Judicial Retirement System of New Jersey

Actuarial Valuation Report as of July 1, 2019

Produced by Cheiron

April 2020

TABLE OF CONTENTS

LETTER OF TRANSMITTAL

April 23, 2020

State House Commission
Judicial Retirement System of New Jersey
State of New Jersey
Department of the Treasury
Division of Pension and Benefits, CN 295
Trenton, New Jersey 08625-0295

Dear Commission Members:

We have performed the July 1, 2019 Actuarial Valuation of the Judicial Retirement System of New Jersey (JRS or System).

In preparing our report, we relied on information (some oral and some written) supplied by the Division of Pensions and Benefits (DPB). This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

The results of this report are only applicable to the System's contribution for Fiscal Year Ending 2021. Future results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the assumptions; changes in assumptions; and changes in plan provisions or applicable law.

The demographic and economic (other than the investment rate of return) actuarial assumptions are based on the recommended assumptions from the July 1, 2014 – June 30, 2018 Experience Study, pending approval by the State House Commission. The investment return assumption of 7.30% is based on the recommendation of the State Treasurer.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

State Police Retirement System of New Jersey
April 23, 2020
Page 2

This actuarial valuation report was prepared exclusively for JRS, the DPB and the System auditors for the purposes described herein and in preparing financial reports in accordance with applicable law and annual report requirements. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron

Janet Cranna, FSA, FCA, MAAA, EA
Principal Consulting Actuary

Anu Patel, FSA, MAAA, EA
Principal Consulting Actuary
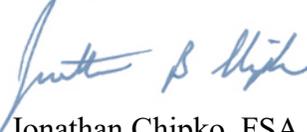
Jonathan Chipko, FSA, MAAA, EA
Consulting Actuary

cc: Kenneth Kent, FSA, FCA, MAAA, EA

SECTION I – BOARD SUMMARY

The primary purpose of the actuarial valuation and this report is to disclose the following as of the valuation date:

- The financial condition of the Judicial Retirement System of New Jersey,
- Past and expected future trends and risks to the System's financial condition, and
- The State's Statutory pension contribution for the Fiscal Year Ending (FYE) 2021.

In this Section we present a summary of the principal valuation results. This includes the basis upon which the July 1, 2019 valuation was completed and an examination of the current financial condition of the System. In addition, we present a review of the key historical trends as well as the System's projected financial outlook. The stress testing in accordance with the requirements set out in Chapter 277, P. L. 2017 follows in Section II.

This report does not include reporting requirements under GASB Statements Nos. 67 and 68 which were provided in separate reports.

Results shown in this report for years prior to July 1, 2018 are based on the prior actuary's valuation reports.

SECTION I – BOARD SUMMARY

Valuation Basis

The July 1, 2019 valuation results are based on the same actuarial methods as used in the July 1, 2018 valuation. The demographic and economic assumptions, aside from the valuation interest rate, are based on the July 1, 2014 – June 30, 2018 Experience Study, which is pending approval by the State House Commission. The valuation is based on a 7.30% interest rate, which was recommended by the State Treasurer.

This valuation reflects plan provisions in effect as of July 1, 2019 and does not reflect the impact of any changes in benefits that may have been approved after the valuation date. The valuation also reflects a new DPB policy regarding the crediting of interest on member contributions for the purpose of refunds of accumulated deductions. This policy change did not impact the actuarial liability for this valuation.

This report was prepared using census data and financial information as of July 1, 2019 provided by the Division of Pensions and Benefits and does not reflect any subsequent changes in the membership or the assets.

The Appropriations Act of Fiscal Year 2019 reduced the State pension contribution from the Statutory amount of $48,368,041 to $29,000,000.

The potential impact of the Appropriations Act of 2020 reduces the State pension contribution for Fiscal Year 2020 from the Statutory amount of $52,327,505 to $36,629,254 (70% of the Statutory contribution). This valuation reflects the potential impact of the Appropriations Act of 2020.

Chapter 83, P.L. 2016 calls for the State to make the required pension contributions on a quarterly basis in each fiscal year according to the following schedule: at least 25% by September 30, at least 50% by December 31, at least 75% by March 31, and at least 100% by June 30. As such, contributions are assumed to be made on a quarterly basis.

The valuation excludes assets and liabilities under the Non-Contributory Group Insurance Premium Fund. The Non-Contributory Group Insurance premiums are separately funded on a pay-as-you-go basis.

SECTION I – BOARD SUMMARY

Key Results

Table I-1 below summarizes the key results of the valuation with respect to the System's membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior year.

Table I-1 Summary of Key Valuation Results			
Valuation Date Fiscal Year Ending (FYE)	July 1, 2019 2021	July 1, 2018 2020	% Change
Member Data			
Contributing Actives	421	447	-5.8%
Non-Contributing Actives	5	6	-16.7%
Deferred Vested Members	6	4	50.0%
Retirees and Beneficiaries[1]	633	614	3.1%
Total Members	1,065	1,071	-0.6%
Appropriation Payroll[2]	$ 76,627,036	$ 77,763,777	-1.5%
Annual Retirement Allowances	$ 59,393,303	$ 57,164,048	3.9%
Assets and Liabilities			
Actuarial Liability	$ 790,936,136	$ 670,562,613	18.0%
Actuarial Value of Assets (AVA)[3]	207,308,308	209,981,271	-1.3%
Unfunded Actuarial Liability/(Surplus)	$ 583,627,828	$ 460,581,342	26.7%
Funded Ratio (AVA)	26.2%	31.3%	-5.1%
Market Value of Assets (MVA)[3]	$ 192,922,219	$ 195,468,291	-1.3%
Unfunded Actuarial Liability/(Surplus)	$ 598,013,917	$ 475,094,322	25.9%
Funded Ratio (MVA)	24.4%	29.1%	-4.7%
Contribution Amounts			
State Normal Cost at End of Year	$ 17,294,294	$ 13,329,514	29.7%
Amortization Payment of UAL	48,457,736	38,997,991	24.3%
Total Statutory Contribution for FYE	$ 65,752,030	$ 52,327,505	25.7%
Percent Appropriated	80.0%	70.0%	10.0%
Net State Contribution	$ 52,601,624	$ 36,629,254	43.6%

[1] Retiree and Beneficiary counts do not include QDROs
[2] Annual compensation for contributing actives only
[3] Includes discounted State appropriations receivable

SECTION I – BOARD SUMMARY

The key results of the July 1, 2019 actuarial valuation are as follows:

- The Statutory contribution increased from $52.3 million for FYE 2020 to $65.8 million for FYE 2021 prior to any adjustments for the State phase-in of contributions.

- The funded ratio, the ratio of actuarial value of assets over liabilities, decreased from 31.3% as of July 1, 2018 to 26.2% as of July 1, 2019. Using the market value of assets, the funded ratio also decreased from 29.1% to 24.4%.

- The unfunded actuarial liability increased from $460.6 million as of July 1, 2018 to $583.6 million as of July 1, 2019 on an actuarial value of assets basis.

- During the year there was a total actuarial experience loss of $15.3 million, consisting of an asset loss of $3.8 million and a liability loss of $11.5 million.

- The reduction in the assumed rate of investment return from 7.50% to 7.30% increased the actuarial liability by $13.9 million.

- The updates in the assumed rates of retirement, mortality, salary increase and inflation as a result of the recently completed experience study increased the actuarial liability by $81.7 million. The increase in liability is primarily due to the change in mortality rates based on the Pub-2010 mortality tables.

SECTION I – BOARD SUMMARY

Recent Trends

Although most of the attention given to the valuation reflects the most recently completed unfunded actuarial liability, funded ratio, and contribution amounts, each valuation is merely a snapshot of the long-term progress of a pension fund. It is important to take a step back from the current year results and view them in the context of the System's recent history as well as trends expected into the future. Below, we present a series of graphs which display historical trends for key factors in the valuations of the last 10 years. Additionally, in Appendix D we provide the numerical values of the historical unfunded actuarial liability, funded ratio, and contribution amounts.

In reviewing the historic trends over the 10 year period, the declining funded status coupled with significant negative net cash flow in excess of 10% of assets highlights the potential risk of running out of assets to pay benefits unless the State consistently contributes the full amount of the Statutory required contributions.

Assets and Liabilities

The gray bars represent the Actuarial Liability (AL). The green line is the Market Value of Assets (MVA) and the gold line is the Actuarial Value of Assets (AVA). The System's funded ratio (ratio of assets to actuarial liability) on both a MVA basis and an AVA basis is shown next to the respective asset lines.

The liability has been increasing over time in part due to additional benefit accruals but also due to decreases in the discount rate and other assumption changes. The liability decrease in 2015 was due to assumption changes. The large liability increase in 2019 was due to the reduction in the assumed rate of investment return from 7.50% to 7.30% and assumption changes related to the recent experience study. The largest impact on the liability was driven by the change in mortality rates which were updated to use the new public plan mortality tables published by the Society of Actuaries.

The funded ratio has been decreasing over time in part due to decreases in the discount rate, recognition of the 2008/2009 market losses and because the State has not been making the full Statutory contribution for the entire period shown.

SECTION I – BOARD SUMMARY

The information above is based on the final actuarial valuation reports for the given years. The amounts do not reflect differences between the discounted State appropriations receivable and the actual State contribution amounts that became known after the issuance of the reports.

SECTION I – BOARD SUMMARY

Membership Trends

The graph below shows the membership counts of the System for the last ten valuations. The numbers which appear above each bar represent the ratio of the number of inactive and non-contributing active members to contributing active members at each valuation date, and provide a measure of the maturity of the System. We refer to this ratio as the support ratio. The support ratio has generally increased over the period. As more of the liability moves from actives to inactives, the System will experience more volatility in contribution rates when actuarial gains and losses are recognized.

With the current support ratio of 1.5, there are significantly more inactive members than active members implying that the risk factor is at a high level relative to other mature pension funds.

The numbers that are shown in the middle of the bars represent the number of actives or inactive members. The black line represents the appropriation payroll over the period, and corresponds with the scale on the right. For valuation years prior to 2018, appropriation payroll includes payroll for non-contributing actives and the appropriation payroll beginning in 2018 excludes the payroll for non-contributing actives.
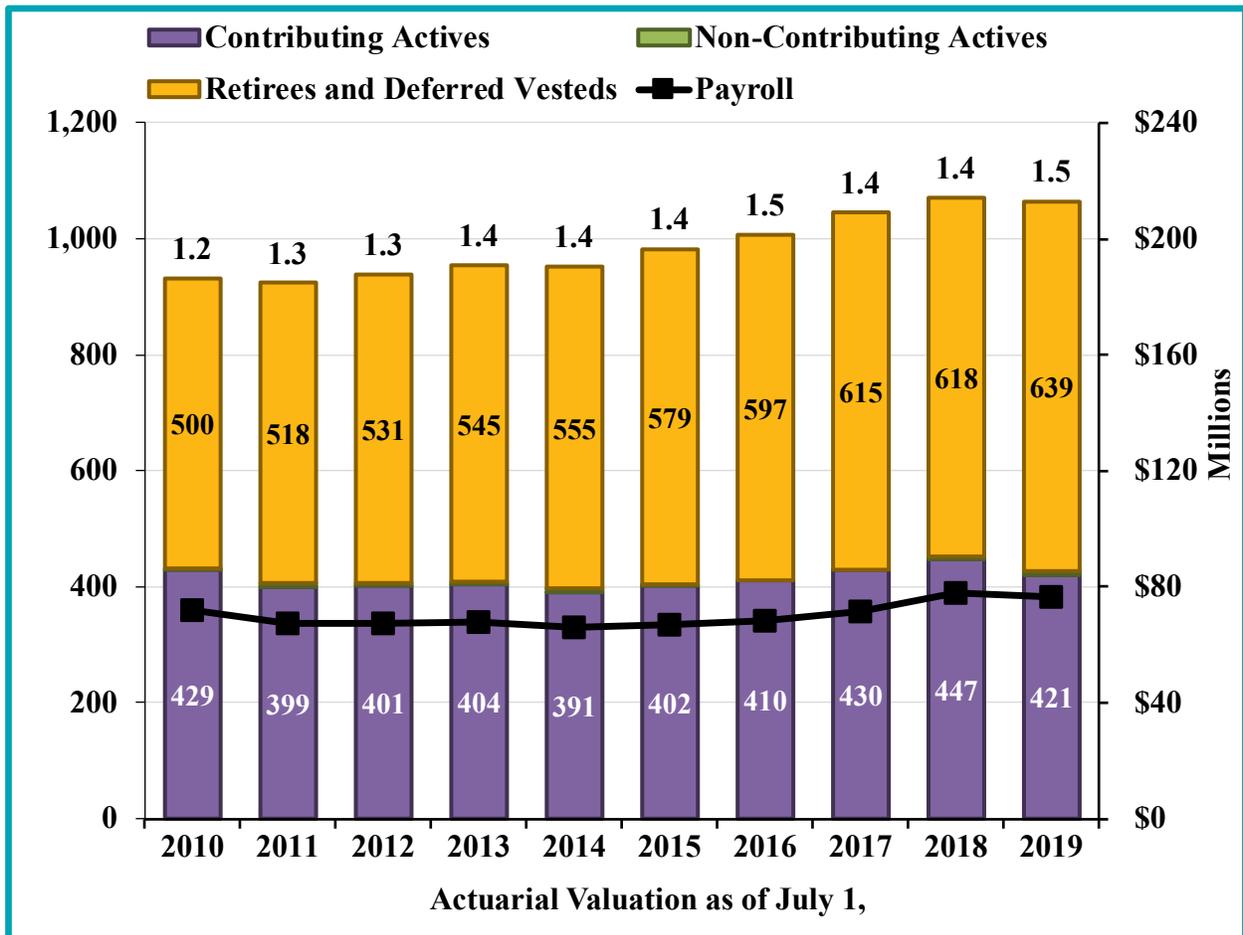
SECTION I – BOARD SUMMARY

Cash Flows

The following graph shows the System net cash flow (contributions less benefit payments and expenses) at the end of each fiscal year. For the entire period shown, the net cash flow, which excludes investment returns, has been negative. This illustrates that contributions have not been sufficient to cover benefits and expenses in any years over the past decade. A major implication of a negative cash flow is that the difference each year must be met first from cash generated by investments and then be paid out of the principal assets, representing additional risk for the System if investments need to be sold in a down market to cover benefit payments.

The black dotted line shows the net cash flow as a percent of the market assets and goes with the axis on the right.

The net cash flow for the System has been significantly negative. Even more disconcerting is that the negative cash flow as a percent of market assets has exceeded a net -10% throughout the period and is greater than the long term investment assumption. This represents a plan that is expected to defund with the risk of insolvency if the contributions do not catch up to cover a higher portion of the benefit payments and expenses.
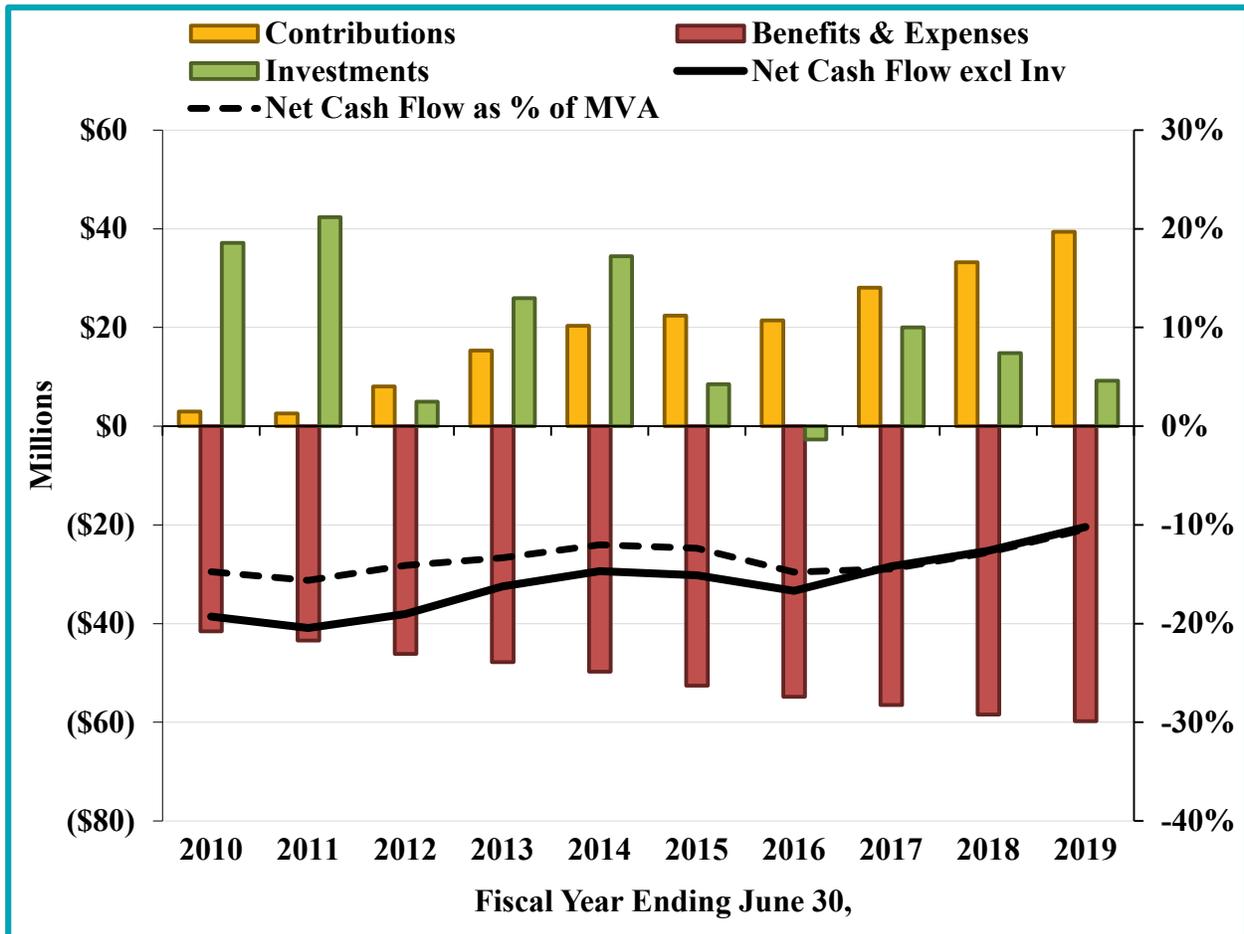
SECTION I – BOARD SUMMARY

Contributions

This graph shows the historical trends for the State contributions. The Statutory contributions are comprised of the State normal cost (blue bars) and the amortization of the UAL (gold bars). The green line shows the actual State contributions over the period. For FYE 2020 and 2021, the green line has a lighter shade to indicate that these are expected, rather than actual, contributions based on the State appropriating 70% and 80% of the Statutory contribution, respectively. The expected contributions are shown in Table I-1.

The red line is the **tread water line**, which is the State normal cost plus the interest on the UAL. The tread water line shows the minimum contributions that are needed to avoid an increase in the UAL.

The graph shows that not only has the State been making contributions less than required by Statute, but that the State contributions have historically been significantly below the tread water line. When contributions are lower than the normal cost plus interest on the UAL, the UAL is expected to grow from one year to the next.
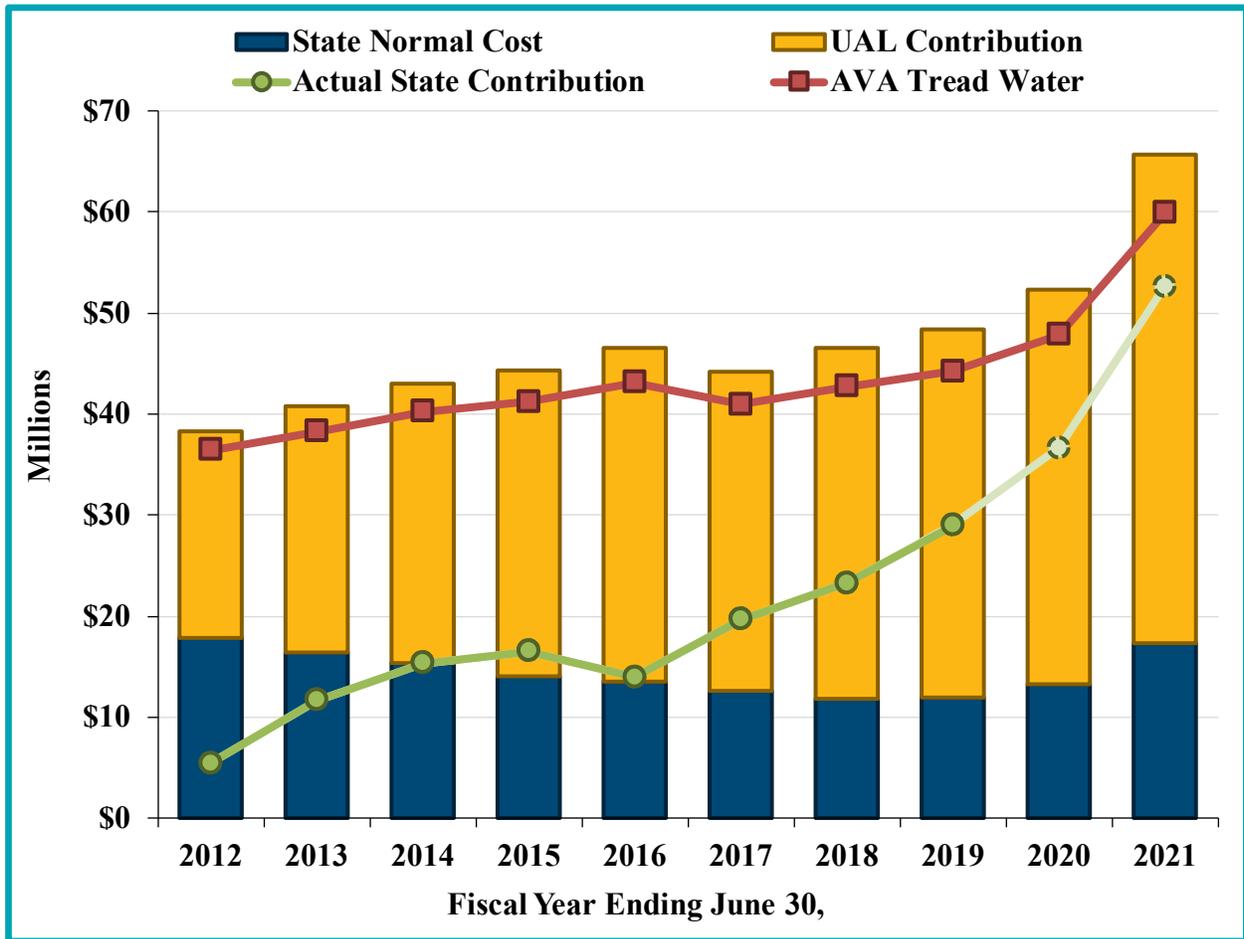
SECTION I – BOARD SUMMARY

Projected Future Outlook

The analysis of projected financial trends is perhaps the most important component of the valuation. This has been recognized by the State Legislature in their adoption of Chapter 277, P.L. 2017 requiring the System to have stress testing performed annually. The graphs presented in this section show the expected progress of the System's funded status over the next 30 years, measured in terms of the expected funded ratios and State contributions assuming that the System is ongoing.

While experience will not conform exactly to the assumptions every year, the trends reflect reasonable expectations. As a result, in addition to the baseline projection, we provide additional **stress testing** in Section II based on varying investment returns in the future. It is our opinion that the stress testing analyses shown in Section II meet the requirements of Chapter 277, P. L. 2017.

The projections assume a constant active population. As members retire, terminate and die based on the current valuation assumptions, it is assumed that new members will replace them based on characteristics (age/gender/salary) similar to recent new members.

Additional assumptions used for these projections, including the investment rate of return for each subsequent valuation as recommended by the State Treasurer, as well as the anticipated appropriation percentages, are shown in Appendix B.

Baseline Scenario

The baseline projection shows the outcome if all actuarial assumptions, including the long-term rate of return assumption of 7.00%, as recommended by the State Treasurer, are exactly met. For each scenario we show two graphs.

The top graph compares the Market Value of Assets (green line) and the Actuarial or smoothed Value of Assets (gold line) to the System's Actuarial Liabilities (gray bars). In addition, at the top of the graph, we show the System's funded ratio on an Actuarial Value of Assets basis (ratio of Actuarial Value of Assets to Actuarial Liabilities). The years shown in the graph signify the valuation date as of July 1 of the labeled year.

The System's funded ratio on an Actuarial Value of Assets basis is projected to increase slightly over the next few years, as the State appropriates less than the Statutory amount while at the same time the valuation investment rate of return assumption decreases from 7.30% to 7.00%, and steadily increases thereafter, ultimately reaching 88% by 2049.

The bottom graph shows the contributions by fiscal year. The member contributions are in purple and the State contributions are in gold. The gold outline shows the State's full Statutory contributions with the shaded portion showing the anticipated appropriated amount.

SECTION I – BOARD SUMMARY

The projection assumes the State appropriates 80% of the Statutory contribution in FYE 2021, and increases the percent by 10% a year, until reaching 100% of the Statutory contribution beginning with FYE 2023. Both the appropriated State contributions and the member contributions are also shown in dollar amounts.

The dashed black line in the bottom graph shows the gross normal cost. The difference between the dashed black line and the purple bar is the State portion of the normal cost.

The solid black line is the tread water line based on the Actuarial Value of Assets. Because the tread water metric equals the normal cost plus interest on the UAL, the difference between the solid black line and the dashed black line is the interest on the UAL. When contributions fall below the solid black line, as is the case in FYE 2021, the UAL grows and the funded ratio falls. When the contributions exceed the solid line, as is the case beginning in FYE 2023, the UAL begins decreasing and the funded ratio increases.

The Statutory contributions increase steadily through FYE 2023 as the State appropriates less than the Statutory amount and the valuation investment rate of return assumption decreases from 7.30% to 7.00%. Thereafter, the Statutory contributions increase more gradually. Once the appropriated amount equals the Statutory contribution, beginning in FYE 2023, the contributions reach the level necessary to pay down the UAL and the tread water line begins to decrease relative to the Statutory contribution.

SECTION I – BOARD SUMMARY

Baseline: 7.0% return for all years

Projected Funded Status

26% 27% 31% 35% 39% 43% 48% 52% 56% 61% 65% 69% 74% 79% 83% 88%

Legend: Actuarial Liability | Actuarial Assets | Market Assets

Projected Aggregate Contributions

Legend: Member Contribution | State Contribution | Normal Cost | Tread Water
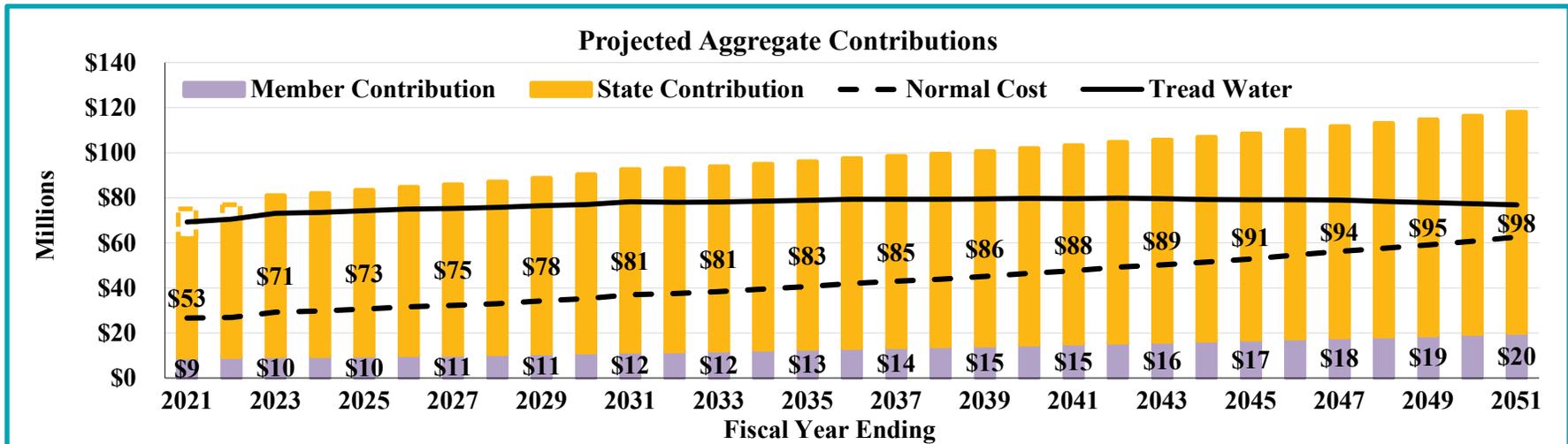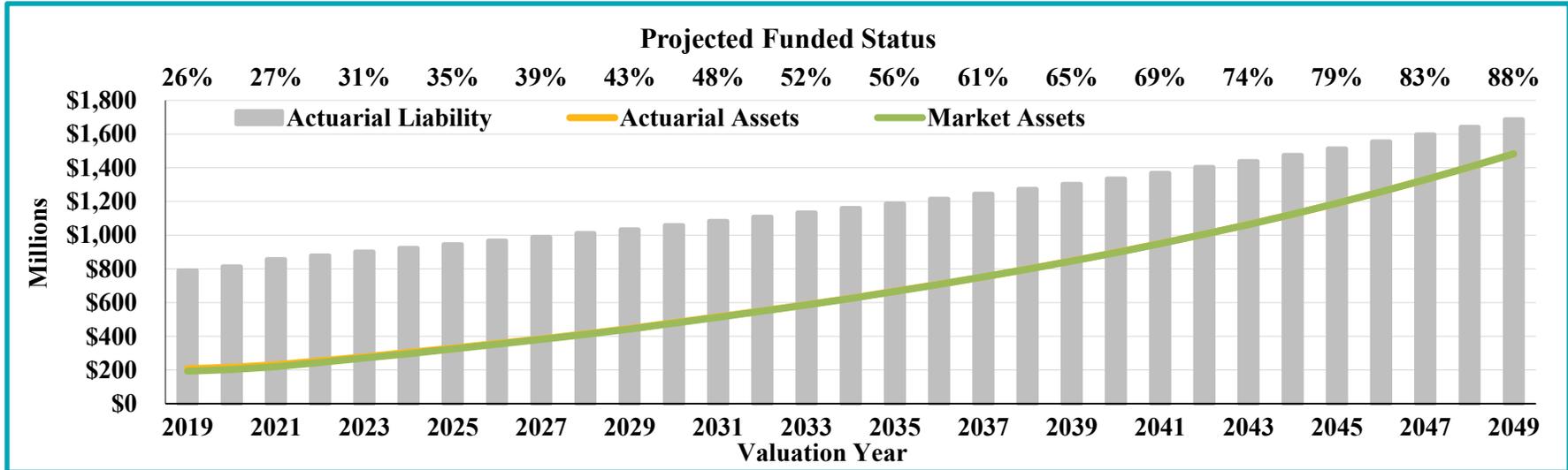
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to the plan, provide some background information about those risks, and provide an assessment of those risks.

Identification of Risks

The fundamental risk to the System is that the contributions needed to pay the benefits become unaffordable. While there are a number of factors that could lead to contribution amounts becoming unaffordable, we believe the primary risks are:

• Investment risk,
• Assumption change risk, and
• Contribution risk.

Other risks that we have not identified may also turn out to be important.

Investment risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the unfunded actuarial liability necessitating higher contributions in the future unless there are other gains that offset these investment losses. The potential volatility of future investment returns is determined by the System's asset allocation and the affordability of the investment risk is determined by the amount of assets invested relative to the size of the plan sponsor or other contribution base.

Assumption change risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. For example, declines in interest rates over the last three decades resulted in higher investment returns for fixed income investments, but lower expected future returns necessitating either a change in investment policy, a reduction in discount rate, or some combination of the two. Assumption change risk is an extension of the other risks identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable.

Contribution risk is the potential for actual future contributions to deviate from expected future contributions. There are different sources of contribution risk ranging from the sponsor choosing to not make contributions in accordance with the funding policy to material changes in the contribution base (e.g., covered employees, covered payroll, sponsor revenue) that affect the amount of contributions the System can collect.

The chart below shows the components of changes in the Unfunded Actuarial Liability (UAL) for the System over the last 10 years, including investment gains and losses on the Actuarial Value of Assets, liability gains and losses, assumption and benefit changes, and contributions compared to the tread water level of contributions (normal cost plus interest on the UAL.) The net UAL change is shown by the dark blue line. Table II-1 below the chart summarizes the changes in the UAL over the last 10 years.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

These total changes in UAL support our identification of investment returns, assumption changes, and contributions as the primary risks to the System.

Historical Changes in UAL 2010-2019
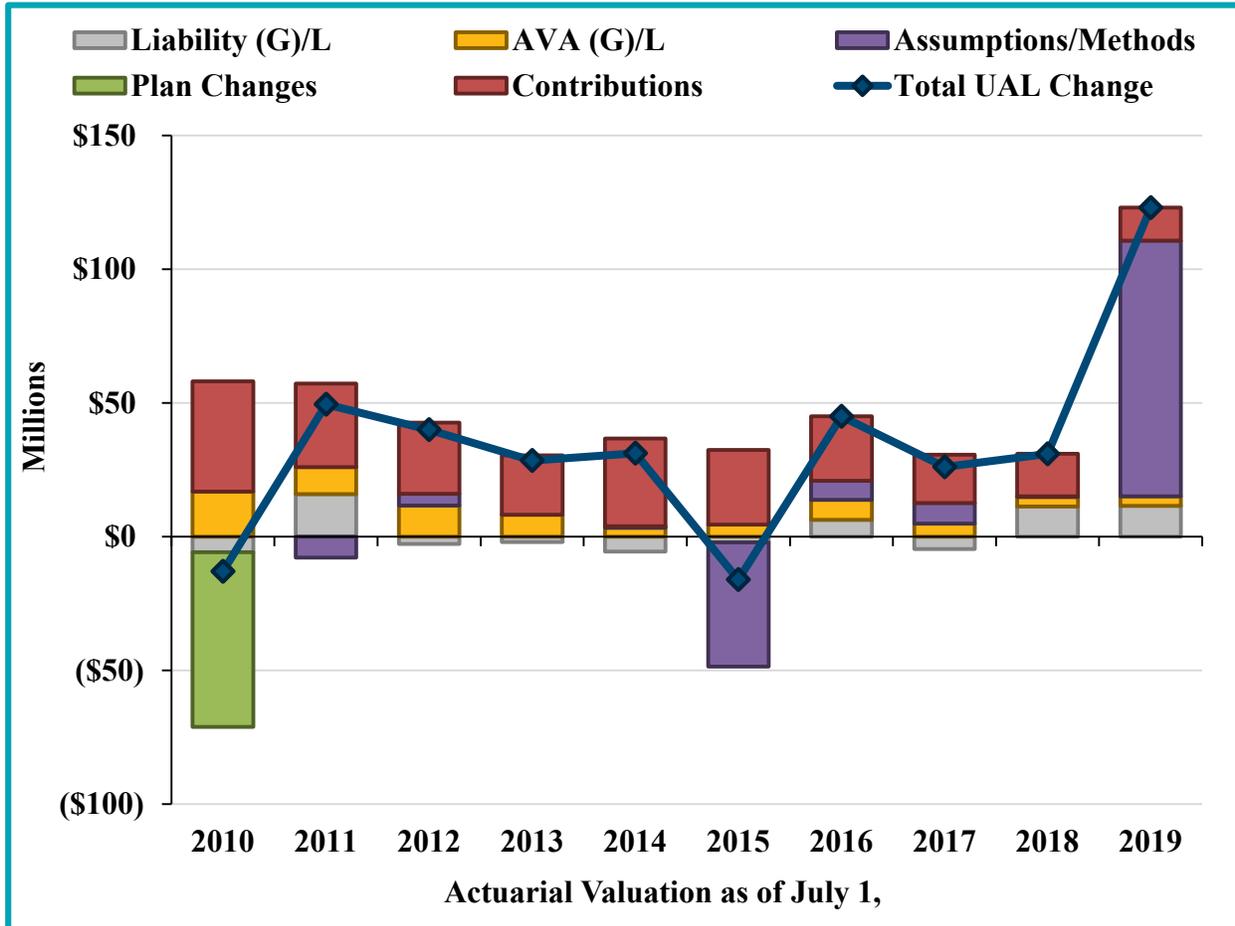
	Table II-1 Changes in Unfunded Actuarial Liability (Dollar amounts in millions)										
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Total**
Discount Rate Source	**8.25%**	**7.95%**	**7.90%**	**7.90%**	**7.90%**	**7.90%**	**7.65%**	**7.50%**	**7.50%**	**7.30%**	
AVA Investment (G)/L	$ 16.9	$ 10.1	$ 11.6	$ 8.2	$ 3.4	$ 4.5	$ 7.5	$ 4.8	$ 3.6	$ 3.6	$ 74.3
Liability (G)/L	(5.7)	15.9	(2.7)	(2.0)	(5.6)	(2.1)	6.3	(4.6)	11.3	11.5	22.3
Assumptions/Methods	0.0	(7.8)	4.5	0.0	0.6	(46.4)	7.1	7.8	0.2	95.6	61.5
Plan Changes	(65.4)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(65.4)
Contributions[1]	41.2	31.3	26.6	22.3	32.8	27.9	24.1	18.0	15.9	12.3	252.4
Net UAL Change	**$ (13.0)**	**$ 49.5**	**$ 40.0**	**$ 28.4**	**$ 31.2**	**$ (16.1)**	**$ 45.0**	**$ 26.1**	**$ 31.0**	**$123.0**	**$345.1**

[1]UAL change due to contributions (greater)/less than normal cost plus interest on the UAL.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

On a smoothed asset basis, the investment gains and losses (gold bars) from 2010 to 2019 reflect material investment losses driven by the market decline of 2008 and 2009, which were spread over the five successive years. In aggregate, over the 10-year period, investment losses have added approximately $74.3 million to the UAL.

On the liability side (gray bars), the System has experienced a combination of gains and losses, however smaller in magnitude compared to the assets, increasing the UAL by approximately $22.3 million over the 10-year period.

Assumption and method changes (purple bars) over the last 10 years have increased the UAL by approximately $61.5 million. The significant assumption changes have included reductions in the discount rate from 8.25% to 7.30% as well as decreases in mortality rates and projected mortality improvement. It is important to note that the discount rate changes simply reflect a downward revision to the estimate of future investment earnings and ultimately costs will be determined by actual investment earnings.

Plan changes (green bars) over the last 10 years have decreased the UAL by approximately $65.4 million. The significant plan change that occurred in 2010 was the suspension of future COLAs.

Each year the UAL is expected to increase for benefit accruals attributable to the current year (the normal cost) and interest on the UAL. This expected increase is referred to as the tread water level. If contributions are greater than the tread water level, the UAL is expected to decrease. Conversely, if contributions are less than the tread water level, the UAL is expected to increase. Changes due to contributions greater or less than the tread water level (red bars) have increased the UAL by approximately $252.4 million over the last 10 years.

In general, the amortization methods used to determine the Statutory contributions are designed to collect more than the tread water level. However, contributions may be less than this threshold due to the State appropriating less than the Statutory contributions.

Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of the plan compared to other plans and how the maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic - the larger the plan is compared to the contribution or revenue base that supports it; the more sensitive the plan will be to risk. The measures below have been selected as the most important in understanding the primary risks identified for the System.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

Inactives per Active (Support Ratio)

One simple measure of plan maturity is the ratio of the number of inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members. We refer to this ratio as the *support ratio.* The revenue base supporting the plan is usually proportional to the number of active members, so a relatively high number of inactives compared to actives indicate a larger plan relative to its revenue base as well. We also discussed this risk metric in Section I.
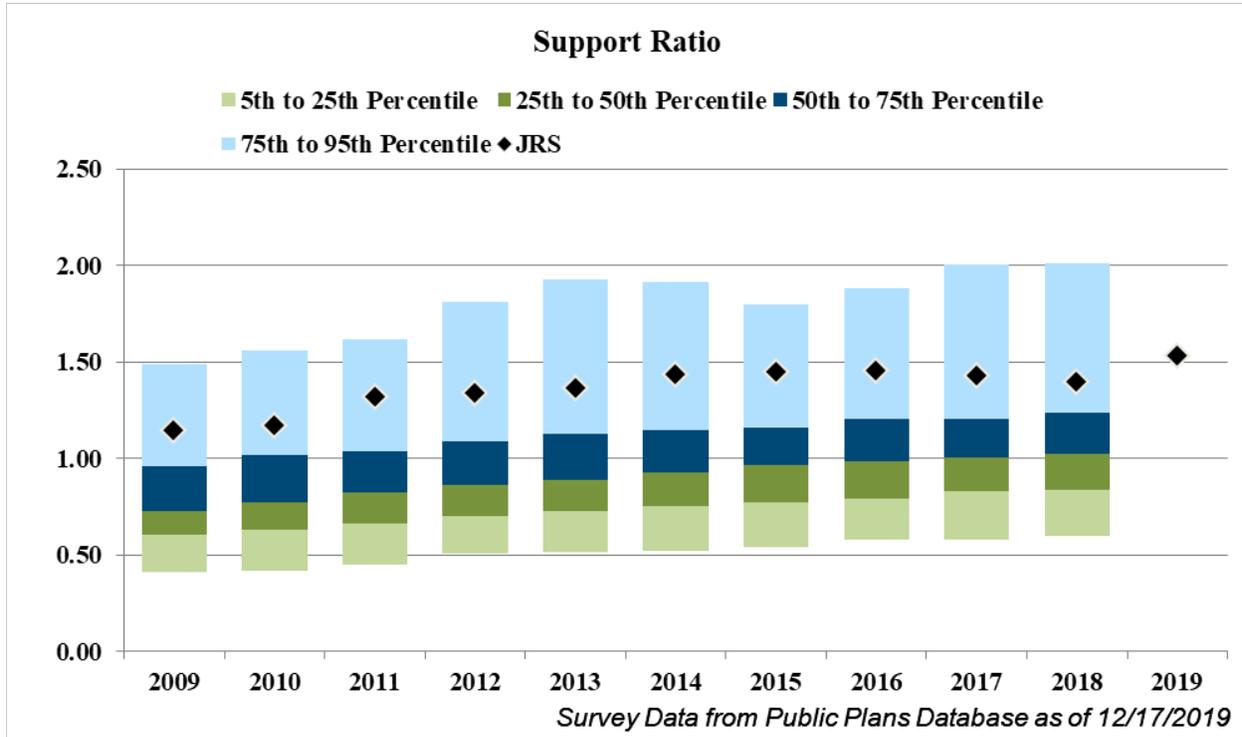
The chart above shows the distribution from the 5th to 95th percentile of support ratios for the plans in the Public Plans Database. The black diamond shows how JRS compares dating back to 2009. For the entire period shown, the JRS support ratio has been above the 75th percentile.

Net Cash Flow

The net cash flow of the plan as a percentage of the beginning of year assets indicates the sensitivity of the plan to short-term investment returns. Net cash flow is equal to contributions less benefit payments and administrative expenses. Mature plans can have large amounts of benefit payments compared to contributions, particularly if they are well funded. Investment losses in the short-term are compounded by the net withdrawal from the plan leaving a smaller asset base to try to recover from the investment losses. Large negative cash flows can also create liquidity issues. We also discussed this risk metric in Section I.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK
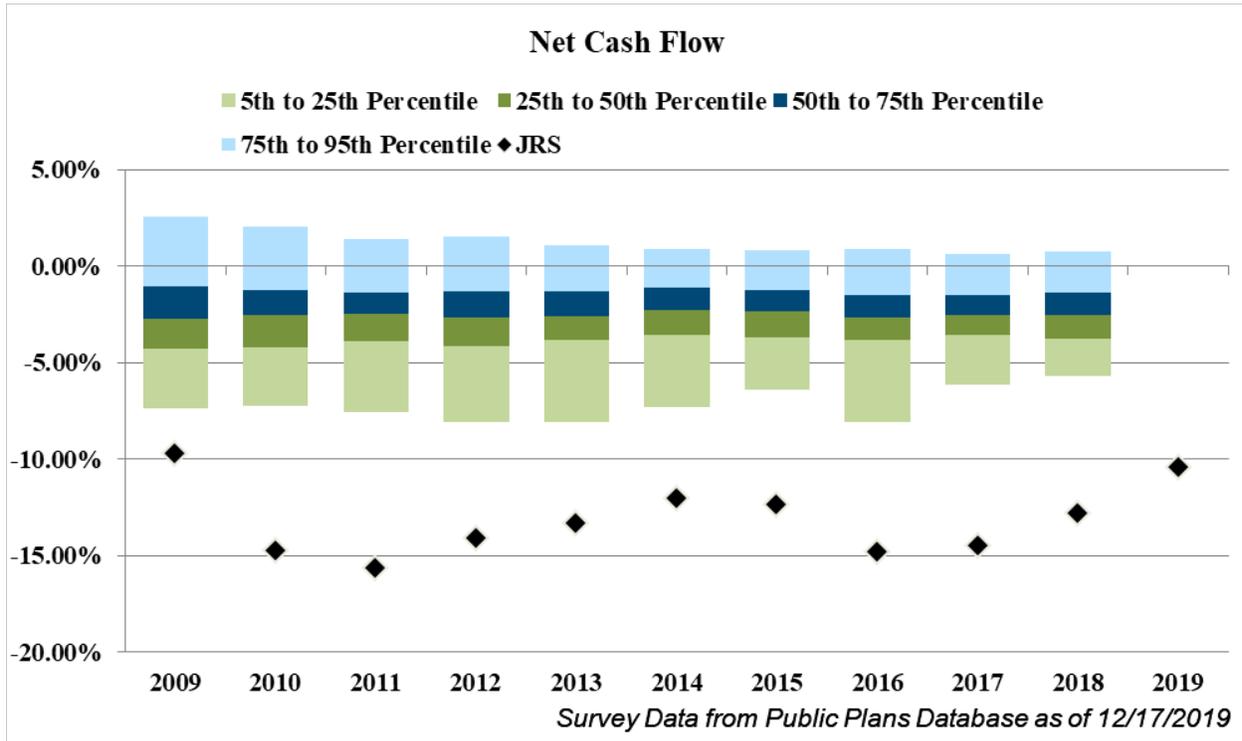
The chart above shows the distribution from the 5th to 95th percentile of net cash flow for the plans in the Public Plans Database. The black diamond shows how JRS compares. Since the Great Recession, JRS has been below the 5th percentile compared to the database of other public plans in terms of negative cash flow as a percentage of assets.

Assessing Costs and Risks

The fundamental risk to the System is that the contributions needed to fund the benefits become unaffordable. Assessing this risk, however, is complex because there is no bright line of what is unaffordable and the contribution amounts themselves are affected not just by the experience of the System, but also by the interaction of that experience and decisions by the State and the State House Commission related to the amount of contributions appropriated, assumptions, asset smoothing methods, and amortization periods.

Investment Risk - Stress Testing

This section illustrates stress testing of the investment return assumption and is an extension of the baseline projections provided in the Summary section. Under the baseline results, we assumed the ultimate 7.00% investment return assumption each and every year beginning July 1, 2019.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

For stress testing purposes, we developed six hypothetical scenarios to illustrate the impact actual investment returns may have on future funded status and contribution amounts. The scenarios are balanced between positive and negative scenarios and are based on a lognormal distribution of one and five year expected returns as shown in the following table using the capital market assumptions from the New Jersey Division of Investments (Geometric return of 7.07%, standard deviation of 11.89%).

Distribution of Expected Average Annual Returns		
Percentile	1 Year	5 Year
5%	-10.7%	-1.3%
25%	-0.6%	3.6%
50%	7.1%	7.1%
75%	15.3%	10.7%
95%	28.3%	16.1%

The scenarios include: a one-year shock using the 5th and 95th percentile returns for one year; a 5-year moderate scenario using the 25th and 75th percentile returns for five years; and a 5-year significant scenario using the 5th and 95th percentile returns for five years. The table below summarizes the theoretical scenarios.

	Theoretical Scenarios					
	1-Yr Shock		5-Yr Moderate		5-Yr Significant	
FYE	Neg	Pos	Neg	Pos	Neg	Pos
2020	-10.7%	28.3%	3.6%	10.7%	-1.3%	16.1%
2021	7.0%	7.0%	3.6%	10.7%	-1.3%	16.1%
2022	7.0%	7.0%	3.6%	10.7%	-1.3%	16.1%
2023	7.0%	7.0%	3.6%	10.7%	-1.3%	16.1%
2024	7.0%	7.0%	3.6%	10.7%	-1.3%	16.1%
2025+	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%

In reviewing each of these projections, it is the future trends, not necessarily the actual values, that are important to observe in consideration of the risks of the System and the potential volatility of future funded ratios and Statutory contribution levels.

The graphs on the following pages show the projections under each of these theoretical scenarios. Instead of the tread water line shown for the baseline projection, the contribution graphs include a dashed red line representing the expected contributions under the baseline projections shown in the Summary section to facilitate the comparison between the particular scenario and the baseline projections assuming all assumptions are met.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

One-Year Negative Shock Scenario: -10.7% return FYE 2020, 7.0% after
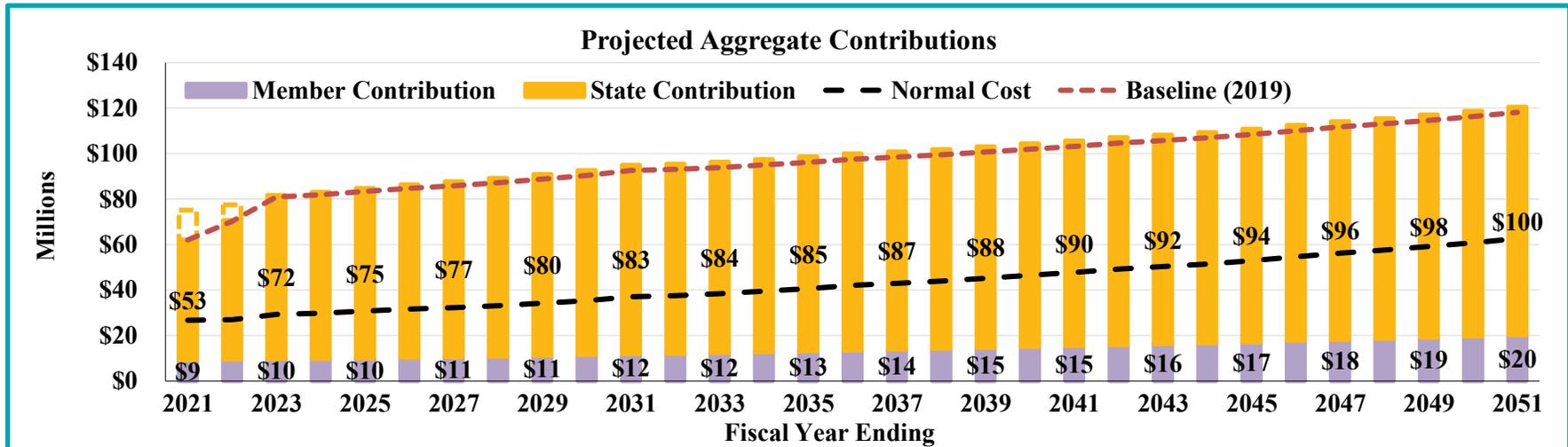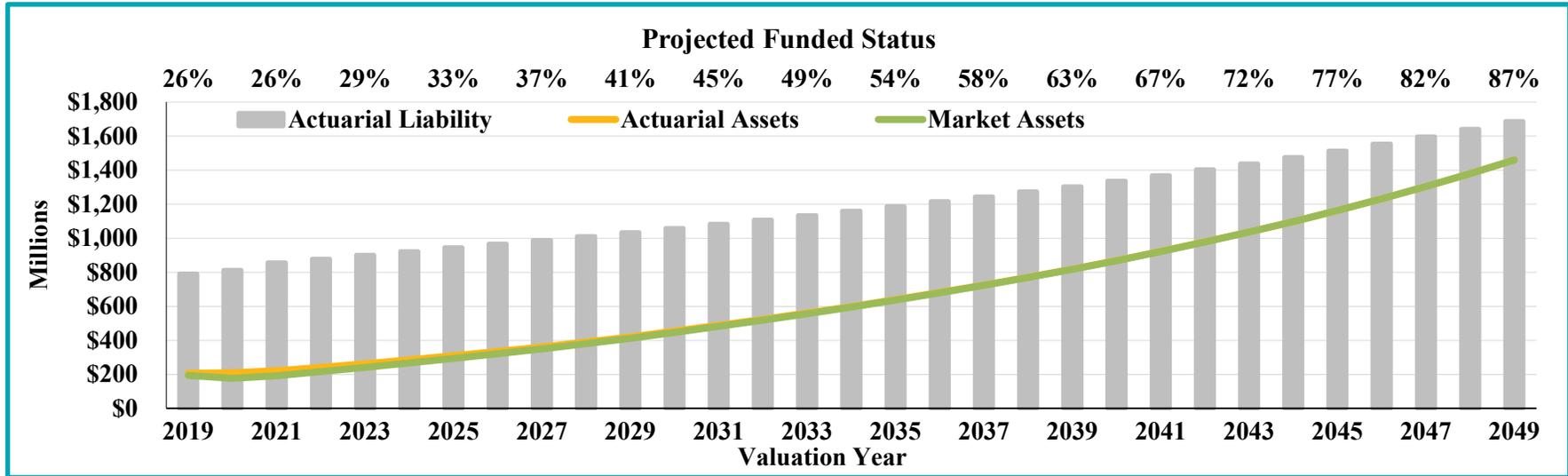
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

<u>One-Year Positive Shock Scenario: 28.3% return FYE 2020, 7.0% after</u>
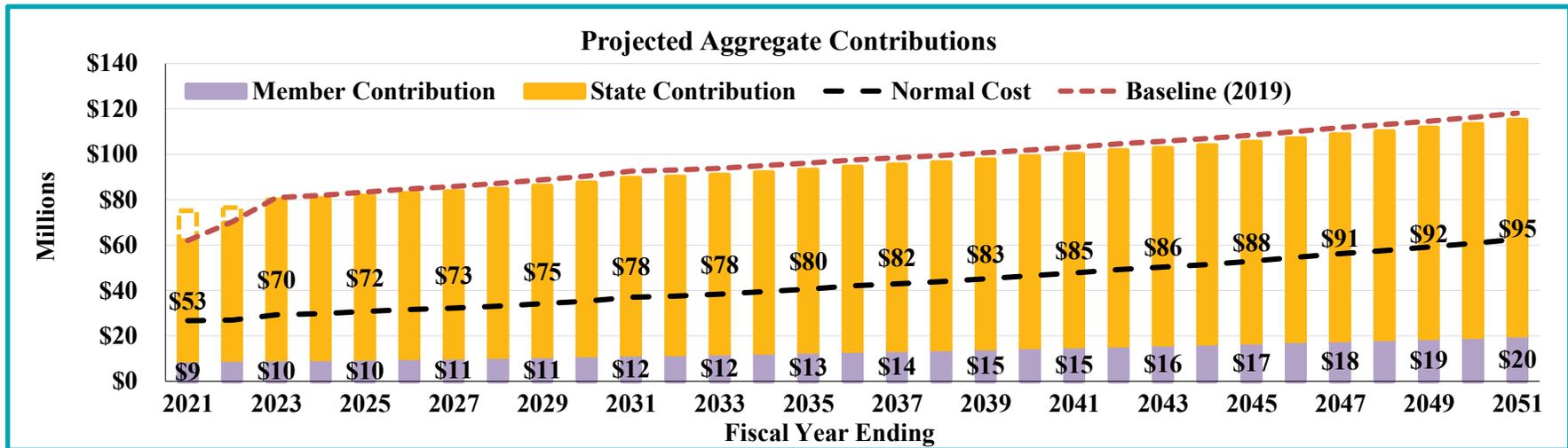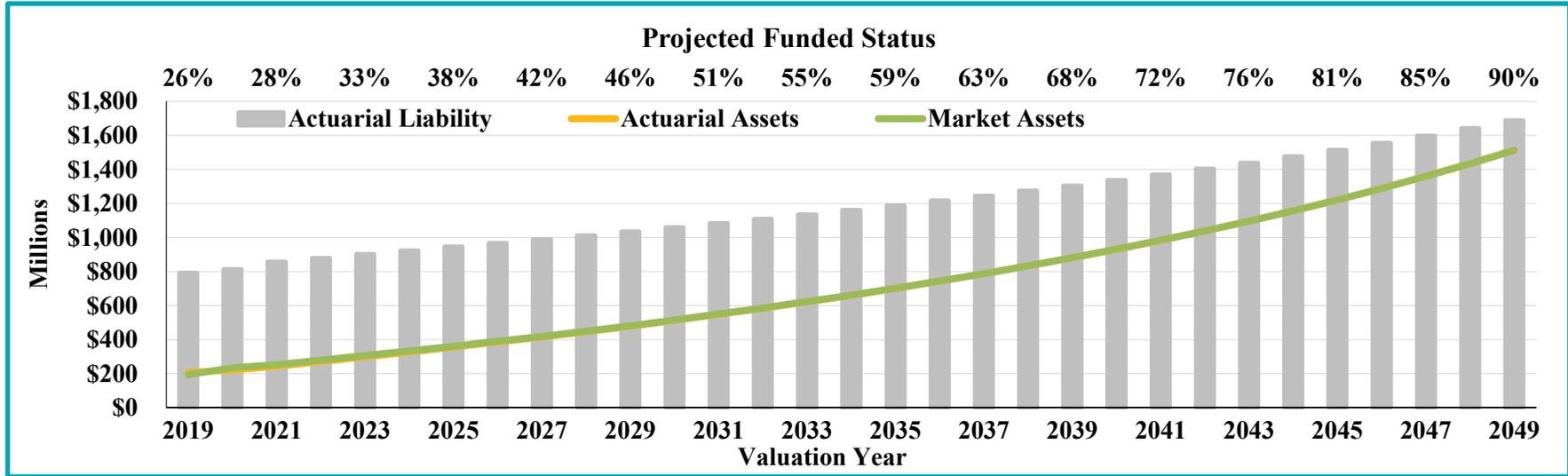
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

Five-Year Moderate Negative Scenario: 3.6% return FYE 2020-2024, 7.0% after
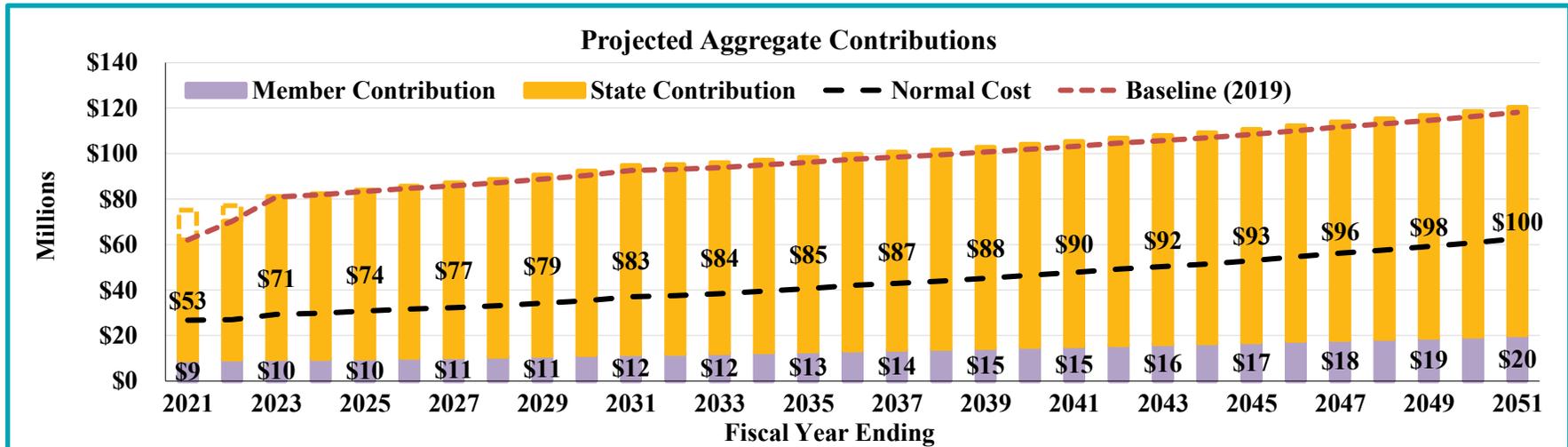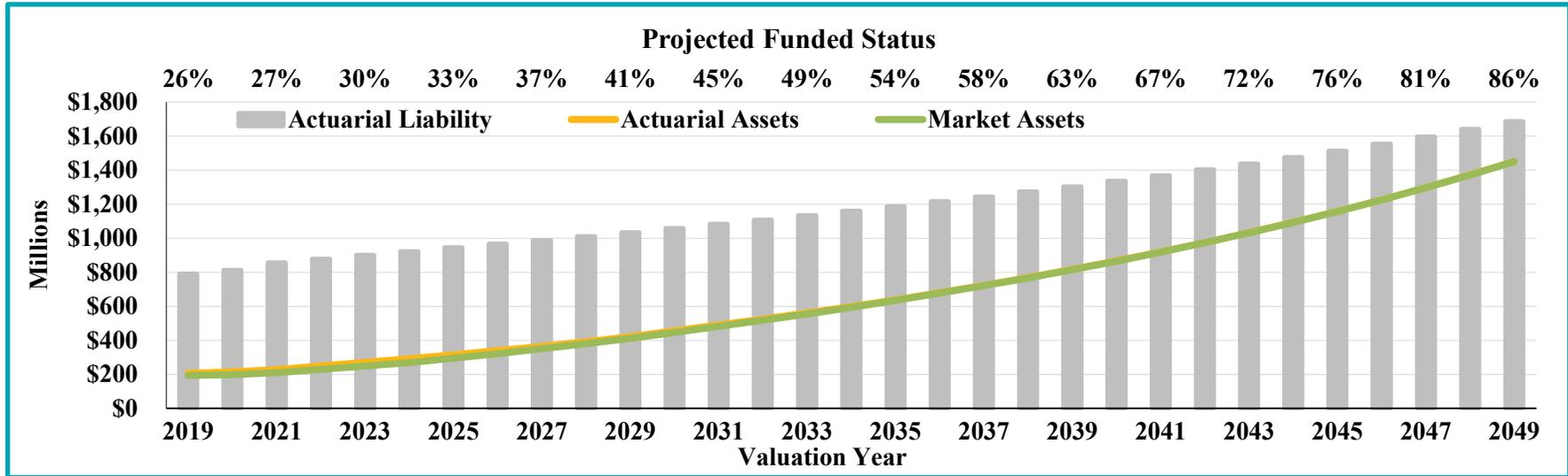
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

Five-Year Moderate Positive Scenario: 10.7% return FYE 2020-2024, 7.0% after
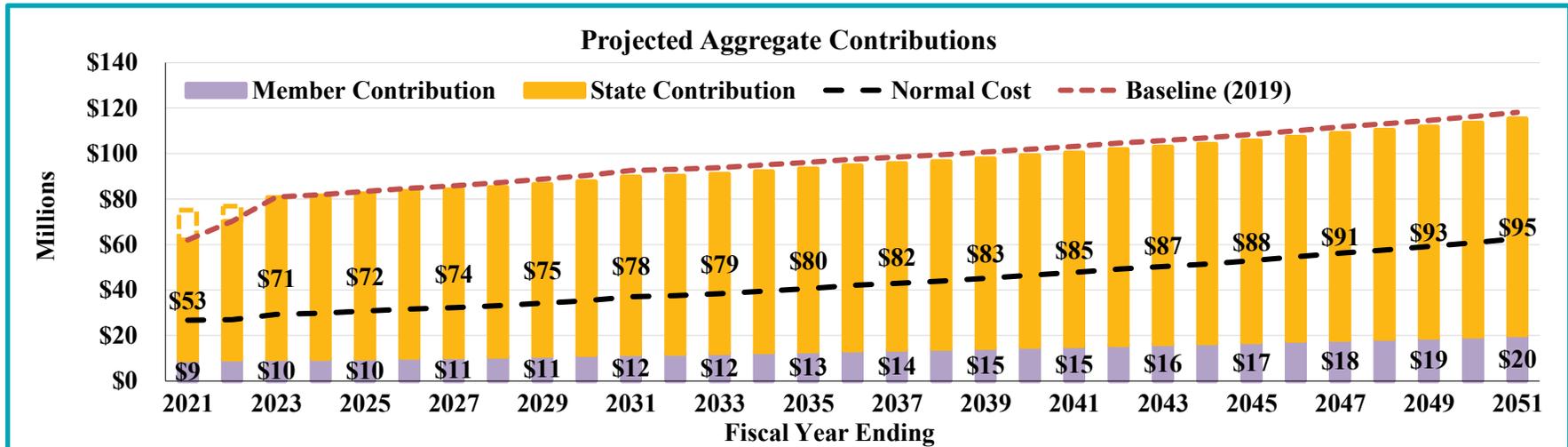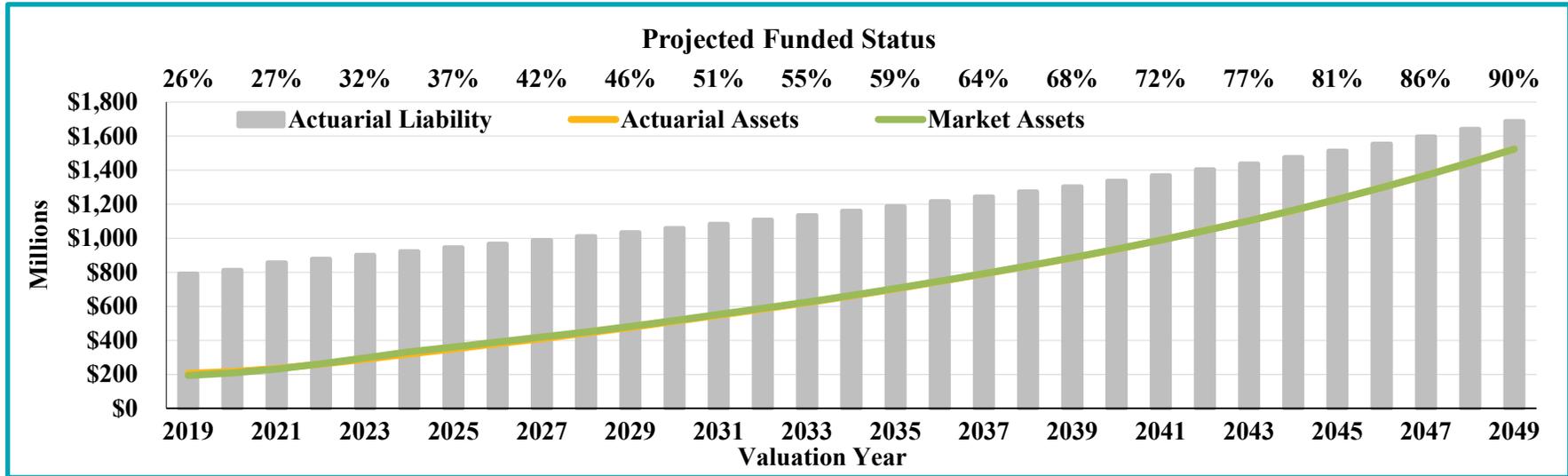
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

<u>Five-Year Significant Negative Scenario: -1.3% return FYE 2020-2024, 7.0% after</u>
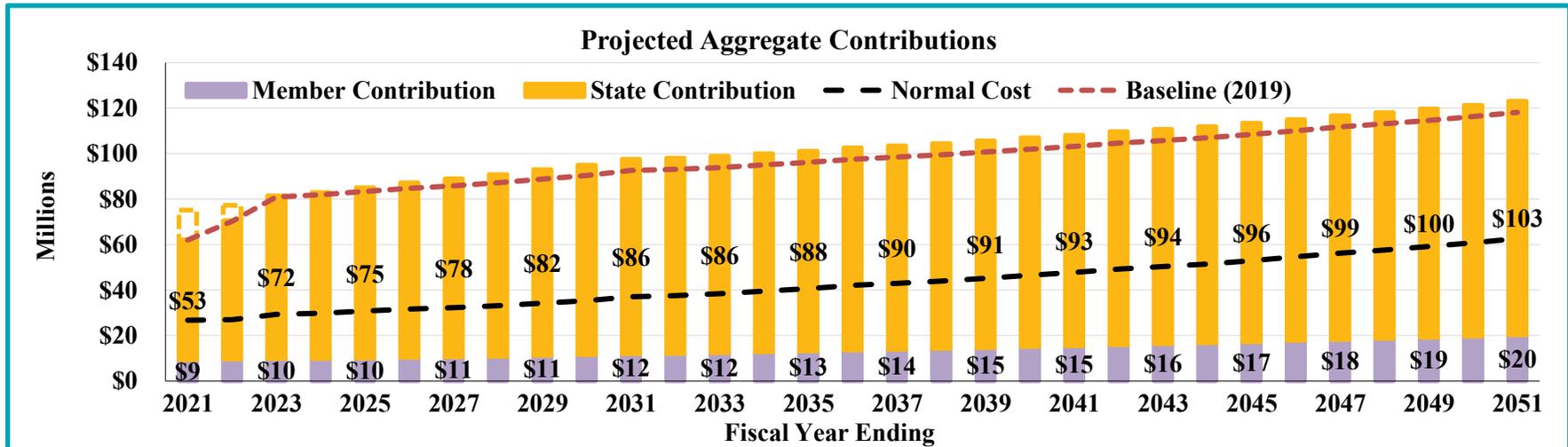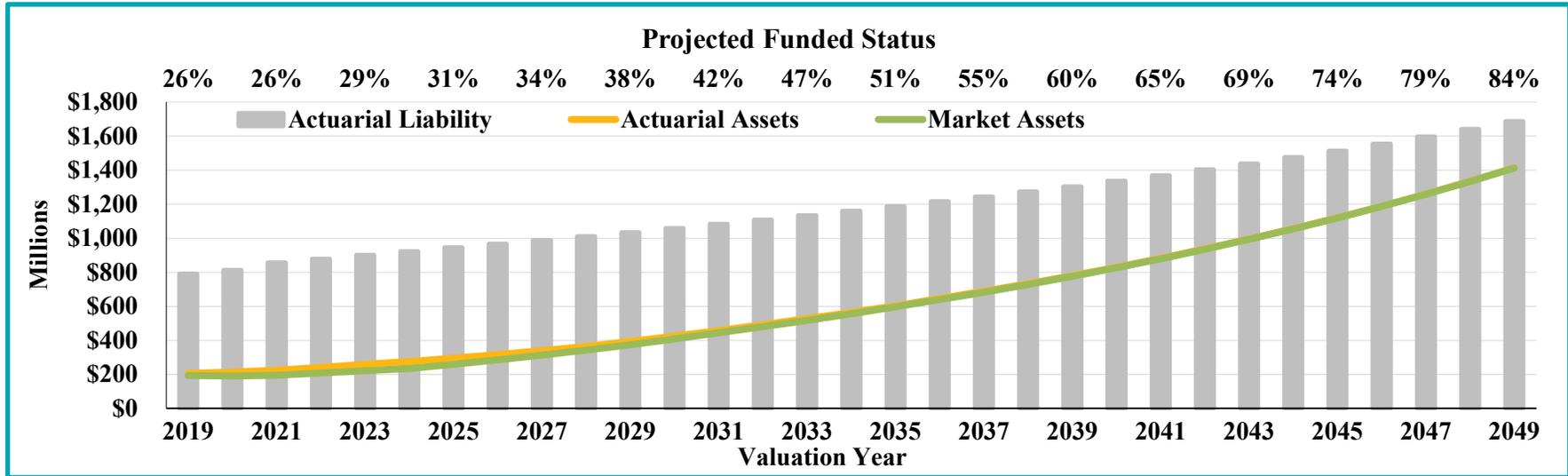
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

Five-Year Significant Positive Scenario: 16.1% return FYE 2020-2024, 7.0% after
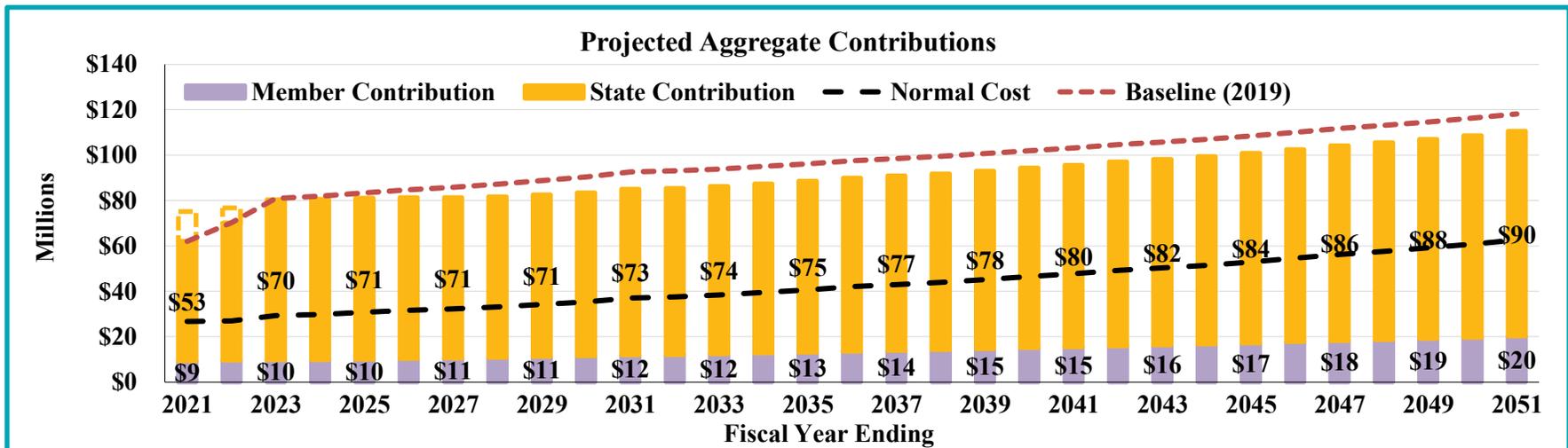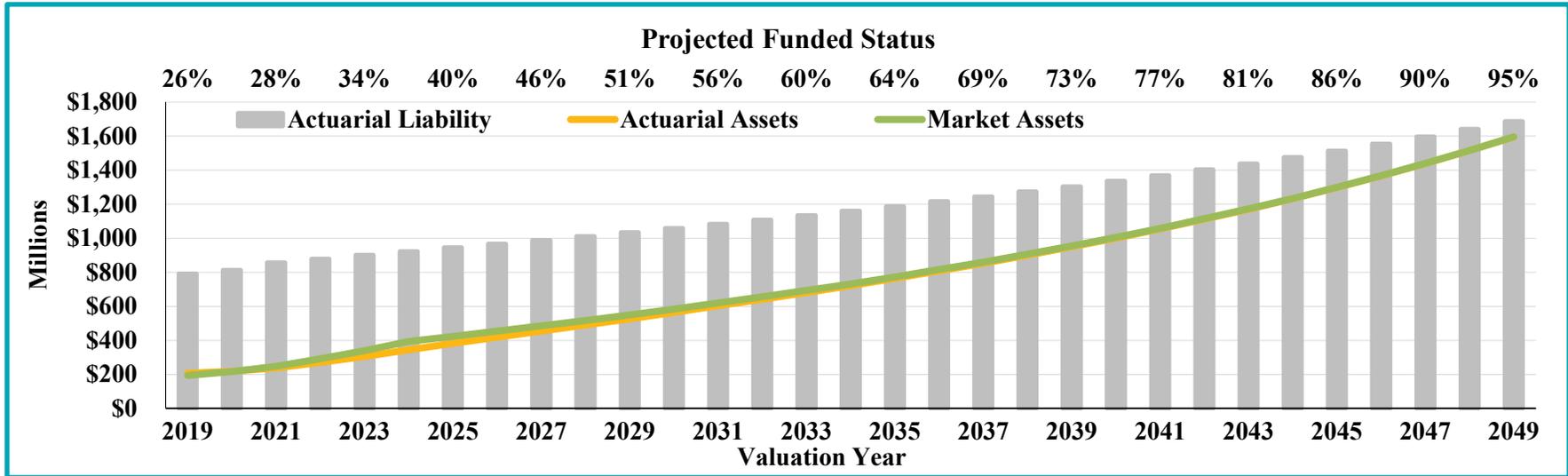
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

These scenarios show that actual future investment returns have an impact on future State contribution amounts. The System is less sensitive to investment returns deviating from the assumption when compared to other Systems, because of the low funded status at the beginning of the projection period. The System is not well funded and, as a result, has less to gain or lose from positive or negative investment experience.

In each of the scenarios, the State contribution amounts gradually increase through FYE 2023 as the State is assumed to appropriate an increasing percentage of the Statutory amount and the valuation investment rate of return assumption decreases from 7.30% to 7.00%. The following table summarizes the impact on the State contributions in FYE 2033 for each of the investment return scenarios.

	1-Yr Shock		**5-Yr Moderate**		**5-Yr Significant**	
	Neg	**Pos**	**Neg**	**Pos**	**Neg**	**Pos**
Amount	$3	($3)	$3	($2)	$5	($7)
Percent	4%	-4%	4%	-2%	6%	-9%

Table II-2
Impact on Contributions for FYE 2033
(dollar amounts in millions)

The investment returns used in the projections above were selected solely to illustrate the impact of investment volatility on the pattern of future funded status and contribution amounts. They are not intended to be predictive of actual future contributions or funded status or even to represent a realistic pattern of investment returns.

Assumption Change Risk – Sensitivity Testing

As shown in Table II-1, assumption changes over the last decade have increased the UAL by approximately $61.5 million. The most significant changes were reductions in the discount rate, decreases in mortality rates and projections of mortality improvement. The reductions in discount rates have been largely driven by declines in interest rates that affect expectations of future investment returns. If there are further declines in interest rates or if there is a desire or need to reduce investment risk that reduces expected returns, the discount rate and expected returns may need to be reduced further. The graph on the following page shows the impact on projected future funded status and contribution amounts if the discount rate and expected returns were reduced by 100 basis points to 6.00% beginning with the July 1, 2020 valuation.

This scenario results in Statutory contribution amounts that are approximately 9% higher than the baseline in FYE 2033.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

<u>6.00% Discount Rate and Investment Return Assumption Effective July 1, 2020</u>

Projected Funded Status

| 26% | 25% | 30% | 34% | 38% | 43% | 48% | 52% | 57% | 62% | 66% | 71% | 75% | 80% | 85% | 89% |

Projected Aggregate Contributions
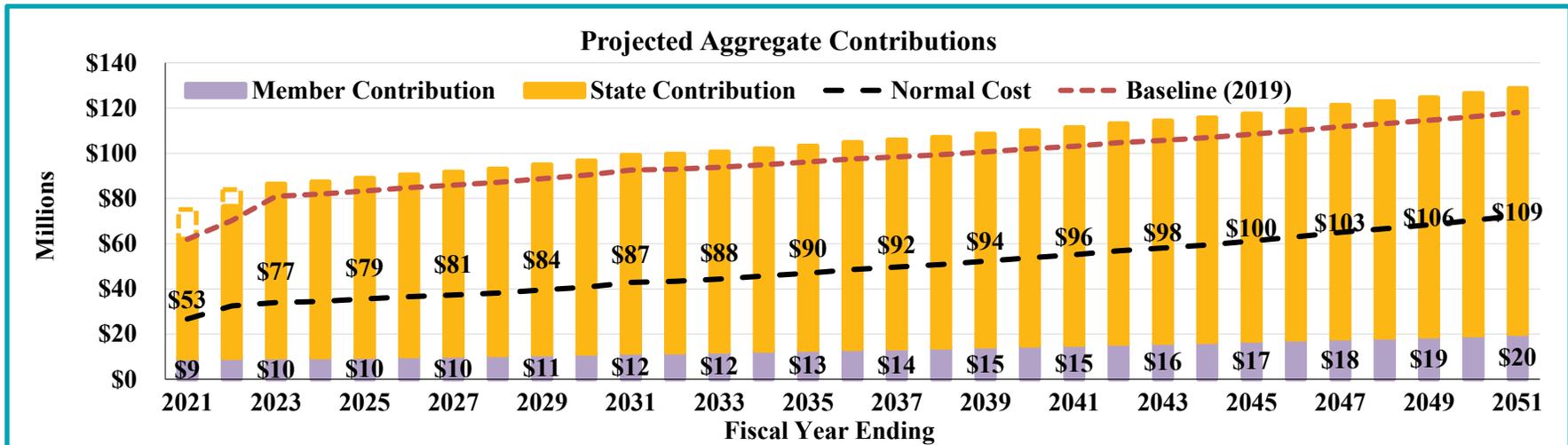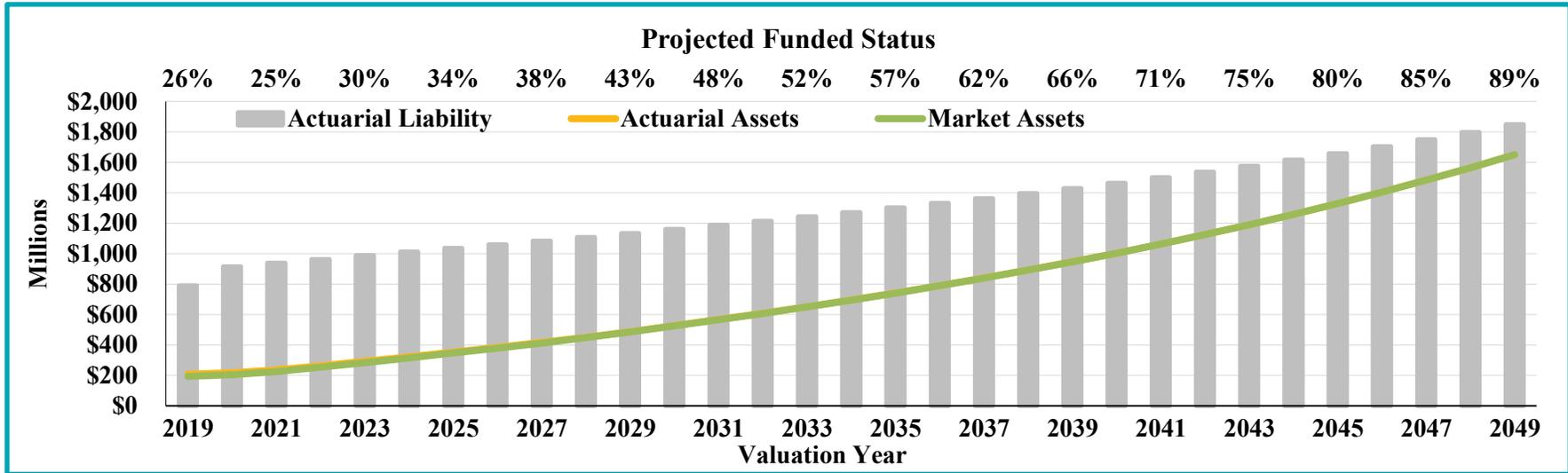
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

Contribution Risk – Sensitivity Testing

The amortization method used to determine the Statutory contributions is designed to collect more than the tread water level and, therefore, gradually pay down the UAL. However, appropriated contributions have consistently been less than the Statutory contributions and the tread water level, causing an increase in the UAL of approximately $252.4 million over the last 10 years. The baseline projections assume the State appropriates 80% of the Statutory contribution in FYE 2021, and increases the percent by 10% a year, until reaching 100% of the Statutory contribution beginning with FYE 2023, at which time contributions are projected to be greater than the tread water level.

Contribution risk is the potential for actual future contributions to deviate from expected future contributions. The graphs on the following page illustrate the impact on projected future funded status and contribution amounts if the State appropriation remains at 70% of the Statutory contribution for each year in the future, rather than gradually increasing to 100% of the Statutory contribution. We show the contribution risk sensitivity assuming the appropriation percent remains at the current level of 70%.

This scenario shows both the Statutory and appropriated State contributions gradually increasing over time. The Statutory contributions quickly exceed the baseline. The appropriated contributions are below the baseline initially but eventually grow to reach the same level, with a much lower funded ratio. The funded ratio at the end of the projection period is 32% compared to 88% under the baseline projections.

SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

State Appropriates 70% of Statutory Contribution for Fiscal Year Ending June 30, 2021 and Thereafter
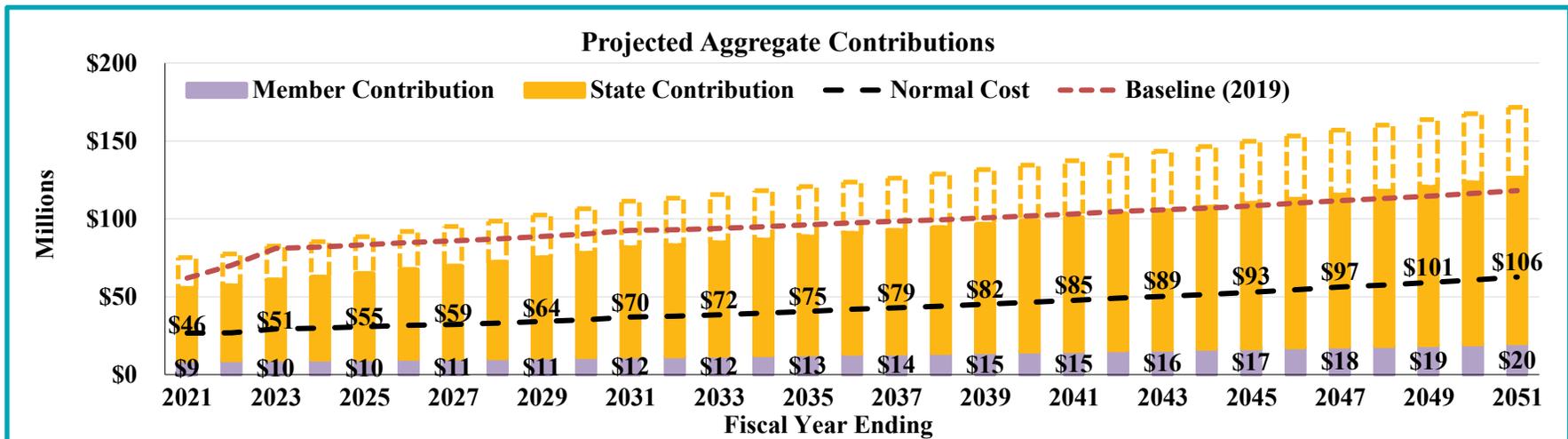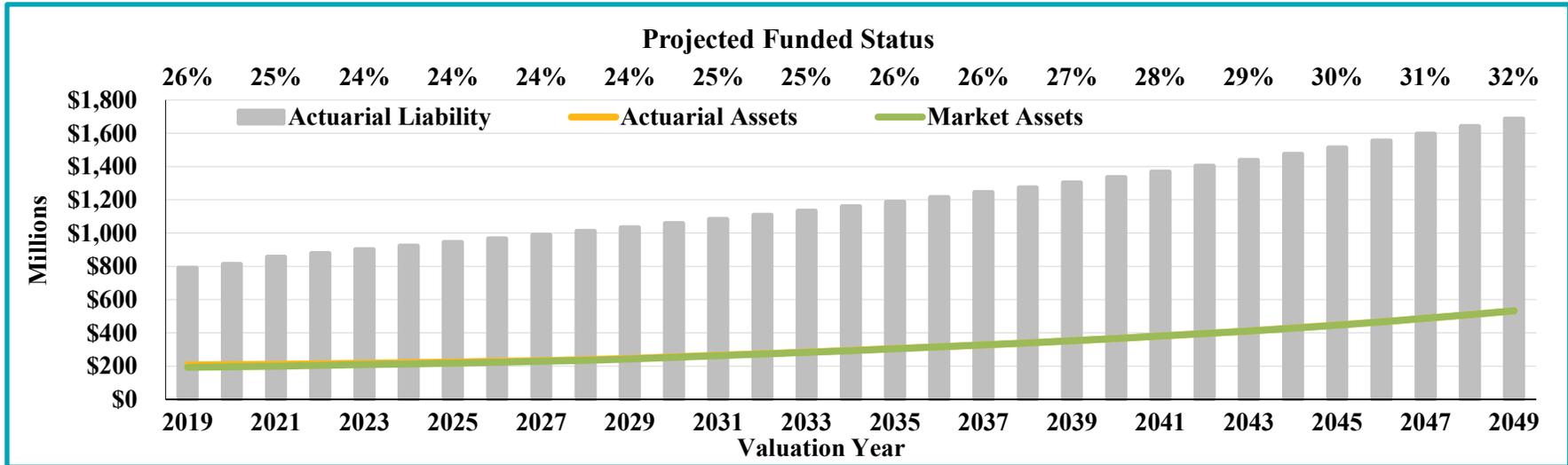
SECTION II – ASSESSMENT AND DISCLOSURE OF RISK

More Detailed Assessment

While a more detailed assessment is always valuable to enhance the understanding of the risks identified above, we believe the scenarios illustrated above cover the primary risks facing the System at this time. We would be happy to provide the State House Commission with a more in-depth analysis at their request.

SECTION III – ASSETS

The System uses and discloses two different asset measurements for funding, which are presented in this section of the report: market value and actuarial value of assets. The market value represents the value of the assets if they were liquidated on the valuation date. The actuarial value of assets is a value that smooths annual investment returns to reduce annual investment volatility and is used in determining contribution levels. In compliance with New Jersey Statute, the method used to calculate the actuarial value of assets recognizes 20% of the difference between the market value of assets and the expected actuarial value of assets each year.

Actuarial Standards of Practice (ASOP) No. 44 states that the asset valuation method should produce an actuarial value of assets that falls within a reasonable range of market value, recognizes the difference between the market value and actuarial value of assets within a reasonably short period of time, and is likely to produce actuarial value of assets that are sometimes greater than and sometimes less than the corresponding market values. The asset method required under N. J. Statute does not meet the requirements of ASOP No. 44 because this method has produced actuarial value of assets which have consistently been greater than the market value of assets and recognizes investment losses slowly over time. Additionally, the method may produce an actuarial value of assets that falls outside of a reasonable range of the market value.

On the following pages, we present detailed information on the System's assets:

- Disclosure of assets for the current and prior year,
- Statement of cash flows during the year,
- Development of the actuarial value of assets, and
- Disclosure of investment performance for the year.

Disclosure

The market value of assets represents a "snap-shot" value as of the last day of the fiscal year that provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the value of the investments. Because these fluctuations would cause volatility in employer contributions, an actuarial value of assets is developed. Table III-1 on the following page presents the market value as of June 30, 2018 and June 30, 2019. Table III-2 presents the System's net cash flows from June 30, 2018 to June 30, 2019. Table III-3 presents the development of the Actuarial Value of Assets as of July 1, 2019.

SECTION III – ASSETS

Table III-1 Statement of Assets at Market Value				
		June 30, 2019		**June 30, 2018**
Assets				
Cash	$	720,054	$	4,975,574
Securities Lending Collateral		1,962,719		1,759,881
Investment Holdings		160,123,955		165,859,752
Interest Receivable on Investment		998		756
Employer Contributions Receivable				
NGCI		30,475		0
Members Contributions Receivable		826,413		437,098
Loans Receivable		338,374		400,378
Accounts Receivable		886,293		834,838
Total Assets	$	164,889,281	$	174,268,277
Liabilities				
Pension Payroll Payable	$	(3,833,483)	$	(3,610,825)
Pension Adjustment Payroll Payable		(247,134)		(261,767)
Death Benefits Payable		(30,475)		0
Withholdings Payable		(882,086)		(895,425)
Securities Lending Collateral				
and Rebates Payable		(1,960,346)		(1,759,831)
Accounts Payable - Other		(71,564)		(16,081)
Total Liabilities	$	(7,025,088)	$	(6,543,929)
Preliminary Market Value of Assets	$	**157,864,193**	$	**167,724,348**
Discounted State Appropriations Receivable		35,058,026		27,743,943
Market Value of Assets	$	**192,922,219**	$	**195,468,291**

SECTION III – ASSETS

System Cash Flows as of June 30, 2019

Table III-2 Changes in Market Values for FYE June 30, 2019		
Additions		
Pension Contributions		
Members' Contributions	$	9,688,270
Transfers from Other Systems		245,911
Accumulated Interest		
Transfer from Other Systems		341,885
Employers' Contributions		
State Appropriations		29,000,000
Non-Contributory Group Insurance		702,700
Transfer from Other Systems		722,322
Administrative Fees - Loans		285
Income		
Per Statement		9,230,701
Total Additions	$	49,932,074
Deductions		
Benefits Provided by Members		
Withdrawal of Members' Contributions - Regular	$	41,727
Withdrawal of Members' Interest - Regular		0
Benefits Provided by Employers and Members		
Retirement Allowances		55,841,702
Benefits Provided by Employers		
Benefit Expense - Pension Adjustment		3,005,477
Administrative Expense		200,278
Administraive Expense - Loans		345
Miscellaneous Expense		0
NCGI Premium Expense		702,700
Total Deductions	$	59,792,229
Net Increase/(Decrease)	$	**(9,860,155)**
Preliminary Market Value of Assets Beginning of Year	$	167,724,348
Preliminary Market Value of Assets End of Year	$	**157,864,193**
Discounted State Appropriations Receivable		35,058,026
Market Value of Assets	$	**192,922,219**
Approximate Return		**5.96%**

SECTION III – ASSETS

Actuarial Value of Assets

To determine on-going funding requirements, most pension systems utilize an actuarial value of assets that differs from the market value of assets. The actuarial value of assets represents an asset value based on averaging or smoothing year-to-year market value returns for purposes of reducing contribution volatility. Each year, 20% of the difference between the market value of assets and the expected actuarial value of assets is added to the expected actuarial value of assets.

Table III-3 Development of Actuarial Value of Assets for July 1, 2019		
1. Preliminary Actuarial Value of Assets as of 7/1/2018[1]	$	182,237,328
2. Net Cash Flow excluding Investment Income	$	(19,090,856)
3. Expected Investment Income[2]	$	12,700,332
4. Expected Actuarial Value of Assets as of 7/1/2019: (1+2+3)	$	175,846,804
5. Preliminary Market Value as of 6/30/2019	$	157,864,193
6. 20% of Difference from MVA = (5-4) x 0.2	$	(3,596,522)
7. Preliminary Actuarial Value of Assets as of 7/1/2019: (4+6)	$	172,250,282
8. Discounted State Appropriations Receivable	$	35,058,026
9. Actuarial Value of Assets as of 7/1/2019: (7+8)	$	207,308,308
10. Rate of Return on Actuarial Value of Assets		5.38%
11. Ratio of Actuarial Value of Assets to Market Value of Assets		107.46%

[1] Excludes discounted State appropriations receivable
[2] Refer to Appendix B, Actuarial Methods, for details on the assumed timing of contributions

SECTION III – ASSETS

Investment Performance

The market value of assets rate of return was 5.96% for the year ending June 30, 2019. This is compared to an assumed return of 7.50% for the same period. On an actuarial value of assets basis, the return for FYE 2019 was 5.38%. Table III-4 shows the historical returns for the last ten years.

The prior actuary did not calculate a market value return prior to 2017.

Table III-4 Annual Rates of Return			
Year Ended June 30	Investment Return Assumption	Market Value	Actuarial Value
2010	8.25%		3.23%
2011	8.25%		4.97%
2012	7.95%		3.81%
2013	7.90%		4.61%
2014	7.90%		6.27%
2015	7.90%		5.66%
2016	7.90%		4.18%
2017	7.65%	11.95%	4.82%
2018	7.50%	9.17%	5.50%
2019	7.50%	5.96%	5.38%
10-Year Compound Average		**N/A**	**4.84%**
5-Year Compound Average		**N/A**	**5.11%**

SECTION IV – LIABILITIES

In this section, we present detailed information on the liabilities of the System, including:

- Disclosure of liabilities at July 1, 2018 and July 1, 2019, and
- The development of the actuarial gain and loss.

Disclosure

The Actuarial Liability is used for determining employer contributions. For JRS, the funding method employed is the Projected Unit Credit (PUC) Actuarial Cost Method. Under this funding method, the actuarial liability is calculated as the actuarial present value of the projected benefits allocated to periods prior to the valuation year.

This liability is determined for funding purposes and is not appropriate for measuring the cost of settling plan liabilities by purchasing annuities or paying lump sums.

SECTION IV – LIABILITIES

Table IV-1 shows the actuarial liability, unfunded actuarial liability and funded ratio as of July 1, 2019, and July 1, 2018 for the System.

Table IV-1 Actuarial Liability				
		July 1, 2019		**July 1, 2018**
Actuarial Liability				
Contributing Actives	$	231,929,444	$	193,164,375
Non-Contributing Actives		1,635,273	$	3,108,982
Deferred Vested		3,581,554		1,863,707
Retirees		477,511,494		406,790,395
Disabled		9,647,427		8,151,641
Beneficiaries		66,630,944		57,483,513
Total	**$**	**790,936,136**	**$**	**670,562,613**
Actuarial Value of Assets	$	207,308,308	$	209,981,271
Unfunded Actuarial Liability/(Surplus)	$	583,627,828	$	460,581,342
Funded Ratio		26.2%		31.3%

SECTION IV – LIABILITIES

Table IV-2 presents the change in the actuarial liabilities, actuarial assets, and unfunded actuarial liability during the plan year. In general, the unfunded actuarial liability (UAL) of any retirement system is expected to change at each subsequent valuation for a variety of reasons. In each valuation, we report on those elements of change in the UAL which are of particular significance, potentially affecting the long-term financial outlook of the System.

Table IV-2 Development of 2019 Experience (Gain)/Loss						
		Actuarial Liability		**Actuarial Value of Assets**		**Unfunded Actuarial Liability**
1. Value as of July 1, 2018	$	670,562,613	$	(209,981,271)	$	460,581,342
2. Additions						
a.) Normal Cost	$	21,046,935	$	0	$	21,046,935
b.) Statutory State Contributions		0		(52,327,505)		(52,327,505)
c.) Expected Member Contributions		0		(8,965,802)		(8,965,802)
d.) Total Additions	$	21,046,935	$	(61,293,307)	$	(40,246,372)
3. Decreases						
a.) Benefit Payments	$	(58,888,906)	$	58,888,906	$	0
b.) Expected Administrative Expenses		0		0		0
c.) Total Deductions	$	(58,888,906)	$	58,888,906	$	0
4. Net Transfers from Other Systems						
a.) State Contributions	$	722,322	$	(722,322)	$	0
b.) Member Contributions		587,796		(587,796)		0
c.) Total Net Transfers	$	1,310,118	$	(1,310,118)	$	0
5. Expected Interest	$	49,750,546	$	(13,958,565)	$	35,791,981
6. Expected Value as of July 1, 2019: [1+2+3+4+5]	$	683,781,306	$	(227,654,355)	$	456,126,951
7. Other Changes						
a.) Appropriation Adjustment	$	0	$	15,719,653	$	15,719,653
b.) Contribution Timing		0		1,571,228		1,571,228
c.) Actual Member Contributions		0		(749,071)		(749,071)
d.) Assumption Changes						
i.) Experience Study		81,677,132		0		81,677,132
ii.) Investment Rate of Return		13,937,146		0		13,937,146
e.) Change in Benefits		0		0		0
f.) Total Tother Changes	$	95,614,278	$	16,541,810	$	112,156,088
8. Expected Value after Changes: [6+7]	$	779,395,584	$	(211,112,545)	$	568,283,039
9. Actual Value as of July 1, 2019	$	790,936,136	$	(207,308,308)	$	583,627,828
10. Actuarial (Gain)/Loss: [9-8]	$	11,540,552	$	3,804,237	$	15,344,789

SECTION IV – LIABILITIES

Table IV-3 shows the components of the Actuarial (Gain)/Loss as of July 1, 2019 and July 1, 2018 for the System.

Table IV-3 Actuarial (Gain)/Loss Analysis				
Components		**July 1, 2019**		**July 1, 2018**
Actuarial Value of Assets				
Investment Return	$	3,596,522	$	3,628,245
Administrative Expenses		207,715		192,190
Total	$	3,804,237	$	3,820,435
Actuarial Liability				
Salary Increases	$	4,986,565	$	5,231,141
New Entrants		82,477		1,409,501
Demographic Experience and Census Data Updates				
Contributing Actives		(1,049,569)		645,101
Non-Contributing Actives		710,656		1,859,888
Inactives		8,168,782		5,078,737
Sub-Total	$	12,898,911	$	14,224,368
Impact of Net Transfers from Other Systems		(1,358,359)		(2,965,145)
Total	$	11,540,552	$	11,259,223
Actuarial (Gain)/Loss	**$**	**15,344,789**	**$**	**15,079,658**

SECTION V – CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funded status of the System. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

Under the current funding policy, the State funding requirement contains two components: the employer normal cost and an amortization of the unfunded actuarial liability (UAL). The funding methodology prescribed by NJ State Statute does not include a cost component for administrative expenses, and therefore administrative expenses are implicitly covered by the investment rate of return assumption. Because the investment rate of return assumption is recommended by the State Treasurer, we provide no opinion on the reasonableness of the assumption.

For JRS, the funding method employed is the Projected Unit Credit (PUC) Actuarial Cost Method. Under this funding method, the actuarial liability is calculated as the actuarial present value of the projected benefits allocated to periods prior to the valuation year. The unfunded actuarial liability is the actuarial liability on the valuation date less the actuarial value of assets.

In accordance with Chapter 78, P. L. 2011, the unfunded actuarial liability for the July 1, 2018 valuation was amortized over an open 30 year period as a level dollar amount. Beginning with the July 1, 2019 valuation, the unfunded actuarial liability is amortized over a closed 30 year period as a level dollar amount.

SECTION V – CONTRIBUTIONS

Table V-1 shows the development of the Statutory pension contribution for the current and prior year. Table V-2 summarizes the contributions as a percentage of payroll.

Table V-1 Development of Statutory Pension Contribution				
Valuation Date **Fiscal Year Ending**		**July 1, 2019** **2021**		**July 1, 2018** **2020**
1. Unfunded Actuarial Liability Contribution				
a. Actuarial Liability	$	790,936,136	$	670,562,613
b. Actuarial Value of Assets		207,308,308		209,981,271
c. Unfunded Actuarial Liability: (1a.-1b.)	$	583,627,828	$	460,581,342
d. Amortization Period (years)		30		30
e. Amortization of UAL payable at Valuation Date (Level Dollar)	$	45,160,984	$	36,277,201
f. UAL Contribution payable Beginning of Fiscal Year: (1e. with interest)	$	48,457,736	$	38,997,991
2. Normal Cost Contribution				
a. Gross Normal Cost	$	24,852,303	$	21,046,935
b. Expected Member Contributions		8,734,601		8,647,387
c. State Normal Cost: (2a.-2b.)	$	16,117,702	$	12,399,548
d. State Normal Cost payable Beginning of Fiscal Year: (2c. with interest)	$	17,294,294	$	13,329,514
3. Total Statutory Pension Contribution as of Beginning of Fiscal Year: (1f.+2d.)	$	65,752,030	$	52,327,505

Table V-2 Statutory Contributions as a Percent of Appropriation Payroll		
Valuation Date **Fiscal Year Ending**	**July 1, 2019** **2021**	**July 1, 2018** **2020**
Statutory Contribution		
State Normal Cost	22.57%	17.14%
UAL Amortization Payment	63.24%	50.15%
Total Statutory Pension Contribution	85.81%	67.29%

APPENDIX A – MEMBERSHIP DATA

The data for this valuation was provided by the New Jersey Division of Pensions and Benefits as of July 1, 2019. Cheiron did not audit any of the data. However, we did perform an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23. The following is a list of data charts contained in this section:

- A-1: Contributing Active Member Data
- A-2: Non-Contributing Active Member Data
- A-3: Inactive Member Data, Total Annual and Average Retirement Allowances by Status
- A-4: Reconciliation of Plan Membership
- A-5 and A-6: Contributing Active Member Data by Age and Service
- A-7 and A-8: Inactive Member Data by Age and Status

APPENDIX A – MEMBERSHIP DATA

Table A-1
Contributing Active Member Data

	July 1, 2019	July 1, 2018	% Change
Count	421	447	-5.8%
Average Age	58.6	58.3	0.5%
Average Judicial Service	8.7	8.2	6.9%
Average Appropriation Pay	$ 182,012	$ 173,968	4.6%
Total Appropriation Payroll	$ 76,627,036	$ 77,763,777	-1.5%

Table A-2
Non-Contributing Active Member Data

	July 1, 2019	July 1, 2018	% Change
Members Eligible for Annuity			
Count	3	5	-40.0%
Average Age	56.2	60.7	-7.4%
Average Judicial Service	9.8	10.2	-3.4%
Average Last Reported Pay	$ 175,244	$ 165,000	6.2%
Total Last Reported Pay	$ 525,731	$ 825,000	-36.3%
Members Only Eligible for Refund			
Count	2	1	100.0%
Last Reported Annuity Savings Fund	113,308	43,514	160.4%
Total			
Count	5	6	-16.7%

APPENDIX A – MEMBERSHIP DATA

Table A-3 Inactive Member Data by Status		July 1, 2019		July 1, 2018	% Change
Retirees					
Count		461		444	3.8%
Annual Retirement Allowances	$	49,229,153	$	47,161,286	4.4%
Average Retirement Allowance	$	106,788	$	106,219	0.5%
Beneficiaries					
Count		163		161	1.2%
Annual Retirement Allowances	$	9,114,936	$	8,953,548	1.8%
Average Retirement Allowance	$	55,920	$	55,612	0.6%
Disabled					
Count		9		9	0.0%
Annual Retirement Allowances	$	1,049,214	$	1,049,214	0.0%
Average Retirement Allowance	$	116,579	$	116,579	0.0%
In-Pay Total					
Count		**633**		**614**	**3.1%**
Annual Retirement Allowances	$	**59,393,303**	$	**57,164,048**	**3.9%**
Average Retirement Allowance	$	**93,828**	$	**93,101**	**0.8%**
Deferred Vested Members					
Count		6		4	50.0%
Annual Retirement Allowances	$	330,771	$	183,500	80.3%
Average Retirement Allowance	$	55,128	$	45,875	20.2%

QDRO benefits included with member records for valuation purposes.

APPENDIX A – MEMBERSHIP DATA

	Table A-4						
	Reconciliation of Plan Membership from July 1, 2018 to July 1, 2019						
	Contributing Actives	**Non-Contrib. Actives**	**Deferred Vested**	**Retired**	**Disabled**	**Beneficiaries**	**Total**
1. July 1, 2018	**447**	**6**	**4**	**444**	**9**	**161**	**1,071**
2. Additions							
a. New entrants	5						5
b. New dependents							0
c. Data correction						2	2
d. Total	5	0	0	0	0	2	7
3. Reductions							
a. Withdrawal							0
b. Died without beneficiary				(7)		(6)	(13)
c. Payments ceased							0
d. Total	0	0	0	(7)	0	(6)	(13)
4. Changes in Status							
a. Contributing Active							0
b. Non-Contributing Active	(3)	3					0
c. Deferred Vested		(2)	2				0
d. Retired	(28)	(2)		30			0
e. Disabled							0
f. Died with beneficiary				(6)		6	0
g. Total	(31)	(1)	2	24	0	6	0
5. July 1, 2019	**421**	**5**	**6**	**461**	**9**	**163**	**1,065**

QDRO benefits included with member records for valuation purposes.

APPENDIX A – MEMBERSHIP DATA

Table A-5
Counts by Age and Service of Contributing Active Members
As of July 1, 2019

Attained Age	Years of Judicial Service								Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & up	
Under 40	1	2	0	0	0	0	0	0	3
40 to 44	0	8	1	0	0	0	0	0	9
45 to 49	1	33	10	2	0	0	0	0	46
50 to 54	2	38	21	7	1	0	0	0	69
55 to 59	0	31	28	23	11	0	0	0	93
60 to 64	1	37	23	26	25	9	1	0	122
65 & up	0	9	24	16	11	10	8	1	79
Total	5	158	107	74	48	19	9	1	421

Table A-6
Average Appropriation Pay by Age and Service of Contributing Active Members
As of July 1, 2019

Attained Age	Years of Judicial Service								Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 & up	
Under 40	$ 181,000	$ 181,000	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 181,000
40 to 44	0	181,000	181,000	0	0	0	0	0	181,000
45 to 49	181,000	181,000	181,000	181,000	0	0	0	0	181,000
50 to 54	181,000	181,000	181,000	181,962	181,000	0	0	0	181,098
55 to 59	0	181,000	181,240	182,666	181,612	0	0	0	181,557
60 to 64	181,000	181,000	182,807	181,405	183,774	183,341	191,534	0	182,254
65 & up	0	183,276	181,000	182,500	186,347	188,286	185,792	181,000	183,715
Total	$ 181,000	$ 181,130	$ 181,451	$ 182,075	$ 183,810	$ 185,944	$ 186,430	$ 181,000	$ 182,012

APPENDIX A – MEMBERSHIP DATA

Table A-7 Counts by Age and Status of Inactive Members As of July 1, 2019				
Attained Age	**Status**			**Total**
	Retiree	Beneficiary	Disabled	
Under 45	0	6	0	6
45 to 49	0	1	0	1
50 to 54	0	2	0	2
55 to 59	1	0	0	1
60 to 64	10	1	2	13
65 to 69	62	10	2	74
70 to 74	149	22	3	174
75 to 79	102	27	1	130
80 to 84	70	35	0	105
85 & up	67	59	1	127
Total	461	163	9	633

Table A-8 Average Retirement Allowances by Age and Status of Inactive Members As of July 1, 2019				
Attained Age	**Status**			**Total**
	Retiree	Beneficiary	Disabled	
Under 45	$ 0	$ 12,118	$ 0	$ 12,118
45 to 49	0	129,112	0	129,112
50 to 54	0	31,251	0	31,251
55 to 59	54,676	0	0	54,676
60 to 64	102,528	41,250	107,265	98,543
65 to 69	112,559	67,980	128,286	106,960
70 to 74	107,984	62,716	123,750	102,532
75 to 79	110,947	77,081	111,746	103,920
80 to 84	101,876	55,198	0	86,317
85 & up	99,000	46,385	95,115	74,526
Total	$ 106,788	$ 55,920	$ 116,579	$ 93,828

QDRO benefits included with member records for valuation purposes.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

1. **Investment Rate of Return** — 7.30% per annum, compounded annually.

2. **Administrative Expenses** — No explicit assumption is made for administrative expenses for funding purposes per the funding methodology prescribed by NJ State Statute.

3. **Interest Crediting Rate on Accumulated Deductions** — 7.30% per annum, compounded annually. Interest credits are assumed to end upon termination.

4. **Cost-of-Living Adjustments (COLAs)** — No future COLA is assumed. Previously granted COLAs are included in the data.

5. **Salary Increases** — Salaries are assumed to increase 4.6% from FYE 2018 to FYE 2019, 4.4% from FYE 2019 to FYE 2020, 2.0% per year for the following five years (from FYE 2020 to FYE 2025), and 2.75% per year thereafter.

   Salary increases are assumed to occur on January 1.

6. **401(a)(17) Pay Limit** — $280,000 in 2019 increasing 2.75% per annum, compounded annually.

7. **Disability** — Representative disability rates are as follows:

Age	Rates
30	0.022%
35	0.026
40	0.033
45	0.064
50	0.114
55	0.197
60	0.326
65	0.473

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

8. Mortality

Healthy Retirees (Healthy Annuitants): The Pub-2010 Teachers Above-Median Income Healthy Retiree mortality table *[PubT-2010(A) Healthy Retiree]* as published by the Society of Actuaries, unadjusted, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2018.

Disabled Retirees (Disabled Annuitants): The Pub-2010 Non-Safety Disabled Retiree mortality table *[PubNS-2010 Disabled Retiree]* as published by the Society of Actuaries, unadjusted, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2018.

Pre-Retirement (Non-Annuitants)**:** The Pub-2010 Teachers Above-Median Income Employee mortality table *[PubT-2010(A) Employee]* as published by the Society of Actuaries, unadjusted, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2018.

9. Retirement

Retirement rates are as follows:

Age	Less than 15 Years of Judicial Service	15-19 Years of Judicial Service	20 or more Years of Judicial Service
<60	0.0%	0.0%	0.0%
60	2.0	5.0	20.0
61	2.0	5.0	20.0
62	2.0	5.0	20.0
63	2.0	5.0	20.0
64	2.0	5.0	20.0
65	5.0	40.0	30.0
66	2.0	50.0	20.0
67	2.0	60.0	20.0
68	2.0	60.0	20.0
69	2.0	60.0	20.0
70	100.0	100.0	100.0

10. Termination

None assumed.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

11. Family Composition Assumptions

For members not currently in receipt, 90% of members are assumed married to spouses of the opposite sex. Males are assumed to be three years older than females.

For purposes of the optional form of payment death benefit for members currently in receipt, beneficiary status is based on the beneficiary allowance reported. If no beneficiary date of birth is provided, the beneficiary is assumed to be the member's spouse of the opposite sex with males assumed to be three years older than females.

For purposes of the statutory death benefit for members currently in receipt, 100% of participants are assumed married to spouses of the opposite sex, with the exception of those members who elected Optional Forms A, B, C or D and are currently in receipt of their maximum retirement allowance. The spouse is assumed to be the reported beneficiary. If no beneficiary date of birth is provided, males are assumed to be three years older than females.

No additional dependent children or parents are assumed.

Current dependents under age 21 are assumed to receive a benefit until age 21. Current dependents over age 21 are assumed to receive a benefit for the remainder of their lifetime.

12. Form of Payment

Current actives are assumed to elect the Maximum Option.

13. Data

Information provided by the prior actuary was relied upon for the purposes of valuing certain deferred vested members.

For current beneficiaries with missing data, reasonable assumptions were made based on the information available in prior years.

Inactives receiving benefits according to the 2018 data but omitted from the 2019 data are assumed to have died without a beneficiary.

14. Rationale for Assumptions

The demographic and economic assumptions used in this report, except for the investment return assumption, reflect the results of the July 1, 2014 – June 30, 2018 Experience Study, which is pending approval by the State House Commission. The investment return assumption was recommended by the State Treasurer.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

15. Changes in Assumptions Since Last Valuation

The assumed rates of retirement, mortality, salary increase and inflation were updated based on the July 1, 2014 – June 30, 2018 Experience Study, which is pending approval by the State House Commission. For a detailed description of each of the assumptions before and after the changes reflected in this valuation, please reference the Experience Study.

The assumed rate of investment return was decreased from 7.50% to 7.30% per annum, compounded annually.

In connection with a new policy adopted by the DPB, interest credits are assumed to end upon termination, instead of continuing through retirement.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

B. Projection Assumptions

1.	**Investment Rate of Return**	• July 1, 2020 valuation: 7.30% per annum, compounded annually. • July 1, 2021 and later valuations: 7.00% per annum, compounded annually.
2.	**Appropriation Percentages**	The State is assumed to appropriate 80% of the Statutory contribution in FYE 2021, and to increase the percent by 10% a year, until reaching 100% of the Statutory contribution beginning with FYE 2023.
3.	**Administrative Expenses**	0.34% of expected pension benefit payments for the year.
4.	**New Entrants**	• Contributing active population assumed to remain at 2019 levels. • Assumed to join mid-year. • Age/sex distributions based on the last three years of new hires. • Salary based on salary for most recent hires reported on 2019 data. • New entrant salary assumed to increase at the same rate used for current members.
5.	**Demographic Assumptions**	Same as those used for valuation purposes.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

C. Actuarial Methods

The actuarial methods used for determining State contributions are described as follows.

1. Actuarial Cost Method

The actuarial cost method for funding calculations is the Projected Unit Credit Cost Method.

The actuarial liability is calculated as the actuarial present value of the projected benefits linearly allocated to periods prior to the valuation year based on judicial service. Refunds are valued as the reported Accumulated Deductions as provided by the DPB. The unfunded actuarial liability is the actuarial liability on the valuation date less the actuarial value of assets.

In accordance with Chapter 78, P.L. 2011:

- Beginning with the July 1, 2010 actuarial valuation, the accrued liability contribution shall be computed so that if the contribution is paid annually in level dollars, it will amortize the unfunded accrued liability over an open 30 year period.

- Beginning with the July 1, 2019 actuarial valuation, the accrued liability contribution shall be computed so that if the contribution is paid annually in level dollars, it will amortize the unfunded accrued liability over a closed 30 year period (i.e., for each subsequent actuarial valuation the amortization period shall decrease by one year).

- Beginning with the July 1, 2029 actuarial valuation, when the remaining amortization period reaches 20 years, any increase or decrease in the unfunded accrued liability as a result of actuarial losses or gains for subsequent valuation years shall serve to increase or decrease, respectively, the amortization period for the unfunded accrued liability, unless an increase in the amortization period will cause it to exceed 20 years. If an increase in the amortization period as a result of actuarial losses for a valuation year would exceed 20 years, the accrued liability contribution shall be computed for the valuation year using a 20 year amortization period.

To the extent that the amortization period remains an open period in future years and depending upon the specific circumstances, it should be noted that in the absence of emerging actuarial gains or contributions made in excess of the actuarially determined contribution, any existing unfunded accrued liability may not be fully amortized in the future.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

2. **Asset Valuation Method**

For the purposes of determining contribution rates, an actuarial value of assets is used that dampens the volatility in the market value of assets, resulting in a smoother pattern of contributions.

The actuarial value of assets is adjusted to reflect actual contributions, benefit payments and administrative expenses and an assumed return on the previous year's assets and the current year's cash flow at the prior year's actuarial valuation interest rate, with a further adjustment to reflect 20% of the difference between the resulting value and the actual market value of Plan assets.

3. **State Contribution Payable Dates**

Chapter 83, P.L. 2016 requires the State to make the required pension contributions on a quarterly basis in each fiscal year according to the following schedule: at least 25% by September 30, at least 50% by December 31, at least 75% by March 31, and at least 100% by June 30. As such, contributions are assumed to be made on a quarterly basis with the first contribution 15 months after the associated valuation date.

4. **Changes in Methods Since the Last Valuation**

None

APPENDIX C – SUMMARY OF PLAN PROVISIONS

This summary of Plan provisions provides an overview of the major provisions of the JRS used in the actuarial valuation. It is not intended to replace the more precise language of the NJ State Statutes, Title 43, Chapter 6A, and if there is any difference between the description of the plan herein and the actual language in the NJ State Statutes, the NJ State Statutes will govern. This valuation is prepared based on plan provisions in effect as of July 1, 2019 and does not reflect the impact of any changes in the benefits that may have been approved after the valuation date.

1. **Eligibility for Membership**

   Chief Justice and Associate Justices of the State Supreme Court, and judges of the Appellate Court, Superior Court and Tax Court of the State of New Jersey.

2. **Plan Year**

   The 12-month period beginning on July 1 and ending on June 30.

3. **Service Credit**

   A year is credited for each year of service as a public employee in the State of New Jersey. Any service, for which the member did not receive annual salary of at least $500, shall be excluded. Judicial service credit is based on biweekly pay periods for which member contributions are made to JRS.

4. **Final Salary**

   Annual salary received by the member at the time of retirement or other termination of service. (Effective June 30, 1996, Chapter 113, P.L. 1997 provided that the amount of compensation used for employer and member contributions and benefits under the program cannot exceed the compensation limitation of Section 401(a)(17) of the Internal Revenue Code.)

5. **Accumulated Deductions**

   The sum of all amounts deducted from the compensation of a member or contributed by him or on his behalf.

6. **Interest Credits on Accumulated Deductions**

   Members receive interest credits while contributing and for the first two years of inactivity. Prior to July 1, 2018, members received interest credits for the entire period of inactivity until retirement or death.

7. **Employee Contributions**

   Any member enrolled prior to January 1, 1996 contributes 3% of the difference between current salary and salary for the position on January 18, 1982. Members enrolled on or after January 1, 1996 contribute 3% of their full salary.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

Chapter 78, P.L. 2011 increased Member Contributions by 9% of salary phased in over a period of seven years beginning October 2011. (The additional 9% of salary was fully recognized in July 2017.)

a) **For Members enrolled prior to January 1, 1996:**

    (1) Member contributes 9% (phased in over a period of seven years beginning October 2011) of the salary for that position on January 18, 1982.

    (2) Member contributes 12% (9% of that phased in over a period of seven years beginning October 2011) of the difference between current salary and salary for that position on January 18, 1982.

b) **For members enrolled on or after January 1, 1996**, Member contributes 12% (9% of that phased in over a period of seven years beginning October 2011) of full salary.

8. **Retirement Allowance**

Benefit comprised of a member annuity plus an employer pension.

9. **Benefits**

a) **Service Retirements**
Mandatory retirement at age 70. Voluntary retirement prior to that age.

    (1) Age 70 and 10 years of judicial service; or

        Age 65 and 15 years of judicial service; or

        Age 60 and 20 years of judicial service.

        Benefit is an annual retirement allowance equal to 75% of final salary.

    (2) Age 65 while serving as a judge, 5 consecutive years of judicial service and 15 years in the aggregate of public service; or

        Age 60 while serving as a judge, 5 consecutive years of judicial service and 20 years in the aggregate of public service.

        Benefit is an annual retirement allowance equal to 50% of final salary.

    (3) Age 60 while serving as a judge, 5 consecutive years of judicial service and 15 years in the aggregate of public service.

        Benefit is an annual retirement allowance equal to 2% of final salary for each year of public service up to 25 years plus 1% of final salary for each year of public service in excess of 25 years.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

(4) Age 60 while serving as a judge.

Benefit is an annual retirement allowance equal to 2% of final salary for each year of judicial service up to 25 years plus 1% for each year of public service in excess of 25 years.

b) Early Retirement

Prior to age 60 while serving as a judge, 5 consecutive years of judicial service and 25 or more years in the aggregate of public service.

Benefit is an annual retirement allowance equal to 2% of final salary for each year of public service up to 25 years plus 1% of final salary for each year of public service in excess of 25 years, actuarially reduced for commencement prior to age 60.

c) Vested Termination

Termination of service prior to age 60, with 5 consecutive years of judicial service and 10 years in the aggregate of public service.

Benefit is a refund of accumulated deductions, or a deferred life annuity beginning at age 60 equal to 2% of final salary for each year of public service up to 25 years, plus 1% of final salary for each year of public service in excess of 25 years.

d) Non-Vested Termination

Termination of service prior to age 60, with less than 5 years of judicial service or less than 10 years in the aggregate of public service.

Benefit is a refund of accumulated deductions.

e) Disability Retirement

Physically or otherwise incapacitated for the full and efficient service to State in his judicial capacity and such incapacity is likely to be permanent.

Benefit is an annual retirement allowance of 75% of final salary.

f) Death Benefits

(1) <u>Before Retirement</u>: Death of an active member of the plan. Benefit is equal to:

   a) Lump sum payment equal to 1-1/2 times compensation, plus

   b) Spousal life annuity of 25% of final salary payable until spouse's remarriage plus 10% (15%) to one (two or more) dependent child(ren). If there is no surviving spouse, or upon death or remarriage, a total of 15% (20%, 30%) of final salary payable to one (two, three or more) dependent child(ren). If there is no surviving spouse or dependent child(ren), 20% (30%) of final salary to one (two) dependent parent(s). If there is no surviving spouse, dependent child(ren) or parent(s), the benefit is a refund of accumulated deductions with credited interest. This is also known as the statutory death benefit.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

(2) <u>After Retirement</u>: Death of a retired member of the plan. The benefit is equal to:

   a) Lump sum of 25% of final salary for a member retired under service or early retirement. For a member receiving a disability benefit, a lump sum of 150% of final salary if death occurred before the member attained age 60 and 25% of final salary if death occurred after age 60, plus

   b) Spousal life annuity of 25% of final salary adjusted for any previously granted Cost-of-Living Adjustments, or the salary of an active judge in the member's final position at retirement, if larger, payable until spouse's remarriage plus 10% (15%) to one (two or more) dependent child(ren). If there is no surviving spouse, or upon death or remarriage, a total of 15% (20%, 30%) of final salary payable to one (two, three or more) dependent child(ren). This is also known as the statutory death benefit.

10. Forms of Payment

In addition to the postretirement death benefits listed above, the member may elect the following forms of payment.

   a) Maximum Option: Single life annuity with a return of the balance of the member accumulated deductions with credited interest.
   b) Option 1: Single life annuity with a return of the balance of the initial reserve.
   c) Option 2: 100% joint and survivor annuity.
   d) Option 3: 50% joint and survivor annuity.
   e) Option 4: Other percentage joint and survivor annuity.
   f) Option A: 100% pop-up joint and survivor annuity.
   g) Option B: 75% pop-up joint and survivor annuity.
   h) Option C: 50% pop-up joint and survivor annuity.
   i) Option D: 25% pop-up joint and survivor annuity

11. Changes in Plan Provisions since Last Valuation

Effective July 1, 2018, the DPB adopted a new policy regarding the crediting of interest on member contributions for the purpose of refund of accumulated deductions. Previously, after termination of employment but prior to retirement or death, interest was credited on member accumulated deductions for the entire period. Effective July 1, 2018, interest is only credited for the first two years of inactivity prior to retirement or death. Thereafter, no additional interest is credited.

APPENDIX D – HISTORICAL DATA AND REQUIRED CAFR EXHIBITS

Table D-1
Historical Summary of Assets and Liabilities

Valuation Date July 1,	Market Value of Assets	Actuarial Value of Assets	Actuarial Liability	Funded Ratio Market Value	Funded Ratio Actuarial Value
2019	$ 192,922,219	$ 207,308,308	$ 790,936,136	24.4%	26.2%
2018	195,468,291	209,981,271	670,562,613	29.1%	31.3%
2017	197,567,630	216,952,852	646,507,109	30.6%	33.6%
2016	196,407,352	226,310,119	629,810,812	31.2%	35.9%
2015	225,712,843	243,864,022	602,364,200	37.5%	40.5%
2014	244,567,822	258,101,497	632,679,937	38.7%	40.8%
2013	244,280,889	276,966,331	620,376,292	39.4%	44.6%
2012	243,679,037	290,191,842	605,180,634	40.3%	48.0%
2011	270,183,306	310,724,782	585,700,787	46.1%	53.1%
2010	261,523,992	329,030,387	554,540,403	47.2%	59.3%

Table D-2
Historical Summary of Employer Contributions[1]

Fiscal Year Ending June 30,	Statutory/ Actuarially Determined Contribution	Actual Pension Contributions	Contribution Deficiency (Excess)	Percentage of Contribution Covered
2020[2]	$ 52,327,505	$ 36,629,254	$ 15,698,251	70.00%
2019	48,368,041	29,000,000	19,368,041	59.96%
2018	46,531,943	23,266,000	23,265,943	50.00%
2017	44,156,771	19,677,000	24,479,771	44.56%
2016	46,502,819	13,951,000	32,551,819	30.00%
2015	44,334,504	16,506,000	27,828,504	37.23%
2014	43,050,167	15,334,000	27,716,167	35.62%
2013	40,751,804	11,643,000	29,108,804	28.57%
2012	38,352,572	5,479,000	32,873,572	14.29%
2011	34,653,737	0	34,653,737	0.00%

[1]Excludes contributions for NCGI

[2]Reflects the State's planned contribution of 70% of the Statutory Contribution

The information above is based on the final actuarial valuation reports for the given years. The amounts do not reflect differences between the discounted State appropriations receivable and the actual State contribution amounts that became known after the issuance of the reports.

APPENDIX D – HISTORICAL DATA AND REQUIRED CAFR EXHIBITS

In accordance with the Government Finance Officers Association (GFOA) and their recommended checklist for Comprehensive Annual Financial Reports (CAFRs), we prepared the following schedules for the System. The GFOA checklist uses the term Actuarial Accrued Liability, which is the same as the Actuarial Liability used elsewhere in this report.

Table D-3
Schedule of Retirees and Beneficiaries Added to and Removed From Rolls

Valuation Date July 1,	Added to Rolls		Removed from Rolls		Rolls at End of Year		Average Annual Allowance[1]	% Increase in Average Annual Allowance[1]
	Number	Annual Allowance	Number[1]	Annual Allowance	Number[1]	Annual Allowance		
2019	38	$ 3,911,675	19	$ 1,734,194	633	$ 59,393,303	$ 93,828	0.78%
2018	31	2,668,375	28	1,958,556	614	57,164,048	93,101	2.69%
2017	37	3,058,274	19	1,670,094	623	56,481,444	90,660	-0.44%
2016	41	3,599,047	22	1,471,553	605	55,093,264	91,063	0.75%
2015	43	4,254,340	18	1,234,963	586	52,965,770	90,385	1.52%
2014	34	3,165,378	22	1,456,153	561	49,946,393	89,031	1.33%
2013	48	4,091,470	34	2,021,915	549	48,237,168	87,864	1.82%
2012	34	3,723,186	21	1,423,636	535	46,167,613	86,295	2.69%
2011	41	3,699,618	24	1,442,965	522	43,868,063	84,038	2.88%
2010	47	4,424,782	24	1,659,228	505	41,250,479	81,684	2.34%

[1]Beginning with the 2018 valuation, QDRO records excluded from headcounts and QDRO benefits included with member records. This change resulted in 12 fewer records on the rolls as of July 1, 2018.

Table D-4
Schedule of Active Member Valuation Data

Valuation Date July 1,	Number of Contributing Active Members[1]	Annual Compensation[1]	Annual Average Compensation[1]	% Increase in Average Annual Compensation[1]
2019	421	$ 76,627,036	$ 182,012	4.62%
2018	447	77,763,777	173,968	4.79%
2017	430	71,385,705	166,013	0.00%
2016	410	68,062,584	166,006	-0.05%
2015	404	67,097,166	166,082	-0.14%
2014	397	66,028,491	166,319	0.32%
2013	409	67,810,110	165,795	-0.03%
2012	407	67,497,660	165,842	-0.16%
2011	406	67,437,125	166,101	0.01%
2010	432	71,746,413	166,080	-0.07%

[1] Prior to July 1, 2018, includes non-contributing active members

JUDICIAL RETIREMENT SYSTEM OF NEW JERSEY
JULY 1, 2019 ACTUARIAL VALUATION

APPENDIX D – HISTORICAL DATA AND REQUIRED CAFR EXHIBITS

Table D-5
Schedule of Funding Progress

Valuation Date July 1,	Actuarial Value of Assets[1] (a)	Actuarial Accrued Liability (b)	(Surplus)/Unfunded Actuarial Accrued Liability (c) = (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (d)	(Surplus)/Unfunded Actuarial Accrued Liability as % of Covered Payroll (c) / (d)
2019	$ 207,308,308	$ 790,936,136	$ 583,627,828	26.21%	$ 76,627,036	761.65%
2018	209,981,271	670,562,613	460,581,342	31.31%	77,763,777	592.28%
2017	216,952,852	646,507,109	429,554,257	33.56%	71,385,705	601.74%
2016	226,310,119	629,810,812	403,500,693	35.93%	68,062,584	592.84%
2015	243,864,022	602,364,200	358,500,178	40.48%	67,097,166	534.30%
2014	258,101,497	632,679,937	374,578,440	40.79%	66,028,491	567.30%
2013	276,966,331	620,376,292	343,409,961	44.64%	67,810,110	506.43%
2012	290,191,842	605,180,634	314,988,792	47.95%	67,497,660	466.67%
2011	310,724,782	585,700,787	274,976,005	53.05%	67,437,125	407.75%
2010	329,030,387	554,540,403	225,510,016	59.33%	71,746,413	314.32%

[1]Includes receivable amounts

Table D-6
Schedule of Funded Liabilities by Type (Solvency Test)

Valuation Date July 1,	Contributing & Non-Active Member Contributions (1)	Retirees, Beneficiaries & Deferred Vesteds[1] (2)	Contributing & Non-Contributing Active Member Benefits Financed by Employer[1] (3)	Actuarial Value of Assets[2]	(1)	(2)	(3)
2019	$ 50,003,665	$ 557,371,419	$ 183,561,052	$ 207,308,308	100.00%	28.22%	0.00%
2018	44,573,503	474,289,256	151,699,854	209,981,271	100.00%	34.87%	0.00%
2017	37,093,233	471,714,228	137,699,648	216,952,852	100.00%	38.13%	0.00%
2016	31,564,870	460,298,517	137,947,425	226,310,119	100.00%	42.31%	0.00%
2015	26,322,768	430,541,499	145,499,933	243,864,022	100.00%	50.53%	0.00%
2014	23,058,086	444,577,573	165,044,278	258,101,497	100.00%	52.87%	0.00%
2013	20,588,967	435,970,958	163,816,367	276,966,331	100.00%	58.81%	0.00%
2012	19,799,227	417,423,315	167,958,092	290,191,842	100.00%	64.78%	0.00%
2011	18,353,365	394,760,527	172,586,895	310,724,782	100.00%	74.06%	0.00%
2010	17,967,938	354,390,110	182,182,355	329,030,387	100.00%	87.77%	0.00%

[1]Prior to July 1, 2018, actuarial accrued liability for deferred vesteds included under (3) instead of (2)
[2]Includes receivable amounts

CHEIRON

60

APPENDIX D – HISTORICAL DATA AND REQUIRED CAFR EXHIBITS

			Table D-7			
			Analysis of Financial Experience			
			Change in Unfunded Actuarial Liability			
Valuation Date July 1,	Actuarial Value of Assets Investment (Gain)/Loss	Actuarial Accrued Liability (Gain)/Loss	Assumption & Method Changes	Plan Changes	Contributions[1]	Change in Unfunded Actuarial Accrued Liability
2019	$ 3,596,522	$ 11,540,552	$ 95,614,278	$ 0	$ 12,295,134	$ 123,046,486
2018	3,628,245	11,259,223	240,890	0	15,898,727	31,027,085
2017	4,846,305	(4,615,530)	7,782,928	0	18,039,861	26,053,564
2016	7,475,692	6,312,912	7,095,990	0	24,115,921	45,000,515
2015	4,537,795	(2,080,753)	(46,435,820)	0	27,900,516	(16,078,262)
2014	3,383,419	(5,591,539)	550,325	0	32,826,274	31,168,479
2013	8,171,361	(2,041,123)	0	0	22,290,931	28,421,169
2012	11,628,201	(2,699,458)	4,492,499	0	26,591,545	40,012,787
2011	10,135,369	15,918,821	(7,845,712)	0	31,257,511	49,465,989
2010	16,876,599	(5,732,265)	0	(65,387,362)	41,232,315	(13,010,713)

[1]Change due to contributions (greater)/less than normal cost plus interest on the Unfunded Actuarial Accrued Liability.

APPENDIX E – GLOSSARY OF TERMS

1. **Actuarial Assumptions**

   Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disability, and retirement; changes in compensation; inflation; rates of investment earnings, and asset appreciation or depreciation; and other relevant items.

2. **Actuarial Cost Method**

   A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a Normal Cost and an Actuarial Liability.

3. **Actuarial Gain/(Loss)**

   A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

4. **Actuarial Liability**

   The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

5. **Actuarial Present Value (Present Value)**

   The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe $100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you won't be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is:

Amount		Probability of Payment		1/(1+Investment Return)		
$100	x	(1 - .01)	x	1/(1+.1)	=	$90

6. **Actuarial Valuation**

   The determination, as of a specified date, of the Normal Cost, Actuarial Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

APPENDIX E – GLOSSARY OF TERMS

7. **Actuarial Value of Assets**

   The value of cash, investments and other property belonging to a pension plan as used by the actuary for the purpose of an Actuarial Valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

8. **Actuarially Equivalent**

   Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

9. **Amortization Payment**

   The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

10. **Funded Ratio**

    The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

11. **Investment Return Assumption**

    The assumed interest rate used for projecting dollar related values in the future.

12. **Mortality Table**

    A set of percentages which estimate the probability of death at a particular point in time. Typically, the rates are annual and based on age and sex.

13. **Normal Cost**

    That portion of the Actuarial Present Value of pension plan benefits and expenses, which is allocated to a valuation year by the Actuarial Cost Method.

14. **Projected Benefits**

    Those pension plan benefit amounts which are expected to be paid in the future under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and increases in future compensation and service credits.

APPENDIX E – GLOSSARY OF TERMS

15. Projected Unit Credit Cost Method

A method under which the Actuarial Liability is calculated as the Actuarial Present Value of the Projected Benefits allocated to periods prior to the valuation year.

16. Unfunded Actuarial Liability

The excess of the Actuarial Liability over the Actuarial Value of Assets.