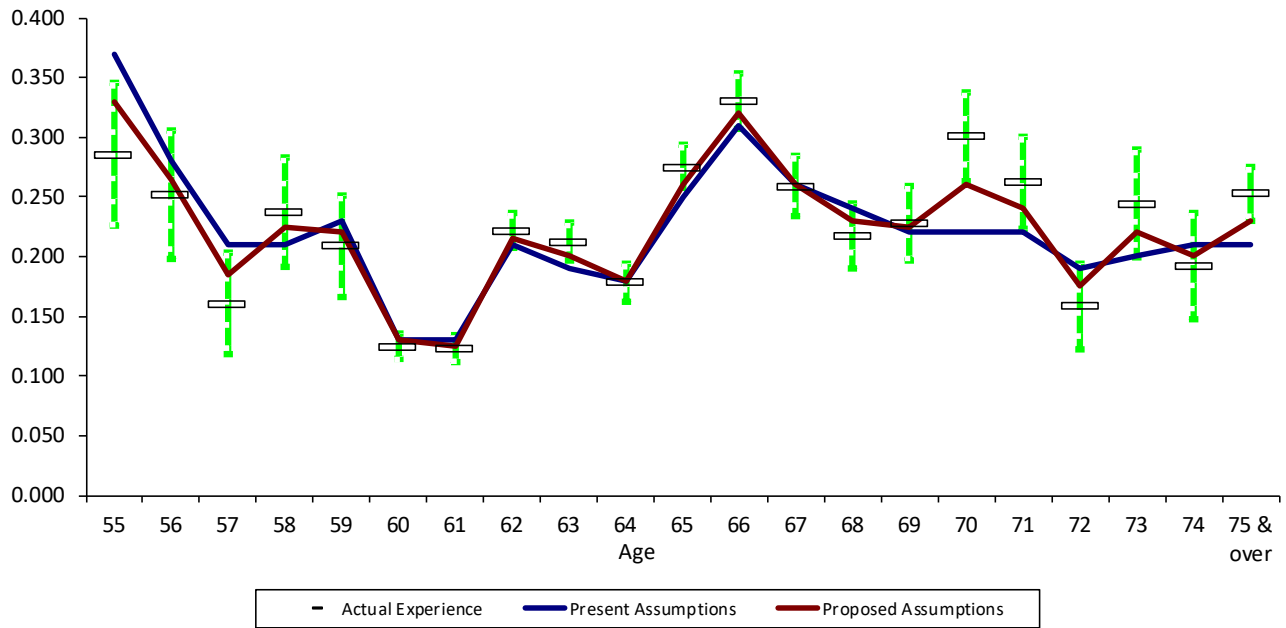
### Early Retirement Experience (Tier 1)

There were 933 age and service reduced retirements and 17,521 life years of exposure (exposure includes active members eligible for reduced retirement) in the male Tier 1 retirement investigation. Retirement rates were found to be more highly correlated with the liability weighted rates. We recommend lowering the proposed rates.

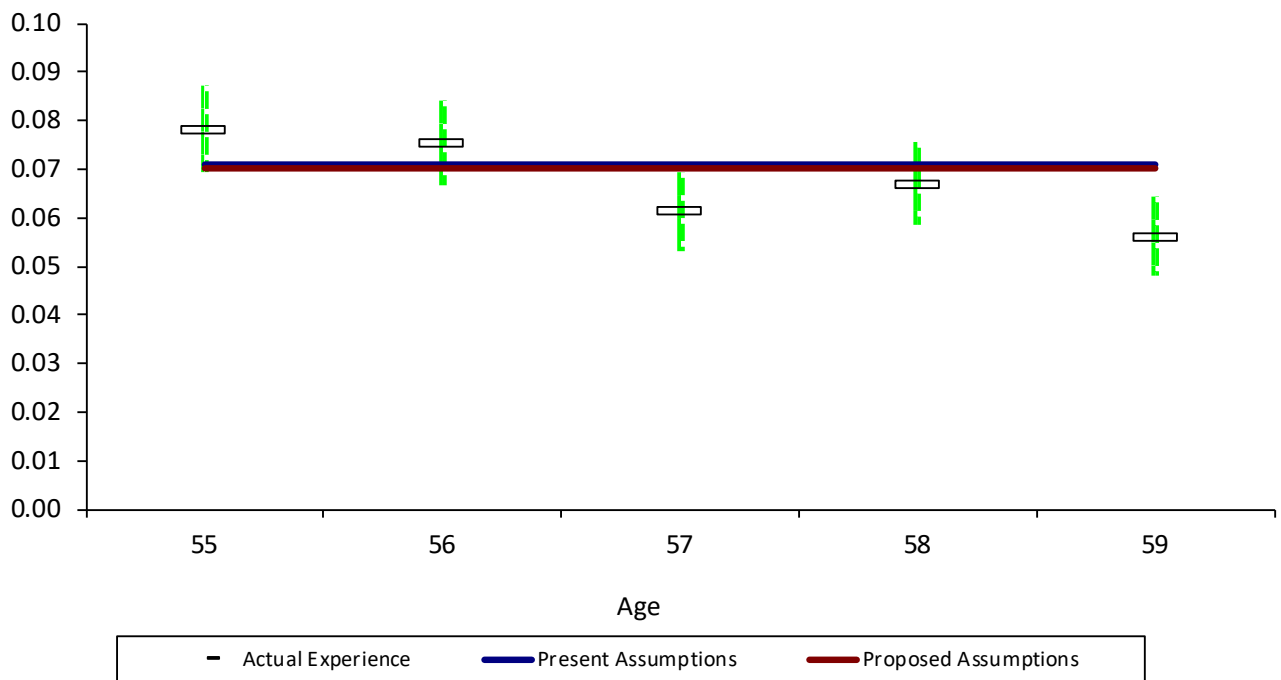
Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
55	215	3,735	0.0576	0.0782	0.0710	0.0700	265	261
56	211	3,693	0.0571	0.0755	0.0710	0.0700	262	259
57	174	3,566	0.0488	0.0613	0.0710	0.0700	253	250
58	183	3,332	0.0549	0.0670	0.0710	0.0700	237	233
59	150	3,195	0.0469	0.0561	0.0710	0.0700	227	224
Total	933	17,521	0.0533	0.0682	0.0710	0.0700	1,244	1,227

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0533	0.0682	0.0700
<b>Previous Investigation Results</b>	0.0547	0.0691	0.0710
<b>2011-2013</b>	0.0564	0.0741	0.0725
<b>2008-2010</b>	0.0510	0.0705	0.0725

## Rates of Normal Retirement Regular Males



## Rates of Early Retirement Regular Males



## Regular Females Normal Retirement Experience (Tier 1)

There were 8,691 age and service reduced retirements and 52,208 life years of exposure (exposure includes active members eligible for reduced retirement) in the female Tier 1 retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates and therefore the proposed rates were adjusted slightly at various ages.

Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	13	13	1.0000	1.0000	N\A	N\A	-	-
55	44	146	0.3014	0.3315	0.2600	0.2950	38	43
56	29	156	0.1859	0.2050	0.2000	0.2025	31	32
57	29	195	0.1487	0.1431	0.1700	0.1550	33	30
58	41	240	0.1708	0.1579	0.1700	0.1650	41	40
59	46	256	0.1797	0.1560	0.1900	0.1750	49	45
60	780	8,074	0.0966	0.1217	0.1100	0.1150	888	929
61	645	7,539	0.0856	0.1069	0.1000	0.1050	754	792
62	1,001	7,058	0.1418	0.1673	0.1800	0.1750	1,270	1,235
63	858	6,033	0.1422	0.1654	0.1800	0.1750	1,086	1,056
64	657	5,057	0.1299	0.1484	0.1700	0.1600	860	809
65	1,175	4,378	0.2684	0.2799	0.2600	0.2700	1,139	1,182
66	1,048	3,254	0.3221	0.3633	0.2800	0.3200	911	1,041
67	623	2,236	0.2786	0.3097	0.2600	0.2850	581	637
68	352	1,653	0.2129	0.2414	0.2200	0.2300	364	380
69	305	1,289	0.2366	0.2711	0.2300	0.2500	296	322
70	267	1,079	0.2475	0.2775	0.2300	0.2550	248	275
71	172	804	0.2139	0.2509	0.2100	0.2300	169	185
72	122	601	0.2030	0.2385	0.2100	0.2250	126	135
73	89	444	0.2005	0.2327	0.2300	0.2100	102	93
74	85	377	0.2255	0.2383	0.2100	0.2250	79	85
75 & over	323	1,339	0.2412	0.2609	0.2200	0.2400	295	321
Total (55 & over)	8,691	52,208	0.1665	0.1886	0.1793	0.1852	9,360	9,667

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.1665	0.1886	0.1852
<b>Previous Investigation Results</b>	0.1677	0.1831	0.1783
<b>2011-2013</b>	0.1551	0.1729	0.1714
<b>2008-2010</b>	0.1467	0.1539	0.1637



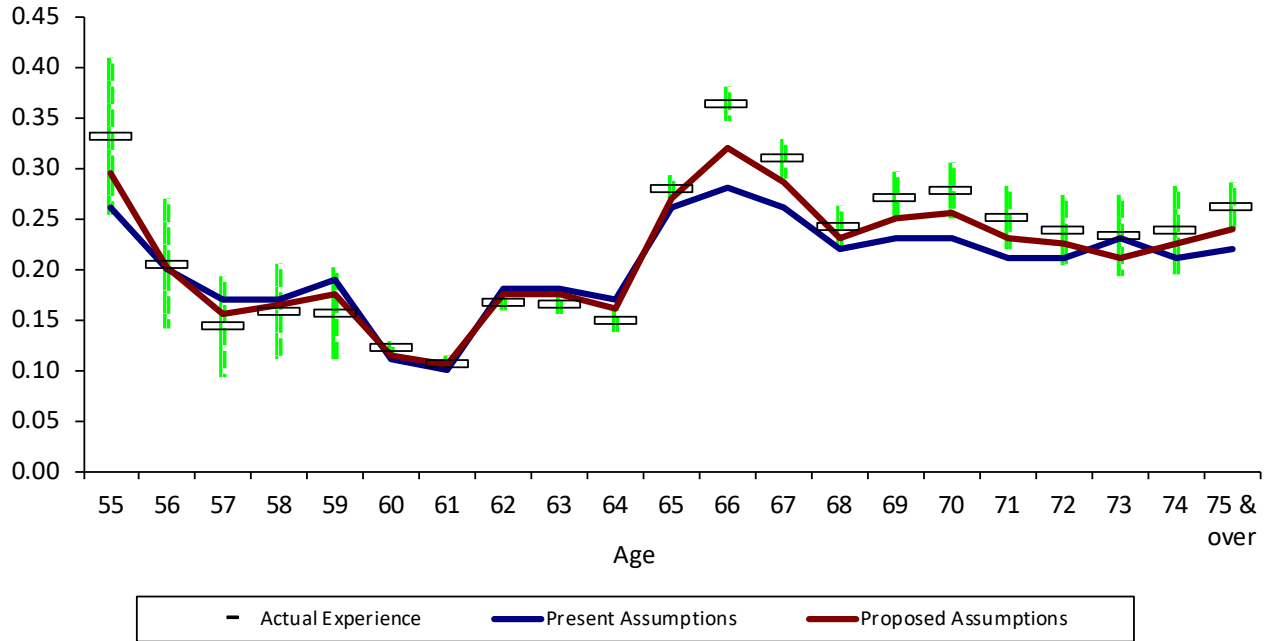
## Regular Females Early Retirement Experience (Tier 1)

There were 2,012 age and service reduced retirements and 39,515 life years of exposure (exposure includes active members eligible for reduced retirement) in the female Tier 1 retirement investigation. Retirement rates were found to be highly correlated with the liability weighted rates. We recommend increasing the proposed rates.

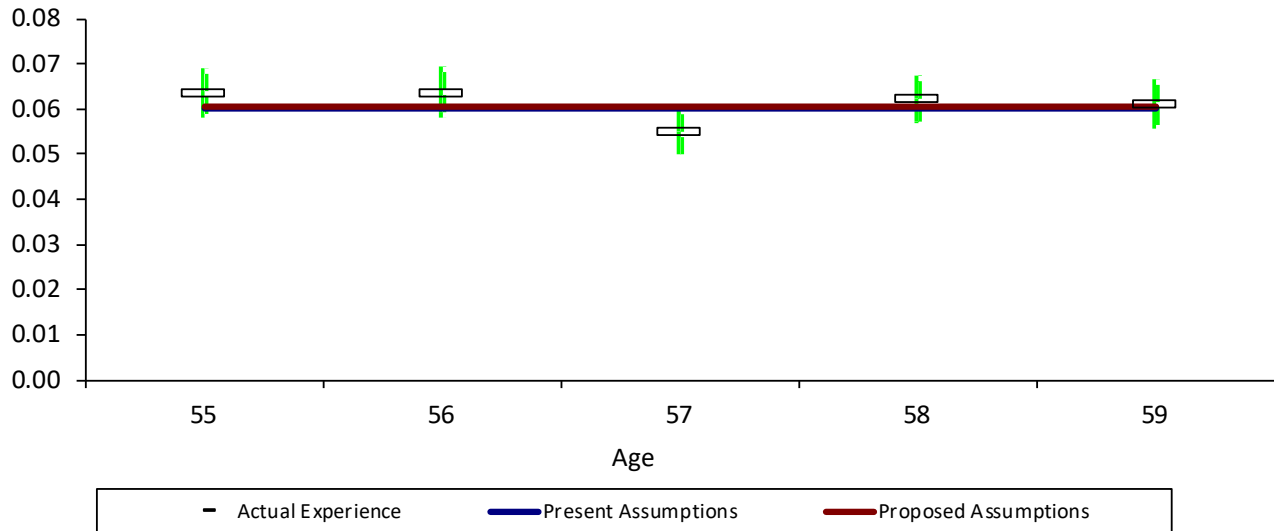
Age	Retirement	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
55	386	7,710	0.0501	0.0636	0.0600	0.0605	463	466
56	424	7,851	0.0540	0.0637	0.0600	0.0605	471	475
57	361	7,920	0.0456	0.0550	0.0600	0.0605	475	479
58	427	8,090	0.0528	0.0622	0.0600	0.0605	485	489
59	414	7,944	0.0521	0.0612	0.0600	0.0605	477	481
Total	2,012	39,515	0.0509	0.0611	0.0600	0.0605	2,371	2,390

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.0509	0.0611	0.0605
<b>Previous Investigation Results</b>	0.0511	0.0612	0.0600
<b>2011-2013</b>	0.0443	0.0567	0.0575
<b>2008-2010</b>	0.0387	0.0504	0.0575

## Rates of Normal Retirement Regular Females



## Rates of Early Retirement Regular Females



## SLEP Members

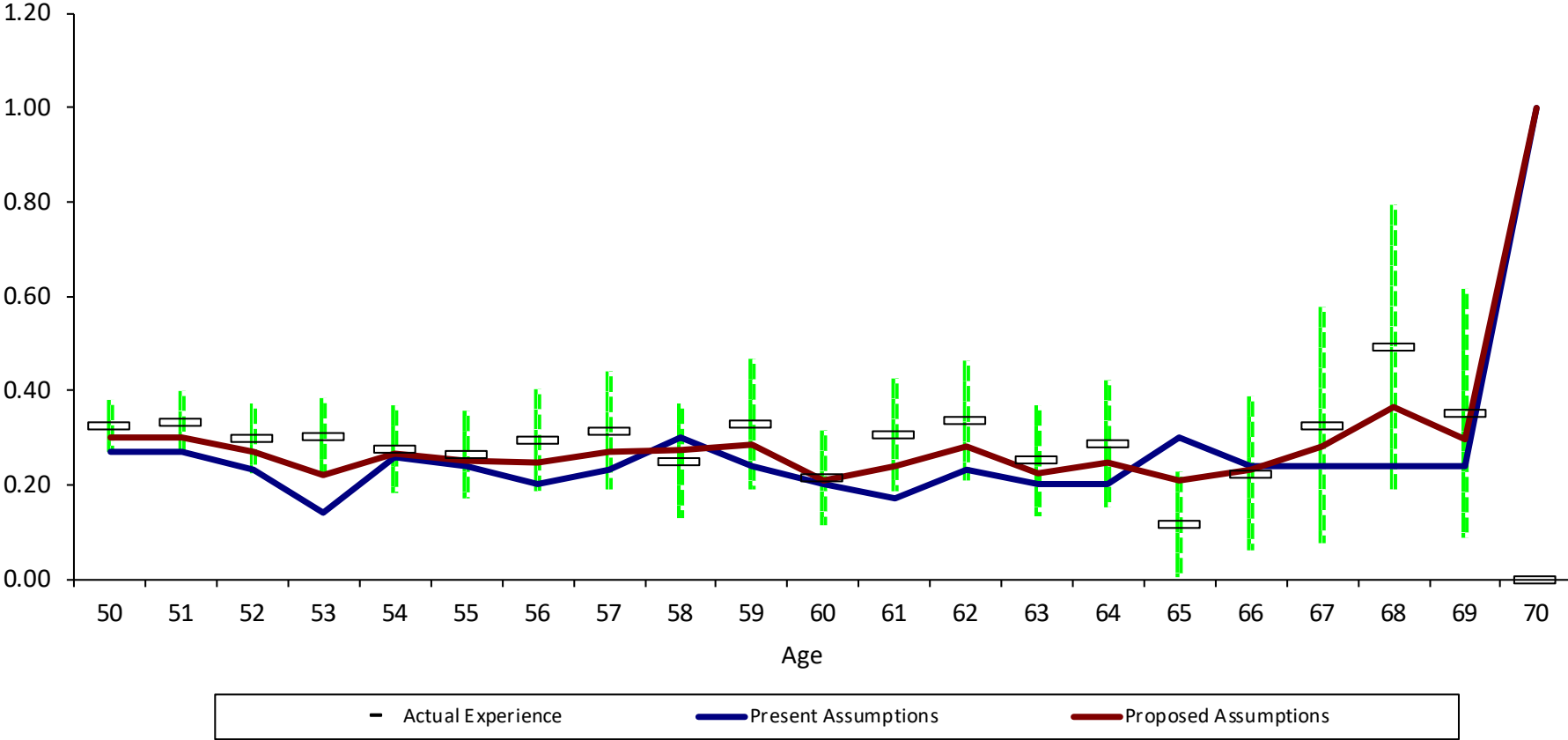
### Normal Retirement Experience (Tier 1)

There were 445 age and service unreduced retirements and 1,701 life years of exposure (exposure includes active members eligible for unreduced retirement) in the Tier 1 retirement investigation. Of these 42 retired after attaining 32 years of service and therefore a maximum of 80% of FAC. We recommend increasing the proposed rates for members with less than 32 years of service, and no change in the rates for members with greater than 32 years of service. We are also recommending the same table be used for both males and females.

Service	Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
				Population	Liability	Present	Proposed	Present	Proposed
less than 32 years	50	81	289	0.2803	0.3259	0.2700	0.3000	78.1	86.7
	51	61	221	0.2760	0.3341	0.2700	0.3000	59.6	66.3
	52	37	147	0.2517	0.2985	0.2300	0.2700	33.9	39.7
	53	32	122	0.2623	0.3012	0.1400	0.2200	17.0	26.8
	54	21	94	0.2234	0.2754	0.2600	0.2650	24.4	24.9
	55	21	90	0.2333	0.2654	0.2400	0.2500	22.3	22.5
	56	22	72	0.3056	0.2941	0.2000	0.2450	14.4	17.6
	57	17	55	0.3091	0.3149	0.2300	0.2700	12.7	14.9
	58	13	51	0.2549	0.2495	0.3000	0.2750	15.3	14.0
	59	15	46	0.3261	0.3295	0.2400	0.2850	10.8	13.1
	60	10	68	0.1471	0.2153	0.2000	0.2100	13.4	14.3
	61	13	59	0.2203	0.3051	0.1700	0.2400	10.0	14.2
	62	16	55	0.2909	0.3342	0.2300	0.2800	12.7	15.4
	63	12	53	0.2264	0.2511	0.2000	0.2250	10.6	11.9
	64	11	45	0.2444	0.2867	0.2000	0.2450	9.0	11.0
	65	2	33	0.0606	0.1171	0.3000	0.2100	9.8	6.9
	66	7	26	0.2692	0.2229	0.2400	0.2300	6.2	6.0
	67	3	14	0.2143	0.3257	0.2400	0.2800	3.4	3.9
	68	4	11	0.3636	0.4932	0.2400	0.3650	2.7	4.0
	69	4	13	0.3077	0.3520	0.2400	0.2950	3.1	3.8
	70	-	-	0.0000	0.0000	1.0000	1.0000	-	-
71	1	-	0.0000	0.0000	1.0000	1.0000	-	-	
72	-	-	0.0000	0.0000	1.0000	1.0000	-	-	
73	-	-	0.0000	0.0000	1.0000	1.0000	-	-	
74	-	-	0.0000	0.0000	1.0000	1.0000	-	-	
75 & over	-	-	0.0000	0.0000	1.0000	1.0000	-	-	
	Total	403	1,564	0.2577	0.3041	0.2362	0.2672	369.4	417.9
more than 32 years	All	42	137	0.3066	0.3021	0.3500	0.3260	48.0	44.7

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
Current	0.2577	0.3041	0.2672
Previous Investigation Results	0.2451	0.2935	0.2344
2011-2013	0.1894	0.2168	0.2034
2008-2010	0.1935	0.2130	0.1790

# SLEP Members Normal Retirement Experience



## ECO Males

### Normal Retirement Experience (Tier 1)

There were 28 age and service unreduced retirements and 136 life years of exposure (exposure includes active members eligible for unreduced retirement) in the male Tier 1 retirement investigation.

Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	-	-	N\A	N/A	N\A	N\A	-	-
55	3	9	0.3333	0.4144	0.2500	0.2500	2.3	2.3
56	1	11	0.0909	0.1309	0.2500	0.2500	2.8	2.8
57	1	9	0.1111	0.2047	0.1500	0.1500	1.4	1.4
58	1	5	0.2000	0.1117	0.1500	0.1500	0.8	0.8
59	1	7	0.1429	0.2789	0.1500	0.1500	1.1	1.1
60	2	11	0.1818	0.1646	0.1500	0.1500	1.7	1.7
61	4	13	0.3077	0.0818	0.1500	0.1500	2.0	2.0
62	1	9	0.1111	0.1227	0.1500	0.1500	1.4	1.4
63	-	11	0.0000	0.0000	0.1500	0.1500	1.7	1.7
64	4	14	0.2857	0.2380	0.1500	0.1500	2.1	2.1
65	2	11	0.1818	0.2681	0.1500	0.1500	1.7	1.7
66	1	4	0.2500	0.0999	0.1500	0.1500	0.6	0.6
67	1	3	0.3333	0.3499	0.1500	0.1500	0.5	0.5
68	1	4	0.2500	0.3307	0.1500	0.1500	0.6	0.6
69	-	5	0.0000	0.0000	0.1500	0.1500	0.8	0.8
70	1	4	0.2500	0.0516	0.1500	0.1500	0.6	0.6
71	1	2	0.5000	0.1334	0.1500	0.1500	0.3	0.3
72	-	-	N\A	N/A	0.1500	0.1500	-	-
73	-	-	N\A	N/A	0.1500	0.1500	-	-
74	1	1	1.0000	1.0000	0.1500	0.1500	0.2	0.2
75 & over	2	3	0.6667	0.6872	0.1700	0.1700	0.5	0.5
<b>Total</b>	<b>28</b>	<b>136</b>	<b>0.2059</b>	<b>0.1875</b>	<b>0.1699</b>	<b>0.1699</b>	<b>23.1</b>	<b>23.1</b>

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.2059	0.1875	0.1699
<b>Previous Investigation Results</b>	0.1389	0.1889	0.1647
<b>2011-2013</b>	0.1024	0.1367	0.1599
<b>2008-2010</b>	0.1717	0.1817	0.1837

## ECO Females

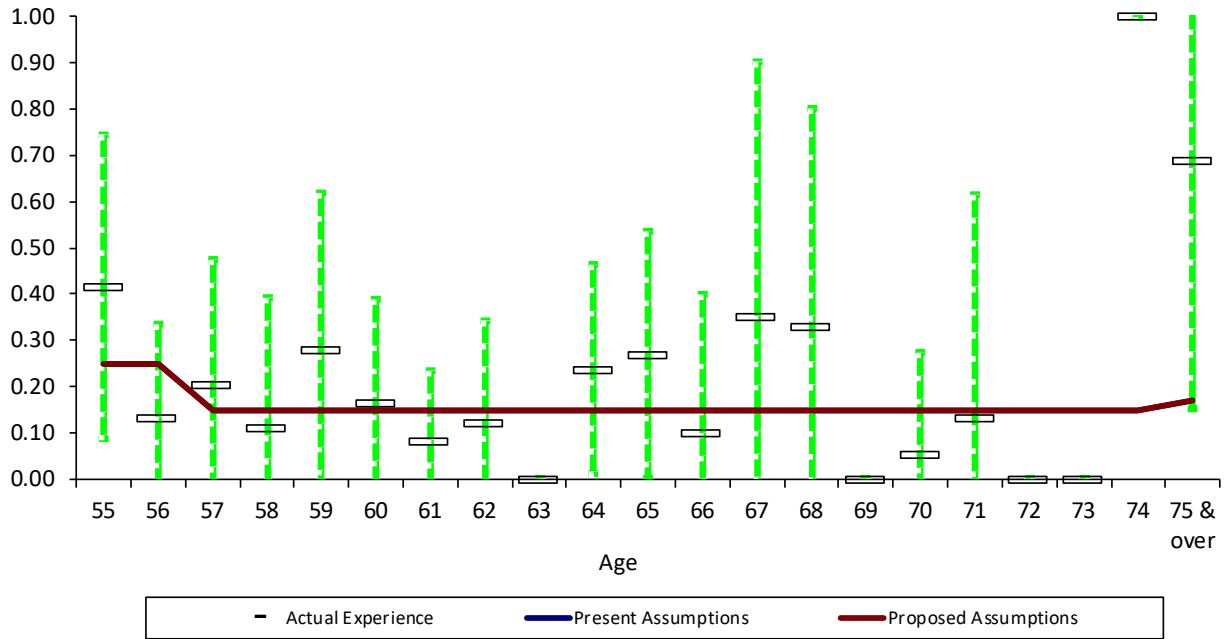
### Normal Retirement Experience (Tier 1)

There were 17 age and service unreduced retirements and 85 life years of exposure (exposure includes active members eligible for unreduced retirement) in the female Tier 1 retirement investigation.

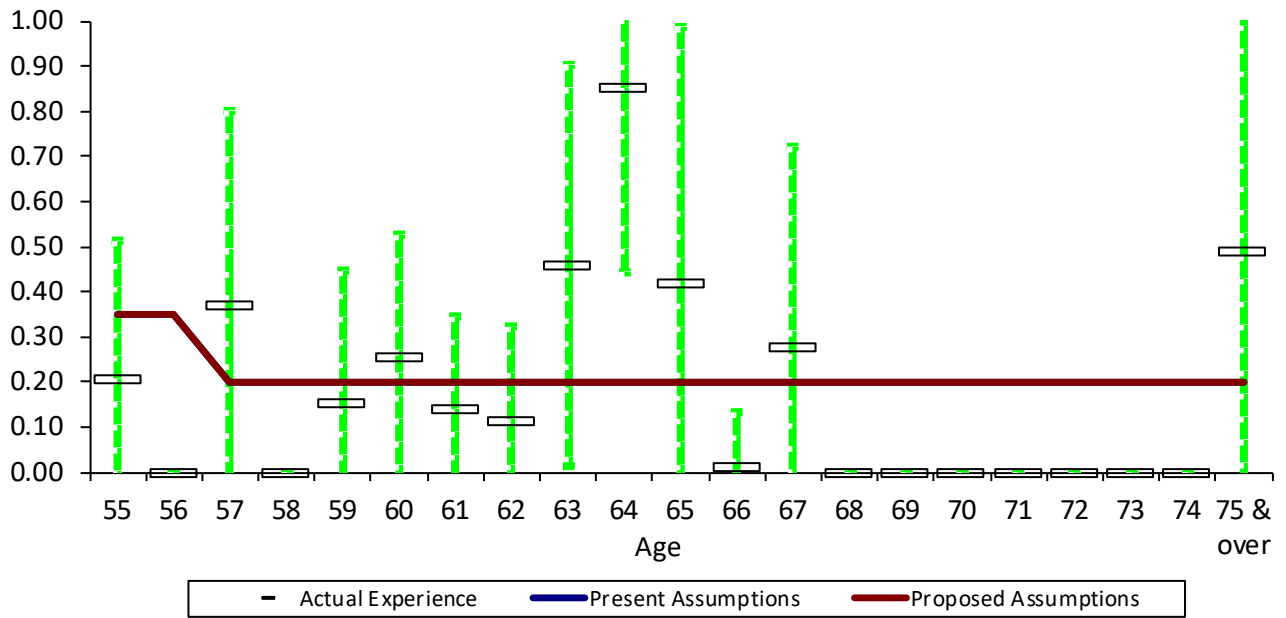
Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 55	1	1	1.0000	N/A	N\A	N\A	-	-
55	1	7	0.1429	0.2065	0.3500	0.3500	2.1	2.1
56	-	8	0.0000	0.0000	0.3500	0.3500	2.8	2.8
57	2	5	0.4000	0.3691	0.2000	0.2000	1.0	1.0
58	-	4	0.0000	0.0000	0.2000	0.2000	0.8	0.8
59	1	6	0.1667	0.1536	0.2000	0.2000	1.2	1.2
60	2	10	0.2000	0.2526	0.2000	0.2000	2.0	2.0
61	1	11	0.0909	0.1385	0.2000	0.2000	2.2	2.2
62	1	9	0.1111	0.1114	0.2000	0.2000	1.8	1.8
63	2	5	0.4000	0.4582	0.2000	0.2000	1.0	1.0
64	2	3	0.6667	0.8516	0.2000	0.2000	0.6	0.6
65	2	3	0.6667	0.4168	0.2000	0.2000	0.6	0.6
66	1	3	0.3333	0.0113	0.2000	0.2000	0.6	0.6
67	1	4	0.2500	0.2762	0.2000	0.2000	0.8	0.8
68	-	2	0.0000	0.0000	0.2000	0.2000	0.4	0.4
69	-	-	N\A	N/A	0.2000	0.2000	-	-
70	-	-	N\A	N/A	0.2000	0.2000	-	-
71	-	-	N\A	N/A	0.2000	0.2000	-	-
72	-	1	0.0000	0.0000	0.2000	0.2000	0.2	0.2
73	-	1	0.0000	0.0000	0.2000	0.2000	0.2	0.2
74	-	1	0.0000	0.0000	0.2000	0.2000	0.2	0.2
75 & over	1	2	0.5000	0.4881	0.2000	0.2000	0.4	0.4
<b>Total</b>	<b>17</b>	<b>85</b>	<b>0.2000</b>	<b>0.1998</b>	<b>0.2224</b>	<b>0.2224</b>	<b>18.9</b>	<b>18.9</b>

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.2000	0.1998	0.2224
<b>Previous Investigation Results</b>	0.1955	0.2414	0.2135
<b>2011-2013</b>	0.1272	0.1356	0.1624
<b>2008-2010</b>	0.1705	0.1587	0.1889

## Rates of Normal Retirement ECO Males



## Rates of Normal Retirement ECO Females



## All ECO-SLEP

### Normal Retirement Experience (Tier 1)

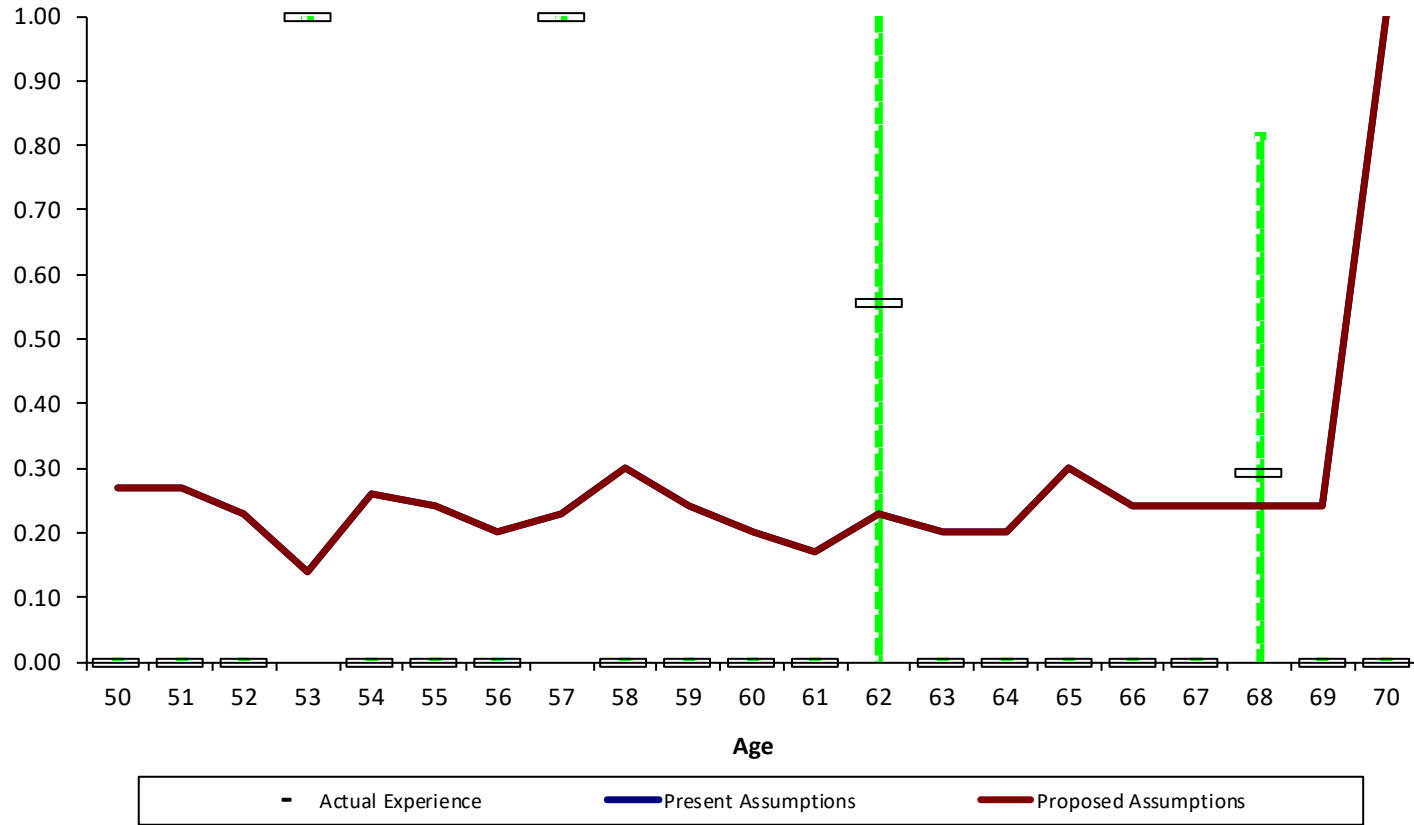
There were 6 age and service unreduced retirements and 18 life years of exposure (exposure includes active members eligible for unreduced retirement) in the Tier 1 retirement investigation.

Age	Retirements	Exposure	Actual Rates Weighted by		Sample Rates		Expected Retirements	
			Population	Liability	Present	Proposed	Present	Proposed
Under 50	-	-	0.0000	0.0000	N\A	N\A	-	-
50	1	-	0.0000	N/A	0.2700	0.2700	-	-
51	1	-	0.0000	N/A	0.2700	0.2700	-	-
52	-	1	0.0000	0.0000	0.2300	0.2300	0.2	0.2
53	1	1	1.0000	1.0000	0.1400	0.1400	0.1	0.1
54	-	-	0.0000	0.0000	0.2600	0.2600	-	-
55	-	-	0.0000	0.0000	0.2400	0.2400	-	-
56	-	1	0.0000	0.0000	0.2000	0.2000	0.2	0.2
57	1	1	1.0000	1.0000	0.2300	0.2300	0.2	0.2
58	-	-	0.0000	0.0000	0.3000	0.3000	-	-
59	-	-	0.0000	0.0000	0.2400	0.2400	-	-
60	-	-	0.0000	0.0000	0.2000	0.2000	-	-
61	-	3	0.0000	0.0000	0.1700	0.1700	0.5	0.5
62	1	2	0.5000	0.5564	0.2300	0.2300	0.5	0.5
63	-	1	0.0000	0.0000	0.2000	0.2000	0.2	0.2
64	-	-	0.0000	0.0000	0.2000	0.2000	-	-
65	-	-	0.0000	0.0000	0.3000	0.3000	-	-
66	-	2	0.0000	0.0000	0.2400	0.2400	0.5	0.5
67	-	3	0.0000	0.0000	0.2400	0.2400	0.7	0.7
68	1	3	0.3333	0.2911	0.2400	0.2400	0.7	0.7
69	-	-	0.0000	0.0000	0.2400	0.2400	-	-
70	-	-	0.0000	0.0000	1.0000	1.0000	-	-
71	-	-	0.0000	0.0000	1.0000	1.0000	-	-
72	-	-	0.0000	0.0000	1.0000	1.0000	-	-
73	-	-	0.0000	0.0000	1.0000	1.0000	-	-
74	-	-	0.0000	0.0000	1.0000	1.0000	-	-
75 & over	-	-	0.0000	0.0000	1.0000	1.0000	-	-
<b>Total</b>	<b>6</b>	<b>18</b>	<b>0.3333</b>	<b>0.3154</b>	<b>0.2111</b>	<b>0.2111</b>	<b>3.8</b>	<b>3.8</b>

	<u>Actual</u>	<u>Liability</u>	<u>Proposed</u>
<b>Current</b>	0.3333	0.3154	0.2111
<b>Previous Investigation Results</b>	0.3214	0.2732	0.2607
<b>2011-2013</b>	0.0000	0.0000	0.2279
<b>2008-2010</b>	0.1897	0.2094	0.1897



## Rates of Normal Retirement All ECO-SLEP



# MORTALITY EXPERIENCE

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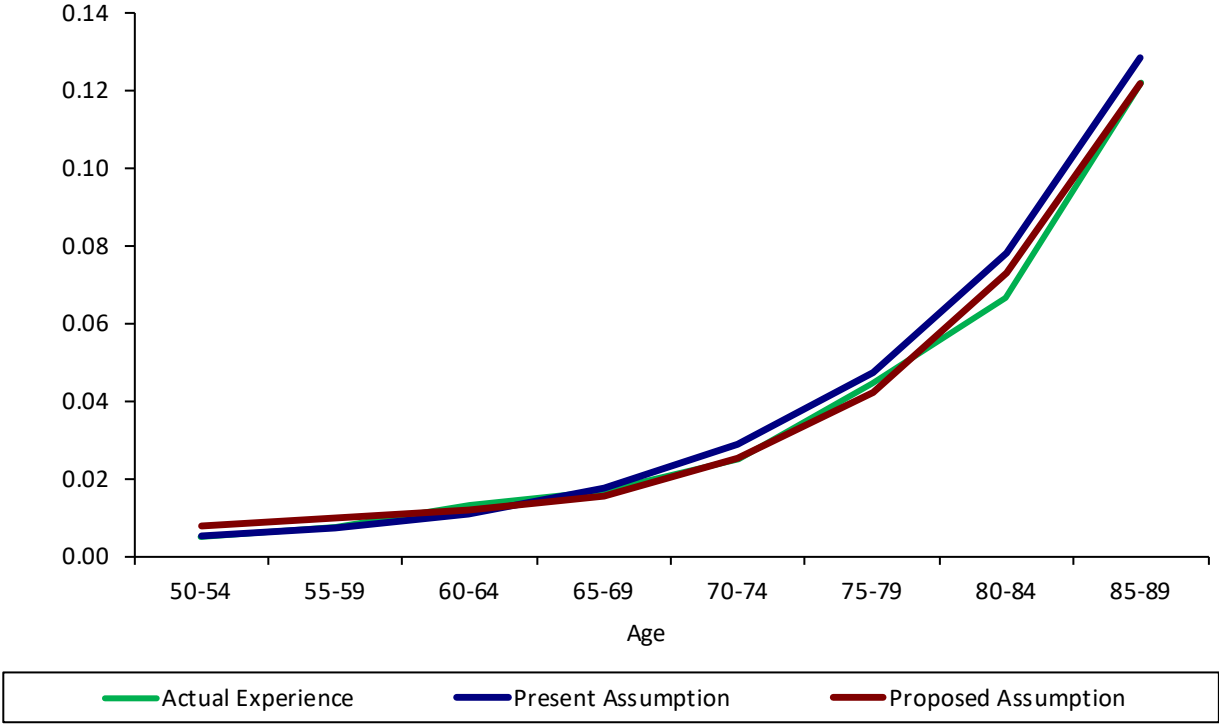
## Post-Retirement Mortality – Males (Original Retirees; Non Disabled Cases)

There were slightly less deaths than expected among retired males. Rates were evaluated on a headcount and benefit weighted basis. Given that there were minimal gains or losses due to mortality during the experience study period, rates were decreased slightly from current basis to take into account improvements in mortality. The proposed rates were projected to the middle of the experience study period with Generational Improvement Scale MP-2019.

Age	Deaths	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Deaths		Ratio of Actuals/Expecteds	
			Headcount	Benefit	Present	Proposed	Present	Proposed	Old	New
50-54	5	987	0.005066	0.003118	0.005370	0.007972	5	8	100.0%	62.5%
55-59	72	9,417	0.007646	0.005752	0.007172	0.010455	70	101	102.9%	71.3%
60-64	279	20,827	0.013396	0.011406	0.010708	0.012806	232	266	120.3%	104.9%
65-69	467	27,668	0.016879	0.013927	0.017698	0.016130	494	445	94.5%	104.9%
70-74	557	22,162	0.025133	0.023271	0.028960	0.025139	624	541	89.3%	103.0%
75-79	677	15,226	0.044463	0.040813	0.047391	0.041825	698	622	97.0%	108.8%
80-84	678	10,223	0.066321	0.063104	0.077829	0.072892	772	724	87.8%	93.6%
85-89	696	5,701	0.122084	0.123811	0.128403	0.123213	707	682	98.4%	102.1%
90-94	510	2,537	0.201025	0.195760	0.207113	0.193437	495	468	103.0%	109.0%
95-99	170	555	0.306306	0.281785	0.291004	0.271001	152	143	111.8%	118.9%
100-104	17	43	0.395349	0.536357	0.384058	0.375562	15	15	113.3%	113.3%
105 & over	1	4	0.250000	0.216815	0.470810	0.474330	2	2	50.0%	50.0%
Totals	4,129	115,350	0.035795	0.026069	0.036983	0.034824	4,266	4,017	96.8%	102.8%

\* Sample values are selected from midpoint of age group.

# Rates of Post-Retirement Mortality – Males (Original Retirees; Non Disabled Cases)



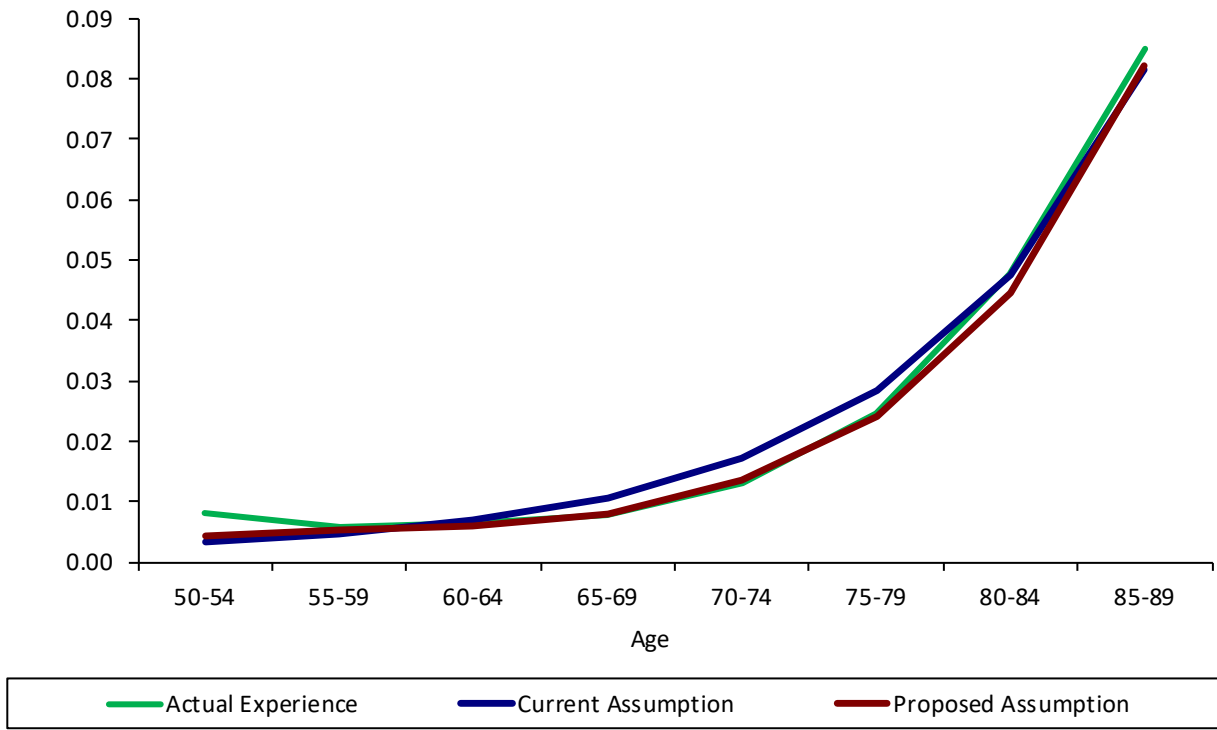
## Post-Retirement Mortality – Females (Original Retirees; Non Disabled Cases)

There were slightly less deaths than expected among retired females. Rates were evaluated on a headcount and benefit weighted basis. Given that there were minimal gains or losses due to mortality during the experience study period, rates were decreased slightly from the current basis to take into account improvements in mortality. The proposed rates were projected to the middle of the experience study period with Generational Improvement Scale MP-2019.

Age	Deaths	Exposure	Actual Rates Weighted by		Sample Rates*		Expected Deaths		Ratio of Actuals/Expecteds	
			Headcount	Benefit	Present	Proposed	Present	Proposed	Old	New
50-54	2	249	0.008032	0.008159	0.003307	0.004620	1	1	200.0%	200.0%
55-59	83	14,567	0.005698	0.004653	0.004652	0.005514	72	81	115.3%	102.5%
60-64	235	37,115	0.006332	0.005931	0.006803	0.006268	262	233	89.7%	100.9%
65-69	434	54,798	0.007920	0.007074	0.010578	0.008398	578	460	75.1%	94.3%
70-74	617	46,657	0.013224	0.013366	0.017187	0.014318	777	651	79.4%	94.8%
75-79	803	32,505	0.024704	0.023648	0.028356	0.025455	896	813	89.6%	98.8%
80-84	1,049	21,952	0.047786	0.044503	0.047553	0.046730	1,022	1,006	102.6%	104.3%
85-89	1,216	14,328	0.084869	0.082619	0.081556	0.086345	1,148	1,217	105.9%	99.9%
90-94	1,130	7,408	0.152538	0.147439	0.138945	0.151298	985	1,073	114.7%	105.3%
95-99	537	2,249	0.238773	0.234953	0.216142	0.227243	457	486	117.5%	110.5%
100-104	106	337	0.314540	0.316345	0.314497	0.332002	99	105	107.1%	101.0%
105 & over	10	18	0.555556	0.596111	0.414876	0.439313	7	7	142.9%	142.9%
Totals	6,222	232,183	0.026798	0.021529	0.027151	0.026415	6,304	6,133	98.7%	101.5%

\* Sample values are selected from midpoint of age group.

## Rates of Post-Retirement Mortality – Females (Original Retirees; Non Disabled Cases)



**COMPLETE LISTS OF PROPOSED DECREMENT ASSUMPTIONS**

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## Proposed Retirement Rates – Tier 1 Only

Age	Regular				SLEP		ECO Regular		ECO SLEP	
	Male		Female		Male	Female	Male	Female	Male	Female
	Normal	Early	Normal	Early	Normal		Normal		Normal	
50					0.2300	0.2300			0.2700	0.2300
51					0.1800	0.1800			0.2700	0.1800
52					0.1300	0.1300			0.2300	0.1300
53					0.0800	0.0800			0.1400	0.0800
54					0.2300	0.2300			0.2600	0.2300
55	0.3300	0.0700	0.2950	0.0605	0.2300	0.2300	0.2500	0.3500	0.2400	0.2300
56	0.2650	0.0700	0.2025	0.0605	0.1800	0.1800	0.2500	0.3500	0.2000	0.1800
57	0.1850	0.0700	0.1550	0.0605	0.2300	0.2300	0.1500	0.2000	0.2300	0.2300
58	0.2250	0.0700	0.1650	0.0605	0.3300	0.3300	0.1500	0.2000	0.3000	0.3300
59	0.2200	0.0700	0.1750	0.0605	0.1300	0.1300	0.1500	0.2000	0.2400	0.1300
60	0.1300		0.1150		0.0800	0.0800	0.1500	0.2000	0.2000	0.0800
61	0.1250		0.1050		0.0800	0.0800	0.1500	0.2000	0.1700	0.0800
62	0.2150		0.1750		0.2300	0.2300	0.1500	0.2000	0.2300	0.2300
63	0.2000		0.1750		0.1800	0.1800	0.1500	0.2000	0.2000	0.1800
64	0.1800		0.1600		0.1800	0.1800	0.1500	0.2000	0.2000	0.1800
65	0.2600		0.2700		0.2300	0.2300	0.1500	0.2000	0.3000	0.2300
66	0.3200		0.3200		0.2300	0.2300	0.1500	0.2000	0.2400	0.2300
67	0.2600		0.2850		0.2300	0.2300	0.1500	0.2000	0.2400	0.2300
68	0.2300		0.2300		0.2300	0.2300	0.1500	0.2000	0.2400	0.2300
69	0.2250		0.2500		0.2300	0.2300	0.1500	0.2000	0.2400	0.2300
70	0.2600		0.2550		1.0000	1.0000	0.1500	0.2000	1.0000	1.0000
71	0.2400		0.2300		1.0000	1.0000	0.1500	0.2000	1.0000	1.0000
72	0.1750		0.2250		1.0000	1.0000	0.1500	0.2000	1.0000	1.0000
73	0.2200		0.2100		1.0000	1.0000	0.1500	0.2000	1.0000	1.0000
74	0.2000		0.2250		1.0000	1.0000	0.1500	0.2000	1.0000	1.0000
75	0.2300		0.2400		1.0000	1.0000	0.1700	0.2000	1.0000	1.0000
76	0.2300		0.2400		1.0000	1.0000	0.1700	0.2000	1.0000	1.0000
77	0.2300		0.2400		1.0000	1.0000	0.1700	0.2000	1.0000	1.0000
78	0.2300		0.2400		1.0000	1.0000	0.1700	0.2000	1.0000	1.0000
79	0.2300		0.2400		1.0000	1.0000	0.1700	0.2000	1.0000	1.0000
80+	1.0000		1.0000		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



## Proposed Retirement Rates – Tier 2 Only

Age	Regular						SLEP			
	Male			Female			Male		Female	
	Normal Service	Early		Normal Service	Early		Normal	Early	Normal	Early
	Service Less Than 30 Years	Between 30 and 35 Years	35 Years or More	Service Less Than 30 Years	Between 30 and 35 Years	35 Years or More	Service Less Than 30 Years	30 Years or More	Service Less Than 30 Years	30 Years or More
50								0.1200		0.1200
51								0.0900		0.0900
52								0.0700		0.0700
53								0.0400		0.0400
54								0.1200		0.1200
55							0.6000	0.8000	0.6000	0.8000
56							0.1800	0.5500	0.1800	0.5500
57							0.2300	0.5500	0.2300	0.5500
58							0.3300	0.5500	0.3300	0.5500
59							0.1300	0.5500	0.1300	0.5500
60							0.0800	0.5500	0.0800	0.5500
61							0.0800	0.5500	0.0800	0.5500
62		0.7500	0.1500		0.7500	0.1300	0.2300	0.5500	0.2300	0.5500
63		0.7500	0.1500		0.7500	0.1300	0.1800	0.5500	0.1800	0.5500
64		0.7500	0.1500		0.7500	0.1300	0.1800	0.5500	0.1800	0.5500
65		0.7500	0.1500		0.7500	0.1300	0.2300	0.5500	0.2300	0.5500
66		0.7500	0.1500		0.7500	0.1300	0.2300	0.5500	0.2300	0.5500
67	0.3000	0.5000	0.7500	0.2500	0.5000	0.7500	0.2300	0.5500	0.2300	0.5500
68	0.3000	0.5000	0.7500	0.2500	0.5000	0.7500	0.2300	0.5500	0.2300	0.5500
69	0.2500	0.5000	0.7500	0.2000	0.5000	0.7500	0.2300	0.5500	0.2300	0.5500
70	0.2000	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
71	0.2000	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
72	0.2000	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
73	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
74	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
75	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
76	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
77	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
78	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
79	0.1800	0.5000	0.7500	0.1800	0.5000	0.7500	1.0000	1.0000	1.0000	1.0000
80+	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

## Proposed Withdrawal Rates – Tier 1 & 2

Service	Regular Rates		SLEP Rates		ECO Rates		ECO-SLEP Rates	
	Less Than		Less Than		Less Than		Less Than	
	8 Years of Service		7 Years of Service		8 Years of Service		7 Years of Service	
	Male	Female	Male	Female	Male	Female	Male	Female
1	0.2480	0.2770	0.1833	0.1833	0.4000	0.4000	0.1700	0.1700
2	0.1980	0.2200	0.1100	0.1100	0.2000	0.2000	0.1000	0.1000
3	0.1530	0.1775	0.0800	0.0800	0.1500	0.1500	0.0650	0.0650
4	0.1330	0.1450	0.0800	0.0800	0.1400	0.1400	0.0620	0.0620
5	0.1070	0.1200	0.0650	0.0650	0.1300	0.1300	0.0550	0.0550
6	0.0875	0.1045	0.0570	0.0570	0.1200	0.1200	0.0460	0.0460
7	0.0770	0.0920	0.0410	0.0410	0.1100	0.1100	0.0360	0.0360
8	0.0770	0.0880			0.1000	0.1000		

Age	8 or More		7 or More		8 or More		7 or More	
	Years of Service		Years of Service		Years of Service		Years of Service	
	Male	Female	Male	Female	Male	Female	Male	Female
25 & under	0.0520	0.0880	0.0410	0.0410	0.0600	0.0320	0.0260	0.0260
26	0.0520	0.0880	0.0410	0.0410	0.0600	0.0320	0.0260	0.0260
27	0.0520	0.0880	0.0410	0.0410	0.0600	0.0320	0.0260	0.0260
28	0.0508	0.0844	0.0398	0.0398	0.0600	0.0320	0.0254	0.0254
29	0.0496	0.0808	0.0386	0.0386	0.0600	0.0320	0.0248	0.0248
30	0.0484	0.0772	0.0374	0.0374	0.0600	0.0320	0.0242	0.0242
31	0.0472	0.0736	0.0362	0.0362	0.0600	0.0320	0.0236	0.0236
32	0.0460	0.0700	0.0350	0.0350	0.0600	0.0320	0.0230	0.0230
33	0.0433	0.0662	0.0315	0.0315	0.0600	0.0320	0.0214	0.0214
34	0.0406	0.0624	0.0280	0.0280	0.0600	0.0320	0.0197	0.0197
35	0.0379	0.0586	0.0245	0.0245	0.0600	0.0320	0.0181	0.0181
36	0.0352	0.0548	0.0210	0.0210	0.0600	0.0320	0.0164	0.0164
37	0.0325	0.0510	0.0175	0.0175	0.0600	0.0320	0.0148	0.0148
38	0.0316	0.0494	0.0170	0.0170	0.0600	0.0320	0.0142	0.0142
39	0.0307	0.0478	0.0165	0.0165	0.0600	0.0320	0.0137	0.0137
40	0.0298	0.0462	0.0160	0.0160	0.0600	0.0320	0.0131	0.0131
41	0.0289	0.0446	0.0155	0.0155	0.0600	0.0320	0.0126	0.0126
42	0.0280	0.0430	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
43	0.0269	0.0413	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
44	0.0258	0.0396	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
45	0.0247	0.0379	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
46	0.0236	0.0362	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
47	0.0225	0.0345	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
48	0.0220	0.0336	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
49	0.0215	0.0327	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
50	0.0210	0.0318	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
51	0.0205	0.0309	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
52	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0120	0.0120
53	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0116	0.0116
54	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0112	0.0112
55	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0108	0.0108
56	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0104	0.0104
57	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0100	0.0100
58	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0100	0.0100
59	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0100	0.0100
60+	0.0200	0.0300	0.0150	0.0150	0.0600	0.0320	0.0100	0.0100

## Proposed Disability Rates - Regular & SLEP – Tier 1 & 2

Rates of Disability For Regular and SLEP Members									
Age	Regular		SLEP		Age	Regular		SLEP	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.0000	0.0000	0.0000	0.0001	51	0.0003	0.0001	0.0005	0.0011
22	0.0000	0.0000	0.0000	0.0001	52	0.0004	0.0002	0.0005	0.0011
23	0.0000	0.0000	0.0000	0.0001	53	0.0004	0.0002	0.0005	0.0012
24	0.0000	0.0000	0.0000	0.0001	54	0.0004	0.0002	0.0006	0.0013
25	0.0000	0.0000	0.0001	0.0001	55	0.0005	0.0002	0.0006	0.0014
26	0.0000	0.0000	0.0001	0.0001	56	0.0005	0.0002	0.0006	0.0015
27	0.0000	0.0000	0.0001	0.0002	57	0.0005	0.0002	0.0007	0.0015
28	0.0000	0.0000	0.0001	0.0002	58	0.0006	0.0003	0.0006	0.0014
29	0.0000	0.0000	0.0001	0.0002	59	0.0006	0.0003	0.0006	0.0013
30	0.0000	0.0000	0.0001	0.0002	60	0.0006	0.0003	0.0005	0.0013
31	0.0000	0.0000	0.0001	0.0002	61	0.0006	0.0004	0.0005	0.0012
32	0.0001	0.0000	0.0001	0.0002	62	0.0006	0.0004	0.0005	0.0011
33	0.0001	0.0000	0.0001	0.0003	63	0.0006	0.0004	0.0004	0.0010
34	0.0001	0.0000	0.0001	0.0003	64	0.0006	0.0004	0.0004	0.0009
35	0.0001	0.0000	0.0001	0.0003	65	0.0006	0.0004	0.0004	0.0008
36	0.0001	0.0000	0.0001	0.0003	66	0.0006	0.0004	0.0003	0.0008
37	0.0001	0.0000	0.0002	0.0004	67	0.0006	0.0004	0.0003	0.0007
38	0.0001	0.0000	0.0002	0.0004	68	0.0006	0.0004	0.0003	0.0006
39	0.0001	0.0000	0.0002	0.0004	69	0.0006	0.0004	0.0002	0.0006
40	0.0001	0.0001	0.0002	0.0005	70	0.0005	0.0003	0.0002	0.0005
41	0.0001	0.0001	0.0002	0.0005	71	0.0005	0.0003	0.0002	0.0004
42	0.0001	0.0001	0.0002	0.0005	72	0.0005	0.0003	0.0002	0.0004
43	0.0002	0.0001	0.0002	0.0006	73	0.0004	0.0003	0.0001	0.0003
44	0.0002	0.0001	0.0003	0.0006	74	0.0004	0.0003	0.0001	0.0002
45	0.0002	0.0001	0.0003	0.0007	75	0.0004	0.0002	0.0001	0.0001
46	0.0002	0.0001	0.0003	0.0007	76	0.0004	0.0002	0.0000	0.0001
47	0.0002	0.0001	0.0003	0.0007	77	0.0003	0.0002	0.0000	0.0000
48	0.0003	0.0001	0.0003	0.0008	78	0.0003	0.0002	0.0000	0.0000
49	0.0003	0.0001	0.0004	0.0009	79	0.0003	0.0002	0.0000	0.0000
50	0.0003	0.0001	0.0004	0.0010	80	0.0003	0.0002	0.0000	0.0000

## Proposed Disability Rates - ECO & ECO SLEP – Tier 1 & 2

Rates of Disability For ECO and ECO-SLEP Members									
Age	ECO		ECO-SLEP		Age	ECO		ECO-SLEP	
	Male	Female	Male	Female		Male	Female	Male	Female
21	0.0001	0.0001	0.0001	0.0001	51	0.0010	0.0007	0.0010	0.0007
22	0.0001	0.0001	0.0001	0.0001	52	0.0011	0.0008	0.0011	0.0008
23	0.0001	0.0001	0.0001	0.0001	53	0.0012	0.0008	0.0012	0.0008
24	0.0001	0.0001	0.0001	0.0001	54	0.0013	0.0009	0.0013	0.0009
25	0.0001	0.0001	0.0001	0.0001	55	0.0015	0.0010	0.0015	0.0010
26	0.0001	0.0001	0.0001	0.0001	56	0.0016	0.0010	0.0016	0.0010
27	0.0001	0.0001	0.0001	0.0001	57	0.0017	0.0011	0.0017	0.0011
28	0.0001	0.0001	0.0001	0.0001	58	0.0018	0.0013	0.0018	0.0013
29	0.0001	0.0001	0.0001	0.0001	59	0.0018	0.0015	0.0018	0.0015
30	0.0001	0.0001	0.0001	0.0001	60	0.0019	0.0017	0.0019	0.0017
31	0.0001	0.0001	0.0001	0.0001	61	0.0019	0.0019	0.0019	0.0019
32	0.0002	0.0001	0.0002	0.0001	62	0.0020	0.0020	0.0020	0.0020
33	0.0002	0.0001	0.0002	0.0001	63	0.0020	0.0020	0.0020	0.0020
34	0.0002	0.0001	0.0002	0.0001	64	0.0020	0.0020	0.0020	0.0020
35	0.0003	0.0002	0.0003	0.0002	65	0.0020	0.0020	0.0020	0.0020
36	0.0003	0.0002	0.0003	0.0002	66	0.0020	0.0020	0.0020	0.0020
37	0.0003	0.0002	0.0003	0.0002	67	0.0020	0.0020	0.0020	0.0020
38	0.0003	0.0002	0.0003	0.0002	68	0.0019	0.0019	0.0019	0.0019
39	0.0004	0.0002	0.0004	0.0002	69	0.0018	0.0018	0.0018	0.0018
40	0.0004	0.0003	0.0004	0.0003	70	0.0017	0.0017	0.0017	0.0017
41	0.0004	0.0003	0.0004	0.0003	71	0.0016	0.0016	0.0016	0.0016
42	0.0005	0.0003	0.0005	0.0003	72	0.0015	0.0015	0.0015	0.0015
43	0.0005	0.0003	0.0005	0.0003	73	0.0014	0.0014	0.0014	0.0014
44	0.0006	0.0004	0.0006	0.0004	74	0.0013	0.0013	0.0013	0.0013
45	0.0006	0.0004	0.0006	0.0004	75	0.0012	0.0012	0.0012	0.0012
46	0.0007	0.0004	0.0007	0.0004	76	0.0011	0.0011	0.0011	0.0011
47	0.0007	0.0004	0.0007	0.0004	77	0.0010	0.0010	0.0010	0.0010
48	0.0008	0.0005	0.0008	0.0005	78	0.0010	0.0010	0.0010	0.0010
49	0.0009	0.0006	0.0009	0.0006	79	0.0010	0.0010	0.0010	0.0010
50	0.0009	0.0006	0.0009	0.0006	80	0.0010	0.0010	0.0010	0.0010

## Proposed Pay Increases – Regular and ECO – Tier 1 & 2

% Increase in Pay Next Year					
5 or More Years Service				Less Than 5 Years of Service	
Age	Merit & Longevity	Economic	Total	Service	% Increase
25	2.50%	2.75%	5.25%	0	7.10%
30	2.02%	2.75%	4.77%	1	6.40%
35	1.34%	2.75%	4.09%	2	3.60%
40	0.98%	2.75%	3.73%	3	2.70%
45	0.72%	2.75%	3.47%	4	2.20%
50	0.48%	2.75%	3.23%		
55	0.28%	2.75%	3.03%		
60	0.14%	2.75%	2.89%		

## Proposed Pay Increases – SLEP & ECO SLEP – Tier 1 & 2

<b>% Increase in Pay Next Year</b>			
<b>Years of Service</b>			
<b>Service</b>	<b>Economic</b>	<b>Merit and Longevity</b>	<b>% Total Increase</b>
1	2.75%	11.00%	13.75%
2	2.75%	8.50%	11.25%
3	2.75%	4.00%	6.75%
4	2.75%	3.50%	6.25%
5	2.75%	3.00%	5.75%
6	2.75%	2.50%	5.25%
7	2.75%	2.00%	4.75%
8	2.75%	1.50%	4.25%
9	2.75%	1.25%	4.00%
10	2.75%	1.00%	3.75%
11	2.75%	0.75%	3.50%
12	2.75%	0.75%	3.50%
13	2.75%	0.50%	3.25%
14	2.75%	0.50%	3.25%
15	2.75%	0.50%	3.25%
16	2.75%	0.50%	3.25%
17	2.75%	0.50%	3.25%
18	2.75%	0.50%	3.25%
19	2.75%	0.50%	3.25%
20	2.75%	0.50%	3.25%
21	2.75%	0.50%	3.25%
22	2.75%	0.50%	3.25%
23	2.75%	0.50%	3.25%
24	2.75%	0.50%	3.25%
25	2.75%	0.50%	3.25%
26	2.75%	0.50%	3.25%
27	2.75%	0.50%	3.25%
28	2.75%	0.50%	3.25%
29	2.75%	0.50%	3.25%
30	2.75%	0.50%	3.25%

## Proposed Pre-Retirement Mortality Rates – Tier 1 & 2

Sample Ages	% Dying				Sample Ages	% Dying			
	Regular & ECO		SLEP & ECO SLEP			Regular & ECO		SLEP & ECO SLEP	
	Male	Female	Male	Female		Male	Female	Male	Female
20	0.04%	0.01%	0.04%	0.01%	50	0.22%	0.11%	0.22%	0.11%
21	0.04%	0.01%	0.04%	0.01%	51	0.24%	0.11%	0.24%	0.12%
22	0.04%	0.01%	0.04%	0.01%	52	0.26%	0.12%	0.26%	0.12%
23	0.04%	0.01%	0.04%	0.01%	53	0.28%	0.13%	0.28%	0.13%
24	0.04%	0.01%	0.04%	0.01%	54	0.30%	0.14%	0.30%	0.15%
25	0.04%	0.01%	0.04%	0.01%	55	0.32%	0.16%	0.32%	0.16%
26	0.04%	0.01%	0.04%	0.01%	56	0.35%	0.17%	0.35%	0.17%
27	0.05%	0.01%	0.05%	0.01%	57	0.37%	0.18%	0.37%	0.19%
28	0.05%	0.02%	0.05%	0.02%	58	0.40%	0.20%	0.40%	0.20%
29	0.05%	0.02%	0.05%	0.02%	59	0.43%	0.22%	0.43%	0.22%
30	0.05%	0.02%	0.05%	0.02%	60	0.47%	0.24%	0.47%	0.24%
31	0.06%	0.02%	0.06%	0.02%	61	0.50%	0.26%	0.50%	0.26%
32	0.06%	0.02%	0.06%	0.02%	62	0.54%	0.28%	0.54%	0.29%
33	0.06%	0.02%	0.06%	0.03%	63	0.59%	0.31%	0.59%	0.31%
34	0.07%	0.03%	0.07%	0.03%	64	0.63%	0.34%	0.63%	0.34%
35	0.07%	0.03%	0.07%	0.03%	65	0.68%	0.38%	0.68%	0.38%
36	0.07%	0.03%	0.07%	0.03%	66	0.74%	0.41%	0.74%	0.42%
37	0.08%	0.04%	0.08%	0.04%	67	0.80%	0.46%	0.80%	0.46%
38	0.08%	0.04%	0.08%	0.04%	68	0.87%	0.51%	0.87%	0.51%
39	0.09%	0.04%	0.09%	0.04%	69	0.94%	0.56%	0.94%	0.57%
40	0.10%	0.05%	0.10%	0.05%	70	1.03%	0.62%	1.03%	0.63%
41	0.10%	0.05%	0.10%	0.05%	71	1.12%	0.69%	1.12%	0.69%
42	0.11%	0.05%	0.11%	0.06%	72	1.22%	0.76%	1.22%	0.77%
43	0.12%	0.06%	0.12%	0.06%	73	1.34%	0.84%	1.34%	0.85%
44	0.13%	0.07%	0.13%	0.07%	74	1.46%	0.93%	1.46%	0.94%
45	0.14%	0.07%	0.14%	0.07%	75	1.60%	1.03%	1.60%	1.04%
46	0.16%	0.08%	0.16%	0.08%	76	1.75%	1.13%	1.75%	1.15%
47	0.17%	0.08%	0.17%	0.08%	77	1.92%	1.25%	1.92%	1.27%
48	0.19%	0.09%	0.19%	0.09%	78	2.10%	1.38%	2.10%	1.40%
49	0.20%	0.10%	0.20%	0.10%	79	2.30%	1.53%	2.30%	1.54%

*Life expectancy in future years is determined by a fully generational projection scale. The sample values shown are for individuals with the indicated attained ages in 2019.*

## Proposed Post-Retirement Mortality Rates – Tier 1 & 2

Sample Ages	% Dying Next Year				Sample Ages	% Dying Next Year			
	Non-Disabled Lives		Disabled Lives			Non-Disabled Lives		Disabled Lives	
	Males	Females	Males	Females		Males	Females	Males	Females
40	0.0979%	0.0470%	1.5487%	0.6516%	70	2.1277%	1.1890%	4.9788%	2.7921%
41	0.1051%	0.0510%	1.6770%	0.7017%	71	2.3531%	1.3290%	5.2941%	2.9977%
42	0.1142%	0.0550%	1.8018%	0.7527%	72	2.6041%	1.4850%	5.6361%	3.2265%
43	0.1234%	0.0600%	1.9197%	0.8045%	73	2.8846%	1.6610%	6.0050%	3.4797%
44	0.1346%	0.0660%	2.0284%	0.8569%	74	3.1977%	1.8580%	6.4043%	3.7582%
45	0.1785%	0.0900%	2.1267%	0.9099%	75	3.5476%	2.0780%	6.8350%	4.0635%
46	0.2366%	0.1230%	2.2137%	0.9633%	76	3.9392%	2.3240%	7.3017%	4.3969%
47	0.3142%	0.1670%	2.2879%	1.0170%	77	4.3758%	2.5990%	7.8088%	4.7597%
48	0.4172%	0.2270%	2.3503%	1.0709%	78	4.8644%	2.9100%	8.3597%	5.1538%
49	0.5539%	0.3090%	2.4013%	1.1248%	79	5.4121%	3.2600%	8.9587%	5.5808%
50	0.7354%	0.4200%	2.4420%	1.1788%	80	6.0251%	3.6580%	9.6146%	6.0426%
51	0.7701%	0.4300%	2.4739%	1.2326%	81	6.7126%	4.1120%	10.3311%	6.5413%
52	0.8068%	0.4400%	2.5023%	1.2849%	82	7.4776%	4.6290%	11.1183%	7.0791%
53	0.8446%	0.4500%	2.5127%	1.3359%	83	8.3263%	5.2200%	11.9832%	7.6583%
54	0.8813%	0.4600%	2.5213%	1.3852%	84	9.2585%	5.8940%	12.9389%	8.2815%
55	0.9190%	0.4700%	2.5363%	1.4334%	85	10.2745%	6.6630%	13.9844%	8.9516%
56	0.9568%	0.4790%	2.5636%	1.4808%	86	11.3730%	7.5400%	15.1307%	9.6717%
57	0.9935%	0.4890%	2.6083%	1.5285%	87	12.5531%	8.5290%	16.3890%	10.4455%
58	1.0302%	0.5000%	2.6732%	1.5772%	88	13.8149%	9.6330%	17.7595%	11.2770%
59	1.0669%	0.5150%	2.7592%	1.6283%	89	15.1582%	10.8480%	19.2495%	12.1710%
60	1.1047%	0.5330%	2.8673%	1.6829%	90	16.5781%	12.1640%	20.8653%	13.1325%
61	1.1434%	0.5560%	2.9967%	1.7427%	91	18.0346%	13.5270%	22.4597%	14.1986%
62	1.1842%	0.5840%	3.1462%	1.8090%	92	19.5085%	14.9120%	24.0288%	15.3634%
63	1.2291%	0.6170%	3.3148%	1.8838%	93	20.9998%	16.3140%	25.5664%	16.6211%
64	1.2781%	0.6540%	3.5008%	1.9685%	94	22.5196%	17.7440%	27.0681%	17.9659%
65	1.3342%	0.6950%	3.7038%	2.0651%	95	24.0893%	19.2250%	28.5215%	19.3921%
66	1.4515%	0.7710%	3.9233%	2.1756%	96	25.7305%	20.7830%	30.1162%	20.8939%
67	1.5892%	0.8570%	4.1583%	2.3018%	97	27.4625%	22.4440%	31.7095%	22.4654%
68	1.7462%	0.9550%	4.4115%	2.4455%	98	29.2975%	24.2260%	33.3179%	24.1009%
69	1.9258%	1.0650%	4.6850%	2.6085%	99	31.2365%	26.1350%	34.9298%	25.7945%
					100	33.2612%	28.1600%	36.5490%	27.5407%
					101	35.3287%	30.2650%	38.1726%	29.3334%
					102	37.3728%	32.3820%	39.8047%	31.1671%
					103	39.3761%	34.4940%	41.4544%	33.0357%
					104	41.3222%	36.5810%	43.1103%	34.9336%
					105	43.1990%	38.6250%	44.7681%	36.8550%
					106	44.9953%	40.6090%	46.4602%	38.7941%
					107	46.7017%	42.5190%	48.0226%	40.6741%
					108	48.3113%	44.3410%	49.4664%	42.4821%
					109	49.8199%	46.0670%	50.7983%	44.2079%
					110	51.0000%	47.6900%	51.9963%	45.8430%

*Life expectancy in future years is determined by a fully generational projection scale. The sample values shown are for individuals with the indicated attained ages in 2019.*