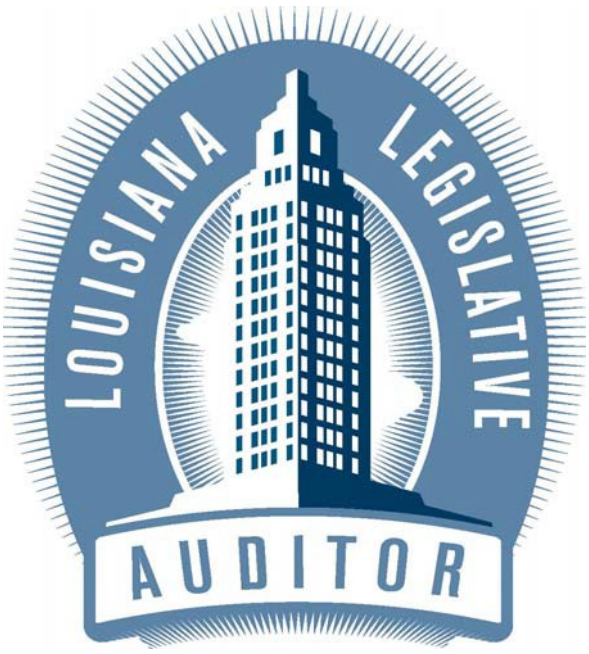
2018 Actuarial Valuation Report on the Louisiana State police Retirement System



Actuarial Valuation as of
June 30, 2018
Issued DECEMBER 2018

LOUISIANA LEGISLATIVE AUDITOR
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2018 ACTUARIAL VALUATION REPORT

LOUISIANA STATE POLICE RETIREMENT SYSTEM

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LOUISIANA LEGISLATIVE AUDITOR
DARYL G. PURPERA, CPA, CFE

December 20, 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 Louisiana State Police Retirement System 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

LSPRS 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*	Definitions*	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 LSPRS.
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 leaves the investment return and inflation assumptions the same as they were for the last PRSAC-accepted official valuation. While the most appropriate return assumption is lower, the last return assumption is within an acceptable range around the most appropriate rate and, therefore, is retained for this valuation. Refer to Appendices B through E for more details.

This actuarial valuation implements other significant changes as compared to the last PRSAC-accepted official valuation.

- This valuation implements the changes in various demographic assumptions that result from the recent experience study and which were recommended by the System's actuary and adopted by the retirement board. Refer to Appendix A for more details.

- This valuation recognizes the expected costs of the System's future gain-sharing cost-of-living (COLA) benefits, while the last PRSAC-accepted valuation only recognized one future permanent benefit increase. Refer to Appendix F for more details.

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

	After Changes	Before Changes	
Valuation Date	June 30, 2018	June 30, 2018	June 30, 2017
Census Summary: Active Members	1,129	1,129	1,071
Retired Members and Survivors	1,174	1,174	1,155
Terminated Due a Deferred Benefit	44	44	43
Terminated Due a Refund	169	169	139
Payroll:	$ 85,349,504	$ 85,349,504	$ 84,059,551
Benefits in Payment:	$ 47,329,769	$ 47,329,769	$ 43,286,212
Present Value of Future Benefits:	$ 1,417,191,885	$ 1,306,947,144	$ 1,226,459,113
Actuarial Accrued Liability (EAN):	$ 1,203,836,393	$ 1,110,188,784	$ 1,062,446,959
Unfunded Actuarial Accrued Liability:	$355,380,086	$ 261,732,477	$ 287,782,158
Experience Account:	$ 1,957,062	$ 1,957,062	$ 5,260,562
Actuarial Value of Assets (AVA):	$ 848,456,307	$ 848,456,307	$ 774,664,801
Market Value of Assets (Includes Experience Account):	$ 866,309,038	$ 866,309,038	$ 782,572,348
Ratio of AVA to Actuarial Accrued Liability:	70.48%	76.42%	72.91%
	Fiscal 2018	Fiscal 2018	Fiscal 2017
Market Rate of Return (Excluding Money Market DROP funds):	9.40%	9.40%	14.62%
Actuarial Rate of Return (Excluding Money Market DROP funds):	8.22%	8.22%	8.23%
Non-Money Market DROP Account Interest Credit Rate:	7.72%	7.72%	7.73%
	Fiscal 2019	Fiscal 2019	Fiscal 2018
Employers' Normal Cost (Mid-year):	$ 19,714,319	$ 15,226,112	$ 15,158,998
Amortization Cost (Mid-Year):	$ 28,522,541	$ 19,976,907	$ 22,725,865
Projected Administrative Expenses:	$ 781,115	$ 781,115	$ 751,409
Insurance Premium Taxes	$ 1,500,000	$ 1,500,000	$ 1,500,000
Net Direct Employer Actuarially Required Contributions:	$ 47,517,975	$ 34,484,134	$ 37,136,272
Projected Payroll:	$ 85,288,101	$ 85,288,101	$ 84,480,807
Actuarially Required Net Direct Employer Contribution Rate:	55.7%	40.4%	44.0%
Actual Employee Contribution Rate:			
Employees whose first state service occurred before January 1, 2011:	8.5%	8.5%	8.5%
Employees whose first state service occurred on or after January 1, 2011:	9.5%	9.5%	9.5%
Actual Net Direct Employer Contribution Rate:	43.1%	43.1%	47.4%
	Fiscal 2020	Fiscal 2020	Fiscal 2019
Minimum Recommended Net Direct Employer Cont. Rate:	60.0%	41.0%	43.1%

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

	Final	Most Appropriate
Investment Return	7.00%	6.50%
Valuation Date	June 30, 2018	June 30, 2018
Census Summa Active Members	1,129	1,129
Retired Members and Survivors	1,174	1,174
Terminated Due a Deferred Benefit	44	44
Terminated Due a Refund	169	169
Payroll:	$ 85,349,504	$ 85,349,504
Benefits in Payment:	$ 47,329,769	$ 47,329,769
Present Value of Future Benefits:	$ 1,417,191,885	$ 1,518,124,541
Actuarial Accrued Liability (EAN):	$ 1,203,836,393	$ 1,277,382,193
Unfunded Actuarial Accrued Liability:	$355,380,086	$428,925,886
Experience Account:	$ 1,957,062	$ 1,957,062
Actuarial Value of Assets (AVA):	$ 848,456,307	$ 848,456,307
Market Value of Assets (Includes Experience Account):	$ 866,309,038	$ 866,309,038
Ratio of AVA to Actuarial Accrued Liability:	70.48%	66.42%
	Fiscal 2018	Fiscal 2018
Market Rate of Return (Excluding Money Market DROP funds):	9.40%	9.40%
Actuarial Rate of Return (Excluding Money Market DROP funds):	8.22%	8.22%
Non-Money Market DROP Account Interest Credit Rate:	7.72%	7.72%
	Fiscal 2019	Fiscal 2019
Employers' Normal Cost (Mid-year):	$ 19,714,319	$ 22,472,612
Amortization Cost (Mid-Year):	$ 28,522,541	$ 33,816,235
Projected Administrative Expenses:	$ 781,115	$ 781,115
Insurance Premium Taxes	$ 1,500,000	$ 1,500,000
Net Direct Employer Actuarially Required Contributions:	$ 47,517,975	$ 55,569,962
Projected Payroll:	$ 85,288,101	$ 85,288,101
Actuarially Required Net Direct Employer Contribution Rate:	55.7%	65.2%
Actual Employee Contribution Rate:		
Employees whose first state service occurred before January 1, 2011:	8.5%	8.5%
Employees whose first state service occurred on or after January 1, 2011:	9.5%	9.5%
Actual Net Direct Employer Contribution Rate:	43.1%	43.1%
	Fiscal 2020	Fiscal 2020
Minimum Recommended Net Direct Employer Cont. Rate:	60.0%	71.7%

DISCUSSION 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 that were used in the 2017 valuation adopted by PRSAC.

The System's most recent experience study covered the period July 1, 2012 through June 30, 2017. The results are presented in a report prepared by LSPRS' actuary (dated August 21, 2018). The LLA's actuary reviewed the report for reasonableness and found it to produce appropriately revised demographic 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 partially credible mortality experience and applied appropriate 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 assumptions were adopted by the LSPRS Board of Trustees for use in the actuary's June 30, 2018 actuarial valuation report.

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

The table on page 6 presents the effect of changes in demographic assumptions (as well as other changes) on the unfunded accrued liability as of June 30, 2018 and on the minimum recommended net direct 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 future gain-sharing COLA benefits of the plan. The future gain-sharing COLA benefits are actuarially equivalent to an annual fixed COLA of approximately 0.60%. This was approximated using stochastic (simulation) modeling techniques. The System's gain-sharing COLA program is complex and must be approximated within an actuarial valuation.

The System and its actuary only recognize one future permanent benefit increase. It is the opinion of the actuary for the LLA that recognizing only one future permanent benefit increase fails to measure the cost of the plan's COLA program properly. Future COLAs are highly likely to be allowed by the statutory template and highly likely to be granted by the Legislature. Their likelihood is as predictable (or more so) that are disabilities or turnover. Therefore, they should be actuarially measured, just as other future benefits which are likely to be provided.

Users of this actuarial valuation report should read the Appendix F 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 6 presents the effect of advance-recognizing gain-sharing COLA benefits (as well as other changes) on the unfunded accrued liability as of June 30, 2018 and on the minimum recommended net direct employer contribution rate for FYE 2020.

Comments on Investment Return and Inflation Assumptions

LSPRS' actuarial calculations and disclosures as of June 30, 2017 and as of June 30, 2018 were developed by its actuary using an investment return assumption of 7.0%.

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 the investment return assumption of 7.0% used by the System and its actuary is an acceptable return assumption and 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 6.50% and inflation assumption to be 2.30%.

All users of this valuation report should read the following Appendices for an understanding of how this assumption was derived:

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

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 minimum recommended net direct employer contribution rate for FYE 2020, for each of the 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 6/30/18 ($ Millions)	Minimum Recommended Net Direct Employer Contribution Rate for FYE 6/30/20 (as Pct of Projected Covered Pay)
(1) Without Any Changes in Assumptions or Methods *(benchmark values)*	261.7	41.0%
(2) New Demographic Assumptions *(effect of changes to the Demographic Assumptions against benchmark)*	292.8	49.1%
a. Effect of this Additional Change: (2)-(1)	31.1	8.1%
(3) New Treatment of Gain-sharing COLA Benefits *(effect of changes to the Demographic Assumptions, Investment Rate Assumption and COLA Assumption against benchmark)*	355.4	60.0%
a. Effect of this Additional Change: (3)-(2)	62.6	10.9%
b. Effect of both Changes: 2a+3a = (3)-(1)	93.7	19.0%

Source : *Developed by LLA's actuarial staff.*

(1) Benchmark values have been developed using assumptions employed in the determination of the 6/30/2017 Unfunded Accrued Liabilities and FYE 2018 Actuarially Determined Net Direct Employer Contribution rate without regard to assumption and method changes adopted after 6/30/17.

(2) Change in demographic assumptions (i.e., rates of retirement, termination, disability, mortality, salary merit scale, 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.

(3) Change in method for gain-sharing COLA increases from LSPRS' recognition of only one future increase to LLA's explicit single equivalent 0.60% COLA approximating all future COLA benefits.

The above table illustrates effects of implementing assumptions described on the previous pages.

QUALIFICATIONS, DISCLOSURES AND CERTIFICATION

This valuation has been prepared as of June 30, 2018, based on plan provisions for the Louisiana State Police Retirement System (LSPRS) as documented in Title 11 of Louisiana Revised Statutes (R.S.), Sections 1301 through 1345.

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 unfunded actuarial liability as of June 30, 2018 and to determine the actuarially determined contribution rate 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 2 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 sponsors to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsors are 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.

Summary and Conclusions

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: December 19, 2018

SECTION I:
DEVELOPMENT OF EMPLOYER CONTRIBUTIONS

1. Analysis of Actuarially Required Contributions

1. Normal Cost of Retirement Benefits	$	23,417,725
2. Normal Cost of Death Benefits	$	312,942
3. Normal Cost of Disability Benefits	$	1,855,694
4. Normal Cost of Deferred Retirement Benefits	$	761,381
5. Normal Cost of Contribution Refunds	$	-
6. TOTAL Normal Cost as of July 1, 2018 (1+2+3+4+5)	$	26,347,742
7. TOTAL Normal Cost Interest Adjusted for Midyear Payment	$	27,254,316
8. Adjustment to Total Normal Cost for Employee Portion	$	7,539,997
9. Employer Normal Cost Adjusted for Midyear Payment (7-8)	$	19,714,319
10. Amortization Payments on Unfunded Accrued Liability at Midyear	$	28,522,541
11. Projected Administrative Expenses for Fiscal 2019	$	781,115
12. Gross Employer Required Contribution (9+10+11)	$	49,017,975
13. Projected Insurance Premium Taxes due in Fiscal 2019	$	1,500,000
14. Net Direct Actuarially Required Employer Contribution for Fiscal 2019 (12-13)	$	47,517,975
15. Projected Payroll for Contributing Members (Fiscal 2019)	$	85,288,101
16. Net Direct Actuarially Required Employer Contribution as a Percentage of Projected Payroll for Fiscal 2019 (14÷15)		55.7%
17. Actual Net Direct Employer Contribution rate for Fiscal 2019		43.1%
18. Projected Fiscal 2019 Contribution Loss (Gain) as a % of Payroll (16-17)		12.6%
19. Projected Fiscal 2019 Employer Contribution Shortfall (Surplus) (15 x 18)	$	10,746,301
20. Estimated Amortization of Fiscal 2019 Employer Contribution Shortfall (Surplus) Based on Midyear Payment in Fiscal 2020	$	2,620,923
21. Estimated Fiscal 2020 Employer Normal Cost Adjusted for Midyear Payment	$	19,700,136
22. Estimated Fiscal 2020 Amortization Payments based on Fiscal 2019 UAL	$	29,499,519
23. Estimated Fiscal 2020 Administrative Expenses	$	800,643
24. Projected Insurance Premium Taxes due in Fiscal 2020	$	1,500,000
25. Estimated Actuarially Required Net Direct Employer Contributions for Fiscal 2020 (20+21+22+23-24)	$	51,121,221
26. Projected Payroll for Contributing Members (Fiscal 2020)	$	85,226,742
27. Minimum Recommended Net Direct Employer Contribution Rate for Fiscal 2020 (25÷26, Rounded to nearest 0.10%)		60.0%

2. Present Value of Future Benefits

PRESENT VALUE OF FUTURE BENEFITS FOR ACTIVE MEMBERS		
Retirement Benefits	$ 786,467,757	
Survivor Benefits	8,494,605	
Disability Benefits	32,855,847	
Vested Termination Benefits (including Refunds of Contributions)	9,042,628	
TOTAL Present Value of Future Benefits for Active Members		$ 836,860,837
PRESENT VALUE OF FUTURE BENEFITS FOR TERMINATED MEMBERS		
Terminated Vested Members Due Benefits at Retirement	$ 12,821,065	
Terminated Members with Reciprocals Due Benefits at Retirement	0	
Terminated Members Due a Refund	270,714	
TOTAL Present Value of Future Benefits for Terminated Members		$ 13,091,779
PRESENT VALUE OF FUTURE BENEFITS FOR RETIREES		
Regular Retirees	464,730,029	
Disability Retirees	19,819,259	
Survivors & Widows	61,565,146	
Liability Attributable to the Experience Account	0	
DROP Account Balances Payable to Retirees	21,124,835	
TOTAL Present Value of Future Benefits for Retirees & Survivors		$ 567,239,269
TOTAL Present Value of Future Benefits		$ 1,417,191,885

3a. Market Value of Assets

CURRENT ASSETS:		
Cash in Banks	$ 73,687	
Contributions Receivable	2,045,409	
Accrued interest and dividends	481,693	
Other Current Assets	193,244	
TOTAL CURRENT ASSETS		$ 2,794,033
Property Plant & Equipment		$ 1,228,323
INVESTMENTS:		
Cash Equivalents	$ 51,548,612	
Equities	547,974,656	
Fixed Income	152,913,879	
Alternative Investments	112,313,487	
Collateral for Securities Lending	49,081,895	
TOTAL INVESTMENTS		$ 913,832,529
TOTAL ASSETS		$ 917,854,885
CURRENT LIABILITIES		
Accounts Payable	$ 815,854	
Securities Lending Obligations	49,081,895	
Other Post-Employment Benefits	314,106	
Deferred Contributions	50,527	
Other Current Liabilities	1,283,465	
TOTAL CURRENT LIABILITIES		$ 51,545,847
MARKET VALUE OF ASSETS		$ 866,309,038

3b. Actuarial Value of Assets

Excess (Shortfall) of invested income for current and previous 4 years: *		
Fiscal Year 2018	$	18,881,595
Fiscal Year 2017		51,566,684
Fiscal Year 2016		(57,851,897)
Fiscal Year 2015		(25,258,982)
Fiscal Year 2014		57,344,656
Total for five years	$	44,682,056
Deferral of excess (Shortfall) of invested income:		
Fiscal Year 2018 (80%)	$	15,105,276
Fiscal Year 2017 (60%)		30,940,010
Fiscal Year 2016 (40%)		(23,140,759)
Fiscal Year 2015 (20%)		(5,051,796)
Fiscal Year 2014 (0%)		0
Total deferred for year	$	17,852,731
Market value of plan net assets, end of year	$	866,309,038
Preliminary actuarial value of plan assets, end of year	$	848,456,307
Actuarial value of assets corridor		
85% of market value, end of year	$	736,362,682
115% of market value, end of year	$	996,255,394
Actuarial Value of Plan Assets, end of year	$	848,456,307

* Excess (shortfall) of actual investment income versus expected investment income is calculated based on assets and income adjusted to exclude the money market DROP accounts.

4. Present Value of Future Contributions

Employee Contributions to the Annuity Savings Fund	$	58,907,662
Employer Normal Contributions to the Pension Accumulation Fund		154,447,830
Employer Amortization Payments to the Pension Accumulation Fund		355,380,086
TOTAL PRESENT VALUE OF FUTURE CONTRIBUTIONS	$	568,735,578

5a. Actuarial Accrued Liability

LIABILITY FOR ACTIVE MEMBERS		
Accrued Liability for Retirement Benefits	$ 598,058,065	
Accrued Liability for Survivor Benefits	4,546,206	
Accrued Liability for Disability Benefits	19,216,234	
Accrued Liability for Vested Termination Benefits (including Refunds of Contributions)	1,684,840	
TOTAL Actuarial Accrued Liability for Active Members		$ 623,505,345
LIABILITY FOR TERMINATED MEMBERS		$ 13,091,779
LIABILITY FOR RETIREES AND SURVIVORS		$ 567,239,269
TOTAL ACTUARIAL ACCRUED LIABILITY		$ 1,203,836,393
ACTUARIAL VALUE OF ASSETS		$ 848,456,307
UNFUNDED ACTUARIAL ACCRUED LIABILITY		$ 355,380,086

5b. Change in Unfunded Actuarial Accrued Liability

PRIOR YEAR UNFUNDED ACCRUED LIABILITY		$ 287,782,158
Interest on Unfunded Accrued Liability	$ 20,144,751	
Liability Assumption/Method Change Loss	93,647,609	
Gains Allocated to Experience Account	1,428,096	
TOTAL Additions to UAL		$ 115,220,456
Asset Experience Gain	9,489,939	
Liability Experience Gain	4,765,728	
Contribution Excess with accrued Interest	9,859,043	
Interest Adjusted Amortization Payments	23,507,818	
TOTAL Reductions to UAL		$ 47,622,528
NET Change in Unfunded Accrued Liability		$ 67,597,928
CURRENT YEAR UNFUNDED ACCRUED LIABILITY		$ 355,380,086

5c. Amortization of Unfunded Actuarial Accrued Liability

Fiscal Year	Description	Amortization Period	Initial Balance	Years Remaining		Remaining Balance	Amortization Payments
1994	Liability Experience Gain	20	$(1,381,660)	11		$ (983,469)	$ (122,572)
1995	Liability Experience Loss	20	20,128,380	11	*	-	1,785,663
1996	Liability Experience Gain	20	9,762,782	11		(6,949,163)	(866,092)
1997	Liability Experience Loss	20	4,409,601	11	*	-	391,192
1998	Liability Experience Gain	20	(2,444,207)	11		(1,739,790)	(216,835)
1999	Liability Experience Loss	20	12,418,148	11	*	6,256,362	1,101,660
2000	Liability Experience Gain	20	(21,262,939)	11		(15,134,994)	(1,886,314)
2001	Liability Experience Loss	20	14,218,540	11		10,120,780	1,261,379
2002	Liability Experience Loss	20	36,882,500	11		26,253,022	3,271,983
2003	Liability Assumption Loss	24	14,644,647	15		11,686,466	1,199,169
2003	Liability Experience Loss	20	60,111,382	11		42,787,377	5,332,703
2004	Liability Experience Loss	20	16,579,889	11		11,801,591	1,470,863
2005	Liability Experience Loss	20	14,086,441	11		10,026,752	1,249,660
2006	Liability Experience Gain	20	(11,718,142)	11		(8,340,991)	(1,039,560)
2007	Liability Experience Loss	20	13,788,779	11		9,814,874	1,223,253
2008	Liability Assumption Loss	29	9,487,421	20		8,219,808	725,132
2008	Liability Experience Loss	20	29,944,312	11		21,314,408	2,656,471
2009	Liability Assumption Loss	30	1,032,469	21		905,092	78,065
2009	Change in Beneits Loss	10	671,120	1		89,982	89,982
2009	Liability Experience Loss	30	74,940,622	21		65,694,972	5,666,284
2010	Liability Experience Loss	30	26,844,661	22		23,998,061	2,027,629
2011	Liability Experience Loss	30	28,079,134	23		25,554,807	2,118,754
2012	Liability Experience Loss	30	7,358,996	24		6,808,007	554,751
2013	Change in Method Gain	30	(12,256,998)	25		(11,510,798)	(923,129)
2013	Liability Assumption Loss	30	26,210,291	25		24,614,618	1,974,012
2013	Liability Experience Gain	30	(25,552,458)	25		(23,996,834)	(1,924,468)
2014	Asset Exerience Gain (Allocated by Act 399 ot 2014)	5	(2,500,000)	1		(569,839)	(569,839)
2014	Liability Experience Gain	30	(1,327,488)	26		(1,265,092)	(99,979)
2014	Contribution Gain	5	(2,038,403)	1		(464,623)	(464,623)
2015	Liability Experience Loss	30	22,863,386	27		22,085,249	1,721,942
2015	Contribution Gain	5	(14,295,186)	2		(6,303,589)	(3,258,377)
2016	Liability Experience Loss	30	46,924,931	28		45,896,624	3,534,123
2016	Contribution Gain	5	(17,097,150)	3		(10,942,966)	(3,897,042)
2017	Change in Model	30	(5,046,395)	29		(4,992,972)	(380,066)
2017	Liability Assumption Loss	30	5,260,562	29		5,204,872	396,196
2017	Asset Assumption Gain	30	(5,260,562)	29		(5,204,872)	(396,196)
2017	Liability Experience Loss	30	6,707,700	29		6,636,690	505,186
2017	Asset Experience Gain **	30	(8,661,910)	29		(8,570,211)	(652,366)
2017	Gains Allocated to Experience Account	10	970,763	9		900,501	129,173
2017	Priority Excess Allocation Offset **	30	6,056,800	29		5,992,681	456,164
2017	Contribution Gain	5	(9,572,640)	4		(7,908,047)	(2,181,942)
2018	Liability Experience Gain	20	(4,765,728)	20		(4,765,728)	(420,422)
2018	Asset Experience Gain/Loss	20	(9,489,939)	20		(9,489,939)	(837,180)
2018	Method for Gain Sharing COLA	20	62,580,847	20		62,580,847	5,520,738
2018	Demographic Assump. Change	20	31,066,762	20		31,066,762	2,740,638
2018	Contribution Gain	5	(9,859,043)	5		(9,859,043)	(2,247,223)
2018	Gains Allocated to Experience Account	10	1,428,096	10		1,428,096	190,027
2018	Priority Excess Allocation	20	6,633,747	20		6,633,747	585,214

TOTAL Unfunded Actuarial Liability	$355,380,088	
TOTAL Fiscal 2019 Amortization Payments at Beginning of Year		$27,573,781
TOTAL Fiscal 2019 Amortization Payments adjusted to Mid-Year		$28,522,541

* Balance reduced by application of investment gains assigned by Act 399 of 2014.

** Asset Experience Gain is the gross gain on assets and includes those gains allocated to the Experience Account and the Priority Excess Allocation to the oldest outstanding positive base.

5d. Cumulative Amortization Base Adjustment

1995 Liability Exerience Loss

Outstanding Balance of 1995 Liability Experience Loss (as of June 30, 2016)	$	15,968,624
Accumulated Priority Offsets as of June 30, 2016	$	(6,056,900)
Amortization Payment on the 1995 Liability Experience Loss (July 1, 2016)	$	(1,785,663)
Interest on the Net Amortization Base to June 30, 2017	$	568,824
Net Balance of the 1995 Liability Experience Loss as of June 30, 2017	$	8,694,885
Priority Excess Allocation Applied to 1995 Liability Experience Loss - June 30, 2017	$	(6,056,800)
Outstanding Balance of 1995 Liability Experience Loss (as of June 30, 2017)	$	2,638,085
Amortization Payment on the 1995 Liability Experience Loss (July 1, 2017)	$	(1,785,663)
Interest on the Net Amortization Base to June 30, 2018	$	59,670
Net Balance of the 1995 Liability Experience Loss as of June 30, 2018	$	912,092
Priority Excess Allocation Applied to 1995 Liability Experience Loss - June 30, 2018	$	(912,092)
Outstanding Balance of the 1995 Liability Experience Loss (as of June 30, 2018)	$	-

1997 Liability Exerience Loss

Outstanding Balance of 1997 Liability Experience Loss (as of June 30, 2017)	$	3,324,613
Amortization Payment on the 1997 Liability Experience Loss (July 1, 2017)	$	(391,192)
Interest on the Net Amortization Base to June 30, 2018	$	205,339
Net Balance of the 1997 Liability Experience Loss as of June 30, 2018	$	3,138,760
Priority Excess Allocation Applied to 1997 Liability Experience Loss - June 30, 2018	$	(3,138,760)
Outstanding Balance of the 1997 Liability Experience Loss (as of June 30, 2018)	$	-

1999 Liability Exerience Loss

Outstanding Balance of 1997 Liability Experience Loss (as of June 30, 2017)	$	9,362,648
Amortization Payment on the 1997 Liability Experience Loss (July 1, 2017)	$	(1,101,660)
Interest on the Net Amortization Base to June 30, 2018	$	578,269
Net Balance of the 1997 Liability Experience Loss as of June 30, 2018	$	8,839,257
Priority Excess Allocation Applied to 1997 Liability Experience Loss - June 30, 2018	$	(2,582,895)
Outstanding Balance of the 1997 Liability Experience Loss (as of June 30, 2018)	$	6,256,362

6. Analysis of Change in Assets

Actuarial Value of Assets (June 30, 2017)		$ 774,664,801
Prior Period Adjustment		$ 118,371
Actuarial Value of Assets (June 30, 2017)		$ 774,783,172
INCOME:		
Member Contributions	$ 7,554,190	
Employer Contributions	46,422,310	
Irregular Contributions	1,148,786	
Insurance Premium Taxes	1,500,000	
Transfers from Other Systems	2,606,335	
Total Contributions		$ 59,231,621
INVESTMENTS:		
Net Appreciation of Investments	$ 67,124,390	
Interest & Dividends	9,108,381	
Miscellaneous Income	148,883	
Investment Expense	(2,388,943)	
Net Investment Income		73,992,711
TOTAL Income		133,224,332
EXPENSES:		
Retirement Benefits	$ 48,833,597	
Refunds of Contributions	511	
Administrative Expenses	771,905	
TOTAL EXPENSES:		$ 49,606,013
Net Market Value Income for Fiscal 2018 (Income - Expenses)		$ 83,618,319
Unadjusted Fund Balance as of June 30, 2018 (Fund Balance Previous Year + Net Income)		$ 858,401,491
Income Adjustment for Actuarial Smoothing		$ (9,945,184)
Actuarial Value of Assets (June 30, 2018)		$ 848,456,307

7. Experience Account

1.	Experience Account Balance -- June 30, 2017	$	5,260,562
2.	Investment Gain, if any	$	9,489,939
3.	Priority Excess Interest Allocated to Reduce UAL	$	6,633,747
4.	Residual Investment Gain, if any (2 - 3)	$	2,856,192
5.	Investment Gain to Alllocate to the Experience Account (50% × 4)	$	1,428,096
6.	Credit for Investment Earnings based on AVA rate of return, if positive	$	432,418
7.	Total Preliminary Credits to be Allocated to Experience Account (5 + 6)	$	1,860,514
8.	Debit for Investment Losses based on AVA rate of return, if negative	$	-
9.	Present Value of Permanent Benefit Increase Paid July 1, 2018	$	(5,164,014)
10.	Total Preliminary Debits to be Allocated to Experience Account (8 + 9)	$	(5,164,014)
11.	Total Net Credit/Debit to be Allocated to Experience Account (7 + 10)	$	(3,303,500)
12.	Limit to the Experience Account Balance -- June 30, 2018 (Present Value of PBI at CPI-U for Fiscal 2018 or 2.00%)	$	9,111,298
13.	Experience Account Balance -- June 30, 2018 (Lesser of 1.+11. & 12. - at least 0)	$	1,957,062

8. Year-to-Year Comparison

	Fiscal 2018	Fiscal 2017	Fiscal 2016	Fiscal 2015
Number of Active Members	1,129	1,071	1,041	991
Number of Retirees & Survivors	1,174	1,155	1,220	1,224
DROP Participants	-	-	-	-
Number of Terminated Due Deferred Benefits	44	43	41	41
Number Terminated Due Refunds	169	139	N/A	N/A
Active Lives Payroll (excludes DROP participants)	$ 85,349,504	$ 84,059,551	$ 75,969,718	$ 64,632,596
Retiree Benefits in Payment	$ 47,329,769	$ 43,286,212	$ 41,866,788	$ 41,737,344
Market Value of Assets (Includes Experience Account)	$ 866,309,038	$ 782,572,348	$ 670,423,169	$ 659,126,281
Ratio of Actuarial Value of Assets to Actuarial Accrued Liability	70.48%	72.91%	69.45%	68.85%
Actuarial Accrued Liability (EAN)	$ 1,203,836,393	$ 1,062,446,959	$ 1,006,626,437	$ 910,845,343
Actuarial Value of Assets (Includes Experience Account) *	$ 848,456,307	$ 774,664,801	$ 699,121,700	$ 627,083,218
UAL (Funding Excess)	$ 355,380,086	$ 28,782,158	$ 307,504,737	$ 283,762,125
Experience Account	$ 1,957,062	$ 5,260,562	$ 3,963,595	$ 12,416,791

	Fiscal 2019	Fiscal 2018	Fiscal 2017	Fiscal 2016
Employee Contribution Rate For Employees Hired Before January 1, 2011	8.5%	8.5%	8.5%	8.5%
Employee Contribution Rate For Employees Hired On Or After January 1, 2011	9.5%	9.5%	9.5%	9.5%
Actuarially Required Employer Contribution as a Percentage of Projected Payroll (based on current valuation)	55.7%	44.0%	48.1%	54.0%
Actual Employer Contribution as a Percentage of Projected Payroll (approved by PRSAC based on prior valuation)	43.1%	47.4%	51.2%	60.8%

* Prior to 2017, AVA was net of Experience of Account

Development of Employer Contributions

Fiscal 2014	Fiscal 2013	Fiscal 2012	Fiscal 2011	Fiscal 2010	Fiscal 2009
956	933	979	1,033	1,065	1,103
1,229	1,234	1,222	1,207	1,181	1,175
-	-	-	2	5	18
34	37	34	31	29	25
N/A	N/A	N/A	N/A	N/A	N/A
$ 54,331,845	$ 51,261,574	$ 57,828,488	$ 58,592,035	$ 59,340,901	$ 58,556,036
$ 40,440,528	$ 39,770,484	$ 38,290,020	$ 36,484,176	$ 34,390,608	$ 33,536,628
$ 622,793,610	$ 521,130,665	$ 451,657,917	$ 447,195,377	$ 366,521,482	$ 334,197,124
65.53%	59.44%	54.76%	54.19%	55.58%	58.37%
$ 837,940,546	$ 797,839,506	$ 759,652,635	$ 740,257,372	$ 704,747,809	$ 678,306,663
$ 549,075,148	$ 474,235,310	$ 415,965,659	$ 401,146,109	$ 391,669,402	$ 395,905,112
$ 288,865,398	$ 323,604,196	$ 343,686,976	$ 339,111,263	$ 313,078,407	$ 282,401,551
$ 12,069,552	$ 18,164,123	$ -	$ -	$ -	$ -

Fiscal 2015	Fiscal 2014	Fiscal 2013	Fiscal 2012	Fiscal 2011	Fiscal 2010
8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
9.5%	9.5%	9.5%	9.5%	N/A	N/A
66.7%	76.2%	70.6%	59.7%	55.5%	51.1%
75.3%	70.0%	68.6%	55.9%	50.9%	41.3%

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 2007 legislative session (Act 333). The program contained two components:

1. **Gain-sharing** – A portion of investment gains (and investment losses) was to be transferred from the pool of assets otherwise 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 inception, the basic format has remained unchanged: 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. Simulations produce estimates of the average annual transfer to the Experience Account.

Following is a table that illustrates the recent history of when LSPRS' COLAs were allowed to be granted and how much was granted. This information has been extracted from Title 11 of Revised Statutes and from information reported in LSPRS' annual actuarial valuation reports.

The Automatic Mechanism for Allowing COLAs is Actuarially Measurable The Pattern of Experience, Legislative History & Framework Expect COLA Approvals When Allowed					
Actuarial Valuation Date	**Legislative Session**	**Amount Allowed By Statutory Template**	**Amount Granted by Legislature and Approved by Governor**	**Date COLA Paid**	**Comments**
6/30/18	2019	None[1]	None	NA	Insufficient balance and not allowed due to granting in prior year
6/30/17	2018	1.6%	1.6%	7/1/18	The 2018 Legislature approved the 1.6% statutory template COLA
6/30/16	2017	None[1]	None	NA	Insufficient balance and not allowed due to granting in prior year
6/30/15	2016	0.1%	2.0%[2]	7/1/16	The 2016 Legislature overrode the statutory template and allowed for a 2% COLA and a 2% Supplement[1]
6/30/14	2015	None	None	NA	Sufficient balance; but not allowed due to granting in prior year
6/30/13	2014	1.5%	1.5%[3]	7/1/14	The 2014 Legislature approved the 1.5% statutory template COLA and a 2% Supplement
6/30/12	2013	None	None	NA	Empty experience account due to Great Recession investment losses phased in over time
6/30/11	2012	None	None	NA	
6/30/10	2011	None	None	NA	
6/30/09	2010	None	None	NA	

During the last nine years, the Legislature and Governor approved COLAs all three times they were permitted by the statutory template to do so. Similarly, there were no cases when a template COLA was allowed but the Legislature or Governor failed to grant it. The evidence leads us to conclude, based on the historical pattern inherent in the data, a COLA was granted every year that the statutory mechanism allowed the Legislature to grant one, and that a COLA was not granted for years when the statutory mechanism did not otherwise permit the Legislature to grant one.

[1] The funds in the Experience Account were not sufficient to grant a full COLA. According to the statutory mechanism, partial COLA's are not permitted except for very narrow set of circumstances.

[2] The application of the statutory mechanism available to the 2016 Legislature would have allowed only a 0.1% COLA due to the limitation of the Consumer Price Index. However, the 2016 Legislature overrode the template (Act 93) and allowed for a 2% COLA but not to exceed the percentage that could be purchased by the balance in the Experience Account at June 30, 2016. The balance could purchase a full 2.0% increase. Besides the 2.0% COLA for all eligible retirees (including the 0.1% base template COLA), an additional 2.0% COLA (aka Supplemental) was granted and paid to a certain subset of otherwise eligible retirees.

[3] In Act 399 the 2014 Legislature adopted a template limiting the frequency and level of COLAs to be recommended while the Plan is less than 80% funded or when the actual actuarial rate of return is below 7.00%. Act 101 of 2014 granted a 1.5% COLA in accordance with that newly adopted template.

The 2016 Legislature decided that the statutory mechanism did not allow *enough* of an increase; so it granted *more* through an amendment outside the established statutory template for COLAs. The main point is that the pattern that emerges from the application of the statutory template has been "to grant a template COLA whenever the template allows it, and possibly to grant a non-template COLA even when the template disallows it." We do not find a sufficient pattern of non-template COLAs being granted, but do find a sufficient pattern for template-driven COLAs.

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.

It is clear that recognizing only one year's transfer to the Experience Account (and that no future COLA benefits would be granted) does not reflect the likelihood that COLAs will be granted in the future. Thus, in this valuation, all actuarially expected future COLA benefits are assumed to be granted in accordance with the statutory template. This is a change in the actuarial assumptions from the previous PRSAC-adopted valuations. Refer to Appendix F for more details in support of this change in assumption.

Stochastic modeling techniques can determine the single fixed annual COLA that would approximate or be equivalent to what is actuarially expected from current statutory mechanism. This single equivalent fixed annual COLA rate can then be modeled within the regular annual actuarial valuation. In this valuation's calculations, it has been determined that the single equivalent fixed COLA assumption should be a 0.60% annual COLA for the gain-sharing COLA program. This is the current best estimate. However, 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 0.60% 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 0.60% 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 0.60% of the present value of currently eligible payees. This is the normal way in which actuarial experience gains and losses with respect to any benefits are measured.

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 since the investment gains for FYE 2018 were more than the roughly $6.6 million threshold applicable for FYE 2018. Calculations associated with this analysis are shown in Section I(7).

Refer to Appendix F for more details and support concerning the actuarial measurement of gain-sharing COLA benefits.

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

Benefit and funding provisions associated with the LSPRS gain-sharing COLA program are contained in R.S. 11:102.4 and R.S. 11:1331.1 - 11:1332. According to R.S. 11:1332, 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 and 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 LSPRS' interpretation of the law. On each valuation date, LSPRS 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 LSPRS, increases the investment gain that otherwise would be calculated. Under LSPRS' 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 LSPRS that exceeds a specified threshold (currently set at $5 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 $5 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 the following table.

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 LSPRS 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 7.0% (7.0% 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. 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.

   d. 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 1 below).

Table 1

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

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, the actuarially required employer contribution for FYE 2019, and the minimum recommended net direct employer contribution rate for FYE 2020. Census data, actuarial methods, and actuarial assumptions used in the preparation of June 30, 2018 assets, liabilities, and employer contribution requirements for FYE 2019 are shown in this section of the report. Additional information is provided whenever a change has been made 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 LSPRS. A comparison with census summaries prepared by the LSPRS' actuary confirms the reasonability of the census data used in preparing this report.

Membership Reconciliation

	Active	Terminated with Funds on Deposit	Retired	Total
Number of Members as of on June 30, 2017	**1,071**	**182**	**1,155**	**2,408**
Additions to Census				
Initial Membership	113	27	0	140
Omitted in error last year	0	0	0	0
Death of another member	0	0	13	13
Adjustment for multiple records	0	0	0	0
Total Additions	**113**	**27**	**13**	**153**
Change in Status during the Year				
Active terminating service	(11)	11	0	0
Active who retired	(42)	0	42	0
Active entering DROP	0	0	0	0
Terminated members rehired	0	0	0	0
Terminated members who retire	0	(6)	6	0
Retirees who are rehired	0	0	0	0
Refunded who are rehired	0	0	0	0
DROP participants retiring	0	0	0	0
DROP returned to work	0	0	0	0
Omitted in error last year	0	0	0	0
Total Changes	**(53)**	**5**	**48**	**0**
Eliminated from Census				
Refund of contributions	0	(1)	0	(1)
Deaths	(2)	0	(40)	(42)
Included in error last year	0	0	0	0
Adjustment for multiple records	0	0	(2)	(2)
Total Eliminated	**(2)**	**(1)**	**(42)**	**(45)**
Number of Members as of on June 30, 2018	**1,129**	**213**	**1,174**	**2,516**

Actives Census by Age

Ages	Number Male	Number Female	Total Number	Average Salary	Total Salary
[21-25)	35	2	37	47,697	1,764,803
[26-30)	91	3	94	49,295	4,633,699
[31-35)	119	4	123	54,000	6,641,971
[36-40)	184	9	193	62,481	12,058,806
[41-45)	201	10	211	74,764	15,775,287
[46-50)	257	15	272	91,295	24,832,207
[51-55)	148	5	153	97,875	14,974,870
[56-60)	39	1	40	101,760	4,070,405
[61-65)	6	0	6	99,576	597,456
TOTAL	1,080	49	1,129	75,597	85,349,504

Terminated Members Due a Deferred Retirement Benefit

Ages	Number Male	Number Female	Total Number	Average Salary	Total Salary
[31-35)	1	0	1	21,685	21,685
[36-40)	4	0	4	24,565	98,261
[41-45)	10	2	12	24,142	289,701
[46-50)	24	1	25	27,696	692,408
[51-55)	2	0	2	19,484	38,967
TOTAL	41	3	44	25,932	1,141,022

Terminated Members Due a Refund of Contributions

Contributions Ranging	Number	Total Contributions
[0-99)	72	3,287
[100-499)	63	16,157
[500-999)	12	8,134
[1,000-1,999)	4	5,384
[2,000-4,999)	6	18,357
[5,000-9,999)	3	24,640
[10,000-19,999)	5	76,897
[20,000-99,999)	4	117,858
TOTAL	169	270,714

Regular Retirees

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[46-50)	21	1	22	80,511	1,771,244
[51-55)	55	2	57	71,070	4,051,012
[56-60)	82	1	83	62,313	5,172,006
[61-66)	148	3	151	60,935	9,201,221
[66-70)	195	1	196	43,495	8,525,078
[71-75)	161	1	162	34,057	5,517,234
[76-80)	81	1	82	30,515	2,502,234
[81-85)	46	0	46	24,507	1,127,344
[86-90)	22	0	22	19,889	437,561
[91-99)	6	0	6	16,687	100,121
TOTAL	817	10	827	46,439	38,405,055

Disability Retirees

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[36-40)	1	1	2	24,495	48,989
[41-45)	5	0	5	37,931	189,656
[46-50)	5	1	6	35,706	214,237
[51-55)	6	0	6	34,018	204,110
[56-60)	3	0	3	35,252	105,756
[61-66)	6	1	7	24,585	172,092
[66-70)	9	2	11	22,920	252,121
[71-75)	12	0	12	24,897	298,764
[76-80)	4	1	5	28,515	142,575
[81-85)	1	0	1	40,827	40,827
[86-90)	1	0	1	13,957	13,957
TOTAL	53	6	59	28,527	1,683,084

Survivors

Ages	Number Male	Number Female	Total Number	Average Benefit	Total Benefit
[0-25)	2	3	5	39,668	198,339
[26-30)	0	1	1	53,088	53,088
[31-35)	0	1	1	32,266	32,266
[36-40)	0	1	1	69,434	69,434
[41-45)	1	1	2	49,418	98,835
[46-50)	0	4	4	38,694	154,774
[51-55)	0	3	3	31,303	93,910
[56-60)	0	8	8	36,005	288,036
[61-66)	0	23	23	33,992	781,819
[66-70)	2	30	32	25,247	807,904
[71-75)	0	55	55	25,284	1,390,623
[76-80)	1	47	48	24,884	1,194,442
[81-85)	1	44	45	21,047	947,120
[86-90)	0	41	41	19,288	790,811
[91-99)	0	19	19	17,904	340,182
TOTAL	7	281	288	25,145	7,241,583

Active Members

Member Count
Total Salary

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)												0
												0
[21-25)	28	5	3	1								37
	46,610	50,296	52,156	51,777								47,697
[26-30)	35	17	16	14	4	8						94
	46,610	50,359	51,585	51,716	51,863	48,676						49,295
[31-35)	25	8	8	8	8	37	29					123
	46,610	50,384	52,159	50,934	51,561	55,285	61,754					54,000
[36-40)	13	4	7	5	6	20	98	37	3			193
	46,610	50,318	52,083	52,038	51,465	56,074	64,142	73,381	65,177			62,481
[41-45)	4	4	2	2	3	6	42	97	49	2		211
	46,610	50,394	52,160	51,771	55,666	59,739	65,161	76,843	88,170	71,536		74,764
[46-50)	3	1	3	1	1	5	23	43	161	31		272
	46,610	50,714	52,163	51,781	51,593	58,559	68,996	80,263	97,851	106,347		91,295
[51-55)			2			3	8	15	54	63	8	153
			52,157			54,762	67,202	81,249	95,624	108,942	115,361	97,875
[56-60)							1	4	12	15	8	40
							68,739	76,132	95,596	102,537	126,493	101,760
[61-65)									3	2	1	6
									95,880	107,534	94,748	99,576
[66+)												0
												0
TOTAL	108	39	41	31	22	79	201	196	282	113	17	1,129
	46,610	50,365	51,922	51,574	52,151	55,341	64,711	77,263	95,278	106,693	119,387	75,597

Terminated Members Due a Deferred Retirement Benefit

Member Count
Annual Benefits

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)												0
												0
[21-25)												0
												0
[26-30)												0
												0
[31-35)								1				1
								21,685				21,685
[36-40)							4					4
							24,565					24,565
[41-45)						12						12
						24,142						24,142
[46-50)	4	9	2	7	3							25
	17,741	31,432	19,189	33,997	20,731							27,696
[51-55)	2											2
	19,484											19,484
[56-60)												0
												0
[61-65)												0
												0
[66+)												0
												0
TOTAL	6	9	2	7	3	12	4	1	0	0	0	44
	18,322	31,432	19,189	33,997	20,731	24,142	24,565	21,685	0	0	0	25,932

Service Retirees

Member Count
Annual Benefits

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-50)	18	1				3						22
	83,939	56,985				67,785						80,511
[51-55)	22	5	3	6	10	11						57
	89,278	66,201	41,050	63,559	56,871	62,061						71,070
[56-60)	7	3		4	5	52	12					83
	100,683	90,454		65,262	61,636	56,434	57,671					62,313
[61-65)				1	2	59	72	4	7	2	4	151
				52,302	70,614	68,820	62,679	43,293	27,862	13,174	9,970	60,935
[66-70)						19	57	40	41	24	15	196
						71,296	65,685	38,337	28,392	22,086	13,253	43,495
[71-75)						3	12	30	32	39	46	162
						56,051	74,432	45,870	33,446	25,772	21,835	34,057
[76-80)							1	6	11	21	43	82
							89,294	48,961	39,587	31,674	23,687	30,515
[81-85)								1	1	5	39	46
								32,101	42,353	35,537	22,441	24,507
[86-90)											22	22
											19,889	19,889
[91+)											6	6
											16,687	16,687
TOTAL	47	9	3	11	17	147	154	81	92	91	175	827
	88,932	73,261	41,050	63,155	59,889	63,971	64,490	42,082	31,600	26,422	20,997	46,439

Disability Retirees

Member Count
Annual Benefits

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-35)												0
												0
[36-40)			1	1								2
			25,195	23,794								24,494
[41-45)	1		2	1	1							5
	31,665		36,420	37,173	47,978							37,931
[46-50)			2			2	1	1				6
			32,428			41,380	27,867	38,755				35,706
[51-55)						3	1	1	1			6
						39,289	27,524	19,926	38,793			34,018
[56-60)						1		1	1			3
						48,883		31,832	25,042			35,252
[61-65)							1		1	3	2	7
							40,094		15,664	27,481	16,945	24,585
[66-70)									2	4	5	11
									20,718	21,849	24,658	22,920
[71-75)										2	10	12
										24,224	25,031	24,897
[76-80)									2		3	5
									26,229		30,039	28,515
[81-85)											1	1
											40,827	40,827
[86-90)											1	1
											13,957	13,957
[91+)												0
												0
TOTAL	1	0	5	2	1	6	3	3	7	9	22	59
	31,665	0	32,578	30,483	47,978	41,585	31,828	30,171	24,770	24,254	25,109	28,527

Surviving Beneficiaries of Former Members

Member Count
Annual Benefits

Age/Service	0	1	2	3	4	[5-9)	[10-14)	[15-19)	[20-24)	[25-29)	[30+)	TOTAL
[0-20)					1	1			1			3
					57,401	53,088			29,703			46,731
[21-25)					2							2
					29,074							29,074
[26-30)						1						1
						53,088						53,088
[31-35)									1			1
									32,266			32,266
[36-40)			1									1
			69,434									69,434
[41-45)						1		1				2
						47,421		51,416				49,418
[46-50)	2									2		4
	56,697									20,692		38,694
[51-55)					1			2				3
					60,666			16,622				31,303
[56-60)		1				1			2	1	3	8
		72,496				60,483			27,192	15,724	28,316	36,004
[61-65)						3	2	1	3	2	12	23
						80,641	68,848	65,053	28,295	13,986	18,691	33,992
[66-70)							2	4	4	7	15	32
							44,038	44,640	28,724	25,541	16,506	25,247
[71-75)							1	6	4	11	33	55
							66,356	45,404	24,582	27,724	19,653	25,284
[76-80)									4	4	40	48
									41,763	31,016	22,583	24,884
[81-85)											45	45
											21,047	21,047
[86-90)								1		2	38	41
								76		23,947	19,550	19,289
[91+)										1	18	19
										38,371	16,767	17,904
TOTAL	2	1	1	0	4	7	5	15	19	30	204	288
	56,697	72,496	69,434	0	44,054	65,143	58,426	40,052	30,606	25,972	20,101	25,145

3. Plan Provisions

The Louisiana State Police Retirement System (LSPRS) was established by Act 293 of the 1938 Legislative Session, for the purpose of providing retirement allowances and other benefits as described under R.S. 11:1301 – 11:1345. The following summary of plan provisions covers many of the most important plan provisions covering LSPRS, but is not a description of every plan provision and should only be used for general informational purposes. This summary does not constitute a guarantee of benefits. The provisions contained within this section are as of June 30, 2018.

MEMBERSHIP:

Sworn, commissioned law enforcement officers of the Division of State Police of the Department of Public Safety who have completed the State Police Training Academy Course of Instruction on the Effective Date of the Fund and those subsequently employed who did not withdraw employee contributions. In addition, the secretary and deputy secretary of the Department of Public Safety, provided they are sworn, commissioned State Police officers who have graduated from the State Police Academy.

CONTRIBUTION RATES:

Employees whose first employment making them eligible for membership in one of Louisiana's state retirement systems occurred on or before December 31, 2010 contribute 8.50% of salary and employees whose first employment making them eligible for membership in one of Louisiana's state retirement systems occurred on or after January 1, 2011 contribute 9.50% of salary. Employers contribute an actuarially determined "normal contribution" rate plus "accrued liability contribution" rate.

CONTRIBUTION REFUNDS:

Upon withdrawal from service, members not entitled to a retirement allowance may receive a refund of accumulated contributions.

FINAL AVERAGE COMPENSATION:

For members employed prior to September 8, 1978, the average final salary is the average salary including any additional pay or salary provided by the legislature over and above that set by the Civil Service Commission, received for the year ending on the last day of the month immediately preceding the date of retirement or date of death or for any one-year period, whichever is the greatest.

For members employed on or after September 8, 1978, and on or before December 31, 2010, the average final salary is the average salary including any additional pay or salary provided by the legislature over and above that set by the Civil Service Commission, received for the thirty-six month period ending on the last day of the month immediately preceding the date of retirement or date of death or for any thirty-six consecutive months, whichever is the greatest. The earnings to be considered exclude overtime, expenses, and clothing allowances. The earnings to be considered for the thirteenth through the twenty-fourth month shall not exceed one hundred twenty-five percent of the earnings of the first through the twelfth month. The earnings to be considered for the final twelve months shall not exceed one hundred twenty-five percent of the earnings of the thirteenth through the twenty-fourth month.

For members employed on or after January 1, 2011 the average final salary is the average annual earned compensation of a member for the sixty highest months of successive employment, or for the highest sixty successive joined months of employment where interruption of service occurred; The earnings to be considered for the thirteenth through the twenty-fourth month shall not exceed one hundred fifteen percent of the earnings of the first through the twelfth month. The earnings to be considered for the twenty-fifth through the thirty-sixth month shall not exceed one hundred fifteen percent of the earnings of the thirteenth through the twenty-fourth month. The earnings to be considered for the thirty-seventh through the forty-eighth month shall not exceed one hundred fifteen percent of the earnings of the twenty-fifth through the thirty-sixth month. The earnings for the final twelve months shall not exceed one hundred fifteen percent of the earnings of the thirty-seventh through the forty-eighth month.

VESTED WITHDRAWAL BENEFITS:

Members with sufficient service credit who terminate employment prior to reaching retirement eligibility age may elect to leave accumulated contributions on deposit and receive a retirement allowance based on the creditable service and accrual rate for their period of membership upon reaching their retirement eligibility age.

For members whose first employment making them eligible for membership in one of Louisiana's state retirement systems occurred on or before December 31, 2010, who have ten or more years of creditable service, may elect to leave accumulated contributions on deposit and after withdrawal from service receive a retirement allowance based on the creditable service and accrual rate for their period of membership upon reaching age fifty.

For members whose first employment making them eligible for membership in one of Louisiana's state retirement systems occurred on or after January 1, 2011, who have twelve or more years of creditable service, may elect to leave accumulated contributions on deposit and after withdrawal from service receive a retirement allowance based on the creditable service and accrual rate for their period of membership upon reaching age fifty-five.

NORMAL RETIREMENT BENEFITS:

Any member of the system whose initial date of employment was prior to September 8, 1978, regardless of age, who has credit for at least twenty years of service shall be paid a monthly benefit equal to the sum of three and one-third percent multiplied by the member's monthly average salary, and further multiplied by the number of years of service credited to the member's account, but the total annual benefit shall not exceed one hundred percent of the member's final average annual salary.

Any member of the system, whose first employment making him eligible for membership in one of the state systems occurred on or before December 31, 2010, and who has attained age fifty and who has credit for at least ten years of service shall be paid a monthly benefit equal to the sum of three and one-third percent multiplied by the member's monthly average salary, and further multiplied by the number of years of service credited to the member's account, but the total annual benefit shall not exceed one hundred percent of the member's final average annual salary.

Any member of the system whose initial date of employment occurred on or after September 8, 1978, and whose first employment making him eligible for membership in one of the state systems occurred on or before December 31, 2010, who has credit for at least twenty-five years of service, regardless of age, shall be paid a monthly benefit equal to the sum of three and one-third percent multiplied by the member's monthly average salary, and further multiplied by the number of years of service credited to

the member's account, but the total annual benefit shall not exceed one hundred percent of the member's final average annual salary.

Any member of the system whose first employment making him eligible for membership in one of the state systems occurred on or after January 1, 2011, shall become a member of the New State Police Retirement Plan of the system as a condition of employment.

Any member of the New State Police Retirement Plan shall be eligible for retirement if he has:

(1) Twenty-five years or more of service, at any age.
(2) Twelve years or more of service, at age fifty-five or thereafter.
(3) Twenty years of service credit at any age, exclusive of military service and unused annual and sick leave, but any person retiring under this Paragraph shall have his benefit, inclusive of military service credit and allowable unused annual and sick leave, actuarially reduced from the earliest age that he would normally become eligible for a regular retirement if he had continued in service to that age. Members retiring under the twenty year at any age rule may not participate in Back-DROP or the Initial Benefit Option.

INITIAL BENEFIT OPTION: In lieu of receiving a regular retirement benefit according to the relevant benefit computation rules, a member who does not retire under the Back-DROP may elect to receive a reduced retirement benefit plus an initial lump sum payment. The reduced retirement benefit plus initial lump sum payment will be determined to be actuarially equivalent to the member's regular retirement benefit computed based on the relevant benefit computation rules.

BACK-DEFERRED RETIREMENT OPTION PLAN (BACK-DROP):

In lieu of receiving a normal retirement benefit, a member (1) who has accrued more service credit than the minimum required for eligibility for a normal retirement benefit and (2) who has attained an age that is greater than the minimum required for eligibility for a normal retirement benefit, if applicable, may elect to retire and have his benefits structured, calculated, and paid as provided in the Back-Deferred Retirement Option Program. At the time of retirement, a member who elects to receive a Back-DROP benefit shall select a period that shall not exceed the lesser of thirty-six months or the number of months of creditable service accrued after the member first attained eligibility. The period shall be comprised of the most recent calendar days corresponding to the member's employment for which service credit accrued. For purposes of Back-DROP, creditable service will be reduced by the Back-DROP period and shall not include reciprocal service credit. The sum of the Back-DROP period and the accrued service credit used to calculate the member's monthly benefit shall not exceed thirty years. Final average compensation shall be calculated by excluding all earnings during Back-DROP. Employee contributions received by the retirement system during the Back-DROP period shall, at the member's election, be refunded to the member without interest or deposited directly into the member's Back-DROP account. Employer contributions and any interest that has accrued on employer and employee contributions received during the period shall be retained by the system and shall not be refunded to the member or to the employer. The member's maximum monthly retirement benefit payable shall be equal to the Back-DROP monthly benefit. In addition to the monthly benefit, the member shall be paid a lump-sum benefit equal to the Back-DROP maximum monthly retirement benefit multiplied by the number of months selected as the Back-DROP period. The Back-DROP lump sum shall, at the member's election, be distributed to the member or paid into an individual account and placed in liquid asset money market investments. Such account shall be credited with interest at the actual rate of return earned on such account balance investments. Cost-of-living adjustments shall not be payable on the member's Back-DROP lump sum.

ACCUMULATION OF SICK AND ANNUAL LEAVE:

A member may convert unused sick and annual leave to retirement credit on the basis of one work day for each eight hours of unused leave. Such converted leave shall not be used to determine eligibility for retirement. A member who has sick and annual leave that if converted to retirement credit would exceed one hundred percent of the member's average compensation may receive a lump sum payment equal to the additional leave's actuarial value.

DISABILITY BENEFITS:

The board of trustees shall award disability benefits to any sworn, commissioned law enforcement officer of the office of state police who is eligible and who has been officially certified as having a disability by the State Medical Disability Board.

Any member whose first employment making him eligible for membership in one of the state systems occurred on or before December 31, 2010, who applies for retirement due to a total and permanent disability caused solely as the result of injuries sustained in the performance of his official duties shall receive a disability benefit equal to fifty percent of his average salary, plus one and one-half percent of his average salary for each year of service credit in excess of ten years. Such benefit shall not exceed one hundred percent of the member's average salary.

Any member whose first employment making him eligible for membership in one of the state systems occurred on or before December 31, 2010, who applies for retirement due to a total and permanent disability caused not as a result of injuries sustained in the performance of his official duties with at least five years of service credit shall receive a disability benefit equal to fifty percent of his average salary plus one and one-half percent for each year of service credit in excess of ten years. Such benefit shall not exceed one hundred percent of the member's average salary.

Any member whose first employment making him eligible for membership in one of the state systems occurred on or before December 31, 2010, who applies for retirement due to a total and permanent disability caused solely as the result of injuries sustained in the performance of official duties including loss of limb, loss of organ, total loss of sight or hearing, paralysis, or permanent damage to the brain or spinal cord, shall receive a disability benefit equal to one hundred percent of his average annual salary, or thirty-six thousand dollars annually, whichever is greater.

Any member whose first employment making him eligible for membership in one of the state systems occurred on or after January 1, 2011, who applies for retirement due to a total and permanent disability resulting solely from injuries sustained in the performance of his official duties, shall receive a disability benefit equal to seventy-five percent of his average compensation regardless of years of service.

Any member whose first employment making him eligible for membership in one of the state systems occurred on or after January 1, 2011, who applies for retirement due to a total and permanent disability caused as the result of any other reason, a member with at least ten years of service credit shall receive a disability benefit equal to fifty percent of his average salary plus one and one-half percent for each year of service credit in excess of ten years. Such benefit shall not exceed one hundred percent of the member's average salary.

SURVIVOR BENEFITS:

For members whose first employment making them eligible for membership in one of the state systems occurred on or before December 31, 2010:

The surviving spouse of any such sworn commissioned law enforcement officer of the office of state police of the Department of Public Safety and Corrections who is killed in the discharge of his duties, or dies from immediate effects of any injury received as the result of an act of violence occurring while engaged in the discharge of his duties, shall receive a benefit equal to seventy-five percent of the salary being received by the employee at the time of the decedent's death or injury, provided the surviving spouse was married to the decedent at the time of the event which resulted in the officer's death. If there is no surviving spouse, surviving minor children shall receive the benefit until reaching eighteen years of age, or twenty-three years of age if a student.

The surviving spouse of any such sworn commissioned law enforcement officer of the office of state police of the Department of Public Safety and Corrections whose death occurs other than in the line of duty shall receive a monthly benefit according to the following table:

Deceased offer's Service Credit	Percent of Final Salary Survivor Benefit
Less than 5 years	25%
At least 5, but less than 10	30%
At least 10, but less than 15	40%
At least 15, but less than 20	50%

If the officer dies with at least 20 years of service, the surviving spouse shall receive a monthly benefit equal to the amount that the employee would have received had the employee elected to retire at the time of his death.

The surviving spouse of any employee whose death occurs other than in the line of duty shall cease receiving benefits while remarried, if remarried before age fifty-five.

Upon the death of an employee where there is no surviving spouse, or if the spouse has remarried and forfeited his or her benefit, the minor children of the deceased shall receive a monthly benefit equal to the greater of 1) 60% of the average salary of the deceased member, or 2) The pension that would have been received by the surviving spouse. Such minor child benefits are divided equally and cease as each minor child reaches eighteen years of age, or twenty-three years of age if a student. Children with a total physical or mental disability may receive benefits beyond age eighteen (or twenty-three).

In the event of the death of member where there is no surviving spouse and no minor children, a monthly pension of twenty-five percent of the average salary of the deceased employee shall be paid to the parent(s) if either of them derives their main support from the employee.

In the event of death of a former employee with at least ten years of service credit, the qualified surviving spouse shall receive a pension equal to the monthly retirement pay that would have been payable to the decedent. In the event of death of a retired employee, the qualified surviving spouse shall receive a pension equal to the monthly retirement pay that was being paid to the decedent on the date of death. (Surviving spouse benefits cease upon remarriage in some cases) If there is no surviving spouse eligible to receive benefits, the minor children of the decedent shall be entitled to share equally in a benefit equal to the greater of the spousal benefit or 60% of the average salary. If there is no surviving spouse or minor children, the qualifying parent(s) of the decedent may be entitled to benefits.

For members whose first employment making them eligible for membership in one of the state systems occurred on or after January 1, 2011:

If a member's death occurs in the line of duty or is a direct result of an injury sustained while in the line of duty, a monthly benefit equal to eighty percent of the member's average compensation will be shared equally by the surviving spouse, qualified minor children, or qualified disabled children.

Upon the death of a member with at least five years of service credit (two of which were earned immediately prior to death unless the member had at least twenty years) other than in the line of duty, the surviving spouse with a minor child or child with a disability, shall receive fifty percent of the benefit to which the member would have been entitled if he had retired on the date of death, or $600 per month, whichever is greater. (Spousal benefits cease upon remarriage in some cases)

In addition, qualifying children receive fifty percent of the benefit to which the spouse would be entitled, up to a maximum 100% to all children.

A surviving spouse without a minor child or a child with a disability shall receive a benefit based on the decedent's years of service credit earned to the date of death using the applicable accrual rate, or $600 per month, whichever is greater. (Spousal benefits cease upon remarriage in some cases)

In the event of death of a member with no surviving spouse or child due benefits, the accumulated contributions are payable to the designated beneficiaries, or estate.

Upon the death of a former member who terminated prior to attaining the requisite age for retirement eligibility with at least twelve years of service credit and contributions on deposit, the surviving spouse shall receive a monthly benefit equal to fifty percent of the benefit that would have been payable to the decedent.

Upon the death of a retired employee, the surviving spouse shall receive a monthly benefit equal to seventy-five percent of the benefit that was being paid to the decedent on the date of death provided the surviving spouse was married to the decedent for at least two years prior to the decedent's death.

Upon the death of a former member or retired employee with no surviving spouse, or if the spouse has remarried and forfeited his benefit, the minor children shall be entitled to fifty percent of the monthly retirement benefit that would have been payable to the decedent or was being paid to the decedent on the date of death. If there are no qualified children, the parents of the decedent may be entitled to a benefit under certain circumstances.

COST OF LIVING ADJUSTMENTS/PERMANENT BENEFIT INCREASES:

Act 333 of 2007 established an Experience Account to be used to pay cost of living adjustments (COLAs), or permanent benefit increases (PBIs). The Experience Account is credited with 50% of the investment experience gain in excess of $5 million (indexed based on increases in the actuarial value of assets after June 30, 2015) along with that portion of the net investment income, if any, attributable to the prior year balance, subject to maximum accumulation limitation based upon the Plan's funded percentage. The account is also debited with that portion of the system's net investment loss, if any, attributable to the prior year balance. In no event may the amount in the experience account fall below zero. Once the balance of the Experience Account accumulates a sum sufficient to grant retirees a COLA, the Board may recommend that the legislature grant a COLA on benefits up to $60,000 (indexed), not to exceed the lesser of the CPI-U or a percentage determined based on the funded level percentage attained by the system as described in R. S. 11:1332, provided a COLA had not been

granted in the prior year. Benefits are restricted to disability retires and those retirees and beneficiaries who have attained the age of 60 and have been retired for at least one year. Maximum limitations are outlined in ACT 399 of 2014. In addition, the Experience Account statute outlines a supplemental permanent benefit increase of 2% of the benefit being received (subject to limitation by the indexed $60,000 limit) to all retirees and beneficiaries who are at least age 65 and who retired on or before June 30, 2001.

4. Funding Policies

LSPRS' funding policy is generally described in Section 102 of Title 11 of Louisiana Revised Statutes. LSPRS 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 Gain or as a contribution Loss. The contribution process is defined below:

A. **Minimum Recommended Net Direct Employer Dollar Contribution for FYE 2018** − The June 30, 2016 valuation established the minimum recommended employer contribution rate for FYE 2018. The minimum recommended contribution for FYE 2018 is equal to the minimum recommended net direct 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 Gain/Loss** – The difference between the Actual Dollar Contribution for FYE 2018 and the minimum recommended Dollar Contribution that would be for FYE 2018, adjusted for investment earnings, is equal to the Contribution Gain/Loss. A Contribution Gain means that a contribution surplus occurred for FYE 2018. A Contribution Loss indicates a contribution shortfall or deficit.

D. **Actuarially Required Net Direct Employer Contribution Rate for FYE 2019** – The actuarially required net direct employer 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 Required Employer Dollar Contribution for FYE 2019** – The actuarially required employer dollar contribution for FYE 2019 is determined by the June 30, 2018 actuarial valuation and is equal to the actuarially required net direct employer contribution rate for FYE 2019 multiplied by the projected payroll for FYE 2019.

F. **Minimum Recommended Net Direct Employer Contribution Rate for FYE 2020** − The June 30, 2018 valuation establishes the minimum recommended net direct employer contribution rate for FYE 2020 The rate is equal to the minimum recommended employer dollar contribution for FYE 2020 divided by the projected active member payroll for FYE 2020.

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

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, 2018, to amortize new credits or debits to the unfunded accrued liability. Unfunded accrued liability charges or credits established on June 30, 2018, 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 20 years.

C. Increases or decreases resulting from changes in actuarial assumptions and methods are amortized with level payments over a 20-year period.

D. Contribution actually made for a given fiscal year will be more or less than the amount actually required. Contribution surpluses or deficits will be amortized with level payments over a 5-year period.

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

1. Investment losses are amortized with level payments over a 20-year period.

2. Investment gains up to the first investment hurdle ($5 million) are used to reduce the outstanding balance of the oldest charge amortization base. However, the payment schedule will remain the same and the outstanding balance of the oldest charge amortization base will be paid off sooner than it would otherwise.

3. Investment gains exceeding the hurdle, net of transfer to the Experience Account, will be amortized over 20 years.

F. 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, 2017 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 20-year period as before.

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 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 115% of the market value on June 30, 2018, then the actuarial value is equal to the average of the preliminary value and 115% of the market value. If the preliminary value is less than 85% of the market value, then the actuarial value is equal to the average of the preliminary value and 85% of the market value. Otherwise, the actuarial value is equal to the preliminary value.

Asset valuation formulas are shown in Section I(3).

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, LSPRS 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.

We have prepared our employer contribution requirements for FYE 2019 and FYE 2020 in accordance with our understanding of the law as summarized above and as summarized in Section II.

Accelerated Reduction of the Oldest Charge Amortization Base

Investment gains falling between $0 and $5 million (adjusted pro-rata for increases in the Actuarial Value of Assets) are used to reduce the oldest charge amortization base. However, the amortization payment schedule is unaffected by the reduction in the outstanding balance.

Valuation Approval Process

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

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

2. The actuary for the Louisiana Legislative Auditor (LLA) also prepares an actuarial valuation.

3. The actuaries present their valuations to the Public Retirement Systems' Actuarial Committee (PRSAC). PRSAC approves one of the two valuations presented.

4. The valuation approved by PRSAC is then submitted to the House and Senate Committees on Retirement and the Joint Legislative Committee on the Budget.

4. 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 LSPRS' 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 outside our acceptable margins of the value produced by the LSPRS' retained actuary. Further refinement in the replication efforts will be deferred until a later date.

Because we could not match results produced by the System's actuary to be within our acceptable margins, liability and normal cost values in our valuation were calculated according to the following formula:

Value = A x B / C, where

A = The value produced by the System's actuary using the current set of assumptions.

B = The value produced by the LLA using the revised set of assumptions, and

C = The value produced by the LLA using the current set of assumptions.

6. Actuarial Assumptions

Demographic assumptions used in the valuation were adopted by the LSPRS 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. The experience study report, dated August 21, 2018, provides further information regarding the rationale for these assumptions. Unless otherwise indicated, all assumptions adopted by the LSPRS Board for its June 30, 2018 valuation are implemented in this valuation. The prior assumptions and rate tables are illustrated at the end of this section.

Valuation Interest Rate

The assumed rate of return on the actuarial value of assets used for all purposes in this valuation is 7.0%. This rate is net of investment expenses. This 7.0% rate is based on research undertaken by the office of the LLA's actuary and is the same as adopted by the System based on its most recent experience study. Refer to Appendices B through E for further details.

Assumed Rate of Inflation

The assumed annual rate of inflation is 2.50%, and is a component of the assumed rate of return and of individual members' salary increase assumption.

Please refer to Appendix B for further details.

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 Employee tables and adjusted by 1.1 for males and by 1.05 for females;
- Non-disabled retirees mortality rates are taken from the RP-2014 Healthy Annuitant tables and adjusted by 1.1 for males and by 1.05 for females;
- Disabled retirees mortality rates are taken from the RP-2014 Disabled Retiree tables;

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

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

Cost of Living Adjustments/Increases (COLA)

Unfunded actuarial accrued liabilities as of June 30, 2018 and contribution rates for FYE 2019 and FYE 2020 were developed based on LSPRS' 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 0.60%.

Please refer to Appendix F for further details.

Annual Salary Increase Rate

The rate of annual salary increase is 5.25%. This rate includes anticipated productivity growth, merit adjustments, and an inflation component of 2.50% for all purposes in this valuation, which is consistent with the inflation assumptions used to develop the return assumption.

Please refer to Appendix B further details concerning inflation assumptions.

Retirement Rates

The retirement rates were developed in the most recent experience study and are the same as adopted by LSPRS. The table of these rates through age 75 is included later in the report. These rates apply only to those individuals eligible to retire.

Retirement Rates for Active Former DROP Participants:

Retirement rates for active former DROP participants were developed in the most recent experience study and are the same as adopted by LSPRS. Active Former DROP Participants retire according to the rates listed for all actives in the table of rates through age 75 included later in the report.

Disability Rates

Disability incidence assumptions used in this valuation are the same as adopted by LSPRS and based on the System's most recent experience study. The table of these rates through age 75 is included later in this report.

Withdrawal Rates

Voluntary termination or withdrawal rates were developed in the most recent experience study and are the same as adopted by LSPRS. In addition, the withdrawal rate for individuals eligible to retire is assumed to be zero.

The following rates of withdrawal are applied based upon completed years of service:

Service	Rate	Service	Rate
< 1	0.036	13	0.003
1	0.026	14	0.003
2	0.011	15	0.003
3	0.009	16	0.003

4	0.018	17	0.003
5	0.028	18	0.003
6	0.030	19	0.003
7	0.027	20	0.003
8	0.021	21	0.003
9	0.017	22	0.003
10	0.016	23	0.003
11	0.014	>24	0.010
12	0.003		

Vesting Electing Percentage

Any member who terminates service credit after reaching the vesting threshold may not receive a refund of employee contributions. Thus, we recognize that 100% of such employees will wait to receive a vested benefit. This percentage is the same as adopted by the System based on the most recent experience study.

Back-DROP Utilization

Back-DROP is an alternative form of retirement benefit elected at the time of retirement. Back-DROP utilization probabilities based on recent experience are as follows:

1 year	2 year	3 year
9.93%	4.96%	12.06%

Retirement Limitations

Projected retirement benefits are not subject to IRS Section 415 limits.

Accumulated Leave Policies

Retirements are monitored to determine the amount of leave converted to service credit. Leave credit is accrued throughout the duration of the member's career. The average service credit converted is expressed as a 5.5% increase in the accrued benefit. This increase is the same as adopted by the System based on the most recent experience study.

Marriage Statistics

70% of the members are assumed to be married (same assumption adopted by the System based on the most recent experience study); husbands are assumed to be three years older than wives.

Family Statistics

Assumptions utilized in determining the costs of various survivor benefits as listed below, and are the same as adopted by the System based on the most recent experience study:

Member's Age	% With Children	Number of Children	Average Age	Remarriage Rates
25	70%	1.84	5	0.04566
35	86%	2.13	9	0.02636
45	75%	1.70	12	0.01355
55	22%	1.42	14	N/A
65	4%	1.45	15	N/A

"In the Line of Duty" Death

20% of the active deaths are assumed to occur while in the line of duty (service connected). This percentage is the same as adopted by the System based on the most recent experience study.

"In the Line of Duty" Disability

50% of the active disabilities awarded by the Board of Trustees are assumed to have occurred while in the line of duty (service related). This percentage is the same as adopted by the System based on the most recent experience study.

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. For FYE 2019 and FYE 2020, administrative expenses are assumed to be $781,115 and $800,643, respectively.

CURRENT ACTUARIAL ASSUMPTIONS FOR ACTIVE EMPLOYEES (Effective June 30, 2018)
RP-2014 MORTALITY TABLE (110% MALE/105% FEMALE)
PROJECTED GENERATIONALLY WITH SCALE MP-2017 (No Projection in Table)

	Mortality Rate			Mortality Rate	
Age	Male	Female	Age	Male	Female
18	0.000361	0.000165	50	0.001855	0.001157
19	0.000406	0.000170	51	0.002058	0.001266
20	0.000447	0.000170	52	0.002279	0.001381
21	0.000494	0.000170	53	0.002518	0.001500
22	0.000537	0.000170	54	0.002780	0.001625
23	0.000560	0.000174	55	0.003067	0.001757
24	0.000568	0.000177	56	0.003387	0.001895
25	0.000532	0.000182	57	0.003748	0.002043
26	0.000508	0.000188	58	0.004157	0.002202
27	0.000494	0.000196	59	0.004624	0.002374
28	0.000488	0.000206	60	0.005157	0.002564
29	0.000491	0.000216	61	0.005764	0.002774
30	0.000497	0.000229	62	0.006454	0.003007
31	0.000509	0.000243	63	0.007235	0.003269
32	0.000525	0.000256	64	0.008115	0.003558
33	0.000541	0.000271	65	0.009105	0.003881
34	0.000559	0.000286	66	0.010093	0.004319
35	0.000575	0.000300	67	0.011188	0.004806
36	0.000590	0.000315	68	0.012403	0.005349
37	0.000606	0.000334	69	0.013748	0.005952
38	0.000627	0.000356	70	0.015239	0.006624
39	0.000655	0.000383	71	0.016893	0.007372
40	0.000691	0.000416	72	0.018725	0.008204
41	0.000738	0.000455	73	0.020757	0.009130
42	0.000798	0.000501	74	0.023010	0.010160
43	0.000872	0.000555	75	0.025507	0.011306
44	0.000964	0.000618	76	0.028274	0.012582
45	0.001070	0.000690	77	0.031342	0.014003
46	0.001196	0.000770	78	0.034744	0.015583
47	0.001337	0.000857	79	0.038513	0.017342
48	0.001494	0.000951	80	0.042692	0.019299
49	0.001667	0.001051			

CURRENT ACTUARIAL ASSUMPTIONS FOR HEALTHY ANNUITANTS (Effective June 30, 2018)
RP-2014 MORTALITY TABLE (110% MALE/105% FEMALE)
PROJECTED GENERATIONALLY WITH SCALE MP-2017 (No Projection in Table)

	Mortality Rate			Mortality Rate	
Age	Male	Female	Age	Male	Female
50	0.004470	0.002906	82	0.061079	0.045408
51	0.004822	0.003050	83	0.068196	0.050720
52	0.005180	0.003210	84	0.076219	0.056734
53	0.005546	0.003386	85	0.085247	0.063529
54	0.005922	0.003583	86	0.095383	0.071191
55	0.006309	0.003803	87	0.106742	0.079813
56	0.006709	0.004051	88	0.119450	0.089492
57	0.007126	0.004334	89	0.133649	0.100341
58	0.007565	0.004658	90	0.149499	0.112482
59	0.008036	0.005028	91	0.166454	0.125731
60	0.008548	0.005451	92	0.184164	0.139964
61	0.009112	0.005928	93	0.202433	0.155106
62	0.009739	0.006464	94	0.221181	0.171120
63	0.010441	0.007059	95	0.240415	0.187986
64	0.011230	0.007720	96	0.260189	0.205698
65	0.012114	0.008450	97	0.280565	0.224243
66	0.013108	0.009262	98	0.301587	0.243591
67	0.014223	0.010163	99	0.323233	0.263679
68	0.015474	0.011165	100	0.345387	0.284401
69	0.016876	0.012277	101	0.367802	0.305592
70	0.018446	0.013511	102	0.390059	0.327016
71	0.020199	0.014880	103	0.411976	0.348495
72	0.022155	0.016395	104	0.433380	0.369844
73	0.024340	0.018071	105	0.454114	0.390887
74	0.026780	0.019926	106	0.474041	0.411453
75	0.029509	0.021985	107	0.493050	0.431391
76	0.032569	0.024274	108	0.511051	0.450568
77	0.036009	0.026832	109	0.527986	0.468871
78	0.039884	0.029702	110	0.543814	0.486214
79	0.044255	0.032934	111	0.550000	0.502534
80	0.049194	0.036586	112	0.550000	0.517794
81	0.054775	0.040722	113	0.550000	0.525000

CURRENT ACTUARIAL TABLES AND RATES

Age	Retirement Rates	Disability Rates
18	0.00000	0.00083
19	0.00000	0.00083
20	0.00000	0.00083
21	0.00000	0.00083
22	0.00000	0.00083
23	0.00000	0.00083
24	0.00000	0.00083
25	0.00000	0.00083
26	0.00000	0.00083
27	0.00000	0.00083
28	0.00000	0.00083
29	0.00000	0.00083
30	0.00000	0.00083
31	0.00000	0.00083
32	0.00000	0.00083
33	0.00000	0.00083
34	0.00000	0.00083
35	0.00000	0.00094
36	0.00000	0.00105
37	0.00000	0.00116
38	0.00000	0.00132
39	0.00000	0.00149
40	0.00000	0.00171
41	0.00000	0.00193
42	0.00000	0.00215
43	0.10000	0.00242
44	0.10000	0.00275
45	0.10000	0.00314
46	0.10000	0.00358
47	0.10000	0.00402
48	0.10000	0.00457
49	0.10000	0.00517
50	0.25000	0.00589
51	0.25000	0.00671
52	0.25000	0.00759
53	0.25000	0.00864
54	0.25000	0.00979
55	0.25000	0.01111
56	0.25000	0.01265
57	0.50000	0.01436
58	0.50000	0.01628
59	0.50000	0.01854
60	0.50000	0.02684
61	0.50000	0.02684
62	0.50000	0.02684
63	0.99000	0.02684
64	0.99000	0.02684
65	0.99000	0.02684
66	0.99000	0.02684
67	0.99000	0.02684
68	0.99000	0.02684
69	0.99000	0.02684
70	0.99000	0.02684
71	0.99000	0.02684
72	0.99000	0.02684
73	0.99000	0.02684
74	0.99000	0.02684
75	1.00000	0.02684

PRIOR-YEAR ASSUMPTIONS
(Revised Effective in this Valuation)

Mortality Assumption

The mortality assumptions used in the prior valuation were the RP-2000 Combined Healthy Sex Distinct Tables with mortality improvements projected to 2025 for active members, annuitants and beneficiaries and the RP-2000 Disabled Lives Sex Distinct Mortality Tables for disabled members.

Annual Salary Increase Rate

The gross rates including inflation of 2.50% and merit increases are as follows:

Years of Service	Salary Growth Rate
1	16.5%
2	7.0%
3-4	5.0%
5-8	5.5%
9-11	6.0%
12-15	5.0%
16-30	4.5%
Above 30	4.0%

Vesting Electing Percentage

For members terminating with less than twenty years of service, it was assumed that 80% will withdraw their accumulated employee contributions. For members terminating with twenty or more years of service, it was assumed that only 30% will withdraw their accumulated employee contributions. The remaining members were assumed to receive a deferred vested retirement benefit.

Accumulated Leave Policies

The retirements were monitored to determine the amount of leave converted to service credit. Leave credit is accrued throughout the duration of the member's career. The average service credit converted was expressed as a 3% increase in the accrued benefit.

Marriage Statistics

80% of the members were assumed to be married in the prior valuation.

Remarriage Rates

Remarriage rates were taken from the 1997 Railroad Retirement Study of Remarriage Rates (for ages below 55). The table of these rates is included later in this report.

“In the Line of Duty” Death

90% of the active deaths are assumed to occur while in the line of duty (service connected).

“In the Line of Duty” Disability

33% of the active disabilities awarded by the Board of Trustees are assumed to have occurred while in the line of duty (service related).

PRIOR YEAR ASSUMPTIONS
ACTUARIAL TABLES AND RATES

Age	Male Mortality Rates	Female Mortality Rates	Retirement Rates	Disability Rates	Termination Rates	Remarriage Rates
18	0.000196	0.000132	0.00000	0.00200	0.02500	0.06124
19	0.000205	0.000130	0.00000	0.00200	0.02500	0.06124
20	0.000214	0.000128	0.00000	0.00200	0.02500	0.06124
21	0.000227	0.000125	0.00000	0.00200	0.02500	0.05818
22	0.000238	0.000126	0.00000	0.00200	0.02500	0.05524
23	0.000256	0.000132	0.00000	0.00200	0.02500	0.05242
24	0.000271	0.000138	0.00000	0.00200	0.02500	0.04971
25	0.000292	0.000146	0.00000	0.00200	0.02500	0.04566
26	0.000325	0.000158	0.00000	0.00200	0.02500	0.04335
27	0.000337	0.000165	0.00000	0.00200	0.02500	0.04114
28	0.000347	0.000174	0.00000	0.00200	0.02500	0.03902
29	0.000363	0.000183	0.00000	0.00200	0.02500	0.03698
30	0.000392	0.000205	0.00000	0.00200	0.02500	0.03502
31	0.000440	0.000251	0.00000	0.00200	0.02000	0.03314
32	0.000496	0.000286	0.00000	0.00200	0.02000	0.03134
33	0.000557	0.000314	0.00000	0.00200	0.02000	0.02961
34	0.000619	0.000338	0.00000	0.00200	0.02000	0.02795
35	0.000682	0.000360	0.00000	0.00200	0.02000	0.02636
36	0.000742	0.000380	0.00000	0.00200	0.02000	0.02483
37	0.000798	0.000399	0.00000	0.00200	0.02000	0.02336
38	0.000829	0.000420	0.00000	0.00200	0.01500	0.02195
39	0.000857	0.000444	0.00000	0.00200	0.01500	0.02060
40	0.000883	0.000484	0.00000	0.00200	0.01500	0.01930
41	0.000911	0.000530	0.00000	0.00200	0.01500	0.01805
42	0.000945	0.000584	0.00000	0.00200	0.01500	0.01686
43	0.000985	0.000642	0.10000	0.00200	0.01000	0.01571
44	0.001033	0.000705	0.10000	0.00200	0.01000	0.01461
45	0.001087	0.000751	0.10000	0.00200	0.01000	0.01355
46	0.001136	0.000797	0.10000	0.00200	0.01000	0.01253
47	0.001188	0.000842	0.10000	0.00200	0.01000	0.01156
48	0.001243	0.000911	0.10000	0.00200	0.01000	0.01063
49	0.001300	0.000984	0.10000	0.00200	0.01000	0.00973
50	0.001358	0.001092	0.25000	0.00200	0.01000	0.00887
51	0.001516	0.001237	0.25000	0.00200	0.01000	0.00804
52	0.001609	0.001419	0.25000	0.00200	0.01000	0.00725
53	0.001760	0.001632	0.25000	0.00200	0.01000	0.00649
54	0.001929	0.001885	0.25000	0.00200	0.01000	0.00576
55	0.002243	0.002223	0.25000	0.00200	0.01000	0.00000
56	0.002667	0.002658	0.25000	0.00200	0.01000	0.00000
57	0.003057	0.003068	0.50000	0.00200	0.01000	0.00000
58	0.003523	0.003461	0.50000	0.00200	0.01000	0.00000
59	0.003972	0.003918	0.50000	0.00200	0.01000	0.00000
60	0.004508	0.004460	0.50000	0.00200	0.01000	0.00000
61	0.005261	0.005129	0.50000	0.00200	0.00000	0.00000
62	0.006002	0.005873	0.50000	0.00200	0.00000	0.00000
63	0.007038	0.006747	0.99000	0.00200	0.00000	0.00000
64	0.007929	0.007604	0.99000	0.00200	0.00000	0.00000
65	0.008953	0.008563	0.99000	0.00000	0.00000	0.00000
66	0.010389	0.009664	0.99000	0.00000	0.00000	0.00000
67	0.011590	0.010730	0.99000	0.00000	0.00000	0.00000
68	0.012562	0.011861	0.99000	0.00000	0.00000	0.00000
69	0.013920	0.013110	0.99000	0.00000	0.00000	0.00000
70	0.015219	0.014770	0.99000	0.00000	0.00000	0.00000
71	0.016839	0.015984	0.99000	0.00000	0.00000	0.00000
72	0.018697	0.017778	0.99000	0.00000	0.00000	0.00000
73	0.020825	0.019270	0.99000	0.00000	0.00000	0.00000
74	0.023233	0.021358	0.99000	0.00000	0.00000	0.00000
75	0.026595	0.022993	1.00000	0.00000	0.00000	0.00000

APPENDIX A
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 LSPRS' 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 confirming the investment return and inflation assumptions used in the System's valuation and in adopting a different COLA assumption used in this actuarial valuation as compared to the System's valuation.

1. The economic assumptions as to future inflation and future investment returns:
   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. All benefits that are reasonably expected to be paid in the future should be measured actuarially, including expected future cost-of-living (COLA) benefits, using actuarial methods that are:
   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.

The improvement in the COLA assumptions enhances the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, this improvement enhances the integrity of the financial disclosures issued by all participating governmental entities, by ensuring the balance sheet liabilities reflect all expected benefits and are a more transparent and fair representation of the pension obligation.

This Appendix A 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 Louisiana State Police Retirement System. The experience study report, dated August 21, 2018, summarized the results. The experience study report includes the following demographic assumptions:

- Mortality Rates
- Retirement Rates
- Disability Rates
- Withdrawal/Termination Rates
- Salary Increases
- Back-DROP Utilization
- Family Statistics
- Accumulated Leave Conversion
- Vesting Election Percentage
- Percentage of active member deaths which occur "In the Line of Duty"
- Percentage of active member disabilities who qualify as "Service Connected"

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 this 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 LSPRS' actuary in the experience study report is an improvement from the methodology employed in prior years.

We commend this improvement by LSPRS' 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 males and females during the exposure period:

Males

Age	Exposures (Number)	Actual Deaths (Number)	Exposures (Dollars)	Actual Deaths (Dollars)
1-5	0	0	0	0
6-10	0	0	0	0
11-15	0	0	0	0
16-20	1	0	1,044	0
21-25	4	0	2,917	0
26-30	1	0	532	0
31-35	0	0	0	0
36-40	1	0	4,201	0
41-45	0	0	0	0
46-50	14	0	71,314	0
51-55	71	2	363,313	11,078
56-60	158	5	705,959	22,899
61-65	229	15	693,951	29,908
66-70	153	18	386,719	38,350
71-75	90	17	196,880	37,934
76-80	70	19	120,849	30,345
81-85	29	13	42,766	20,881
86-90	11	7	16,023	10,930
91-95	5	3	8,278	5,444
96-100	0	0	0	0
100+	0	0	0	0
Total	837	99	2,614,746	207,769

Females

Age	Exposures (Number)	Actual Deaths (Number)	Exposures (Dollars)	Actual Deaths (Dollars)
1-5	0	0	0	0
6-10	0	0	0	0
11-15	0	0	0	0
16-20	0	0	0	0
21-25	1	0	1,412	0
26-30	0	0	0	0
31-35	0	0	0	0
36-40	1	0	3,581	0
41-45	0	0	0	0
46-50	3	0	8,561	0
51-55	8	0	20,947	0
56-60	15	0	26,340	0
61-65	23	3	54,697	4,362
66-70	47	3	85,097	4,301
71-75	45	6	74,314	10,682
76-80	55	12	86,952	17,064
81-85	43	12	60,974	16,286
86-90	23	8	30,180	10,273
91-95	7	4	10,209	5,480
96-100	3	1	4,263	1,288
100+	0	0	0	0
Total	274	49	467,527	69,736

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 for the overall population with male mortality measured separately from female mortality. In order to be fully credible, the experience study for each group for which rates are developed is required to have at least 1,082 deaths during the exposure period.

Based on the information in the above tables, the LSPRS experience study data is insufficient to be fully credible since the number of deaths is less than 1,082 (less than 100 for males and for females). This means the experience study results are only partially credible. The credibility factors were determined to be 31% for males and 21% for females.

Formula

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

$$[\boldsymbol{f} \times (\mathbf{C}) \ + \ (\mathbf{1.0}) \times (\mathbf{1} - \mathbf{C})] \ \times \ \boldsymbol{q_x^{SR}} = \boldsymbol{q_x^{V}}$$

Where,

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

[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/.

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;

f is the experience-derived adjustment factor to the standard mortality rate at every age (q_x^{SR}).

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 LSPRS-derived adjustment factor. Because Louisiana's mortality rates are higher than observed nationwide, the reference table was chosen to include a 10% load accounting for that higher state-specific mortality. Consequently the standard reference table was built by multiplying rates from the published RP-2014 tables by 110%.

The experience study report presents the mortality information for active, annuitant, and disabled members separately. For active members, the loaded RP-2014 Employee Tables were used as the standard reference tables. For annuitant members, the loaded RP-2014 Healthy Annuitants Tables were used as the standard reference tables. For disabled retiree members, the unadjusted RP-2014 Disability Tables were used as the standard reference tables.

The following tables present the unadjusted mortality rates from the RP-2014 Employee Tables, the RP-2014 Healthy Annuitants Tables, and the RP-2014 Disability Tables:

RP-2014 Employee		
Sample Attained Age	Probability of Death Next Year	
	Male	Female
50	0.17%	0.11%
55	0.28%	0.17%
60	0.47%	0.24%
65	0.83%	0.37%
70	1.39%	0.63%
75	2.32%	1.08%
80	3.88%	1.84%

RP-2014 Healthy Annuitants		
Sample Attained Age	Probability of Death Next Year	
	Male	Female
50	0.41%	0.28%
55	0.57%	0.36%
60	0.78%	0.52%
65	1.10%	0.80%
70	1.68%	1.29%
75	2.68%	2.09%
80	4.47%	3.48%

RP-2014 Disability		
Sample Attained Age	Probability of Death Next Year	
	Male	Female
50	2.04%	1.19%
55	2.34%	1.45%
60	2.66%	1.70%
65	3.17%	2.09%
70	4.03%	2.82%
75	5.43%	4.10%
80	7.66%	6.10%

LSPRS-derived adjustment factors

LSPRS-derived adjustment factors to be applied to reference tables were calculated separately for the male and female annuitants (and the same factors were applied to the active members). Due to the manner of data collection and retention, separate adjustment factors were not developed for active employees. For the disabled retiree members, no adjustment factors were calculated due to the lack of available data.

The LSPRS-derived adjustment factors were developed by comparing the total observed number of deaths for the group from the experience study to the total number of deaths expected from application of the base reference mortality table for each subgroup projected to 2015, the central year of the experience study. Calculations were based on the following steps:

1. The dollar-weighted exposures at the beginning of the experience study period (July 1, 2012) were determined for each five-year age groups.

2. Using the median age (for each five-year age groups), the probability of dying in the next five years was calculated using the mortality rates from the standard reference tables.

3. For each five-year age groups, the resulting probability (from step 2) was multiplied by the dollar-weighted exposures (from step 1) to determine the expected number of deaths.

4. The total expected number of deaths of all the age groups was then compared to the actual number of deaths over the experience study period.

5. Steps 2 through 4 were repeated several times for each gender separately until the number of expected deaths fell within acceptable margin of the actual number resulting in a 96% preliminary adjustment for males and 83% factor for females. Application of credibility factors led to

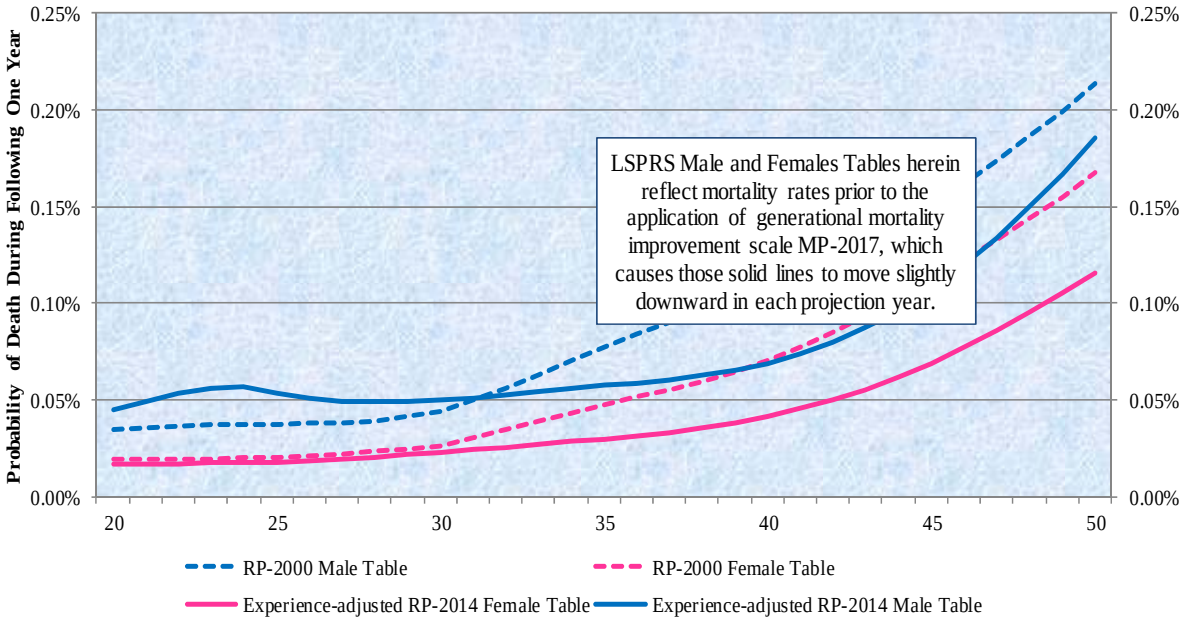
6. After accounting for the credibility factors of 31% for males and 21% for females, the credibility-weighted adjustment factors came to 99% for males and 97% for females to be applied to the reference tables. Since the reference tables included a 10% load for the Louisiana mortality, the final adjustment factors to be applied to the published MP-2014 mortality tables and reflecting both the LSPRS own experience and the assumed state-specific load is 110% for males and 105% for females.

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

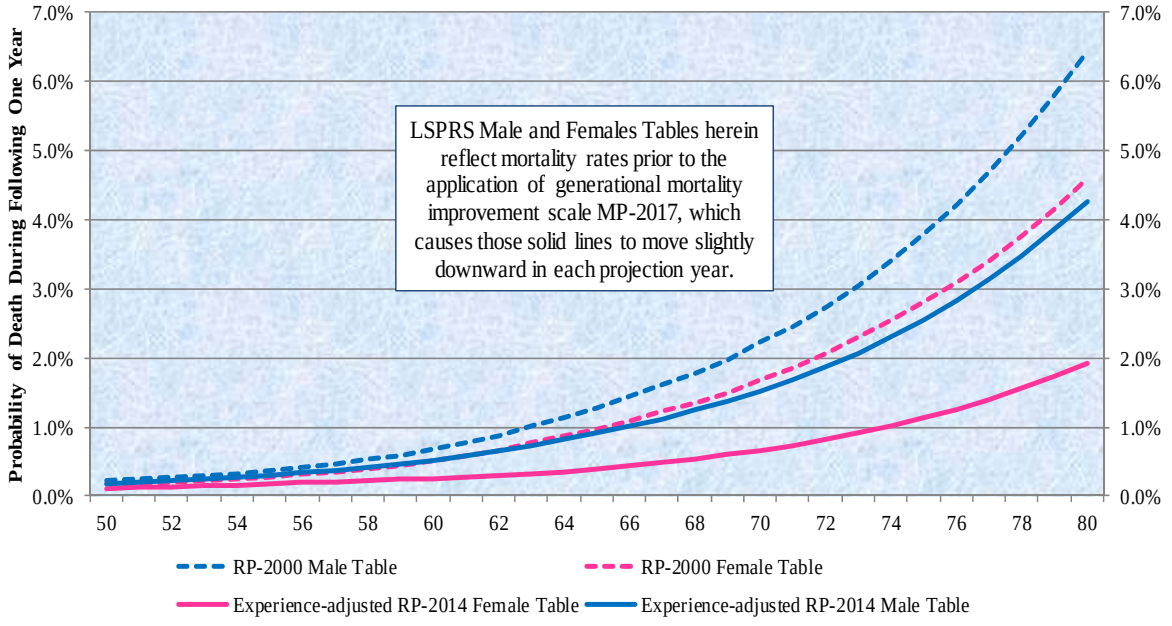
- The prior valuation (the published RP-2000 mortality tables) and
- This valuation (state and experience-adjusted RP-2014 mortality tables)

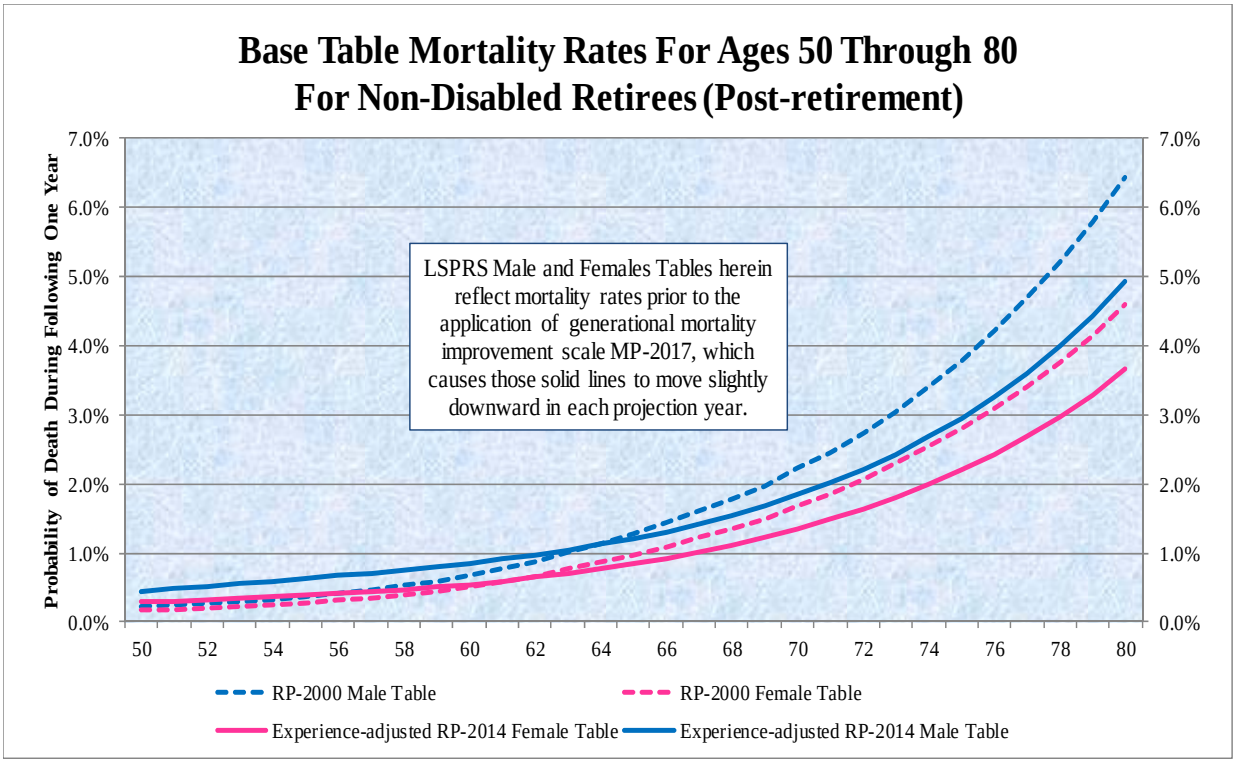
These represent base tables, prior to the respective methods of recognizing mortality improvement in the future.

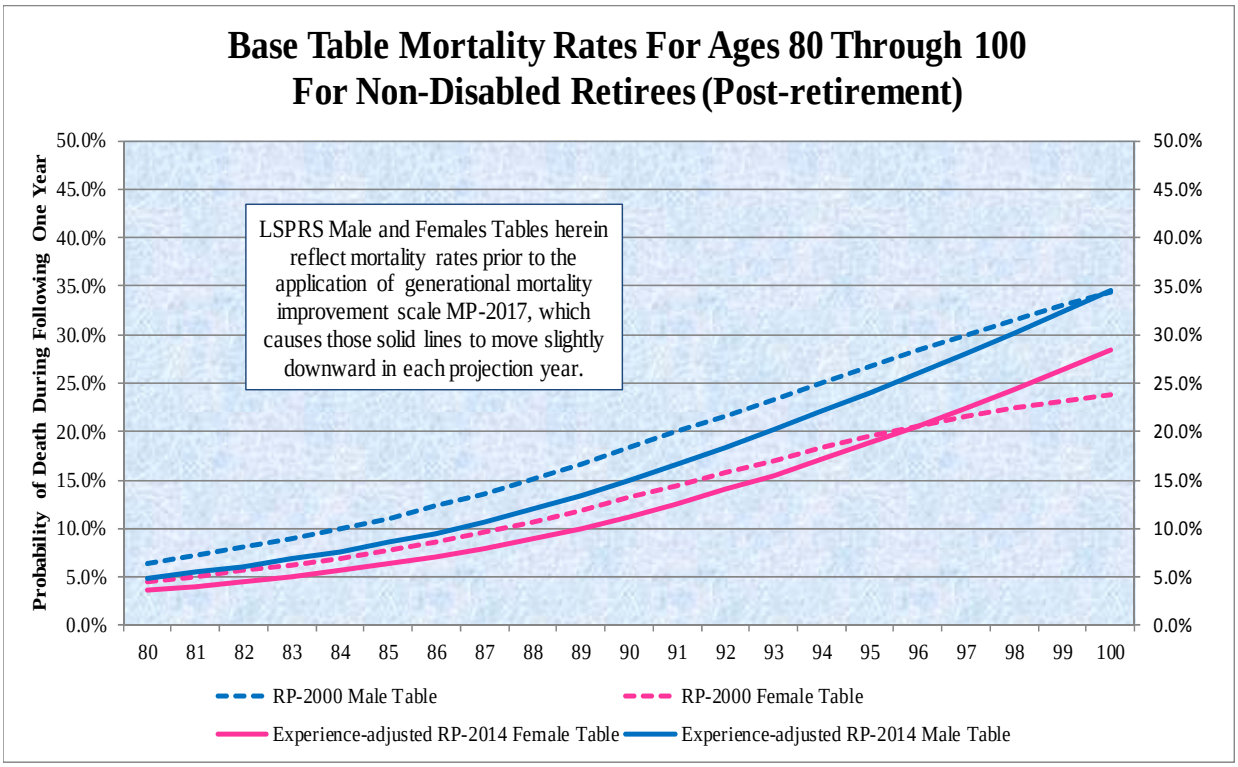
Base Table Mortality Rates For Ages 20 Through 50 For Active Employees (Pre-retirement)



Base Table Mortality Rates For Ages 50 Through 80 For Active Employees (Pre-retirement)




Base Table Mortality Rates For Ages 50 Through 80
For Non-Disabled Retirees (Post-retirement)
Probability of Death During Following One Year
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
LSPRS 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)
Probability of Death During Following One Year
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
LSPRS 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 last PRSAC-accepted valuation used Scale AA as a static improvement projected to 2025.

This valuation used the Society of Actuaries recommended approach – application of the 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. Since the RP-2014 tables were constructed based on experience between years 2004 and 2008, the final published rates were developed by projecting rates from 2006 (central age for the experience period) to 2014 using improvement scale MP-2014. It is becoming more and more common to use the MP-2017 improvement scale with modified RP-2014 tables adjusted to remove the projection from 2006 to 2014. These adjusted tables are sometimes referred to as "RP-2014 adjusted to 2006" or simply RP-2006". This approach was recommended by the system actuary in the experience study report and is employed in the June 30, 2018 valuation. Specifically, experience based adjustment factors are applied to the base rates from RP-2006 tables and are then generationally project in the course of the valuation process using improvement scale MP-2017.

Actuarial Practice

We recognize that experience studies for larger systems are generally performed every five years, and such study for LSPRS 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 August 21, 2018) for the period from July 1, 2012, through June 30, 2017, and approved by the retirement board are suitable for use in LSPRS' 2018 Actuarial Valuation.

APPENDIX B
BASIS FOR INFLATION ASSUMPTION

Appendix B: Basis for Inflation Assumption

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

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 LSPRS' 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 confirming the investment return and inflation assumptions used in the System's valuation and in adopting a different COLA assumption used in this actuarial valuation as compared to the System's valuation.

1. The economic assumptions as to future inflation and future investment returns:
   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. All benefits that are reasonably expected to be paid in the future should be measured actuarially, including expected future cost-of-living (COLA) benefits, using actuarial methods that are:
   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.

The improvement in the COLA assumption enhances the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, this improvement enhances the integrity of the financial disclosures issued by all participating governmental entities, by ensuring the balance sheet liabilities reflect all expected benefits and are a more transparent and fair representation of the pension obligation.

This Appendix B 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 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 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 2.24%, 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 2.41%, the consensus average directly from six (6) expert sources of long-term inflation forecasts

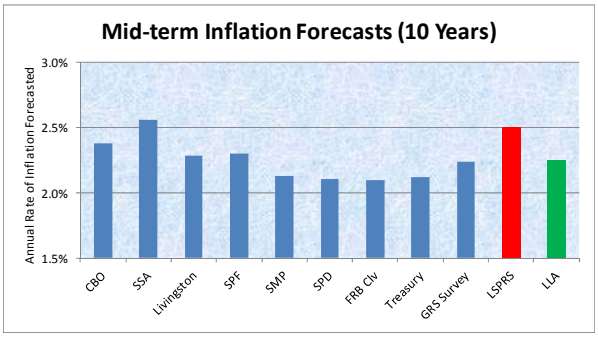
Both mid-term and long-term horizons of inflation forecasts are used in developing our final net return assumption. It would be a false choice to be forced to pick between mid-term and long-term for the net return assumption. The composite single equivalent benefit horizon turns out to be much closer 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 Appendix D. 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).

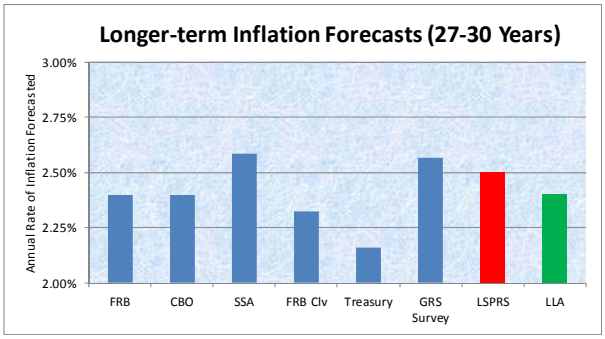
On the other hand, the inflation component of the individual salary scale assumptions more clearly should be the mid-term horizon, given the average remaining working life of active members.

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

Appendix B: Basis for Inflation Assumption

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%





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 over 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 C
BASIS FOR NET INVESTMENT RETURN ASSUMPTION

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

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 LSPRS' 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 confirming the investment return and inflation assumptions used in the System's valuation and in adopting a different COLA assumption used in this actuarial valuation as compared to the System's valuation.

1. The economic assumptions as to future inflation and future investment returns:
   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. All benefits that are reasonably expected to be paid in the future should be measured actuarially, including expected future cost-of-living (COLA) benefits, using actuarial methods that are:
   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.

The improvement in the COLA assumption enhances the benefit security of plan members by ensuring the contribution requirements have a stronger actuarial basis. Furthermore, this improvement enhances the integrity of the financial disclosures issued by all participating governmental entities, by ensuring the balance sheet liabilities reflect all expected benefits and are a more transparent and fair representation of the pension obligation.

This Appendix C 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.

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 13 target asset allocation percentages set forth in the System's formal Investment Policy Statement last updated June 2017.

2018 LSPRS Target Asset Allocation			
Risk Assets		**Fixed Income Assets**	
Domestic Large Cap	25%	Core Fixed Income	10%
Domestic Mid Cap	5%	Full Discretion (Domestic)	7%
Domestic Small Cap	10%	Full Discretion (Foreign)	3%
Foreign Equities - Developed	15%	Cash	2%
Foreign Equities - Emerging	8%		
Real Estate	8%		
Hedge Funds	2%	*Total Fixed Income Assets*	*22%*
Timber	1%		
Private Equity	5%		
Total Risk Assets	*78%*		
		Total Asset Allocation	*100%*

Source: Current 2018 Investment Policy Statement (dated June 2017)

Refer to Appendix G 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[IM]
Wilshire Associates[IC]			

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

[IM] *In the top 75 largest investment managers, according to the most recent survey from P&I/WillisTowersWatson.*

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 B, 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 LSPRS

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 mid-term horizon.

Investment Forecaster	Distribution of 10-Year Compound Average Percentile Expectations			Probability of exceeding
	40th	50th	60th	7.00%
1	4.01%	5.05%	6.10%	31.99%
2	4.52%	5.59%	6.67%	37.05%
3	4.52%	5.60%	6.70%	37.38%
4	4.65%	5.70%	6.76%	37.81%
5	4.83%	5.72%	6.62%	35.91%
6	4.83%	5.94%	7.06%	40.49%
7	5.04%	6.04%	7.05%	40.45%
8	5.15%	6.06%	6.97%	39.70%
9	5.12%	6.16%	7.21%	41.93%
10	5.03%	6.19%	7.36%	43.00%
11	5.37%	6.39%	7.42%	44.00%
12	6.48%	7.47%	8.46%	54.78%
Average	**4.96%**	**5.99%**	**7.03%**	**40.37%**
Average of Middle* 10	**4.91%**	**5.94%**	**6.98%**	**39.77%**

* Discarding the lowest and highest outliers.

There are three important takeaways from this exhibit:

a. Over the mid-term horizon, the range of expert expectations of the 50th percentile of compound average return runs from 5.05% to 7.47%.

b. The 50th percentile consensus expert mid-term forecast is 5.99%.

c. The consensus of these experts is that there is only a 40.37% chance of achieving at least the current 7.0% over the mid-term horizon. This does not mean a 40.37% chance of achieving the 7.0% assumption in any year during the horizon; it means that the compound return over the next 10 years has a 40.37% of achieving at least the 7.0% assumption.

This is why, actuarially speaking, the 5.99% 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 5.99% when compounded over the next 10 years.

Below are the results of this process for the long-term horizon.

Investment Forecaster	Distribution of 27-Year Compound Average Percentile Expectations			Probability of exceeding
	40th	50th	60th	7.00%
A	5.96%	6.59%	7.23%	43.51%
B	5.97%	6.62%	7.27%	44.12%
C	6.05%	6.71%	7.38%	45.60%
D	6.49%	7.13%	7.78%	52.08%
Average	**6.12%**	**6.76%**	**7.41%**	**44.41%**

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 long-term horizon, the range of expert expectations of the 50th percentile of compound average return runs from 6.59% to 7.13%.

2. The 50th percentile expectation of the consensus average for the long-term horizon is 6.76%.

3. The consensus of these experts is that there is only a 44.41% chance of achieving at least the current 7.0% over the long-term horizon. This does not mean a 44.41% chance of achieving the 7.0% assumption in any year during the horizon; it means the compound return over the next 27 years has a 44.41% of achieving at least the 7.0% assumption.

This is why, actuarially speaking, the 6.76% 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 6.76% 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 D 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 D
HORIZON FOR THE
NET INVESTMENT RETURN ASSUMPTION

Appendix D: 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 not 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.

[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.

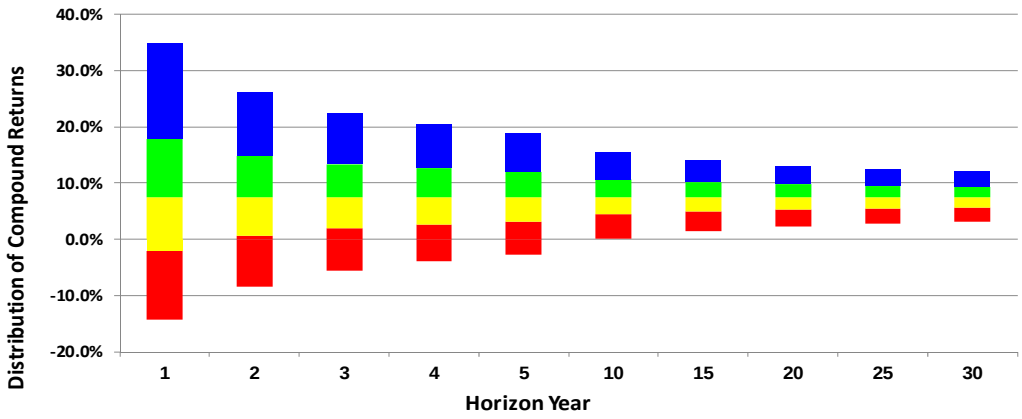
Compelling reason #3: Return forecasts over a longer-term horizon are the less reliable.

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 around the mean (some have called this "risk") and
2. Error in 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.

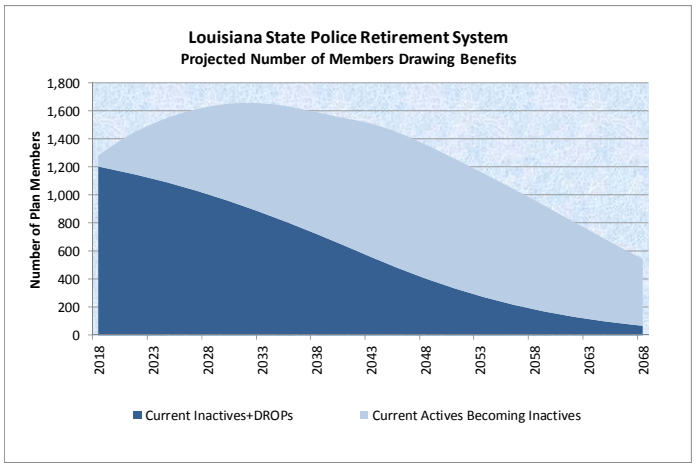
Retirement system A can comfortably adopt a longer-term horizon for its expected investment return assumption because it has a long time to make up for the lower earnings that are expected in the mid-term (e.g., years 1-10) before it has to actually pay benefits out of the fund.

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).

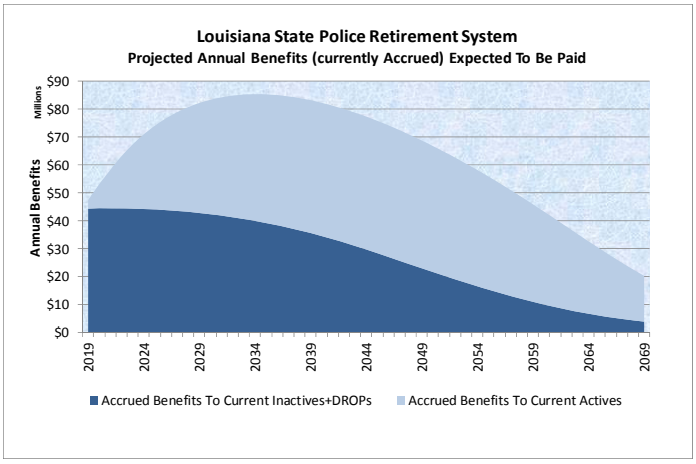
Even if one were to a accept long-term horizon for setting return assumptions, in disregard of the first three arguments outlined in the immediately preceding pages, he or she would need to take into account the systems own benefit demands and adopt a return assumption somewhere between the mid-term 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.

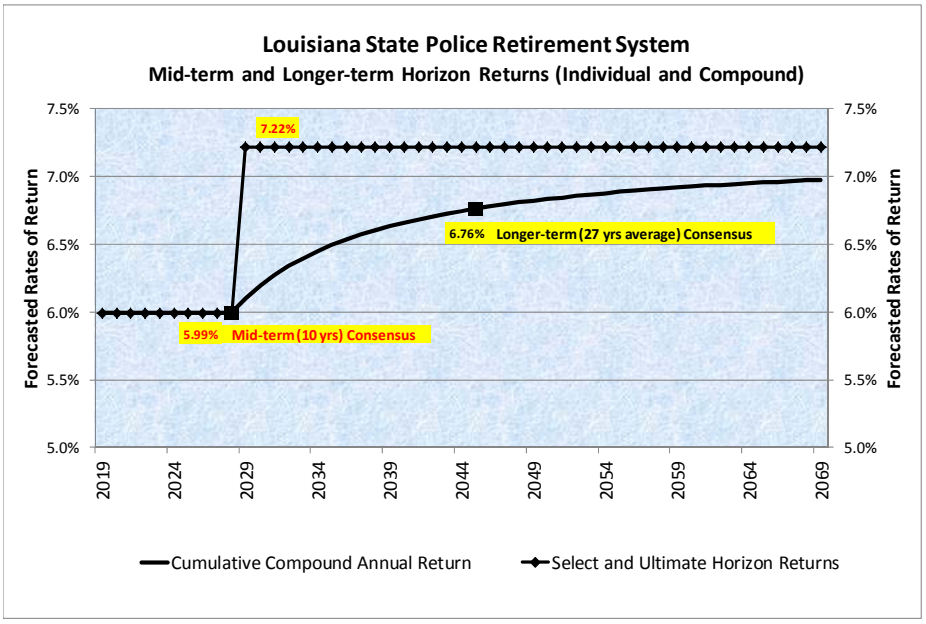


Over 1,200 current retirees are drawing benefits and will continue to do so until death. More retirees will be added to the roll from current active employees retiring in the years ahead, and then they will continue to receive benefits until death.



Currently, over $45 million 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.



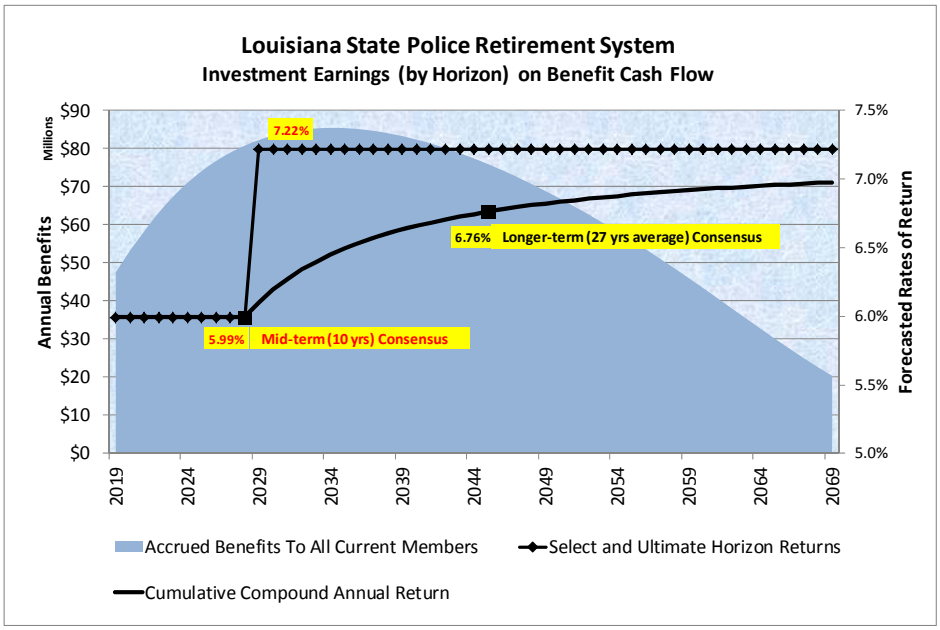
As presented in the previous Appendix C, the consensus 50th percentile expectation for the compound annual returns over the next 10 years (years 1-10) is 5.99%, and over the full 30 years (years 1-30) it is 6.76%. In order for the 30-year average to be 6.76%, the returns during each of the years 11-30 need to be 7.22% (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 5.99% per year for years 1-10 compounded with returns of

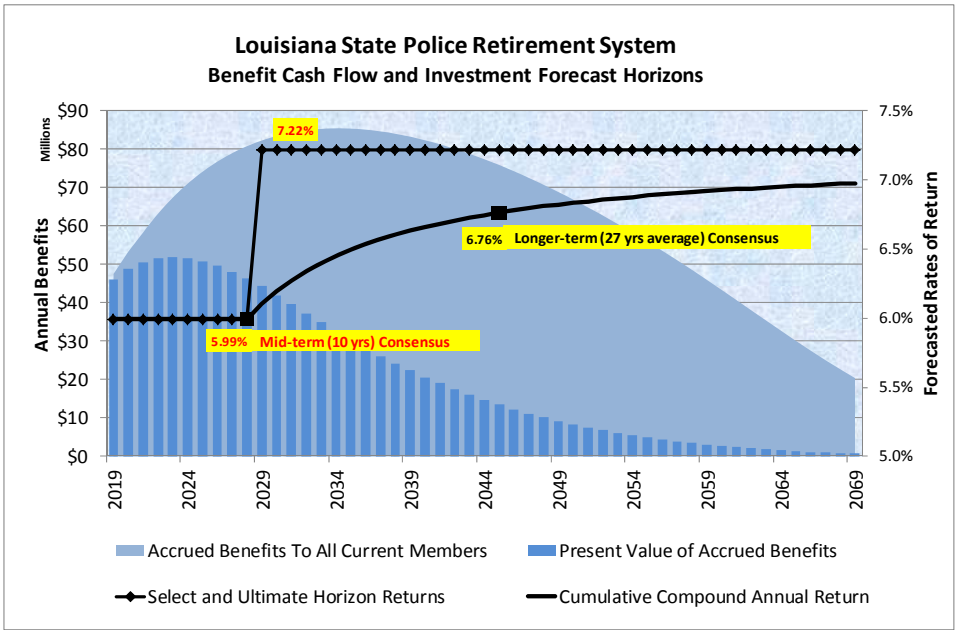
7.22% each year thereafter. Notice at 27 years, the compound average return is the forecasted 6.76%.

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.

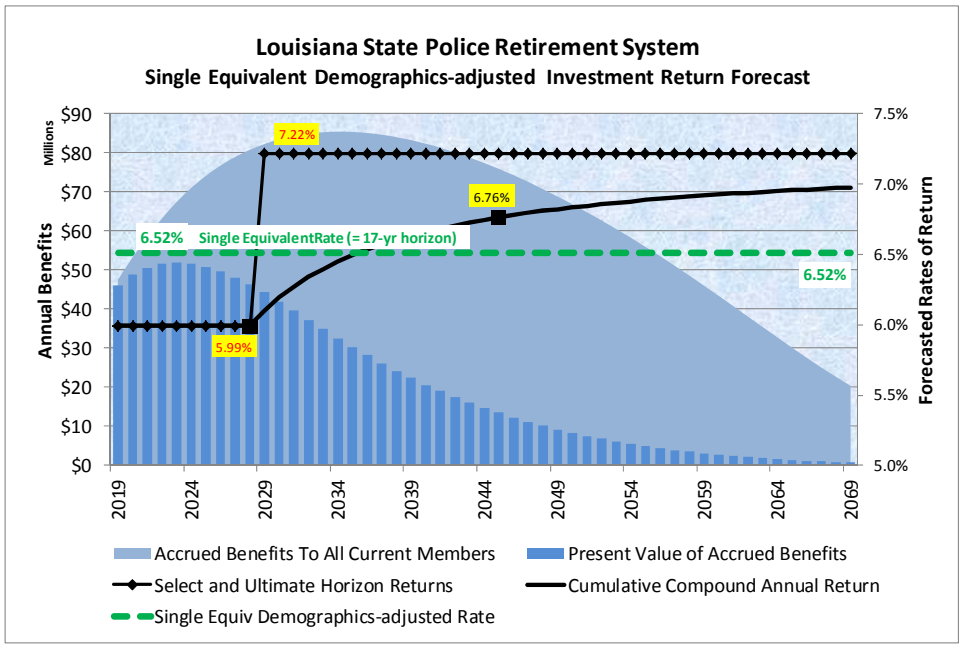
In the graph below, overlay the total annual benefits (accrued to current retirees and current actives becoming retired) to illustrate the time when the benefit assets are still in the fund.



The graph below overlays 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 5.99% per year, while assets that will pay the benefits for years 11-20 will be earning only 5.99% for years 1-10 and 7.22% for the balance of years until payment.



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 6.52%.



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 17 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 5.99% consensus of 10-year expectations is even more appropriate than the 6.52% single equivalent return assumption. There is merit in that position for those three compelling reasons.

We chose to use a rounded-down assumption of 6.5% as the "most appropriate" return assumption. However, as set forth in the following Appendix E, we consider a range of reasonableness around (above and below) this most appropriate return assumption.

APPENDIX E
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 D is 6.50%, rounding down from 6.52% to reflect less confidence in the long-term return forecasts.

The actuary for the Louisiana Legislative Auditor, therefore, adopts 6.50% 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 6.50%.

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 54 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 80 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 6.50% most appropriate return assumption. *This results in a reasonable range of 6.0% to 7.0%.*

A choice of 7.0%, even though lying within the reasonable range, lies at the upper extremities of reasonableness and, should be considered aggressive.

A valuation assumption of 7.0% is not conservative. The 6.50% 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, 6.0%, should be considered conservative.

APPENDIX F
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 F.

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.

LSPRS does not currently include the value of future COLA-grants in it measurement of costs and liabilities. LSPRS does recognize one fill-up of the Experience Account as an automatic benefit that would someday need to be translated into a COLA. But LSPRS does not recognize any depletion of the account by the granting of a COLA so as to automatically fill up the account again with "excess" earnings. So, beyond that one fill-up, no future COLA benefits are recognized.

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. Consider the following internal and external forces at play, which tend to press board members, the Legislature, and the Governor to recommend and approve COLAs when allowed:

a. While we have no personal knowledge of, or experience with, the LSPRS board, generally speaking, retirement board members often have a sense of duty to serve the plan members. The LSPRS retirement board of trustees is composed of individuals who have a natural constituency in plan members. There is a natural tendency to recommend COLAs when allowed.

b. Social Security gives a COLA almost every year. In any given future year, if LSPRS retirees have not had a COLA in a couple years, and since they are not generally covered by Social Security, there is a natural tendency to want to recommend a COLA if allowed.

c. Furthermore, if other retirement systems, such as LASERS, TRSL, or other state or statewide systems give COLAs in a given year, LSPRS' board members, legislators, and the Governor may feel pressure to recommend a COLA if allowed.

d. Finally, if the funded ratio of the System continues to improve as it is expected to do, board members might feel like sharing that success with the plan members by recommending a COLA.

Following is a table that illustrates the recent history of when LSPRS' COLAs were allowed to be granted and how much was granted. This information has been extracted from Title 11 of Revised Statutes and from information reported in LSPRS' annual actuarial valuation reports.

The Automatic Mechanism for Allowing COLAs is Actuarially Measurable The Pattern of Experience, and Legislative History & Framework Presume COLA Approvals When Allowed					
Actuarial Valuation Date	**Legislative Session**	**Amount Allowed By Statutory Template**	**Amount Granted by Legislature and Approved by Governor**	**Date COLA Paid**	**Comments**
6/30/18	2019	None[3]	NA	NA	Insufficient balance and not allowed due to granting in prior year
6/30/17	2018	1.6%	1.6%	7/1/18	The 2018 Legislature approved the 1.6% statutory template COLA
6/30/16	2017	None[3]	None	NA	Insufficient balance and not allowed due to granting in prior year
6/30/15	2016	0.1%	2.0%[4]	7/1/16	The 2016 Legislature overrode the statutory template and allowed for a 2% COLA and a 2% Supplement[2]
6/30/14	2015	None	None	NA	Sufficient balance; but not allowed due to granting in prior year
6/30/13	2014	1.5%	1.5%[5]	7/1/14	The 2014 Legislature approved the 1.5% statutory template COLA and a 2% Supplement
6/30/12	2013	None	None	NA	Empty experience account due to Great Recession investment losses phased in over time
6/30/11	2012	None	None	NA	
6/30/10	2011	None	None	NA	
6/30/09	2010	None	None	NA	

[3] The funds in the Experience Account were not sufficient to grant a full COLA. According to the statutory mechanism, partial COLA's are not permitted except for very narrow set of circumstances.

[4] The application of the statutory mechanism available to the 2016 Legislature would have allowed only a 0.1% COLA due to the limitation of the Consumer Price Index. However, the 2016 Legislature overrode the template (Act 93) and allowed for a 2% COLA but not to exceed the percentage that could be purchased by the balance in the Experience Account at June 30, 2016. The balance could purchase a full 2.0% increase. Besides the 2.0% COLA for all eligible retirees (including the 0.1% base template COLA), an additional 2.0% COLA (aka Supplemental) was granted and paid to a certain subset of otherwise eligible retirees.

[5] In Act 399 the 2014 Legislature adopted a template limiting the frequency and level of COLAs to be recommended while the Plan is less than 80% funded or when the actual actuarial rate of return is below 7.00%. Act 101 of 2014 granted a 1.5% COLA in accordance with that newly adopted template.

During the last nine years, the Legislature and Governor approved COLAs all three times they were permitted by the statutory template to do so. Similarly, there were no cases when a template COLA was allowed but the Legislature or Governor failed to grant it. The evidence leads us to conclude, based on the historical pattern inherent in the data, a COLA was granted every year that the statutory mechanism allowed the Legislature to grant one, and that a COLA was not granted for years when the statutory mechanism did not otherwise permit the Legislature to grant one.

The 2016 Legislature decided that the statutory mechanism did not allow *enough* of an increase; so it granted *more* through an amendment outside the established statutory template for COLAs. The main point is that the pattern that emerges from the application of the statutory template has been "to grant a template COLA whenever the template allows it, and possibly to grant a non-template COLA even when the template disallows it." We do not find a sufficient pattern of non-template COLAs being granted, but do find a sufficient pattern for template-driven COLAs.

Act 399 passed in the 2014 Legislature included a limit on the frequency so that a permanent benefit increase may not be granted more often the every other year until the System is at least 85% funded. The statutory mechanism and this feature are additional evidence of an intention by the Legislature to approve COLAs with some regularity.

In addition, Legislators are inclined to approve COLAs whenever permitted by the statutory template since they have often been told they have already been funded with the balance in the Experience Account.

It is clear that recognizing only one year's transfer to the Experience Account (and that no future COLA benefits would be granted) does not reflect the likelihood that COLAs will be granted in the future. Thus, in this valuation, all actuarially expected future COLA benefits are assumed to be granted in accordance with the statutory template. This is a change in the actuarial assumptions from the previous PRSAC-adopted valuations. Refer to Appendix F for more details in support of this change in assumption.

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.

Modeling Gain-sharing COLA Benefits

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 first actuarial method (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 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 second actuarial method *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 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 third actuarial method 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 confusion between the return assumption and discount rate. This can lead 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 6.78% during years 1-10,
- A mean of 7.59% during years 11-30, and
- A standard deviation of 13.06% 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 B through E.

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 C and D), 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.

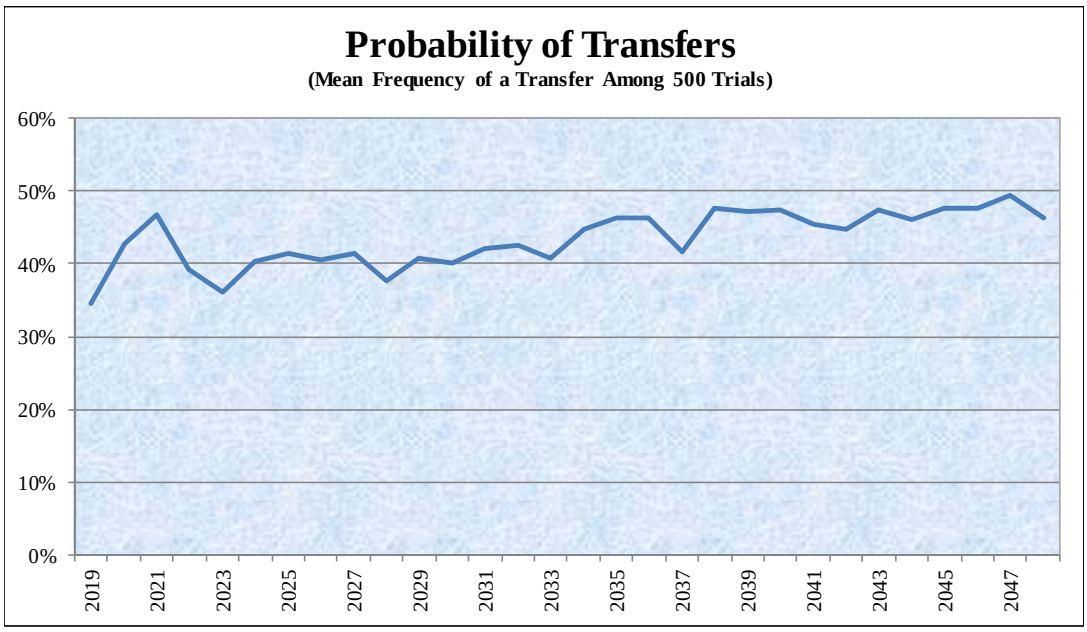
The model built for this purpose includes the following primary steps, as well as numerous other intermediary tests and calculations:

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.

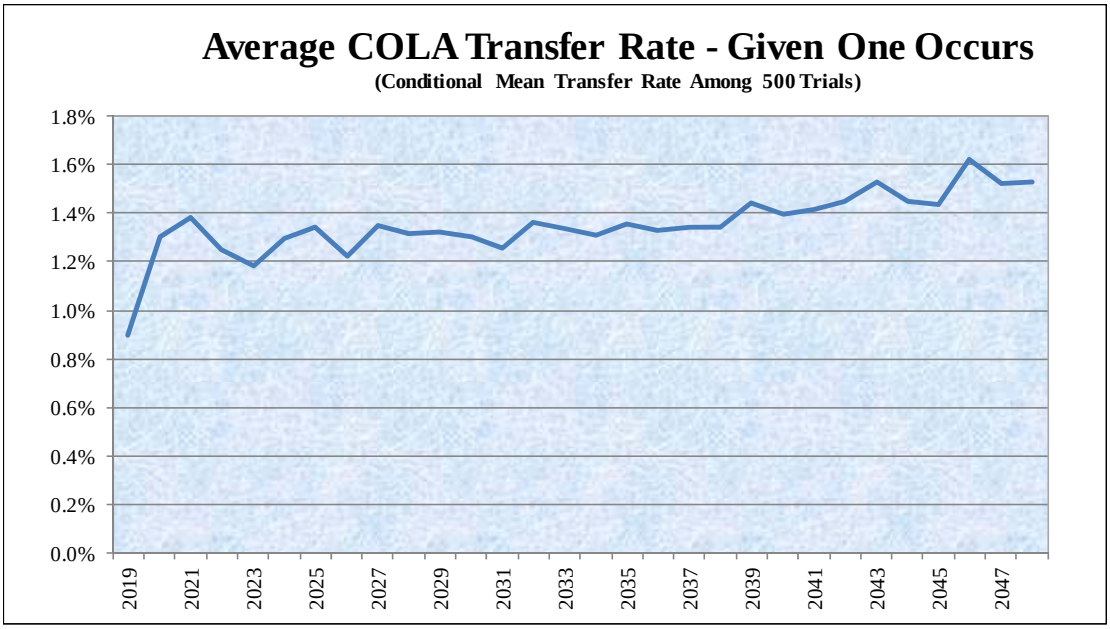
In some years, the model expects a transfer to the Experience Account and in some years expects none. For each year in which the model expects a transfer, the amount can vary widely.

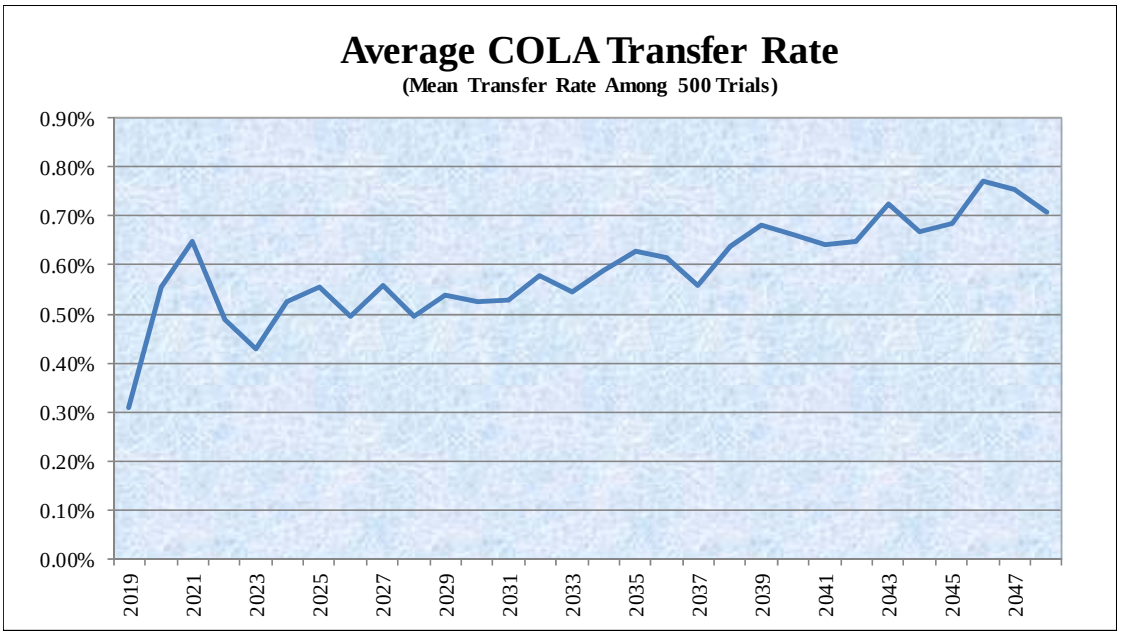
The mean (average) amount expected to be transferred to the Experience Account each year was captured and their present value calculated. *It was determined that a 0.60% annual cost-of-living increase (COLA) would produce the same additional present value.* This is the fixed annual COLA rate that approximates the statutory COLA template. 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 LSPRS' gain-sharing COLA program.



Based on the graph above, during each of the next 30 years there is a 35% to 50% chance of a transfer to the Experience Account. 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.





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 0.60% as a reasonable approximation of the future workings of the actual statutory gain-sharing COLA template.

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

Appendix G: 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 nearing maturity, 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	9.9	9.4	8.2	10.2	11.4
Ratio of actuarial accrued liability to payroll	13.1	12.8	12.3	14.1	15.4
Funded ratio	76%	74%	67%	72%	74%
Ratio of actives to inactives and beneficiaries	0.4	0.4	0.5	0.4	0.4
Net cash in (out) flow: in millions	$ 6	$ 11	$ 20	$ 15	$ 5
Ratio of net cash flow to market value of assets	0.7%	1.4%	3.0%	2.3%	0.8%
Duration of the actuarial accrued liability	13.7	NA	NA	NA	NA

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%.

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 H
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 positive actions for plan members and taxpayers.

Appendix H: Press Clippings for Retirement Systems Lowering Return Assumptions

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,"*

Appendix H: Press Clippings for Retirement Systems Lowering Return Assumptions

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 H: 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 H: 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 H: 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