GRS Gabriel Roeder Smith & Company
Consultants & Actuaries

NEW HAMPSHIRE RETIREMENT SYSTEM

5-YEAR EXPERIENCE STUDY
JULY 1, 2010 THROUGH JUNE 30, 2015

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March 11, 2016

Board of Trustees
New Hampshire Retirement System
54 Regional Drive
Concord, New Hampshire 03301

Re: New Hampshire Retirement System Experience Study

Dear Board Members:

Presented in this report are the results of a 5-year actuarial experience study of the New Hampshire Retirement System (NHRS). The Study was conducted for the purpose of reviewing and, where necessary, updating the assumptions used in the actuarial valuation model. This report provides the rationale for the economic and demographic assumptions used in the valuation.

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

The report was based upon information furnished by New Hampshire Retirement System (NHRS) staff, concerning active members, terminated members, retirees and beneficiaries for the valuations as of June 30, 2010, 2011, 2012, 2013, 2014 and 2015. We checked for internal and year-to-year consistency, but did not otherwise audit the data. We are not responsible for the accuracy or completeness of the data provided by NHRS.

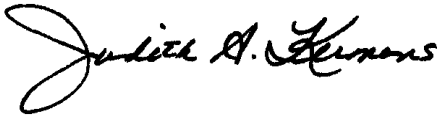
The investigation covered the 5-year period from July 1, 2010 to June 30, 2015, and was carried out using generally accepted actuarial principles and techniques.

To the best of our knowledge, the report is complete and accurate and was conducted in accordance with the standards of practice promulgated by the Actuarial Standards Board. We believe that the recommended actuarial assumptions contained in this report are reasonable under the Actuarial Standards of Practice and in compliance with the NHRS Statutes.

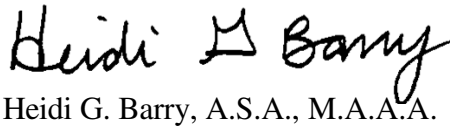
The actuaries submitting this report are independent of the plan sponsor, are Members of the American Academy of Actuaries (M.A.A.A.), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,

David T. Kausch, F.S.A., E.A., M.A.A.A.



Judith A. Kermans, E.A., F.C.A., M.A.A.A.



Heidi G. Barry, A.S.A., M.A.A.A.

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SECTION A

OVERVIEW AND SUMMARY OF RESULTS

INTRODUCTION

The statutory funding requirements for the New Hampshire Retirement System (NHRS) can be found in RSA 100-A:16 for Pension and RSA 100-A:53, 100-A:53-b, 100-A:53-c, and 100-A:53-d for medical subsidy benefits. The Actuarial Funding Policy adopted by the NHRS states the following Funding Objectives:

> "The main financial objective of the New Hampshire Retirement System is to receive employer and member contributions to fund the long-term costs of benefits provided by statute to plan members and beneficiaries. From the perspective of the members and beneficiaries, a funding policy based on actuarially determined contributions is one which will pay all benefits provided by statute when due. From the perspective of the contributing plan sponsors and taxpayers, the actuarially determined contributions have the additional objectives of keeping contribution rates relatively stable as a percentage of active member payroll and equitably allocating the costs over the active members' period of active service. The Statute goes on to say that this shall be achieved by use of the entry age normal actuarial cost method and amortizing the unfunded actuarial accrued liability as a level percent of payroll. For pension funding, the payment of benefits is supported in part by income earned on investment assets. This funding policy meets those criteria. It is stipulated by state law and implemented through the application of Board adopted governance policies."

Under RSA 100-A:14 IX of the NHRS statute, the actuarial assumptions are adopted by the Retirement Board after consultation with the actuary. The Board adopts actuarial assumptions and an actuarial cost method to best attempt to meet the funding objective. The entry age normal actuarial cost method is designed to determine contributions which are expected to remain level as a percent of payroll. The economic assumptions used for budgeting contributions under this method are based on reasonable estimates of future experience.

The actuarial principle in force is that over time contributions and investment income must be sufficient to pay benefits throughout retirement. Actuarial valuations make a number of assumptions to estimate investment accumulation and benefit payouts in order to determine the required level percent of payroll objective. From year to year, actual experience on any assumption will not coincide exactly with assumed experience. NHRS copes with these continually changing differences by having annual actuarial valuations and periodic experience studies to review all assumptions. Under RSA 100-A:14, IX, since 1970 the System has undergone an experience study at least every five years.

INTRODUCTION

The purpose of the experience study is to systematically review the actuarial assumptions used in the annual valuation. The actuarial valuation is a mathematical model designed to meet the funding objectives.

The mathematical model is necessary in a defined benefit plan because there are "knowns" and "unknowns" which must be evaluated before the level contribution rate can be determined. The knowns are:

- Who participates in the plan
- The demographic characteristics of each active and inactive member (i.e., age, sex, salary, service, etc.)
- The demographic characteristics of each retired member and beneficiary (i.e., age, sex, benefit, form of payment, etc.)
- The conditions and characteristics of the plan (i.e., type and amount of benefits payable, eligibility for benefits, length of time benefit is payable, etc.)
- The current purchasing power of a dollar
- The value of the pool of assets
- How the pool of assets is invested

The unknowns are:

- Who will retire and at what age, service and final average salary
- Who will quit before becoming vested
- Who will quit and be entitled to a future vested benefit
- Who will become disabled
- How long will members and their beneficiaries live (before and after retirement)

- What is the future purchasing power of a dollar (future inflation)

- How much income will the pool of assets generate

The valuation model takes the "knowns," incorporates assumptions about the "unknowns" and develops the estimated cost of the plan for the current members. This cost is then financed using an actuarial cost method to determine the level contribution requirement.

Because future experience cannot be predicted with certainty, the costs can only be estimated. The model is revisited at least biennially to re-determine the cost estimates based upon experience which has already occurred and assumptions about future experience.

When Fund experience deviates from expected experience, a gain or loss is generated. This gain or loss is then amortized over a period of future years and applied as an offset or addition to the normal cost contribution. Over time it is expected that the gains and losses will offset each other. If they do not, then one or more of the actuarial assumptions should be modified to reflect actual emerging experience.

Each year, as of June 30, the liabilities of the New Hampshire Retirement System are valued. In order to perform the valuation, assumptions must be made regarding the future experience of the System with regard to the following risk areas:

- Rates of withdrawal of active participants
- Rates of disability among active participants
- Patterns of salary increases to active participants
- Rates of retirement among active participants
- Rates of mortality among active participants, retirees, and beneficiaries
- Long-term rates of investment return to be generated by the assets of the System
- Other actuarial assumptions as necessary

INTRODUCTION

Assumptions should be carefully chosen and continually monitored. A poor initial choice of assumptions or continued use of outdated assumptions can lead to:

- Understated costs resulting in either an inability to pay benefits when due, or sharp increases in required contributions at some point in the future;

- Overstated costs resulting in an unnecessarily large burden on the current generation of participants, employers and taxpayers.

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

No single 5-year experience period should be given full credibility in the setting of actuarial valuation assumptions. When we see significant differences between what is expected from our assumptions and actual experience, our strategy in recommending a change in assumptions is usually to select rates that would produce results somewhere between the actual and expected experience. In this way, with each experience study the actuarial assumptions become better and better representations of actual experience. Consequently, temporary conditions that might influence a particular experience study period will not unduly influence the choice of long-term assumptions.

We are recommending certain changes in assumptions. The various assumption changes and their impact on the required contribution are described on the following pages. Actuarial assumptions were last revised with the June 30, 2011 regular actuarial valuation.

The actuarial valuation funding method is the entry age normal cost actuarial funding method. Each year, actuarial gains and losses are measured in the aggregate. The assumptions were last updated effective July 1, 2011 so the first relevant gain/(loss) measurement is as of June 30, 2012. The table below shows the estimated gains and losses for the trust (pension and medical subsidy) during the period of the study:

Estimate of Gain/(Loss) on Fund
($Millions)

June 30	Total	Investment	Liability	Liability Gain/(Loss) as a % of Beginning of Year Accrued Liability
2012	$ (114.9)	$ (259.8)	$ 144.9	(1.1)%
2013	94.3	(36.2)	130.5	0.8 %
2014	394.1	273.4	120.7	3.4 %
2015	204.4	197.6	6.8	1.7 %
Total	$ 577.9	$ 175.0	$ 402.9	

This aggregate analysis sets the starting point for the experience study. Note that gain and loss analysis can be further broken down by member classification and by major assumption. A more detailed gain and loss analysis was not in the scope of this study.

The System has experienced cumulative gains during the experience period. The cumulative investment gains are certainly good news, but by themselves they are insufficient for assessing the reasonableness of the assumed rate of return. Similarly, the liability gains are good news for the System but a large portion of these gains is likely attributable to lower payroll growth than expected, which is not expected to continue for the long run. In total, the assumption changes we are recommending will increase the liability realized between the June 30, 2013 and June 30, 2015 rate setting valuations.

Note: In the aggregate, the proposed demographic assumption changes increase the actuarial accrued liability. The computed contribution rates for the 2018-19 biennium decrease slightly from the 2016-17 biennium since they reflect the cumulative gains realized between the June 30, 2013 and June 30, 2015 rate setting valuations.

SUMMARY OF ECONOMIC ASSUMPTIONS

Background: The selection of economic assumptions for pension valuations is governed by Actuarial Standard of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations. Economic assumptions may be based on estimates of future experience or observations of estimates inherent in market data. Appropriate recent and long-term historical economic data may also be useful, but without giving undue weight to recent experience. For purposes of the valuation assumptions, our recommendations are based on estimates of future experience. Additional discussion on all economic assumptions and proposed rates are detailed in Section B.

Rate of Investment Return, net of investment expenses, on System assets was studied based on the current investment policy and future capital market expectations from eight nationally recognized investment consultants. Investment return expectations were analyzed for the System as a whole. Based on this analysis, we recommend lowering the assumed rate of investment return.

Rate of Wage Inflation on member pay in general corresponds to increases in average member pay driven by aggregate market forces. For a stable workforce with a constant active membership headcount, the rate of wage inflation is a reasonable estimate of total payroll growth. Generally, the rate of wage inflation is a long-term assumption. Short-term expectations, if justifiably different from long-term expectations, may be reflected in a select and ultimate wage inflation assumption. Based on this analysis, we recommend lowering the assumed rate of wage inflation.

Rate of Price Inflation on a basket of goods purchased was studied in the aggregate. While not directly used in the calculation of plan liabilities, the rate of price inflation is the first building block for evaluating the rate of investment return. Based on this analysis, we recommend lowering the assumed rate of price inflation.

Rates of Merit and Longevity Salary Increases on member pay in general correspond to increases experienced by members as they progress through their careers. As with the prior experience study, we studied rates of merit and longevity pay increases separately by member classification. We recommend a decrease in overall rates of merit and longevity pay increases for Employees and modest increases in overall rates for the other member classifications.

End of Career Pay Increases may occur for those members with a definition of compensation which includes information generally unreported during regular annual valuations such as severance pay, end-of-career longevity payments, and pay for unused sick or vacation time. The definition of compensation changed for members who had not attained vested status prior to January 1, 2012 and for those hired on and after July 1, 2011. We studied the impact of end of career pay increases for recent retirees subject to the prior definition of compensation. We recommend minor adjustments to the current assumption.

Assumed Population Size for active headcount by membership classification is generally assumed to be level for future years provided that the plan remains open to new hires and the State and Political Subdivisions provide the same level of services to future constituencies. For purposes of this study, we consider this with the economic assumptions because of its relationship to the total payroll growth assumption which is a critical component of the level percent of payroll amortization of the unfunded actuarial accrued pension liability and the solvency medical subsidy contributions. Based on additional census data provided by System staff, we studied active member population expectations by membership classification. For all membership classifications except Teachers, we recommend maintaining the current assumption of a level active headcount based on the expected growth of the general population in the State of New Hampshire. For Teachers, we recommend considering assuming a decrease in active member population size based on the expected decrease of the school-age population in the State of New Hampshire.

Administrative Expenses paid from plan expenses other than for investment purposes are funded through employer contributions in the normal cost. We analyzed administrative expenses for the System as a whole during the experience study period as a percentage of member payroll. We recommend maintaining the 0.35% administrative expense assumption as a percent of payroll.

SUMMARY OF DEMOGRAPHIC ASSUMPTIONS

Background: The selection of demographic assumptions for pension valuations is governed by ASOP No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations. In general, recent patterns of non-economic activity (rates of withdrawal, disability, death, retirement, and mortality) tend to be reliable predictors of future experience. However, past activity will also contain anomalies (or special circumstances) that cannot be assumed to replicate in the future. The actuary attempts to identify and remove these anomalies before creating recommended rates. The goal is to identify long-term trends in activity and move the rates toward those trends as a result of the periodic investigations. In establishing our recommendations, we have considered the results of the prior study, as well as the observed trends from this study.

We give additional consideration to economic conditions during the experience study period. The Great Recession is considered to have had a delayed effect in the public sector. This may materialize in the experience study as lower pay, lower turnover, and delayed retirement. Some of these short term factors are not expected to persist in the long run, therefore we may not adjust assumptions all the way to the experience.

We have compared the demographic experience in this study with that of the prior study. In general, if experience continues to move in the same direction as the prior study, we will adjust assumptions closer to the actual experience. If experience moves in the opposite direction, we generally do not move all the way to recent experience in order to reduce flip-flopping from one study to the next.

For mortality, we apply a more formal credibility procedure in accordance with ASOP No. 25, Credibility Procedures. NHRS has a large enough aggregate population to be considered credible for determining an appropriate set of base tables, however the separate member classifications are not large enough. We use a partial credibility procedure based on the limited fluctuation method to determine appropriate adjustments to the base table to be applied to each gender within each member classification.

The Society of Actuaries (SOA) published new tables for U.S. pension plans called the RP-2014 tables in October 2014. The SOA also published the MP-2015 projection scales to reflect mortality improvements after 2015. We recommend using these tables with an adjustment based on our partial credibility analysis discussed above and in more detail in Section G of this report. Please see Section G for more information.

Rates of Withdrawal from service without entitlement to an immediate benefit (other than a separation benefit) are segregated into two categories:

- Service based (select), covering an initial employment period
- Age based (ultimate), beginning after the initial employment period

Male and female rates were looked at independently for all groups. Male and female experience was ultimately combined for Fire. In addition, the length of the service-based period was reviewed. Currently the service-based period is 5 years for Groups I and II. We do not recommend changing the service-based period. We recommend decreases in the overall rates of termination.

Development of the rates is shown in Sections C through F. The proposed rates are detailed in their entirety in Section J.

Rates of Disability from active service with entitlement to a disability benefit were studied by member classification. For Group I, the study was further broken down between males and females. Disability rates were studied for accidental and ordinary combined. We recommend a decrease in the overall rates of disability for Fire and an increase in the overall rates of disability for the other member classifications.

Development of the rates is shown in Sections C through F. The proposed rates are detailed in their entirety in Section J.

Rates of Retirement from service with entitlement to an immediate benefit are segregated into three categories:

- Rule-based for those Group I members retiring under the rule of 70 with 20 years of service condition for early retirement
- Age-based for those Group I members retiring based on the age 50 with 10 years of service condition for early retirement
- Age-based for those members retiring under normal retirement

Male and female experience was studied separately for Group I and jointly for Group II. In general, proposed rates of retirement were lowered from current assumptions.

Miscellaneous Observations: Data suggests that terminations and disabilities are occurring for Group I members eligible for early retirement and Group II members eligible for service retirement. The current assumption is to assume members eligible for retirement will retire only and not decrement under termination or disability. This experience is consistent with the prior experience study and we therefore recommend that Group I members be exposed to termination and disability decrements during early retirement and Group II members be exposed to termination and disability during service retirement.

Forfeitures: Experience continues to indicate that some vested members are refunding and forfeiting their pensions. The current assumption is that a certain percent of vested members who quit before retirement will elect to refund and forfeit their pension. The assumption grades from 25% at first vesting to 0% at first retirement eligibility. No change is recommended.

Marriage Assumption: Based on the members who retired during the study period, we recommend lowering the marriage assumption to 60% for Group I members (from 70%) and increasing the marriage assumption to 60% for Group II members (from 50%). This assumption relates to the benefits payable resulting from death-in-service for Groups I and Group II and the automatic death after retirement spousal benefit for Group II.

Data: The data submitted by NHRS Staff has undergone many changes during the experience study period. In particular, NHRS Staff underwent an audit of the NHRS medical subsidy data submitted for valuation purposes and made several significant changes. GRS did not audit the data. Actual exposures, decrements, and expected figures shown in this experience study report may differ from the totals shown in prior valuation reports.

We continue to work with System Staff to identify data needs and improve data quality.

EXPECTED IMPACT OF PROPOSED CHANGES ON EMPLOYER CONTRIBUTION RATE

Group I

Employees		
	Likely Direction of Change on Employer Rate Due to Proposed	
Assumption	NC	UAAL
Current	1.95%	7.95%
Rates of Age-Based Withdrawal	Moderate Incr.	Moderate Incr.
Rates of Service-Based Withdrawal	Marginal Incr.	Marginal Incr.
Rates of Disability	Marginal Incr.	Marginal Incr.
Rates of Age-Based Retirement	Moderate Decr.	Moderate Decr.
Rates of Age-Based Early Retirement	Moderate Decr.	Moderate Decr.
Rates of Rule-Based Early Retirement	Marginal Decr.	Marginal Decr.
Pre-Retirement Mortality	Marginal Incr.	Marginal Incr.
Post-Retirement Healthy Mortality	Moderate Incr.	Material Incr.
Post-Retirement Disabled Mortality	Marginal Incr.	Marginal Incr.
Merit and Longevity Salary Increases	Moderate Decr.	Moderate Decr.
Forfeitures	No Change	No Change
End of Career Payments	Moderate Decr.	Moderate Decr.
Marriage Assumption	Marginal Decr.	Marginal Decr.
Administrative Expenses	No Change	No Change
Aggregate (at 7.75% / 3.75%)	Marginal Decr.	Marginal Decr.
Proposed	1.82%	7.81%

Teachers		
	Likely Direction of Change on Employer Rate Due to Proposed	
Assumption	NC	UAAL
Current	1.49%	10.30%
Rates of Age-Based Withdrawal	Moderate Incr.	Moderate Incr.
Rates of Service-Based Withdrawal	Marginal Incr.	Marginal Incr.
Rates of Disability	Marginal Incr.	Marginal Incr.
Rates of Age-Based Retirement	Moderate Decr.	Moderate Decr.
Rates of Age-Based Early Retirement	Marginal Decr.	Marginal Decr.
Rates of Rule-Based Early Retirement	Marginal Decr.	Marginal Decr.
Pre-Retirement Mortality	Marginal Incr.	Marginal Incr.
Post-Retirement Healthy Mortality	Moderate Incr.	Material Incr.
Post-Retirement Disabled Mortality	Marginal Incr.	Marginal Incr.
Merit and Longevity Salary Increases	Moderate Incr.	Moderate Incr.
Forfeitures	No Change	No Change
End of Career Payments	Moderate Decr.	Moderate Decr.
Marriage Assumption	Marginal Decr.	Marginal Decr.
Administrative Expenses	No Change	No Change
Aggregate (at 7.75% / 3.75%)	Marginal Incr.	Material Incr.
Proposed	1.66%	12.03%

Order of Magnitude
Marginal < Moderate < Material

Changes described are relative to what the 2018-2019 employer rates would have been without any assumption changes. Rate comparisons shown on pages A-13 through A-17 are made between the previously certified rates from the 2016-2017 biennium which were set based on the June 30, 2013 actuarial valuation. The system recognized asset gains in both 2014 and 2015 which would have reduced contribution rates prior to the proposed assumption changes.

EXPECTED IMPACT OF PROPOSED CHANGES ON EMPLOYER CONTRIBUTION RATE

Group II

Police		
	Likely Direction of Change on Employer Rate Due to Proposed	
Assumption	NC	UAAL
Current	4.52%	14.79%
Rates of Age-Based Withdrawal	Moderate Incr.	Moderate Incr.
Rates of Service-Based Withdrawal	Marginal Incr.	Marginal Incr.
Rates of Disability	Marginal Incr.	Marginal Incr.
Rates of Age-Based Retirement	Moderate Decr.	Moderate Decr.
Pre-Retirement Mortality	Marginal Incr.	Marginal Incr.
Post-Retirement Healthy Mortality	Moderate Incr.	Material Incr.
Post-Retirement Disabled Mortality	Marginal Incr.	Marginal Incr.
Merit and Longevity Salary Increases	Material Incr.	Material Incr.
Forfeitures	No Change	No Change
End of Career Payments	Moderate Decr.	Moderate Decr.
Marriage Assumption	Marginal Incr.	Marginal Incr.
Administrative Expenses	No Change	No Change
Aggregate (at 7.75% / 3.75%)	Marginal Incr.	Material Incr.
Proposed	4.69%	16.50%

Fire		
	Likely Direction of Change on Employer Rate Due to Proposed	
Assumption	NC	UAAL
Current	6.10%	15.89%
Rates of Age-Based Withdrawal	Moderate Incr.	Moderate Incr.
Rates of Service-Based Withdrawal	Marginal Incr.	Marginal Incr.
Rates of Disability	Marginal Decr.	Marginal Decr.
Rates of Age-Based Retirement	Moderate Decr.	Moderate Decr.
Pre-Retirement Mortality	Marginal Incr.	Marginal Incr.
Post-Retirement Healthy Mortality	Moderate Incr.	Material Incr.
Post-Retirement Disabled Mortality	Marginal Incr.	Marginal Incr.
Merit and Longevity Salary Increases	Moderate Incr.	Moderate Incr.
Forfeitures	No Change	No Change
End of Career Payments	Marginal Decr.	Marginal Decr.
Marriage Assumption	Marginal Incr.	Marginal Incr.
Administrative Expenses	No Change	No Change
Aggregate (at 7.75% / 3.75%)	Marginal Decr.	Material Incr.
Proposed	5.92%	17.33%

Order of Magnitude
Marginal < Moderate < Material

Changes described are relative to what the 2018-2019 employer rates would have been without any assumption changes. Rate comparisons shown on pages A-13 through A-17 are made between the previously certified rates from the 2016-2017 biennium which were set based on the June 30, 2013 actuarial valuation. The system recognized asset gains in both 2014 and 2015 which would have reduced contribution rates prior to the proposed assumption changes.

NHRS IN TOTAL[@]
($ IN MILLIONS)

Demographic Assumptions Economic Assumptions	*Current (2016-2017 Adopted Rate based on June 30, 2013 valuation)* *Current (7.75%/3.75%)*	Proposed (2018-2019 rates based on the June 30, 2015 valuation) Current (7.75%/3.75%)	Alt 1 (7.5%/3.5%)	Alt 2 (7.25%/3.25%)	Alt 3 (7.0%/3.0%)
Employer Pension Normal Cost	*2.47%*	2.26%	2.48%	2.73%	2.98%
Pension UAAL Payment*	*11.08%*	10.90%	11.71%	12.54%	13.42%
Total Pension Contribution	*13.55%*	13.16%	14.19%	15.27%	16.40%
Employer Medical Subsidy Contribution	*2.21%*	1.54%	1.57%	1.60%	1.62%
Total Employer Contribution	***15.76%***	**14.70%**	**15.76%**	**16.87%**	**18.02%**
Total Estimated Employer Contribution $	***$ 452.8***	**$ 421.5**	**$ 448.5**	**$ 476.7**	**$ 505.5**

		Proposed - June 30, 2015			
Pension	Current June 30, 2015	Current	Alt 1	Alt 2	Alt 3
Accrued Liability	$ 11,488.6	$ 11,762.6	$ 12,027.6	$ 12,303.7	$ 12,591.2
Valuation Assets	$ 7,280.8	$ 7,280.8	$ 7,280.8	$ 7,280.8	$ 7,280.8
UAAL	$ 4,207.8	$ 4,481.8	$ 4,746.8	$ 5,022.9	$ 5,310.4
Funded Percent (Valuation Assets/Accrued Liability)	63.4%	61.9%	60.5%	59.2%	57.8%
Medical Subsidy					
Accrued Liability	$ 675.6	$ 723.3	$ 741.9	$ 761.3	$ 781.7
Valuation Assets	$ 19.5	$ 19.5	$ 19.5	$ 19.5	$ 19.5
UAAL	$ 656.1	$ 703.8	$ 722.4	$ 741.8	$ 762.2
Funded Percent (Valuation Assets/Accrued Liability)	2.9%	2.7%	2.6%	2.6%	2.5%

* *Unfunded Actuarial Accrued Liability, financed over a 22 year period from the contribution effective date -- 7/1/2017.*

@ *Totals may not add due to rounding.*

NOTE: Current contribution rates shown were set based on the June 30, 2013 valuation. Contribution rates based on the June 30, 2015 valuation without any assumption changes would have been 12.24% of payroll for pension, 1.40% for the medical subsidy and 13.64% in total.

2010-2015 EXPERIENCE STUDY
THE EFFECT OF ALTERNATE ASSUMPTIONS ON THE JUNE 30, 2015 ACTUARIAL VALUATION

EMPLOYEES
($ IN MILLIONS)

Demographic Assumptions / Economic Assumptions	*Current (2016-2017 Adopted Rate based on June 30, 2013 valuation)*			Proposed (2018-2019 rates based on the June 30, 2015 valuation)											
	Current (7.75%/3.75%)			Current (7.75%/3.75%)			Alt 1 (7.5%/3.5%)			Alt 2 (7.25%/3.25%)			Alt 3 (7.0%/3.0%)		
	State	*Pol. Sub.*	*Total*	State	Pol. Sub.	Total	State	Pol. Sub.	Total	State	Pol. Sub.	Total	State	Pol. Sub.	Total
Employer Pension Normal Cost	*2.14%*	*2.14%*	*2.14%*	1.82%	1.82%	1.82%	1.98%	1.98%	1.98%	2.16%	2.16%	2.16%	2.33%	2.33%	2.33%
Pension UAAL Payment*	*8.72%*	*8.72%*	*8.72%*	7.81%	7.81%	7.81%	8.35%	8.35%	8.35%	8.92%	8.92%	8.92%	9.51%	9.51%	9.51%
Total Pension Contribution	*10.86%*	*10.86%*	*10.86%*	9.63%	9.63%	9.63%	10.33%	10.33%	10.33%	11.08%	11.08%	11.08%	11.84%	11.84%	11.84%
Employer Medical Subsidy Contribution	*1.64%*	*0.31%*		1.04%	0.28%		1.05%	0.29%		1.07%	0.30%		1.09%	0.31%	
Total Employer Contribution	*12.50%*	*11.17%*		10.67%	9.91%		11.38%	10.62%		12.15%	11.38%		12.93%	12.15%	
Total Estimated Employer Contribution $			***$ 148.4***			**$ 129.2**			**$ 137.2**			**$ 145.6**			**$ 154.1**
Pension															
Accrued Liability			$ 3,864.5			$ 3,846.0			$ 3,925.5			$ 4,008.1			$ 4,094.1
Valuation Assets			$ 2,403.3			$ 2,403.3			$ 2,403.3			$ 2,403.3			$ 2,403.3
UAAL			$ 1,461.2			$ 1,442.7			$ 1,522.2			$ 1,604.8			$ 1,690.8
Funded Percent (Valuation Assets/Accrued Liability)			62.2%			62.5%			61.2%			60.0%			58.7%
Medical Subsidy															
Accrued Liability	$ 73.7	$ 58.6	$ 132.3	$ 75.5	$ 59.2	$ 134.7	$ 76.9	$ 60.4	$ 137.3	$ 78.3	$ 61.6	$ 139.9	$ 79.9	$ 62.9	$ 142.8
Valuation Assets	$ 0.5	$ 22.0	$ 22.5	$ 0.5	$ 22.0	$ 22.5	$ 0.5	$ 22.0	$ 22.5	$ 0.5	$ 22.0	$ 22.5	$ 0.5	$ 22.0	$ 22.5
UAAL	$ 73.2	$ 36.6	$ 109.8	$ 75.0	$ 37.2	$ 112.2	$ 76.4	$ 38.4	$ 114.8	$ 77.8	$ 39.6	$ 117.4	$ 79.4	$ 40.9	$ 120.3
Funded Percent (Valuation Assets/Accrued Liability)	0.7%	37.5%	17.0%	0.7%	37.2%	16.7%	0.7%	36.4%	16.4%	0.6%	35.7%	16.1%	0.6%	35.0%	15.8%

** Unfunded Actuarial Accrued Liability, financed over a 22 year period from the contribution effective date -- 7/1/2017.*

NOTE: Current contribution rates shown were set based on the June 30, 2013 valuation. Contribution rates based on the June 30, 2015 valuation without any assumption changes would have been 9.90% of payroll for pension, 1.01% for the State employees medical subsidy and 0.24% for the Political Subdivision employees medical subsidy, and 10.91% in total for State and 10.14% in total for Political Subdivision employees.

TEACHERS
($ IN MILLIONS)

Demographic Assumptions Economic Assumptions	*Current (2016-2017 Adopted Rate based on June 30, 2013 valuation)* *Current (7.75%/3.75%)*	Proposed (2018-2019 rates based on the June 30, 2015 valuation) Current (7.75%/3.75%)	Alt 1 (7.5%/3.5%)	Alt 2 (7.25%/3.25%)	Alt 3 (7.0%/3.0%)
Employer Pension Normal Cost	*1.69%*	1.66%	1.86%	2.07%	2.30%
Pension UAAL Payment*	*11.03%*	12.03%	12.81%	13.63%	14.48%
Total Pension Contribution	*12.72%*	13.69%	14.67%	15.70%	16.78%
Employer Medical Subsidy Contribution	*2.95%*	1.61%	1.64%	1.66%	1.69%
Total Employer Contribution	***15.67%***	**15.30%**	**16.31%**	**17.36%**	**18.47%**
Total Estimated Employer Contribution $	***$ 183.8***	**$ 178.2**	**$ 188.6**	**$ 199.3**	**$ 210.5**

Pension	Current June 30, 2015	Proposed - June 30, 2015 Current	Alt 1	Alt 2	Alt 3
Accrued Liability	$ 4,439.6	$ 4,641.3	$ 4,745.0	$ 4,852.8	$ 4,964.8
Valuation Assets	$ 2,682.1	$ 2,682.1	$ 2,682.1	$ 2,682.1	$ 2,682.1
UAAL	$ 1,757.5	$ 1,959.2	$ 2,062.9	$ 2,170.7	$ 2,282.7
Funded Percent (Valuation Assets/Accrued Liability)	60.4%	57.8%	56.5%	55.3%	54.0%
Medical Subsidy					
Accrued Liability	$ 229.4	$ 252.4	$ 258.1	$ 264.0	$ 270.2
Valuation Assets	$ (13.3)	$ (13.3)	$ (13.3)	$ (13.3)	$ (13.3)
UAAL	$ 242.7	$ 265.7	$ 271.4	$ 277.3	$ 283.5
Funded Percent (Valuation Assets/Accrued Liability)	(5.8)%	(5.3)%	(5.2)%	(5.0)%	(4.9)%

* *Unfunded Actuarial Accrued Liability, financed over a 22 year period from the contribution effective date -- 7/1/2017.*

NOTE: Current contribution rates shown were set based on the June 30, 2013 valuation. Contribution rates based on the June 30, 2015 valuation without any assumption changes would have been 11.79% of payroll for pension, 1.39% for the medical subsidy and 13.18% in total.

POLICE
($ IN MILLIONS)

Demographic Assumptions Economic Assumptions	*Current (2016-2017 Adopted Rate based on June 30, 2013 valuation)* *Current (7.75%/3.75%)*	Proposed (2018-2019 rates based on the June 30, 2015 valuation) Current (7.75%/3.75%)	Alt 1 (7.5%/3.5%)	Alt 2 (7.25%/3.25%)	Alt 3 (7.0%/3.0%)
Employer Pension Normal Cost	*5.06%*	4.69%	5.16%	5.67%	6.19%
Pension UAAL Payment*	*17.48%*	16.50%	18.04%	19.66%	21.35%
Total Pension Contribution	*22.54%*	21.19%	23.20%	25.33%	27.54%
Employer Medical Subsidy Contribution	*3.84%*	3.97%	4.03%	4.10%	4.16%
Total Employer Contribution	***26.38%***	**25.16%**	**27.23%**	**29.43%**	**31.70%**
Total Estimated Employer Contribution $	***$ 82.4***	**$ 78.5**	**$ 84.4**	**$ 90.6**	**$ 96.8**

Pension	Current June 30, 2015	Proposed - June 30, 2015 Current	Alt 1	Alt 2	Alt 3
Accrued Liability	$ 2,159.6	$ 2,226.2	$ 2,282.5	$ 2,341.4	$ 2,403.0
Valuation Assets	$ 1,477.5	$ 1,477.5	$ 1,477.5	$ 1,477.5	$ 1,477.5
UAAL	$ 682.1	$ 748.7	$ 805.0	$ 863.9	$ 925.5
Funded Percent (Valuation Assets/Accrued Liability)	68.4%	66.4%	64.7%	63.1%	61.5%
Medical Subsidy (Police and Fire Combined)					
Accrued Liability	$ 313.9	$ 336.2	$ 346.5	$ 357.4	$ 368.7
Valuation Assets	$ 10.3	$ 10.3	$ 10.3	$ 10.3	$ 10.3
UAAL	$ 303.6	$ 325.9	$ 336.2	$ 347.1	$ 358.4
Funded Percent (Valuation Assets/Accrued Liability)	3.3%	3.1%	3.0%	2.9%	2.8%

** Unfunded Actuarial Accrued Liability, financed over a 22 year period from the contribution effective date -- 7/1/2017.*

NOTE: Current contribution rates shown were set based on the June 30, 2013 valuation. Contribution rates based on the June 30, 2015 valuation without any assumption changes would have been 19.31% of payroll for pension, 3.72% for the medical subsidy and 23.03% in total.

FIRE
($ IN MILLIONS)

	Current (2016-2017 Adopted Rate based on June 30, 2013 valuation)	Proposed (2018-2019 rates based on the June 30, 2015 valuation)			
Demographic Assumptions	*Current*	**Current**	**Alt 1**	**Alt 2**	**Alt 3**
Economic Assumptions	*(7.75%/3.75%)*	**(7.75%/3.75%)**	**(7.5%/3.5%)**	**(7.25%/3.25%)**	**(7.0%/3.0%)**
Employer Pension Normal Cost	*6.56%*	5.92%	6.47%	7.05%	7.65%
Pension UAAL Payment*	*18.76%*	17.33%	18.99%	20.74%	22.58%
Total Pension Contribution	*25.32%*	23.25%	25.46%	27.79%	30.23%
Employer Medical Subsidy Contribution	*3.84%*	3.97%	4.03%	4.10%	4.16%
Total Employer Contribution	***29.16%***	**27.22%**	**29.49%**	**31.89%**	**34.39%**
Total Estimated Employer Contribution $	***$ 38.2***	**$ 35.6**	**$ 38.3**	**$ 41.2**	**$ 44.1**

		Proposed - June 30, 2015			
Pension	**Current June 30, 2015**	**Current**	**Alt 1**	**Alt 2**	**Alt 3**
Accrued Liability	$ 1,024.9	$ 1,049.1	$ 1,074.6	$ 1,101.4	$ 1,129.3
Valuation Assets	$ 717.9	$ 717.9	$ 717.9	$ 717.9	$ 717.9
UAAL	$ 307.0	$ 331.2	$ 356.7	$ 383.5	$ 411.4
Funded Percent (Valuation Assets/Accrued Liability)	70.0%	68.4%	66.8%	65.2%	63.6%
Medical Subsidy (Police and Fire Combined)					
Accrued Liability	$ 313.9	$ 336.2	$ 346.5	$ 357.4	$ 368.7
Valuation Assets	$ 10.3	$ 10.3	$ 10.3	$ 10.3	$ 10.3
UAAL	$ 303.6	$ 325.9	$ 336.2	$ 347.1	$ 358.4
Funded Percent (Valuation Assets/Accrued Liability)	3.3%	3.1%	3.0%	2.9%	2.8%

** Unfunded Actuarial Accrued Liability, financed over a 22 year period from the contribution effective date -- 7/1/2017.*

NOTE: Current contribution rates shown were set based on the June 30, 2013 valuation. Contribution rates based on the June 30, 2015 valuation without any assumption changes would have been 21.99% of payroll for pension, 3.72% for the medical subsidy and 25.71% in total.

SECTION B

ECONOMIC ASSUMPTIONS

ECONOMIC ASSUMPTIONS

The relevant Actuarial Standard of Practice for economic assumption setting is ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations. Note that ASOP No. 27 has been revised since the last experience study. Perhaps the most significant change is the narrowing of the reasonable range for economic assumptions. All recommendations on economic assumptions in this report are based on the current version of ASOP No. 27.

Under ASOP No. 27, the type of measurement consistent with the statutory requirement is referred to as contribution budgeting. For contribution budgeting with the level percent of payroll objective, the selection of the investment return assumption depends upon the investment portfolio and investment policy. It is important to note that an actuarial investment return assumption based on expected future experience is a single estimate and consequently implicitly assumes that positive and negative risk will "cancel out" over time. In other words, the investment risk is not reflected in advance under this approach. Instead, investment risk is reflected with each annual actuarial valuation as actual investment experience emerges.

An alternative approach is to determine present values using a discount rate assumption which is independent of the investment portfolio and therefore independent of the investment risk. This approach is referred to in ASOP No. 27 as a market-consistent measurement. As described in ASOP No. 27, "…a market-consistent measurement may use a discount rate implicit in the price at which benefits that are expected to be paid in the future would trade in an open market between a knowledgeable seller and a knowledgeable buyer. In some instances, that discount rate may be approximated by market yields for a hypothetical bond portfolio whose cash flows reasonably match the pattern of benefits expected to be paid in the future. The type and quality of bonds in the hypothetical portfolio may depend on the particular type of market-consistent measurement."

In the current low interest rate environment, a market-consistent measurement of the benefit obligation would be based on a discount rate much lower than a reasonable assumed rate of investment return and therefore equate to a much higher liability. Moreover, with interest rates changing every year, the market-consistent discount rates would change every year, introducing volatility in the liability measurement.

In our opinion, a market-consistent measurement is not consistent with the statutory objective of budgeting contributions as a level percent of payroll. That said, a market-consistent measurement may be useful for investment purposes such as a liability driven investment strategy. In addition, the Actuarial Standards of Practice continue to evolve. There may be a point in the not-too-distant future when a calculation of a market-consistent liability is required to be presented in actuarial valuation reports, even if it is not used for determining budgeting contributions.

The following analysis includes reviewing the current NHRS investment policy under various capital market assumptions. The purpose of this analysis is to determine the reasonability of the assumed rate of return for purposes of the valuation. Nothing in this report should be construed as GRS giving investment advice.

Economic Assumptions used in the Annual Actuarial Valuations

The remainder of this Section provides the Board with the technical information needed to make an informed decision on NHRS' economic assumptions. The Background primarily discussed the investment return assumption which is used as the discount rate, but that is not the only economic assumption. The economic assumptions used in the annual actuarial valuations are as follows:

- Investment return,
- Wage inflation,
- Price inflation,
- Merit and longevity pay increases,
- End of career payments,
- Size of the active population, (economic because of its relationship to total payroll growth); and
- Administrative expenses.

Each of these assumptions will be discussed and in some cases the relationships between assumptions will also be discussed. For example, the difference between the investment return assumption and the price inflation assumption is often referred to as the spread or the real return for investment purposes. This information can be useful for investment purposes when assessing certain risk premia. For actuarial purposes the difference between the investment return and wage inflation assumption is also a useful measure of the spread or real return since benefits (and hence liabilities) grow with wages not prices. Whenever possible, we will make the distinction clear, but in general, real return is understood most commonly to relate to price inflation.

A summary of the economic assumptions currently in place for NHRS is shown below.

- Assumed rate of investment return – 7.75% per year, net of investment expenses,
- Assumed rate of wage inflation – 3.75% per year,
- Assumed rate of price inflation – 3.0% per year (implicit),
- Assumed rate of merit and longevity pay increases – rates based on the service of the member,
- End of career payments – loads based on the definition of compensation for each of the four member classifications,
- Assumed size of the active population – expected to remain at the current level, and
- Administrative expenses – 0.35% of payroll added to the Normal Cost.

Many of the economic assumptions are developed using a building block method which depends on the analysis of price inflation. Since the last experience study, there has been a significant shift in the expectations on the part of many forecasters for future performance in the capital markets. In particular, expectations for future price inflation have decreased significantly and this affects expectations for nominal returns of most if not all investment classes.

Reviewing the Investment Return Assumption

The review of the investment return assumption in this report are forward-looking measures of likely investment return outcomes for the asset classes in the current investment policy. For purposes of this analysis, we have analyzed NHRS' investment policy with the capital market assumptions from eight nationally recognized investment consultants. We have compared this analysis with that of NHRS' Investment Staff and Investment Consultant, NEPC. We thank NHRS' Staff and NEPC for their cooperation. We have attempted to make our analysis as independent as possible and used our discussions with NHRS Staff as confirmation of our understanding of NHRS' investment objectives.

The investment consultants who have shared their capital market assumptions with us are (in alphabetical order) BNY Mellon, HEK, JPMorgan, Mercer, NEPC, PCA, RVK, and Willis Towers Watson. It is important to understand that in general no two investment consultants will consider the same asset classes. Moreover, there are differences in investment horizons, price inflation, the treatment of investment expenses, excess manager performance (i.e., alpha), geometric vs. arithmetic averages, and other technical differences.

We have incorporated the assumptions of these eight consultants into our Capital Market Assumption Modeler (CMAM). To the best of our ability, we have adapted the NHRS investment policy to fit with the eight consultants' assumptions adjusting for these known differences in assumptions and methodology. In the following charts, all returns are net of investment expenses and have no assumption for excess manager performance (alpha).

ASOP No. 27 acknowledges that for any given economic assumption, there is a reasonable range of opinions on that assumption. This is evident from the summaries we show from our CMAM.

Presented below is the approximate current asset allocation for NHRS. The approximate asset allocation is based upon the study prepared by NEPC in December 2015 and provided to GRS for use in this Experience Study. The NHRS June 30, 2016 target portfolio was analyzed to estimate future investment returns.

	Target Allocation
Domestic Equity	30%
International Equity	20%
Fixed Income	25%
Real Estate	10%
Alternative Investments	15%
Expected 5-7 Year Return	6.47%
Expected 5-7 Year Standard Deviation	12.45%
Expected 30 Year Return	7.49%
Expected 30 Year Standard Deviation	12.45%

The arithmetic expected return developed from this asset allocation is shown in the table below. The CMAM begins with the nominal expected return from each consultant (column 2), takes out each consultant's price inflation assumption (column 3) to arrive at the real return (column 4). We then incorporate the price inflation assumption of 2.5% (column 5) to get the adjusted nominal return (column 6). Plan administrative expenses are shown as 0.0% (Column 9) since they are contributed by the employers in the normal cost. Note that this return has not yet been adjusted for risk or "volatility drag." We have shown the standard deviation of returns as the investment risk (column 9).

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)		Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)
1	5.73%	2.12%	3.61%	2.50%	6.11%	0.00%	6.11%		10.85%
2	6.74%	2.50%	4.24%	2.50%	6.74%	0.00%	6.74%		12.10%
3	6.78%	2.50%	4.28%	2.50%	6.78%	0.00%	6.78%		11.19%
4	6.89%	2.20%	4.69%	2.50%	7.19%	0.00%	7.19%		11.26%
5	7.13%	2.26%	4.87%	2.50%	7.37%	0.00%	7.37%		10.95%
6	7.17%	2.11%	5.06%	2.50%	7.56%	0.00%	7.56%		11.70%
7	7.80%	2.20%	5.60%	2.50%	8.10%	0.00%	8.10%		12.10%
8	8.21%	2.25%	5.96%	2.50%	8.46%	0.00%	8.46%		12.45%
Average	**7.06%**	**2.27%**	**4.79%**	**2.50%**	**7.29%**	**0.00%**	**7.29%**		**11.58%**

The average expected nominal return from column 8 is 7.29%. Note that the expected rate of return shown in the table above represents the *average* future expected return which is higher than the *median* future expected return. Setting the valuation assumption at this return means that over time the *average* accumulated assets will grow at this rate. However, in any given year it is less than 50% likely that this return will be achieved. From the perspective of the Actuarial Standards of Practice, this is a reasonable assumption.

It is important to keep in mind the investment horizon for actuarial purposes is very long (e.g., 50-70 years). Return expectations over short horizons (e.g., 5-7 years) may be appropriate for monitoring investment performance, but should not be given undue weight for setting the actuarial assumption. We understand that NEPC recently estimated an expected return for NHRS of 6.47% on a 5-7 year horizon and 7.49% on a 30-year horizon.

Recommendation

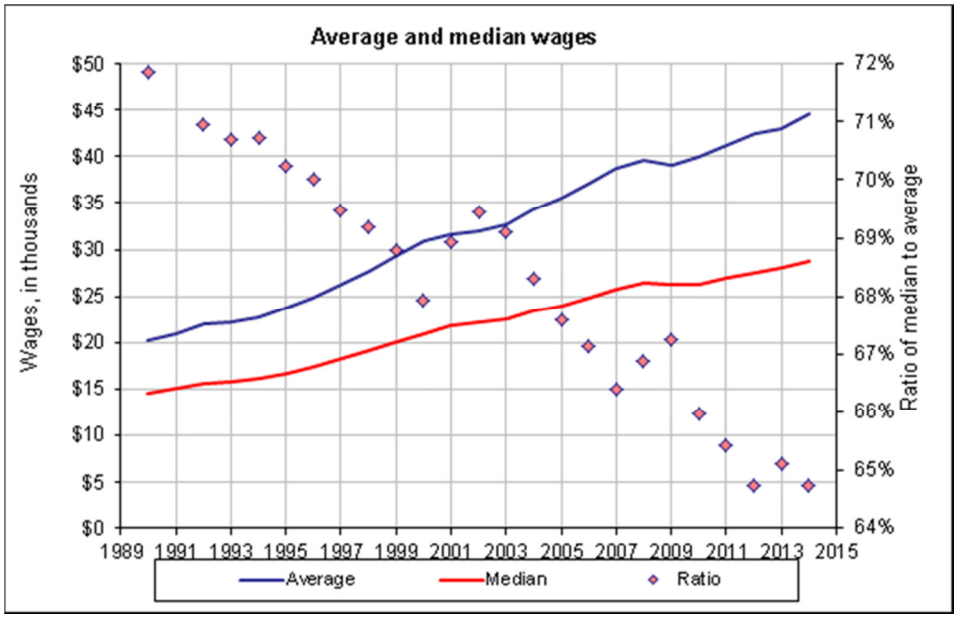
We recommend lowering the assumed rate of return below the current 7.75%. For purposes of this study, we have shown economic scenarios with rate of assumptions of 7.50%, 7.25%, and 7.00%, net of investment expenses. Other assumptions may also be reasonable.

Disclosures

The results in this report are based on Capital Market Assumptions (CMAs) from eight national investment consulting firms. The actual decisions of appropriate assets classes were developed with input from NHRS Investment Staff on current capital market assumptions, NHRS' investment policy, and are net of investment expenses with no alpha expectations. These results will vary from information provided by NEPC and NHRS Investment Staff primarily due to the differing horizons provided (10, 12, 15, 20 and 30 years) and differing distinctions and categorizations amongst investment classes as well as minor variations in the underlying models. The information is not intended to be construed as investment advice.

Reviewing the Wage Inflation Assumption

Macroeconomic theory suggests that in the long run wages are expected to exceed prices in an economy with healthy productivity growth. The current wage inflation assumption is 3.75% per year. The spread of wages over prices is currently 0.75% (3.75% - 3.00%). The average wage inflation experienced from 1990 through 2014 (the last full year available) as measured by the Social Security Administration (SSA) was 3.36% per year, roughly 100 basis points higher than price inflation over the same period. However, the SSA also observes that the median increase in compensation from 1990 through 2014 was 2.91% per year, less than 50 basis points higher than price inflation over the same period. The following chart produced by the SSA illustrates these trends.



In more recent periods, such as the 10-year period from 2004 through 2014, average compensation outpaced inflation by only 40 basis points and median compensation increases were below inflation.

One measure of short term wage inflation is the increase in average pay. The following table shows the increase in the average member pay for each of the four member classifications and in total over the experience study period.

		Increase in Average Pay				
		Employees	**Teachers**	**Police**	**Fire**	**Total**
	2010 - 2011	3.7%	2.3%	2.9%	1.7%	3.0%
	2011 - 2012	(0.2)%	1.7%	1.2%	4.4%	1.1%
	2012 - 2013	(0.0)%	0.7%	0.2%	2.4%	0.4%
	2013 - 2014	1.9%	(0.0)%	1.9%	(0.8)%	1.0%
	2014 - 2015	4.7%	3.1%	3.2%	2.1%	3.7%
Wage Inflation	**2010-2015**	**2.0%**	**1.5%**	**1.9%**	**1.9%**	**1.8%**
Price Inflation		**1.8%**	**1.8%**	**1.8%**	**1.8%**	**1.8%**
Spread of Wages Over Prices		**0.2%**	**(0.3)%**	**0.1%**	**0.1%**	**0.0%**

These NHRS-based measures may not be perfect since the demographics within each member classification shift over time, but they give an indication that in general recent experienced wage inflation has not exceeded price inflation as much as historical norms. In the long run, we do not expect this pattern to persist.

Based on this information, our opinion is that it would be reasonable to lower the 3.75% wage inflation assumption. The selection of wage inflation is linked to the selection of price inflation. On a forward looking basis, we believe that the current spread of wages over prices of 0.75% is reasonable. A lower spread would also be reasonable.

Recommendation

We recommend lowering the assumed rate of wage inflation below the current 3.75%. For purposes of this study, we have shown economic scenarios with wage inflation assumptions of 3.50%, 3.25%, and 3.00%. Other assumptions may also be reasonable.

Reviewing the Price Inflation Assumption

No specific price inflation assumption is currently used in the valuation since there are no benefits that are specifically linked to price inflation. However, a price inflation assumption of 3.0% per year was considered in the building block development of the assumed rate of return in the prior experience study. The high inflation of the 1970s and 1980s is well in the past. The geometric average price inflation over the last 25 years from December 1990 to December 2015 (the most recent month available) was 2.30% per year. In the five years of the experience study from June 2010 to June 2015, the geometric average price inflation was 1.83% per year.

It is important not to give undue weight to recent experience. We must also consider future expectations as well. One measure is the spread between yields on U.S. Treasuries and U.S. TIPS. This calculation varies depending on the maturity selected. Moreover, there may be other influences on the result such as a risk premium on Treasuries and a liquidity premium on TIPS. Nevertheless, it is a measure easily made.

The longest horizon we can use for this basis is 30 years. The yield on 30-year Treasuries as of December 30, 2015 was 3.04% and the yield on inflation index TIPS was 1.31% for a raw difference of 1.73%. This is significantly lower than past experience and noticeably below the Federal Reserve's target inflation rate of 2.0%.

Another point of reference is the 2015 Social Security Trustees report which assumed three scenarios of ultimate annual increases in CPI of 3.4%, 2.7%, and 2.0% for the low-cost, intermediate, and high-cost scenarios. The Social Security Trustees report uses the ultimate rates for their 75-year projections, much longer than the longest horizon we can discern from Treasuries and TIPS.

Based on this information, our opinion is that it would be reasonable to lower the price inflation assumption of 3.0%. We caution against lowering the price inflation assumption below 2.0%. Even though the Treasury/TIPS measure is below 2.0% for 30 years, the Federal Reserve's target and the Social Security Trustees' ultimate high cost assumptions are both 2.0%.

Recommendation

We recommend lowering the assumed rate of price inflation below the current 3.00%. For purposes of this study, we have used a price inflation assumption of 2.75%, 2.50% and 2.25% per year. Other assumptions may also be reasonable.

Reviewing the Merit and Longevity Assumptions

Pay increases granted to active members typically consist of two pieces:

- An across-the-board, economic type of increase granted to most or all members of the group. This increase is typically tied to wage inflation or cost of living changes, and

- An increase as a result of merit and seniority. This increase is typically related to the performance of an individual and includes promotions and increased years of experience.

The assumption for across-the-board increases is the pay inflation assumption discussed in the wage inflation section. The merit and seniority portion of pay increases are discussed in this section.

We reviewed the merit and seniority pay increases experienced by member classification during the 5-year period. For each member classification, the 5-year increase in average pay was subtracted from the actual pay increases to obtain the merit/seniority portion of the pay increases. It should be noted that the results of the analysis are sensitive to the estimated wage inflation component.

The results of the analysis are shown on pages B-10 through B-17. Using the technique described above, observed pay increases were generally lower than presently assumed increases for Employees and higher for the other member classifications. This analysis suggests a need to decrease the merit/seniority pay increase assumption for Employees and increase the assumption for the other remaining member classifications.

Recommendation

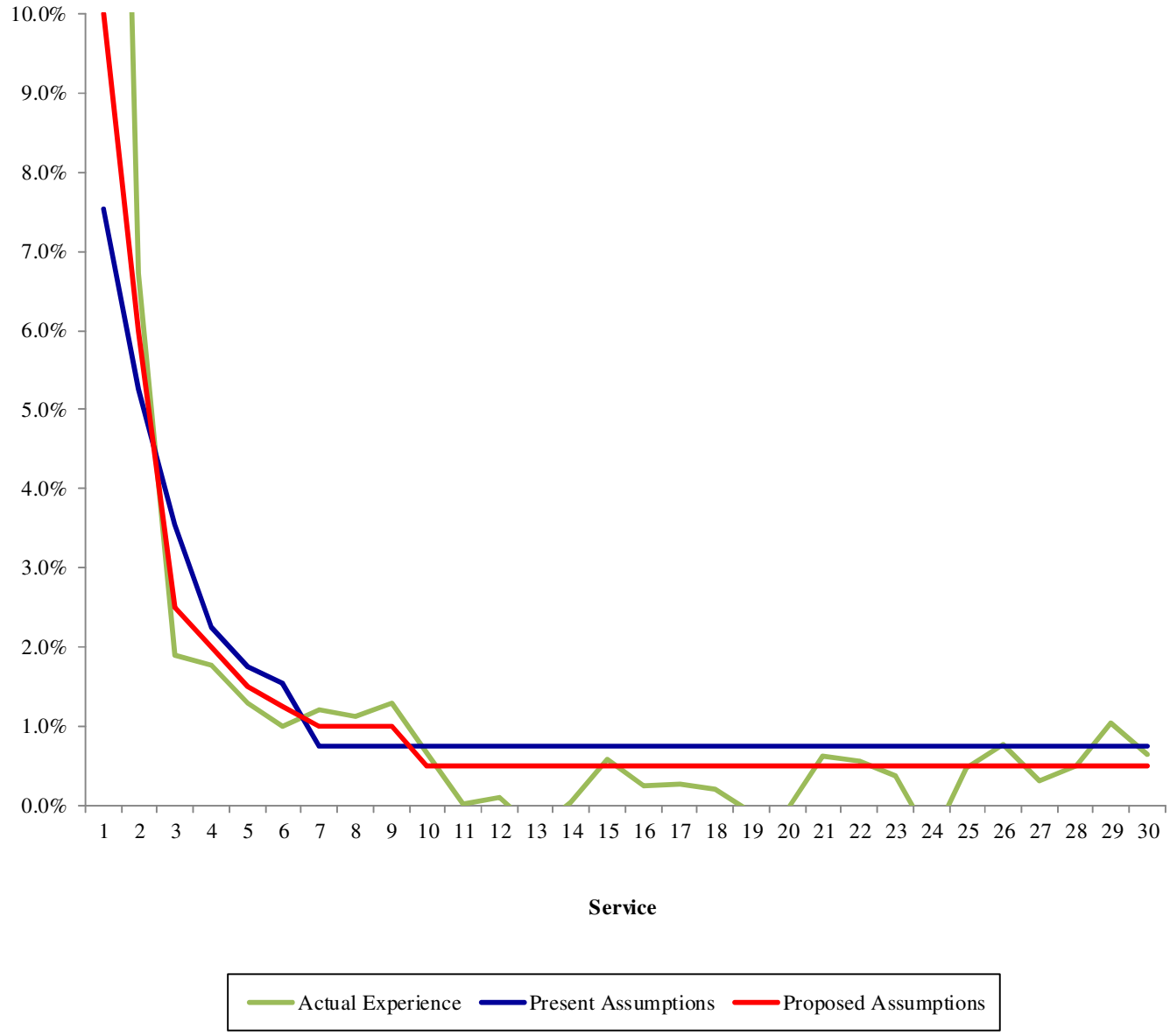
We recommend lowering the assumed rates of merit and longevity for Employees and raising the rates for Teachers, Police, and Fire as indicated on pages B-10 through B-17.

EMPLOYEES
MERIT AND LONGEVITY PAY INCREASES

Service Index	Number	Merit/Seniority % Increase		
			Expected	
		Actual*	Present	Proposed
1	2,913	24.20 %	7.55 %	10.00 %
2	7,055	6.71 %	5.25 %	6.00 %
3	6,352	1.89 %	3.55 %	2.50 %
4	6,361	1.78 %	2.25 %	2.00 %
5	6,435	1.29 %	1.75 %	1.50 %
6	6,539	0.99 %	1.55 %	1.25 %
7	6,464	1.20 %	0.75 %	1.00 %
8	6,055	1.12 %	0.75 %	1.00 %
9	5,697	1.29 %	0.75 %	1.00 %
10	5,452	0.66 %	0.75 %	0.50 %
11	5,147	0.03 %	0.75 %	0.50 %
12	4,924	0.10 %	0.75 %	0.50 %
13	4,626	(0.32)%	0.75 %	0.50 %
14	4,133	0.04 %	0.75 %	0.50 %
15	3,668	0.59 %	0.75 %	0.50 %
16	3,105	0.25 %	0.75 %	0.50 %
17	2,694	0.28 %	0.75 %	0.50 %
18	2,410	0.22 %	0.75 %	0.50 %
19	2,196	(0.08)%	0.75 %	0.50 %
20	1,992	(0.04)%	0.75 %	0.50 %
21	1,862	0.63 %	0.75 %	0.50 %
22	1,887	0.57 %	0.75 %	0.50 %
23	1,894	0.36 %	0.75 %	0.50 %
24	1,831	(0.45)%	0.75 %	0.50 %
25	1,709	0.47 %	0.75 %	0.50 %
26	1,616	0.77 %	0.75 %	0.50 %
27	1,323	0.32 %	0.75 %	0.50 %
28	1,054	0.51 %	0.75 %	0.50 %
29	905	1.04 %	0.75 %	0.50 %
30	786	0.64 %	0.75 %	0.50 %
Total	109,085			

** Actual merit is actual total reduced by the estimated wage increase of 2.0%.*

EMPLOYEES
MERIT AND LONGEVITY PAY INCREASES GRAPH

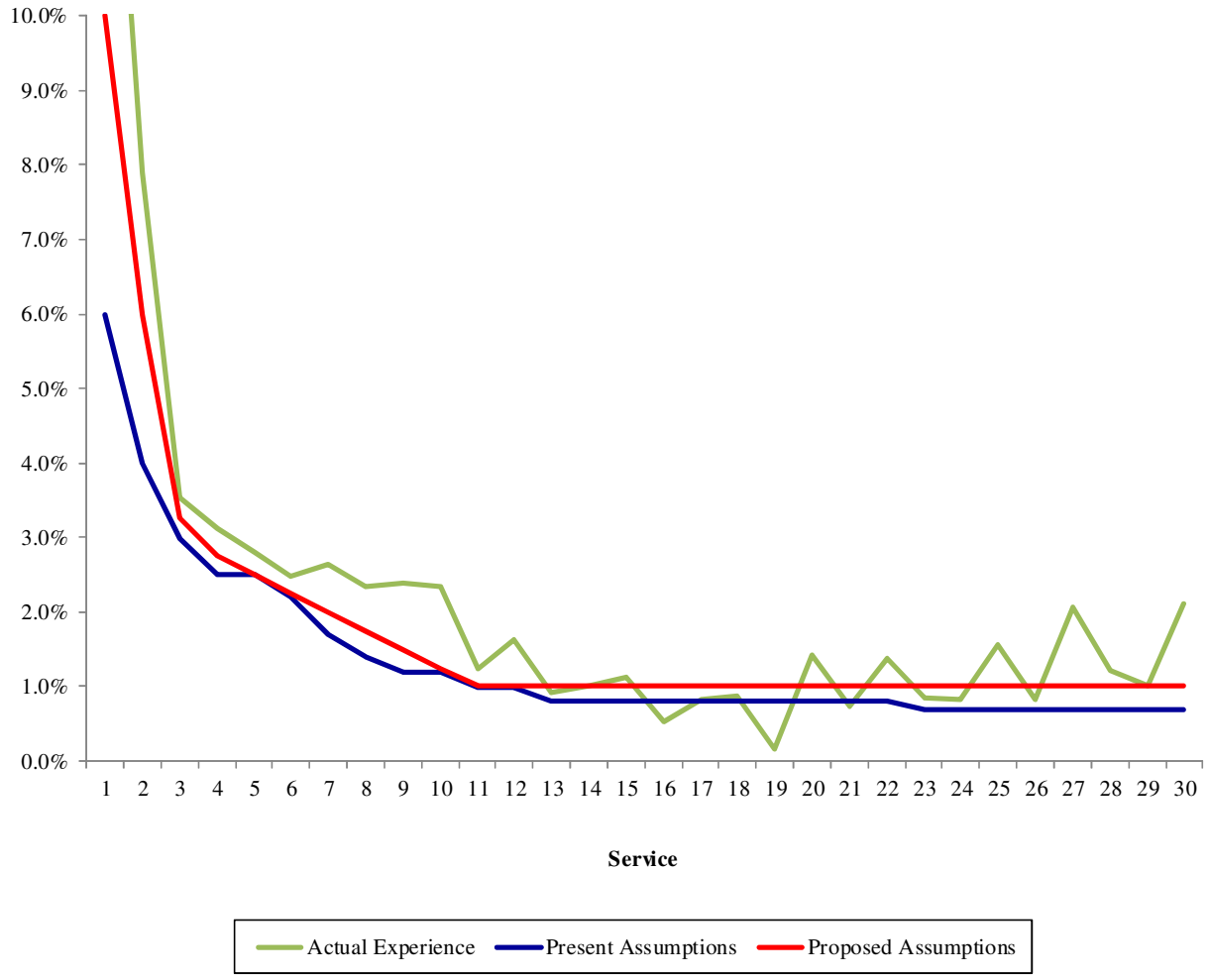


TEACHERS
MERIT AND LONGEVITY PAY INCREASE

Service Index	Number	Merit/Seniority % Increase		
			Expected	
		Actual*	Present	Proposed
1	240	15.01 %	6.00 %	10.00 %
2	3,761	7.89 %	4.00 %	6.00 %
3	3,838	3.53 %	3.00 %	3.25 %
4	3,927	3.11 %	2.50 %	2.75 %
5	4,090	2.81 %	2.50 %	2.50 %
6	4,232	2.47 %	2.20 %	2.25 %
7	4,370	2.64 %	1.70 %	2.00 %
8	4,209	2.34 %	1.40 %	1.75 %
9	4,032	2.38 %	1.20 %	1.50 %
10	3,964	2.35 %	1.20 %	1.25 %
11	3,961	1.24 %	1.00 %	1.00 %
12	3,951	1.62 %	1.00 %	1.00 %
13	3,750	0.93 %	0.80 %	1.00 %
14	3,559	1.01 %	0.80 %	1.00 %
15	3,280	1.13 %	0.80 %	1.00 %
16	2,874	0.54 %	0.80 %	1.00 %
17	2,497	0.83 %	0.80 %	1.00 %
18	2,275	0.87 %	0.80 %	1.00 %
19	2,001	0.17 %	0.80 %	1.00 %
20	1,748	1.43 %	0.80 %	1.00 %
21	1,554	0.73 %	0.80 %	1.00 %
22	1,447	1.37 %	0.80 %	1.00 %
23	1,422	0.85 %	0.70 %	1.00 %
24	1,442	0.82 %	0.70 %	1.00 %
25	1,456	1.57 %	0.70 %	1.00 %
26	1,407	0.83 %	0.70 %	1.00 %
27	1,335	2.07 %	0.70 %	1.00 %
28	1,185	1.21 %	0.70 %	1.00 %
29	1,028	1.01 %	0.70 %	1.00 %
30	946	2.12 %	0.70 %	1.00 %
Total	79,781			

** Actual merit is actual total reduced by the estimated wage increase of 1.5%.*

TEACHERS
MERIT AND LONGEVITY PAY INCREASE GRAPH

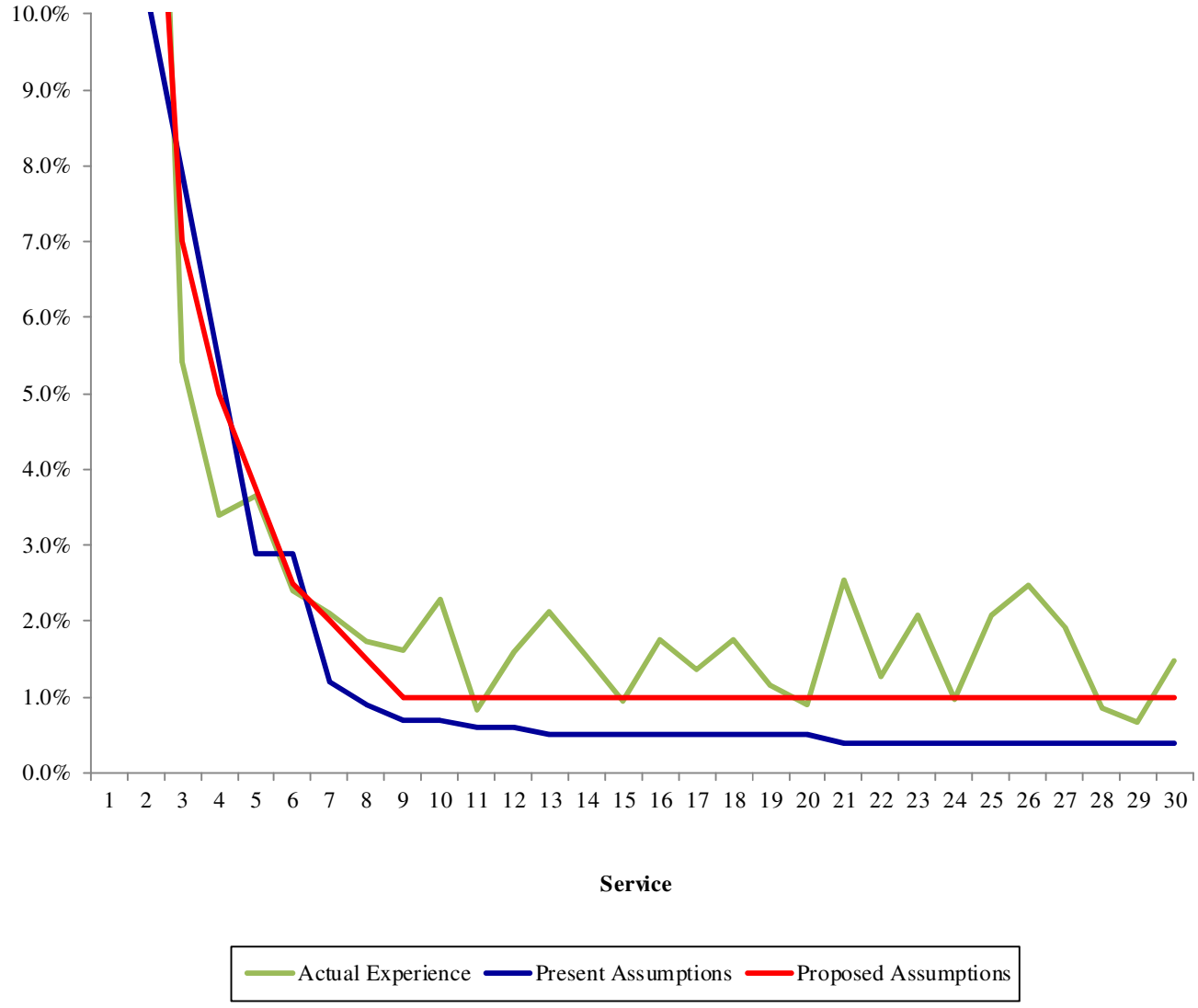


POLICE
MERIT AND LONGEVITY PAY INCREASE

Service Index	Number	Merit/Seniority % Increase		
			Expected	
		Actual*	Present	Proposed
1	518	42.77 %	20.40 %	22.00 %
2	1,067	19.29 %	10.40 %	15.00 %
3	991	5.41 %	7.90 %	7.00 %
4	953	3.40 %	5.40 %	5.00 %
5	979	3.65 %	2.90 %	3.75 %
6	979	2.40 %	2.90 %	2.50 %
7	1,029	2.10 %	1.20 %	2.00 %
8	969	1.73 %	0.90 %	1.50 %
9	911	1.61 %	0.70 %	1.00 %
10	896	2.29 %	0.70 %	1.00 %
11	906	0.83 %	0.60 %	1.00 %
12	926	1.60 %	0.60 %	1.00 %
13	895	2.12 %	0.50 %	1.00 %
14	834	1.55 %	0.50 %	1.00 %
15	755	0.95 %	0.50 %	1.00 %
16	703	1.76 %	0.50 %	1.00 %
17	630	1.36 %	0.50 %	1.00 %
18	600	1.75 %	0.50 %	1.00 %
19	559	1.16 %	0.50 %	1.00 %
20	494	0.90 %	0.50 %	1.00 %
21	436	2.53 %	0.40 %	1.00 %
22	379	1.28 %	0.40 %	1.00 %
23	336	2.08 %	0.40 %	1.00 %
24	307	0.97 %	0.40 %	1.00 %
25	268	2.08 %	0.40 %	1.00 %
26	200	2.48 %	0.40 %	1.00 %
27	158	1.91 %	0.40 %	1.00 %
28	132	0.84 %	0.40 %	1.00 %
29	97	0.66 %	0.40 %	1.00 %
30	74	1.48 %	0.40 %	1.00 %
Total	18,981			

** Actual merit is actual total reduced by the estimated wage increase of 1.9%.*

POLICE
MERIT AND LONGEVITY PAY INCREASE GRAPH

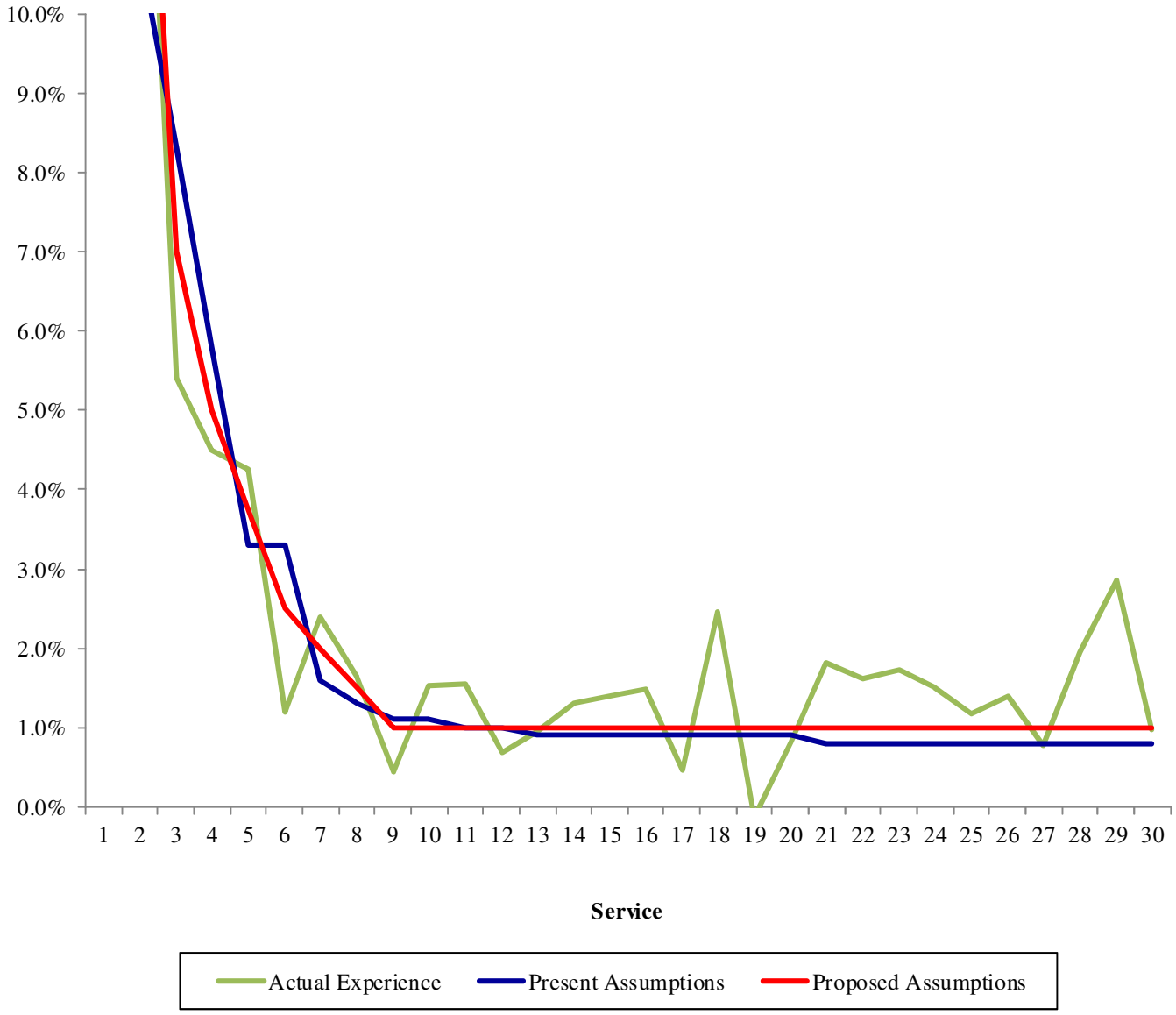


FIRE
MERIT AND LONGEVITY PAY INCREASES

Service Index	Number	Merit/Seniority % Increase		
			Expected	
		Actual*	Present	Proposed
1	112	44.09 %	20.80 %	22.00 %
2	248	15.25 %	10.80 %	15.00 %
3	282	5.41 %	8.30 %	7.00 %
4	309	4.49 %	5.80 %	5.00 %
5	311	4.25 %	3.30 %	3.75 %
6	341	1.20 %	3.30 %	2.50 %
7	381	2.39 %	1.60 %	2.00 %
8	385	1.64 %	1.30 %	1.50 %
9	388	0.43 %	1.10 %	1.00 %
10	415	1.54 %	1.10 %	1.00 %
11	420	1.55 %	1.00 %	1.00 %
12	435	0.68 %	1.00 %	1.00 %
13	397	0.95 %	0.90 %	1.00 %
14	354	1.30 %	0.90 %	1.00 %
15	287	1.40 %	0.90 %	1.00 %
16	263	1.48 %	0.90 %	1.00 %
17	220	0.46 %	0.90 %	1.00 %
18	194	2.45 %	0.90 %	1.00 %
19	185	(0.14)%	0.90 %	1.00 %
20	169	0.82 %	0.90 %	1.00 %
21	158	1.82 %	0.80 %	1.00 %
22	173	1.63 %	0.80 %	1.00 %
23	170	1.74 %	0.80 %	1.00 %
24	182	1.50 %	0.80 %	1.00 %
25	174	1.18 %	0.80 %	1.00 %
26	159	1.40 %	0.80 %	1.00 %
27	136	0.78 %	0.80 %	1.00 %
28	111	1.96 %	0.80 %	1.00 %
29	85	2.85 %	0.80 %	1.00 %
30	59	0.98 %	0.80 %	1.00 %
Total	7,503			

** Actual merit is actual total reduced by the estimated wage increase of 1.9%.*

FIRE
MERIT AND LONGEVITY PAY INCREASES



Reviewing the Population Size Assumption

The active member population is currently assumed to remain constant for each member classification. This affects the projection of the payroll for the amortization of the unfunded actuarial accrued pension liability and the solvency medical subsidy contributions. If payroll growth is less than assumed, this affects both the payment received from the Employers during a particular year and the rate calculated in the following actuarial valuation.

Looking historically at two sources, the number of full time state and local employees reported by the U.S. Census Bureau and the NHRS active member headcount both reached their peak in 2009 right before the Great Recession. The definitions of part time for purposes of the U.S. Census Bureau and NHRS participation may not be identical, but the declines in NHRS active member headcount appear to be strongly influenced by the shift to part time employees.

State and Local Employees - All Job Classifications

	U.S. Census Annual Survey[1]		
Year	**Full Time**	**Part Time**	**NHRS[2]**
2007	61,801	26,304	50,802
2008	61,395	25,611	50,988
2009	63,213	26,599	51,032
2010	61,639	29,477	50,467
2011	60,630	29,292	49,738
2012	59,892	30,448	48,625
2013	57,227	29,974	48,688
2014	58,293	31,776	48,307
Annual Rate of Change			
All Years	-0.83%	2.74%	-0.72%
Last 5 years	-1.61%	3.62%	-1.09%
Last 3 years	-1.30%	2.75%	-0.97%

[1]Historical information for the State of New Hampshire based on U.S. Census Annual Surveys of Public Employment & Payroll, March 2007-13

[2]Historical information based on data submitted for the annual valuations as of June 30.

It is not clear whether the shift to part time employees will continue or whether there will be a point in the near future where the delivery of services depends on maintaining a full time workforce.

We explore future active member population expectations separately by member classification. For purposes of these analyses, we rely on the New Hampshire population projections through 2040 produced by the State of New Hampshire, Office of Energy and Planning Regional Planning Commission's County Population Projections report from 2013. Independent review and audit of that report is outside the scope of this project.

Employees

We compare the historical and projected ratios of the New Hampshire general population to the number of active Employee members.

Historical Information

June 30	Employees' Headcount[1]	Annual Rate of Change	New Hampshire Population[2]	Annual Rate of Change	Population/ Employee Ratio	Annual Rate of Change
2007	26,474		1,315,000		49.67	
2008	26,507	0.12%	1,315,000	0.00%	49.61	-0.12%
2009	26,352	-0.58%	1,324,575	0.73%	50.26	1.32%
2010	25,987	-1.39%	1,316,470	-0.61%	50.66	0.78%
2011	25,539	-1.72%	1,318,000	0.12%	51.61	1.87%
2012	24,747	-3.10%	1,321,000	0.23%	53.38	3.44%
2013	24,809	0.25%	1,323,459	0.19%	53.35	-0.06%
2014	24,545	-1.06%	1,326,813	0.25%	54.06	1.33%
2015	24,298	-1.01%	1,330,834	0.30%	54.77	1.32%

Projections

June 30	Employees' Headcount[1]	Annual Rate of Change	New Hampshire Population[2]	Annual Rate of Change	Population/ Employee Ratio	Annual Rate of Change
2020	24,298		1,359,836		55.96	
2025	24,298	0.00%	1,388,884	0.42%	57.16	0.42%
2030	24,298	0.00%	1,412,041	0.33%	58.11	0.33%
2035	24,298	0.00%	1,425,357	0.19%	58.66	0.19%
2040	24,298	0.00%	1,427,098	0.02%	58.73	0.02%

[1]Historical information based on data submitted for the annual valuations. Projections are based on the prospective Employees' Headcount assumption.

[2]Historical information based on New Hampshire Office of Energy and Planning historical reports. Projections based on State of New Hampshire, Office of Energy and Planning Regional Planning Commissions County Population Projections.

The ratio of the general population to active Employees for 2015 is 54.77, roughly a 10% increase since 2007 when the ratio was 49.67. A projection of 0% growth in the active member headcount through 2040 results in a ratio of 58.73, roughly an increase of 7% from 2015. While there is no hard and fast rule that says active Employee headcounts will grow in sync with the general population, it is reasonable to assume that the recent decline in active members will not continue indefinitely given the projected population increase.

Teachers

We compare the historical and projected ratios of the New Hampshire school-age population to the number of active Teacher members.

Historical Information

June 30	Teachers Headcount[1]	Annual Rate of Change	Public District School Students[2]	Annual Rate of Change	Student/ Teacher Ratio	Annual Rate of Change
2007	18,477		200,975		10.88	
2008	18,509	0.17%	195,668	-2.64%	10.57	-2.81%
2009	18,709	1.08%	192,811	-1.46%	10.31	-2.51%
2010	18,603	-0.57%	191,802	-0.52%	10.31	0.04%
2011	18,466	-0.74%	188,595	-1.67%	10.21	-0.94%
2012	18,161	-1.65%	185,278	-1.76%	10.20	-0.11%
2013	18,084	-0.42%	181,900	-1.82%	10.06	-1.41%
2014	17,986	-0.54%	178,947	-1.62%	9.95	-1.09%
2015	17,732	-1.41%	176,685	-1.26%	9.96	0.15%

Projections

June 30	Teachers Headcount[1]	Annual Rate of Change	Public District School Students[2]	Annual Rate of Change	Student/ Teacher Ratio	Annual Rate of Change
2020	17,511		169,217		9.66	
2025	17,294	-0.25%	164,095	-0.61%	9.49	-0.36%
2030	17,079	-0.25%	162,710	-0.17%	9.53	0.08%
2035	16,866	-0.25%	163,165	0.06%	9.67	0.31%
2040	16,656	-0.25%	160,758	-0.30%	9.65	-0.05%

[1]Historical information based on data submitted for the annual valuations. Projections are based on the prospective Teachers Headcount assumption.

[2]Historical information based on New Hampshire Department of Education data as of February 4, 2015. Projections based on State of New Hampshire, Office of Energy and Planning Regional Planning Commissions County Population Projections, 2013, 74% of ages 5-19.

The ratio of the school-age population to active Teachers for 2015 is 9.96, roughly an 8% decrease since 2007 when the ratio was 10.88. This suggests that the active Teacher workforce has not declined as rapidly as the school-age population from 2007 to 2015. Moreover, the school-age population is projected to continue to decrease through 2040. A projection of a 0.25% annual decline in the active member headcount through 2040 results in a ratio of 9.65 of students to active Teachers, roughly a decrease of 3% from 2015. We consider a levelling off of the ratio of students to Teachers as a reasonable assumption. Therefore we recommend considering an annual decrease in the active Teacher population of 0.25% per year.

Police

We compare the historical and projected ratios of the New Hampshire general population to the number of active Police members.

Historical Information

June 30	Police Headcount[1]	Annual Rate of Change	New Hampshire Population[2]	Annual Rate of Change	Population/ Police Ratio	Annual Rate of Change
2007	4,263		1,315,000		308.47	
2008	4,332	1.62%	1,315,000	0.00%	303.55	-1.59%
2009	4,318	-0.32%	1,324,575	0.73%	306.76	1.05%
2010	4,231	-2.01%	1,316,470	-0.61%	311.15	1.43%
2011	4,130	-2.39%	1,318,000	0.12%	319.13	2.56%
2012	4,118	-0.29%	1,321,000	0.23%	320.79	0.52%
2013	4,187	1.68%	1,323,459	0.19%	316.09	-1.46%
2014	4,166	-0.50%	1,326,813	0.25%	318.49	0.76%
2015	4,174	0.19%	1,330,834	0.30%	318.84	0.11%

Projections

June 30	Police Headcount[1]	Annual Rate of Change	New Hampshire Population[2]	Annual Rate of Change	Population/ Police Ratio	Annual Rate of Change
2020	4,174		1,359,836		325.79	
2025	4,174	0.00%	1,388,884	0.42%	332.75	0.42%
2030	4,174	0.00%	1,412,041	0.33%	338.29	0.33%
2035	4,174	0.00%	1,425,357	0.19%	341.48	0.19%
2040	4,174	0.00%	1,427,098	0.02%	341.90	0.02%

[1]Historical information based on data submitted for the annual valuations. Projections are based on the prospective Police Headcount assumption.

[2]Historical information based on New Hampshire Office of Energy and Planning historical reports. Projections based on State of New Hampshire, Office of Energy and Planning Regional Planning Commissions County Population Projections.

The ratio of the general population to active Police members for 2015 is 318.84, roughly a 3% increase since 2007 when the ratio was 308.47. A projection of 0% growth in the active member headcount through 2040 results in a ratio of 341.90, roughly an increase of 7% from 2015. While there is no hard and fast rule that says active Police headcounts will grow in sync with the general population, it is reasonable to assume that the recent decline in active members will not continue indefinitely given the projected population increase.

Fire

We compare the historical and projected ratios of the New Hampshire general population to the number of active Fire members.

Historical Information

June 30	Fire Headcount[1]	Annual Rate of Change	New Hampshire Population[2]	Annual Rate of Change	Population/ Fire Ratio	Annual Rate of Change
2007	1,588		1,315,000		828.09	
2008	1,640	3.27%	1,315,000	0.00%	801.83	-3.17%
2009	1,653	0.79%	1,324,575	0.73%	801.32	-0.06%
2010	1,646	-0.42%	1,316,470	-0.61%	799.80	-0.19%
2011	1,603	-2.61%	1,318,000	0.12%	822.21	2.80%
2012	1,599	-0.25%	1,321,000	0.23%	826.14	0.48%
2013	1,608	0.56%	1,323,459	0.19%	823.05	-0.37%
2014	1,610	0.12%	1,326,813	0.25%	824.11	0.13%
2015	1,608	-0.12%	1,330,834	0.30%	827.63	0.43%

Projections

June 30	Fire Headcount[1]	Annual Rate of Change	New Hampshire Population[2]	Annual Rate of Change	Population/ Fire Ratio	Annual Rate of Change
2020	1,608		1,359,836		845.67	
2025	1,608	0.00%	1,388,884	0.42%	863.73	0.42%
2030	1,608	0.00%	1,412,041	0.33%	878.13	0.33%
2035	1,608	0.00%	1,425,357	0.19%	886.42	0.19%
2040	1,608	0.00%	1,427,098	0.02%	887.50	0.02%

[1]Historical information based on data submitted for the annual valuations. Projections are based on the prospective Fire Headcount assumption.

[2]Historical information based on New Hampshire Office of Energy and Planning historical reports. Projections based on State of New Hampshire, Office of Energy and Planning Regional Planning Commissions County Population Projections.

The ratio of the general population to active Fire members for 2015 is 827.63, roughly unchanged since 2007 when the ratio was 828.09. A projection of 0% growth in the active member headcount through 2040 results in a ratio of 887.50, roughly an increase of 7% from 2015. While there is no hard and fast rule that says active Fire headcounts will grow in sync with the general population, it is reasonable to assume that the active headcount will remain constant.

Recommendation

We recommend maintaining the assumption of a constant active member population for Employees, Police, and Fire and considering an active member population decline assumption of 0.25% per year for Teachers.

Medical Subsidy

The investment return rate assumed in the medical subsidy valuations is 3.75% per year, compounded annually (net after investment expenses) for purposes of computing accrued liabilities and other disclosures required by GASB Statement No. 43 (where applicable). However, for determining the solvency contribution rate for the medical subsidy account, the investment return rate assumption was 7.75%, where applicable.

Recommendation

We recommend using the wage inflation assumption and investment return assumption adopted by the Board for purposes of the medical subsidy as well.

End of Career Payments

End of Career Pay Increases may occur for those members with a definition of compensation which includes information generally unreported during regular annual valuations such as severance pay, end-of-career longevity payments, and pay for unused sick or vacation time. The definition of compensation changed for members who had not attained vested status prior to January 1, 2012 and for those hired on and after July 1, 2011.

Summary of Data

	Employees	Teachers	Police	Fire	Total
Number of Retirees	15,483	10,859	3,457	1,551	31,350
Pension Payroll	$208,433,970	$249,334,853	$121,002,081	$58,250,664	$637,021,568
Average Age	71.3	70.4	63.4	65.5	69.8
Average Pay	$13,462	$22,961	$35,002	$37,557	$20,320

Retiree Data Available For Load Analysis as of June 30, 2015

	Employees	Teachers	Police	Fire	Total
(a) Members retiring in 5 yr. period ending 6/30/15	5,005	3,056	865	390	9,316
(b) Members in (a) for which final AFC was available	4,430	2,811	716	290	8,247
(c) Members in (b) that had 3 complete years of active pay history	3,091	2,561	665	278	6,595
(d) Members in (b) that had 6 complete years of active pay history	2,850	1,588	356	139	4,933

Summary of Results

	(A)	(B)	(C)	(D)
Group	Liability/Normal Cost Load	Raw Load Results Using Final 3 Years Prior to Retirement	Raw Load Results Using Reported Pays 4-6 Years Prior to Retirement	Recommended Liability/Normal Cost Load
Employees	9.0%	6.3%	19.6%	**7.5%**
Teachers	7.0%	3.6%	18.4%	**5.0%**
Police	12.0%	10.9%	22.6%	**11.5%**
Fire	12.0%	11.2%	20.4%	**11.5%**

(A) The current assumptions used to model severance pay.

(B) Average ratio (payroll-weighted) of actual AFC at retirement to the average of the 3-year average compensation based on earnable compensation reported for annual valuations.

(C) Average ratio (payroll-weighted) of actual AFC at retirement to the average of the 3-year average compensation based on earnable compensation reported for annual valuations, 3 years prior to retirement.

(D) Recommended assumption.

Recommendation

We recommend lowering the assumed liability/normal costs loads for end of career payments as shown.

Review of the Administrative Expense Assumption

Fiscal Year Ending	Admin. & Misc. Expenses *	Total Payroll	As a % of Payroll
6/30/2011	$ 9,687,268	$ 2,517,779,470	0.38%
6/30/2012	6,921,273	2,487,757,437	0.28%
6/30/2013	8,851,641	2,501,741,708	0.35%
6/30/2014	8,866,839	2,507,898,809	0.35%
6/30/2015	9,119,305	2,575,031,210	0.35%
5-year average			**0.34%**

** As defined by GASB Statement No. 68. Includes administrative, custodial and professional fees and other non-investment expenses.*

The assumption for the administrative expenses is included in the normal cost. Administrative expenses are determined by the Board through its budgeting process. The cost estimates contained in this report include the current assumption of 0.35% of payroll in the normal cost.

Recommendation

We recommend maintaining a 0.35% administrative expense assumption as a percent of payroll.

SECTION C

DEMOGRAPHIC ASSUMPTIONS – EMPLOYEES

Withdrawal Experience

Findings

Members who leave active employment, for reasons other than retirement or death, may be eligible for the following payments from the pension trust:

- A refund of employee contributions, or
- A deferred retirement benefit, if they are vested

Deferred retirement benefits are based on the pay and service credit at the time of withdrawal. The benefit is frozen, and not payable until sometime in the future. Consequently, members who withdraw receive much less from the plan then members who stay in employment until retirement. Higher rates of withdrawal result in lower computed contributions, and vice-versa.

We separated the members into two groups for the analysis: 1) members with 5 or fewer years of credited service, and 2) those members with 5 or more years of credited service. Male and female rates were looked at separately.

Males

The analysis for male members with fewer than 5 years of credited service is shown on pages C-7 and C-8. Overall, the plan experienced fewer withdrawals (1,683) than projected by the present assumptions (2,017 – see totals at the bottom of page C-7). This experience suggests a need to lower the assumed rates of withdrawal among male individuals with fewer than 5 years of service.

The analysis for male members with 5 or more years of credited service is shown on pages C-7 and C-8. Overall, the plan experienced fewer withdrawals (882) than projected by the present assumptions (1,320 – see totals at the top of page C-7). This experience suggests a need to lower the assumed rates of withdrawal among male individuals with 5 or more years of service.

Females

The analysis for female members with fewer than 5 years of credited service is shown on pages C-9 and C-10. Overall, the actual number of withdrawals (3,314) is generally consistent with the number projected by the present assumptions (3,341 – see totals at the bottom of page C-9). This experience suggests that the current rates of withdrawal among female individuals with fewer than 5 years of service are a good fit with plan experience.

The analysis for female members with 5 or more years of credited service is shown on pages C-9 and C-10. Overall, the plan experienced fewer withdrawals (1,738) than projected by the present assumptions (2,010 – see totals at the top of page C-9). This experience suggests a need to lower the assumed rates of withdrawal among female individuals with 5 or more years of service.

Withdrawal Experience (Concluded)

Other

There were occurrences of terminations (with deferred benefits) for members eligible for early retirement. The current assumptions do not anticipate this behavior. Therefore, we suggest that termination rates should continue during early retirement eligibility. The exposures and expected terminations have been adjusted to reflect this change.

Given the economic conditions during the experience study period, we believe that some of the low turnover is temporary. Therefore, the proposed decreases in termination rates do not reflect the full experience of the last five years.

Recommendation

We recommend adoption of the proposed withdrawal assumptions.

Disability Experience

Findings

The assumed rates of disability (leaving active service due to injury or illness while not entitled to age and service retirement benefits) are a minor ingredient in cost calculations, since the incidence of disability is low. Higher rates of disability generally would result in somewhat higher computed contributions for NHRS, and vice-versa. Male and female rates were looked at separately.

Males

We reviewed the male disability experience during the 5 year period. The results are shown on page C-11. Overall, the plan experienced more disability retirements (42) than projected by the present assumptions (29.7 – see totals on page C-11). This experience suggests a need to increase the assumed rates of disability among male individuals.

Females

We reviewed the female disability experience during the 5 year period. The results are shown on page C-11. Overall, the plan experienced more disability retirements (50) than projected by the present assumptions (34.3 – see totals on page C-11). This experience suggests a need to increase the assumed rates of disability among female individuals.

Other

The actual incidence of accidental vs. ordinary disability was 36% accidental and 64% ordinary vs. the assumption of 50%/50%. This experience suggests that a change in the assumption is warranted.

Recommendation

We recommend adoption of the proposed disability retirement rates for male and female individuals. In addition, we recommend assuming that 40% of disabilities are accidental.

Age and Service (Normal) Retirement Experience

Findings

The benefit provisions of the Retirement System establish the minimum age and service requirements for unreduced or normal retirement. However, the actual cost of retirement is determined by when members actually retire. The assumption about timing of retirements is a major ingredient in cost calculations. Note that higher rates of retirement with full benefits generally results in higher computed contributions, and vice-versa. Group I members hired before July 1, 2011 may retire at age 60 with unreduced benefits. Group I members hired on or after July 1, 2011 may retire at age 65 with unreduced benefits. Male and female rates were looked at separately for members hired prior to July 1, 2011. Retirement rates for those hired on or after July 1, 2011 will be studied in the future as experience emerges. For purposes of this study, retirement rates for those hired on or after July 1, 2011 are adjusted in the first two years of unreduced retirement eligibility to model pent-up demand for retirement.

Males

We reviewed the retirement experience among active male members during the study period. The results are shown on page C-12. Overall, the plan experienced fewer retirements (1,342) than projected by the present assumptions (1,940 – see totals on page C-12). This experience suggests a need to lower the assumed rates of retirement among eligible male individuals. Retirement rates for ages 70 and above are set to 100% as a margin for adverse experience.

Females

We reviewed the retirement experience among active female members during the study period. The results are shown on page C-13. Overall, the plan experienced fewer retirements (1,957) than projected by the present assumptions (2,598 – see totals on page C-13). This experience suggests a need to lower the assumed rates of retirement among eligible female individuals. Retirement rates for ages 70 and above are set to 100% as a margin for adverse experience.

Other

Given the economic conditions during the experience study period, some of the observed reduction in retirement rates is not expected to persist. We gave more weight to this study's experience if the direction of the change was the same as in the prior experience study. Therefore, the proposed decreases in retirement rates do not reflect the full experience of the last five years.

Recommendations

We recommend adoption of the proposed normal retirement rates for male and female individuals.

Early Retirement Experience

Findings

NHRS Employees hired before July 1, 2011 may retire with a reduced benefit at age 50 with 10 years of service or under the rule of 70 with 20 years of service. We refer to these cases as early reduced retirements, since the retiring members receive smaller benefits than if they had waited until normal retirement to retire. Early retirement eligibility conditions for those hired on or after July 1, 2011 are at age 60 with 30 years of service.

Generally, because of the subsidized early retirement reduction, these members' immediate reduced benefits generally have a slightly greater value than the deferred benefit to which they would be eligible if they did not request early commencement of the benefit. Higher rates of early retirement generally result in moderately higher computed contributions, and vice-versa. Male and female rates were looked at separately. Retirement rates for those hired on or after July 1, 2011 will be studied in the future as experience emerges. For purposes of this study, early retirement rates for those hired on or after July 1, 2011 are set to match the normal retirement rates of those hired before July 1, 2011 to model pent-up demand for retirement.

Males

We reviewed the early retirement experience among active male members during the study period that meet early retirement eligibility at age 50 with 10 years of service. The results are shown on page C-14. Overall, the plan experienced fewer early retirements (124) than projected by the present assumptions (175 – see totals on page C-14). This experience suggests a need to lower the assumed rates of early retirement among eligible male individuals.

We also reviewed the early retirement experience among active male members during the study period that meet early retirement eligibility under the rule of 70. The results are shown on page C-15. Overall, the plan experienced fewer early retirements (170) than projected by the present assumptions (192 – see totals on page C-15). This experience suggests a need to lower the assumed rates of early retirement among eligible male individuals.

Females

We reviewed the early retirement experience among active female members during the study period that meet early retirement eligibility at age 50 with 10 years of service. The results are shown on page C-16. Overall, the plan experienced fewer early retirements (235) than projected by the present assumptions (370 – see totals on page C-16). This experience suggests a need to lower the assumed rates of early retirement among eligible female individuals.

We also reviewed the early retirement experience among active female members during the study period that meet early retirement eligibility under the rule of 70. The results are shown on page C-17. Overall, the plan experienced fewer early retirements (147) than projected by the present assumptions (199 – see totals on page C-17). This experience suggests a need to lower the assumed rates of early retirement among eligible female individuals.

Early Retirement Experience (Concluded)

Other

Given the economic conditions during the experience study period, some of the observed reduction in early retirement rates is not expected to persist. We gave more weight to this study's experience if the direction of the change was the same as in the prior experience study. Therefore, the proposed decreases in early retirement rates do not reflect the full experience of the last five years.

Recommendation

We recommend adoption of the proposed early retirement rates for male and female individuals.

DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
MALE WITHDRAWAL EXPERIENCE

A withdrawal is a separation from active member status for a reason other than disability, death or retirement and may be either vested or non-vested.

Summary of Age-Based Withdrawal Experience With 5 or More Years of Service

Age	Withdrawals	Exposure	Crude Rates	Sample Rates*		Expected Withdrawals**	
				Present	Proposed	Present	Proposed
Under 30	47	703	0.0669	0.0500	0.0720	35	50
30-34	94	1,667	0.0564	0.0500	0.0558	83	97
35-39	116	2,280	0.0509	0.0500	0.0504	114	115
40-44	132	3,683	0.0358	0.0500	0.0504	185	186
45-49	144	4,070	0.0354	0.0500	0.0468	204	189
50-54	174	6,668	0.0261	0.0500	0.0360	333	247
55-59	175	7,318	0.0239	0.0500	0.0360	366	263
Totals	**882**	**26,389**	**0.0334**	**0.0500**	**0.0435**	**1,320**	**1,147**

Summary of Service-Based Withdrawal Experience With Less Than 5 Years of Service

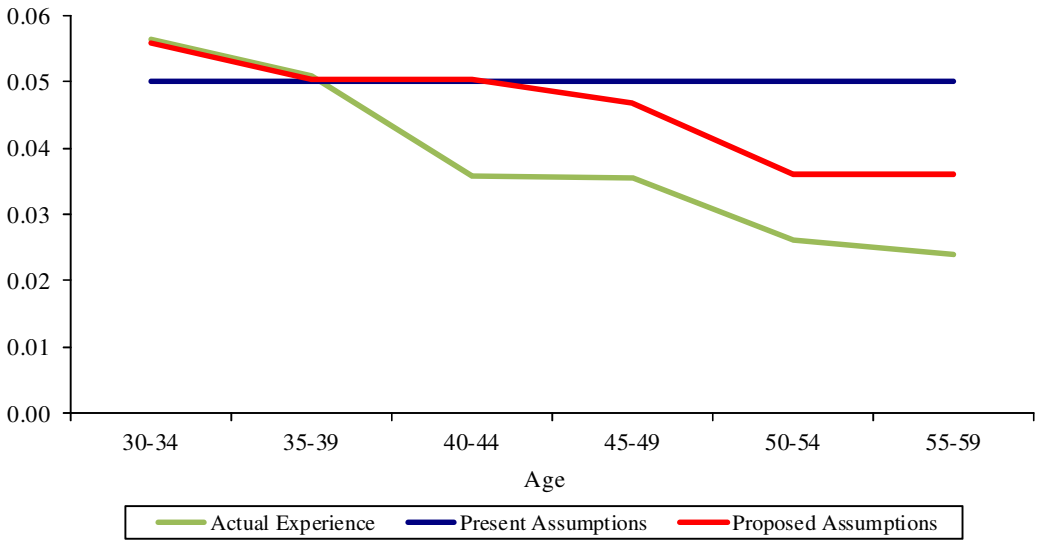
Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	296	1,423	0.2080	0.3000	0.2300	428	327
2	536	3,136	0.1709	0.2200	0.2000	693	627
3	346	2,575	0.1344	0.1600	0.1500	414	386
4	262	2,415	0.1085	0.1200	0.1200	292	290
5	243	2,341	0.1038	0.0800	0.1000	190	234
Totals	**1,683**	**11,890**	**0.1415**	**0.1696**	**0.1568**	**2,017**	**1,864**

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

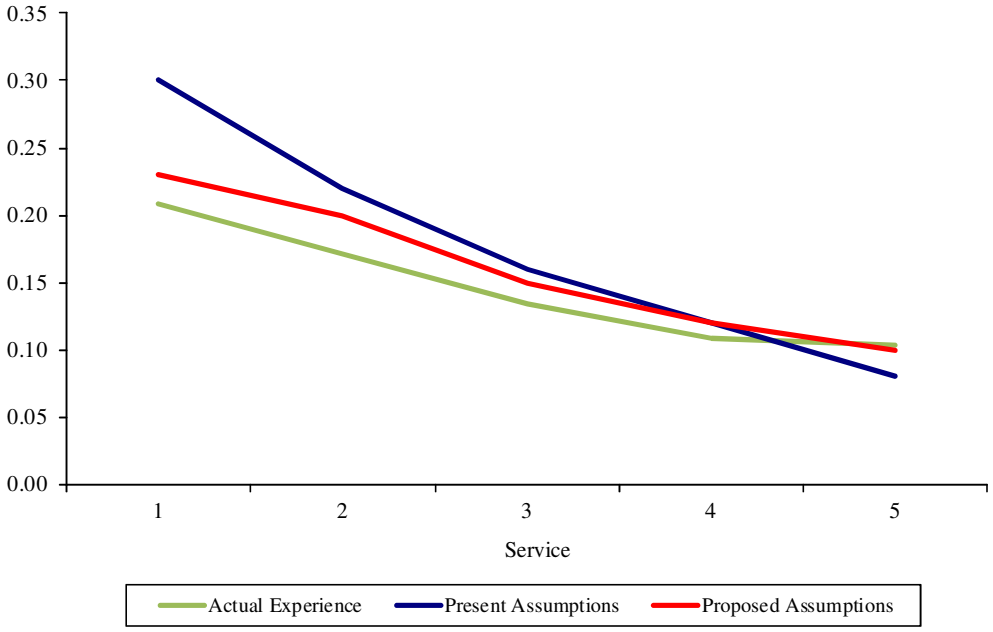
** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during early retirement eligibility.

Age-Based Withdrawal Experience
With 5 or More Years of Service



Service-Based Withdrawal Experience
With Less Than 5 Years of Service



DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
FEMALE WITHDRAWAL EXPERIENCE

A withdrawal is a separation from active member status for a reason other than disability, death or retirement and may be either vested or non-vested.

Summary of Age-Based Withdrawal Experience With 5 or More Years of Service

Age	Withdrawals	Exposure	Crude Rates	Sample Rates*		Expected Withdrawals**	
				Present	Proposed	Present	Proposed
Under 30	90	840	0.1071	0.0800	0.0720	67	61
30-34	173	2,303	0.0751	0.0620	0.0558	147	132
35-39	160	3,083	0.0519	0.0560	0.0504	173	155
40-44	208	5,280	0.0394	0.0560	0.0504	296	266
45-49	308	7,212	0.0427	0.0520	0.0468	372	333
50-54	397	11,420	0.0348	0.0400	0.0360	457	423
55-59	402	12,462	0.0323	0.0400	0.0360	498	449
Totals	**1,738**	**42,600**	**0.0408**	**0.0472**	**0.0427**	**2,010**	**1,819**

Summary of Service-Based Withdrawal Experience With Less Than 5 Years of Service

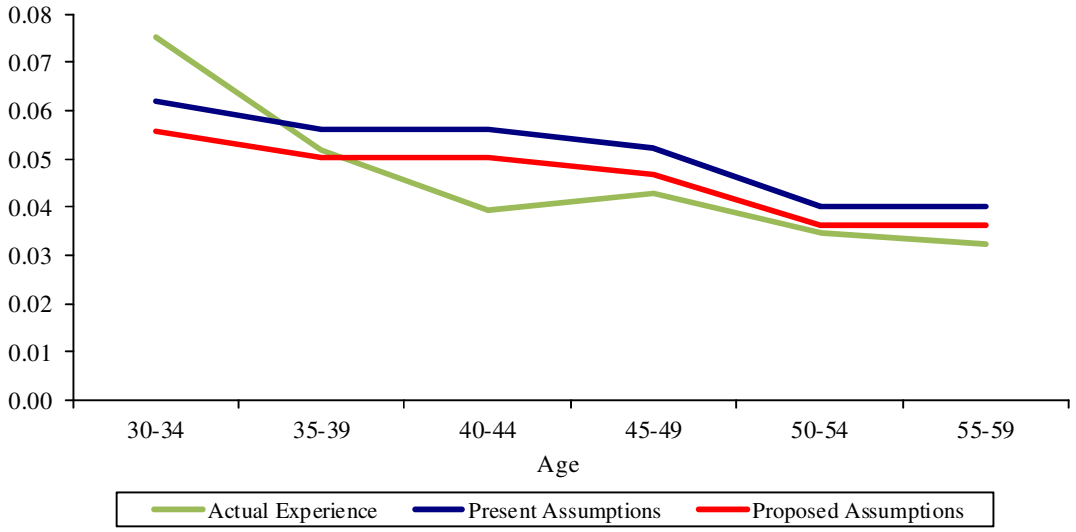
Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	586	2,265	0.2587	0.3000	0.3000	681	681
2	1,036	5,172	0.2003	0.2200	0.2200	1,140	1,140
3	723	4,361	0.1658	0.1600	0.1600	700	700
4	557	4,128	0.1349	0.1200	0.1200	498	498
5	412	3,992	0.1032	0.0800	0.0800	322	322
Totals	**3,314**	**19,918**	**0.1664**	**0.1677**	**0.1677**	**3,341**	**3,341**

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

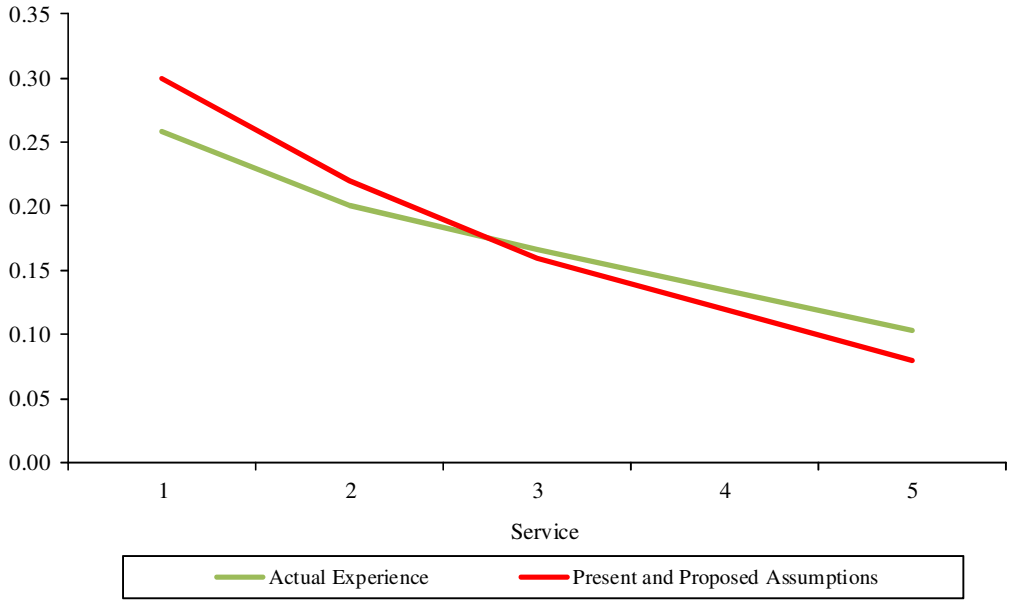
** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during early retirement eligibility.

Age-Based Withdrawal Experience With 5 or More Years of Service



Service-Based Withdrawal Experience With Less Than 5 Years of Service



Male Disability Experience

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Present	Proposed	Present	Proposed
Totals	**42**	**27,385**	**0.0015**	**0.00108**	**0.00117**	**29.7**	**32.1**

Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Present	Proposed	Present	Proposed
Totals	**50**	**43,957**	**0.0011**	**0.00078**	**0.00095**	**34.3**	**41.6**

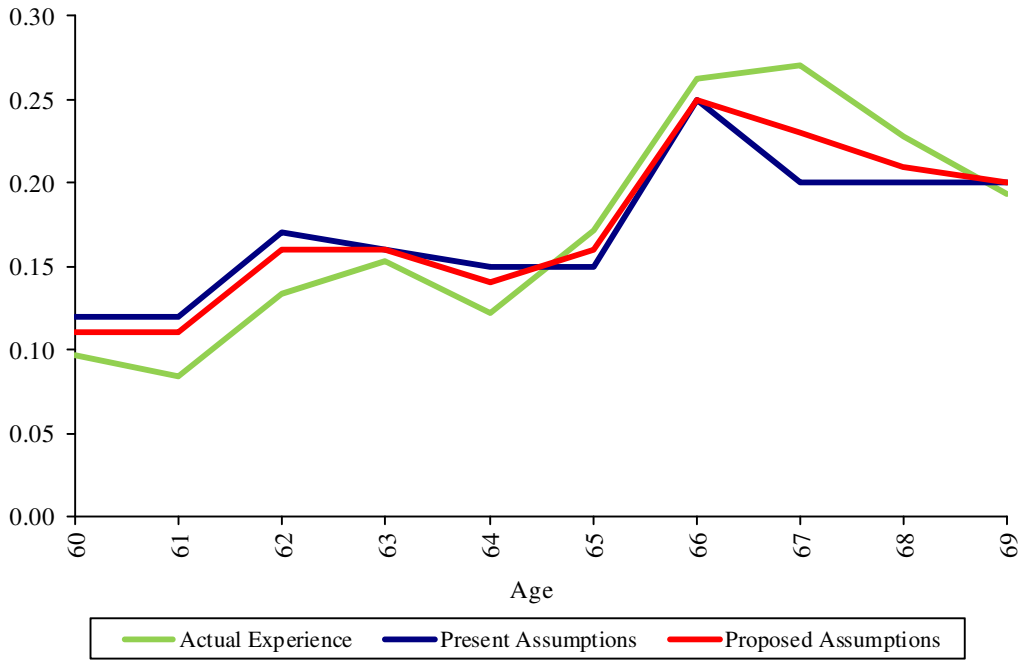
Rates in the tables are aggregated due to the small number of actual disabilities.

DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
MALE AGE-BASED RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
59 & Under	14	14	1.0000	N/A	N/A	4	N/A
60	157	1,632	0.0962	0.1200	0.1100	196	180
61	118	1,413	0.0835	0.1200	0.1100	170	155
62	170	1,277	0.1331	0.1700	0.1600	217	204
63	164	1,073	0.1528	0.1600	0.1600	172	172
64	104	856	0.1215	0.1500	0.1400	128	120
65	127	742	0.1712	0.1500	0.1600	118	119
66	153	584	0.2620	0.2500	0.2500	146	146
67	105	388	0.2706	0.2000	0.2300	78	89
68	69	303	0.2277	0.2000	0.2100	61	64
69	43	222	0.1937	0.2000	0.2000	44	44
Totals	1,224	8,504	0.1439			1,334	1,293
70 & Over	118	606	0.1947	1.0000	1.0000	606	606
Total	**1,342**	**9,110**	**0.1473**			**1,940**	**1,899**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Male Age-Based Retirement Experience

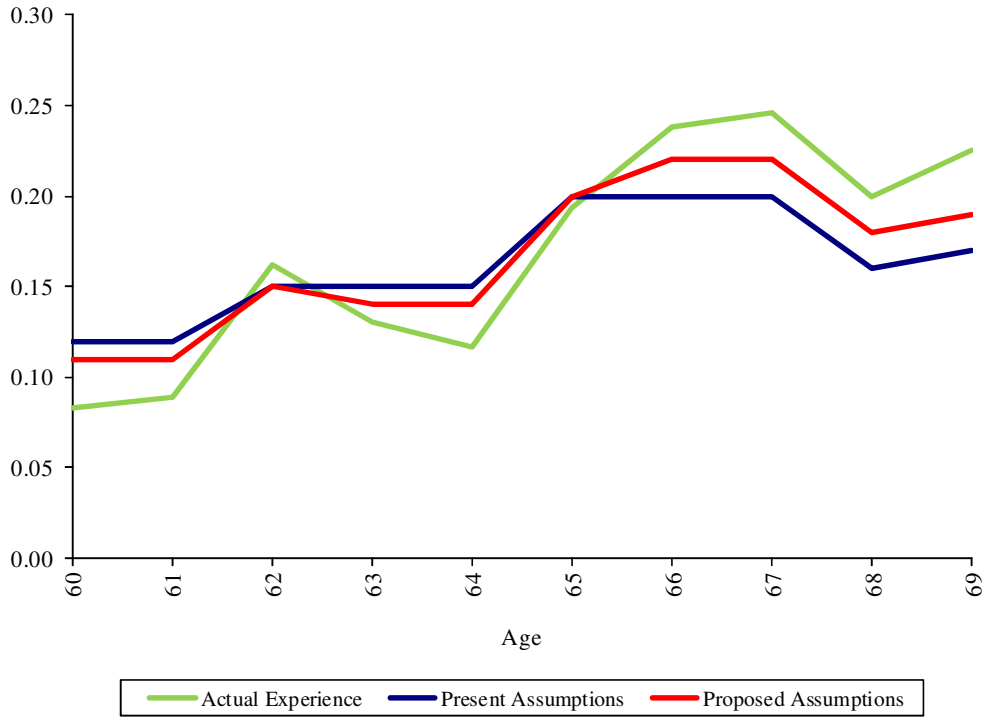


DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
FEMALE AGE-BASED RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
59 & Under	19	19	1.0000	N/A	N/A	1	N/A
60	204	2,457	0.0830	0.1200	0.1100	295	270
61	194	2,179	0.0890	0.1200	0.1100	262	240
62	317	1,953	0.1623	0.1500	0.1500	293	293
63	208	1,596	0.1303	0.1500	0.1400	239	223
64	159	1,369	0.1161	0.1500	0.1400	206	192
65	222	1,148	0.1934	0.2000	0.2000	230	230
66	197	826	0.2385	0.2000	0.2200	168	182
67	138	562	0.2456	0.2000	0.2200	112	124
68	77	385	0.2000	0.1600	0.1800	62	69
69	60	266	0.2256	0.1700	0.1900	45	51
Totals	1,795	12,760	0.1407			1,913	1,874
71 & Over	162	685	0.2365	1.0000	1.0000	685	685
Total	**1,957**	**13,445**	**0.1456**			**2,598**	**2,559**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Female Age-Based Retirement Experience

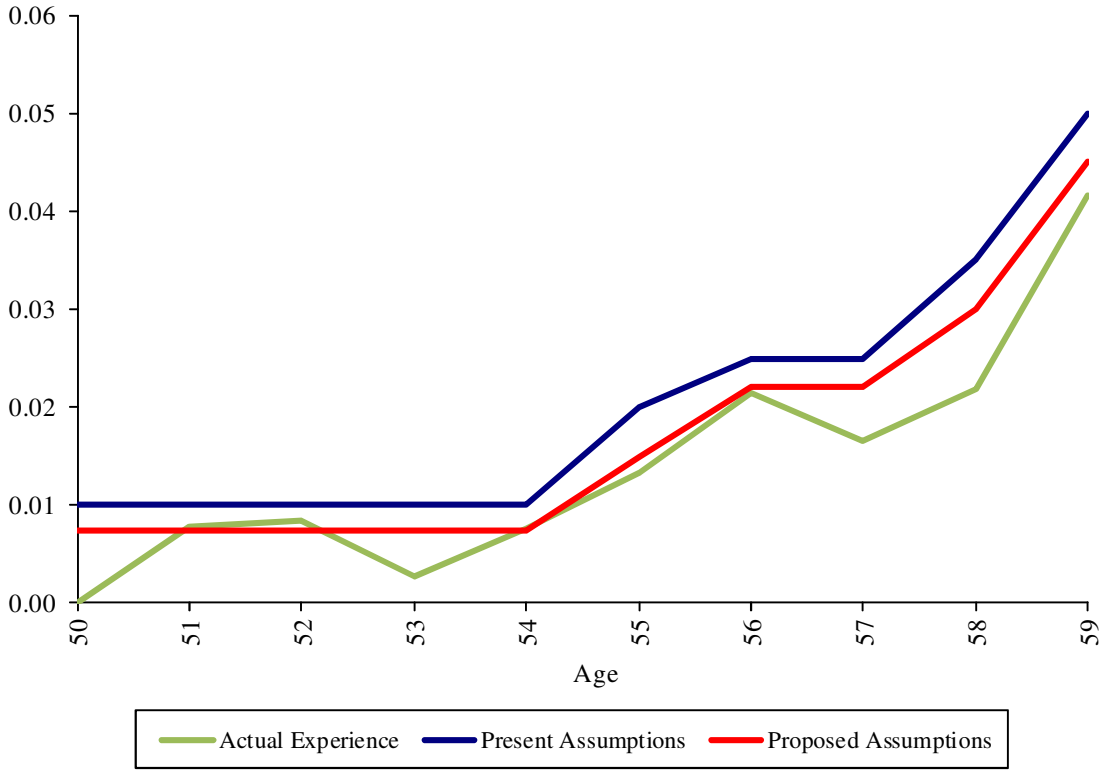


DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
MALE AGE-BASED EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
50	-	561	0.0000	0.0100	0.0075	6	4
51	5	647	0.0077	0.0100	0.0075	6	5
52	6	704	0.0085	0.0100	0.0075	7	5
53	2	750	0.0027	0.0100	0.0075	7	6
54	6	786	0.0076	0.0100	0.0075	8	6
55	11	825	0.0133	0.0200	0.0150	16	12
56	19	883	0.0215	0.0250	0.0220	22	19
57	15	908	0.0165	0.0250	0.0220	23	20
58	20	913	0.0219	0.0350	0.0300	32	27
59	40	963	0.0415	0.0500	0.0450	48	43
Totals	**124**	**7,940**	**0.0156**			**175**	**147**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages.*
"Expected retirements - Present" is the sum of actual probabilities applied in the valuation.

Male Age-Based Early Retirement Experience

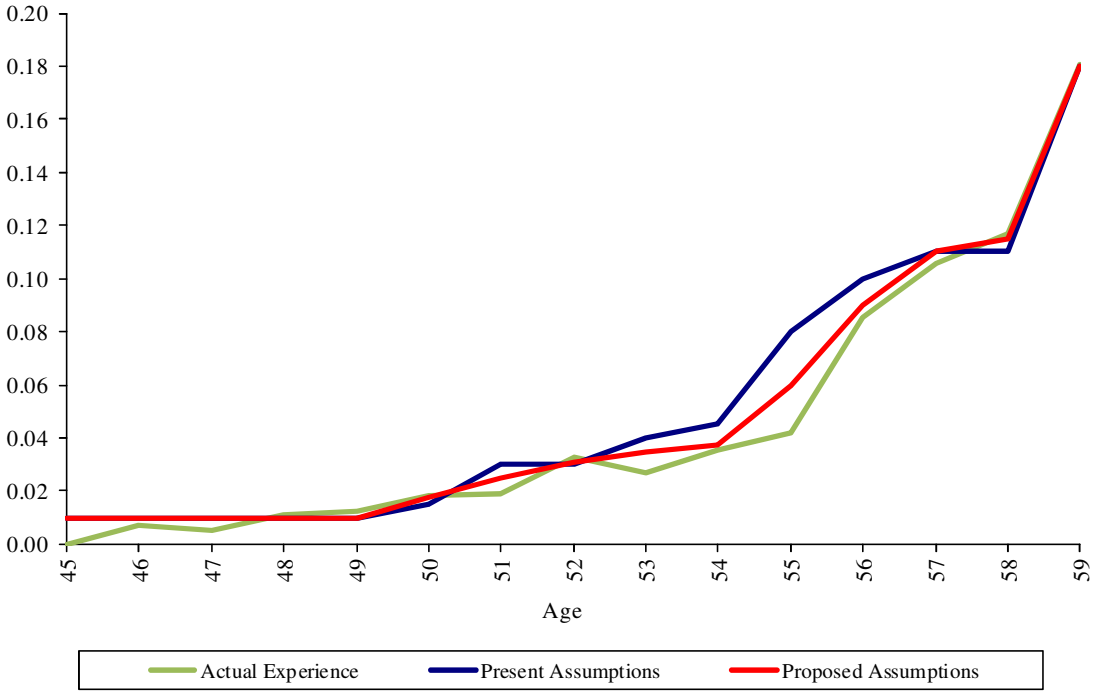


DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
MALE RULE-70 EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
45	-	60	0.0000	0.0100	0.0100	1	1
46	1	138	0.0072	0.0100	0.0100	1	1
47	1	206	0.0049	0.0100	0.0100	2	2
48	3	274	0.0109	0.0100	0.0100	3	3
49	4	331	0.0121	0.0100	0.0100	3	3
50	6	330	0.0182	0.0150	0.0175	5	6
51	6	316	0.0190	0.0300	0.0250	9	8
52	10	305	0.0328	0.0300	0.0310	9	9
53	8	299	0.0268	0.0400	0.0350	12	10
54	10	282	0.0355	0.0450	0.0375	13	11
55	11	263	0.0418	0.0800	0.0600	21	16
56	23	269	0.0855	0.1000	0.0900	27	24
57	25	236	0.1059	0.1100	0.1100	26	26
58	26	222	0.1171	0.1100	0.1150	24	26
59	36	199	0.1809	0.1800	0.1800	36	36
Total	**170**	**3,730**	**0.0456**			**192**	**182**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Male Rule-70 Early Retirement Experience

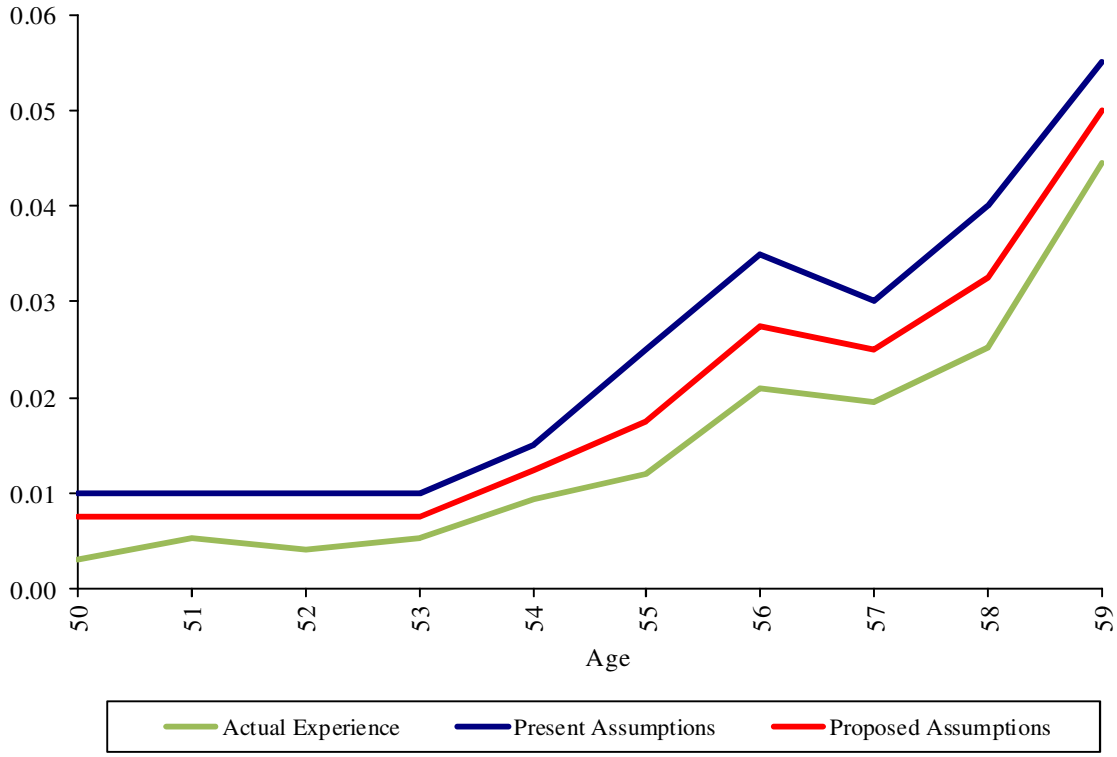


DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
FEMALE AGE-BASED EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
50	3	988	0.0030	0.0100	0.0075	10	7
51	6	1,113	0.0054	0.0100	0.0075	11	8
52	5	1,208	0.0041	0.0100	0.0075	12	9
53	7	1,315	0.0053	0.0100	0.0075	13	10
54	14	1,482	0.0094	0.0150	0.0125	22	19
55	19	1,584	0.0120	0.0250	0.0175	40	28
56	34	1,626	0.0209	0.0350	0.0275	57	45
57	32	1,631	0.0196	0.0300	0.0250	49	41
58	42	1,662	0.0253	0.0400	0.0325	66	54
59	73	1,637	0.0446	0.0550	0.0500	90	82
Total	**235**	**14,246**	**0.0165**			**370**	**303**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages.*
"Expected retirements - Present" is the sum of actual probabilities applied in the valuation.

Female Age-Based Early Retirement Experience

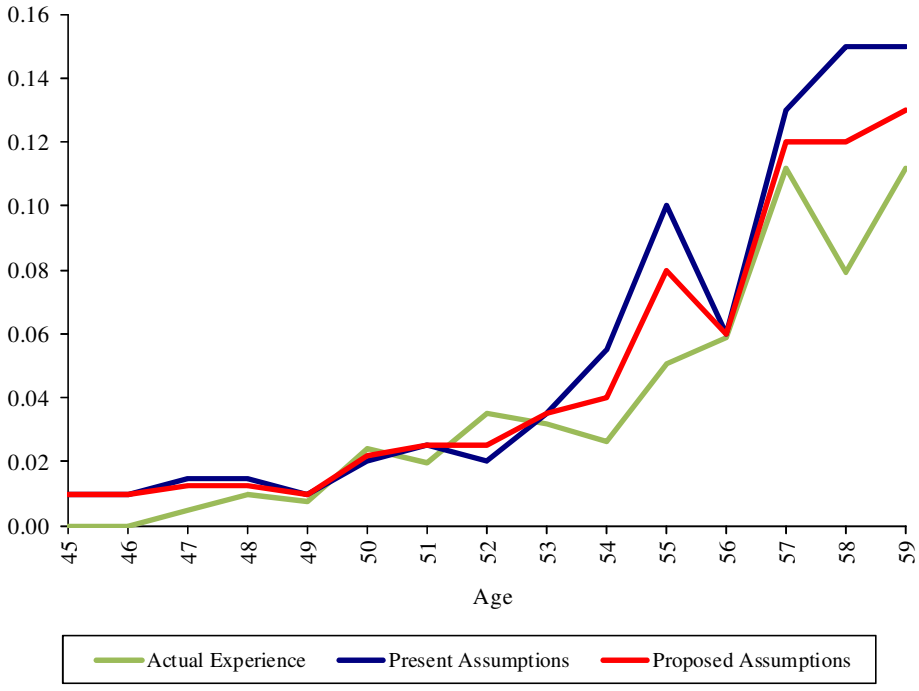


DEMOGRAPHIC ASSUMPTIONS - EMPLOYEES
FEMALE RULE-70 EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
45	-	52	0.0000	0.0100	0.0100	1	1
46	-	126	0.0000	0.0100	0.0100	1	1
47	1	204	0.0049	0.0150	0.0125	3	3
48	3	301	0.0100	0.0150	0.0125	5	4
49	3	385	0.0078	0.0100	0.0100	4	4
50	9	375	0.0240	0.0200	0.0220	7	8
51	7	357	0.0196	0.0250	0.0250	9	9
52	12	343	0.0350	0.0200	0.0250	7	9
53	10	313	0.0319	0.0350	0.0350	11	11
54	8	303	0.0264	0.0550	0.0400	17	12
55	14	278	0.0504	0.1000	0.0800	28	22
56	15	254	0.0591	0.0600	0.0600	15	15
57	27	242	0.1116	0.1300	0.1200	31	29
58	17	214	0.0794	0.1500	0.1200	32	26
59	21	188	0.1117	0.1500	0.1300	28	24
Total	**147**	**3,935**	**0.0374**			**199**	**178**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Female Rule-70 Early Retirement Experience



SECTION D

DEMOGRAPHIC ASSUMPTIONS – TEACHERS

Withdrawal Experience

Findings

Members who leave active employment, for reasons other than retirement or death, may be eligible for the following payments from the pension trust:

- A refund of employee contributions, or
- A deferred retirement benefit, if they are vested

Deferred retirement benefits are based on the pay and service credit at the time of withdrawal. The benefit is frozen, and not payable until sometime in the future. Consequently, members who withdraw receive much less from the plan then members who stay in employment until retirement. Higher rates of withdrawal result in lower computed contributions, and vice-versa.

We separated the members into two groups for the analysis: 1) members with fewer than 5 years of credited service, and 2) those members with 5 or more years of credited service. Male and female rates were looked at separately.

Males

The analysis for male members with fewer than 5 years of credited service is shown on pages D-7 and D-8. Overall, the actual number of withdrawals (451) is generally consistent with the number projected by the present assumptions (454 – see totals at the bottom of page D-7). This suggests that the current rates of withdrawal among male individuals with fewer than 5 years of service are a good fit with plan experience.

The analysis for male members with 5 or more years of credited service is shown on pages D-7 and D-8. Overall, the plan experienced fewer withdrawals (332) than projected by the present assumptions (481 – see totals at the top of page D-7). This experience suggests a need to lower the assumed rates of withdrawal among male individuals with 5 or more years of service.

Females

The analysis for female members with fewer than 5 years of credited service is shown on pages D-9 and D-10. Overall, the plan experienced fewer withdrawals (1,542) than projected by the present assumptions (1,836 – see totals at the bottom of page D-9). This experience suggests a need to lower the assumed rates of withdrawal among female individuals with fewer than 5 years of service.

The analysis for female members with 5 or more years of credited service is shown on pages D-9 and D-10. Overall, the plan experienced fewer withdrawals (1,300) than projected by the present assumptions (2,112 – see totals at the top of page D-9). This experience suggests a need to lower the assumed rates of withdrawal among female individuals with 5 or more years of service.

Withdrawal Experience (Concluded)

Other

There were occurrences of terminations (with deferred benefits) for members eligible for early retirement. The current assumptions do not anticipate this behavior. Therefore, we suggest that termination rates should continue during early retirement eligibility. The exposures and expected terminations have been adjusted to reflect this change.

Given the economic conditions during the experience study period, we believe that some of the low turnover is temporary. Therefore, the proposed decreases in termination rates do not reflect the full experience of the last five years.

Recommendation

We recommend adoption of the proposed withdrawal assumptions.

Disability Experience

Findings

The assumed rates of disability (leaving active service due to injury or illness while not entitled to age and service retirement benefits) are a minor ingredient in cost calculations, since the incidence of disability is low. Higher rates of disability generally would result in somewhat higher computed contributions for NHRS, and vice-versa. Male and female rates were looked at separately.

Males

We reviewed the male disability experience during the 5 year period. The results are shown on page D-11. Overall, the plan experienced more disability retirements (5) than projected by the present assumptions (2 – see totals on page D-11). This experience suggests a need to increase the assumed rates of disability among male individuals.

Females

We reviewed the female disability experience during the 5 year period. The results are shown on page D-11. Overall, the plan experienced more disability retirements (36) than projected by the present assumptions (3.6 – see totals on page D-11). This experience suggests a need to increase the assumed rates of disability among female individuals.

Other

The actual incidence if accidental vs. ordinary disability was 17% accidental and 83% ordinary vs. the assumption of 8%/92%. This experience suggests that a change in the assumption is warranted.

Recommendation

We recommend adoption of the proposed disability retirement rates for male and female individuals. In addition, we recommend assuming that 20% of disabilities are accidental.

Age and Service (Normal) Retirement Experience

Findings

The benefit provisions of the Retirement System establish the minimum age and service requirements for unreduced or normal retirement. However, the actual cost of retirement is determined by when members actually retire. The assumption about timing of retirements is a major ingredient in cost calculations. Note that higher rates of retirement with full benefits generally results in higher computed contributions, and vice-versa. Group I members hired before July 1, 2011 may retire at age 60 with unreduced benefits. Group I members hired on or after July 1, 2011 may retire at age 65 with unreduced benefits. Male and female rates were looked at separately for members hired prior to July 1, 2011. Retirement rates for those hired on or after July 1, 2011 will be studied in the future as experience emerges. For purposes of this study, retirement rates for those hired on or after July 1, 2011 are adjusted in the first two years of unreduced retirement eligibility to model pent-up demand for retirement.

Males

We reviewed the retirement experience among active male members during the study period. The results are shown on page D-12. Overall, the plan experienced fewer retirements (432) than projected by the present assumptions (687 – see totals on page D-12). This experience suggests a need to lower the assumed rates of retirement among eligible male individuals. Retirement rates for ages 70 and above are set to 100% as a margin for adverse experience.

Females

We reviewed the retirement experience among active female members during the study period. The results are shown on page D-13. Overall, the plan experienced fewer retirements (1,435) than projected by the present assumptions (2,032 – see totals on page D-13). This experience suggests a need to lower the assumed rates of retirement among eligible female individuals. Retirement rates for ages 70 and above are set to 100% as a margin for adverse experience.

Other

Given the economic conditions during the experience study period, some of the observed reduction in retirement rates is not expected to persist. We gave more weight to this study's experience if the direction of the change was the same as in the prior experience study. Therefore, the proposed decreases in retirement rates do not reflect the full experience of the last five years.

Recommendations

We recommend adoption of the proposed normal retirement rates for male and female individuals.

Early Retirement Experience

Findings

NHRS Teachers hired before July 1, 2011 may retire with a reduced benefit at age 50 with 10 years of service or under the rule of 70 with 20 years of service. We refer to these cases as early reduced retirements, since the retiring members receive smaller benefits than if they had waited until normal retirement to retire. Early retirement eligibility conditions for those hired on or after July 1, 2011 are at age 60 with 30 years of service.

Generally, because of the subsidized early retirement reduction, these members' immediate reduced benefits generally have a slightly greater value than the deferred benefit to which they would be eligible if they did not request early commencement of the benefit. Higher rates of early retirement generally result in moderately higher computed contributions, and vice-versa. Male and female rates were looked at separately. Retirement rates for those hired on or after July 1, 2011 will be studied in the future as experience emerges. For purposes of this study, early retirement rates for those hired on or after July 1, 2011 are set to match the normal retirement rates of those hired before July 1, 2011 to model pent-up demand for retirement.

Males

We reviewed the early retirement experience among active male members during the study period that meet early retirement eligibility at age 50 with 10 years of service. The results are shown on page D-14. Overall, the actual number of early retirements (78) is generally consistent with the number projected by the present assumptions (76 – see totals on page D-14). This suggests that the current rates of early retirement among eligible male individuals are a good fit with plan experience.

We also reviewed the early retirement experience among active male members during the study period that meet early retirement eligibility under the rule of 70. The results are shown on page D-15. Overall, the plan experienced fewer early retirements (88) than projected by the present assumptions (158 – see totals on page D-15). This experience suggests a need to lower the assumed rates of early retirement among eligible male individuals.

Females

We reviewed the early retirement experience among active female members during the study period that meet early retirement eligibility at age 50 with 10 years of service. The results are shown on page D-16. Overall, the plan experienced fewer early retirements (285) than projected by the present assumptions (431 – see totals on page D-16). This experience suggests a need to lower the assumed rates of early retirement among eligible female individuals.

We also reviewed the early retirement experience among active female members during the study period that meet early retirement eligibility under the rule of 70. The results are shown on page D-17. Overall, the plan experienced fewer early retirements (217) than projected by the present assumptions (396 – see totals on page D-17). This experience suggests a need to lower the assumed rates of early retirement among eligible female individuals.

Early Retirement Experience (Concluded)

Other

Given the economic conditions during the experience study period, some of the observed reduction in early retirement rates is not expected to persist. We gave more weight to this study's experience if the direction of the change was the same as in the prior experience study. Therefore, the proposed decreases in early retirement rates do not reflect the full experience of the last five years.

Recommendation

We recommend adoption of the proposed early retirement rates for male and female individuals.

DEMOGRAPHIC ASSUMPTIONS - TEACHERS
MALE WITHDRAWAL EXPERIENCE

Summary of Age-Based Withdrawal Experience With 5 or More Years of Service

Age	Withdrawals	Exposure	Crude Rates	Sample Rates*		Expected Withdrawals**	
				Present	Proposed	Present	Proposed
Under 30	6	203	0.0296	0.0350	0.0400	7	8
30-34	45	1,463	0.0308	0.0350	0.0310	51	46
35-39	54	2,222	0.0243	0.0350	0.0280	78	62
40-44	55	2,481	0.0222	0.0350	0.0280	87	69
45-49	63	2,164	0.0291	0.0350	0.0260	76	56
50-54	63	2,605	0.0242	0.0350	0.0200	91	54
55-59	46	2,609	0.0176	0.0350	0.0200	91	52
Totals	**332**	**13,747**	**0.0242**	**0.0350**	**0.0252**	**481**	**347**

Summary of Service-Based Withdrawal Experience With Less Than 5 Years of Service

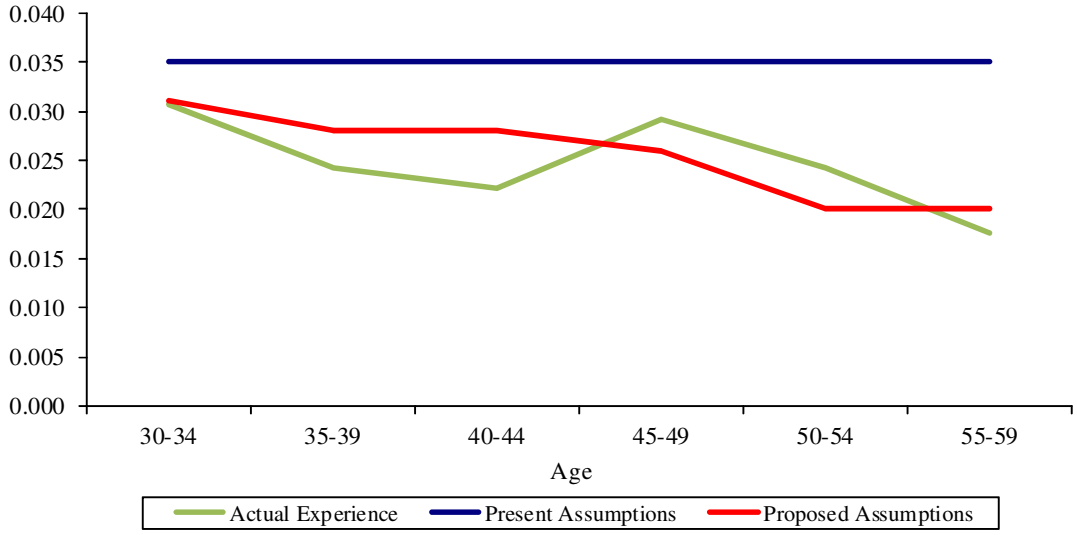
Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	23	59	0.3898	0.3500	0.3500	21	21
2	152	914	0.1663	0.1700	0.1700	157	157
3	114	886	0.1287	0.1400	0.1400	125	125
4	89	841	0.1058	0.1000	0.1000	85	85
5	73	823	0.0887	0.0800	0.0800	66	66
Totals	**451**	**3,523**	**0.1280**	**0.1289**	**0.1289**	**454**	**454**

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

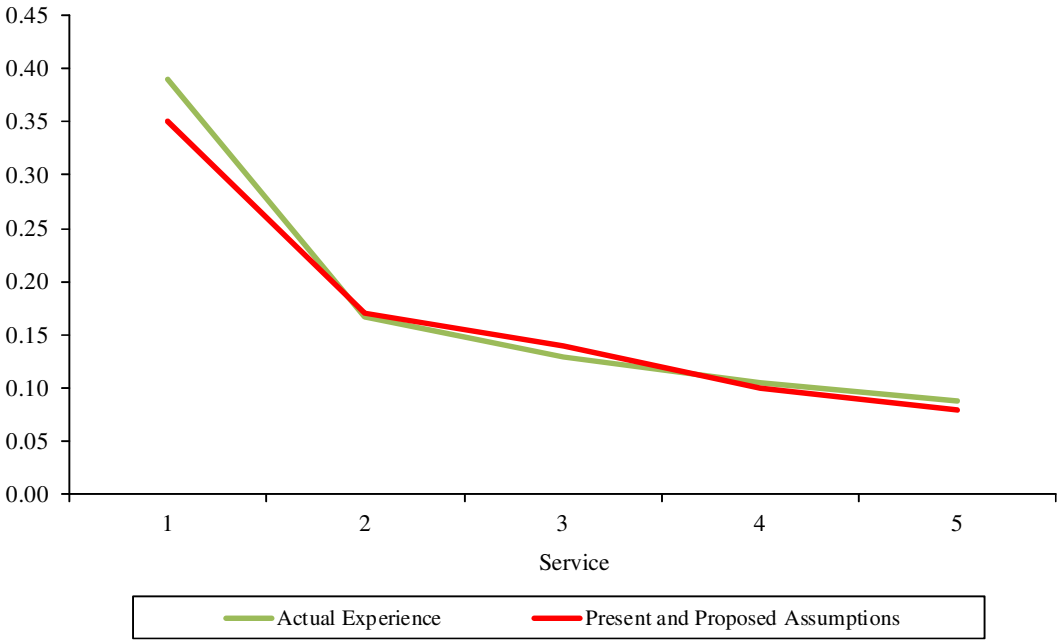
** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during early retirement eligibility.

Age-Based Withdrawal Experience
With 5 or More Years of Service



Service-Based Withdrawal Experience
With Less Than 5 Years of Service



DEMOGRAPHIC ASSUMPTIONS - TEACHERS
FEMALE WITHDRAWAL EXPERIENCE

Summary of Age-Based Withdrawal Experience With 5 or More Years of Service

Age	Withdrawals	Exposure	Crude Rates	Sample Rates*		Expected Withdrawals**	
				Present	Proposed	Present	Propose
Under 30	67	1,018	0.0658	0.0450	0.0600	46	61
30-34	278	5,623	0.0494	0.0450	0.0465	253	270
35-39	225	6,402	0.0351	0.0450	0.0420	288	269
40-44	174	6,625	0.0263	0.0450	0.0420	299	278
45-49	168	6,162	0.0273	0.0450	0.0390	278	239
50-54	203	9,945	0.0204	0.0450	0.0300	448	307
55-59	185	11,116	0.0166	0.0450	0.0300	500	333
Totals	**1,300**	**46,891**	**0.0277**	**0.0450**	**0.0375**	**2,112**	**1,757**

Summary of Service-Based Withdrawal Experience With Less Than 5 Years of Service

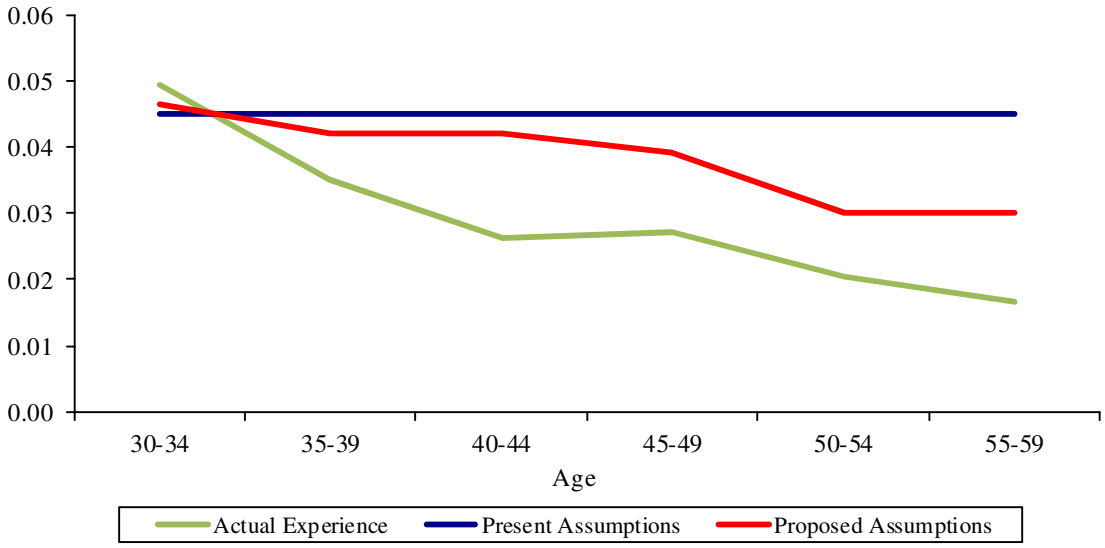
Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	83	283	0.2933	0.3300	0.3100	93	88
2	462	3,404	0.1357	0.1800	0.1600	617	545
3	414	3,393	0.1220	0.1300	0.1300	443	443
4	343	3,392	0.1011	0.1100	0.1100	374	374
5	240	3,430	0.0700	0.0900	0.0800	309	274
Totals	**1,542**	**13,902**	**0.1109**	**0.1321**	**0.1240**	**1,836**	**1,724**

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

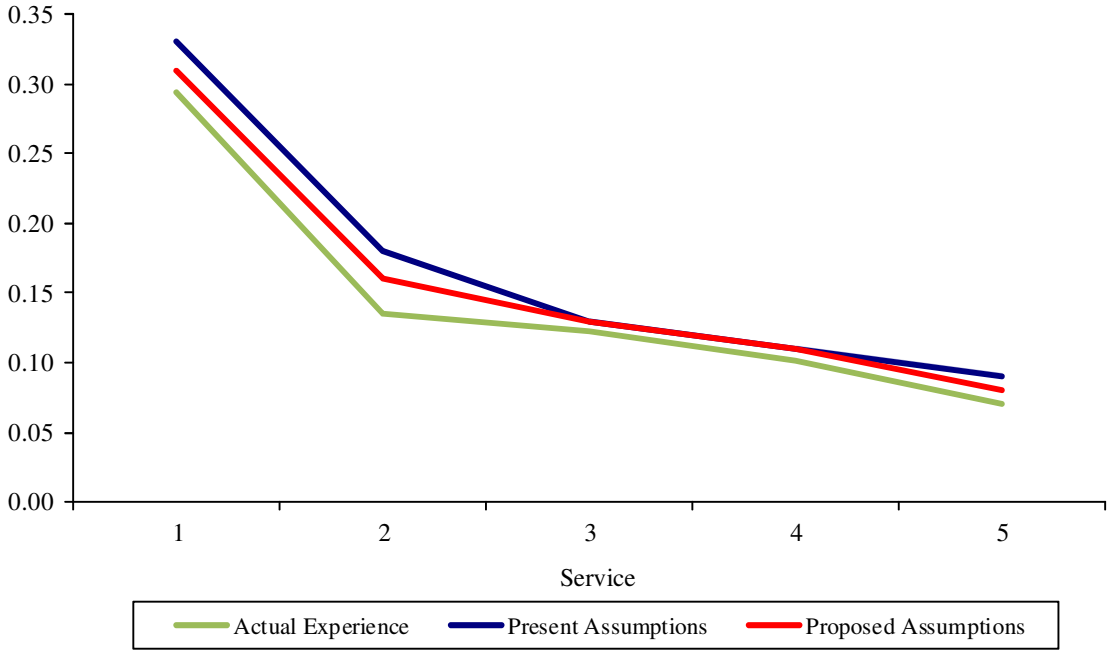
** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during early retirement eligibility.

Age-Based Withdrawal Experience
With 5 or More Years of Service



Service-Based Withdrawal Experience
With Less Than 5 Years of Service



Male Disability Experience

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Present	Proposed	Present	Proposed
Totals	**5**	**12,814**	**0.0004**	**0.00016**	**0.00036**	**2.0**	**4.6**

Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Present	Proposed	Present	Proposed
Totals	**36**	**34,702**	**0.0010**	**0.00010**	**0.00034**	**3.6**	**11.7**

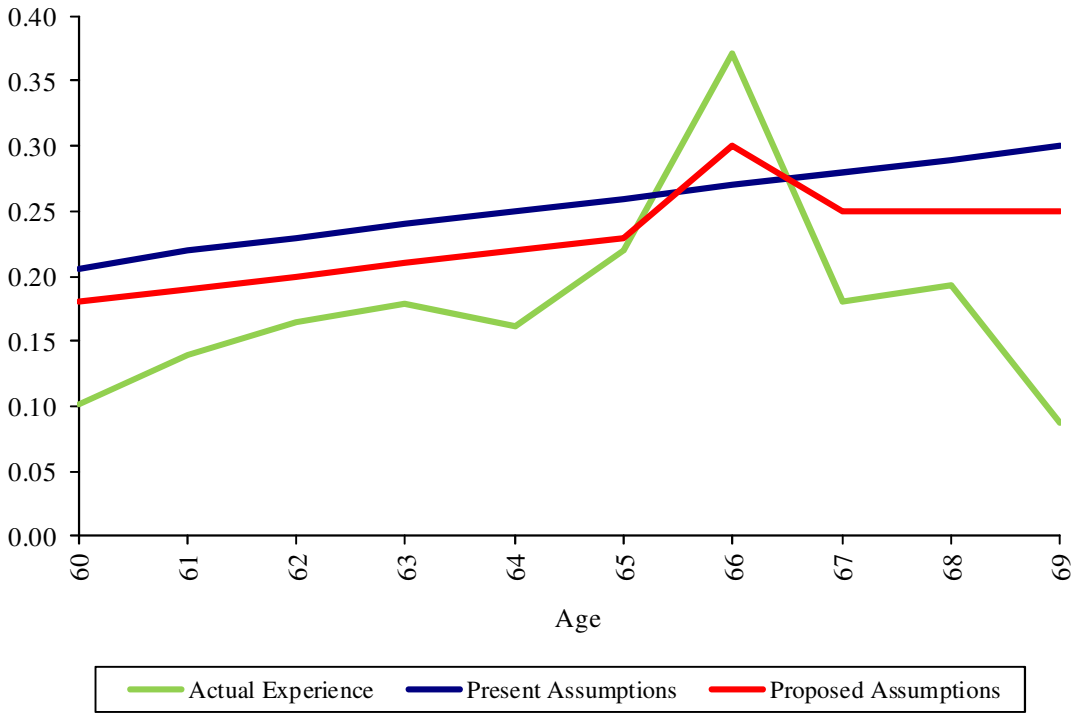
Rates in the tables are aggregated due to the small number of actual disabilities.

DEMOGRAPHIC ASSUMPTIONS - TEACHERS
MALE AGE-BASED RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
60	56	555	0.1009	0.2050	0.1800	114	100
61	66	473	0.1395	0.2200	0.1900	104	90
62	66	402	0.1642	0.2300	0.2000	92	80
63	57	318	0.1792	0.2400	0.2100	76	67
64	44	273	0.1612	0.2500	0.2200	68	60
65	46	209	0.2201	0.2600	0.2300	55	48
66	53	143	0.3706	0.2700	0.3000	39	43
67	13	72	0.1806	0.2800	0.2500	20	18
68	11	57	0.1930	0.2900	0.2500	17	14
69	3	34	0.0882	0.3000	0.2500	10	9
Totals	415	2,536	0.1636			595	529
70 & Over	17	92	0.1848	1.0000	1.0000	92	92
Total	**432**	**2,628**	**0.1644**			**687**	**621**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Age-Based Retirement Experience

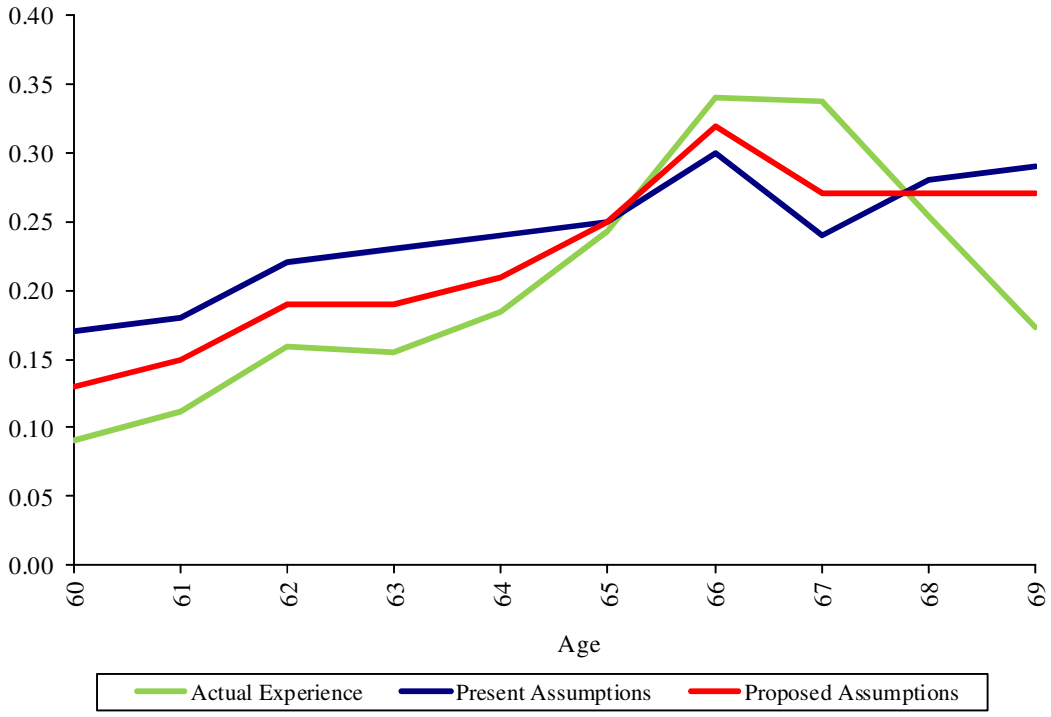


DEMOGRAPHIC ASSUMPTIONS - TEACHERS
FEMALE AGE-BASED RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
60	193	2,128	0.0907	0.1700	0.1300	361	277
61	207	1,848	0.1120	0.1800	0.1500	333	277
62	245	1,535	0.1596	0.2200	0.1900	337	292
63	184	1,182	0.1557	0.2300	0.1900	272	225
64	158	858	0.1841	0.2400	0.2100	206	180
65	148	611	0.2422	0.2500	0.2500	153	153
66	141	415	0.3398	0.3000	0.3200	125	133
67	83	246	0.3374	0.2400	0.2700	59	66
68	33	130	0.2538	0.2800	0.2700	36	35
69	13	75	0.1733	0.2900	0.2700	22	20
Totals	1,405	9,028	0.1556			1,904	1,658
70 & Over	30	128	0.2344	1.0000	1.0000	128	128
Total	**1,435**	**9,156**	**0.1567**			**2,032**	**1,786**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Age-Based Retirement Experience

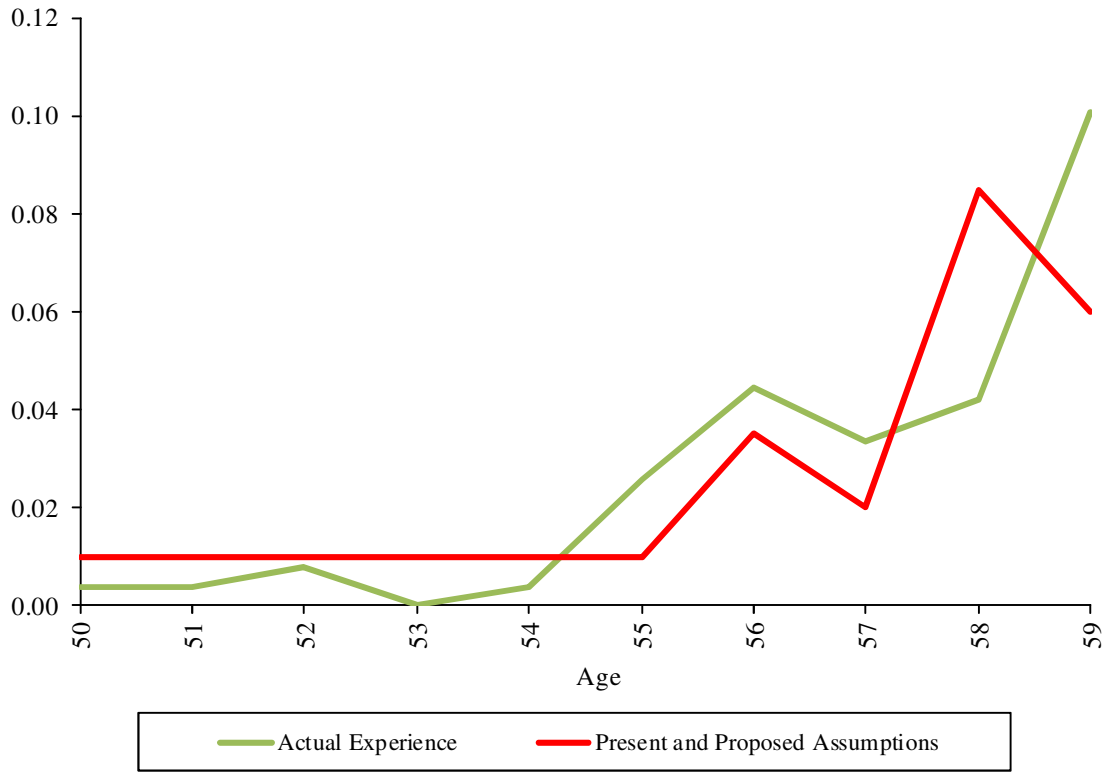


DEMOGRAPHIC ASSUMPTIONS - TEACHERS
MALE AGE-BASED EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
50	1	250	0.0040	0.0100	0.0100	2	2
51	1	259	0.0039	0.0100	0.0100	3	3
52	2	256	0.0078	0.0100	0.0100	3	3
53	-	251	0.0000	0.0100	0.0100	3	3
54	1	255	0.0039	0.0100	0.0100	3	3
55	7	269	0.0260	0.0100	0.0100	3	3
56	12	269	0.0446	0.0350	0.0350	9	9
57	9	267	0.0337	0.0200	0.0200	5	5
58	13	308	0.0422	0.0850	0.0850	26	26
59	32	318	0.1006	0.0600	0.0600	19	19
Total	**78**	**2,702**	**0.0289**			**76**	**76**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Age-Based Early Retirement Experience

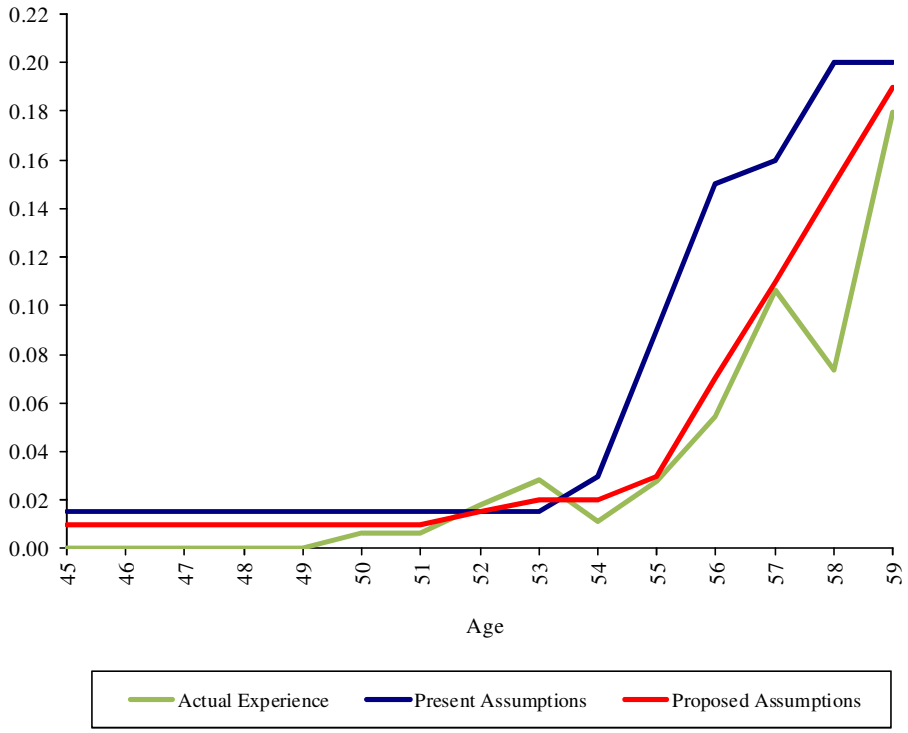


DEMOGRAPHIC ASSUMPTIONS - TEACHERS
MALE RULE OF 70 EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
45	-	4	0.0000	0.0150	0.0100	-	-
46	-	15	0.0000	0.0150	0.0100	-	-
47	-	58	0.0000	0.0150	0.0100	1	1
48	-	96	0.0000	0.0150	0.0100	1	1
49	-	145	0.0000	0.0150	0.0100	2	1
50	1	154	0.0065	0.0150	0.0100	2	2
51	1	160	0.0063	0.0150	0.0100	2	2
52	3	169	0.0178	0.0150	0.0150	3	3
53	5	175	0.0286	0.0150	0.0200	3	4
54	2	175	0.0114	0.0300	0.0200	5	4
55	5	181	0.0276	0.0900	0.0300	16	5
56	10	185	0.0541	0.1500	0.0700	28	13
57	19	179	0.1061	0.1600	0.1100	29	20
58	12	163	0.0736	0.2000	0.1500	33	24
59	30	167	0.1796	0.2000	0.1900	33	32
Total	**88**	**2,026**	**0.0434**			**158**	**112**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages.*
"Expected retirements - Present" is the sum of actual probabilities applied in the valuation.

Rule of 70 Early Retirement Experience

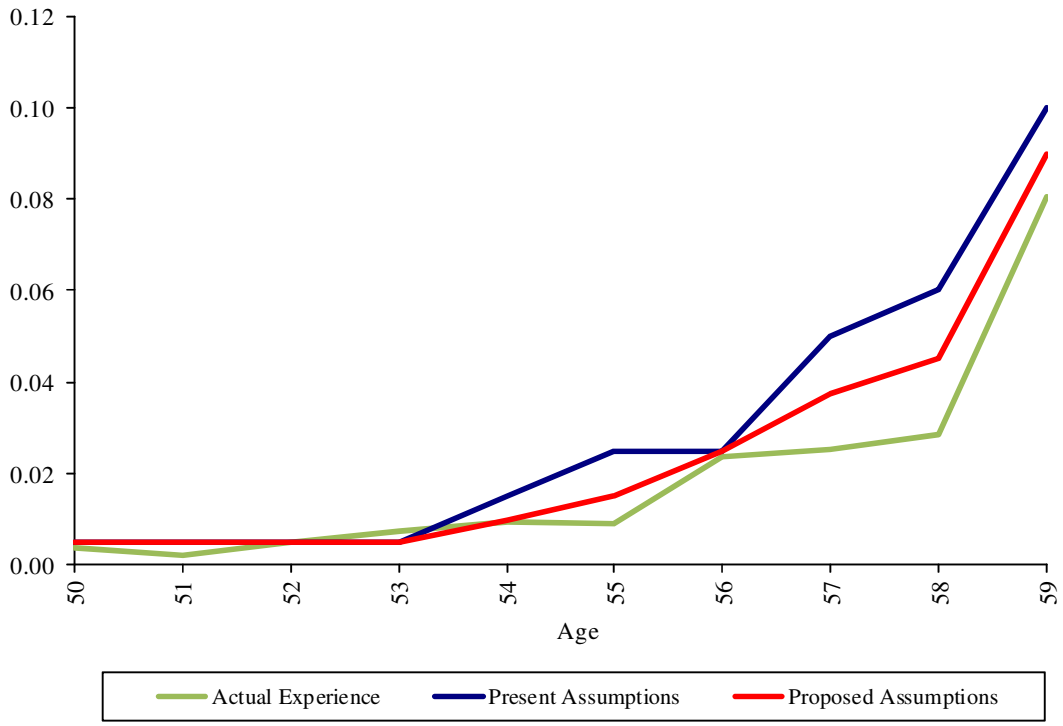


DEMOGRAPHIC ASSUMPTIONS - TEACHERS
FEMALE AGE-BASED EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
50	3	773	0.0039	0.0050	0.0050	4	4
51	2	883	0.0023	0.0050	0.0050	4	4
52	5	996	0.0050	0.0050	0.0050	5	5
53	8	1,108	0.0072	0.0050	0.0050	6	6
54	11	1,190	0.0092	0.0150	0.0100	18	12
55	12	1,310	0.0092	0.0250	0.0150	33	20
56	33	1,388	0.0238	0.0250	0.0250	35	35
57	37	1,462	0.0253	0.0500	0.0375	73	55
58	44	1,541	0.0286	0.0600	0.0450	92	69
59	130	1,612	0.0806	0.1000	0.0900	161	145
Total	**285**	**12,263**	**0.0232**			**431**	**355**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Age-Based Early Retirement Experience

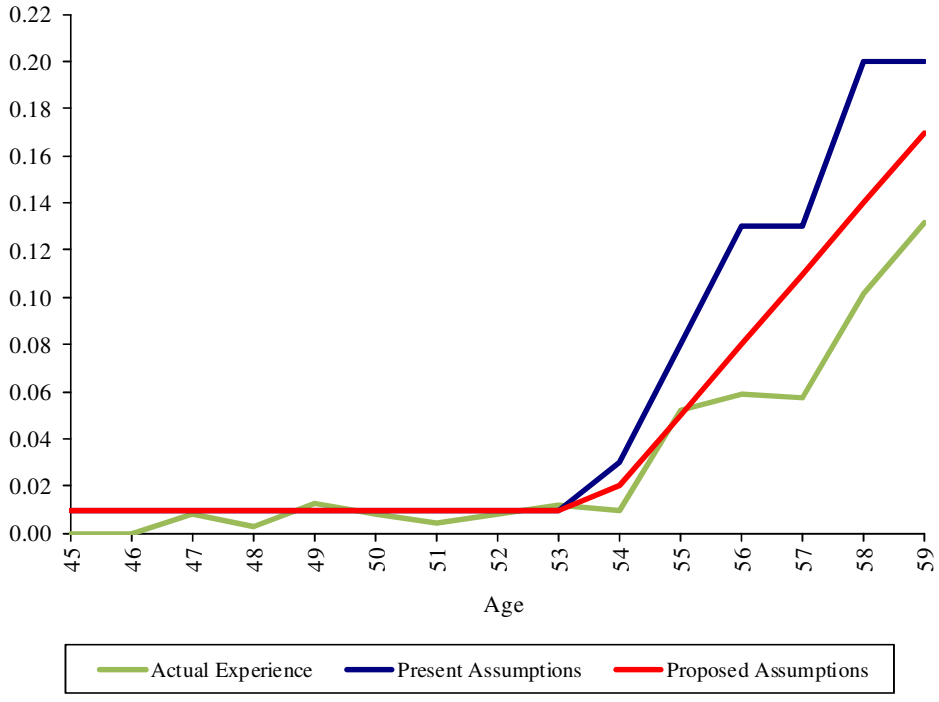


DEMOGRAPHIC ASSUMPTIONS - TEACHERS
FEMALE RULE OF 70 EARLY RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
45	-	9	0.0000	0.0100	0.0100	-	-
46	-	76	0.0000	0.0100	0.0100	1	1
47	2	241	0.0083	0.0100	0.0100	2	2
48	1	362	0.0028	0.0100	0.0100	4	4
49	6	476	0.0126	0.0100	0.0100	5	5
50	4	473	0.0085	0.0100	0.0100	5	5
51	2	501	0.0040	0.0100	0.0100	5	5
52	4	491	0.0081	0.0100	0.0100	5	5
53	6	517	0.0116	0.0100	0.0100	5	5
54	5	506	0.0099	0.0300	0.0200	15	10
55	27	522	0.0517	0.0800	0.0500	42	26
56	30	507	0.0592	0.1300	0.0800	66	41
57	28	489	0.0573	0.1300	0.1100	64	54
58	47	464	0.1013	0.2000	0.1400	93	65
59	55	418	0.1316	0.2000	0.1700	84	71
Total	**217**	**6,052**	**0.0359**			**396**	**299**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages.*
"Expected retirements - Present" is the sum of actual probabilities applied in the valuation.

Rule of 70 Early Retirement Experience



SECTION E

DEMOGRAPHIC ASSUMPTIONS – POLICE

Withdrawal Experience

Findings

Members who leave active employment, for reasons other than retirement or death, may be eligible for the following payments from the pension trust:

- A refund of employee contributions, or
- A deferred retirement benefit, if they are vested

Deferred retirement benefits are based on the pay and service credit at the time of withdrawal. The benefit is frozen, and not payable until sometime in the future. Consequently, members who withdraw receive much less from the plan then members who stay in employment until retirement. Higher rates of withdrawal result in lower computed contributions, and vice-versa.

We separated the members into two groups for the analysis: 1) members with fewer than 5 years of credited service, and 2) those members with 5 or more years of credited service. Male and female rates were looked at separately.

Males

The analysis for male members with fewer than 5 years of credited service is shown on page E-5. Overall, the plan experienced fewer withdrawals (446) than projected by the present assumptions (481 – see totals on page E-6). This experience suggests a need to lower the assumed rates of withdrawal among male individuals with fewer than 5 years of service.

Females

The analysis for female members with fewer than 5 years of credited service is shown on page E-6. Overall, the plan experienced fewer withdrawals (134) than projected by the present assumptions (151 – see totals on page E-7). This experience suggests a need to lower the assumed rates of withdrawal among female individuals with fewer than 5 years of service.

Other

The rates proposed for males with 5 or more years of service are an even better fit to the shape of the experience curve for female members. Therefore, the analysis for male and female members with 5 or more years of credited service is combined and shown on page E-4. Overall, the plan experienced fewer withdrawals (376) than projected by the present assumptions (611 – see totals on page E-5). This experience suggests a need to lower the assumed rates of withdrawal among individuals with 5 or more years of service.

Given the economic conditions during the experience study period, we believe that some of the low turnover is temporary. Therefore, the proposed decreases in termination rates do not reflect the full experience of the last five years.

Recommendation

We recommend adoption of the proposed withdrawal assumptions.

Disability Experience

Findings

The assumed rates of disability (leaving active service due to injury or illness while not entitled to age and service retirement benefits) are a minor ingredient in cost calculations, since the incidence of disability is low. Higher rates of disability generally would result in somewhat higher computed contributions for NHRS, and vice-versa.

We reviewed the disability experience during the 5 year period. The results are shown on page E-7. Overall, the plan experienced more disability retirements (61) than projected by the present assumptions (42.9 – see totals on page E-7). This experience suggests a need to increase the assumed rates of disability.

The actual incidence of accidental vs. ordinary disability was 64% accidental and 36% ordinary vs. the assumption of 40%/60%. This experience suggests that a change in the assumption is warranted.

Recommendation

We recommend adoption of the proposed rates of disability retirement rates. In addition, we recommend assuming that 50% of disabilities are accidental.

Age and Service (Normal) Retirement Experience

Findings

The benefit provisions of the Retirement System establish the minimum age and service requirements for unreduced or normal retirement. However, the actual cost of retirement is determined by when members actually retire. The assumption about timing of retirements is a major ingredient in cost calculations. Note that higher rates of retirement with full benefits generally results in higher computed contributions, and vice-versa.

We reviewed the retirement experience among active members during the study period. The results are shown on pages E-8 and E-9. The plan experienced fewer retirements (606) than projected by the present assumptions (820 – see totals on page E-8). This experience suggests a need to lower the assumed rates of retirement.

Given the economic conditions during the experience study period, some of the observed reduction in retirement rates is not expected to persist. We gave more weight to this study's experience if the direction of the change was the same as in the prior experience study. Therefore, the proposed decreases in retirement rates do not reflect the full experience of the last five years.

Retirement rates for those hired on or after July 1, 2011 will be studied in the future as experience emerges. For purposes of this study, retirement rates for those hired on or after July 1, 2011 are adjusted in the first five years of retirement eligibility to model pent-up demand for retirement.

Recommendations

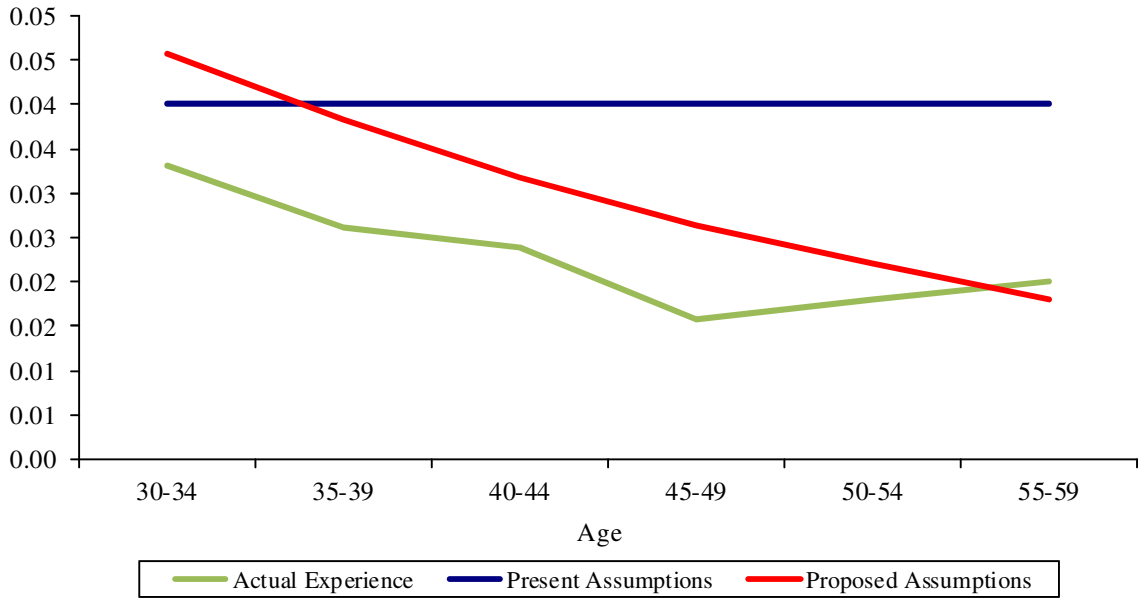
We recommend adoption of the proposed normal retirement rates.

DEMOGRAPHIC ASSUMPTIONS - POLICE
AGE BASED WITHDRAWAL EXPERIENCE

Summary of Male & Female Age-Based Withdrawal Experience With 5 or More Years of Service

Age	Withdrawals	Exposure	Crude Rates	Sample Rates*		Expected Withdrawals**	
				Present	Proposed	Present	Proposed
Under 30	37	734	0.0504	0.0400	0.0547	29	38
30-34	79	2,388	0.0331	0.0400	0.0458	97	109
35-39	80	3,064	0.0261	0.0400	0.0384	123	118
40-44	89	3,714	0.0240	0.0400	0.0318	150	118
45-49	45	2,874	0.0157	0.0400	0.0264	115	76
50-54	28	1,546	0.0181	0.0400	0.0222	62	34
55-59	18	894	0.0201	0.0400	0.0181	35	16
Totals	**376**	**15,214**	**0.0247**	**0.0402**	**0.0335**	**611**	**509**

Summary of Male & Female Age-Based Withdrawal Experience With 5 or More Years of Service



Summary of Male Service-Based Withdrawal Experience With Less Than 5 Years of Service

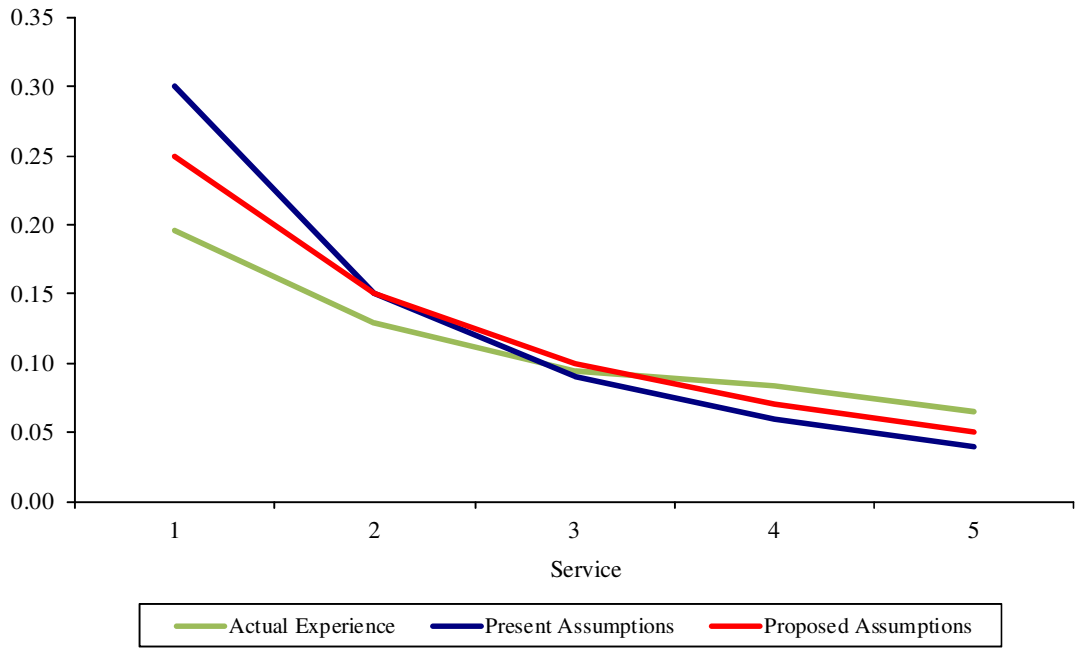
Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	104	529	0.1966	0.3000	0.2500	159	132
2	128	988	0.1296	0.1500	0.1500	150	150
3	84	896	0.0938	0.0900	0.1000	82	90
4	72	862	0.0835	0.0600	0.0700	53	60
5	58	888	0.0653	0.0400	0.0500	37	44
Totals	**446**	**4,163**	**0.1071**	**0.1155**	**0.1143**	**481**	**476**

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

** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during retirement eligibility.

Summary of Male Service-Based Withdrawal Experience With Less Than 5 Years of Service



DEMOGRAPHIC ASSUMPTIONS - POLICE
FEMALE WITHDRAWAL EXPERIENCE

Summary of Female Service-Based Withdrawal Experience With Less Than 5 Years of Service

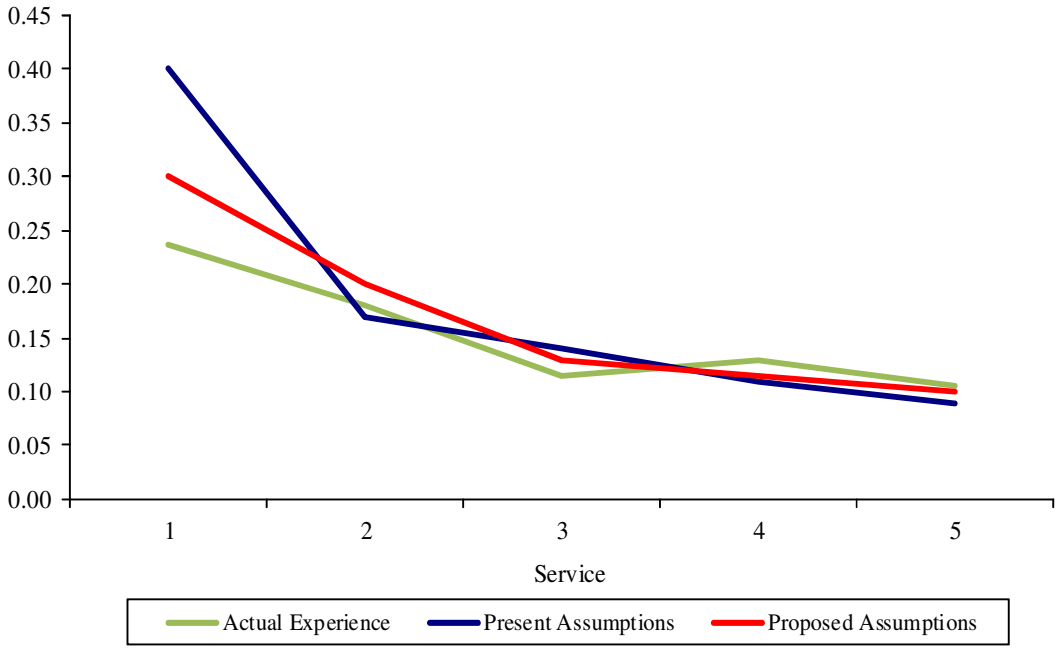
Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	28	118	0.2373	0.4000	0.3000	47	35
2	44	243	0.1811	0.1700	0.2000	42	49
3	22	191	0.1152	0.1400	0.1300	27	25
4	23	177	0.1299	0.1100	0.1150	20	20
5	17	160	0.1063	0.0900	0.1000	15	16
Totals	**134**	**889**	**0.1507**	**0.1699**	**0.1631**	**151**	**145**

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

** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during retirement eligibility.

Summary of Female Service-Based Withdrawal Experience With Less Than 5 Years of Service



Male & Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Present	Proposed	Present	Proposed
Totals	**61**	**17,727**	**0.0034**	**0.00242**	**0.00273**	**42.9**	**48.4**

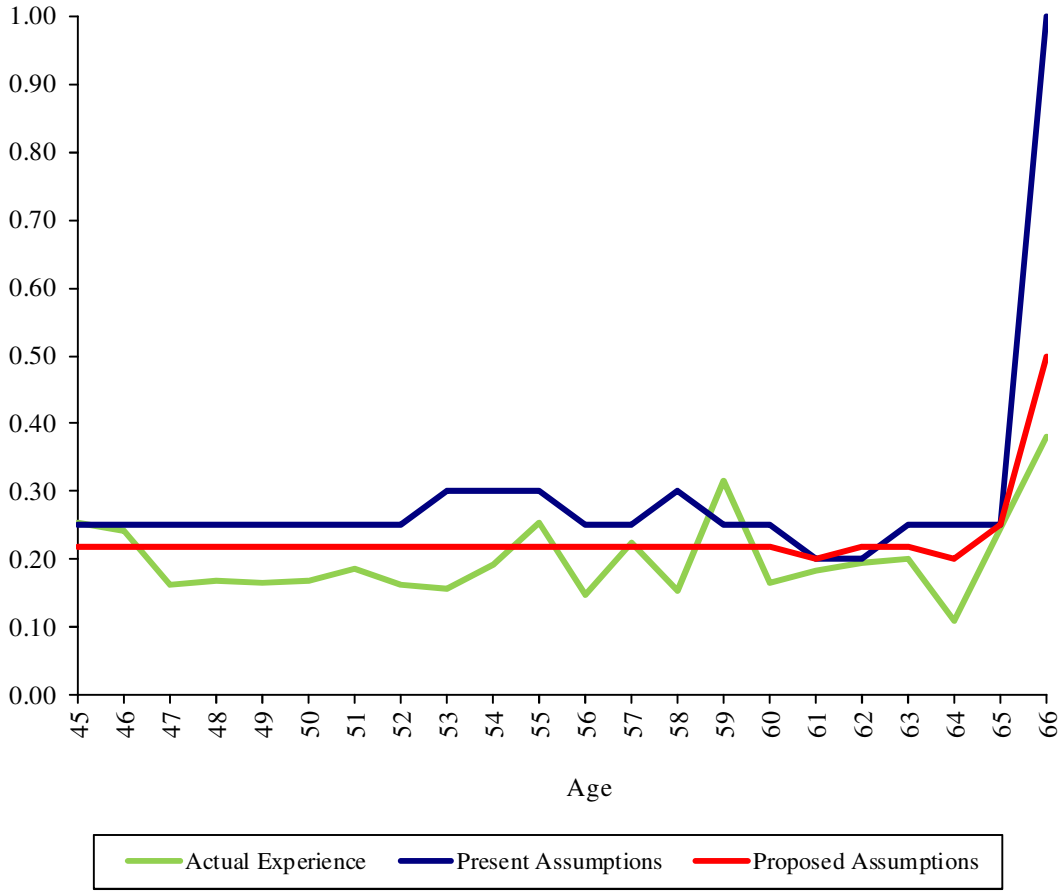
Rates in the table are aggregated due to the small number of actual disabilities.

DEMOGRAPHIC ASSUMPTIONS - POLICE
MALE & FEMALE AGE-BASED RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
45	84	330	0.2545	0.2500	0.2200	82	73
46	69	286	0.2413	0.2500	0.2200	71	63
47	42	257	0.1634	0.2500	0.2200	64	57
48	43	254	0.1693	0.2500	0.2200	63	56
49	39	235	0.1660	0.2500	0.2200	59	52
50	33	197	0.1675	0.2500	0.2200	49	43
51	34	183	0.1858	0.2500	0.2200	46	40
52	25	154	0.1623	0.2500	0.2200	38	34
53	21	133	0.1579	0.3000	0.2200	40	29
54	23	120	0.1917	0.3000	0.2200	36	26
55	25	98	0.2551	0.3000	0.2200	30	22
56	13	87	0.1494	0.2500	0.2200	21	19
57	19	84	0.2262	0.2500	0.2200	21	18
58	10	65	0.1538	0.3000	0.2200	20	14
59	17	54	0.3148	0.2500	0.2200	13	12
60	22	133	0.1654	0.2500	0.2200	33	29
61	19	104	0.1827	0.2000	0.2000	21	21
62	17	87	0.1954	0.2000	0.2200	17	19
63	14	70	0.2000	0.2500	0.2200	17	15
64	6	54	0.1111	0.2500	0.2000	13	11
65	10	41	0.2439	0.2500	0.2500	10	10
66	8	21	0.3810	1.0000	0.5000	21	11
67	3	13	0.2308	1.0000	0.5000	13	7
68	5	9	0.5556	1.0000	0.5000	9	5
69	1	3	0.3333	1.0000	0.5000	3	2
70 & Over	4	10	0.4000	1.0000	1.0000	10	10
Total	**606**	**3,082**	**0.1966**			**820**	**698**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Male & Female Age-Based Retirement Experience



SECTION F

DEMOGRAPHIC ASSUMPTIONS – FIRE

Withdrawal Experience

Findings

Members who leave active employment, for reasons other than retirement or death, may be eligible for the following payments from the pension trust:

- A refund of employee contributions, or
- A deferred retirement benefit, if they are vested

Deferred retirement benefits are based on the pay and service credit at the time of withdrawal. The benefit is frozen, and not payable until sometime in the future. Consequently, members who withdraw receive much less from the plan then members who stay in employment until retirement. Higher rates of withdrawal result in lower computed contributions, and vice-versa. Due to the small group size, males and females were studied together.

We separated the members into two groups for the analysis: 1) members with fewer than 5 years of credited service, and 2) those members with 5 or more years of credited service.

The analysis for members with fewer than 5 years of credited service is shown on pages F-4 and F-5. Overall, the plan experienced fewer withdrawals (38) than projected by the present assumptions (57 – see totals at the bottom of page F-4). This experience suggests a need to lower the assumed rates of withdrawal among individuals with fewer than 5 years of service.

The analysis for members with 5 or more years of credited service is shown on pages F-4 and F-5. Overall, the plan experienced fewer withdrawals (59) than projected by the present assumptions (101 – see totals at the top of page F-4). This experience suggests a need to lower the assumed rates of withdrawal among individuals with 5 or more years of service.

Given the economic conditions during the experience study period, we believe that some of the low turnover is temporary. Therefore, the proposed decreases in termination rates do not reflect the full experience of the last five years.

Recommendation

We recommend adoption of the proposed withdrawal assumptions.

Disability Experience

Findings

The assumed rates of disability (leaving active service due to injury or illness while not entitled to age and service retirement benefits) are a minor ingredient in cost calculations, since the incidence of disability is low. Higher rates of disability generally would result in somewhat higher computed contributions for NHRS, and vice-versa.

We reviewed the disability experience during the 5 year period. The results are shown on page F-6. Overall, the plan experienced less disability retirements (13) than projected by the present assumptions (16.4 – see totals on page F-6). This experience suggests a need to lower the assumed rates of disability.

The actual incidence of accidental vs. ordinary disability was 61% accidental and 39% ordinary vs. the assumption of approximately 40%/60%. This experience suggests that a change in the assumption is warranted.

Recommendation

We recommend adoption of the proposed rates of disability retirement rates. In addition, we recommend assuming that approximately 50% of disabilities are accidental.

Age and Service (Normal) Retirement Experience

Findings

The benefit provisions of the Retirement System establish the minimum age and service requirements for unreduced or normal retirement. However, the actual cost of retirement is determined by when members actually retire. The assumption about timing of retirements is a major ingredient in cost calculations. Note that higher rates of retirement with full benefits generally results in higher computed contributions, and vice-versa.

We reviewed the retirement experience among active members during the study period. The results are shown on pages F-7 and F-8. The plan experienced fewer retirements (262) than projected by the present assumptions (324 – see totals on page F-7). This experience suggests a need to lower the assumed rates of retirement.

Given the economic conditions during the experience study period, some of the observed reduction in retirement rates is not expected to persist. We gave more weight to this study's experience if the direction of the change was the same as in the prior experience study. Therefore, the proposed decreases in retirement rates do not reflect the full experience of the last five years.

Retirement rates for those hired on or after July 1, 2011 will be studied in the future as experience emerges. For purposes of this study, retirement rates for those hired on or after July 1, 2011 are adjusted in the first five years of retirement eligibility to model pent-up demand for retirement.

Recommendations

We recommend adoption of the proposed normal retirement rates.

DEMOGRAPHIC ASSUMPTIONS - FIRE
MALE & FEMALE WITHDRAWAL EXPERIENCE

Summary of Male & Female Age-Based Withdrawal Experience With 5 or More Years of Service

Age	Withdrawals	Exposure	Crude Rates	Sample Rates*		Expected Withdrawals**	
				Present	Proposed	Present	Proposed
Under 30	1	292	0.0034	0.0150	0.0125	5	4
30-34	5	797	0.0063	0.0150	0.0125	12	10
35-39	11	1,048	0.0105	0.0150	0.0125	16	13
40-44	13	1,580	0.0082	0.0150	0.0125	25	20
45-49	18	1,581	0.0114	0.0150	0.0125	24	20
50-54	5	922	0.0054	0.0150	0.0125	13	11
55-59	6	412	0.0146	0.0150	0.0125	6	5
Totals	**59**	**6,632**	**0.0089**	**0.0152**	**0.0125**	**101**	**83**

Summary of Male & Female Service-Based Withdrawal Experience With Less Than 5 Years of Service

Service Index	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Present	Proposed	Present	Proposed
1	9	120	0.0750	0.0800	0.0775	10	9
2	8	251	0.0319	0.0600	0.0450	16	11
3	5	283	0.0177	0.0450	0.0300	14	8
4	8	312	0.0256	0.0300	0.0275	10	9
5	8	316	0.0253	0.0200	0.0225	7	7
Totals	**38**	**1,282**	**0.0296**	**0.0445**	**0.0343**	**57**	**44**

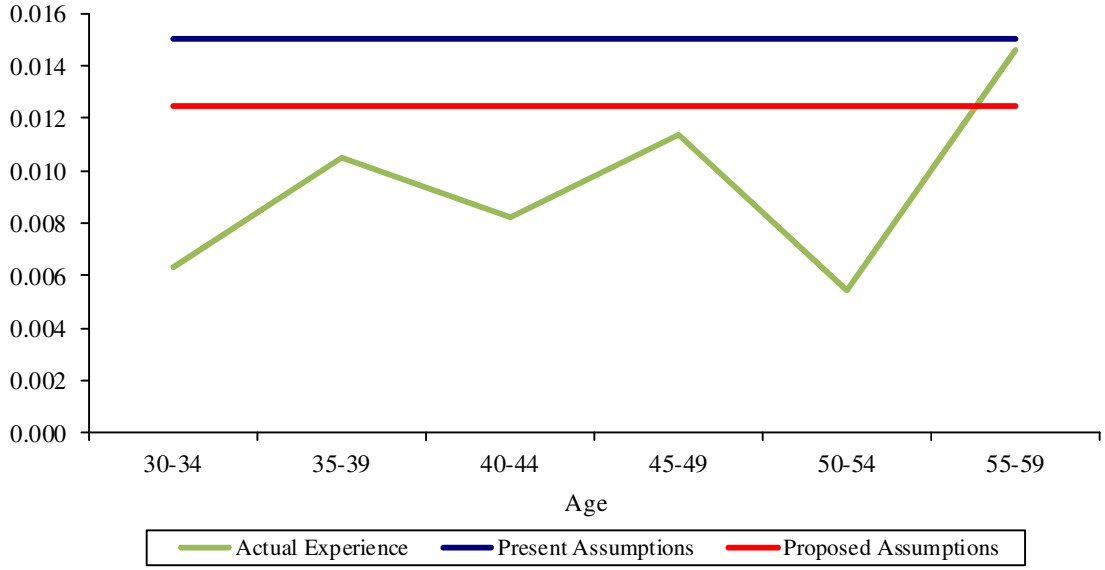
* *Sample rates are taken from midpoint of age group.*

** *"Expected withdrawals - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected withdrawals - Present" is the sum of actual probabilities applied in the valuation.*

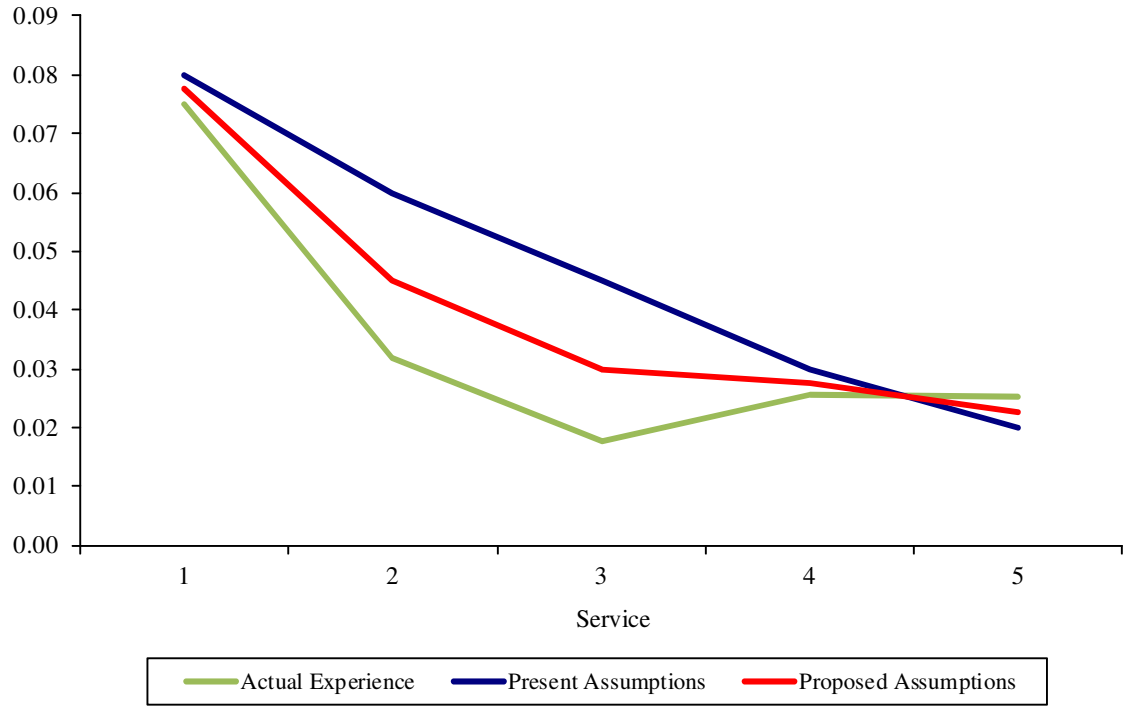
Exposures for those with more than 5 years of experience have been adjusted to reflect the change in assumption to consider withdrawals separately during early retirement eligibility.

DEMOGRAPHIC ASSUMPTIONS - FIRE
WITHDRAWAL GRAPHS

Age-Based Withdrawal Experience
With 5 or More Years of Service



Service-Based Withdrawal Experience
With Less Than 5 Years of Service



DEMOGRAPHIC ASSUMPTIONS - FIRE
DISABILITY EXPERIENCE

Male & Female Disability Experience

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Present	Proposed	Present	Proposed
Totals	**13**	**6,333**	**0.0021**	**0.0026**	**0.0023**	**16.4**	**14.7**

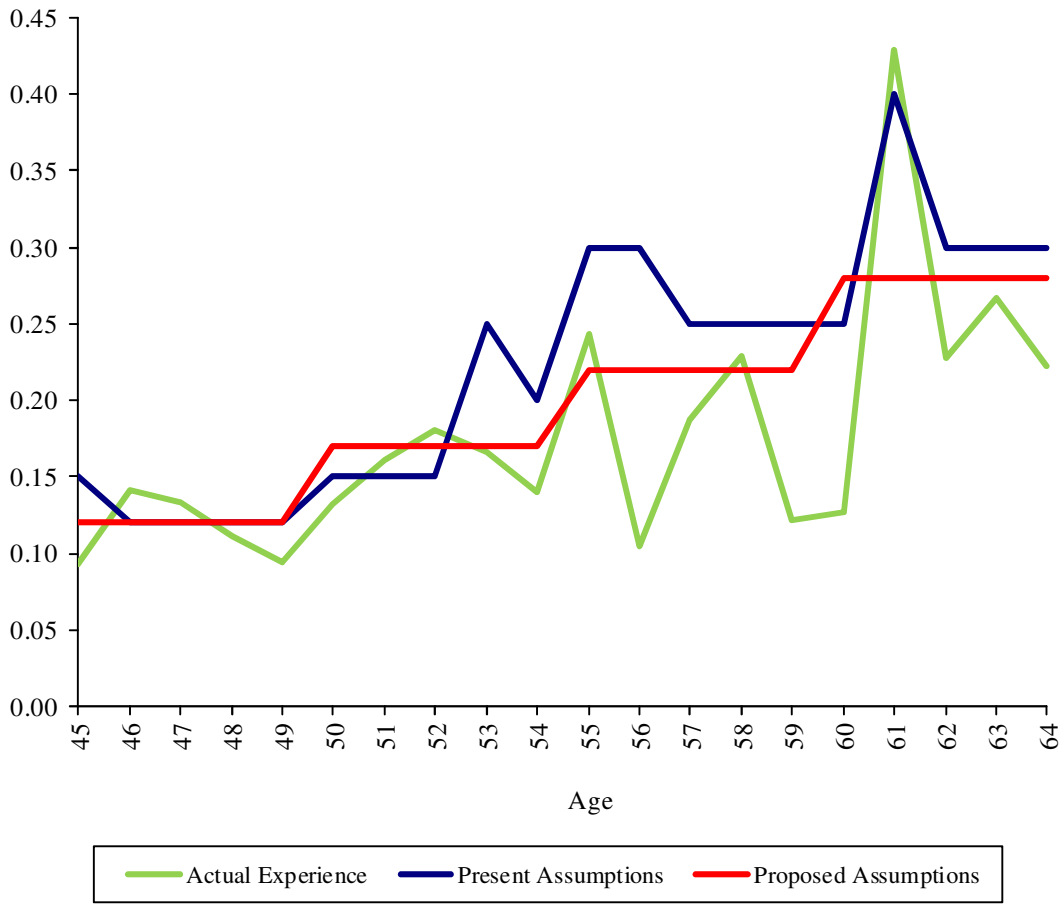
Rates in the table are aggregated due to the small number of actual disabilities.

DEMOGRAPHIC ASSUMPTIONS - FIRE
MALE & FEMALE AGE-BASED RETIREMENT EXPERIENCE

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements*	
				Present	Proposed	Present	Proposed
45	14	150	0.0933	0.1500	0.1200	22	18
46	23	163	0.1411	0.1200	0.1200	19	19
47	23	172	0.1337	0.1200	0.1200	21	21
48	16	143	0.1119	0.1200	0.1200	17	17
49	13	138	0.0942	0.1200	0.1200	16	16
50	17	129	0.1318	0.1500	0.1700	19	22
51	20	124	0.1613	0.1500	0.1700	18	21
52	21	116	0.1810	0.1500	0.1700	17	20
53	17	102	0.1667	0.2500	0.1700	26	17
54	13	93	0.1398	0.2000	0.1700	19	16
55	19	78	0.2436	0.3000	0.2200	23	17
56	6	57	0.1053	0.3000	0.2200	17	13
57	9	48	0.1875	0.2500	0.2200	12	11
58	8	35	0.2286	0.2500	0.2200	9	8
59	4	33	0.1212	0.2500	0.2200	8	7
60	7	55	0.1273	0.2500	0.2800	13	15
61	15	35	0.4286	0.4000	0.2800	14	10
62	5	22	0.2273	0.3000	0.2800	7	6
63	4	15	0.2667	0.3000	0.2800	4	4
64	2	9	0.2222	0.3000	0.2800	2	3
65	2	9	0.2222	1.0000	0.2800	9	3
66	1	4	0.2500	1.0000	0.2800	4	1
67	-	2	0.0000	1.0000	0.2800	2	1
68	-	-	N/A	1.0000	0.2800	-	-
69	-	-	N/A	1.0000	0.2800	-	-
70 & Over	3	6	0.5000	1.0000	1.0000	6	-
Total	**262**	**1,738**	**0.1507**			**324**	**286**

* *"Expected retirements - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected retirements - Present" is the sum of actual probabilities applied in the valuation.*

Age-Based Retirement Experience



SECTION G

DEMOGRAPHIC ASSUMPTIONS – MORTALITY

Findings

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

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

The proposed rates take a different approach and assume that future mortality rates will continue to decline with each generation. For this "generational" approach, we remove the static margin from the base tables and apply a mortality improvement scale to project rates getting lower each year in the future. This means that next year's 65-year-old will have a slightly longer life expectancy than this year's, etc.

The approach we have taken is based on the RPEC_2014 model described by the Society of Actuaries (SOA). The base mortality tables we select from are the RP-2014 mortality tables. The improvement scales we consider are the 2-dimensional MP-2015 mortality improvement scales projected from the base year of 2006 after adjusting for MP-2014 improvements. It is anticipated that the SOA will release new improvement scales annually. For purposes of NHRS valuations, we recommend maintaining the MP-2015 improvement scales until the next experience study.

NHRS has a large enough aggregate population to be considered credible for determining an appropriate set of base tables, however the separate member classifications are not large enough. We apply a credibility procedure in accordance with ASOP No. 25, Credibility Procedures to determine partial credibility based on the limited fluctuation method to determine appropriate adjustments to the base table to be applied to each gender within each member classification.

The first step in this procedure is to select the appropriate version of the RP-2014 mortality tables for the aggregate NHRS population of healthy retirees. We have performed this analysis on a benefits weighted basis consistent with the development of the RP-2014 tables and their intended use in the valuations.

Healthy Retirees

We reviewed the mortality experience of healthy retirees during the 5-year period. The results are shown on pages G-4 and G-5. Figures in the tables are developed with a scaling factor of $1 million. The plan experienced more benefit weighted deaths among males ($26.17 million) than projected by the present assumptions ($23.77 million – see totals on page G-4). The actual number of benefit weighted deaths among retired females ($18.38 million) was less than the number projected by the present assumptions ($19.70 million – see totals on page G-5).

The expected new benefit weighted deaths for each gender are based on the RP-2014 Healthy Annuitant tables. Based on the good fit of the benefit weighted deaths, these tables are an appropriate selection for the System as a whole. Tables have been extended to younger ages as needed using a cubic spline method with the published Juvenile rates. Additional adjustments by member classification are described below.

Disabled Retirees

Disabled mortality experience during the study period was not sufficient to be fully credible. We recommend adopting the RP-2014 disabled mortality tables with the same partial credibility adjustments for each member classification as the healthy annuitant tables.

Active Members

Active mortality experience during the study period was not sufficient to be fully credible. We recommend adopting the RP-2014 Employees mortality tables with the same partial credibility adjustments for each member classification as the healthy annuitant tables. There was insufficient experience to warrant a change in the ordinary/accidental death weighting assumption.

Mortality Improvement

The Society of Actuaries' MP-2015 report recommends considering applying MP-2015 fully generational to the selected RP-2014 table adjusted to the base year of 2006. We have applied this adjustment as recommended.

Partial Credibility

We use the limited fluctuation credibility procedure to determine the appropriate scaling factor of the base mortality tables for each gender and each member classification on a benefits weighted basis. In each case, the Z-factor is computed based on the experience of the group being studied. This Z-factor is a measure of the credibility of the pertinent group.

The Best Fit is the ratio of actual to expected deaths using the base table. The final scale is then determined as the weighted average of the Best Fit and 100% based on the Z-factor. For example, for male Employees, the Z-factor of 73% suggests the data for that group is 73% credible. The Best Fit for that group would be to scale the base tables by 122%. The final scale of 116% is the credibility-weighted average (116% = 73% x 122% + 27% x 100%). Factors for other groups are determined similarly.

	Deaths Needed For Full Credibility	Observed NHRS Deaths			
		Employees	Teachers	Police	Fire
Male	1,785	961	289	169	96
Female	1,749	914	538	23	1

	Employees	Teachers	Police	Fire
Z-Male	73%	40%	31%	23%
Z-Female	72%	55%	11%	2%
Scale-Male	116%	100%	99%	100%
Scale-Female	124%	87%	106%	101%
Best Fit Male	122%	99%	98%	98%
Best Fit Female	133%	76%	156%	147%

Recommendations

We recommend adoption of the proposed mortality rates, partial credibility adjustments, and improvement scales.

The specifics of the recommended mortality tables follow:

Healthy Retirees: RP-2014 Healthy Annuitant generational mortality tables for males and females, adjusted for mortality improvements using Scale MP-2015.

Disabled Retirees: RP-2014 Disabled Retiree generational mortality tables for males and females, adjusted for mortality improvements using Scale MP-2015.

Active Members: RP-2014 Employee generational mortality tables for males and females, adjusted for mortality improvements using Scale MP-2015.

Scaling factors for each member classification apply to all mortality tables.

Mortality Improvement: MP-2015 2-dimensional improvement scales, fully generational.

There was insufficient experience to warrant changing the weighting of ordinary and accidental deaths. We recommend maintaining the current assumptions.

	Employees	Teachers	Police	Fire
Ordinary	98%	98%	50%	50%
Accidental	2%	2%	50%	50%

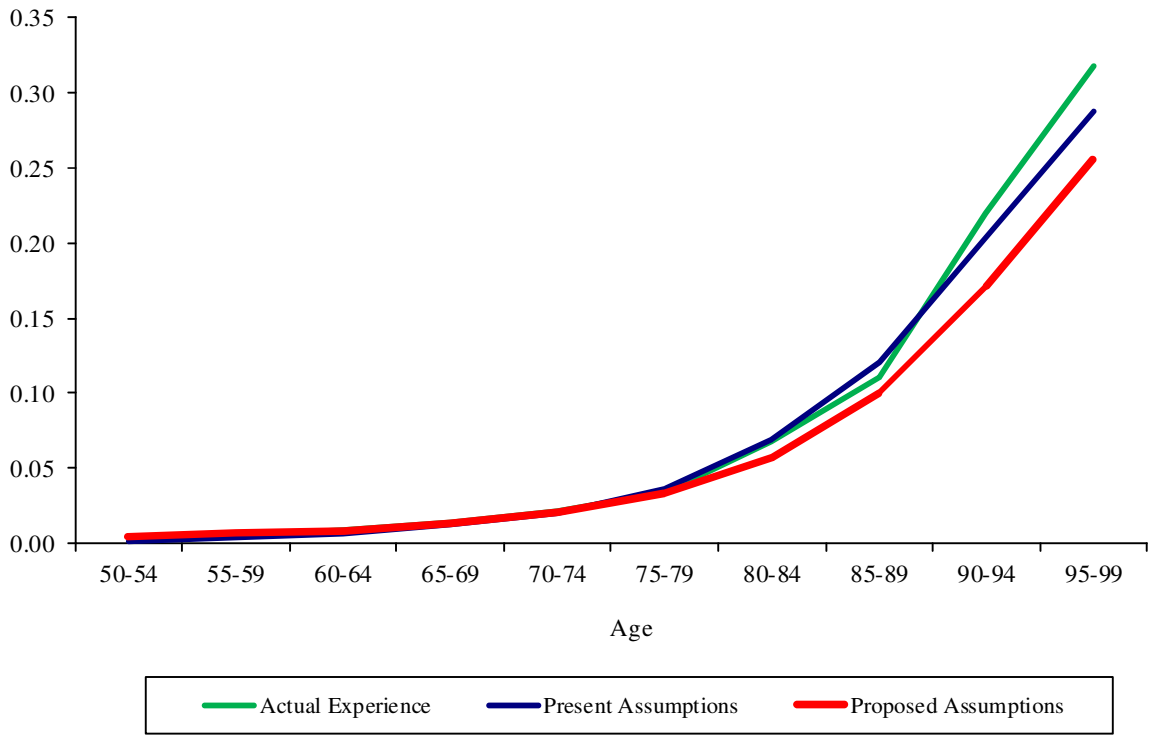
HEALTHY MALE RETIRANT MORTALITY EXPERIENCE

Actual and expected deaths and exposures are **benefit weighted** with a scaling factor of $1 million.

Age	Deaths	Exposure	Crude Rates	Sample Rates*		Expected Deaths**	
				Present	Proposed	Present	Proposed
50-54	0.62	122.14	0.005076	0.001781	0.004648	0.22	0.57
55-59	0.95	170.93	0.005558	0.003331	0.006430	0.58	1.11
60-64	2.67	288.65	0.009250	0.006473	0.008784	1.97	2.59
65-69	3.98	287.57	0.013840	0.012374	0.012856	3.48	3.69
70-74	3.62	172.82	0.020947	0.020164	0.020428	3.46	3.49
75-79	3.84	113.93	0.033705	0.036105	0.033750	4.12	3.83
80-84	4.65	68.25	0.068132	0.068542	0.057578	4.54	3.86
85-89	3.18	28.72	0.110724	0.120616	0.100511	3.34	2.78
90-94	1.81	8.24	0.219660	0.203973	0.170957	1.57	1.33
95-99	0.41	1.29	0.317829	0.288083	0.255391	0.35	0.31
100-104	0.06	0.18	0.333333	0.371685	0.354865	0.06	0.06
105-109	0.02	0.02	1.000000	0.400000	0.448460	0.01	0.01
Other	0.36	52.46	0.006862			0.07	
Totals	**26.17**	**1,315.20**	**0.019898**	**0.018073**	**0.017967**	**23.77**	**23.63**

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

** *"Expected deaths - Proposed" is calculated as the sum of rates applied to exposure at individual ages. "Expected deaths - Present" is the sum of actual probabilities applied in the valuation.*



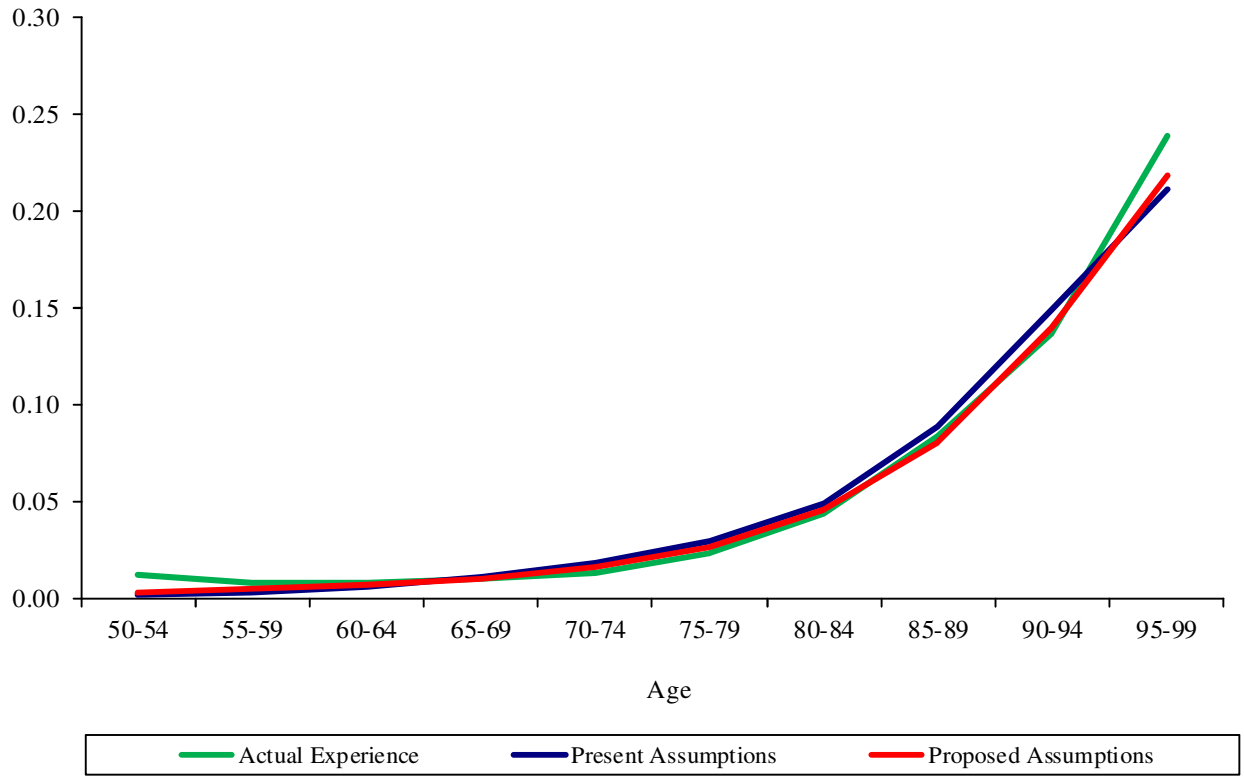
HEALTHY FEMALE RETIRANT MORTALITY EXPERIENCE

Actual and expected deaths and exposures are **benefit weighted** with a scaling factor of $1 million.

Age	Deaths	Exposure	Crude Rates	Sample Rates*		Expected Deaths**	
				Present	Proposed	Present	Proposed
50-54	0.13	11.09	0.011722	0.001522	0.003025	0.01	0.03
55-59	0.39	51.70	0.007544	0.003146	0.004245	0.19	0.23
60-64	2.04	274.63	0.007428	0.006022	0.006240	1.77	1.79
65-69	3.04	297.68	0.010212	0.011003	0.009727	3.23	2.87
70-74	2.13	162.98	0.013069	0.018322	0.015861	2.93	2.55
75-79	2.28	99.92	0.022818	0.029635	0.026261	2.92	2.61
80-84	2.50	58.00	0.043103	0.048916	0.045262	2.80	2.60
85-89	2.68	32.29	0.082998	0.088916	0.080465	2.79	2.55
90-94	1.87	13.74	0.136099	0.148426	0.139159	1.98	1.84
95-99	0.98	4.11	0.238443	0.210976	0.218631	0.84	0.86
100-104	0.26	0.87	0.298851	0.254498	0.316762	0.23	0.26
105-109	0.02	0.03	0.666667	0.322725	0.415097	0.01	0.01
Other	0.06	3.88	0.015464			-	0.01
Totals	**18.38**	**1,010.92**	**0.018181**	**0.019487**	**0.018013**	**19.70**	**18.21**

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

** *"Expected deaths - Proposed" is calculated as the sum of rates applied to exposure at individual ages.*
"Expected deaths - Present" is the sum of actual probabilities applied in the valuation.



SECTION H

ACTUARIAL METHODS

ACTUARIAL METHODS

Excerpts from the Board Funding Policy adopted March 11, 2014:

Actuarial Cost Method

The law stipulates under RSA 100-A:16 the use of the entry age normal actuarial cost method for each of the four member classifications. The purpose of this method is to determine the annual Normal Cost for each individual active member, payable from the date of employment to the date of retirement, that is:

(i) Sufficient to accumulate to the value of the member's benefit at the time of retirement, and
(ii) A constant percentage of the member's year by year projected covered pay.

The Actuarial Accrued Liability under this cost method is the accumulation of normal costs accrued prior to the actuarial valuation date. The Actuarial Accrued Liability represents the theoretical amount of assets required to fund benefits earned on members' past service. The Normal Cost represents the cost required to fund benefits accruing during the current year.

Under RSA 100-A:16, II (i), if the actuarially determined normal contribution rate as set forth in subparagraphs (b) and (c) on account of any of the various member classifications shall be negative in any fiscal year, then the excess amount resulting from the difference between zero and the negative actuarially determined normal contribution rate shall be used to reduce the member contribution rate for that member classification in that fiscal year.

Under RSA 100-A:16, II-a. (a) if within a member classification the employer rates have lowered to require them to be equal to the member rates, then for all subsequent years the employer rates and the members rates for such member classification shall continue to be equal whether the system liabilities increase or decrease.

Medical Subsidy

Liabilities are determined under the entry-age actuarial cost method. Under New Hampshire Statute, contribution rates to the 401(h) sub-trust are determined as the lesser of 25% of the employers' total contributions or the actuarial required contribution rate that keeps the medical subsidy sub-trust solvent (the "solvency rate"). Under IRS Regulations, 401(h) sub-trust contributions are limited by 25% of the total contributions to the plan (other than contributions to fund past service credits). NHRS maintains the historical information for determining compliance with IRC Section 401(h). A test for compliance with IRC Section 401(h) was outside the scope of this valuation.

The rate-setting valuations project the unfunded actuarial accrued liability to the beginning of the applicable biennium to determine the unfunded amortization rate. Currently, the normal cost rate is based on the rates determined on the valuation date. We recommend adjusting the normal cost rates to the projected rate from the first year of the rate setting biennium to better reflect the impact of the changing benefit tiers and generational mortality. We recommend developing projected normal cost rates based on a new entrant profile determined by the current active population with 3-8 years of service.

Asset Valuation Method

The Actuarial Value of Assets is based on the market value with investment gains and losses smoothed over 5 years. The Actuarial Value of Assets will not consistently be above or below the Market Value and is expected to converge to the Market Value in a relatively short period of time. At any time it may be either greater or less than Market Value. During periods when investment performance exceeds the assumed rate, Actuarial Value of Assets will tend to be less than Market Value. During periods when investment performance is less than the assumed rate, Actuarial Value of Assets will tend to be greater than Market Value. If assumed rates are exactly realized for 4 consecutive years, the Actuarial Value will become equal to Market Value.

Actuarial Value is limited to a 20% corridor around the Market Value. This means that if the preliminary development of the Actuarial Value results in an amount that is greater than 120% of the Market Value (or less than 80% of the Market Value), the final Actuarial Value is limited to 120% (or 80%) of the Market Value. Any gains or losses on the Market Value outside of the 20% corridor are therefore recognized immediately.

Pension Amortization Method

The law stipulates under RSA 100-A:16 an amortization period of 30 years or the maximum period allowed by standards adopted by the Government Accounting Standards Board (GASB), whichever is less. When this statute was enacted, the GASB accounting standards provided broad guidelines on plan funding. The GASB Statements Nos. 67 and 68 do not address plan funding and only address financial reporting. This Actuarial Funding Policy retains the original intent of the statute.

Beginning with the June 30, 2007 actuarial valuation which determined the employer contribution rates beginning with the fiscal year ending June 30, 2010, the 30-year period is a closed period ending June 30, 2039.

The amortization method is a level percentage of payroll, consistent with RSA 100-A:16 II (b) and (c).

Pension Funding Target

The funding objective is to achieve 100% funding. For this purpose, 100% funding means that the Actuarial Value of Assets equals the Actuarial Accrued Liability. The amortization objective is to reach 100% funding over the closed 30-year period ending June 30, 2039.

Medical Subsidy Funding Policy

Medical Subsidy benefits provided through NHRS are funded on a pay-as-you-go basis. The medical subsidy benefits provided by statute are fixed rates for a declining population.

The actuarial cost method does not anticipate accumulating assets for medical subsidy benefits. The data reported for the medical subsidy benefits has undergone significant clean-up efforts during the experience study period. The data reports all those currently receiving a subsidy as well as those who could opt-in at any point in the future.

Considerations for Actuarial Methods

We recommend continued use of the current actuarial cost method, asset valuation method and amortization method for pension and medical subsidy benefits. We further recommend a review of the amortization method and funding policy prior to or concurrent with the Decennial Retirement Commission under RSA 100-A:57. We further recommend consideration of accelerated prefunding of medical subsidy benefits with the Decennial Retirement Commission.

SECTION I

MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

Optional factors are adopted by the Board. Factors will be reviewed after the Board has adopted mortality and interest rate assumptions.

Marriage Assumption

The current marriage assumption for Group I members is that 70% of males and 70% of females are assumed to be married for purposes of death-in-service benefits. For Group II, the current assumption is that 50% of males and 50% of females are assumed to be married for purposes of death-in-service and death after retirement benefits. Male spouses are assumed to be three years older than female spouses for active member valuation purposes. Experience, as shown in the table below, indicates that the Group I assumption may be decreased and the Group II assumption may be increased. We have assumed that 60% of males and 60% of females are married for both Groups.

	Group I		Group II	
	Employees	**Teachers**	**Police**	**Fire**
# Retirees (Excluding Survivors) =	13,974	10,255	2,866	1,171
# Retirees (Excluding Survivors) with J & S Benefit =	6,861	5,550	1,896	823
% Retirees (Excluding Survivors) with J & S Benefit =	49%	54%	66%	70%
Current Marriage Assumption =	70%	70%	50%	50%
Proposed Marriage Assumption =	**60%**	**60%**	**60%**	**60%**

Service Purchases

Service purchase calculations are based on actuarial equivalent factors without adjustment for anti-selection. We studied the active member data for service purchases to model the potential cost of anti-selection. As a result of our analysis, we recommend adding 1 month of service to the reported service for all active participants in consideration of potential subsidized service purchases in the future.

Other Miscellaneous and Technical Assumptions

A number of additional miscellaneous and technical assumptions are used in the actuarial valuation. The present assumptions are listed on the following pages.

MISCELLANEOUS AND TECHNICAL ASSUMPTIONS

Administrative & Investment Expenses	The investment return assumption is intended to be the return net of investment expenses. Annual administrative expenses are assumed to be 0.35% of payroll.
Benefit Service	Exact Fractional service is used to determine the amount of benefit payable.
COLA	None assumed.
Decrement Operation (Proposed)	Disability and turnover decrements do not operate during normal retirement eligibility for Group I members. They do operate for early retirement for Group I members and during normal retirement for Group II members.
Decrement Timing	Normal and early retirement decrements for the Teachers group are assumed to occur at the beginning of the year. All other decrements for all groups were assumed to occur mid-year.
Eligibility Testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Forfeitures	The percent of vested members who quit before retirement who elect to refund and forfeit their pension is assumed to be 25% at first vesting eligibility, grading to 0% at first retirement eligibility.
Incidence of Contributions	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
Normal Form of Benefit	This valuation assumes that members will elect the normal form of payment. Alternate forms of payment are available and are actuarially adjusted based on the valuation interest and mortality. Group I: The assumed normal form of benefit is a straight life benefit. Group II: The assumed normal form of benefit is straight life for single members and joint and 50% survivor for married members.

Pay Increase Timing	Beginning of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
New Entrant Profile	For purposes of projecting the normal cost to the beginning of the rate setting biennium, the new entrant profile is based on actual members with 3-8 years of service on the valuation date.
Service Credit Accruals	It is assumed that members accrue one year of service credit per year.
Medical Subsidy	Actual medical subsidy recipients are included in the valuation plus 5% of those who opted-out. The solvency rates for the medical subsidy benefits are determined to provide an estimated margin of 20% of the benefits by the end of the first year of the biennium and thereafter. A retired member's medical subsidy amount is provided by System staff. If the member is under the age of 65, the pre-65 subsidy amount used is the amount reported by System staff, and the post-65 subsidy amount is assumed to be at the post-65 rates.
IRC Section 415(b) and 401(a)(17)	For purposes of the valuation, the limitations under IRC Section 401(a)(17) and 415(b) were not reflected due to immateriality. Our analysis indicates that there are no participants that are impacted by the IRC limitations.

Recommendation

We recommend continued use of the Miscellaneous and Technical Assumptions with the exceptions discussed on page I-1, in particular, the marriage assumption and service purchase assumption.

SECTION J

COMPREHENSIVE LISTING OF RECOMMENDED ASSUMPTIONS

EMPLOYEES
PROPOSED RATES

Service Based Salary Scale

% Merit Increases in Salaries Next Year	
Service Index	**Rate**
1	10.00%
2	6.00%
3	2.50%
4	2.00%
5	1.50%
6	1.25%
7	1.00%
8	1.00%
9	1.00%
10	1.00%
11	1.00%
12	1.00%
13	1.00%
14	1.00%
15	1.00%
16	1.00%
17	1.00%
18	1.00%
19	1.00%
20	1.00%
21	1.00%
22	1.00%
23	1.00%
24	1.00%
25	1.00%
26	1.00%
27	1.00%
28	1.00%
29	1.00%
30	1.00%
31	1.00%
32	1.00%
33	1.00%
34	1.00%
35	1.00%
36	1.00%
37	1.00%
38	1.00%
39	1.00%
40	1.00%
Ref	662

Select Withdrawal

Less than 5 Years of Service		
Service Index	**Male**	**Female**
1	23.00%	30.00%
2	20.00%	22.00%
3	15.00%	16.00%
4	12.00%	12.00%
5	10.00%	8.00%
Sw	59	36

Ultimate Withdrawal

5 or more Years of Service		
Age	**Male**	**Female**
25	7.20%	7.20%
26	7.20%	7.20%
27	7.20%	7.20%
28	7.20%	7.20%
29	7.20%	7.20%
30	7.20%	7.20%
31	6.30%	6.30%
32	5.58%	5.58%
33	5.22%	5.22%
34	5.04%	5.04%
35	5.04%	5.04%
36	5.04%	5.04%
37	5.04%	5.04%
38	5.04%	5.04%
39	5.04%	5.04%
40	5.04%	5.04%
41	5.04%	5.04%
42	5.04%	5.04%
43	5.04%	5.04%
44	5.04%	5.04%
45	5.04%	5.04%
46	4.86%	4.86%
47	4.68%	4.68%
48	4.50%	4.50%
49	4.14%	4.14%
50	3.96%	3.96%
51	3.78%	3.78%
52	3.60%	3.60%
53	3.60%	3.60%
54	3.60%	3.60%
Wx	256	256
Wx Mult	180.0%	180.0%

Disability Rates

	% Becoming Disabled	
Age	**Male**	**Female**
20	0.03%	0.00%
21	0.03%	0.00%
22	0.03%	0.00%
23	0.03%	0.00%
24	0.03%	0.00%
25	0.03%	0.02%
26	0.03%	0.02%
27	0.03%	0.02%
28	0.03%	0.02%
29	0.03%	0.02%
30	0.03%	0.02%
31	0.03%	0.02%
32	0.03%	0.02%
33	0.03%	0.02%
34	0.03%	0.03%
35	0.03%	0.03%
36	0.04%	0.03%
37	0.04%	0.03%
38	0.06%	0.04%
39	0.07%	0.05%
40	0.08%	0.06%
41	0.09%	0.07%
42	0.11%	0.08%
43	0.13%	0.09%
44	0.14%	0.10%
45	0.16%	0.11%
46	0.18%	0.13%
47	0.20%	0.15%
48	0.22%	0.17%
49	0.24%	0.19%
50	0.27%	0.23%
51	0.30%	0.26%
52	0.33%	0.29%
53	0.37%	0.33%
54	0.41%	0.38%
55	0.47%	0.42%
56	0.57%	0.47%
57	0.70%	0.52%
58	0.84%	0.57%
59	1.02%	0.63%
60	1.24%	0.69%
Hx	7	19
Mult	140%	90%

Ordinary	60%
Accidental	40%

Early Retirement Pattern

Age and Service Pre 7/1/11

	% Retiring	
Age	**Male**	**Female**
50	0.75%	0.75%
51	0.75%	0.75%
52	0.75%	0.75%
53	0.75%	0.75%
54	0.75%	1.25%
55	1.50%	1.75%
56	2.20%	2.75%
57	2.20%	2.50%
58	3.00%	3.25%
59	4.50%	5.00%
Rx	2554	2555
anchor	50	50

Rule 70 Pre 7/1/11

	% Retiring	
Age	**Male**	**Female**
45	1.00%	1.00%
46	1.00%	1.00%
47	1.00%	1.25%
48	1.00%	1.25%
49	1.00%	1.00%
50	1.75%	2.20%
51	2.50%	2.50%
52	3.10%	2.50%
53	3.50%	3.50%
54	3.75%	4.00%
55	6.00%	8.00%
56	9.00%	6.00%
57	11.00%	12.00%
58	11.50%	12.00%
59	18.00%	13.00%
Rx	2556	2557
anchor	45	45

Age and Service Post 7/1/11

	% Retiring	
Age	**Male**	**Female**
60	11.0%	11.0%
61	11.0%	11.0%
62	16.0%	15.0%
63	16.0%	14.0%
64	14.0%	14.0%
Rx	2552	2553
anchor	60	60

Normal Retirement Pattern

Age and Service Pre 7/1/11

	% Retiring	
Age	**Male**	**Female**
60	11.0%	11.0%
61	11.0%	11.0%
62	16.0%	15.0%
63	16.0%	14.0%
64	14.0%	14.0%
65	16.0%	20.0%
66	25.0%	22.0%
67	23.0%	22.0%
68	21.0%	18.0%
69	20.0%	19.0%
70	100.0%	100.0%
Rx	2552	2553
anchor	60	60

Age and Service Post 7/1/11

	% Retiring	
Age	**Male**	**Female**
65	45.0%	44.0%
66	45.0%	44.0%
67	23.0%	22.0%
68	21.0%	18.0%
69	20.0%	19.0%
70	100.0%	100.0%
Rx	999	999
anchor	65	65

TEACHERS
PROPOSED RATES

Service Based Salary Scale

% Merit Increases in Salaries Next Year	
Service Index	Rate
1	10.00%
2	6.00%
3	3.25%
4	2.75%
5	2.50%
6	2.25%
7	2.00%
8	1.75%
9	1.50%
10	1.25%
11	1.00%
12	1.00%
13	1.00%
14	1.00%
15	1.00%
16	1.00%
17	1.00%
18	1.00%
19	1.00%
20	1.00%
21	1.00%
22	1.00%
23	1.00%
24	1.00%
25	1.00%
26	1.00%
27	1.00%
28	1.00%
29	1.00%
30	1.00%
31	1.00%
32	1.00%
33	1.00%
34	1.00%
35	1.00%
36	1.00%
37	1.00%
38	1.00%
39	1.00%
40	1.00%
Ref	663

Select Withdrawal

Less than 5 Years of Service		
Service Index	Male	Female
1	35.00%	31.00%
2	17.00%	16.00%
3	14.00%	13.00%
4	10.00%	11.00%
5	8.00%	8.00%
Sw	184	996

Ultimate Withdrawal

5 or more Years of Service		
Age	Male	Female
25	4.00%	6.00%
26	4.00%	6.00%
27	4.00%	6.00%
28	4.00%	6.00%
29	4.00%	6.00%
30	4.00%	6.00%
31	3.50%	5.25%
32	3.10%	4.65%
33	2.90%	4.35%
34	2.80%	4.20%
35	2.80%	4.20%
36	2.80%	4.20%
37	2.80%	4.20%
38	2.80%	4.20%
39	2.80%	4.20%
40	2.80%	4.20%
41	2.80%	4.20%
42	2.80%	4.20%
43	2.80%	4.20%
44	2.80%	4.20%
45	2.80%	4.20%
46	2.70%	4.05%
47	2.60%	3.90%
48	2.50%	3.75%
49	2.30%	3.45%
50	2.20%	3.30%
51	2.10%	3.15%
52	2.00%	3.00%
53	2.00%	3.00%
54	2.00%	3.00%
Wx	256	256
Wx Mult	100.0%	150.0%

Disability Rates

	% Becoming Disabled	
Age	Male	Female
20	0.01%	0.00%
21	0.01%	0.00%
22	0.01%	0.00%
23	0.01%	0.00%
24	0.01%	0.00%
25	0.01%	0.00%
26	0.02%	0.00%
27	0.02%	0.00%
28	0.02%	0.00%
29	0.02%	0.00%
30	0.02%	0.00%
31	0.02%	0.00%
32	0.02%	0.01%
33	0.02%	0.01%
34	0.02%	0.01%
35	0.02%	0.01%
36	0.02%	0.01%
37	0.02%	0.02%
38	0.03%	0.02%
39	0.03%	0.03%
40	0.04%	0.04%
41	0.04%	0.05%
42	0.05%	0.05%
43	0.06%	0.05%
44	0.07%	0.06%
45	0.07%	0.06%
46	0.08%	0.07%
47	0.10%	0.08%
48	0.11%	0.09%
49	0.14%	0.10%
50	0.17%	0.11%
51	0.21%	0.14%
52	0.25%	0.17%
53	0.29%	0.23%
54	0.33%	0.29%
55	0.38%	0.35%
56	0.42%	0.39%
57	0.47%	0.41%
58	0.52%	0.44%
59	0.56%	0.45%
60	0.94%	0.00%
Hx	2	66
Mult	25%	75%

Ordinary	67%
Accidental	33%

Early Retirement Pattern

Age and Service Pre 7/1/11

	% Retiring	
Age	Male	Female
50	1.00%	0.50%
51	1.00%	0.50%
52	1.00%	0.50%
53	1.00%	0.50%
54	1.00%	1.00%
55	1.00%	1.50%
56	3.50%	2.50%
57	2.00%	3.75%
58	8.50%	4.50%
59	6.00%	9.00%
Rx	1925	2560
anchor	50	50

Rule 70 Pre 7/1/11

	% Retiring	
Age	Male	Female
45	1.0%	1.0%
46	1.0%	1.0%
47	1.0%	1.0%
48	1.0%	1.0%
49	1.0%	1.0%
50	1.0%	1.0%
51	1.0%	1.0%
52	1.5%	1.0%
53	2.0%	1.0%
54	2.0%	2.0%
55	3.0%	5.0%
56	7.0%	8.0%
57	11.0%	11.0%
58	15.0%	14.0%
59	19.0%	17.0%
Rx	2561	2562
anchor	45	45

Age and Service Post 7/1/11

	% Retiring	
Age	Male	Female
60	18.0%	13.0%
61	19.0%	15.0%
62	20.0%	19.0%
63	21.0%	19.0%
64	22.0%	21.0%
Rx	2558	2559
anchor	60	60

Normal Retirement Pattern

Age and Service Pre 7/1/11

	% Retiring	
Age	Male	Female
60	18.0%	13.0%
61	19.0%	15.0%
62	20.0%	19.0%
63	21.0%	19.0%
64	22.0%	21.0%
65	23.0%	25.0%
66	30.0%	32.0%
67	25.0%	27.0%
68	25.0%	27.0%
69	25.0%	27.0%
70	100.0%	100.0%
Rx	2558	2559
anchor	60	60

Age and Service Post 7/1/11

	% Retiring	
Age	Male	Female
65	58.0%	56.0%
66	58.0%	56.0%
67	25.0%	27.0%
68	25.0%	27.0%
69	25.0%	27.0%
70	100.0%	100.0%
Rx	999	999
anchor	65	65

POLICE
PROPOSED RATES

Service Based Salary Scale

% Merit Increases in Salaries Next Year	
Service Index	Rate
1	22.00%
2	15.00%
3	7.00%
4	5.00%
5	3.75%
6	2.50%
7	2.00%
8	1.50%
9	1.00%
10	1.00%
11	1.00%
12	1.00%
13	1.00%
14	1.00%
15	1.00%
16	1.00%
17	1.00%
18	1.00%
19	1.00%
20	1.00%
21	1.00%
22	1.00%
23	1.00%
24	1.00%
25	1.00%
26	1.00%
27	1.00%
28	1.00%
29	1.00%
30	1.00%
31	1.00%
32	1.00%
33	1.00%
34	1.00%
35	1.00%
36	1.00%
37	1.00%
38	1.00%
39	1.00%
40	1.00%
Ref	665

Select Withdrawal

Less than 5 Years of Service		
Service Index	Male	Female
1	25.00%	30.00%
2	15.00%	20.00%
3	10.00%	13.00%
4	7.00%	11.50%
5	5.00%	10.00%
Sw	16	1008

Ultimate Withdrawal

5 or more Years of Service		
Age	Male	Female
25	5.88%	5.88%
26	5.67%	5.67%
27	5.47%	5.47%
28	5.28%	5.28%
29	5.10%	5.10%
30	4.93%	4.93%
31	4.75%	4.75%
32	4.58%	4.58%
33	4.42%	4.42%
34	4.27%	4.27%
35	4.13%	4.13%
36	3.98%	3.98%
37	3.84%	3.84%
38	3.70%	3.70%
39	3.57%	3.57%
40	3.45%	3.45%
41	3.31%	3.31%
42	3.18%	3.18%
43	3.06%	3.06%
44	2.94%	2.94%
45	2.83%	2.83%
46	2.73%	2.73%
47	2.64%	2.64%
48	2.56%	2.56%
49	2.48%	2.48%
50	2.40%	2.40%
51	2.31%	2.31%
52	2.22%	2.22%
53	2.13%	2.13%
54	2.05%	2.05%
Wx	40	40
Wx Mult	50.0%	50.0%

Disability Rates

Age	% Becoming Disabled Male	Female
20	0.06%	0.06%
21	0.06%	0.06%
22	0.06%	0.06%
23	0.06%	0.06%
24	0.06%	0.06%
25	0.06%	0.06%
26	0.06%	0.06%
27	0.06%	0.06%
28	0.06%	0.06%
29	0.06%	0.06%
30	0.06%	0.06%
31	0.07%	0.07%
32	0.09%	0.09%
33	0.10%	0.10%
34	0.13%	0.13%
35	0.14%	0.14%
36	0.18%	0.18%
37	0.20%	0.20%
38	0.23%	0.23%
39	0.27%	0.27%
40	0.31%	0.31%
41	0.35%	0.35%
42	0.40%	0.40%
43	0.45%	0.45%
44	0.50%	0.50%
45	0.56%	0.56%
46	0.62%	0.62%
47	0.68%	0.68%
48	0.75%	0.75%
49	0.82%	0.82%
50	0.90%	0.90%
51	0.98%	0.98%
52	1.06%	1.06%
53	1.14%	1.14%
54	1.24%	1.24%
55	1.34%	1.34%
56	1.43%	1.43%
57	1.54%	1.54%
58	1.65%	1.65%
59	1.76%	1.76%
60	0.00%	0.00%
Hx	35	35
Mult	80%	80%

Ordinary	50%
Accidental	50%

POLICE
PROPOSED RATES
(CONCLUDED)

RATES OF RETIREMENT

(Applying to Eligible Members)

For Members Hired Prior to July 1, 2011 Who Have Vested Status as of January 1, 2012		For Members Hired on or After July 1, 2011 and for Members Hired Prior to July 1, 2011 Who Have Non-Vested Status as of January 1, 2012				
Retirement Ages	**% of Active Members Retiring Within Next Year**	**Age 46 with 21 years**	**Age 47 with 22 years**	**Age 48 with 23 years**	**Age 49 with 24 years**	**Age 50 with 25 years**
45	22%					
46	22%	27%				
47	22%	27%	31%			
48	22%	25%	31%	34%		
49	22%	25%	31%	34%	38%	
50	22%	25%	27%	34%	38%	40%
51	22%	22%	27%	31%	38%	40%
52	22%	22%	22%	31%	33%	40%
53	22%	22%	22%	22%	33%	38%
54	22%	22%	22%	22%	22%	38%
55	22%	22%	22%	22%	22%	22%
56	22%	22%	22%	22%	22%	22%
57	22%	22%	22%	22%	22%	22%
58	22%	22%	22%	22%	22%	22%
59	22%	22%	22%	22%	22%	22%
60	22%	22%	22%	22%	22%	22%
61	20%	20%	20%	20%	20%	20%
62	22%	22%	22%	22%	22%	22%
63	22%	22%	22%	22%	22%	22%
64	20%	20%	20%	20%	20%	20%
65	25%	25%	25%	25%	25%	25%
66	50%	50%	50%	50%	50%	50%
67	50%	50%	50%	50%	50%	50%
68	50%	50%	50%	50%	50%	50%
69	50%	50%	50%	50%	50%	50%
70	100%	100%	100%	100%	100%	100%

FIRE
PROPOSED RATES

Service Based Salary Scale

% Merit Increases in Salaries Next Year	
Service Index	Rate
1	22.00%
2	15.00%
3	7.00%
4	5.00%
5	3.75%
6	2.50%
7	2.00%
8	1.50%
9	1.00%
10	1.00%
11	1.00%
12	1.00%
13	1.00%
14	1.00%
15	1.00%
16	1.00%
17	1.00%
18	1.00%
19	1.00%
20	1.00%
21	1.00%
22	1.00%
23	1.00%
24	1.00%
25	1.00%
26	1.00%
27	1.00%
28	1.00%
29	1.00%
30	1.00%
31	1.00%
32	1.00%
33	1.00%
34	1.00%
35	1.00%
36	1.00%
37	1.00%
38	1.00%
39	1.00%
40	1.00%
Ref	665

Select Withdrawal

Less than 5 Years of Service		
Service Index	Male	Female
1	7.75%	7.75%
2	4.50%	4.50%
3	3.00%	3.00%
4	2.75%	2.75%
5	2.25%	2.25%
Sw	1007	1007

Ultimate Withdrawal

5 or more Years of Service		
Age	Male	Female
25	1.25%	1.25%
26	1.25%	1.25%
27	1.25%	1.25%
28	1.25%	1.25%
29	1.25%	1.25%
30	1.25%	1.25%
31	1.25%	1.25%
32	1.25%	1.25%
33	1.25%	1.25%
34	1.25%	1.25%
35	1.25%	1.25%
36	1.25%	1.25%
37	1.25%	1.25%
38	1.25%	1.25%
39	1.25%	1.25%
40	1.25%	1.25%
41	1.25%	1.25%
42	1.25%	1.25%
43	1.25%	1.25%
44	1.25%	1.25%
45	1.25%	1.25%
46	1.25%	1.25%
47	1.25%	1.25%
48	1.25%	1.25%
49	1.25%	1.25%
50	1.25%	1.25%
51	1.25%	1.25%
52	1.25%	1.25%
53	1.25%	1.25%
54	1.25%	1.25%
Wx	151	151
Wx Mult	125.0%	125.0%

Disability Rates

	% Becoming Disabled	
Age	Male	Female
20	0.08%	0.08%
21	0.09%	0.09%
22	0.10%	0.10%
23	0.11%	0.11%
24	0.11%	0.11%
25	0.12%	0.12%
26	0.13%	0.13%
27	0.13%	0.13%
28	0.14%	0.14%
29	0.14%	0.14%
30	0.15%	0.15%
31	0.15%	0.15%
32	0.16%	0.16%
33	0.16%	0.16%
34	0.17%	0.17%
35	0.18%	0.18%
36	0.19%	0.19%
37	0.20%	0.20%
38	0.21%	0.21%
39	0.23%	0.23%
40	0.25%	0.25%
41	0.27%	0.27%
42	0.29%	0.29%
43	0.31%	0.31%
44	0.34%	0.34%
45	0.36%	0.36%
46	0.39%	0.39%
47	0.42%	0.42%
48	0.46%	0.46%
49	0.49%	0.49%
50	0.53%	0.53%
51	0.57%	0.57%
52	0.62%	0.62%
53	0.67%	0.67%
54	0.73%	0.73%
55	0.80%	0.80%
56	0.89%	0.89%
57	0.98%	0.98%
58	1.09%	1.09%
59	1.21%	1.21%
60	1.35%	1.35%
Hx	3	3
Mult	70%	70%

Ordinary	50%
Accidental	50%

FIRE
PROPOSED RATES
(CONCLUDED)

RATES OF RETIREMENT

(Applying to Eligible Members)

For Members Hired Prior to July 1, 2011 Who Have Vested Status as of January 1, 2012		For Members Hired on or After July 1, 2011 and for Members Hired Prior to July 1, 2011 Who Have Non-Vested Status as of January 1, 2012				
Retirement Ages	% of Active Members Retiring Within Next Year	Age 46 with 21 years	Age 47 with 22 years	Age 48 with 23 years	Age 49 with 24 years	Age 50 with 25 years
45	12%					
46	12%	15%				
47	12%	15%	18%			
48	12%	15%	18%	22%		
49	12%	15%	18%	22%	26%	
50	17%	15%	18%	21%	26%	30%
51	17%	17%	18%	21%	26%	30%
52	17%	17%	17%	21%	21%	30%
53	17%	17%	17%	17%	21%	22%
54	17%	17%	17%	17%	17%	22%
55	22%	22%	22%	22%	22%	22%
56	22%	22%	22%	22%	22%	22%
57	22%	22%	22%	22%	22%	22%
58	22%	22%	22%	22%	22%	22%
59	22%	22%	22%	22%	22%	22%
60	28%	28%	28%	28%	28%	28%
61	28%	28%	28%	28%	28%	28%
62	28%	28%	28%	28%	28%	28%
63	28%	28%	28%	28%	28%	28%
64	28%	28%	28%	28%	28%	28%
65	28%	28%	28%	28%	28%	28%
66	28%	28%	28%	28%	28%	28%
67	28%	28%	28%	28%	28%	28%
68	28%	28%	28%	28%	28%	28%
69	28%	28%	28%	28%	28%	28%
70	100%	100%	100%	100%	100%	100%

HEALTHY MORTALITY
PROPOSED RATES*

Age	% Dying Next Year	
	Male	Female
50	0.3951%	0.2688%
51	0.4293%	0.2847%
52	0.4648%	0.3025%
53	0.4984%	0.3224%
54	0.5324%	0.3445%
55	0.5676%	0.3687%
56	0.6043%	0.3954%
57	0.6430%	0.4245%
58	0.6836%	0.4566%
59	0.7266%	0.4922%
60	0.7729%	0.5314%
61	0.8232%	0.5752%
62	0.8784%	0.6240%
63	0.9408%	0.6784%
64	1.0112%	0.7395%
65	1.0912%	0.8081%
66	1.1825%	0.8856%
67	1.2856%	0.9727%
68	1.4028%	1.0707%
69	1.5362%	1.1800%
70	1.6862%	1.3018%
71	1.8542%	1.4367%
72	2.0428%	1.5861%
73	2.2537%	1.7512%
74	2.4890%	1.9350%
75	2.7511%	2.1400%
76	3.0455%	2.3683%
77	3.3750%	2.6261%
78	3.7454%	2.9171%
79	4.1619%	3.2463%
80	4.6325%	3.6195%

Age	% Dying Next Year	
	Male	Female
81	5.1604%	4.0455%
82	5.7578%	4.5262%
83	6.4305%	5.0733%
84	7.1892%	5.6928%
85	8.0389%	6.3897%
86	8.9890%	7.1728%
87	10.0511%	8.0465%
88	11.2315%	9.0167%
89	12.5394%	10.0861%
90	13.9905%	11.2708%
91	15.5215%	12.5533%
92	17.0957%	13.9159%
93	18.6882%	15.3473%
94	20.2903%	16.8334%
95	21.8937%	18.3814%
96	23.6917%	20.0841%
97	25.5391%	21.8631%
98	27.4496%	23.7173%
99	29.4224%	25.6439%
100	31.4356%	27.6222%
101	33.4720%	29.6405%
102	35.4865%	31.6762%
103	37.4840%	33.7151%
104	39.4352%	35.7256%
105	41.3091%	37.7120%
106	43.1302%	39.6516%
107	44.8460%	41.5097%
108	46.4784%	43.3020%
109	48.0281%	45.0018%
110	100.0000%	100.0000%
Ref	#2135sb0x1	#2136sb0x1

** Applicable to calendar year 2015. Rates in future years are determined by the above rates and the MP-2015 projection scale. The rates shown are the base table rates prior to using a scaling factor adjustment for each member classification. See page G-3 for adjustment rates.*

DISABLED MORTALITY
PROPOSED RATES*

Age	% Dying Next Year	
	Male	Female
50	1.9828%	1.1566%
51	2.0583%	1.2199%
52	2.1342%	1.2841%
53	2.1957%	1.3489%
54	2.2541%	1.4129%
55	2.3131%	1.4740%
56	2.3733%	1.5330%
57	2.4375%	1.5878%
58	2.5039%	1.6399%
59	2.5730%	1.6904%
60	2.6462%	1.7402%
61	2.7241%	1.7935%
62	2.8087%	1.8523%
63	2.9056%	1.9201%
64	3.0144%	2.0001%
65	3.1394%	2.0946%
66	3.2828%	2.2063%
67	3.4435%	2.3366%
68	3.6253%	2.4876%
69	3.8305%	2.6593%
70	4.0570%	2.8532%
71	4.3065%	3.0699%
72	4.5814%	3.3105%
73	4.8823%	3.5764%
74	5.2106%	3.8709%
75	5.5673%	4.1950%
76	5.9590%	4.5498%
77	6.3866%	4.9408%
78	6.8553%	5.3684%
79	7.3690%	5.8345%
80	7.9361%	6.3403%

Age	% Dying Next Year	
	Male	Female
81	8.5562%	6.8924%
82	9.2430%	7.4840%
83	9.9996%	8.1245%
84	10.8357%	8.8135%
85	11.7531%	9.5490%
86	12.7593%	10.3352%
87	13.8640%	11.1690%
88	15.0693%	12.0507%
89	16.3802%	12.9755%
90	17.8093%	13.9564%
91	19.2287%	15.0354%
92	20.6368%	16.2007%
93	22.0287%	17.4429%
94	23.4054%	18.7446%
95	24.7596%	20.1110%
96	26.3034%	21.6369%
97	27.8638%	23.2306%
98	29.4526%	24.8881%
99	31.0717%	26.6067%
100	32.7099%	28.3698%
101	34.3741%	30.1760%
102	36.0579%	32.0194%
103	37.7841%	33.8973%
104	39.5397%	35.7899%
105	41.3091%	37.7120%
106	43.1302%	39.6516%
107	44.8460%	41.5097%
108	46.4784%	43.3020%
109	48.0281%	45.0018%
110	100.0000%	100.0000%
Ref	#2137sb0x1	#2138sb0x1

** Applicable to calendar year 2015. Rates in future years are determined by the above rates and the MP-2015 projection scale. The rates shown are the base table rates prior to using a scaling factor adjustment for each member classification. See page G-3 for adjustment rates.*

PRE-RETIREMENT MORTALITY
PROPOSED RATES*

Age	% Dying Next Year	
	Male	Female
50	0.1639%	0.1070%
51	0.1832%	0.1181%
52	0.2045%	0.1301%
53	0.2263%	0.1428%
54	0.2499%	0.1564%
55	0.2760%	0.1703%
56	0.3051%	0.1850%
57	0.3382%	0.2001%
58	0.3757%	0.2159%
59	0.4181%	0.2324%
60	0.4663%	0.2500%
61	0.5207%	0.2692%
62	0.5821%	0.2903%
63	0.6519%	0.3141%
64	0.7307%	0.3409%
65	0.8201%	0.3711%
66	0.9105%	0.4130%
67	1.0113%	0.4599%
68	1.1244%	0.5130%
69	1.2514%	0.5722%
70	1.3931%	0.6382%
71	1.5507%	0.7118%
72	1.7266%	0.7937%
73	1.9220%	0.8848%
74	2.1386%	0.9866%
75	2.3781%	1.1006%
76	2.6439%	1.2276%
77	2.9376%	1.3705%
78	3.2627%	1.5304%
79	3.6219%	1.7094%
80	4.0202%	1.9092%

Age	% Dying Next Year	
	Male	Female
81	4.5453%	2.2558%
82	5.1958%	2.7418%
83	5.9648%	3.3640%
84	6.8488%	4.1162%
85	7.8388%	4.9900%
86	8.9292%	5.9794%
87	10.1153%	7.0730%
88	11.3868%	8.2603%
89	12.7344%	9.5256%
90	14.1543%	10.8653%
91	15.6293%	12.2743%
92	17.1512%	13.7409%
93	18.7082%	15.2553%
94	20.2937%	16.8011%
95	21.8937%	18.3814%
96	23.6917%	20.0841%
97	25.5391%	21.8631%
98	27.4496%	23.7173%
99	29.4224%	25.6439%
100	31.4356%	27.6222%
101	33.4720%	29.6405%
102	35.4865%	31.6762%
103	37.4840%	33.7151%
104	39.4352%	35.7256%
105	41.3091%	37.7120%
106	43.1302%	39.6516%
107	44.8460%	41.5097%
108	46.4784%	43.3020%
109	48.0281%	45.0018%
110	100.0000%	100.0000%
Ref	#2133sb0x1	#2134sb0x1

** Applicable to calendar year 2015. Rates in future years are determined by the above rates and the MP-2015 projection scale. The rates shown are the base table rates prior to using a scaling factor adjustment for each member classification. See page G-3 for adjustment rates.*

SECTION K
GLOSSARY

GLOSSARY

The following glossary is intended to provide definitions of a number of terms which are used throughout this report and which are somewhat unique to the discussion of an Experience Study.

Actuarial Decrement. The actual number of decrements which occurred during the study. This number is a straight tabulation of the actual number of occurrences of the particular decrement in question. Normally, the actual number of decrements will be subdivided by age and possibly sex.

Aggregate Assumptions. Assumptions which vary only by sex and/or age. The impact of year of service on the decrement is ignored. All experience is combined by age and/or sex without regard to service. Rates of death and disablement are more appropriate to aggregate measurement in a retirement system.

Crude Rate of Decrement. The rate of decrement determined by dividing the actual number of the respective decrement for that age and sex by the corresponding exposure for that age and sex. The rate is described as a crude rate because no smoothing or elimination of statistical fluctuations has been made. It is indicative of the underlying true rate of the decrement and is the basis used in graduation to obtain the graduated or tabular rate.

Decrements. The decrements are the means by which a member ceases to be a member. For active members, the decrements are death, withdrawal, service retirement, and disability retirement. For retired members, the only decrement is death. The purpose of the Experience Study is to determine the underlying rates of each decrement.

Expected Decrement. This is the number of occurrences of a given decrement expected to occur for a given age and sex based on the number of lives exposed to the risk of the particular decrement and the current assumed rate for that decrement. It may also be referred to as the tabular number of decrements. It is the number of deaths, withdrawals, retirements, or disabilities (whichever is applicable) that would have actually occurred had the actuarial assumptions been exactly realized.

GLOSSARY

Exposure. The number of lives exposed to a given risk of decrement for a particular age and sex. It represents the number of members who could have potentially died, retired, become disabled, or withdrawn at that particular age and for that particular sex. This term will also be described as "the number exposed to a given risk."

Graduated Rates. Graduation is the mathematical process by which a set of crude rates of a particular type is translated into graduated or tabular rates. The graduation process attempts to smooth out statistical fluctuations and to arrive at a set of rates that adequately fit the underlying actual experience of the crude rates that are being graduated. The graduation process involves smoothing the results, but at the same time trying to fit the results to be consistent with the original data. It requires that the actuary exercise his or her judgment in what the underlying shape of the risk curve should look like.

Interpolated Rates. For the active rates of decrement (death, disability, retirement, and withdrawal), the actuary will develop graduated rates based on quinquennial age groupings (see definition). To arrive at the rates of decrement for ages between two quinquennial ages, the graduated quinquennial rates must be interpolated for these intermediate ages. The interpolated results are arrived at by applying a mathematical interpolation formula to the quinquennial graduated rates.

Merit and Seniority Pay Increase Rate. The portion of the total salary scale which varies by service. It reflects the impact of moving up the salary grid in a given year, rather than the increase in the overall grid. It includes the salary increase associated with promotions during the year.

Quinquennial Age Groupings. For the active decrements, it is preferable to group the experience in five-year age groups for graduation and analysis purposes so as to minimize statistical fluctuations resulting from a lack of exposure which may occur for individual ages. Quinquennial age grouping is the five-year age grouping which is used to develop the graduated rates of decrement for active membership. The quinquennial age is the central age of the five-year grouping.

Tabular Rates. The tabular rate of decrement or salary increase is the rate determined by the graduation and interpolation process. It is the expected rate of change as opposed to the crude rate of change. It is deemed to be the underlying rate applicable to the decrement or to the rate of salary increase. In the first phase of the study, the actual results are compared to the expected results based on the tabular rates developed by the previous study. The second phase of the study determines the new tabular rates based on the crude rates. The final phase of the study compares the actual decrement to the expected decrement based on the new tabular rates.

Wage Inflation. The general rate of increase in salaries during a year. It is the component of the total salary scale which is independent of age or service. It consists of two components: inflation and productivity increases. It may be viewed as the ultimate rate of increase if there are no more step-rate/promotional increases applicable.

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March 11, 2016

Mr. Jack Dianis
Director of Finance
New Hampshire Retirement System
54 Regional Drive
Concord, New Hampshire 03301

Dear Jack:

Enclosed please find 30 copies of the report of the July 1, 2010 - June 30, 2015 experience study for the New Hampshire Retirement System.

Respectfully submitted,

David T. Kausch, F.S.A., E.A., M.A.A.A.

DTK:mrb
Enclosures