

**TENNESSEE CONSOLIDATED
RETIREMENT SYSTEM
EXPERIENCE STUDY**

JULY 1, 2008 - JUNE 30, 2012



Bryan, Pendleton, Swats & McAllister, LLC
A Wells Fargo Company

JUSTIN C. THACKER, F.S.A.
DIRECT LINE: (615) 665-5387
EMAIL: JUSTIN.THACKER@BPSM.COM

September 27, 2013

The Honorable David H. Lillard, Jr., Chairman
Board of Trustees
Tennessee Consolidated Retirement System
Nashville, Tennessee 37219

Dear Mr. Lillard:

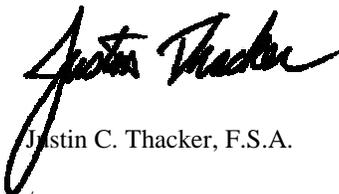
Submitted herewith are the results of an experience study of the Tennessee Consolidated Retirement System prepared for the four year period ending June 30, 2012, pursuant to the provisions of TCA Section 8-34-503(b). Also included are recommendations with respect to the actuarial assumptions of the plan for use with valuations occurring after this study date.

We trust that this report will be helpful in formulation of policy with respect to the operation and financing of the System. We very much appreciate the opportunity to serve the Board of Trustees, and will be pleased to supplement this report in any way, as you request.

The staff of the Tennessee Consolidated Retirement System has been extremely helpful and cooperative in developing the information required for this study. Their cooperation has been greatly appreciated, and is hereby acknowledged.

The study summarized in this report has been performed utilizing generally accepted actuarial principles and, where applicable, applying actuarial standards of practice. The undersigned is an actuary at BPS&M, member of the American Academy of Actuaries, and has met the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions herein.

Respectfully submitted,



Justin C. Thacker, F.S.A.

/mec

Enclosures

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Introduction

"At least once in each six (6) year period, the actuary shall make an actuarial investigation into the mortality, service and compensation experience of the members and beneficiaries of the retirement system, and taking into account the results of such investigation, the board of trustees shall adopt for the retirement system such mortality, service, and other tables as shall be deemed necessary."

Tennessee Code Annotated, Section 8-34-503(b)

Since the Tennessee Consolidated Retirement System was established effective July 1, 1972, an actuarial experience study has been conducted periodically in accordance with the statute cited above. Each study has covered a four year reporting period, in compliance with the statutory requirement prior to amendment in 1992 to permit a six year rather than four year span. The current study examines the four year period ending June 30, 2012.

The initial four year period ended June 30, 1976. The experience study performed as of that date reached some definite conclusions and identified other probable trends. However, there were shortcomings to the data collected for the study because the records on which the study drew had been established, necessarily, to support the ongoing administration of the System. Steps were taken at that time to begin accumulating more elaborate information so that studies performed as of June 30, 1980 and later produced more comprehensive results. The data collection process continues to be refined to take advantage of the additional processing power made available by advances in technology. Information that was not previously available is now gathered allowing more elaborate analysis of results.

TCA 8-34-503(b) provides that the periodic actuarial investigation shall cover the "mortality, service and compensation experience" of the System. Within this framework, the various factors relating to the System's experience can be categorized, as follows:

- A. Demographic Assumptions
 - 1. Post-retirement Mortality
 - 2. Pre-retirement Mortality
 - 3. Rates of Disability
 - 4. Turnover (i.e., withdrawal from the System)
 - 5. Spreads of Retirement Age

- B. Economic Assumptions
 - 1. Rate of Investment Return
 - 2. Changes in Compensation for Continuing Employees
 - 3. Increases in Social Security Taxable Wage Base
 - 4. Cost of Living Adjustments

Each of the factors is discussed separately in the following sections of this report.

As input for the study, census data was obtained for the fiscal years beginning July 1, 2008, 2009, 2010, and 2011. For each year, the employee population established as of the beginning of the fiscal year was traced through the end of the fiscal year. For these years, records had been provided by TCRS indicating whether each individual was still a member of the System as of the end of the fiscal year or, if he was no longer a member, the cause of his withdrawal (retirement, disability, death, etc.).

Salaries were reported for each employee who was an active participant as of the beginning of each fiscal year. For each individual who remained an active employee as of the end of a fiscal year, salaries were compared to full year salaries reported in the previous fiscal year in order to determine compensation increase rates.

In studying each "decrement" (that is, each reason for which individuals could have withdrawn from the System), a comparison of "actual" to "expected" terminations was made. The number of "actual" withdrawals for each cause was tabulated from the records maintained by the System. The "expected" terminations for each cause were determined by applying the rates of decrement recommended with the 2008 experience study to the exposure (that is, the number of individuals active as of the beginning of each fiscal year). By comparing the ratio of actual terminations to expected terminations for each cause, the validity of the actuarial tables was tested.

Results for the four separate years included in the review period have been combined in order to increase the sample size and smooth out random variations.

Each of the studies investigated several groups separately, because it was felt that they might have significantly different experience. The groups were defined as follows:

1. Teachers
2. General State Employees
3. Employees of Political Subdivisions
4. "Group II" Members (Firemen, Police, Wildlife Officers, and Highway Patrol)
5. "Group III" Members (County officials and Public Service Commissioners)
6. UT-TIAA with Guarantees
7. Local Teachers in Closed Systems
8. "Aged" Teachers and State Employees (retired lives only)

In practice, "Group II" and "Group III" were small, closed groups which were not large enough to generate credible experience, and "UT-TIAA", local teachers, and "aged" retirees exhibited experience quite similar to the larger group of teachers. Therefore, primary attention was paid to the first three groups—Teachers, general State employees and employees of Political Subdivisions. The results shown for Teachers include not only contributory ("K-12") teachers, but UT-TIAA members and local teachers, as well as "aged" retirees. "Non-Contributory" teachers (higher education) are included with general State employees, since they are combined with them for purposes of determining contribution rates.

Each of the sections in the Demographic Assumptions portion of the report deals with a particular rate of decrement or other assumption, in the order previously listed. For each assumption, the "ratios of actual to expected" based on the current tables are illustrated and discussed. A recommendation is then made concerning each assumption. The Board may choose to adopt the recommendations for use with valuations occurring after this study date and with any actuarial calculations required prior to subsequent changes in the assumptions.

Effect of Actuarial Assumptions on Plan Costs

It is important to realize that actuarial assumptions do not determine the ultimate cost of a pension plan. Actual experience (benefits paid plus the expenses of plan operation, less interest earned on plan assets) ultimately determines the amount which the plan sponsor must contribute. What the actuarial assumptions do, in combination with the actuarial funding method, is determine the incidence of the plan's ultimate cost over a period of years --- how much the plan's sponsor must contribute to the plan each year.

For example, if a very "conservative" set of assumptions is used as the basis for a valuation (low interest earnings, high salary increases, low turnover, low mortality rates), the initial cost of the plan will be high, but the required contribution rates will in all likelihood decrease gradually in later years. If, on the other hand, a plan starts out using a very "liberal" or "optimistic" set of assumptions (high interest earnings, low salary increases, high turnover, high mortality rates), the initial cost of the plan may be quite low, but plan costs will gradually increase in future years.

For most employers, a fairly level plan contribution as a percentage of covered payroll is a desirable goal. Therefore, plan sponsors usually try to choose assumptions that they feel are generally reasonable. In the absence of unusual events, a reasonable set of actuarial assumptions can be expected to develop a reasonably level series of annual contributions.

The purpose of the experience study is to review the existing set of actuarial assumptions and identify any trends in participant behavior or economic situations that are deemed to be long-term in nature. Any changes to the assumptions would be expected to have an impact on the future level of required contributions to the plan.

General Approach

The portion of the study concerning active participants was based on the active life data associated with fiscal years beginning in 2008 through 2011. For each plan year, a record was established for each person who was an active participant in the plan as of the beginning of the year. Those records were tracked through the end of each fiscal year to determine the employment status at that time. A similar process was used to develop records concerning mortality among retired lives to determine whether the participant was still living at the end of the respective fiscal years.

These records served as the basis for the experience study. For most of the actuarial assumptions, the study took the form of determining ratios of "actual" results to the "expected" results obtained by applying the current tables to the participating lives. The table on the next page shows an example of the way in which "actual" terminations were compared to "expected" terminations and a ratio of "actual to expected" was obtained.

In order to obtain this table, each record was treated as a "unit of exposure" -- that is, the participant with which it is associated entered the year and was "exposed" to the contingency being measured. The member either terminated participation for this reason during the year or did not. In either event, it counted as a unit of exposure, so the exposure figure for the proper age and sex was increased by one. If the person actually terminated participation for this reason, the "actual" column was also increased by one for that age and sex; if the person was still employed at the end of the year, or if he terminated for some other reason, no entry was made to the "actual" column. An "expected" figure was calculated by multiplying the one unit of exposure by the probability of termination included in the turnover table currently being utilized in the valuation. For example, if for a particular age and sex the current table assumes that 15% of the participants will terminate employment during the next year, a factor of .15 was added to the "expected" column for the appropriate age and sex.

After all of the records were processed through the program, ratios of actual to expected were calculated. For example, over the four years of observation, 8,571 males between the ages of 36 and 40 began a year of employment. Of those 8,571 people, 473 terminated their employment before the end of the year. On the other hand, the turnover table currently being utilized assumes that approximately 3.44% of males in this age bracket will terminate their employment, so the "expected" figure was 295. Thus, actual terminations in this category were greater than the "expected" terminations --- the ratio of actual to expected was 160%.

DEMOGRAPHIC ASSUMPTIONS

		General State Ultimate Withdrawal Unweighted				
		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	1,092	163	171	95.08	
	26-30	4,493	474	503	94.21	
	31-35	7,066	544	482	112.82	
	36-40	8,571	473	295	160.47	
	41-45	10,333	480	204	235.13	
	46-50	12,164	477	242	196.88	
	51-55	11,876	506	281	180.35	
	56-60	4,682	221	162	136.32	
	61-65	182	23	7	327.99	
	66-70	50	9	0	n/a	
	71-75	14	2	0	n/a	
	TOTAL		60,523	3,372	2,348	143.63
	<u>FEMALE</u>	16-20	6	1	1	90.32
		21-25	1,023	179	159	112.83
26-30		7,067	894	835	107.08	
31-35		10,848	988	846	116.75	
36-40		12,840	933	570	163.74	
41-45		14,764	794	382	208.00	
46-50		19,350	850	428	198.48	
51-55		19,214	927	561	165.20	
56-60		7,156	392	277	141.64	
61-65		168	28	8	353.97	
66-70		34	9	0	n/a	
71-75		10	4	0	n/a	
TOTAL			92,480	5,999	4,067	147.52
<u>TOTAL</u>		16-20	6	1	1	90.32
		21-25	2,115	342	330	103.61
	26-30	11,560	1,368	1,338	102.24	
	31-35	17,914	1,532	1,328	115.32	
	36-40	21,411	1,406	865	162.63	
	41-45	25,097	1,274	586	217.46	
	46-50	31,514	1,327	671	197.90	
	51-55	31,090	1,433	842	170.25	
	56-60	11,838	613	439	139.67	
	61-65	350	51	15	341.76	
	66-70	84	18	0	n/a	
	71-75	24	6	0	n/a	
	TOTAL		153,003	9,371	6,414	146.10

This example provides a simplified illustration of the methodology used in succeeding sections of the report. Actual comparisons made herein are conducted on the basis described above but have been modified by “weighting” in order to enhance the effectiveness of the results. The weighting process gives recognition to the fact that some participants, due to associated larger liabilities, have a greater impact on valuation results than others. For instance, a senior official who has completed a significant number of years of service and receives a high salary will have a substantially larger actuarial liability than a short service lower paid employee of the same age. The impact on the plan of service retirement of the senior official is a more significant event than retirement of the lower paid employee of the same age. Therefore, the “number” of participants used to develop exposure, actual and expected numbers has been weighted by multiplying the number by the actuarial liability for that participant. Actuarial assumptions recommended with the 2008 experience study are used in determining liability weightings. For instance, an employee with a liability of \$10,000 for whom the probability of termination was 10% would result in exposure and expected amounts for a particular year of 1 and 0.10 respectively on an unweighted basis and 10,000 and 1,000 respectively on a weighted basis. If the participant died during the year, the “actual” weighted entry for the year would be 10,000.

The charts presented herein have been developed recognizing liability weightings. Weighted results have been reduced proportionately to maintain exposure amounts within a reasonable range.

The table on the following page shows the results of the earlier table after data for participants have been weighted by liability amount. After weighting, the actual to expected ratio for the group of Consolidated State male employees between 36 and 40 years of age is reduced from 160.47% to 114.92%. The reduction suggests that higher paid employees with relatively more seniority are less inclined to terminate employment than lower paid employees with shorter periods of service. This result is expected and is further confirmed by comparing the overall actual to expected ratio between the two tables. The overall ratio declines from 146.10% to 113.91%. The process of correlating rates of termination, death, etc. to liability weightings ensures that actuarial assumptions are developed in the same manner they are applied. Both the development of the rates in the experience study and their application in the valuation process are with respect to liability amounts.

DEMOGRAPHIC ASSUMPTIONS

		General State Ultimate Withdrawal Weighted				
		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	9,473	1,264	1,466	86.22	
	26-30	87,794	7,566	9,584	78.95	
	31-35	262,919	14,124	17,439	80.99	
	36-40	501,365	19,405	16,886	114.92	
	41-45	858,222	22,303	16,818	132.61	
	46-50	1,271,319	30,145	25,371	118.81	
	51-55	1,260,551	38,151	29,758	128.20	
	56-60	488,807	19,464	16,936	114.93	
	61-65	16,305	275	679	40.43	
	66-70	1,262	284	0	n/a	
	71-75	82	3	0	n/a	
	TOTAL		4,758,099	152,982	134,936	113.37
	<u>FEMALE</u>	16-20	33	3	6	50.64
21-25		8,451	1,293	1,299	99.55	
26-30		128,038	13,960	14,752	94.63	
31-35		378,982	26,670	28,958	92.10	
36-40		651,459	33,549	28,441	117.96	
41-45		1,084,621	34,987	27,667	126.46	
46-50		1,826,399	46,228	40,452	114.28	
51-55		1,816,710	63,820	53,073	120.25	
56-60		679,201	31,401	26,218	119.77	
61-65		8,146	648	409	158.27	
66-70		525	231	0	n/a	
71-75		23	6	0	n/a	
TOTAL			6,582,588	252,796	221,275	114.25
<u>TOTAL</u>		16-20	33	3	6	50.64
	21-25	17,924	2,557	2,765	92.48	
	26-30	215,832	21,527	24,336	88.46	
	31-35	641,901	40,793	46,396	87.92	
	36-40	1,152,824	52,954	45,327	116.83	
	41-45	1,942,843	57,290	44,485	128.78	
	46-50	3,097,718	76,372	65,823	116.03	
	51-55	3,077,260	101,970	82,831	123.11	
	56-60	1,168,009	50,864	43,154	117.87	
	61-65	24,452	922	1,088	84.74	
	66-70	1,787	515	0	n/a	
	71-75	105	9	0	n/a	
	TOTAL		11,340,687	405,778	356,212	113.91

In each of the following sections, the appropriateness of the current assumptions is discussed, and tables are included which compare actual results during the past four years to the "expected" results obtained by applying the current tables to the exposure. A recommendation is then made, and a second group of tables illustrates the relationship between "actual" and "expected" based on any proposed new tables.

Post-Retirement Mortality

Pension costs are quite sensitive to changes in post-retirement mortality assumptions. Therefore, it is important that mortality tables used in the actuarial valuation adequately reflect post-retirement mortality experience. Mortality rates have been studied based on two major groups of employees, a) the Teachers group consisting of Teachers and Group III members and b) the group consisting of State employees, Political Subdivision employees and Group II members.

In this context, "conservative" tables are tables with low assumed rates of mortality—it is assumed that retirees will continue to live for comparatively long periods of time. Translated into ratios of actual to expected deaths among retirees, a mortality table is "conservative" if ratios of actual to expected are above 100%. If ratios are below 100%, fewer retirees are dying than expected. Since they are living longer than expected, they will receive more benefits from the plan than expected, so more money will have to go into the fund than has been anticipated.

The 1976, 1980, and 1984 studies all showed that retirees, especially teachers, were living longer than expected—that is, the post-retirement mortality tables then in use were not sufficiently conservative. Differences between actual and expected deaths were so great that some question remained as to whether the improvements in mortality were permanent or were due partially to statistical fluctuations. Therefore, the Board adopted an "intermediate" approach. About one-half of the apparent improvement in mortality was recognized in the new tables adopted after the 1980 study, with the understanding that further action could be taken if subsequent studies indicated permanent and/or continuing improvement. In 1984, the full continued improvement in mortality was recognized by adoption of the 1983 Group Annuity Mortality Tables as the basis for expected deaths among teachers and the 1975 Group Annuity Mortality Tables (somewhat less conservative) as the basis for expected deaths among other retirees.

Experience from 1984 to 1988 indicated that the tables adopted as a result of the 1984 study had provided an accurate picture of expected deaths among retirees, and this pattern continued during the period ending in 1992. For the four year period ending in 1996, the ratio of actual to expected mortality declined below 100% among service retirees. As a result of the 1996 study, the male Teachers mortality table was modified to a more conservative basis, while other groups were left unchanged since the ratios were generally above 95%.

Mortality experience in the 2000 study showed continued improvement among both major groups. Overall ratios for both groups declined by almost 4% from 1996 to 2000, with the majority of mortality improvement recognized among males. As a result of the 2000 study, mortality tables were modified for both major groups in order to bring actual to expected ratios back up to 100%. In addition, the new mortality tables were based on actual TCRS mortality experience. Historically, mortality rates had been created by adjusting standard tables by a uniform percentage to fit the overall pattern of the TCRS groups. This change was made to better reflect actual TCRS mortality experience below age 65, which was not consistent with standard mortality tables.

Experience in the 2004 study showed continued mortality improvement in the group consisting of State employees, Political Subdivision employees and Group II members. The ratio of actual to expected mortality for this group declined from 100% to 91% since the 2000 study, with males experiencing more mortality improvement than females. Experience of the Teachers group (consisting of Teachers and Group III members) resulted in a reasonably conservative ratio of 103%. As a result of the 2004 study, mortality tables were modified for both major groups in order to bring actual to expected ratios back to 100%.

Experience in the 2008 study showed continued mortality improvement among all groups. The ratio of actual to expected mortality for both of the main groups declined from 100% to just below 90% since the 2004 study, with

both males and females experiencing consistent mortality improvement during the period. As a result of the 2008 study, mortality tables were modified for both major groups in order to bring actual to expected ratios back to 100%.

Experience in this study showed modest continued mortality improvement in the group consisting of State employees, Political Subdivision employees and Group II members. The ratio of actual to expected mortality for this group declined from 100% to 96% since the 2008 study, with consistent improvement among males and females. Experience of the Teachers group (consisting of Teachers and Group III members) showed relatively greater improvement with the actual to expected ratio declining from 100% to 87% since the 2008 Study, with males experiencing more mortality improvement than females.

Mortality experience following disability retirements was also investigated. The number of death claims among disabled retirees is not large enough to be fully credible statistically—disability retirees amount to only 5% of TCRS retirees. The results of the study indicate that actual mortality among both males and females is lower than expected. Results for disability mortality continue to be very inconsistent between study periods, suggesting further that experience in this area is less than fully credible.

The tables on the next three pages set out actual deaths, expected deaths, and ratios of actual to expected during the last four years. Actual and expected deaths are weighted by liability amounts to improve accuracy. Expected deaths are based on the tables used in the 2011 valuation (assumptions adopted after the 2008 experience study). The first two pages show results for service retirees and the third for disability retirees.

DEMOGRAPHIC ASSUMPTIONS

All Teacher Groups Post-Retirement Mortality Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	36-40	21,927	286	12	2,346.25
	41-45	9,441	0	13	0.00
	46-50	10,550	0	28	0.00
	51-55	209,422	985	1,032	95.49
	56-60	1,383,837	4,907	7,709	63.66
	61-65	3,138,685	19,843	26,645	74.47
	66-70	2,667,244	30,141	38,163	78.98
	71-75	1,797,157	37,896	43,894	86.34
	76-80	1,231,264	42,588	51,559	82.60
	81-85	585,203	40,537	39,539	102.52
	86-90	188,418	21,921	25,277	86.72
	91-95	50,916	10,518	11,486	91.57
	TOTAL	11,294,064	209,622	245,358	85.44
	<u>FEMALE</u>	36-40	23,857	304	12
41-45		10,795	0	11	0.00
46-50		19,883	0	34	0.00
51-55		737,553	884	2,085	42.40
56-60		4,140,064	12,474	17,534	71.14
61-65		7,307,171	36,330	42,305	85.88
66-70		5,373,124	38,741	47,229	82.03
71-75		3,322,236	39,693	49,538	80.13
76-80		2,065,193	46,667	54,950	84.93
81-85		1,169,762	55,685	56,228	99.04
86-90		468,445	42,595	44,291	96.17
91-95		221,591	40,178	41,649	96.47
TOTAL		24,859,674	313,551	355,867	88.11
<u>TOTAL</u>		36-40	45,784	590	24
	41-45	20,235	0	24	0.00
	46-50	30,433	0	62	0.00
	51-55	946,975	1,869	3,117	59.98
	56-60	5,523,902	17,381	25,243	68.85
	61-65	10,445,856	56,173	68,950	81.47
	66-70	8,040,368	68,882	85,392	80.67
	71-75	5,119,393	77,589	93,432	83.04
	76-80	3,296,458	89,255	106,508	83.80
	81-85	1,754,965	96,222	95,767	100.48
	86-90	656,864	64,515	69,568	92.74
	91-95	272,507	50,696	53,136	95.41
	TOTAL	36,153,738	523,173	601,225	87.02

DEMOGRAPHIC ASSUMPTIONS

Consolidated State, Polisubs & Group II Post-Retirement Mortality Old Assumptions

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	36-40	30,928	64	38	171.71
	41-45	9,677	68	20	342.38
	46-50	49,245	404	182	221.57
	51-55	434,143	1,780	2,541	70.06
	56-60	1,787,004	17,073	15,682	108.87
	61-65	3,718,044	37,752	45,827	82.38
	66-70	3,733,328	64,465	66,935	96.31
	71-75	2,736,537	79,911	82,192	97.23
	76-80	1,556,166	74,358	81,468	91.27
	81-85	639,606	53,926	52,726	102.28
	86-90	213,448	29,201	28,275	103.28
	91-95	37,391	8,058	7,746	104.03
	TOTAL	14,945,518	367,060	383,630	95.68
<u>FEMALE</u>	36-40	44,217	32	30	106.27
	41-45	26,862	0	36	0.00
	46-50	78,157	62	155	39.88
	51-55	588,035	3,563	1,961	181.70
	56-60	1,846,094	11,640	10,575	110.07
	61-65	3,463,634	29,999	28,812	104.12
	66-70	3,458,539	34,042	39,789	85.55
	71-75	2,473,062	42,663	42,361	100.71
	76-80	1,451,636	45,217	49,829	90.75
	81-85	764,612	38,245	42,720	89.53
	86-90	288,503	29,926	29,557	101.25
	91-95	78,297	13,693	14,770	92.71
	TOTAL	14,561,647	249,084	260,596	95.58
<u>TOTAL</u>	36-40	75,145	97	68	142.50
	41-45	36,539	68	56	122.05
	46-50	127,402	466	338	137.92
	51-55	1,022,177	5,343	4,502	118.70
	56-60	3,633,097	28,713	26,257	109.35
	61-65	7,181,678	67,751	74,639	90.77
	66-70	7,191,867	98,506	106,724	92.30
	71-75	5,209,599	122,573	124,552	98.41
	76-80	3,007,802	119,576	131,297	91.07
	81-85	1,404,218	92,171	95,445	96.57
	86-90	501,951	59,128	57,832	102.24
	91-95	115,688	21,752	22,516	96.61
	TOTAL	29,507,165	616,144	644,226	95.64

DEMOGRAPHIC ASSUMPTIONS

**All Retirees
Post-Disability Mortality
Old Assumptions**

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	36-40	8,885	78	214	36.65
	41-45	22,474	566	640	88.45
	46-50	50,359	1,357	1,593	85.17
	51-55	116,999	4,081	4,111	99.29
	56-60	168,072	5,559	6,569	84.63
	61-65	152,244	6,362	6,626	96.03
	66-70	66,711	3,736	3,354	111.37
	71-75	25,158	1,920	1,547	124.14
	76-80	10,530	1,132	852	132.82
	81-85	6,545	1,168	714	163.54
	86-90	3,983	243	668	36.33
	91-95	2,487	52	526	9.84
	TOTAL	634,447	26,255	27,414	95.77
	<u>FEMALE</u>	36-40	12,231	374	304
41-45		26,469	280	755	37.11
46-50		80,104	2,778	2,532	109.72
51-55		166,282	3,947	5,847	67.50
56-60		228,816	6,063	8,940	67.82
61-65		207,965	6,487	9,055	71.64
66-70		103,632	2,104	5,223	40.28
71-75		39,215	1,792	2,406	74.48
76-80		19,102	1,223	1,542	79.30
81-85		9,514	556	1,041	53.39
86-90		3,608	537	566	94.82
91-95		1,277	341	304	112.10
TOTAL		898,216	26,480	38,515	68.75
<u>TOTAL</u>		36-40	21,116	452	517
	41-45	48,943	846	1,395	60.66
	46-50	130,463	4,135	4,125	100.24
	51-55	283,281	8,028	9,958	80.62
	56-60	396,888	11,622	15,509	74.94
	61-65	360,209	12,849	15,681	81.94
	66-70	170,343	5,840	8,577	68.08
	71-75	64,373	3,712	3,953	93.91
	76-80	29,632	2,355	2,394	98.35
	81-85	16,059	1,724	1,756	98.22
	86-90	7,590	780	1,234	63.18
	91-95	3,764	392	830	47.27
	TOTAL	1,532,663	52,735	65,929	79.99

Recommendation: Results for the tables applied to both of the main groups (State employees/Political Subdivisions and Teachers) have again reached the lower end of the acceptable range due to improvements in mortality. As in the past, new tables are recommended for both groups to better fit the mortality experience from the study period.

Since continued mortality improvement has been documented throughout recent studies, anticipating future improvements in mortality is prudent. This can be accomplished by using a generational mortality table that reduces the expected probabilities of mortality for all future years. This approach assumes that mortality improvements will continue indefinitely, but is not yet widely used. Another approach is to create a mortality table that would produce actual to expected ratios greater than 100%. Mortality tables with ratios greater than 100% would be a reasonable approach in the short-term, while continuing to monitor mortality improvements in the future.

New tables are recommended for both groups to fit the mortality experience from the study period with a 2-year mortality projection to reflect continued mortality improvements. This is the first time mortality improvements have been incorporated into the recommended tables and will create more conservative mortality assumptions. Experience regarding mortality improvements will continue to be monitored and a longer projection period may be considered in future studies if appropriate.

Two sets of mortality tables have been created for both major groups. The first set is the 2012 “base tables” to bring actual to expected ratios back to 100% of experience observed in the study. The second set of mortality tables created apply a 2-year projection to the 2012 base tables using the standard AA projection scale.

Adopting the new tables with the 2-year projection would produce actual to expected ratios of approximately 103% for State Employees and 102% for Teachers based on the experience data observed from 2008 to 2012. The actual to expected ratios are now over 100% as a result of incorporating a 2-year mortality projection.

For the disability assumption, the difference in results from the prior period suggests that a change is warranted. Since the experience in this area is less than fully credible, a modified standard table is recommended. The sex-distinct table in IRS Revenue Ruling 96-7 for disabled lives (including both those that are and are not eligible for Social Security disability) has been selected. In order to better match current experience, the rates in the standard table have been increased by 10%. A degree of conservatism has been built into the new table such that the actual over expected ratio is 103.5%.

DEMOGRAPHIC ASSUMPTIONS

**All Teacher Groups
Post-Retirement Mortality
Recommended Assumptions**

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	36-40	21,927	286	12	2,353.57
	41-45	9,441	0	13	0.00
	46-50	10,550	0	23	0.00
	51-55	209,422	985	618	159.55
	56-60	1,383,837	4,907	5,195	94.46
	61-65	3,138,685	19,843	19,190	103.40
	66-70	2,667,244	30,141	29,461	102.31
	71-75	1,797,157	37,896	36,230	104.60
	76-80	1,231,264	42,588	42,987	99.07
	81-85	585,203	40,537	38,190	106.14
	86-90	188,418	21,921	22,391	97.90
	91-95	50,916	10,518	10,366	101.46
	TOTAL	11,294,064	209,622	204,676	102.42
	<u>FEMALE</u>	36-40	23,857	304	9
41-45		10,795	0	8	0.00
46-50		19,883	0	24	0.00
51-55		737,553	884	1,557	56.76
56-60		4,140,064	12,474	13,093	95.27
61-65		7,307,171	36,330	34,942	103.97
66-70		5,373,124	38,741	38,258	101.26
71-75		3,322,236	39,693	39,343	100.89
76-80		2,065,193	46,667	46,427	100.52
81-85		1,169,762	55,685	53,475	104.13
86-90		468,445	42,595	42,220	100.89
91-95		221,591	40,178	40,687	98.75
TOTAL		24,859,674	313,551	310,045	101.13
<u>TOTAL</u>		36-40	45,784	590	21
	41-45	20,235	0	22	0.00
	46-50	30,433	0	47	0.00
	51-55	946,975	1,869	2,175	85.95
	56-60	5,523,902	17,381	18,288	95.04
	61-65	10,445,856	56,173	54,132	103.77
	66-70	8,040,368	68,882	67,719	101.72
	71-75	5,119,393	77,589	75,573	102.67
	76-80	3,296,458	89,255	89,414	99.82
	81-85	1,754,965	96,222	91,665	104.97
	86-90	656,864	64,515	64,612	99.85
	91-95	272,507	50,696	51,054	99.30
	TOTAL	36,153,738	523,173	514,721	101.64

DEMOGRAPHIC ASSUMPTIONS

**Consolidated State, Polisubs and Group II
Post-Retirement Mortality
Recommended Assumptions**

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	36-40	30,928	64	17	384.62
	41-45	9,677	68	13	529.96
	46-50	49,245	404	144	279.55
	51-55	434,143	1,780	2,063	86.30
	56-60	1,787,004	17,073	14,166	120.52
	61-65	3,718,044	37,752	38,628	97.73
	66-70	3,733,328	64,465	61,789	104.33
	71-75	2,736,537	79,911	76,898	103.92
	76-80	1,556,166	74,358	74,128	100.31
	81-85	639,606	53,926	52,155	103.39
	86-90	213,448	29,201	28,055	104.08
	91-95	37,391	8,058	7,694	104.74
	TOTAL	14,945,518	367,060	355,751	103.18
<u>FEMALE</u>	36-40	44,217	32	16	200.76
	41-45	26,862	0	20	0.00
	46-50	78,157	62	118	52.31
	51-55	588,035	3,563	1,758	202.69
	56-60	1,846,094	11,640	10,514	110.71
	61-65	3,463,634	29,999	29,106	103.07
	66-70	3,458,539	34,042	35,272	96.51
	71-75	2,473,062	42,663	40,830	104.49
	76-80	1,451,636	45,217	45,068	100.33
	81-85	764,612	38,245	38,345	99.74
	86-90	288,503	29,926	28,957	103.35
	91-95	78,297	13,693	14,235	96.20
	TOTAL	14,561,647	249,084	244,239	101.98
<u>TOTAL</u>	36-40	75,145	97	33	294.77
	41-45	36,539	68	33	205.15
	46-50	127,402	466	263	177.12
	51-55	1,022,177	5,343	3,821	139.85
	56-60	3,633,097	28,713	24,679	116.34
	61-65	7,181,678	67,751	67,734	100.03
	66-70	7,191,867	98,506	97,061	101.49
	71-75	5,209,599	122,573	117,728	104.12
	76-80	3,007,802	119,576	119,196	100.32
	81-85	1,404,218	92,171	90,501	101.85
	86-90	501,951	59,128	57,012	103.71
	91-95	115,688	21,752	21,929	99.19
	TOTAL	29,507,165	616,144	599,990	102.69

DEMOGRAPHIC ASSUMPTIONS

**All Retirees
Post-Disability Mortality
Recommended Assumptions**

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	36-40	8,885	78	143	54.72
	41-45	22,474	566	448	126.25
	46-50	50,359	1,357	1,227	110.62
	51-55	116,999	4,081	3,512	116.22
	56-60	168,072	5,559	6,190	89.82
	61-65	152,244	6,362	6,802	93.54
	66-70	66,711	3,736	3,738	99.94
	71-75	25,158	1,920	1,865	102.93
	76-80	10,530	1,132	1,030	109.89
	81-85	6,545	1,168	814	143.54
	86-90	3,983	243	696	34.86
	91-95	2,487	52	527	9.82
	TOTAL	634,447	26,255	26,992	97.27
	<u>FEMALE</u>	36-40	12,231	374	161
41-45		26,469	280	404	69.40
46-50		80,104	2,778	1,390	199.77
51-55		166,282	3,947	3,320	118.88
56-60		228,816	6,063	5,337	113.60
61-65		207,965	6,487	5,729	113.24
66-70		103,632	2,104	3,456	60.88
71-75		39,215	1,792	1,665	107.62
76-80		19,102	1,223	1,100	111.20
81-85		9,514	556	741	75.04
86-90		3,608	537	410	130.88
91-95		1,277	341	233	146.40
TOTAL		898,216	26,480	23,945	110.59
<u>TOTAL</u>		36-40	21,116	452	304
	41-45	48,943	846	852	99.31
	46-50	130,463	4,135	2,617	157.98
	51-55	283,281	8,028	6,832	117.51
	56-60	396,888	11,622	11,527	100.83
	61-65	360,209	12,849	12,530	102.55
	66-70	170,343	5,840	7,194	81.17
	71-75	64,373	3,712	3,530	105.14
	76-80	29,632	2,355	2,130	110.57
	81-85	16,059	1,724	1,555	110.90
	86-90	7,590	780	1,106	70.48
	91-95	3,764	392	760	51.63
	TOTAL	1,532,663	52,735	50,937	103.53

Pre-Retirement Mortality

Pension costs are not particularly sensitive to changes in pre-retirement mortality rates, because the mortality rates at active ages are quite low. Nevertheless, it is desirable to utilize rates which reasonably reflect actuarial experience if possible.

Since TCRS became non-contributory for most State employees, records do not support a study of pre-retirement mortality among non-contributory groups. Previously, when a Member's employment terminated, a claim had to be made for the return of his contributions, and that claim indicated the reason for the termination. Now no such claim needs to be filed. As a result, TCRS records do not indicate the reason for the termination; the Member is simply no longer active. The same problem relates partially to Political Subdivisions, since some of them are contributory and some are not. Teacher data may also not be completely reliable.

The table on the next page shows the results for active Teachers, and the tables on the following pages show results for Consolidated State and Political Subdivision employees. The results likely do not adequately reflect reality, since deaths appear to be understated. The limited amount of pre-retirement deaths also limits the credibility of this experience.

DEMOGRAPHIC ASSUMPTIONS

Teachers
Pre-Retirement Mortality
Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	10,691	0	2	0.00	
	26-30	129,774	36	32	113.49	
	31-35	392,770	362	154	234.97	
	36-40	682,649	207	398	51.97	
	41-45	771,440	392	609	64.36	
	46-50	982,497	755	1,110	67.98	
	51-55	1,498,419	4,636	2,399	193.28	
	56-60	1,843,723	7,143	4,474	159.67	
	61-65	1,071,701	3,615	3,974	90.96	
	66-70	195,867	766	1,027	74.53	
	71-75	41,067	203	695	29.17	
	TOTAL		7,620,598	18,114	14,874	121.79
	<u>FEMALE</u>	16-20	9	0	0	n/a
		21-25	62,075	5	8	64.96
26-30		576,809	160	84	189.84	
31-35		1,450,826	222	351	63.18	
36-40		2,538,489	834	933	89.35	
41-45		2,880,314	708	1,630	43.43	
46-50		3,748,216	2,633	3,292	79.99	
51-55		6,143,088	7,170	8,025	89.34	
56-60		7,027,035	8,245	13,948	59.11	
61-65		3,459,965	7,569	9,961	75.99	
66-70		510,251	3,800	2,042	186.06	
71-75		70,443	327	926	35.32	
TOTAL			28,467,521	31,672	41,200	76.87
<u>TOTAL</u>		16-20	9	0	0	n/a
		21-25	72,766	5	10	49.31
	26-30	706,583	196	116	168.77	
	31-35	1,843,596	584	505	115.60	
	36-40	3,221,139	1,041	1,331	78.17	
	41-45	3,651,754	1,099	2,238	49.12	
	46-50	4,730,713	3,388	4,402	76.96	
	51-55	7,641,508	11,806	10,424	113.26	
	56-60	8,870,758	15,388	18,422	83.53	
	61-65	4,531,666	11,184	13,935	80.26	
	66-70	706,118	4,566	3,070	148.74	
	71-75	111,510	530	1,621	32.69	
	TOTAL		36,088,119	49,786	56,074	88.79

DEMOGRAPHIC ASSUMPTIONS

General State Pre-Retirement Mortality Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	370	0	0	n/a
	21-25	14,308	0	4	0.00
	26-30	97,167	0	32	0.00
	31-35	272,079	0	142	0.00
	36-40	511,219	333	399	83.53
	41-45	867,483	487	925	52.64
	46-50	1,452,959	2,227	2,200	101.25
	51-55	2,121,867	5,244	4,516	116.11
	56-60	2,551,703	6,731	8,271	81.37
	61-65	1,913,395	9,609	9,621	99.88
	66-70	744,420	9,410	5,256	179.03
	71-75	216,190	3,369	5,112	65.90
	TOTAL	10,763,161	37,410	36,479	102.55
	<u>FEMALE</u>	16-20	195	0	0
21-25		14,524	0	2	0.00
26-30		142,481	0	28	0.00
31-35		391,186	0	126	0.00
36-40		666,442	148	327	45.17
41-45		1,096,784	169	850	19.89
46-50		2,116,108	1,495	2,480	60.27
51-55		3,005,293	2,407	5,204	46.26
56-60		2,986,541	5,915	7,875	75.11
61-65		1,822,919	1,970	7,109	27.72
66-70		491,693	378	2,649	14.27
71-75		140,427	736	2,476	29.73
TOTAL		12,874,593	13,218	29,125	45.38
<u>TOTAL</u>		16-20	565	0	0
	21-25	28,832	0	7	0.00
	26-30	239,648	0	60	0.00
	31-35	663,265	0	268	0.00
	36-40	1,177,661	481	726	66.26
	41-45	1,964,267	656	1,775	36.96
	46-50	3,569,067	3,722	4,680	79.53
	51-55	5,127,160	7,651	9,720	78.72
	56-60	5,538,244	12,645	16,146	78.32
	61-65	3,736,314	11,579	16,730	69.21
	66-70	1,236,113	9,788	7,905	123.82
	71-75	356,617	4,105	7,588	54.10
	TOTAL	23,637,754	50,628	65,604	77.17

DEMOGRAPHIC ASSUMPTIONS

Political Subdivisions Pre-Retirement Mortality Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	721	0	0	n/a
	21-25	39,706	16	12	132.89
	26-30	180,368	148	59	251.50
	31-35	399,677	85	208	40.84
	36-40	756,760	726	590	122.95
	41-45	1,062,292	712	1,125	63.26
	46-50	1,432,630	2,786	2,155	129.29
	51-55	1,631,626	3,223	3,456	93.24
	56-60	1,516,908	4,153	4,855	85.54
	61-65	862,831	3,924	4,285	91.57
	66-70	270,176	2,014	1,913	105.27
	71-75	94,423	2,730	2,253	121.14
	TOTAL	8,248,118	20,516	20,912	98.11
	<u>FEMALE</u>	16-20	231	0	0
21-25		12,363	0	2	0.00
26-30		80,535	0	16	0.00
31-35		212,217	35	69	51.59
36-40		456,376	181	225	80.35
41-45		774,940	458	596	76.88
46-50		1,252,042	765	1,463	52.30
51-55		1,644,558	2,311	2,848	81.14
56-60		1,621,251	2,795	4,273	65.40
61-65		1,008,261	2,525	3,953	63.88
66-70		341,700	1,120	1,852	60.46
71-75		104,577	280	1,851	15.14
TOTAL		7,509,050	10,471	17,148	61.06
<u>TOTAL</u>		16-20	953	0	0
	21-25	52,069	16	14	113.71
	26-30	260,903	148	75	198.66
	31-35	611,894	120	276	43.51
	36-40	1,213,136	907	816	111.18
	41-45	1,837,232	1,170	1,720	67.98
	46-50	2,684,672	3,551	3,618	98.15
	51-55	3,276,184	5,534	6,305	87.78
	56-60	3,138,159	6,948	9,129	76.11
	61-65	1,871,092	6,449	8,239	78.28
	66-70	611,876	3,134	3,765	83.23
	71-75	199,000	3,010	4,104	73.34
	TOTAL	15,757,168	30,987	38,060	81.41

Recommendation: It is recommended that future expectations of pre-retirement mortality for all groups be based on a standard IRS table, the 2012 Static Annuitant Table (male and female) as provided for by the Pension Protection Act of 2008. This table is published by the IRS and includes projections of future mortality improvements for 15-years beyond the 2012 base year using Scale AA.

While the recommended mortality rates are different than reported experience, the resulting tables are expected to reasonably predict the liabilities the System will incur in the future. Usage of a standard table is prudent given the lack of credibility associated with the reported data (including both data collection challenges and the limited number of pre-retirement deaths).

DEMOGRAPHIC ASSUMPTIONS

Teachers
Pre-Retirement Mortality
Recommended Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	10,691	0	3	0.00	
	26-30	129,774	36	47	78.08	
	31-35	392,770	362	224	161.43	
	36-40	682,649	207	558	37.08	
	41-45	771,440	392	750	52.26	
	46-50	982,497	755	1,189	63.44	
	51-55	1,498,419	4,636	2,343	197.85	
	56-60	1,843,723	7,143	4,758	150.12	
	61-65	1,071,701	3,615	4,464	80.98	
	66-70	195,867	766	1,185	64.61	
	71-75	41,067	203	420	48.24	
	TOTAL		7,620,598	18,114	15,941	113.63
	<u>FEMALE</u>	16-20	9	0	0	n/a
21-25		62,075	5	9	57.88	
26-30		576,809	160	103	154.91	
31-35		1,450,826	222	452	49.11	
36-40		2,538,489	834	1,061	78.57	
41-45		2,880,314	708	1,795	39.42	
46-50		3,748,216	2,633	3,399	77.49	
51-55		6,143,088	7,170	9,840	72.86	
56-60		7,027,035	8,245	20,211	40.79	
61-65		3,459,965	7,569	14,501	52.20	
66-70		510,251	3,800	2,973	127.81	
71-75		70,443	327	693	47.23	
TOTAL			28,467,521	31,672	55,036	57.55
<u>TOTAL</u>		16-20	9	0	0	n/a
	21-25	72,766	5	11	42.98	
	26-30	706,583	196	150	130.99	
	31-35	1,843,596	584	676	86.39	
	36-40	3,221,139	1,041	1,619	64.27	
	41-45	3,651,754	1,099	2,545	43.20	
	46-50	4,730,713	3,388	4,588	73.84	
	51-55	7,641,508	11,806	12,184	96.90	
	56-60	8,870,758	15,388	24,969	61.63	
	61-65	4,531,666	11,184	18,965	58.97	
	66-70	706,118	4,566	4,158	109.80	
	71-75	111,510	530	1,113	47.61	
	TOTAL		36,088,119	49,786	70,977	70.14

DEMOGRAPHIC ASSUMPTIONS

General State Pre-Retirement Mortality Recommended Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	370	0	0	n/a
	21-25	14,308	0	4	0.00
	26-30	97,167	0	35	0.00
	31-35	272,079	0	155	0.00
	36-40	511,219	333	419	79.60
	41-45	867,483	487	850	57.29
	46-50	1,452,959	2,227	1,764	126.23
	51-55	2,121,867	5,244	3,309	158.47
	56-60	2,551,703	6,731	6,601	101.97
	61-65	1,913,395	9,609	8,117	118.38
	66-70	744,420	9,410	4,538	207.33
	71-75	216,190	3,369	2,474	136.18
	TOTAL	10,763,161	37,410	28,266	132.35
	<u>FEMALE</u>	16-20	195	0	0
21-25		14,524	0	2	0.00
26-30		142,481	0	26	0.00
31-35		391,186	0	122	0.00
36-40		666,442	148	279	52.96
41-45		1,096,784	169	700	24.13
46-50		2,116,108	1,495	1,920	77.85
51-55		3,005,293	2,407	4,767	50.50
56-60		2,986,541	5,915	8,556	69.13
61-65		1,822,919	1,970	7,762	25.38
66-70		491,693	378	2,892	13.07
71-75		140,427	736	1,392	52.87
TOTAL		12,874,593	13,218	28,417	46.51
<u>TOTAL</u>		16-20	565	0	0
	21-25	28,832	0	6	0.00
	26-30	239,648	0	60	0.00
	31-35	663,265	0	277	0.00
	36-40	1,177,661	481	698	68.95
	41-45	1,964,267	656	1,550	42.31
	46-50	3,569,067	3,722	3,685	101.02
	51-55	5,127,160	7,651	8,076	94.74
	56-60	5,538,244	12,645	15,156	83.43
	61-65	3,736,314	11,579	15,879	72.92
	66-70	1,236,113	9,788	7,430	131.73
	71-75	356,617	4,105	3,866	106.18
	TOTAL	23,637,754	50,628	56,683	89.32

DEMOGRAPHIC ASSUMPTIONS

**Political Subdivisions
Pre-Retirement Mortality
Recommended Assumptions**

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	721	0	0	n/a
	21-25	39,706	16	11	149.66
	26-30	180,368	148	64	231.00
	31-35	399,677	85	227	37.41
	36-40	756,760	726	620	117.11
	41-45	1,062,292	712	1,036	68.67
	46-50	1,432,630	2,786	1,733	160.76
	51-55	1,631,626	3,223	2,533	127.25
	56-60	1,516,908	4,153	3,868	107.38
	61-65	862,831	3,924	3,610	108.69
	66-70	270,176	2,014	1,651	122.01
	71-75	94,423	2,730	1,103	247.55
	TOTAL	8,248,118	20,516	16,455	124.68
	<u>FEMALE</u>	16-20	231	0	0
21-25		12,363	0	2	0.00
26-30		80,535	0	14	0.00
31-35		212,217	35	66	53.51
36-40		456,376	181	192	94.37
41-45		774,940	458	491	93.21
46-50		1,252,042	765	1,133	67.56
51-55		1,644,558	2,311	2,610	88.55
56-60		1,621,251	2,795	4,643	60.19
61-65		1,008,261	2,525	4,316	58.51
66-70		341,700	1,120	2,022	55.37
71-75		104,577	280	1,047	26.75
TOTAL		7,509,050	10,471	16,537	63.32
<u>TOTAL</u>		16-20	953	0	0
	21-25	52,069	16	12	129.28
	26-30	260,903	148	79	188.60
	31-35	611,894	120	293	41.05
	36-40	1,213,136	907	812	111.73
	41-45	1,837,232	1,170	1,528	76.56
	46-50	2,684,672	3,551	2,865	123.92
	51-55	3,276,184	5,534	5,143	107.61
	56-60	3,138,159	6,948	8,511	81.64
	61-65	1,871,092	6,449	7,927	81.36
	66-70	611,876	3,134	3,673	85.33
	71-75	199,000	3,010	2,150	139.99
	TOTAL	15,757,168	30,987	32,992	93.92

Disability

As is the case with pre-retirement mortality rates, the incidence of disability is so low that overall pension costs are not very sensitive to changes in disability rates.

Disability ratios were inconsistent among all groups with Teachers actual to expected ratio coming in close to 100% while the State and Political Subdivisions were 87% and 78% respectively.

DEMOGRAPHIC ASSUMPTIONS

Teachers Ordinary Disability Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	10,691	0	1	0.00	
	26-30	129,774	0	11	0.00	
	31-35	392,770	0	67	0.00	
	36-40	682,649	263	445	59.26	
	41-45	771,440	756	886	85.26	
	46-50	982,497	1,494	1,564	95.53	
	51-55	1,498,419	2,007	2,602	77.16	
	56-60	1,843,723	2,061	2,217	92.96	
	61-65	1,071,701	0	0	n/a	
	66-70	195,867	0	0	n/a	
	71-75	41,067	0	0	n/a	
	TOTAL	7,620,598	6,581	7,792	84.46	
	<u>FEMALE</u>	16-20	9	0	0	n/a
		21-25	62,075	0	5	0.00
26-30		576,809	36	48	74.71	
31-35		1,450,826	159	246	64.40	
36-40		2,538,489	537	1,655	32.47	
41-45		2,880,314	2,001	3,301	60.61	
46-50		3,748,216	6,893	5,986	115.14	
51-55		6,143,088	11,754	10,667	110.18	
56-60		7,027,035	9,768	8,556	114.17	
61-65		3,459,965	478	0	n/a	
66-70		510,251	0	0	n/a	
71-75		70,443	0	0	n/a	
TOTAL		28,467,521	31,625	30,465	103.81	
<u>TOTAL</u>		16-20	9	0	0	n/a
		21-25	72,766	0	6	0.00
	26-30	706,583	36	59	60.96	
	31-35	1,843,596	159	313	50.61	
	36-40	3,221,139	801	2,100	38.14	
	41-45	3,651,754	2,756	4,187	65.83	
	46-50	4,730,713	8,387	7,550	111.08	
	51-55	7,641,508	13,761	13,269	103.71	
	56-60	8,870,758	11,829	10,773	109.80	
	61-65	4,531,666	478	0	n/a	
	66-70	706,118	0	0	n/a	
	71-75	111,510	0	0	n/a	
	TOTAL	36,088,119	38,206	38,257	99.87	

DEMOGRAPHIC ASSUMPTIONS

General State Ordinary Disability Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	370	0	0	n/a	
	21-25	14,308	0	9	0.00	
	26-30	97,167	0	67	0.00	
	31-35	272,079	297	253	117.18	
	36-40	511,219	507	730	69.45	
	41-45	867,483	1,757	1,692	103.79	
	46-50	1,452,959	4,511	3,750	120.29	
	51-55	2,121,867	6,007	5,861	102.48	
	56-60	2,551,703	4,087	5,204	78.54	
	61-65	1,913,395	99	0	n/a	
	66-70	744,420	0	0	n/a	
	71-75	216,190	0	0	n/a	
	TOTAL		10,763,161	17,265	17,567	98.28
	<u>FEMALE</u>	16-20	195	0	0	n/a
21-25		14,524	0	4	0.00	
26-30		142,481	0	45	0.00	
31-35		391,186	384	204	188.09	
36-40		666,442	182	730	24.93	
41-45		1,096,784	2,136	2,225	95.98	
46-50		2,116,108	4,677	6,242	74.94	
51-55		3,005,293	10,190	10,991	92.71	
56-60		2,986,541	4,970	8,863	56.07	
61-65		1,822,919	151	0	n/a	
66-70		491,693	158	0	n/a	
71-75		140,427	433	0	n/a	
TOTAL			12,874,593	23,282	29,305	79.45
<u>TOTAL</u>		16-20	565	0	0	n/a
	21-25	28,832	0	14	0.00	
	26-30	239,648	0	112	0.00	
	31-35	663,265	681	457	148.83	
	36-40	1,177,661	689	1,460	47.19	
	41-45	1,964,267	3,893	3,918	99.36	
	46-50	3,569,067	9,189	9,992	91.96	
	51-55	5,127,160	16,197	16,852	96.11	
	56-60	5,538,244	9,057	14,067	64.39	
	61-65	3,736,314	250	0	n/a	
	66-70	1,236,113	158	0	n/a	
	71-75	356,617	433	0	n/a	
	TOTAL		23,637,754	40,546	46,872	86.50

DEMOGRAPHIC ASSUMPTIONS

Political Subdivisions Ordinary Disability Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	721	0	0	n/a
	21-25	39,706	0	13	0.00
	26-30	180,368	0	58	0.00
	31-35	399,677	59	129	45.65
	36-40	756,760	603	446	135.35
	41-45	1,062,292	1,487	1,577	94.32
	46-50	1,432,630	4,329	4,381	98.80
	51-55	1,631,626	7,756	7,495	103.47
	56-60	1,516,908	4,284	6,193	69.18
	61-65	862,831	14	0	n/a
	66-70	270,176	0	0	n/a
	71-75	94,423	0	0	n/a
	TOTAL	8,248,118	18,533	20,292	91.33
	<u>FEMALE</u>	16-20	231	0	0
21-25		12,363	0	4	0.00
26-30		80,535	0	26	0.00
31-35		212,217	39	68	56.44
36-40		456,376	436	273	159.76
41-45		774,940	1,086	1,164	93.31
46-50		1,252,042	2,955	3,865	76.46
51-55		1,644,558	4,557	7,564	60.25
56-60		1,621,251	3,483	6,573	52.98
61-65		1,008,261	0	0	n/a
66-70		341,700	0	0	n/a
71-75		104,577	0	0	n/a
TOTAL		7,509,050	12,556	19,537	64.26
<u>TOTAL</u>		16-20	953	0	0
	21-25	52,069	0	17	0.00
	26-30	260,903	0	84	0.00
	31-35	611,894	97	197	49.39
	36-40	1,213,136	1,039	719	144.62
	41-45	1,837,232	2,574	2,741	93.89
	46-50	2,684,672	7,284	8,246	88.33
	51-55	3,276,184	12,313	15,059	81.76
	56-60	3,138,159	7,767	12,766	60.84
	61-65	1,871,092	14	0	n/a
	66-70	611,876	0	0	n/a
	71-75	199,000	0	0	n/a
	TOTAL	15,757,168	31,088	39,829	78.05

Recommendation: The economy since 2008 has experienced a difficult and unusual period of economic recession and modest recovery which likely influenced participant behavior. As such, the disability experience during this period may not be credible for long-term future predictions. In addition, the incidence of disability is so low that overall pension costs are not very sensitive to changes in disability rates.

No change is recommended to the current assumption.

Turnover

Nine pages of tables are included to illustrate ratios of actual to expected turnover. A "two-year select and ultimate" approach has been used. That is, separate rates are examined for the first year of participation, the second year of participation, and an aggregate rate (by age and sex) is utilized thereafter. The "ultimate" tables are more important than the "first-year" and "second-year" tables because the "ultimate" tables apply throughout most of an individual's career.

It should be noted that ratios in excess of 100% are "conservative" with respect to turnover. If turnover is higher than expected, fewer employees will remain until retirement, so fewer benefits will be paid. However, turnover tends to fluctuate with the general condition of the economy, so substantial fluctuations should be expected between high-growth periods (jobs are plentiful, and turnover is high) and low-growth periods (options are limited, and turnover is low).

DEMOGRAPHIC ASSUMPTIONS

Teachers
1st Year Withdrawal
Old Assumptions

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	16-20	0	0	0	n/a
	21-25	1,188	208	214	97.46
	26-30	1,560	343	281	122.13
	31-35	918	181	165	109.45
	36-40	1,014	177	183	97.12
	41-45	954	182	173	104.84
	46-50	618	86	118	73.05
	51-55	494	119	104	114.69
	56-60	505	216	121	178.87
	61-65	577	403	158	254.89
	66-70	34	14	10	n/a
	71-75	78	69	7	n/a
	TOTAL	7,940	1,997	1,532	130.34
	<u>FEMALE</u>	16-20	0	0	0
21-25		5,785	815	1,041	78.29
26-30		6,078	1,170	1,094	106.96
31-35		3,795	803	683	117.56
36-40		3,881	724	699	103.62
41-45		3,158	531	573	92.77
46-50		1,805	333	345	96.51
51-55		1,593	327	334	97.94
56-60		1,480	448	352	127.23
61-65		785	564	215	262.70
66-70		125	115	35	n/a
71-75		12	12	1	2,257.77
TOTAL		28,497	5,842	5,371	108.77
<u>TOTAL</u>		16-20	0	0	0
	21-25	6,974	1,024	1,255	81.56
	26-30	7,638	1,513	1,375	110.06
	31-35	4,713	984	848	115.98
	36-40	4,895	901	881	102.28
	41-45	4,112	713	746	95.58
	46-50	2,423	419	463	90.55
	51-55	2,087	446	437	101.92
	56-60	1,985	664	473	140.42
	61-65	1,362	967	373	259.39
	66-70	160	129	45	n/a
	71-75	90	80	8	n/a
	TOTAL	36,437	7,839	6,903	113.56

DEMOGRAPHIC ASSUMPTIONS

**General State
1st Year Withdrawal
Old Assumptions**

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	16-20	240	78	73	106.34
	21-25	1,902	483	499	96.84
	26-30	3,030	671	726	92.44
	31-35	3,007	568	651	87.24
	36-40	2,949	531	575	92.33
	41-45	2,838	475	491	96.74
	46-50	2,755	420	423	99.32
	51-55	2,377	282	356	79.34
	56-60	1,776	276	293	94.02
	61-65	1,228	446	255	174.96
	66-70	286	169	75	n/a
	71-75	17	11	2	n/a
	TOTAL	22,405	4,410	4,420	99.78
	<u>FEMALE</u>	16-20	103	54	31
21-25		2,395	601	621	96.73
26-30		4,282	888	1,025	86.66
31-35		3,703	845	802	105.32
36-40		4,367	850	852	99.81
41-45		3,586	677	622	108.77
46-50		3,425	437	531	82.40
51-55		3,338	422	500	84.47
56-60		2,591	790	428	184.63
61-65		1,023	498	211	235.52
66-70		286	192	75	n/a
71-75		13	3	1	n/a
TOTAL		29,111	6,257	5,699	109.78
<u>TOTAL</u>		16-20	343	132	105
	21-25	4,298	1,084	1,120	96.78
	26-30	7,311	1,559	1,751	89.05
	31-35	6,710	1,413	1,453	97.22
	36-40	7,315	1,381	1,427	96.80
	41-45	6,424	1,152	1,113	103.46
	46-50	6,180	857	954	89.91
	51-55	5,715	704	856	82.33
	56-60	4,367	1,065	721	147.79
	61-65	2,251	944	466	202.43
	66-70	572	361	151	n/a
	71-75	30	14	3	n/a
	TOTAL	51,516	10,667	10,119	105.41

DEMOGRAPHIC ASSUMPTIONS

**Political Subdivisions
1st Year Withdrawal
Old Assumptions**

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	421	99	111	89.17
	21-25	3,466	588	827	71.08
	26-30	3,516	688	785	87.65
	31-35	3,045	457	644	70.99
	36-40	3,088	488	612	79.72
	41-45	2,793	351	509	68.82
	46-50	2,376	321	408	78.68
	51-55	2,215	283	378	74.70
	56-60	1,960	350	371	94.24
	61-65	1,507	568	353	160.81
	66-70	580	290	152	n/a
	71-75	90	22	11	n/a
	TOTAL	25,057	4,505	5,163	87.26
	<u>FEMALE</u>	16-20	148	39	39
21-25		1,992	532	471	112.89
26-30		2,881	641	642	99.89
31-35		3,068	640	648	98.68
36-40		3,959	693	784	88.42
41-45		3,663	558	670	83.36
46-50		3,566	489	612	79.85
51-55		2,511	424	429	98.83
56-60		1,893	348	357	97.28
61-65		889	289	206	140.41
66-70		202	80	53	n/a
71-75		53	2	5	n/a
TOTAL		24,825	4,734	4,916	96.31
<u>TOTAL</u>		16-20	569	138	151
	21-25	5,458	1,120	1,298	86.24
	26-30	6,397	1,329	1,427	93.16
	31-35	6,113	1,097	1,293	84.88
	36-40	7,047	1,181	1,396	84.60
	41-45	6,457	909	1,179	77.08
	46-50	5,942	809	1,020	79.38
	51-55	4,726	706	807	87.52
	56-60	3,853	697	728	95.73
	61-65	2,396	858	559	153.30
	66-70	782	371	206	n/a
	71-75	143	24	15	n/a
	TOTAL	49,882	9,239	10,078	91.67

DEMOGRAPHIC ASSUMPTIONS

Teachers
2nd Year Withdrawal
Old Assumptions

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	4,510	516	609	84.76	
	26-30	8,662	1,179	1,169	100.80	
	31-35	5,247	715	708	101.01	
	36-40	5,103	925	689	134.26	
	41-45	3,758	403	507	79.43	
	46-50	3,359	627	460	136.31	
	51-55	2,838	614	441	139.28	
	56-60	2,331	779	451	172.50	
	61-65	1,746	1,145	409	280.08	
	66-70	378	166	89	n/a	
	71-75	83	55	2	n/a	
	TOTAL		38,016	7,124	5,535	128.71
	<u>FEMALE</u>	16-20	9	0	1	0.00
21-25		22,583	2,337	3,049	76.66	
26-30		29,649	3,757	4,003	93.85	
31-35		17,398	2,469	2,349	105.12	
36-40		17,080	1,935	2,306	83.90	
41-45		13,299	1,614	1,795	89.92	
46-50		9,218	1,386	1,262	109.83	
51-55		6,504	1,049	1,010	103.88	
56-60		6,761	3,016	1,306	230.96	
61-65		2,852	1,511	665	227.06	
66-70		572	443	135	n/a	
71-75		0	0	0	n/a	
TOTAL			125,923	19,517	17,880	109.15
<u>TOTAL</u>		16-20	9	0	1	0.00
	21-25	27,093	2,853	3,658	78.01	
	26-30	38,311	4,935	5,172	95.43	
	31-35	22,645	3,184	3,057	104.16	
	36-40	22,183	2,860	2,995	95.49	
	41-45	17,057	2,017	2,303	87.61	
	46-50	12,577	2,013	1,722	116.90	
	51-55	9,342	1,663	1,451	114.63	
	56-60	9,092	3,794	1,757	215.94	
	61-65	4,598	2,656	1,074	247.24	
	66-70	951	609	223	n/a	
	71-75	83	55	2	n/a	
	TOTAL		163,940	26,640	23,415	113.77

DEMOGRAPHIC ASSUMPTIONS

General State 2nd Year Withdrawal Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>
<u>MALE</u>	16-20	130	36	32	112.77
	21-25	2,933	607	652	93.14
	26-30	6,343	1,196	1,244	96.13
	31-35	6,154	974	1,044	93.25
	36-40	6,906	941	1,015	92.72
	41-45	6,423	724	818	88.41
	46-50	5,367	678	610	111.01
	51-55	5,409	542	608	89.14
	56-60	5,517	619	710	87.22
	61-65	2,366	371	408	90.88
	66-70	618	272	137	n/a
	71-75	85	8	4	n/a
	TOTAL	48,251	6,967	7,284	95.66
	<u>FEMALE</u>	16-20	59	24	15
21-25		3,677	733	805	90.95
26-30		10,161	1,764	1,999	88.26
31-35		8,502	1,468	1,453	101.01
36-40		10,617	1,866	1,559	119.67
41-45		8,577	1,300	1,091	119.22
46-50		9,265	1,149	1,055	108.91
51-55		8,449	1,295	949	136.43
56-60		6,664	1,099	865	126.99
61-65		2,886	1,001	485	206.13
66-70		693	377	154	n/a
71-75		42	4	7	n/a
TOTAL		69,592	12,080	10,438	115.73
<u>TOTAL</u>		16-20	189	60	47
	21-25	6,611	1,340	1,458	91.93
	26-30	16,505	2,960	3,243	91.27
	31-35	14,655	2,442	2,497	97.77
	36-40	17,522	2,807	2,574	109.04
	41-45	15,000	2,024	1,909	106.01
	46-50	14,632	1,826	1,665	109.68
	51-55	13,859	1,838	1,558	117.96
	56-60	12,181	1,718	1,575	109.06
	61-65	5,251	1,371	893	153.52
	66-70	1,311	649	291	n/a
	71-75	128	12	11	n/a
	TOTAL	117,843	19,047	17,722	107.48

DEMOGRAPHIC ASSUMPTIONS

Political Subdivisions 2nd Year Withdrawal Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	250	41	54	76.00	
	21-25	7,405	984	1,461	67.35	
	26-30	9,632	1,188	1,751	67.85	
	31-35	7,961	1,066	1,381	77.20	
	36-40	9,165	1,032	1,499	68.84	
	41-45	7,806	937	1,156	81.05	
	46-50	7,404	790	995	79.43	
	51-55	6,178	552	795	69.44	
	56-60	5,248	736	730	100.80	
	61-65	3,667	1,023	617	165.75	
	66-70	1,518	660	321	n/a	
	71-75	275	60	16	n/a	
	TOTAL		66,509	9,070	10,777	84.16
	<u>FEMALE</u>	16-20	70	20	15	127.17
21-25		2,860	541	562	96.39	
26-30		6,488	1,129	1,179	95.77	
31-35		8,106	1,332	1,406	94.72	
36-40		11,667	1,464	1,904	76.88	
41-45		11,576	1,716	1,711	100.29	
46-50		10,415	1,274	1,399	91.03	
51-55		7,923	980	1,020	96.10	
56-60		5,816	822	809	101.61	
61-65		2,661	450	444	101.35	
66-70		610	227	129	n/a	
71-75		157	41	11	n/a	
TOTAL			68,351	9,996	10,589	94.40
<u>TOTAL</u>		16-20	320	61	70	87.26
	21-25	10,265	1,525	2,022	75.42	
	26-30	16,120	2,317	2,930	79.08	
	31-35	16,068	2,398	2,787	86.04	
	36-40	20,832	2,496	3,403	73.34	
	41-45	19,382	2,653	2,867	92.53	
	46-50	17,819	2,064	2,394	86.21	
	51-55	14,101	1,532	1,815	84.42	
	56-60	11,064	1,558	1,539	101.22	
	61-65	6,329	1,473	1,061	138.81	
	66-70	2,128	887	450	n/a	
	71-75	432	101	26	n/a	
	TOTAL		134,860	19,066	21,366	89.24

DEMOGRAPHIC ASSUMPTIONS

**Teachers
Ultimate Withdrawal
Old Assumptions**

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	4,992	650	428	151.75	
	26-30	119,552	7,037	7,992	88.04	
	31-35	386,605	11,562	16,974	68.12	
	36-40	676,533	16,587	17,035	97.37	
	41-45	766,727	13,309	12,161	109.44	
	46-50	956,522	17,099	16,288	104.98	
	51-55	849,714	19,754	22,247	88.79	
	56-60	278,462	15,187	10,336	146.93	
	61-65	1,515	856	66	1,304.63	
	66-70	257	127	0	n/a	
	71-75	77	35	0	n/a	
	TOTAL		4,040,956	102,202	103,527	98.72
	<u>FEMALE</u>	16-20	0	0	0	n/a
21-25		33,707	3,536	3,394	104.17	
26-30		541,083	37,850	45,212	83.72	
31-35		1,429,634	60,117	80,759	74.44	
36-40		2,517,529	59,584	76,718	77.67	
41-45		2,863,857	46,106	41,460	111.20	
46-50		3,589,578	47,381	46,543	101.80	
51-55		3,381,551	88,684	94,599	93.75	
56-60		1,266,998	60,727	60,066	101.10	
61-65		2,538	1,064	117	910.85	
66-70		485	205	0	n/a	
71-75		70	70	0	n/a	
TOTAL			15,627,031	405,324	448,869	90.30
<u>TOTAL</u>		16-20	0	0	0	n/a
	21-25	38,700	4,186	3,823	109.50	
	26-30	660,635	44,887	53,204	84.37	
	31-35	1,816,239	71,679	97,733	73.34	
	36-40	3,194,061	76,170	93,753	81.25	
	41-45	3,630,585	59,414	53,621	110.80	
	46-50	4,546,099	64,480	62,831	102.62	
	51-55	4,231,265	108,438	116,847	92.80	
	56-60	1,545,460	75,914	70,402	107.83	
	61-65	4,053	1,920	182	1,052.46	
	66-70	743	333	0	n/a	
	71-75	147	105	0	n/a	
	TOTAL		19,667,987	507,527	552,397	91.88

DEMOGRAPHIC ASSUMPTIONS

**General State
Ultimate Withdrawal
Old Assumptions**

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	16-20	0	0	0	n/a
	21-25	9,473	1,264	1,466	86.22
	26-30	87,794	7,566	9,584	78.95
	31-35	262,919	14,124	17,439	80.99
	36-40	501,365	19,405	16,886	114.92
	41-45	858,222	22,303	16,818	132.61
	46-50	1,271,319	30,145	25,371	118.81
	51-55	1,260,551	38,151	29,758	128.20
	56-60	488,807	19,464	16,936	114.93
	61-65	16,305	275	679	40.43
	66-70	1,262	284	0	n/a
	71-75	82	3	0	n/a
	TOTAL	4,758,099	152,982	134,936	113.37
<u>FEMALE</u>	16-20	33	3	6	50.64
	21-25	8,451	1,293	1,299	99.55
	26-30	128,038	13,960	14,752	94.63
	31-35	378,982	26,670	28,958	92.10
	36-40	651,459	33,549	28,441	117.96
	41-45	1,084,621	34,987	27,667	126.46
	46-50	1,826,399	46,228	40,452	114.28
	51-55	1,816,710	63,820	53,073	120.25
	56-60	679,201	31,401	26,218	119.77
	61-65	8,146	648	409	158.27
	66-70	525	231	0	n/a
	71-75	23	6	0	n/a
	TOTAL	6,582,588	252,796	221,275	114.25
<u>TOTAL</u>	16-20	33	3	6	50.64
	21-25	17,924	2,557	2,765	92.48
	26-30	215,832	21,527	24,336	88.46
	31-35	641,901	40,793	46,396	87.92
	36-40	1,152,824	52,954	45,327	116.83
	41-45	1,942,843	57,290	44,485	128.78
	46-50	3,097,718	76,372	65,823	116.03
	51-55	3,077,260	101,970	82,831	123.11
	56-60	1,168,009	50,864	43,154	117.87
	61-65	24,452	922	1,088	84.74
	66-70	1,787	515	0	n/a
	71-75	105	9	0	n/a
	TOTAL	11,340,687	405,778	356,212	113.91

DEMOGRAPHIC ASSUMPTIONS**Political Subdivisions
Ultimate Withdrawal
Old Assumptions**

		<i>Exposure</i>	<i>Actual</i>	<i>Expected</i>	<i>Act/Exp</i>
<u>MALE</u>	16-20	50	6	7	86.38
	21-25	28,835	2,523	3,171	79.57
	26-30	167,220	10,712	13,670	78.36
	31-35	388,671	17,507	22,905	76.43
	36-40	744,507	25,251	29,560	85.42
	41-45	1,051,130	26,597	31,219	85.19
	46-50	1,252,775	31,084	34,106	91.14
	51-55	1,072,323	27,303	34,211	79.81
	56-60	401,455	12,250	16,208	75.58
	61-65	2,514	491	103	475.81
	66-70	990	293	0	n/a
	71-75	269	64	0	n/a
	TOTAL	5,110,738	154,082	185,162	83.21
<u>FEMALE</u>	16-20	13	3	3	124.89
	21-25	7,512	1,136	1,185	95.92
	26-30	71,166	7,192	8,669	82.96
	31-35	201,043	13,399	17,650	75.92
	36-40	440,750	23,367	26,959	86.68
	41-45	759,701	30,362	34,413	88.23
	46-50	1,162,347	38,105	44,928	84.82
	51-55	1,343,188	44,790	53,825	83.21
	56-60	521,150	21,680	24,593	88.15
	61-65	2,267	360	107	337.42
	66-70	525	105	0	n/a
	71-75	145	33	0	n/a
	TOTAL	4,509,805	180,534	212,331	85.02
<u>TOTAL</u>	16-20	63	9	10	96.77
	21-25	36,346	3,660	4,356	84.01
	26-30	238,386	17,904	22,339	80.15
	31-35	589,714	30,906	40,555	76.21
	36-40	1,185,256	48,618	56,519	86.02
	41-45	1,810,831	56,960	65,632	86.79
	46-50	2,415,123	69,190	79,034	87.54
	51-55	2,415,511	72,093	88,037	81.89
	56-60	922,604	33,930	40,801	83.16
	61-65	4,781	851	210	405.45
	66-70	1,515	399	0	n/a
	71-75	413	97	0	n/a
	TOTAL	9,620,544	334,616	397,492	84.18

Recommendation: The economy since 2008 has experienced a difficult and unusual period of economic recession and modest recovery which likely influenced participant behavior. As such, the turnover experience during this period may not be credible for long-term future predictions.

While the “ultimate turnover” experience was lower than expected for Teachers and Political Subdivisions (this is normal for an economic recession), “ultimate turnover” was higher than expected within the State group. This was due to reductions in force during the study period within the State group.

Since the experience observed during the study period may not be appropriate for long-term future predictions, no change is recommended to the current assumption.

Spread of Retirement Ages

Spreads of actual retirement ages have been obtained separately for males and females within each category. Comparisons were also made between the age at which each individual became eligible for full retirement benefits and the age at which he actually retired.

These rates reflect the way in which they are applied. Retirement rates apply to ages that are calculated as the "age nearest birthday" on a valuation date (June 30), and anticipate all retirements before the next June 30. Thus, anyone who attains age 64 during 2011 (i.e., was born in 1947) will be treated as being age 64 in the 2011 valuation. Any member in this group who retires before June 30, 2012 will be thought of, for valuation purposes, as retiring at age 64, even though (for example, a teacher who retires at the end of the 2011-2012 school year) he may already have attained age 65 when he retires. The effect of this approach is to divide between age 64 and age 65 retirements which actually occur shortly after the participants' 65th birthdays, rather than assigning them all to age 65.

As a result of the 2000 study, retirement arrays for each major group were modified to reflect liability weighted patterns. Prior to age 60, retirement rates upon first attaining the service retirement age were increased by 10% for all groups. On and after age 60, retirement rates for participants who have completed at least fifteen years of service were increased by 10%, 5% and 5% for Teachers, State and Political Subdivision employees.

For the 2000 to 2004 study period, the actual to expected ratios for service retirements declined considerably for each major group (all groups had ratios at or near 80%). These results suggested a significant decline in the number of retirements from the results of the 2000 study. Since the observed shift in retirement experience was significant, it was difficult to predict whether the data represented a permanent shift in retirement patterns or only a temporary change due to other factors. The 2004 study recommended that only a portion of the decline in service retirements be reflected in the modified retirement arrays. Retirement patterns from the 1996 to 2000 study period were blended with the results from the 2000 to 2004 study period to produce modified retirement arrays. The expectation was to monitor results over the next study period and adjust again in 2008 if the shift in service retirement was observed again. The 2004 study also modified the special adjustments for retirement rates (prior to age 60 and on or after age 60 with fifteen years of service).

The 2008 analysis continued to suggest that adding an incremental percentage to retirement rates upon attaining the service retirement age prior to age 60 is appropriate. It also supported applying a greater probability of retirement on and after age 60 if the period of employment has been substantial. The extent of the additional retirement probability following attainment of age 60 varies among groups as well as by age and was updated accordingly.

For the 2004 to 2008 study period, the trend for employees to delay retirement continued for all groups. Retirement arrays for each group were modified to reflect the continued change in the pattern of retirement first noticed in the 2004 study. Retirement experience observed during the 2008 study for State employees was adjusted when creating the new assumptions due to an incentive program that was to be effective after the end of the study period. The incentive program was believed to have caused some State employees to delay retirement to take advantage of the incentive program.

Experience observed during the 2008-2012 period is reported on the following pages.

DEMOGRAPHIC ASSUMPTIONS

Teachers Service Retirement Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	0	0	0	n/a	
	26-30	0	0	0	n/a	
	31-35	0	0	0	n/a	
	36-40	0	0	0	n/a	
	41-45	0	0	0	n/a	
	46-50	1,601	566	100	566.73	
	51-55	388,514	40,903	52,163	78.42	
	56-60	1,234,716	179,001	200,175	89.42	
	61-65	1,061,336	305,188	287,285	106.23	
	66-70	193,741	59,453	45,458	130.79	
	71-75	40,476	12,395	11,690	106.04	
	TOTAL		2,920,384	597,507	596,870	100.11
	<u>FEMALE</u>	16-20	0	0	0	n/a
21-25		0	0	0	n/a	
26-30		0	0	0	n/a	
31-35		0	0	0	n/a	
36-40		0	0	0	n/a	
41-45		0	0	0	n/a	
46-50		2,743	765	521	146.83	
51-55		1,761,402	212,739	238,203	89.31	
56-60		4,173,795	674,348	744,571	90.57	
61-65		3,442,519	961,352	1,066,881	90.11	
66-70		506,961	176,794	164,104	107.73	
71-75		70,047	22,369	37,504	59.64	
TOTAL			9,957,467	2,048,368	2,251,785	90.97
<u>TOTAL</u>		16-20	0	0	0	n/a
	21-25	0	0	0	n/a	
	26-30	0	0	0	n/a	
	31-35	0	0	0	n/a	
	36-40	0	0	0	n/a	
	41-45	0	0	0	n/a	
	46-50	4,344	1,331	621	214.37	
	51-55	2,149,916	253,642	290,366	87.35	
	56-60	5,408,511	853,350	944,746	90.33	
	61-65	4,503,855	1,266,540	1,354,166	93.53	
	66-70	700,702	236,247	209,562	112.73	
	71-75	110,523	34,765	49,194	70.67	
	TOTAL		12,877,851	2,645,875	2,848,655	92.88

DEMOGRAPHIC ASSUMPTIONS

General State Service Retirement Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	0	0	0	n/a	
	26-30	0	0	0	n/a	
	31-35	0	0	0	n/a	
	36-40	0	0	0	n/a	
	41-45	0	0	0	n/a	
	46-50	59,634	7,658	4,513	169.70	
	51-55	556,191	54,785	40,977	133.70	
	56-60	1,474,978	161,167	133,876	120.39	
	61-65	1,859,439	318,530	303,073	105.10	
	66-70	738,618	146,474	128,044	114.39	
	71-75	215,212	40,118	61,788	64.93	
	TOTAL		4,904,073	728,732	672,270	108.40
	<u>FEMALE</u>	16-20	0	0	0	n/a
21-25		0	0	0	n/a	
26-30		0	0	0	n/a	
31-35		0	0	0	n/a	
36-40		0	0	0	n/a	
41-45		0	0	0	n/a	
46-50		102,680	11,445	8,784	130.30	
51-55		823,528	96,686	75,943	127.31	
56-60		1,511,286	181,758	143,697	126.49	
61-65		1,790,154	350,474	300,029	116.81	
66-70		487,446	116,979	91,638	127.65	
71-75		139,797	32,700	38,733	84.43	
TOTAL			4,854,889	790,043	658,824	119.92
<u>TOTAL</u>		16-20	0	0	0	n/a
	21-25	0	0	0	n/a	
	26-30	0	0	0	n/a	
	31-35	0	0	0	n/a	
	36-40	0	0	0	n/a	
	41-45	0	0	0	n/a	
	46-50	162,314	19,103	13,296	143.67	
	51-55	1,379,719	151,471	116,919	129.55	
	56-60	2,986,264	342,925	277,573	123.54	
	61-65	3,649,592	669,004	603,102	110.93	
	66-70	1,226,064	263,453	219,683	119.92	
	71-75	355,009	72,818	100,520	72.44	
	TOTAL		9,758,962	1,518,775	1,331,094	114.10

DEMOGRAPHIC ASSUMPTIONS

Political Subdivisions Service Retirement Old Assumptions

		<u>Exposure</u>	<u>Actual</u>	<u>Expected</u>	<u>Act/Exp</u>	
<u>MALE</u>	16-20	0	0	0	n/a	
	21-25	0	0	0	n/a	
	26-30	0	0	0	n/a	
	31-35	0	0	0	n/a	
	36-40	0	0	0	n/a	
	41-45	0	0	0	n/a	
	46-50	68,830	3,596	6,269	57.36	
	51-55	375,066	38,142	41,294	92.36	
	56-60	658,975	71,763	73,126	98.14	
	61-65	839,552	173,478	165,902	104.57	
	66-70	261,392	52,234	48,516	107.66	
	71-75	92,011	16,933	29,010	58.37	
	TOTAL		2,295,825	356,147	364,117	97.81
	<u>FEMALE</u>	16-20	0	0	0	n/a
21-25		0	0	0	n/a	
26-30		0	0	0	n/a	
31-35		0	0	0	n/a	
36-40		0	0	0	n/a	
41-45		0	0	0	n/a	
46-50		29,028	2,175	2,577	84.39	
51-55		203,320	10,395	19,834	52.41	
56-60		537,554	49,673	63,765	77.90	
61-65		987,383	165,027	177,904	92.76	
66-70		337,072	66,256	69,711	95.04	
71-75		103,208	22,015	32,185	68.40	
TOTAL			2,197,566	315,541	365,977	86.22
<u>TOTAL</u>		16-20	0	0	0	n/a
	21-25	0	0	0	n/a	
	26-30	0	0	0	n/a	
	31-35	0	0	0	n/a	
	36-40	0	0	0	n/a	
	41-45	0	0	0	n/a	
	46-50	97,858	5,771	8,846	65.24	
	51-55	578,385	48,536	61,129	79.40	
	56-60	1,196,529	121,436	136,890	88.71	
	61-65	1,826,936	338,506	343,806	98.46	
	66-70	598,464	118,490	118,227	100.22	
	71-75	195,219	38,948	61,195	63.65	
	TOTAL		4,493,391	671,688	730,093	92.00

Recommendation: The economy since 2008 has experienced a difficult and unusual period of economic recession and modest recovery which likely influenced participant behavior. As such, the retirement experience during this period may not be credible for long-term future predictions.

While the retirement experience was lower than expected for Teachers and Political Subdivisions (this is normal for an economic recession), retirements were higher than expected within the State group. This was due to the incentive program offered in 2008 and other reductions in force during the study period within the State group.

Since the experience observed during the study period may not be appropriate for long-term future predictions, no change is recommended to the current assumption.

Summary of Demographic Assumptions

Recommendations of demographic assumptions utilized for each major group have been made herein. These changes relate to experience identified (when deemed to be credible) from the four year period ending June 30, 2012. It is recommended that the revised array of assumptions be adopted for the major groups of employees.

Various economic assumptions such as interest rates, probable future salary increases, and increases in the Social Security taxable wage base are all linked to general economic conditions (especially the rate of inflation), and therefore are interrelated. Economic assumptions are not so directly the province of the actuary as are the assumptions previously discussed. Nevertheless, assumptions concerning the future pattern of these items are more important in determining plan costs than any of the decrements previously discussed, and usually are included under the title "Actuarial Assumptions." Also, past performance can serve as a clue to future performance, even if only as a starting point for adjustments reflecting changed situations.

Economic assumptions are often determined based upon a component approach. Under this approach, the individual elements of each assumption are identified and combined to produce a total or composite amount. Each of these components contains inflation as a common item.

Inflation

Inflation is a common element in each of the economic assumptions made for the plan. Inflation is also a separate assumption that affects costs by determining cost of living adjustments that affect geometrically increased plan benefits following retirement.

There has been substantial fluctuation in historical rates of inflation. The table below presents rates of inflation that have occurred over various periods ending in 2012.

<i>Period</i>	<i>Period Length</i>	<i>Inflation</i>
2012-2012	1	1.7%
1998-2012	15	2.4%
1988-2012	25	2.8%
1983-2012	30	2.9%
1963-2012	50	4.1%
1953-2012	60	3.7%
1938-2012	75	3.8%
1933-2012	80	3.6%

Indicators of future inflation expectations include the opinion of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, whose 2013 Annual Report discusses underlying actuarial assumption data. The report provides sets of low, intermediate and high cost actuarial assumptions. The ultimate annual inflation assumption documented in the report is assumed to be 1.8%, 2.8% and 3.8% for the low, intermediate and high cost assumptions, respectively.

Based upon the above historical information and expectation of future occurrences, the expected annual rate of inflation has been established at an intermediate annual rate of 3.0%. This expected annual rate of future inflation is unchanged from the current assumption being used by TCRS.

Cost of Living Adjustment for TCRS Retirees

TCRS provides an annual cost of living adjustment to retirees effective July 1 of each year based on the inflation measured in the previous calendar year. The method for determining the cost of living adjustment does not allow the adjustment to exceed 3.0% in any given year. The table below is the same as the one shown in the inflation section above that presents rates of inflation that have occurred over various periods ending in 2012, but this table contains an extra column to show the impact of applying the 3.0% limit over each period.

	<i>Period</i>	<i>Inflation</i>	<i>3.0% Limit</i>
<u>Period</u>	<u>Length</u>		<u>Per Year</u>
2012-2012	1	1.7%	1.7%
1998-2012	15	2.4%	2.2%
1988-2012	25	2.8%	2.4%
1983-2012	30	2.9%	2.5%
1963-2012	50	4.1%	2.6%
1953-2012	60	3.7%	2.4%
1938-2012	75	3.8%	2.3%
1933-2012	80	3.6%	2.3%

The expected annual rate of inflation was established in the previous section at 3.0%. This assumption does not imply that inflation will be exactly 3.0% in each future year, but rather that inflation will average 3.0% in the future (some years greater and some years less). During periods when actual inflation is high, the TCRS cost of living adjustment will be limited to 3.0%. Therefore, the range of future TCRS cost of living adjustments will be between the actual rate of inflation during low inflationary periods and 3.0%.

Based upon the above historical information and the assumption that the long-term average expectation of future inflation has been established at 3.0%, the expected rate of the cost of living adjustment to TCRS retirees has been established at an annual rate of 2.5%. This expected annual rate of the cost of living adjustment is unchanged from the current assumption being used by TCRS.

Interest Rates

The long-term rate of return on investments is the most important single factor in determining the cost of a pension plan with a given set of benefits and participants. The investment experience of the TCRS trust fund has been studied on a "total return" basis by the TCRS investment staff. The following table shows the historical investment return for each individual year and the 25-year average annualized rates of return through the given year:

Fiscal Year	Rate of Return During Year	25-Year Average Annualized Rate of Return Through Given Year
2011-2012	5.6%	7.6%
2010-2011	19.6	7.8
2009-2010	10.2	8.1
2008-2009	(15.3)	8.7
2007-2008	(1.2)	9.3
2006-2007	13.2	10.7
2005-2006	6.9	10.4
2004-2005	7.3	10.2
2003-2004	9.3	10.3
2002-2003	4.9	10.2

From the table above, it may be seen that the 25-year average annual total rate of return through 2012 is 7.6%, but that within that period there has been substantial fluctuation.

In accordance with investment policies established by the Board, TCRS investments emphasize bonds and other fixed income securities, but also include a substantial percentage of equity investments. On a "total return" basis, both kinds of investments are subject to wide fluctuations dependent upon market and economic conditions. The results shown in the table illustrate such fluctuations.

In order to arrive at contribution rates that are not unduly affected by these fluctuations, TCRS valuations assign a value to assets which is based on a "10-year moving average of market values". Over a short period, this approach may differ substantially from the year-by-year results shown above, but over longer periods the results should be similar and should reasonably replicate market value results. The smoothing process attempts to avoid the wide fluctuations shown in the table, tending also to smooth contribution rates.

Any analysis of expected returns should include both long-term historical returns and current expectations of the future investment climate. Generally, current expectations are useful for predicting short-term returns, while historical experience can be a better indicator of longer-term expected returns.

An expected long-term rate of return for the plan has been developed using a blend of future expectations of returns and long-term historical performance. The following chart reflects the investment policy adopted by the Board. The policy permits investments from various asset classes within a minimum and maximum allocation percentage, and also defines a target portfolio to determine the basis for measuring investment performance of the fund. Since the investment manager will make decisions to periodically over or under weight a particular asset class, the basis used for estimating future returns is the target portfolio instead of the plan's actual asset allocation at any given point in time.

TCRS Investment Policy

Asset Class	Minimum	Maximum	Target
Domestic Stocks	25%	50%	33%
Domestic Bonds	20%	60%	25%
Inflation Indexed Bonds	0%	15%	4%
Short-term Securities	0%	10%	1%
International Bonds	0%	10%	0%
International Stocks	5%	25%	17%
Emerging Markets Stocks*	0%	10%	5%
Private Equity & Strategic Lending	0%	10%	8%
Real Estate	0%	10%	7%

*Emerging Market Stocks are a subset of International Stocks; Maximum International Stocks and Emerging Market Stocks may not exceed 25%.

The two categories used in the forecast of expected future returns are as follows: (1) Capital market studies from Strategic Investment Solutions (SIS), Wells Fargo, Towers Perrin and JP Morgan and (2) historical rates of return by asset class as reported in Ibbotson's 2012 SBBI (Stocks, Bonds, Bills and Inflation) Yearbook as well as actual TCRS historical rates of return. In considering what historical rates of return to consider, we extracted average returns for all historically available information (since 1926) and also considered TCRS average returns for the 25 year period ending in 2012. Since no assumption has a single "correct" answer, but a range of reasonable results, we have considered different weighting factors below. In Scenario I, we assume the Average Expected Market Returns to be of greatest value and so weight that category 75% while weighting the other category 25%. In Scenario II, we assume all historical data to be the most meaningful and so weight that category 75% with the other being 25%. When no historical data was available for certain asset classes, assumptions were made consistent with the level of risk presented within each class.

ECONOMIC ASSUMPTIONS

Expected Market Returns				
	Real Return	Expenses	Assumed Inflation	Adjusted Total Return
Blended Capital Market Expectations	3.95%	0.0%	3.00%	6.95%
Historical Returns				
	Real Return	Expenses	Assumed Inflation	Adjusted Total Return
TCRS Historical (1988-2012)	4.68%	0.0%	3.00%	7.68%
Historical Market Returns (1926 -2012)	5.24%	0.0%	3.00%	8.24%
Average Historical Return	4.96%			7.96%
Weight Historical and Expected Returns				
	Total Return	Weighting	Contribution	
Weighting Expected	6.95%	75%	5.21%	
Weighting Historical	7.96%	25%	1.99%	
Weighted Expected Return			7.20%	
Weighting Expected	6.95%	25%	1.74%	
Weighting Historical	7.96%	75%	5.97%	
Weighted Expected Return			7.71%	

All returns above are reported without regard to expenses. An explicit expense assumption is incorporated in the actuarial valuation report and contribution rate recommendations to reflect actual expenses.

While there is no single “correct” assumption for the rate of investment return, the above range of 7.20% to 7.71% gives a reasonable range of outcomes that might be expected based on the plan’s current funding policy. Based on this analysis, a rate of 7.5% would appear to be a reasonable assumption. Even if different weightings were applied to the various sources of data, 7.5% would still likely be in the range of reasonable outcomes.

The 7.5% interest assumption is representative of interest assumptions used by pension plans sponsored by large public employers. A 2013 Wilshire report indicates the median interest rate assumption used by 134 different state retirement systems is 7.8%, meaning about half the plans have an assumption greater than 7.8% and half have an assumption lower than 7.8%. However, the average commitment to equity investments among other state retirement systems is approximately the same (65%) as TCRS. The similar equity allocations for TCRS suggest that a rate selection of 7.5% would be a more conservative assumption compared to many other state retirement systems.

Recommendation: The current rate of 7.5% presents a reasonable expectation of future investment returns when evaluated based upon the existing asset allocation targets and expected real rates of return. The rate is based upon an inflation rate of 3.0% which is consistent with the underlying inflation rate used in the establishment of other economic assumptions.

Salary Scale

In recent years, there has been a tendency away from uniform salary scales that do not vary by age to age graded scales. Age graded scales typically begin with higher increase rates for the younger ages where salary increases are highest and decline to lower levels for older participants where increases often approximate the cost of living. While direct comparisons may be accurately made among plans that use a uniform scale, comparisons between age graded scales are not as easily made. A 5% uniform scale will produce higher contribution rates than an age graded scale that begins at 7% and declines to 3%, for which the *average* is 5%, because the higher rates of the graded scale affect only the relatively smaller number of participants who are below the age midpoint.

After the 2000 experience study, salary assumptions were adopted to include an age-related feature for the first time. The new salary assumptions were further validated with the 2004 study where no changes were recommended. The greater accuracy achieved with age related tables offsets the small advantage of greater understandability afforded by uniform tables. Recommended tables are based upon an average real wage increase rate expectation of 0.5% coupled with anticipated inflation of 3.0%.

Under the current tables, salary increases decline from 9.5% at age 20 to 4.3% at age 60. Rates are assumed to decline very modestly thereafter to 4.2% ultimately. The average increase from age 20 to 60 is 6.17%. Although the average seems high, the table in aggregate is actually less conservative because the higher rates applicable to younger employees affect a relatively small group of employees for whom the expectation of reaching retirement and receiving benefit values are low. The graded salary scale replicates the effect of a uniform salary scale that increases annually at the rate of approximately 4.75%.

The current experience period shows average salary increases to be much less than expected based on the current assumptions. Average salaries for all groups averaged 5.3% during the period 2004 to 2008. Over the period 2008 to 2012 average salaries increased only 2.6% (about 2.15% less than the current assumptions). While much of the lower increases observed may be reflective of the current economic environment, it is expected that salaries may continue to be lower in the future than the current assumptions would indicate.

The tables show that salary increases continue to vary significantly by age among all major groups. This result further supports the continued use of an age graded salary scale. There is also variability by year of examination. The average percentage increase was the lowest for all groups in the 2009-2010 period averaging 2.02%, 0.26% and 1.95% for the Teachers, State and Political Subdivisions, respectively. This is believed to be a direct result of the difficult economic markets in the prior year. While the average salary increase among all groups was much higher in 2011-2012, averaging 3.17%, it seems unlikely average salary increases will return to pre-2008 levels in the foreseeable future.

Recommendation: In order to evaluate the current salary scale assumption, the results of the following tables were averaged. It was also necessary to adjust the results based on the difference between the assumed inflation component built into the salary scale assumption and inflation that actually occurred during the study period. Inflation was assumed to be 3.0% annually, while actual inflation was 2.6% from the beginning of 2008 to the end of 2011. It is interesting to note, salary increases from 2008 to 2012 were also 2.6%, indicating no real growth in pay over the period.

To better reflect future expectations, it is recommended that the real growth rates at all ages be reduced by 50 basis points. Such recommendation is still reflective of an average annual increase of 4.25% which is still higher than the recent average experience of 2.6%.

Teachers
Salary History - Individual Records
Weighted By Salary

	2008 No.	Percentage Increase in Average Salary					Exp. Inc.
		2008-09	2009-10	2010-11	2011-12	Average	
<u>TOTAL</u> 16-20	0	0.00	0.00	0.00	0.00	0.00	9.97
21-25	276	4.80	3.63	4.26	5.63	4.52	8.75
26-30	5,390	5.49	3.19	3.69	4.85	4.29	7.55
31-35	7,847	5.28	3.32	3.85	4.74	4.29	6.80
36-40	9,006	4.85	2.81	3.36	4.19	3.79	6.13
41-45	7,388	4.37	2.20	2.68	3.75	3.24	5.47
46-50	7,557	3.60	1.64	2.02	3.23	2.62	4.93
51-55	8,790	3.07	1.30	1.66	2.63	2.17	4.58
56-60	8,026	2.63	0.96	1.26	2.20	1.77	4.35
61-65	3,158	2.40	0.98	1.08	2.09	1.66	4.23
66-70	427	1.86	0.91	1.06	1.57	1.37	4.21
71-75	77	1.73	0.58	1.02	1.78	1.32	4.20
TOTAL	57,942	3.88	2.02	2.45	3.42	2.94	

General Employees
Salary History - Individual Records
Weighted By Salary

	2008 No.	Percentage Increase in Average Salary					Exp. Inc.
		2008-09	2009-10	2010-11	2011-12	Average	
<u>TOTAL</u> 16-20	3	23.40	-13.28	19.87	0.00	9.15	9.97
21-25	459	3.32	2.81	3.39	6.62	3.93	8.75
26-30	2,558	3.36	1.77	3.17	5.52	3.38	7.55
31-35	3,935	3.25	0.97	2.44	4.73	2.83	6.80
36-40	4,867	2.64	0.80	2.15	4.45	2.48	6.13
41-45	5,826	2.47	0.46	1.81	4.13	2.22	5.47
46-50	7,938	2.16	0.20	1.48	3.88	1.90	4.93
51-55	9,008	1.87	0.13	1.35	3.53	1.71	4.58
56-60	8,139	1.72	-0.23	1.06	3.23	1.45	4.35
61-65	4,554	1.46	-0.17	1.01	3.02	1.41	4.23
66-70	1,233	1.38	-0.26	0.68	2.99	1.34	4.21
71-75	416	1.16	0.21	0.30	2.53	1.14	4.20
TOTAL	48,936	2.12	0.26	1.51	3.72	1.91	

**Political Subdivisions
Salary History - Individual Records
Weighted By Salary**

		Percentage Increase in Average Salary						
		2008 No.	2008-09	2009-10	2010-11	2011-12	Average	Exp. Inc.
TOTAL	16-20	1	9.14	11.45	0.00	14.11	11.95	9.97
	21-25	749	6.61	4.00	5.34	4.46	5.07	8.75
	26-30	2,741	5.31	2.91	4.15	4.18	4.11	7.55
	31-35	4,442	4.83	2.33	3.76	3.30	3.54	6.80
	36-40	6,721	4.19	2.17	3.64	3.06	3.26	6.13
	41-45	8,165	4.00	2.18	3.26	2.74	3.03	5.47
	46-50	9,754	3.65	1.97	3.08	2.58	2.81	4.93
	51-55	9,668	3.39	1.72	2.93	2.25	2.56	4.58
	56-60	8,115	3.29	1.59	2.73	2.12	2.41	4.35
	61-65	4,554	3.10	1.37	2.49	1.74	2.14	4.23
	66-70	1,815	3.17	1.10	2.26	2.05	2.13	4.21
	71-75	655	2.91	1.02	2.06	2.13	2.03	4.20
TOTAL		57,380	3.82	1.95	3.14	2.58	2.85	

Social Security Increases

Although the TCRS is not heavily integrated with Social Security, it is affected by changes in the Social Security taxable wage base because such changes affect the "Social Security Integration Level" of the TCRS. In general, the State's cost is lowered somewhat by assuming that the taxable wage base will increase. Since such increases are primarily due to inflation, an assumption concerning the wage base should parallel the interest assumption. An appropriate wage base escalation rate that relates consistently to the other economic assumptions can be determined by combining the expected real wage increase rate of 0.5% with anticipated inflation of 3.0% to produce a rate of 3.5%. This rate is unchanged from the current assumption being used by TCRS.

Economic Assumption Summary

Recommendation: The group of economic assumptions recommended above is based upon an integrated set of assumptions of which inflation is common to all. The approach taken in establishing assumptions results in coordination among the assumption elements.

The thrust of this study has been directed toward three major groups—Teachers, general State employees, and Political Subdivision employees. These three groups include the vast bulk of TCRS participants. Two other small groups ("UT-TIAA with guarantee" and "Local Teachers") are basically teacher groups, so it is recommended that the assumptions adopted for Teachers also be applied to them. The "Aged Teacher and State" retirees also are primarily former teachers, so they also should be covered by the assumptions used for Teachers.

"Group II" is a closed group that is not large enough to have credible experience with respect to mortality or disability. It is proposed that this group adopt the same mortality and disability assumptions as the Consolidated State group. Turnover varies from expected rates, but experience and recent economic experience limits credibility. It is recommended that existing tables continue to be used for turnover.

"Group III" is a closed group that is also not large enough to generate credible experience. It is recommended that the mortality and disability rates adopted for Teachers be used also for "Group III." It is proposed that the retirement array adopted after the 2008 study be maintained without further changes for this group. The current schedule assumes rates of retirement for those who have met the service retirement eligibility requirements of 8% after age 50 increasing to 20% after age 65.