

## II. ACTUARIAL EXHIBITS

accumulated sufficient assets to pay both the expected cost of benefits that have been earned today and the expected cost of benefits that will be earned by current members in the future. As of this valuation date, and under the data, assumptions and methods used for this actuarial valuation, only LEOFF 1 has sufficient assets to cease ongoing contributions.

The funded status presented in this report are not sufficient to determine whether a plan has enough assets to terminate or settle the plan obligations.

The funded status depends on numerous assumptions. Two of the most significant assumptions are the mortality rates, which estimate how long we expect members to live, and the interest rate or expected return on plan assets. A key component of the mortality assumption is the rate at which mortality is expected to improve in the future. To show this, we doubled the current mortality improvement assumption, i.e., longer lifespans than our best estimate, and assumed no future improvements, shorter lifespans than our best estimate. The tables below demonstrate how the funded status changes across all retirement systems if we alter these assumptions. Please see our [Commentary on Risk](#) webpage for individual system results.

Sensitivity of Funded Status to Mortality Rates			
(Dollars in Millions)	No Mortality Improvement	Best Estimate Mortality	Double Mortality Improvement
<b>Accrued Liability</b>	\$98,672	\$104,477	\$110,330
<b>Valuation Assets</b>	\$95,987	\$95,987	\$95,987
<b>Unfunded Liability</b>	\$2,685	\$8,490	\$14,342
<b>Funded Ratio</b>	97%	92%	87%

Sensitivity of Funded Ratios to Interest Rates*			
(Dollars in Millions)	1% Lower 6.5%	Best Estimate 7.5%	1% Higher 8.5%
<b>Accrued Liability</b>	\$118,519	\$104,477	\$92,861
<b>Valuation Assets</b>	\$95,987	\$95,987	\$95,987
<b>Unfunded Liability</b>	\$22,532	\$8,490	(\$3,126)
<b>Funded Ratio</b>	81%	92%	103%

\*Best estimate assumption for LEOFF 2 is 7.4% with sensitivities equal to 6.4%/8.4%.

## ACTUARIAL GAIN/LOSS

The following tables display actuarial gains and losses, expressed as contribution rate changes. Actuaries use gain/loss analysis to compare actual changes to assumed changes from various sources with respect to assets, liabilities, and salaries. We also use this analysis to determine:

- ❖ The accuracy of our valuation model and annual processing.
- ❖ Why contribution rates changed.
- ❖ The reasonableness of the actuarial assumptions.

Actuarial gains will reduce contribution rates; actuarial losses will increase contribution rates. Under a reasonable set of actuarial assumptions, actuarial gains and losses will offset over long-term experience periods. The tables that follow provide more details on the individual contribution rate gains and losses for both the Normal Cost rate and the UAAL rate that employers pay.

<b>Change in Employer and State Plan 2/3 Normal Cost Rate by Source</b>			
<b>Change in Normal Costs</b>	<b>PERS</b>	<b>TRS</b>	<b>SERS</b>
<b>2018 Normal Cost Before Laws of 2019</b>	<b>7.45%</b>	<b>8.40%</b>	<b>8.02%</b>
Remove Rate Floor	0.00%	0.00%	0.00%
Remove Prior Employer Liability	(0.02%)	(0.38%)	0.00%
<b>2018 Adjusted Normal Cost Rate</b>	<b>7.43%</b>	<b>8.02%</b>	<b>8.02%</b>
Liabilities			
Salaries	0.11%	0.60%	0.91%
Termination	(0.15%)	(0.24%)	(0.16%)
Retirement	0.01%	0.02%	0.03%
Disability	0.01%	0.00%	0.01%
Mortality	0.01%	0.01%	0.01%
Growth / Return to Work	0.65%	1.10%	1.09%
Other Liabilities	0.12%	0.02%	0.13%
<b>Total Liability Gains/Losses</b>	<b>0.76%</b>	<b>1.51%</b>	<b>2.02%</b>
Assets*			
Contributions	(0.12%)	(0.03%)	(0.12%)
Disbursements	(0.03%)	(0.02%)	(0.01%)
Investment Returns	(0.65%)	(0.43%)	(0.59%)
<b>Total Asset Gains/Losses</b>	<b>(0.80%)</b>	<b>(0.48%)</b>	<b>(0.73%)</b>
Incremental Changes			
Plan Change	0.00%	0.00%	0.00%
Method Change	0.03%	0.01%	0.03%
Assumption Change	0.02%	0.02%	0.03%
Correction Change	0.00%	0.00%	0.00%
Experience Study Change	(0.23%)	0.12%	0.25%
<b>Total Incremental Changes Gains/Losses</b>	<b>(0.18%)</b>	<b>0.15%</b>	<b>0.31%</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>(0.62%)</b>	<b>(1.09%)</b>	<b>(1.59%)</b>
<b>Plan 3 TAP Annuities</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>Other Gains/Losses</b>	<b>0.00%</b>	<b>0.06%</b>	<b>(0.01%)</b>
<b>Total Change</b>	<b>(0.84%)</b>	<b>0.15%</b>	<b>0.00%</b>
<b>2019 Preliminary Normal Cost</b>	<b>6.59%</b>	<b>8.17%</b>	<b>8.02%</b>
Increase from Applied Rate Floor	0.00%	0.00%	0.00%
Rate to Amortize Prior Employer Liability	0.00%	0.00%	0.00%
Excess Member Rate	N/A	0.00%	N/A
Laws of 2020	0.00%	0.00%	0.00%
<b>2019 Adjusted Normal Cost</b>	<b>6.59%</b>	<b>8.17%</b>	<b>8.02%</b>

Note: Totals may not agree due to rounding.

\*Asset Gain/Loss performed on AVA not MVA.

## II. ACTUARIAL EXHIBITS

<b>Change in Employer and State Plan 2/3 Normal Cost Rate by Source</b> (Continued)			
<b>Change in Normal Costs</b>	<b>PSERS</b>	<b>LEOFF<sup>1</sup></b>	<b>WSPRS<sup>2</sup></b>
<b>2018 Normal Cost Before Laws of 2019</b>	<b>6.76%</b>	<b>3.43%</b>	<b>20.41%</b>
Remove Rate Floor	0.00%	(0.84%)	0.00%
Remove Prior Employer Liability <sup>3</sup>	0.00%	0.00%	(6.64%)
<b>2018 Adjusted Normal Cost Rate</b>	<b>6.76%</b>	<b>2.59%</b>	<b>13.77%</b>
<b>Liabilities</b>			
Salaries	0.27%	0.13%	(0.14%)
Termination	(0.22%)	(0.01%)	0.01%
Retirement	0.01%	0.01%	(0.09%)
Disability	0.01%	0.00%	0.03%
Mortality	0.01%	0.00%	0.20%
Growth / Return to Work	2.69%	0.33%	0.82%
Other Liabilities	0.01%	0.04%	0.36%
<b>Total Liability Gains/Losses</b>	<b>2.78%</b>	<b>0.50%</b>	<b>1.19%</b>
<b>Assets<sup>4</sup></b>			
Contributions	(0.19%)	(0.13%)	0.16%
Disbursements	0.00%	0.01%	0.04%
Investment Returns	(0.19%)	(0.33%)	(1.68%)
<b>Total Asset Gains/Losses</b>	<b>(0.37%)</b>	<b>(0.45%)</b>	<b>(1.47%)</b>
<b>Incremental Changes</b>			
Plan Change	0.00%	0.00%	0.00%
Method Change	0.00%	0.01%	0.01%
Assumption Change	0.00%	0.00%	0.17%
Correction Change	(0.01%)	0.00%	0.00%
Experience Study Change	(0.30%)	(0.08%)	(0.04%)
<b>Total Incremental Changes Gains/Losses</b>	<b>(0.31%)</b>	<b>(0.07%)</b>	<b>0.14%</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>(2.30%)</b>	<b>(0.23%)</b>	<b>(0.89%)</b>
<b>Other Gains/Losses</b>	<b>0.02%</b>	<b>0.00%</b>	<b>0.05%</b>
<b>Total Change</b>	<b>(0.18%)</b>	<b>(0.25%)</b>	<b>(0.98%)</b>
<b>2019 Preliminary Normal Cost</b>	<b>6.58%</b>	<b>2.34%</b>	<b>12.79%</b>
Increase from Applied Rate Floor	0.00%	0.74%	0.00%
Rate to Amortize Prior Employer Liability	0.00%	0.00%	1.32%
Excess Member Rate	N/A	N/A	4.34%
Laws of 2020	0.00%	0.00%	0.16%
<b>2019 Adjusted Normal Cost</b>	<b>6.58%</b>	<b>3.08%</b>	<b>18.61%</b>

Note: Totals may not agree due to rounding.

<sup>1</sup> The LEOFF contribution rate is the state's portion only (20% of the Plan 2 Normal Cost).

<sup>2</sup> The WSPRS normal cost contribution rate applies to Plans 1 and 2.

<sup>3</sup> For WSPRS, this rate is attributable to the excess member rate (5.32%), and the remaining (1.32%) is attributable to prior employer liability.

<sup>4</sup> Asset Gain/Loss performed on AVA not MVA.

Change in Employer and State Plan 1 UAAL Rate by Source <sup>1</sup>			
Change in UAAL Rate	PERS, SERS, & PSERS <sup>2</sup>		
	TRS	LEOFF <sup>3</sup>	
<b>2018 UAAL Rate Before Laws of 2019</b>	<b>4.08%</b>	<b>6.11%</b>	<b>(26.29%)</b>
Remove Rate Floor	0.00%	(0.32%)	0.00%
Remove Plan 1 Benefit Improvements	(0.24%)	(0.36%)	N/A
Fixed Amortization Date Adjustment <sup>4</sup>	N/A	N/A	0.66%
<b>2018 Adjusted UAAL Rate</b>	<b>3.84%</b>	<b>5.43%</b>	<b>(25.63%)</b>
Liabilities	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
Salaries	0.00%	0.01%	(0.02%)
Termination	0.00%	0.00%	0.00%
Retirement	0.00%	0.00%	(0.03%)
Disability	0.00%	0.00%	0.00%
Mortality	0.00%	0.00%	(0.17%)
Return to Work	0.00%	0.00%	0.00%
Inflation (CPI)	0.00%	0.00%	0.41%
Other Liabilities	0.01%	0.00%	0.38%
<b>Total Liability Gains/Losses</b>	<b>0.01%</b>	<b>0.01%</b>	<b>0.57%</b>
Assets <sup>5</sup>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
Contributions	(0.22%)	(0.32%)	(0.00%)
Disbursements	0.01%	0.04%	0.07%
Investment Returns	(0.20%)	(0.33%)	(2.77%)
<b>Total Asset Gains/Losses</b>	<b>(0.40%)</b>	<b>(0.61%)</b>	<b>(2.70%)</b>
Incremental Changes	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
Plan Change	0.09%	0.19%	0.00%
Method Change	0.00%	0.00%	0.00%
Assumption Change	0.00%	0.00%	0.00%
Correction Change	0.00%	0.00%	0.00%
Experience Study Change	(0.26%)	(0.24%)	0.34%
<b>Total Incremental Changes Gains/Losses</b>	<b>(0.17%)</b>	<b>(0.05%)</b>	<b>0.34%</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>(0.37%)</b>	<b>(0.67%)</b>	<b>0.55%</b>
<b>Other Gains/Losses</b>	<b>0.05%</b>	<b>0.05%</b>	<b>(0.66%)</b>
<b>Total Change</b>	<b>(0.88%)</b>	<b>(1.27%)</b>	<b>(1.90%)</b>
<b>2019 Preliminary UAAL Rate</b>	<b>2.96%</b>	<b>4.16%</b>	<b>(27.53%)</b>
Increase from Applied Rate Floor	0.54%	1.59%	0.00%
Increase from Plan 1 Benefit Improvements	0.10%	0.21%	N/A
Laws of 2020	0.11%	0.23%	0.00%
<b>2019 Adjusted UAAL Rate</b>	<b>3.71%</b>	<b>6.19%</b>	<b>(27.53%)</b>

Note: Totals may not agree due to rounding.

<sup>1</sup> WSPRS does not have a UAAL rate.

<sup>2</sup> Rate determined to fund the PERS Plan 1 UAAL. SERS and PSERS employers also pay the PERS 1 UAAL rate.

<sup>3</sup> The LEOFF contribution rate is the UAAL rate for Plan 1. The plan has a surplus of assets over liabilities, so no rate is currently payable.

<sup>4</sup> LEOFF 1 fixed amortization date is 6/30/2024.

<sup>5</sup> Asset Gain/Loss performed on AVA not MVA.