



**Cavanaugh Macdonald**  
CONSULTING, LLC

*The experience and dedication you deserve*

***MISSOURI STATE EMPLOYEES’  
RETIREMENT SYSTEM - JUDGES***

**ACTUARIAL VALUATION REPORT  
AS OF JUNE 30, 2022**

**CONTRIBUTION RATE FOR FISCAL YEAR ENDING  
JUNE 30, 2024**







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# Cavanaugh Macdonald

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September 13, 2022

Board of Trustees  
Missouri State Employees' Retirement System  
907 Wildewood Drive  
Jefferson City, MO 65102

Dear Members of the Board:

At your request, we performed an actuarial valuation of the Missouri State Employees' Retirement System (MOSERS) as of June 30, 2022 for the purpose of determining the employer required contribution rate for the fiscal year ending June 30, 2024. This report provides valuation results for the Missouri State Employees' Retirement System - Judges (Judges). The major findings of the valuation are contained in this report, which reflects the benefit provisions in place on June 30, 2022. There have been no changes to the plan provisions or actuarial assumptions since the prior valuation.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, member data and financial information. We found this information to be reasonably consistent and comparable with the information received in the prior year. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, rates of interest and other factors for Judges have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of each Plan and reasonable expectations); and which, in combination, offer the best estimate of anticipated experience affecting Judges. Nevertheless, the emerging costs will vary from those presented in this report to the extent actual experience differs from that projected by the actuarial assumptions. The MOSERS Board has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix C.

In order to prepare the results in this report, we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost



Board of Trustees  
September 13, 2022  
Page 2

or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

The actuarial computations presented in this report are for purposes of determining the funding amounts for Judges as set out in the Missouri state statutes. The calculations in the enclosed report have been made on a basis consistent with our understanding of MOSERS' funding policy. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes. For example, actuarial computations for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standards No. 67 and No. 68 will be presented in separate reports.

The consultants who worked on this assignment are pension actuaries with substantive experience valuing public retirement systems. Cavanaugh Macdonald's advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in the report or to provide explanations or further details as may be appropriate.

We respectfully submit the following report and look forward to discussing it with you.

Sincerely,

A handwritten signature in blue ink that reads 'Patrice Beckham'.

Patrice A. Beckham, FSA, EA, FCA, MAAA  
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Bryan K. Hoge'.

Bryan K. Hoge, FSA, EA, FCA, MAAA  
Consulting Actuary



## SECTION 1 – EXECUTIVE SUMMARY

This report presents the results of the June 30, 2022 actuarial valuation of the Missouri State Employees’ System – Judges (Judges). The primary purposes of performing the actuarial valuation are to:

- Determine the employer contribution rate, as defined in the Missouri state statutes and set out in the Board’s funding policy, for the fiscal year ending June 30, 2024;
- Disclose asset and liability measurements as well as the current funded status of Judges on the valuation date;
- Compare the actual and expected experience of Judges during the plan year ended June 30, 2022;
- Assess and disclose the key risks associated with funding the System; and
- Analyze and report on trends in Judges’ contributions, assets and liabilities over the past several years.

The actuarial valuation results provide a “snapshot” view of the System’s financial condition on June 30, 2022. A summary of the key results compared to the prior valuation is shown in the following table.

	June 30, 2022	June 30, 2021
Unfunded Actuarial Accrued Liability (\$M)	\$426.0	\$431.3
Funded Ratio (Actuarial Assets)	32.4%	31.1%
Normal Cost Rate	20.25%	20.57%
UAAL Amortization Rate	42.16%	42.02%
Total Actuarial Required Contribution Rate	62.41%	62.59%
Member Contribution Rate	(2.58%)	(2.42%)
Employer Contribution Rate	59.83%	60.17%

### Experience Impacting the June 30, 2022 Valuation

The key factors impacting the 2022 valuation results include:

- The net rate of return on the market value of assets for fiscal year 2022 was -9.0%, as reported by MOSERS. However, due to the use of an asset smoothing method, the rate of return on the actuarial value of assets was 5.6%, which was lower than the assumed return of 6.95%. As a result, there was an actuarial loss on assets of \$2.6 million which increased the unfunded actuarial accrued liability. The employer contribution rate increased by 0.29% as a result of the asset loss.
- There was a net liability gain of \$6.1 million for fiscal year 2022, i.e., the actuarial accrued liability was lower than expected. The main sources of gain were lower salary increases than expected for continuing active members and more retiree deaths than expected, based on the actuarial assumptions. The net liability gain decreased the UAAL and decreased the employer contribution rate by 0.66%.
- Because the benefit structure is different for judges hired after January 1, 2011, including an employee contribution rate of 4%, the ongoing cost of the System (normal cost) declines as a larger percentage of active members are covered by the 2011 benefit structure. The number of active members covered by the 2011 Plan increased from 252 in the 2021 valuation to 263 in the 2022 valuation, and the percentage of total active members in 2011 Plan increased from 60% to 63%.



## SECTION 1 – EXECUTIVE SUMMARY

The normal cost rate decreased by 0.32% and the effective member contribution rate increased by 0.16% which both served to reduce the employer contribution rate.

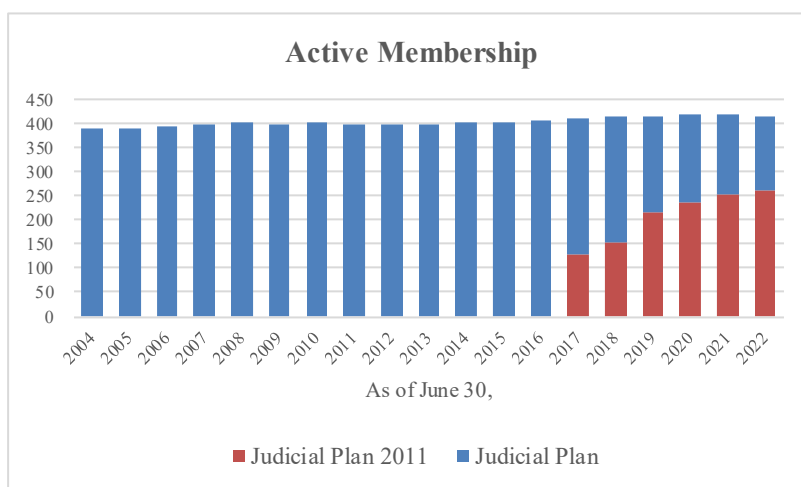
Further detail on the changes and actuarial experience affecting the valuation results can be found in the following sections of this Executive Summary.

### Actual Experience for the Last Plan Year

Numerous factors contributed to the change in the Judges assets, liabilities, and actuarial required contribution rate between June 30, 2021 and June 30, 2022. The components are examined in the following discussion.

### Membership

The number of active members in this valuation decreased slightly from the prior valuation, from 418 to 415. As shown in the following graph, the active population has remained relatively steady over the past 18 years, which is typical for a statewide retirement system covering judges.



Note: Split between MSEP and MSEP 2011 is not available prior to June 30, 2017.

The percentage of active members covered by the Judicial 2011 Plan has increased over time as actives covered by the Judicial Plan leave the bench and are replaced by new judges. The number of active members covered by the Judicial 2011 Plan increased from 252 in the 2021 valuation (about 60% of the total active population) to 263 (about 63% of total active population) in the 2022 valuation. Because the benefit structure is different for the Judicial 2011 members, including an employee contribution rate of 4.0%, the ongoing cost of the System (normal cost) declines as a larger percentage of active members is covered by the Judicial 2011 Plan. As a result of the increase in the number of active members covered by the 2011 Plan, the effective member contribution rate increased 0.16% and the normal cost rate decreased by 0.32%. The combined impact (total of 0.48% of covered payroll) was a significant factor in the decrease in the employer contribution rate.

Due to a spike in the number of retiree deaths this year (40 during FYE 2022 vs 18 during FYE 2021), the number of members receiving benefits decreased from 607 last year to 596 in the current valuation. In





## SECTION 1 – EXECUTIVE SUMMARY

addition, the average benefit amount for this group increased by 3.3%, which is consistent with expectations.

### *System Assets*

As of June 30, 2022, Judges System had net assets of \$190.4 million, when measured on a market value basis, a decrease of \$20.6 million from the prior year value of \$211.1 million. However, the market value of assets is not used directly in the calculation of the unfunded actuarial accrued liability and the employer actuarial contribution rate. An asset valuation method, which smoothes the effect of market fluctuations, is applied to determine the value of assets used in the valuation, called the actuarial value of assets. The current asset valuation method was first implemented in the June 30, 2018 actuarial valuation. Under this method, the difference between the dollar amount of the actual and assumed investment return on the market value of assets is recognized evenly over a closed five-year period. In addition, to transition from the prior to the new smoothing method, the total unrecognized investment experience as of June 30, 2017 (\$11.9 million) was established on a schedule to evenly recognize the amount over a closed seven-year period beginning June 30, 2018.

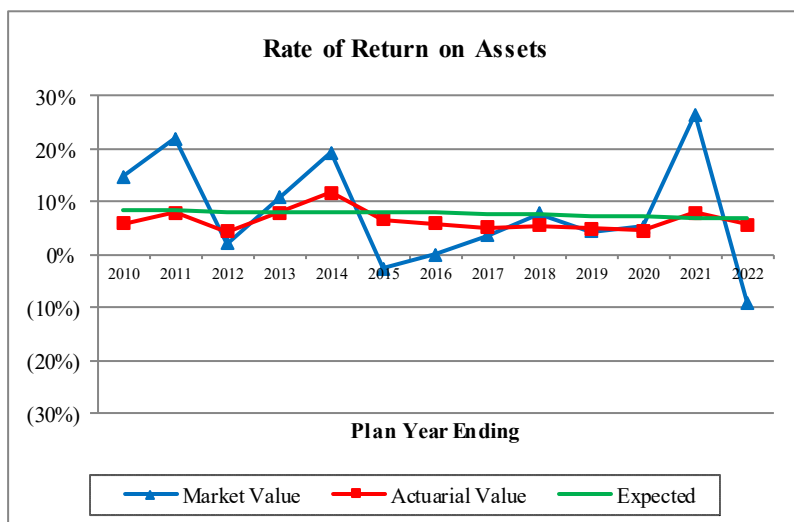
In the current valuation, the actuarial value of assets for Judges is \$204.0 million, an increase of \$9.0 million from the prior year. The components of change in the asset values are shown in the following table.

	Market Value (\$M)		Actuarial Value (\$M)	
<b>Net Assets, June 30, 2021</b>	\$	211.08	\$	194.99
- Employer and Member Contributions	+	40.78	+	40.78
- Benefit Payments	-	42.53	-	42.53
- Net Investment Income	-	18.80	+	10.84
- Administrative Expenses	-	0.08	-	0.08
<b>Net Assets, June 30, 2022</b>	\$	190.45	\$	204.00
Estimated Net Rate of Return		(9.0%)		5.6%

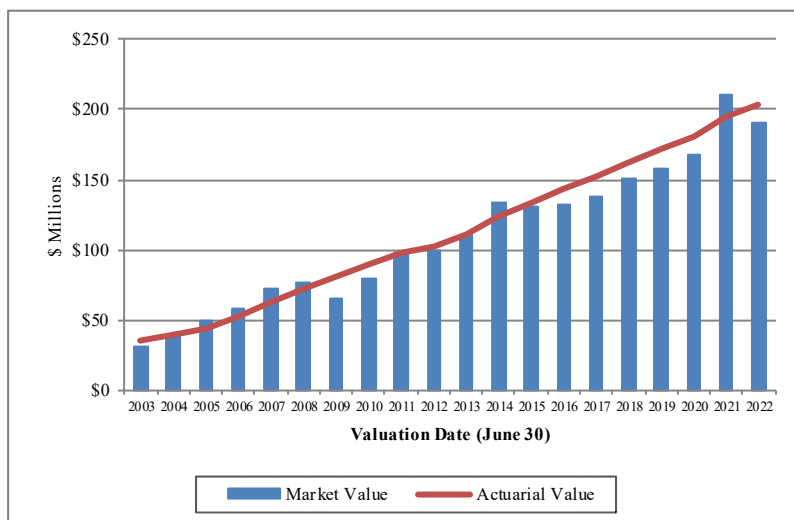
Due to the scheduled recognition of the current and prior investment experience in the asset smoothing method, the estimated rate of return on the actuarial value of assets for fiscal year 2022 was 5.6%, which is lower than the assumed investment return of 6.95% during that period. As a result, there was an actuarial loss on the smoothed value of assets of \$2.6 million. The investment return on the market value of assets for the year ending June 30, 2022 of -9.0%, as reported by MOSERS, was well below the assumed rate of return. As a result, it produced an investment income shortfall from expected return for the year ended June 30, 2022 of \$33.4 million. There is currently a net deferred investment loss of \$13.5 million (actuarial value of assets exceeds market value). Please see Section 3 of this report for more detailed information on the market and actuarial value of assets.



## SECTION 1 – EXECUTIVE SUMMARY



*The rate of return of the actuarial value of assets has been less volatile than the market value return, illustrating the benefit of using an asset smoothing method. However, during this period, the rate of return on actuarial assets has been at or below the assumed rate of return for most years, resulting in actuarial losses.*



*An asset smoothing method is used to mitigate the volatility in the market value of assets. By using a smoothing method, the actuarial (or smoothed) value can be, and actually should be, both above and below the pure market value.*

*Note the asset smoothing method changed with the 2018 valuation.*

### System Liabilities

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future normal costs. The difference between this liability and the actuarial value of assets as of the valuation date is called the unfunded actuarial accrued liability. The dollar amount of the UAAL is reduced if the contributions to the System exceed the normal cost for the year plus interest on the prior year's UAAL.

Note that until 1999, the Judges Plan was funded on a pay-as-you-go basis so no advance funding occurred. Since that time the funding of the Plan has steadily increased, but the funded ratio is still very low and the amount of the UAAL is significant for a plan of this size. As the State continues to fund the Judges Plan, the funded ratio is expected to increase and eventually reach 100% if all actuarial assumptions are met in future years.



## SECTION 1 – EXECUTIVE SUMMARY

The UAAL, using both the actuarial and market value of assets, is shown as of June 30, 2022 in the following table:

	Actuarial Value of Assets	Market Value of Assets
Actuarial Accrued Liability	\$630,043,013	\$630,043,013
Value of Assets	<u>203,997,065</u>	<u>190,449,086</u>
Unfunded Actuarial Accrued Liability	\$426,045,948	\$439,593,927
Funded Ratio	32.38%	30.23%

See Section 4 of the report for the detailed development of the UAAL.

The net change in the UAAL from June 30, 2021 to June 30, 2022 was a decrease of \$5.3 million. The components of this net change are shown in the following table:

	(\$ Millions)
<b>Unfunded Actuarial Accrued Liability, June 30, 2021</b>	\$431.3
- Expected increase from amortization method	0.7
- Investment experience	2.6
- Liability experience	(6.1)
- Data/Programming Refinement	(3.0)
- Other experience	<u>0.5</u>
<b>Unfunded Actuarial Accrued Liability, June 30, 2022</b>	\$426.0

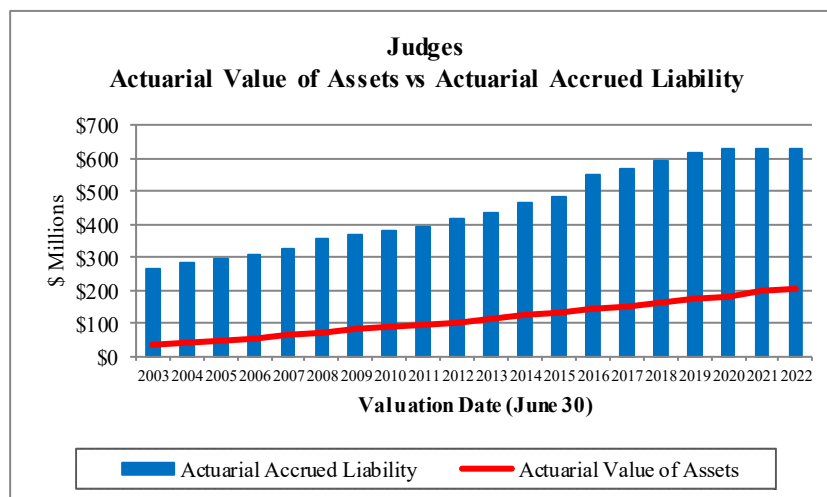
As shown above, various components impacted the dollar amount of the UAAL. The UAAL is amortized as a level-percent of payroll. This methodology results in dollar payment amounts that are lower in the early part of the amortization period but increase each year in the future with the assumed payroll growth assumption (currently 2.25%). Given the amortization period and the actuarial assumptions, the current amortization payment is less than the interest on the UAAL. As a result, even if all assumptions are met the dollar amount of the UAAL is expected to increase as evidenced in the first row in the table above.

Actuarial gains (losses), which result from actual experience that is more (less) favorable than anticipated based on the actuarial assumptions in place in the prior valuation, are reflected in the UAAL and are measured as the difference between the expected UAAL and the actual UAAL, taking into account any changes due to actuarial assumptions and methods, benefit provision changes or valuation programming changes. Overall, the Judges System experienced a net actuarial gain of \$3.4 million, the result of an actuarial gain of \$6.1 million on System liabilities and a \$2.6 million actuarial loss on actuarial assets. The most significant sources of liability gain were lower salary increases than expected and more retiree deaths than expected, based on actuarial assumptions.



**SECTION 1 – EXECUTIVE SUMMARY**

As the following graph of historical actuarial assets and actuarial accrued liabilities shows, due to the magnitude of the contributions to the Plan, the assets have been growing at a faster rate than the liabilities. As a result, the Plan’s funded ratio has steadily improved over time.



An evaluation of the UAAL on a pure dollar basis may not provide a complete analysis since only the difference between the assets and liabilities (which are both large numbers) is reflected. Another way to evaluate the UAAL and the progress made in its funding is to track the funded ratio, the ratio of the actuarial value of assets to the actuarial accrued liability. The funded status information, using both the actuarial value of assets and the market value of assets, is shown in the following table (in millions).

	6/30/2017	6/30/2018	6/30/2019	6/30/2020	6/30/2021	6/30/2022
Using Actuarial Value of Assets:						
- Funded Ratio	26.9%	27.3%	27.9%	28.9%	31.1%	32.4%
- UAAL (\$M)	\$413	\$432	\$445	\$444	\$431	\$426
Using Market Value of Assets:						
- Funded Ratio	24.4%	25.3%	25.6%	26.8%	33.7%	30.2%
- UAAL (\$M)	\$427	\$444	\$459	\$458	\$415	\$440

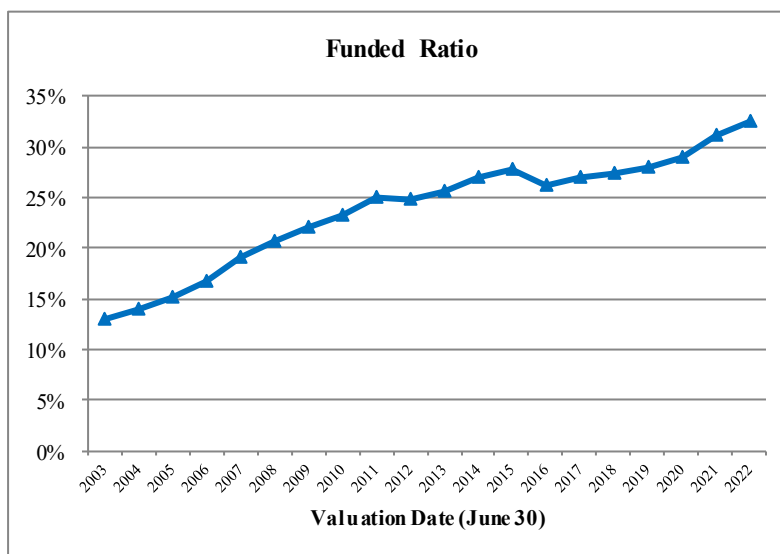
Note that the funded ratio does not indicate whether or not the System assets are sufficient to settle benefits earned to date. The funded ratio, by itself, also may not be indicative of future funding requirements. As shown in the table above, the funded ratios differ using the market value of assets.



## SECTION 1 – EXECUTIVE SUMMARY

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The funded ratio over a longer period is shown in the following graph:



Typically plans that have been in existence as long as the Judges System (over 40 years) have a funded ratio well above the current level of 32%. However, until 1999, this plan was funded on a pay-as-you-go basis. As a result, each year's contribution was equal to the benefit payments and administrative expenses for that year only, i.e., the funded ratio was 0%. As a result of a change in funding policy that required contributions to equal the normal cost plus an amortization payment on the UAAL, the funded ratio has steadily increased over time. Assuming future experience follows the current actuarial assumptions, continued contributions under the current funding policy will allow the funded ratio to increase, until the UAAL is fully amortized in 2049, and the funded ratio reaches 100%.

### *Actuarial Required Contribution Rate*

The Plan is funded by contributions from employers (actuarially determined) and employees hired after December 31, 2010 (4.00% of pay). Under the Entry Age Normal cost method, the actuarial contribution rate consists of two components:

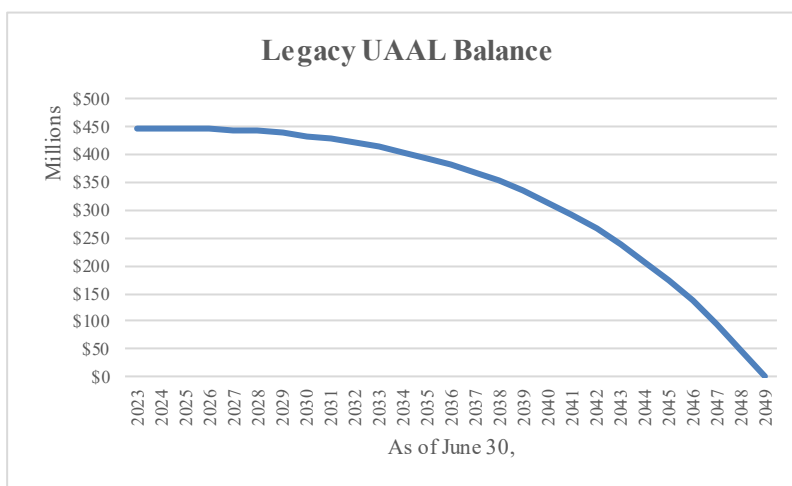
- A “normal cost” for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date, which includes a component for administrative expenses.
- An “unfunded actuarial accrued liability contribution” for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

Under the System's current funding policy, the UAAL contribution rate is determined by amortizing the UAAL using the layered amortization method. To implement this method, the projected UAAL developed in the June 30, 2018 valuation was amortized as a level-percent of payroll over a closed, 30-year period. Effective June 30, 2021, subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 25-year periods. Bases established prior to June 30, 2021 will continue to be amortized on their original schedule. Any change in the System's benefit structure shall be amortized over a closed period of 20 years, as specified in state statute. The total UAAL amortization payment is the sum of the payments for each of the amortization bases.



**SECTION 1 – EXECUTIVE SUMMARY**

The level-percent of payroll methodology for UAAL payments results in dollar payment amounts that are lower than the level-dollar payment method in the early portion of the amortization period but increase each year in the future with the assumed payroll growth assumption (currently 2.25%). Because the UAAL contribution rate is determined as a level-percent of payroll, the dollar amount of the UAAL contribution is scheduled to increase 2.25% each year in the future, even if all actuarial assumptions are met. If covered payroll increases, as assumed, the actuarial required contribution rate will remain stable. However, if actual payroll increases are lower than 2.25% assumption, the UAAL contribution rate will increase. Note that with this payment methodology the dollar amount of the legacy UAAL base is expected to hold steady for about six years before starting to decline as illustrated in the following graph:



See Section 5 of the report for the detailed development of the employer contribution rate, which is summarized in the following table:

Actuarial Required Contribution Rates	June 30 Valuation	
	2022	2021
1. Normal Cost Rate	20.25%	20.57%
2. UAAL Contribution Rate	42.16%	42.02%
3. Total Actuarial Required Contribution Rate	62.41%	62.59%
4. Member Contribution Rate	(2.58%)	(2.42%)
5. Employer Contribution Rate	59.83%	60.17%

The total actuarial required contribution rate in the June 30, 2022 valuation is 62.41%. The member contribution rate (as a percentage of total payroll) is anticipated to be 2.58%, resulting in an employer contribution rate for the fiscal year ending June 30, 2024 of 59.83%. This amount exceeds the minimum employer contribution of 58.45%, as required by the Funding Policy.

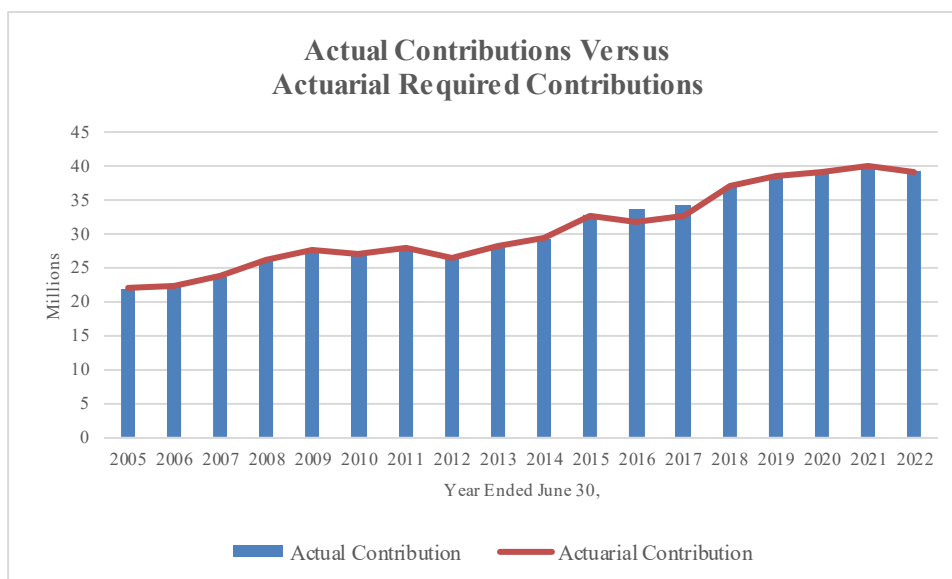


**SECTION 1 – EXECUTIVE SUMMARY**

The following table shows the reconciliation of the Computed Employer Contribution Rate from June 30, 2021 to June 30, 2022 valuation:

	<b>% of Payroll</b>
<b>6/30/2021 Employer Contribution Rate</b>	<b>60.17%</b>
Asset (Gain)/Loss	0.29%
Liability (Gain)/Loss	(0.66%)
Data/Programming Refinement	(0.33%)
Projected Payroll Lower than Expected	0.80%
Change in Normal Cost Rate	(0.32%)
Change in Effective Member Contribution Rate	(0.16%)
Other Experience	0.04%
<b>6/30/2022 Employer Contribution Rate</b>	<b>59.83%</b>

Since the system changed from a pay-as-you-go system, the state of Missouri has contributed the full actuarial required contribution as shown in the graph below which compares the computed employer contribution rates and actual contribution amounts:

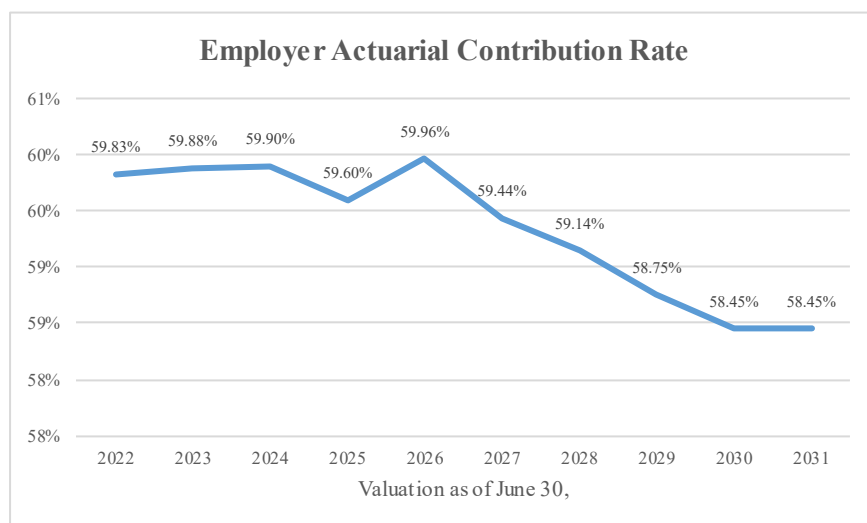


The computed employer contribution rate, which is determined based on the snapshot of the System taken on each valuation date, is anticipated to be relatively stable over the short-term as the deferred investment experience is recognized through the asset smoothing method and then decline. Future experience (both investment and demographic), which is not modeled here, will also have an impact on the ultimate level of contributions for the Judges System. The following graph of the projected employer contribution rate over the next ten years reflects the impact of the recognition of the deferred investment experience (\$13.5 million loss). Once the deferred investment experience is recognized, the actuarial required rate declines as the normal cost rate decreases and the effective employee contribution rate increases due to a higher percentage of active members covered by the 2011 Plan. As shown in the following graph, the minimum employer contribution rate of 58.45% is expected to impact the valuation results within the next ten years, assuming



## SECTION 1 – EXECUTIVE SUMMARY

all actuarial assumptions are met in the future. In compliance with the Board’s Funding Policy, the minimum contribution rate will be in effect until the System reaches an 80% funded ratio.



The net deferred investment loss (difference between the market value and actuarial value of assets) is \$13.5 million as of June 30, 2022. Absent favorable investment experience in future years, the deferred investment losses will eventually be reflected in the actuarial value of assets in future years. While the use of an asset smoothing method is a common procedure for public retirement systems, it is important to recognize the potential impact of the deferred investment experience. This is accomplished by comparing the key valuation results from the June 30, 2022 actuarial valuation using both the actuarial and market value of assets (see table below):

	Using Actuarial Value of Assets	Using Market Value of Assets
Actuarial Accrued Liability	\$630,043,013	\$630,043,013
Asset Value	<u>(203,997,065)</u>	<u>(190,449,086)</u>
Unfunded Actuarial Accrued Liability	\$426,045,948	\$439,593,927
Funded Ratio	32.4%	30.2%
Normal Cost Rate	20.25%	20.25%
UAAL Contribution Rate	<u>42.16%</u>	<u>43.62%</u>
Total Actuarial Required Contribution Rate	62.41%	63.87%
Member Contribution Rate	<u>(2.58%)</u>	<u>(2.58%)</u>
Employer Contribution Rate	59.83%	61.29%





## SECTION 1 – EXECUTIVE SUMMARY

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A typical retirement plan faces many different risks. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. Actuarial Standard of Practice Number 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions. Risk evaluation is an important part of managing a defined benefit plan. Please see Section 7 of this report for an in-depth discussion of the specific risks facing MOSERS.

The next page contains a comprehensive summary of valuation results for the current and prior year. Detailed exhibits deriving the results are in the following sections.

**SECTION 1 – EXECUTIVE SUMMARY****SUMMARY OF PRINCIPAL RESULTS**  
(\$ in millions)

<b>Valuation Date</b>	<b>June 30, 2022</b>	<b>June 30, 2021</b>	
<b>Contribution for Fiscal Year Ending</b>	<b>June 30, 2024</b>	<b>June 30, 2023</b>	<b>% Change</b>
<b>Employer Contribution</b>			
Annual Amount (Estimated)	\$39.9	\$39.9	0.0%
Percentage of Covered Payroll	59.83%	60.17%	(0.6%)
Projected Payroll for FYE 2024 and 2023	\$66.7	\$66.4	0.5%
<b>Benefit Payments During Prior Year</b>	\$42.5	\$41.6	2.2%
<b>Membership</b>			
Number of			
- Active Members	415	418	(0.7%)
- Retirees and Beneficiaries	596	607	(1.8%)
- Terminated Vested Members	27	27	0.0%
- Leave-of-Absence Members	0	0	0.0%
- Long Term Disability Members	0	0	0.0%
- Total	1,038	1,052	(1.3%)
- Reported Payroll	\$63.3	\$63.0	0.5%
<b>Assets</b>			
Market Value (MVA)	\$190.4	\$211.1	(9.8%)
Actuarial Value (AVA)	\$204.0	\$195.0	4.6%
Ratio - Actuarial Value to Market Value	107%	92%	
Return on Market Value*	(9.0%)	26.4%	
Return on Actuarial Value	5.6%	8.0%	
<b>Actuarial Information</b>			
Actuarial Accrued Liability (AAL)	\$630.0	\$626.3	0.6%
Unfunded Actuarial Accrued Liability (UAAL)	\$426.0	\$431.3	(1.2%)
Funded Ratio (Actuarial Value of Assets)	32.4%	31.1%	4.2%
Ratio of AVA to Reported Payroll	3.2	3.1	
Ratio of AAL to Reported Payroll	10.0	9.9	
Normal Cost Rate	20.25%	20.57%	(1.6%)
UAAL Contribution Rate	42.16%	42.02%	0.3%
Total Actuarial Required Contribution Rate	62.41%	62.59%	(0.3%)
Member Contribution Rate	(2.58%)	(2.42%)	6.6%
Employer Contribution Rate	59.83%	60.17%	(0.6%)

\* As reported by MOSERS.



## **SECTION 2 – SCOPE OF THE REPORT**

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This report presents the actuarial valuation results of the Missouri State Employees' Retirement System – Judges as of June 30, 2022. This valuation was prepared at the request of the MOSERS Board.

Please pay particular attention to our actuarial certification letter, where the guidelines employed in the preparation of this report are outlined. We also comment on the sources and reliability of both the data and the actuarial assumptions upon which our findings are based. Those comments are the basis for our certification that this report is complete and accurate to the best of our knowledge and belief.

A summary of the findings which result from this valuation is presented in the previous section. Section 3 describes the assets and investment experience of the System. Sections 4 and 5 describe how the obligations of the System are to be met under the System's funding policy. Section 6 contains projections of future valuation results, assuming all actuarial assumptions are met. Section 7 discloses key maturity measurements and discusses the key risks facing the funding of the System. Section 8 includes some historical funding information that was required by the Governmental Accounting Standards Board (GASB) in the past.



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### **SECTION 3 – SYSTEM ASSETS**

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In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2022. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System, which are generally in excess of assets. The actuarial process then leads to a method of determining the contributions needed by members and the employer in the future to balance the System assets and liabilities.

#### **Market Value of Assets**

The current market value represents the "snapshot" or "cash-out" value of System assets as of the valuation date. In addition, the market value of assets provides a basis for measuring investment performance from time to time. Table 1 shows a summary of changes to both the market and the actuarial value assets for the year beginning June 30, 2021 and ending June 30, 2022.

#### **Actuarial Value of Assets**

Neither the market value of assets, representing a "cash-out" value of System assets, nor the book values of assets, representing the cost of investments, may be the best measure of the System's ongoing ability to meet its obligations.

To arrive at a suitable value of assets for the actuarial valuation, a technique for determining the actuarial value of assets is used which dampens swings in the market value while still indirectly recognizing market values.

Table 2 shows the development of the actuarial value of assets (AVA) as of the valuation date.



**TABLE 1**  
**ASSET SUMMARY**

	Judges	
	Market Value	Actuarial Value
1. Assets at June 30, 2021	211,081,342	194,988,153
2. Contributions		
State Contributions	39,228,848	39,228,848
Employee Contributions	1,550,712	1,550,712
Member Purchases of Service Credit	0	0
Total	40,779,560	40,779,560
3. Investment Income, Net of Investment Expenses	(18,801,946)	10,839,222
4. Benefit Payments		
Monthly Benefit Payments	42,513,238	42,513,238
Inactive Vested Lump Sum Payments	0	0
Contribution Refunds	17,140	17,140
Total	42,530,378	42,530,378
5. Administrative and Misc. Expenses	79,492	79,492
6. Assets at June 30, 2022	190,449,086	203,997,065
(1) + (2) + (3) - (4) - (5)		
7. Rate of Return, Net of Investment Expenses*	(9.0%)	5.6%

\* Based on the approximation formula:  $(2 \times I) / (A+B-I)$ , where  
I = Investment Increment  
A = Beginning of year asset value  
B = End of year asset value

Market value return reported by MOSERS



**SECTION 3 – SYSTEM ASSETS**

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**TABLE 2  
DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS**

Under the current asset smoothing method, the difference between the actual and assumed investment return on the market value of assets will be recognized evenly over a closed five-year period. The method was first implemented with the June 30, 2018 valuation. Deferred asset experience as of June 30, 2017 will be recognized evenly over a closed seven-year period, beginning June 30, 2018.

<b>Fiscal Year End June 30,</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
A. Market Value of Assets, Beginning of Year	\$ 137,566,230	\$ 150,199,575	\$ 158,332,990	\$ 167,288,066	\$ 211,081,342
B. Contributions During Year	37,794,522	39,742,769	40,489,085	41,444,937	40,779,560
C. Benefit Payments and Expenses During Year	35,838,843	37,665,190	39,696,718	41,701,368	42,609,870
D. Expected Rate of Return	7.50%	7.25%	7.10%	6.95%	6.95%
E. Expected Net Investment Income	10,389,479	10,963,464	11,269,289	11,617,759	14,607,618
F. Expected Market Value of Assets, End of Year	149,911,388	163,240,618	170,394,646	178,649,394	223,858,650
G. Market Value of Assets, End of Year	150,199,575	158,332,990	167,288,066	211,081,342	190,449,086
H. Excess/(Shortfall) of Net Investment Income	\$ 288,187	\$ (4,907,628)	\$ (3,106,580)	\$ 32,431,948	\$ (33,409,564)



SECTION 3 – SYSTEM ASSETS

TABLE 2
DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS
(continued)

The table below shows the development of gain/(loss) to be recognized in the current year:

Table with 5 columns: Plan Year Ended, Asset Gain/(Loss), Gain/(Loss) Recognized in Prior Years, Gain/(Loss) Recognized This Year, Gain/(Loss) Deferred to Future Years. Rows include years from 6/30/2017 to 6/30/2022 and a Total row.

Summary table with 2 columns: Description and Value. Rows include Market Value of Assets as of June 30, 2022 (\$ 190,449,086), Total Deferred Investment Experience (\$ (13,547,979)), Actuarial Value of Assets as of June 30, 2022 (A. - B.) (\$ 203,997,065), and Ratio of Actuarial Value to Market Value (107.1%).

\* The unrecognized investment experience as of June 30, 2017 will be recognized over a closed seven-year period.





## SECTION 4 – SYSTEM LIABILITIES

---

In the previous section, an analysis of System's current assets was given as of June 30, 2022. In this section, the discussion will focus on the commitments (future benefit payments) of the System, which are referred to as its liabilities.

Table 3 contains an analysis of the actuarial present value of all future benefits (PVFB) for contributing members, inactive members, retirees and their beneficiaries. The liabilities summarized in Table 3 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes measures of both benefits already earned and future benefits expected to be earned. For all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving spouses.

The actuarial assumptions used to determine liabilities are based on the results of the latest experience study. These assumptions are outlined in Appendix C.

The Board's funding policy amortizes the UAAL using a "layered" bases method. Under this method, the "Legacy UAAL", as determined in the June 30, 2018 valuation, is amortized over a closed 30-year period (see Table 4). Effective June 30, 2021, subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 25-year periods. Bases established prior to June 30, 2021 will continue to be amortized on their original schedule. Any change in the System's benefit structure shall be amortized over a closed period of 20 years, as set out in state statutes. The total UAAL amortization payment is the sum of the payments for each of the amortization bases. Note that the use of closed amortization periods will result in the System being fully funded at the end of the amortization period, if all actuarial assumptions are met.

All liabilities reflect the benefit provisions in place as of June 30, 2022, as amended by any legislation in the 2022 Legislative Session.

### **Actuarial Accrued Liability**

A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to the period in which benefits are earned, rather than to the period of benefit distribution. An actuarial cost method is a mathematical technique that allocates the present value of future benefits into annual costs. In order to do this allocation, it is necessary for the funding method to "breakdown" the present value of future benefits into two components:

- (1) that which is attributable to the past and
- (2) that which is attributable to the future.

Actuarial terminology calls the part attributable to the past the "past service liability" or the "actuarial accrued liability." The portion allocated to the future is known as the present value of future normal costs, with the specific piece of it allocated to the current year being called the "normal cost." Table 5 contains the actuarial balance sheet for the System. The Entry Age Normal actuarial cost method is used to develop the actuarial accrued liability. Table 6 shows the gain/(loss) analysis in total for the System.



SECTION 4 – SYSTEM LIABILITIES

TABLE 3
UNFUNDED ACTUARIAL ACCRUED LIABILITY
As of June 30, 2022

Table with 4 columns: Description, (1) Actuarial Present Value, (2) Present Value of Future Normal Cost Contributions, and (3) = (1) - (2) Actuarial Accrued Liabilities. Rows include Active Members (Service retirement, Disability, Survivor, Separation), Members on Leave of Absence & LTD, Terminated Vested Members, Retired Lives, Total Actuarial Accrued Liability, Actuarial Value of Assets, Unfunded Actuarial Accrued Liability, and Funded Ratio.



**TABLE 4  
AMORTIZATION SCHEDULE FOR LEGACY UAAL**

The legacy UAAL base, established in the June 30, 2018 valuation, is the largest component of the total UAAL. To illustrate the impact of the level percent of payroll methodology, the amortization schedule for the legacy base is shown below. Note that this schedule is based on the underlying assumptions used in this valuation including an investment return assumption of 6.95% and an assumed payroll growth of 2.25%. Any change in these assumptions in the future, will impact the projected UAAL amortization schedule for the legacy UAAL.

As of June 30	Outstanding Balance (BOY)	Amortization Years Remaining	Contributions (\$M)
2023	445	26	29
2024	446	25	30
2025	446	24	31
2026	445	23	31
2027	443	22	32
2028	441	21	33
2029	438	20	34
2030	434	19	34
2031	428	18	35
2032	422	17	36
2033	414	16	37
2034	405	15	38
2035	394	14	38
2036	382	13	39
2037	368	12	40
2038	352	11	41
2039	334	10	42
2040	314	9	43
2041	291	8	44
2042	266	7	45
2043	238	6	46
2044	207	5	47
2045	173	4	48
2046	136	3	49
2047	95	2	50
2048	50	1	51
2049	0	0	0



**TABLE 5**  
**ACTUARIAL BALANCE SHEET**

ASSETS

Actuarial Value of Assets		\$	203,997,065
Unfunded Actuarial Accrued Liability			426,045,948
Present Value of Future Normal Costs			<u>94,333,020</u>
Total Assets		\$	724,376,033

LIABILITIES

Present Value of Future Benefits			
Active members			
Retirement	\$	253,772,230	
Withdrawal		15,693,125	
Death		4,453,709	
Disability		<u>0</u>	
Total			\$ 273,919,064
Inactive members			
Currently receiving benefits		440,091,330	
Not currently receiving benefits		<u>10,365,639</u>	
Total			\$ 450,456,969
Total Liabilities			\$ 724,376,033



SECTION 4 – SYSTEM LIABILITIES

TABLE 6  
ANALYSIS OF GAIN/(LOSS)

	(1) Actuarial Accrued Liabilities	(2) Valuation Assets	(3) = (1) - (2) UAAL
(1) Value at Start of Year	\$ 626,284,219	\$ 194,988,153	\$ 431,296,066
(2) Total Normal Cost From Last Valuation	12,439,236	0	12,439,236
(3) Actual Contributions (Employer and Member)	0	40,779,560	(40,779,560)
(4) Benefit Payments	(42,530,378)	(42,530,378)	0
(5) Administrative Expenses	0	(79,492)	79,492
(6) Interest on (1), (2), (3), (4) and (5) at 6.95%	<u>42,938,173</u>	<u>13,489,142</u>	<u>29,449,031</u>
(7) Expected Value Before Changes	\$ 639,131,250	\$ 206,646,985	\$ 432,484,265
(8) Data/Programming Refinement	<u>(3,007,064)</u>	<u>0</u>	<u>(3,007,064)</u>
(9) Expected Value After Changes: (7) + (8)	\$ 636,124,186	\$ 206,646,985	\$ 429,477,201
(10) Actual Value at End of Year	630,043,013	203,997,065	426,045,948
(11) Gain / (Loss)	\$ 6,081,173	\$ (2,649,920)	\$ 3,431,253
(12) Gain / (Loss) as Percent of Expected Actuarial Accrued Liabilities: \$639,131,250	1.0%	(0.4%)	0.5%



SECTION 4 – SYSTEM LIABILITIES

TABLE 7  
GAIN/(LOSS) ANALYSIS BY SOURCE

Type of Activity	Gain or (Loss) for Year Ended 6/30/2022	
<b>Age &amp; Service Retirements.</b> If members retire at older ages or with lower final average pay than assumed, there is a gain. If younger ages or higher average pays, a loss.	\$890,000	0.1%
<b>Death-in-Service Benefits.</b> If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	240,000	0.0%
<b>Withdrawal From Employment.</b> If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	(90,000)	(0.0%)
<b>Salary Increases.</b> If there are smaller salary increases than assumed, there is a gain. If greater increases, a loss.	3,200,000	0.5%
<b>Investment Income.</b> If there is greater investment return on assets than assumed, there is a gain. If less return, a loss.	(2,600,000)	(0.4%)
<b>Retiree Mortality.</b> If more deaths than assumed, there is a gain. If fewer deaths, a loss.	3,190,000	0.5%
<b>COLAs.</b> If Cost of Living Adjustments are less than expected, a gain; if more a loss.	(1,570,000)	(0.2%)
<b>Other.</b> Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, valuation methods, etc.	140,000	0.0%
<b>Gain (or Loss) During Year From Experience</b>	<b>\$3,400,000</b>	<b>0.5%</b>



## SECTION 5 – EMPLOYER CONTRIBUTIONS

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The previous two sections were devoted to a discussion of the Judges' assets and liabilities. Table 5 indicates that current assets fall short of meeting the present value of future benefits (total liability). This is expected in all but a completely closed fund, where no further contributions are anticipated. In an active system, there will almost always be a difference between the actuarial value of assets and total liabilities. This deficiency has to be made up by future contributions and investment returns. An actuarial valuation sets out a schedule of future contributions that will fund this deficiency in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. Under an actuarial cost method, the contributions required to meet the difference between current assets and current liabilities are allocated each year between two elements: (1) the normal cost rate and (2) the unfunded actuarial accrued liability contribution rate.

The term "fully funded" is often applied to a system in which contributions at the normal cost rate are sufficient to pay for the benefits of existing employees as well as for those of new employees. More often than not, systems are not fully funded, either because of past benefit improvements that have not been completely funded or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated by the actuarial assumptions. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists. Likewise, when the actuarial value of assets is greater than the actuarial accrued liability, a surplus exists.

### Description of Contribution Rate Components

The Entry Age Normal (EAN) actuarial cost method is used for the valuation. Under that method, the normal cost for each year from entry age to assumed exit age is a constant percentage of the member's year by year projected compensation. The portion of the present value of future benefits not provided by the present value of future normal costs is the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains and losses.

In general, contributions are computed in accordance with a level percent-of-payroll funding objective. The contribution rate based on the June 30, 2022 actuarial valuation will be used to determine the actuarial employer contribution rate for the plan year ending June 30, 2024. In this context, the term "contribution rate" means the percentage, which is applied to the active member payroll to determine the actual employer contribution amount (i.e., in dollars) for the group.

### Contribution Rate Summary

Table 8 shows the development of the June 30, 2023 projected UAAL. In Table 9, the amortization payment related to the UAAL is developed. Table 10 develops the computed employer contribution rate for the Plan and the estimated amount of required State contributions. Table 11 shows estimated contribution amounts if the employer contributions are paid early on July 15, September 1 or November 1. Amounts are shown for both the UAAL payment only and the total employer contribution.

The contribution rates shown in this report are based on the actuarial assumptions and cost methods described in Appendix C.



**SECTION 5 – EMPLOYER CONTRIBUTIONS**

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**TABLE 8  
PROJECTED UAAL AS OF JUNE 30, 2023**

(1) Unfunded Actuarial Accrued Liability at June 30, 2022	\$426,045,948
(2) Expected Contribution Rate for Year Ending June 30, 2023*	62.59%
(3) Normal Cost Rate for Year Ending June 30, 2023	20.25%
(4) Contribution Rate Applied to UAAL [(2) - (3)]	42.34%
(5) Projected Payroll for the Year After the Valuation Date	\$65,217,421
(6) Expected UAAL Contribution [(4) * (5)]	\$27,613,056
(7) Interest on (1) and (6) to June 30, 2023 at 6.95%	\$28,666,757
(8) Projected UAAL at June 30, 2023 [(1) - (6) + (7)]	\$427,099,649

\*The Expected Contribution Rate for FYE 2023 is equal to the employer rate of 60.17% plus the weighted average member rate of 2.42% of payroll from the June 30, 2021 valuation.





SECTION 5 – EMPLOYER CONTRIBUTIONS

TABLE 9  
UAAL CONTRIBUTION RATE

Amortization Base	Original Amount	Remaining Payments	Projected June 30, 2023 Balance	Annual Payment*
2018 Legacy UAAL	\$ 435,941,756	26	\$ 445,221,834	\$ 29,360,797
2019 Assumption Changes	5,024,057	27	5,104,540	330,083
2019 Experience Base	3,858,637	27	3,920,450	253,515
2020 Assumption Changes	6,341,771	28	6,411,616	407,041
2020 Experience Base	(12,097,127)	28	(12,230,357)	(776,444)
2021 Assumption Changes	(4,928,456)	24	(4,927,749)	(339,363)
2021 Experience Base	(10,350,056)	24	(10,348,571)	(712,683)
2022 Experience Base	\$ (6,052,114)	25	(6,052,114)	(407,565)
<b>Total</b>			<b>\$ 427,099,649</b>	<b>\$ 28,115,381</b>

\* Payment amount reflects mid-year timing.

- 1. Total UAAL Amortization Payments \$ 28,115,381
- 2. Expected Payroll for FYE 2024 \$ 66,684,813
- 3. UAAL Amortization Payment Rate 42.16%  
(1) / (2)



**SECTION 5 – EMPLOYER CONTRIBUTIONS**

**TABLE 10  
COMPUTED EMPLOYER CONTRIBUTION RATE  
FOR THE FISCAL YEAR ENDING JUNE 30, 2024**

**ACTUARIAL VALUATION RESULTS AS OF JUNE 30, 2022**

	Percent of Payroll		Weighted Average
	Pre 1/1/2011 Hires	Post 1/1/2011 Hires	
A. Normal Cost			
(1) Service retirement benefits	15.93 %	17.16 %	16.72 %
(2) Termination benefits	3.40	2.35	2.73
(3) Survivor benefits	0.60	0.72	0.68
(4) Disability benefits	0.00	0.00	0.00
(5) Administrative expenses	0.12	0.12	0.12
(6) Total	20.05	20.35	20.25
B. Less Member Contributions	0.00	4.00	2.58
C. Employer Normal Cost [A(6) - B]	20.05	16.35	17.67
D. Unfunded Actuarial Accrued Liabilities (UAAL) (level percent-of-payroll amortization with layered bases)			42.16
<b>E. EMPLOYER CONTRIBUTION RATE [C. + D.]</b>			<b>59.83 %</b>
<b>F. POLICY MINIMUM EMPLOYER CONTRIBUTION RATE</b>			<b>58.45 %</b>
<b>G. ESTIMATED EMPLOYER CONTRIBUTION (\$Millions) #</b>			<b>\$39.9</b>

At the September 18, 2014 meeting, the Board adopted a policy minimum contribution rate so that the employer contribution rate shall not fall below the fiscal 2015 rate (58.45% of payroll) until the plan is 80% funded.

# Illustrative only. Estimated employer contribution amounts (shown in millions) are based on the greater of the Total Computed Employer Contribution Rate and the Policy Minimum Contribution Rate shown and the valuation payroll projected two years to the applicable fiscal year using the valuation assumption of 2.25% per year.



**SECTION 5 – EMPLOYER CONTRIBUTIONS**

**TABLE 11  
EARLY PAYMENT AMOUNTS FOR FISCAL YEAR 2024**

Section 104.436, RSMo. describes the certified contribution rate the employer shall pay in accordance with its ordinary course payrolls during each fiscal year. Per a Board Rule adopted during 2020, the employer may elect to pre-pay the amount for the unfunded actuarial accrued liability (UAAL) only or the total contribution which also includes the normal cost rate, on July 15, September 1, or November 1. At the end of the fiscal year, actual payroll will be compared to assumed payroll and an adjustment will be made to the total contributions paid, in either an additional amount paid by the employer or a credit to reduce future payments.

This exhibit is for informational purposes only and all payment amounts should be confirmed with MOSERS. Payment amounts are adjusted to payment dates using the assumed rate of return (6.95%) used in the actuarial funding valuation and assuming all scheduled payments are made prior to the one-time payment date.

	<b>Expected Payroll for FY 2024</b>	<b>Total FY 2024 Payments</b>	<b>FY 2024 Contribution Rate</b>	<b>One-Time Payment, Adjusted for Expected Payroll Contributions to Date:</b>			<b>Additional Payroll Contributions</b>
				<b>July 15*</b>	<b>September 1**</b>	<b>November 1***</b>	
UAAL Payment Only	66,684,813	28,115,381	42.16%	27,262,736	22,910,565	18,534,857	17.67%
Full Employer Contribution	66,684,813	39,897,524	59.83%	38,687,567	32,511,557	26,302,148	0.00%

\* One-time payment is for fiscal year payments and assumes no other contributions during the fiscal year have been made.

\*\* Fiscal year payments are assumed to be made for all of July and August, in addition to the one-time payment.

\*\*\* Fiscal year payments are assumed to be made for all of July, August, September, and October, in addition to the one-time payment.



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## SECTION 6 – PROJECTIONS

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The June 30, 2022 valuation results present the System’s financial status at a single point in time and contribution requirements for a single fiscal year. Historical valuation results allow analysis of past trends, but no insight into future trends. A projection model provides insight into the longer term trend of (1) the projected Employer contributions; (2) the projected System funded status (ratio of actuarial assets over liabilities); (3) net cash flow patterns; and (4) the unfunded actuarial accrued liability (actuarial accrued liability minus actuarial assets). Projections can also be used to demonstrate how sensitive the valuation results are to the key variables being modeled. Such sensitivity analysis can be found in Section 7 of this report.

For Judges, projections are particularly important and insightful due to the multiple-tiered benefit structure. The current valuation produces a normal cost and actuarial accrued liability based on the composition of active members on the valuation date, June 30, 2022. Without a tiered structure, systems can assume that the normal cost, as a percentage of payroll, will remain relatively level. However, since all new employees are covered under a less costly benefit structure, until all new employees are covered under the post-2010 benefit structure, the normal cost percentage will continue to decrease. In addition, members hired after 2010 are the only group making employee contributions so projections allow for the projected payroll to be segregated by tier so that total future contributions reflect an estimate of the amounts to be contributed by employees.

The member data (active and in-pay status) is projected for each year in the future using current assumptions. After the first year, a new-member profile is used to estimate the demographics of new employees replacing members who are projected to terminate, retire, die or become disabled in future years. ***For this modeling, the number of active members is assumed to remain level over the projection period.***

These projections in this section assume that all actuarial assumptions are met in all future years, including the investment return assumption, and that the Employer makes contributions equal to the full amount of the actuarially determined contribution, as calculated by the valuation, based on the Board’s Funding Policy. The projections are based on the current plan provisions and assume that all new members joining after June 30, 2022 will make employee contributions and participate in the post-2010 benefit structure.

**The projections do not predict the System’s financial condition or its ability to pay benefits in the future and do not provide any guarantee of future financial soundness of the System nor do they, on their own, indicate future funding requirements.** Over time, a defined benefit plan’s total cost will depend on a number of factors, including the amount of benefits paid, the number of people paid benefits, plan expenses and the amount of earnings on assets invested to pay benefits. These amounts, and other variables, are uncertain and unknowable at the time the projections were prepared. Because not all of the assumptions will unfold exactly as expected, actual results will differ from the projections shown.



SECTION 6 – PROJECTIONS

**TABLE 12  
PROJECTION OF FUTURE ACTUARIAL VALUATION RESULTS  
AS OF JUNE 30, 2022**

Projection Based on Assumptions Outlined in Appendix D (Amounts in thousands)											
Valuation as of June 30, (1)	Covered Payroll at Valuation (2)	Actuarial Accrued Liability (AAL) (3)	Actuarial Value of Assets (AVA) (4)	Unfunded AAL (5)	Funded Ratio Using AVA (6)	Normal Cost Rate (7)	UAAL Amortization Payment Rate (8)	Actuarial Contribution Rate (9)	Member Contribution Rate (10)	Employer Actuarial Contribution Rate* (11)	Estimated Dollar Amount of Employer Contribution** (12)
2022	\$65,217	\$630,043	\$203,997	\$426,046	32.4%	20.25%	42.16%	62.41%	2.58%	59.83%	\$39,979
2023	66,822	641,281	209,850	431,431	32.7%	20.13%	42.52%	62.65%	2.77%	59.88%	40,956
2024	68,397	651,341	216,187	435,154	33.2%	20.07%	42.77%	62.84%	2.94%	59.90%	42,012
2025	70,136	661,209	225,697	435,512	34.1%	20.02%	42.66%	62.68%	3.08%	59.60%	42,844
2026	71,886	670,502	229,160	441,343	34.2%	19.97%	43.20%	63.17%	3.21%	59.96%	44,189
2027	73,697	679,408	239,687	439,721	35.3%	19.74%	43.01%	62.75%	3.31%	59.44%	44,863
2028	75,476	687,181	250,788	436,393	36.5%	19.70%	42.86%	62.56%	3.42%	59.14%	45,738
2029	77,339	694,889	262,358	432,531	37.8%	19.54%	42.70%	62.24%	3.49%	58.75%	46,552
2030	79,237	701,971	274,505	427,466	39.1%	19.47%	42.54%	62.01%	3.57%	58.45%	47,429
2031	81,145	708,725	287,318	421,407	40.5%	19.32%	42.39%	61.71%	3.64%	58.45%	48,520
2032	83,012	714,697	300,670	414,027	42.1%	19.23%	42.27%	61.50%	3.69%	58.45%	49,681
2033	84,997	720,558	315,268	405,290	43.8%	19.27%	42.10%	61.37%	3.75%	58.45%	50,854
2034	87,005	726,379	331,349	395,030	45.6%	19.29%	41.94%	61.23%	3.80%	58.45%	52,093
2035	89,124	732,263	349,198	383,066	47.7%	19.29%	41.72%	61.01%	3.84%	58.45%	53,376
2036	91,318	738,474	369,194	369,281	50.0%	19.32%	41.48%	60.80%	3.87%	58.45%	54,659
2037	93,513	745,185	391,615	353,570	52.6%	19.35%	41.26%	60.61%	3.91%	58.45%	56,004
2038	95,815	752,379	416,567	335,812	55.4%	19.37%	40.99%	60.36%	3.93%	58.45%	57,380
2039	98,169	759,968	444,246	315,722	58.5%	19.40%	40.71%	60.11%	3.96%	58.45%	58,743
2040	100,501	767,707	474,645	293,062	61.8%	19.42%	40.43%	59.85%	3.97%	58.45%	60,162
2041	102,929	776,054	508,236	267,818	65.5%	19.44%	40.12%	59.56%	3.98%	58.45%	61,645
2042	105,467	785,087	545,306	239,781	69.5%	19.44%	39.78%	59.22%	3.99%	58.45%	63,212
2043	108,148	795,158	586,420	208,739	73.7%	19.47%	39.39%	58.86%	3.99%	58.45%	64,762
2044	110,799	805,832	631,627	174,205	78.4%	19.47%	39.00%	58.47%	4.00%	58.45%	66,365
2045	113,541	817,461	681,330	136,131	83.3%	19.48%	38.58%	58.06%	4.00%	54.06%	62,916
2046	116,381	830,103	735,907	94,197	88.7%	19.53%	39.93%	59.46%	4.00%	55.46%	66,099

\* Reflects Policy Minimum Contribution Rate, if applicable.

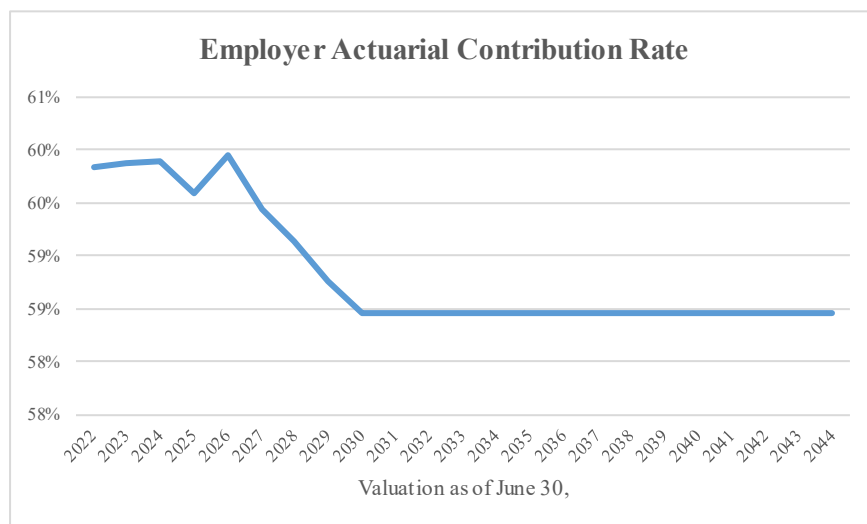
\*\* Amounts shown are contributions in the fiscal year ending two years after the valuation date.

Note: Projections also assume the active population remains constant over the projection period and all actuarial assumptions are met in the future.



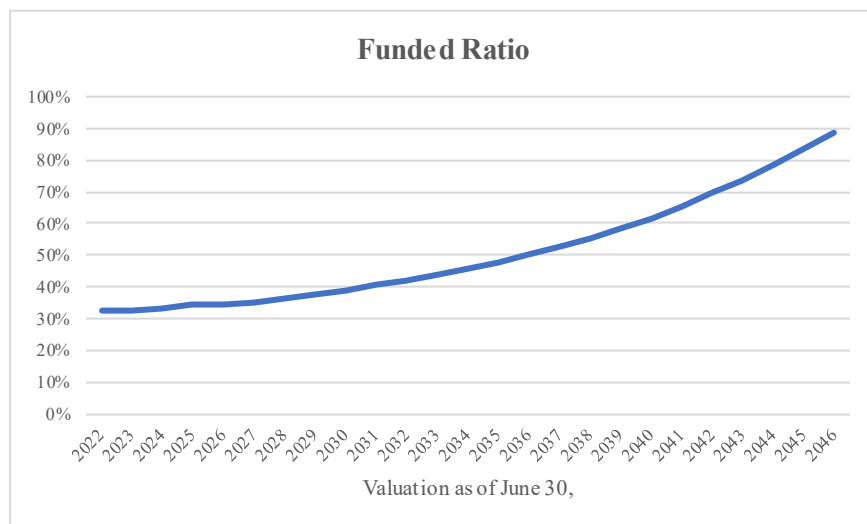
**TABLE 12  
PROJECTION OF FUTURE ACTUARIAL VALUATION RESULTS  
AS OF JUNE 30, 2022**

(continued)



Note: Reflects Policy Minimum Contribution Rate, if applicable.

The employer contribution rate trends downward over time as a greater percentage of active members are covered by Judges 2011 Plan which has a lower normal cost rate and employee contributions of 4.0% of pay. The Policy Minimum Contribution Rate applies beginning in 2030.



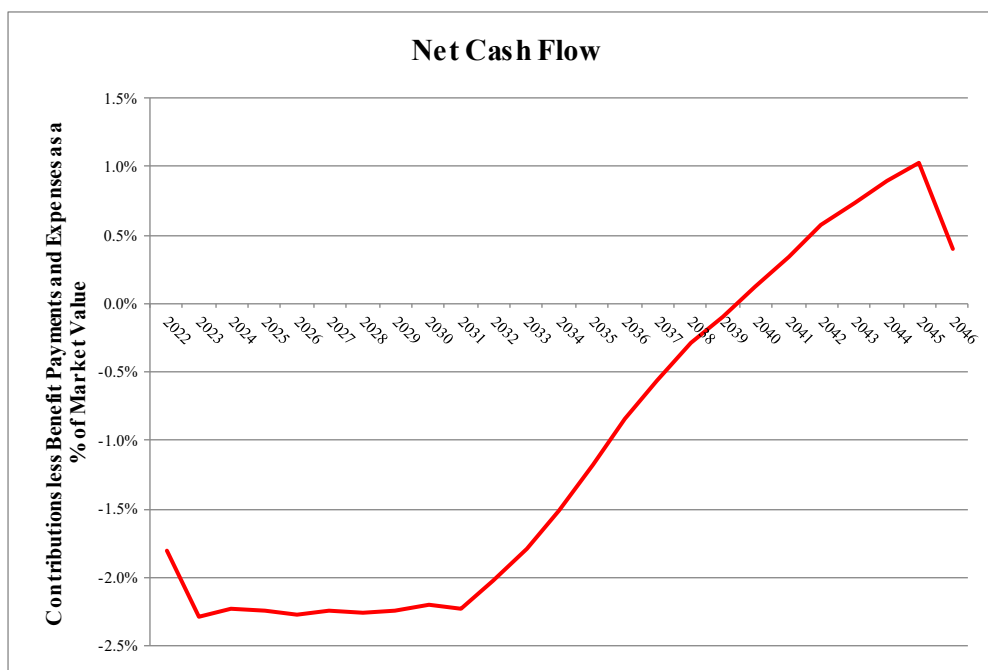
In the early stages of funding a retirement system (Judges was funded on a “pay as you go” basis until 1999), the contributions are an important part of accumulating assets and improving the funded ratio. If assumptions are met in the future, the funded ratio is expected to steadily improve.



SECTION 6 – PROJECTIONS

**TABLE 13  
PROJECTION OF FUTURE NET CASH FLOWS  
AS OF JUNE 30, 2022**

Projection Based on Assumptions Outlined in Appendix D Amounts in thousands						
Valuation as of June 30, (1)	Total Contributions (2)	Benefit Payments (3)	Administrative Expenses (4)	Net Cash Flows (5)	Market Value of Assets (MVA) (6)	Net Cash Flow as a % of MVA (7)
2022	\$40,820	\$44,178	\$81	(\$3,440)	\$190,449	(1.81%)
2023	41,703	46,191	83	(4,571)	200,128	(2.28%)
2024	42,851	47,447	85	(4,681)	209,309	(2.24%)
2025	44,074	48,896	87	(4,910)	219,015	(2.24%)
2026	45,058	50,190	89	(5,220)	229,160	(2.28%)
2027	46,554	51,838	91	(5,374)	239,687	(2.24%)
2028	47,361	52,934	93	(5,666)	250,788	(2.26%)
2029	48,383	54,175	95	(5,886)	262,358	(2.24%)
2030	49,317	55,278	97	(6,058)	274,505	(2.21%)
2031	50,326	56,625	99	(6,398)	287,318	(2.23%)
2032	51,542	57,531	102	(6,091)	300,670	(2.03%)
2033	52,817	58,351	104	(5,637)	315,268	(1.79%)
2034	54,117	59,020	106	(5,009)	331,349	(1.51%)
2035	55,480	59,503	109	(4,132)	349,198	(1.18%)
2036	56,882	59,901	111	(3,130)	369,194	(0.85%)
2037	58,278	60,355	113	(2,191)	391,615	(0.56%)
2038	59,750	60,864	116	(1,229)	416,567	(0.30%)
2039	61,238	61,580	119	(461)	444,246	(0.10%)
2040	62,723	62,018	121	584	474,645	0.12%
2041	64,248	62,434	124	1,690	508,236	0.33%
2042	65,843	62,607	127	3,109	545,306	0.57%
2043	67,528	63,093	130	4,305	586,420	0.73%
2044	69,183	63,438	133	5,613	631,627	0.89%
2045	70,906	63,785	136	6,986	681,330	1.03%
2046	67,571	64,521	139	2,911	735,907	0.40%







## RISK MEASURES

Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, was first applicable for the June 30, 2019 actuarial valuation for the Missouri State Employees' Retirement System – Judges (Judges or System).

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become “pay as you go”. This risk is why consistent funding of the full actuarial contribution rate, based on reasonable assumptions and methods, is so critical to the successful funding of a retirement system.

The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

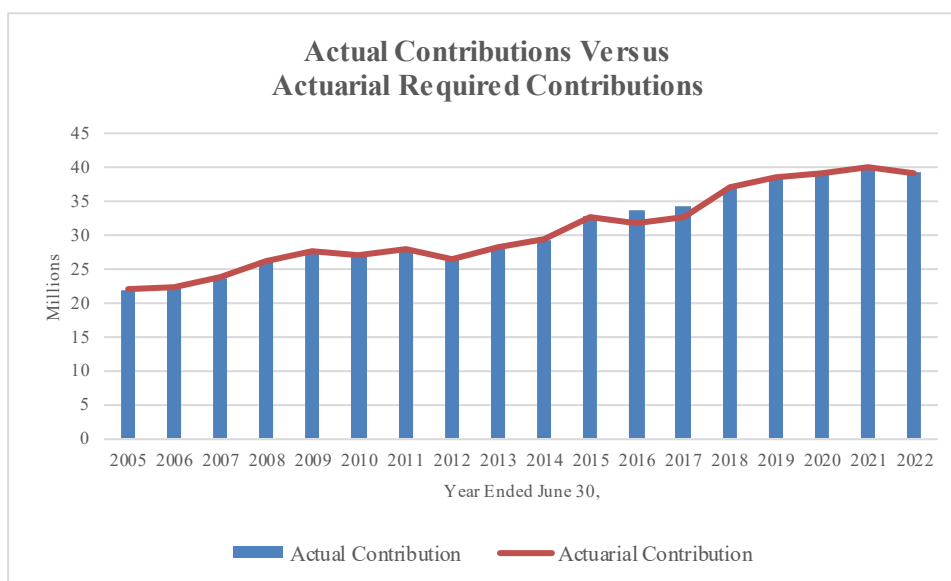
There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population, declining active membership and retirement ages;
- external risks such as the regulatory and political environment.

There is typically a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial contribution rate each year. Historically, the state of Missouri has contributed the full actuarial contribution rate. At their September 18, 2014 meeting, the Board adopted a policy minimum contribution rate so that the employer contribution rate will not fall below the fiscal 2015 rate (58.45% of payroll) until the plan is 80% funded. As a result, the System's contributions were slightly above the actuarial rate during FY 2016 and FY 2017. The following graph displays the System's historical contribution levels over the past 18 years.



## SECTION 7 – RISK MEASURES



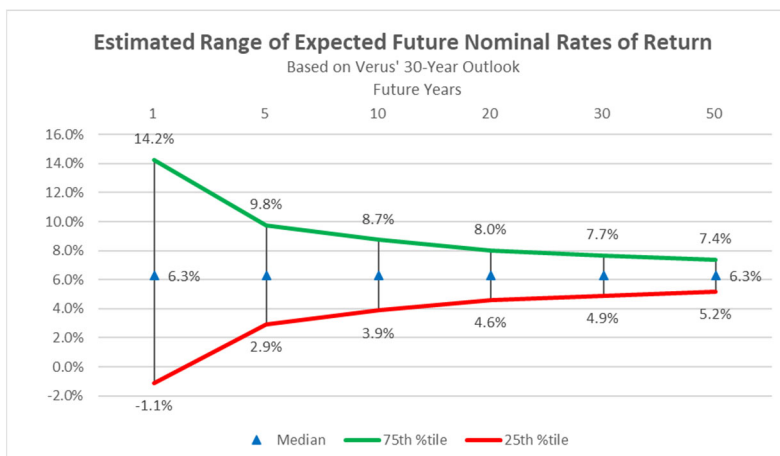
One of the most positive factors regarding the System’s funding is the State’s commitment to make contributions that are at least equal to the actuarial required contribution. This disciplined approach to funding has been illustrated by consistently contributing the full actuarial required contribution amount even with the increases that have occurred in the recent past. Despite the fact the full actuarial contribution rate has been contributed, the Judges Plan is only 32% funded. This is because the Plan was funded using a “pay-as-you-go” method prior to 1999, which means that there was no cash reserve to invest and pay benefits from and the System’s funded ratio was zero. In addition, the actuarial assumptions have been changed eight times in the last eleven years, including a reduction in the investment return assumption from 8.50% in the 2011 valuation to 6.95% in the 2020 valuation. In addition, actual investment experience over this period has lagged the assumptions. However, to the extent the State continues to fund the full actuarial contribution rate in the future, we would expect the funded ratio to steadily improve if the actuarial assumptions are met.

The most significant risk factor for most systems is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 14). Given the underlying capital market assumptions provided by MOSERS’ investment consultant, Verus, in 2021 when the experience study was performed and the System’s asset allocation, the distribution of returns over time is illustrated in the graph on the next page.

As the following graph illustrates, in any single year the rate of return is expected to fall between -1% and 14% about 50% of the time. This volatility in the investment return from year to year creates significant risk to funding a retirement plan because of the corresponding volatility it creates in the employer contribution rate. As Table 14 explains, if the actual return is 10% different than the expected return, it would result in an increase in the actuarial contribution rate of 2.03% once the experience is fully recognized in the asset smoothing method (five years). As the System continues to build its asset reserve and approach 100% funding, unfavorable investment experience will have a more and more significant impact on the contribution rate. This is a typical characteristic of well-funded, mature plans.



## SECTION 7 – RISK MEASURES



A key demographic risk for all retirement systems, including Judges, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect small, continuous improvements in mortality experience over time and these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical breakthrough that could quickly increase liabilities. Likewise, there is some possibility of a significant public health crisis that could result in a significant number of additional deaths in a short time period, as experienced with the COVID-19 pandemic. This type of event is also significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

Many of the public retirement systems were created shortly after World War II. In general, the aging of the population, including the retirement of the baby boomers, along with earlier retirement eligibility has created a shift in the demographics of most systems. This change is not unexpected and has, in fact, been anticipated in the funding of the retirement system. Even though it was anticipated, the demographic shift and maturing of the plans have increased the risk associated with funding the system. The following exhibits summarize certain historical information that indicates how certain key risk metrics have changed over time due to the maturing of the retirement system.



**TABLE 14**  
**HISTORICAL ASSET VOLATILITY RATIOS**

As a retirement system matures, the size of the market value of assets is expected to increase relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contribution rates.

Valuation Date	Market Value of Assets	Covered Payroll	Asset Volatility Ratio	Change in ACR with a Return 10% Different than Assumed*
6/30/2004	39,705,632	39,878,499	1.00	0.67%
6/30/2005	48,534,166	40,016,098	1.21	0.81%
6/30/2006	57,728,934	40,270,535	1.43	0.96%
6/30/2007	72,180,820	40,846,581	1.77	1.19%
6/30/2008	77,341,103	44,542,530	1.74	1.17%
6/30/2009	65,919,546	45,505,512	1.45	0.98%
6/30/2010	78,553,877	46,112,730	1.70	1.14%
6/30/2011	98,208,033	45,888,020	2.14	1.44%
6/30/2012	99,837,257	45,835,501	2.18	1.47%
6/30/2013	111,203,538	48,697,726	2.28	1.54%
6/30/2014	132,645,657	49,587,936	2.67	1.80%
6/30/2015	130,851,263	55,656,457	2.35	1.58%
6/30/2016	132,056,351	57,421,016	2.30	1.55%
6/30/2017	137,634,941	58,150,935	2.37	1.60%
6/30/2018	150,199,575	59,551,874	2.52	1.70%
6/30/2019	158,332,990	60,380,734	2.62	1.76%
6/30/2020	167,288,066	61,450,808	2.72	1.83%
6/30/2021	211,081,342	63,031,506	3.35	2.26%
6/30/2022	190,449,086	63,317,888	3.01	2.03%

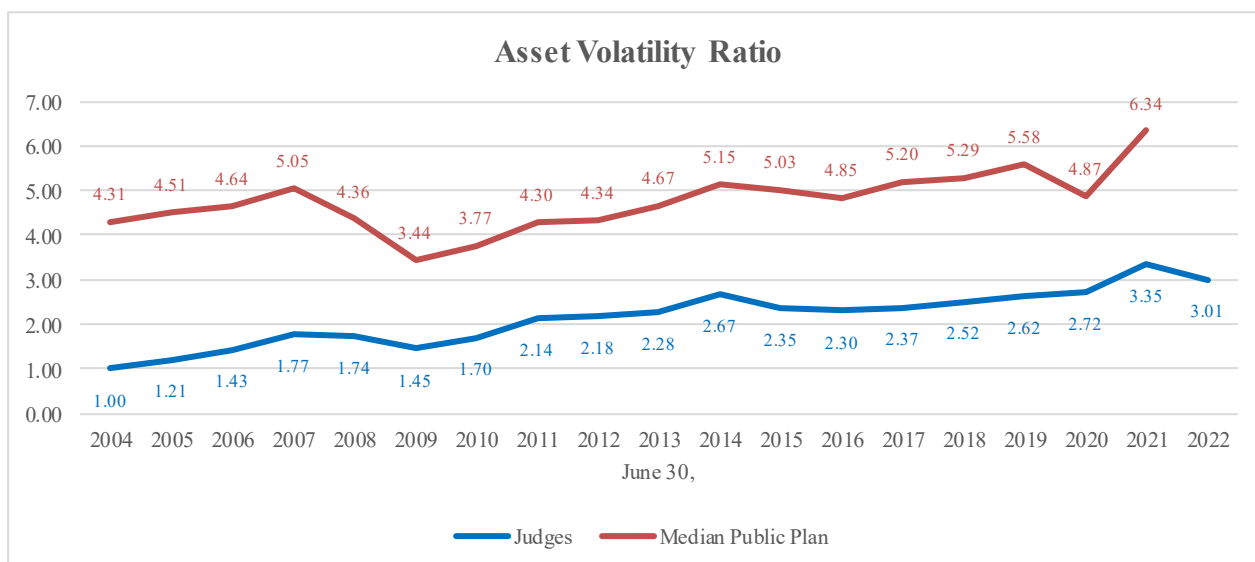
\* The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). Current year assumptions are used for all years shown.

The assets at June 30, 2022 are about 3.0 times the amount of covered payroll. Consequently, underperforming the investment return assumption by 10.00% (i.e., earn -3.05% for one year) is equivalent to about 30% of payroll. While the actual impact of this experience in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this table illustrates the risk associated with volatile investment returns. Such an event in one year would be expected to increase the actuarial contribution rate by 2.03% of payroll once it is fully recognized in the asset smoothing method.



**TABLE 14**  
**HISTORICAL ASSET VOLATILITY RATIOS**  
**(continued)**

The following graph shows a comparison of Judges’ historical asset volatility ratios and the historical median asset volatility ratio for a group of large public plans that are tracked in the Public Plan Database. The pattern of the change in the asset volatility ratio for Judges over time is similar to that observed in the Public Plan Database. When asset values drop significantly (like in 2009), the ratio drops as well. Most of the plans that participate in the NASRA Public Fund Survey have been accumulating assets for fifty or more years. Consequently, it is not surprising that the Judges System has a lower asset volatility ratio in comparison.



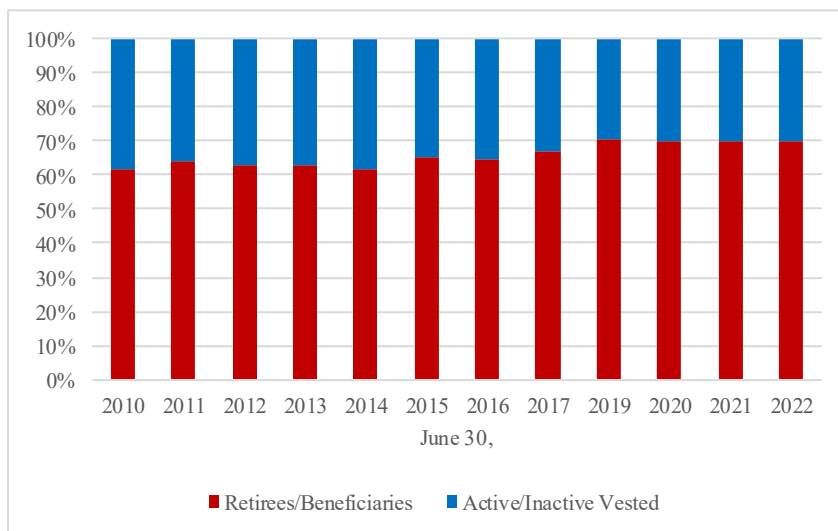


**TABLE 15**  
**LIABILITY MATURITY MEASUREMENTS**

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs.

Projections provide the most effective way of analyzing the impact of these changes on future funding measures, but studying several key metrics from the valuation can also provide some valuable insight.

<u>Fiscal Year End</u>	<u>Retiree Liability</u> (a)	<u>Total Actuarial Accrued Liability</u> (b)	<u>Retiree Percentage</u> (a) / (b)	<u>Covered Payroll</u> (c)	<u>Ratio</u> (b) / (c)
6/30/10	236,113,077	382,012,773	61.81%	46,112,730	8.28
6/30/11	251,532,354	393,484,589	63.92%	45,888,020	8.57
6/30/12	258,642,149	413,332,538	62.57%	45,835,501	9.02
6/30/13	274,911,416	435,378,358	63.14%	48,697,726	8.94
6/30/14	285,124,436	462,336,255	61.67%	49,587,936	9.32
6/30/15	316,042,514	482,969,311	65.44%	55,656,457	8.68
6/30/16	354,715,048	547,621,617	64.77%	57,421,016	9.54
6/30/17	377,099,534	564,417,925	66.81%	58,150,935	9.71
6/30/18	401,725,610	593,788,592	67.65%	59,551,874	9.97
6/30/19	434,204,353	617,482,705	70.32%	60,380,734	10.23
6/30/20	436,014,583	624,847,011	69.78%	61,450,808	10.17
6/30/21	438,537,859	626,284,219	70.02%	63,031,506	9.94
6/30/22	440,091,330	630,043,013	69.85%	63,317,888	9.95

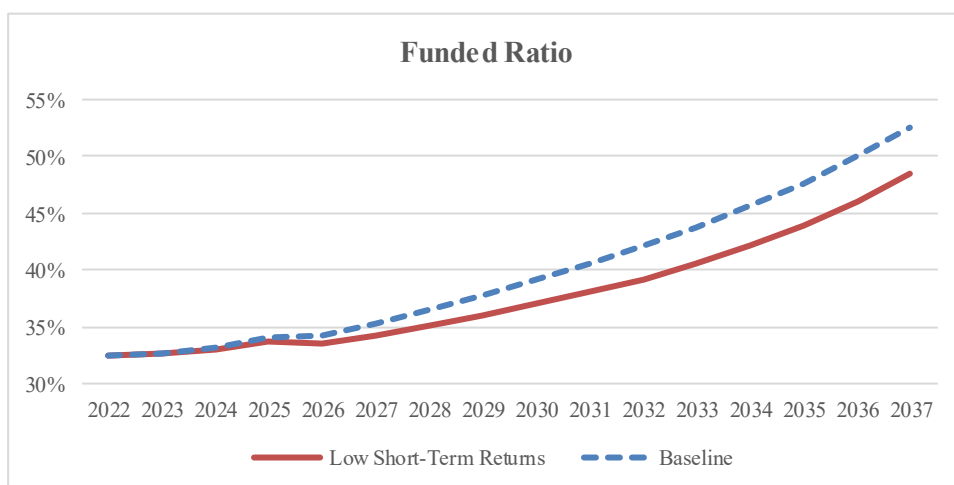




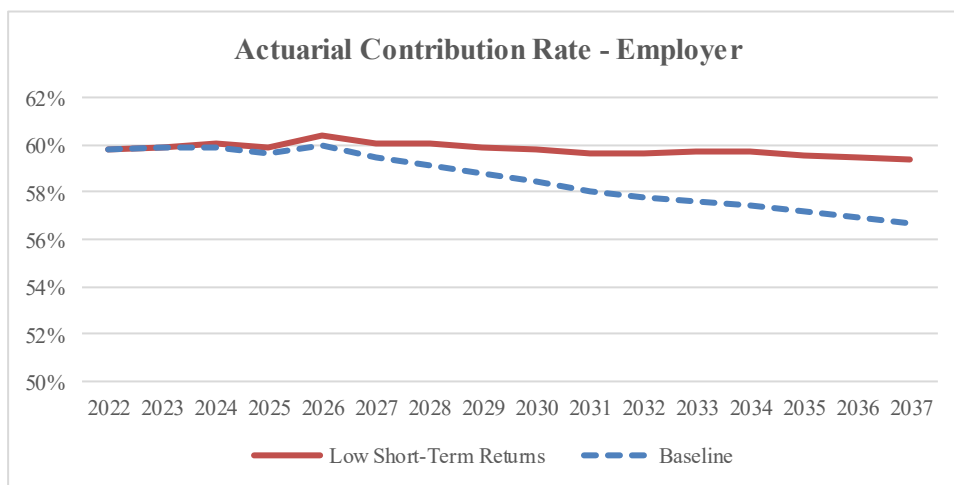
**TABLE 16  
SCENARIO TESTING**

As mentioned earlier, the most significant risk factor for most systems is investment return. There are many different tools that can be useful when assessing investment risk. One of these tools is to perform scenario testing using a projection model. Scenario testing is choosing one set of specific criteria to compare against another set of specific criteria, also known as a “what if” scenario.

Many investment consultants have been projecting lower returns over the next ten years compared to the longer term (30+ years). The scenario test below shows results if actual investment returns are 1.0% less than assumed (5.95%) over the next 10 years (“Low Short-Term Returns”) compared to if all assumptions are met (“Baseline”).



In both scenarios, the funded ratio gradually increases over the next 15 years, even in the low short-term returns scenario. The most significant factor in the early stages of building an asset reserve is the contributions, rather than investment income. However, that is not to say that investment returns have no impact on the System’s funding. By the end of this period, the funded ratio is about 4% lower under the low short-term returns scenario.

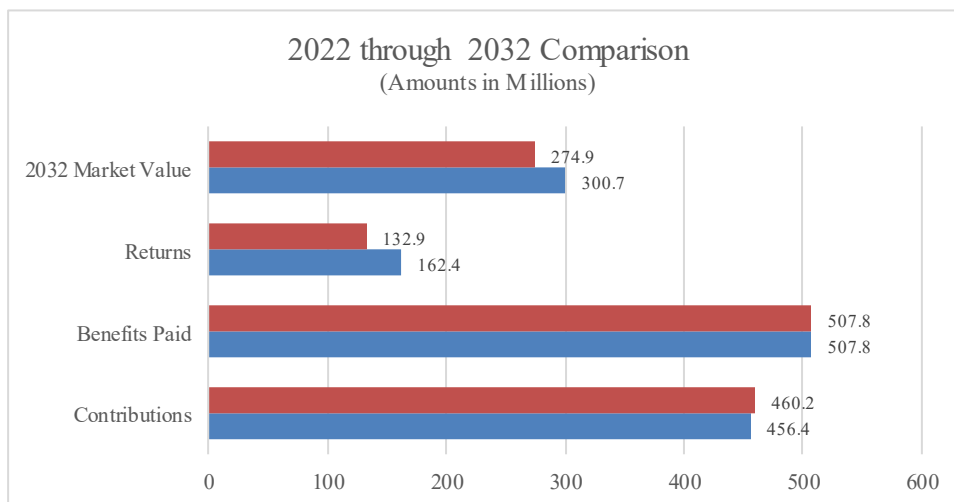




**TABLE 16**  
**SCENARIO TESTING**  
**(continued)**

Under both scenarios, the employer portion of the actuarial contribution rate holds steady at around 60% over the next four years due to the recognition of deferred asset experience. Under the baseline scenario, the employer portion of the actuarial contribution rate drops to just under 57% after 15 years, which is about 3% lower than the low short-term returns scenario. Note that while the employer portion of the actuarial contribution rate falls to below 58%, the Policy Minimum Employer Contribution does not allow the employer to contribute less than 58.45% until the System is 80% funded, which is not projected to happen in the next 15 years. The steadily decreasing employer contribution rate is largely due to a decline in the normal cost rate as more members are covered by the Judges 2011 benefit structure over time, as well as increases in the effective employee contribution rate.

While it is helpful to see the funded ratio and employer contribution rate trend lines when scenario testing, it can sometimes be difficult to grasp the full impact without analyzing the impact in dollar amounts. The graph below compares the projected 2032 market value of assets under the baseline (blue bars) and the low short-term return scenario (red bars). In addition, the sum over a ten-year period of actual investment returns, benefits paid and contribution to the System are compared.



Under the low short-term return scenario, the 2032 market value of assets is about \$26 million lower when compared with the baseline. If asset returns are 1.0% lower than assumed for the next ten years, actual investment returns would be \$30 million less than assumed. Also note that contributions are only slightly higher under the low short-term return scenario over the ten-year period. This is because the recognition of deferred investment gains.





**TABLE 17**  
**COMPARISON OF VALUATION RESULTS UNDER ALTERNATE**  
**INVESTMENT RETURN ASSUMPTIONS**

(\$ in millions)

This exhibit compares the key June 30, 2022 valuation results under five (5) different investment return assumptions to illustrate the impact of different assumptions on the funding of the System. Note that only the investment return assumption is changed, as identified in the heading below. All other assumptions are unchanged for purposes of this analysis.

Investment Return Assumption	5.95%	6.45%	6.95%	7.45%	7.95%
<b>Contributions</b>					
Total Normal Cost	24.65%	22.32%	20.25%	18.39%	16.73%
Member Contributions	(2.58%)	(2.58%)	(2.58%)	(2.58%)	(2.58%)
Employer Normal Cost	22.07%	19.74%	17.67%	15.81%	14.15%
Unfunded Actuarial Accrued Liability	44.04%	43.11%	42.16%	41.19%	40.20%
<b>Employer Contribution Rate</b>	66.11%	62.85%	59.83%	57.00%	54.35%
<b>Estimated Employer Contribution Amount</b>	\$44.1	\$41.9	\$39.9	\$38.0	\$36.2
<b>Actuarial Accrued Liability</b>	\$692.4	\$660.0	\$630.0	\$602.3	\$576.6
<b>Actuarial Value of Assets</b>	\$204.0	\$204.0	\$204.0	\$204.0	\$204.0
<b>Unfunded Actuarial Accrued Liability</b>	\$488.4	\$456.0	\$426.0	\$398.3	\$372.6
<b>Funded Ratio</b>	29.5%	30.9%	32.4%	33.9%	35.4%

Note: All other assumptions are unchanged for purposes of this sensitivity analysis.

The Employer Contribution Rate does not reflect the 58.45% Policy Minimum to show the true impact of the alternate investment return assumptions.

Numbers may not add due to rounding.



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## **HISTORICAL FUNDING AND OTHER INFORMATION**

This section of the report provides a historical perspective on the System’s funding and contribution practices, along with other information that may be of interest.

The information required for financial reporting by the System and participating employers is established by the Governmental Accounting Standards Board (GASB). GASB 67 separates accounting and financial reporting from funding requirements by creating disclosure and reporting requirements that are independent of the basis used for funding the System. A separate report that contains all of the information and exhibits of an actuarial nature that are necessary for the System’s financial reporting under GASB 67 will be issued in the future.

GASB Statement No. 68 establishes standards for the measurement, recognition, and display of pension expense and related liabilities. Annual pension cost is measured and disclosed on the accrual basis of accounting. A separate report containing all of the pertinent information under GASB 68 reporting will also be prepared in the future.

**SECTION 8 – OTHER INFORMATION****TABLE 18  
SCHEDULE OF FUNDING PROGRESS**

(\$ in millions)

<b>Actuarial Valuation Date</b>	<b>Actuarial Value of Assets (a)</b>	<b>Actuarial Accrued Liability (AAL) (b)</b>	<b>Unfunded Actuarial Accrued Liability (UAAL) (b - a)</b>	<b>Funded Ratio (a / b)</b>	<b>Covered Payroll (c)</b>	<b>UAAL as a % of Covered Payroll [(b - a) / c]</b>
June 30, 2004	\$39	\$280	\$241	14.0%	\$39.9	604.0%
June 30, 2005	44	292	248	15.1%	40.0	620.0%
June 30, 2006	52	309	257	16.7%	40.3	637.7%
June 30, 2007	62	327	265	18.9%	40.8	649.5%
June 30, 2008	73	355	282	20.6%	44.5	633.7%
June 30, 2009	81	369	288	22.0%	45.5	633.0%
June 30, 2010	89	382	293	23.3%	46.1	635.6%
June 30, 2011	98	393	295	25.0%	45.9	642.7%
June 30, 2012	102	413	311	24.8%	45.8	679.0%
June 30, 2013	111	435	324	25.5%	48.7	665.3%
June 30, 2014	124	462	338	28.0%	49.6	681.5%
June 30, 2015	134	483	349	27.8%	55.7	626.6%
June 30, 2016	143	548	404	26.2%	57.4	703.8%
June 30, 2017	152	564	413	26.9%	58.2	708.9%
June 30, 2018	162	594	432	27.3%	59.6	724.8%
June 30, 2019	172	617	445	27.9%	60.4	737.4%
June 30, 2020	181	625	444	28.9%	61.5	722.7%
June 30, 2021	195	626	431	31.1%	63.0	684.3%
June 30, 2022	204	630	426	32.4%	63.3	672.9%

Note: Information before 2017 was produced by the prior actuary. Numbers may not add due to rounding.



SECTION 8 – OTHER INFORMATION

TABLE 19  
SHORT-TERM SOLVENCY TEST

Fiscal Year End	Member Contributions (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
					(1)	(2)	(3)
2010	\$ 0	\$ 236,113,077	\$ 145,899,696	\$ 88,976,738	100.0	37.7	0.0
2011	59,958	251,532,354	141,892,277	98,398,628	100.0	39.1	0.0
2012	209,817	258,642,149	154,450,572	102,266,706	100.0	39.5	0.0
2013	421,753	274,911,416	160,045,189	111,140,339	100.0	40.3	0.0
2014	716,564	285,124,436	176,469,255	124,269,105	100.0	43.3	0.0
2015	1,204,757	316,042,514	165,722,040	134,349,908	100.0	42.1	0.0
2016	1,855,955	354,715,048	191,050,614	143,468,860	100.0	39.9	0.0
2017	2,232,405	377,099,534	185,085,986	151,828,631	100.0	39.7	0.0
2018	3,124,482	401,725,610	188,938,500	162,135,045	100.0	39.6	0.0
2019	4,421,019	434,204,353	178,857,333	172,224,529	100.0	38.6	0.0
2020	5,991,360	436,014,583	182,841,068	180,713,310	100.0	40.1	0.0
2021	7,294,197	438,537,859	180,452,163	194,988,153	100.0	42.8	0.0
2022	8,675,309	440,091,330	181,276,374	203,997,065	100.0	44.4	0.0



**TABLE 20**  
**HISTORICAL EMPLOYER CONTRIBUTIONS**

(\$ in millions)

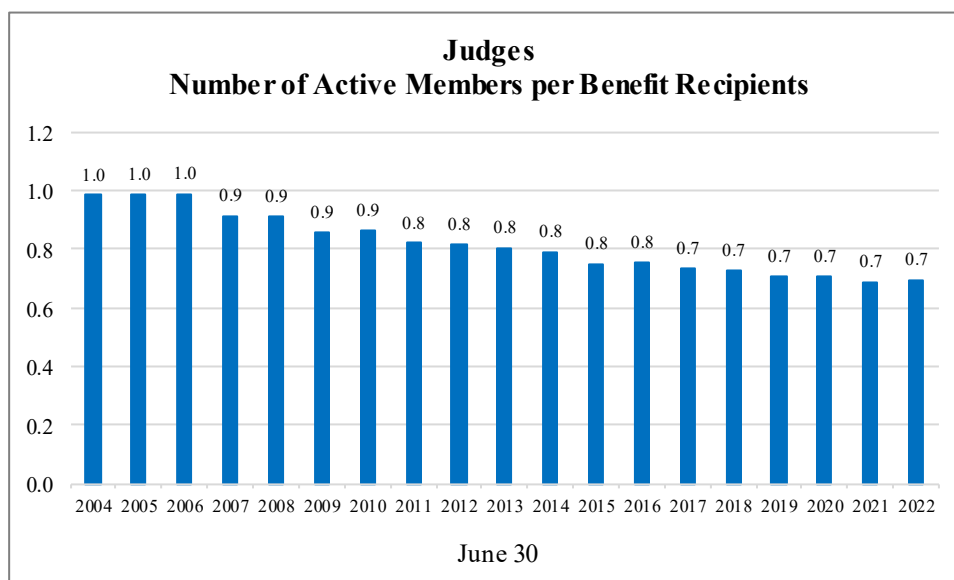
<b>Fiscal Year Ending</b>	<b>Actuarially Required Employer Contribution</b>	<b>Actual Dollar Amount</b>	<b>Percent Contributed</b>
June 30, 2005	\$21.9	\$21.9	100.0%
June 30, 2006	22.4	22.4	100.0%
June 30, 2007	23.7	23.7	100.0%
June 30, 2008	26.2	26.2	100.0%
June 30, 2009	27.7	27.7	100.0%
June 30, 2010	27.0	27.0	100.0%
June 30, 2011	27.8	27.8	100.0%
June 30, 2012	26.3	26.3	100.0%
June 30, 2013	28.3	28.3	100.0%
June 30, 2014	29.3	29.3	100.0%
June 30, 2015	32.7	32.7	100.0%
June 30, 2016	31.6	33.6	106.3%
June 30, 2017	32.7	34.2	104.6%
June 30, 2018	36.9	36.9	100.0%
June 30, 2019	38.6	38.6	100.0%
June 30, 2020	39.2	39.2	100.0%
June 30, 2021	40.0	40.0	100.0%
June 30, 2022	39.2	39.2	100.0%



SECTION 8 – OTHER INFORMATION

**TABLE 21  
HISTORICAL MEMBER STATISTICS**

Valuation Date June 30	Active Members				Retired Members			
	Number	Payroll \$ Millions	Average Salary \$	% Incr.	Number	Active/ Retired	Annual Benefits \$ Millions	% Incr.
2004	391	\$40	\$101,911		397	1.0	\$18.0	
2005	392	40	102,082	0.2	397	1.0	18.8	4.4
2006	394	40	102,209	0.1	398	1.0	19.4	3.2
2007	400	41	102,116	(0.1)	437	0.9	21.7	11.9
2008	401	45	111,079	8.8	440	0.9	22.5	3.7
2009	397	46	114,623	3.2	463	0.9	24.0	6.7
2010	402	46	114,708	0.1	465	0.9	24.5	2.1
2011	399	46	115,008	0.3	486	0.8	26.5	8.2
2012	398	46	115,165	0.1	488	0.8	27.0	1.9
2013	400	49	121,744	5.7	497	0.8	28.4	5.2
2014	405	50	122,439	0.6	511	0.8	29.8	4.9
2015	405	56	137,423	12.2	539	0.8	32.4	8.7
2016	408	57	140,738	2.4	540	0.8	33.2	2.5
2017	410	58	141,832	0.8	559	0.7	34.6	4.2
2018	415	60	143,498	1.2	569	0.7	36.3	4.9
2019	414	60	145,847	1.6	585	0.7	38.6	6.3
2020	418	61	147,012	0.8	590	0.7	40.1	3.9
2021	418	63	150,793	2.6	607	0.7	42.3	5.5
2022	415	63	152,573	1.2	596	0.7	42.9	1.4





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**MEMBER DATA RECONCILIATION**

	Active Members	Inactive Vested	Leave of Absence	Retirees	Beneficiaries	Total
As of June 30, 2021	418	27	0	450	157	1,052
Changes in status:						
a) Retirement	(15)	(2)	0	17	0	0
b) Death	(1)	0	0	(18)	(22)	(41)
c) Leave of absence	0	0	0	0	0	0
d) Vested termination	(2)	2	0	0	0	0
e) Contribution refund	0	0	0	0	0	0
f) Beneficiary in receipt	0	0	0	0	12	12
g) Disability retirement	0	0	0	0	0	0
h) Return to active service	0	0	0	0	0	0
i) Expired benefit	0	0	0	0	0	0
j) Data adjustment	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total changes in status	(18)	0	0	(1)	(10)	(29)
New entrants	15	0	0	0	0	15
Net Change	(3)	0	0	(1)	(10)	(14)
As of June 30, 2022	415	27	0	449	147	1,038



**APPENDIX A – MEMBERSHIP DATA**

**SUMMARY OF MEMBERSHIP DATA**

<b>A. ACTIVE MEMBERS</b>	<b>June 30, 2022</b>	<b>June 30, 2021</b>	<b>% Change</b>
1. Number of Active Members			
(a) Judicial Plan	152	166	(8.4)
(b) Judicial Plan 2011	263	252	4.4
(c) Total	415	418	(0.7)
2. Annualized Reported Salary			
(a) Judicial Plan	\$ 23,780,701	\$ 25,683,827	(7.4)
(b) Judicial Plan 2011	39,537,187	37,347,679	5.9
(c) Total	\$ 63,317,888	\$ 63,031,506	0.5
3. Accumulated Member Contributions	\$ 8,386,600	\$ 7,040,934	19.1
4. Active Member Averages			
(a) Age	55.7	55.5	0.4
(b) Service	11.0	10.8	1.9
(c) Compensation	\$ 152,573	\$ 150,793	1.2
<b>B. INACTIVE MEMBERS</b>			
1. Number of Inactive Vested Members	27	27	0.0
2. Inactive Vested Member Averages			
(a) Age	53.7	54.0	(0.6)
(b) Monthly benefit	\$ 2,692	2,629	2.4
<b>C. RETIREES, DISABLEDS, AND BENEFICIARIES</b>			
1. Number of Members			
(a) Retirees	449	450	(0.2)
(b) Beneficiaries	147	157	(6.4)
(c) Total	596	607	(1.8)
2. Total Monthly Benefits			
(a) Retired	\$ 3,086,391	\$ 3,011,453	2.5
(b) Beneficiaries	489,145	514,059	(4.8)
(c) Total	\$ 3,575,536	\$ 3,525,512	1.4
3. Average Age			
(a) Retired	75.7	75.3	0.5
(b) Beneficiaries	80.6	81.2	(0.7)
(c) Total	76.9	76.8	0.1

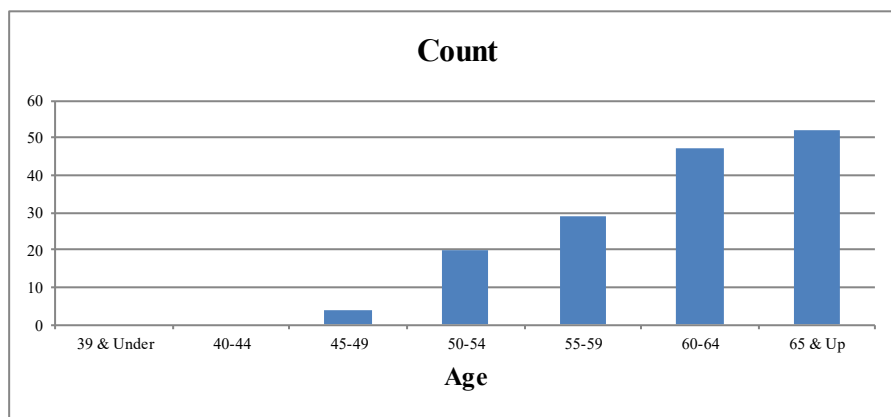


**APPENDIX A – MEMBERSHIP DATA**

**ACTIVE MEMBERS  
AS OF JUNE 30, 2022**

**HIRED BEFORE JANUARY 1, 2011**

Age	Count of Members			Reported Annualized Earnings for Current Members		
	Male	Female	Total	Male	Female	Total
39 & Under	0	0	0	\$ 0	\$ 0	\$ 0
40-44	0	0	0	0	0	0
45-49	2	2	4	306,132	293,376	599,508
50-54	12	8	20	1,828,307	1,284,848	3,113,155
55-59	23	6	29	3,689,865	927,312	4,617,177
60-64	30	17	47	4,630,411	2,702,559	7,332,970
65 & Up	<u>41</u>	<u>11</u>	<u>52</u>	<u>6,400,886</u>	<u>1,717,005</u>	<u>8,117,891</u>
Total	108	44	152	\$ 16,855,601	\$ 6,925,100	\$ 23,780,701



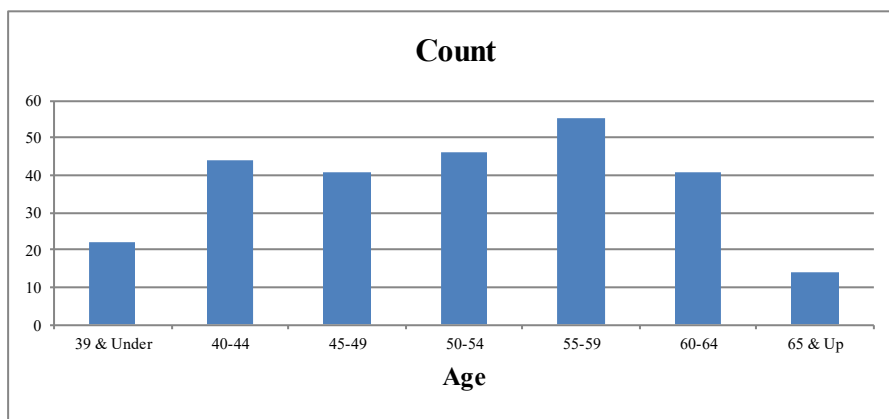


**APPENDIX A – MEMBERSHIP DATA**

**ACTIVE MEMBERS  
AS OF JUNE 30, 2022**

**HIRED ON OR AFTER JANUARY 1, 2011**

Age	Count of Members			Reported Annualized Earnings for Current Members		
	Male	Female	Total	Male	Female	Total
39 & Under	14	8	22	\$ 2,130,347	\$ 1,200,219	\$ 3,330,566
40-44	23	21	44	3,417,609	3,099,553	6,517,162
45-49	24	17	41	3,606,810	2,518,617	6,125,427
50-54	33	13	46	4,947,496	1,943,552	6,891,048
55-59	44	11	55	6,733,282	1,668,396	8,401,678
60-64	25	16	41	3,804,390	2,332,935	6,137,325
65 & Up	<u>12</u>	<u>2</u>	<u>14</u>	<u>1,815,093</u>	<u>318,888</u>	<u>2,133,981</u>
Total	175	88	263	\$ 26,455,027	\$ 13,082,160	\$ 39,537,187



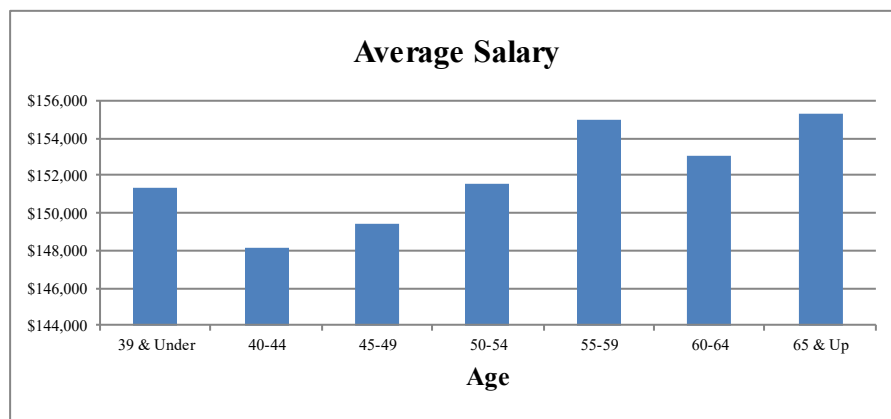
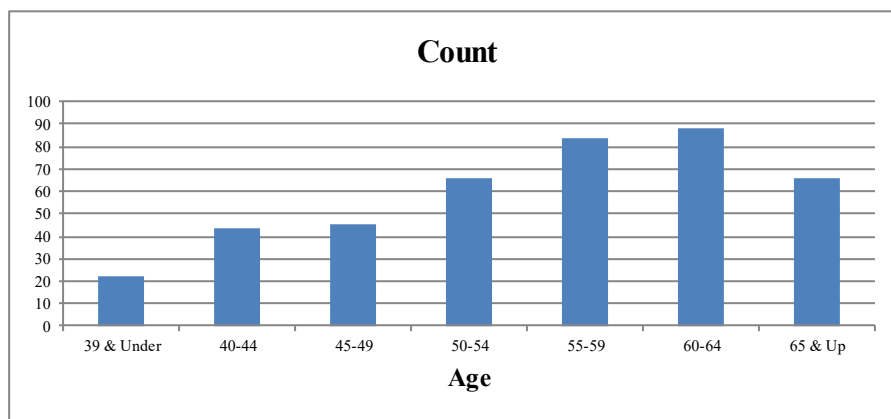


**APPENDIX A – MEMBERSHIP DATA**

**ACTIVE MEMBERS  
AS OF JUNE 30, 2022**

**TOTAL**

Age	Count of Members			Reported Annualized Earnings for Current Members		
	Male	Female	Total	Male	Female	Total
39 & Under	14	8	22	\$ 2,130,347	\$ 1,200,219	\$ 3,330,566
40-44	23	21	44	3,417,609	3,099,553	6,517,162
45-49	26	19	45	3,912,942	2,811,993	6,724,935
50-54	45	21	66	6,775,803	3,228,400	10,004,203
55-59	67	17	84	10,423,147	2,595,708	13,018,855
60-64	55	33	88	8,434,801	5,035,494	13,470,295
65 & Up	<u>53</u>	<u>13</u>	<u>66</u>	<u>8,215,979</u>	<u>2,035,893</u>	<u>10,251,872</u>
Total	283	132	415	\$ 43,310,628	\$ 20,007,260	\$ 63,317,888





APPENDIX A – MEMBERSHIP DATA

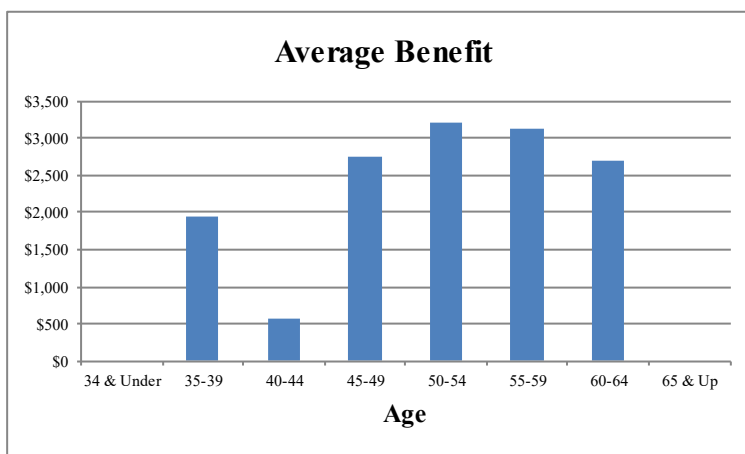
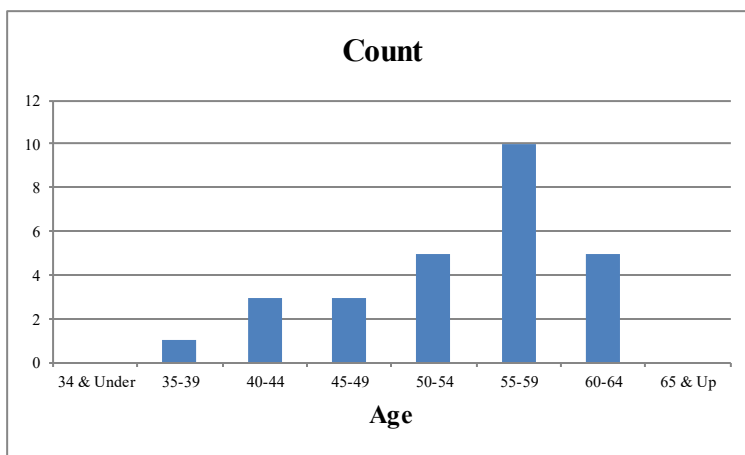
**AGE AND SERVICE DISTRIBUTION  
AS OF JUNE 30, 2022**

Age		0-4	5-9	10-14	15-19	20-24	25-29	Over 29	Total
<b>39 &amp; Under</b>	Number	20	1	1	0	0	0	0	22
	Total Salary	\$ 3,014,528	\$ 156,594	\$ 159,444	\$ 0	\$ 0	\$ 0	\$ 0	\$ 3,330,566
	Average Sal.	\$ 150,726	\$ 156,594	\$ 159,444	\$ 0	\$ 0	\$ 0	\$ 0	\$ 151,389
<b>40-44</b>	Number	31	12	1	0	0	0	0	44
	Total Salary	\$ 4,537,308	\$ 1,820,410	\$ 159,444	\$ 0	\$ 0	\$ 0	\$ 0	\$ 6,517,162
	Average Sal.	\$ 146,365	\$ 151,701	\$ 159,444	\$ 0	\$ 0	\$ 0	\$ 0	\$ 148,117
<b>45-49</b>	Number	19	16	7	3	0	0	0	45
	Total Salary	\$ 2,816,812	\$ 2,415,731	\$ 1,052,328	\$ 440,064	\$ 0	\$ 0	\$ 0	\$ 6,724,935
	Average Sal.	\$ 148,253	\$ 150,983	\$ 150,333	\$ 146,688	\$ 0	\$ 0	\$ 0	\$ 149,443
<b>50-54</b>	Number	20	21	11	12	2	0	0	66
	Total Salary	\$ 2,974,425	\$ 3,148,041	\$ 1,742,273	\$ 1,846,088	\$ 293,376	\$ 0	\$ 0	\$ 10,004,203
	Average Sal.	\$ 148,721	\$ 149,907	\$ 158,388	\$ 153,841	\$ 146,688	\$ 0	\$ 0	\$ 151,579
<b>55-59</b>	Number	16	27	18	17	5	1	0	84
	Total Salary	\$ 2,416,571	\$ 4,147,628	\$ 2,804,460	\$ 2,687,028	\$ 816,480	\$ 146,688	\$ 0	\$ 13,018,855
	Average Sal.	\$ 151,036	\$ 153,616	\$ 155,803	\$ 158,060	\$ 163,296	\$ 146,688	\$ 0	\$ 154,986
<b>60-64</b>	Number	9	22	18	11	14	12	2	88
	Total Salary	\$ 1,349,517	\$ 3,282,660	\$ 2,798,749	\$ 1,729,059	\$ 2,131,542	\$ 1,885,392	\$ 293,376	\$ 13,470,295
	Average Sal.	\$ 149,946	\$ 149,212	\$ 155,486	\$ 157,187	\$ 152,253	\$ 157,116	\$ 146,688	\$ 153,072
<b>65 &amp; Up</b>	Number	2	10	13	7	10	15	9	66
	Total Salary	\$ 306,132	\$ 1,521,717	\$ 2,041,008	\$ 1,064,993	\$ 1,530,660	\$ 2,345,847	\$ 1,441,515	\$ 10,251,872
	Average Sal.	\$ 153,066	\$ 152,172	\$ 157,001	\$ 152,142	\$ 153,066	\$ 156,390	\$ 160,168	\$ 155,331
<b>Total</b>	Number	117	109	69	50	31	28	11	415
	Total Salary	\$ 17,415,293	\$ 16,492,781	\$ 10,757,706	\$ 7,767,232	\$ 4,772,058	\$ 4,377,927	\$ 1,734,891	\$ 63,317,888
	Average Sal.	\$ 148,849	\$ 151,310	\$ 155,909	\$ 155,345	\$ 153,937	\$ 156,355	\$ 157,717	\$ 152,573



**INACTIVE VESTED MEMBERS  
AS OF JUNE 30, 2022**

<u>Age</u>	<u>Count of Members</u>			<u>Monthly Deferred Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
34 & Under	0	0	0	\$ 0	\$ 0	\$ 0
35-39	1	0	1	1,937	0	1,937
40-44	2	1	3	1,377	369	1,746
45-49	1	2	3	5,821	2,458	8,279
50-54	4	1	5	14,338	1,740	16,078
55-59	6	4	10	24,577	6,589	31,166
60-64	4	1	5	10,823	2,658	13,481
65 & Up	0	0	0	0	0	0
Total	18	9	27	\$ 58,873	\$ 13,814	\$ 72,687

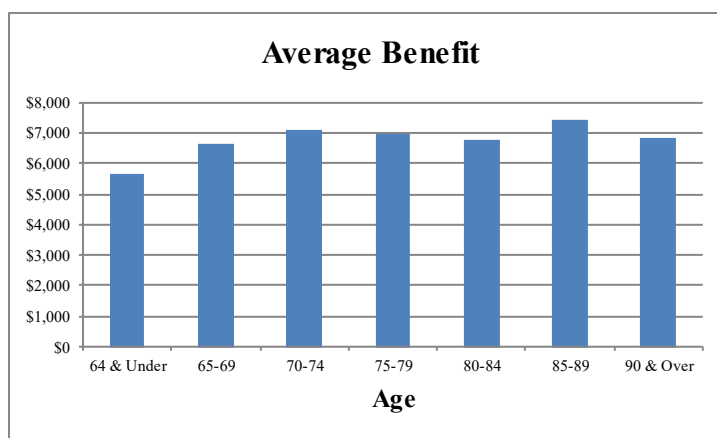
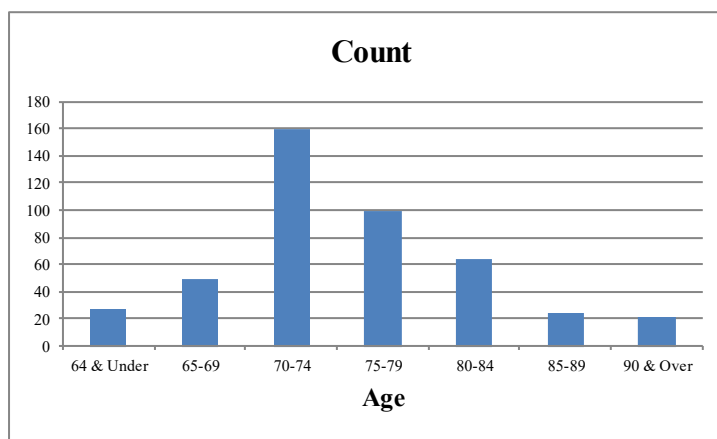




**APPENDIX A – MEMBERSHIP DATA**

**RETIRED MEMBERS  
AS OF JUNE 30, 2022**

<u>Age</u>	<u>Count of Members</u>			<u>Monthly Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
64 & Under	22	6	28	\$ 124,229	\$ 34,486	\$ 158,715
65-69	36	14	50	247,639	83,697	331,336
70-74	132	28	160	932,480	198,554	1,131,034
75-79	85	15	100	590,242	105,576	695,818
80-84	56	8	64	378,390	54,277	432,667
85-89	25	0	25	185,927	0	185,927
90 & Over	<u>22</u>	<u>0</u>	<u>22</u>	<u>150,894</u>	<u>0</u>	<u>150,894</u>
Total	378	71	449	\$ 2,609,801	\$ 476,590	\$ 3,086,391

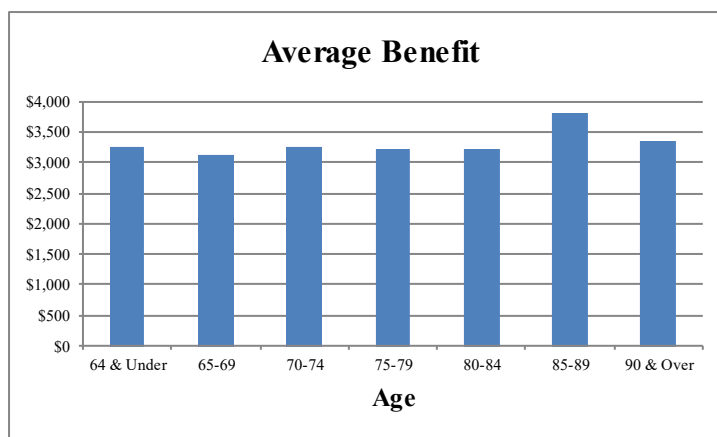
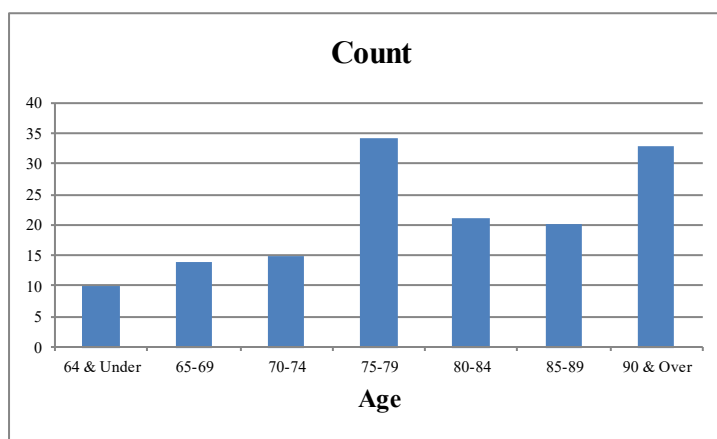






**BENEFICIARIES RECEIVING BENEFITS  
AS OF JUNE 30, 2022**

<u>Age</u>	<u>Count of Members</u>			<u>Monthly Benefits</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
64 & Under	1	9	10	\$ 4,865	\$ 27,667	\$ 32,532
65-69	1	13	14	3,793	39,962	43,755
70-74	1	14	15	2,924	45,996	48,920
75-79	1	33	34	2,916	106,512	109,428
80-84	0	21	21	0	67,624	67,624
85-89	1	19	20	3,955	72,163	76,118
90 & Over	<u>1</u>	<u>32</u>	<u>33</u>	<u>2,357</u>	<u>108,411</u>	<u>110,768</u>
Total	6	141	147	\$ 20,810	\$ 468,335	\$ 489,145





**RETIRED LIVES BENEFITS PAYABLE  
TABULATED BY OPTION AND TYPE OF BENEFIT  
AS OF JUNE 30, 2022**

**Judges Hired Before January 1, 2011**

Type of Benefit	No.	Total Monthly Benefits
Service Retirement		
Life Annuity	2	\$ 14,264
50% Joint and Survivor	437	3,038,451
100% Joint and Survivor	0	0
15-Year Certain and Life	0	0
Survivor Beneficiary	116	395,550
Total	<u>555</u>	<u>3,448,265</u>
Death-in-Service	29	89,951
<b>Total</b>	<b>584</b>	<b>\$ 3,538,216</b>

**Judges Hired On or After January 1, 2011**

Type of Benefit	No.	Total Monthly Benefits
Service Retirement		
Life Annuity	3	\$ 10,178
50% Joint and Survivor	2	7,958
100% Joint and Survivor	4	10,136
15-Year Certain and Life	1	5,404
Survivor Beneficiary	0	0
Total	<u>10</u>	<u>33,676</u>
Death-in-Service	2	3,644
<b>Total</b>	<b>12</b>	<b>\$ 37,320</b>



## Age and Service Retirement

### *Eligibility for Unreduced Benefit (for Members Hired Before 1/1/2011)*

The earliest of attaining:

- (1) At least 62 with 12 years of creditable service.
- (2) At least 60 with 15 years of creditable service.
- (3) At least 55 with 20 years of creditable service.

### *Eligibility for Unreduced Benefit (for Members Hired On or After 1/1/2011)*

The earliest of attaining:

- (1) At least 67 with 12 years of creditable service.
- (2) At least 62 with 20 years of creditable service.

### *Benefit Amount*

50% of compensation

## Early Retirement

### *Eligibility for Reduced Benefit (for Members Hired Before 1/1/2011)*

Age 60

### *Benefit Amount*

- (1) If between 60 and 62, years of service divided by 15 multiplied by 50% of compensation.
- (2) If at least 62, years of service divided by 12 and multiplied by 50% of compensation.

### *Eligibility for Reduced Benefit (for Members Hired On or After 1/1/2011)*

Age 62

### *Benefit Amount*

- (1) If between 60 and 67, years of service divided by 20 multiplied by 50% of compensation.
- (2) If at least 67, years of service divided by 12 and multiplied by 50% of compensation.

## Compensation used for Benefit Determination

The annual salary at date of termination of the highest position held.



## APPENDIX B – SUMMARY OF PLAN PROVISIONS

### Vested Deferred Benefits

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested. Benefits commence once the individual qualifies for normal or early retirement based on age and service.

### Death Benefits

#### *Death Prior to Retirement*

50% of the benefit the member would have been eligible to receive based on service to age 70 is payable to an eligible spouse or minor children.

#### *Death After Retirement*

50% of the benefit the retired member was receiving at the date of death to an eligible surviving spouse for members hired before January 1, 2011.

### Disability Benefits

Disability benefits become payable at the time the member is eligible for normal retirement (50% of salary for remainder of term) and are computed based on the service that would have accrued if active employment had continued until normal retirement age, and member's compensation while an active employee.

### Post-Retirement Benefit Adjustments

Benefits are increased to benefit recipients (including survivors) annually in accordance with the following formulas:

Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase
5.00% or less	4.00%	80% of CPI increase
5.01% - 6.24%	80% of CPI increase	80% of CPI increase
6.25% or more	5.00%	5.00%

Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point, subsequent COLAs based on Formula 2 are granted.

Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2.

Members hired prior to January 1, 2011 who work beyond the later of age 60 or the date when first eligible for age and service retirement will have their monthly benefit increased upon retirement. The percentage increase is equal to all COLAs for the years between (i) the later of age 60 or the date when first eligible for age and service retirement and (ii) date of actual retirement, not to exceed 65%.



**APPENDIX B – SUMMARY OF PLAN PROVISIONS**

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**Member Contributions**

For members hired prior to 1/1/2011:	None
For members hired on or after 1/1/2011:	4.00% of salary, with interest credited at 4.00%.



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## ACTUARIAL METHODS

- 1. Calculation of Normal Cost and Actuarial Accrued Liability:** The funding method used to determine the normal cost and actuarial accrued liability was the Entry Age Actuarial Cost Method described below.

### Entry Age Actuarial Cost Method

Under the entry age normal cost method, the actuarial present value of each member's projected benefit is allocated on a level basis over the member's compensation between the entry age of the member and their assumed exit age. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.

- 2. Calculation of the Actuarial Value of Assets:** Calculation of the Actuarial Value of Assets (AVA): The current asset smoothing method was first effective with the June 30, 2018 valuation. Under this method, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. No corridor is used with the new method. In addition, the total unrecognized investment experience as of June 30, 2017 will be recognized evenly over a seven-year period beginning June 30, 2018.
- 3. Amortization of the Unfunded Actuarial Accrued Liability (UAAL):** Beginning with the June 30, 2018 valuation, the UAAL is amortized using a "layered" approach. Under this method, the "Legacy UAAL", as determined in the June 30, 2018 valuation, is amortized over a closed 30-year period. Effective June 30, 2021, subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 25-year periods. Bases established prior to June 30, 2021 will continue to be amortized on their original schedule. Any change in the System's benefit structure shall be amortized over a closed period of 20 years, as set out in state statutes. The total UAAL amortization payment is the sum of the payments for each of the amortization bases.



**APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS**

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**Changes in Methods and Assumptions since the Prior Year**

There have been no changes since the prior valuation.





## APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

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### ACTUARIAL ASSUMPTIONS

An experience study which analyzed the System’s economic and demographic assumptions was performed in 2021 and the results were presented to the Board. The assumptions listed below are a result of that experience study. The next experience study is scheduled for 2026.

#### Economic Assumptions

- |                                     |  |
|-------------------------------------|--|
| 1. Investment Return                | 6.95%, compounded annually, net of investment expenses.  |
| 2. Inflation                        | 2.25% per year   |
| 3. Salary Increases                 | 3.00% per year (2.25% Inflation + 0.25% Productivity + 0.50% Merit)  |
| 4. Payroll Growth                   | 2.25% per year   |
| 5. Cost-of-Living Adjustment (COLA) | 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect.<br><br>1.80% on a compounded basis when no minimum COLA is in effect. |
| 6. Administrative Expenses          | Actual prior year expenses, included in normal cost rate.  |

#### Demographic Assumptions

- |                                    |  |
|------------------------------------|--|
| 1. Mortality                       | The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.  |
| a. Post-retirement (Retirees)      | Pub-2010 General Members Median Healthy Retiree mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.     |
| b. Post-retirement (Beneficiaries) | Pub-2010 General Members Median Contingent Survivor mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020. |
| c. Pre-retirement                  | Pub-2010 General Members Median Employee mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.            |



**APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS**

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2. Retirement

**Members Hired Before January 1, 2011**

<b>Early Retirement</b>	
<b>Age</b>	<b>Rate</b>
62-69	5%
70	100

<b>Unreduced Retirement</b>	
<b>Age</b>	<b>Rate</b>
55	10.0%
56-63	3.0
64-66	10.0
67	17.5
68	25.0
69	35.0
70	100.0

**Members Hired On or After January 1, 2011**

<b>Unreduced Retirement</b>	
<b>Age</b>	<b>Rate</b>
62	10%
63-66	3
67	25
68-69	20
70	100

3. Termination: 2.0% per year

4. Disability: None



## APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

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### Other Assumptions

1. Form of Payment	Hired before 1/1/2011 – 50% joint and survivor Hired on or after 1/1/2011 – Straight life annuity
2. Marital Status	
a. Percent married	90% married
b. Spouse's age	Females assumed to be four years younger than males.
3. Pay Increase Timing	Beginning of the fiscal year.
4. Decrement Timing	Decrements of all types are assumed to occur mid-year.
5. Eligibility Testing	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
6. Benefit Service	Exact fractional service is used to determine the amount of the benefit payable.
7. Decrement Relativity	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
8. Decrement Operation	Withdrawal does not operate during normal retirement eligibility.
9. Other Liability Adjustments	None
10. Incidence of Contributions	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
11. Forfeitures	For members hired on or after January 1, 2011 only: Value the greater of the refund amount or the present value of the deferred benefit.
12. Salary and Benefit Limits	For purposes of the valuation, no limits were applied to member compensation or benefits.
13. Commencement age for deferred vested benefit	Normal retirement age



## APPENDIX C – SUMMARY OF ACTUARIAL ASSUMPTIONS

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### **Data Adjustments**

Active and retired member data was reported as of May 31, 2022. It was brought forward to June 30, 2022 by adding one month of service for all active members, one month of contributions and interest for Judicial Plan 2011 members, and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with no annualized salary were assumed to receive the average active member pay.

### **TECHNICAL VALUATION PROCEDURES**

#### **Other Valuation Procedures**

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.



## **APPENDIX D – GLOSSARY OF TERMS**

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<b>Actuarial Accrued Liability</b>	The difference between the actuarial present value of system benefits and the actuarial value of future normal costs. Also referred to as “accrued liability” or “actuarial liability”.
<b>Actuarial Assumptions</b>	Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
<b>Accrued Service</b>	Service credited under the system which was rendered before the date of the actuarial valuation.
<b>Actuarial Equivalent</b>	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate assumptions.
<b>Actuarial Cost Method</b>	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of retirement system benefit between future normal cost and actuarial accrued liability. Sometimes referred to as the “actuarial funding method”.
<b>Experience Gain (Loss)</b>	The difference between actual experience and actuarial assumptions anticipated experience during the period between two actuarial valuation dates.
<b>Actuarial Present Value</b>	The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest and by probabilities of payment.
<b>Amortization</b>	Paying off an interest-discounted amount with periodic payments of interest and principal, as opposed to paying off with lump sum payment.
<b>Normal Cost</b>	The actuarial present value of retirement system benefits allocated to the current year by the actuarial cost method.
<b>Unfunded Actuarial Accrued Liability</b>	<p>The difference between actuarial accrued liability and the valuation assets. Sometimes referred to as “unfunded actuarial liability” or “unfunded accrued liability”.</p> <p>Most retirement systems have unfunded actuarial accrued liability. They arise each time new benefits are added and each time an actuarial loss is realized.</p>