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May 3, 2010

Mr. David Senn
Executive Director
Teachers Retirement System
State of Montana
1500 Sixth Avenue
Helena, MT 59620-0139

Dear Mr. Senn:

Enclosed are 15 copies of the "Montana Teachers' Retirement System Experience Study for the Five-Year Period Ending July 1, 2009".

Let us know if there are any questions concerning this report.

Sincerely,

Edward A. Macdonald ASA, FCA, MAAA
President

Todd B. Green, ASA, FCA, MAAA
Principal & Senior Actuary

EAM:TBG/jnw

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Experience Study

For the Five-Year Period

Ending July 1, 2009





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May 3, 2010

Teachers' Retirement Board
State of Montana
1500 Sixth Avenue
Helena, MT 59620-0139

Dear Members of the Board:

We are pleased to submit the results of a study of the economic and demographic experience for the Montana Teachers' Retirement System. The purpose of this investigation is to assess the reasonability of the actuarial assumptions for the System. This investigation covers the five-year period from July 1, 2004 to July 1, 2009. As a result of the investigation, it is recommended that revised assumptions be adopted by the Board for future use.

The experience study includes all active full-time members, retired members and beneficiaries of deceased members. The mortality experience was studied separately for males and females. Incidences of withdrawal, disability, retirement and compensation increases were investigated without regard to gender. Retirement experience and compensation increases were investigated separately for university and non-university members.

This report shows comparisons between the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. Tables and graphs are used to show the actual decrement rates, the expected decrement rates and, where applicable, the proposed decrement rates.

The recommended decrement tables are shown in Appendix D of this report. In the actuary's judgment, the recommended rates are suitable for use until further experience indicates that modifications are needed.

Actuarial assumptions are used to measure and budget future costs. Changing assumptions will not change the actual cost of future benefits. Once the assumptions have been adopted, the actuarial valuation measures the adequacy of the contributions rates set in Montana State Law.

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The experience study 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 meets 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'.

Edward A. Macdonald ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Todd B. Green'.

Todd B. Green, ASA, FCA, MAAA
Principal & Senior Actuary

EAM:TBG\jnw



Summary of Results

The following summarizes the findings and recommendations with regard to the assumptions utilized by the Montana Teachers’ Retirement System. 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 valuation and their current and proposed rates. We recommend no changes to these assumptions.

Item	Current	Proposed
Price Inflation	3.50%	3.50%
Investment Return	7.75%	7.75%
Real Wage Growth	1.00%	1.00%

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.

Assumption Change
Increase rates of withdrawal Decrease rates of disability retirements Adjust rates of service retirement

Recommended Method Changes

The table below lists the recommended method changes.

Method Changes
Calculation of normal rate Discontinue adjusting the unfunded accrued liability by the present value of future ORP supplemental contributions



Financial Impact

The following table highlights the impact of the recommended changes noted on the previous page on the unfunded accrued liability (UAL) and funded status for the System as of July 1, 2009.

Pension		
	Before Change	After Change
UAL	\$1,411,583,000	\$1,566,414,000
Funded Status	66.18%	63.81%



Economic Assumptions

There are three economic assumptions used in performing the actuarial valuation for the Montana Teachers’ Retirement System. The assumptions are:

- Price Inflation
- Investment Return
- Wage Inflation

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 27, “*Selection of Economic Assumptions for Measuring Pension Obligations*”, which provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. As noted in ASOP No. 27, because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on a mixture of past experience and future expectations. These estimates therefore are best stated as a range utilizing the actuary’s professional judgment. In setting the range and the single point within that range to use, the actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

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 explanations of each assumption.

Item	Current	Proposed
Price Inflation	3.50%	3.50%
Real Rate of Return	<u>4.25</u>	<u>4.25</u>
Investment Return	7.75%	7.75%
Price Inflation	3.50%	3.50%
Real Wage Growth	<u>1.00</u>	<u>1.00</u>
Wage Inflation	4.50%	4.50%



Price Inflation

Background: As seen in the table on the previous page, assumed price inflation is used as a component for both the investment return assumption and the wage inflation assumption. The 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. 25 and 27.

The current price inflation assumption is 3.50% 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, average 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:

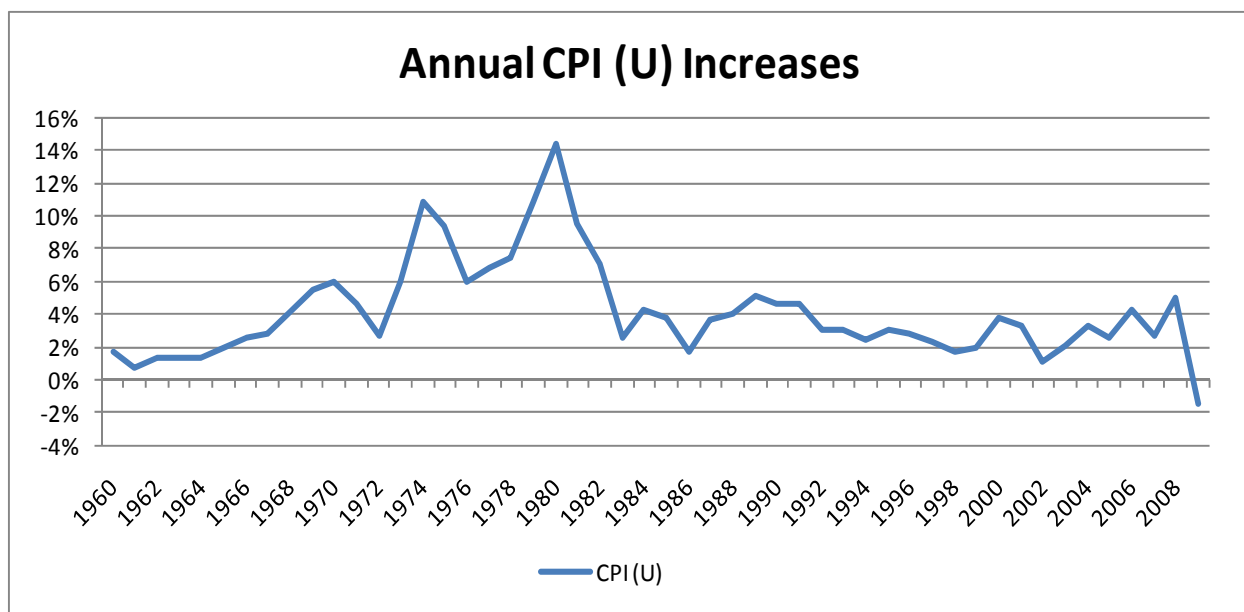
Period	Average Annual Rate of Inflation
2004 – 2009	2.60%
1999 – 2009	2.64%
1989 – 2009	3.06%
1979 – 2009	4.07%
1969 - 2009	4.53%
1959 – 2009	4.09%
1926 - 2009	3.06%

Over shorter historic periods, the average annual rate of increase in the CPI-U has been below 3.00%. The years of high inflation occurring from 1973 to 1982 has a significant impact on the averages over periods which include these rates. We should add that since 1926, the average annual rate of inflation was 3.06%.



Section II: Economic Assumptions

The graph below shows the annual increases in the CPI (U) over a 50 year period.



Additional information to consider when determining the reasonable range is obtained from measuring the spread on inflation protected treasury bills (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities and the inflation indexed nominal yield on TIPS of the same maturity is referred to as the “breakeven rate of inflation” and represents the bond market’s expectation of inflation over the period to maturity. The table below provides the calculation of the breakeven rate of inflation as of December 31, 2009 over various periods.

Years to Maturity	Bond Nominal Yield	TIPS Nominal Yield	Breakeven Rate of Inflation
5	2.69%	0.56%	2.13%
10	3.85%	1.48%	2.37%
20	4.58%	2.03%	2.55%

The bond market’s expectation for the rate of inflation is significantly lower than historical average annual rates. Additionally, based upon information provided from the “Survey of Professional Forecasters” published by the Philadelphia Federal Reserve Bank, the median annual rate of inflation for the ten years beginning January 1, 2010 is 2.39%.



Section II: Economic Assumptions

Recommendation: It is difficult to accurately predict inflation. Current economic forecasts and the bond market suggest lower inflation over the next ten to twenty years when compared to the historical averages, which is a shorter time period than appropriate for our purposes. In the 2009 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75 year cost projections on an intermediate inflation assumption of 2.8% with a range of 1.8% - 3.8%. We concur in general with a range of 2.0% - 4.0%, and recommend use of a 3.50% per year rate recognizing the likely inflation pressures built into the economy at the current time.

Price Inflation Assumption	
Current	3.50%
Reasonable Range	2.00% - 4.00%
Recommended	3.50%



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 Investments.

The current assumption is 7.75%, consisting of a price inflation assumption of 3.50% and a real rate of return assumption of 4.25%. The return is net of all investment and administrative expenses.

Past Experience: The actuarial value of assets of the System are developed using a widely accepted asset-smoothing methodology that fully recognizes investment gains and losses over a four year period. The recent experience for the retirement funds over the last fifteen years is shown in the table below.

Nominal Total Rate of Return		
Year Ending 6/30	Market Value	Actuarial Value
1995	15.7%	8.9%
1996	12.4%	10.4%
1997	19.4%	14.9%
1998	16.6%	16.0%
1999	11.9%	12.3%
2000	7.8%	12.8%
2001	(5.1)%	9.2%
2002	(7.3)%	3.8%
2003	6.2%	1.6%
2004	13.3%	2.1%
2005	8.0%	2.7%
2006	8.9%	8.5%
2007	17.6%	10.2%
2008	(4.9)%	7.2%
2009	(20.8)%	(10.3)%
Average	6.0%	7.2%



Section II: Economic Assumptions

Because of the significant variability in past year-to-year results and the inter-play 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 of Investments in setting investment policy and the asset allocation established by the Board of Investments as a result of that policy. This approach is referred to as the building block method in ASOP No. 27.

Historical Analysis: The historical real rate of return of the S&P 500 over the long-term has averaged 6.4%, and the approximate historical real rate of return of intermediate high quality bonds over the long term has averaged 2.3%. By weighting these rates by common allocation of large retirement funds (30%/70% to 70%/30%) we construct the reasonable range for real rates of return to be from 3.5% to 5.2%. This correlates well with the information above and the latest *Public Fund Survey* which shows the median plan real return assumption of 4.5% with a median equity allocation of 54%.

Analysis: The current capital market assumptions and asset allocation are shown in Appendix B. Using stochastic projection results provides an expected range of real rates of return over various time horizons. Looking at one year results produces an expected real return of 5.35% but also has a high standard deviation, which means there is high volatility. Over larger time horizons, the median return does not change much but the volatility declines significantly. The following table provides a summary of results.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5 th	25 th	50 th	75 th	95 th
1	5.31%	12.53%	-9.9%	-1.8%	4.6%	11.6%	22.9%
5	4.76	5.56	-2.3	1.7	4.6	7.7	12.3
10	4.69	3.93	-0.3	2.5	4.6	6.8	10.0
20	4.66	2.78	1.1	3.1	4.6	6.1	8.4
30	4.65	2.27	1.7	3.4	4.6	5.9	7.7
50	4.64	1.76	2.4	3.7	4.6	5.6	7.0

The percentile ranks are the outcomes based on the log normal random variable distribution that produce returns of less than the return at that particular percentile level over the time span. Thus for the 20 year time span, 5% of the resulting real rates of return were below 1.1% and 95% were above that. As the time span increases, the results begin to merge. Over a 50 year time span, the result indicate there is a 25% chance that real return will be below 3.7% and a 25% chance they will be above 5.6%. In other words there is a 50% chance the real returns will be between 3.7% and 5.6%.



Section II: Economic Assumptions

Administrative and Investment Expenses: The investment return is assumed to be net of administrative and investment expenses. The table below compares, for the last five years, the expense levels during the fiscal year to the market value of assets for the systems at the end of the fiscal years.

FY Ending June 30	Administrative Expenses	Investment Expenses	Total Expenses	Market Value of Assets	Expense Ratio
2005	1,560,820	5,988,496	7,549,316	2,487,136,540	0.30
2006	1,579,155	7,687,038	9,266,193	2,745,771,047	0.34
2007	1,434,103	13,126,101	14,560,204	3,209,259,107	0.45
2008	1,750,765	23,228,638	24,979,403	2,993,392,632	0.83
2009	1,853,873	15,459,976	17,313,849	2,301,828,565	0.75

Over the five-year period the expense ratio averaged approximately 0.50%. We recommend a long term expense ratio of 0.50% for the net investment return assumption. This represents an increase of 0.30% from the current assumed expense ratio of 0.20%.

Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we recommend 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 ratio assumption. The following table details the range.

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return	3.70%	4.60%	5.60%
Inflation	3.50	3.50	3.50
Expenses	<u>(0.50)</u>	<u>(0.50)</u>	<u>(0.50)</u>
Net Investment Return	6.70%	7.60%	8.60%



Section II: Economic Assumptions

A net return of 7.75% is slightly greater than the 50th percentile. Although not in the center of the reasonable range, in our opinion 7.75% return is still reasonable. We recommend the long-term net investment return assumption of 7.75% be retained.

Investment Return Assumption	
Current	7.75%
Reasonable Range	6.70% - 8.60%
Recommended	7.75%



Wage Inflation

Background: The assumed future increases in salaries consist of an inflation component and a component for promotion and longevity, often called merit increases. Merit increases are generally age and or service related, and will be studied in the demographic assumption section of the report. Wage inflation normally is above price inflation, which reflects the overall return on labor in the economy. The current wage inflation assumption is 4.50%, or 1.00% above price 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 we did in our analysis of inflation, on the following page, we show the wage inflation and a comparison with the price inflation over various time periods. Since wage data is only available through 2008 we use that year as the end point.

Period	Wage Inflation	Price Inflation	Real Wage Growth
1998-2008	3.66%	2.52%	1.14%
1988-2008	3.87	2.82%	1.05
1978-2008	4.66	3.85	0.81
1968-2008	5.14	4.55	0.59
1958-2008	4.96	4.05	0.91

Thus, over the last 50 years, annual real wage growth has averaged 0.91%. The graph on the following page shows the annual increases in real wage growth over the entire 50 year period.



Recommendation: As we did with price inflation, we again look at the 2009 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75 year cost projections on a national wage growth assumption 1.1% greater than the price inflation assumption of 2.8%. We concur in general with a range of .5% - 1.5%, and recommend use of a 1.00% per year rate at the current time.

Wage Inflation Assumption		
Current	4.50%	
	Reasonable Range	
Real Wage Growth	0.50%	1.50%
Inflation	<u>3.50</u>	<u>3.50</u>
Total	4.00%	5.00%
Recommended	4.50%	



Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for the Montana Teachers' Retirement System. They are:

- Rates of Withdrawal
- Rates of Disability Retirement
- Rates of Service Retirement
- Rates of Post-retirement Mortality
- Rates of Post-retirement Disabled Mortality
- Rates of Salary Increase for Merit and Promotions

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, 2004 through July 1, 2009) 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 identifying 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. In addition non-recurring events, such as early retirement windows, need to be taken into account in determining the weight to give to recent experience.

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 under the current assumptions. If a change is being proposed, the revised actual to expected ratios are shown as well.



Rates of Withdrawal

The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service that will occur prior to attaining the eligibility requirement for a retirement benefit as a result of resignation or dismissal.

The current assumption utilizes a service based approach that sets the withdrawal rates based on years of service. Withdrawal experience was investigated without regard to gender for both Non-University and University members combined.

The analysis of the actual withdrawal experience for both University and Non-University members over the five-year period indicates an overall actual/expected ratio of 134%. This ratio indicates that more members withdrew during study period than expected. The table below shows in detail the actual/expected ratio by years of service and in total.

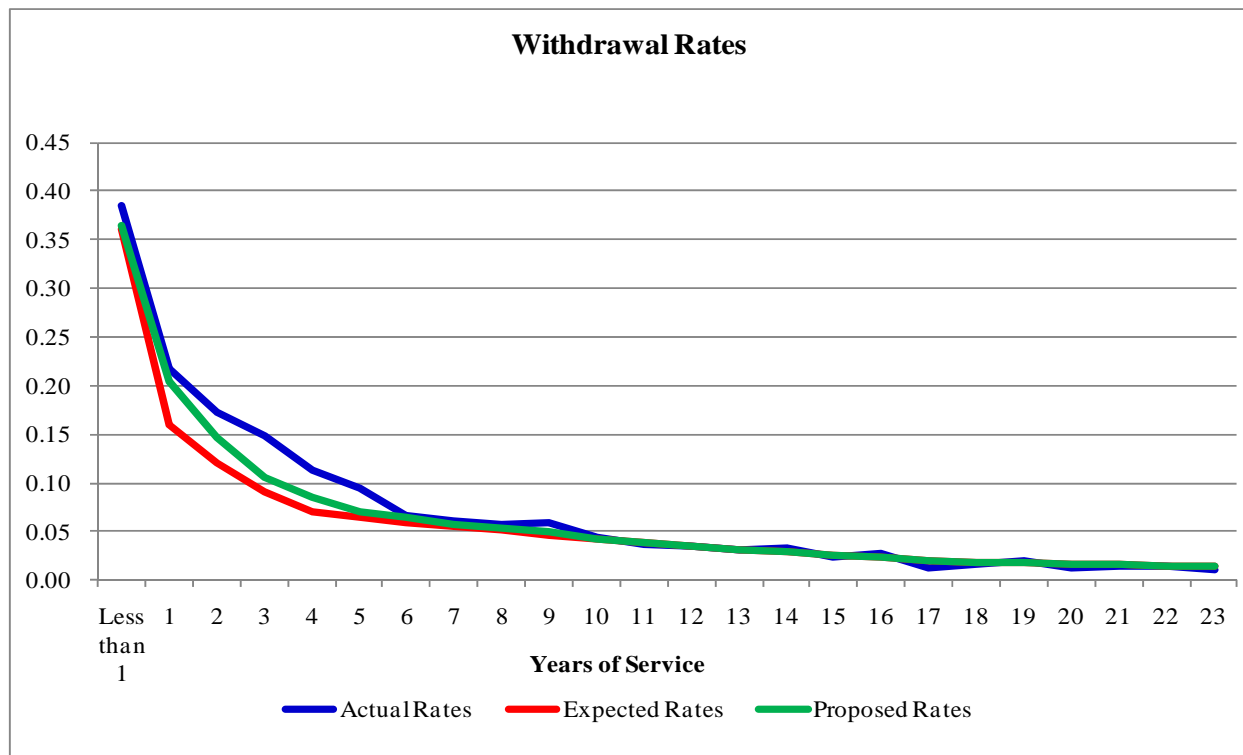
EXPERIENCE UNDER CURRENT ASSUMPTIONS

Years of Service	Withdrawal Experience		
	Actual	Expected	Ratio
			Actual/Expected
Less than 1	72	67.28	1.07
1	763	559.55	1.36
2	555	386.33	1.44
3	435	265.18	1.64
4	300	184.76	1.62
5	192	132.29	1.45
6	125	112.40	1.11
7	108	97.81	1.10
8	94	84.47	1.11
9	92	72.07	1.28
10	64	61.63	1.04
11	51	53.87	0.95
12	47	46.32	1.01
13	41	42.03	0.98
14	41	35.97	1.14
15	29	31.13	0.93
16	30	24.73	1.21
17	12	18.93	0.63
18	13	15.91	0.82
19	16	13.85	1.16
20	9	12.18	0.74
21	11	11.54	0.95
22	10	10.12	0.99
23	7	9.41	0.74
24	47	8.41	5.59
TOTAL	3,164	2,358.17	1.34



Section III: Demographic Assumptions

The chart below shows (i) the actual average withdrawal rates of employment by years of service during the past five years, (ii) the current assumed withdrawal rates, and (iii) the recommended withdrawal rates.



Findings and Recommendations

The data reflects a general increase in the rates of withdrawal for those members with less than nine years of service. As a result, we recommend increasing withdrawal rates to more closely reflect the actual experience. The proposed rates can be considered conservative and reflect a significant margin as compared to the actual experience.

The complete tables of recommended withdrawal rates are shown in Appendix D.

The actual/expected ratios based on the recommended assumption are shown in the table on the following page. The overall ratio has been reduced from 134% to 116%.



EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Years of Service	Withdrawal Experience		
	Actual	Proposed	Ratio
			Actual/Proposed
Less than 1	72	68.26	1.05
1	763	717.30	1.06
2	555	470.27	1.18
3	435	309.54	1.41
4	300	224.49	1.34
5	192	142.52	1.35
6	125	119.94	1.04
7	108	103.18	1.05
8	94	89.48	1.05
9	92	76.70	1.20
10	64	61.66	1.04
11	51	53.90	0.95
12	47	46.34	1.01
13	41	42.05	0.98
14	41	35.99	1.14
15	29	31.15	0.93
16	30	24.75	1.21
17	12	18.94	0.63
18	13	15.92	0.82
19	16	13.86	1.15
20	9	12.19	0.74
21	11	11.55	0.95
22	10	10.13	0.99
23	7	9.42	0.74
24	47	8.42	5.59
TOTAL	3,164	2,717.91	1.16



Rates of Disability Retirement

The rates of disability used in the actuarial valuation project the percentage of employees who are expected to become disabled each year.

Disability experience was investigated without regard to gender for both Non-University and University members combined.

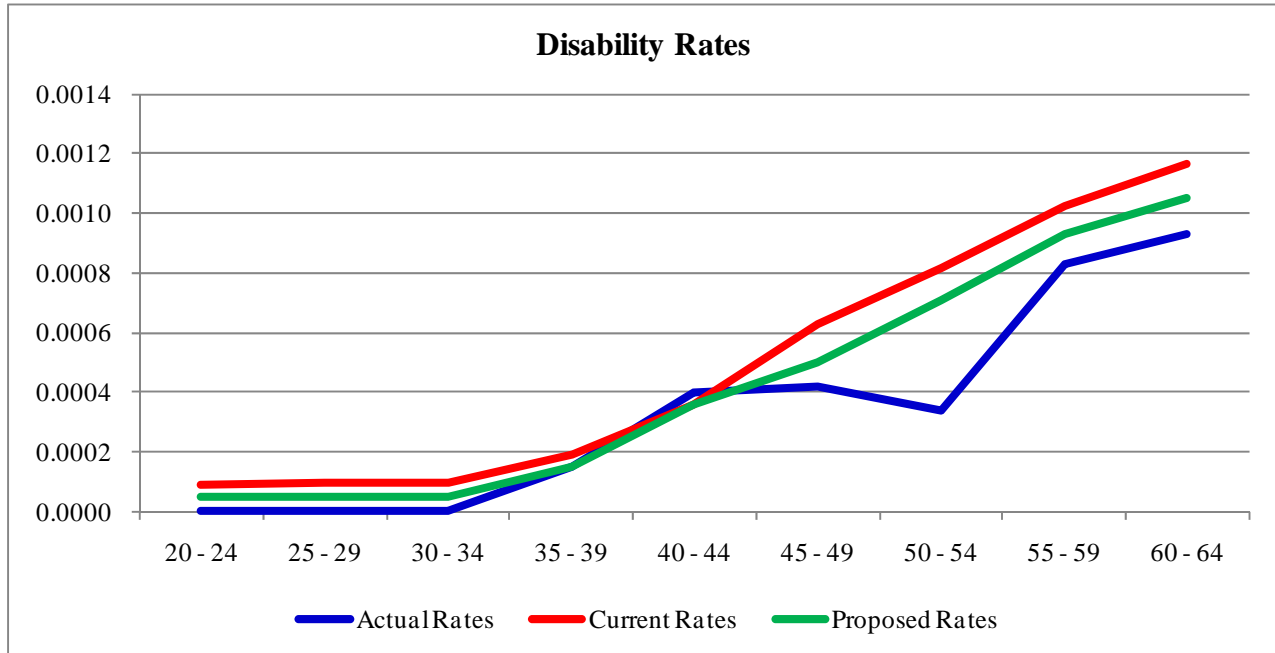
The analysis of the actual disability experience for both Non-University and University members over the five-year experience period yields an actual/expected ratio of 68%. The table below details the actual/expected ratio by age group and in total.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Age Group	Disability Experience		
	Actual	Expected	Ratio
			Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	0.05	0.00
25 - 29	0	0.47	0.00
30 - 34	0	0.58	0.00
35 - 39	1	1.31	0.76
40 - 44	3	2.66	1.13
45 - 49	4	5.97	0.67
50 - 54	4	9.67	0.41
55 - 59	9	11.08	0.81
60 - 64	4	5.03	0.80
65 & Over	1	1.22	0.82
TOTAL	26	38.04	0.68



The chart below shows (i) the actual disability rates for employees by age during the past five years, (ii) the current assumed disability rates, and (iii) the recommended disability rates.



Findings and Recommendations

During the period under investigation, the actual rates of disability retirement were less than expected over all age groups except ages 40 to 44. For ages 40 to 44 there were greater than expected disability retirements. As a result, we recommend the rates of disability retirement be revised to more closely reflect the experience of the System. The proposed rates reflect the partial credibility given to the most recent experience and provides for a significant margin for conservatism.

The complete table of recommended disability rates is shown in Appendix D.

The actual/expected ratios based on the recommended assumptions are shown in the table on the following page. The total actual/expected ratio is 78% compared to 68% under the current assumption.



EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Age Group	Disability Experience		
	Actual	Proposed	Ratio
			Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	0.03	0.00
25 - 29	0	0.25	0.00
30 - 34	0	0.30	0.00
35 - 39	1	1.01	0.99
40 - 44	3	2.68	1.12
45 - 49	4	4.74	0.84
50 - 54	4	8.40	0.48
55 - 59	9	10.09	0.89
60 - 64	4	4.53	0.88
65 & Over	1	1.11	0.90
TOTAL	26	33.14	0.78



Rates of Retirement

The retirement rates used in the actuarial valuation project the percentage of employees who are expected to retire during the upcoming year. Separate rates are assumed for University and Non-University members.

In addition to membership type, retirement rates are set based on type of retirement. The rates of retirement were studied separately for those eligible for a reduced benefit, first eligible for an unreduced benefit and beyond first eligibility for an unreduced benefit.

Eligible for an Unreduced Benefit

The analysis of the actual retirement experience over the five-year period yields actual/expected ratios of 153% and 213% respectively for Non-University and University members.

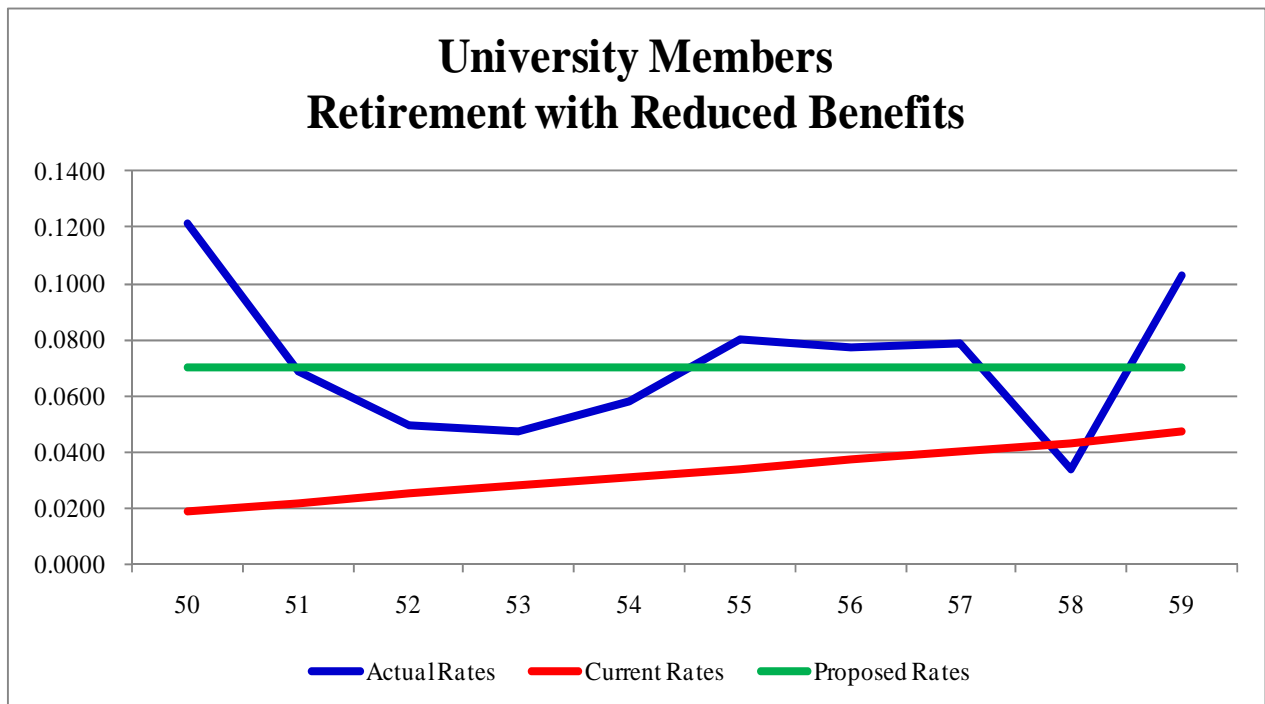
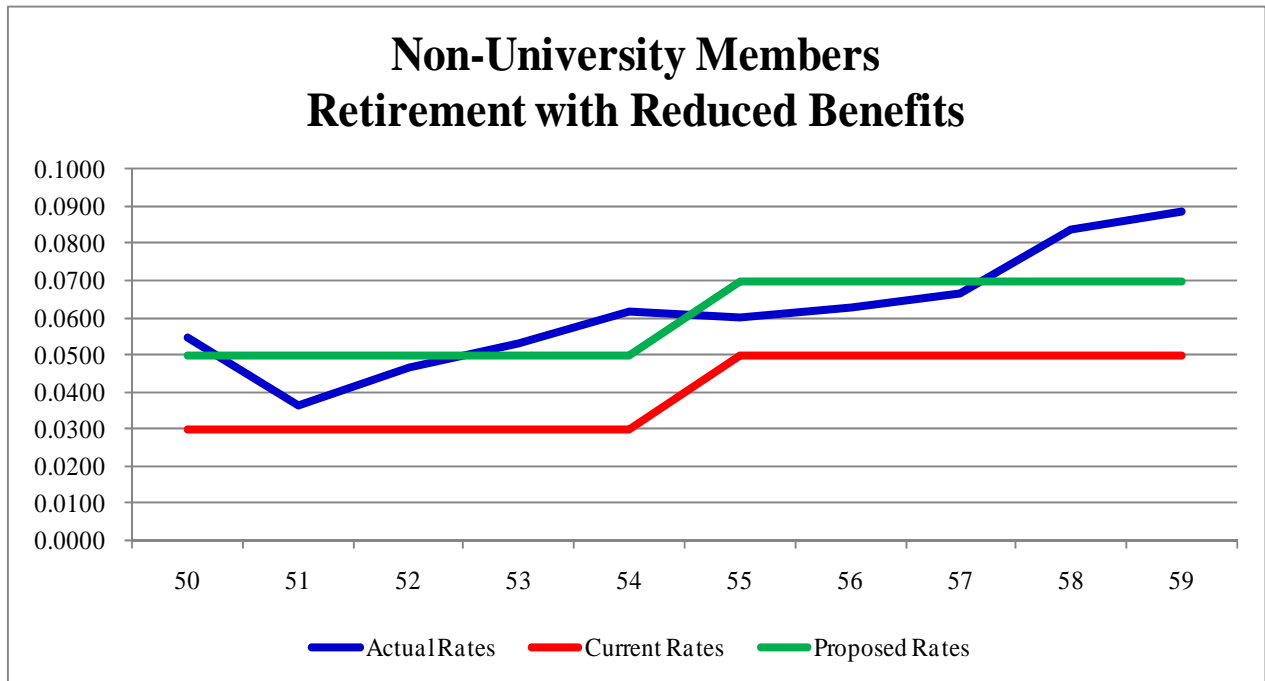
EXPERIENCE UNDER CURRENT ASSUMPTIONS

Number of Service Retirements Eligible for a Reduced Benefit						
Age	Current Rates					
	Non-University			University		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
50	77	42.05	1.83	8	1.25	6.40
51	49	40.43	1.21	5	1.60	3.13
52	63	40.42	1.56	4	2.02	1.98
53	72	40.51	1.78	4	2.38	1.68
54	78	37.87	2.06	5	2.66	1.88
55	71	58.96	1.20	8	3.39	2.36
56	70	55.86	1.25	7	3.36	2.08
57	66	49.61	1.33	8	4.07	1.97
58	71	42.22	1.68	3	3.82	0.79
59	61	34.32	1.78	8	3.66	2.19
TOTAL	678	442.25	1.53	60	28.21	2.13



Section III: Demographic Assumptions

The charts below show (i) the actual retirement rates for employees by age during the past five years, (ii) the current assumed retirement rates and (iii) the recommended retirement rates separately for Non-University and University members.





Findings and Recommendations

In general, actual retirements for members who were eligible for a reduced benefit were greater than expected for both Non-University and University members. We recommend increasing retirement rates during eligibility for a reduced benefit to reflect this trend.

The complete table of recommended retirement rates is shown in Appendix D.

The actual/expected ratios based on the recommended assumptions are 101% for both Non-University and University members.

The table below shows in detail the actual/expected ratios by individual age and total.

EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Number of Service Retirements Eligible for a Reduced Benefit						
Age	Proposed Rates					
	Non-University			University		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
50	77	70.15	1.10	8	4.62	1.73
51	49	67.45	0.73	5	5.11	0.98
52	63	67.45	0.93	4	5.67	0.71
53	72	67.60	1.07	4	5.95	0.67
54	78	63.20	1.23	5	6.02	0.83
55	71	82.67	0.86	8	7.00	1.14
56	70	78.33	0.89	7	6.37	1.10
57	66	69.58	0.95	8	7.14	1.12
58	71	59.22	1.20	3	6.23	0.48
59	61	48.16	1.27	8	5.46	1.47
TOTAL	678	673.81	1.01	60	59.57	1.01



First Eligible for an Unreduced Benefit

The analysis of the actual retirement experience over the five-year period yields an actual/expected ratio of 53% and 58% respectively for Non-University and University members respectively.

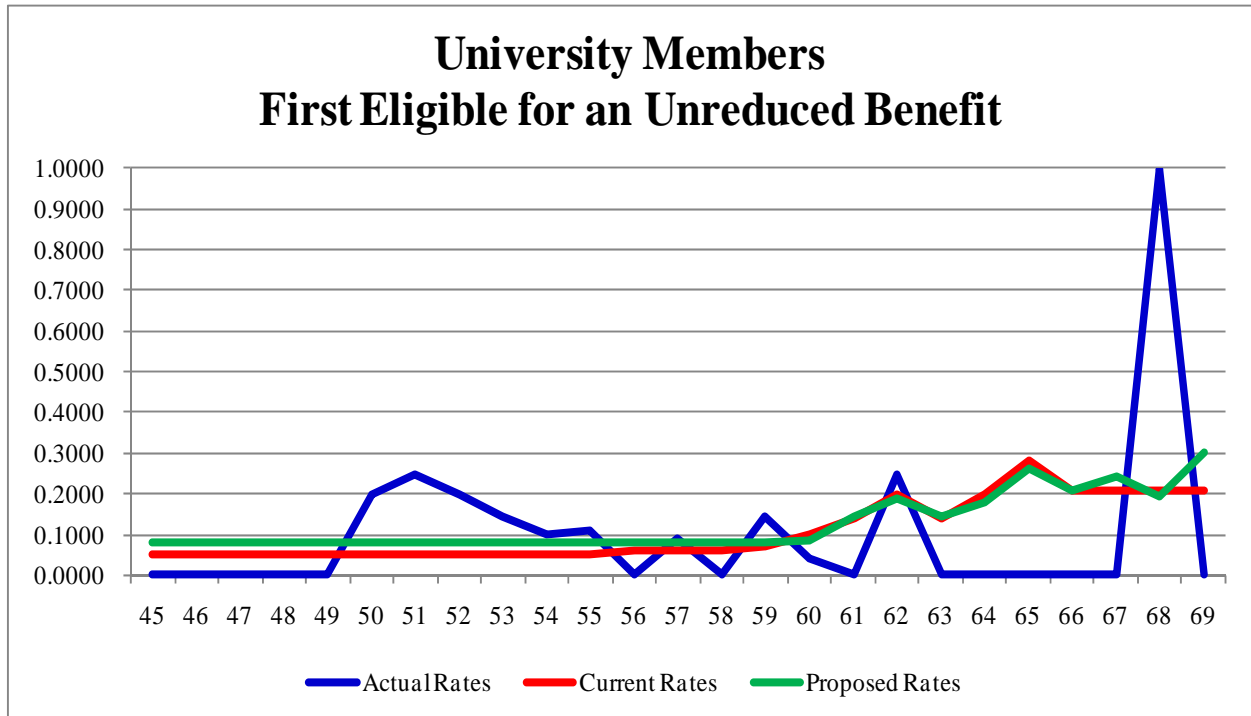
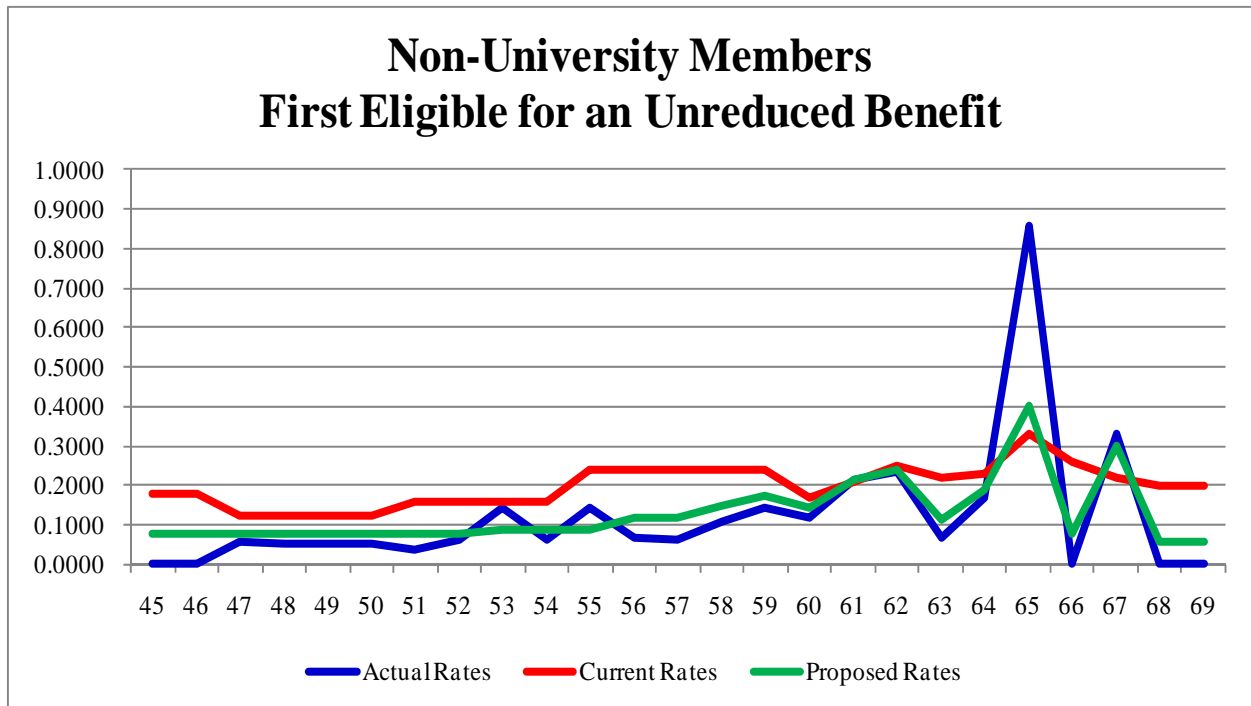
EXPERIENCE UNDER CURRENT ASSUMPTIONS

Number of Service Retirements First Eligible for an Unreduced Benefit						
Age	Current Rates					
	Non-University			University		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
45	0	0.00	0.00	0	0.00	0.00
46	0	0.36	0.00	0	0.00	0.00
47	6	13.36	0.45	0	0.27	0.00
48	8	19.36	0.41	0	0.09	0.00
49	8	18.73	0.43	0	0.09	0.00
50	6	13.74	0.44	1	0.45	2.22
51	4	15.98	0.25	1	0.36	2.78
52	6	14.86	0.40	1	0.45	2.22
53	12	13.42	0.89	1	0.63	1.59
54	5	12.78	0.39	1	0.90	1.11
55	11	18.45	0.60	1	1.35	0.74
56	5	17.73	0.28	0	1.95	0.00
57	5	18.45	0.27	1	1.65	0.61
58	7	15.33	0.46	0	1.20	0.00
59	7	11.49	0.61	1	1.05	0.95
60	70	122.45	0.57	3	6.88	0.44
61	9	8.79	1.02	0	1.26	0.00
62	10	10.71	0.93	1	0.80	1.25
63	2	6.36	0.31	0	0.56	0.00
64	2	2.75	0.73	0	0.40	0.00
65	6	2.30	2.61	0	1.11	0.00
66	0	0.26	0.00	0	0.21	0.00
67	2	1.32	1.52	0	0.21	0.00
68	0	0.60	0.00	1	0.21	4.76
69	0	0.40	0.00	0	0.21	0.00
TOTAL	191	359.98	0.53	13	22.29	0.58



Section III: Demographic Assumptions

The charts below show (i) the actual rates of retirement for employees by age during past five years, (ii) the current assumed rates of retirement and (iii) the recommended rates of retirement.





Findings and Recommendations

We recommend revising retirement rates during first eligibility for an unreduced benefit to more closely reflect actual experience.

The complete tables of recommended retirement rates are shown in Appendix D.

The actual/expected ratios based on the recommended assumptions are 83% and 45% respectively for both Non-University and University members.

The table on the following page shows in detail the actual/expected ratios by individual age and total based on the recommended rates of retirement.



EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Number of Service Retirements First Eligible for an Unreduced Benefit						
Age	Proposed Rates					
	Non-University			University		
	Actual	Expected	Ratio	Actual	Expected	Ratio
Actual/Expected			Actual/Expected			
45	0	0.00	0.00	0	0.00	0.00
46	0	0.16	0.00	0	0.00	0.00
47	6	8.56	0.70	0	0.51	0.00
48	8	12.40	0.65	0	0.17	0.00
49	8	12.00	0.67	0	0.17	0.00
50	6	8.80	0.68	1	0.85	1.18
51	4	8.00	0.50	1	0.68	1.47
52	6	7.44	0.81	1	0.85	1.18
53	12	7.56	1.59	1	1.19	0.84
54	5	7.20	0.69	1	1.70	0.59
55	11	6.93	1.59	1	1.35	0.74
56	5	8.88	0.56	0	1.95	0.00
57	5	9.09	0.55	1	1.65	0.61
58	7	9.47	0.74	0	1.20	0.00
59	7	8.35	0.84	1	1.05	0.95
60	70	85.85	0.82	3	10.35	0.29
61	9	8.95	1.01	0	1.26	0.00
62	10	10.23	0.98	1	0.80	1.25
63	2	3.31	0.60	0	0.56	0.00
64	2	2.28	0.88	0	0.40	0.00
65	6	2.80	2.14	0	1.11	0.00
66	0	0.08	0.00	0	0.21	0.00
67	2	1.80	1.11	0	0.21	0.00
68	0	0.18	0.00	1	0.21	4.76
69	0	0.12	0.00	0	0.21	0.00
TOTAL	191	230.43	0.83	13	28.64	0.45



Beyond First Year of Eligibility for an Unreduced Benefit

The analysis of the actual retirement experience over the five-year period yields an actual/expected ratio of 88% and 102% respectively for Non-University and University members respectively.

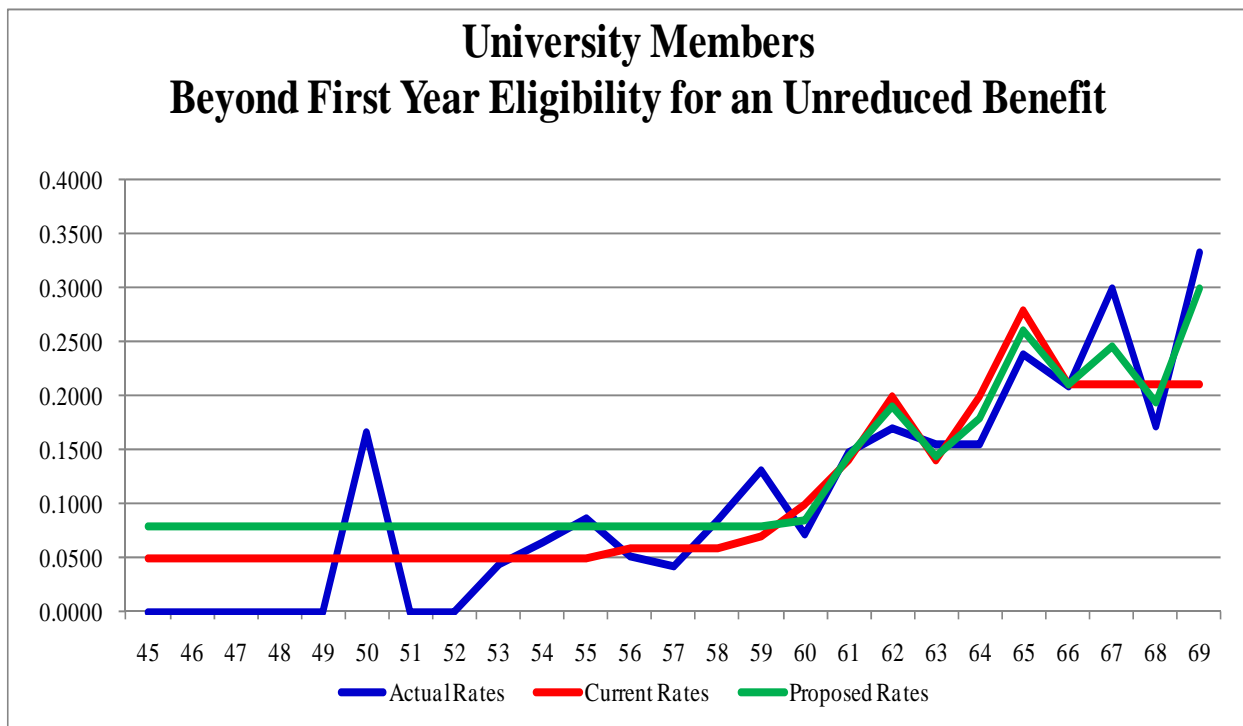
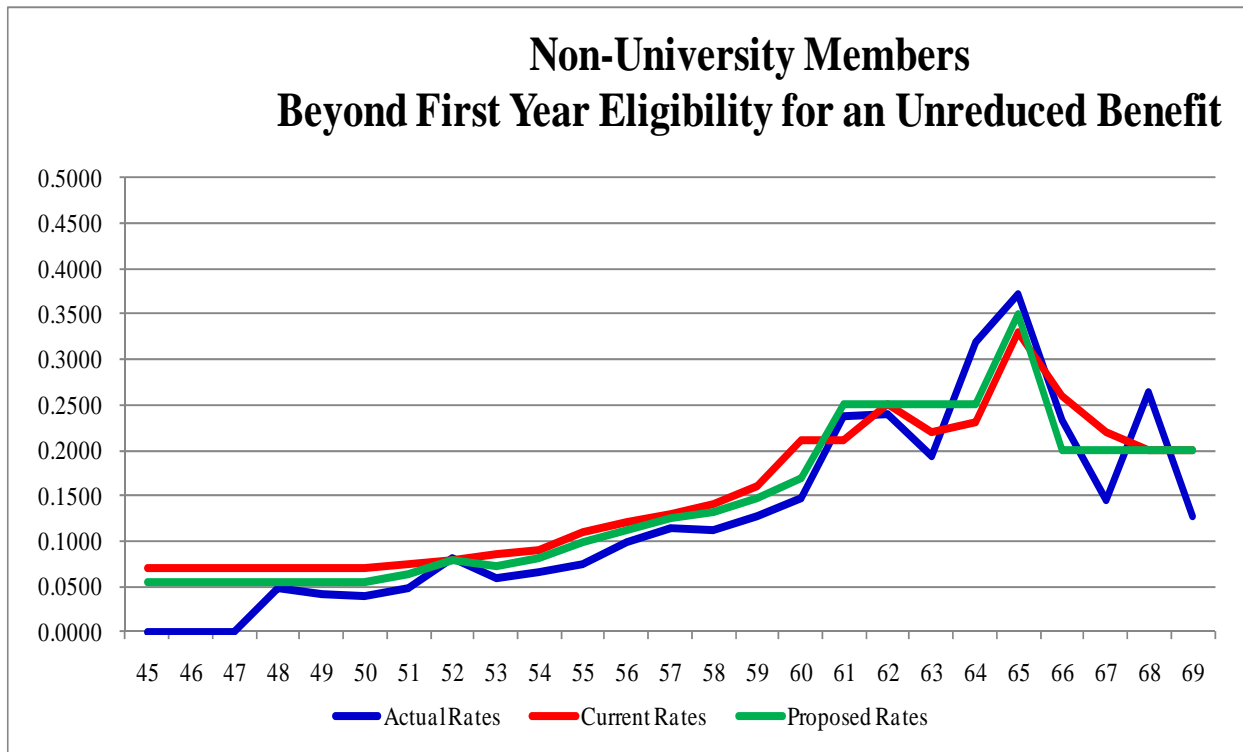
EXPERIENCE UNDER CURRENT ASSUMPTIONS

Beyond First Year of Eligibility for an Unreduced Benefit						
Age	Current Rates					
	Non-University			University		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
45	0	0.07	0.00	0	0.00	0.00
46	0	0.14	0.00	0	0.00	0.00
47	0	0.21	0.00	0	0.00	0.00
48	5	7.13	0.70	0	0.15	0.00
49	11	18.95	0.58	0	0.25	0.00
50	16	29.23	0.55	1	0.30	3.33
51	27	41.35	0.65	0	0.50	0.00
52	53	52.42	1.01	0	0.85	0.00
53	46	65.70	0.70	1	1.15	0.87
54	56	75.49	0.74	2	1.55	1.29
55	66	97.20	0.68	4	2.30	1.74
56	91	109.37	0.83	3	3.53	0.85
57	106	119.63	0.89	3	4.31	0.70
58	91	112.47	0.81	8	5.69	1.41
59	88	110.62	0.80	14	7.40	1.89
60	85	120.65	0.70	7	9.67	0.72
61	206	182.39	1.13	22	20.66	1.06
62	136	141.56	0.96	22	25.72	0.86
63	75	85.06	0.88	17	15.21	1.12
64	90	64.83	1.39	16	20.51	0.78
65	67	59.13	1.13	20	23.41	0.85
66	24	26.64	0.90	14	14.00	1.00
67	10	15.09	0.66	15	10.44	1.44
68	15	11.32	1.33	6	7.30	0.82
69	5	7.75	0.65	9	5.62	1.60
TOTAL	1,369	1,554.40	0.88	184	180.52	1.02



Section III: Demographic Assumptions

The charts below show (i) the actual retirement rates by age, (ii) the current assumed rates of retirement, and (iii) the recommended rates of retirement.





Findings and Recommendations

We recommend revising retirement rates beyond first eligibility for an unreduced benefit to partially reflect actual experience.

The complete tables of recommended retirement rates are shown in Appendix D.

The actual/expected ratios based on the recommended assumptions are 91% and 97% respectively for both Non-University and University members.

The table on the following page shows in detail the actual/expected ratios by individual age and total based on the new recommended assumption.



EXPERIENCE UNDER PROPOSED ASSUMPTIONS

Beyond First Year of Eligibility for an Unreduced Benefit						
Age	Proposed Rates					
	Non-University			University		
	Actual	Expected	Ratio Actual/Expected	Actual	Expected	Ratio Actual/Expected
45	0	0.06	0.00	0	0.00	0.00
46	0	0.11	0.00	0	0.00	0.00
47	0	0.17	0.00	0	0.00	0.00
48	5	5.61	0.89	0	0.24	0.00
49	11	14.91	0.74	0	0.40	0.00
50	16	22.99	0.70	1	0.48	2.08
51	27	34.78	0.78	0	0.80	0.00
52	53	52.48	1.01	0	1.36	0.00
53	46	56.50	0.81	1	1.84	0.54
54	56	68.88	0.81	2	2.48	0.81
55	66	86.73	0.76	4	3.68	1.09
56	91	103.17	0.88	3	4.72	0.64
57	106	115.25	0.92	3	5.76	0.52
58	91	105.46	0.86	8	7.60	1.05
59	88	102.56	0.86	14	8.48	1.65
60	85	97.92	0.87	7	8.25	0.85
61	206	217.75	0.95	22	21.46	1.03
62	136	142.00	0.96	22	24.51	0.90
63	75	97.00	0.77	17	15.81	1.08
64	90	70.75	1.27	16	18.54	0.86
65	67	63.00	1.06	20	21.84	0.92
66	24	20.60	1.17	14	14.07	1.00
67	10	13.80	0.72	15	12.25	1.22
68	15	11.40	1.32	6	6.83	0.88
69	5	7.80	0.64	9	8.10	1.11
TOTAL	1,369	1,511.66	0.91	184	189.49	0.97



Rates of Healthy Post-Retirement Mortality

The post-retirement mortality rates used in the actuarial valuation project the percentage of non-disabled retirees and beneficiaries who are expected to die in the upcoming year. This assumption is a very material demographic assumption. Based upon the long term trend of mortality improvement, actuaries seek to maintain a sufficient margin in expected rates of mortality to account for future improvements in longevity.

The analysis of the actual post-retirement mortality experience over the five-year experience study period yields actual/expected ratios of 113% and 109% respectively for males and females. The table below details the actual/expected ratios by individual age group and total.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Age Group	Post-Retirement Mortality Experience					
	Males			Females		
	Actual	Expected	Ratio	Actual	Expected	Ratio
			Actual/Expected			Actual/Expected
Under 50	7	0.28	25.00	22	1.87	11.76
50 - 54	4	1.60	2.50	5	1.90	2.63
55 - 59	22	8.54	2.58	11	10.03	1.10
60 - 64	43	27.09	1.59	29	28.58	1.01
65 - 69	59	48.78	1.21	42	48.75	0.86
70 - 74	68	68.72	0.99	53	64.61	0.82
75 - 79	81	81.66	0.99	73	87.19	0.84
80 - 84	104	96.92	1.07	107	117.18	0.91
85 - 89	81	81.75	0.99	196	177.14	1.11
90 - 94	62	50.23	1.23	201	172.71	1.16
95 - 99	21	21.84	0.96	130	96.78	1.34
100 & Over	6	4.83	1.24	39	26.90	1.45
TOTAL	558	492.24	1.13	908	833.64	1.09

Findings and Recommendations

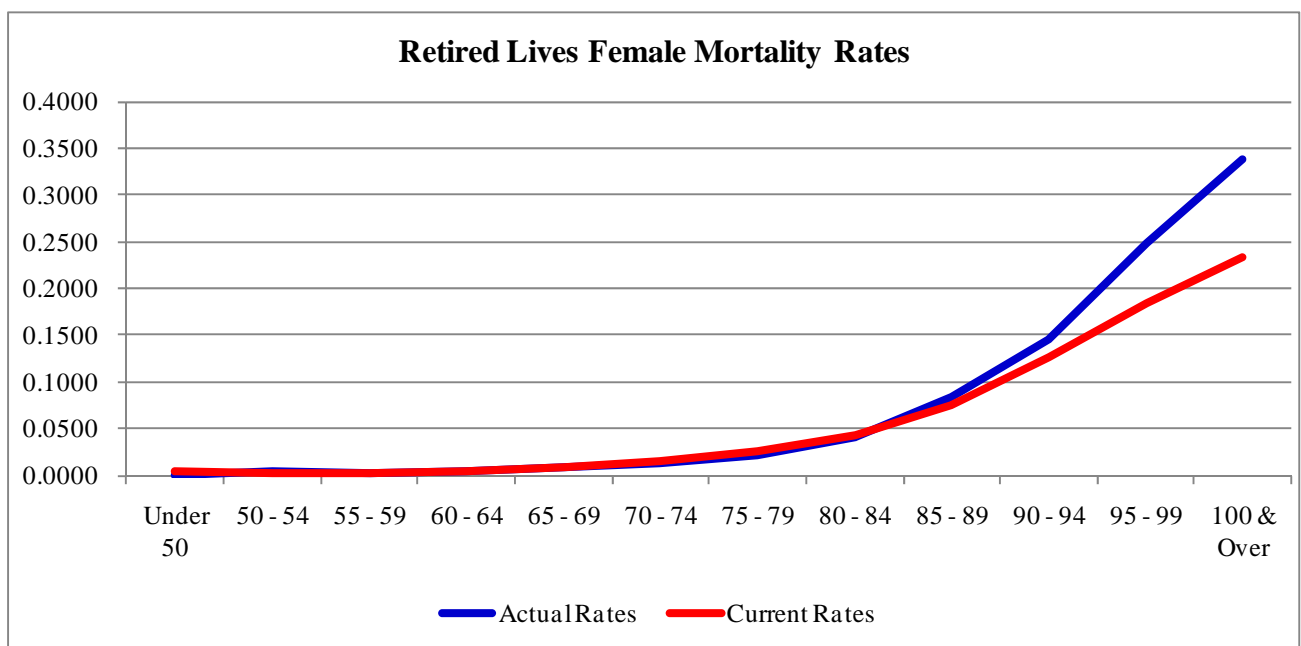
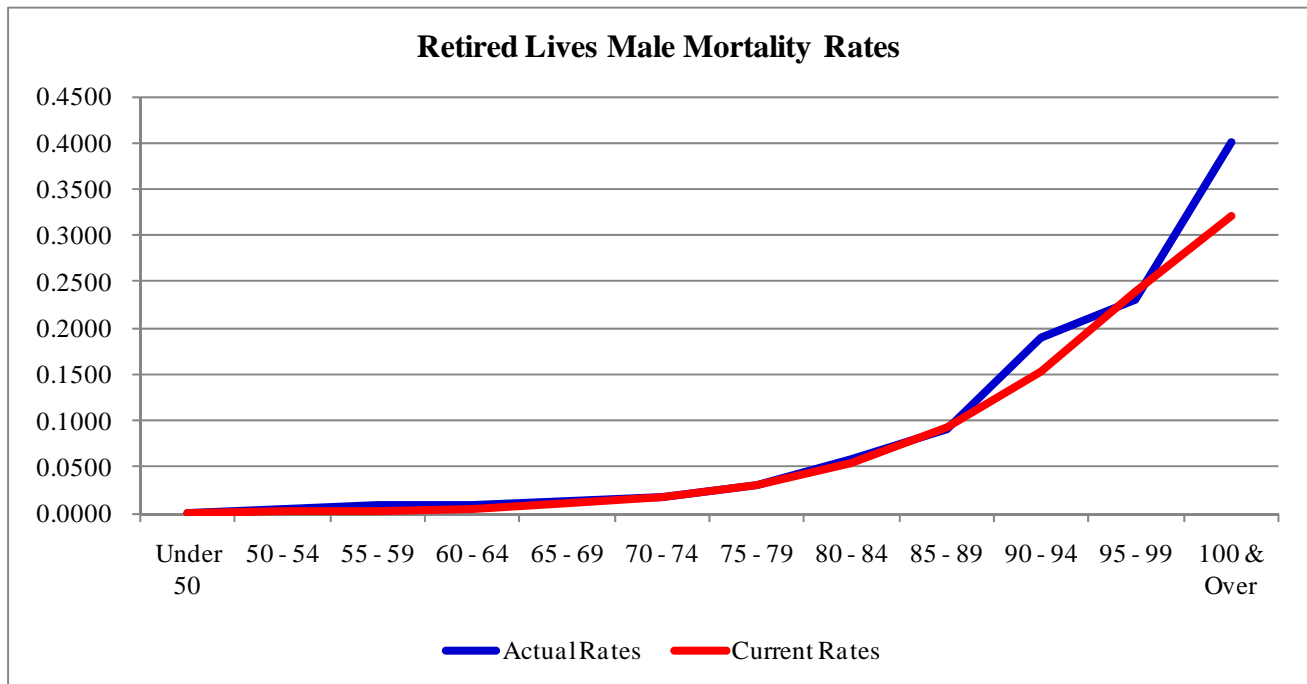
Experience indicates that overall more members have died than expected during the study period, resulting in actuarial gains to the system. The table currently in use is the RP-2000 Combined Healthy Mortality for Males set back three years, with mortality improvements projected by Scale AA to 2008, and Females set back two years, with mortality improvements projected by Scale AA to 2008. This assumption maintains a reasonable margin (13% for males and 9% for females) for further mortality improvement and conservatism, therefore, we recommend no change to the rates of healthy post-retirement mortality at this time.



Section III: Demographic Assumptions

The number of deaths among active members is not large enough to provide statistics credible enough to develop a unique table. Therefore, it is assumed that pre-retirement mortality follows the same table for healthy post-retirement mortality.

The charts below show (i) actual mortality rates for retirees by age group and (ii) the currently assumed mortality rates for retirees.





Rates of Disabled Post-Retirement Mortality

The disability mortality rates used in the actuarial valuations project the percentage of disabled retirees who are expected to die in the upcoming year for both Non-University and University Members. Mortality for disabled retirees is expected to be higher than mortality for non-disabled retirees.

The analysis of the actual disabled mortality over the five-year experience study period yields actual/expected ratio of 73% and 93% respectively for disabled male and female retirees. The table below shows the actual/expected ratios by age groups and in total.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Age Group	Post-Disablement Mortality Experience					
	Males			Females		
	Actual	Expected	Ratio	Actual	Expected	Ratio
			Actual/Expected			Actual/Expected
Under 25	0	0.00	0.00	0	0.00	0.00
25 - 29	0	0.00	0.00	0	0.00	0.00
30 - 34	0	0.00	0.00	0	0.00	0.00
35 - 39	0	0.00	0.00	0	0.01	0.00
40 - 44	0	0.08	0.00	0	0.10	0.00
45 - 49	0	0.10	0.00	1	0.33	3.03
50 - 54	1	0.56	1.79	2	1.06	1.89
55 - 59	4	1.91	2.09	4	3.02	1.32
60 - 64	1	2.37	0.42	1	3.19	0.31
65 - 69	2	1.62	1.23	3	3.44	0.87
70 - 74	2	2.96	0.68	2	2.39	0.84
75 - 79	2	2.98	0.67	0	4.35	0.00
80 - 84	0	1.64	0.00	3	4.34	0.69
85 - 89	0	2.14	0.00	8	4.29	1.86
90 - 94	0	0.15	0.00	2	2.14	0.93
100 & Over	0	0.00	0.00	1	0.45	2.22
TOTAL	12	16.51	0.73	27	29.11	0.93

Findings and Recommendations

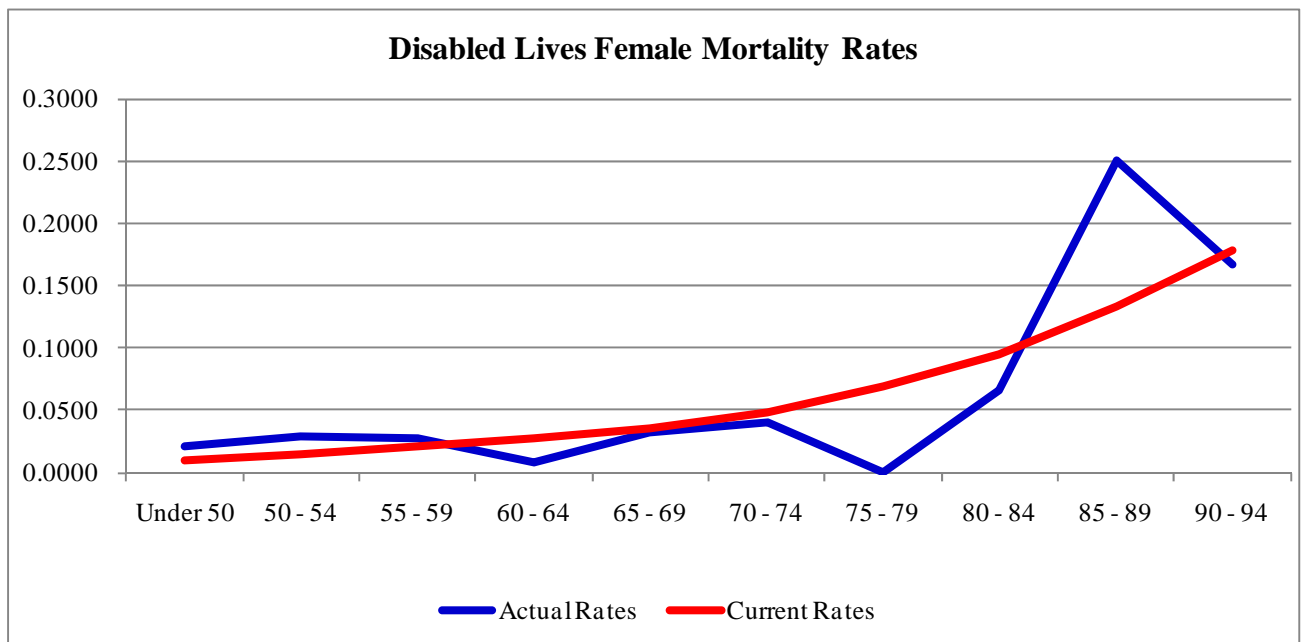
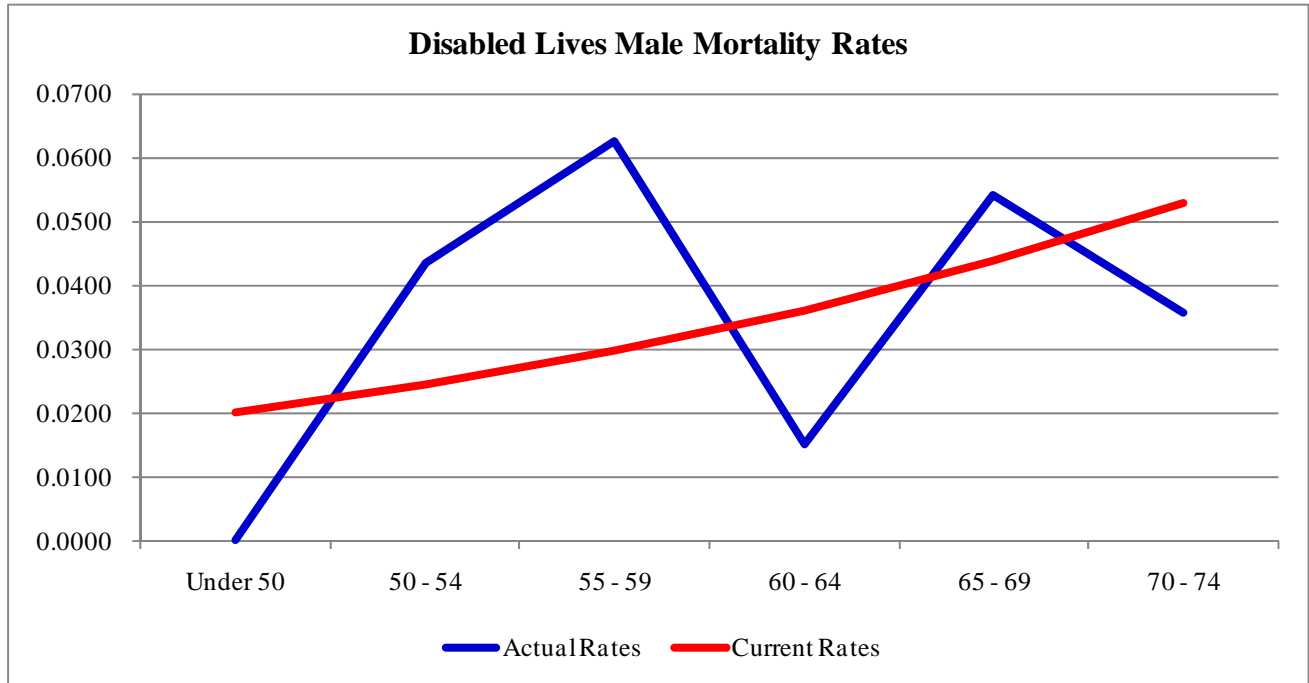
Experience indicates that overall fewer disabled retired members have died than expected during the study period. The table currently in use is the RP-2000 Disabled Mortality for Males, setback three years with mortality improvement projected by Scale AA to 2008 and RP-2000 Disabled Mortality for Females, set forward three years, with mortality improvements projected by Scale AA to 2008.

Since the number of disabled retirees exposed is low, the data was not sufficient to produce a credible statistic and the fact that the RP-2000 Mortality is a modern mortality table, we recommend no change in this assumption at this time.



Section III: Demographic Assumptions

The charts below show (i) actual mortality rates for disabled retirees by age during the past five years and (ii) the currently assumed disabled mortality rates.





Rates of Salary Increase

Under the “building block” approach recommended in ASOP 27, this assumption is composed of three components; inflation, productivity, and merit/promotion. The inflation and productivity components are combined to produce the assumed rates of wage inflation. The rate represents the “across the board” average annual increase in salaries shown in the experience data. The merit component includes the additional increases in salary due to performance, seniority, promotions, etc.

The table below shows the actual/expected ratios for total salary increases over the five year period separately for Non-University and University members.

EXPERIENCE UNDER CURRENT ASSUMPTIONS

Years of Service	Salaries End of Year (in thousands)					
	Non-University Members			University Members		
	Actual	Expected	Ratio	Actual	Expected	Ratio
			Actual/Expected			Actual/Expected
1	180,507	176,000	1.026	656	580	1.131
2	86,403	86,763	0.996	511	494	1.034
3	83,320	83,123	1.002	672	694	0.968
4	82,290	81,764	1.006	645	679	0.950
5	81,615	80,829	1.010	646	603	1.071
6	82,041	81,164	1.011	734	789	0.930
7	81,482	80,380	1.014	503	544	0.925
8	80,069	79,601	1.006	547	579	0.945
9	79,829	78,856	1.012	922	944	0.977
10	81,501	80,820	1.008	1,502	1,469	1.022
11	82,322	81,540	1.010	2,196	2,241	0.980
12	85,064	84,599	1.005	3,448	3,455	0.998
13	86,595	86,056	1.006	4,219	4,221	1.000
14	89,054	88,216	1.009	5,042	5,221	0.966
15	86,538	86,177	1.004	6,296	6,321	0.996
16	82,832	82,549	1.003	6,858	6,859	1.000
17	80,433	80,304	1.002	6,632	6,657	0.996
18	76,245	75,969	1.004	7,086	7,248	0.978
19	73,903	74,169	0.996	6,957	7,075	0.983
20	75,088	75,042	1.001	6,756	6,852	0.986
21	74,137	74,030	1.001	7,320	7,543	0.970
22 & Up	684,746	687,358	0.996	104,586	106,808	0.979
TOTAL	2,496,014	2,485,309	1.000	174,734	177,876	0.980



Rates of Non-University Salary Increase

Utilizing the “building block” approach, the first step in developing the merit based rates of increase is to remove the apparent wage inflation component from the actual salary rates of increase. The average annual rate of inflation over the five-year period ending June 30, 2009 was 2.61% and the apparent real rate of wage inflation (wage inflation above price inflation or CPI) in the data was 1.58%. These combined equal the apparent annual rate of wage inflation of 4.19% over the five-year period. The table below provides the analysis concerning the development of the merit component of this assumption for non-university members.

Years of Service	Actual Rate	Actual Merit Increase (Actual Less Wage Inflation)	Assumed Merit Increases
1	11.41%	7.22%	4.51%
2	7.51%	3.32%	4.09%
3	7.61%	3.42%	3.46%
4	7.71%	3.52%	2.94%
5	7.75%	3.56%	2.52%
6	7.54%	3.35%	2.21%
7	7.63%	3.44%	1.89%
8	6.59%	2.40%	1.68%
9	7.09%	2.90%	1.47%
10	6.55%	2.36%	1.31%
11	6.51%	2.32%	1.16%
12	5.92%	1.73%	1.00%
13	5.84%	1.65%	0.84%
14	6.08%	1.89%	0.68%
15	5.41%	1.22%	0.58%
16	5.23%	1.04%	0.47%
17	4.93%	0.74%	0.37%
18	5.09%	0.90%	0.26%
19	4.29%	0.10%	0.21%
20	4.19%	0.00%	0.16%
21	4.19%	0.00%	0.11%
22 & Up	4.19%	0.00%	0.00%

Findings and Recommendations

Based on the analysis above, it appears that the merit component of the salary increases have been higher than expected during the experience period. However, we recommend no change in the Non-University Members merit increase assumption at this time. We will continue to monitor this trend and address it in the future if this experience persists.



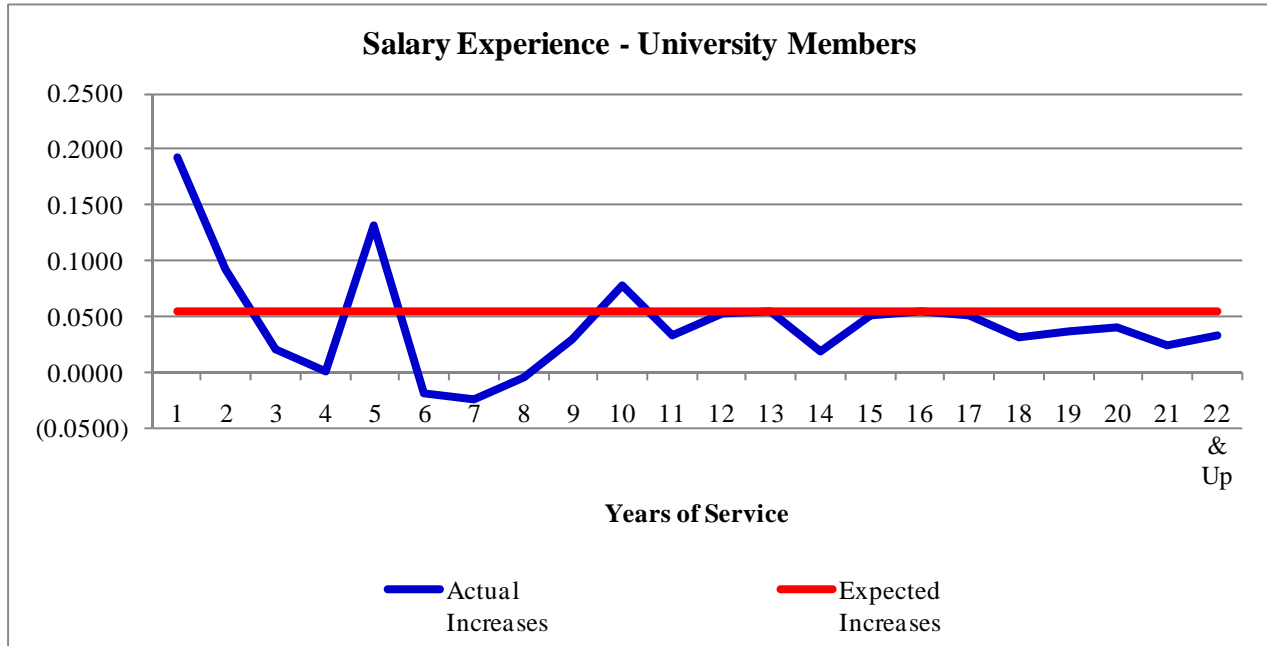
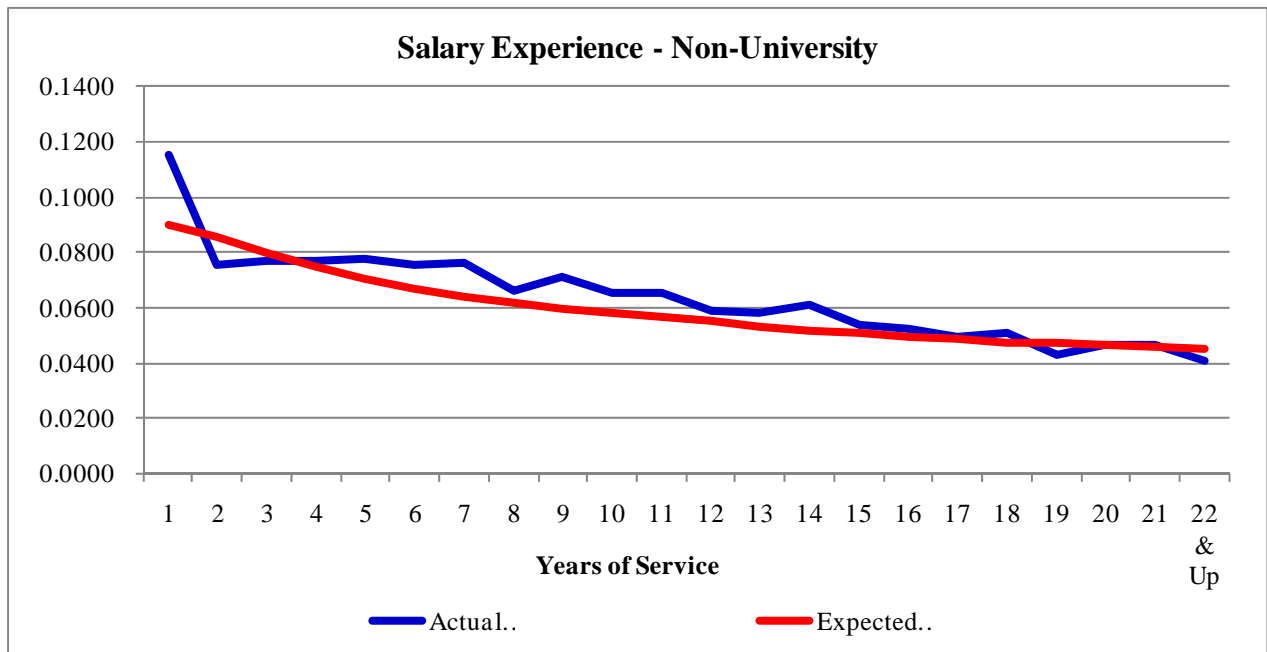
Rates of University Salary Increases

Overall, the rates of salary increase for University Members for the five-year experience study period were somewhat less than expected. However, we recommend no change in the salary increase rates for University Members.



Section III: Demographic Assumptions

The following graphs show a comparison of current and actual rates of salary increase for Non-University members and for University members.





Summary and Cost of Changes

Assumption Changes

As a result of the experience investigation, we are recommending revised rates of withdrawal, disability and service retirement for active members. When these proposed assumption changes are applied to the July 1, 2009 valuation, the results will change. The change in results represents the financial impact of adopting the proposed assumptions.

Method Changes

In addition to assumption changes we also recommend two changes in the methodology in which the normal rate is determined. They are:

- **Calculation of the Normal Rate** - Under the Entry Age Normal Cost Method the Actuarial Present Value of the Projected Benefits of each active member included in the Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and the assumed exit age. The portion of this Actuarial Present Value allocated to the valuation year is called the Normal Cost. The calculation of the Normal Cost is based on each individual's expected salaries for the valuation year. The normal rate is traditionally the normal cost divided by the expected total salaries for the valuation year. Under the current method, the normal rate is developed by dividing the normal cost for the valuation year by the reported payroll of continuing active members for the prior year. For calculation of the normal rate, we recommend dividing the normal cost by the projected total salaries for the same period for which the normal cost is developed by increasing individual salaries with the assumed rates of salary increase. The impact of this change will lower the normal rate leaving a larger percentage of the total contribution rate available to amortize unfunded liabilities.
- **Present Value of Future ORP Contributions**- University supplemental contributions to the System are made as a percent of pay for members of the Optional Retirement Plan (ORP) until June 30, 2033. Currently, the present value of these contributions is used to offset the System's Unfunded Accrued Liability (UAL). We propose instead, that the Systems' UAL is not offset by the present value of these additional contributions. Instead, the ORP contributions will be used as additional contributions toward the System's amortization of the unfunded liability.



The table below summarizes the incremental financial impact of adopting (i) assumption changes, (ii) combination of adopting the assumption changes and the change in the calculation of the normal rate and (iii) the assumption changes, calculation of the normal rate and removing the adjustment to the unfunded liability by the present value of future ORP supplemental contributions.

	Valuation 7/1/2009	Assumption Changes	Normal Rate & Assumption Changes	All Changes
Employer Contribution Rate:				
Normal Rate	3.54%	3.17%	2.59%	2.59%
UAAL	<u>6.42%</u>	<u>6.79%</u>	<u>7.37%</u>	<u>7.37%</u>
Total Statutory Employer Rate	9.96%	9.96%	9.96%	9.96%
Actuarial accrued liability*	\$4,173,777	\$4,170,329	\$4,170,329	\$4,328,608
Actuarial value of assets*	\$2,762,194	\$2,762,194	\$2,762,194	\$2,762,194
UAAL*	\$1,411,583	\$1,408,135	\$1,408,135	\$1,566,414
Amortization Period	Infinite	87	54	54
Required increase in statutory rate to maintain 30-year funding period	4.11%	3.71%	2.54%	2.54%

* In thousands

**Historical June CPI (U) Index**

Year	CPI (U)	Year	CPI (U)
1959	29.10	1985	107.60
1960	29.60	1986	109.50
1961	29.80	1987	113.50
1962	30.20	1988	118.00
1963	30.60	1989	124.10
1964	31.00	1990	129.90
1965	31.60	1991	136.00
1966	32.40	1992	140.20
1967	33.30	1993	144.40
1968	34.70	1994	148.00
1969	36.60	1995	152.50
1970	38.80	1996	156.70
1971	40.60	1997	160.30
1972	41.70	1998	163.00
1973	44.20	1999	166.20
1974	49.00	2000	172.40
1975	53.60	2001	178.00
1976	56.80	2002	179.90
1977	60.70	2003	183.70
1978	65.20	2004	189.70
1979	72.30	2005	194.50
1980	82.70	2006	202.90
1981	90.60	2007	208.35
1982	97.00	2008	218.82
1983	99.50	2009	215.69
1984	103.70		



Capital Market Assumptions and Asset Allocation

Rates of Return and Standard Deviation by Asset Class

Asset Class	Return	Standard Deviation
Broad US Equity	8.15%	17.50%
Broad International Equity	8.60%	19.10%
US Core Fixed Income	5.00%	5.00%
Real Estate - Core	7.00%	10.50%
Real Estate - Value Added	9.75%	18.50%
Real Estate - Opportunistic	11.75%	27.75%
Private Equity	12.25%	29.75%
Cash Equivalents	3.00%	2.50%

Asset Class Correlation Coefficients

	US Equity	Int'l Equity	US Core Fixed Income	Real Estate Core	Real Estate Value Added	Real Estate Opportunistic	Private Equity	Cash Equivalents
Broad US Equity	1.00	0.74	0.24	0.11	0.37	0.63	0.67	0.04
Broad International Equity	0.74	1.00	0.14	0.10	0.33	0.55	0.60	-0.07
US Core Fixed Income	0.24	0.14	1.00	-0.13	-0.20	-0.27	-0.11	0.26
Real Estate - Core	0.11	0.10	-0.13	1.00	0.75	0.51	0.24	0.48
Real Estate - Value Added	0.37	0.33	-0.20	0.75	1.00	0.75	0.49	0.32
Real Estate - Opportunistic	0.63	0.55	-0.27	0.51	0.75	1.00	0.69	0.16
Private Equity	0.67	0.60	-0.11	0.24	0.49	0.69	1.00	0.13
Cash Equivalents	0.04	-0.07	0.26	0.48	0.32	0.16	0.13	1.00

**Asset Allocation Targets**

Asset Class	Allocation Percentage
Broad US Equity	37.20%
Broad International Equity	18.00%
US Core Fixed Income	27.30%
Real Estate - Core	2.70%
Real Estate - Value Added	1.35%
Real Estate - Opportunistic	1.35%
Private Equity	11.10%
Cash Equivalents	1.00%



Social Security Administration Wage Index

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1957	\$3,641.72		1983	\$15,239.24	4.87%
1958	3,673.80	0.88%	1984	16,135.07	5.88
1959	3,855.80	4.95	1985	16,822.51	4.26
1960	4,007.12	3.92	1986	17,321.82	2.97
1961	4,086.76	1.99	1987	18,426.51	6.38
1962	4,291.40	5.01	1988	19,334.04	4.93
1963	4,396.64	2.45	1989	20,099.55	3.96
1964	4,576.32	4.09	1990	21,027.98	4.62
1965	4,658.72	1.80	1991	21,811.60	3.73
1966	4,938.36	6.00	1992	22,935.42	5.15
1967	5,213.44	5.57	1993	23,132.67	0.86
1968	5,571.76	6.87	1994	23,753.53	2.68
1969	5,893.76	5.78	1995	24,705.66	4.01
1970	6,186.24	4.96	1996	25,913.90	4.89
1971	6,497.08	5.02	1997	27,426.00	5.84
1972	7,133.80	9.80	1998	28,861.44	5.23
1973	7,580.16	6.26	1999	30,469.84	5.57
1974	8,030.76	5.94	2000	32,154.82	5.53
1975	8,630.92	7.47	2001	32,921.92	2.39
1976	9,226.48	6.90	2002	33,252.09	1.00
1977	9,779.44	5.99	2003	34,064.95	2.44
1978	10,556.03	7.94	2004	35,648.55	4.65
1979	11,479.46	8.75	2005	36,952.94	3.66
1980	12,513.46	9.01	2006	38,651.41	4.60
1981	13,773.10	10.07	2007	40,405.48	4.54
1982	14,531.34	5.51	2008	41,334.97	2.30



Recommended Rates of Withdrawal and Salary Increases

Years of Service	Rates of Withdrawal	Rates of Salary Increase	
		University	Non-University
Less than 1	36.50%	5.50%	9.01%
1	20.50%	5.50%	8.59%
2	14.60%	5.50%	7.96%
3	10.50%	5.50%	7.44%
4	8.50%	5.50%	7.02%
5	7.00%	5.50%	6.71%
6	6.40%	5.50%	6.39%
7	5.80%	5.50%	6.18%
8	5.40%	5.50%	5.97%
9	5.00%	5.50%	5.81%
10	4.30%	5.50%	5.66%
11	3.90%	5.50%	5.50%
12	3.50%	5.50%	5.34%
13	3.20%	5.50%	5.18%
14	2.90%	5.50%	5.08%
15	2.60%	5.50%	4.97%
16	2.30%	5.50%	4.87%
17	2.00%	5.50%	4.76%
18	1.90%	5.50%	4.71%
19	1.80%	5.50%	4.66%
20	1.70%	5.50%	4.61%
21	1.60%	5.50%	4.50%
22	1.50%	5.50%	4.50%
23	1.50%	5.50%	4.50%
24	1.50%	5.50%	4.50%



Recommended Rates of Retirement

Years of Service	Non-University Members			University Members		
	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter
45		8.00%	5.50%		17.00%	8.00%
46		8.00%	5.50%		17.00%	8.00%
47		8.00%	5.50%		17.00%	8.00%
48		8.00%	5.50%		17.00%	8.00%
49		8.00%	5.50%		17.00%	8.00%
50	5.00%	8.00%	5.50%	7.00%	17.00%	8.00%
51	5.00%	8.00%	6.30%	7.00%	17.00%	8.00%
52	5.00%	8.00%	8.00%	7.00%	17.00%	8.00%
53	5.00%	9.00%	7.30%	7.00%	17.00%	8.00%
54	5.00%	9.00%	8.20%	7.00%	17.00%	8.00%
55	7.00%	9.00%	9.80%	7.00%	15.00%	8.00%
56	7.00%	12.00%	11.30%	7.00%	15.00%	8.00%
57	7.00%	11.80%	12.50%	7.00%	15.00%	8.00%
58	7.00%	14.80%	13.10%	7.00%	15.00%	8.00%
59	7.00%	17.40%	14.80%	7.00%	15.00%	8.00%
60		14.60%	17.00%		15.00%	8.50%
61		21.30%	25.00%		14.00%	14.50%
62		23.80%	25.00%		20.00%	19.00%
63		11.40%	25.00%		14.00%	14.50%
64		19.00%	25.00%		20.00%	18.00%
65		40.00%	35.00%		28.00%	26.00%
66		8.00%	20.00%		21.00%	21.00%
67		30.00%	20.00%		21.00%	24.50%
68		6.00%	20.00%		21.00%	19.50%
69		6.00%	20.00%		21.00%	30.00%
70		100.00%	100.00%		100.00%	100.00%

**Recommended Rates of Disability**

Age	Rate of Disability	Age	Rate of Disability
15	0.005%	43	0.039%
16	0.005%	44	0.042%
17	0.005%	45	0.044%
18	0.005%	46	0.047%
19	0.005%	47	0.050%
20	0.005%	48	0.054%
21	0.005%	49	0.058%
22	0.005%	50	0.063%
23	0.005%	51	0.067%
24	0.005%	52	0.071%
25	0.005%	53	0.075%
26	0.005%	54	0.080%
27	0.005%	55	0.084%
28	0.005%	56	0.089%
29	0.005%	57	0.093%
30	0.005%	58	0.095%
31	0.005%	59	0.098%
32	0.005%	60	0.100%
33	0.005%	61	0.103%
34	0.005%	62	0.105%
35	0.008%	63	0.109%
36	0.012%	64	0.113%
37	0.015%	65	0.117%
38	0.019%	66	0.117%
39	0.023%	67	0.117%
40	0.028%	68	0.117%
41	0.032%	69	0.117%
42	0.036%	70	0.117%