

Experience Study Analysis

State Retirement System: 2000-2005
Public Employee Retirement Administration Commission



Commonwealth of Massachusetts
Public Employee Retirement Administration Commission

- The Honorable Domenic J. F. Russo
Chairman
- The Honorable A. Joseph DeNucci
Auditor of the Commonwealth
Vice Chairman
- The Honorable Deval Patrick
Governor of the Commonwealth
- The Honorable Paul V. Doane
Executive Director
Arkansas Teacher Retirement System
- Kenneth J. Donnelly
Lieutenant
Lexington Fire Department
- James M. Machado
Sergeant
Fall River Police Department
- Donald R. Marquis
Former Town Manager
Arlington
- Joseph E. Connarton
Executive Director

Five Middlesex Avenue, Suite 304, Somerville, MA 02145
ph 617 666 4446 | fax 617 628 4002 | tty 617 591 8917 | web www.mass.gov/perac

Published by PERAC Communications, 2007.
Printed on recycled paper. 

TABLE OF CONTENTS

	<u>PAGE</u>
Introduction.....	1
Executive Summary	3
Methodology	6
Findings.....	9
Summary of Assumptions.....	12
Effect of Proposed Assumptions.....	21
Terms and Definitions.....	22
Appendix	23

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Introduction

The Public Employee Retirement Administration Commission (PERAC) has completed our second Experience Study of the State Retirement System. This report presents the results of our experience analysis for members of the State Retirement System over the six-year period from January 1, 2000 through December 31, 2005.

The nature of an experience study is to track annual salary increases and how members leave a system (retirement, death, disability, or withdrawal) and adjust our actuarial assumptions based on both this past experience as well as anticipated future experience. This task requires more detailed data than is necessary for an annual actuarial valuation. We received additional information and a number of data listings from the State Retirement Board to complete this study.

Each year as part of the valuation, we test how well the assumptions are working by performing a gain/loss analysis. If plan liabilities increase more than expected, there is an actuarial loss. Conversely, if plan liabilities increase less than expected, there is an actuarial gain. If each year the results consistently produced an actuarial loss (or an actuarial gain), then this would indicate that the assumptions are not properly reflecting actual experience. In this way, the gain/loss analysis serves as a proxy to the performance of a detailed experience study.

We reviewed the gains and losses on plan liabilities (excluding asset gains and losses) from 2000 through 2005. PERAC performed State valuations for each year in this period. Our review of the gains and losses over this period shows that, overall, the actuarial assumptions are reasonable. In three years there were actuarial gains and in the other three years there were actuarial losses. In no year did the gain or loss exceed \$400 million. There was a cumulative gain (experience better than anticipated) of approximately \$250 million over the 6-year period. This amount is quite small considering the total accrued liability of approximately \$21.7 billion as of January 1, 2007 (average gain of less than ½ of 1% each year).

As part of this experience study, we performed a detailed member reconciliation of actual retirements, terminations, and disabilities over the 6-year period. We analyzed these results using not only our valuation data from each year, but also listings generated by the PERAC disability unit and the State Retirement Board's response to a number of our data questions.

The annual funding schedule appropriation (the total plan cost) reflects two sources of plan costs and liabilities. The first is the amortization of the unfunded liability. The actuarial accrued liability less plan assets equals the unfunded liability. The unfunded liability is amortized through FY2023 under the current schedule. In addition to the amortization of the unfunded liability, the annual appropriation also reflects the normal cost (or current cost), which represents the value of benefits accruing during the coming year. The measure of the impact on the total plan cost of any change in assumptions is the impact of that change on these two components.

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Introduction (continued)

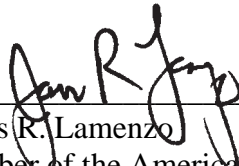
Although the normal cost and accrued liability directly determine the appropriation under the funding schedule, these items are components that make up a portion of the present value of future benefits (PVFB). The PVFB may be the most accurate measure of the “true” total cost of a plan since it represents the present value of total projected benefits for all active, inactive and retired members. Any change in the actuarial assumptions will change the PVFB and, accordingly, the normal cost and accrued liability (and thereby the amortization of the unfunded liability).

Overall, our proposed assumptions slightly decrease the total plan cost.

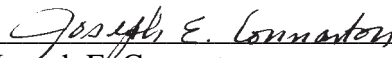
It is important to note that the results for the State reflect only one component of the total Commonwealth obligation. The Teachers’ experience study will be released later this year. The revised assumptions will first be reflected in our January 1, 2008 actuarial valuation.

We gratefully acknowledge the efforts of the State Retirement Board staff in completing this project.

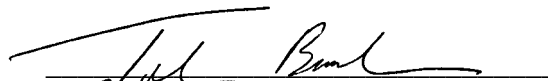
Respectfully submitted,
Public Employee Retirement Administration
Commission



James R. Lamenza
Member of the American Academy of Actuaries
Associate of the Society of Actuaries
Enrolled Actuary Number 05-4709



Joseph E. Connarton
Executive Director



John F. Boorack
Senior Actuarial Analyst

Dated: July 27, 2007

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Executive Summary

In October, 2000, PERAC published the first experience study of the State Retirement System. That study looked at the experience over the five-year period from 1995-1999. Based on the results of that study, there were a number of changes made to the assumptions used to value the liabilities of the State Retirement System.

This study continues the analysis of the experience of the State Retirement System and covers the six-year period from 2000-2005. Based on the results of this study, we are recommending minor changes be made to most of the assumptions used to value the liabilities of the State Retirement System. These changes are detailed below.

General Analysis

The principal results of the six-year experience study can be summarized as follows:

Experience indicates that changes should be made to the following assumptions:

- Rates of retirement for Group 3 and Group 4 active members; negligible decrease in total plan cost
- Rates of disability for all active members; slight increase in plan cost
- Rates of withdrawal for all active members; slight decrease in total plan cost
- Rates of salary increases for active members; slight decrease in total plan cost

No changes were made to the following assumptions:

- Rates of retirement for Group 1 and Group 2 members
- Rates of mortality for retired members
- Rates of mortality for disabled members

Nature and effect of changes:

- Proposed changes are based on both actual past and anticipated future experience
- Overall, proposed changes produce a total plan cost slightly less than that under the current assumptions

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Executive Summary (continued)

Specific Analysis

Retirement

- For Group 1, propose leaving the rates unchanged due to Early Retirement Incentives offered in 2002 and 2003
- For Group 2, propose leaving the rates unchanged due to Early Retirement Incentives offered in 2002 and 2003
- For Group 3, propose decreasing or leaving the rates unchanged at most ages with slight increases at the other ages
- For Group 4, propose decreasing or leaving the rates unchanged at most ages with slight increases at the other ages
- Overall, the effect of the proposed assumptions would be a negligible decrease in total plan cost

Disability

- For Group 1, propose decreasing rates at all ages
- For Group 2, propose increasing rates for ages 45 and older and leaving the other rates unchanged
- For Group 3, propose decreasing or leaving the rates unchanged at most ages with slight increases at the other ages
- For Group 4, propose decreasing rates for ages less than 34 and increasing rates thereafter
- Propose increasing the percentage of disabilities assumed to be accidental (job-related)
- Proposed assumptions would slightly increase total plan cost

Withdrawal

- For Groups 1 and 2, propose increasing the rates for all years of service and most ages within each year of service
- For Group 3, propose leaving rates at years of service 0 to 9 unchanged and decreasing rates at 10 years of service and greater
- For Group 4, propose increasing rates at most years of service with decreases at the other ages
- Proposed assumptions would slightly decrease total plan cost

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Executive Summary (continued)

Salary Increases

- For Groups 1 and 2, propose extending the table to 20 years and decreasing the ultimate assumption to 4.5%. Also propose decreasing or leaving the rates unchanged at most years of service
- For Group 3, propose extending the table to 20 years and decreasing the ultimate assumption to 5.0% at 20 years. Also, propose decreasing rates except for years of service 3 to 5 which are unchanged
- For Group 4, propose extending the table to 20 years and decreasing the ultimate assumption to 5.0% at 20 years. Also, propose decreasing most rates while maintaining the rates of 3-9 years of service
- Proposed assumptions slightly decrease total plan cost

Post-Retirement Mortality

- Propose leaving these rates unchanged
- Proposed assumptions would have no impact on total plan cost

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Methodology

General methodology for all assumptions

- Study comprises the years January 1, 2000 through January 1, 2006
- Data used in this study was provided by the State Retirement Board and reflects the data used in the State actuarial valuations in each of these years
- Reconciliation of members completed for each year
- For each period in the 6-year experience study period (1/00 to 1/01, 1/01 to 1/02, 1/02 to 1/03, 1/03 to 1/04, 1/04 to 1/05, and 1/05 to 1/06), we determined the member experience relating to:
 - Retirement
 - Disability
 - Withdrawal (Turnover)
 - Salary increases
 - Post-retirement mortality
- Actual experience determined at each age (and/or years of service) for each assumption. For example, for retirement, we determined the actual number of members retiring at each age.
- Expected experience determined for each assumption. For example, for retirement, we determined the expected number of members retiring at each age based on the plan assumptions.
- An actual/expected (A/E) ratio was computed at each age for each assumption.
- Reviewed experience results and used various smoothing techniques to select final assumptions
- Analysis reflects a review by age, service and job group:
 - Group 1- general employees
 - Group 2- certain employees with hazardous positions
 - Group 3- state police
 - Group 4- generally public safety and correction officers
- Compared the results of the experience from this study, with the results of the experience from the study from 1995-2000

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Methodology (continued)

In addition to the general methodology that was used for each assumption outlined on the previous page, the following specific analysis was conducted:

Retirement

- Assumed a member retired if the member was eligible to retire at the beginning of a period and is not in the active file at the end of the period
- Analyzed results for Groups 1 and 2 by gender
- Analyzed results separately for members over age 70

Disability

- Results modified to reflect that some members retire from an inactive status as opposed to an active status
- Compared results to historical disability counts from PERAC disability unit
- Analyzed results by the percentage of disabilities that are job-related (accidental) compared to non-job-related (ordinary)
- Analyzed results in 5-year age brackets in selecting assumptions

Withdrawal

- Assumed a member withdrew if the member was not eligible to retire at the beginning of the period and is not in the active file at the end of the period
- Analyzed results by service and age/service combined in addition to age
- Analyzed results in 5-year age brackets in selecting assumptions

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Methodology (continued)

Salary Increases

- Determined ratios of salaries at the end of the year to salaries at the beginning of the year for continuing members
- Analyzed results by service and age/service combined in addition to age
- Analyzed results in 3-year and 5-year age brackets in selecting assumptions

Post-Retirement Mortality

- Assumes a member died if they were coded as receiving an allowance at the beginning of the year and were coded as not receiving an allowance or are missing from the file at the end of the year
- Analyzed results by gender
- Analyzed results by job group
- Adjusted results for each Group to reflect retiree deaths with continuing payments to beneficiaries
- Compared actual experience for each Group to the RP-2000 mortality table
- Performed testing for disabled retired members separately by gender
- Analyzed results in 5-year age brackets in selecting assumptions

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Findings

Retirement

- For Groups 1 and 2, there were Early Retirement Incentives (ERIs) adopted in 2002 and 2003. The ERIs skewed the results of our analysis as many members who would have normally retired in 2004 or later took advantage of the ERI. Since we have no reasonable basis to adjust retirement rates, we will maintain the assumptions adopted in our prior study.
- For Group 1, there is a significant proportion of the workers over age 70 that continue working instead of retiring. However, since this cohort is such a small percentage of the population, we will continue to use an assumption of 100% retirement at age 70.
- For Group 3, there were less actual retirements in total than expected during each year. These totals were consistent in each year of the study.
- For Group 3, the actual experience was generally consistent with the assumptions prior to age 55. Most of the changes occur for ages above 55.
- For Group 4, the actual experience was more consistent for the later years of the study (2003-2005) than the earlier years of the study (2000-2002).
- Assistant District Attorneys (who have served at least ten years in that capacity) and District Attorneys were added to Group 4 in 1995 and 1996 respectively. These additions changed the make-up of Group 4 members who had previously been mostly corrections officers. This change was more noticeable in this study than it was in the prior study.
- For Group 4, we generally increased the rates at the younger ages (45-49) and increased the rates at the older ages (65+). For the most part, the rates for the intermediate ages remained the same with some minor adjustments.

Disability

- There is often a lag between the date of injury of a member and the date of retirement. Our software cannot recognize this lag so we monitor this issue and make adjustments as necessary.
- Actual number of disability retirements more than expected for Groups 2 and 4
- Actual number of disability retirements less than expected for Group 1
- Actual number of disability retirements about as expected (in total) for Group 3
- For Group 3, even though the overall assumption was reasonable, individual age rates were adjusted
- Actual ratio of accidental disability to ordinary disability retirements found to be somewhat greater than assumed

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Findings (continued)

Withdrawal

- Measuring withdrawal (termination) rates continues to be a challenge. Therefore, our rates for this assumption tend to be more conservative than retirement and disability
- For Groups 1, 2 and 4, actual terminations are greater than expected for each year of service
- Group 2 results similar to Group 1 results so will use the same assumptions for both Groups
- Group 4 consists of District Attorneys and Assistant District Attorneys (who have at least 10 years of service in this capacity) who are not typical Group 4 employees (public safety)
- Group 3 A/E ratios are generally approximately 1 (actual withdrawal about as expected)

Salary Increases

- Like withdrawal rates, accurately measuring salary increases continues to be a challenge. Therefore, our assumptions tend to be more conservative than retirement and disability rates.
- For Groups 1 and 2, salary increases for continuing members generally average from 4-7% per year for all years of service
- For Groups 3 and 4, salary increases for continuing members generally average from 3-8% for all years of service
- For all Groups, the ultimate rates of salary increases were less than previously assumed

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Findings (continued)

Post-Retirement Mortality

- Overall, mortality somewhat greater than expected but data issues may influence this overstatement
- Male mortality greater than expected in all years
- Female mortality greater than expected in most years
- Female mortality results may be overstated because many of the females who were previously listed under their spouse's Social Security number had their records corrected to reflect their own Social Security number
- Recent retiree data is more credible than past data for retirees; 2006 experience (although beyond the scope of the study) appears the most reliable
- Total disabled mortality somewhat greater than expected; gender allocation difficult to assess
- Mortality not significantly different by Group
- This assumption will continue to be monitored each year as we perform the actuarial valuation. We did not change this assumption because of some uncertainty regarding the actual number of deaths due to data issues for most of the 6-year period of our study.

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions

The selection of the actuarial assumptions reflects a work in progress. The assumptions shown here will first be used in the January 1, 2008 actuarial valuation. However, we will continue to test and refine the assumptions in future years.

In this section, we show sample rates for each assumption. A rate essentially represents the likelihood of an event occurring at a given time. For example, the mortality rates represent the likelihood of death. The complete tables for Group specific assumptions are shown in the Appendix.

Assumptions Common to All Groups

1. Rate of Investment Return: Currently the rate is 8.25% annually. This assumption is determined by the legislature and was not reviewed as part of this study.
2. Pre-Retirement Mortality: Current rates of mortality are in accordance with the RP-2000 Employees table projected 10 years with Scale AA. Based on our analysis, the pre-retirement mortality rates will not change.
3. Post-Retirement Mortality: Current rates of mortality are in accordance with the RP-2000 Healthy Annuitant table projected 10 years with Scale AA. For disabled members, current rates are in accordance with the RP-2000 table set forward 3 years for males. Based on our analysis, the post-retirement mortality rates will not change, but we will continue to monitor this assumption closely.

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 1 – Specific Assumptions:

1. Rates of Retirement: An accurate analysis of the retirement rates could not be performed because of the ERIs that were adopted during 2002 and 2003. Thus the Group 1 retirement rates did not change.

2. Rates of Disability: The following table shows that the proposed disability rates are less than the current rates. It is also assumed that the percentage of job-related disabilities is 75% (increased from 55%).

Age	Current	Proposed
20	.00030	.00010
30	.00033	.00010
40	.00091	.00075
50	.00168	.00140
60	.00250	.00200

3. Rates of Withdrawal: Current rates are age and service based for the first 10 years of service and age based after 10 years. The proposed rates will remain age and service based for the first 10 years and age based after 10 years. The proposed rates are higher than the current rates.

Age	Current (0 years)	Current (5 years)	Current (after 10 years)	Proposed (0 years)	Proposed (5 years)	Proposed (after 10 years)
20	.180	.100	.045	.270	.120	.060
30	.150	.090	.041	.230	.100	.055
40	.125	.070	.031	.160	.080	.040
50	.100	.048	.021	.140	.060	.030

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 1 – Specific Assumptions (continued):

4. Rate of Salary Increase: The following table compares current and proposed salary increase rates. The proposed rates are lower than the current rates before 5 years of service and the proposed ultimate rate is lower than the current ultimate rate. Overall, the proposed rates decrease total plan cost.

Service	Current	Proposed
0	8.50%	8.00%
5	6.00%	6.00%
10	4.75%	5.25%
15	4.75%	5.00%
20+	4.75%	4.50%

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 2 - Specific Assumptions:

1. Rates of Retirement: An accurate analysis of the retirement rates could not be performed because of the ERIs that were adopted during 2002 and 2003. Thus the Group 2 retirement rates did not change.

2. Rates of Disability: The following table compares the proposed disability rates and the current rates. The proposed rates are the same as the current rates through age 45 and are higher thereafter. It is also assumed that the percentage of job-related disabilities is 75% (increased from 55%).

Age	Current	Proposed
20	.00060	.00060
30	.00080	.00080
40	.00166	.00166
50	.00260	.00425
60	.00350	.00550

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 2 - Specific Assumptions (continued):

3. Rates of Withdrawal: Current rates are age and service based rates for the first 10 years of service and age based after 10 years. The proposed rates will remain age and service based for the first 10 years and age based after 10 years. The proposed rates are higher than the current rates. The proposed rates are the same as the Group 1 rates.

Age	Current (0 years)	Current (5 years)	Current (after 10 years)	Proposed (0 years)	Proposed (5 years)	Proposed (after 10 years)
20	.180	.100	.045	.270	.120	.060
30	.150	.090	.041	.230	.100	.055
40	.125	.070	.031	.160	.080	.040
50	.100	.048	.021	.140	.060	.030

4. Rate of Salary Increase: The following table compares current and proposed salary increase rates. The proposed rates are lower than the current rates before 5 years of service and the proposed ultimate rate is lower than the current ultimate rate. Overall, the proposed rates decrease total plan cost.

Service	Current	Proposed
0	8.50%	8.00%
5	6.00%	6.00%
10	4.75%	5.25%
15	4.75%	5.00%
20+	4.75%	4.50%

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 3 – Specific Assumptions:

1. Rates of Retirement: The following table compares current and proposed retirement rates. The proposed rates are the same as the current rates for ages less than 55 and at ages 58 to 59 and age 64. The proposed rates are slightly higher at ages 60 and 61 and less at the other ages.

Age	Current	Proposed
45	.020	.020
50	.050	.050
52	.075	.075
55	.110	.080
58	.110	.110
60	.100	.110
62	.250	.150
65	.500	.250
68	.500	.250
70	1.000	1.000

2. Rates of Disability: The following table compares the current and the proposed disability rates. The proposed rates are the same as the current rates until age 32 and from ages 56-59. The proposed rates are less than the current rates for ages 60 and over. The proposed rates are greater at most other ages. It is also assumed that the percentage of job-related disabilities is 95% (increased from 90%).

Age	Current	Proposed
20	.00100	.00100
30	.00160	.00160
40	.00753	.00800
50	.01559	.01400
60	.02000	.03000

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 3 - Specific Assumptions (continued):

3. Rates of Withdrawal: Current rates are strictly service based. The proposed rates will remain service based. The proposed rates are the same as the current rates for years of service 0 - 9 and less thereafter.

Service	Current	Proposed
0-4	.008	.008
5-9	.008	.008
10-14	.009	.006
15+	.009	.006

4. Rate of Salary Increase: The following table compares current and proposed salary increase rates. For most years of service, the proposed rates are lower than the current rates and the proposed ultimate rate is lower than the current ultimate rate.

Service	Current	Proposed
0	9.50%	8.00%
5	7.00%	7.00%
10	5.75%	5.25%
15	5.50%	5.25%
20+	5.50%	5.00%

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 4 – Specific Assumptions:

1. Rates of Retirement: The following table compares current and proposed retirement rates. Generally, the proposed rates reflect a number of small changes.

Age	Current	Proposed
45	.030	.040
50	.100	.050
52	.100	.100
55	.300	.250
58	.150	.150
60	.300	.200
62	.250	.250
65	.500	.650
68	.500	.250
70	1.000	1.000

2. Rates of Disability: The following table compares the proposed disability rates to the current rates. The proposed rates are lower up to age 34 and higher thereafter. It is also assumed that the percentage of job-related disabilities is 95% (increased from 90%).

Age	Current	Proposed
20	.00410	.0020
30	.00504	.0040
40	.00608	.0070
50	.00712	.0100
60	.00780	.0080

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Summary of Assumptions (continued)

Group 4 - Specific Assumptions (continued):

3. Rates of Withdrawal: Current rates are strictly service based. The proposed rates will remain service based. The proposed rates are generally greater than the current rates.

Service	Current	Proposed
0	.044	.080
5	.037	.045
10	.029	.030
15	.022	.025
20+	.015	.040

4. Rate of Salary Increase: The following table compares current and proposed salary increase rates. The proposed rates are less than the current rates for years of service 0 to 2 and years of service 10 or more. The proposed rates are the same as the current rates for all other years of service.

Service	Current	Proposed
0	12.00%	10.00%
5	7.00%	7.00%
10	5.50%	5.25%
15	5.50%	5.25%
20+	5.50%	5.00%

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Effect of Proposed Assumptions

For illustration, the effect of the proposed changes to the salary scale and demographic assumptions based on the January 1, 2006 valuation results is shown below. In light of the common goal of addressing the pension funding of the Commonwealth in a disciplined and appropriate manner, it is recommended that no change in the existing funding schedule take place at this time that would reduce the current level of appropriation.

1. Number of Members:

Active Members	83,178
Term. Vested Members	3,033
Retirees and Survivors	<u>50,593</u>
Total	136,804

2. Total Annual Regular Compensation \$4,200,577,139

3. Average Annual Regular Compensation \$50,501

Development of Total Cost (in thousands)

	Current Assumptions	Proposed Assumptions	Increase/Decrease
4. Normal Cost			
a. Total Normal Cost	\$516,852	\$504,800	(\$12,052)
b. Employee Contributions	<u>\$349,199</u>	<u>\$346,000</u>	<u>(\$3,199)</u>
c. Net Normal Cost	\$167,653	\$158,800	(\$8,853)
5. Actuarial Accrued Liability			
a. Active Members	\$10,093,928	\$10,115,600	\$21,672
b. Vested Terminated Members	\$355,900	\$355,900	\$0
c. Non-vested Terminated Members	\$93,336	\$93,336	\$0
d. Retirees and Survivors	<u>\$9,863,762</u>	<u>\$9,863,762</u>	<u>\$0</u>
e. Total Actuarial Liability	\$20,406,926	\$20,428,598	\$21,672
6. Actuarial Value of Assets	<u>\$16,638,043</u>	<u>\$16,638,043</u>	<u>\$0</u>
7. Unfunded Actuarial Liability: (5e)-(6)	\$3,768,883	\$3,790,555	\$21,672
8. Funded Ratio: (6) / (5e)	81.5%	81.4%	(0.1%)
9. Amortization of unfunded liability (17 year, 4.5% increasing)	\$289,600	\$291,265	\$1,665
10. Total Cost: (4c) + (9)	\$457,253	\$450,065	(\$7,188)
11. Total Cost FY07: (10) x 1.0825	\$494,976	\$487,195	(\$7,781)

Our results are shown for comparison only and assume a 17 year, 4.5% annual increasing schedule on a fresh start basis. The results of the State valuation represent only one of the components of the total Commonwealth obligation. The determination of the funding schedule for the Commonwealth would also include the results of the State Teachers' valuation, Boston teachers, and the local COLA liability.

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Terms and Definitions

ACTUAL/EXPECTED (or A/E) RATIO The ratio of the actual number of occurrences of a particular decrement compared to the expected number of occurrences of that decrement, based upon the current set of assumptions and the applicable exposures.

ACTUARIAL ACCRUED LIABILITY That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

ACTUARIAL ASSUMPTIONS Assumptions, based upon past experience or standard tables, used to predict the occurrence of future events affecting the amount and duration of pension benefits, such as: mortality, withdrawal, disablement and retirement; changes in compensation; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

ACTUARIAL GAIN OR LOSS (or EXPERIENCE GAIN or LOSS) A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between two Actuarial Valuation dates.

Note: The effect on the Accrued Liability and/or the Normal Cost resulting from changes in the Actuarial Assumptions, the Actuarial Cost Method or pension plan provisions would be described as such, not as an Actuarial Gain (Loss).

DECREMENTS The means by which a member changes status. For active members, the decrements are retirement, disability retirement, withdrawal and death. For retired members, the only decrement is death.

EXPOSURE The number of lives exposed to a given risk of decrement for a particular age (and/or service and gender). It represents the number of members who could have potentially retired, become disabled, withdrawn or died at that particular age.

NORMAL COST Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is to be paid in a single fiscal year. The Employee Normal Cost is the amount of the expected employee contributions for the fiscal year. The Employer Normal Cost is the difference between the Total Normal Cost and the Employee Normal Cost.

RP-2000 Mortality tables recently published by the Society of Actuaries based on a study of uninsured pension plan mortality. The tables reflect data submitted from 100 large pension plans for the years 1990-1994, and the resulting table is projected to the year 2000.

UNFUNDED ACCRUED LIABILITY The excess of the Actuarial Accrued Liability over the Assets.

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Appendix

Retirement Assumptions - Proposed Rates

	Group 1		Group 2	Group 3	Group 4
	Male	Female			
45	0.000	0.000	0.000	0.020	0.040
46	0.000	0.000	0.000	0.020	0.040
47	0.000	0.000	0.000	0.050	0.060
48	0.000	0.000	0.000	0.050	0.060
49	0.000	0.000	0.000	0.050	0.060
50	0.015	0.030	0.020	0.050	0.050
51	0.010	0.030	0.020	0.075	0.050
52	0.010	0.030	0.020	0.075	0.100
53	0.015	0.025	0.040	0.075	0.100
54	0.020	0.035	0.050	0.075	0.150
55	0.040	0.050	0.100	0.080	0.250
56	0.035	0.060	0.100	0.080	0.150
57	0.040	0.055	0.100	0.080	0.150
58	0.045	0.070	0.100	0.110	0.150
59	0.050	0.090	0.130	0.110	0.200
60	0.080	0.080	0.150	0.110	0.200
61	0.100	0.100	0.150	0.150	0.250
62	0.160	0.160	0.150	0.150	0.250
63	0.160	0.160	0.150	0.150	0.200
64	0.160	0.160	0.200	0.250	0.300
65	0.250	0.250	0.200	0.250	0.650
66	0.250	0.250	0.200	0.250	0.250
67	0.250	0.250	0.200	0.250	0.250
68	0.250	0.250	0.200	0.250	0.250
69	0.250	0.250	0.200	0.250	0.250
70	1.000	1.000	1.000	1.000	1.000

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Appendix (continued)

Disability Assumptions - Proposed Rates

Age	Group 1	Group 2	Group 3	Group 4
< 20	0.00010	0.00060	0.0010	0.0020
20	0.00010	0.00060	0.0010	0.0020
21	0.00010	0.00065	0.0010	0.0020
22	0.00010	0.00065	0.0010	0.0020
23	0.00010	0.00070	0.0010	0.0020
24	0.00010	0.00070	0.0010	0.0020
25	0.00010	0.00070	0.0011	0.0020
26	0.00010	0.00075	0.0012	0.0020
27	0.00010	0.00075	0.0013	0.0020
28	0.00010	0.00075	0.0014	0.0020
29	0.00010	0.00080	0.0015	0.0020
30	0.00010	0.00080	0.0016	0.0040
31	0.00014	0.00082	0.0017	0.0040
32	0.00018	0.00092	0.0018	0.0040
33	0.00025	0.00101	0.0019	0.0040
34	0.00035	0.00110	0.0020	0.0040
35	0.00048	0.00120	0.0030	0.0070
36	0.00054	0.00129	0.0040	0.0070
37	0.00060	0.00138	0.0050	0.0070
38	0.00066	0.00148	0.0060	0.0070
39	0.00072	0.00157	0.0070	0.0070
40	0.00075	0.00166	0.0080	0.0070
41	0.00080	0.00176	0.0080	0.0070
42	0.00085	0.00185	0.0080	0.0070
43	0.00090	0.00194	0.0080	0.0070
44	0.00095	0.00204	0.0080	0.0070
45	0.00100	0.00240	0.0090	0.0100
46	0.00110	0.00280	0.0100	0.0100
47	0.00125	0.00320	0.0110	0.0100
48	0.00130	0.00360	0.0120	0.0100
49	0.00135	0.00400	0.0130	0.0100
50	0.00140	0.00425	0.0140	0.0100
51	0.00145	0.00450	0.0150	0.0100
52	0.00150	0.00475	0.0160	0.0100
53	0.00155	0.00500	0.0170	0.0100
54	0.00160	0.00525	0.0180	0.0100
55	0.00165	0.00550	0.0190	0.0090
56	0.00170	0.00550	0.0200	0.0090
57	0.00175	0.00550	0.0200	0.0090
58	0.00180	0.00550	0.0200	0.0090
59	0.00190	0.00550	0.0200	0.0090
60	0.00200	0.00550	0.0300	0.0080
61	0.00215	0.00550	0.0300	0.0080
62	0.00230	0.00550	0.0300	0.0080
63	0.00245	0.00550	0.0300	0.0080
64	0.00250	0.00550	0.0300	0.0080
65	0.00250	0.00550	0.0300	0.0080

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Appendix (continued)

Turnover Assumptions - Proposed Rates (Groups 1 and 2 only)

Age	Service										
	0	1	2	3	4	5	6	7	8	9	10+
< 21	0.270	0.250	0.220	0.150	0.150	0.120	0.100	0.095	0.085	0.080	0.060
21	0.260	0.240	0.210	0.150	0.150	0.120	0.100	0.095	0.085	0.080	0.060
22	0.260	0.240	0.200	0.150	0.140	0.120	0.100	0.095	0.085	0.080	0.060
23	0.250	0.230	0.200	0.150	0.135	0.120	0.100	0.095	0.085	0.080	0.060
24	0.250	0.230	0.190	0.150	0.135	0.120	0.100	0.095	0.085	0.080	0.060
25	0.250	0.220	0.190	0.140	0.130	0.110	0.100	0.095	0.085	0.080	0.060
26	0.250	0.220	0.180	0.140	0.130	0.110	0.100	0.095	0.080	0.080	0.060
27	0.240	0.210	0.180	0.140	0.125	0.105	0.100	0.095	0.080	0.080	0.060
28	0.240	0.200	0.170	0.140	0.125	0.100	0.095	0.095	0.080	0.080	0.060
29	0.230	0.190	0.160	0.140	0.120	0.100	0.095	0.095	0.080	0.080	0.060
30	0.230	0.180	0.150	0.130	0.120	0.100	0.095	0.095	0.090	0.080	0.055
31	0.200	0.170	0.150	0.130	0.120	0.095	0.095	0.095	0.085	0.075	0.055
32	0.200	0.160	0.140	0.130	0.120	0.095	0.095	0.095	0.080	0.075	0.055
33	0.190	0.160	0.140	0.130	0.110	0.090	0.090	0.090	0.080	0.070	0.055
34	0.190	0.150	0.130	0.130	0.110	0.090	0.090	0.085	0.085	0.065	0.050
35	0.180	0.140	0.130	0.120	0.110	0.090	0.085	0.080	0.075	0.065	0.050
36	0.180	0.140	0.120	0.110	0.110	0.090	0.080	0.075	0.075	0.060	0.045
37	0.170	0.130	0.120	0.100	0.100	0.085	0.075	0.075	0.075	0.055	0.045
38	0.170	0.130	0.120	0.100	0.100	0.085	0.070	0.075	0.070	0.055	0.045
39	0.160	0.120	0.110	0.095	0.090	0.080	0.070	0.070	0.070	0.050	0.040
40	0.160	0.120	0.110	0.095	0.090	0.080	0.065	0.070	0.065	0.050	0.040
41	0.160	0.120	0.100	0.090	0.080	0.080	0.065	0.065	0.060	0.045	0.035
42	0.160	0.120	0.100	0.090	0.080	0.075	0.060	0.065	0.060	0.045	0.035
43	0.150	0.110	0.100	0.090	0.075	0.070	0.060	0.060	0.060	0.045	0.035
44	0.150	0.110	0.090	0.085	0.075	0.070	0.055	0.060	0.055	0.040	0.035
45	0.150	0.100	0.085	0.080	0.070	0.070	0.055	0.055	0.050	0.040	0.030
46	0.150	0.100	0.085	0.080	0.070	0.065	0.050	0.050	0.050	0.035	0.030
47	0.140	0.100	0.085	0.075	0.070	0.065	0.050	0.050	0.045	0.035	0.030
48	0.140	0.100	0.080	0.075	0.065	0.060	0.050	0.050	0.045	0.035	0.030
49	0.140	0.100	0.080	0.070	0.065	0.060	0.050	0.045	0.045	0.035	0.030
50	0.140	0.090	0.080	0.070	0.065	0.060	0.045	0.050	0.040	0.040	0.030
51	0.130	0.090	0.080	0.065	0.065	0.055	0.045	0.040	0.040	0.040	0.030
52	0.130	0.090	0.080	0.065	0.065	0.055	0.045	0.040	0.040	0.040	0.030
53	0.130	0.090	0.075	0.065	0.060	0.050	0.045	0.040	0.040	0.040	0.030
54	0.130	0.090	0.075	0.060	0.060	0.050	0.045	0.040	0.040	0.040	0.030
55	0.100	0.100	0.080	0.060	0.060	0.050	0.045	0.035	0.035	0.035	0.000
56	0.100	0.100	0.080	0.060	0.060	0.045	0.045	0.035	0.035	0.035	0.000
57	0.100	0.100	0.080	0.060	0.060	0.045	0.045	0.035	0.035	0.035	0.000
58	0.100	0.100	0.080	0.060	0.065	0.045	0.045	0.035	0.035	0.035	0.000
59	0.100	0.100	0.080	0.060	0.070	0.045	0.050	0.040	0.040	0.040	0.000
60	0.100	0.100	0.080	0.075	0.075	0.050	0.050	0.045	0.045	0.045	0.000
61	0.100	0.100	0.080	0.075	0.075	0.055	0.055	0.050	0.050	0.050	0.000
62	0.100	0.100	0.080	0.075	0.075	0.060	0.055	0.055	0.055	0.055	0.000
63	0.100	0.100	0.080	0.075	0.075	0.065	0.060	0.060	0.060	0.060	0.000
64	0.100	0.100	0.080	0.075	0.075	0.070	0.070	0.065	0.065	0.065	0.000
65	0.100	0.100	0.080	0.075	0.075	0.075	0.075	0.070	0.070	0.070	0.000

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Appendix (continued)

Turnover Assumptions - Proposed Rates

Service	Group 3	Group 4
0	0.008	0.080
1	0.008	0.070
2	0.008	0.065
3	0.008	0.055
4	0.008	0.045
5	0.008	0.045
6	0.008	0.040
7	0.008	0.035
8	0.008	0.035
9	0.008	0.035
10	0.006	0.030
11	0.006	0.030
12	0.006	0.025
13	0.006	0.025
14	0.006	0.025
15	0.006	0.025
16	0.006	0.020
17	0.006	0.015
18	0.006	0.020
19	0.006	0.030
20+	0.006	0.040

STATE RETIREMENT SYSTEM
2000-2005 EXPERIENCE STUDY

Appendix (continued)

Salary Increase Assumption - Proposed Rates

Years of Service	Group 1	Group 2	Group 3	Group 4
0	8.00%	8.00%	8.00%	10.00%
1	7.50%	7.50%	8.00%	9.00%
2	7.00%	7.00%	8.00%	8.50%
3	6.50%	6.50%	8.00%	8.00%
4	6.25%	6.25%	7.50%	7.50%
5	6.00%	6.00%	7.00%	7.00%
6	5.75%	5.75%	6.00%	6.50%
7	5.50%	5.50%	5.50%	6.00%
8	5.50%	5.50%	5.50%	5.50%
9	5.50%	5.50%	5.50%	5.50%
10	5.25%	5.25%	5.25%	5.25%
11	5.25%	5.25%	5.25%	5.25%
12	5.25%	5.25%	5.25%	5.25%
13	5.00%	5.00%	5.25%	5.25%
14	5.00%	5.00%	5.25%	5.25%
15	5.00%	5.00%	5.25%	5.25%
16	4.75%	4.75%	5.25%	5.25%
17	4.75%	4.75%	5.25%	5.25%
18	4.75%	4.75%	5.25%	5.25%
19	4.75%	4.75%	5.25%	5.25%
20+	4.50%	4.50%	5.00%	5.00%

PERAC

Five Middlesex Ave.

Suite 304

Somerville, MA 02145

ph 617 666 4446

fax 617 628 4002

tty 617 591 8917

web www.mass.gov/perac