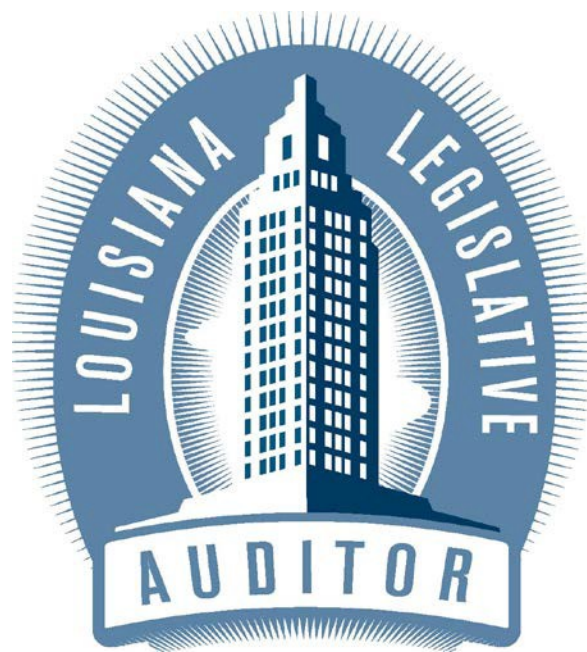# 2018 ACTUARIAL VALUATION REPORT ON THE TEACHERS' RETIREMENT SYSTEM OF LOUISIANA

ACTUARIAL VALUATION AS OF
JUNE 30, 2018
ISSUED DECEMBER 2018

LOUISIANA LEGISLATIVE AUDITOR
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POST OFFICE BOX 94397
BATON ROUGE, LOUISIANA 70804-9397

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2018 ACTUARIAL VALUATION REPORT

TEACHERS' RETIREMENT SYSTEM OF LOUISIANA

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

December 14, 2018

The Honorable John A. Alario, Jr.,
 President of the Senate
The Honorable Taylor Barras,
 Speaker of the House of Representatives

Dear Senator Alario and Representative Barras:

This report provides the results of an actuarial valuation of the Teachers' Retirement System of Louisiana as of June 30, 2018, as required under R.S. 11:127(C).

The report contains our findings, conclusions, and recommendations. I hope this report will benefit you in your legislative decision-making process.

Sincerely,

Daryl G. Purpera, CPA, CFE
Legislative Auditor

DGP:NE:ch

TRSL 2018 VALUATION

SUMMARY AND CONCLUSIONS

As required by Louisiana law, this actuarial valuation report was prepared by the actuary for the Louisiana Legislative Auditor (LLA) and is hereby submitted to the Public Retirement Systems' Actuarial Committee (PRSAC) for its consideration.

PUBLIC DOCUMENT

This valuation report is a public document. This report has been prepared for the following users:

Potential Users*	Definition*	Identified Persons
Principal	A client or employer of the actuary.	The Legislative Auditor.
Intended Users	Any person who the actuary identifies as able to rely on the findings of the report.	The Louisiana Legislature and staff, PRSAC and TRSL.
Other Users	Any recipient of the report who is not an intended user.	Other interested government entities or employees and the public.

* As defined by the Actuarial Standards of Practice (ASOP) No. 41.

CHANGES IN ASSUMPTIONS AND METHODS

This actuarial valuation implements a few significant changes as compared to the last PRSAC-accepted valuation.

- This valuation implements the changes in various demographic assumptions adopted by the retirement board that result from the recent experience study. Refer to Appendix B for more details.

- This valuation changes the inflation assumption to 2.30% from the 2.50% assumption in the last PRSAC-accepted valuation. Refer to Appendix D for more details.

- This valuation lowers the return assumption to 7.50% (from 8.20%) and sets the discount rate to be equal to the return assumption, at 7.50% (from 7.70%).

  This 7.50% return assumption is considerably higher than the assumption used in the valuation prepared by the actuary for the LLA last year (6.75%) due to (a) the recognition of cash flow in the determination of the most appropriate return assumptions (between the mid-term and long-term forecasts) and (b) the allowance of a range of reasonableness around the most appropriate return assumption, which is 7.00%. Yet, it is still significantly lower than the last PRSAC-accepted valuation.

  Refer to Appendices C and E through G for more details.

- This valuation changes the method of recognizing future gain-sharing cost-of-living (COLA) permanent benefit increases. Refer to Appendix H for more details.

- This valuation employs one return assumption (7.50%) and one discount rate (7.50%) for all purposes within the valuation, instead of one rate for some purposes and another rate for other purposes.

BRIEF SUMMARY COMPARING TO PRIOR YEARS

| | | June 30, 2018 | ----------------Prior Years---------------- | |
			June 30, 2017	June 30, 2016
A.	**Membership Data**			
	(1) Retirees	78,423	77,258	75,828
	(2) Actives	85,045	84,228	84,068
	(3) DROP	2,420	2,478	2,504
	(4) Terminated Vested	7,211	6,941	6,687
B.	**Annual Benefits**	$ 1,986,400,248	$ 1,939,661,208	$ 1,887,454,080
C.	**Total Payroll**	3,998,051,313	3,901,627,792	3,869,730,024
D.	**Valuation Assets**	20,319,561,584	19,210,425,004	18,254,321,142
E.	**Experience Account**	85,129,775	37,154,395	24,977,477
F.	**Investment Returns**			
	(1) Market (Total Assets)	11.15%	15.19%	1.02%
	(2) Market (excl. ORP & self-directed)	11.35%	15.55%	1.04%
	(3) Net Actuarial Value	9.48%	9.15%	6.67%
	(4) Rate for DROP Accounts	8.98%	8.65%	6.17%
G.	**Normal Costs**			
	(1) Total in Dollars	$ 459,311,260	$ 473,025,011	$ 466,591,480
	(2) Total Normal Cost Rate	11.49%	12.12%	12.06%
	(3) Employer Normal Cost Rate	3.51%	4.14%	4.07%
H.	**Accrued Liability**	$ 32,395,175,509	$ 29,762,623,913	$ 29,272,401,978
I.	**Unfunded Accrued Liability**	$ 12,075,613,925	$ 10,552,198,909	$ 11,018,080,836
J.	**Funded Percentage**	62.7%	64.5%	62.4%
K.	**Funding Requirements for the Fiscal Year Following the Valuation Date**			
	(1) Employee			
	a) Contributions	$ 322,492,929	$ 317,192,109	$ 314,144,467
	b) Rate	8.0%	8.0%	8.0%
	(2) Employer			
	a) Contributions	$ 1,327,919,644	$ 1,172,121,854	$ 11,376,501,636
	b) Rate	29.4%	26.4%	25.8%
L.	**Funding Requirements for the Subsequent Fiscal Year**			
	(1) Employee			
	a) Contributions	$ 328,390,065	$ 327,430,671	$ 323,541,841
	b) Rate	8.0%	8.0%	8.0%
	(2) Employer			
	a) Contributions	$ 1,331,459,765	$ 1,211,871,889	$ 1,199,029,516
	b) Rate	28.9%	26.5%	26.4%

BRIEF SUMMARY COMPARING
NEW ASSUMPTIONS/METHODS TO OLD ASSUMPTIONS/METHODS

		After Changes	Before Changes	
		June 30, 2018	June 30, 2018	June 30, 2017
A.	**Membership Data**			
	(1) Retirees	78,423	78,423	77,258
	(2) Actives	85,045	85,045	84,228
	(3) DROP	2,420	2,420	2,478
	(4) Terminated Vested	7,211	7,211	6,941
B.	**Annual Benefits**	$ 1,986,400,248	$ 1,986,400,248	$ 1,939,661,208
C.	**Total Payroll**	3,998,051,313	3,998,051,313	3,901,627,792
D.	**Valuation Assets**	20,319,561,584	20,319,561,585	19,210,425,004
E.	**Experience Account**	85,129,775	85,129,775	37,154,395
F.	**Investment Returns**			
	(1) Market (Total Assets)	11.15%	11.15%	15.19%
	(2) Market (excl. ORP & self-directed)	11.35%	11.35%	15.55%
	(3) Net Actuarial Value	9.48%	9.48%	9.15%
	(4) Rate for DROP Accounts	8.98%	8.98%	8.65%
G.	**Normal Costs**			
	(1) Total in Dollars	$ 459,311,260	$ 478,495,081	$ 473,025,011
	(2) Total Normal Cost Rate	11.49%	11.97%	12.12%
	(3) Employer Normal Cost Rate	3.51%	3.99%	4.14%
H.	**Accrued Liability**	$ 32,395,175,509	$ 30,184,972,606	$ 29,762,623,913
I.	**Unfunded Accrued Liability**	$ 12,075,613,925	$ 9,865,411,021	$ 10,552,198,909
J.	**Funded Percentage**	62.7%	67.3%	64.5%
K.	**Funding Requirements for the Fiscal Year Following the Valuation Date**			
	(1) Employee			
	a) Contributions	$ 322,492,929	$ 322,492,929	$ 317,192,109
	b) Rate	8.0%	8.0%	8.0%
	(2) Employer			
	a) Contributions	$ 1,327,919,644	$ 1,161,321,614	$ 1,172,121,854
	b) Rate	29.4%	25.7%	26.4%
L.	**Funding Requirements for the Subsequent Fiscal Year**			
	(1) Employee			
	a) Contributions	$ 328,390,065	$ 328,390,065	$ 327,430,671
	b) Rate	8.0%	8.0%	8.0%
	(2) Employer			
	a) Contributions	$ 1,331,459,765	$ 1,127,100,227	$ 1,211,871,889
	b) Rate	28.9%	24.6%	26.5%

BRIEF SUMMARY COMPARING
FINAL SELECTED RETURN ASSUMPTION TO
MOST APPROPRIATE RETURN ASSUMPTION

		Final Selected 7.50%	Most Appropriate 7.00%
		June 30, 2018	**June 30, 2018**
A.	**Membership Data**		
	(1) Retirees	78,423	78,423
	(2) Actives	85,045	85,045
	(3) DROP	2,420	2,420
	(4) Terminated Vested	7,211	7,211
B.	**Annual Benefits**	$ 1,986,400,248	$ 1,986,400,248
C.	**Total Payroll**	3,998,051,313	3,998,051,313
D.	**Valuation Assets**	20,319,561,584	20,319,561,584
E.	**Experience Account**	85,129,775	85,129,775
F.	**Investment Returns**		
	(1) Market (Total Assets)	11.15%	11.15%
	(2) Market (excl. ORP & self-directed)	11.35%	11.35%
	(3) Net Actuarial Value	9.48%	9.48%
	(4) Rate for DROP Accounts	8.98%	8.98%
G.	**Normal Costs**		
	(1) Total in Dollars	$ 459,311,260	$ 512,161,009
	(2) Total Normal Cost Rate	11.49%	12.81%
	(3) Employer Normal Cost Rate	3.51%	4.83%
H.	**Accrued Liability**	$ 32,395,175,509	$ 34,057,884,070
I.	**Unfunded Accrued Liability**	$ 12,075,613,925	$ 13,738,322,485
J.	**Funded Percentage**	62.7%	59.7%
K.	**Funding Requirements for the Fiscal Year Following the Valuation Date**		
	(1) Employee		
	a) Contributions	$ 322,492,929	$ 322,492,929
	b) Rate	8.0%	8.0%
	(2) Employer		
	a) Contributions	$ 1,327,919,644	$ 1,452,896,621
	b) Rate	29.4%	32.2%
L.	**Funding Requirements for the Subsequent Fiscal Year**		
	(1) Employee		
	a) Contributions	$ 328,390,065	$ 328,390,065
	b) Rate	8.0%	8.0%
	(2) Employer		
	a) Contributions	$ 1,331,459,765	$ 1,485,495,459
	b) Rate	28.9%	32.3%

BRIEF SUMMARY OF CHANGES IN ASSUMPTIONS AND METHODS

The following sections provide a brief explanation of the new assumptions and methods and the rationale. More details concerning the selection of these assumptions can be found in the Appendices.

Demographic Assumptions (Rates of Mortality, Turnover, Retirement, etc.)

This valuation revised the various rates of mortality, turnover, retirement and other demographic assumptions used in this valuation as compared to the 2017 valuation adopted by PRSAC.

The most recent experience study covered the period July 1, 2012 through June 30, 2017. The results are presented in a report prepared by TRSL's actuary and was dated March 1, 2018. The LLA's actuary carefully reviewed the report for reasonableness and found it to produce appropriately revised assumptions. Concerning mortality, the methodology presented in the experience study report to develop new base mortality tables made appropriate use of the System's own mortality experience and applied current actuarial methods. Furthermore, the experience study appropriately recommended the use of generational mortality improvements as published by the Society of Actuaries to be applied to the base table.

All these new demographic assumption changes were also adopted by the TRSL board for use in the actuary's June 30, 2018 actuarial valuation report.

Refer to Appendix B for more information concerning the demographic changes.

The table on page 8 presents the effect of change in demographic assumptions (as well as other changes) on the unfunded accrued liability as of June 30, 2018 and on the projected employer contribution rate for FYE 2020.

Economic Assumptions (Inflation and Investment Return)

TRSL's actuarial calculations and disclosures as of June 30, 2017 were developed by its actuary using an investment return assumption of 8.20%[1]. However, 7.70% was commonly disclosed[2] and publicly understood as being TRSL's investment return assumption, which was the discount rate (not the return assumption).

- Confusion may result from the board and actuary's use of an *implicit* recognition of gain-sharing COLAs by reducing the net return assumption by 40 basis points and by another 10 basis points to reflect administrative expenses to obtain the final discount rate. It could be construed as misleading to disclose the return assumption as being 7.70%.
- This confusion may also be exacerbated by the board's disclosure in its Comprehensive Annual Financial Statements (CAFR) and the State's disclosure in its CAFR, that the System's long-term expected investment rate of return assumption for 2017 was 7.70% (or 7.75%).

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[1] Statement by the board actuary in the January 2018 PRSAC meeting, implied on pages 5 and 49-50 in the System actuary's 2017 valuation report valuation report, explicit in pages 5-6 in the System actuary's response (6/23/17) to LLA inquiries concerning the board's 2017 valuation, and other documentation.
[2] By research and advocacy organizations (NASRA, Reason Foundation), in the press (P&I and Greater Baton Rouge Business Report), and on the System's own website (in 10/8/18 and 10/6/17 press releases on www.trsl.org).

The changes employed in this actuarial valuation will remove the confusion by making the discount rate the same as the return assumption. This is achieved by using a more transparent method of recognizing future gain-sharing COLA benefits and administrative expenses, described below.

Based on the research conducted by the LLA's actuary, among many independent national experts in forecasting inflation and investment returns, the LLA's actuary has determined that 7.50% is an acceptable return assumption and which is used for all purposes in this actuarial valuation. This is the very upper end of a range of reasonableness around the most appropriate return assumption determined to be 7.00%.

A full, fair and comparable disclosure (apples-to-apples) of the System's return assumption of 8.20% (2017) and 8.05% (2018) puts the System at the most aggressive return assumption in the Public Plan Database (NASRA). Refer to Appendix C for charts illustrating this point. This actuarial valuation report's 7.50% return assumption puts the System closer to the median.

All users of this valuation report should read the following Appendices for an understanding of how this revised return assumption was derived and why it constitutes an improvement:

- Appendix C – Return Assumptions of Other Large Retirement Systems
- Appendix D – Basis for Inflation Assumption
- Appendix E – Basis for Net Investment Return Assumption
- Appendix F – Horizon for the Net Investment Return Assumption
- Appendix G – A Reasonable Range around the Most Appropriate Net Investment Return Assumption
- Appendix J – Press Clippings for Other Retirement Systems Lowering Their Return Assumptions (2015-2018).

The table on page 8 presents the effect of change in economic assumptions (as well as other changes) on the unfunded accrued liability as of June 30, 2018 and on the projected employer contribution rate for FYE 2020

Method for Administrative Expenses

Act 94 of 2016 requires that the expected noninvestment-related administrative expenses for the contribution year be included in the actuarially required employer contribution beginning with the first fiscal year in which the projected aggregate employer contribution rate, calculated without regard to any changes in the board-approved actuarial valuation rate, will not increase. That threshold was satisfied for the contribution year ending June 30, 2019.

In this actuarial valuation, the LLA's actuary applied this direct explicit method to the determination of the contribution rate for the year ending June 30, 2019, just as TRSL'S actuary did. Another component of the employer contribution requirement (besides the normal cost and the amortization payments) was included, equal to 0.45% of pay to fund for administrative expenses, just as TRSL's actuary did.

The table on page 8 presents the effect of change in treatment of administrative expenses (as well as other changes) on the unfunded accrued liability as of June 30, 2018 and on the projected employer contribution rate for FYE 2020.

Method for Gain-sharing COLA Benefits

This actuarial valuation employs an explicit method of recognizing the expected cost of gain-sharing COLA benefits of the plan. This is being accomplished by estimating, through stochastic modeling techniques, what the single equivalent annual COLA increase is, and measuring the single equivalent benefit in the actuarial valuation. The single fixed annual COLA rate that is equivalent to and approximates the current statutory gain-sharing template is 0.50% per year.

This is a different method than employed by the System and its actuary, which was to lower the return assumption by 40 basis points to derive a different and lower discount rate. That lower discount rate was then applied in a valuation without measuring any future COLA benefits.

Using an explicit actuarial method to approximate the current statutory COLA template improves the valuation by making the return assumption equal the discount rate (thereby avoiding confusing and potentially misleading disclosures) and by making it more transparent and more useful to readers.

Users of this actuarial valuation report should read the Appendix H for an understanding of how and why this change in method was derived and implemented and why it is an improvement.

The table on page 8 presents the effect of change in method for advance-recognizing gain-sharing COLA benefits (as well as other changes) on the unfunded accrued liability as of June 30, 2018 and on the projected employer contribution rate for FYE 2020.

Single Set of Actuarial Assumptions

In prior years, when return assumptions and discount rates were changed by the board and actuary, they were changed for the purpose of calculating the contribution rate(s) for the prospective year. Those new return assumptions and discount rates were not used to calculate and disclose the current accrued liability, current unfunded accrued liability, current funded ratio, or current normal costs as of the current valuation date. Consequently, within the same actuarial valuation report, different return assumptions and discount rates were used for disclosure of the liabilities from what was used for the prospective year's contribution requirements.

For clarity and for consistency with common actuarial practice, with this valuation's change in return assumption and other assumptions, all actuarial calculations and disclosures are made using the new assumptions. This change also improves simplicity and transparency in the annual actuarial valuation report.

It is recognized that this is not how things have always been done in prior year's official valuations. However, this is an opportunity to improve the valuation: for simplicity and transparency and for consistency with actuarial practice around the country and in Louisiana's other retirement systems.

BRIEF SUMMARY OF THE EFFECTS OF ASSUMPTION/METHOD CHANGES

The following table presents (a) the unfunded accrued liability as of July 30, 2018 and (b) the associated employer contribution requirements for FYE 2020, for each of the first four new assumptions/methods described above. The entries below isolate the effect of each new assumption/method individually and cumulatively.

The Effects of Changes in Assumptions and Methods	Unfunded Accrued Liability as of 6/30/2018 ($ Millions)	Projected Employer Contribution Rate for FYE 2020 (as a % of Projected Covered Pay)
(1) Without Any Changes in Assumptions or Methods *(benchmark values)*	$ 9,864.3	24.6%
(2) Change in Method for Actuarial Valuation System *(effect of change in Actuarial Valuation System against benchmark)*	$ 9,865.4	24.6%
a. Effect of this Change: (2)-(1)	$ 1.1	0.0%
(3) Change in Demographic Assumptions *(combined effect of all changes above and in Demographic Assumptions against benchmark)*	$ 10,428.0	24.5%
a. Effect of this Additional Change: (3)-(2)	$ 562.6	-0.1%
(4) Change in Economic Assumptions *(combined effect of all changes above and in Investment Return and Inflation Assumptions against benchmark)*	$ 12,499.4	29.2%
a. Effect of this Additional Change: (4)-(3)	$ 2,071.4	4.7%
(5) Change in Method for Administrative Expense *(combined effect of all changes above and in Method for Administrative Expenses against benchmark)*	$ 12,176.3	29.0%
a. Effect of this Additional Change: (5)-(4)	$ (323.1)	-0.2%
(6) Change in Method for Gain-sharing COLA Benefits *(combined effect of all changes above and in Method for Gain-sharing COLA against benchmark)*	**$ 12,075.6**	**28.9%**
a. Effect of this Additional Change: (6)-(5)	$ (100.7)	-0.1%
b. Combined Effect of All Changes: 2a+3a+4a+5a = (6)-(1)	$ 2,211.3	4.3%

Source: Developed by LLA's actuary.

[1] Benchmark values have been developed using assumptions employed in the determination of the 6/30/2017 Unfunded Accrued Liabilities and FYE 2018 Actual Employer Contribution rate, without regard to assumption and method changes adopted after 6/30/2017.

[2] Change in method for actuarial valuation system.

[3] Change in demographic assumptions (i.e., rates of retirement, termination, disability, mortality, salary merit scale, converted leave, etc.), adopted by the Board of Trustees effective 6/30/2018 pursuant to the most recent experience study, which covered the 5-year period from 7/1/2012 through 6/30/2017.

[4] Change in inflation and net investment return assumption used in the 6/30/2017 actuarial valuation, from TRSL's 8.20% (translating to TRSL's 7.70% discount rate) to LLA's 7.50% net investment return assumption.

[5] Change in method for administrative expenses from TRSL's implicit reduction of net investment return assumption (by 0.10%) to LLA's explicit Employer Contribution component (equal to 0.45% of covered payroll), consistent with Act 94 of 2016 providing for direct funding of non-investment-related administrative expenses through the employer contribution.

[6] Change in method for gain-sharing COLA increases from TRSL's implicit reduction of net investment return assumption (by 0.40%) to LLA's explicit single equivalent annual 0.50% COLA.

CONTRIBUTION RATES FOR FYE 2020

Employer contribution requirements for FYE 2020 for the System vary from sub-plan to sub-plan. Per Act 95 of the 2016 regular session of the legislature, two contribution rates are being developed:

- The K-12 sub-plan, applicable to teachers employed by school districts, as well as employees classified as Lunch Plan A and Lunch Plan B.
- The Higher Education sub-plan.

Contribution rates for the sub-plans have one or more of the following component parts:

1. Total normal cost
2. Employee normal cost
3. Employer normal cost
4. Administrative expenses
5. UAL costs that are shared by both sub-plans

Contribution rates are summarized below. More details are presented in Appendix A.

Projected Contribution Rates for FYE 2020							
Membership Group	**Status** 6/30/2018	**Total NC %** (A)	**Employee NC %** (B)	**Employer NC %** (C) = (A) - (B)	**Administrative Expense %** (D)	**Shared UAL %** (E)	**Total Employer Cost %** (F) = (C) + (D) + (E)
Aggregated K-12 (Regular Teachers, Lunch A & B)	O/C*	11.6082	7.9797	3.6284	0.45	24.9565	29.0349
Higher Education (Non-ORP Members)	O	10.8416	8.0000	2.8416	0.45	24.9565	28.2481
Higher Education (ORP Members)	O	0.0000	0.0000	0.0000	0.00	24.9565	24.9565
Total		11.4884	7.9829	3.5055	0.45	24.9565	28.9120

Status

O - Plan open to new members.

C - Plan closed to new members.

* Note: Lunch A sub plan has been closed to new members. New employees of K-12 agencies are eligible for participation in Lunch B or Regular Teachers sub plans.

SOURCES AND AMOUNTS OF CHANGES IN THE UAL FOR FYE 2018

Gains and losses measured during FYE 2018 have been identified below, and the unfunded accrued liability at the end of the year has been reconciled with the unfunded accrued liability on June 30, 2017.

A. **Unfunded Accrued Liability on June 30, 2017**   **$ 10,552,198,909**

B. **Increases in the UAL Due to:**
   1. Interest on the UAL $ 812,519,316
   2. Experience Account Allocation   44,451,679
   3. Permanent Benefit Increase   0
   4. Employer Contribution Shortfall   0
   5. Assumption/Method Changes   2,211,299,094
   6. Investment Loss   0
   7. Experience Loss   0
   8. Total Increases = B1 + B2 + B3 + B4 + B5 + B6 + B7   **$ 3,068,270,089**

C. **Decreases in the UAL Due to:**
   1. Employer Amortization Payment $ 1,045,692,251
   2. Legislative Appropriation (Act 59 of 2018)   8,585,163
   3. Employer Contribution Surplus   61,466,735
   4. Investment Gain   319,679,362
   5. Experience Gain   109,431,562
   6. Total Decreases = C1 + C2 + C3 + C4 + C5   **$ 1,544,855,073**

D. **Unfunded Accrued Liability on June 30, 2018**
   = A + B8 - C6   **$ 12,075,613,925**

QUALIFICATIONS, DISCLOSURES, AND CERTIFICATION

This valuation has been prepared as of June 30, 2018, based on plan provisions for the Teachers' Retirement System of Louisiana (TRSL) as documented in Title 11 of Louisiana Revised Statutes (R.S.), Sections 701 through 952.

This report was prepared at the request of the Louisiana Legislative Auditor (LLA) and is intended for use by the Public Employees Retirement Systems' Actuarial Committee (PRSAC) and those designated or approved by the LLA and PRSAC. This report may be provided to parties other than PRSAC only in its entirety and only with the permission of the LLA. GRS is not responsible for unauthorized use of this report.

The purposes of the valuation are to measure the System's funding progress, to determine the employer contribution rates for the fiscal year ending June 30, 2020. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results associated with the benefits described in this report for purposes other than those identified above may be significantly different.

The contribution rates shown on page 11 may be considered minimum contribution rates that comply with the statutes' funding policy. Users of this report should be aware that contributions made at these rates do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the System in excess of those presented in this report be considered.

The contribution rates in this report are determined using the actuarial assumptions and methods disclosed in Section III of this report. This report does not include a robust assessment of the risks of future experience not meeting the actuarial assumptions, as the assessment of these risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the System's financial condition.

The findings in this report are based on census and financial data and other information through June 30, 2018. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the System's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

This valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The valuation was based upon information furnished by the System and its actuary concerning plan benefits, financial transactions, plan provisions, active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the System or its actuary.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge, the information contained in this report is accurate and fairly presents the actuarial position of the System as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

James J. Rizzo and Piotr Krekora are members of the American Academy of Actuaries. These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor and the System.

This actuarial valuation and contribution determination was prepared and completed by us or under our direct supervision, and we acknowledge responsibility for the results. To the best of our knowledge, the results are complete and accurate. In our opinion, the techniques and assumptions used are reasonable, meet the requirements and intent of relevant Louisiana Statutes, and are based on generally accepted actuarial principles and practices. There is no benefit or expense to be provided by the System and/or paid from the System's assets for which liabilities or current costs have not been established or otherwise taken into account in the valuation. All known events or trends which may require a material increase in plan costs or required contribution rates have been taken into account in the valuation.

The actuary for the Legislative Auditor will be pleased to review this valuation report with PRSAC and to answer any questions pertaining to the valuation.

Respectfully submitted,

ACTUARY FOR THE LOUISIANA LEGISLATIVE AUDITOR

Gabriel, Roeder, Smith & Company

By: James J. Rizzo, ASA, MAAA

By: Piotr Krekora, ASA, MAAA, PhD

Date: <u>November 30, 2018</u>

SECTION I:
DEVELOPMENT OF EMPLOYER CONTRIBUTIONS

1. Employer Contribution Requirements for FYE 2019 - Combined Plan

Employer contribution requirements for FYE 2019, as measured for all sub-plans combined using assumptions and methods applicable to that fiscal year, are calculated below. These values have been determined as if the entire system had been measured as a single financial entity. Although R.S. 11:102(D) requires separate calculations of normal cost for two groups of sub-plans within TRSL (i.e., Regular Teachers combined with Lunch Plans A & B, and Higher Education), values in the aggregate are useful for comparisons with contribution requirements for prior years.

The amounts shown below for FYE 2019 are based on a 7.50% assumed rate of return on investments and a 7.50% discount rate. All calculations in this valuation as based on a single set of assumptions for the reasons set forth in the Summary and Conclusions section.

		Dollar Amount	Percent of Salary
A.	**Employer Portion of Normal Cost**	$ 141,614,184	3.505478%
B.	**Administrative Expenses**	18,179,085	0.450000%
C.	**Shared Amortization Payments**	1,168,126,375	25.399431%
D.	**Contribution Variance Payments**	-	0.000000%
E.	**Total Contribution = A + B + C + D**	1,327,919,644	29.354909%
F.	**Projected Payroll for FYE 2019**		
	1. Projected Payroll for Normal Costs	4,039,796,674	
	2. Projected Payroll for Administrative Expenses	4,039,796,674	
	3. Projected Payroll for Amortization Costs	4,599,025,728	
G.	**Total Contribution Rate for FYE 2019**		
	1. Employer Normal Cost Rate = A / F1	3.51%	
	2. Administrative Expense Rate = B / F2	0.45%	
	3. Employer Amortization Cost Rate = (C + D) / F3	25.40%	
	4. Total Employer Contribution Rate = G1 + G2 + G3	29.4%	
H.	**Minimum Contribution Rate**	15.5%	
I.	**Minimum Required Contribution for FYE 2019 =** **A + B + F3 x (H - G1 - G2)**	690,520,838	15.500000%
J.	**Required Employer Contribution for FYE 2019 =** **The Greater of E and I**	1,327,919,644	29.354909%

2. Employer Contribution Requirements for FYE 2020 - Combined Plan

Employer contribution requirements for FYE 2020, as measured for all sub-plans combined using assumptions and methods applicable to that fiscal year, are calculated below. These values have been determined as if the entire system had been measured as a single financial entity. Although R.S. 11:102(D) requires separate calculations of normal cost for two groups of sub-plans within TRSL (i.e., Regular Teachers combined with Lunch A & B, and Higher Education), values in the aggregate are useful for comparisons with contribution requirements for prior years. Contribution requirements by sub plan are presented in Appendix A.

The amounts shown below for FYE 2020 are based on a 7.50% assumed rate of return on investments and a 7.50% discount rate. All calculations in this valuation as based on a single set of assumptions for the reasons set forth in the Summary and Conclusions section.

		Dollar Amount	Percent of Salary
A.	**Employer Portion of Normal Cost**	$ 144,203,754	3.505478%
B.	**Administrative Expenses**	18,511,510	0.450000%
C.	**Shared Amortization Payments**	1,134,819,167	24.232098%
D.	**Contribution Variance Payments**	33,925,334	0.724417%
E.	**Total Contribution = A + B + C + D**	1,331,459,765	28.911993%
F.	**Projected Payroll for FYE 2020**		
	1. Projected Payroll for Normal Costs	4,113,668,781	
	2. Projected Payroll for Administrative Expenses	4,113,668,781	
	3. Projected Payroll for Amortization Costs	4,683,123,950	
G.	**Total Contribution Rate for FYE 2020**		
	1. Employer Normal Cost Rate = A / F1	3.51%	
	2. Administrative Expense Rate = B / F2	0.45%	
	3. Employer Amortization Cost Rate = (C + D) / F3	24.96%	
	4. Total Employer Contribution Rate = G1 + G2 + G3	28.9%	
H.	**Minimum Contribution Rate**	15.5%	
I.	**Minimum Required Contribution for FYE 2020 = A + B + F3 x (H - G1 - G2)**	703,147,768	15.500000%
J.	**Required Employer Contribution for FYE 2020 = The Greater of E and I**	1,331,459,765	28.911993%

3. Normal Cost Values - Combined Plan

Employer and Employee Normal Costs

Funding rules under R.S. 11:22 require normal costs to be determined in accordance with the Entry Age Normal (EAN) funding method. Employee contributions and actuarially determined employer normal cost values for FYE 2019 are based on the valuation of normal costs as of June 30, 2018. The total normal cost percentage is calculated as the total normal cost for FYE 2019 divided by the payroll as of June 30, 2018. The employee normal cost is calculated as employee contributions collected in FYE 2018 divided by the June 30, 2018 payroll. The employer normal cost percentage is equal to the difference between the total normal cost percentage and the employee normal cost percentage. These percentages are then multiplied by the projected payroll for FYE 2019 to determine dollar contribution amounts for that fiscal year.

Projected normal costs for FYE 2020 are calculated in a similar manner. The calculated normal cost percentages, however, are multiplied by projected payroll amounts for FYE 2020.

Normal costs for FYE 2019 and 2020 are each based on a 7.50% discount rate. The basis for these rates is described in Section III of this report. Please also refer to Appendices C-H for more information concerning the changes in assumptions and methods implemented for this valuation.

Development of Employer Contributions

		June 30, 2018 Valuation Actual FYE 2019 & Projected FYE 2020	June 30, 2017 Valuation Actual FYE 2018	Projected FYE 2019
A.	**Discount Rate**	7.50%	7.70%	7.65%
B.	**Total Normal Cost**			
	1. Retirement Benefits	$ 272,012,248	$ 305,135,968	Not available
	2. Disability Benefits	14,902,112	14,558,297	Not available
	3. Survivor Benefits	5,927,774	11,324,442	Not available
	4. Vested Deferred Benefits	166,469,126	142,006,304	Not available
	5. Total Normal Cost	$ 459,311,260	$ 473,025,011	$ 477,898,808
C.	**Payrolls**			
	1. On Valuation Date	$ 3,998,051,313	$ 3,901,627,792	$ 3,901,627,792
	2. Projected for FY after Valuation Date	4,039,796,674	3,973,145,635	n/a
	3. Projected for 2nd FY after Valuation Date	4,113,668,781	n/a	4,101,385,050
	4. ORP – Salary Adjustment Factor	1.13843	1.13883	1.13883
D.	**Normal Cost Rates**			
	1. Total Normal Cost Rate = B6 / C1	11.488378%	12.123786%	12.248703%
	2. Employee Normal Cost Rate	7.982900%	7.983417%	7.983417%
	3. Employer Normal Cost Rate = D1 - D2	3.505478%	4.140369%	4.265286%
E.	**Employer Normal Cost**			
	1. For 1st FY after Valuation Date = C2 x D3	$ 141,614,184	$ 164,503,573	n/a
	2. For 2nd FY after Valuation Date = C3 x D3	$ 144,203,754	n/a	$ 174,935,804
F.	**Employee Normal Cost**			
	1. For 1st FY after Valuation Date = C2 x D2	$ 322,492,929	$ 317,192,109	n/a
	2. For 2nd FY after Valuation Date = C3 x D2	$ 328,390,066	n/a	$ 327,430,672
G.	**Total Normal Cost**			
	1. For FYE 2019 = E1 + F1	$ 464,107,113	$ 481,695,682	n/a
	2. For FYE 2020 = E2 + F2	$ 472,593,820	n/a	$ 502,366,476

Increases in Normal Costs Attributable to Assumption and Method Changes

The following assumptions changes have affected the determination of the normal cost rate as of June 30, 2018:

a. Changes in demographic assumptions,
b. Changes in future rates of return and inflation assumptions (and discount rate),
c. Treatment of administrative expenses, and
d. Treatment of gain-sharing COLA benefits.

Please refer to the Appendices for further details pertaining to the assumption changes. The change in normal cost due to change in actuarial systems is incorporated into both columns below. Increases associated with the various components of the normal cost are shown below.

		For the June 30, 2018 Valuation		Increase/
		Old Assumptions	New Assumptions	(Decrease)
A.	**Discount Rate**	7.70%	7.50%	
B.	**Total Normal Cost**			
	1. Retirement Benefits	$ 304,219,523	$ 272,012,248	$ (32,207,275)
	2. Disability Benefits	14,820,039	14,902,112	82,073
	3. Survivor Benefits	11,652,800	5,927,774	(5,725,026)
	4. Vested Deferred Benefits	147,802,719	166,469,126	18,666,407
	5. Total Normal Cost	$ 478,495,081	$ 459,311,260	$ (19,183,821)
C.	**Payrolls**			
	1. Projected Payroll on June 30, 2018	3,998,051,313	3,998,051,313	0
	2. Projected Payroll for FYE 2019	4,039,796,674	4,039,796,674	0
	3. Projected Payroll for FYE 2020	4,113,668,781	4,113,668,781	0
	4. ORP - Salary Adjustment Factor	1.13843	1.13843	
D.	**Normal Cost Rates**			
	1. Total Normal Cost Rate	11.968208%	11.488378%	-0.479830%
	2. Employee Normal Cost Rate	7.982900%	7.982900%	0.000000%
	3. Employer Normal Cost Rate = D1 - D2	3.985308%	3.505478%	-0.479830%
E.	**Employer Normal Costs**			
	1. Projected Cost for FYE 2019 = C2 x D3	160,998,340	141,614,184	(19,384,156)
	2. Projected Cost for FYE 2020 = C3 x D3	163,942,371	144,203,754	(19,738,617)
F.	**Employee Normal Costs**			
	1. Projected Cost for FYE 2019 = C2 x D2	322,492,929	322,492,929	0
	2. Projected Cost for FYE 2020 = C3 x D2	328,390,065	328,390,065	0

4. Unfunded Accrued Liability

Components of the Unfunded Accrued Liability as of June 30, 2018

Funding rules under R.S. 11:21 require a measurement of the unfunded accrued liability for the plan to be calculated in accordance with the Entry Age Normal Funding method. This measurement is to be made for all sub-plans combined. Accrued liability values as of June 30, 2018, are based on a 7.50% return assumption (and discount rate) net of investment expenses, and other assumptions and methods as described in Section III of this report. The unfunded accrued liability is based on the actuarial value of assets measured on June 30, 2018.

The components of the unfunded accrued liability on June 30, 2018 and June 30, 2017 are shown below.

		Valuation Date	
		June 30, 2018	**June 30, 2017**
A.	**Discount Rate**	7.50%	7.70%
B.	**Accrued Liability**		
	1. Accrued Liability for Active Members		
	(a) Retirement Benefits	$ 8,217,889,964	$ 7,725,929,420
	(b) Disability Benefits	180,572,151	146,890,693
	(c) Survivor Benefits	79,050,185	137,955,169
	(d) Vested Deferred Benefits	525,618,795	313,899,689
	(e) Total	$ 9,003,131,095	$ 8,324,674,971
	(f) Ratio of Active Liability to Total Accrued Liability	27.79%	27.97%
	2. Accrued Liability for Retired and Inactive Members		
	(a) Regular Retirees	$ 18,079,729,704	$ 16,459,826,669
	(b) Disability Retirees	497,781,642	455,327,086
	(c) Survivors	1,206,442,041	1,105,159,843
	(d) Members with a Deferred Benefit	404,712,636	327,107,035
	(e) Contributions to be Refunded	147,388,316	135,466,985
	(f) Deferred Benefits for DROP Members	1,955,540,551	1,855,657,127
	(g) Account Balances for DROP Members	1,100,449,524	1,099,404,197
	(h) Total	$ 23,392,044,414	$ 21,437,948,942
	(i) Ratio of Inactive Liability to Total Accrued Liability	72.21%	72.03%
	3. Total Accrued Liability	$ 32,395,175,509	$ 29,762,623,913
C.	**Valuation Assets**	$ 20,319,561,584	$ 19,210,425,004
D.	**Unfunded Accrued Liability**	$ 12,075,613,925	$ 10,552,198,909
E.	**Funded Ratio = C / B3**	62.7%	64.5%

18

Reconciliation of UAL between June 30, 2017 and June 30, 2018

The unfunded accrued liability on June 30, 2018, is reconciled below with the unfunded accrued liability on June 30, 2017.

A.	**Unfunded Accrued Liability on June 30, 2017**			**$ 10,552,198,909**
B.	**Increases in the UAL Due to:**			
	1. Interest on the UAL	$	812,519,316	
	2. Experience Account Allocation		44,451,679	
	3. Permanent Benefit Increase		0	
	4. Employer Contribution Shortfall		0	
	5. Assumption/Method Changes		2,211,299,094	
	6. Investment Loss		0	
	7. Liability Experience Loss		0	
	8. Total Increases = B1 + B2 + B3 + B4 + B5 + B6 + B7			**$ 3,068,270,089**
C.	**Decreases in the UAL Due to:**			
	1. Employer Amortization Payment	$	1,045,692,251	
	2. Legislative Appropriation (Act 59 of 2018)		8,585,163	
	3. Employer Contribution Surplus		61,466,735	
	4. Investment Gain		319,679,362	
	5. Liability Experience Gain		109,431,562	
	6. Total Decreases = C1 + C2 + C3 + C4 + C5			**$ 1,544,855,073**
D.	**Unfunded Accrued Liability on June 30, 2018**			
	= A + B8 - C6			**$ 12,075,613,925**

Projected Unfunded Accrued Liability as of June 30, 2019

The calculation of the projected unfunded accrued liability as of June 30, 2019 is shown below.

A.	**Unfunded Accrued Liability on June 30, 2018**		**$ 12,075,613,925**
B.	**Increases in the UAL Due to:**		
	1. Interest on the UAL	$ 905,671,044	
	2. Expected Employer Contribution Shortfall	142,312,118	
	3. Recognition of Gain Sharing	0	
	4. Assumption/Method Changes	0	
	5. Total Increases = B1 + B2 + B3 + B4		**$ 1,047,983,162**
C.	**Decreases in the UAL Due to:**		
	1. Employer Amortization Payment	$ 1,211,139,203	
	2. Employer Contribution Surplus	0	
	3. Total Decreases = C1 + C2		**$ 1,211,139,203**
D.	**Projected Unfunded Accrued Liability on June 30, 2019**		
	= A + B5 - C3		**$ 11,912,457,884**

5. Assets

Actuarial Value of Assets

The actuarial value of assets is the market value of assets adjusted to phase in realized and unrealized investment gains and losses that occurred over the four-year period immediately prior to the valuation date.

A.	Investment Gain/(Losses) Based on Market	June 30, 2018	June 30, 2017	June 30, 2016	June 30, 2015
	1. BOY Market Value	$ 19,513,345,675	$ 17,537,950,955	$ 17,896,379,678	$ 17,886,838,190
	2. Contributions	1,581,181,730	1,491,336,625	1,528,698,762	1,581,664,935
	3. Legislative Appropriations	8,585,163	-	-	10,384,806
	4. Benefit Payments	2,167,642,666	2,113,255,290	2,050,287,273	2,008,403,199
	5. Administrative Expenses	29,465,710	18,194,370	17,432,419	19,265,221
	6. EOY Market Value	21,046,702,165	19,513,345,675	17,537,950,955	17,896,379,678
	7. Actual Investment Income = A6 - A1 - A2 - A3 + A4 + A5	2,140,697,973	2,615,507,755	180,592,207	445,160,167
	8. Expected Investment Income Based on the Discount Rate	1,478,814,441	1,334,386,819	1,366,082,362	1,368,947,325
	9. Gain/(Loss) = A7 - A8	661,883,532	1,281,120,936	(1,185,490,155)	(923,787,158)

B.	Market Value Adjustment	Gain/(Loss) (a)	Factor (b)	Market Value Adjustment (c) = (a) x (b)
	1. Adjustment for 2018	$ 661,883,532	80%	$ 529,506,826
	2. Adjustment for 2017	1,281,120,936	60%	768,672,562
	3. Adjustment for 2016	(1,185,490,155)	40%	(474,196,062)
	4. Adjustment for 2015	(923,787,158)	20%	(184,757,432)
	5. Total Market Value Adjustment			639,225,894

C.	Preliminary Actuarial Value	
	1. Market Value on June 30, 2018 = A6	21,046,702,165
	2. Market Value Adjustment = B5	639,225,894
	3. Preliminary Actuarial Value = C1 - C2	20,407,476,271

D.	Corridor Values	
	1. 80% x Market Value	16,837,361,732
	2. 120% x Market Value	25,256,042,598

E.	Actuarial Value of Assets = Preliminary Value if Preliminary Value is inside the Corridor. Otherwise the Actuarial Value = the average between the Preliminary Value and the Corridor	$ 20,407,476,271

Investment Gain/(Loss)

The investment gain/(loss) is measured as the difference between actuarial and expected investment earnings during FYE 2018.

A.	**Components of the Gain/(Loss) Calculation**		
	1. Net Actuarial Value of Assets on June 30, 2017		$ 18,828,777,469
	2. Contributions for FYE 2018		1,485,778,888
	3. Legislative Appropriations		8,585,163
	4. Benefits Paid for FYE 2018		2,012,284,179
	5. Administrative Expenses Paid for FYE 2018		29,465,710
	6. Net Actuarial Value of Assets on June 30, 2018		20,040,737,732
	7. Expected Rate of Return on Assets		7.70%
B.	Actual Investment Earnings = A6 - A1 - A2 - A3 + A4 + A5		$ 1,759,346,102
C.	Expected Investment Earnings		1,428,807,886
D.	Investment Gain/(Loss) = B - C		$ 330,538,216

Allocation of Investment Gains to DROP, LSU Extension Service, and Experience Accounts

According to R.S. 11:883.1, 50% of the total investment gain, not associated with DROP accounts, in excess of $200 million will be transferred from the regular asset pool to the Experience Account. Beginning June 30, 2016, the $200 million hurdle will be indexed by the increase in the actuarial value of assets, if any. Moreover, the transfer to the Experience Account is capped by the maximum COLA if the retirement system is less
than 80% funded and two COLAs otherwise.

Funded Ratio	Maximum COLA
< 55%	0%
55% to < 65%	1.5%
65% to < 75%	2.0%
75% to < 80%	2.5%
80% +	3.0%

The amount of assets to be transferred under R.S. 11:883.1 from the regular pool of assets to the Experience Account is calculated on the following pages.

Development of Employer Contributions

A. Excess Investment Earnings = Gross Investment Gain $ 330,538,216

B. Excess Investment Earnings Paid to DROP Accounts

  1. DROP Accounts Eligible for System Investment Earnings

    a. Total of all DROP and IBO accounts 1,049,326,421

    b. DROP accounts for Actives not entitled to system earnings 113,288,293

    c. Self-directed DROP accounts not entitled to system earnings 366,738,539

    d. DROP accounts entitled to system earnings = B1a - B1b - B1c 569,299,589

  2. Rate of Return Attributable to Excess Earnings on DROP Accounts

    a. Actual rate of return on investments for DROP accounts 8.980000%

    b. Expected rate of return for DROP accounts* 7.200000%

    c. Rate of return attributable to excess earnings = B2a - B2b 1.780000%

  3. Excess Investment Earnings Paid to DROP Accounts = B1d x B2c 10,133,533

C. Investment Gain/(Loss) Paid to LSU Ext Service Account

  1. LSU Ag Ext Service Account at Beginning of the Year 2,598,899

  2. Contributions to the LSU Ag Ext Service at the Beginning of the Year 1,873,303

  3. Benefit Payments from the LSU Ag Ext Service Account at Mid-Year 2,017,909

  4. Actual Rate of Return on Investments for LSU Ag Ext Service Accounts 9.546502%

  5. Expected Rate of Return for LSU Ag Ext Service Accounts 7.70%

  6. Actual Investment Earnings on LSU Ag Ext Service Account 330,619

  7. Expected Investment Earnings on LSU Ag Ext Service Account 268,111

  8. Excess Investment Earnings Paid to LSU Ag Ext Service Account = C6 - C7, not less than 0 62,508

D. Benefit Disbursements 0

E. Investment Gain/(Loss) Paid to the Experience Account

  1. Experience Account Assets Entitled to System Earnings 37,154,395

  2. Actual Rate of Return on the Actuarial Value of Assets 9.483941%

  3. Actual Investment Earnings on EA Assets Entitled to System Earnings = E1 x E2 3,523,701

  4. Expected Rate of Return on the Actuarial Value of Assets 7.700000%

  5. Expected Investment Earnings on EA Assets = E1 x E4 2,860,888

  6. Potential Investment Gains for the Experience Account = E3 - E5 662,813

  7. Maximum Fund in the Experience Account = Present Value of a 1.5% PBI 223,442,355

  8. Maximum Investment Earnings that Can Be Allocated to the EA = E7 - (E1 - D) 186,287,960

  9. Investment Earnings Potentially Allocated to the EA = lesser of E3, E5 and E8 2,860,888

  10. Investment Gains for the Experience Account = lesser of E6 and (E8 - E9) 662,813

  11. Allocation of Investment Earnings to the Experience Account = E9 + E10 3,523,701

  12. Investment Earnings to be Treated as Investment Gains = E3 - E11, not less than 0 0

Development of Employer Contributions

F. **Miscellaneous Items** $ -

G. **Net Excess Investment Earnings = A - B3 - C8 + E10 - E12 - F, not less than 0**   319,679,362

H. **Allocation of Excess Investment Earnings to the Experience Account**
    1. Net Excess Investment Earnings = G   319,679,362
    2. Administrative Expense   0
    3. Threshold Gain   230,776,004
    4. Gain Available for Gain Sharing = H1 - H2 - H3, not less than 0   88,903,358
    5. Gain Sharing Percentage   50%
    6. Preliminary Allocation of Excess Gains to the Experience Account = H4 × H5   44,451,679
    7. Maximum Excess Investment Earnings that Can be Applied to EA = E8   186,287,960
    8. Allocation of Excess Gains to the Experience Account = lesser H6 and H7   44,451,679

    * Determined as: [Discount Rate - 50 Basis Points] = [7.70% - 0.50%] = 7.20%

Employer Shortfall/(Surplus) for FYE 2018

Total contributions received from participating employers were higher in FYE 2018 than were expected. As a result, asset values are more than what they would have been otherwise. The unfunded accrued liability has decreased because of the contribution surplus. The surplus will be used to reduce the Experience Account Amortization Base (EAAB), without a recalculation of amortization payments. The calculation of the surplus as of June 30, 2018 is shown below.

A. Actual Employer Contributions

1. Employer Contributions	$ 1,110,943,147
2. Employer Amortization Payments for ORP Members	130,984,645
3. Other Appropriations	8,137
4. Actual Employer Contributions = A1 + A2 + A3	$ 1,241,935,929

B. Expected Employer Contributions

1. Employee Contributions for Regular Teachers	$ 336,385,147
2. Employee Contribution Rate for Regular Teachers	8.00%
3. Salaries upon which Employer Contributions Received = B1 / B2	4,204,814,338
4. Employee Contributions for Lunch Plan A Members	22,256
5. Employee Contribution Rate for Lunch Plan A Members	9.10%
6. Salaries upon which Employer Contributions Were Received = B4 / B5	244,571
7. Employee Contributions for Lunch Plan B Members	1,187,397
8. Employee Contribution Rate for Lunch Plan B Members	5.00%
9. Salaries upon which Employer Contributions Received = B7 / B8	23,747,940
10. Total Salaries upon which Contributions Were Received = B3 + B6 + B9	$ 4,228,806,849
11. Employer Normal Cost Rate for FYE 2018	4.14038619%
12. Employer Normal Costs = B10 x B11	175,088,935
13. Contributions to the Employer Credit Account for FYE 2018	0
14. Amortization Payments for FYE 2018	1,004,883,456
15. Payment toward Contribution Variances for FYE 2018	2,734,825
16. Expected Employer Contributions = B12 + B13 + B14 + B15	1,182,707,216

C. Mid-Year Employer Shortfall/(Surplus) for FYE 2018 = B16 - A4 $ (59,228,713)

D. Interest at 7.70% for One-Half Year   (2,238,022)

E. Employer Shortfall/(Surplus) on June 30, 2018 = C + D $ (61,466,735)

Projected Employer Contribution Shortfall/(Surplus) for FYE 2019

A shortfall in employer contributions is expected to occur for FYE 2019 because the actual employer contribution rate, 29.4% of pay for FYE 2018, is greater than or equal to the projected 26.5% rate of pay set by PRSAC a year ago.

The actual employer contribution rate for amortization costs pertaining to ORP members will be 21.80449611%. This is the rate for FYE 2019 set by PRSAC based on the June 30, 2017 valuation. However, the required employer contribution rate for the amortization costs based on the June 30, 2018 valuation is 25.39946400%. Therefore, the expected contribution for FYE 2019 (based on the rate set by PRSAC) will be less than the amount necessary to fully offset amortization charges for FYE 2019, resulting in a shortfall. The expected shortfall of employer contributions is calculated below.

A.	**Projected Employer Contribution Shortfall/(Surplus) for Regular Non-ORP Members**	
	1. Actual Employer Contributions Required in Mid-Year for FYE 2019	$ 1,187,700,222
	2. Projected Employer Contributions Expected in Mid-Year for FYE 2019	1,070,546,119
	3. Shortfall/(Surplus) of Regular Employer Contributions Expected Mid-Year for FYE 2019 = A1 - A2	117,154,104
B.	**Projected Employer Contribution Shortfall/(Surplus) for ORP Members**	
	1. Projected Employer Contribution Rate for FYE 2019	21.80449611%
	2. Actual Employer Contribution Rate for FYE 2019	25.39946400%
	3. Contribution Rate Shortfall for FYE 2019 = B2 - B1	3.594967890%
	4. Actual ORP Payroll for FYE 2019	$ 559,223,112
	5. Shortfall/(Surplus) of ORP Employer Contributions Expected Mid-Year for FYE 2019 = B3 x B4	$ 20,103,891
C.	**Total Employer Contribution Shortfall/(Surplus) at Mid-Year 2019 = A3 + B5**	$ 137,257,995
D.	**Interest for One-Half Year**	$ 5,054,123
E.	**Total Employer Contribution Shortfall/(Surplus) at FYE 2019**	$ 142,312,118

Asset Allocation (Market Values)

		June 30, 2018	**June 30, 2017**
A.	**Short-Term Assets**		
	1. Cash/Cash Equivalents	$ 277,091,189	$ 216,603,032
	2. Short-Term Investments	1,076,810,833	1,033,090,820
B.	**Bonds**		
	1. Domestic Issues	2,371,403,311	1,913,773,495
	2. International Issues	1,278,291,190	1,568,601,507
C.	**Equities**		
	1. Domestic Stock	6,321,369,477	5,927,969,405
	2. International Stock	3,635,793,802	3,465,254,946
D.	**Other Assets**		
	1. Fixed Assets	3,402,044	3,430,912
	2. Real Estate and Alternative Investments	6,465,934,316	5,296,424,434
E.	**Receivables Minus Payables**	(383,393,997)	88,197,124
F.	**Other Adjustments**	0	0
G.	**Total Assets**	$ 21,046,702,165	$ 19,513,345,675

Income Statement (Market Value)

		FYE June 30, 2018	FYE June 30, 2017
A.	**Income**		
	1. Contribution Income		
	a. Member Contributions	$ 337,928,752	$ 328,541,240
	b. Employer Contributions	1,110,943,147	1,037,915,514
	c. ORP Contributions	130,984,645	122,560,251
	d. Total = A1a + A1b + A1c	1,579,856,544	1,489,017,005
	2. Other Income		
	a. IUAL Appropriations	8,585,163	0
	b. Other Appropriations	8,137	28,103
	c. LSU Coop/Ext	1,873,303	1,754,855
	d. Miscellaneous	(556,254)	536,662
	e. Total = A2a + A2b + A2c + A2d	9,910,349	2,319,620
	3. Net Investment Income		
	a. Investment Income	2,177,985,187	2,650,391,172
	b. Investment Expense	37,287,214	34,883,417
	c. Net Investment Income = A3a - A3b	2,140,697,973	2,615,507,755
	Total Income = A1d + A2e + A3c	$ 3,730,464,866	$ 4,106,844,380
B.	**Expense**		
	1. Operating Expense		
	a. General Administration	14,046,725	14,368,886
	b. Post-Employment Benefits	13,633,156	586,166
	c. Depreciation	400,766	432,238
	d. Other Expenses	1,385,063	2,807,080
	e. Total = B1a + B1b + B1c + B1d	29,465,710	18,194,370
	2. Benefit Payments		
	a. Pension Benefits	2,118,971,446	2,063,449,370
	b. Return of Employee Contributions	48,671,220	49,805,920
	c. Total = B2a + B2b	2,167,642,666	2,113,255,290
	3. Total Expense = B1e + B2c	$ 2,197,108,376	$ 2,131,449,660
C.	**Net Income = A4 - B3**	$ 1,533,356,490	$ 1,975,394,720

Allocation of Assets to Sub-accounts

		FYE June 30, 2018	FYE June 30, 2017
A.	**Employer Credit Account**		
	1. Beginning Balance for Current Year	0	0
	2. Allocation for Current Year	0	0
	3. Disbursements for Current Year	0	0
	4. Accumulated Interest for Current Year	0	0
	5. Ending Balance for Current Year = A1 + A2 - A3 + A4	0	0
B.	**Initial UAL Amortization Fund**		
	1. Beginning Balance for Current Year	0	0
	2. Allocation for Current Year	0	0
	3. Disbursements for Current Year	0	0
	4. Accumulated Interest	0	0
	5. Ending Balance for Current Year = B1 + B2 - B3 + B4	0	0
C.	**Experience Account Fund**		
	1. Beginning Balance for Current Year	$ 37,154,395	$ 24,977,477
	2. Allocation for Current Year	44,451,679	9,891,500
	3. Disbursements for Current Year	0	0
	4. Accumulated Interest	3,523,701	2,285,418
	5. Ending Balance for Current Year = C1 + C2 + C3 + C4	$85,129,775	$37,154,395
D.	**LSU Ag/Ext Service**		
	1. Beginning Balance for Current Year	$ 2,598,899	$ 2,535,804
	2. Allocation for Current Year	1,873,303	1,754,855
	3. Disbursements for Current Year	2,017,909	1,995,075
	4. Accumulated Interest	330,619	303,315
	5. Ending Balance for Current Year = D1 + D2 - D3 + D4	$2,784,912	$2,598,899
E.	**Valuation Assets**		
	1. Actuarial Value of Assets	$ 20,407,476,271	$ 19,250,178,299
	2. Employer Credit Account = A5	0	0
	3. Initial UAL Amortization Fund = B5	0	0
	4. Experience Account Fund = C5	85,129,775	37,154,395
	5. LSU Ag/Ext Service = D5	2,784,912	2,598,899
	6. Valuation Assets = E1 - E2 - E3 - E4 - E5	$ 20,319,561,584	$ 19,210,425,005

6. Rates of Return on Investments

Rates of Return on Investments Based on Market Value

The market value of assets includes funds that have been invested outside the trust fund by members with money in self-directed and ORP accounts. Column (a) shows the rate of return on investments with these account funds included; column (b) shows the rate of return associated with self-directed and ORP account funds; and column (c) shows the rate of return with these funds excluded.

		Market Value (a)	Self-Directed & ORP Values (b)	Net Market Value (c) = (a) - (b)
A.	Asset Value on June 30, 2017	$ 19,513,345,675	$ 421,400,830	$ 19,091,944,845
B.	Contributions	$ 1,589,766,893	$ 95,402,842	$ 1,494,364,051
C.	Benefit Payments	$ 2,167,642,666	$ 155,358,487	$ 2,012,284,179
D.	Administrative Expenses	29,465,710	0	$ 29,465,710
E.	Asset Value on June 30, 2018	$ 21,046,702,165	$ 366,738,539	$ 20,679,963,626
F.	Investment Income = E - A - B + C + D	$ 2,140,697,973	$ 5,293,354	$ 2,135,404,619
G.	Unrounded Rates of Return	11.146344%	1.352336%	11.350108%
H.	Rounded Rate of Return on Investments	11.15%	1.35%	11.35%

Rates of Return on Investments Based on Actuarial Value

The actuarial value of assets includes funds that have been invested outside the trust fund by members with money in ORP and self-directed accounts. Column (a) shows the rate of return on investments with these account funds included; column (b) shows the rate of return associated with ORP and self-directed account funds; and column (c) shows the rate of return with these funds excluded.

		Actuarial Value (a)	Self-Directed & ORP Values (b)	Net Actuarial Value (c) = (a) - (b)
A.	Asset Value on June 30, 2017	$ 19,250,178,299	$ 421,400,830	$ 18,828,777,469
B.	Contributions	1,589,766,893	95,402,842	$ 1,494,364,051
C.	Benefit Payments	2,167,642,666	155,358,487	$ 2,012,284,179
D.	Administrative Expenses	29,465,710	0	$ 29,465,710
E.	Asset Value on June 30, 2018	$ 20,407,476,271	$ 366,738,539	$ 20,040,737,732
F.	Investment Income = E - A - B + C + D	$ 1,764,639,455	$ 5,293,354	$ 1,759,346,102
G.	Unrounded Rates of Return	9.315909%	1.352336%	9.483941%
H.	Rounded Rate of Return on Investments	9.32%	1.35%	9.48%

Rate of Return to Be Granted on DROP Accounts

A.	Rounded Rate of Return on the Net Actuarial Value of Assets	9.48%
B.	Reduction for Administrative Expenses	0.50%
C.	Rate of Return to Be Granted on DROP Accounts	8.98%

Summary of Rates of Return on Investments

		Rates Measured on June 30				
		2018	**2017**	**2016**	**2015**	**2014**
A.	Total Market Value	11.15%	15.19%	1.02%	2.52%	18.44%
B.	Market Value Net of Self-Directed and ORP Accounts	11.35%	15.55%	1.04%	2.58%	18.90%
C.	Actuarial Value Net of Self-Directed and ORP Accounts	9.48%	9.15%	6.67%	11.26%	13.14%
D.	Five-Year Geometric Average of the Actuarial Value Net of Self-Directed and ORP Accounts	9.92%	10.70%	9.85%	9.80%	7.30%
E.	Interest Credited to Self-Directed and ORP Accounts	1.35%	0.76%	0.34%	10.76%	12.64%

7. Amortization Payments for FYE 2019

Year	Description	Amortization Method	Period	Initial Liability	Years Remaining	Balance on June 30, 2018	Mid-Year Payment	Balance on June 30, 2019
Shared Bases								
2010	Orig Amort Base	I	19	$ 2,677,501,778	11	$ 1,865,658,900	$ 281,098,196	$ 1,714,134,505
2010	Exp Acct Amort Base	I	30	3,999,115,151	22	3,212,415,138	361,402,898	3,078,635,773
2009	Change in Liability	L	30	2,979,708,647	21	2,649,671,935	245,409,840	2,593,950,992
2010	Change in Liability	L	30	1,150,854,854	22	1,041,795,143	94,638,635	1,021,806,354
2011	Change in Liability	L	30	(175,198,199)	23	(161,187,360)	(14,385,802)	(158,360,895)
2012	Change in Liability	L	30	125,767,665	24	117,430,240	10,312,312	115,545,475
2013	Change in Liability	L	30	(248,560,781)	25	(235,227,305)	(20,352,961)	(231,766,954)
2013	Assumption Change	L	30	871,681,891	25	824,922,498	71,376,134	812,787,335
2013	Asset Valuation Method	L	30	(25,686,598)	25	(24,308,698)	(2,103,302)	(23,951,100)
2014	Liability Gain	L	30	(162,364,783)	26	(155,613,841)	(13,282,669)	(153,513,115)
2014	Assumption Change	L	30	570,933,583	26	547,194,820	46,706,692	539,807,903
2014	Funding Method	L	30	881,187,059	26	844,548,309	72,087,777	833,147,234
2014	Reduction in EA Deposit	L	5	(76,831,515)	1	(17,737,405)	(18,390,533)	-
2014	Gain from $100-$200M	L	5	(100,000,000)	1	(23,086,107)	(23,936,185)	-
2014	Remaining Investment Gain	L	5	(247,166,403)	1	(57,061,098)	(59,162,206)	-
2015	Experience Gain	L	30	(37,106,169)	27	(35,992,382)	(3,034,086)	(35,546,003)
2015	Investment Gain	L	30	(339,621,226)	27	(329,427,074)	(27,770,047)	(325,341,507)
2016	Experience Gain	L	30	(157,650,103)	28	(154,609,820)	(12,884,653)	(152,846,464)
2016	Investment Loss	L	30	184,262,638	28	180,709,131	15,059,680	178,648,107
2017	DR Change (7.75% to 7.70%)	L	30	135,132,845	29	133,872,677	11,039,368	132,467,267
2017	Experience Gain	L	30	(216,992,070)	29	(214,968,532)	(17,726,670)	(212,711,769)
2017	Exp Acct Allocation	L	10	9,891,500	9	9,198,905	1,390,871	8,446,737
2018	Liability Exp Gain	L	30	(109,431,562)	30	(109,431,562)	(8,936,640)	(108,373,224)
2018	Investment Exp Gain	L	30	(88,903,358)	30	(88,903,358)	(7,260,221)	(88,043,553)
2018	Exp Acct Allocation	L	30	44,451,679	10	44,451,679	6,245,994	41,309,571
2018	Actuarial System Method Change	L	30	1,096,191	30	1,096,191	89,520	1,085,589
2018	Demographic Assump. Changes	L	30	562,593,128	30	562,593,128	45,943,713	557,152,157
2018	Economic Assump. Changes	L	30	2,071,441,457	30	2,071,441,457	169,162,592	2,051,408,058
2018	Admin. Expense Method Change	L	30	(323,113,670)	30	(323,113,670)	(26,386,817)	(319,988,761)
2018	COLA Method Change	L	30	$ (100,718,014)	30	$ (100,718,014)	$ (8,225,055)	$ (99,743,947)
Total				$13,856,275,615		$ 12,075,613,925	$ 1,168,126,375	$ 11,770,145,765
Employers Credit Balance								
2013	Contribution Variance	L	5	$ 11,400,601	0	$ -	$ -	$ -
Total				$ 11,400,601		$ -	$ -	$ -
Grand Total						$ 12,075,613,925	$ 1,168,126,375	$ 11,770,145,765

8. Amortization Payments for FYE 2020

Year	Description	Amortization Method	Period	Initial Liability	Years Remaining	Balance on June 30, 2019	Mid-Year Payment	Balance on June 30, 2020
Shared Bases								
2010	Orig Amort Base	I	19	$ 2,677,501,778	10	$ 1,714,134,505	$ 222,564,938	$ 1,611,934,354
2010	Exp Acct Amort Base	I	30	3,999,115,151	21	3,078,635,773	285,140,022	3,013,893,989
2009	Change in Liability	L	30	2,979,708,647	20	2,593,950,992	245,409,840	2,534,050,979
2010	Change in Liability	L	30	1,150,854,854	21	1,021,806,354	94,638,635	1,000,318,405
2011	Change in Liability	L	30	(175,198,199)	22	(158,360,895)	(14,385,802)	(155,322,445)
2012	Change in Liability	L	30	125,767,665	23	115,545,475	10,312,312	113,519,353
2013	Change in Liability	L	30	(248,560,781)	24	(231,766,954)	(20,352,961)	(228,047,076)
2013	Assumption Change	L	30	871,681,891	24	812,787,335	71,376,135	799,742,033
2013	Asset Valuation Method	L	30	(25,686,598)	24	(23,951,100)	(2,103,302)	(23,566,683)
2014	Liability Gain	L	30	(162,364,783)	25	(153,513,115)	(13,282,669)	(151,254,834)
2014	Assumption Change	L	30	570,933,583	25	539,807,903	46,706,693	531,866,966
2014	Funding Method	L	30	881,187,059	25	833,147,234	72,087,777	820,891,079
2014	Reduction in EA Deposit	L	5	(76,831,515)	0	-	-	-
2014	Gain from $100-$200M	L	5	(100,000,000)	0	-	-	-
2014	Remaining Investment Gain	L	5	(247,166,403)	0	-	-	-
2015	Experience Gain	L	30	(37,106,169)	26	(35,546,003)	(3,034,086)	(35,066,146)
2015	Investment Gain	L	30	(339,621,226)	26	(325,341,507)	(27,770,047)	(320,949,522)
2016	Experience Gain	L	30	(157,650,103)	27	(152,846,464)	(12,884,653)	(150,950,856)
2016	Investment Loss	L	30	184,262,638	27	178,648,107	15,059,680	176,432,506
2017	DR Change (7.75% to 7.70%)	L	30	135,132,845	28	132,467,267	11,039,368	130,956,452
2017	Experience Gain	L	30	(216,992,070)	28	(212,711,769)	(17,726,670)	(210,285,749)
2017	Exp Acct Allocation	L	10	9,891,500	8	8,446,737	1,390,871	7,638,157
2018	Liability Exp Gain	L	30	(109,431,562)	29	(108,373,224)	(8,936,640)	(107,235,510)
2018	Investment Exp Gain	L	30	(88,903,358)	29	(88,043,553)	(7,260,221)	(87,119,262)
2018	Exp Acct Allocation	L	30	44,451,679	9	41,309,571	6,245,994	37,931,804
2018	Actuarial System Method Change	L	30	1,096,191	29	1,085,589	89,520	1,074,192
2018	Demographic Assump. Changes	L	30	562,593,128	29	557,152,157	45,943,713	551,303,113
2018	Economic Assump. Changes	L	30	2,071,441,457	29	2,051,408,058	169,162,592	2,029,872,154
2018	Admin. Expense Method Change	L	30	(323,113,670)	29	(319,988,761)	(26,386,817)	(316,629,484)
2018	COLA Method Change	L	30	(100,718,014)	29	(99,743,947)	(8,225,055)	(98,696,824)
Total				$13,856,275,615		$ 11,770,145,765	$ 1,134,819,167	$ 11,476,301,145
Employers Credit Balance								
2019	Contribution Variance	L	5	142,312,118	5	142,312,118	33,925,334	$ 117,810,992
Total				$ 142,312,118		$ 142,312,118	$ 33,925,334	$ 117,810,992
Grand Total						**$ 11,912,457,883**	**$ 1,168,744,501**	**$ 11,594,112,137**

SECTION II
VALUATION OF THE GAIN-SHARING/COLA PROGRAM

1. Actuarial Basis for the Valuation of the Gain-sharing/COLA Program

A. Challenges in Interpreting Louisiana Law

The current gain sharing COLA program was originally enacted during the 1991 legislative session. The program contained two components:

1. **Gain-sharing** – A portion of investment gains (and until 2004, investment losses) was to be transferred from the pool of assets reserved for regular retirement benefits to the Experience Account, which would be used to fund COLAs. Funds would remain in the Experience Account until a COLA was granted. The law limited the amount of assets that could be held in the Experience Account to no more than two times the cost of a full COLA. Whenever a COLA was granted, assets equal to the present value of the COLA benefits granted were then transferred back to the regular pool of assets to cover the COLA liabilities that had been created.

2. **COLAs** – COLAs would be granted if specified conditions were satisfied and if there were sufficient assets in the Experience Account to cover the additional liability created by the COLA grant.

Although the program has been modified several times since its inception, the basic format has remained unchanged; there is a gain sharing component and a COLA grant component.

The gain-sharing component is a legislative mandate. Transfers to the Experience Account occur automatically. No approvals are necessary; if the conditions are satisfied, a transfer must occur unless the Experience Account has been capped out.

The COLA component is not a legislative mandate. Historically and currently, a COLA can be granted only if specified conditions are satisfied, there are sufficient assets in the Experience Account to pay for the COLA, and the COLA- grant is approved by the System's board and the legislature.

The structure of the gain sharing COLA program creates an actuarial dilemma. If the COLA component is assumed not part of current law, then the only liability that must be accounted for are transfers to the Experience Account. However, if COLA grants are not part of current law, then the Experience Account will reach its limit and no additional transfers will occur. The only additional liability that will be incurred by the System is the difference between the Experience Account limit and the amount already in the Experience Account.

Alternatively, if the COLA component is assumed part of current law, the frequency for which the board will recommend and the legislature will enact a COLA payment when all other conditions necessary for a COLA grant have been satisfied must be assumed. Monte Carlo simulations then produce estimates of the average annual transfer to the Experience Account.

In light of this discussion set forth above, future gain-sharing COLA benefits are recognized in this valuation in accordance with the following assumptions and methods.

1. The COLA component is part of current law that must be valued based on actuarial likelihood.

2. The board and the legislature will grant a COLA if there are sufficient funds in the Experience Account and if all other necessary conditions have been satisfied.

Stochastic modeling techniques can then determine the single fixed annual COLA that would approximate or be equivalent to the current statutory mechanism. This single equivalent fixed annual COLA rate can then be modeled within the regular annual actuarial valuation. We have determined the single equivalent fixed COLA assumption should be a 0.50% annual COLA for the gain-sharing COLA program. This is the current best estimate. While this single equivalent rate has held consistent with prior year's estimates, this estimate may change for future valuations as circumstances change.

B. Gains and Losses Associated with the Gain-Sharing/COLA Account

If the automatic COLA used to value plan liabilities is 0.50% per year, then funding for the gain-sharing COLA program has been accounted for actuarially, and done so in a transparent and explicit manner. An experience gain will occur if no COLA is granted (or no transfer is made) or if a smaller COLA than 0.50% is granted with funds in the Experience Account (or if a smaller than expected transfer is made). An experience loss will occur if a COLA is granted (or a transfer is made) that is larger than 0.50% of the present value of currently eligible payees.

The Louisiana Constitution provides the following.

> *F) Benefit Provisions; Legislative Enactment. Benefit provisions for members of any public retirement system, plan, or fund that is subject to legislative authority shall be altered only by legislative enactment. No such benefit provisions having an actuarial cost shall be enacted unless approved by two-thirds of the elected members of each house of the legislature. Furthermore, no such benefit provision for any member of a state retirement system having an actuarial cost shall be approved by the legislature unless a funding source providing new or additional funds sufficient to pay all such actuarial cost within ten years of the effective date of the benefit provision is identified in such enactment. This Paragraph shall be implemented as provided by law.* [Underlining for emphasis.]

For the purpose of this valuation, it is assumed that the constitutional language applies only if the COLA approved by the legislature exceeds that which would have been granted under current law. Therefore, an additional liability is created only to the extent that the cost of the COLA grant exceeds the cost of the COLA grant that otherwise would be available under current law. Such an increase would be subject to 10-year amortization.

C. Experience Account Transfers for the June 30, 2018 Valuation

Investment gains were transferred to the Experience Account on June 30, 2018. Investment gains for FYE 2018 were more than the roughly $230.8 million threshold applicable for FYE 2018. Calculations associated with this analysis are shown in Section I(5).

2. Summary of Benefit Provisions for the Gain-sharing/COLA Program

Benefit and funding provisions associated with the TRSL gain-sharing COLA program are contained in R.S. 11:102.2 and 11:883.1. According to R.S. 11:883.1, a special account, called the Experience Account, is established and maintained to fund COLAs. Experience Account rules have changed several times since the Account's inception in 1991. For example, Act 497 of the 2009 session required all funds in the Experience Account to be transferred back to the regular pool of assets. The balance in the Experience Account was set to $0. Additional changes were made to Experience Account rules by Act 399 of the 2014 session. Provisions associated with the gain sharing COLA program as amended through Act 399 are summarized below.

A. Experience Account Provisions

Rules pertaining to debits and credits to the Experience Account are summarized below.

1. The first transaction on June 30 of a given year is the transfer of assets from the Experience Account, if any, to the regular pool of assets to offset the liability associated with any COLA grant that becomes effective on the next day, July 1.

2. The second transaction is the transfer of investment earnings on the balance in the Experience Account on the July 1 prior to the valuation date. Assets in the Experience Account are invested in the same manner as assets in the regular pool of assets. The Experience Account is credited with investment earnings based on the actuarial rate of return on assets for the system as a whole. The following rules apply.

   a. If the Experience Account balance on the prior July 1 plus investment earnings for the FYE on the valuation date is less than the maximum amount allowed in the Experience Account on the valuation date, then all investment earnings on the July 1 balance may be credited.

   b. If the Experience Account balance on the prior July 1 plus investment earnings for the FYE on the valuation date equals or exceeds the maximum amount allowed in the Experience Account on the valuation date, then investment earnings on the Experience Account balance will be reduced sufficiently to restrict the Experience Account balance on the valuation date to the maximum limit.

   c. Any investment earnings not credited to the Experience Account are transferred to or retained by the regular pool of assets.

   d. These credits, if any, occur on the June 30 valuation date.

3. The third transaction is the transfer of the allocation of investment gains as calculated in accordance with TRSL's interpretation of the law. On each valuation date, TRSL calculates the amount of investment gain or loss that has occurred during the system's fiscal year. The investment gain for this purpose, based on an interpretation of law made by the legal staff for TRSL, increases the investment gain that otherwise would be calculated. Under TRSL's interpretation, the ***actual*** investment gain is calculated net of investment expenses, but the ***expected*** investment gain is determined as net of investment expenses, net of administrative expenses and net of gain sharing. The following rules apply.

   a. This transaction occurs after items 1 and 2 have been completed.

   b. Fifty percent (50%) of any investment gain as determined by TRSL that exceeds a specified threshold (currently set at $200 million) potentially will be transferred from the regular pool of assets to the Experience Account. The effective date of this transfer is June 30 of the fiscal year in which the investment gain occurs. The $200 million threshold is indexed: the threshold value will increase (but not decrease) in any year by the ratio of the actuarial value of assets at the end of the year to the actuarial value of assets at the beginning of the year. The first such increase may occur no earlier than June 30, 2016.

   c. The transfer amount may not exceed the amounts shown in Table 1.

Table 1

Funded Ratio on Valuation Date	Transfer May Not Exceed:
At least 80%	The difference between **two** times the cost of a full 3% COLA and the amount already in the Experience Account.
At least 75% but less than 80%	The difference between the cost of a full 2.5% COLA and the amount already in the Experience Account.
At least 65% but less than 75%	The difference between the cost of a full 2.0% COLA and the amount already in the Experience Account.
At least 55% but less than 65%	The difference between the cost of a full 1.5% COLA and the amount already in the Experience Account.
Less than 55%	No transfer is allowed.

   d. If the Experience Account balance (on June 30) plus the investment gain allocation to the Experience Account is less than the maximum amount allowed in the Experience Account, then the full allocation will be transferred from the regular pool of assets and credited to the Experience Account.

e. If the Experience Account balance plus the investment gain allocation equals or exceeds the maximum amount, then the allocation is reduced sufficiently to restrict the Experience Account on the valuation date to the maximum.

f. Any gain allocation not transferred to the Experience Account is retained by the regular pool of assets.

g. These credits, if any, will occur on the June 30 valuation date.

The value of the Experience Account balance cannot be less than $0, except under special circumstances.

B. Benefit Provisions

Current law provides a legal template that the legislature may choose to adopt in the enactment of cost-of-living adjustment. This template specifies eligibility criteria, which is generally age 60 with one year of retirement, and the basis for the amount of a COLA grant, which is the CPI-U. There is no requirement that COLA legislation follow the template. Nor is there any guarantee that COLAs in the future will even be based on the balance in the Experience Account.

The COLA template contains the following provisions:

1. Eligibility:

   The following retirees and beneficiaries of TRSL will be eligible for a COLA to be paid on the July 1 following the date the board of trustees and the legislature approve a COLA.

   a. Each retiree who satisfies all of the following criteria on the July 1 immediately following the valuation date:

   • Has received a benefit for at least one year, and
   • Has attained at least age 60.

   b. Each non-retiree beneficiary (including each survivor of a deceased active member) receiving a benefit on the July 1 immediately following the valuation date who satisfies all of the following criteria:

   • The deceased member or beneficiary or both combined have received benefits for at least one year, and
   • The deceased member would have been at least age 60 had he lived.

    c. Each disability retiree and each beneficiary who is receiving benefits based on the death of a disability retiree, who also on the valuation date has been receiving benefits for at least one year.

2. COLAs:

    a. The maximum COLA that may be granted on the July 1 immediately following the valuation date is equal to the lesser of:

        i. 3% x the benefit payable on the valuation date,

        ii. The increase in the CPI-U for the calendar year immediately prior to the valuation date (December to December) x the benefit payable on the valuation date.

    b. If the rate of return on the actuarial value of assets for the FYE on the June 30 prior to the valuation date is less than 8.25% (8.25% is hard coded into the law), then a COLA may be granted on July 1. However, the maximum COLA that may be granted is the lesser of:

        i. 2% x the benefit payable on the valuation date,

        ii. The increase in the CPI-U for the calendar year immediately prior to the valuation date (December to December) x the benefit payable on the valuation date.

    c. No COLA may be granted on July 1 if the actuarial return on system assets for the FYE on the June 30 prior to the valuation date is less than the discount rate on that date (currently 7.50%) and the funded ratio of the system is less than 80%.

    d. If the balance in the Experience Account is less than the actuarial present value of the full COLA determined above, then no COLA may be granted.

    e. COLAs will be based on the portion of a retiree's benefit on the valuation date that is less than $60,000. This limit is indexed to the CPI-U.

3. The amount of COLA that may be granted in a single year also depends on the funded ratio of the system (see Table 2 on the next page).

Table 2

Funded Percentage of the System	Maximum COLA Percentage
At least 80%	3.00%
At least 75% but less than 80%	2.50%
At least 65% but less than 75%	2.00%
At least 55% but less than 65%	1.50%
Less than 55%	No COLA

C. Approval Process

Prior to the June 30, 2011 Valuation

A COLA potentially becomes payable whenever there is an increase in the cost of living based on the Consumer Price Index for all urban consumers (CPI-U) and other specified numerical measures are satisfied. Prior to June 30, 2011, a COLA could be granted only in accordance with the following approval process:

1. The actuary for TRSL must determine that the necessary conditions exist for a COLA to be granted and then determines the actuarial cost that will be incurred by the Experience Account should such an increase be approved.

2. The TRSL's actuary must also declare that there are sufficient dollars in the Experience Account to cover the actuarial cost of the COLA.

3. The actuary for the Louisiana Legislative Auditor must review the actuarial cost analysis and must not disagree with the assessment prepared by the TRSL's actuary.

4. The TRSL's board of trustees must approve the COLA.

5. The TRSL's board of trustees must ask the Speaker of the House and the President of the Senate for a concurrent resolution to authorize the COLA. A COLA is granted with a 50% majority vote by the legislature on the concurrent resolution.

6. The COLA becomes effective on the first day of the fiscal year following the legislative session.

Effective with the June 30, 2011 Valuation

As discussed on previous pages, no permanent benefit increase or COLA can be implemented by the System's board unless a legislative bill authorizing such increase is introduced by the legislature, passes both houses with a two-thirds majority and is signed into law by the governor. It is assumed that whenever the conditions set out by the statutory template described above are satisfied, such a bill will be successfully introduced resulting in a permanent benefit increase or COLA grant.

This is not to be construed as a legal opinion. It is merely an assumption made for the purpose of this valuation based on information available during the preparation of this report.

This valuation has recognized a liability associated with automatic transfers of investment gains to the Experience Account.

3. Compliance with Actuarial Standards of Practice

The method employed for recognizing the gain-sharing COLA benefits as described in Section II(1)(A) and (B) complies with Actuarial Standards of Practice.

According to Section 3.5.3 of Actuarial Standards of Practice No. 4:

Plan Provisions that are Difficult to Measure -- *Some **plan provisions** may create pension obligations that are difficult to appropriately measure using traditional valuation procedures. Examples of such **plan provisions** include the following:*

a. *gain sharing provisions that trigger benefit increases when investment returns are favorable but do not trigger benefit decreases when investment returns are unfavorable;*
b. *floor-offset provisions that provide a minimum defined benefit in the event a **participant's** account balance in a separate plan falls below some threshold;*
c. *benefit provisions that are tied to an external index, but subject to a floor or ceiling, such as certain cost of living adjustment provisions and cash balance crediting provisions; and*
d. *benefit provisions that may be triggered by an event such as a plan shutdown or a change in control of the plan sponsor.*

*For such **plan provisions**, the actuary **should consider** using alternative valuation procedures, such as stochastic modeling, option-pricing techniques, or deterministic procedures in conjunction with assumptions that are adjusted to reflect the impact of variations in experience from year to year. When selecting alternative valuation procedures for such **plan provisions**, the actuary should use professional judgment based on the purpose of the measurement and other relevant factors.*

According to Section 2.1 of Actuarial Standards of Practice No. 1:

The words "must" and "should" are used to provide guidance in the ASOPs. "Must" as used in the ASOPs means that the ASB does not anticipate that the actuary will have any reasonable alternative but to follow a particular course of action. In contrast, the word "should" indicates what is normally the appropriate practice for an actuary to follow when rendering actuarial services. Situations may arise where the actuary applies professional judgment and concludes that complying with this practice would be inappropriate, given the nature and purpose of the assignment and the principal's needs, or that under the circumstances it would not be reasonable or practical to follow the practice.

Failure to follow a course of action denoted by either the term "must" or "should" constitutes a deviation from the guidance of the ASOP. In either event, the actuary is directed to ASOP No. 41, Actuarial Communications.

The terms "must" and "should" are generally followed by a verb or phrase denoting action(s), such as "disclose," "document," "consider," or "take into account." For example, the phrase "should consider" is often used to suggest potential courses of action. If, after consideration, in the actuary's professional judgment an action is not appropriate, the action is not required and failure to take this action is not a deviation from the guidance in the standard.

Bold and underline have been added for emphasis and identification.

SECTION III
BASIS FOR THE VALUATION

1. Introduction

The June 30, 2018 valuation is used to determine actuarial liabilities as of June 30, 2018, employer contribution requirements that would have been required for FYE 2019, and projected employer contribution rates required for FYE 2020. Census data, actuarial methods, and actuarial assumptions used in the preparation of June 30, 2018 assets, liabilities, and employer contribution rates required for FYE 2019 and FYE 2020 are shown in this section of the report. Additional information is provided with respect to changes made in actuarial systems, assumptions and methods since the June 30, 2017 valuation.

2. Census Data

Census data used in the preparation of the June 30, 2018 valuation is summarized below. The census data was provided by TRSL. A comparison with census summaries prepared by the TRSL's actuary confirmed the reasonability of the census data used in preparing this report.

	June 30 Valuation Date		
Membership Status	**2018**	**2017**	**2016**
Regular Teachers	71,986	71,458	71,511
Higher Education	9,633	9,186	8,792
Lunch Plan A	4	6	8
Lunch Plan B	1,138	1,121	1,162
Post DROP	2,284	2,457	2,595
Total Active Members	**85,045**	**84,228**	**84,068**
Retired and Inactive Members			
Regular Retirees	66,760	65,749	64,593
Disability Retirees	4,248	4,280	4,238
Survivors	7,415	7,229	6,997
DROP Participants	2,420	2,478	2,504
Vested & Reciprocal	7,211	6,941	6,687
Inactive Non-Vested (Due Refunds)	22,364	20,980	19,842
Total Inactive Members	**110,418**	**107,657**	**104,861**
Total Active and Inactive Members	**195,463**	**191,885**	**188,929**
Terminated Due Refund	(22,364)	(20,980)	(19,842)
Total Members	**173,099**	**170,905**	**169,087**

Membership Reconciliation

	Active (Pre DROP)	Active After DROP	Terminated Vested	In DROP	Retired, Disabled, Survivor	Total
Members on June 30, 2017	81,771	2,457	6,941	2,478	77,258	170,905
Additions to Census						
Added to Membership	8,470					8,470
Total Additions	8,470					8,470
Change in Status						
Active to Term Vested	(1,334)		1,334			
Active to In DROP	(905)			905		
Active to Retired	(1,559)				2,866	1,307
Active to Disabled	(122)				130	8
Active to Survivor	(35)				38	3
Terminated Vested to Active	474		(474)			
Terminated Vested to In DROP			(3)	3		
Terminated Vested to Retiree			(183)			(183)
Terminated to Disabled			(8)			(8)
Terminated to Survivor			(3)			(3)
In DROP to Active after DROP		399		(399)		
In DROP to Retired/Survivor				(557)		(557)
Active after DROP to Retired		(567)				(567)
Active after DROP to Survivor						
Disabled to Active	4				(4)	
Disabled to Terminated Vested						
Retired to Active						
Total Changes	(3,477)	(168)	663	(48)	3,030	
Eliminated from Census						
Refunded or Due Refund	(3,946)		(391)			(4,337)
Deceased	(41)	(6)	(19)	(7)	(1,918)	(1,991)
No Further Survivor Benefits Due					(14)	(14)
Total Eliminated	(3,987)	(6)	(410)	(7)	(1,932)	(6,342)
Data Revisions	(16)	1	17	(3)	67	66
Members on June 30, 2018	82,761	2,284	7,211	2,420	78,423	173,099

TRSL MEMBERSHIP PROFILE
ALL ACTIVE MEMBERS
(PRE-DROP)

CELLS DEPICT   **Member Count**   **Valuation Date**   **6/30/2018**
                   Total Salary

Age/Service	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	TOTAL
<25	783	1,086	-	-	-	-	-	-	-	1,869
	$ 32,959,670	$ 43,536,807	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 76,496,477
25-29	1,194	5,241	1,182	5	-	-	-	-	-	7,622
	$ 49,365,496	$ 220,283,901	$ 54,748,147	$ 165,141	$ -	$ -	$ -	$ -	$ -	$ 324,562,685
30-34	978	3,937	3,753	1,149	2	-	-	-	-	9,819
	$ 42,828,553	$ 164,421,474	$ 178,263,488	$ 57,494,515	$ 64,295	$ -	$ -	$ -	$ -	$ 443,072,325
35-39	856	3,355	2,927	3,869	1,074	2	-	-	-	12,083
	$ 36,933,232	$ 139,364,286	$ 135,711,915	$ 198,254,287	$ 59,306,622	$ 59,453	$ -	$ -	$ -	$ 569,629,795
40-44	607	2,543	2,211	2,709	3,181	760	-	-	-	12,011
	$ 25,968,134	$ 100,955,846	$ 103,228,301	$ 131,982,510	$ 179,047,758	$ 45,217,617	$ -	$ -	$ -	$ 586,400,166
45-49	500	2,002	1,900	2,366	2,275	2,750	752	-	-	12,545
	$ 21,218,314	$ 80,516,921	$ 83,110,378	$ 107,399,042	$ 120,629,352	$ 163,156,208	$ 47,237,073	$ -	$ -	$ 623,267,288
50-54	393	1,558	1,467	1,945	1,820	1,713	2,027	98	1	11,022
	$ 16,097,231	$ 59,548,542	$ 62,171,243	$ 81,644,061	$ 84,609,196	$ 91,214,707	$ 122,695,287	$ 6,786,481	$ 42,000	$ 524,808,748
55-59	279	1,200	1,144	1,539	1,657	1,666	330	117	21	7,953
	$ 11,482,345	$ 46,187,870	$ 47,522,474	$ 63,836,117	$ 71,838,007	$ 78,662,799	$ 17,565,557	$ 8,184,859	$ 1,321,592	$ 346,601,620
60-64	182	714	700	934	908	1,018	318	113	98	4,985
	$ 7,561,426	$ 29,229,456	$ 28,283,894	$ 39,388,943	$ 40,912,927	$ 48,134,637	$ 16,714,316	$ 7,277,572	$ 8,400,940	$ 225,904,111
65-69	56	250	272	352	307	312	290	94	84	2,017
	$ 2,641,470	$ 9,894,156	$ 12,903,983	$ 16,917,387	$ 15,870,476	$ 15,111,450	$ 14,882,455	$ 6,930,082	$ 7,993,296	$ 103,144,755
70+	27	99	100	146	110	79	88	100	86	835
	$ 1,502,792	$ 4,137,380	$ 4,899,501	$ 6,579,980	$ 5,556,428	$ 3,868,282	$ 4,384,284	$ 7,438,641	$ 8,384,437	$ 46,751,725
TOTAL	5,855	21,985	15,656	15,014	11,334	8,300	3,805	522	290	82,761
	$ 248,558,664	$ 898,076,639	$ 710,843,324	$ 703,661,983	$ 577,835,061	$ 445,425,153	$ 223,478,972	$ 36,617,635	$ 26,142,265	$ 3,870,639,696

AVERAGES   Attained Age   44.39
                 Service Years   10.57
                 Annual Salary $46,769

TRSL MEMBERSHIP PROFILE
Active - Regular K-12

CELLS DEPICT	Member Count									
	Total Salary							**Valuation Date**		**6/30/2018**

Age/Service	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	TOTAL
<25	671	1,000	-	-	-	-	-	-	-	1,671
	$ 28,215,157	$ 40,677,369	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 68,892,526
25-29	869	4,716	1,134	5	-	-	-	-	-	6,724
	$ 34,752,245	$ 198,896,828	$ 52,586,128	$ 165,141	$ -	$ -	$ -	$ -	$ -	$ 286,400,342
30-34	689	3,279	3,408	1,100	1	-	-	-	-	8,477
	$ 26,675,443	$ 131,881,770	$ 160,411,271	$ 55,133,455	$ 18,266	$ -	$ -	$ -	$ -	$ 374,120,205
35-39	613	2,796	2,497	3,586	1,036	2	-	-	-	10,530
	$ 22,696,203	$ 106,583,757	$ 110,418,174	$ 182,262,323	$ 56,850,403	$ 59,453	$ -	$ -	$ -	$ 478,870,313
40-44	471	2,108	1,877	2,418	3,027	745	-	-	-	10,646
	$ 18,031,515	$ 76,570,069	$ 81,736,908	$ 114,469,141	$ 169,159,508	$ 44,174,827	$ -	$ -	$ -	$ 504,141,968
45-49	389	1,686	1,620	2,097	2,114	2,659	730	-	-	11,295
	$ 14,953,099	$ 62,734,117	$ 66,058,527	$ 91,106,285	$ 109,484,755	$ 156,615,558	$ 45,775,025	$ -	$ -	$ 546,727,366
50-54	290	1,294	1,224	1,682	1,661	1,600	1,950	92	1	9,794
	$ 10,534,910	$ 45,205,088	$ 48,237,780	$ 66,777,622	$ 75,520,771	$ 84,101,400	$ 117,205,093	$ 6,319,733	$ 42,000	$ 453,944,397
55-59	209	930	905	1,286	1,463	1,532	270	101	17	6,713
	$ 7,705,441	$ 30,960,193	$ 33,547,852	$ 48,629,173	$ 60,612,756	$ 71,452,105	$ 14,110,195	$ 6,905,680	$ 1,112,057	$ 275,035,452
60-64	140	524	515	764	806	935	262	77	65	4,088
	$ 4,958,429	$ 17,953,624	$ 17,596,149	$ 29,146,323	$ 33,974,313	$ 43,075,810	$ 12,455,506	$ 3,981,982	$ 5,259,877	$ 168,402,013
65-69	39	181	181	270	237	268	254	56	39	1,525
	$ 1,628,028	$ 5,780,637	$ 7,035,349	$ 10,759,382	$ 10,791,167	$ 12,090,334	$ 12,157,565	$ 3,042,731	$ 2,766,633	$ 66,051,826
70+	15	64	67	93	71	59	66	56	32	523
	$ 474,134	$ 1,981,572	$ 2,304,423	$ 3,298,369	$ 2,720,600	$ 2,504,744	$ 2,736,175	$ 2,481,877	$ 1,385,747	$ 19,887,641
TOTAL	4,395	18,578	13,428	13,301	10,416	7,800	3,532	382	154	71,986
	$ 170,624,603	$ 719,225,024	$ 579,932,561	$ 601,747,214	$ 519,132,539	$ 414,074,231	$ 204,439,559	$ 22,732,003	$ 10,566,314	$ 3,242,474,048

AVERAGES		
	Attained Age	44.15
	Service Years	10.90
	Annual Salary	$45,043

49

TRSL MEMBERSHIP PROFILE
Active - Higher Education

CELLS DEPICT	Member Count								Valuation Date	6/30/2018
	Total Salary									

Age/Service	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	TOTAL
<25	109	79	-	-	-	-	-	-	-	188
	$ 4,694,555	$ 2,756,332	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7,450,887
25-29	314	505	46	-	-	-	-	-	-	865
	$ 14,411,301	$ 21,033,942	$ 2,125,169	$ -	$ -	$ -	$ -	$ -	$ -	$ 37,570,412
30-34	276	629	337	48	1	-	-	-	-	1,291
	$ 15,920,322	$ 31,970,931	$ 17,684,268	$ 2,343,526	$ 46,029	$ -	$ -	$ -	$ -	$ 67,965,076
35-39	230	526	409	273	37	-	-	-	-	1,475
	$ 13,993,529	$ 32,142,556	$ 24,867,875	$ 15,783,384	$ 2,424,949	$ -	$ -	$ -	$ -	$ 89,212,293
40-44	124	397	314	276	149	14	-	-	-	1,274
	$ 7,688,914	$ 23,727,526	$ 21,149,328	$ 17,178,024	$ 9,769,134	$ 1,026,226	$ -	$ -	$ -	$ 80,539,152
45-49	94	282	249	236	152	87	21	-	-	1,121
	$ 5,890,383	$ 17,145,060	$ 16,413,133	$ 15,632,856	$ 10,944,164	$ 6,436,692	$ 1,443,940	$ -	$ -	$ 73,906,228
50-54	82	206	184	213	111	91	72	2	-	961
	$ 5,178,174	$ 13,341,687	$ 12,872,502	$ 13,783,272	$ 8,070,943	$ 6,570,443	$ 5,372,349	$ 347,138	$ -	$ 65,536,508
55-59	56	214	194	210	147	89	36	14	2	962
	$ 3,493,305	$ 14,191,723	$ 13,160,458	$ 14,402,121	$ 10,304,420	$ 6,215,504	$ 2,921,192	$ 1,212,004	$ 159,922	$ 66,060,649
60-64	34	152	139	145	93	67	52	33	31	746
	$ 2,439,456	$ 10,582,684	$ 9,902,230	$ 9,775,792	$ 6,748,301	$ 4,615,629	$ 4,176,697	$ 3,233,891	$ 3,088,498	$ 54,563,178
65-69	14	58	82	72	68	44	33	37	45	453
	$ 953,855	$ 3,939,507	$ 5,717,437	$ 5,973,490	$ 5,030,281	$ 3,021,116	$ 2,604,590	$ 3,872,981	$ 5,226,663	$ 36,339,920
70+	12	31	29	49	37	20	21	44	54	297
	$ 1,028,658	$ 2,090,364	$ 2,525,647	$ 3,211,529	$ 2,800,111	$ 1,363,538	$ 1,630,266	$ 4,956,764	$ 6,998,690	$ 26,605,567
TOTAL	1,345	3,079	1,983	1,522	795	412	235	130	132	9,633
	$ 75,692,453	$ 172,922,312	$ 126,418,047	$ 98,083,994	$ 56,138,332	$ 29,249,148	$ 18,149,034	$ 13,622,778	$ 15,473,773	$ 605,749,871

AVERAGES	Attained Age	45.40
	Service Years	8.31
	Annual Salary	$62,883

TRSL MEMBERSHIP PROFILE
Active - School Lunch Plan A

CELLS DEPICT	Member Count							Valuation Date	6/30/2018
	Total Salary								

Age/Service	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	TOTAL
<25	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
25-29	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
30-34	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
35-39	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
40-44	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
45-49	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
50-54	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
55-59	-	-	-	-	-	-	-	-	1	1
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 24,426	$ 24,426
60-64	-	-	-	-	-	-	-	1	1	2
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 16,378	$ 29,657	$ 46,035
65-69	-	-	-	-	-	-	1	-	-	1
	$ -	$ -	$ -	$ -	$ -	$ -	$ 26,817	$ -	$ -	$ 26,817
70+	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
TOTAL	-	-	-	-	-	-	1	1	2	4
	-	-	-	-	-	-	$ 26,817	$ 16,378	$ 54,083	$ 97,278

AVERAGES		
	Attained Age	62.65
	Service Years	35.33
	Annual Salary	$24,320

TRSL MEMBERSHIP PROFILE
Active - School Lunch Plan B

CELLS DEPICT	Member Count								Valuation Date	6/30/2018
	Total Salary									

Age/Service	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	TOTAL
<25	3	7	-	-	-	-	-	-	-	10
	$ 49,957	$ 103,106	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 153,063
25-29	11	20	2	-	-	-	-	-	-	33
	$ 201,950	$ 353,131	$ 36,850	$ -	$ -	$ -	$ -	$ -	$ -	$ 591,931
30-34	13	29	8	1	-	-	-	-	-	51
	$ 232,788	$ 568,773	$ 167,949	$ 17,534	$ -	$ -	$ -	$ -	$ -	$ 987,044
35-39	13	33	21	10	1	-	-	-	-	78
	$ 243,501	$ 637,973	$ 425,866	$ 208,580	$ 31,270	$ -	$ -	$ -	$ -	$ 1,547,190
40-44	12	38	20	15	5	1	-	-	-	91
	$ 247,705	$ 658,251	$ 342,065	$ 335,345	$ 119,116	$ 16,564	$ -	$ -	$ -	$ 1,719,046
45-49	17	34	31	33	9	4	1	-	-	129
	$ 374,832	$ 637,744	$ 638,718	$ 659,901	$ 200,433	$ 103,958	$ 18,108	$ -	$ -	$ 2,633,694
50-54	21	58	59	50	48	22	5	4	-	267
	$ 384,148	$ 1,001,767	$ 1,060,961	$ 1,083,167	$ 1,017,482	$ 542,864	$ 117,845	$ 119,610	$ -	$ 5,327,844
55-59	14	56	45	43	47	45	24	2	1	277
	$ 283,599	$ 1,035,954	$ 814,164	$ 804,823	$ 920,831	$ 995,190	$ 534,170	$ 67,175	$ 25,187	$ 5,481,093
60-64	8	38	46	25	9	16	4	2	1	149
	$ 163,541	$ 693,148	$ 785,515	$ 466,828	$ 190,313	$ 443,198	$ 82,113	$ 45,321	$ 22,908	$ 2,892,885
65-69	3	11	9	10	2	-	2	1	-	38
	$ 59,587	$ 174,012	$ 151,197	$ 184,515	$ 49,028	$ -	$ 93,483	$ 14,370	$ -	$ 726,192
70+	-	4	4	4	2	-	1	-	-	15
	$ -	$ 65,444	$ 69,431	$ 70,082	$ 35,717	$ -	$ 17,843	$ -	$ -	$ 258,517
TOTAL	115	328	245	191	123	88	37	9	2	1,138
	$ 2,241,607	$ 5,929,303	$ 4,492,716	$ 3,830,775	$ 2,564,190	$ 2,101,774	$ 863,562	$ 246,476	$ 48,095	$ 22,318,498

AVERAGES		
Attained Age	51.48
Service Years	9.17
Annual Salary	$19,612

TRSL MEMBERSHIP PROFILE
DROP Participants

CELLS DEPICT   **Member Count**   **Valuation Date**   **6/30/2018**
               Total Benefits

Age/Years Retired	<1	1	2	3	4-5	6-10	11-15	16-20	20+	TOTAL
<40	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
40-44	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
45-49	2	-	-	-	-	-	-	-	-	2
	$ 55,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 55,200
50-54	245	206	97	5	-	-	-	-	-	553
	$ 10,689,876	$ 8,899,800	$ 4,282,680	$ 250,920	$ -	$ -	$ -	$ -	$ -	$ 24,123,276
55-59	479	472	408	15	-	-	-	-	-	1,374
	$ 17,494,416	$ 17,468,244	$ 15,555,372	$ 712,272	$ -	$ -	$ -	$ -	$ -	$ 51,230,304
60-64	130	181	156	6	-	-	-	-	-	473
	$ 2,744,604	$ 4,115,484	$ 3,526,248	$ 176,088	$ -	$ -	$ -	$ -	$ -	$ 10,562,424
65-69	6	7	2	-	-	-	-	-	-	15
	$ 37,536	$ 51,012	$ 16,452	$ -	$ -	$ -	$ -	$ -	$ -	$ 105,000
70-74	1	1	-	-	-	-	-	-	-	2
	$ 3,384	$ 9,024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,408
75-79	1	-	-	-	-	-	-	-	-	1
	$ 3,420	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,420
80-84	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
85-89	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
90+	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL	864	867	663	26	-	-	-	-	-	2,420
	$ 31,028,436	$ 30,543,564	$ 23,380,752	$ 1,139,280	$ -	$ -	$ -	$ -	$ -	$ 86,092,032

AVERAGES

Attained Age	57.05
Years Retired	1.31
Yearly Benefit	$35,575

TRSL MEMBERSHIP PROFILE
Active After DROP

CELLS DEPICT	Member Count
	Total Salary
	Total Benefit

Valuation Date 6/30/2018

Age/Credited Service	<1	1	2	3	4	5-9	10-14	15-19	20+	TOTAL
<44	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
44-49	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
50-54	18	5	-	-	-	-	-	-	-	23
	$ 782,311	$ 277,502	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,059,813
	$ 726,564	$ 188,268	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 914,832
55-59	199	167	70	41	31	16	-	-	-	524
	$ 8,636,070	$ 10,290,235	$ 4,853,427	$ 2,986,017	$ 1,719,714	$ 718,956	$ -	$ -	$ -	$ 29,204,419
	$ 7,552,716	$ 6,631,116	$ 3,229,764	$ 1,986,156	$ 1,114,992	$ 485,664	$ -	$ -	$ -	$ 21,000,408
60-64	158	144	127	120	81	288	8	-	-	926
	$ 4,659,160	$ 7,048,661	$ 7,325,212	$ 6,517,733	$ 4,430,555	$ 19,232,055	$ 455,566	$ -	$ -	$ 49,668,942
	$ 3,522,324	$ 3,728,268	$ 4,286,256	$ 3,881,184	$ 2,757,720	$ 11,130,240	$ 236,448	$ -	$ -	$ 29,542,440
65-69	8	6	47	56	61	258	100	-	-	536
	$ 145,614	$ 369,756	$ 2,443,020	$ 2,304,889	$ 2,813,351	$ 14,689,980	$ 7,755,063	$ -	$ -	$ 30,521,673
	$ 44,568	$ 139,500	$ 928,392	$ 940,344	$ 1,258,104	$ 6,946,368	$ 3,538,092	$ -	$ -	$ 13,795,368
70+	-	-	2	4	2	90	110	55	12	275
	$ -	$ -	$ 138,179	$ 129,306	$ 31,908	$ 3,991,027	$ 6,771,949	$ 4,667,651	$ 1,226,751	$ 16,956,771
	-	-	101,544	23,964	13,824	1,262,496	2,617,704	1,635,324	424,644	$ 6,079,500
TOTAL	383	322	246	221	175	652	218	55	12	2,284
	$ 14,223,155	$ 17,986,154	$ 14,759,838	$ 11,937,945	$ 8,995,528	$ 38,632,018	$ 14,982,578	$ 4,667,651	$ 1,226,751	$ 127,411,618
	$ 11,846,172	$ 10,687,152	$ 8,545,956	$ 6,831,648	$ 5,144,640	$ 19,824,768	$ 6,392,244	$ 1,635,324	$ 424,644	$ 71,332,548

AVERAGES		
	Attained Age	63.92
	Post-DROP Service Years	4.88
	Annual Salary	$55,784
	Yearly Benefit	$31,231

TRSL MEMBERSHIP PROFILE
Regular Retirees

CELLS DEPICT Member Count
Total Benefits

Valuation Date   6/30/2018

Age/Years Retired	<1	1	2	3	4	5-9	10-14	15-19	20+	TOTAL
<40	-	-	-	-	-	-	-	-	-	-
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
40-44	34	21	8	2	-	-	-	-	-	65
	$ 774,084	$ 426,432	$ 142,392	$ 50,592	$ -	$ -	$ -	$ -	$ -	$ 1,393,500
45-49	96	97	80	60	66	105	-	-	-	504
	$ 2,320,416	$ 2,389,056	$ 1,723,836	$ 1,374,888	$ 1,365,948	$ 2,172,096	$ -	$ -	$ -	$ 11,346,240
50-54	163	128	111	110	105	384	69	2	1	1,073
	$ 5,671,224	$ 3,902,052	$ 3,087,792	$ 2,831,784	$ 2,419,272	$ 8,641,212	$ 1,098,600	$ 19,836	$ 1,416	$ 27,673,188
55-59	624	565	434	433	377	713	381	117	1	3,645
	$ 21,840,732	$ 21,444,948	$ 16,160,544	$ 15,779,796	$ 13,078,344	$ 20,497,548	$ 6,922,632	$ 1,526,388	$ 8,028	$ 117,258,960
60-64	823	916	871	882	1,091	3,644	1,158	641	239	10,265
	$ 21,991,236	$ 25,185,432	$ 25,954,992	$ 27,922,668	$ 36,474,156	$ 126,916,368	$ 25,419,156	$ 9,000,204	$ 2,486,160	$ 301,350,372
65-69	485	603	742	813	970	5,236	4,752	1,034	1,020	15,655
	$ 12,287,376	$ 16,196,376	$ 20,586,696	$ 22,036,248	$ 26,891,376	$ 158,813,700	$ 149,243,916	$ 21,130,272	$ 13,644,552	$ 440,830,512
70-74	126	188	216	296	380	2,913	4,872	3,173	1,511	13,675
	$ 3,966,156	$ 6,103,428	$ 5,797,356	$ 8,990,448	$ 11,285,160	$ 82,010,412	$ 131,429,088	$ 90,313,872	$ 23,998,668	$ 363,894,588
75-79	42	57	61	85	88	821	2,175	3,280	3,136	9,745
	$ 989,532	$ 1,826,556	$ 2,247,612	$ 2,442,396	$ 3,099,816	$ 25,148,232	$ 53,531,148	$ 81,307,716	$ 75,739,980	$ 246,332,988
80-84	6	9	9	21	18	176	603	1,455	4,119	6,416
	$ 190,212	$ 177,108	$ 441,108	$ 648,156	$ 438,372	$ 6,273,624	$ 17,623,752	$ 33,862,536	$ 95,222,604	$ 154,877,472
85-89	3	-	1	7	4	42	121	365	3,281	3,824
	$ 228,624	$ -	$ 13,740	$ 287,664	$ 82,680	$ 1,368,384	$ 4,050,456	$ 9,568,740	$ 70,384,020	$ 85,984,308
90+	-	-	-	-	-	7	16	43	1,827	1,893
	$ -	$ -	$ -	$ -	$ -	$ 375,084	$ 515,220	$ 1,382,004	$ 33,095,268	$ 35,367,576
TOTAL	2,402	2,584	2,533	2,709	3,099	14,041	14,147	10,110	15,135	66,760
	$ 70,259,592	$ 77,651,388	$ 76,156,068	$ 82,364,640	$ 95,135,124	$ 432,216,660	$ 389,833,968	$ 248,111,568	$ 314,580,696	$ 1,786,309,704

AVERAGES

Attained Age	71.54
Years Retired	13.34
Yearly Benefit	$26,757

55

TRSL MEMBERSHIP PROFILE
Disability Retirees

| CELLS DEPICT | Member Count | | | | | | | | | Valuation Date | 6/30/2018 |
| | Total Benefits | | | | | | | | | | |

Age/Years Retired	<1	1	2	3	4	5-9	10-14	15-19	20+	TOTAL
<40	6	9	11	5	2	5	-	-	-	38
	$ 98,760	$ 159,024	$ 159,984	$ 85,788	$ 33,396	$ 70,908	$ -	$ -	$ -	$ 607,860
40-44	12	16	10	7	12	27	5	-	-	89
	$ 287,208	$ 307,008	$ 190,956	$ 112,128	$ 244,008	$ 419,868	$ 55,248	$ -	$ -	1,616,424
45-49	19	19	28	22	17	40	22	7	1	175
	$ 432,216	$ 437,184	$ 699,888	$ 530,400	$ 337,560	$ 727,704	$ 257,400	$ 61,044	$ 9,528	3,492,924
50-54	26	45	37	37	23	93	51	21	8	341
	$ 446,196	$ 768,324	$ 613,296	$ 790,344	$ 396,432	$ 1,693,728	$ 633,228	$ 215,880	$ 71,520	5,628,948
55-59	34	41	61	42	27	150	77	62	34	528
	$ 532,776	$ 583,212	$ 1,006,848	$ 632,760	$ 427,236	$ 2,295,672	$ 950,916	$ 623,244	$ 357,288	7,409,952
60-64	16	33	37	34	48	173	166	136	102	745
	$ 240,972	$ 472,668	$ 511,404	$ 519,708	$ 718,416	$ 2,488,512	$ 2,066,016	$ 1,614,888	$ 962,832	9,595,416
65-69	2	10	11	15	14	136	220	149	223	780
	$ 18,072	$ 136,620	$ 130,044	$ 227,160	$ 232,308	$ 2,033,148	$ 2,678,052	$ 1,636,560	$ 2,724,552	9,816,516
70-74	1	4	3	9	2	38	153	193	280	683
	$ 13,500	$ 54,588	$ 46,632	$ 136,116	$ 30,840	$ 544,068	$ 1,812,288	$ 1,957,188	$ 3,041,256	7,636,476
75-79	1	-	-	-	-	5	18	110	325	459
	$ 5,256	$ -	$ -	$ -	$ -	$ 76,536	$ 245,652	$ 1,118,760	$ 3,277,140	4,723,344
80-84	-	1	-	-	1	-	5	17	234	258
	$ -	$ 10,428	$ -	$ -	$ 11,484	$ -	$ 43,728	$ 169,620	$ 2,333,508	2,568,768
85-89	-	-	-	-	-	-	1	2	107	110
	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,456	$ 12,600	$ 1,146,372	1,165,428
90+	-	-	-	-	-	-	-	1	41	42
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,820	$ 403,956	412,776
TOTAL	117	178	198	171	146	667	718	698	1,355	4,248
	$ 2,074,956	$ 2,929,056	$ 3,359,052	$ 3,034,404	$ 2,431,680	$ 10,350,144	$ 8,748,984	$ 7,418,604	$ 14,327,952	$ 54,674,832

AVERAGES		
	Attained Age	66.13
	Years Retired	15.41
	Yearly Benefit	$12,871

TRSL MEMBERSHIP PROFILE
Survivor Benefits

| CELLS DEPICT | Member Count | | | | | | | | Valuation Date | 6/30/2018 |
| | Total Benefits | | | | | | | | | |

Age/Years Retired	<1	1	2	3	4	5-9	10-14	15-19	20+	TOTAL
<40	23	40	36	35	28	86	45	19	5	317
	$ 255,168	$ 539,244	$ 344,040	$ 353,004	$ 351,660	$ 901,176	$ 478,260	$ 132,312	$ 58,512	$ 3,413,378
40-44	16	9	7	6	6	35	18	9	4	110
	$ 180,648	$ 72,192	$ 91,344	$ 63,540	$ 88,596	$ 527,892	$ 266,280	$ 116,772	$ 46,884	1,454,148
45-49	18	22	22	18	18	61	41	20	19	239
	$ 290,556	$ 290,724	$ 325,716	$ 202,584	$ 206,112	$ 876,696	$ 538,920	$ 232,020	$ 220,884	3,184,212
50-54	16	22	18	21	19	68	51	36	24	275
	$ 305,544	$ 344,172	$ 274,392	$ 278,364	$ 215,628	$ 1,131,852	$ 520,560	$ 508,200	$ 276,264	3,854,976
55-59	28	28	31	20	21	103	69	51	35	386
	$ 494,316	$ 526,908	$ 571,368	$ 355,956	$ 309,324	$ 1,413,636	$ 878,244	$ 649,848	$ 560,520	5,760,120
60-64	33	45	38	38	50	175	103	58	71	611
	$ 815,508	$ 1,004,604	$ 731,520	$ 934,164	$ 950,388	$ 3,008,604	$ 1,914,024	$ 771,900	$ 814,764	10,945,476
65-69	65	55	59	52	56	221	126	97	120	851
	$ 1,779,564	$ 1,402,428	$ 1,583,532	$ 1,250,952	$ 1,797,024	$ 5,432,520	$ 2,742,552	$ 1,775,592	$ 1,606,644	19,370,808
70-74	85	83	61	78	67	242	193	135	173	1,117
	$ 2,221,644	$ 2,292,060	$ 1,785,396	$ 1,745,376	$ 1,827,828	$ 5,406,144	$ 4,365,000	$ 2,808,912	$ 2,545,116	24,997,476
75-79	80	91	73	58	64	248	184	132	234	1,164
	$ 2,002,248	$ 2,211,000	$ 1,838,664	$ 1,553,376	$ 1,648,680	$ 5,985,672	$ 4,030,524	$ 2,950,404	$ 4,126,140	26,346,708
80-84	58	71	80	68	65	224	206	136	261	1,169
	$ 1,459,896	$ 1,691,748	$ 1,728,972	$ 1,633,920	$ 1,646,508	$ 5,062,524	$ 4,341,768	$ 2,797,416	$ 4,514,532	24,877,284
85-89	35	42	40	33	33	162	116	88	180	729
	$ 738,132	$ 835,260	$ 610,296	$ 775,260	$ 608,424	$ 2,777,256	$ 2,389,200	$ 1,710,012	$ 3,277,188	13,721,028
90+	11	18	16	19	23	81	74	62	143	447
	$ 269,616	$ 282,876	$ 446,316	$ 406,692	$ 314,640	$ 1,388,580	$ 1,069,692	$ 965,808	$ 2,345,880	7,490,100
TOTAL	468	526	481	446	450	1,706	1,226	843	1,269	7,415
	$ 10,812,840	11,493,216	10,331,556	9,553,188	9,964,812	33,912,552	23,535,024	15,419,196	20,393,328	$ 145,415,714

AVERAGES		
	Attained Age	71.45
	Years Retired	11.20
	Yearly Benefit	$19,611

57

TRSL MEMBERSHIP PROFILE
Vested Terminations

CELLS DEPICT Member Count
Total Benefit

Valuation Date 6/30/2018

Age/Service		<1		1-4		5-9		10-14		15-19		20-24		25-29		30-34		35+		TOTAL
<20		-		-		-		-		-		-		-		-		-		-
	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-		-
20-24		-		-		-		-		-		-		-		-		-		-
	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-		-
25-29		-		-		49		-		-		-		-		-		-		49
	$	-	$	-	$	301,985	$	-	$	-	$	-	$	-	$	-	$	-	$	301,985
30-34		-		1		563		20		-		-		-		-		-		584
	$	-	$	4,224	$	4,265,752	$	252,900	$	-	$	-	$	-	$	-	$	-	$	4,522,876
35-39		-		1		891		244		11		-		-		-		-		1,147
	$	-	$	4,491	$	7,141,340	$	3,523,225	$	248,287	$	-	$	-	$	-	$	-	$	10,917,343
40-44		-		4		707		344		84		4		-		-		-		1,143
	$	-	$	11,770	$	5,553,224	$	5,152,720	$	1,933,924	$	168,484	$	-	$	-	$	-	$	12,820,122
45-49		1		4		758		357		124		26		4		-		-		1,274
	$	672	$	15,352	$	5,549,574	$	4,911,468	$	2,740,830	$	821,910	$	202,159	$	-	$	-	$	14,241,965
50-54		-		6		657		345		143		20		11		1		-		1,183
	$	-	$	17,647	$	4,542,359	$	4,267,030	$	2,382,943	$	561,525	$	438,103	$	48,015	$	-	$	12,257,621
55-59		-		6		604		420		176		24		4		2		-		1,236
	$	-	$	13,346	$	4,221,260	$	4,828,768	$	2,849,317	$	521,228	$	91,508	$	108,583	$	-	$	12,634,010
60-64		-		2		204		120		42		13		5		-		-		386
	$	-	$	3,503	$	1,213,593	$	1,278,102	$	547,381	$	328,978	$	147,235	$	-	$	-	$	3,518,792
65-69		1		4		69		30		13		5		6		1		-		129
	$	388	$	4,919	$	374,590	$	276,505	$	209,890	$	86,493	$	163,246	$	51,283	$	-	$	1,167,314
70+		-		-		33		24		9		6		2		4		2		80
	$	-	$	-	$	170,066	$	185,344	$	72,821	$	169,561	$	65,390	$	98,026	$	66,894	$	828,101
TOTAL		2		28		4,535		1,904		602		98		32		8		2		7,211
	$	1,059	$	75,252	$	33,333,743	$	24,676,062	$	10,985,392	$	2,658,179	$	1,107,641	$	305,907	$	66,894	$	73,210,128

AVERAGES

Attained Age	47.79
Service Years	9.52
Yearly Benefit	$10,153

3. Plan Provisions

A. SUMMARY OF PLAN PROVISIONS

EFFECTIVE DATE:

August 1, 1936

EMPLOYER:

The State of Louisiana, the parish school board, the city school board, the State Board of Education, the State Board of Supervisors, University or any other agency of and within the State by which a teacher is paid.

ELIGIBILITY FOR PARTICIPATION:

In general, with few exceptions, all teachers shall become members of this system as a condition of their employment. R.S. 11:721

SERVICE:

Service as a "Teacher," within the meaning of paragraph R.S. 11:701(33)

CREDITABLE SERVICE:

"Prior Service" plus "Membership Service" for which credit is allowable. "Prior Service" means allowable service rendered prior to the date of establishment of the retirement system and "Membership Service" means service as a teacher rendered while a member of the retirement system.

ADDITIONAL CREDITABLE SERVICE:

1. Credit for service canceled by withdrawal of accumulated contributions may be restored by a member by paying the amount withdrawn plus interest.

2. Service rendered in the public school system of another state may be purchased at the actuarial cost of the additional retirement benefit, or at the member's option receive service credit based on the funds actually transferred.

3. Credit for service in non-public or parochial schools may be purchased at the actuarial cost of the additional retirement benefit, or at the member's option receive service credit based on the funds actually transferred.

4. Maximum of 4 years of credit for military service may be obtained for each member, contingent on payment of actuarial cost.

5. Credit for legislative service of a former teacher, who is now a legislator, may be purchased at the actuarial cost.

6. Conversion of Sick Leave to Membership Service: At retirement, or at death before retirement of member with surviving spouse or dependent or both who are entitled to benefits, unused accumulated sick leave will be added to membership service. Conversion of unused sick and annual leave cannot be used to obtain retirement eligibility. Leave accumulated after January 30, 1990, can be converted to a maximum one year service credit. Leave is converted on the following basis:

Leave Earned Prior to 6/30/88	
Accumulated Sick Days	Fraction of Year Credit
25-45	0.25 year
46-90	0.50 year
91-135	0.75 year
136-180	1.00 year
181-225	1.25 years
226-270	1.50 years
271-315	1.75 years
316-360	2.00 years

Leave Earned After 6/29/88				
Accumulated Sick Days (by Member Classification)				Fraction of Year Credit
9 Month	10 Month	11 Month	12 Month	
10-18	11-20	12-22	13-24	0.1
19-36	21-40	23-44	25-48	0.2
37-54	41-60	45-66	49-72	0.3
55-72	61-80	67-88	73-96	0.4
73-90	81-100	89-110	97-120	0.5
91-108	101-120	111-132	121-144	0.6
109-126	121-140	133-154	145-168	0.7
127-144	141-160	155-176	169-192	0.8
145-162	161-180	177-198	193-216	0.9
163-180	181-200	199-220	217-240	1

EARNABLE COMPENSATION:

The compensation earned by a member for qualifying service.

FINAL AVERAGE COMPENSATION

For members whose first employment makes them eligible for membership in a Louisiana state retirement system on or after January 1, 2011, the average annual earnable compensation is the highest 60 successive months of employment. The average compensation for purposes of computing benefits cannot increase more than 15% per year.

For all other members, the average annual earnable compensation is the highest 36 successive months of employment; the average compensation for purposes of computing benefits cannot increase more than 10% per year.

Per R.S.11:892, if the maximum benefit accrual (100%) is reached, employee contributions are discontinued, average final compensation is not limited to the years for which employee contributions were made. Compensation is limited by the Internal Revenue Code Section 401(a)(17) compensation limit.

Includes workmen's compensation, and PIP's program in accordance with the following:

Years of Participation	% of Earnings to Be Included
3	60%
4	80%
5	100%

However, if member completed at least two years and subsequently becomes disabled, he shall receive 40% of such earnings. If he has completed one year and becomes disabled, he shall receive 20% of such earnings.

ACCUMULATED CONTRIBUTIONS:

Sum of all amounts deducted from compensation of members.

EMPLOYEE CONTRIBUTIONS:

8% of earnable compensation. Prior to July 1, 1989, 7% of earnable compensation.

EMPLOYER CONTRIBUTIONS:

Determined in accordance with Louisiana Revised Statutes Sections 102 and 102.2, which require the employer rate to be actuarially determined and set annually, based on the Public Retirement Systems' Actuarial Committee's recommendation to the Legislature.

NORMAL RETIREMENT BENEFIT:

Eligibility and Benefit:

After submitting written application to the Board, members are eligible for the following:

1. Members whose first employment making them eligible for membership in a Louisiana state retirement system on or after July 1, 2015, may retire with a 2.5% accrual rate after attaining age 62 with at least 5 years of service credit. Members are eligible for an actuarially reduced benefit with 20 years of service at any age.

2. Members whose first employment makes them eligible for membership in a Louisiana state retirement system on or after January 1, 2011, and before July 1, 2015, may retire with a 2.5% accrual rate after attaining age 60 with at least 5 years of service credit. Members are eligible for an actuarially reduced benefit with 20 years of service at any age.

3. For all other members:

    If hired on or after July 1, 1999, members are eligible for a 2.5% accrual rate at the earliest of age 60 with 5 years of service, age 55 with 25 years of service, or at any age with 30 years of service. Members may retire with an actuarially reduced benefit with 20 years of service at any age.

    If hired before July 1, 1999, members are eligible for a 2% accrual rate at the earliest of age 60 with 5 years of service, or at any age with 20 years of service and are eligible for a 2.5% accrual rate at the earliest of age 65 with 20 years of service, age 55 with 25 years of service, or at any age with 30 years of service.

Benefit:

Annuity, which shall be the actuarial equivalent of accumulated employee contributions at retirement date, and Annual pension, which, together with annuity, provides total allowance equal to the applicable accrual rate times final average compensation times years of creditable service (including unused sick leave). Members hired before June 30, 1986, receive an additional $300 annual supplemental benefit (Act 608 of 1986).

A. Annual benefit may not exceed 100% of average earnable compensation.

B. Legislator's benefit is calculated based on either Teacher's or Legislator's salary but not both - for new legislators (their option to choose); employee contribution to be 12% of either salary or expense allowance as legislator, not both.

C. For Members employed on or after July 1, 1999, the annual pension cannot exceed the maximum benefit provided under Section 415(b) of the Internal Revenue Service Code and related Federal Regulations as adjusted for inflation and form of benefit other than life annuity or qualified joint and survivor annuity.

DISABILITY RETIREMENT:

Eligibility:

Members whose first employment makes them eligible for membership in a Louisiana state retirement system on or after January 1, 2011, are eligible with 10 years of service credit. All other members are eligible with 5 years of service; certification of disability by medical board (medical examination required once in every year for the first 5 years of disability retirement, and once in every 3 years thereafter, until age 60).

Benefit: Act 572 of 1995

(1)   If ineligible for service retirement at disability, disability pension will be 2.5% of average compensation multiplied by years of service. Benefit is limited to 50% of average compensation, but will not be less than the lesser of 40% of the state minimum salary for a beginning teacher with a bachelor's degree or 75% of average compensation.

(2)   Additional 50% of member's benefit payable if minor child is present, but total amount to family limited to 75% of final average compensation.

(3)   Member will become a regular retiree upon attainment of the earliest age for retirement eligibility as if the member continued in service, without further change in compensation. Benefit is based on years of creditable service but not less than the disability benefit. Benefit for minor children continue as long as the retiree has a minor child.

(4)   Upon death of a disability retiree, surviving spouse, married to retiree at least two years prior to death of the disability retiree, shall receive 75% of disability benefit. Upon death of an unmarried retiree with minor children, the benefit shall equal 50% of disability benefit.

(5)   Upon recovery of disability as determined by the board of trustees, upon advice of the medical board, and returns to active membership for at least three years starting no later than one year after recovery, then he shall be credited with one year of service for each year disabled for purposes of establishing benefit eligibility, but not for computation of benefits.

SURVIVOR'S BENEFITS (Effective July 13, 1978):

Eligibility and Benefit:

1.   Surviving Spouse with minor children of an active member with 5 years of creditable service with at least 2 years earned immediately prior to death; or a member with 20 years of creditable service regardless of when earned or whether in active service at time of death will receive:

The greater of:

A.) $600 per month, or

B.) 50% of benefit that would have been payable upon service retirement at age 60 had member continued in service to age 60 without change in compensation. 50% of spouse's benefit payable for each minor child (not greater than two), with total benefit to family at least equal to the Option 2, accrued Benefit based on actual service credit. Benefits to spouse cease upon remarriage, but resumes upon subsequent divorce or death of new spouse; however, if the member was eligible to retire or had reached age 55 on the date of his death, benefits shall not cease upon remarriage. When minor children are no longer present, spouse's benefit reverts to benefit in B, for eligible spouse. If a deceased member had less than 10 years, then the spouse will receive a refund of any remaining member contributions and monthly survivor benefits will cease.

2. Surviving Spouse without minor children of either an active member with 10 years of creditable service with at least 2 years earned immediately prior to death, or a member with 20 years of creditable service regardless of when earned or whether in active service at time of death will receive:

The greater of:

a. $600 per month, or

b. Option 2 equivalent of accrued benefit based on actual service. Spouse's benefit is payable for life. Benefits to spouse cease upon remarriage, but resumes upon subsequent divorce or death of new spouse; however, if the member was eligible to retire on the date of his death, benefits shall not cease upon remarriage.

3. Beneficiary not eligible for 1 or 2 will receive return of member's accumulated contributions.

OPTIONAL FORMS OF BENEFIT:

In lieu of receiving a normal retirement benefit, members may elect to receive an actuarial equivalent retirement allowance in a reduced form as follows:

Option 1   If a member dies before receiving present value of annuity in monthly payments, balance paid to designated beneficiary.

Option 2   Reduced retirement allowance, if member dies, to be continued to designated beneficiary for his lifetime.

Option 3   One-half of reduced retirement allowance, if member dies, to be continued to designated beneficiary for his lifetime.

Option 4   Other benefits of equal actuarial value may be elected with approval of board.

Options 2A, 3A, 4A

       Same as Options 2, 3, and 4, except that reduced benefit reverts back to maximum if beneficiary predeceases retiree.

Automatic COLA Option

       Members may choose an irrevocable election at retirement to receive an actuarially reduced benefit which increases 2.5% annually.   The increase begins on the first retirement anniversary date, but not before the retiree attains age 55 or would have attained age 55 in the case of a surviving spouse. This option can be chosen in combination with the above options. (Per Act 270 of 2009, effective July 1, 2009)

Initial Lump Sum Benefit Option

       Members who did not participate in DROP may elect an actuarially reduced pension and receive a lump-sum equal to not more than 36 months of the maximum monthly pension.

REFUND OF CONTRIBUTIONS:

Death prior to retirement - accumulated contributions credited to individual account in annuity savings fund are returnable to designated beneficiary, if any; otherwise, to his estate.

TERMINATION WITH VESTED SERVICE:

Any member with credit for 5 years of service who withdraws from service may elect to leave accumulated contributions in system until age 60, when he may apply for retirement and begin receiving a retirement benefit based on the credits he had at date of withdrawal.

DEFERRED RETIREMENT OPTION PLAN:

Instead of terminating employees and accepting a service retirement allowance, any member who has met the eligibility requirements may elect to participate in the Deferred Retirement Option Plan (DROP) and defer receipt of benefits.

Normal Eligibility:

DROP Eligibility by Plan		
Plan	**Benefit Factor**	**Eligibility Criteria**
Membership prior to January 1, 2011		
Regular Plan	2.50%	Any age with 30 years of eligibility credit; or
		At least age 55 with 25 years of eligibility credit
	2.00%	At least age 60 with 10 years of eligibility credit
Lunch Plan A	3.00%	Any age with 30 years of eligibility credit; or
		At least age 55 with 25 years of eligibility credit; or
		At least age 60 with 10 years of eligibility credit
Lunch Plan B	2.00%	At least age 55 with 30 years of eligibility credit; or
		At least age 60 with 10 years of eligibility credit
Membership between January 1, 2011, and June 30, 2015		
Regular Plan	2.50%	At least age 60 with 5 years of eligibility credit
Lunch Plan B	2.00%	At least age 55 with 30 years of eligibility credit; or
		At least age 60 with 10 years of eligibility credit
Membership on or after July 1, 2015		
Regular Plan	2.50%	At least age 62 with 5 years of eligibility credit
Lunch Plan B	2.00%	At least age 62 with 5 years of eligibility credit

Benefit:

Upon termination of employment, a participant will receive, at his option:

(1)   Lump sum payment (equal to the payments to the account);
(2)   A true annuity based upon his account; or
(3)   Other methods of payment approved by the board of trustees.

If a participant dies during the period of participation in the program, his account balance shall be paid to the beneficiary, or if none, to his estate in any form approved by the Board of Trustees.

If employment is not terminated at the end of DROP participation, payments into the account ceases and account earns interest. The participant resumes active contributing membership and earns an additional retirement benefit based on additional service rendered. The method of computation of the additional benefit is subject to the following:

(1)   If additional service was less than the period used to determine Final Average Compensation, average compensation figure to calculate the additional benefit will be the same as used to calculate initial benefit.

(2)   If additional service was earned for a period greater than the number of months used to determine Final Average Compensation, the average compensation figure used to calculate the additional benefit will be based on compensation during the period of additional service.

DROP Accounts established prior to January 1, 2004, earn interest following termination of DROP at a rate 0.5% below the actuarial rate of the System's investment portfolio.

DROP accounts established on or after January 1, 2004 are credited with Money Market rates.

B. DESCRIPTION OF BENEFITS FOR MERGED LSU EMPLOYEES
GENERAL:

Eligibility for benefits based on the eligibility requirements of the Teachers' plan, except for deaths and disabilities before 1984. All service, funded and non-funded, is used in determining eligibility.

Final Average Salary was the average of the three highest years, except for academic year employees who retired within three years after January 1, 1979. For this group, any salary used in the Final Average Salary calculation, which was earned before January 1, 1979, was increased by 2/9ths.

The Social Security breakpoint average, for service under the funded LSU plan, was frozen at the December 31, 1978, level. That is, the breakpoint average for funded service was calculated as of December 31, 1978, and kept constant. This produced the following breakpoint averages:

Social Security Breakpoint Average
(for LSU funded service)

Calendar Year of Entry	Breakpoint Average
1971 or before	13,400
1972	13,800
1973	14,600
1974	15,360
1975	15,900
1976	16,500
1977	17,100
1978	17,700

RETIREMENT BENEFITS:

Retirement benefits calculated using LSU funded service with the LSU formula and service after December 31, 1978, with the Teacher's formula. Thus, the "funded" benefit is (1) 1.33% of final average salary under the Social Security breakpoint average plus 2.5% of final average salary over the Social Security breakpoint average, times years of "funded" service with LSU before December 31, 1978, plus (2) 2.5% (or 2% if total service less is than 20 years) times final average salary times years since January 1, 1979, plus $300.

SURVIVOR'S BENEFITS:

For deaths after 1983, the provisions of the Teachers' plan apply. However, the benefit is calculated using all service, funded and non-funded, then prorated by service between the funded and non-funded portions. Children's benefits are also prorated into the funded and non-funded portions.

DISABILITY BENEFITS:

For disabilities after 1983, the provisions of the Teachers' plan apply.   However, the benefit is calculated using all service, then prorating by service between the funded and non-funded portions. Children's benefits are also prorated.

VESTING BENEFITS:

Benefits for terminated vested members are determined as outlined under "Retirement Benefits."

REFUND OF CONTRIBUTIONS:

Terminated members are allowed a refund of accumulated contributions as described by the Teachers' plan.

COOPERATIVE EXTENSION PERSONNEL:

The LSU employees are eligible for the supplemental benefit described in Section 700.2 of Act 643 of 1978. The benefit is equal to 1% for the first five years of service, 3/4% for the next five years, and 1/2% thereafter. The funded benefit is the benefit based on service after September 12, 1975.

OPTIONAL FORMS OF BENEFITS:

Retiring members may elect options as described by the Teachers' plan.

DEFERRED RETIREMENT OPTION PLAN:

Eligible members may participate under same requirements as described by the Teachers' plan.

C. DESCRIPTION OF BENEFITS FOR MERGED SCHOOL LUNCH EMPLOYEES EFFECTIVE DATE:

The School Lunch Employees' Retirement System was originally established on January 1, 1953.

On July 1, 1980, the School Lunch Employees' Retirement System was restructured. All individuals who become employed after July 1, 1980, shall become members of Plan A or Plan B as determined by the agreement in effect for each employer.

Plan A: Parishes which had withdrawn from Social Security coverage became known as Plan A parishes. Those participating in both the regular and the supplemental plan or only in the supplemental plan shall become members of Plan A.

Plan B: Parishes which had not withdrawn from Social Security coverage became known as Plan B parishes. Those participating only in the regular plan shall become members of Plan B.

Effective July 1, 1983, Plan A and Plan B were merged into TRSL.

CREDITABLE SERVICE:

Service as an employee while member of the system.

MILITARY SERVICE:

Maximum of 4 years of credit may be purchased.

ADDITIONAL CREDITABLE SERVICE:

Credit for service canceled by withdrawal of accumulated contributions may be restored by paying into system the amount withdrawn plus regular interest.

EMPLOYEE CONTRIBUTIONS:

Plan A: 9.10% of monthly earnings
Plan B: 5% of monthly earnings

EMPLOYER CONTRIBUTIONS:

Plan A and Plan B: Actuarial Required Amount (Effective July 1, 1989)

D. SCHOOL LUNCH PLAN A
RETIREMENT BENEFIT:

Members hired after June 30, 1983, earn Regular Teachers Benefits. Benefits description below applies to members hired prior to July 1, 1983.

NORMAL RETIREMENT:

Eligibility:

1.   Age 60 and 5 years of creditable service.
2.   Age 55 and 25 years of creditable service.
3.   30 years of creditable service, regardless of age.

Benefit:
3% of average final compensation times years of creditable service.

Members of only the supplemental plan prior to July 1, 1980, who were age 60 or older at the time the member's employer terminated its agreement with the Department of Health, Education and Welfare, and who became a member of the retirement system because of this termination earned 1% of average final compensation plus $2 per month for each year of service credited prior to July 1, 1980, plus 3% of average final compensation for each year of service credited after July 1, 1980.

*These members are eligible to retire upon reaching age 70, with less than 10 years of creditable service.

Members hired before June 30, 1986, receive an additional $300 annual supplemental benefit.

Benefits are limited to 100% of average final compensation.

DISABILITY RETIREMENT:

Eligibility:

Five years of creditable service; certification of disability by the State Medical Disability Board.

Benefit:

> Normal retirement allowance if eligible; otherwise, an amount equal to the normal retirement allowance to which the member would have been entitled had he met eligibility requirements; provided the amount is subject to a minimum of 60% and a maximum of 100% of average final compensation, in the event no optional selection is chosen.

SURVIVOR'S BENEFITS:

Eligibility:

1. Surviving spouse with minor children of a member with 5 years of service credit with at least 2 years earned immediately prior to death, or 20 years of service credit regardless of when earned or whether the deceased member was in active service at the time of death.

2. Surviving spouse with no minor children of member with 10 or more years of service credit with at least 2 years earned immediately prior to death, or 20 years of service credit regardless of when earned or whether the deceased member was in active service at the time of death.

3. Beneficiary not eligible for 1 or 2.

Benefit:

1. Greater of:

    A. $600 per month, or

    B. 50% of benefit that would have been payable upon retirement at age 60 had member continued in service to age 60 without change in compensation. 50% of spouse's benefit payable for each minor child (maximum two children), with total benefit to family at least equal to the Option 2 benefit. Accrued Benefit based on actual service credit. Benefits to spouse cease upon remarriage, but will resume upon subsequent death or divorce. When minor children are no longer present, spouse's benefit reverts to benefit in (2), if spouse is eligible for such benefit.

2. Greater of:

    A. $600 per month, or

    B. Option 2 equivalent of accrued benefit based on actual service. Surviving spouse must have been married to the deceased member at least one year prior to death. If the member had not been eligible for retirement upon date of death, benefits to spouse cease upon remarriage, but resume upon subsequent death or divorce of new spouse.

3. Return of member's accumulated contributions.

E. SCHOOL LUNCH PLAN B
NORMAL RETIREMENT:

Eligibility:

1.   Age 60 and 5 years of creditable service.

2.   Age 55 and 30 years of creditable service.

Benefit:

Annual pension which provides total allowance equal to 2% of average final compensation times years of creditable service. Members hired before June 30, 1986, receive an additional $300 annual supplemental benefit.

NOTE:

Benefit reduced by 3% for each year under age 62, unless member has 25 years of creditable service.

DISABILITY RETIREMENT:

Eligibility:

Five years of creditable service; certification of disability by the State Medical Disability Board.

Benefit:

Normal retirement allowance if eligible; otherwise 2% of average final compensation times years of creditable service; provided amount not less than 30%, nor more than 75% of average final compensation, in the event no optional selection is made.

SURVIVOR'S BENEFITS:

Eligibility: Twenty or more years of creditable service.

Benefit: Option 2 benefit.

F. SCHOOL LUNCH PLAN A and PLAN B
OPTIONAL FORMS OF BENEFIT:

Retiring members may elect options as described by the Teachers' plan.

RETURN OF CONTRIBUTIONS:

Should a member not eligible to retire cease to be an employee, he shall be paid the amount of his accumulated contributions upon demand. Should a members death occur prior to retirement with no survivors eligible for benefits, his accumulated contributions are returnable to a designated beneficiary, if any; otherwise, to his estate.

TERMINATION WITH VESTED SERVICE:

Any member with credit for 5 years of service who withdraws from service may elect to leave accumulated contributions in system until his earliest normal retirement date, when he may apply for retirement and begin receiving a retirement benefit based on average final compensation and creditable service at date of withdrawal.

DEFERRED RETIREMENT OPTION PLAN:

Retiring members may elect options as described by the Teachers' plan.

4. Funding Policies

TRSL's funding policy is generally described in Sections 102 and 102.2 of Title 11 of Louisiana Revised Statutes. TRSL is funded from employee and employer contributions using the Entry Age Normal funding method. The total contribution requirement consists of the normal cost (the value of benefits earned by current active employees allocated to the current year) and the amortization cost (amortization payments necessary to liquidate the unfunded accrued liability). The total contribution percentage is determined as the total contribution requirement divided by the payroll applicable to active members. Employee contribution requirements are set forth in R.S. 11:62. The employer contribution rate is equal to the total contribution rate minus the employee rate.

Employer contribution requirements are determined one year in advance of the fiscal year for which the requirement is used. Differences between projected contributions and actual contributions are defined as a contribution variance. The contribution process is defined below:

A. **Projected Employer Dollar Contribution for FYE 2018** − The June 30, 2016 valuation established the projected employer contribution rate for FYE 2018. The projected dollar contribution for FYE 2018 is equal to the projected employer contribution rate, multiplied by the projected active member payroll for FYE 2018.

B. **Actual Employer Dollar Contribution for FYE 2018** – Actual dollar contributions for FYE 2018 are obtained from system financial statements.

C. **Contribution Variance** – The difference between the Actual Dollar Contribution for FYE 2019 and the Projected Dollar Contribution that would be for FYE 2018, adjusted for investment earnings, is equal to the Contribution Variance. A positive variance means that a contribution surplus occurred for FYE 2018. A negative variance indicates a contribution shortfall or deficit.

D. **Actuarially Determined Employer Contribution Rate for FYE 2019** – The actuarially determined contribution rate for FYE 2019 is determined by the June 30, 2018 valuation. The normal cost rate for FYE 2019 is equal to the dollar normal cost for FYE 2019 divided by the projected payroll for FYE 2019. The amortization cost rate for FYE 2019 is equal to the sum of all amortization payments for FYE 2019 divided by the projected payroll for FYE 2019. The total contribution rate is the sum of the normal cost rate and the amortization cost rate.

E. **Actuarially Determined Employer Dollar Contribution for FYE 2019** – The actuarially determined employer dollar contribution for FYE 2019 is determined by the June 30, 2018 actuarial valuation and is equal to the actuarially determined employer contribution rate for FYE 2019 multiplied by the projected payroll for FYE 2019.

F. **Projected Employer Contribution Rate for FYE 2020** − The June 30, 2018 valuation establishes the projected employer contribution rate for FYE 2020 The rate is equal to the projected employer dollar contribution for FYE 2020 divided by the projected active member payroll for FYE 2020.

G. **Projected Employer Dollar Contribution for FYE 2020** − The June 30, 2018 valuation establishes the projected employer contribution for FYE 2020. It is equal to the projected employer contribution rate multiplied by the projected active member payroll for FYE 2020.

From time to time, additional funding is provided directly by the state out of non-recurring revenue in accordance with Article VII, Section 10(D)(2)(b)(i). This provision of the Constitution requires such funds to be used to reduce the Original Amortization Base (OAB) which includes the Initial Unfunded Accrued Liability (IUAL). These amounts have been about 1% of the total contribution paid to the retirement system annually since the inception of this constitutional provision in 2014.

According to Article X(29)(E)(2)(a) of the Louisiana Constitution, the minimum employer contribution that may be made to TRSL is equal to 11.0% and 11.7% depending on whether the employee was hired on or before June 30, 2011, or on or after July 1, 2011, respectively. The legislature established a larger minimum employer contribution rate in the 2004 session. This legislative minimum is 15.5% of pay. Any amount made in excess of the legislative minimum will be deposited and accumulated in the Employer Credit Account. Amounts in the Employer Credit Account may be used only to reduce any UAL established before July 1, 2004.

5. Actuarial Methods

Cost Method

The Entry Age Normal (EAN) funding method is the method required under R.S. 11:22 of Louisiana law to produce annual employer contribution requirements. This EAN method generally produces normal costs that are level as a percentage of salary through an individual's working career. The EAN method produces an unfunded accrued liability that changes annually. Various methods were used prior to June 30, 2015, to amortize new credits or debits to the unfunded accrued liability. Unfunded accrued liability charges or credits established on June 30, 2015, or later years, will be amortized in the following manner:

A. Increases or decreases resulting from changes in benefit provisions are amortized with level payments over 10 years.

B. Increase or decreases resulting from decrement gains and losses are amortized with level payments over 30 years.

C. Increases or decreases resulting from changes in actuarial assumptions and methods are amortized with level payments over a 30-year period.

D. Contribution actually made for a given fiscal year will be more or less than the amount actually required. Contribution deficits will be amortized with level payments over a 5-year period. Contribution surpluses will be used to reduce the EAAB through FYE 2040 (i.e., immediate amortization). Thereafter, surpluses will be amortized with level payments over 5 years.

E. Increases resulting from actual contributions being less than the actual dollar required contribution are amortized with level payments over 5 years. Decreases resulting from actual contributions being greater than the dollar contribution requirement are used to reduce the EAAB through FYE 2040 (i.e., immediate amortization). Decreases thereafter will be amortized with level payments over a 5-year period.

F. Amortization rules pertaining to investment gains and losses are summarized below:

1. Investment losses are amortized with level payments over a 30-year period. Once the system becomes 85% funded, investment gains will be amortized over a 20-year period.

2. Investment gains up to the first investment hurdle ($100 million) are used to reduce the outstanding balance of the OAB. However, the OAB payment schedule will remain the same and the OAB will be paid off sooner than it would otherwise.

3. Investment gains between the first hurdle ($100 million) and the second hurdle ($200 million) are used to reduce the outstanding balance of the Experience Account Amortization Base (EAAB). However, the EAAB payment schedule will remain the same and the EAAB will be paid off sooner than it would otherwise.

4. Both hurdles are being indexed to increases (but not decreases) in the Actuarial Value of Assets since June 30, 2015. For the June 30, 2018 valuation, the first hurdle increased to $115,388,002 and the second hurdle is $230,776,004.

5. Investment gains exceeding the second hurdle, net of transfer to the Experience Account, will be amortized over 30 years. Once the system becomes 70% funded, investment gains exceeding the second hurdle will be amortized over a 20-year period.

G. Previously, increases in the unfunded accrued liability resulting from investment gains being transferred from the regular pool of assets to the Experience Account were amortized together with all other unexpected decreases or increases in the unfunded accrued liability (also known as the total actuarial gain or loss) over a 30-year period. Beginning with the June 30, 2016 valuation, transfers to the Experience Account are to be amortized over 10-year period leaving the remainder of total actuarial gain or loss to be amortized over a 30-year period as before.

Ever since TRSL began using an assumed actuarial valuation rate (also known as the discount rate) which is lower than the assumed actuarial rate of return on assets to recognize the expectation of experience account transfers, ambiguities arose in the application of the rules for determining whether a transfer is to occur and how much it would be. These ambiguities should be addressed and resolved in the near future.

These rules comply with actuarial standards of practice. However, the rules are viewed as a not-recommended practice under the CCA PPC white paper because:

A. Some UAL bases have amortization periods that are longer than 25 years.
B. Increases and decreases in UAL produced by the same cause are not always symmetrical.

The Louisiana Legislature has changed amortization periods several times since 1989. The LLA is currently monitoring this type of legislative action and will alert the appropriate legislators and retirement committees if changes are made that would cause the retirement system to fail in its constitutionally mandated requirement to be actuarially sound.

The funding policy described above is consistent with the plan accumulating adequate assets to make benefit payments when due and consistent with improving the funded status of the plan by fully amortizing the unfunded accrued liability. This retirement system is sustainable as long as actuarially determined contributions are paid when due and all actuarial assumptions are realized.

Asset Valuation Method

The actuarial value of assets is equal to the market value of assets for the current valuation date plus an adjustment to phase in investment gains and losses occurring over the past four years. For June 30, 2018, the preliminary actuarial value is equal to the market value of assets on June 30, 2014, plus 80% of investment gains/losses for FYE 2015, plus 60% of investment gains/losses for FYE 2016, plus 40% of investment gains/losses for FYE 2017, plus 20% of investment gains/losses for FYE 2018.

If the preliminary actuarial value of assets exceeds 120% of the market value on June 30, 2018, then the actuarial value is equal to the average of the preliminary value and 120% of the market value. If the preliminary value is less than 80% of the market value, then the actuarial value is equal to the average of the preliminary value and 80% of the market value. Otherwise, the actuarial value is equal to the preliminary value.

Asset valuation formulas are shown in Section I(5).

Methods for the Experience Account

A detailed analysis of the Experience Account is presented in Section II. The 2010 amendment to the Louisiana Constitution (Article (10)(29)(F)) and discussions with the LLA's General Counsel and with legislative staff have led us to reconsider the treatment of the Experience Account process. We have concluded the following.

1. Laws pertaining to transfers of gains to the Experience Account are still in force.

2. However, laws pertaining to COLAs require additional legislation to implement.

3. Therefore, the System still has an obligation under the law to fund the Experience Account as determined by Act 399 of 2014. However, disbursements from the Experience Account will occur only after a bill is introduced by the legislature, passed each house with a two- thirds vote, and signed by the governor.

The employer contribution requirements for FYE 2020 have been determined in accordance with this understanding of the law as summarized above and as summarized in Section II.

Accelerated Reduction of the OAB and EAAB

Specified actuarial gains are used to reduce the outstanding balances of the OAB and the EAAB. These gains include the following special allocations:

1. Specified legislative appropriations reduce the outstanding balance of the OAB.

2. Positive Contribution Variances (or surpluses) reduce the outstanding balance of the EAAB.

3. Investment gains falling between $0 and $100 million reduce the outstanding balance of the OAB.

4. Investment gains falling between $100 million and $200 million reduce the outstanding balance of the EAAB.

However, the amortization payment schedule is unaffected by the reduction in the outstanding balance. Although not identified as such in the law, the end result is that the OAB and the EAAB will each consist of two separate accounts – an Amortization Account and an Offset Account. These accounts operate in the following manner:

1. Amortization payments and outstanding balances in the Amortization Account will be unaffected by the special allocation to the OAB and EAAB cited above. This account will operate as if the special allocations did not exist.

2. The special allocations will be accumulated in the Offset Account. The outstanding balance will grow annually with new special allocations and interest based on the discount rate.

3. The outstanding balance of the OAB on any June 30 will be equal to the outstanding balance of the Amortization Account minus the outstanding balance on the Offset Account.

Eventually, the Offset Account will equal or exceed the Amortization Account and the OAB or EAAB will be fully paid.

Valuation Approval Process

The approval process for annual actuarial valuations for TRSL, as specified in Louisiana law, is summarized below:

1. The TRSL's retained actuary prepares an actuarial valuation which is presented to the TRSL board of trustees for review and approval.

2. The actuary for the LLA also prepares an actuarial valuation.

3. The actuaries present their valuations to PRSAC for its review and approval of one of the two valuations as the official valuation.

4. The official valuation is submitted to the House and Senate Committees on Retirements and to the Joint Legislative Committee on the Budget. The PRSAC-approved valuation receives automatic approval unless one of the legislative committees elects to overturn the PRSAC approval.

Benchmarking

Valuation results were tested by comparing actuarial calculations produced in this valuation with values produced by TRSL's retained actuary. Comparisons of values were made for each sub-plan, for each member status category, and for each type of decrement.

In aggregate, this valuation's present value of benefits, normal cost and accrued liability values (using old assumptions) as of June 30, 2018 was within acceptable margins of the value produced by the TRSL's retained actuary. Comparisons of values by sub-plan, by status category, and by decrement showed larger deviations, but on the whole produced values acceptable for valuation purposes.

Because of the set of new actuarial assumptions selected by the actuary for the LLA effective in this valuation and because one set of actuarial assumptions is used for this valuation, the (unfunded) accrued liability as of June 30, 2018 was based on these new assumptions and methods, as are the contributions that would have been required for FYE 2019 and the contribution rates required for FYE 2020.

6. Actuarial Assumptions

Demographic assumptions used in the valuation were adopted by the TRSL board of trustees following the most recent experience study, effective June 30, 2018 . The study was based on an observation period July 1, 2012 through June 30, 2017. The retirement system is required to conduct an experience study every five years, but the scope of such a study is not necessarily limited to a five-year period. Except for rates of mortality, the experience was reviewed separately for Regular Teachers, Higher Education, School Lunch Plan A, and School Lunch Plan B. The experience study report, dated March 1, 2018, provides further information regarding the rationale for these assumptions. Unless otherwise indicated, all assumptions adopted by the TRSL board for its June 30, 2018 valuation are implemented in this valuation. The prior assumption tables and the current assumption tables are illustrated at the end of this section.

Economic Assumptions

Assumed Rate of Return on the Actuarial Value of Assets

The assumed rate of return on the actuarial value of assets used for all purposes in this valuation is 7.50%. This rate is net of investment expenses. This 7.50% rate is based on research undertaken by the office of the LLA's actuary. Refer to Appendices C through G for further details.

The Cost of the Gain-Sharing/COLA Program

Unfunded actuarial accrued liabilities as of June 30 2018 and contribution rates for FYE 2019 and FYE 2020 were developed based on TRSL's gain-sharing COLA program using an explicit approach. The future benefits expected to be paid under the System's complex gain-sharing program are approximated with a single equivalent fixed annual COLA equal to 0.50%.

Please refer to Appendix H for further details.

Discount Rate

The discount rate is set equal to the investment return assumption (7.50%) without adjustment. Please refer to Appendix C through G for further details regarding the selection of 7.50% as the return assumption.

Assumed Rate of Inflation

The assumed rate of inflation is 2.30%, and is a component of the assumed rate of return and of individual members' salary increase assumption and.

Please refer to Appendix C for further details.

Administrative Expenses

Administrative expenses have been accounted for in this valuation by explicitly recognizing them as an addition to normal cost, as one of the three components of the employer contribution. It is estimated as 0.45% of covered payroll.

Mortality Assumption

Mortality assumptions used in this valuation are the same as adopted by the System and based on its most recent experience study.

The mortality assumption has been updated to the RP-2014 mortality tables, adjusted by System-derived mortality experience factors, with mortality generational improvement projected using the MP-2017 improvement scale from 2014. Base tables have been adjusted as follows:

- Active members mortality rates are taken from the RP-2014 White Collar Employee tables and adjusted by 1.010 for males and by 0.997 for females;

- Non-disabled retirees mortality rates are taken from the RP-2014 White Collar Healthy Annuitant tables and adjusted by 1.366 for males and by 1.189 for females;

- Disabled retirees mortality rates are taken from the RP-2014 Disabled Retiree tables and adjusted by 1.111 for males and by 1.134 for females;

Refer to pages that follow for a listing of mortality rates in the base table.

Please refer to Appendix B for comments on selection of demographic assumptions.

Disability Assumption

Disability incidence assumptions used in this valuation are the same as adopted by TRSL and based on the System's most recent experience study.

Retirement/DROP Assumption

Eligibility for normal retirement benefits and participation in DROP is based on age and service requirements that vary by sub-plan. Retirement/DROP decrements differ from one sub-plan to another. These decrements were developed in the most recent experience study and are the same as adopted by TRSL and based on the System's most recent experience study. Refer to pages that follow for a listing of retirement/DROP rates.

Termination Assumption

Voluntary termination or withdrawal rates were developed in the most recent experience study and are the same as adopted by TRSL and based on the System's most recent experience study. For members hired before July 1, 2015, and terminating with vested benefits, it is assumed that 20% will elect to withdraw their accumulated employee contribution, and 80% will receive a benefit beginning at age 60. For members hired on or after July 1, 2015, and terminating with vested benefits, it is assumed that 20% will elect to withdraw their

accumulated employee contribution, and 80% will receive a benefit beginning at age 62. Refer to pages that follow for a listing of termination rates.

Salary Growth

The rates of annual salary growth are based upon the member's years of service and are based on the most recent experience study. The rates include anticipated productivity growth, merit adjustments, and an inflation component of 2.30% for all purposes in this valuation, which is consistent with the inflation assumptions used to develop the return assumptions. Please refer to Appendix C further details concerning inflation assumptions.

Family Statistics

The composition of the family is based upon Current Population Reports published by the United States Census Bureau. Seventy-five percent of the membership is assumed to be married. The wife is assumed to be three years younger than the husband. Sample rates for the assumed number of minor children are as follows:

Age of Member	Number of Minor Children	Years for Child to Attain Majority
25	1.2	17
30	1.4	15
35	1.7	13
40	1.7	10
45	1.4	8
50	1.1	4

Assumption for Incomplete Data

Records identified as containing suspicious data or errors in data were assumed to possess the same characteristics of "good data" in the same cohort of members.

Converted Leave

Leave credit is accrued throughout a member's career and converted to service credit or paid as a lump sum. Converted leave rates below represent the percentage increase in a retiree's accrued benefit upon conversion of the leave to benefits. The current rates shown below are based on the most recent experience study.

	Current Rates	Prior Rates
Regular Teachers	0.90%	1.50%
Higher Education	3.00%	1.50%
Lunch Plans A & B	0.90%	1.00%

PRIOR ACTUARIAL ASSUMPTIONS (Effective June 30, 2013)
RP-2000 MORTALITY TABLES WITH PROJECTION TO 2025 WITH SCALE AA

Age	Mortality Rate		Age	Mortality Rate		Age	Mortality Rate	
	Male	Female		Male	Female		Male	Female
18	0.000196	0.000132	53	0.001760	0.001632	88	0.132854	0.097072
19	0.000205	0.000130	54	0.001929	0.001885	89	0.146819	0.110532
20	0.000214	0.000128	55	0.002243	0.002223	90	0.165921	0.122153
21	0.000227	0.000125	56	0.002667	0.002658	91	0.180722	0.134140
22	0.000238	0.000126	57	0.003057	0.003068	92	0.200931	0.146213
23	0.000256	0.000132	58	0.003523	0.003461	93	0.216754	0.162113
24	0.000271	0.000138	59	0.003972	0.003918	94	0.232553	0.173875
25	0.000292	0.000146	60	0.004508	0.004460	95	0.254433	0.185013
26	0.000325	0.000158	61	0.005261	0.005129	96	0.270045	0.195353
27	0.000337	0.000165	62	0.006002	0.005873	97	0.285214	0.209923
28	0.000347	0.000174	63	0.007038	0.006747	98	0.307507	0.218415
29	0.000363	0.000183	64	0.007929	0.007604	99	0.322050	0.225671
30	0.000392	0.000205	65	0.008953	0.008563	100	0.336045	0.231601
31	0.000440	0.000251	66	0.010389	0.009664	101	0.358628	0.244834
32	0.000496	0.000286	67	0.011590	0.010730	102	0.371685	0.254498
33	0.000557	0.000314	68	0.012562	0.011861	103	0.383040	0.266044
34	0.000619	0.000338	69	0.013920	0.013110	104	0.392003	0.279055
35	0.000682	0.000360	70	0.015219	0.014770	105	0.397886	0.293116
36	0.000742	0.000380	71	0.016839	0.015984	106	0.400000	0.307811
37	0.000798	0.000399	72	0.018697	0.017778	107	0.400000	0.322725
38	0.000829	0.000420	73	0.020825	0.019270	108	0.400000	0.337441
39	0.000857	0.000444	74	0.023233	0.021358	109	0.400000	0.351544
40	0.000883	0.000484	75	0.026595	0.022993	110	0.400000	0.364617
41	0.000911	0.000530	76	0.029643	0.025332	111	0.400000	0.376246
42	0.000945	0.000584	77	0.033819	0.028612	112	0.400000	0.386015
43	0.000985	0.000642	78	0.038544	0.031540	113	0.400000	0.393507
44	0.001033	0.000705	79	0.043933	0.034821	114	0.400000	0.398308
45	0.001087	0.000751	80	0.050067	0.038490	115	0.400000	0.400000
46	0.001136	0.000797	81	0.057467	0.042601	116	0.400000	0.400000
47	0.001188	0.000842	82	0.065843	0.047227	117	0.400000	0.400000
48	0.001243	0.000911	83	0.073396	0.052439	118	0.400000	0.400000
49	0.001300	0.000984	84	0.083709	0.058321	119	0.400000	0.400000
50	0.001358	0.001092	85	0.092919	0.066628	120	1.000000	1.000000
51	0.001516	0.001237	86	0.103019	0.076203			
52	0.001609	0.001419	87	0.117040	0.087152			

CURRENT ACTUARIAL ASSUMPTIONS (Effective June 30, 2018)
RP-2014 WHITE COLLAR EMPLOYEE MORTALITY TABLES
ADJUSTED FOR EXPERIENCE FACTORS (1.010 MALES / 0.997 FEMALES)
WITH GENERATIONAL PROJECTION PER SCALE MP-2017
FOR ACTIVE MEMBERS (PRIOR TO DECREMENT)

	Mortality Rate			Mortality Rate			Mortality Rate	
Age	**Male**	**Female**	**Age**	**Male**	**Female**	**Age**	**Male**	**Female**
18	0.000232	0.000132	53	0.001621	0.001202	88	0.099968	0.078314
19	0.000262	0.000137	54	0.001790	0.001302	89	0.112924	0.088457
20	0.000288	0.000137	55	0.001975	0.001408	90	0.127452	0.099906
21	0.000318	0.000137	56	0.002181	0.001518	91	0.143130	0.112509
22	0.000345	0.000137	57	0.002413	0.001637	92	0.159711	0.126175
23	0.000361	0.000140	58	0.002677	0.001764	93	0.177041	0.140857
24	0.000366	0.000143	59	0.002977	0.001902	94	0.195062	0.156536
25	0.000342	0.000146	60	0.003321	0.002054	95	0.213791	0.173215
26	0.000327	0.000151	61	0.003712	0.002222	96	0.233286	0.190903
27	0.000318	0.000158	62	0.004155	0.002410	97	0.253617	0.209604
28	0.000314	0.000165	63	0.004658	0.002619	98	0.274834	0.229308
29	0.000316	0.000173	64	0.005225	0.002850	99	0.296786	0.249971
30	0.000320	0.000183	65	0.005863	0.003110	100	0.317128	0.270045
31	0.000328	0.000194	66	0.006573	0.003475	101	0.337709	0.290167
32	0.000338	0.000205	67	0.007369	0.003882	102	0.358145	0.310510
33	0.000348	0.000217	68	0.008261	0.004338	103	0.378269	0.330904
34	0.000360	0.000229	69	0.009261	0.004847	104	0.397922	0.351175
35	0.000371	0.000240	70	0.010382	0.005417	105	0.416959	0.371156
36	0.000380	0.000252	71	0.011638	0.006053	106	0.435255	0.390684
37	0.000390	0.000267	72	0.013046	0.006764	107	0.452709	0.409616
38	0.000404	0.000285	73	0.014625	0.007558	108	0.469238	0.427825
39	0.000421	0.000307	74	0.016394	0.008447	109	0.484787	0.445204
40	0.000444	0.000333	75	0.018378	0.009439	110	0.499320	0.461672
41	0.000476	0.000364	76	0.020602	0.010547	111	0.505000	0.477168
42	0.000513	0.000401	77	0.023096	0.011787	112	0.505000	0.491658
43	0.000562	0.000445	78	0.025890	0.013171	113	0.505000	0.498500
44	0.000620	0.000496	79	0.029023	0.014719	114	0.505000	0.498500
45	0.000689	0.000552	80	0.032536	0.016448	115	0.505000	0.498500
46	0.000770	0.000616	81	0.042400	0.033999	116	0.505000	0.498500
47	0.000861	0.000687	82	0.047806	0.038171	117	0.505000	0.498500
48	0.000962	0.000762	83	0.053994	0.042915	118	0.505000	0.498500
49	0.001073	0.000842	84	0.061053	0.048312	119	0.505000	0.498500
50	0.001194	0.000927	85	0.069080	0.054449	120	1.000000	1.000000
51	0.001325	0.001015	86	0.078170	0.061426			
52	0.001468	0.001107	87	0.088428	0.069344			

Note: Mortality rates above are base rates _before_ application of generational projection of mortality improvement using Scale MP-2017.

CURRENT ACTUARIAL ASSUMPTIONS (Effective June 30, 2018)
RP-2014 WHITE COLLAR HEALTHY ANNUITANT MORTALITY TABLES
ADJUSTED FOR EXPERIENCE FACTORS (1.366 MALES / 1.189 FEMALES)
WITH GENERATIONAL PROJECTION PER SCALE MP-2017
FOR NON-DISABLED RETIREES/INACTIVE MEMBERS

	Mortality Rate			Mortality Rate			Mortality Rate	
Age	Male	Female	Age	Male	Female	Age	Male	Female
18	0.000232	0.000132	53	0.004684	0.002876	88	0.135204	0.093396
19	0.000262	0.000137	54	0.005001	0.003043	89	0.152727	0.105492
20	0.000288	0.000137	55	0.005338	0.003229	90	0.172376	0.119146
21	0.000318	0.000137	56	0.005629	0.003441	91	0.193580	0.134176
22	0.000345	0.000137	57	0.005950	0.003681	92	0.216006	0.150474
23	0.000361	0.000140	58	0.006305	0.003956	93	0.239443	0.167983
24	0.000366	0.000143	59	0.006700	0.004270	94	0.263817	0.186681
25	0.000342	0.000146	60	0.007137	0.004626	95	0.289147	0.206572
26	0.000327	0.000151	61	0.007625	0.005192	96	0.315513	0.227666
27	0.000318	0.000158	62	0.008174	0.005787	97	0.343011	0.249969
28	0.000314	0.000165	63	0.008800	0.006413	98	0.371706	0.273468
29	0.000316	0.000173	64	0.009520	0.007077	99	0.401396	0.298110
30	0.000320	0.000183	65	0.010354	0.007787	100	0.428908	0.322050
31	0.000328	0.000194	66	0.011324	0.008557	101	0.456743	0.346047
32	0.000338	0.000205	67	0.012450	0.009401	102	0.484382	0.370307
33	0.000348	0.000217	68	0.013750	0.010337	103	0.511600	0.394629
34	0.000360	0.000229	69	0.015243	0.011381	104	0.538179	0.418804
35	0.000371	0.000240	70	0.016941	0.012549	105	0.563927	0.442633
36	0.000380	0.000252	71	0.018855	0.013855	106	0.588672	0.465922
37	0.000390	0.000267	72	0.021002	0.015321	107	0.612278	0.488499
38	0.000404	0.000285	73	0.023400	0.016967	108	0.634633	0.510214
39	0.000421	0.000307	74	0.026074	0.018816	109	0.655662	0.530941
40	0.000444	0.000333	75	0.029067	0.020899	110	0.675318	0.550580
41	0.000777	0.000547	76	0.032426	0.023251	111	0.683000	0.569060
42	0.001110	0.000760	77	0.036213	0.025907	112	0.683000	0.586340
43	0.001444	0.000974	78	0.040503	0.028911	113	0.683000	0.594500
44	0.001777	0.001187	79	0.045385	0.032312	114	0.683000	0.594500
45	0.002110	0.001401	80	0.050961	0.036168	115	0.683000	0.594500
46	0.002443	0.001614	81	0.057345	0.040546	116	0.683000	0.594500
47	0.002776	0.001828	82	0.064657	0.045522	117	0.683000	0.594500
48	0.003110	0.002041	83	0.073025	0.051179	118	0.683000	0.594500
49	0.003443	0.002255	84	0.082573	0.057615	119	0.683000	0.594500
50	0.003776	0.002468	85	0.093429	0.064935	120	1.000000	1.000000
51	0.004072	0.002591	86	0.105723	0.073255			
52	0.004374	0.002725	87	0.119596	0.082699			

Note: Mortality rates above are base rates *before* application of generational projection of mortality improvement using Scale MP-2017.

Basis for the Valuation

PRIOR ACTUARIAL ASSUMPTIONS (Effective June 30, 2013)
REGULAR TEACHERS
ACTUARIAL TABLES AND RATES

| Age | Disability Rates | Termination Rates | | | | | Duration | Merit Salary Scale* |
		< 1 YOS	1 YOS	2 YOS	3 YOS	>=4 YOS		
18-22	0.0000	0.200	0.200	0.200	0.095	0.180	0	0.031707
23	0.0001	0.200	0.200	0.200	0.095	0.180	1	0.031707
24	0.0001	0.200	0.200	0.200	0.095	0.180	2	0.031707
25	0.0001	0.180	0.180	0.126	0.095	0.090	3	0.031707
26	0.0001	0.180	0.180	0.126	0.095	0.060	4	0.031707
27	0.0001	0.190	0.190	0.126	0.095	0.060	5	0.024390
28	0.0001	0.190	0.190	0.126	0.095	0.055	6	0.024390
29	0.0001	0.190	0.190	0.126	0.095	0.053	7	0.024390
30	0.0001	0.190	0.190	0.120	0.109	0.053	8	0.024390
31	0.0003	0.190	0.190	0.120	0.109	0.050	9	0.024390
32	0.0003	0.190	0.190	0.120	0.109	0.045	10	0.021951
33	0.0003	0.190	0.190	0.120	0.109	0.045	11	0.021951
34	0.0003	0.190	0.190	0.120	0.109	0.045	12	0.021951
35	0.0006	0.180	0.180	0.117	0.095	0.040	13	0.021951
36	0.0010	0.180	0.180	0.117	0.095	0.040	14	0.021951
37	0.0007	0.180	0.180	0.117	0.095	0.040	15	0.019512
38	0.0007	0.180	0.180	0.117	0.095	0.040	16	0.019512
39	0.0011	0.180	0.180	0.117	0.095	0.040	17	0.019512
40	0.0011	0.165	0.165	0.123	0.090	0.037	18	0.019512
41	0.0013	0.165	0.165	0.123	0.090	0.037	19	0.019512
42	0.0016	0.165	0.165	0.123	0.090	0.037	20	0.014634
43	0.0016	0.165	0.165	0.123	0.090	0.037	21	0.014634
44	0.0016	0.165	0.165	0.123	0.090	0.040	22	0.014634
45-49	0.0022	0.163	0.163	0.099	0.090	0.040	23	0.014634
50	0.0025	0.175	0.175	0.112	0.090	0.040	24	0.014634
51	0.0025	0.175	0.175	0.112	0.090	0.040	25	0.012195
52	0.0025	0.175	0.175	0.112	0.090	0.040	26	0.012195
53	0.0030	0.175	0.175	0.112	0.090	0.040	27	0.012195
54	0.0030	0.175	0.175	0.112	0.090	0.040	28	0.012195
55	0.0040	0.175	0.175	0.106	0.090	0.040	29	0.012195
56	0.0050	0.175	0.175	0.106	0.090	0.040	30	0.017073
57	0.0055	0.155	0.155	0.106	0.090	0.040	31	0.017073
58	0.0055	0.200	0.200	0.106	0.090	0.040	32	0.017073
59	0.0055	0.200	0.200	0.106	0.090	0.040	33	0.017073
60	0.0055	0.200	0.200	0.106	0.090	0.040	>=34	0.017073
61	0.0050	0.200	0.200	0.106	0.090	0.040		
62	0.0050	0.200	0.200	0.106	0.090	0.040		
63	0.0050	0.200	0.200	0.106	0.090	0.040		
64	0.0035	0.200	0.200	0.106	0.090	0.040		
65	0.0035	0.200	0.200	0.106	0.090	0.040		
>=66	0.0020	0.200	0.200	0.106	0.090	0.040		

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.50%).

PRIOR ACTUARIAL ASSUMPTIONS (Effective June 30, 2013)
REGULAR TEACHERS
ACTUARIAL TABLES AND RATES

Age	Retirement/DROP Rates											
	Hired before 7/1/1999				Hired between 7/1/1999 and 1/1/2011				Hired on or after 1/1/2011			
	0-19	20-24	25-29	>=30	0-4	5-24	25-29	>=30	0-4	5-24	25-29	>=30
	YOS	YOS	YOS	YOS	YOS	YOS	YOS	YOS	YOS	YOS	YOS	YOS
<=37	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
38	0.000	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
39	0.000	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40	0.000	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
42	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
43	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
44	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45	0.000	0.025	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
46	0.000	0.025	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
47	0.000	0.025	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.030	0.020	0.700	0.000	0.000	0.000	0.700	0.000	0.000	0.000	0.000
49	0.000	0.030	0.020	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
50	0.000	0.030	0.050	0.300	0.000	0.000	0.000	0.300	0.000	0.000	0.000	0.000
51	0.000	0.030	0.170	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
52	0.000	0.030	0.280	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
53	0.000	0.100	0.208	0.500	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000
54	0.000	0.150	0.450	0.400	0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.000
55	0.000	0.150	0.750	0.300	0.000	0.000	0.750	0.300	0.000	0.000	0.000	0.000
56	0.000	0.150	0.330	0.200	0.000	0.000	0.330	0.200	0.000	0.000	0.000	0.000
57	0.000	0.150	0.250	0.200	0.000	0.000	0.250	0.200	0.000	0.000	0.000	0.000
58	0.000	0.250	0.250	0.200	0.000	0.000	0.250	0.200	0.000	0.000	0.000	0.000
59	0.000	0.250	0.300	0.200	0.000	0.000	0.300	0.200	0.000	0.000	0.000	0.000
60	0.250	0.250	0.300	0.200	0.000	0.250	0.300	0.200	0.000	0.250	0.300	0.200
61	0.150	0.150	0.300	0.200	0.000	0.150	0.300	0.200	0.000	0.150	0.300	0.200
62	0.150	0.150	0.220	0.250	0.000	0.150	0.220	0.250	0.000	0.150	0.220	0.250
63	0.150	0.150	0.170	0.150	0.000	0.150	0.170	0.150	0.000	0.150	0.170	0.150
64	0.200	0.200	0.200	0.300	0.000	0.200	0.200	0.300	0.000	0.200	0.200	0.300
65	0.200	0.200	0.200	0.300	0.000	0.200	0.200	0.300	0.000	0.200	0.200	0.300
66	0.200	0.200	0.200	0.300	0.000	0.200	0.200	0.300	0.000	0.200	0.200	0.300
67	0.200	0.200	0.200	0.300	0.000	0.200	0.200	0.200	0.000	0.200	0.200	0.200
68	0.200	0.200	0.200	0.300	0.000	0.200	0.300	0.300	0.000	0.200	0.300	0.300
69	0.200	0.200	0.200	0.300	0.000	0.200	0.300	0.300	0.000	0.200	0.300	0.300
70	0.200	0.200	0.200	0.400	0.000	0.200	0.300	0.400	0.000	0.200	0.300	0.400
71	0.200	0.200	0.200	0.200	0.000	0.200	0.300	0.200	0.000	0.200	0.300	0.200
72	0.200	0.200	0.200	0.250	0.000	0.200	0.300	0.250	0.000	0.200	0.300	0.250
73	0.200	0.200	0.200	0.250	0.000	0.200	0.300	0.250	0.000	0.200	0.300	0.250
74	0.200	0.200	0.200	0.250	0.000	0.200	0.300	0.250	0.000	0.200	0.300	0.250
>=75	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000

Basis for the Valuation

CURRENT ACTUARIAL ASSUMPTIONS (Effective June 30, 2018)
REGULAR TEACHERS
ACTUARIAL TABLES AND RATES

Age	Disability Rates	Termination Rates				Retirement/DROP Rates			Duration	Merit Salary Scale*
		<=1 YOS	2 YOS	3 YOS	>=4 YOS	< 25 YOS	25-29 YOS	>= 30 YOS		
<20	0.0000	0.250	0.250	0.165	0.170	0.000	0.000	0.000	1	0.024438
20	0.0001	0.250	0.250	0.165	0.170	0.000	0.000	0.000	2	0.015640
21	0.0001	0.250	0.250	0.165	0.170	0.000	0.000	0.000	3	0.015640
22	0.0001	0.250	0.250	0.165	0.170	0.000	0.000	0.000	4	0.015640
23	0.0001	0.180	0.200	0.165	0.170	0.000	0.000	0.000	5	0.015640
24	0.0001	0.180	0.200	0.165	0.170	0.000	0.000	0.000	6	0.013685
25	0.0001	0.180	0.135	0.165	0.090	0.000	0.000	0.000	7	0.013685
26	0.0001	0.180	0.135	0.125	0.090	0.000	0.000	0.000	8	0.013685
27	0.0001	0.180	0.135	0.122	0.090	0.000	0.000	0.000	9	0.013685
28	0.0001	0.180	0.135	0.119	0.085	0.000	0.000	0.000	10	0.013685
29	0.0001	0.180	0.135	0.116	0.080	0.000	0.000	0.000	11	0.013685
30	0.0003	0.180	0.135	0.113	0.070	0.000	0.000	0.000	12	0.013685
31	0.0003	0.180	0.135	0.110	0.070	0.000	0.000	0.000	13	0.013685
32	0.0003	0.165	0.135	0.107	0.060	0.000	0.000	0.000	14	0.010753
33	0.0003	0.165	0.135	0.104	0.060	0.000	0.000	0.000	15	0.010753
34	0.0003	0.165	0.130	0.101	0.050	0.000	0.000	0.000	16	0.010753
35	0.0007	0.165	0.130	0.098	0.050	0.000	0.000	0.000	17	0.010753
36	0.0008	0.165	0.120	0.095	0.045	0.000	0.000	0.000	18	0.010753
37	0.0009	0.165	0.120	0.095	0.045	0.000	0.000	0.000	19	0.010753
38	0.0010	0.165	0.120	0.095	0.042	0.035	0.000	0.000	20	0.010753
39	0.0011	0.165	0.120	0.092	0.042	0.035	0.000	0.000	21	0.010753
40	0.0012	0.165	0.120	0.090	0.042	0.035	0.000	0.000	22	0.010753
41	0.0013	0.165	0.120	0.090	0.042	0.035	0.000	0.000	23	0.010753
42	0.0014	0.150	0.120	0.090	0.042	0.035	0.000	0.000	24	0.010753
43	0.0015	0.150	0.120	0.090	0.042	0.035	0.000	0.000	25	0.010753
44	0.0016	0.150	0.120	0.090	0.042	0.035	0.000	0.000	26	0.010753
45	0.0019	0.150	0.120	0.090	0.042	0.035	0.020	0.000	27	0.010753
46	0.0020	0.150	0.120	0.090	0.042	0.035	0.020	0.000	28	0.010753
47	0.0022	0.150	0.120	0.090	0.042	0.035	0.020	0.000	29	0.010753
48	0.0023	0.150	0.120	0.090	0.042	0.035	0.025	0.450	30	0.010753
49	0.0025	0.150	0.120	0.090	0.042	0.035	0.025	0.450	31	0.010753
50	0.0030	0.150	0.120	0.090	0.042	0.035	0.045	0.450	32	0.010753
51	0.0035	0.150	0.120	0.090	0.042	0.035	0.140	0.600	33	0.010753
52	0.0040	0.150	0.120	0.090	0.042	0.035	0.240	0.600	34	0.010753
53	0.0045	0.150	0.120	0.090	0.042	0.040	0.240	0.450	>=35	0.010753
54	0.0050	0.150	0.120	0.090	0.042	0.100	0.470	0.360		
55	0.0050	0.150	0.120	0.090	0.042	0.180	0.760	0.270		
56	0.0050	0.150	0.120	0.090	0.042	0.180	0.350	0.210		
57	0.0050	0.150	0.120	0.090	0.042	0.180	0.310	0.220		
58	0.0050	0.150	0.120	0.090	0.042	0.190	0.310	0.230		
59	0.0050	0.150	0.120	0.090	0.100	0.235	0.250	0.230		
60	0.0048	0.150	0.120	0.090	0.100	0.235	0.250	0.230		
61	0.0046	0.150	0.120	0.090	0.100	0.145	0.250	0.230		
62	0.0044	0.150	0.120	0.090	0.100	0.145	0.240	0.230		
63	0.0042	0.150	0.120	0.090	0.100	0.145	0.220	0.210		
64	0.0040	0.150	0.120	0.090	0.100	0.180	0.240	0.290		
65	0.0034	0.150	0.120	0.090	0.100	0.250	0.235	0.270		
66	0.0029	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
67	0.0024	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
68	0.0022	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
69	0.0020	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
70	0.0020	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
71	0.0020	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
72	0.0020	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
73	0.0020	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
74	0.0020	0.150	0.120	0.090	0.100	0.200	0.220	0.225		
>=75	0.0020	0.150	0.120	0.090	0.100	1.000	1.000	1.000		

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.30%).

Basis for the Valuation
PRIOR ACTUARIAL ASSUMPTIONS (Effective June 30, 2013)
HIGHER EDUCATION
ACTUARIAL TABLES AND RATES

| Age | Disability Rates | Termination Rates | | | | | Duration | Merit Salary Scale* |
		< 1 YOS	1 YOS	2 YOS	3 YOS	>=4 YOS		
18-22	0.0000	0.250	0.250	0.250	0.170	0.120	0	0.073171
23	0.0001	0.250	0.250	0.250	0.170	0.120	1	0.073171
24	0.0001	0.250	0.250	0.250	0.170	0.120	2	0.063415
25	0.0001	0.250	0.250	0.250	0.170	0.120	3	0.053659
26	0.0001	0.210	0.210	0.250	0.170	0.120	4	0.014634
27	0.0001	0.210	0.210	0.220	0.170	0.120	5	0.043902
28	0.0001	0.220	0.220	0.220	0.170	0.120	6	0.024390
29	0.0001	0.240	0.240	0.220	0.170	0.120	7	0.043902
30	0.0001	0.250	0.250	0.160	0.170	0.180	8	0.043902
31	0.0001	0.220	0.220	0.178	0.170	0.100	9	0.019512
32	0.0001	0.220	0.220	0.190	0.160	0.100	10	0.019512
33	0.0001	0.190	0.190	0.170	0.150	0.120	11	0.019512
34	0.0001	0.230	0.230	0.155	0.100	0.120	12	0.019512
35	0.0001	0.220	0.220	0.175	0.130	0.120	13	0.019512
36	0.0001	0.220	0.220	0.160	0.150	0.120	14	0.014634
37	0.0001	0.220	0.220	0.108	0.150	0.120	15	0.014634
38	0.0001	0.190	0.190	0.180	0.150	0.100	16	0.014634
39	0.0001	0.190	0.190	0.140	0.150	0.100	17	0.014634
40	0.0001	0.230	0.230	0.185	0.150	0.100	18	0.014634
41	0.0001	0.165	0.165	0.108	0.150	0.100	19	0.014634
42	0.0001	0.230	0.230	0.115	0.150	0.100	20	0.014634
43	0.0001	0.155	0.155	0.168	0.150	0.100	21	0.014634
44	0.0001	0.195	0.195	0.135	0.150	0.100	22	0.014634
45	0.0001	0.190	0.190	0.116	0.150	0.100	23	0.014634
46	0.0008	0.162	0.162	0.170	0.150	0.080	24	0.014634
47	0.0008	0.210	0.210	0.140	0.150	0.090	25	0.014634
48	0.0008	0.135	0.135	0.180	0.150	0.090	26	0.014634
49	0.0008	0.135	0.135	0.125	0.150	0.090	27	0.009756
50	0.0008	0.185	0.185	0.108	0.060	0.090	28	0.009756
51	0.0008	0.145	0.145	0.070	0.050	0.090	29	0.009756
52	0.0008	0.155	0.155	0.110	0.095	0.090	30	0.009756
53	0.0008	0.220	0.220	0.130	0.125	0.090	31	0.009756
54	0.0008	0.220	0.220	0.075	0.017	0.090	32	0.009756
55	0.0008	0.200	0.200	0.104	0.140	0.090	33	0.009756
56	0.0020	0.135	0.135	0.122	0.100	0.080	>=34	0.009756
57	0.0020	0.250	0.250	0.055	0.140	0.080		
58	0.0020	0.100	0.100	0.115	0.200	0.100		
59	0.0005	0.100	0.100	0.210	0.125	0.080		
>=60	0.0005	0.150	0.150	0.160	0.090	0.060		

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.50%).

HIGHER EDUCATION
ACTUARIAL TABLES AND RATES

Age	Retirement/DROP Rates											
	Hired before 7/1/1999					Hired between 7/1/1999 and 1/1/2011				Hired on or after 1/1/2011		
	0-4 Years	5-19 Years	20-24 Years	25-29 Years	>=30 Years	0-4 Years	5-24 Years	25-29 Years	>=30 Years	0-4 Years	5-24 Years	25-29 Years	>=30 Years
<=37	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
38	0.000	0.000	0.100	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
39	0.000	0.000	0.100	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
40	0.000	0.000	0.100	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
41	0.000	0.000	0.100	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
42	0.000	0.000	0.100	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
43	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
44	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
45	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
46	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
47	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
48	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
49	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
50	0.000	0.000	0.070	0.080	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
51	0.000	0.000	0.070	0.160	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
52	0.000	0.000	0.070	0.160	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
53	0.000	0.000	0.070	0.160	0.600	0.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000
54	0.000	0.000	0.150	0.280	0.400	0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.000
55	0.000	0.000	0.150	0.350	0.200	0.000	0.000	0.350	0.200	0.000	0.000	0.000	0.000
56	0.000	0.000	0.150	0.200	0.050	0.000	0.000	0.200	0.050	0.000	0.000	0.000	0.000
57	0.000	0.000	0.150	0.130	0.050	0.000	0.000	0.130	0.050	0.000	0.000	0.000	0.000
58	0.000	0.000	0.150	0.130	0.050	0.000	0.000	0.130	0.050	0.000	0.000	0.000	0.000
59	0.000	0.000	0.150	0.130	0.050	0.000	0.000	0.130	0.050	0.000	0.000	0.000	0.000
60	0.000	0.150	0.150	0.130	0.050	0.000	0.150	0.130	0.050	0.000	0.150	0.130	0.050
61	0.000	0.120	0.120	0.120	0.120	0.000	0.120	0.120	0.120	0.000	0.120	0.120	0.120
62	0.000	0.120	0.120	0.120	0.120	0.000	0.120	0.120	0.120	0.000	0.120	0.120	0.120
63	0.000	0.120	0.120	0.120	0.120	0.000	0.120	0.120	0.120	0.000	0.120	0.120	0.120
64	0.000	0.120	0.120	0.120	0.120	0.000	0.120	0.120	0.120	0.000	0.120	0.120	0.120
65	0.000	0.120	0.120	0.160	0.200	0.000	0.120	0.160	0.200	0.000	0.120	0.160	0.200
66	0.000	0.120	0.120	0.160	0.180	0.000	0.120	0.160	0.180	0.000	0.120	0.160	0.180
67	0.000	0.120	0.120	0.160	0.180	0.000	0.120	0.160	0.180	0.000	0.120	0.160	0.180
68	0.000	0.120	0.120	0.160	0.180	0.000	0.120	0.160	0.180	0.000	0.120	0.160	0.180
69	0.000	0.120	0.120	0.160	0.280	0.000	0.120	0.160	0.280	0.000	0.120	0.160	0.280
70	0.000	0.120	0.120	0.160	0.280	0.000	0.120	0.160	0.280	0.000	0.120	0.160	0.280
71	0.000	0.120	0.120	0.160	0.200	0.000	0.120	0.160	0.200	0.000	0.120	0.160	0.200
72	0.000	0.120	0.120	0.160	0.200	0.000	0.120	0.160	0.200	0.000	0.120	0.160	0.200
73	0.000	0.120	0.120	0.160	0.200	0.000	0.120	0.160	0.200	0.000	0.120	0.160	0.200
74	0.000	0.120	0.120	0.160	0.200	0.000	0.120	0.160	0.200	0.000	0.120	0.160	0.200
>=75	0.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000	0.000	1.000	1.000	1.000

CURRENT ACTUARIAL ASSUMPTIONS (Effective June 30, 2018)
HIGHER EDUCATION
ACTUARIAL TABLES AND RATES

Age	Disability Rates	Termination Rates				Retirement/DROP Rates			Duration	Merit Salary Scale*
		<=1 YOS	2 YOS	3 YOS	>=4 YOS	< 25 YOS	25-29 YOS	>= 30 YOS		
<20	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	1	0.024438
20	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	2	0.024438
21	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	3	0.021505
22	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	4	0.015640
23	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	5	0.015640
24	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	6	0.015640
25	0.0000	0.230	0.250	0.170	0.250	0.000	0.000	0.000	7	0.015640
26	0.0000	0.230	0.210	0.230	0.250	0.000	0.000	0.000	8	0.015640
27	0.0000	0.230	0.210	0.220	0.200	0.000	0.000	0.000	9	0.015640
28	0.0001	0.230	0.210	0.215	0.120	0.000	0.000	0.000	10	0.012708
29	0.0001	0.230	0.210	0.210	0.120	0.000	0.000	0.000	11	0.012708
30	0.0001	0.230	0.210	0.205	0.120	0.000	0.000	0.000	12	0.012708
31	0.0001	0.230	0.180	0.200	0.120	0.000	0.000	0.000	13	0.012708
32	0.0001	0.210	0.180	0.195	0.120	0.000	0.000	0.000	14	0.012708
33	0.0001	0.210	0.180	0.190	0.120	0.000	0.000	0.000	15	0.012708
34	0.0001	0.210	0.180	0.185	0.100	0.000	0.000	0.000	16	0.012708
35	0.0002	0.210	0.180	0.180	0.100	0.000	0.000	0.000	17	0.012708
36	0.0002	0.210	0.180	0.175	0.090	0.000	0.000	0.000	18	0.012708
37	0.0002	0.195	0.180	0.170	0.090	0.000	0.000	0.000	19	0.009775
38	0.0002	0.195	0.180	0.165	0.090	0.080	0.050	0.400	20	0.009775
39	0.0003	0.195	0.180	0.160	0.080	0.080	0.050	0.400	21	0.009775
40	0.0003	0.195	0.180	0.155	0.080	0.080	0.050	0.400	22	0.009775
41	0.0004	0.195	0.200	0.153	0.080	0.080	0.050	0.400	23	0.009775
42	0.0004	0.195	0.200	0.151	0.080	0.080	0.050	0.400	24	0.009775
43	0.0005	0.195	0.200	0.149	0.080	0.070	0.050	0.400	25	0.009775
44	0.0006	0.195	0.200	0.147	0.080	0.045	0.050	0.400	26	0.009775
45	0.0007	0.195	0.200	0.145	0.080	0.045	0.050	0.400	27	0.009775
46	0.0008	0.195	0.190	0.143	0.080	0.033	0.050	0.400	28	0.009775
47	0.0008	0.195	0.180	0.141	0.080	0.033	0.050	0.400	29	0.009775
48	0.0008	0.195	0.170	0.139	0.080	0.033	0.050	0.400	30	0.009775
49	0.0008	0.195	0.160	0.137	0.080	0.033	0.050	0.400	31	0.009775
50	0.0008	0.195	0.150	0.135	0.080	0.033	0.050	0.400	32	0.009775
51	0.0008	0.195	0.140	0.133	0.080	0.033	0.100	0.500	33	0.009775
52	0.0008	0.195	0.140	0.131	0.080	0.033	0.100	0.250	34	0.009775
53	0.0008	0.195	0.140	0.129	0.080	0.033	0.100	0.250	>=35	0.009775
54	0.0008	0.195	0.140	0.127	0.080	0.100	0.320	0.400		
55	0.0008	0.195	0.140	0.125	0.080	0.125	0.500	0.155		
56	0.0008	0.195	0.140	0.123	0.080	0.125	0.250	0.155		
57	0.0008	0.195	0.140	0.121	0.080	0.100	0.200	0.155		
58	0.0008	0.195	0.140	0.119	0.080	0.145	0.120	0.155		
59	0.0006	0.195	0.140	0.117	0.080	0.160	0.135	0.155		
60	0.0004	0.195	0.140	0.115	0.080	0.200	0.180	0.155		
61	0.0003	0.195	0.140	0.115	0.080	0.120	0.150	0.155		
62	0.0002	0.195	0.140	0.115	0.080	0.120	0.150	0.155		
63	0.0001	0.195	0.140	0.115	0.080	0.080	0.150	0.155		
64	0.0001	0.195	0.140	0.115	0.080	0.130	0.120	0.155		
65	0.0001	0.195	0.140	0.115	0.080	0.180	0.165	0.155		
66	0.0001	0.195	0.140	0.115	0.080	0.180	0.180	0.155		
67	0.0001	0.195	0.140	0.115	0.080	0.140	0.100	0.155		
68	0.0001	0.195	0.140	0.115	0.080	0.140	0.100	0.155		
69	0.0001	0.195	0.140	0.115	0.080	0.140	0.160	0.155		
70	0.0001	0.195	0.140	0.115	0.080	0.140	0.160	0.155		
71	0.0001	0.195	0.140	0.115	0.080	0.140	0.160	0.155		
72	0.0001	0.195	0.140	0.115	0.080	0.140	0.160	0.155		
73	0.0001	0.195	0.140	0.115	0.080	0.140	0.160	0.155		
74	0.0001	0.195	0.140	0.115	0.080	0.140	0.160	0.155		
>=75	0.0001	0.195	0.140	0.115	0.080	1.000	1.000	1.000		

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.30%).

PRIOR ACTUARIAL ASSUMPTIONS (Effective June 30, 2013)
LUNCH PLAN A
ACI'UARIAL TABLES AND RATES

| Age | Disability Rates | Retirement Rates | | | | Duration | Termination Rates | Merit Salary Scale* |
		0-4 Years	5-24 Years	25-29 Years	>=30 Years			
<=30	0.0000	0.00	0.00	0.00	0.00	0	0.140	0.034146
31-37	0.0001	0.00	0.00	0.00	0.00	1	0.140	0.034146
38	0.0001	0.00	0.00	0.00	0.30	2	0.140	0.034146
39	0.0001	0.00	0.00	0.00	0.30	3	0.140	0.034146
40	0.0001	0.00	0.00	0.00	0.30	4	0.140	0.034146
41	0.0001	0.00	0.00	0.00	0.30	5	0.140	0.034146
42	0.0001	0.00	0.00	0.00	0.30	6	0.140	0.034146
43	0.0001	0.00	0.00	0.00	0.30	7	0.140	0.034146
44	0.0001	0.00	0.00	0.00	0.30	8	0.140	0.034146
45	0.0001	0.00	0.00	0.00	0.30	9	0.140	0.034146
46	0.0001	0.00	0.00	0.00	0.30	10	0.140	0.034146
47	0.0001	0.00	0.00	0.00	0.30	11	0.140	0.034146
48	0.0001	0.00	0.00	0.00	0.30	12	0.140	0.021951
49	0.0100	0.00	0.00	0.00	0.30	13	0.140	0.021951
50	0.0100	0.00	0.00	0.00	0.30	14	0.140	0.021951
51	0.0100	0.00	0.00	0.00	0.30	15	0.140	0.034146
52	0.0150	0.00	0.00	0.00	0.70	16	0.140	0.034146
53	0.0175	0.00	0.00	0.00	0.70	17	0.140	0.043902
54	0.0175	0.00	0.00	0.00	0.70	18	0.140	0.043902
55	0.0175	0.00	0.00	0.80	0.70	19	0.140	0.010732
56	0.0002	0.00	0.00	0.35	0.70	20	0.140	0.010732
57	0.0002	0.00	0.00	0.35	0.70	21	0.140	0.010732
58	0.0002	0.00	0.00	0.35	0.70	22	0.140	0.010732
59	0.0002	0.00	0.00	0.60	0.70	23	0.140	0.034146
60	0.0002	0.00	0.45	0.45	0.70	24	0.140	0.034146
61	0.0002	0.00	0.20	0.20	0.50	25	0.140	0.014634
62	0.0002	0.00	0.20	0.20	0.50	26	0.140	0.014634
63	0.0002	0.00	0.35	0.35	0.50	27	0.140	0.014634
64	0.0002	0.00	0.10	0.10	0.50	28	0.140	0.014634
65	0.0002	0.00	0.10	0.10	0.50	29	0.140	0.014634
66	0.0002	0.00	0.10	0.10	0.25	30+	0.140	0.014634
67	0.0002	0.00	0.20	0.20	0.25			
68	0.0002	0.00	0.20	0.20	0.25			
69	0.0002	0.00	0.20	0.20	0.25			
70	0.0002	0.00	0.20	0.20	0.25			
71	0.0002	0.00	0.20	0.20	0.25			
72	0.0002	0.00	0.20	0.20	0.25			
73	0.0002	0.00	0.20	0.20	0.25			
74	0.0002	0.00	0.20	0.20	0.25			
>=75	0.0002	0.00	1.00	1.00	1.00			

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.50%).

<u>**PRIOR** ACTUARIAL ASSUMPTIONS (Effective June 30, 2013)</u>
LUNCH PLAN B
ACTUARIAL TABLES AND RATES

Age	Disability Rates	Retirement Rates	Duration	Termination Rates	Merit Salary Scale*
<=35	0.0000	0.00	0	0.100	0.029268
36-39	0.0010	0.00	1	0.090	0.029268
40	0.0050	0.00	2	0.080	0.029268
41	0.0050	0.00	3	0.070	0.029268
42	0.0050	0.00	4	0.060	0.029268
43	0.0050	0.00	5	0.050	0.029268
44	0.0050	0.00	6	0.050	0.029268
45	0.0050	0.00	7	0.045	0.029268
46	0.0050	0.00	8	0.045	0.029268
47	0.0050	0.00	9	0.045	0.029268
48	0.0050	0.00	10	0.045	0.029268
49	0.0050	0.00	11	0.045	0.019512
50	0.0130	0.00	12	0.040	0.019512
51	0.0130	0.00	13	0.030	0.019512
52	0.0130	0.00	14	0.030	0.019512
53	0.0130	0.00	15	0.030	0.019512
54	0.0130	0.00	16	0.050	0.024390
55	0.0175	0.80	17	0.050	0.024390
56	0.0175	0.80	18	0.050	0.024390
57	0.0225	0.80	19	0.030	0.014634
58	0.0225	0.80	20	0.040	0.014634
59	0.0150	0.60	21	0.040	0.014634
60	0.0050	0.50	22	0.040	0.014634
61	0.0050	0.25	23	0.040	0.014634
62	0.0050	0.25	24	0.040	0.014634
63	0.0050	0.25	25	0.040	0.014634
64	0.0010	0.25	26	0.040	0.014634
65	0.0010	0.15	27	0.040	0.014634
66	0.0010	0.15	28	0.040	0.014634
67	0.0010	0.30	29	0.040	0.014634
68	0.0010	0.45	30+	0.040	0.014634
69	0.0010	0.20			
70	0.0010	0.20			
71	0.0010	0.20			
72	0.0010	0.20			
73	0.0010	0.20			
74	0.0010	0.20			
>=75	0.0010	1.00			

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.50%).

CURRENT ACTUARIAL ASSUMPTIONS (Effective June 30, 2018)
LUNCH PLANS A & B
ACTUARIAL TABLES AND RATES

Age	Disability Rates	Retirement/ DROP Rates		Duration	Termination Rates	Merit Salary Scale*
<35	0.0000	0.000		<1	0.150	0.022483
35	0.0001	0.000		1	0.135	0.022483
36	0.0003	0.000		2	0.120	0.012708
37	0.0005	0.000		3	0.105	0.009775
38	0.0007	0.500		4	0.090	0.009775
39	0.0009	0.500		5	0.075	0.009775
40	0.0011	0.500		6	0.060	0.009775
41	0.0015	0.500		7	0.045	0.009775
42	0.0019	0.500		8	0.045	0.009775
43	0.0024	0.500		9	0.045	0.009775
44	0.0029	0.500		10	0.045	0.009775
45	0.0037	0.500		11	0.045	0.009775
46	0.0045	0.500		12	0.045	0.009775
47	0.0050	0.500		13	0.045	0.009775
48	0.0056	0.500		14	0.045	0.009775
49	0.0064	0.500		15	0.045	0.009775
50	0.0074	0.500		16	0.045	0.009775
51	0.0084	0.500		17	0.045	0.009775
52	0.0094	0.500		18	0.045	0.009775
53	0.0098	0.500		19	0.045	0.009775
54	0.0098	0.500		20	0.045	0.009775
55	0.0100	0.700		21	0.045	0.009775
56	0.0100	0.430		22	0.045	0.009775
57	0.0100	0.390		23	0.045	0.009775
58	0.0100	0.350		24	0.045	0.009775
59	0.0100	0.330		25	0.045	0.009775
60	0.0030	0.430		26	0.045	0.009775
61	0.0025	0.230		27	0.045	0.009775
62	0.0020	0.230		28	0.045	0.009775
63	0.0015	0.230		29	0.045	0.009775
64	0.0011	0.300		30	0.045	0.009775
65	0.0009	0.280		31	0.045	0.009775
66	0.0008	0.240		32	0.045	0.009775
67	0.0007	0.240		33	0.045	0.009775
68	0.0006	0.240		34	0.045	0.009775
69	0.0005	0.240		35+	0.045	0.009775
70	0.0005	0.240				
71	0.0005	0.240				
72	0.0005	0.240				
73	0.0005	0.240				
74	0.0005	0.240				
75+	0.0000	1.000				

*Annual salary increases are modeled by compounding Merit Salary Scale with Inflation (assumed to be 2.30%).

APPENDIX A
CONTRIBUTION RATES FOR SUB-PLANS

The calculations of employer contribution rates for FYE 2020 for employers participating in each sub-plan of TRSL are shown below.

A. Regular Teachers, Lunch Plan A and Lunch Plan B Sub Plans (Combined)

	Dollar Contribution	Projected Payroll	Contribution Rate
Employer Normal Cost	$ 125,936,105		3.628443%
Shared Amortization Costs	866,191,521	$ 3,470,803,288	24.956514%
Administrative Expenses	15,618,615		0.450000%
Total	$ 1,007,746,241		29.0350%

B. Higher Education Sub Plan for Non ORP Members

	Dollar Contribution	Projected Payroll	Contribution Rate
Employer Normal Cost	$ 18,267,649		2.841597%
Shared Amortization Costs	160,436,819	$ 642,865,493	24.956514%
Administrative Expenses	2,892,895		0.450000%
Total	$ 181,597,363		28.2481%

C. Higher Education Sub Plan for ORP Members

	Dollar Contribution	Projected Payroll	Contribution Rate
Employer Normal Cost	$ -	$ -	0.000000%
Shared Amortization Costs	142,116,161	569,455,169	24.956514%
Administrative Expenses	-	-	0.000000%
Total	$ 142,116,161		24.9565%

D. Total For All Sub Plans

	Dollar Contribution	Projected Payroll	Contribution Rate
Employer Normal Cost	$ 144,203,754	$ 4,113,668,781	3.505478%
Shared Amortization Costs	$ 1,168,744,501	4,683,123,950	24.956514%
Administrative Expenses	$ 18,511,510	4,113,668,781	0.450000%
Net Employer Cost	$ 1,331,459,765		28.9120%

APPENDIX B
BASIS FOR MORTALITY ASSUMPTIONS

Introduction to Improvements in Assumptions and Methods

The actuary for the LLA is required by R.S. 11:127(C) to prepare an actuarial valuation for review by PRSAC. In fulfilling that responsibility, we accept some of the actuarial assumptions developed by TRSL's actuary and adopted by its board of trustees, while we reject other actuarial assumptions. Following is a brief summary of the principles we applied in adopting different assumptions used in this actuarial valuation as compared to last year's PRSAC-accepted valuation.

1. The economic assumptions as to future <u>inflation</u> and future <u>investment returns:</u>
    a. Should be an unbiased expectation of the future,
    b. Should not be unduly influenced by perceptions of what the contributing entity(ies) can afford in current annual budget negotiations,
    c. Should explicitly reflect the System's own asset allocation,
    d. Should explicitly reflect the System's own projected benefit cash flow,
    e. Should lie within the mainstream of forward-looking forecasts from experts, and
    f. Should be within a reasonable range above/below the most appropriate return assumption.

2. The expected future <u>cost-of-living (COLA) benefits</u> should be measured using an actuarial method that is:
    a. *Explicit.* Separately identify the cost of COLA benefits, and should not be implicitly buried or conflated within the return assumption and
    b. *Transparent.* Clear and meaningful; should not be misleading or confuse to the public.

3. <u>One set of assumptions</u> is used for the calculation of the unfunded actuarial liability as of June 30, 2018 and the contribution rate for the year ending June 30, 2020.
    a. *A change*. TRSL's board and actuary use two set of assumptions in a given actuarial valuation report, one for the UAL and one for the projected contribution rate.
    b. *Simple.* One set of assumptions is less complicated for a given actuarial valuation report.
    c. *Transparent.* Clear as to what the assumptions are; no confusion with multiple assumptions used for different purposes in the same report.
    d. *Consistent with actuarial practice.* Consistent with the method used by other actuaries around the country and in Louisiana when assumptions are changed.
    e. *Consistent with the need for new assumptions.* If a new set of assumptions is more appropriate, and is adopted for use in an actuarial valuation, that new set of assumptions should consistently be used for all purposes throughout the actuarial valuation report.

The improvements in these three actuarial assumptions/methods enhance the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, these improvements enhance the integrity of the State's financial disclosures by ensuring the balance sheet liabilities are a more transparent and fair representation of the pension obligation.

This <u>Appendix B</u> describes our approach to developing mortality rates from the System's own experience.

Experience Study

An actuarial experience study was prepared by the System's actuary for the period from July 1, 2012 through June 30, 2017, for the Teachers' Retirement System of Louisiana. The experience study report, dated March 1, 2018, summarized the results. The experience study report includes the following demographic assumptions:

- Mortality Rates
- Retirement rates
- Disability Rates
- Withdrawal/Termination Rates
- Salary Increases
- Deferred Vested
- Marital Status
- Spouse's age
- Dependent/minor children
- Option factors
- Unisex rates
- Unused annual leave service credit adjustments

We reviewed the experience study report and found all the sections relating to the demographic assumptions mentioned above to be described with reasonable detail and careful recognition of relevant experience. Therefore, we accept all the demographic assumptions proposed in the experience study report and find them fully appropriate for the 2018 Actuarial Valuation.

Mortality Assumption

The mortality assumption used in this 2018 actuarial valuation prepared by the LLA's actuary is based on the results of the experience study report. The methodology employed for developing the mortality assumption recommended by TRSL's actuary in the experience study report is a significant improvement from the methodology employed in prior years.

We commend this improvement by TRSL's actuary, since the mortality assumption is now based on the most recently developed broad-based mortality tables and on reasonable applications of actuarial credibility principles.

The following tables present the mortality experience for the different subgroups during the exposure period:

Active Members Mortality

Age	Males		Females	
	Exposures	Actual Deaths	Exposures	Actual Deaths
<20	1	0	7	0
20-24	1,153	0	5,074	0
25-29	6,759	1	27,049	2
30-34	9,566	4	40,208	10
35-39	9,916	3	45,362	15
40-44	10,234	4	49,370	21
45-49	9,847	13	49,536	36
50-54	8,990	12	49,084	62
55-59	7,224	17	39,298	64
60-64	6,183	26	25,243	58
65-69	3,453	25	9,665	34
70-74	1,590	25	2,974	16
75-79	0	0	0	0
80-84	0	0	0	0
Total	74,916	130	342,870	318

Non-Disabled Retiree Members Mortality

Age	Males		Females	
	Exposures	Actual Deaths	Exposures	Actual Deaths
50-54	2,237	19	11,853	36
55-59	5,863	48	29,417	119
60-64	11,564	109	53,021	299
65-69	16,977	207	59,164	480
70-74	15,995	324	45,358	683
75-79	12,772	500	33,794	819
80-84	9,626	621	25,114	1,209
85-89	4,763	555	14,666	1,254
90-94	1,669	329	6,668	1,022
95-99	272	78	2,035	488
100+	24	9	280	90
Total	81,762	2,799	281,370	6,499

Disabled Retiree Members Mortality

Age	Males Exposures	Males Actual Deaths	Females Exposures	Females Actual Deaths
<20	0	0	0	0
20-24	0	0	0	0
25-29	1	0	1	1
30-34	4	1	20	0
35-39	14	1	134	6
40-44	19	0	321	7
45-49	79	6	754	10
50-54	94	1	1,498	35
55-59	260	7	2,511	36
60-64	374	10	3,566	85
65-69	393	26	3,615	106
70-74	254	18	2,761	98
75-79	190	15	1,830	80
80-84	97	8	1,029	79
85-89	36	9	413	62
90-94	18	3	171	32
95-99	9	0	21	3
100+	0	0	3	1
Total	1,842	105	18,648	641

Credibility

Actuarial credibility pertains to the statistical confidence we can have in the results of an experience study for projecting future mortality rates.

Full credibility means that the data is fully reliable as a reasonable predictor of future experience and "adjustment factors" can be developed and applied to a standard reference table to obtain a new mortality table that make full use of the group's own experience. This retains the shape of the standard reference table, but adjusts the rates to partially or fully reflect the group's own actual experience.

If an experience study's data is partially credible, a weighted average adjustment factor should be applied to the standard reference table's individual mortality rates to obtain new mortality rates for each individual age that partially reflects the group's own experience and partially reflects the standard reference table.

For the purpose of the experience study, full credibility was assigned a confidence level of 90% of being within 5% margin from the correct value. The credibility was assessed separately for actives, non-disabled retirees, and disabled retirees and also for males and females. In order to be fully credible, the experience study is required to have at least 1,082 deaths during the exposure period for each subgroup.

Based on the information in the above tables, the TRSL experience study data is sufficient to be fully credible for the non-disabled retirees groups (males and females) since their respective numbers of deaths are more than 1,082 each, and is insufficient to be fully credible for the other subgroups. This means 100% of the experience study results can be taken into account in the determination of the mortality assumption for non-disabled retiree members. The credibility factors were determined to be 34.7% for active males, 54.2% for active females, 100% for the non-disabled male retirees, 100% for the non-disabled female retirees, 31.2% for disabled male retirees, and 77.0% for disabled female retirees.

Formula

This process is outlined in actuarial literature.[1] Following is the basic formula for determining new mortality rates for each age (and for each subgroup) to be used in this valuation.

$$\left[\left(\frac{q_A^{ES}}{q_A^{SR}}\right) \times (\mathbf{C}) \ + \ (\mathbf{1.0}) \times (\mathbf{1} - \mathbf{C})\right] \ \times \ q_x^{SR} = q_x^{V}$$

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[1] A few examples in actuarial literature on reflecting fully credible and partially credible mortality experience in selecting mortality assumptions for pension valuations include: (a) A Public Policy Practice Note "*Selecting and Documenting Mortality Assumptions for Pensions,*" Revised June 2015, published by the American Academy of Actuaries (see especially Appendix 2), found at http://www.actuary.org/files/Mortality_PN_060515_0.pdf, (b) "*Selecting Mortality Tables: A Credibility Approach,*" by Gavin Benjamin published by the Society of Actuaries in October 2008, found at www.soa.org/files/research/projects/research-2008-benjamin.pdf and (c) "*Credibility Theory for Pension Actuaries Webcast*", June 23, 2017 sponsored by the Society of Actuaries, found at https://www.soa.org/prof-dev/events/2016-credibility-theory-pension-actuaries/.

Where,

q_x^V is the probability (absolute rate) of a member age **x** dying before attaining age x+1, as used in this actuarial **V**aluation;

q_x^{SR} is the probability (absolute rate) of a member age **x** dying before attaining age x+1, as taken from the **S**tandard **R**eference table;

C is the **C**redibility factor assigned to the data in the experience study; C and (1-C) serve as weights in the weighted average adjustment factor;

q_A^{ES} is the **A**verage probability (absolute rate), derived as an average or composite rate for the whole group from the **E**xperience **S**tudy, i.e., total deaths divided by total exposures; and

q_A^{SR} is the **A**verage probability (absolute rate), derived as an average or composite rate for the whole group expected by the **S**tandard **R**eference table.

Base RP-2014 Mortality Tables

The RP-2014 Mortality Tables, the most recently developed broad-based mortality tables, were issued by the Retirement Plans Experience Committee (RPEC) of the Society of Actuaries. These were published in October 2014. These tables constitute the most recent and reliable standard reference tables available.

The RP-2014 mortality tables were used as the standard reference tables in determining the mortality assumption for this valuation. The RP-2014 mortality tables were not used as the base mortality table assumption in this actuarial valuation. The shape of RP-2014 was retained; but the mortality rates actually used as the base table in this actuarial valuation were the RP-2014 rates multiplied by a TRSL-derived adjustment factor.

The experience study report presents the mortality information for active, non-disabled retiree, and disabled retiree members separately. For active members, the RP-2014 White Collar Employee Tables were determined to be the closest match to the experience and were used as the standard reference tables. For non-disabled retiree members, the RP-2014 White Collar Healthy Annuitants Tables were determined to be the closest match to the experience (after applying the adjustment factors) and were used as the standard reference tables. For disabled retiree members, the RP-2014 Disability Tables were used as the standard reference tables.

The following tables present the mortality rates based on the RP-2014 White Collar Employee Tables, the RP-2014 White Collar Healthy Annuitants Tables, and the RP-2014 Disability Tables:

| RP-2014 White Collar Employee | | | RP-2014 White Collar Healthy Annuitants | | | RP-2014 Disability | | |
| Sample Attained | Probability of Death Next Year | | Sample Attained | Probability of Death Next Year | | Sample Attained | Probability of Death Next Year | |
Age	Male	Female	Age	Male	Female	Age	Male	Female
50	0.12%	0.09%	50	0.28%	0.21%	50	2.04%	1.19%
55	0.20%	0.14%	55	0.39%	0.27%	55	2.34%	1.45%
60	0.33%	0.21%	60	0.52%	0.39%	60	2.66%	1.70%
65	0.58%	0.31%	65	0.76%	0.65%	65	3.17%	2.09%
70	1.03%	0.54%	70	1.24%	1.06%	70	4.03%	2.82%
75	1.82%	0.95%	75	2.13%	1.76%	75	5.43%	4.10%
80	3.22%	1.65%	80	3.73%	3.04%	80	7.66%	6.10%

TRSL-derived adjustment factors

TRSL-derived adjustment factors to be applied to the RP-2014 mortality tables were calculated separately for each subgroup. The ratio (A/E ratio) of the average/composite mortality rate from the experience study (q_A^{ES}) to the average/composite mortality rate of the RP-2014 mortality table (q_A^{SR}) was calculated for each subgroup.

    a. For active male members, the TRSL-derived adjustment factor is <u>101%</u>. That factor was calculated by applying the credibility factor of 34.7% to the A/E ratio of 103.0%.

    b. For active female members, the TRSL-derived adjustment factor is <u>99.7%</u>. That factor was calculated by applying the credibility factor of 54.2% to the A/E ratio of 99.4%.

    c. For non-disabled male retiree members, the TRSL-derived adjustment factor is <u>136.6%</u>. That factor was calculated by applying the credibility factor of 100% to the A/E ratio.

    d. For non-disabled female retiree members, the TRSL-derived adjustment factor is <u>118.9%</u>. That factor was calculated by applying the credibility factor of 100% to the A/E ratio.

    e. For disabled male retiree members, the TRSL-derived adjustment factor is <u>111%</u>. That factor was calculated by applying the credibility factor of 31.2% to the A/E ratio of 136.0%.

    f. For disabled female retiree members, the TRSL-derived adjustment factor is <u>113%</u>. That factor was calculated by applying the credibility factor of 77.0% to the A/E ratio of 117.0%.

Four graphs on the following pages compare the base table mortality rates used in:

- The prior valuation (the published RP-2000 mortality tables) and
- This valuation (experience-adjusted RP-2014 mortality tables)

These represent base tables, prior to the respective methods of recognizing mortality improvement in the future.

Base Table Mortality Rates For Ages 20 Through 50
For Active Employees (Pre-retirement)

TRSL Male and Females Tables herein reflect mortality rates prior to the application of generational mortality improvement scale MP-2017, which causes those solid lines to move slightly downward in each projection year.

Legend:
- - - - RP-2000 Male Table
- - - - RP-2000 Female Table
——— Experience-adjusted RP-2014 Female Table
——— Experience-adjusted RP-2014 Male Table
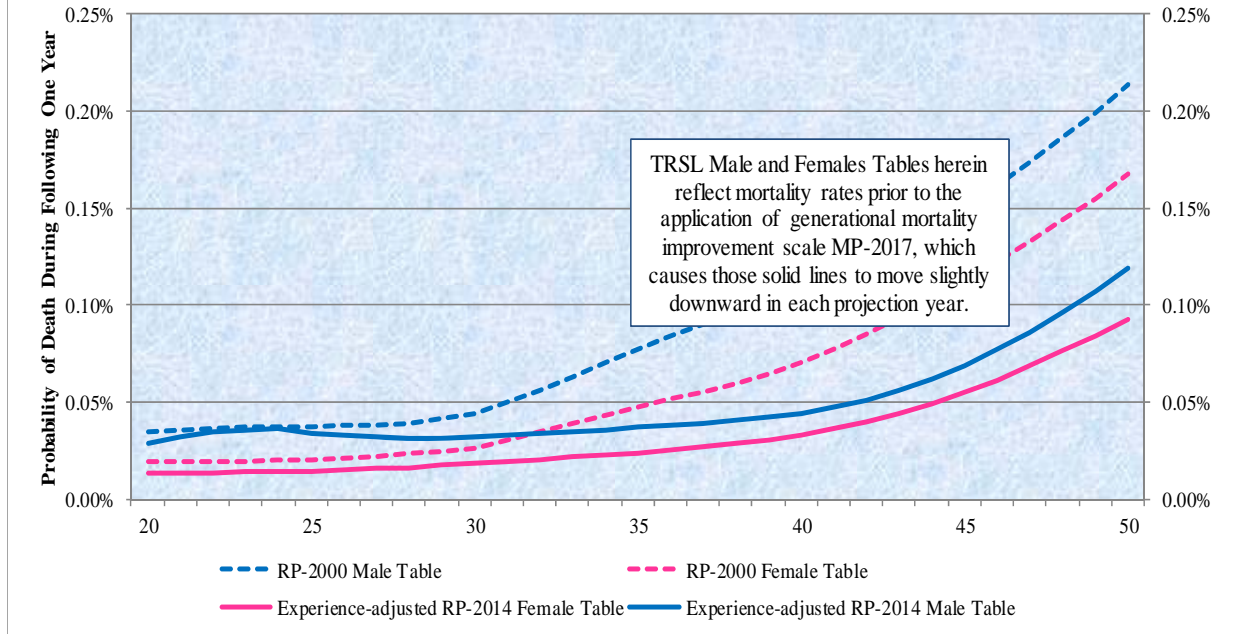
Base Table Mortality Rates For Ages 50 Through 80
For Active Employees (Pre-retirement)
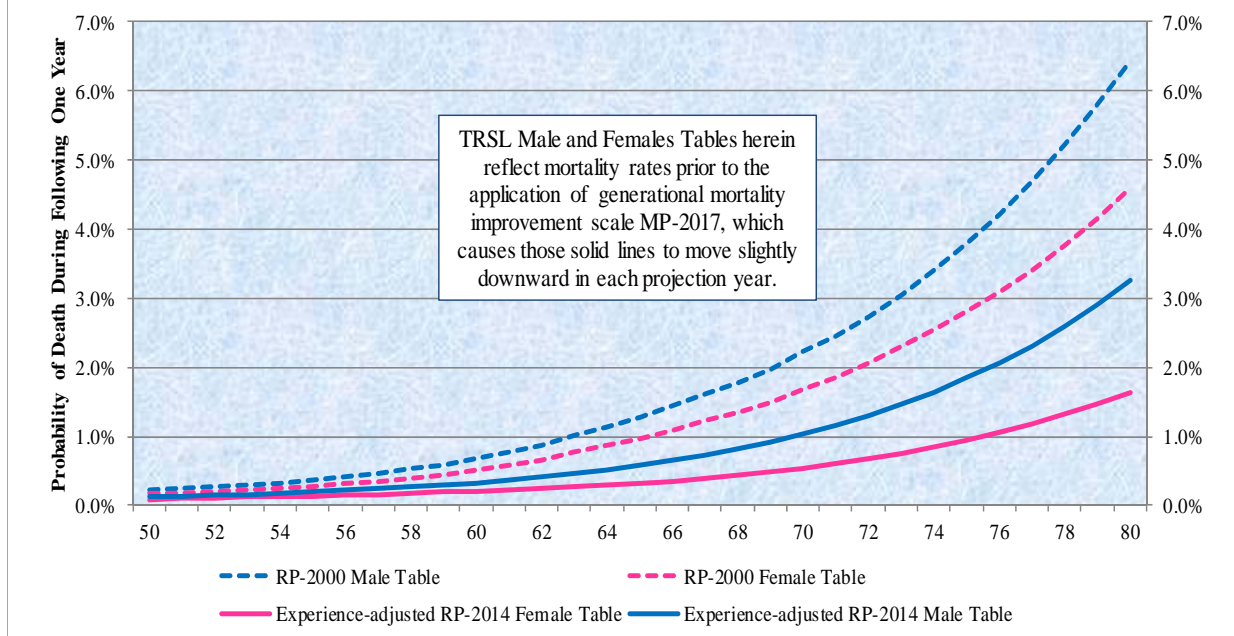
TRSL Male and Females Tables herein reflect mortality rates prior to the application of generational mortality improvement scale MP-2017, which causes those solid lines to move slightly downward in each projection year.

Legend:
- - - - RP-2000 Male Table
- - - - RP-2000 Female Table
——— Experience-adjusted RP-2014 Female Table
——— Experience-adjusted RP-2014 Male Table

Base Table Mortality Rates For Ages 50 Through 80
For Non-Disabled Retirees (Post-retirement)

TRSL Male and Females Tables herein reflect mortality rates prior to the application of generational mortality improvement scale MP-2017, which causes those solid lines to move slightly downward in each projection year.

- - - - RP-2000 Male Table
- - - - RP-2000 Female Table
——— Experience-adjusted RP-2014 Female Table
——— Experience-adjusted RP-2014 Male Table
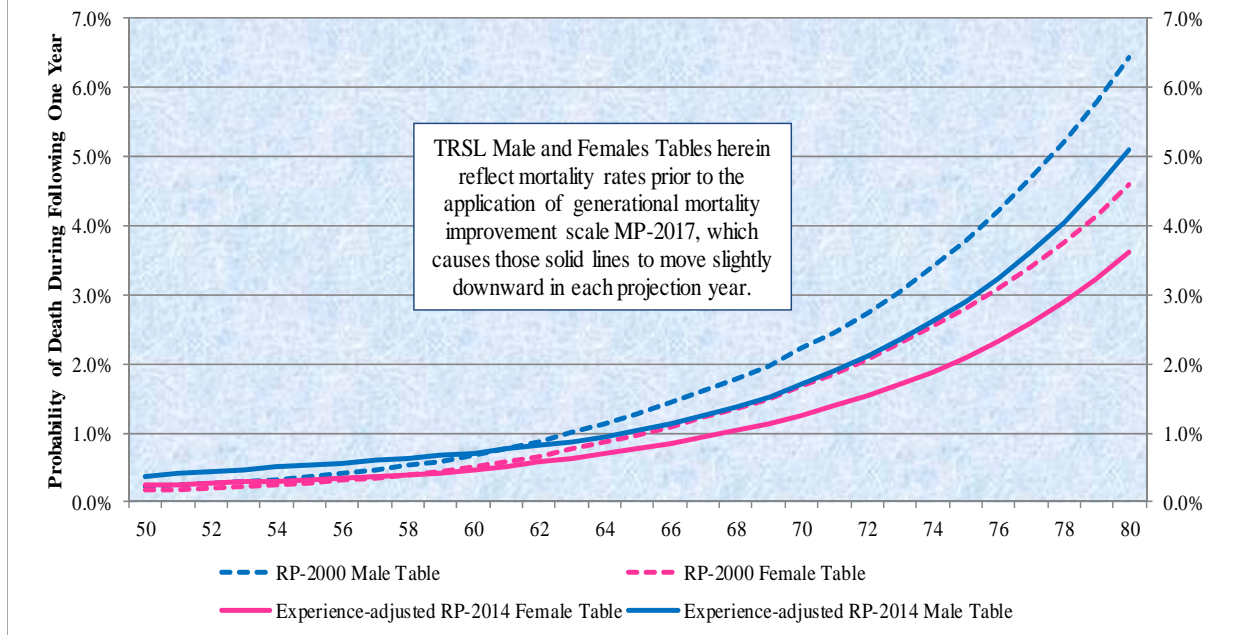
Base Table Mortality Rates For Ages 80 Through 100
For Non-Disabled Retirees (Post-retirement)

TRSL Male and Females Tables herein reflect mortality rates prior to the application of generational mortality improvement scale MP-2017, which causes those solid lines to move slightly downward in each projection year.

- - - - RP-2000 Male Table
- - - - RP-2000 Female Table
——— Experience-adjusted RP-2014 Female Table
——— Experience-adjusted RP-2014 Male Table
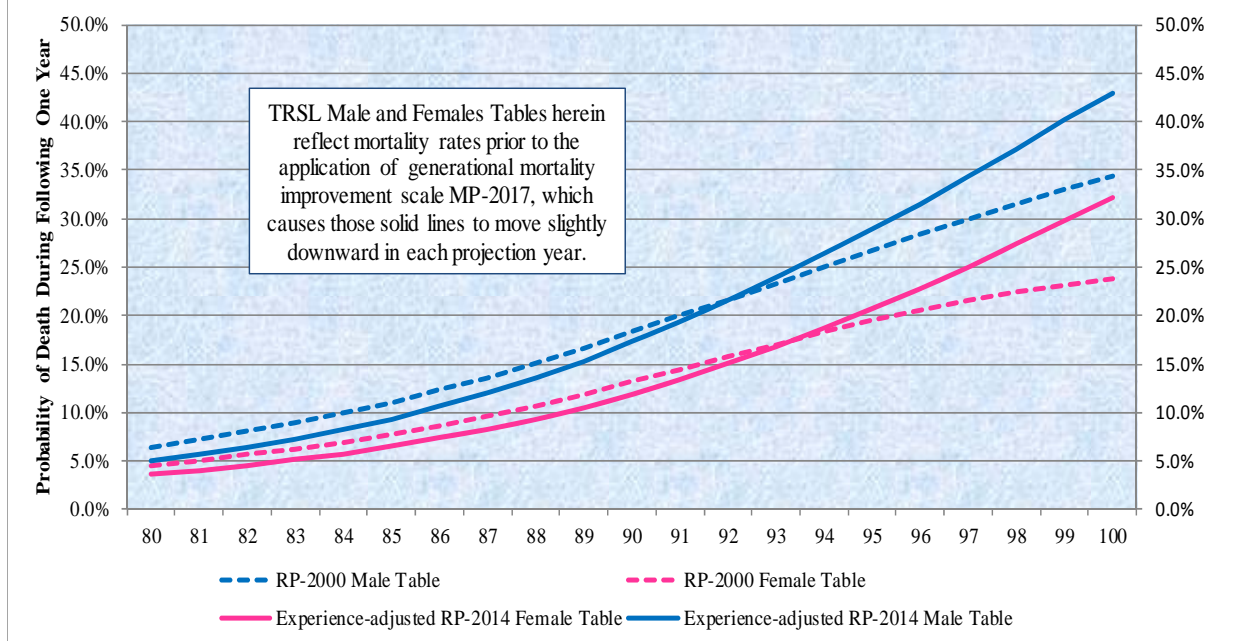
Mortality Improvement Scale

The prior valuation used Scale AA as a static improvement projected to 2025.

This valuation used the Society of Actuaries recommended approach – generational mortality improvement scale MP-2017. The improvement scale projects the mortality rates from the base year (2014) of the mortality table to future years to account for future improvement in the mortality rates. The MP-2017 improvement scale, released in October 2017, is intended to be used along with the RP-2014 mortality tables and is the most recent improvement scale available as of the valuation date. The MP-2017 generational improvement scale was applied to the experience-adjusted version of RP-2014 base table.

Actuarial Practice

We recognize that experience studies for larger systems are generally performed every five years, and such study for TRSL was prepared in 2018. It is also generally accepted among retirement system executives, board members and actuaries that if events occur or if better or new techniques emerge between experience studies that materially affect results, they would be considered for change.

Furthermore, Actuarial Standard of Practice (ASOP) No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, states that at each measurement date the actuary should determine whether the assumptions continue to be reasonable, which includes the requirement to take into account historical and current demographic data that is relevant as of the measurement date.

We believe the mortality table used in this 2018 actuarial valuation (developed as described above) satisfies that ASOP and is consistent with current actuarial literature.

For all other demographic assumptions

In our opinion, all other demographic assumptions set forth in the Experience Study report prepared by the System's actuary (dated March 1, 2018) for the period from July 1, 2012, through June 30, 2017, and approved by the retirement board are suitable for use in TRSL's 2018 Actuarial Valuation.

APPENDIX C
RETURN ASSUMPTIONS FOR OTHER LARGE RETIREMENT SYSTEMS

COMPARISON OF 2017 RETURN ASSUMPTIONS

For the 2017 actuarial valuation, the System's retirement board and actuary used a net investment return assumption of (a) 8.20% for the calculation of the System's unfunded actuarial liability as of June 30, 2017 and (b) 8.05% for the calculation of the prospective contribution rate for the year ending June 30, 2019. PRSAC accepted that valuation report.

For perspective, the following chart presents the distribution of 2017 return assumption for large retirement systems, using the same database as NASRA uses for their research and publications.
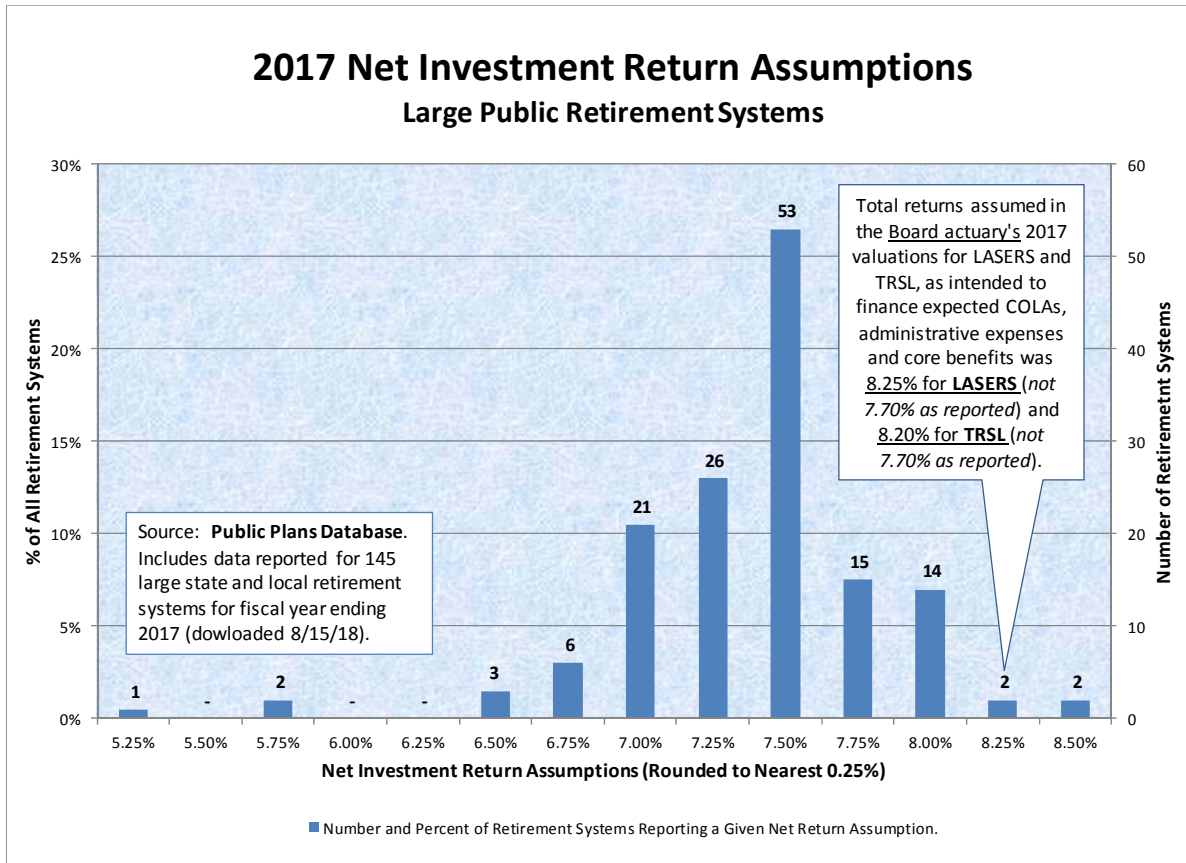
The System's 2017 return assumption has been said to be 7.70%; but it was actually 8.20%, not 7.70%. Refer to the Summary and Conclusions section of this report for support of this observation. In order to finance the core/regular benefits, expected COLA benefits and administrative expenses, the System's actuarial valuation was prepared assuming 8.20% was needed in total.

COMPARISON OF 2018 RETURN ASSUMPTIONS

For the System's 2018 valuation report, the return assumption needed to finance all expected plan benefits (core benefits and gain-sharing COLAs) is actually 8.05%, not 7.65%. Consider how this compares to other large retirement systems, as published by NASRA.

Comparing the previous chart and this chart, the reader can see the continued and significant movement downward in return assumptions by large public sector retirement systems.
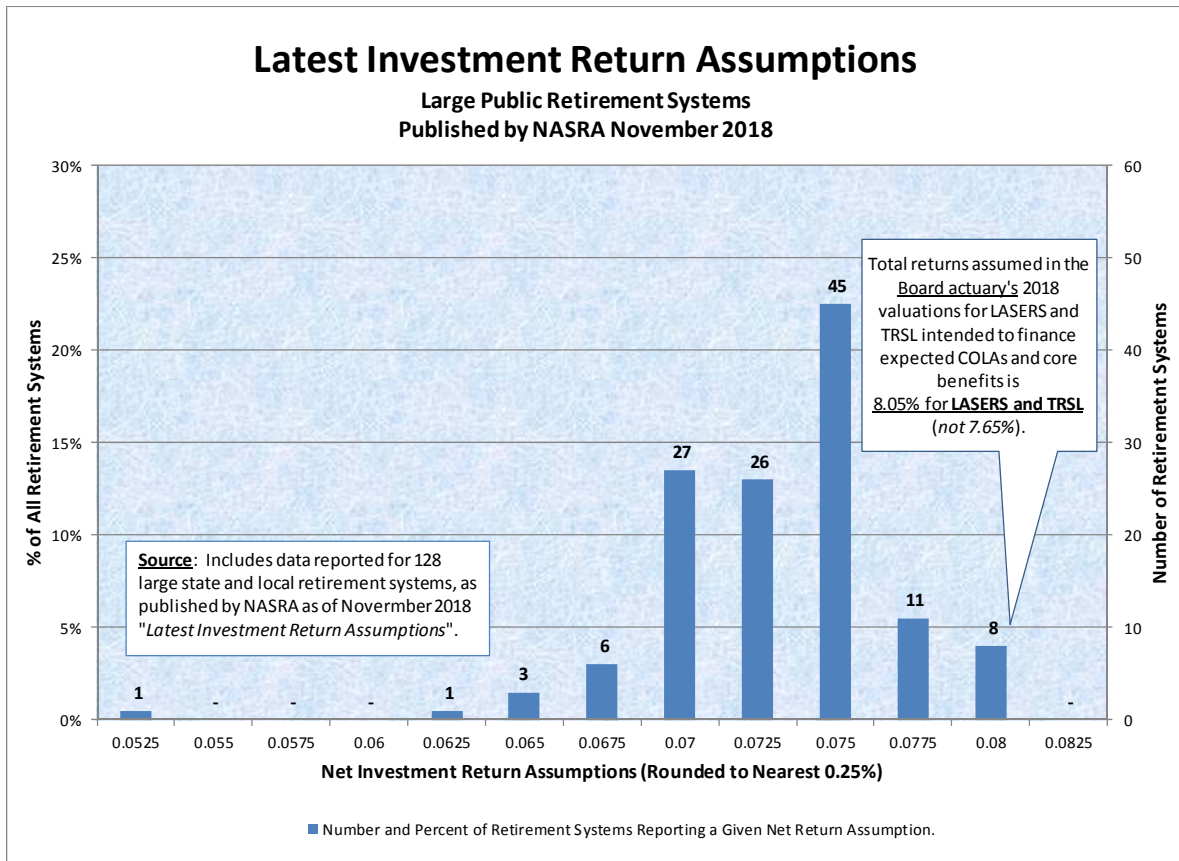
For this actuarial valuation report, as derived in Appendices D through G, the actuary for the LLA uses a net investment return assumption (same as discount rate) of 7.50% for all purposes. This valuation's assumption of 7.50% is at the upper end a range of reasonableness for this year (6.50% to 7.50%). As derived in Appendices D through G, the "most appropriate" net return assumption for this valuation would be 7.00%.

SYSTEM-BY-SYSTEM REDUCTIONS

Consider the prevalence and magnitude of recent reductions in return assumptions among large public sector retirement systems in the past year, as shown in the chart below.

Also, please refer to Appendix J for press clippings for positive statements by the systems, state treasurers, and others about their reductions in return assumptions.

Recent Reductions in Return Assumptions

LASERS and TRSL data replaced with true return assumptions.

System	Reduction
Louisiana SERS	0.20%
Louisiana Teachers	0.15%
Connecticut Teachers	0.50%
New Mexico PERA	0.24%
Minnesota State Employees	0.50%
Minnesota Teachers	0.97%
St. Paul Teachers	0.50%
Texas ERS	0.50%
Texas LECOS	0.50%
Washington PERS 2/3	0.20%
Washington School Employees Plan 2/3	0.20%
Washington Teachers Plan 2/3	0.20%
San Francisco City & County	0.04%
Maryland Teachers	0.05%
Maryland PERS	0.05%
Florida RS	0.10%
Georgia ERS	0.10%
Massachusetts SRS	0.15%
Massachusetts Teachers	0.15%
Missouri State Employees	0.15%
California PERF	0.25%
LA County ERS	0.13%
New York State Teachers	0.25%
Texas Teachers	0.75%
TN Political Subdivisions	0.25%
TN State and Teachers	0.25%
Ohio PERS	0.30%
Arkansas PERS	0.35%
California Teachers	0.50%
Chicago Teachers	0.75%
Houston Firefighters	0.25%
Idaho PERS	0.50%
Illinois Teachers	0.50%
Michigan SERS	1.00%
Wyoming Public Employees	0.75%
Illinois Universities	0.50%
Louisiana State Parochial Employees	0.25%
Maine State and Teacher	0.13%
Kentucky ERS	0.50%

■ Per NASRA Nov 2018 "Latest Investment Return Assumptions" Release (Reduced Down To this Value)

■ Assumption Recently Reduced By this Value (Reduced from 2017 Assumptions per Public Plans Database)

APPENDIX D
BASIS FOR INFLATION ASSUMPTION

Introduction to Improvements in Assumptions and Methods (repeated from Appendix B)

The actuary for the LLA is required by R.S. 11:127(C) to prepare an actuarial valuation for review by PRSAC. In fulfilling that responsibility, we accept some of the actuarial assumptions developed by TRSL's actuary and adopted by its board of trustees, while we reject other actuarial assumptions. Following is a brief summary of the principles we applied in adopting different assumptions used in this actuarial valuation as compared to last year's PRSAC-accepted valuation.

1. The economic assumptions as to future <u>inflation</u> and future <u>investment returns:</u>
    a. Should be an unbiased expectation of the future,
    b. Should not be unduly influenced by perceptions of what the contributing entity(ies) can afford in current annual budget negotiations,
    c. Should explicitly reflect the System's own asset allocation,
    d. Should explicitly reflect the System's own projected benefit cash flow,
    e. Should lie within the mainstream of forward-looking forecasts from experts, and
    f. Should be within a reasonable range above/below the most appropriate return assumption.

2. The expected future <u>cost-of-living (COLA) benefits</u> should be measured using an actuarial method that is:
    a. *Explicit.* Separately identify the cost of COLA benefits, and should not be implicitly buried or conflated within the return assumption and
    b. *Transparent. C*lear and meaningful; should not be misleading or confuse to the public.

3. <u>One set of assumptions</u> is used for the calculation of the unfunded actuarial liability as of June 30, 2018 and the contribution rate for the year ending June 30, 2020.
    a. *A change*. TRSL's board and actuary use two set of assumptions in a given actuarial valuation report, one for the UAL and one for the projected contribution rate.
    b. *Simple.* Less complicated for a given actuarial valuation report.
    c. *Transparent.*   Clear as to what the assumptions are; no confusion with multiple assumptions used for different purposes in the same report.
    d. *Consistent with actuarial practice.* Consistent with the method used by other actuaries around the country and in Louisiana when assumptions are changed.
    e. *Consistent with the need for new assumptions.* If a new set of assumptions is more appropriate, and adopted for use in an actuarial valuation, that new set of assumptions should consistently be used for all purposes throughout the actuarial valuation report.

The improvements in these four actuarial assumptions/methods enhance the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, these improvements enhance the integrity of the State's financial disclosures by ensuring the balance sheet liabilities are a more transparent and fair representation of the pension obligation.

This <u>Appendix D</u> describes our approach to developing the economic assumption as to future price inflation.

Perspectives: Where Should Actuaries Look for Input on Inflation Assumptions?

There are two types of perspectives to consider when defending or determining an assumed rate of future inflation. One is temporal – Do we look more to historical rates to inform decision-makers; or more to forward-looking forecasts of the future? The other is social – Do we look more to what other retirement systems are doing; or look more to what expert inflation forecasters are expecting?

Past returns? Looking backwards at historical inflation rates is not considered to be reliable supporting documentation for current pension actuarial assumptions of future inflation. Historical inflation rates are viewed more as information, than used to defend or determine a current inflation assumption. The past is indeed useful for understanding historical relationships among various economic forces.

The current economic environment is not like the past 10, 30, or 50 years; and the future economic environment is certain to be different from the past. The role of the Federal Reserve Board and other factors are different than they used to be years ago.

A forward-looking perspective should drive the defense or determination of an inflation assumption for pension actuarial valuations. Strategically selecting historical rates (an X-year period ending on Y-date) to justify a return assumption being applied to the next 10, 20, or 30 year period is not valid.

Therefore, historical CPI rates of increase have minimal relevance to us. We chose instead to develop our inflation assumptions based on *forward-looking* forecasts from subject matter experts.

Other retirement systems? Looking to what other peer retirement systems are assuming for future inflation rates is generally not a well-placed focus for defending or determining a future inflation rate.

While it may be interesting, even important, to know what inflation assumptions are used by other large public sector retirement systems, that information is not useful for discharging our duties for adopting an inflation assumption for the System's actuarial valuation. It is not useful for actually informing us concerning the economic forecasts applicable to this valuation.

    a. *Different environments.* Public retirement systems across the United States each have their own politics, environments and sets of agency risk. Their assumption-setters may not have adhered to mainstream and objective forecasts of experts, but may have been influenced by budgets, protectionism, and politics. These are not best practices to be emulated when setting assumptions. Since it is impossible to determine which retirement systems applied a robust, analytical process and which were more influenced by budgets, it is best not to select the inflation assumption based on what other retirement systems assume.

    b. *Different horizon.* Other retirement systems may have been influenced by their consultants advocating a long-term horizon for the net investment return assumption.

This is fairly common, but as discussed below, a mid-term horizon is more appropriate for the reasons stated. A single equivalent rate between the mid-term consensus and the longer term consensus, derived from a system's <u>own respective cash flow demands</u>, may be the most appropriate return assumption.

Looking at other retirement systems is important and useful for knowing what others are doing; but it is not appropriate as a driving factor in defending or determining an inflation assumption for this retirement System.

Expert sources of inflation forecasts (from large, independent, unbiased and, reputable inflation forecasting organizations) are the best places to look for input when setting an inflation assumption for pension valuations. These are much more objective and unfiltered sources, directly from the experts themselves, to guide decision-makers.

Adopting a *process* that looks to a consensus of external and independent subject matter experts' forward-looking forecasts is the best way to avoid the political and budget pressures that sometimes distract or influence assumption-setters away from our primary duty to set an inflation assumption as an unbiased best estimate (or most appropriate) of the future inflation.

Inflation Forecasts from Independent Experts

Expected rates of inflation are critical components of expected rates of return. In a building block approach it forms the starting point for building up the final choice for the return assumption, salary scale increases for individuals, cost-of-living adjustment benefits, general wage inflation and a payroll growth rate assumption when applicable.

We applied considerable care to obtain relevant research and opinions from independent inflation forecasting experts for this fundamental component.

There are many professional sources available to actuaries and investment consultants that forecast inflation on a forward-looking basis.

Inflation forecasting is mostly the domain of *economists*, particularly those specializing in that area. In our opinion, as mentioned earlier, forward-looking forecasts from subject matter experts are much more appropriate than historical rates or peer groups.

Consider the forward-looking forecasts from the following eight (8) subject matter expert organizations, comprising hundreds of economists' opinions.

Major Inflation Forecasters	
Congressional Budget Office	Federal Reserve Bank of Cleveland
Federal Reserve Bank of Philadelphia	Federal Reserve Bank of New York
Federal Reserve Board	Social Security Trustees Report
U.S. Department of the Treasury	Investment Forecaster Survey (GRS)

Some of these organizations provide multiple forecasts of inflation for different time horizons, making a total of 18 forecasts from eight (8) reputable sources.

2018 Forward-looking Forecasts of CPI Inflation		
Horizon	**Average**	**Sources**
27 - 30⁺ yrs	2.41%	6
20 yrs	2.25%	3
10 yrs	2.24%	9

Our preferred inflation assumption for a 10 year horizon would be <u>2.24%</u>, the consensus average directly from nine (9) expert sources of mid-term inflation forecasts.

Our preferred inflation assumption for a 30 year horizon would be <u>2.41%</u>, the consensus average directly from six (6) expert sources of long-term inflation forecasts

Both mid-term and long-term horizons of inflation forecasts are used in developing our final net return assumption. It would be a false choice to be forced to pick between mid-term and long-term for the net return assumption. The composite single equivalent benefit horizon turns out to be much closer to the mid-term horizon than the long-term horizon, due to the expected future benefits stream, and the long-term forecasts are less reliable for reasons discussed in <u>Appendix F</u>. Nevertheless, our final development of the net return assumption is a blend or the single equivalent net return assumption (between the mid-term and long-term census averages).

On the other hand, the inflation component of the individual salary scale assumptions more clearly should be the mid-term horizon, given the average remaining working life of active members.

Consider the exhibit below, which shows the detailed inflation forecasts of these eight large reputable expert organizations in the field of inflation forecasting.

2018 Forward-looking Annual Inflation Forecasts (From Professional Experts in the Field of Forecasting Inflation)	
Federal Reserve Board's Federal Open Market Committee	
Current Long-run Price Inflation Objective:	
Objective since Jan 2012; Personal Consumer Expenditures (PCE)	2.00%
Consumer Price Index Inflation Objective (CPI = PCE + approx 40 bps)	2.40%
Congressional Budget Office: The Budget and Economic Outlook	
Overall Consumer Price Index (April 2018; Ultimate)	2.40%
Overall Consumer Price Index (April 2018; 10 Years)	2.38%
2018 Social Security Trustees Report	
CPI-W 10-Year Intermediate Assumption	2.55%
CPI-W 30-Year Intermediate Assumption	2.58%
Federal Reserve Bank of Philadelphia	
Livingston Survey: 10-Year Median Forecast (June 2018)	2.28%
Survey of Professional Forecasters: 10-Year Median Forecast (2Q2018)	2.30%
Federal Reserve Bank of New York's Trading Desk (June 2018)	
Survey of Market Participants: 10-Year Median Expectation	2.12%
Survey of Primary Dealers: 10-Year Median Expectation	2.10%
Federal Reserve Bank of Cleveland (July 1, 2018)	
10-Year Expectation	2.09%
20-Year Expectation	2.23%
30-Year Expectation	2.32%
U.S. Department of the Treasury (Ave in June 2018)	
10-Year Breakeven Inflation	2.12%
20-Year Breakeven Inflation	2.12%
30-Year Breakeven Inflation	2.16%
2018 GRS Survey of Investment Consultants and Forecasters	
Median expectation among 12 firms (averaging a 10-year horizon)	2.23%
Median expectation among 4 firms (averaging 27-year horizon)	2.57%

Mid-term Inflation Forecasts (10 Years)

Longer-term Inflation Forecasts (27-30 Years)
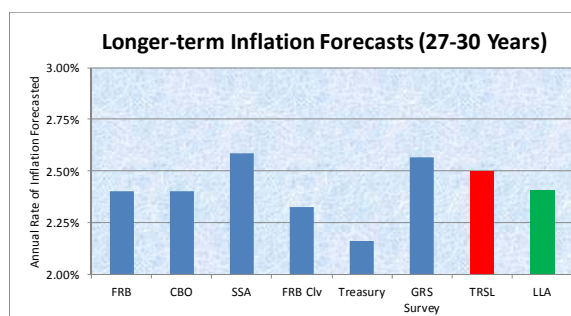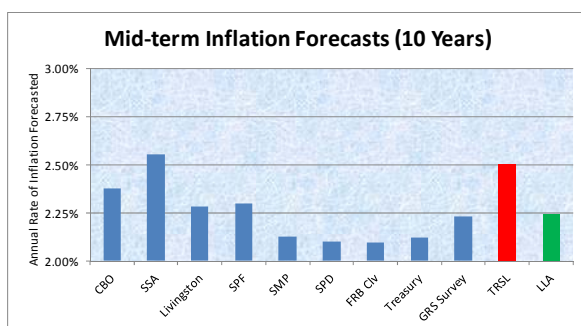
Note the System's inflation assumption makes no distinction between mid-term or longer-term; but is just a single 2.50% rate for its 2018 valuation.

Clearly, it is difficult to defend an inflation assumption of 2.50% for a mid-term horizon of 10 years. An inflation assumption of 2.50% for a long-term assumption of 30 years might be defensible. We opt for unbiased and independent opinions of leading inflation forecasters. To repeat the summary table for convenience:

2018 Forward-looking Forecasts of CPI Inflation		
Horizon	**Average**	**Sources**
27 - 30$^+$ yrs	2.41%	6
20 yrs	2.25%	3
10 yrs	2.24%	9

APPENDIX E
BASIS FOR NET INVESTMENT RETURN ASSUMPTION

Introduction to Improvements in Assumptions and Methods (repeated from Appendix B)

The actuary for the LLA is required by R.S. 11:127(C) to prepare an actuarial valuation for review by PRSAC. In fulfilling that responsibility, we accept some of the actuarial assumptions developed by TRSL's actuary and adopted by its board of trustees, while we reject other actuarial assumptions. Following is a brief summary of the principles we applied in adopting different assumptions used in this actuarial valuation as compared to last year's PRSAC-accepted valuation.

1. The economic assumptions as to future <u>inflation</u> and future <u>investment returns:</u>
    a. Should be an unbiased expectation of the future,
    b. Should not be unduly influenced by perceptions of what the contributing entity(ies) can afford in current annual budget negotiations,
    c. Should explicitly reflect the System's own asset allocation,
    d. Should explicitly reflect the System's own projected benefit cash flow,
    e. Should lie within the mainstream of forward-looking forecasts from experts, and
    f. Should be within a reasonable range above/below the most appropriate return assumption.

2. The expected future <u>cost-of-living (COLA) benefits</u> should be measured using an actuarial method that is:
    a. *Explicit.* Separately identify the cost of COLA benefits, and should not be implicitly buried or conflated within the return assumption and
    b. *Transparent. C*lear and meaningful; should not be misleading or confuse to the public.

3. <u>One set of assumptions</u> is used for the calculation of the unfunded actuarial liability as of June 30, 2018 and the contribution rate for the year ending June 30, 2020.
    a. *A change*. TRSL's board and actuary use two set of assumptions in a given actuarial valuation report, one for the UAL and one for the projected contribution rate.
    b. *Simple.* Less complicated for a given actuarial valuation report.
    c. *Transparent.* Clear as to what the assumptions are; no confusion with multiple assumptions used for different purposes in the same report.
    d. *Consistent with actuarial practice.* Consistent with the method used by other actuaries around the country and in Louisiana when assumptions are changed.
    e. *Consistent with the need for new assumptions.* If a new set of assumptions is more appropriate, and is adopted for use in an actuarial valuation, the new set of assumptions should consistently be used for all purposes throughout the actuarial valuation report.

The improvements in these four actuarial assumptions/methods enhance the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, these improvements enhance the integrity of the State's financial disclosures by ensuring the balance sheet liabilities are a more transparent and fair representation of the pension obligation.

This <u>Appendix E</u> describes our approach to developing the economic assumption as to the future net investment returns of the retirement fund's portfolio.

Principles for Setting Pension Return Assumptions

The purpose of the return assumption is to forecast what the pension portfolio is expected to earn in the future. While we are cognizant of the financial burden that pension contributions place on participating employers, our responsibility is to measure costs and liabilities without being unduly influenced by the resulting contribution requirement for a given return assumption. The role of the actuary for the LLA is to make an unbiased measurement of the retirement program's expected future cost to taxpayers, without regard whether the contributions are affordable. Our role is not to set or recommend assumptions to assist the employers in balancing their current budgets.

The pension return assumption should be a reasonable and defensible best estimate of the future net investment return of the pension portfolio over the given horizon. It should be based on the professional forecasts of *independent* subject matter experts and should be appropriate for use in an actuarial valuation of a retirement system. While we understand that different professionals may have differing opinions about the future, we do not consider the pension return assumption to be a lever to adjust up or down depending on what is affordable at the time.

Our primary focus is on following a robust and analytical process for objectively adopting an appropriate forecast of the pension portfolio's future earnings. We recognize the initial contribution shock caused by a large change in return assumption. But we choose to separate the setting of the most appropriate return assumption from budget implications; not to ignore the budget implications, but to address them separately, after the most appropriate return assumptions is derived.

Nevertheless, a reasonable and defensible "most appropriate" assumption for future net investment returns:

  a. Provides the most unbiased measure of the unfunded actuarial liability that is reported to the public,

  b. Provides the most responsible funding levels for the benefit security of plan members, and

  c. Achieves an appropriate balance of intergenerational equity (does not unduly "kick the can down the road").

This *purpose* of the return assumption is what drives our *process* for setting the assumption used in this actuarial valuation.

Process for Setting the Pension Return Assumption

We follow a robust and disciplined process for setting the return assumption (including the inflation assumption). The process includes these elements:

1. Perspectives: Where Should Actuaries Look for Input?
2. Inflation Forecasts from *Independent* Experts.
3. Asset Allocation.
4. Investment Return Forecasts from *Independent* Experts.
5. Consensus of Multiple Independent Experts.
6. Appropriate Horizon.
7. Most Appropriate Return Assumption
8. Reasonable Range Around the Most Appropriate Return Assumption

Perspectives: Where Should Actuaries Look for Input on Return Assumptions?

There are two types of perspectives to consider when defending or determining an assumed rate of future net investment returns of a pension fund. One is temporal – Do we look more to historical rates to inform decision-makers; or more to forward-looking forecasts of the future? The other is social – Do we look more to what other retirement systems are doing; or look more to what expert forecasters would expect for the System's own portfolio in the future?

Past returns? Looking backwards at historical rates of return is not considered to be reliable supporting documentation for current pension actuarial assumptions of future net returns. Historical rates of return are viewed more as information, than used to defend or determine a current net return assumption.   The past is indeed useful for understanding historical relationships among various economic forces and various statistical metrics such as standard deviations, correlation coefficients and P/E ratios; but even those have been known to change over time and may be different from their historical averages.

The current economic environment is not like the past 10, 30, or 50 years; and the future economic environment is certain to be different from the past. The role of the Federal Reserve Board and other factors are different than they used to be years ago. The System's portfolio and its managers are not even the same now as they were in the past; nor will they be the same in the future as they are now.

A forward-looking perspective should drive the defense or determination of a net return assumption for pension actuarial valuations. Strategically selecting historical returns (an X-year period ending on Y-date) to justify a return assumption being applied to the next 10, 20, or 30 year period is not valid.

Therefore, historical returns for this System or investments in general have minimal relevance to us. We chose instead to develop our net return assumptions based on *forward-looking* forecasts from subject matter experts, then apply this System's own characteristics to arrive at a final assumption.

Other retirement systems?   Looking to what other peer retirement systems are assuming for future investment returns is generally not a well-placed focus.

While it may be interesting, even important, to know what investment return assumptions are used by other large public sector retirement systems, that information is not useful for discharging our duties for adopting a net investment return assumption for the System's actuarial valuation. It is not useful for actually informing us concerning the economic forecasts applicable to this valuation.

a. *Different environments*. Public retirement systems across the United States each have their own politics, environments and sets of agency risk. Their assumption-setters may not have adhered to mainstream and objective forecasts of experts, but may have been influenced by budgets, protectionism, and politics. These are not best practices to be emulated when setting assumptions. Since it is impossible to determine which retirement systems applied a robust, analytical process and which were more influenced by budgets, we felt it best not to select the return assumptions based on what other retirement systems assume.

b. *Different asset allocations*. Other retirement systems are certain to have different asset allocations than this System, either more aggressive or less aggressive. That would make it a false comparison. A system's own table of asset allocation targets is a major input factor into the selection process.

c. *Different horizon*.   Other retirement systems may have been influenced by their consultants advocating a long-term horizon for the net investment return assumption. This is fairly common, but as discussed below, a mid-term horizon in more appropriate for the reasons stated. A single equivalent rate between the mid-term consensus and the longer term consensus, derived from a system's own respective cash flow demands, may be the most appropriate return assumption.

Looking at other retirement systems is important and useful for knowing what others are doing; but is not appropriate as a driving factor in defending or determining a return assumption for this retirement System.

Expert sources of investment return forecasts (from large, independent, unbiased and, reputable forecasting firms) are the best places to look for input when setting a return assumption for pension valuations. These are much more objective and unfiltered sources, directly from the experts themselves, to guide decision-makers.

Adopting a *process* that looks to a consensus of external and independent subject matter experts' forward-looking forecasts is the best way to avoid the political and budget pressures that sometimes distract or influence assumption-setters away from our primary duty to set a return assumption as an unbiased best estimate (or most appropriate) of the future earnings of the portfolio.

Asset Allocation

It has been generally accepted for many years that a fund's asset allocation is responsible for the vast majority of a fund's investment performance. Therefore, the asset allocation of the System is a core element in setting and evaluating assumed future returns.

We relied on the 18 target asset allocation percentages set forth in the System's formal Investment Policy Statement last updated December 1, 2017.

2018 TRSL Target Asset Allocation				
Risk Assets			**Fixed Income Assets**	
Large/Mid Cap U.S. Equity	20.0%		Core U.S. Fixed Income	9.0%
Small Cap US Equity	5.0%		High Yield Bonds	4.0%
International (Non-U.S.) Equity	11.0%		Non-U.S. Developed Bonds	2.0%
Emerging Markets Equity	8.0%		Emerging Market Bonds	3.5%
REITs	2.0%			
Core Real Estate	5.0%			
Non-Core Real Estate	5.0%		*Total Fixed Income Assets*	*18.5%*
Private Equity - Corporate Finance/Buyouts	11.0%			
Private Equity - Venture Capital	3.0%			
Private Equity - Mezzanine	5.0%			
Private Equity - Distressed Debt	3.0%			
Infrastructure	1.5%			
Commodities	1.0%			
Farmland	1.0%			
Total Risk Assets	*81.5%*		*Total Asset Allocation*	*100.0%*

Source: Current TRSL Investment Policy Statement (Effective December 1, 2017)

This asset allocation is riskier than other pension funds. Even the fund's allocations to fixed income assets are risk-oriented. It is, therefore, expected to earn somewhat more than others with more conservative portfolios. As a result, this System's expected rate of return *should* be greater than other retirement systems with lower allocations to risk assets.

Refer to Appendix I for additional information concerning pension risk in accordance with ASOP No. 51.

Input from Independent Experts

We applied the target asset allocations to the expectations in the GRS Survey of 13 major national investment consultants and forecasters.

External forecasters

These 13 firms are independent of the LLA's office and independent of GRS. This way, all parties can be assured there is no real or perceived agency risk or bias in the selection of the most appropriate return assumption by the actuary for the LLA.

Twelve of these 13 investment consultants/forecasters provided GRS with their mid-term (10 years) horizon forecasts, and four of them provided GRS with their longer-term (20 to 30 years) horizon forecasts. Given the brevity of the descriptions of the asset classes identified, our mapping of the fund's asset classes to the investment consultant's asset classes may not be exact.

Listed below are the national firms in our 2018 GRS Survey. These are very large and reputable investment consultants and forecasters.

Participating Investment Forecasters			
Aon/Hewitt[IC]	BNY/Mellon[IM]	Callan[IC]	Cambridge Associates[IC]
J.P. Morgan[IM]	Marquette[IC]	Mercer[IC]	NEPC[IC]
PCA[IC]	RVK[IC]	Summit[IC]	VOYA
	Wilshire[IC]		

[IC] *In the top 25 largest investment consultants, according to the most recent survey from P&I.*

[IM] *In the top 10 largest investment managers, according to the most recent survey from P&I/WTW.*

Number of experts

A caution is in order against including too many in the consensus survey. GRS includes 13 large forecasting firms, with large research staffs, robust methodologies and peer accountability.

If the number of firms in the survey were too high, it would include firms with smaller research staffs, much less robust methodologies and less peer accountability. Furthermore, smaller firms often rely on some of the same research information and forecasts developed by the larger firms and, therefore, create overlap in the survey.

Methodology

The actuary for the Legislative Auditor adopts a methodology that minimizes "mapping error" and selects experts for inflation forecasting separate from investment return forecasting:

1. Mapping error refers to the slippage that sometimes occurs when mapping asset allocations from one list of asset classes to another. Not all asset class lists are identical.

For example, one list might include international debt while another might fold its holdings in international debt into an asset class called merely core fixed income. A reasonable proxy must be substituted. This creates some amount of uncertainty in the process.

The actuary for the Legislative Auditor minimized this mapping error by using only a single mapping.

Another methodology creates a standardized set of asset classes and maps all forecasters' asset classes into this single standardized list of asset classes. The *first source of mapping error* occurs when each such standardized asset class is assigned a composite expected return and a composite standard deviation from those forecasters who all have different lists of asset classes. A *second source of mapping error* arises from trying to create a single standardized composite set of correlation coefficients across mismatched sets of asset classes. These two sources of mapping error distort each forecaster's original capital market assumptions and their own considered relationships among asset classes. Then a *third source of mapping error* occurs when a system's own asset class list is mapped to the standardized set of asset classes with their composite expected returns, standard deviations and correlation coefficients.

The methodology employed in this valuation's research maps the System's asset allocation to each of the 13 forecasters' asset classes separately, thereby preserving the integrity of each such forecaster's capital market assumptions. This methodology also generates useful information about what each forecaster would say is their own expectation of the System's portfolio returns in the future.

2. As described in detail in Appendix D, the actuary for the Legislative Auditor turned to professional inflation forecasters for estimates of future inflation rates for this actuarial valuation report. Investment consultants and managers all have some expectations of future inflation, and usually include those expectations in their capital market assumptions for their investment forecasts. While investment forecasters are one source for inflation forecasting, they are not considered the best source.

   Economists are the best source of inflation forecasting. Economists often specialize in a wide range of subtopics (labor markets, tax revenue, etc.). Economists who publish inflation forecasts (specialists) are the best sources, not investment consultants.

Independent Experts' Forecasts for TRSL

We mapped the System's most recent target asset allocation to each of these 13 investment forecasters' expected returns by asset class.

We replaced the mid-term investment forecasters' respective mid-term inflation assumptions with 2.24%, our preferred mid-term assumption based on the consensus of expert inflation forecasters' expectations presented above in order to normalize for a consistent inflation assumption across all forecasters.

Likewise, we replaced the long-term investment forecasters' respective long-term inflation assumptions with 2.41%, our preferred long-term assumption based on the consensus of expert inflation forecasters' expectations presented above in order to normalize for a consistent inflation assumption across all forecasters.

This process results in normalized expected returns for any one given year in each of the two forecast horizons (mid-term and long-term). These are called the expected arithmetic returns. Finally, we reduced the resultant one-year arithmetic returns for volatility drag in the compound return expected over time, because pensions are all about compounding in a volatile environment over the horizon. These are called the expected geometric returns or 50th percentiles.

Below are the results of this process for the <u>mid-term horizon</u>.

Investment Forecaster	Distribution of 10-Year Compound Average Percentile Expectations			Probability of exceeding 8.05%
	40th	50th	60th	
1	4.78%	5.78%	6.80%	28.62%
2	4.86%	6.07%	7.28%	34.02%
3	5.05%	6.25%	7.45%	35.29%
4	5.19%	6.30%	7.41%	34.60%
5	5.34%	6.33%	7.32%	33.10%
6	5.24%	6.44%	7.65%	36.83%
7	5.14%	6.52%	7.93%	39.15%
8	5.59%	6.56%	7.55%	35.11%
9	5.60%	6.66%	7.72%	37.02%
10	5.74%	6.84%	7.94%	39.04%
11	6.00%	7.16%	8.34%	42.43%
12	7.54%	8.42%	9.31%	54.24%
Average	**5.51%**	**6.61%**	**7.72%**	**37.45%**
Average of Middle* 10	**5.38%**	**6.51%**	**7.66%**	**36.66%**

* Discarding the lowest and highest outliers.

There are three important takeaways from this exhibit:

a. Over the <u>mid-term horizon</u>, the range of expert expectations of the 50th percentile of compound average return runs from 5.78% to 8.42%.

b. The 50th percentile consensus expert <u>mid-term</u> forecast is 6.61%.

c. The consensus of these experts is that there is only a 37.45% chance of achieving at least the current 8.05% over the mid-term horizon. *The System's current return assumption is 8.05% (not 7.65% or 7.60%).* This does not mean a 37.45% chance of achieving the 8.05% assumption in any year during the horizon; it means that the compound return over the next 10 years has a 37.45% of achieving at least the 8.05% assumption.

This is why, actuarially speaking, the 6.61% rate of return is the preferred assumption for a mid-term horizon because it is the 50th percentile expectation of compound returns over a mid-term horizon. The consensus is that there is a 50-50 chance of returning at least 6.61% when compounded over the next 10 years.

Below are the results of this process for the <u>long-term horizon.</u>

Investment Forecaster	Distribution of 27-Year Compound Average Percentile Expectations			Probability of exceeding 8.05%
	40th	50th	60th	
A	6.59%	7.27%	7.95%	38.62%
B	6.65%	7.38%	8.11%	40.81%
C	6.76%	7.44%	8.12%	41.00%
D	6.99%	7.67%	8.35%	44.32%
Average	**6.75%**	**7.44%**	**8.13%**	**40.14%**

Note: These investment forecasters providing longer term expectations are among the top 12 largest investment consultants with substantial research departments. Nevertheless, in our opinion, mid-term forecasts (or somewhere between mid-term and longer-term) are more appropriate for most retirement systems for reasons discussed in Appendix F.

There are three important takeaways from this exhibit:

1. Over the <u>long-term horizon,</u> the range of expert expectations of the 50th percentile of compound average return runs from 7.27% to 7.67%.

2. The 50th percentile expectation of the consensus average for the <u>long-term horizon</u> is 7.44%.

3. The consensus of these experts is that there is only a 40.14% chance of achieving at least the current 8.05% over the long-term horizon. *The System's current return assumption is 8.05% (not 7.65% or 7.60%).* This does not mean a 40.14% chance of achieving the 8.05% assumption in any year during the horizon; it means the compound return over the next 27 years has a 40.14% of achieving at least the 8.05% assumption.

This is why, actuarially speaking, the 7.44% rate of return is the preferred assumption for a long-term horizon because it is the 50th percentile expectation of compound returns over a long-term horizon. The consensus is that there is a 50-50 chance of returning at least 7.44% when compounded over the next 27 years.

However, as discussed in a later section, we do not have to choose between the mid-term and long-term horizons. That most appropriate return is somewhere in between the two horizons, derived by recognizing the plan's own expected benefit stream.

A new pension plan with very little in benefits paid until the third decade can comfortably use a long-term horizon. But a mature pension plan with a large proportion of its future benefits expected to be paid in the first decade or two should adopt a return assumption that is closer to the mid-term than to the long-term. This derives from basic actuarial principles.

Refer to the Appendix F below on the appropriate horizon for more actuarial details.

Consensus of Multiple Independent Experts

Rather than rely on just one or two experts, we follow conventional wisdom and track the consensus (average) of several expert forecasts.

It matters not whether the field of forecasting is for hurricanes, earthquakes, elections, or inflation and investment returns, a *consensus average* of many reputable experts is proven to be more accurate than any one of those experts.

This ensures the final selection of the return assumption is in the mainstream consensus of reputable national experts.

As described in the section above on "Perspectives: Where Should Actuaries Look for Input on Return Assumptions," it is more important to be in (a) the mainstream of what forecasting experts say about this System's portfolio than to be in (b) the mainstream of what other retirement systems say about their own systems.

APPENDIX F
HORIZON FOR THE
NET INVESTMENT RETURN ASSUMPTION

It is often said that projecting pension costs is a long-term proposition. Forecasts of future inflation and future returns come in short-term horizons (1-5 years), mid-term horizons (5-10 years), and longer-term horizons (20-30 years). Long-term forecasts are appealing and tempting, usually producing higher returns than mid-term horizon forecasts.

While it may be argued that reliance should be placed on the longest-term horizons, there are at least four compelling reasons <u>not</u> to do so:

Compelling reason #1: Underperformance in the mid-term is not sustainable.

If the forecasting experts are right, there may be a decade or two of lower pension plan returns, with a need for very high returns thereafter if their longer-term forecasts are to hold up.

For example, in correspondence dated May 6, 2016, the U.S. Treasury Department denied the application of the Board of Trustees of the Central States, Southeast and Southwest Areas Pension Plan for rolling back benefits under the Multiemployer Pension Reform Plan Act of 2014 in order to avoid insolvency. One of the reasons given in the ruling[2] was that the 7.5% and other embedded return assumptions were "significantly optimistic" and were "not reasonable." More specifically, the ruling stated that the return assumptions used to support the application were not reasonable or appropriate for the purpose of the measurement, did not take into account relevant current economic and investment forecast data, and had significant bias by being significantly optimistic. This three-fold denouncement was made primarily on the basis of the assumption's failure to recognize the lower expected returns in the first 10 to 20 years of the longer term horizon.

Even though pensions are long-term propositions, we live in a short-term and mid-term world. We should not need to wait 20 or 30 years to be vindicated for an assumption for which we have so little confidence in anyway. In *The Tract on Monetary Reform (*1923), John Maynard Keynes said, "*But this long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is past the ocean is flat again.*" Many financial economists, many in the press and many academics are calling for much lower investment return assumptions. The optics are not good for continuing to hold to a long-term horizon of 20-30$^+$ years, when so many mid-term years are forecasted by the experts to be underperforming against the long-term.

Repeated underperformance (for the next decade or so) of actual returns compared to the assumed return undermines the confidence in defined benefit plans. If the experts are right about the next 10 years but the return assumption is significantly higher, legislators and taxpayers might insist on a retirement plan that transfers the investment risk onto the members. Repeated increases in contribution rates and repeated additions to the unfunded actuarial liability may not be tolerable.

It is better to be more conservative in the return assumption over the mid-term time horizon while experts are forecasting lower compound annual returns.

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[2] https://www.treasury.gov/services/Responses2/Central%20States%20Notification%20Letter.pdf

Compelling reason #2: Over-reliance on reversion to mean returns.

Long-term investment return forecasts (20-30 year horizons) often use a different methodology than mid-term forecasts. They often rely on the concept of "reversion to mean returns." While almost everything about the future is not known for certain, at least two things are known for sure – (1) The long-term picture will not be like the past and (2) Neither will the steps leading through it. Reversion to mean returns depends on the future environment being like the past.

The number of heads we see in an unbiased coin-flip experiment exhibits reversion to the mean. Given a large enough number of coin-flips, we can reasonably expect the future number of heads to be approximately the same as in the past (half the number of coin-flips), because the coin is unbiased and the future is very much like the past. This cannot be said of investment markets.

This weakness of long-term forecasts is not, by itself, sufficient to disregard experts' long-term forecasts of the future entirely. But it should inform us not to rely on it to the exclusion of mid-term forecasts.

Compelling reason #3: Return forecasts over a longer-term horizon are the less reliable.

There is less certainty in the longer-term forecasts. Conventional risk management says that in the face of uncertainty, investors become more conservative. Thus, decision-makers should consider being more conservative than the longer-term forecasts because the longer-term forecasts are more uncertain.   This is a principle in any forecasting profession, whether investment forecasting, election forecasting or hurricane forecasting. Longer-term forecasts are less reliable than mid-term forecasts.

There are two types of statistical error in forecasting –
  1. Error <u>around</u> the mean (some have called this "risk") and
  2. Error <u>in</u> the mean (and some call this "uncertainty").

Consider the following graph of the expected dispersion of forecasted compound returns around the forecasted compound mean. This shows that the compounded error around the compounded mean decreases over time. This is a common graph. But that type of error is not the one that brings the most uncertainty.
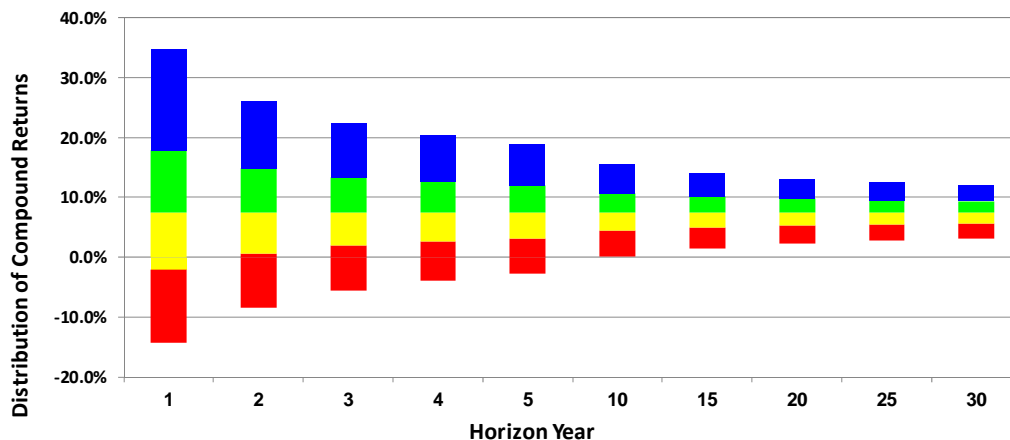
This dispersion graph *presumes* we know for certain what the statistical mean is for the ever-varying future investment returns, and illustrates merely what we think about how the varying returns will behave around that anchor-mean. The biggest uncertainty, here, is that no one knows for certain what the anchor-mean will be.

Many unexpected events will happen in the future that will throw off the anchor from our *presumption*. Even though the experts are reasonably accurate about the dispersion around the mean, they are likely to be off for their expectation of the future mean.

Many more things can insert themselves into our future over the next 30 years than over the next 10 years. So when we say, "*Return forecasts over a longer-term horizon are the less reliable*", we do not refer to the dispersion illustrated in this graph (which might be misunderstood as proving the opposite). We are referring to how confident (or not) we are in the mean itself.

We can mitigate some of the uncertainty by aggregating the opinions or several experts as to what the long-term compound annual return will be, i.e., calculate the average (or consensus) of their forecasts. However, the consensus of long-term forecasts is still more unreliable than the consensus of mid-term forecasts. There will be many events in years 1-10 that will undermine the mid-term outcome, making the final result either higher or lower than the mid-term consensus forecast. But add other 20 years on top of that (years 11-30) and many more events can insert themselves in years 11-30 to undermine any such long-term forecast.

This is the third reason why we are hesitant to place too much reliance on long-term investment return forecasts.

Compelling reason #4: The system's own cash flow demands.

Possibly the most compelling reason *not* to accept the long-term forecasts, without regard to the mid-term forecasts is a purely actuarial reason. It is fundamental in setting actuarial assumptions to incorporate (explicitly so) a retirement system's own characteristics into the process.

- The most obvious factor is to incorporate a system's own investment policy's asset allocation, as required by ASOP 27 Section 3.8.3(a). It is an actuarial weakness to either select or defend a system's return assumption without explicitly incorporating the fund's own asset allocation into the math.

- Secondly, a system's own cash demands upon the fund should explicitly be incorporated into the assumption-setting math, as required by ASOP 27 Section 3.8.3(f). The timing of when benefit and expense payments place a drain on the fund affects how much the fund should be expected to earn while those assets are still in the fund.

Experts currently forecast investment returns to be lower over the mid-term horizon (say, years 1-10) than over the long-term (years 11-30). They generally expect the later years to boost the compound average over 30 years compared to the compound average over the first 10 years.

Consider a newly formed retirement system (system A) which is expected to pay very little in benefits over the mid-term horizon and most of its benefits beginning in year 25. Consider

another retirement system (system B) that is a "mature" retirement system. This is not so extreme, but actually quite common. A mature retirement system is expected to pay a significant amount of its current accrued benefits over years 1-10. Mature retirement systems often pay out more in benefits than they take in from contributions (from employees, employers, or other sources). This is the natural order of things.

Retirement system A can comfortably adopt a longer-term horizon for its expected investment return assumption because it has a long time to make up for the lower earnings that are expected in the mid-term (e.g., years 1-10) before it has to actually pay benefits out of the fund.

A large portion of retirement system B's current assets will not be around in years 11-30. They will be paid out of the fund over the next 1-10 years. Those assets will be earning only what is available in the marketplace over the next 1-10 years. They will not be around to make up for the lower earnings that are expected in the mid-term (e.g., years 1-10).

Even if one were to a accept long-term horizon for setting return assumptions, in disregard of the first three arguments outlined in the immediately preceding pages, he or she would need to take into account the systems own benefit demands and adopt a return assumption somewhere between the mid-term and long-term expectations, so as to recognize the investment horizon or timetable for the benefit payments to be made over the next 10 years.

Furthermore, even the benefits expected to be paid out in years 11-20 will not be around for those last 10 years (years 20-30) and the first 10 years of earnings will drag down their average compounded return for the time remaining in the fund (years 1-20).

There is a not-so-complicated actuarial projection of a retirement system's future benefit demands. Consider the following graphs illustrating these points.

Teachers' Retirement Systems of Louisiana (TRSL)
Projected Number of Members Drawing Benefits
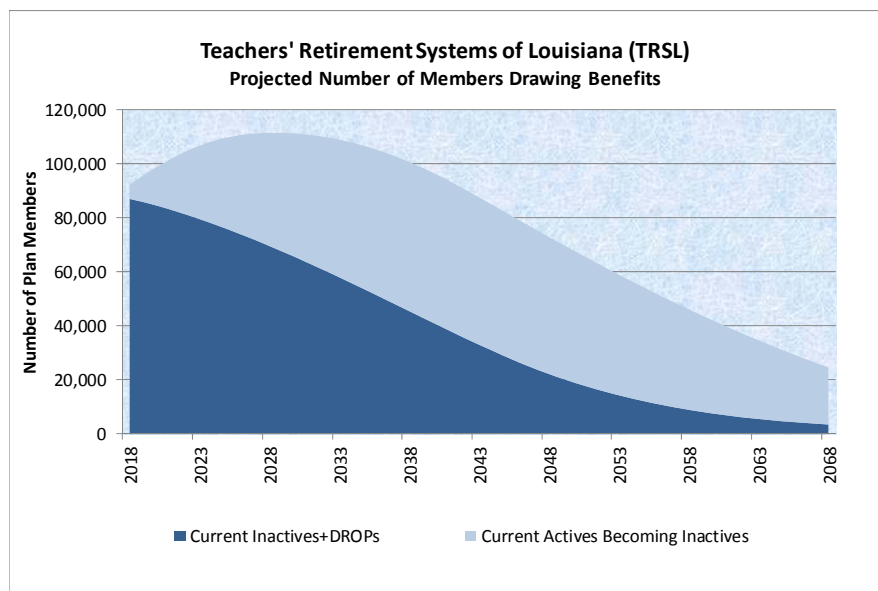
Over 80,000 current retirees are drawing benefits and will continue to do so until death. More retirees will be added to the roll from current active employees retiring in the years ahead, and then they will continue to receive benefits until death.
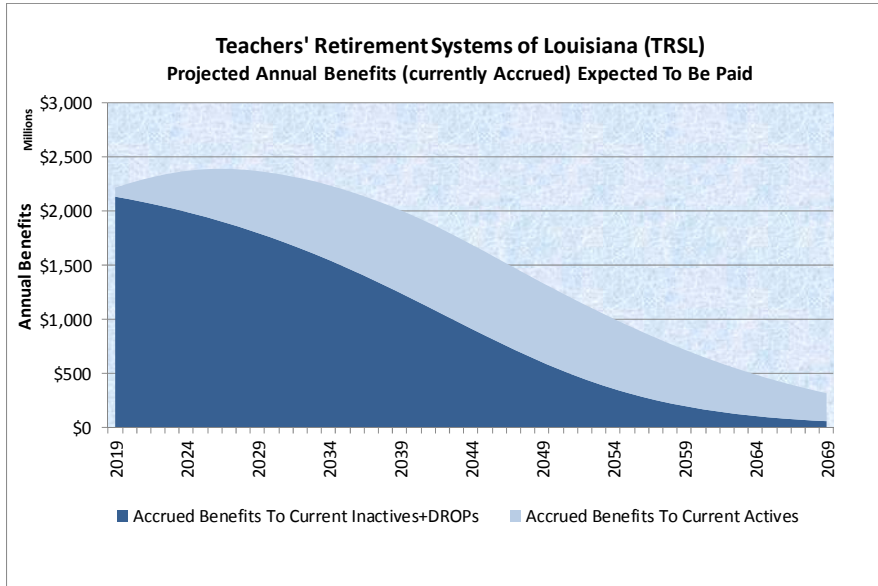
Currently, over $2 billion per year in benefits are being paid to current retirees. Their benefits will continue until death. More benefits will be paid to current active who will retire in the years ahead. This, of course, is the purpose of retirement systems – to pay benefits to retiring public servants.

For many years, benefits and expenses paid exceed the contributions made from employees, employers and the state (i.e., negative cash flow). This System is very mature. The cash demands upon the fund need to be recognized in setting or defending the return assumptions.
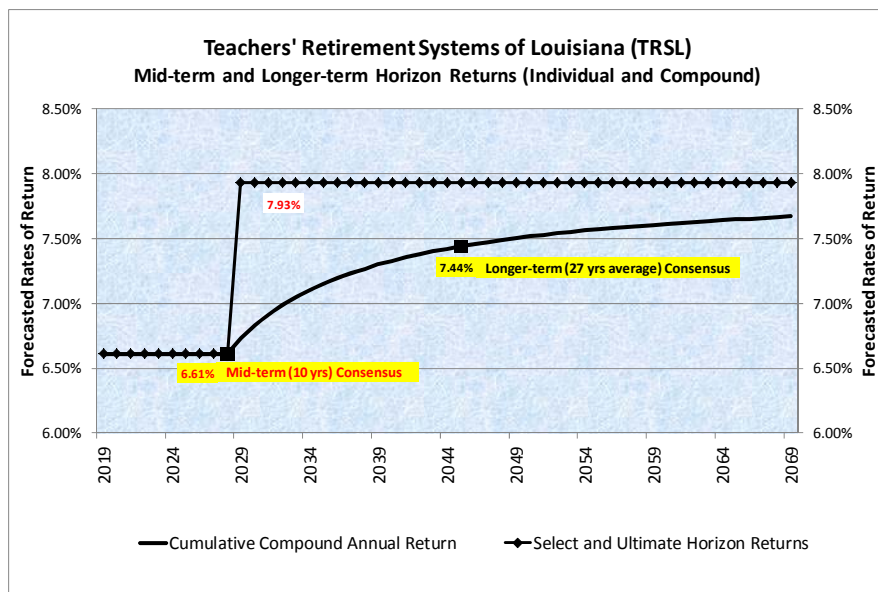
As presented in the previous <u>Appendix E</u>, the consensus 50th percentile expectation for the compound annual returns over the next 10 years (years 1-10) is 6.61%, and over the full 30 years (years 1-30) it is 7.44%. In order for the 30-year average to be 7.44%, the returns during each of the years 11-30 need to be 7.93% (in order to make up for drag in returns for years 1-10).

The curved line from 2028 through 2069 represents the cumulative compound average returns at each point, comprised of returns of 6.61% per year for years 1-10 compounded with returns of 7.93% each year thereafter. Notice at 27 years, the compound average return is the forecasted 7.44%.

This separate forecast of returns for years 1-10 and years 11-30 is necessary to measure the earnings generated by the fund's current assets from the valuation date through the year when the benefits are expected to be paid.

In the graph below, overlay the total annual benefits (accrued to current retirees and current actives becoming retired) to illustrate the time when the benefit assets are still in the fund.
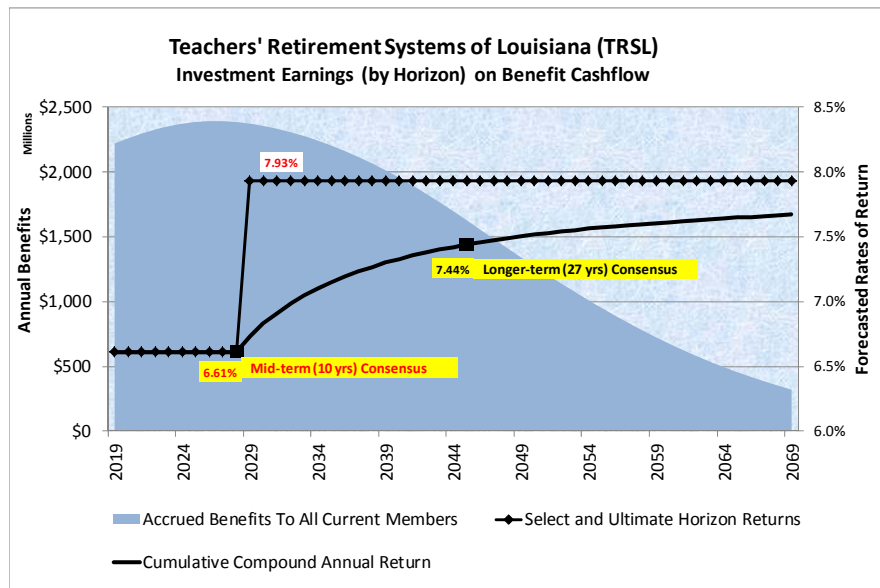
Teachers' Retirement Systems of Louisiana (TRSL)
Investment Earnings (by Horizon) on Benefit Cashflow

In the graph below, overlay the present value (darker blue bars) of those annual benefit payments to illustrate the effect in terms of current dollars, i.e., current assets that will ultimately pay those benefits (lighter blue region). Again, the current assets that will pay these expected benefits for years 1-10 will only be earning 6.61% per year, while assets that will pay the benefits for years 11-20 will be earning only 6.61% for years 1-10 and 7.93% for the balance of years until payment.

Teachers' Retirement Systems of Louisiana (TRSL)
Benefit Cashflow and Investment Forecast Horizons
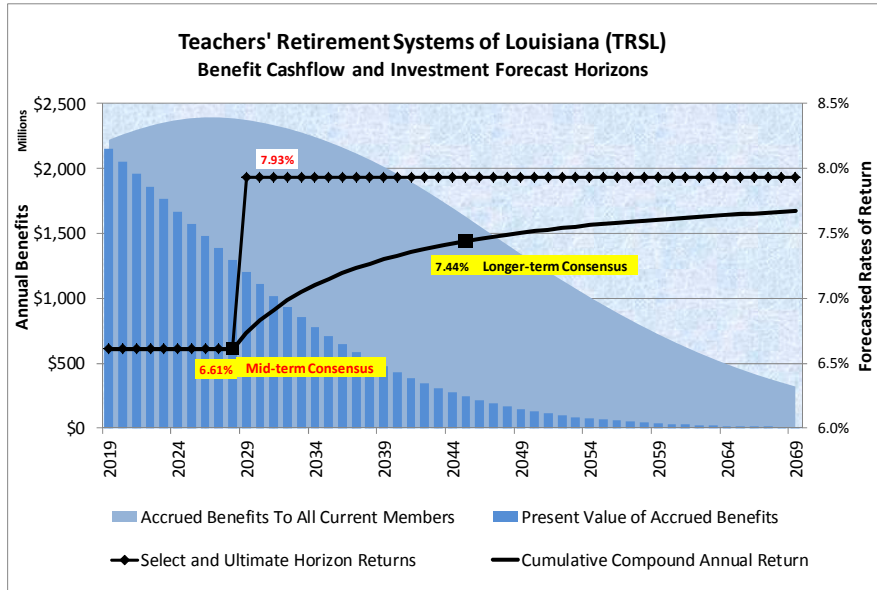
Recognizing the System's own benefit demand timing and the different earnings expectations over years 1-10 versus years 11-27, the single equivalent net investment return on all assets used to pay these benefits is <u>7.08%.</u>

Teachers' Retirement Systems of Louisiana (TRSL)
Single Equivalent Cashflow-adjusted Investment Return Forecast
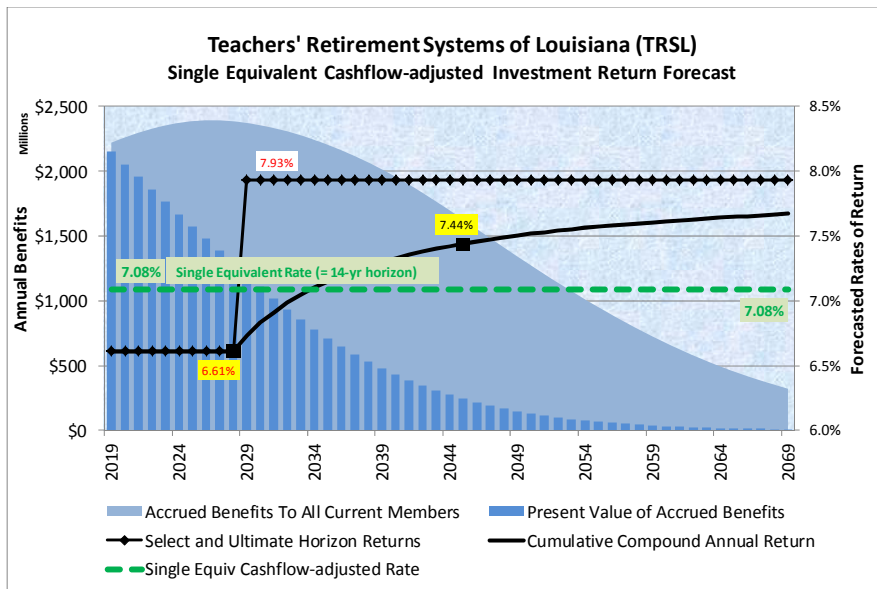
Appendix F: Horizon for the Net Investment Return Assumption

All of these last several pages demonstrate how inappropriate it is to simply adopt a 30-year horizon for setting the net investment return assumption for an actuarial funding valuation.

To summarize, adopting a return assumption should incorporate in an explicit manner:

1. A retirement system's own investment policy (target asset allocation) and
2. A retirement system's own expected benefit stream.

Notice the horizon associated with the single equivalent expected return is 14 years. Therefore, the mid-term forecast consensus should have a strong influence over the final assumption that incorporates the system's own cash benefit demands.

Some might argue, based on the first three compelling reasons not to consider long-term horizon forecasts at all, i.e., that the 6.61% consensus of 10-year expectations is even more appropriate than the 7.08% single equivalent return assumption. There is merit in that position for those three compelling reasons.

We chose to use a rounded-down assumption of 7.0% as the "most appropriate" return assumption. However, as set forth in the following Appendix G, we consider a range of reasonableness around (above and below) this most appropriate return assumption.

APPENDIX G
A REASONABLE RANGE AROUND
THE MOST APPROPRIATE ASSUMED
NET INVESTMENT RATE OF RETURN

Most Appropriate Return Assumption

The single equivalent return assumption developed in the previous Appendix F is 7.00%, rounding down from 7.08% to reflect less confidence in the long-term return forecasts.

The actuary for the Louisiana Legislative Auditor, therefore, adopts 7.00% as the "most appropriate" return assumption, with a range of reasonableness around it. This valuation was prepared using a net return assumption at the very top of the range of reasonableness around the most appropriate return assumption of 7.00%.

Reasonable Range around the Most Appropriate Return Assumption

After all the robust analytics are applied to develop the most appropriate single equivalent return assumption, the next and final step in the process is to identify a reasonable range around that "most appropriate" return assumption.

Even though this process is robust, objective and analytical, it does not assure that the most appropriate return assumption is what the future will actually bring.

There is some slippage or uncertainty at key steps in the process. The final step is to overlay a certain amount of subjectivity to the final range. This range is intended to recognize the uncertainties inherent in this process. The uncertainties can go both ways: the actual emerging results over time can turn out either higher or lower than this "most appropriate" return assumption.

Therefore, the range is expressed as X basis points above and below the most appropriate return assumption.

- Mapping error might be responsible for 10-20 basis points.

- Considering the four long-term horizon forecasters, the range between top and bottom 50th percentiles is 40 basis points.

- Considering the 12 mid-term horizon forecasters, after discarding the two outlier 50th percentiles (lowest and highest), the range between the 2nd lowest and the 2nd highest is 109 basis points.

Therefore, we consider 100 basis points *around* the most appropriate return assumption to be a reasonable range, i.e., 50 basis points above and 50 basis points below the 7.00% most appropriate return assumption. *This results in a reasonable range of 6.50% to 7.50%.*

A choice of 7.50%, even though lying within the reasonable range, lies at the upper extremities of reasonableness and, should be considered aggressive.

A valuation assumption of 7.50% is not conservative. The 7.00% most appropriate return assumption should also not be considered "conservative." It is at the middle of the range, i.e., the most appropriate. The bottom end of the range, 6.50%, should be considered conservative.

APPENDIX H
MEASURING FUTURE
GAIN-SHARING COST-OF-LIVING BENEFITS

Modeling Gain-sharing COLA Benefits

COLA benefits derived from investment earnings above certain thresholds are commonly called "gain-sharing" COLAs. More commonly, retirement benefit COLAs are fixed or tied to the Consumer Price Index.

This term "gain-sharing" derives from plan provisions that "share" higher-than-usual investment gains with members rather than using them, as is typically done, to help pay (indirectly) for the employer's required contribution. But there is a cost to that "sharing." Measuring that cost is the subject of this Appendix H.

The System's retirees are likely to receive future cost-of-living (COLA) benefit increases with some regularity. This likelihood comes from the workings of the relevant state statutes coupled with the tendency and history of board members and legislators voting to grant COLAs whenever allowed in accordance with the statutory template.

A notional Experience Account is maintained by the System to hold funds which ultimately are used to provide COLA benefits. The Experience Account is replenished with investment gains that exceed certain thresholds, subject to a series of complex formulas and rules set forth in the statutes.

The mathematical and logical rules set forth in the statutory template lend themselves to actuarial modeling. The frequency and magnitude of the future transfers to the Experience Account can be modelled actuarially using well-accepted techniques. Given the presumption that Legislators will grant template-driven COLAs whenever allowed by the statutes, it is actuarially appropriate to recognize the frequency and magnitude of future COLAs when performing an annual actuarial valuation of the System's costs and liabilities.

The System's board and actuary have included the value of future COLAs, as described above, in each of the last several annual funding valuations. We concur that it is essential to recognize the costs and liabilities of future COLAs in all actuarial valuations, and have done so in this valuation.

We have seen three actuarial methods employed to measure the costs and liabilities of future COLAs, all of which require stochastic modeling techniques to simulate the operation of the statutory mechanism. The statutory COLA provisions applicable to the System are complex, but can be modeled actuarially. Each actuarial method involves an estimate of one statistic or another, which should be re-calculated every few years unless something changes significantly or the actuarial programming is improved. Nevertheless, as with all assumptions, it should be reviewed every year for reasonableness.

The three actuarial methods are described below, along with our rationale for why we employed the first one in this actuarial valuation rather than either of the other two.

1. The <u>first actuarial method</u> (preferred) is also the most explicit and transparent of the three actuarial methods. It determines a *single equivalent annual COLA* benefit which is calculated as equivalent to the stochastically modelled statutory template (after transfers to the Experience Account and after approvals of permanent benefit increases).

    It substitutes an assumed annual COLA to measure the plan's future costs and liabilities. It is only hypothetically applied annually, in the actuarial valuation as an approximation of the actual COLA provisions.

    a. This is preferable to the third method (which is currently employed by the System and its actuary) because this first method leaves the return assumption equal to the discount rate. This method will eliminate substantial confusion and misunderstanding, caused by the current method.

    b. It is preferable to the next two methods because it gives management of the System and Legislators an idea of how much of an annual COLA is equivalent to the current complex statutory template.

    c. It is preferable to the next two methods because the statistic being estimated is not a number of investment basis point earnings, nor a load factor, but an equivalent annual COLA – the very thing that is being promised in the statutes.

    d. It is useful information for members who want a rough equivalent annual COLA value. We do not believe use of this actuarial method in the annual actuarial valuation will automatically give members an expectation of an annual COLA, as some have purported. The statutes prevail; and knowledgeable parties should understand that COLAs are not allowed to be granted annually until the funded status reaches a higher level. This is just an estimated equivalency.

2. The <u>second actuarial method</u> *adds a load factor* to the non-COLA benefit stream to approximate the effect of granting future COLAs. This load factor is applied to increase the non-COLA normal cost and actuarial accrued liability as an estimate of the additional benefits generated by the workings of the COLA provisions (after transfers to the Experience Account and after approvals of permanent benefit increases).

    While not as preferable as the first method, this second method is preferable to the third method (which is currently employed by the System and its actuary) because it leaves the return assumption equal to the discount rate. This method would eliminate a lot of the confusion and misunderstanding, caused by the current method. However, this second method lacks additional management-useful information available under the first actuarial method.

3. The <u>third actuarial method</u> is the current method employed by the System and its actuary. It employs an implicit recognition of future COLAs by *reducing the return assumption* by an annual amount expected (on average) to be syphoned off from the core pension fund and transferred to the experience account. This is the least preferable of the three methods because:

    a. It creates a confusion between the return assumption and discount rate. For 2017, as described in <u>Appendix C</u>, page C-1, the System assumed 8.20% as the total rate of return (net of investment-related expenses) to finance the core/regular benefits, the gain-sharing COLA benefits and administrative expenses. They *reduced the return assumption* by 0.40% as an estimate of the cost of gain-sharing COLAs and by 0.10% for the administrative expenses, which resulted in a final discount rate of 7.70%. These are called implicit adjustments to the return assumption.

    The System has disclosed 8.20% as its return assumption to some audiences but 7.70% to broader audiences, while they really mean their discount rate was 7.70%. This has led to significant confusion and misunderstanding of the actual assumptions.

    b. This third method is not permitted for GASB financial reporting.

    c. It is not fully transparent in isolating and identifying the stream of expected COLA benefits.

    d. The "implicit" approach is out of favor among actuaries, who generally prefer "explicit" assumptions being reasonable individually; the actuarial profession moved toward explicit assumptions during the 1970s and 1980s.

    e. It causes some confusion and interpretive questions when applying the statutory rules and determining the actuarial gains and losses in connection with the use of a return assumption, the board-approved valuation rate, and/or the discount rate.

Modeling results for the first actuarial method

The first actuarial method (preferred) projects the expected streams of future gain-sharing transfers into the experience account using the investment-related assumptions adopted by the LLA's actuary.

The application of this explicit model stochastically generated net investment returns for the next 30 years, and did so 500 times (i.e., 500 trials). A total of 15,000 annual rates of return (single-year market rates) were randomly selected from a lognormal distribution with these parameters:

- A mean of 7.53% during years 1-10,
- A mean of 7.93% during years 11-30, and
- A standard deviation of 14.03% for years 1-30.

These lognormal parameters (arithmetic means - one year) are not to be confused with the 50th percentile expectations (geometric means - compounded) over similar time periods addressed in Appendices D through G.

The computer-generated market returns were used as the base input to the model which simulated the operation of the System's complex gain-sharing COLA program over time. The means were not the expected compound returns over time (as discussed in Appendices D and E), which is much lower and more appropriate for actuarial valuations. These means are the forecaster's consensus expectations for each one year standing on its own.

The model applied the various internal statutory rules and limitations on the amounts that might be transferred to the Experience Account. It assumes that every year for which the statutes permit a permanent benefit increase to be granted, it will be granted and will be the maximum allowed. There is substantial evidence for this assumption from both historical statistics and behavioral expectations.

The model built for this purpose includes the following primary steps, as well as numerous other intermediary tests and calculations:

    a. Modeling future new hires and future actuarial valuations,
    b. Modeling the markets and future rates of return using generally acceptable techniques,
    c. Modeling the smoothed actuarial rate of return,
    d. Modeling the dollar hurdle,
    e. Modeling the limitations on the balance in the Experience Account,
    f. Modeling the maximum allowed on the COLA rate,
    g. Modeling the frequency rules for granting a COLA and
    h. Modeling the amount of the COLA rate.

In some years, the model expects a transfer to the Experience Account and in some years expects none. For each year in which the model expects a transfer, the amount can vary widely.

The mean (average) amount expected to be transferred to the Experience Account each year was captured and their present value calculated. *It was determined that a 0.50% annual cost-of-living increase (COLA) would produce the same additional present value.* This is not to be confused with the 0.40% which the board actuary reduces the total return assumption to obtain the discount rate. This is the fixed annual COLA rate that approximates the statutory COLA template. This 0.50% annual COLA rate is approximately the same result obtained in the last two years. It is, therefore, considered the single equivalent COLA this year representing the future working of the statutory gain-sharing mechanism.

Consider the following graphs illustrating the results (Experience Account transfers) of the simulations in the stochastic model of TRSL's gain-sharing COLA program.

Probability of Transfers
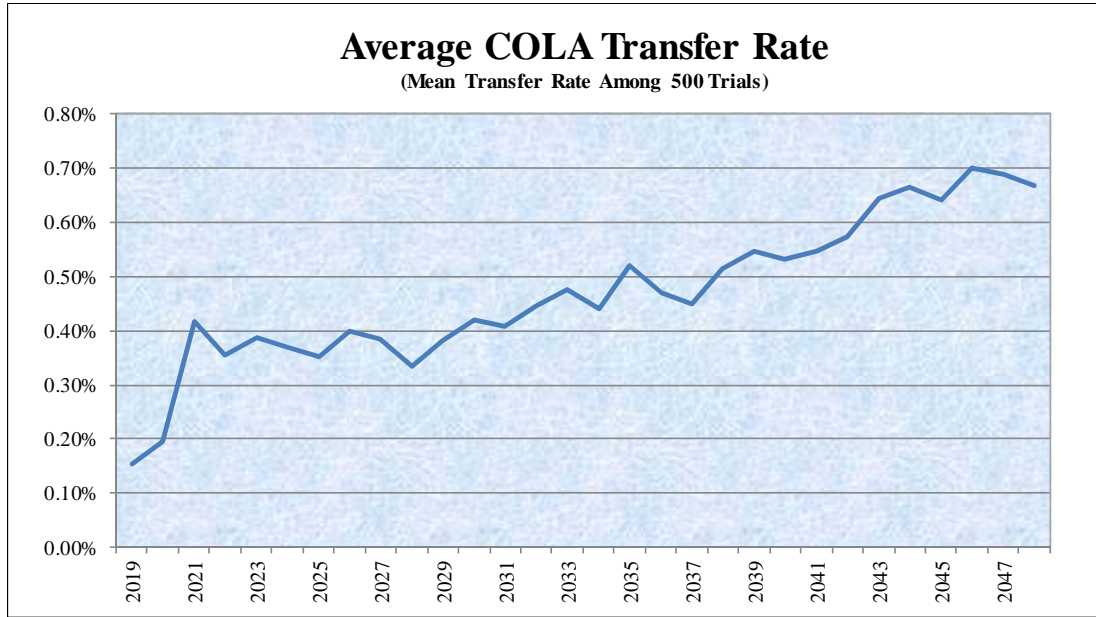(Mean Frequency of a Transfer Among 500 Trials)
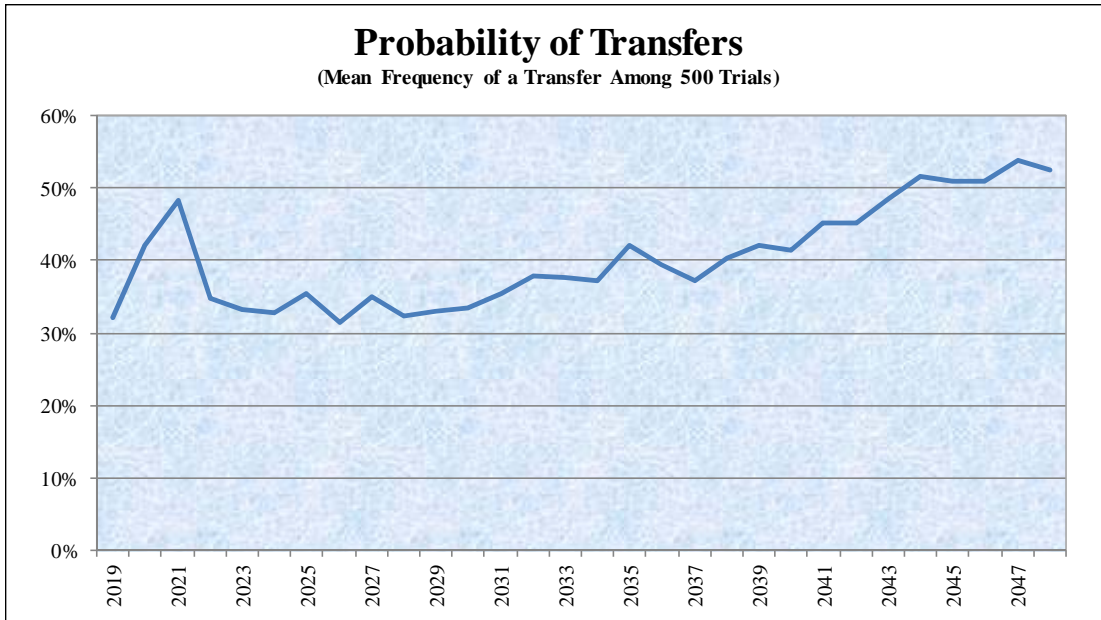
Based on the graph above, during each of the next 20 years there is a 30% to 45% chance of a transfer to the Experience Account and during the years 20-30 there is a 40% to 55% chance of such a transfer. In other words, transfers to the Experience Account are expected to occur approximately two out of every five years. Once a transfer occurs, it may not be used for anything other than COLAs (unless the Legislature changes the template); although there may be a slight shift in timing. Therefore, measuring the transfer frequency and amounts is the same as measuring the future COLAs.

Average COLA Transfer Rate - Given One Occurs
(Conditional Mean Transfer Rate Among 500 Trials)
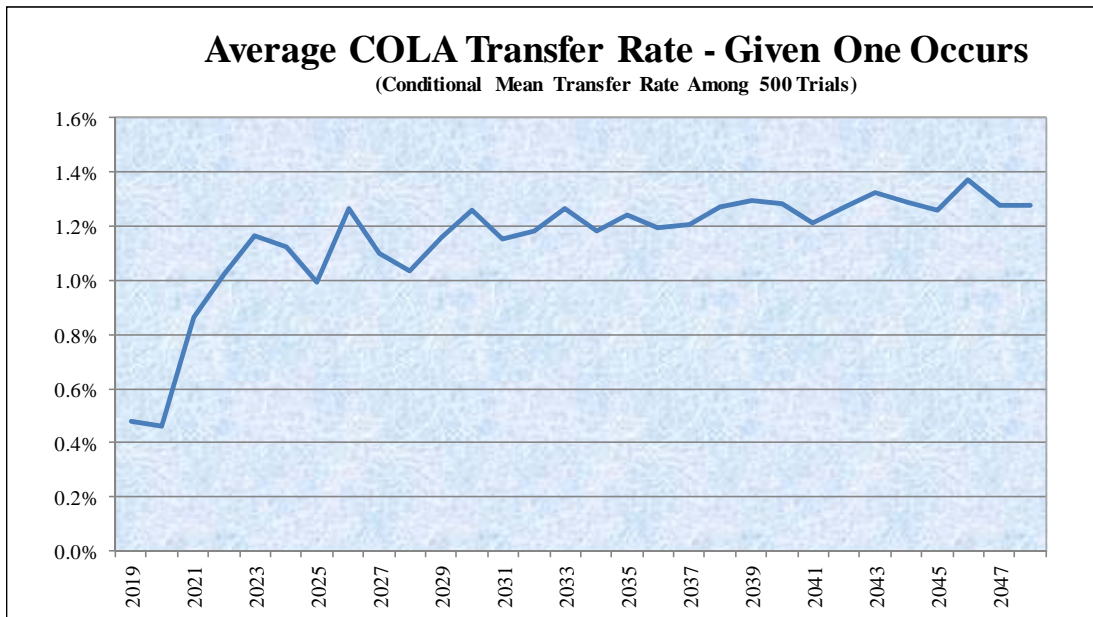
Average COLA Transfer Rate
(Mean Transfer Rate Among 500 Trials)

Based on present values of future expected COLA transfers to the Experience Account, therefore, the final assumption used in this first actuarial method is to include a fixed annual COLA of 0.50% as a reasonable approximation of the future workings of the actual statutory gain-sharing COLA template.

APPENDIX I
RISKS ASSOCIATED WITH MEASURING THE
ACCRUED LIABILITY AND ACTUARIALLY
DETERMINED CONTRIBUTIONS

Appendix I: Risks Associated with Actuarial Measurements

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The computed contribution rates presented in this actuarial valuation report may be considered as a minimum contribution rate that complies with state statute. The timely receipt of actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. This System is considered to be very mature, requiring extra attention to various actuarial risks.

Generally accepted plan maturity measures include the following:

Risk Measures	2018	2017	2016	2015	2014
Ratio of the market value of assets to total payroll	5.3	5.0	4.5	4.7	4.8
Ratio of actuarial accrued liability to payroll	7.7	7.6	7.6	7.5	7.5
Funded ratio	68%	66%	60%	62%	64%
Ratio of actives to inactives and beneficiaries	0.4	0.4	0.4	0.4	0.4
Net cash in (out) flow: in millions	$ (616)	$ (640)	$ (539)	$ (446)	$ (414)
Ratio of net cash flow to market value of assets	-2.9%	-3.3%	-3.1%	-2.5%	-2.3%
Duration of the actuarial accrued liability	10.8	NA	NA	NA	NA

Source: System's Comprehensive Annual Financial Reports

Ratio of Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher or increasing level of this maturity measure generally indicates a higher or increasing volatility in plan sponsor contributions as a percentage of payroll, and vice versa.

Ratio of Actuarial Accrued Liability to Payroll

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% different than assumed would equal 5% of payroll. A higher or increasing level of this maturity measure generally indicates a higher or increasing volatility in liability (and plan sponsor contributions) as a percentage of payroll, and vice versa.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when a plan is mature. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions. As a plan matures, it takes on more actuarial risk.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Asset Allocation

Focusing on investment risk, the primary source of volatility risk in a retirement plan's unfunded actuarial liability, funded ratio and employer contributions is mostly ascribed to the fund's asset allocation.

A larger portion of a fund's assets allocated to risk-oriented asset classes means a larger expected return coupled with a larger expected volatility in returns. The following chart illustrates the progression of the System's investments toward more risk-oriented asset classes.

Actual and Target Percentages of TRSL Total Plan Asset Allocation
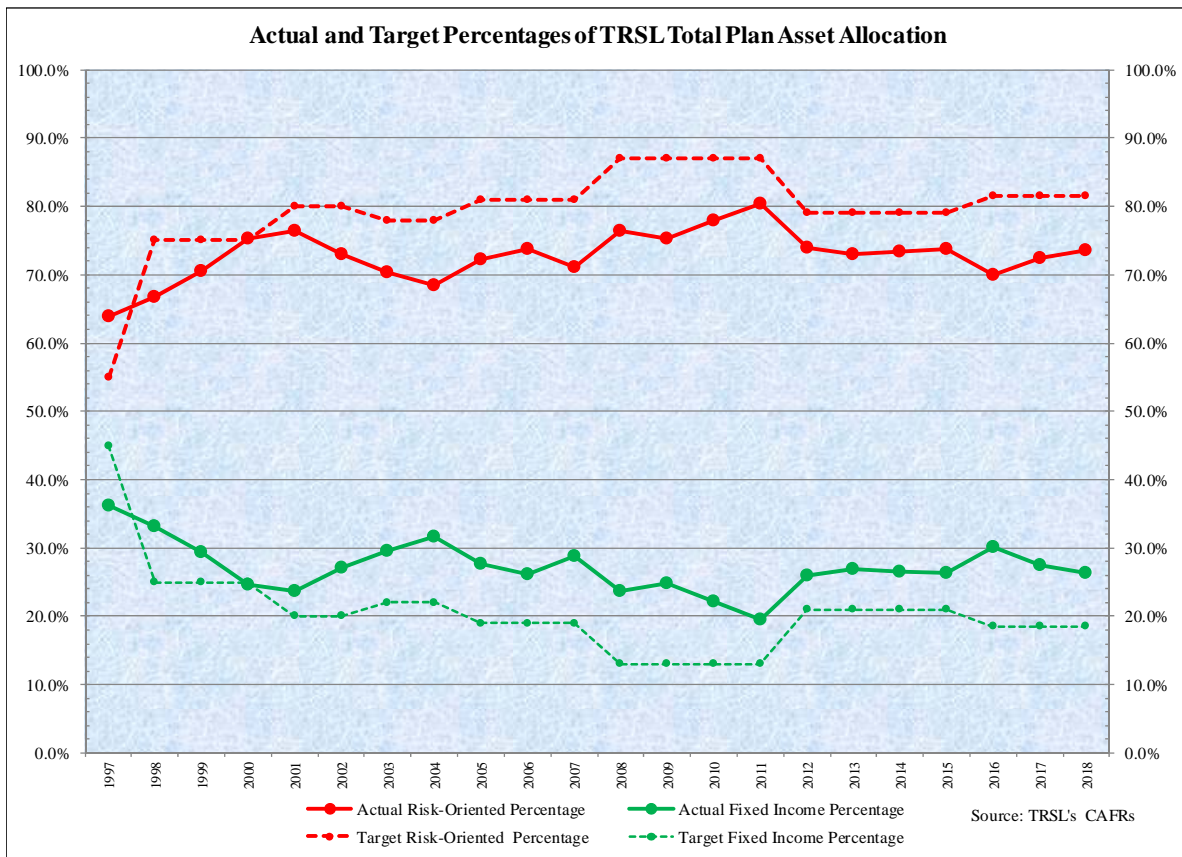
Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

Useful risk metrics include unfunded actuarial liability (and net pension liability), funded ratio (on actuarial value or market value basis) and actuarially determined employer contribution rates required.

APPENDIX J
PRESS CLIPPINGS FOR OTHER RETIREMENT SYSTEMS LOWERING THEIR RETURN ASSUMPTIONS (2015-2018)

Other retirement systems and state officials have characterized their

decisions to lower pension return assumptions as being

<u>positive actions</u> for plan members and taxpayers.

New Jersey

The New Jersey Pension Fund's assumed rate of return has been reduced to 7% from 7.65% by state Treasurer Ford M. Scudder, the second rate cut he has enacted this year. Mr. Scudder had cut the rate to 7.65% from 7.9% in February 2017.
"Given the current elevated level of asset values across the board, long-run expected returns have diminished, so it is appropriate to lower the assumed rate of return," Mr. Rijksen wrote [Willem Rijksen, a Treasury Department spokesman]. "Our actuaries have suggested doing so, and it is the unmistakable trend in public pension plans across the country."
Pensions and Investments Online (pionline.com), 12/22/17

The move increases the pension tab for state and local governments by more than $800 million for the fiscal year that begins in July, according to an NJ Advance Media analysis of state actuary reports released Tuesday.
The change was praised by the pension fund actuaries, who say a 7 percent assumed rate of return is in line with other large funds and is a more conservative estimate of what pension investments can achieve over the long term. In contrast, assuming the investments will earn a high rate makes the pension fund look healthier than it really is and doesn't reflect the reality of the state's investment outcomes, actuaries say.
The state contributes less than what's recommended by actuaries. This year, it's expected to kick in about $2.5 billion, or half of what's recommended, and it is on track to contribute 60 percent next year.
NJ.com, New Jersey Online, 12/22/17

Notice a couple observations: (1) Down from 7.9% to 7.65% to 7.0% in 10 months, (2) The change will increase the contribution requirement by more than $800 million and (3) NJ is roughly tied (with Kentucky) for the worst-funded pension system in the country (30.9% in 2016) and has been contributing only about half the actuarially required contribution under their previously high return assumption, yet they did the "appropriate" thing and lowered the return assumption from 7.9% to 7.0%.
*Notice the **positive statements** about this decision: (1) "a 7 percent assumed rate of return is a more conservative estimate of what pension investments can achieve" (2) "Given the current elevated level of asset values across the board, long-run expected returns have diminished, so it is appropriate to lower the assumed rate of return."*

Kentucky

Since the last actuarial valuation the Board adopted changes to certain economic assumptions for KERS, CERS and SPRS. Specifically, the Board decreased the price inflation assumption to 2.30% for all funds. The assumed rate of return was decreased to 5.25% for two of its pension funds, and to 6.25% for the three other pension funds and all the insurance funds associated with the systems.
2017 Actuarial Valuation Report

He admonished, "We need to use real numbers . . . We need to use actual data. We need to use true rates of return, and not hypothetical ones."
Huffingtonpost.com, 4/4/17, quote from Gov. Matt Bevin

"The most important function of our board is to give correct numbers to the legislature," Farris said. "If we don't do that, if we continue to rely on aggressively optimistic assumptions, then we will continue to fall behind.",
Kentucky.com, 5/20/17, quote from board chairman John Farris

"We're trying to make the assumptions more realistic and from an investment standpoint, more in line with structure and expectations of the portfolios," Mr. Eager said.
pionline.com, 7/14/17, quote from Interim Executive Director David Eager

[State Budget Director John] Chilton said that Gov. Matt Bevin and state lawmakers believe it is important to embrace the revised financial assumptions. "No more pretending that everything is just fine," he wrote. "Everyone needs to understand the severity of the situation. To do otherwise will lead to solutions that fall short of solving the problem." Kentucky.com, 9/9/17

Note a couple observations: (1) Down from 7.5% to 6.35% for some plans and 5.25% for others and (2) KY is roughly tied (with New Jersey) for the worst-funded pension system in the country (31.4% in 2016), yet they did the "more realistic" thing and lowered the return assumption from 7.5% to 6.25% and 5.25%.
*Notice the **positive statements** said: (1) "The most important function of our board is to give correct numbers to the legislature", (2) "We're trying to make the assumptions more realistic and from an investment standpoint, more in line with structure and expectations of the portfolios,"*

Arkansas

The trustees last week voted to reduce the system's projected annual investment returns from 7.25 percent to 6.25 percent at the recommendation of actuary Gabriel, Roeder, Smith & Co. of Southfield, Mich., . . . [Gail Stone, executive director for the judicial retirement system,] explained that "10-year capital market predictions from a basket of 8 different public fund investment consultants did not support a 7.25 [percent investment] return, given the AJRS fund's very conservative asset allocation."
Arkansasonline.com, 8/14/15

*Notice the **positive statement**: The executive director wanted the return assumption to be consistent with the "10-year capital market assumptions of a basket of 8 different public fund investment consultants."*

New York

New York State Common Retirement Fund, Albany, is lowering its assumed rate of return to 7% from 7.5%.
"Lowering the assumed rate of return is fiscally prudent and will better position the state pension fund for the future. This strategic decision is consistent with the tougher investment climate ahead."
pionline.com, 9/9/15, quote from Thomas DiNapoli (State Comptroller and sole trustee)

*Notice the **positive statements**: (1) Lowering it is fiscally prudent, (2) Lowering the return assumption will put the state pension fund in a better position for the future."*

California Teachers

CalSTRS on Wednesday approved lowering the pension fund's assumed rate of return to 7% from 7.5% over the next two years because of diminished capital market and inflation forecasts. Milliman, the board's actuarial consultant, last month had recommended a reduction to 7.25%, but also offered the board the option of a 7% rate of return.
The plan approved by the board of the $196.4 billion California State Teachers' Retirement System would lower the rate of return to 7.25% as of July 1, and 7% as of July 1, 2018.
The vote for the more aggressive reduction came at a meeting in San Diego after a report from one of CalSTRS' investment consultants, Pension Consulting Alliance, that the pension fund had a less than 50% chance of meeting the 7.25% rate of return long term. "It's responsible," said board member Harry M. Keiley of the move to 7%. Mr. Keiley said it was necessary to ensure the long-term financial stability of the retirement system.
pionline.com, 2/4/17

"Going to 7.00% would be an acceptable alternative if the board wanted to add another level of conservatism in the actuarial assumptions by increasing the likelihood the investment assumption will be met long term," the report said.
calpensions.com, 1/28/17, quote from the Milliman actuarial experience study

Note a couple observations: (1) CalSTRS investment consultant said there was less than a 50% chance of meeting a 7.25% assumption and (2) The board's investment consultant directed attention to the probability of the compound average return over time reaching the assumption.
*Notice the **positive statements** the Board member made about this move: (1) "It's responsible." and (2) "It was necessary to ensure the long-term financial stability of the retirement system."*

Oregon

The Oregon Public Employees Retirement Fund's board lowered the assumed rate of return for the $73 billion pension fund to 7.2% from 7.5%, said James Sinks, spokesman for the Oregon State Treasury, in an email. Return projections for the next 10 years are lower than in the prior decade, according to a report presented at the pension fund's July 28 meeting.
pionline.com, 8/1/17

Appendix J: Press Clippings for Retirement Systems Lowering Return Assumptions

Article about Alaska that mentions California
The nation's largest public employee retirement system has just cut its long-term predictions of how much it expects to earn on its investments to 6.5 percent, raising a caution flag for Alaska, which still has expectations of 8 percent returns.   The assumed long-range investment returns are a key indicator of the financial health of the state retirement programs. Pick a number that is too high and the systems give a false image of financial strength. In addition, it could force a pattern of more aggressive and risky investments.   It is generally easier to get agreement on optimistic numbers, especially when budgets are tight. The difficulty is that you never really know what returns will be until the future becomes the past.   While other states have trimmed back their long-term earnings estimates since 2008, Alaska is still using 8 percent as its target, which is on the high end of pension systems in the United States.   "Some critics of current public pension investment return assumption levels say that current low interest rates and volatile investment markets require public pension funds to take on excessive investment risk to achieve their assumption," the National Association of State Retirement Administrators said in May.   But California Gov. Jerry Brown says the new plan is irresponsible because of the slow pace in lowering expectations, a claim that the California Public Employees Retirement System denies. A more rapid reduction in investment return projections would have increased the strain on local governments, it said. But Brown, expressing more caution than his state's retirement board, said the CalPERS plan is based on "unrealistic investment returns" and assumes an "unacceptable level of risk in the coming years."   Alaska Dispatch News, 12/9/15

Iowa
Iowa Public Employees' Retirement System, Des Moines, lowered its assumed rate of return to 7% from 7.5%, said a news release from the $28.5 billion pension fund.   Under the changes, the pension fund's funding ratio is expected to fall by roughly four basis points to 80% and liabilities are expected to increase by $1.4 billion.   The changes follow a review of economic assumptions from actuarial firm Cavanaugh Macdonald Consulting.   "Even though these changes will have a negative impact on IPERS' funded ratio, the investment board believes that these modifications will provide a more accurate valuation of future liabilities," IPERS said in the news release.   pionline.com, 3/28/17
*Notice the **positive statement** about the decision "Even though these changes will have a negative impact on IPERS' funded ratio, the investment board believes that these modifications will provide a more accurate valuation of future liabilities,"*

Maryland
"The action taken by the Board is part of its overall strategy to increase the probability of achieving investment returns required to improve the health of the retirement System and meet its obligations to its members," says State Treasurer Nancy K. Kopp, chair of the MSRPS Board of Trustees. "Recognizing that both the inflation experience and expectations for future inflation remain lower than the rate currently assumed, the Board felt it reasonable to reduce the expected return accordingly."   plansponsor.com, 8/2/17
*Notice those two **positive statements** about their changes.*

San Mateo County
San Mateo County Employees' Retirement Association, Redwood City, Calif., lowered its assumed rate of return to 7% from 7.25%.   "In the coming years, lowering the rate will add to the financial strength and stability of the retirement fund by mitigating the effects of future returns that are lower than current expectations."   SamCERA.org News, 7/6/16

Appendix J: Press Clippings for Retirement Systems Lowering Return Assumptions

North Carolina
"We need to make realistic assumptions regarding our ability to achieve expected returns in the future. We owe it to the General Assembly, taxpayers, public employees and future generations to be transparent and realistic about the true valuation of the pension plans," pionline.com, 5/1/18, State Treasurer Dale Folwell

Texas Teachers
Brian Guthrie, TRS executive director, told trustees the consensus among outside parties was that market returns will be significantly lower, and he stressed that "not taking action" to lower the assumed rate of return would not be prudent. Cypen & Cypen E-Newsletter, 8/16/18

Ohio Public Employees
"We are long-term investors, but investment returns over the next 10 to 15 years are very important to our plan," said Karen Carraher, executive director, in the news release. pionline.com, 10/22/18

Colorado
In the race for Colorado treasurer, Republican Brian Watson is in favor or raising the retirement age to at least to 67 — to match Social Security — as well as reducing or freezing cost-of-living adjustments and dropping Colorado PERA's assumed rate of return from 7.25% to something more "realistic," according to his campaign website. pionline.com, 10/30/18

Other Positive Statements about Lowering the Return Assumption
Harrisburg cannot take advantage of the Act 44 MMO reduction and does not set unrealistically high investment return assumptions which, Mr. McAneny said, has been a key factor in its success in managing its pension funds. Scranton Times-Tribune, 7/9/15
"If we do lower that assumed rate, that would certainly be a conservative approach. And one that I think would be reasonable," he continued. "The stock market can't stay up as high as it has forever. I think being a little more conservative would be prudent." pension360.org, 7/24/15, quotes from Thomas DiNapoli
"But with the volatile market environment we have seen this year, and will likely see for the next several years, changing the assumed rate of return was a prudent decision," stated Chief Investment Officer Craig Husting [of Missouri's school and teacher retirement systems]. psrs.peers.org 6/17/16
The $7.8 billion pension fund's board approved the change at its June 16 meeting, Ms. Smith said, to "put the system on a path that reflects the current and expected low-return capital markets and to ensure adequate funding to pay future benefits." pionline.com, 7/13/16, quote from Candy Smith, Spokeswoman for the Missouri State Employees' RS
"This more conservative assumption will require additional state investments into the retirement systems, helping to ensure that available funds will be sufficient to pay the benefits that have been earned," said a summary of the governor's proposed budget changes. pionline.com, 2/10/17, Michigan Gov. Rick Snyder

Appendix J: Press Clippings for Retirement Systems Lowering Return Assumptions

General
"The use of such high assumptions is deceptive because it keeps the funded level looking higher than it should be," said David Crane, public policy lecturer at Stanford University who worked as an adviser to former California Gov. Arnold Schwarzenegger. "Too high a return is dishonest." news.bna.com, 8/19/15
A lower rate of return can force issuers to face up to their funding commitments," said Tom Aaron, vice president with Moody's Investors Service. news.bna.com, 8/19/15
Lockhart also discussed the correlation between macroeconomic growth and pension funding. He recommended that public pension funds align their overall investment return assumptions with realistic assumptions related to macroeconomic momentum and trends. frbatlanta.org, 8/28/15, quote from Dennis Lockhart, President and CEO of Atlanta Federal Reserve Bank