



Cavanaugh Macdonald
CONSULTING, LLC

The experience and dedication you deserve



**EMPLOYEES'
RETIREMENT SYSTEM
OF GEORGIA**

EMPLOYEES' RETIREMENT SYSTEM OF GEORGIA

**EXPERIENCE INVESTIGATION FOR THE FIVE-YEAR
PERIOD ENDING JUNE 30, 2014**





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

December 17, 2015

Board of Trustees
Employees' Retirement System of Georgia
Two Northside 75, Suite 300
Atlanta, GA 30318

Members of the Board:

We are pleased to submit the results of an investigation of the economic and demographic experience for the Employees' Retirement System of Georgia. The purpose of the investigation was to assess the reasonability of the actuarial assumptions currently used by the Retirement System. This investigation covers the five-year period from July 1, 2009 to June 30, 2014. As a result of the investigation, it is recommended that revised economic assumptions and demographic tables be adopted by the Board for future use.

The investigation of the demographic experience of members of the System includes all active and retired members as well as beneficiaries of deceased members. The experience was investigated separately for males and females since different tables are used for each of these groups.

The number of members expected to separate from active service, the expected rates of salary increase and the expected number of post-retirement deaths was obtained by use of the rates determined in the last experience investigation and adopted by the Board of Trustees. The results of the investigation indicate that the assumed rates of separation from active service due to withdrawal, disability, death and retirement, and rates of salary increase and post-retirement mortality do not accurately reflect the actual and anticipated experience of the Retirement System. As a result of the investigation, new withdrawal, salary, disability, retirement and mortality tables have been developed which reflect more closely the actual experience of the membership.

This report shows a comparison of the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. A comparison between the rates of separation and mortality presently in use and the recommended revised rates are also shown in this report.

3550 Busbee Pkwy, Suite 250, Kennesaw, GA 30144

Phone (678) 388-1700 • Fax (678) 388-1730

www.CavMacConsulting.com

Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE



All new assumptions are shown in the attached tables in Appendix D of this report. In the actuary's judgment, the recommended assumptions are suitable for use until further experience indicates that modifications are desirable.

The experience investigation was performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement systems. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Edward Macdonald', with a stylized, cursive script.

Edward A. Macdonald, ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Cathy Turcot', in a cursive script.

Cathy Turcot
Principal and Managing Director

A handwritten signature in blue ink, appearing to read 'Edward J. Koebel', in a cursive script.

Edward J. Koebel, FCA, EA, MAAA
Principal and Consulting Actuary



TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
I	Executive Summary	1
II	Financial Impact	3
III	Economic Assumptions	4
IV	Demographic Assumptions	13
	Rates of Withdrawal	14
	Rates of Disability Retirement	24
	Rates of Retirement	29
	Rates of Pre-retirement Mortality	44
	Rates of Post-retirement Mortality	47
	Rates of Salary Increase	53
V	Other Assumptions and Methods	56
VI	Special Contribution Rates and Group Term Life Insurance Plan Results	57
<u>Appendix</u>		
A	Historical CPI (U) Index	60
B	Capital Market Assumptions and Asset Allocation	61
C	Social Security Administration Wage Index	62
D	Recommended Rates	63



Section I Executive Summary

The following table summarizes the findings and recommendations with regard to the assumptions utilized for the Employees' Retirement System of Georgia. Detailed explanations for the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the three economic assumptions used in the actuarial valuations and the current and proposed rates.

Item	Current	Proposed
Price Inflation	3.00%	2.75%
Investment Return*	7.50%	7.50%
Wage Inflation	3.75%	3.25%

* net of investment expenses.

Recommended Demographic Assumption Changes

The table below lists the demographic assumptions that we recommend be changed based on the experience of the last five years.

Employee Group	Assumption Changes
Non-Police	Withdrawal, Pre-Retirement Mortality, Disability Retirement, Service Retirement, Post-Retirement Mortality, Salary Scale
Police	Withdrawal, Pre-Retirement Mortality, Disability Retirement, Service Retirement, Post-Retirement Mortality, Salary Scale



Recommended Other Assumption Changes

The table below lists the other assumptions that are considered in our valuations that should be reviewed during the experience study.

Assumption	Assumption Changes
Administrative Expenses	No Change to current method of determining rate
Amortization Method	No change to current method of level dollar amortization
Asset Smoothing	No change to current method of smoothing market gains and losses over 5 year period
Option Factors	Recommend change in current option factors to reflect change in mortality rate
Unused Sick Leave	Recommend changes to our loads on service for allowing members to convert forfeited sick leave to service at retirement
Termination Benefits	Recommend change in assumption for active vested members receiving termination benefits
Valuation Cost Method	No change in Entry Age Normal Cost Method



Section II Financial Impact

The following table highlights the impact of the recommended changes on the principal valuation results.

Impact on Principal Valuation Results (\$ in Thousands)		
	Valuation Results 2014	Recommended Assumptions
Unfunded Actuarial Accrued Liability	\$4,615,843	\$4,688,509
Funding Ratio	72.8%	72.5%
Amortization Period (in years)	22.6	23.0
<u>Actuarially Determined Employer Contribution</u>		
Old Plan		
Initial Normal Rate	6.13%	6.06%
Employer Paid on Behalf of Employee	<u>(4.75)</u>	<u>(4.75)</u>
Normal Rate	1.38%	1.31%
Accrued Liability Rate	<u>18.56</u>	<u>18.72</u>
Total	19.94%	20.03%
New Plan		
Normal Rate	6.13%	6.06%
Accrued Liability Rate	<u>18.56</u>	<u>18.72</u>
Total	24.69%	24.78%
GSEPs		
Normal Rate	3.13%	2.97%
Accrued Liability Rate	<u>18.56</u>	<u>18.72</u>
Total	21.69%	21.69%



Section III Economic Assumptions

There are three economic assumptions used in the actuarial valuations performed for the System. They are:

- Price Inflation
- Investment Return
- Wage Inflation

Actuarial Standard of Practice (ASOP) No. 27, *“Selection of Economic Assumptions for Measuring Pension Obligations”* provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. ASOP No. 27 was revised in September, 2013 and no longer includes the concept of a “best estimate range”. Instead, the revised standard now requires that each economic assumption selected by the actuary should be reasonable which means it has the following characteristics:

- It is appropriate for the purpose of the measurement;
- It reflects the actuary’s professional judgment;
- It takes into account historical and current economic data that is relevant as of the measurement date;
- 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
- 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, or when alternative assumptions are used for the assessment of risk.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27. The following table shows our recommendations followed by detailed discussions of each assumption.



Item	Current	Proposed
Price Inflation	3.00%	2.75%
Real Rate of Return*	<u>4.50</u>	<u>4.75</u>
Investment Return	7.50%	7.50%
Price Inflation	3.00%	2.75%
Real Wage Growth	<u>0.75%</u>	<u>0.50%</u>
Wage Inflation	3.75%	3.25%

* Net of investment expenses

Price Inflation

Background: As can be seen from the table above, assumed price inflation is used as the basis for both the investment return assumption and the wage inflation assumption. These latter two assumptions will be discussed in detail in the following sections.

It is important that the price inflation assumption be consistently applied throughout the economic assumptions utilized in an actuarial valuation. This is called for in ASOP No. 27 and is also required to meet the parameters for determining pension liabilities and expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and 68.

The current price inflation assumption is 3.00% per year.

Past Experience: The Consumer Price Index, US City Average, All Urban Consumers, CPI (U), has been used as the basis for reviewing historical levels of price inflation. The level of that index in June of each of the last 50 years is provided in Appendix A.

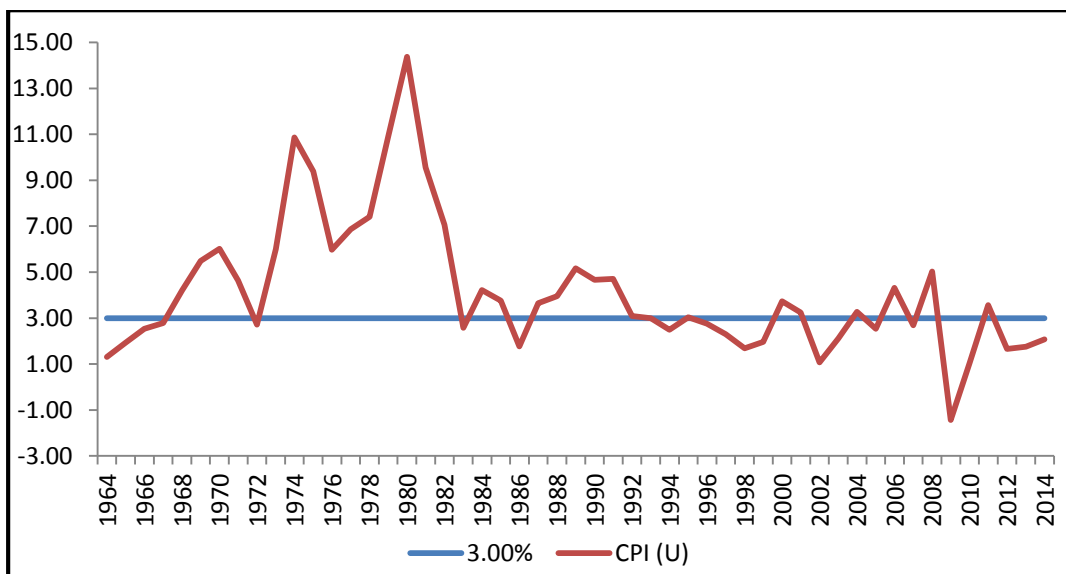
In analyzing this data, annual rates of inflation have been determined by measuring the compound growth rate of the CPI (U) over various time periods. The results are as follows:



Period	Number of Years	Inflation	Annual Standard Deviation
2004-2014	10	2.31%	1.81%
1994-2004	10	2.51	0.83
1984-1994	10	3.62	1.06
1974-1984	10	7.78	3.39
1964-1974	10	4.68	2.63
1994-2014	20	2.41%	1.37%
1984-2014	30	2.81	1.39
1974-2014	40	4.03	2.99
1964-2014	50	4.16	2.90
1926-2014	88	2.98	4.15

The following graph illustrates the historical levels of price inflation measured as of June 30th of each of the last 50 years and compared to the current 3.00% annual rate currently assumed.

Annual Rate of CPI (U) Increases



Over more recent historical periods, the average annual rate of increase in the CPI-U has been below 3.00%. The period of high inflation from 1973 to 1982 has a significant impact on the averages over periods which include these rates. Further, the average rate of 2.98% over the entire 88 year period is close to the average rate of 2.81% for the prior 30 years (1984 to 2014) but the volatility of the annual rates in the more recent years has been markedly lower as indicated by the



significantly lower annual standard deviations. Many experts attribute the lower average annual rates and lower volatility to the increased efforts of the Federal Reserve since the early 1980's to stabilize price inflation. The severe recession of 2008-2009 resulted in a short period of deflation followed by low levels of inflation. The Federal Reserve has combated this weak environment with zero interest rates and quantitative easing. Although the quantitative easing program has ended, the Federal Reserve has disclosed an inflation target of at least 2.0% annually and will keep interest rates very low until they see progress toward the target.

Recommendation: It is difficult to accurately predict inflation. Inflation's short-term volatility is illustrated by comparing its average rate over the last 10, 30 and 50 years. Although the 10-year average of 2.31% is lower than the System's assumed rate of 3.00%, the longer 30, 40 and 50-year averages of 2.79%, 3.94% and 4.25% respectively, are at or slightly higher than the System's rate. The validity of the System's assumption is, therefore, dependent upon the emphasis one assigns to the short and long-terms.

Current economic forecasts suggest lower inflation but are generally looking at a shorter time period than appropriate for our purposes. In the 2014 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75 year cost projections on an intermediate inflation assumption of 2.7% with a range of 1.7% to 3.7%. We consider that range reasonable and recommend that ERS lower the current price inflation assumption from 3.00 to 2.75%.

Price Inflation Assumption	
Current	3.00%
Recommended	2.75%



Investment Return

Background: The assumed investment return is one of the most significant assumptions in the annual actuarial valuation process as it is used to discount the expected benefit payments for all active, inactive and retired members of the System. Minor changes in this assumption can have a major impact on valuation results. The investment return assumption should reflect the asset allocation target for the funds set by the Board of Trustees.

The current assumption is 7.50%, consisting of a price inflation assumption of 3.00% and a real rate of return assumption of 4.50%. The return is net of all investment expenses.

Past Experience: The assets for the System are valued using a widely accepted asset-smoothing methodology (5-year smoothing) that fully recognizes the expected investment income and also recognizes 20% of each year's investment gain or loss (the difference between actual and expected investment income). The asset smoothing methodology from 2010 through 2012 was based on 7-year smoothing and actuarial value was set equal to market value in 2013. The recent experience over the last five years is shown in the table below.

Year Ending 6/30	Actuarial Value	Market Value Rate of Return
2010	(2.12)%	11.54%
2011	4.06	21.29
2012	4.25	1.95
2013	6.47	13.38
2014	9.46	17.28
Average	4.35	12.90%

The impact of the asset smoothing method can be observed in the table. Very poor asset returns during 2008 and 2009 are reflected in the actuarial value returns through 2013. While important to review and analyze, historical returns over such a short time period are not credible for the purpose of setting the long-term assumed future rate of return.

We next include in our analysis information concerning future expectations for the investment return assumption. Because of the significant variability in past year-to-year results and the interplay of inflation on those results in the short term, we prefer to base our investment return assumption on the capital market assumptions utilized by the Board in setting investment policy and the asset allocation established by the Board as a result of that policy. This approach is referred to as the building block method in ASOP No. 27.



Analysis: The current capital market assumptions and asset allocation as provided by the System are shown in Appendix B. We further assumed that investment returns approximately follow a lognormal distribution with no correlation between years. The results below provide an expected range of real rates of return over a 50 year time horizon. Looking at one year results produces an expected real return of 6.38% but also has a high standard deviation or measurement of volatility. By expanding the time horizon, the average return does not change much but the volatility declines significantly. The following table provides a summary of results. The geometric real rates of return are net of investment expenses.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5 th	25 th	50 th	75 th	95 th
1	6.38%	15.36%	-16.87%	-4.44%	5.29%	16.00%	33.35%
5	5.51%	6.79%	-5.27%	0.82%	5.29%	9.95%	17.02%
10	5.40%	4.79%	-2.29%	2.11%	5.29%	8.56%	13.46%
20	5.34%	3.38%	-0.13%	3.03%	5.29%	7.59%	11.00%
30	5.32%	2.76%	0.84%	3.44%	5.29%	7.17%	9.93%
40	5.32%	2.39%	1.43%	3.69%	5.29%	6.91%	9.30%
50	5.31%	2.14%	1.93%	3.86%	5.29%	6.74%	8.87%

Based on this analysis there is a 50% likelihood that the average real rate of return over a 50-year period will be 5.29%. It can also be inferred that for the 10 year time span, 5% of the resulting real rates of return were below -2.29% and 95% were above that. As the time span increases, the results begin to merge. Over a 50 year time span, the results indicate there is a 25% chance that real returns will be below 3.86% and a 25% chance they will be above 6.74%. In other words there is a 50% chance the real returns will be between 3.86% and 6.74 %.



Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we are recommending a range for the investment return assumption of the 25th to 75th percentile real returns over the 50 year time span plus the recommended inflation assumption less the recommended expense rate. The following table details the range.

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return*	3.86%	5.29%	6.74%
Inflation	<u>2.75</u>	<u>2.75</u>	<u>2.75</u>
Net Investment Return	6.61%	8.04%	9.49%

* net of investment expenses.

There is a 50% chance that the net return will be 8.04% or more over a 50-year period. A net return of 7.50% is at the 40th percentile. Although not in the center of the recommended range, in our opinion a return of 7.50% is conservative yet reasonable. In addition, the most recent Public Fund Survey indicates that the current median return assumptions for the approximately 126 large public plans in the summary is 7.75%. Further, the recent trend in the return assumption of these large plans is toward lower annual rates of return.

After review of past experience for ERS and future expectation analysis, we are recommending the real rate of return assumption can be increased from 4.50% to 4.75%. Combining this with our recommendation to lower the price inflation assumption, we recommend the long-term investment return assumption remain at 7.50%.

Investment Return Assumption		
	Current	Recommended
Real Rate of Return*	4.50%	4.75%
Inflation	<u>3.00</u>	<u>2.75</u>
Net Investment Return	7.50%	7.50%

* net of investment expenses.



Wage Inflation

Background: The assumed future increases in salaries consist of a wage inflation component and a component for promotion and longevity, often called merit increases. Wage inflation normally consists of price inflation and a component for real wage growth which reflects the overall return on labor in the economy. Merit increases are generally age and or service related, and will be discussed in the demographic assumption section of the report.

The current wage inflation assumption is 3.75%, and is composed of a 3.00% rate of inflation assumption and a 0.75% real rate of wage inflation.

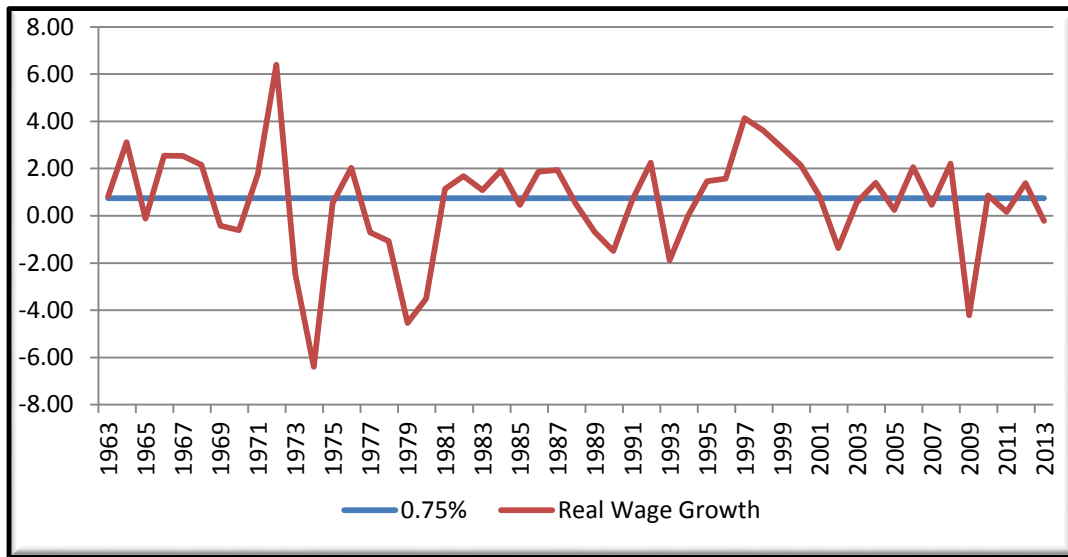
Past Experience: The Social Security Administration publishes data on wage growth in the United States. Appendix C shows the last 50 calendar years' data. As with our analysis of inflation, we provide below wage inflation and a comparison with price inflation over various time periods. Currently, this wage data is only available through calendar year 2013. We remove the rate of price inflation for each year from the data to result in the historical real rate of wage inflation.

Period	Wage Inflation	Price Inflation	Real Wage Growth
2003-2013	2.80%	2.37%	0.43%
1993-2003	3.95%	2.37%	1.58%
1983-1993	4.26%	3.71%	0.55%
1973-1983	7.23%	8.17%	(0.94)%
1963-1973	5.60%	4.10%	1.50%
1993-2013	3.37%	2.37%	1.00%
1983-2013	3.67%	2.82%	0.85%
1973-2013	4.55%	4.13%	0.42%
1963-2013	4.76%	4.12%	0.64%

Thus over the last 50 years, annual real wage growth has averaged 0.64%.



Annual Real Rates of Wage Growth



As the analysis of the national wage growth data shows, the shorter-term historical average real rate (0.43% for latest 10 year period) is lower than the longer-term average real rates. The rate of real wage inflation over the prior 20 and 30 year periods is 1.00% and 0.85% respectively. Over the longer term, 50 years, the rate is 0.64%.

Recommendation: As with price inflation, we again look at the 2014 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75 year cost projections on an ultimate national wage growth assumption 1.12% greater than the price inflation assumption of 2.80%. The actual experience in ERS, as seen in payroll increases during the experience study, has been lower than the national average. Therefore, we recommend use of a 0.50% per year rate at the current time for real wage growth.

Wage Inflation Assumption		
	Current	Recommended
Price Inflation	3.00%	2.75%
Real Wage Growth	0.75%	0.50%
Wage Inflation	3.75%	3.25%

Payroll Growth Assumption: The current amortization method is level dollar amortization. We recommend continued use of this amortization method.



Section IV Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for the Employees' Retirement System of Georgia. They are:

- Rates of Withdrawal
- Rates of Disability Retirement
- Rates of Service Retirement
- Rates of Mortality
- Rates of Salary Merit Increase

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 35, "*Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*", which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (July 1, 2009, through June 30, 2014) with what was expected to happen based on the assumptions used in the most recent Actuarial Valuations.

Detailed tabulations by age, service and/or gender are performed over the entire study period. These tabulations look at all active and retired members during the period as well as separately annotating those who experience a demographic event, also referred to as a decrement. In addition the tabulation of all members together with the current assumptions permits the calculation of the number of expected decrements during the study period.

If the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, gender, or service does not follow the expected pattern, new assumptions are recommended. Recommended changes usually do not follow the exact actual experience during the observation period. Judgment is required to extrapolate future experience from past trends and current member behavior.

The remainder of this section presents the results of the demographic study. We have prepared tables that show a comparison of the actual and expected decrements and the overall ratio of actual to expected results (A/E Ratios) under the current assumptions. If a change is being proposed, the revised A/E Ratios are shown as well. Salary adjustments, other than the economic assumption for wage inflation discussed in the previous section, are treated as demographic assumptions.



RATES OF WITHDRAWAL

**COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS
FROM ACTIVE SERVICE**

NON-POLICE

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 5 years of service					
20	916	743.1	1.233	412	402.3	1.024
25	2,038	1,849.3	1.102	2,921	2,699.2	1.082
30	1,618	1,535.1	1.054	2,907	2,800.7	1.038
35	1,049	973.2	1.078	1,974	1,925.2	1.025
40	941	856.5	1.099	1,647	1,519.2	1.084
45	792	732.2	1.082	1,277	1,140.1	1.120
50	613	540.5	1.134	979	942.0	1.039
53 & OVER	917	778.8	1.177	1,405	1,177.5	1.193
TOTAL	8,884	8,008.7	1.109	13,522	12,606.2	1.073
	Withdrawals with at least 5 but less than 10 years of service					
25	158	184.7	0.855	177	175.5	1.009
30	419	481.9	0.869	912	1,023.6	0.891
35	367	416.6	0.881	906	949.5	0.954
40	333	349.4	0.953	770	698.6	1.102
45	280	290.7	0.963	567	551.3	1.028
50	236	231.0	1.022	474	448.5	1.057
53 & OVER	565	567.9	0.995	952	816.1	1.167
TOTAL	2,358	2,522.2	0.935	4,758	4,663.1	1.020
	Withdrawals with 10 or more years of service					
30	51	53.9	0.946	62	50.2	1.235
35	168	221.7	0.758	335	363.7	0.921
40	292	335.9	0.869	543	475.2	1.143
45	335	317.7	1.054	571	475.7	1.200
50	332	280.9	1.182	686	475.1	1.444
53 & OVER	738	396.2	1.863	1,103	620.3	1.778
TOTAL	1,916	1,606.3	1.193	3,300	2,460.2	1.341



POLICE

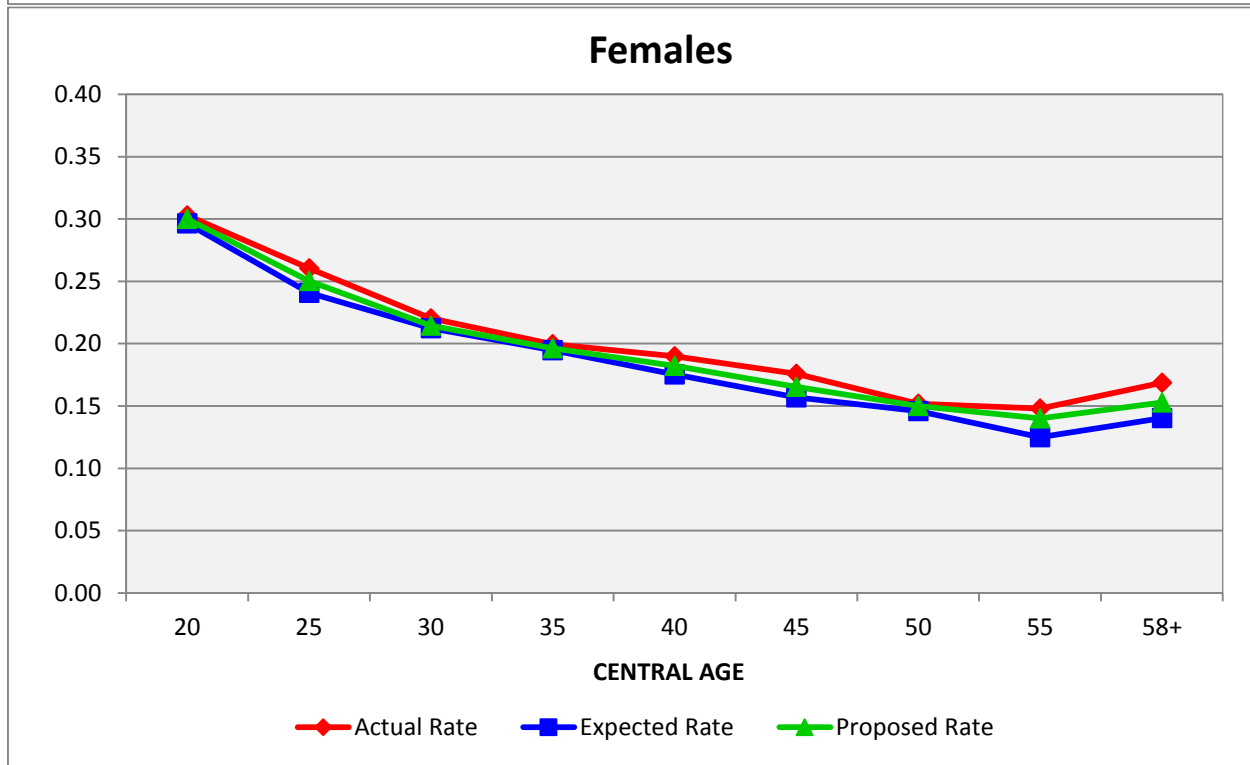
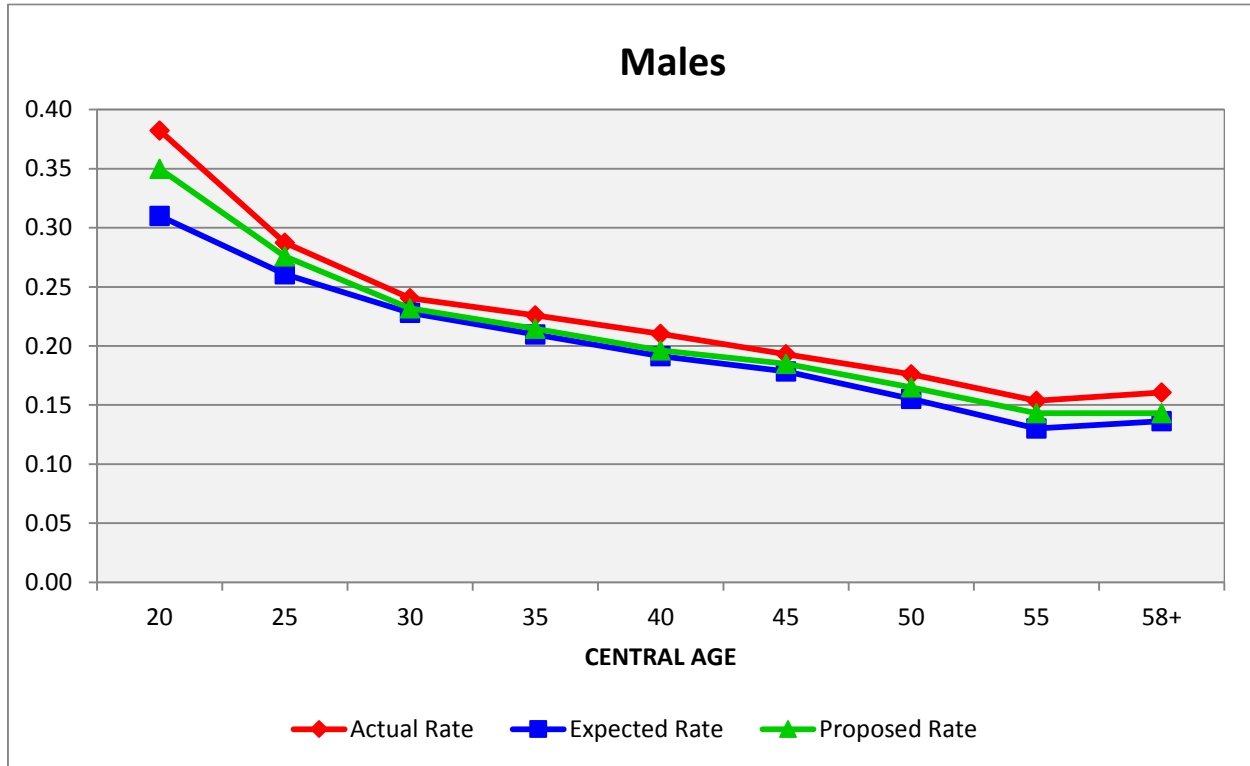
CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Current Rates		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 10 years of service		
20	5	5.1	0.980
25	19	34.9	0.544
30	31	47.0	0.660
35	23	34.9	0.659
40	10	22.2	0.450
45	3	10.9	0.275
50	5	3.7	1.351
53 & OVER	1	0.7	1.429
TOTAL	97	159.4	0.609
	Withdrawals with 10 or more years of service		
30	2	5.7	0.351
35	13	27.8	0.468
40	17	46.5	0.366
45	10	32.3	0.310
50	6	18.0	0.333
53 & OVER	6	4.0	1.500
TOTAL	54	134.3	0.402

The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service which will occur as a result of resignation or dismissal. The experience indicates that during the period studied, for Non-Police members, there were more withdrawals than expected overall in all service categories except for males between five and ten years of service. For Police members, there were significantly fewer withdrawals than expected for members at the younger ages and more than expected at the older ages. We recommend that the rates be adjusted to more closely reflect the experience.

The following graphs show a comparison of the current expected, actual, and proposed rates of withdrawal for actives.

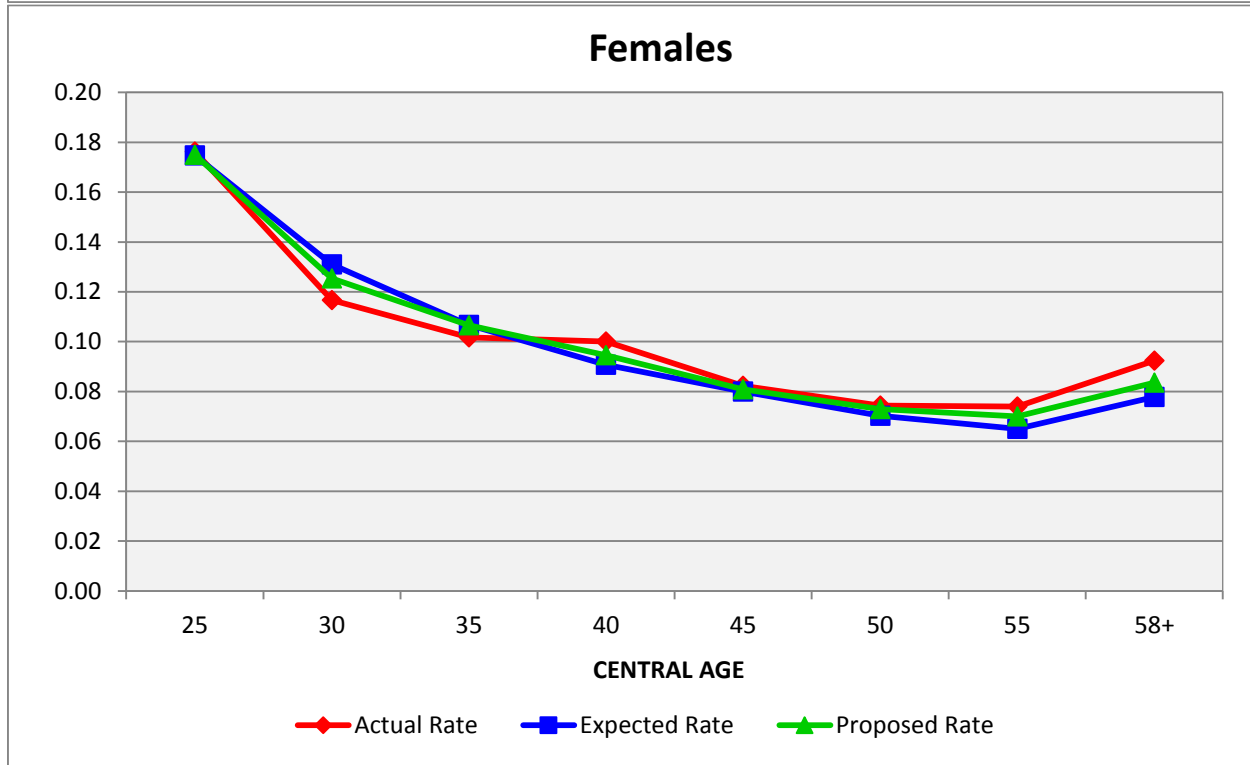
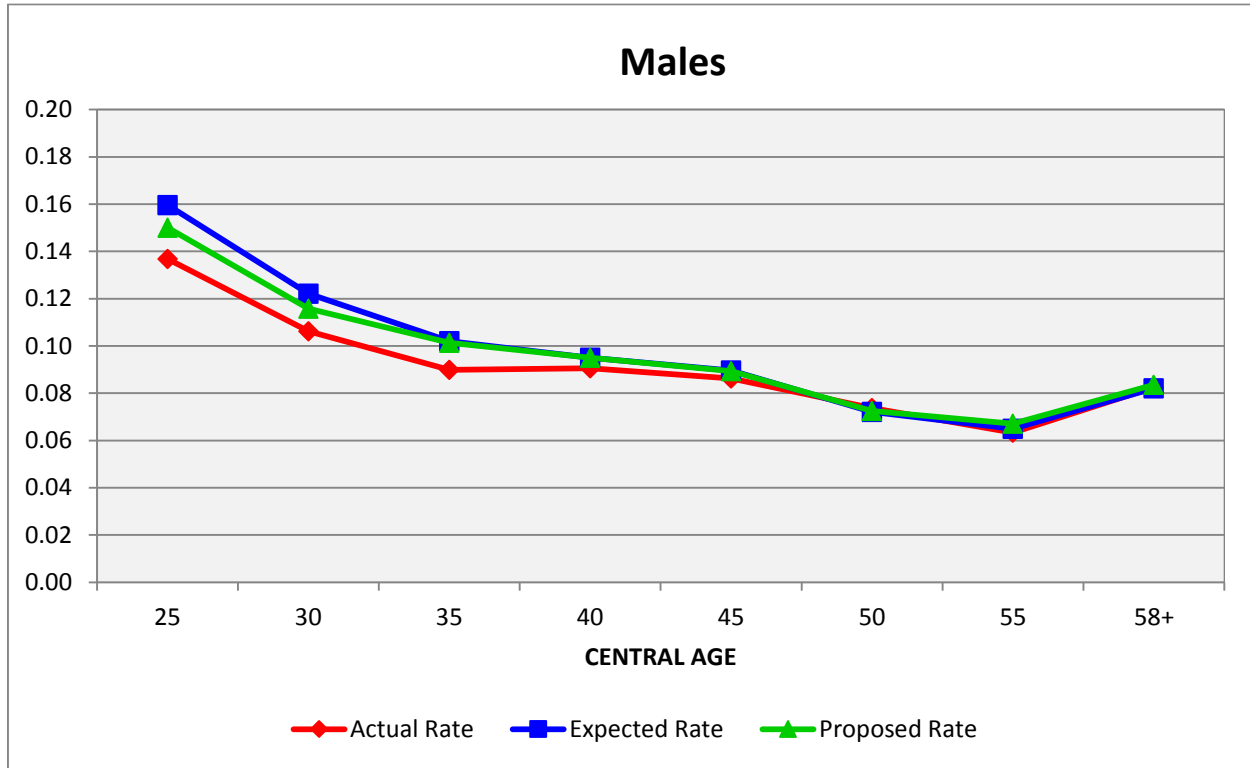


RATES OF WITHDRAWAL FOR NON-POLICE ACTIVE MEMBERS WITH LESS THAN 5 YEARS OF SERVICE



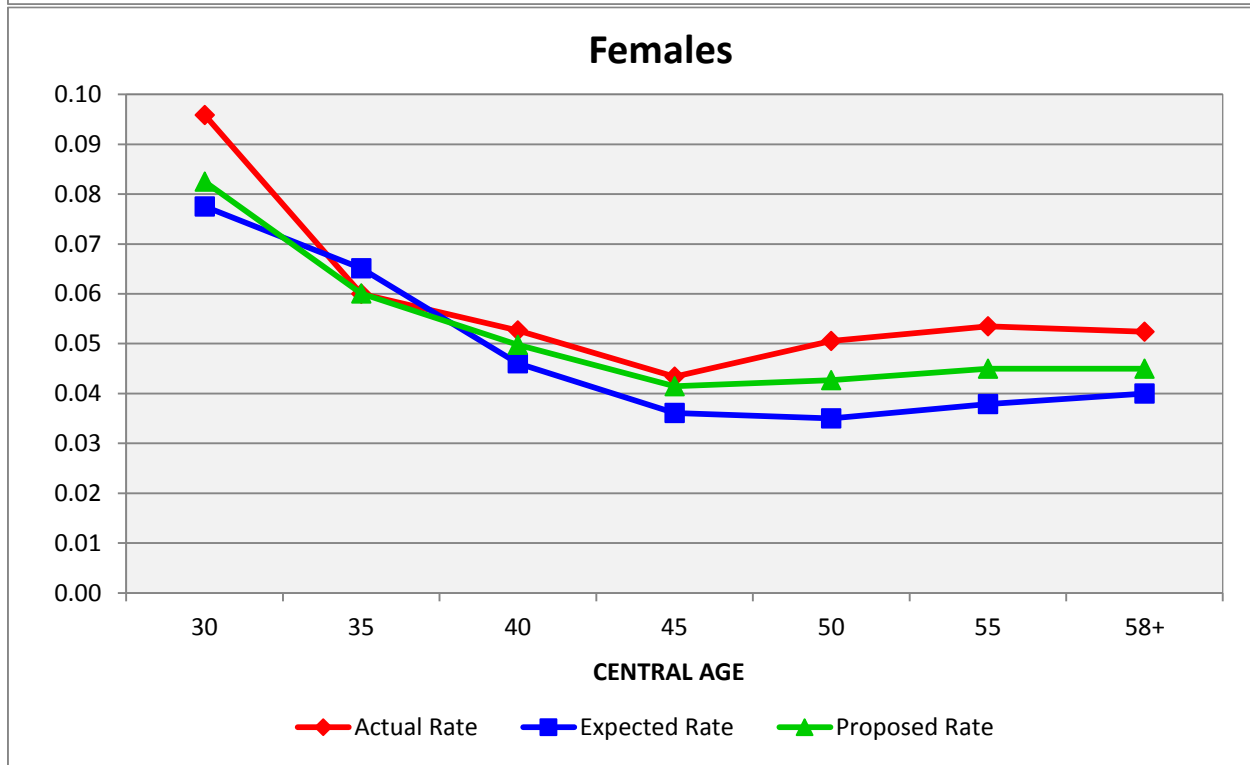
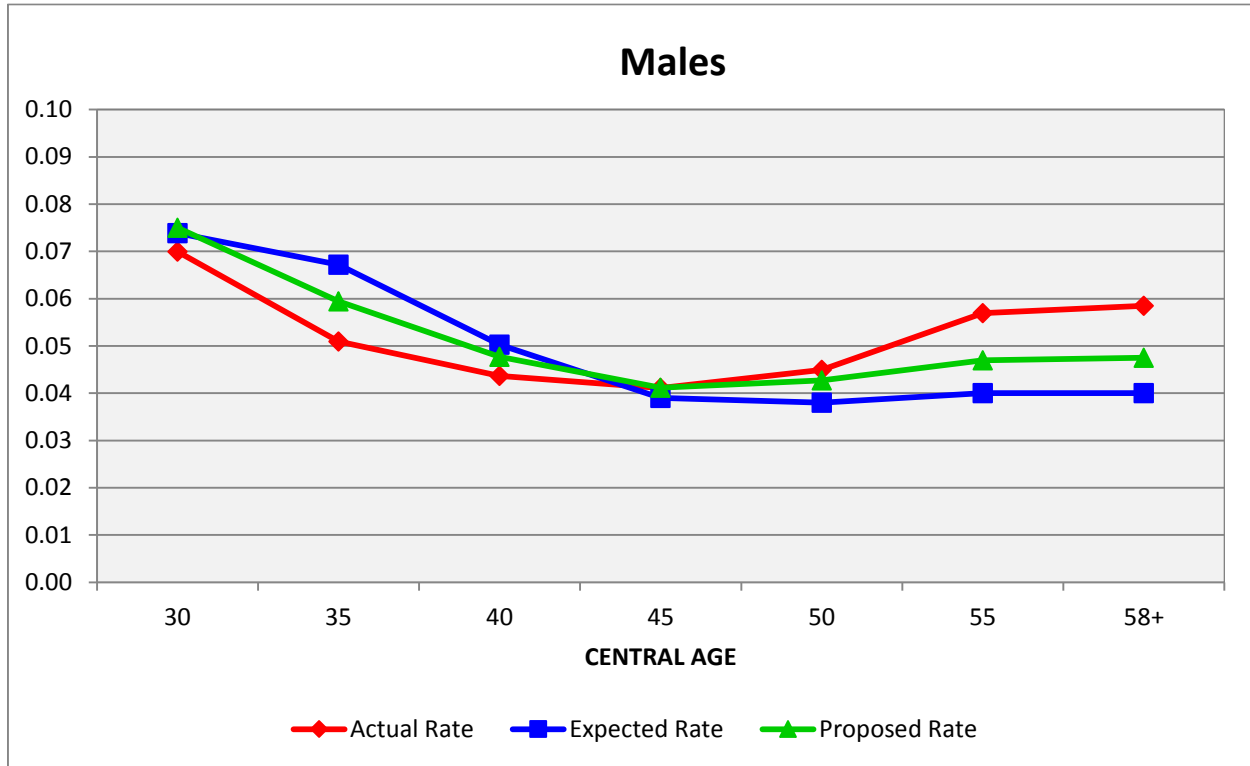


RATES OF WITHDRAWAL FOR NON-POLICE ACTIVE MEMBERS WITH AT LEAST 5 BUT LESS THAN 10 YEARS OF SERVICE



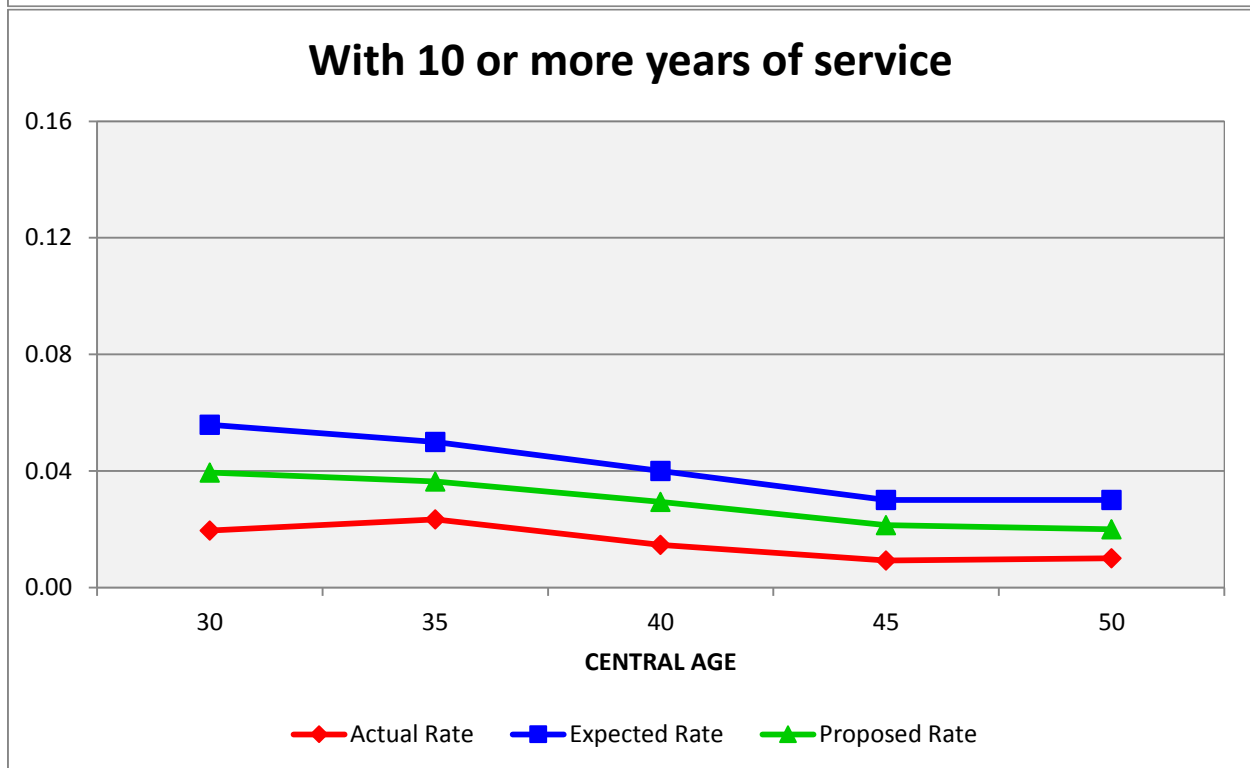
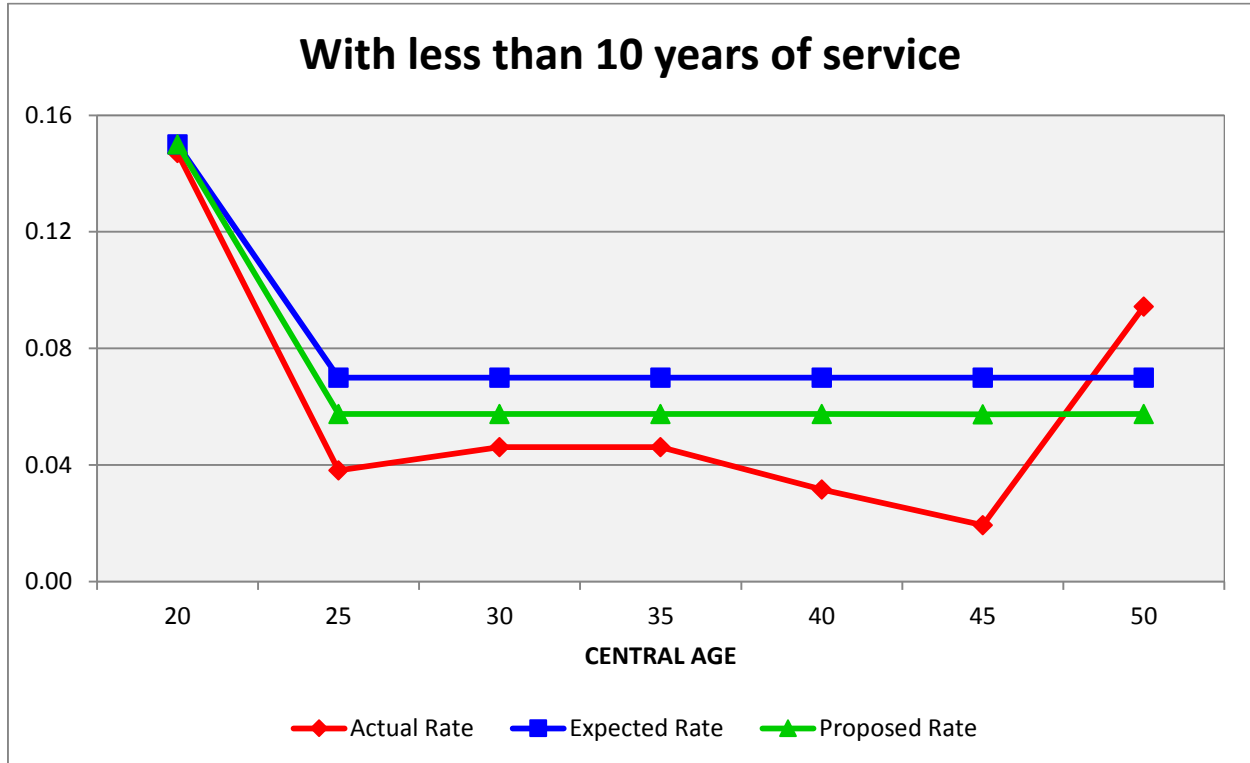


RATES OF WITHDRAWAL FOR NON-POLICE ACTIVE MEMBERS WITH 10 OR MORE YEARS OF SERVICE





RATES OF WITHDRAWAL FOR POLICE ACTIVE MEMBERS





The charts below provide our recommended changes to this assumption.

**COMPARATIVE RATES OF WITHDRAWAL
FROM ACTIVE SERVICE**

NON-POLICE

AGE	RATES OF WITHDRAWAL					
	CURRENT			PROPOSED		
	Years of Service			Years of Service		
	0 – 4	5 – 9	10+	0 – 4	5 – 9	10+
	Males					
20	31.00%			35.00%		
25	26.00	17.00%		27.50	15.00%	
30	22.50	12.00	7.50%	23.00	11.50	7.50%
35	21.00	10.00	7.00	21.50	10.00	6.00
40	19.00	9.50	5.00	19.50	9.50	4.75
45	18.00	9.00	3.75	18.50	9.00	4.00
50	15.50	7.00	3.75	16.50	7.25	4.25
55	13.00	6.50	4.00	14.50	7.00	4.75
Females						
20	31.00%			30.00%		
25	24.00	19.00%		25.00	17.50%	
30	21.00	13.00	7.75%	21.50	12.50	8.25%
35	19.50	10.50	6.75	19.50	10.50	6.00
40	17.50	9.00	4.50	18.25	9.50	5.00
45	15.50	8.00	3.50	16.50	8.00	4.00
50	15.00	7.00	3.50	15.00	7.25	4.25
55	12.50	6.50	4.00	14.00	7.00	4.50



POLICE

AGE	RATES OF WITHDRAWAL			
	CURRENT		PROPOSED	
	Years of Service		Years of Service	
	0 – 9	10+	0 – 9	10+
20	15.0%		15.00%	
25	7.0		5.75	
30	7.0	6.0	5.75	4.00
35	7.0	5.0	5.75	3.75
40	7.0	4.0	5.75	3.00
45	7.0	3.0	5.75	2.00
50	7.0	3.0	5.75	2.00
55	0.0	0.0	0.00	0.00

The following tables show a comparison of the actual and expected withdrawals from active service based on the new proposed rates of withdrawal and the resulting A/E (actual to expected) ratio.



**COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS
BASED ON PROPOSED RATES**

NON-POLICE

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 5 years of service					
20	916	839.0	1.092	412	407.1	1.012
25	2,038	1,955.8	1.042	2,921	2,806.9	1.041
30	1,618	1,559.7	1.037	2,907	2,829.0	1.028
35	1,049	996.4	1.053	1,974	1,940.0	1.018
40	941	878.9	1.071	1,647	1,578.4	1.043
45	792	759.1	1.043	1,277	1,202.1	1.062
50	613	574.8	1.066	979	968.2	1.011
53 & OVER	917	835.2	1.098	1,405	1,301.0	1.080
TOTAL	8,884	8,398.9	1.058	13,522	13,032.7	1.038
	Withdrawals with at least 5 but less than 10 years of service					
25	158	173.6	0.910	177	175.7	1.007
30	419	456.8	0.917	912	979.7	0.931
35	367	414.0	0.886	906	948.6	0.955
40	333	349.4	0.953	770	727.8	1.058
45	280	290.1	0.965	567	557.5	1.017
50	236	232.4	1.015	474	465.5	1.018
53 & OVER	565	581.4	0.972	952	877.4	1.085
TOTAL	2,358	2,497.7	0.944	4,758	4,732.2	1.005
	Withdrawals with 10 or more years of service					
30	51	54.7	0.932	62	53.4	1.161
35	168	196.1	0.857	335	335.6	0.998
40	292	318.8	0.916	543	513.1	1.058
45	335	335.6	0.998	571	545.7	1.046
50	332	315.6	1.052	686	579.3	1.184
53 & OVER	738	475.8	1.551	1,103	739.0	1.493
TOTAL	1,916	1,696.6	1.129	3,300	2,766.1	1.193



**COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS
BASED ON PROPOSED RATES**

POLICE

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Proposed Rates		
	Actual	Expected	Ratio of Actual to Expected
Withdrawals with less than 10 years of service			
20	5	5.1	0.980
25	19	28.6	0.664
30	31	38.6	0.803
35	23	28.7	0.801
40	10	18.2	0.549
45	3	8.9	0.337
50	5	3.1	1.613
53 & OVER	1	1.2	0.833
TOTAL	97	132.4	0.733
Withdrawals with 10 or more years of service			
30	2	4.0	0.500
35	13	20.3	0.640
40	17	34.2	0.497
45	10	23.0	0.435
50	6	12.0	0.500
53 & OVER	6	2.7	2.222
TOTAL	54	96.2	0.561



RATES OF DISABILITY RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS

NON-POLICE

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
35	5	20.1	0.249	6	14.3	0.420
40	34	38.5	0.883	27	29.0	0.931
45	68	84.4	0.806	68	76.5	0.889
50	108	140.4	0.769	138	158.7	0.870
53 & OVER	234	268.7	0.871	238	352.4	0.675
TOTAL	449	552.1	0.813	477	630.9	0.756

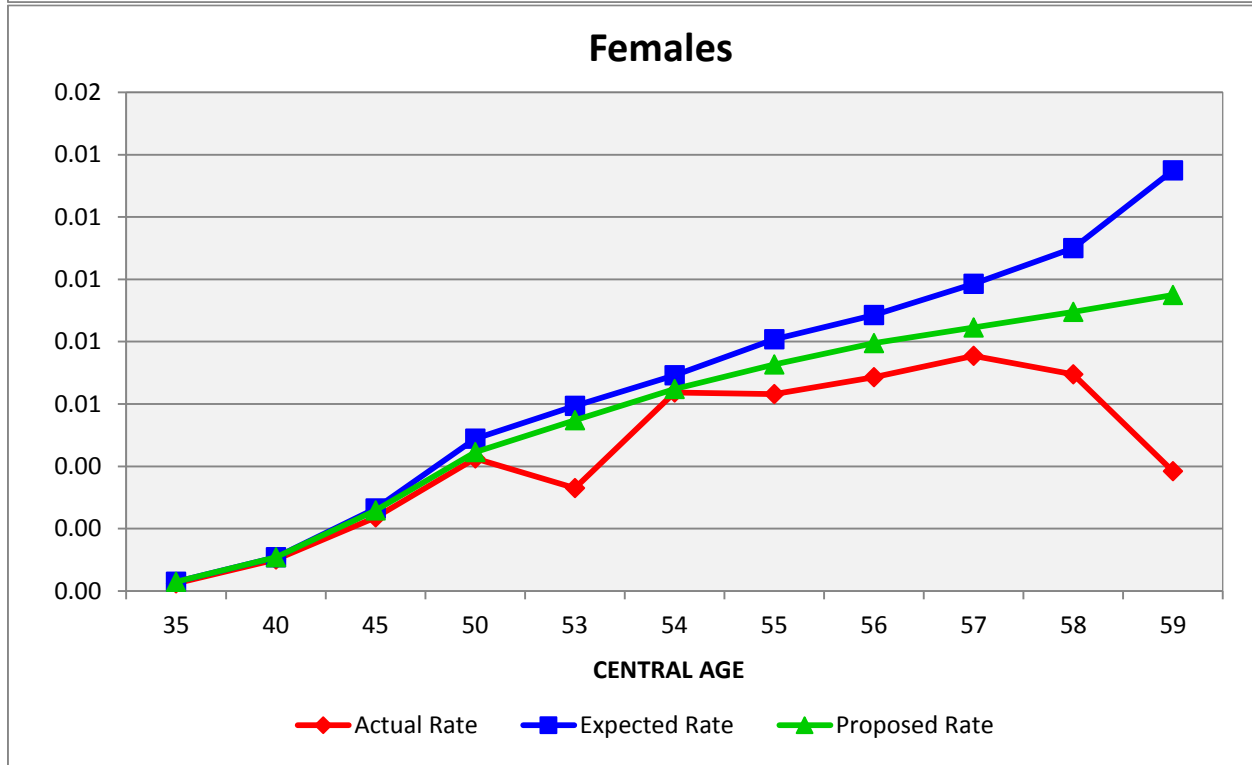
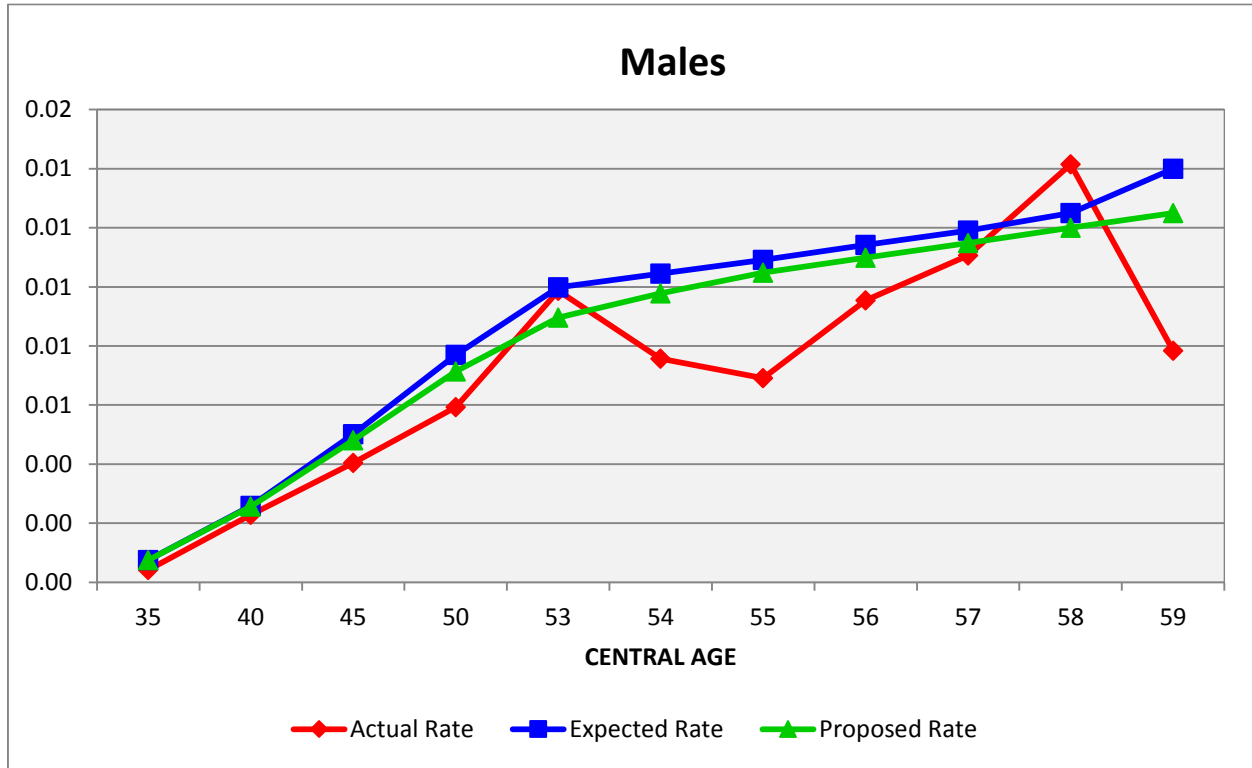
POLICE

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS		
	Current Rates		
	Actual	Expected	Ratio of Actual to Expected
35	1	4.2	0.238
40	18	9.4	1.915
45	22	14.2	1.549
50	24	10.2	2.353
53 & OVER	12	7.3	1.644
TOTAL	77	45.3	1.700

During the period under investigation, the actual rates of disability retirement for Non-Police members were less than expected over all age groups. On the contrary, for Police members the disability retirements were significantly more than expected over most age groups. Therefore, we recommend the rates of disability retirement be decreased for Non-Police members and increased for Police members to partially reflect the experience of the System. The following graphs show a comparison of the current expected, actual, and proposed rates of disability retirements for actives.

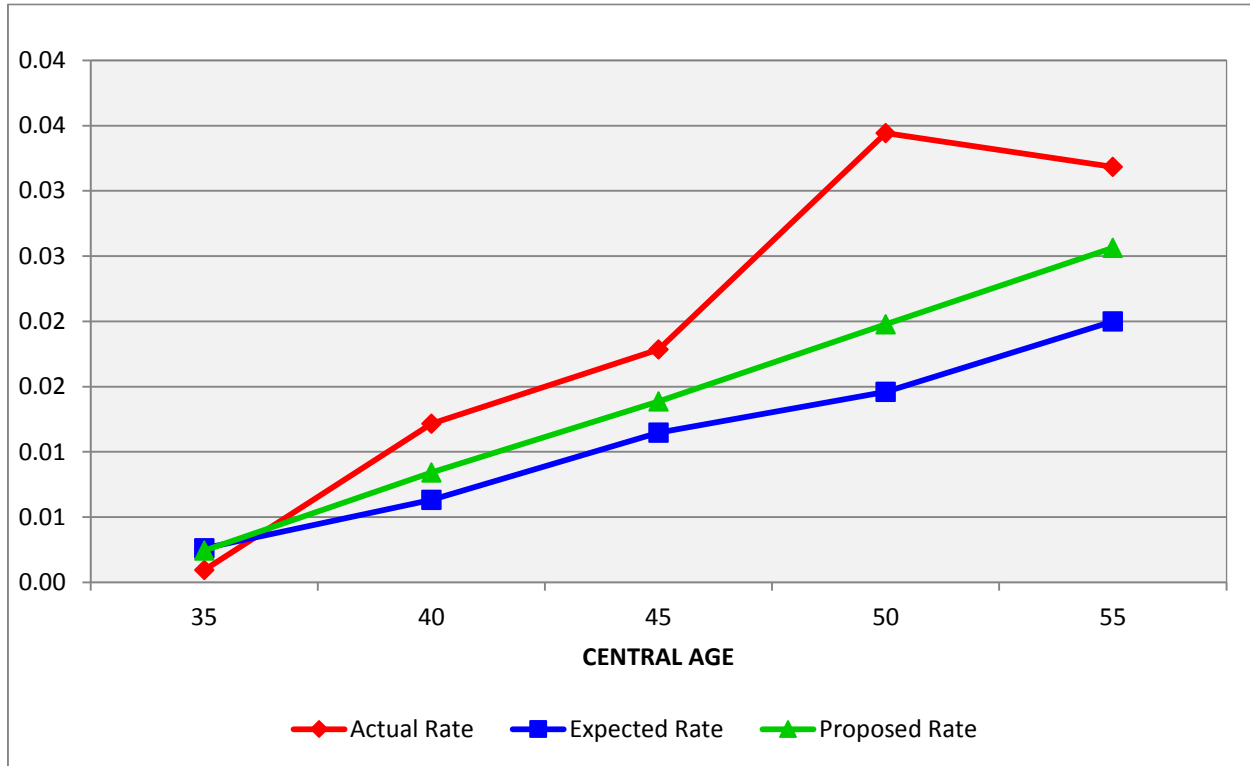


RATES OF DISABILITY RETIREMENT NON-POLICE





RATES OF DISABILITY RETIREMENT POLICE



The following tables show a comparison between the present disability retirement rates and the proposed rates.

COMPARATIVE RATES OF DISABILITY RETIREMENTS NON-POLICE

AGE	RATES OF DISABILITY			
	MALES		FEMALES	
	Current	Proposed	Current	Proposed
20	0.05%	0.05%	0.02%	0.02%
25	0.05	0.05	0.02	0.02
30	0.05	0.05	0.02	0.02
35	0.05	0.05	0.02	0.02
40	0.25	0.25	0.10	0.10
45	0.50	0.48	0.25	0.25
50	0.75	0.70	0.50	0.45
55	1.10	1.05	0.82	0.73



**COMPARATIVE RATES OF DISABILITY RETIREMENTS
POLICE**

AGE	RATES OF DISABILITY	
	Current	Proposed
20	0.05%	0.02%
25	0.08	0.05
30	0.13	0.08
35	0.22	0.16
40	0.60	0.85
45	1.20	1.40
50	1.50	2.00
55	2.30	2.70

The following table shows a comparison of the actual and expected disability retirements based on the new proposed rates of disability and the resulting A/E (actual to expected) ratio.

**COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS
BASED ON PROPOSED RATES**

NON-POLICE

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
35	5	20.1	0.249	6	14.3	0.420
40	34	38.1	0.892	27	29.0	0.931
45	68	80.8	0.842	68	74.6	0.912
50	108	130.1	0.830	138	144.7	0.954
53 & OVER	234	252.3	0.927	238	300.1	0.793
TOTAL	449	521.4	0.861	477	562.7	0.848



**COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS
BASED ON PROPOSED RATES**

POLICE

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS		
	Proposed Rates		
	Actual	Expected	Ratio of Actual to Expected
35	1	3.5	0.286
40	18	12.5	1.440
45	22	17.1	1.287
50	24	13.8	1.739
53 & OVER	12	9.0	1.333
TOTAL	77	55.9	1.377



RATES OF RETIREMENT

**COMPARISON OF ACTUAL AND EXPECTED
EARLY RETIREMENTS**

OLD PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
45	1	1.0	1.000	0	1.2	0.000
50	2	9.7	0.206	10	14.1	0.709
53	2	2.5	0.800	3	3.6	0.833
54	1	2.3	0.435	1	3.5	0.286
55	2	1.9	1.053	2	5.2	0.385
56	1	2.2	0.455	6	6.7	0.896
57	1	1.7	0.588	3	4.2	0.714
58	1	1.6	0.625	4	3.5	1.143
59	2	1.7	1.176	1	3.7	0.270
TOTAL	13	24.6	0.528	30	45.7	0.656

NEW PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
45	50	75.1	0.666	35	34.7	1.009
50	103	233.1	0.442	130	151.9	0.856
53	18	41.8	0.431	27	41.6	0.649
54	27	37.7	0.716	36	42.1	0.855
55	16	35.3	0.453	34	49.0	0.694
56	14	33.3	0.420	34	47.0	0.723
57	24	31.2	0.769	45	51.6	0.872
58	27	29.6	0.912	39	53.7	0.726
59	27	24.5	1.102	49	61.1	0.802
TOTAL	306	541.6	0.565	429	532.7	0.805



**COMPARISON OF ACTUAL AND EXPECTED
NORMAL RETIREMENTS**

OLD PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
52 & UNDER	183	191.7	0.955	193	207.6	0.930
55	476	506.2	0.940	838	879.9	0.952
60	345	348.9	0.989	572	586.6	0.975
65	67	71.9	0.932	111	120.2	0.923
68 & OVER	25	40.6	0.616	35	46.9	0.746
TOTAL	1,096	1,159.3	0.945	1,749	1,841.2	0.950

NEW PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
52 & UNDER	256	174.8	1.465	185	132.4	1.397
55	235	171.3	1.372	287	225.6	1.272
60	1,250	932.9	1.340	2,021	1,483.0	1.363
65	653	706.8	0.924	904	939.1	0.963
68 & OVER	232	293.4	0.791	227	284.8	0.797
TOTAL	2,626	2,279.2	1.152	3,624	3,064.9	1.182



**COMPARISON OF ACTUAL AND EXPECTED
NORMAL RETIREMENTS**

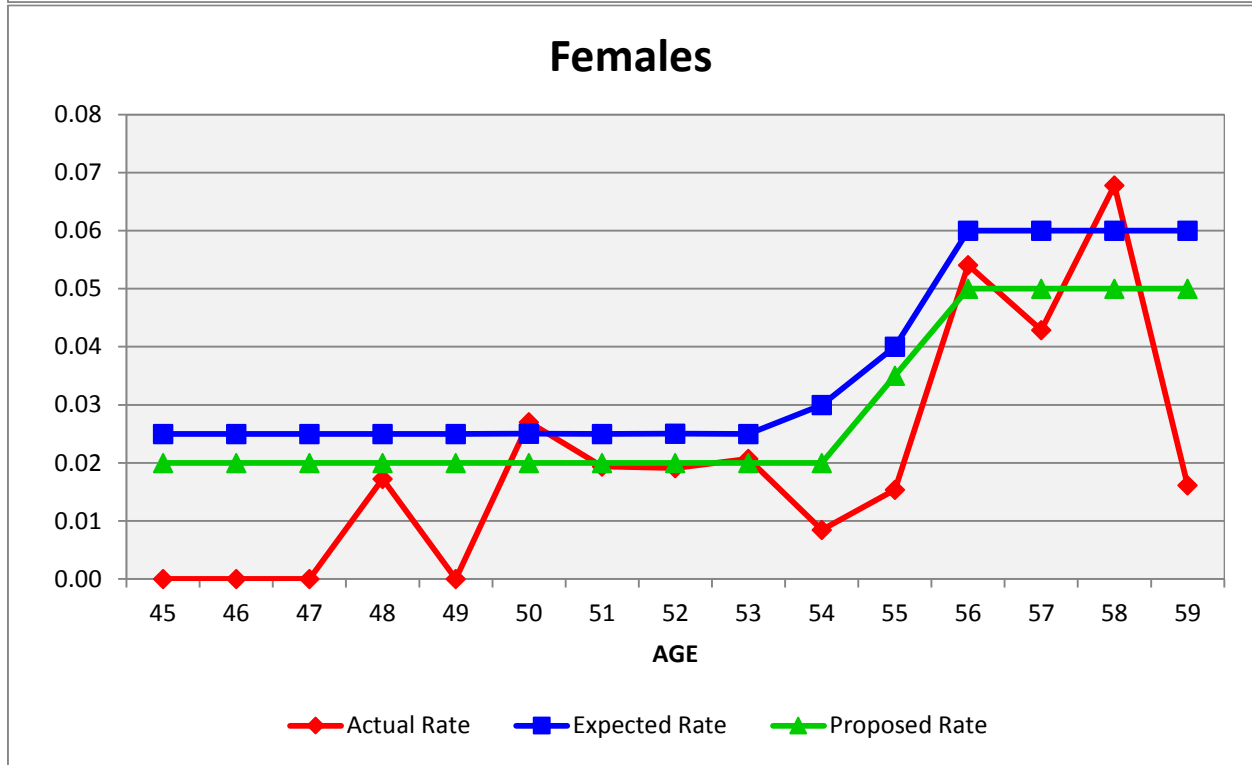
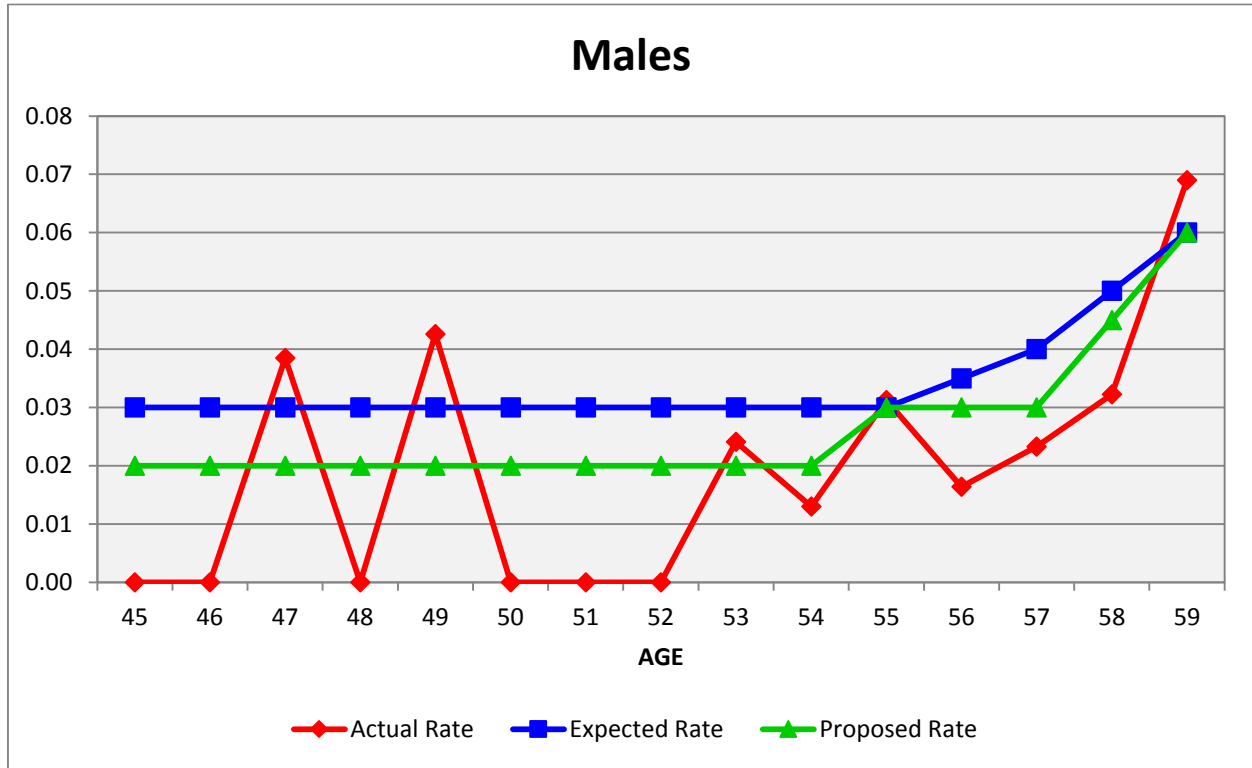
POLICE

AGE	NUMBER OF SERVICE RETIREMENTS		
	Current Rates		
	Actual	Expected	Ratio of Actual to Expected
< 55	36	50.0	0.720
55	16	5.7	2.807
56	6	4.2	1.429
57	3	3.1	0.968
58	3	1.9	1.579
59	1	1.2	0.833
60	4	3.5	1.143
61	1	1.5	0.667
62	4	2.0	2.000
63	0	0.8	0.000
64	2	0.8	2.500
65 & OVER	1	1.3	0.769
TOTAL	77	76.0	1.013

The analysis of the experience reflects that actual early retirement rates were less than expected at most ages. The rates of normal retirement for Old Plan members indicate that there were slightly fewer retirements than expected overall. For New Plan members and Police members, the rates of retirement are greater than expected at most ages except for those age 65 and over where fewer than expected retired during the study period. We recommend an adjustment to the rates to reflect the experience as well as maintain a reasonable degree of margin. The following graphs show a comparison of the present, actual, and proposed rates of service retirements.

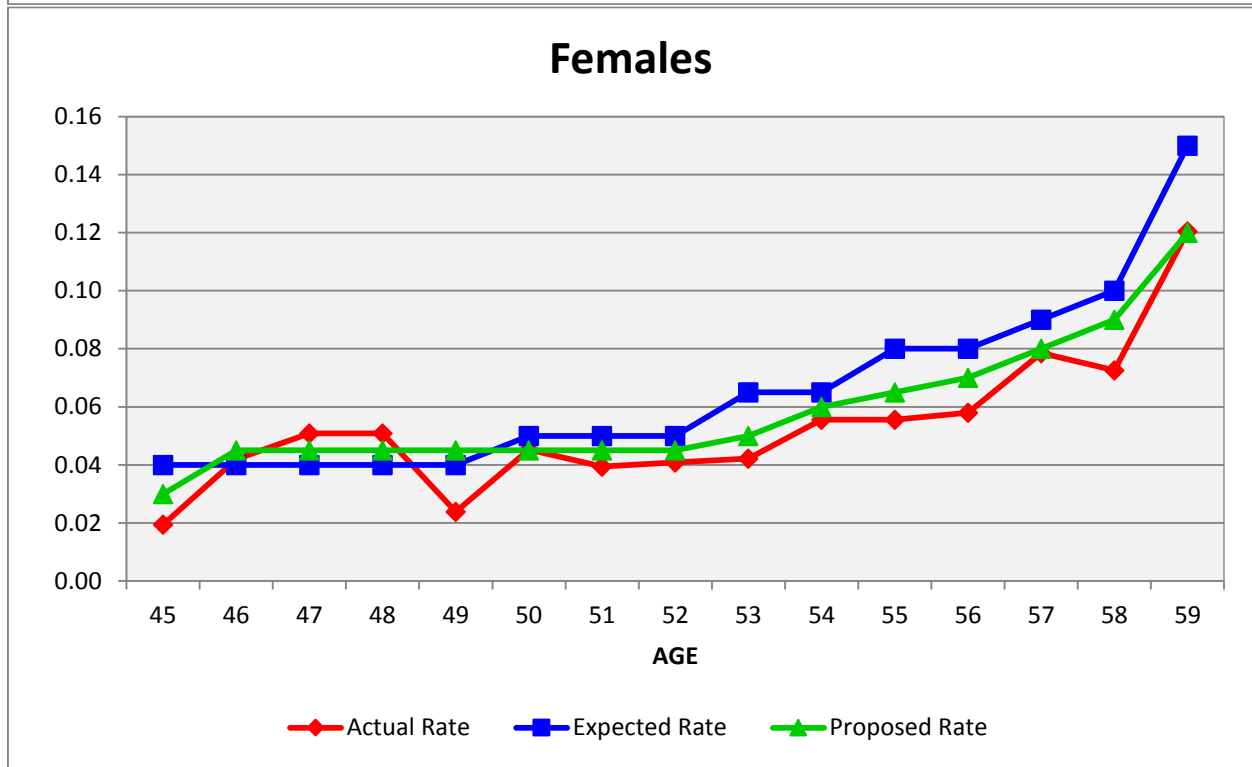
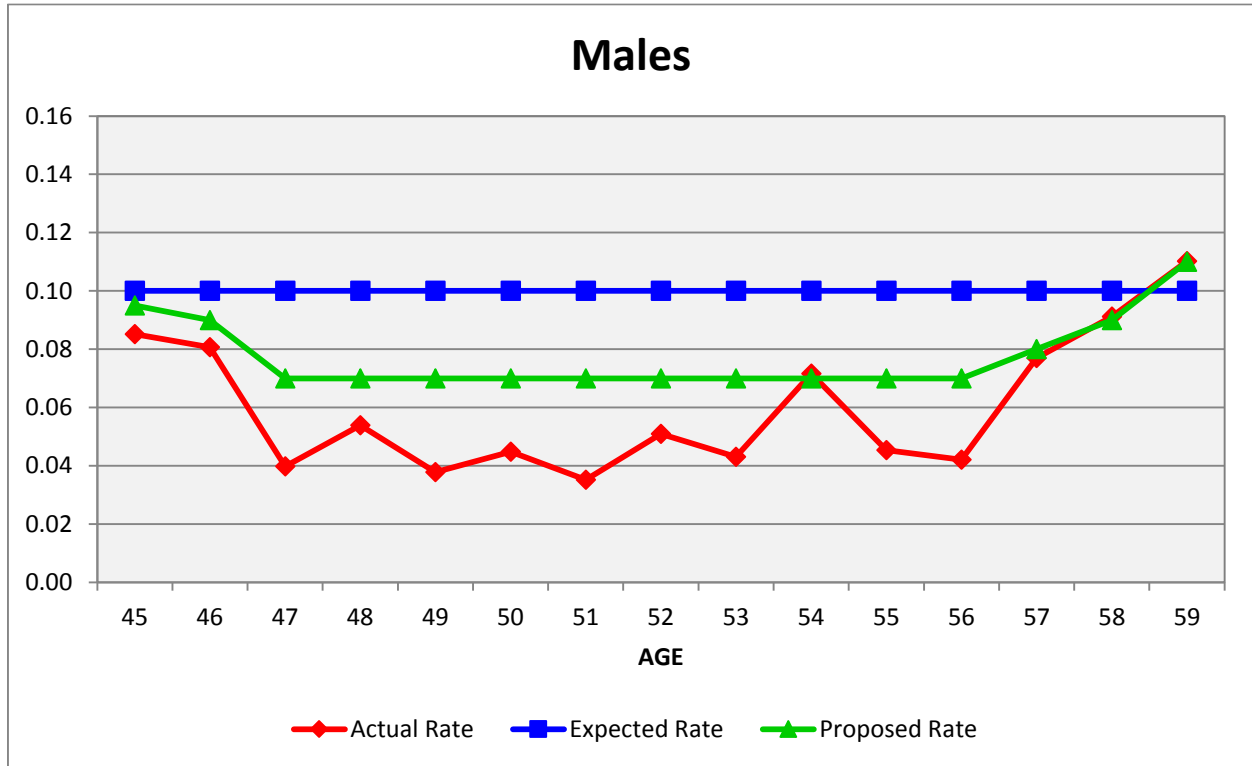


RATES OF EARLY RETIREMENT OLD PLAN



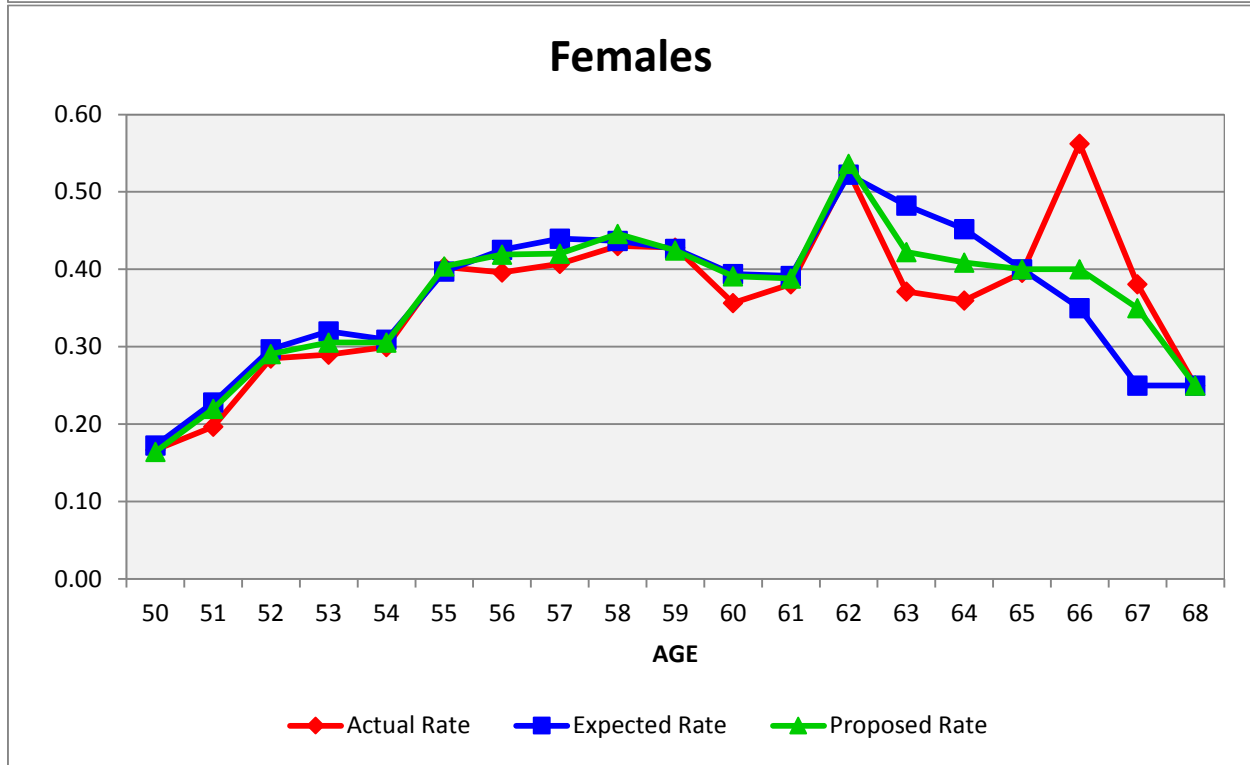
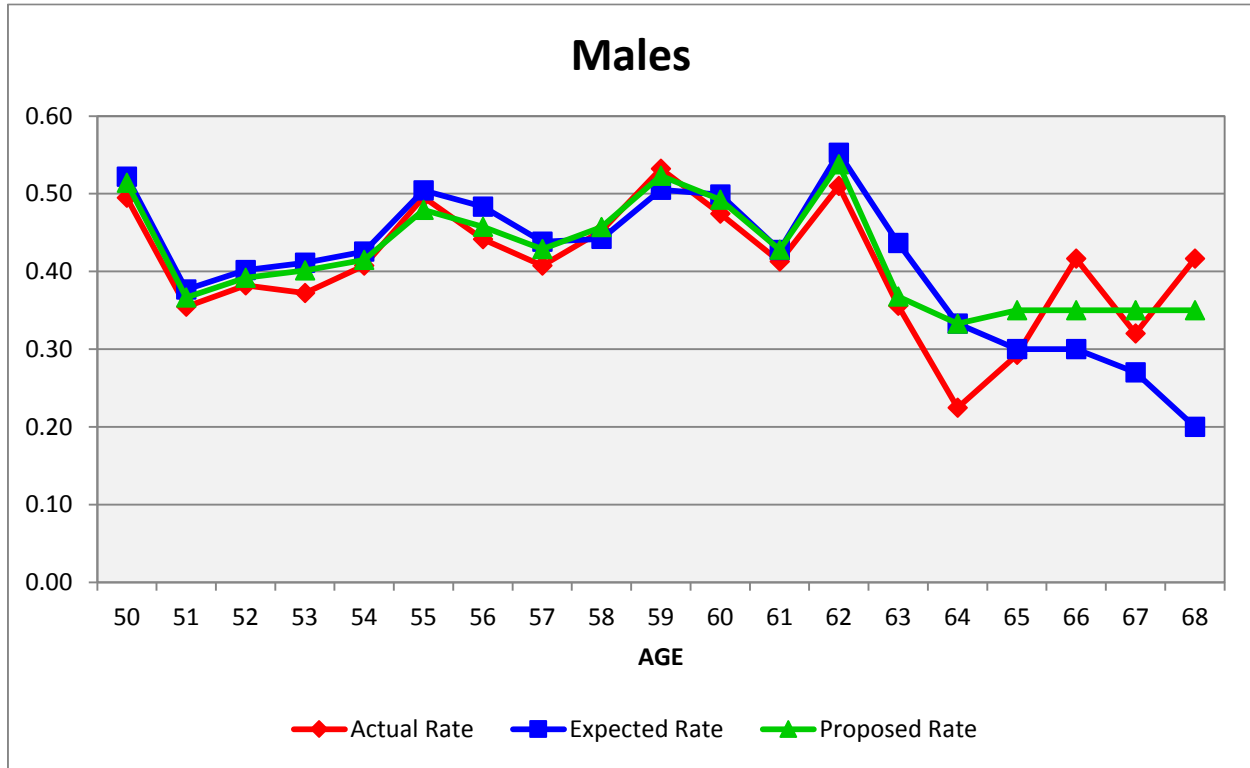


RATES OF EARLY RETIREMENT NEW PLAN



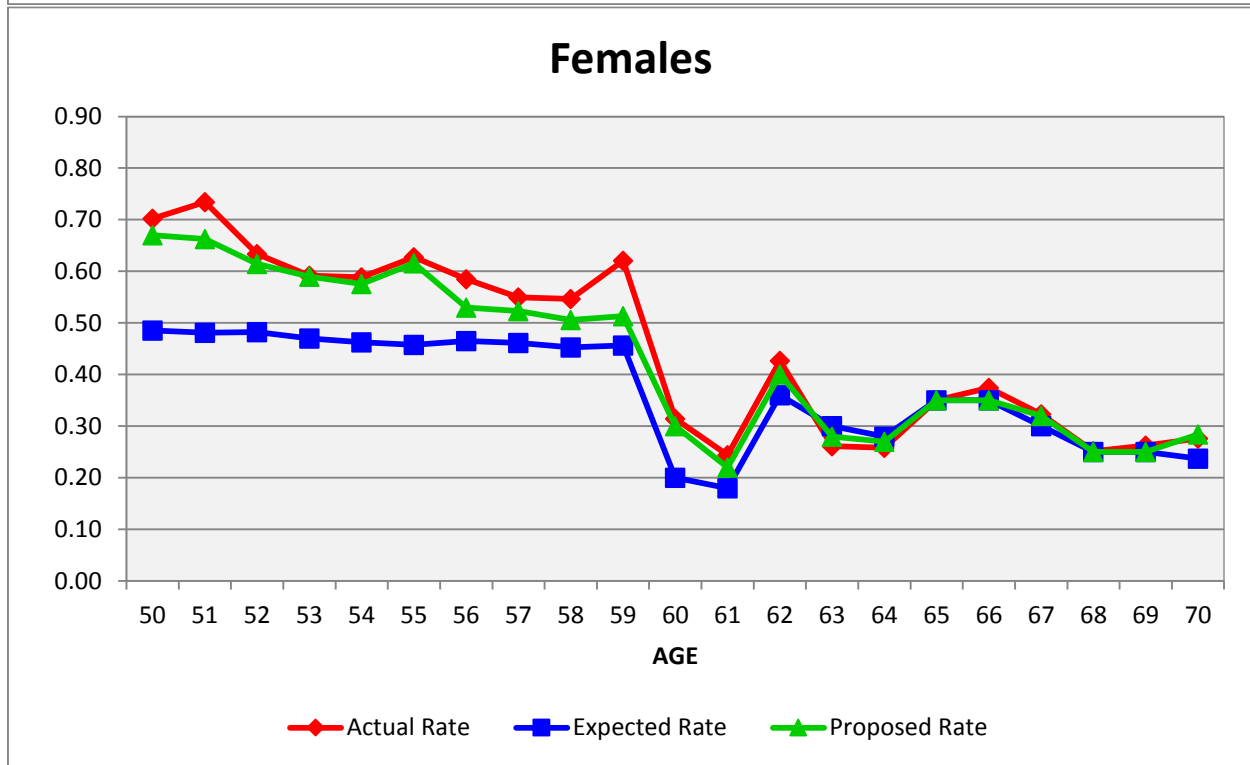
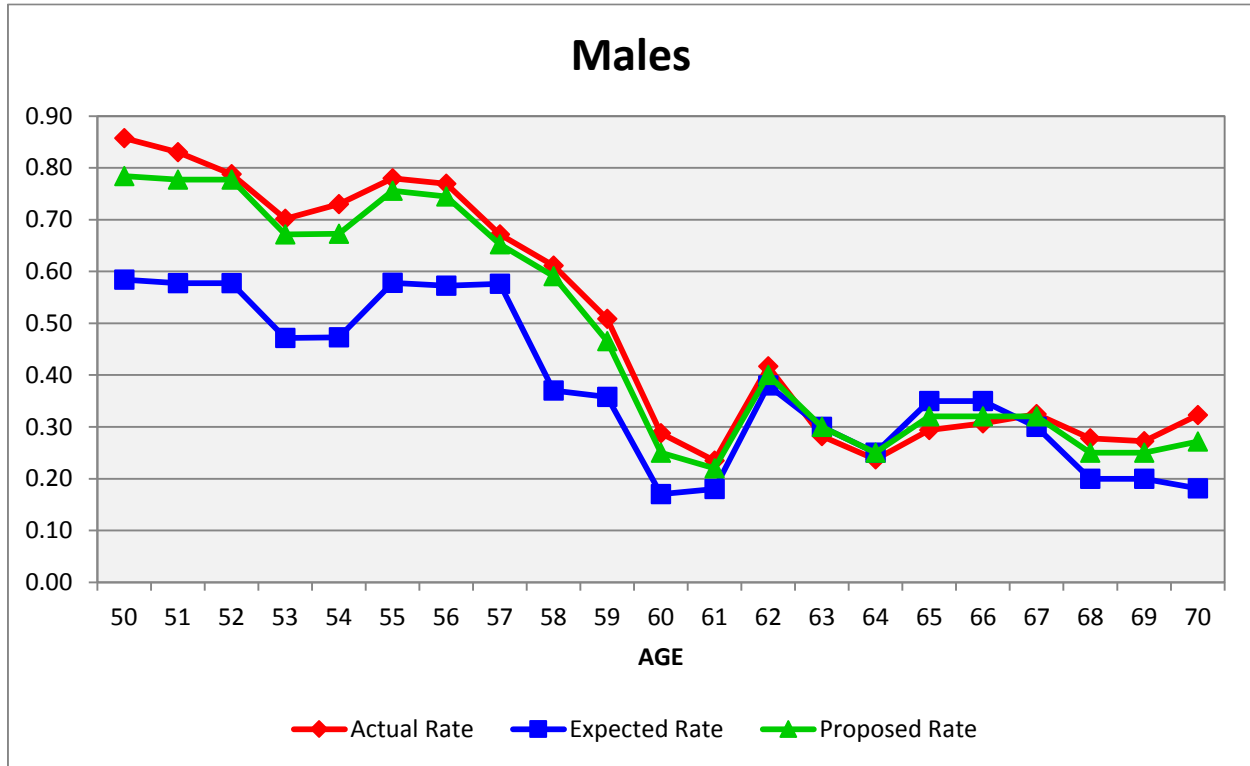


RATES OF NORMAL RETIREMENT OLD PLAN



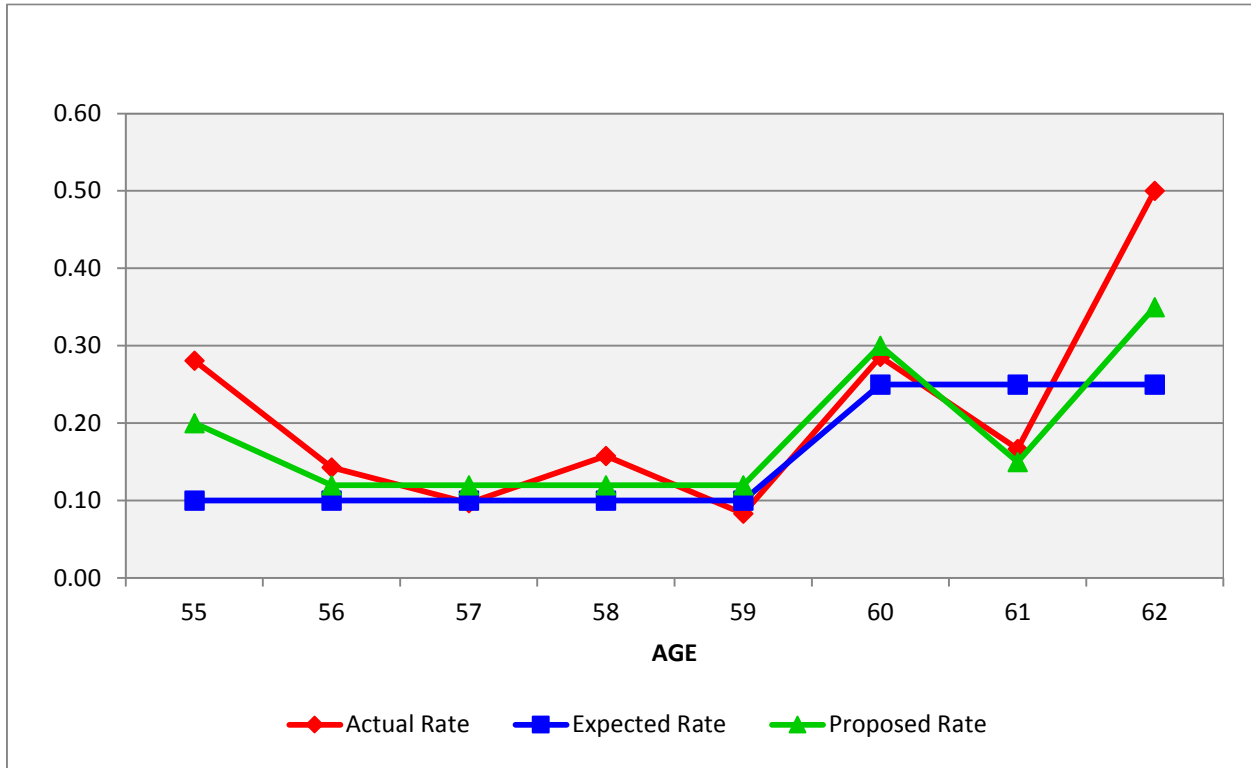


RATES OF NORMAL RETIREMENT NEW PLAN





RATES OF RETIREMENT POLICE



The following tables show a comparison of the present and proposed rates of service retirement.



**COMPARATIVE RATES OF RETIREMENT
Old Plan**

AGE	EARLY RETIREMENT			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
45	3.0%	2.0%	2.5%	2.0%
50	3.0	2.0	2.5	2.0
55	3.0	3.0	4.0	3.5
59	6.0	6.0	6.0	5.0

AGE	NORMAL RETIREMENT			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
	AT AGE 60 OR ATTAINMENT OF 30 YEARS OF SERVICE			
50	9.0%	7.5%	7.0%	6.0%
55	11.5	7.5	9.0	10.0
60	17.0	15.0	20.0	20.0
61	20.0	20.0	20.0	20.0
62	37.0	32.0	40.0	40.0
63	28.0	20.0	34.0	25.0
64	20.0	20.0	30.0	25.0
65	30.0	35.0	40.0	40.0
66	30.0	35.0	35.0	40.0
67	27.0	35.0	25.0	35.0
68	20.0	35.0	25.0	25.0
69	45.0	35.0	35.0	25.0
70	45.0	35.0	35.0	35.0
75	100.0	100.0	100.0	100.0

In addition, the following rates are recommended for Old Plan members with 34 or more years of service.



**COMPARATIVE RATES OF RETIREMENT
Old Plan (continued)**

AGE	NORMAL RETIREMENT (continued)			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
	ATTAINMENT OF 34 YEARS OF SERVICE			
50	100.0%	100.0%	100.0%	100.0%
55	100.0	100.0	100.0	100.0
60	95.0	97.5	95.0	95.0
61	95.0	97.5	95.0	95.0
62	90.0	97.5	90.0	95.0
63	90.0	90.0	90.0	95.0
64	90.0	90.0	90.0	90.0
	ATTAINMENT OF GREATER THAN 34 YEARS OF SERVICE			
50	90.0%	90.0%	90.0%	100.0%
55	90.0	75.0	90.0	90.0
60	50.0	40.0	60.0	55.0
61	50.0	40.0	60.0	55.0
62	50.0	40.0	60.0	65.0
63	50.0	40.0	60.0	50.0
64	15.0	15.0	60.0	50.0



**COMPARATIVE RATES OF RETIREMENT
New Plan**

AGE	EARLY RETIREMENT			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
45	10.0%	9.5%	4.0%	3.0%
50	10.0	7.0	5.0	4.5
55	10.0	7.0	8.0	6.5
59	10.0	11.0	15.0	12.0

AGE	NORMAL RETIREMENT			
	MALES		FEMALES	
	Present*	Proposed**	Present*	Proposed***
50	50.0%	70.0%	40.0%	50.0%
55	50.0	60.0	40.0	50.0
60	17.0	25.0	20.0	30.0
62	38.0	40.0	36.0	40.0
64	25.0	25.0	28.0	27.0
65	35.0	32.0	35.0	35.0
66	35.0	32.0	35.0	35.0
67	30.0	32.0	30.0	32.0
68	20.0	25.0	25.0	25.0
69	20.0	25.0	25.0	25.0
70	20.0	30.0	25.0	30.0
75	100.0	100.0	100.0	100.0

* An additional 10% are assumed to retire in the first year eligible for unreduced retirement with 30 years of service.

** An additional 10% for ages below 55 and 20% for ages 55 to 59 are assumed to retire in the first year eligible for unreduced retirement with 30 years of service.

*** An additional 20% are assumed to retire in the first year eligible for unreduced retirement with 30 years of service before age 60.



**COMPARATIVE RATES OF RETIREMENT
Police**

AGE	RATES OF RETIREMENT	
	Current*	Proposed**
55	10%	20%
56	10	12
57	10	12
58	10	12
59	10	12
60	25	30
61	25	15
62	25	35
63	25	25
64	25	25
65	25	25
66	25	25
67	25	25
68	25	25
69	25	25
70 & OVER	100	100

* In addition, 100% are assumed to retire with 30 years of service before age 55.

** In addition, 100% are assumed to retire with 30 years of service on or before age 50 and 75% are assumed to retire with 30 years of service after age 50 but before age 55.



**COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS
BASED ON PROPOSED RATES OF EARLY RETIREMENT**

OLD PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
45	1	0.6	1.667	0	1.0	0.000
50	2	6.4	0.313	10	11.3	0.885
53	2	1.7	1.176	3	2.9	1.034
54	1	1.5	0.667	1	2.4	0.417
55	2	1.9	1.053	2	4.6	0.435
56	1	1.8	0.556	6	5.6	1.071
57	1	1.3	0.769	3	3.5	0.857
58	1	1.4	0.714	4	3.0	1.333
59	2	1.7	1.176	1	3.1	0.323
TOTAL	13	18.3	0.710	30	37.4	0.802

NEW PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
45	50	62.7	0.797	35	35.6	0.983
50	103	163.2	0.631	130	147.0	0.884
53	18	29.3	0.614	27	32.0	0.844
54	27	26.4	1.023	36	38.9	0.925
55	16	24.7	0.648	34	39.8	0.854
56	14	23.3	0.601	34	41.1	0.827
57	24	25.0	0.960	45	45.8	0.983
58	27	26.6	1.015	39	48.3	0.807
59	27	27.0	1.000	49	48.8	1.004
TOTAL	306	408.2	0.750	429	477.3	0.899



**COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS
BASED ON PROPOSED RATES OF NORMAL RETIREMENT**

OLD PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
52 & UNDER	183	186.9	0.979	193	200.8	0.961
55	476	488.0	0.975	838	864.1	0.970
60	345	352.0	0.980	572	590.3	0.969
65	67	73.7	0.909	111	114.4	0.970
68 & OVER	25	45.3	0.552	35	45.0	0.778
TOTAL	1,096	1,145.9	0.956	1,749	1,814.6	0.964

NEW PLAN

CENTRAL AGE OF GROUP	NUMBER OF RETIREMENTS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
52 & UNDER	256	234.6	1.091	185	174.5	1.060
55	235	224.7	1.046	287	276.6	1.038
60	1,250	1,149.3	1.088	2,021	1,885.6	1.072
65	653	687.8	0.949	904	918.4	0.984
68 & OVER	232	331.9	0.699	227	297.9	0.762
TOTAL	2,626	2,628.3	0.999	3,624	3,553.0	1.020



**COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS
BASED ON PROPOSED RATES OF NORMAL RETIREMENT**

POLICE

AGE	NUMBER OF SERVICE RETIREMENTS		
	Proposed Rates		
	Actual	Expected	Ratio of Actual to Expected
< 55	36	39.5	0.911
55	16	11.4	1.404
56	6	5.0	1.200
57	3	3.7	0.811
58	3	2.3	1.304
59	1	1.4	0.714
60	4	4.2	0.952
61	1	0.9	1.111
62	4	2.8	1.429
63	0	0.8	0.000
64	2	0.8	2.500
65 & OVER	1	1.3	0.769
TOTAL	77	74.1	1.039



RATES OF MORTALITY

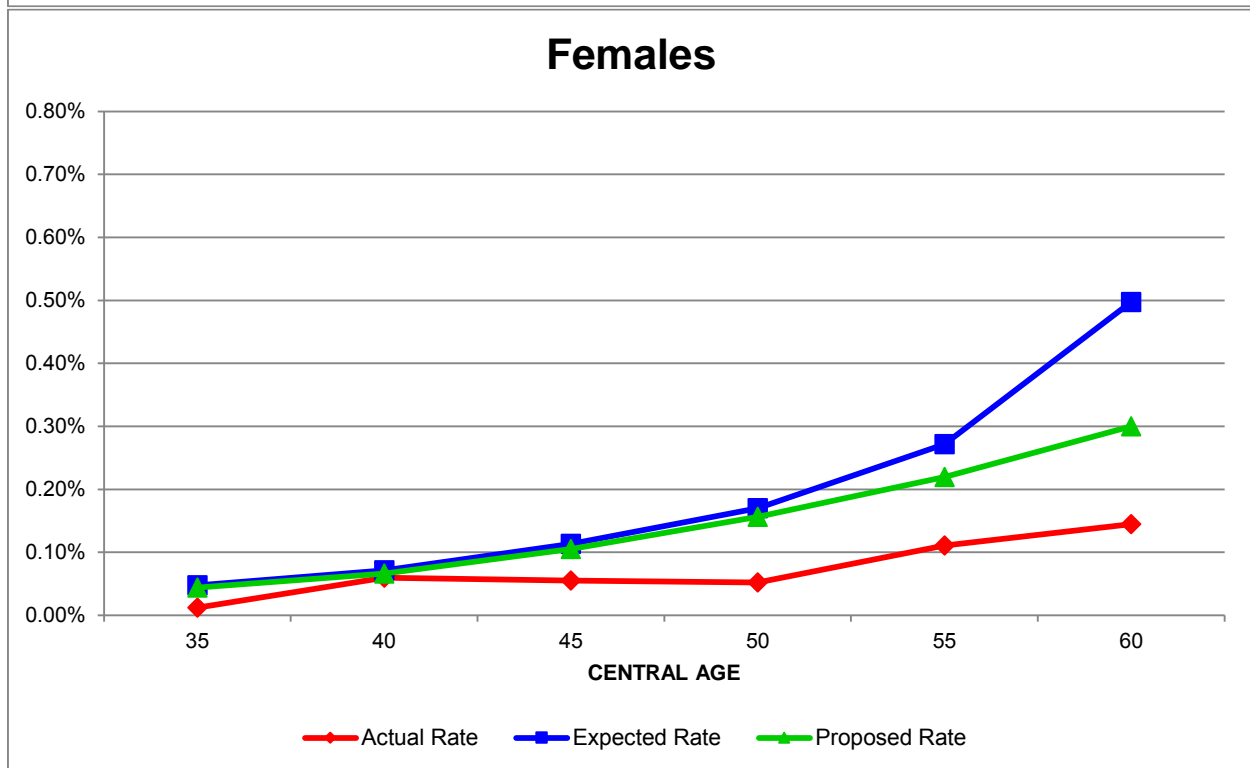
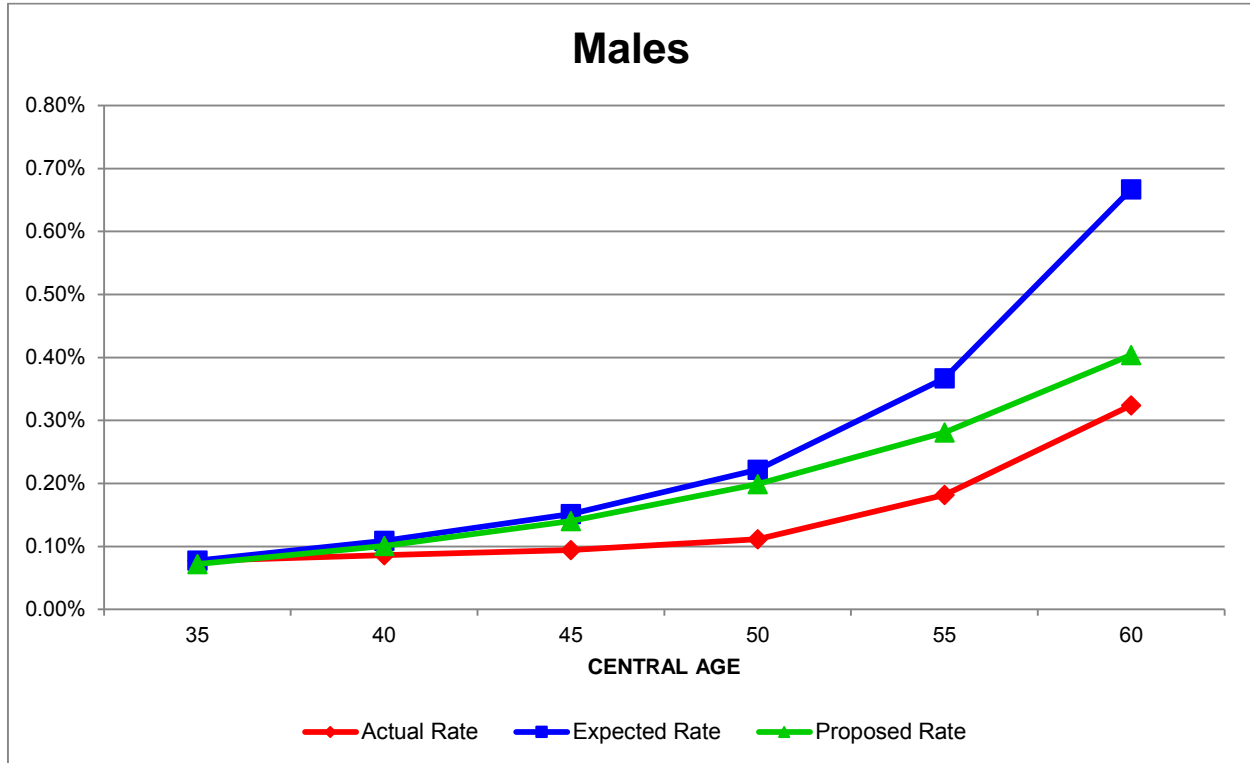
Pre-Retirement Mortality

COMPARISON OF ACTUAL AND EXPECTED PRE-RETIREMENT DEATHS

CENTRAL AGE OF GROUP	NUMBER OF PRE-RETIREMENT DEATHS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
20	1	0.9	1.111	0	0.3	0.000
25	1	3.3	0.303	3	2.6	1.154
30	3	5.6	0.536	3	6.2	0.484
35	10	10.1	0.990	3	11.6	0.259
40	14	17.7	0.791	16	19.2	0.833
45	17	27.3	0.623	16	32.8	0.488
50	21	41.8	0.502	17	55.3	0.307
55	32	64.5	0.496	33	81.0	0.407
58 & OVER	66	177.7	0.371	41	177.9	0.230
TOTAL	165	348.9	0.473	132	386.9	0.341

During the period under investigation, the actual rates of death in active service were significantly less than expected for both males and females at all ages. We recommend that the rates of mortality in active service for both males and females be changed to the RP-2000 Employee Mortality Table projected to 2025 with projection scale BB. The following graphs show a comparison of the present, actual, and proposed rates of pre-retirement mortality.

PRE-RETIREMENT RATES OF DEATH





The following table shows a comparison of the present and proposed rates of pre-retirement mortality.

COMPARATIVE RATES OF PRE-RETIREMENT MORTALITY

AGE	MALES		FEMALES	
	Present	Proposed	Present	Proposed
20	0.0345%	0.0320%	0.0191%	0.0177%
25	0.0376	0.0349	0.0207	0.0192
30	0.0444	0.0412	0.0264	0.0245
35	0.0773	0.0717	0.0475	0.0441
40	0.1079	0.1001	0.0706	0.0655
45	0.1508	0.1399	0.1124	0.1043
50	0.2138	0.1983	0.1676	0.1555
55	0.3624	0.2810	0.2717	0.2228
60	0.6747	0.4092	0.5055	0.3058

The following table show a comparison of the actual deaths that occurred during the study period with the expected deaths based on the proposed rates of pre-retirement mortality.

COMPARISON OF ACTUAL AND EXPECTED CASES OF PRE-RETIREMENT DEATHS BASED ON PROPOSED RATES OF MORTALITY

CENTRAL AGE OF GROUP	NUMBER OF PRE-RETIREMENT DEATHS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
20	1	0.8	1.250	0	0.3	0.000
25	1	3.0	0.333	3	2.4	1.250
30	3	5.2	0.577	3	5.7	0.526
35	10	9.3	1.075	3	10.8	0.278
40	14	16.4	0.854	16	17.8	0.899
45	17	25.3	0.672	16	30.4	0.526
50	21	37.5	0.560	17	50.8	0.335
55	32	49.4	0.648	33	65.5	0.504
58 & OVER	66	94.7	0.697	41	97.5	0.421
TOTAL	165	241.6	0.683	132	281.2	0.469



Post-Retirement Mortality Rates

The current mortality used for mortality during the period after service retirement and for beneficiaries of deceased members is the RP-2000 Combined Mortality Table. The current rates of disabled mortality are based on the RP-2000 Disabled Mortality Table set back 9 years for males and set forward 1 year for females. The following shows a comparison of the actual and expected deaths during the study period.

COMPARISON OF ACTUAL AND EXPECTED CASES OF POST-RETIREMENT DEATHS

CENTRAL AGE OF GROUP	NUMBER OF POST-RETIREMENT DEATHS					
	Current Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
SERVICE RETIREMENTS AND BENEFICIARIES						
57 & UNDER	40	21.1	1.896	38	23.0	1.652
60	82	79.9	1.026	87	92.3	0.943
65	219	226.0	0.969	202	237.3	0.851
70	285	306.1	0.931	259	305.5	0.848
75	346	374.2	0.925	356	384.0	0.927
80	421	408.8	1.030	458	464.8	0.985
85	376	374.5	1.004	602	555.3	1.084
90	267	258.7	1.032	563	515.3	1.093
93 & OVER	89	90.9	0.979	317	268.4	1.181
TOTAL	2,125	2,140.2	0.993	2,882	2,845.9	1.013
DISABILITY RETIREMENTS						
52 & UNDER	25	43.2	0.579	30	16.5	1.818
55	39	48.2	0.809	42	37.1	1.132
60	79	92.8	0.851	74	71.1	1.041
65	90	94.9	0.948	46	76.6	0.601
70	71	51.6	1.376	65	59.6	1.091
75	49	25.8	1.899	27	33.4	0.808
80	25	12.3	2.033	26	18.7	1.390
85	19	9.0	2.111	15	10.5	1.429
90	16	6.0	2.667	9	6.5	1.385
93 & OVER	3	1.0	3.000	5	2.2	2.273
TOTAL	416	384.8	1.081	339	332.2	1.020

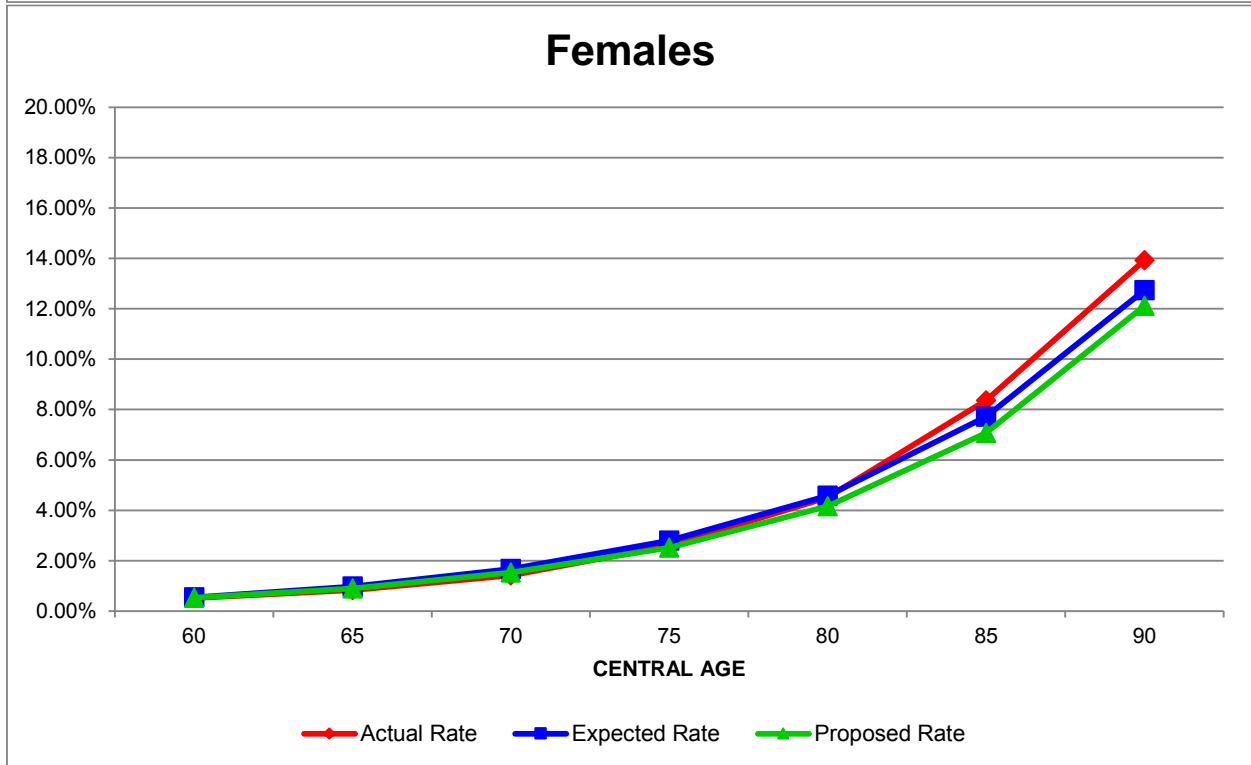
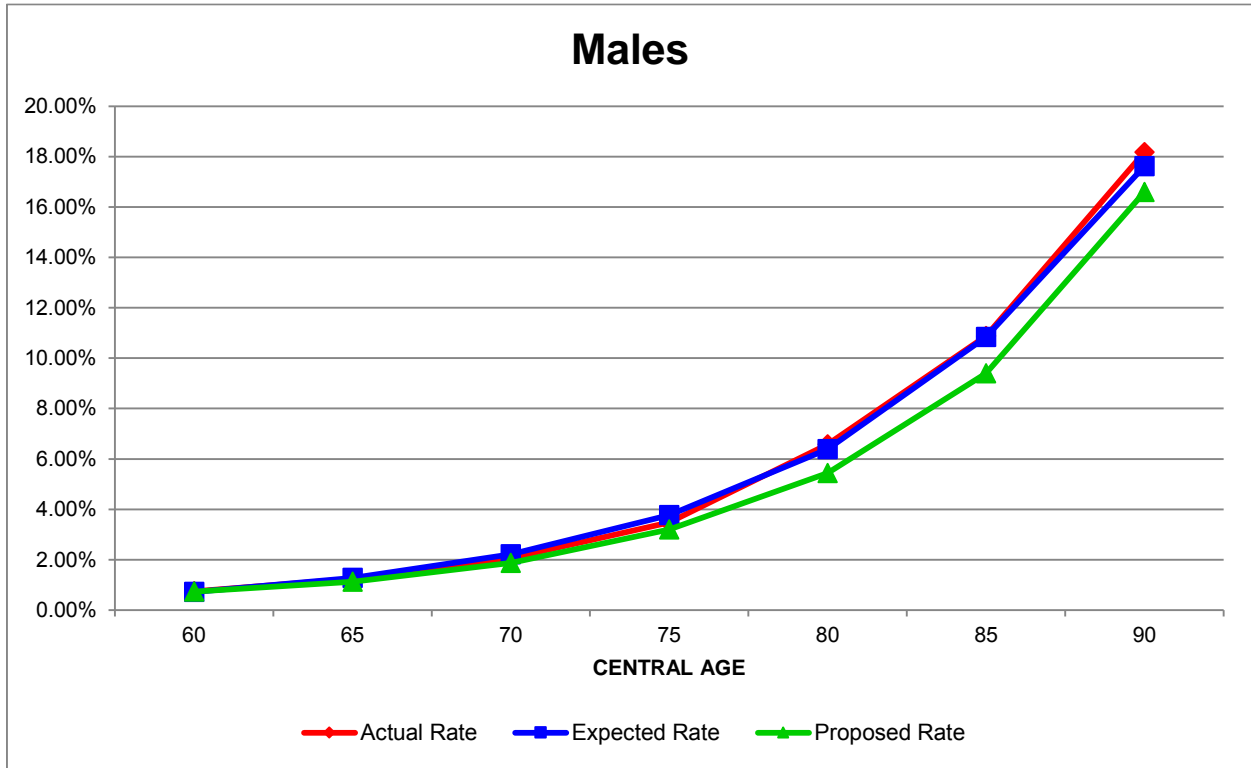


Overall, the number of actual deaths among service retirements and beneficiaries was close to the number of deaths expected, and the number of deaths among disability retirements was somewhat greater than expected during the period under investigation. We recommend continued use of the RP-2000 Combined Mortality Table for service retirements and beneficiaries but in order to provide a margin for anticipated mortality improvement, we recommend projecting the table to 2025 with projection scale BB and setting the table forward 2 years for both males and females. Although an updated mortality table and mortality improvement scale have been published by the Society of Actuaries (SOA), the SOA did not include public sector data in the development of these new tables and relied on private sector data only. The SOA is currently reviewing mortality for the public sector and may issue new tables in time for the next experience study.

For the period after disability retirement, we recommend the RP-2000 Disabled Mortality Table projected to 2025 with scale BB set back 7 years for males and set forward 3 years for females. The following graphs show a comparison of the present, actual, and proposed rates of post-retirement mortality.

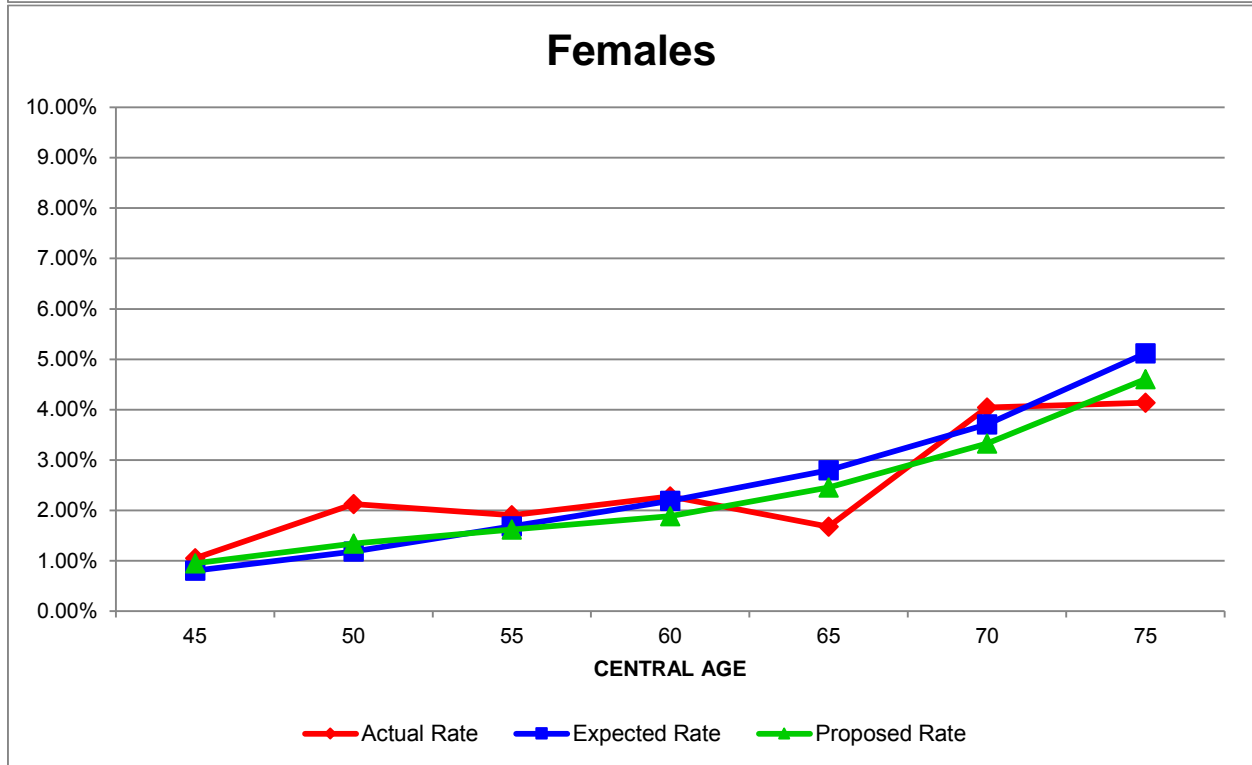
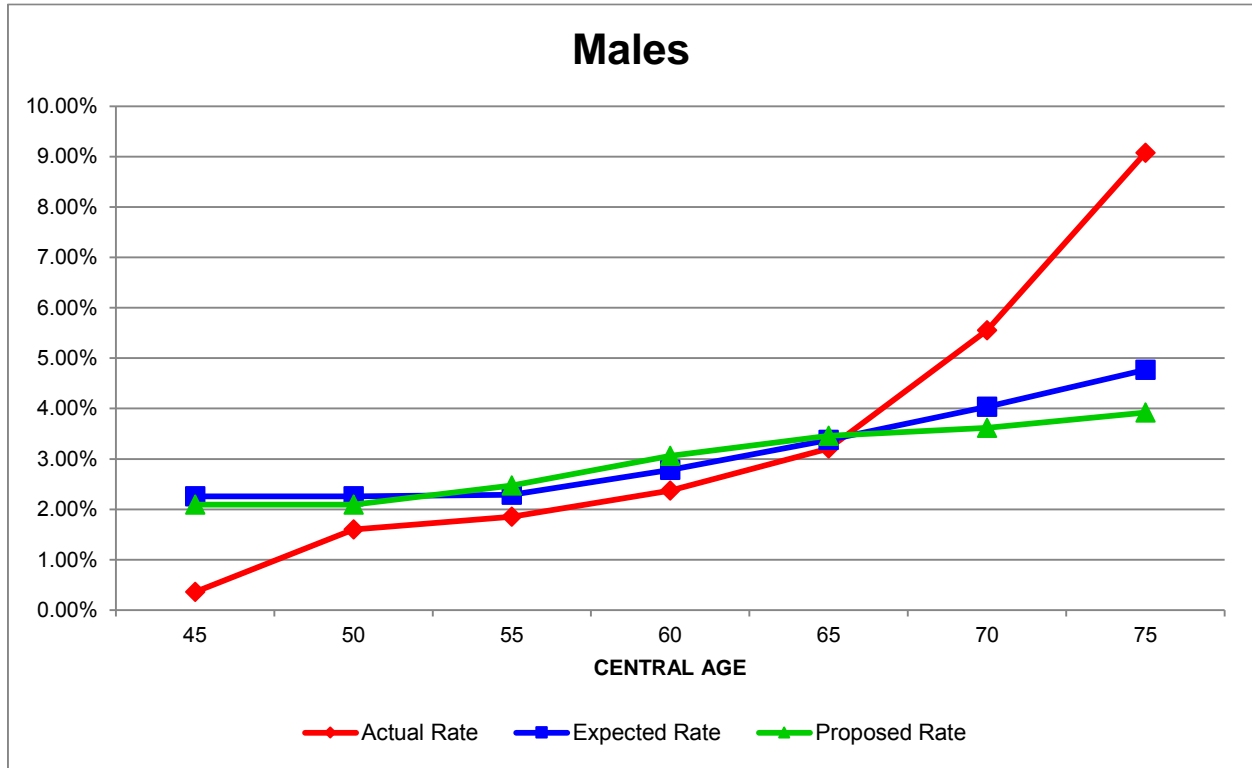


POST-RETIREMENT RATES OF DEATH FOR SERVICE RETIREMENTS AND BENEFICIARIES





POST-RETIREMENT RATES OF DEATH FOR DISABILITY RETIREMENTS





The following table shows a comparison of the present and proposed rates of post-retirement mortality.

COMPARATIVE RATES OF POST-RETIREMENT MORTALITY

AGE	MALES		FEMALES	
	Present	Proposed	Present	Proposed
	SERVICE RETIREMENTS AND BENEFICIARIES			
35	0.0773%	0.0839%	0.0475%	0.0514%
40	0.1079	0.1127	0.0706	0.0790
45	0.1397	0.1609	0.1124	0.1230
50	0.2138	0.2474	0.1676	0.1872
55	0.3624	0.4246	0.2717	0.2918
60	0.6747	0.6985	0.5055	0.4923
65	1.2737	1.1300	0.9706	0.8994
70	2.2206	1.8697	1.6742	1.5281
75	3.7834	3.2147	2.8106	2.5220
80	6.4368	5.5160	4.5879	4.1628
85	11.0757	9.5631	7.7446	7.1239
90	18.3408	17.2787	13.1682	12.5732
DISABILITY RETIREMENTS				
35	2.2571%	2.0938%	0.7450%	0.6911%
40	2.2571	2.0938	0.7450	0.6911
45	2.2571	2.0938	0.7450	0.9068
50	2.2571	2.0938	1.1535	1.3418
55	2.2571	2.4493	1.6544	1.6124
60	2.7687	3.0481	2.1839	1.8704
65	3.4152	3.4701	2.8026	2.4576
70	4.0668	3.6234	3.7635	3.3845
75	4.8307	3.9002	5.2230	4.6990
80	5.9613	5.0230	7.2312	6.4954
85	7.7512	6.6917	10.0203	9.0559
90	10.3392	8.7959	14.0490	13.9427



The following table shows a comparison of the actual deaths during the period under investigation with the expected deaths based on the proposed rates of mortality. The results indicate that there is a margin for future mortality improvement in the recommended tables. The numbers of expected future deaths overall are 9-12% less than the actual number of deaths that occurred during the study period for service retirements and beneficiaries and for disability retirements.

**COMPARISON OF ACTUAL AND EXPECTED CASES OF
POST-RETIREMENT DEATHS
BASED ON PROPOSED RATES OF MORTALITY**

CENTRAL AGE OF GROUP	NUMBER OF POST-RETIREMENT DEATHS					
	Proposed Rates					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
	SERVICE RETIREMENTS AND BENEFICIARIES					
57 & UNDER	40	23.7	1.688	38	24.3	1.564
60	82	81.1	1.011	87	89.8	0.969
65	219	199.8	1.096	202	218.8	0.923
70	285	259.7	1.097	259	280.0	0.925
75	346	317.9	1.088	356	345.5	1.030
80	421	348.2	1.209	458	422.0	1.085
85	376	324.7	1.158	602	509.5	1.182
90	267	243.8	1.095	563	490.3	1.148
93 & OVER	89	91.2	0.976	317	267.4	1.185
TOTAL	2,125	1,890.1	1.124	2,882	2,647.6	1.089
	DISABILITY RETIREMENTS					
52 & UNDER	25	40.1	0.623	30	18.7	1.604
55	39	52.1	0.749	42	35.8	1.173
60	79	102.0	0.775	74	61.3	1.207
65	90	97.2	0.926	46	67.2	0.685
70	71	46.2	1.537	65	53.5	1.215
75	49	21.2	2.311	27	30.1	0.897
80	25	10.3	2.427	26	16.8	1.548
85	19	7.8	2.436	15	9.5	1.579
90	16	5.1	3.137	9	6.4	1.406
93 & OVER	3	0.9	3.333	5	2.3	2.174
TOTAL	416	382.9	1.086	339	301.6	1.124



RATES OF SALARY INCREASE

COMPARISON OF ACTUAL AND EXPECTED RATES OF SALARY INCREASE OF ACTIVE MEMBERS

CENTRAL AGE OF GROUP	RATES OF SALARY INCREASE		
	CURRENT RATES		
	Actual	Expected	Ratio of Actual to Expected
20	3.42%	5.83%	0.587
25	3.96%	5.20%	0.762
30	3.09%	4.19%	0.737
35	2.41%	3.57%	0.675
40	2.02%	3.31%	0.610
45	1.83%	3.28%	0.558
50	1.45%	3.25%	0.446
55	1.06%	3.24%	0.328
58+	0.94%	3.27%	0.288
TOTAL	1.80%	3.47%	0.518

The current assumed rates of salary increase were significantly greater than the actual rates of increase averaged over the study period for all age categories. We recommend a change to the long-term current salary increase assumption.

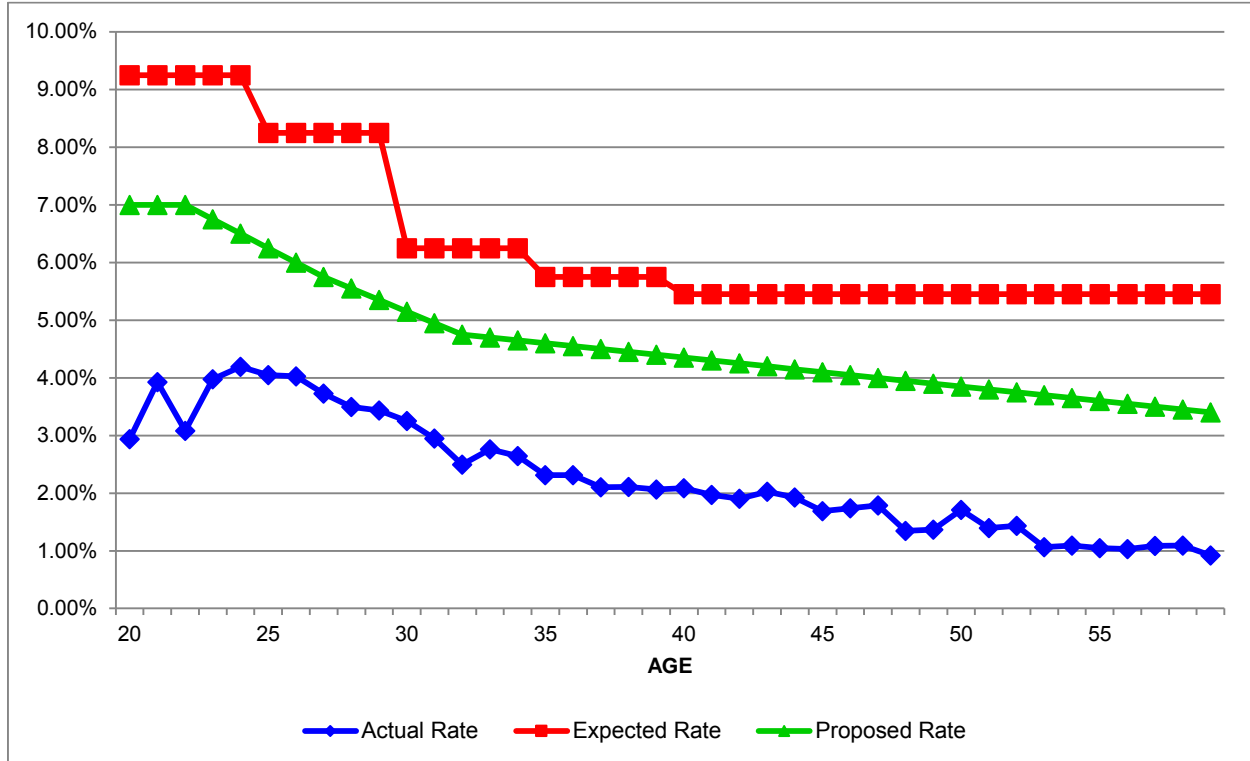
Over the past five years, actual rates of salary increase have been less than expected at all service breakdowns. In the economic section of this experience study report, we are recommending the price inflation assumption be reduced from 3.00% to 2.75% (see page 4). The price inflation assumption is part of our building block approach to determining the salary scale. Therefore the total salary scale will be reduced accordingly at all age intervals.

The average annual rate of inflation over the period was 2.02% and the apparent real rate of salary increase over this period was determined to be 0.00%. These combined equal an apparent rate of wage inflation of 2.02%. The rates of salary increase assumption will use the 3.25% rate of wage inflation (inflation plus the real rate of salary increase assumption) as the base rate of increase at all years of service and add the merit/promotion component which varies by age. The table below provides the analysis concerning the development of the merit component of this assumption.



Central Age	Actual Rate of Increase	Apparent Merit Increase (Actual Increase Less Actual Wage Inflation (2.02%))	Proposed Assumed Merit Increase
22	3.84%	1.82%	3.75%
27	3.69%	1.67%	2.50%
32	2.80%	0.78%	1.50%
37	2.17%	0.15%	1.25%
42	1.98%	-0.04%	1.00%
47	1.58%	-0.44%	0.75%
52	1.34%	-0.68%	0.50%
57	1.04%	-0.98%	0.25%
62	0.91%	-1.11%	0.00%

The proposed assumed rates of merit increases are added to the assumed rate of wage inflation (3.25%) for each year of service. The following graph shows the actual, expected, and proposed rates of salary increase.





The following table shows a comparison between the current and proposed rates of salary increase.

COMPARATIVE ASSUMED RATES OF SALARY INCREASE

RATES OF SALARY INCREASE		
AGE	Current	Proposed
20	9.25%	7.00%
25	8.25%	6.25%
30	6.25%	5.15%
35	5.75%	4.55%
40	5.45%	4.30%
45	5.45%	4.05%
50	5.45%	3.80%
55	5.45%	3.55%
60	5.45%	3.30%
63+	5.45%	3.25%



Section V

Other Assumptions and Methods

ADMINISTRATIVE EXPENSES: Currently the method used for administrative expenses is to add the budgeted expenses for the fiscal year to the normal cost. We recommend no change to this method.

AMORTIZATION METHOD: Currently, the unfunded accrued liability is amortized using a level dollar amortization method. We recommend no change to this amortization method.

ASSETS: Currently the actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected actuarial value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected actuarial value. We recommend maintaining the current smoothing method.

OPTION FACTORS: The option factors currently used by the Retirement System are based on the mortality tables and investment rate of return (discount rate) used in the valuation. We recommend that the factors be revised to be based on the mortality table recommended for the valuation.

SICK LEAVE: We currently assume a load on service for the practice of allowing members to convert forfeited sick leave to service at retirement. We assume one year of additional service for retirement eligibility purposes and we continue to recommend this assumption. In addition, we assume a load on liabilities as follows:

- Old Plan members who retire with 34 years of service – 4.0%
- Old Plan members who retire on normal retirement – 2.5%
- All New Plan retirements and Old Plan early retirement – 2.0%

We recommend a change in the assumption as follows

- Old Plan members who retire with 34 years of service – 4.0%
- Old Plan members who retire on normal retirement – 2.0%
- Old Plan members who retire on early retirement – 1.5%
- All New Plan and GSEPS Retirements – 3.00%
- All Police Retirements – 5.0%

ASSUMPTION FOR ACTIVE VESTED MEMBERS TERMINATION BENEFITS: Currently, we assume that 25% of active members who terminate with ten or more years of service before retirement will receive a benefit beginning at age 60 and 75% will receive a refund of member contributions. We recommend changing this to assume that 50% will receive a benefit and 50% will receive a refund of member contributions.

VALUATION COST METHOD: Currently the valuation uses the entry age actuarial cost method. This is the most widely used cost method of large public sector plans and has demonstrated the highest degree of stability as compared to alternative methods. We recommend no change to this assumption.



Section VI
Special Contribution Rates

We have also determined the impact of the recommended new assumptions on the special employer contribution rates as follows:

Groups that have Age 55 Retirement and Line-of-Duty Disability Benefits:

- Public Safety #466
- Revenue Agents #474
- DNR Conservation Rangers #462
- GBI Officers/Agents #471

PLAN	Additional Rate	Total Rate
Old Plan	0.00%	20.03%
New Plan	5.80%	30.58%
GSEPS	2.18%	23.87%

Groups that have Line-of-Duty Disability Benefits:

- Deputy DNR Conservation Rangers #462
- Probation Officers #467
- Parole Officers – Pardons and Paroles #465

PLAN	Additional Rate	Total Rate
Old Plan	0.00%	20.03%
New Plan	0.06%	24.84%
GSEPS	0.04%	21.73%

Group that has Age 55 Retirement:

- Special Investigators Department of Revenue #474

PLAN	Additional Rate	Total Rate
New Plan	5.74%	30.52%
GSEPS	2.14%	23.83%

Appellate Court Judges: Total rate equal to 44.79% of payroll



Group Term Life Insurance Plan Results

The following table highlights the impact of the recommended changes on the Group Term Life Insurance Plan for pre-retirement benefits.

Pre-Retirement Benefits

Impact on Principal Valuation Results (\$ in Thousands)		
	Valuation Results 2014	Recommended Assumptions
Unfunded Actuarial Accrued Liability	\$(199,481)	\$(211,932)
Funding Ratio	656.0%	1,004.7%
<u>Actuarially Determined Employer Contribution</u>		
Total Normal Rate	0.16%	0.11%
Employee Rates		
Old Plan Members	0.05%*	0.05%*
New Plan, LRS and JRS Members	0.02%	0.02%
Employer Normal Rate	0.14%	0.09%
Accrued Liability Rate	<u>(0.14)%</u>	<u>(0.09)%</u>
Total Employer Rate	0.00%	0.00%

* 0.03% paid by employer.



The following table highlights the impact of the recommended changes on the Group Term Life Insurance Plan for post-retirement benefits.

Post-Retirement Benefits

Impact on Principal Valuation Results		
(\$ in Thousands)		
	Valuation Results 2014	Recommended Assumptions
Unfunded Actuarial Accrued Liability	\$ (249,881)	\$ (283,897)
Funding Ratio	131.7%	137.7%
<u>Actuarially Determined Employer Contribution</u>		
Total Normal Rate	0.67%	0.64%
Employee Rates		
Old Plan Members	0.45%*	0.45%*
New Plan, LRS and JRS Members	0.23%	0.23%
Employer Normal Rate	0.44%	0.41%
Accrued Liability Rate	<u>(0.44)%</u>	<u>(0.41)%</u>
Total Employer Rate	0.00%	0.00%

* 0.22% paid by employer.



APPENDIX A

Historical June CPI (U) Index

Year	CPI (U)	Year	CPI (U)
1961	29.8	1989	124.1
1962	30.2	1990	129.9
1963	30.6	1991	136.0
1964	31.0	1992	140.2
1965	31.6	1993	144.4
1966	32.4	1994	148.0
1967	33.3	1995	152.5
1968	35.7	1996	156.7
1969	34.7	1997	160.3
1970	38.8	1998	163.0
1971	40.6	1999	166.2
1972	41.7	2000	172.4
1973	44.2	2001	178.0
1974	49.0	2002	179.9
1975	53.6	2003	183.7
1976	56.8	2004	189.7
1977	60.7	2005	194.5
1978	65.2	2006	202.9
1979	72.3	2007	208.352
1980	82.7	2008	218.815
1981	90.6	2009	215.693
1982	97.0	2010	217.965
1983	99.5	2011	225.722
1984	103.7	2012	229.478
1985	107.6	2013	233.504
1986	109.5	2014	238.343



APPENDIX B

Capital Market Assumptions and Asset Allocation

Real Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Real Rate of Return	Standard Deviation
Fixed Income	0.0%	9.0%
Domestic Stocks – Large Cap	9.0%	21.5%
Domestic Stocks – Mid Cap	12.0%	24.5%
Domestic Stocks – Small Cap	13.5%	34.0%
Int'l Stocks - Developed Mkt	8.0%	19.0%
Int'l Stocks - Emerging Mkt	12.0%	27.0%
Alternatives	10.5%	27.5%

Asset Class Correlation Coefficients

Asset Class	Fixed Income	Domestic Stocks – Large Cap	Domestic Stocks – Mid Cap	Domestic Stocks – Small Cap	Int'l Stocks - Developed Mkt	Int'l Stocks - Emerging Mkt	Alts
Fixed Income	1.00						
Domestic Stocks – Large Cap	0.18	1.00					
Domestic Stocks – Mid Cap	0.18	0.94	1.00				
Domestic Stocks – Small Cap	0.14	0.83	0.90	1.00			
Int'l Stocks - Developed Mkt	0.15	0.63	0.65	0.51	1.00		
Int'l Stocks - Emerging Mkt	0.08	0.67	0.70	0.65	0.69	1.00	
Alternatives	0.32	0.75	0.80	0.83	0.65	0.63	1.00

Asset Allocation Targets

Asset Class	Asset Allocation
Fixed Income	30.0%
Domestic Stocks – Large Cap	37.2%
Domestic Stocks – Mid Cap	3.4%
Domestic Stocks – Small Cap	1.4%
Int'l Stocks - Developed Mkt	17.8%
Int'l Stocks - Emerging Mkt	5.2%
Alternatives	5.0%



APPENDIX C

Social Security Administration Wage Index

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1960	\$4,007.12	3.92%	1988	\$19,334.04	4.93%
1961	4,086.76	1.99	1989	20,099.55	3.96
1962	4,291.40	5.01	1990	21,027.98	4.62
1963	4,396.64	2.45	1991	21,811.60	3.73
1964	4,576.32	4.09	1992	22,935.42	5.15
1965	4,658.72	1.80	1993	23,132.67	0.86
1966	4,938.36	6.00	1994	23,753.53	2.68
1967	5,213.44	5.57	1995	24,705.66	4.01
1968	5,571.76	6.87	1996	25,913.90	4.89
1969	5,893.76	5.78	1997	27,426.00	5.84
1970	6,186.24	4.96	1998	28,861.44	5.23
1971	6,497.08	5.02	1999	30,469.84	5.57
1972	7,133.80	9.80	2000	32,154.82	5.53
1973	7,580.16	6.26	2001	32,921.92	2.39
1974	8,030.76	5.94	2002	33,252.09	1.00
1975	8,630.92	7.47	2003	34,064.95	2.44
1976	9,226.48	6.90	2004	35,648.55	4.65
1977	9,779.44	5.99	2005	36,952.94	3.66
1978	10,556.03	7.94	2006	38,651.41	4.60
1979	11,479.46	8.75	2007	40,405.48	4.54
1980	12,513.46	9.01	2008	41,334.97	2.30
1981	13,773.10	10.07	2009	40,711.61	-1.51
1982	14,531.34	5.51	2010	41,673.83	2.36
1983	15,239.24	4.87	2011	42,979.61	3.13
1984	16,135.07	5.88	2012	44,321.67	3.12
1985	16,822.51	4.26	2013	44,888.16	1.28
1986	17,321.82	2.97			
1987	18,426.51	6.38			



APPENDIX D

TABLE 1

RATES OF SEPARATION FROM ACTIVE SERVICE – MALES (NON-POLICE)

AGE	RATES OF WITHDRAWAL			RATES OF DEATH	RATES OF DISABILITY
	YEARS OF SERVICE				
	0 – 4	5 – 9	10+		
19	0.3500			0.000307	0.000500
20	0.3500			0.000320	0.000500
21	0.3500			0.000331	0.000500
22	0.3500			0.000340	0.000500
23	0.3000	0.1500		0.000346	0.000500
24	0.2875	0.1500		0.000349	0.000500
25	0.2750	0.1500		0.000349	0.000500
26	0.2660	0.1500		0.000351	0.000500
27	0.2570	0.1500		0.000354	0.000500
28	0.2400	0.1250	0.0750	0.000365	0.000500
29	0.2350	0.1220	0.0750	0.000382	0.000500
30	0.2300	0.1150	0.0750	0.000412	0.000500
31	0.2270	0.1120	0.0750	0.000463	0.000500
32	0.2240	0.1090	0.0750	0.000521	0.000500
33	0.2210	0.1060	0.0680	0.000585	0.000500
34	0.2180	0.1030	0.0630	0.000651	0.000500
35	0.2150	0.1000	0.0600	0.000717	0.000500
36	0.2110	0.0990	0.0575	0.000780	0.000900
37	0.2070	0.0980	0.0550	0.000839	0.001300
38	0.2030	0.0970	0.0525	0.000894	0.001700
39	0.1990	0.0960	0.0500	0.000947	0.002100
40	0.1950	0.0950	0.0475	0.001001	0.002500
41	0.1930	0.0940	0.0460	0.001059	0.002960
42	0.1910	0.0930	0.0445	0.001127	0.003420
43	0.1900	0.0920	0.0430	0.001205	0.003880
44	0.1880	0.0910	0.0415	0.001296	0.004340
45	0.1860	0.0900	0.0400	0.001399	0.004800
46	0.1820	0.0880	0.0405	0.001499	0.005240
47	0.1780	0.0860	0.0410	0.001609	0.005680
48	0.1750	0.0750	0.0415	0.001725	0.006120
49	0.1710	0.0750	0.0420	0.001851	0.006560
50	0.1660	0.0725	0.0425	0.001983	0.007000
51	0.1590	0.0700	0.0433	0.002122	0.007667
52	0.1530	0.0700	0.0442	0.002271	0.008333
53	0.1450	0.0700	0.0450	0.002431	0.009000
54	0.1450	0.0700	0.0475	0.002609	0.009800
55	0.1450	0.0700	0.0475	0.002810	0.010500
56	0.1450	0.0650	0.0475	0.003067	0.011000
57	0.1350	0.0600	0.0475	0.003282	0.011500
58	0.1350	0.0600	0.0475	0.003526	0.012000
59	0.1350	0.0600	0.0475	0.003797	0.012500
60	0.1400	0.0600	0.0475	0.004092	0.000000
61	0.1450	0.0850	0.0475	0.004403	0.000000
62	0.1500	0.1000	0.0475	0.004721	0.000000
63	0.1500	0.1000	0.0475	0.005034	0.000000
64	0.1500	0.1000	0.0475	0.005330	0.000000
65	0.1500	0.1000	0.0475	0.005600	0.000000
66	0.1500	0.1000	0.0475	0.005839	0.000000
67	0.1500	0.1000	0.0475	0.006044	0.000000
68	0.1500	0.1000	0.0475	0.006215	0.000000
69	0.1500	0.1000	0.0475	0.006518	0.000000
70	0.1500	0.1000	0.0475	0.006800	0.000000



TABLE 2
RATES OF SEPARATION FROM ACTIVE SERVICE – MALES (NON-POLICE)
(Continued)

AGE	RATES OF SERVICE RETIREMENT					
	OLD PLAN				NEW PLAN	
	EARLY RETIREMENT	AGE 60 OR 30 YEARS	34 YEARS	MORE THAN 34 YEARS	EARLY RETIEMENT	NORMAL RETIREMENT*
49	0.020	0.075	1.000	0.900	0.070	0.700
50	0.020	0.075	1.000	0.900	0.070	0.700
51	0.020	0.075	1.000	0.900	0.070	0.700
52	0.020	0.075	1.000	0.900	0.070	0.700
53	0.020	0.075	1.000	0.900	0.070	0.600
54	0.020	0.075	1.000	0.750	0.070	0.600
55	0.030	0.075	1.000	0.750	0.070	0.600
56	0.030	0.075	1.000	0.700	0.070	0.600
57	0.030	0.105	1.000	0.700	0.080	0.500
58	0.045	0.140	0.975	0.700	0.090	0.450
59	0.060	0.175	0.975	0.700	0.110	0.350
60		0.150	0.975	0.400		0.250
61		0.200	0.975	0.400		0.220
62		0.320	0.975	0.400		0.400
63		0.200	0.900	0.400		0.300
64		0.200	0.900	0.150		0.250
65		0.350	0.350	0.350		0.320
66		0.350	0.350	0.350		0.320
67		0.350	0.350	0.350		0.320
68		0.350	0.350	0.350		0.250
69		0.350	0.350	0.350		0.250
70		0.350	0.350	0.350		0.300
71		0.350	0.350	0.350		0.300
72		0.350	0.350	0.350		0.220
73		0.350	0.350	0.350		0.220
74		0.350	0.350	0.350		0.220
75		1.000	1.000	1.000		1.000

* An additional 10% for ages below 55 and 20% for ages 55 to 59 are assumed to retire in the first year eligible for unreduced retirement with 30 years of service.



TABLE 3
RATES OF SEPARATION FROM ACTIVE SERVICE – FEMALES (NON-POLICE)

AGE	RATES OF WITHDRAWAL			RATES OF DEATH	RATES OF DISABILITY
	YEARS OF SERVICE				
	0 – 4	5 – 9	10+		
19	0.3000			0.000176	0.000200
20	0.3000			0.000177	0.000200
21	0.3000			0.000178	0.000200
22	0.3000			0.000180	0.000200
23	0.2800	0.1750		0.000183	0.000200
24	0.2650	0.1750		0.000186	0.000200
25	0.2500	0.1750		0.000192	0.000200
26	0.2430	0.1750		0.000199	0.000200
27	0.2360	0.1750		0.000207	0.000200
28	0.2200	0.1400	0.0825	0.000218	0.000200
29	0.2175	0.1350	0.0825	0.000230	0.000200
30	0.2150	0.1250	0.0825	0.000245	0.000200
31	0.2110	0.1210	0.0825	0.000285	0.000200
32	0.2070	0.1170	0.0825	0.000325	0.000200
33	0.2030	0.1130	0.0690	0.000365	0.000200
34	0.1990	0.1090	0.0645	0.000404	0.000200
35	0.1950	0.1050	0.0600	0.000441	0.000200
36	0.1925	0.1030	0.0580	0.000477	0.000360
37	0.1900	0.1010	0.0560	0.000514	0.000520
38	0.1875	0.0990	0.0540	0.000555	0.000680
39	0.1850	0.0970	0.0520	0.000601	0.000840
40	0.1825	0.0950	0.0500	0.000655	0.001000
41	0.1790	0.0920	0.0480	0.000718	0.001300
42	0.1755	0.0890	0.0460	0.000790	0.001600
43	0.1720	0.0860	0.0440	0.000869	0.001900
44	0.1685	0.0830	0.0420	0.000955	0.002200
45	0.1650	0.0800	0.0400	0.001043	0.002500
46	0.1620	0.0785	0.0405	0.001135	0.002900
47	0.1590	0.0770	0.0410	0.001230	0.003300
48	0.1560	0.0755	0.0415	0.001330	0.003700
49	0.1530	0.0740	0.0420	0.001438	0.004100
50	0.1500	0.0725	0.0425	0.001555	0.004500
51	0.1467	0.0717	0.0433	0.001683	0.004833
52	0.1433	0.0708	0.0442	0.001825	0.005167
53	0.1400	0.0700	0.0450	0.001981	0.005500
54	0.1400	0.0700	0.0450	0.002100	0.006500
55	0.1400	0.0700	0.0450	0.002228	0.007300
56	0.1400	0.0700	0.0450	0.002371	0.008000
57	0.1400	0.0700	0.0450	0.002525	0.008500
58	0.1400	0.0600	0.0450	0.002692	0.009000
59	0.1400	0.0600	0.0450	0.002871	0.009500
60	0.1450	0.0625	0.0450	0.003058	0.000000
61	0.1500	0.0750	0.0450	0.003250	0.000000
62	0.1700	0.1100	0.0450	0.003443	0.000000
63	0.1700	0.1100	0.0450	0.003726	0.000000
64	0.1700	0.1100	0.0450	0.004015	0.000000
65	0.1700	0.1100	0.0450	0.004304	0.000000
66	0.1700	0.1100	0.0450	0.004590	0.000000
67	0.1700	0.1100	0.0450	0.004868	0.000000
68	0.1700	0.1100	0.0450	0.005136	0.000000
69	0.1700	0.1100	0.0450	0.005390	0.000000
70	0.1700	0.1100	0.0450	0.005630	0.000000



TABLE 4
RATES OF SEPARATION FROM ACTIVE SERVICE – FEMALES (NON-POLICE)
(Continued)

AGE	RATES OF SERVICE RETIREMENT					
	OLD PLAN				NEW PLAN	
	EARLY RETIREMENT	AGE 60 OR 30 YEARS	34 YEARS	MORE THAN 34 YEARS	EARLY RETIREMENT	NORMAL RETIREMENT*
49	0.020	0.060	1.000	0.900	0.045	0.450
50	0.020	0.060	1.000	1.000	0.045	0.500
51	0.020	0.060	1.000	1.000	0.045	0.500
52	0.020	0.060	1.000	1.000	0.045	0.450
53	0.020	0.060	1.000	1.000	0.050	0.450
54	0.020	0.075	1.000	0.900	0.060	0.450
55	0.035	0.100	1.000	0.900	0.065	0.500
56	0.050	0.100	1.000	0.700	0.070	0.400
57	0.050	0.100	1.000	0.700	0.080	0.400
58	0.050	0.140	1.000	0.650	0.090	0.400
59	0.050	0.160	0.950	0.650	0.120	0.400
60		0.200	0.950	0.550		0.300
61		0.200	0.950	0.550		0.220
62		0.400	0.950	0.650		0.400
63		0.250	0.950	0.500		0.280
64		0.250	0.900	0.500		0.270
65		0.400	0.400	0.400		0.350
66		0.400	0.400	0.400		0.350
67		0.350	0.350	0.350		0.320
68		0.250	0.250	0.250		0.250
69		0.250	0.250	0.250		0.250
70		0.350	0.350	0.350		0.300
71		0.350	0.350	0.350		0.300
72		0.350	0.350	0.350		0.250
73		0.350	0.350	0.350		0.250
74		0.350	0.350	0.350		0.250
75		1.000	1.000	1.000		1.000

* An additional 20% are assumed to retire in the first year eligible for unreduced retirement with 30 years of service before age 60.



TABLE 5

RATES OF SEPARATION FROM ACTIVE SERVICE - POLICE

AGE	RATES OF WITHDRAWAL		DEATH		DISABILITY	RETIREMENT
	With less than 10 years of service	With 10 or more years of service	MALE	FEMALE		
19	0.1500		0.000307	0.000176	0.00020	
20	0.1500		0.000320	0.000177	0.00020	
21	0.1500		0.000331	0.000178	0.00026	
22	0.1500		0.000340	0.000180	0.00032	
23	0.0575		0.000346	0.000183	0.00038	
24	0.0575		0.000349	0.000186	0.00044	
25	0.0575	0.0400	0.000349	0.000192	0.00050	
26	0.0575	0.0400	0.000351	0.000199	0.00056	
27	0.0575	0.0400	0.000354	0.000207	0.00062	
28	0.0575	0.0400	0.000365	0.000218	0.00068	
29	0.0575	0.0400	0.000382	0.000230	0.00074	
30	0.0575	0.0400	0.000412	0.000245	0.00080	
31	0.0575	0.0395	0.000463	0.000285	0.00096	
32	0.0575	0.0390	0.000521	0.000325	0.00112	
33	0.0575	0.0385	0.000585	0.000365	0.00128	
34	0.0575	0.0380	0.000651	0.000404	0.00144	
35	0.0575	0.0375	0.000717	0.000441	0.00160	
36	0.0575	0.0360	0.000780	0.000477	0.00198	
37	0.0575	0.0345	0.000839	0.000514	0.00436	
38	0.0575	0.0330	0.000894	0.000555	0.00574	
39	0.0575	0.0315	0.000947	0.000601	0.00712	
40	0.0575	0.0300	0.001001	0.000655	0.00850	
41	0.0575	0.0280	0.001059	0.000718	0.00960	
42	0.0575	0.0260	0.001127	0.000790	0.01070	
43	0.0575	0.0240	0.001205	0.000869	0.01180	
44	0.0575	0.0220	0.001296	0.000955	0.01290	
45	0.0575	0.0200	0.001399	0.001043	0.01400	
46	0.0575	0.0200	0.001499	0.001135	0.01520	
47	0.0575	0.0200	0.001609	0.001230	0.01640	
48	0.0575	0.0200	0.001725	0.001330	0.01760	
49	0.0575	0.0200	0.001851	0.001438	0.01880	
50	0.0575	0.0200	0.001983	0.001555	0.02000	
51	0.0575	0.0200	0.002122	0.001683	0.02140	
52	0.0575	0.0200	0.002271	0.001825	0.02280	
53	0.0575	0.0200	0.002431	0.001981	0.02420	
54	0.0575	0.0200	0.002609	0.002100	0.02560	
55			0.002810	0.002228	0.02700	0.200
56			0.003067	0.002371	0.02660	0.120
57			0.003282	0.002525	0.02620	0.120
58			0.003526	0.002692	0.02580	0.120
59			0.003797	0.002871	0.02540	0.120
60			0.004092	0.003058		0.300
61			0.004403	0.003250		0.150
62			0.004721	0.003443		0.350
63			0.005034	0.003726		0.250
64			0.005330	0.004015		0.250
65			0.005600	0.004304		0.250
66			0.005839	0.004590		0.250
67			0.006044	0.004868		0.250
68			0.006215	0.005136		0.250
69			0.006518	0.005390		0.250
70			0.006800	0.005630		1.000

* In addition, 100% are assumed to retirement with 30 years of service on or before age 50 and 75% are assumed to retire with 30 years of service after age 50 but before age 55.



TABLE 6
RATES OF ANTICIPATED SALARY INCREASES
(For Both Males and Females)

AGE	SALARY INCREASES
19	0.0700
20	0.0700
21	0.0700
22	0.0700
23	0.0675
24	0.0650
25	0.0625
26	0.0600
27	0.0575
28	0.0555
29	0.0535
30	0.0515
31	0.0495
32	0.0475
33	0.0465
34	0.0460
35	0.0455
36	0.0450
37	0.0445
38	0.0440
39	0.0435
40	0.0430
41	0.0425
42	0.0420
43	0.0415
44	0.0410
45	0.0405
46	0.0400
47	0.0395
48	0.0390
49	0.0385
50	0.0380
51	0.0375
52	0.0370
53	0.0365
54	0.0360
55	0.0355
56	0.0350
57	0.0345
58	0.0340
59	0.0335
60	0.0330
61	0.0325
62	0.0325
63	0.0325
64	0.0325
65	0.0325
66	0.0325
67	0.0325
68	0.0325
69	0.0325
70	0.0325



TABLE 7

**RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF SERVICE
AND BENEFICIARIES OF DECEASED MEMBERS**

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.000331	0.000178	71	0.020825	0.016986
20	0.000340	0.000180	72	0.023233	0.018826
21	0.000346	0.000183	73	0.025929	0.020784
22	0.000349	0.000186	74	0.028900	0.022899
23	0.000349	0.000192	75	0.032147	0.025220
24	0.000351	0.000199	76	0.035722	0.027801
25	0.000354	0.000207	77	0.039700	0.030693
26	0.000365	0.000218	78	0.044114	0.033926
27	0.000382	0.000230	79	0.049373	0.037551
28	0.000412	0.000245	80	0.055160	0.041628
29	0.000463	0.000285	81	0.061487	0.046222
30	0.000521	0.000325	82	0.068382	0.051406
31	0.000585	0.000365	83	0.075906	0.057269
32	0.000651	0.000404	84	0.084158	0.063873
33	0.000717	0.000441	85	0.095631	0.071239
34	0.000780	0.000477	86	0.108574	0.079348
35	0.000839	0.000514	87	0.123063	0.088111
36	0.000894	0.000555	88	0.139099	0.099870
37	0.000947	0.000601	89	0.155385	0.112476
38	0.001001	0.000655	90	0.172787	0.125732
39	0.001059	0.000718	91	0.191152	0.139427
40	0.001127	0.000790	92	0.210317	0.153358
41	0.001205	0.000869	93	0.230128	0.167340
42	0.001296	0.000955	94	0.250467	0.181190
43	0.001399	0.001043	95	0.271263	0.194718
44	0.001499	0.001135	96	0.285234	0.202595
45	0.001609	0.001230	97	0.306313	0.214644
46	0.001725	0.001330	98	0.319624	0.220284
47	0.001851	0.001438	99	0.341120	0.232882
48	0.001983	0.001555	100	0.353540	0.242074
49	0.002272	0.001718	101	0.373578	0.259472
50	0.002474	0.001872	102	0.382320	0.272162
51	0.002705	0.002047	103	0.397886	0.293116
52	0.002965	0.002193	104	0.400000	0.307811
53	0.003362	0.002397	105	0.400000	0.322725
54	0.003896	0.002658	106	0.400000	0.337441
55	0.004246	0.002918	107	0.400000	0.351544
56	0.004652	0.003209	108	0.400000	0.364617
57	0.005115	0.003543	109	0.400000	0.376246
58	0.005660	0.003932	110	0.400000	0.386015
59	0.006280	0.004409	111	0.400000	0.393507
60	0.006985	0.004923	112	0.400000	0.398308
61	0.007788	0.005656	113	0.400000	0.400000
62	0.008555	0.006374	114	0.400000	0.400000
63	0.009419	0.007177	115	0.400000	0.400000
64	0.010389	0.008100	116	0.400000	0.400000
65	0.011300	0.008994	117	0.400000	0.400000
66	0.012248	0.009942	118	1.000000	1.000000
67	0.013571	0.010989	119	1.000000	1.000000
68	0.015219	0.012380	120	1.000000	1.000000
69	0.016839	0.013739			
70	0.018697	0.015281			



TABLE 8
RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF DISABILITY

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.020938	0.006911	71	0.036637	0.036157
20	0.020938	0.006911	72	0.037102	0.038623
21	0.020938	0.006911	73	0.037645	0.041246
22	0.020938	0.006911	74	0.038275	0.044032
23	0.020938	0.006911	75	0.039002	0.046990
24	0.020938	0.006911	76	0.040855	0.050131
25	0.020938	0.006911	77	0.042891	0.053473
26	0.020938	0.006911	78	0.045123	0.057039
27	0.020938	0.006911	79	0.047566	0.060857
28	0.020938	0.006911	80	0.050230	0.064954
29	0.020938	0.006911	81	0.053122	0.069358
30	0.020938	0.006911	82	0.056244	0.074098
31	0.020938	0.006911	83	0.059591	0.079197
32	0.020938	0.006911	84	0.063153	0.084679
33	0.020938	0.006911	85	0.066917	0.090559
34	0.020938	0.006911	86	0.070859	0.096851
35	0.020938	0.006911	87	0.074957	0.106215
36	0.020938	0.006911	88	0.079187	0.116438
37	0.020938	0.006911	89	0.083527	0.127572
38	0.020938	0.006911	90	0.087959	0.139427
39	0.020938	0.006911	91	0.092468	0.153358
40	0.020938	0.006911	92	0.097046	0.167340
41	0.020938	0.006911	93	0.101687	0.181190
42	0.020938	0.006911	94	0.109122	0.194718
43	0.020938	0.007592	95	0.116934	0.202595
44	0.020938	0.008311	96	0.125144	0.214644
45	0.020938	0.009068	97	0.139099	0.220284
46	0.020938	0.009865	98	0.155385	0.232882
47	0.020938	0.010700	99	0.172787	0.242074
48	0.020938	0.011574	100	0.191152	0.259472
49	0.020938	0.012482	101	0.210317	0.272162
50	0.020938	0.013418	102	0.230128	0.293116
51	0.020938	0.014019	103	0.250467	0.307811
52	0.020938	0.014595	104	0.271263	0.322725
53	0.022121	0.015140	105	0.285234	0.337441
54	0.023306	0.015650	106	0.306313	0.351544
55	0.024493	0.016124	107	0.319624	0.364617
56	0.025684	0.016567	108	0.341120	0.376246
57	0.026878	0.016987	109	0.353540	0.386015
58	0.028078	0.017395	110	0.373578	0.393507
59	0.029279	0.017807	111	0.382320	0.398308
60	0.030481	0.018704	112	0.397886	0.400000
61	0.031681	0.019670	113	0.400000	0.400000
62	0.032877	0.020725	114	0.400000	0.400000
63	0.034074	0.021884	115	0.400000	0.400000
64	0.034400	0.023164	116	0.400000	0.400000
65	0.034701	0.024576	117	0.400000	1.000000
66	0.034987	0.026129	118	0.400000	1.000000
67	0.035271	0.027830	119	0.400000	1.000000
68	0.035565	0.029683	120	1.000000	1.000000
69	0.035881	0.031687			
70	0.036234	0.033845			