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IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM

Actuarial Valuation Report
as of June 30, 2022

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Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

October 27, 2022

Investment Board
Iowa Public Employees' Retirement System
7401 Register Drive
Des Moines, IA 50321

Re: June 30, 2022 Actuarial Valuation Report

Dear Investment Board Members:

At your request, we have performed an actuarial valuation of the Iowa Public Employees' Retirement System (IPERS or System) as of June 30, 2022, to measure the assets and liabilities of the System, determine the funded status, and set the Required Contribution Rate for fiscal year 2024 based on the results of the valuation and IPERS' Contribution Rate Funding Policy. 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 benefit provisions or actuarial methods since last year's valuation. However, the regularly scheduled quadrennial experience study was completed in June 2022. Based on the findings of that study, the actuary recommended changes to the set of actuarial assumptions which were then adopted by the Investment Board. The assumption changes, as well as their impact on the current valuation results, are discussed further in the Executive Summary section of this report.

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, System benefit provisions as defined in statute, member census data and financial information. While not verifying the data at its source, the actuary performed tests for consistency and reasonableness. We found this information to be reasonably consistent and comparable with information provided in prior years. 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.

In order to prepare the results in this report, we have utilized actuarial models that were developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and 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; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

We certify that all costs, liabilities, and other factors for the System have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer our best estimate of anticipated experience affecting the System. 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. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of potential results is not presented herein.

The actuarial computations presented in this report are for purposes of determining the recommended funding amounts for the System and have been made on a basis consistent with our understanding of the System's funding requirements and goals and the plan provisions described in Appendix B of this report. 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. In particular, actuarial computations for purposes of fulfilling financial reporting requirements for the System under Governmental Accounting Standards Board Statements No. 67 and No. 68 are presented in separate reports.

The consultants who worked on this assignment are pension actuaries with significant public plan experience. In addition, the signing actuaries are independent of the System and the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

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 this valuation was prepared in accordance with standards of practice promulgated by the Actuarial Standards Board. The actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonable based on the actual experience of the System. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

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

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

Brent A. Banister, PhD, FSA, EA, FCA, MAAA
Chief Actuary

INTRODUCTION

This report presents the results of the June 30, 2022, actuarial valuation of the Iowa Public Employees' Retirement System (IPERS). The primary purposes of performing the valuation are as follows:

- to determine the Actuarial Contribution Rate (ACR) and the Required Contribution Rate (RCR) for the Regular membership, Sheriffs and Deputies, and the Protection Occupation group (all public safety members other than Sheriffs and Deputies) in accordance with IPERS' Contribution Rate Funding Policy (described in Appendix E),
- to evaluate the funded status of the System and disclose various asset and liability measures as of June 30, 2022,
- to determine the actuarial experience of the System since the last valuation,
- to assess and disclose the key risks associated with funding the System, and
- to analyze and report on trends in System contributions, assets, and liabilities over the past several years.

Given the importance of actuarial assumptions in the valuation process, IPERS performs a comprehensive experience study every four years, a statutory requirement. The purpose of the experience study is to review the current assumptions, in light of the actual experience, and determine whether changes are needed to more appropriately model future experience. The regularly scheduled experience study, which covered the four-year period ending June 30, 2021, was completed in June 2022. Based on the findings in the study, the System's actuary recommended some changes to the set of actuarial assumptions which were then adopted by the Investment Board. They include:

- Mortality assumption was changed to the Pub-2010 General Employees Mortality Tables, projected generationally using Scale MP-2021. Rates were modified for each membership group to better reflect observed experience.
- Retirement rates were adjusted to partially reflect observed experience for Regular members only.
- Disability rates were lowered for Regular members only.
- Termination rates were adjusted to partially reflect observed experience for all groups.

The new set of actuarial assumptions is intended to better model future experience and, therefore, produce a better estimate of the System's liabilities. The impact of these changes on the June 30, 2022, valuation results is summarized in the following tables (dollars in millions):

Regular Members	Old Assumptions	New Assumptions	Difference
Actuarial Liability (AL)	$41,091	$41,091	$0
Actuarial Value of Assets (AVA)	36,346	36,346	0
Unfunded AL (UAL)	$ 4,745	$ 4,745	$0
Funded Ratio	88.45%	88.45%	0.00%
Normal Cost Rate	10.49%	10.60%	0.11%
UAL Rate	3.35%	3.36%	0.01%
Actuarial Contribution Rate	13.84%	13.96%	0.12%
Required Contribution Rate	15.73%	15.73%	0.00%

Note: Numbers may not add due to rounding

Sheriffs & Deputies	Old Assumptions	New Assumptions	Difference
Actuarial Liability (AL)	$859.7	$849.7	($10.1)
Actuarial Value of Assets (AVA)	889.6	889.6	0.0
Unfunded AL (UAL)	$ (29.9)	$ (40.0)	($10.1)
Funded Ratio	103.48%	104.70%	1.22%
Normal Cost Rate	16.93%	16.78%	(0.15%)
UAL Rate	0.00%	0.00%	0.00%
Actuarial Contribution Rate	16.93%	16.78%	(0.15%)
Required Contribution Rate	17.02%	17.02%	0.00%

Note: Numbers may not add due to rounding

Protection Occupation	Old Assumptions	New Assumptions	Difference
Actuarial Liability (AL)	$2,062	$2,029	($32)
Actuarial Value of Assets (AVA)	2,119	2,119	0
Unfunded AL (UAL)	$ (57)	$ (89)	($32)
Funded Ratio	102.77%	104.41%	1.64%
Normal Cost Rate	15.32%	15.31%	(0.01%)
UAL Rate	0.00%	0.00%	0.00%
Actuarial Contribution Rate	15.32%	15.31%	(0.01%)
Required Contribution Rate	15.52%	15.52%	0.00%

Note: Numbers may not add due to rounding

The actuarial valuation results provide a "snapshot" view of the System's financial condition on June 30, 2022. There have been no changes to the plan provisions or actuarial methods since last year's valuation. The valuation results reflect net favorable experience for the past plan year as demonstrated by an unfunded actuarial liability (UAL) that was lower than expected. The total UAL on June 30, 2022, for all three membership groups covered by IPERS, is $4.615 billion while the expected UAL, before the assumption change, was $4.751 billion. The favorable experience was the net result of an experience gain of $277 million on the actuarial value of assets and an experience loss of $142 million on System liabilities.

For many years, the contribution rates for Regular members and employers were set in state statute. Effective with the 2011 valuation, authority was given to IPERS to set the Required Contribution Rate for the Regular membership group based on the Actuarial Contribution Rate developed in the annual actuarial valuation, subject to a maximum change of 1.00% per year. Based on the Contribution Rate Funding Policy and the valuation results, the Required Contribution Rate for Regular members remains unchanged at 15.73% of pay. The Required Contribution Rate also remains the same for the Protection Occupation group, while it decreased by 0.50% of pay for the Sheriffs and Deputies group. The contribution rate is split 50%/50% for the Sheriffs and Deputies group so the change will impact both employer and employee contribution rates. **The Required Contribution Rate is above the Actuarial Contribution Rate for all three groups, resulting in a contribution margin, as shown in the following table.**

Contribution Rate for FY 2024	Regular Membership	Sheriffs and Deputies	Protection Occupation
1. Normal Cost Rate	10.60%	16.78%	15.31%
2. Amortization of UAL	3.36%	0.00%	0.00%
3. Actuarial Contribution Rate	13.96%	16.78%	15.31%
4. Required Contribution Rate	15.73%	17.02%	15.52%
5. Shortfall/(Margin) (3) – (4)	(1.77%)	(0.24%)	(0.21%)
6. Employee Contribution Rate	6.29%	8.51%	6.21%
7. Employer Contribution Rate (4) - (6)	9.44%	8.51%	9.31%
8. Unfunded Actuarial Liability ($M)	$4,745	($40)	($89)
9. Funded Ratio	88.45%	104.70%	104.41%

Further details on the June 30, 2022, valuation results can be found in the following sections of this Executive Summary.

EXPERIENCE FOR THE PRIOR PLAN YEAR

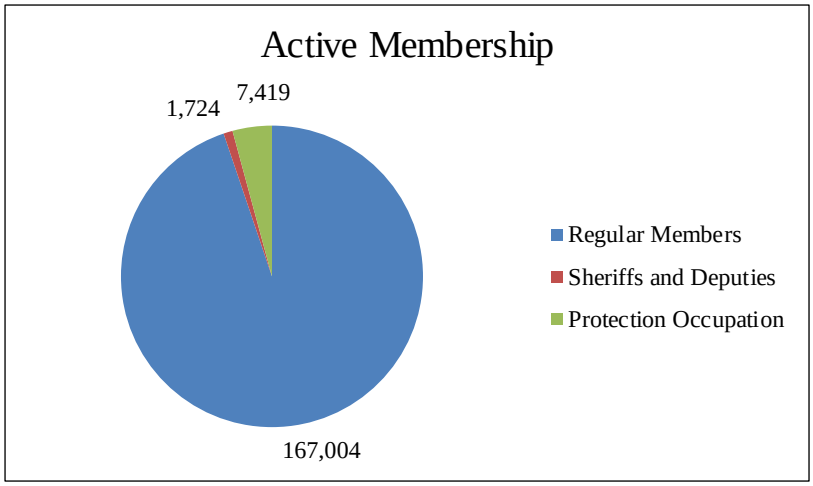
Numerous factors contributed to the change in the System's assets, liabilities and the Actuarial Contribution Rate between the June 30, 2021, and June 30, 2022, valuations. The components are examined in the following discussion.

MEMBERSHIP

IPERS has three membership groups:

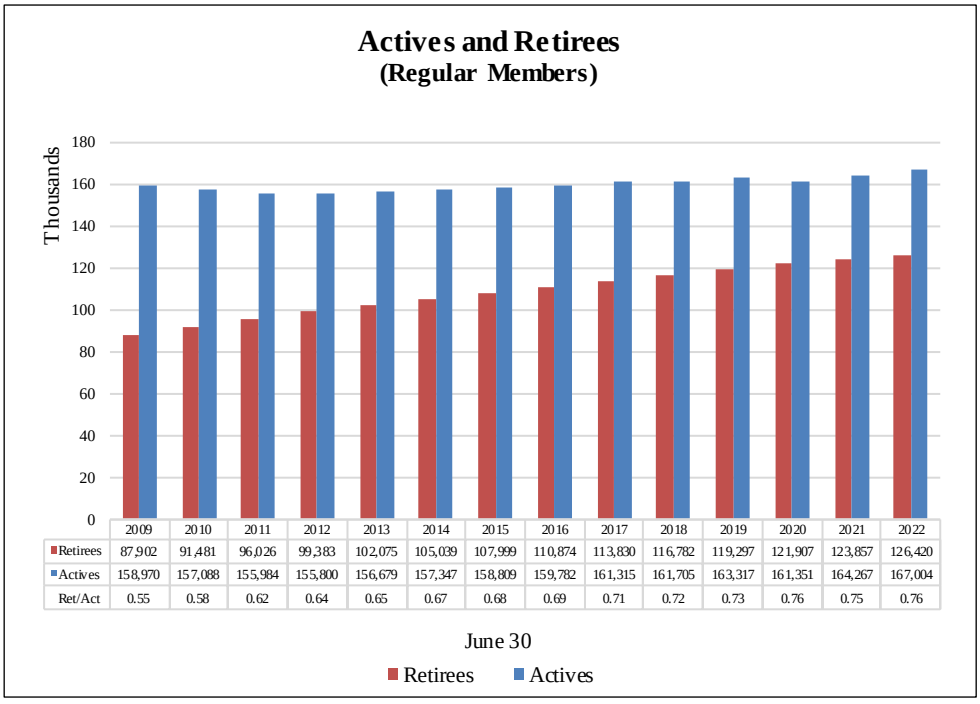
- Regular,
- Sheriffs and Deputies, and
- Protection Occupation.

Each membership group has a different benefit structure and members of each group, and their employers contribute to IPERS at different contribution rates. Note that the split of the Required Contribution Rate for the Sheriffs and Deputies group is 50% employee/50% employer while the split for the Regular members and Protection Occupation group is 40% employee/60% employer. A breakdown of the active membership by group, as of June 30, 2022, is shown on the following page. The Regular members represent about 95% of the total actives.



There were 167,004 active Regular members in the 2022 valuation compared to 164,267 in the 2021 valuation, a 1.7% increase. When the number of active members increases, it usually has a favorable impact on the Actuarial Contribution Rate. The unfunded actuarial liability is amortized assuming future covered payroll will increase in accordance with the assumption (currently 3.25% per year). If covered payroll increases more than assumed, the dollar amount of the UAL payment is divided by a higher dollar amount of covered payroll, resulting in a lower UAL contribution rate. As a result, there is a corresponding lower Actuarial Contribution Rate. Due to the increase in the active membership since the 2021 valuation, covered payroll in the 2022 valuation, including covered payroll for retired reemployed members, increased by 4.08% which was higher than the assumed increase of 3.25%. As a result, the UAL contribution rate is lower as is the actuarial contribution rate.

The following graph shows the number of members receiving a benefit (retired reemployed members are only counted as retirees) compared to the number of active members for the Regular membership over the past 14 valuations. The number of active members in the Regular membership group has remained relatively stable for the past 14 years. In contrast, the number of members receiving a benefit has steadily increased. As a result, the ratio of retirees to actives has increased materially over this period. This is common for very mature retirement systems and is one of the reasons for accumulating assets by funding the benefits in advance. However, the relationship between the number of retirees/beneficiaries and the number of active members (which impacts covered payroll on which contributions are paid) can create some pressure on the actuarial contribution rate. For more discussion, please see Exhibit 22 in Section VI of this report.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Retirees	87,902	91,481	96,026	99,383	102,075	105,039	107,999	110,874	113,830	116,782	119,297	121,907	123,857	126,420
Actives	158,970	157,088	155,984	155,800	156,679	157,347	158,809	159,782	161,315	161,705	163,317	161,351	164,267	167,004
Ret/Act	0.55	0.58	0.62	0.64	0.65	0.67	0.68	0.69	0.71	0.72	0.73	0.76	0.75	0.76

Although the ratio of retirees to actives is different for the Sheriffs and Deputies and Protection Occupation groups, the same increasing trend is evident in all three membership groups (see Exhibit 25).

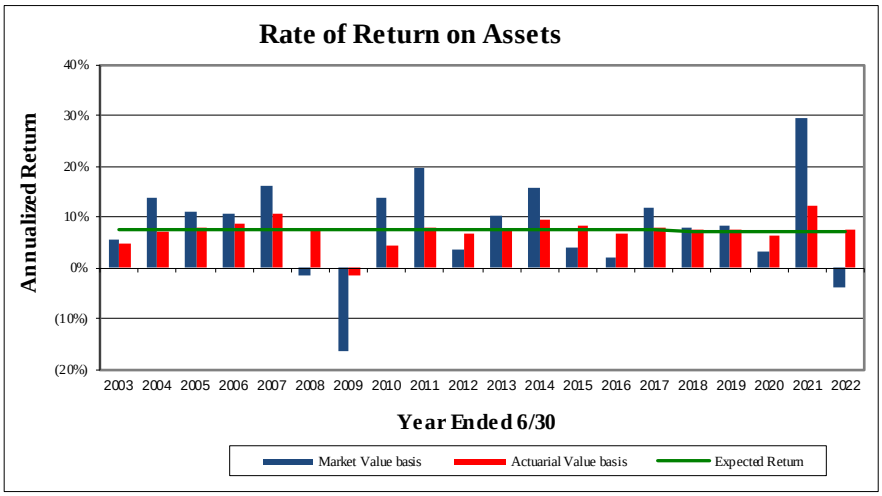
ASSETS

As of June 30, 2022, the System (all membership groups) had total net assets of $40.186 billion, when measured on a market value (or "fair value") basis. This was a decrease of $2.703 billion from the prior year.

The market value of assets is not used directly in the calculation of the unfunded actuarial liability and the Actuarial Contribution Rates. An asset valuation method that smoothes the effect of market fluctuations is used to determine the value of assets used in the valuation. This amount, called the "actuarial value of assets", is equal to the expected asset value, based on the actuarial value in the prior valuation, net cash flows, and the assumed rate of return (7.0%), plus 25% of the difference between the actual market value and the expected asset value. After applying the asset valuation method, the resulting value must be no less than 80% of market value and no more than 120% of market value (referred to as a "corridor"). The corridor rarely applies and did not impact the determination of the actuarial value of assets in this valuation. The actuarial value of assets as of June 30, 2022, was $39.354 billion, an increase of $1.769 billion from the value in the prior valuation. The components of the change in the asset values are shown in the following table.

	Market Value ($M)		Actuarial Value ($M)	
Net Assets, June 30, 2021	**$**	**42,890**	**$**	**37,585**
• Employer and Member Contributions	+	1,431	+	1,431
• Benefit Payments and Refunds	-	2,532	-	2,532
• Expected Investment Income, Net of Expenses (Based on 7.0% Assumption)	+	2,964	+	2,593
• Actuarial Gain/(Loss) on Investment Return	-	4,567	+	277
Net Assets, June 30, 2022 Before FED Transfer	**$**	**40,186**	**$**	**39,354**
• FED Transfer	+	0	+	0
Net Assets, June 30, 2022 After FED Transfer	**$**	**40,186**	**$**	**39,354**
• Application of Corridor		N/A	+	0
Final Net Assets, June 30, 2022	**$**	**40,186**	**$**	**39,354**

The rate of return on a market value basis, as reported by IPERS, was -3.90%. Due to the combined impact of the unfavorable investment experience during FY 2022 and the deferred investment experience, the net rate of return, measured on the actuarial value of assets, was 7.75%. Since this return exceeded the investment return assumption of 7.00%, it generated an actuarial gain of $277 million.



Rates of return on the actuarial value of assets are much smoother than market value returns, illustrating the advantage of using an asset smoothing method.

Please see Exhibits 2 and 3 in Section II of this report for a summary of the market and actuarial value of assets by group (Regular, Sheriffs and Deputies, and Protection Occupation group) as of June 30, 2022.

In last year's valuation, there was a deferred (unrecognized) investment gain (actuarial value exceeded market value) of $5.305 billion. Due to the rate of return of -3.90% for FY 2022, the deferred investment gain has decreased to $832 million. The deferred investment gain will be recognized in the smoothing method in future years, but may be offset by actual investment experience if less favorable than assumed. For example, a return of 5.0% on the market value of assets for FY 2023 would eliminate the deferred investment gain and result in a return of 7.0% on the actuarial value of assets.

LIABILITIES

The actuarial liability is that portion of the present value of future benefits that will not be paid by the future normal costs for active members. The difference between this liability and the actuarial value of assets at the same date is called the unfunded actuarial liability. The dollar amount of the UAL will be reduced if the contributions to the System exceed the normal cost for the year plus interest on the prior year's UAL, assuming that all actuarial assumptions are met.

The unfunded actuarial liability by group, as of June 30, 2022, is shown in the following table:

($ Millions)	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
Actuarial Liability	$41,091	$850	$2,029	$43,970
Actuarial Value of Assets	36,346	890	2,119	39,354
Unfunded Actuarial Liability*	$4,745	($40)	($89)	$4,615
Funded Ratio	88.45%	104.70%	104.41%	89.50%

* May not add due to rounding.

See Exhibit 7 in Section III of the report for the detailed development of the unfunded actuarial liability for each group.

Changes in the UAL occur for various reasons. The net decrease in the UAL from June 30, 2021, to June 30, 2022 was $344 million, largely due to the investment return on the actuarial value of assets that was higher than the expected return of 7.00%. The components of the net change in the UAL are shown in the following table (in millions):

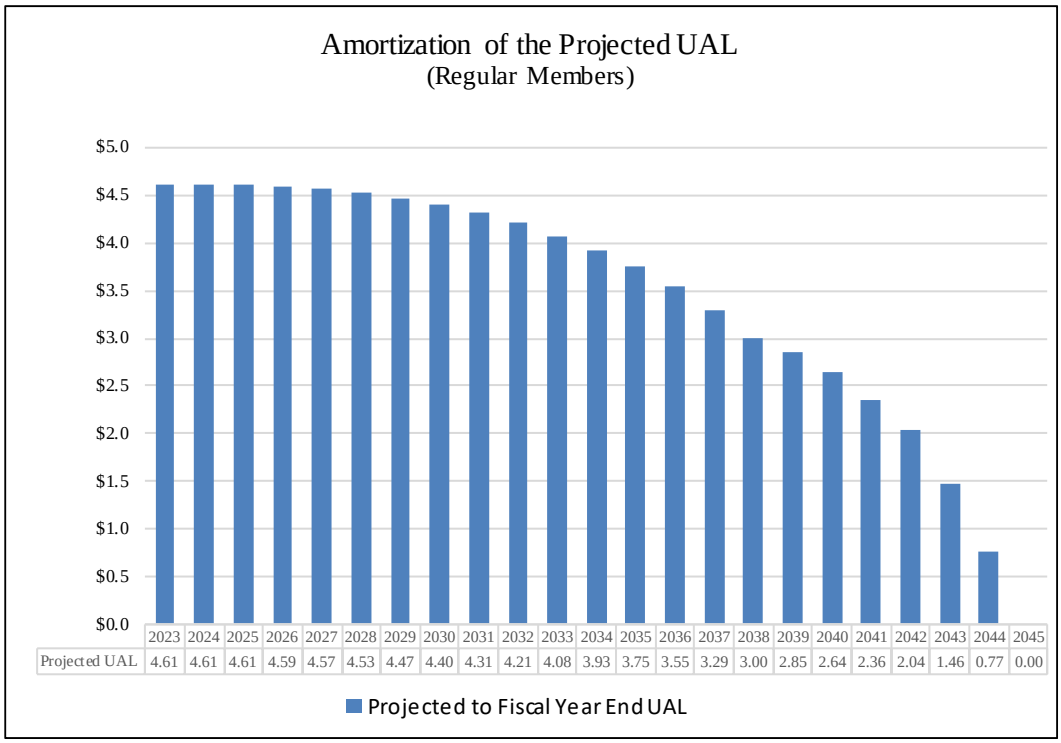
Unfunded Actuarial Liability, June 30, 2021	**$**	**4,960**
• Expected decrease from amortization method		(95)
• Expected decrease from contributions above actuarial rate		(20)
• Investment experience		(277)
• Liability experience*		142
• Assumption changes		(43)
• Other		(52)
Unfunded Actuarial Liability, June 30, 2022	**$**	**4,615**
• FED transfer for favorable experience		0
Unfunded Actuarial Liability, June 30, 2022	**$**	**4,615**

* Liability experience is 0.32% of the expected actuarial liability.

As can be observed above, various factors impacted the amount of the UAL as of June 30, 2022. Actuarial gains (losses), which result from actual experience that is more (less) favorable than anticipated based on the actuarial assumptions, are reflected in the UAL. They are measured as the difference between the expected unfunded actuarial liability and the actual unfunded actuarial liability, after taking into account any changes due to actuarial assumptions and methods or benefit provision changes. Overall, the System experienced a net

actuarial gain of $135 million which may be explained by considering the separate experience of assets and liabilities. As discussed earlier, there was a $277 million actuarial gain on the actuarial value of assets and a net actuarial loss of $142 million from demographic experience that was less favorable than anticipated by the actuarial assumptions. While there are various components of demographic experience, the most significant sources of actuarial loss were due to retirement and mortality experience that was less favorable than anticipated, partially offset by an actuarial gain from salary increases that were lower than expected.

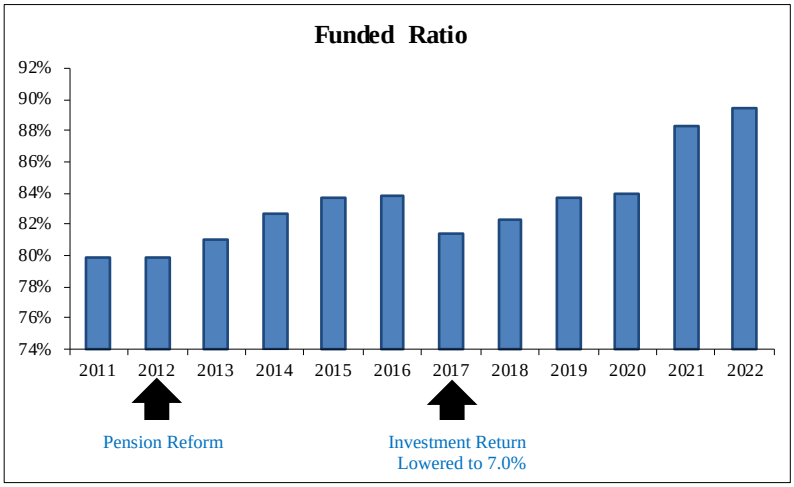
IPERS' UAL is amortized with payments that are determined as a level percentage of covered payroll, a methodology commonly used by public plans. Because covered payroll is expected to increase each year, the dollar amounts of the UAL payments also increase in each future year. As a result, in the early years of the amortization schedule the dollar amount of contributions may be less than the interest on the UAL (particularly when the amortization period is longer), resulting in an increase in the dollar amount of UAL. The following graph illustrates the outstanding balance of the projected UAL ($ in billions) for Regular members over the remainder of the amortization period if the Actuarial Contribution Rate is paid each year and all assumptions are met. There is a one-year lag from the valuation date to the date the contribution rate becomes effective, so while there are 22 payments remaining in the graph below, the UAL isn't eliminated until 23 years after the current valuation date.



The dollar amount of UAL holds relatively steady for a few years and then begins to decline. Note that given IPERS' Contribution Rate Funding Policy, the Required Contribution Rate may vary from the Actuarial Contribution Rate which will impact the outstanding balance of the UAL in future valuations compared to the amounts shown here. In addition, recognition of the deferred investment gains through the asset smoothing method in the future (absent offsetting investment losses) could also impact the actual rate of decline in the UAL compared to this projection.

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

	6/30/2018	6/30/2019	6/30/2020	6/30/2021	6/30/2022
Funded Ratio (Actuarial Value)	82.4%	83.7%	84.0%	88.3%	89.5%
Unfunded Actuarial Liability ($M)	$6,815	$6,477	$6,587	$4,960	$4,615



The funded ratio over this timeframe has typically remained between 80% and 84%, although an exceptionally strong investment return led to a sharp improvement in 2021. Note the decrease in 2017 resulted from lowering the investment return assumption from 7.5% to 7.0%.

Although IPERS has an unfunded actuarial liability, the funded ratio of 89.5% (actuarial assets divided by actuarial liability) marks the highest funded ratio for the System since the Great Recession and represents a positive trend. In addition, since the Contribution Rate Funding Policy was adopted, the actual contribution rate each year has met or exceeded the full actuarial contribution rate. This Funding Policy provides that the scheduled contribution dollars to eventually eliminate the unfunded actuarial liability over time will be made and the funded ratio should improve if all actuarial assumptions are met.

Measures of the funded ratio presented in this report are not an indication of the System's ability to settle its current obligations, nor, on their own, are they an indication of the need for future funding. In addition, please note that due to the use of an asset smoothing method the funded ratio, based on the market value of assets, may differ from the funded ratio based on the actuarial value of assets (shown above).

CONTRIBUTION RATE

Under the Entry Age Normal cost method, the Actuarial Contribution Rate consists of two components:

- a "normal cost" for the portion of projected liability allocated by the actuarial cost method to the service of active members during the year following the valuation date;
- an "unfunded actuarial liability contribution" for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

This valuation is used to determine the contribution rates that will be effective July 1, 2023, for the fiscal year ending June 30, 2024. Prior to the 2011 valuation, Regular members (about 95% of the active membership) contributed according to fixed contribution rates set in statute. Beginning with the 2011 valuation (which set contribution rates for FY 2013), IPERS was given the statutory authority to set the Required Contribution Rate for Regular members, subject to a maximum change of 1.00% per year. **Based on IPERS' Contribution Rate Funding Policy, the Required Contribution Rate for Regular members in this valuation (which sets the contribution rate for FY 2024) will remain unchanged from the prior valuation.**

The remaining 5% of the active members, the Sheriffs and Deputies and the Protection Occupation groups, have historically contributed at the Actuarial Contribution Rate, which was subject to change each year. These groups now contribute based on the same funding policy as is used for the Regular members (without the 1% cap). According to the Contribution Rate Funding Policy, if the Actuarial Contribution Rate is less than the previous Required Contribution Rate by 0.50% or more, then the Required Contribution Rate shall be lowered by 0.50% provided the funded ratio of the membership group is 95% or higher. The current valuation results show that the Actuarial Contribution Rate has decreased by 0.15% for the Sheriffs and Deputies group and increased by 0.01% for the Protection Occupation group. As a result, the Actuarial Contribution Rate for FY 2024 is now 0.74% below the FY 2023 Required Contribution Rate for Sheriffs and Deputies, and 0.21% below the FY 2023 Required Contribution Rate for Protection Occupation. In addition, both groups also have a funded ratio greater than 95%. **Therefore, the FY 2024 Required Contribution Rate for the Sheriffs and Deputies group will decrease by 0.50% of pay from the FY 2023 rate, while Required Contribution Rate for the Protection Occupation group will remain unchanged.** Based on the results of this valuation, the Required Contribution Rate is greater than the Actuarial Contribution Rate for all three groups.

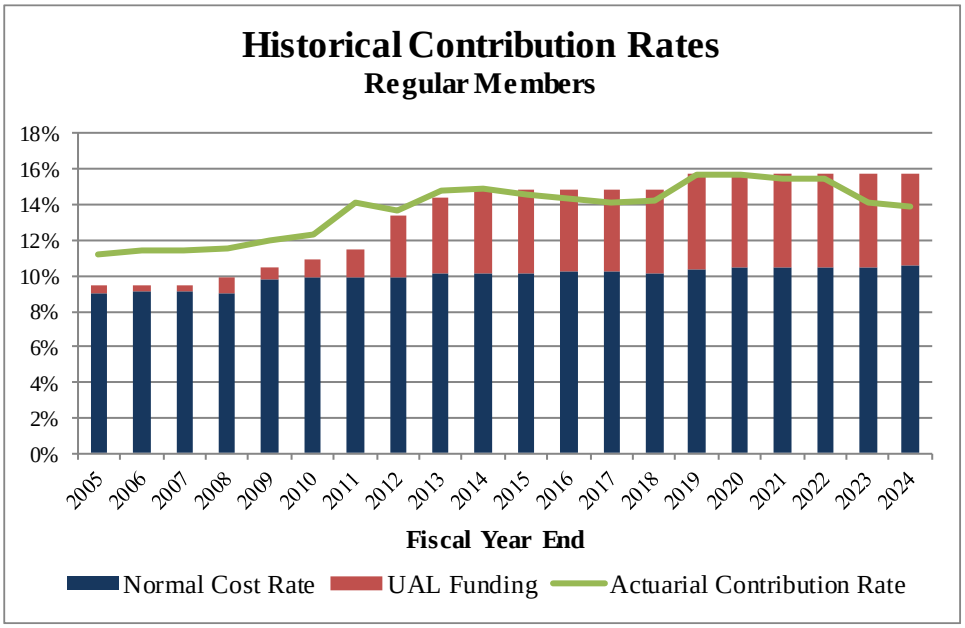
See Exhibit 14 in Section IV for the development of these contribution rates which are summarized in the following table.

Contribution Rate for FY 2024	Regular Membership	Sheriffs & Deputies	Protection Occupation
1. Actuarial Contribution Rate	13.96%	16.78%	15.31%
2. Required Contribution Rate	15.73%	17.02%	15.52%
3. Employee Contribution Rate	6.29%	8.51%	6.21%
4. Employer Contribution Rate (2) – (3)	9.44%	8.51%	9.31%
5. Shortfall/(Margin) (1) – (2)	(1.77%)	(0.24%)	(0.21%)

The Actuarial Contribution Rate is determined based on the snapshot of the System taken on the valuation date, June 30, 2022, and applies only for the fiscal year beginning July 1, 2023. The Actuarial Contribution Rate in future years will change each year as the deferred actuarial investment experience is recognized and other experience (both investment and demographic) impacts the System. The Required Contribution Rate will be set in each future year based on the Actuarial Contribution Rate for that year and the Contribution Rate Funding Policy.

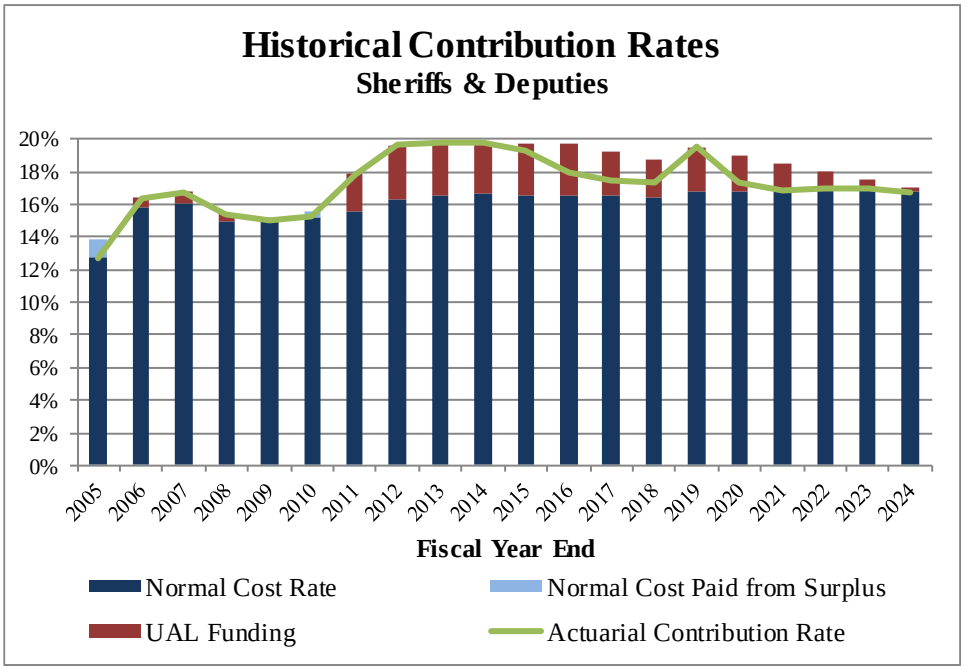
In 2006 and 2010, legislation was passed that increased the statutory contribution rate for Regular members. Beginning with the 2011 valuation (which applied to FY 2013), the Investment Board was given the authority to set the Required Contribution Rate for Regular members subject to certain statutory limitations. A historical

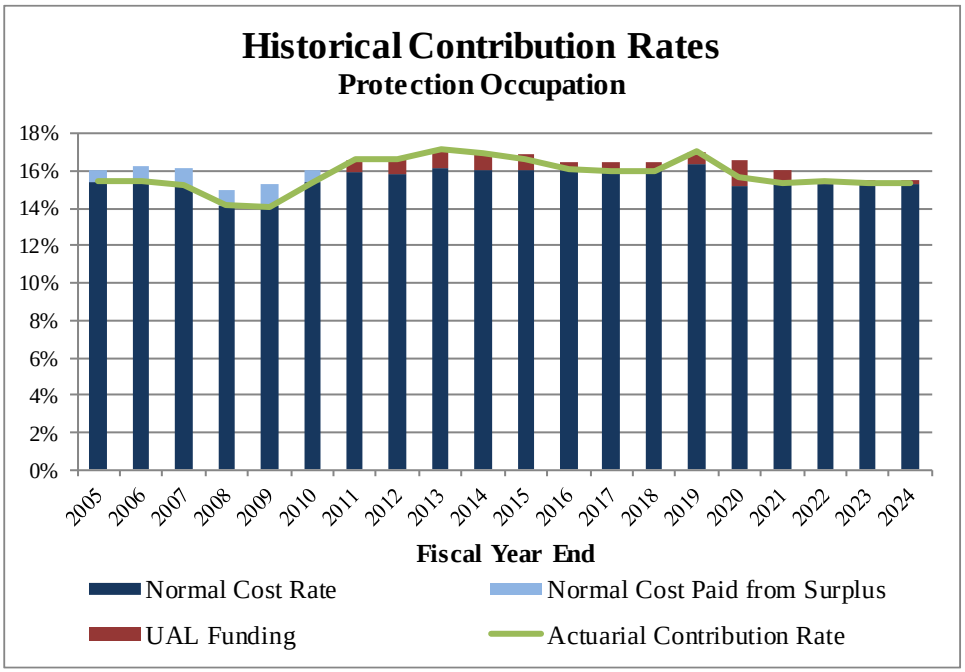
summary of the actual contribution rate, split between the normal cost and the remaining amount available to fund the UAL, and the Actuarial Contribution Rate is shown in the following graph.



At the beginning of this time period, the actual contribution rates were less than the Actuarial Contribution Rate and a very small portion of the total contribution rate was available to fund the UAL. Recent changes have significantly increased this portion, providing more progress toward eliminating the UAL.

As shown in the following graphs, the Sheriffs and Deputies group and the Protection Occupation group have historically contributed the full Actuarial Contribution Rate. During the 20-year period shown, both groups have contributed the full Actuarial Contribution Rate every year (sometimes using surplus to fund part of the normal cost rate) and have contributed more than the ACR in nine of the past ten years, due to the Contribution Rate Funding Policy. As a result, the current valuation results show that both groups have a very strong funded ratio (104.7% for Sheriffs and Deputies, and 104.4% for Protection Occupation).


Historical Contribution Rates
Sheriffs & Deputies
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Fiscal Year End
Normal Cost Rate
Normal Cost Paid from Surplus
UAL Funding
Actuarial Contribution Rate


Historical Contribution Rates
Protection Occupation
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Fiscal Year End
Normal Cost Rate
Normal Cost Paid from Surplus
UAL Funding
Actuarial Contribution Rate

SUMMARY

The investment return on the market value of assets for FY 2022 was -3.90%, as reported by IPERS. This unfavorable investment experience, combined with significant unrecognized investment gains in last year's valuation, led to an investment return on the actuarial value of assets of 7.75%. Since that return is above the assumed investment return of 7.00%, there was an experience gain on the actuarial value of assets of $277 million. This was partially offset by an experience loss on the System's liabilities of $142 million. The System's total experience for FY 2022 was a net experience gain of $135 million, resulting in a smaller unfunded actuarial liability than was expected.

For each membership group, the Actuarial Contribution Rate consists of the normal cost and an amortization payment (not less than zero) of the group's unfunded actuarial liability. The normal cost may only be offset by a negative amortization payment after a membership group has attained a funded ratio of 110% or greater for three consecutive years. The following table summarizes the change to the Actuarial Contribution Rate as well as the Required Contribution Rate, based on the current valuation results.

	2022 Valuation (FY 2024)	2021 Valuation (FY 2023)	Change
Regular Members			
Actuarial Contribution Rate	13.96%	14.14%	(0.18%)
Required Contribution Rate	15.73%	15.73%	0.00%
Sheriffs & Deputies			
Actuarial Contribution Rate	16.78%	16.93%	(0.15%)
Required Contribution Rate	17.02%	17.52%	(0.50%)
Protection Occupation			
Actuarial Contribution Rate	15.31%	15.30%	0.01%
Required Contribution Rate	15.52%	15.52%	0.00%

As illustrated above, the Required Contribution Rate declined for the Sheriffs and Deputies group but remained the same for the Regular Members and Protection Occupation groups. **The Required Contribution Rate remains higher than the Actuarial Contribution Rate for FY 2024 for all three membership groups.**

The Actuarial Contribution Rate is determined based on the snapshot of the System taken on the valuation date, June 30, 2022, and applies only for the fiscal year beginning July 1, 2023. The Actuarial Contribution Rate in the future will change each year as the deferred actuarial investment experience is recognized and as other experience (both investment and demographic) impacts the System. While the Required Contribution Rate can vary each year, the annual change to the rate for Regular members is limited by statute to 1.0% and the Contribution Rate Funding Policy also limits the decrease in the rate. Therefore, depending on actual experience in future years, the Required Contribution Rate may vary from the Actuarial Contribution Rate.

As mentioned earlier, the System utilizes an asset smoothing method in the valuation process. While this is a common procedure for public retirement systems, it is important to identify the potential impact of the deferred investment experience, particularly if deferred investment losses exist. The asset smoothing method impacts only the timing of when the actual market experience is recognized in the valuation process. As a result of the smoothing of actual returns, there is currently a deferred investment gain of $832 million. The key valuation results, using both actuarial and market value of assets, are shown below:

Actuarial Contribution Rate*	**Actuarial Value**	**Market Value**
Regular Members		
Normal Cost	10.60%	10.60%
UAL Contribution	3.36%	2.72%
Total Contribution	13.96%	13.32%
UAL ($M)	$4,745	$3,975
Funded Ratio	88.45%	90.33%
Sheriffs & Deputies		
Normal Cost	16.78%	16.78%
UAL Contribution	(1.66%)	(2.42%)
Total Contribution	15.12%	14.36%
UAL ($M)	($40)	($59)
Funded Ratio	104.70%	106.92%
Protection Occupation		
Normal Cost	15.31%	15.31%
UAL Contribution	(1.18%)	(1.75%)
Total Contribution	14.13%	13.56%
UAL ($M)	($89)	($133)
Funded Ratio	104.41%	106.56%

* Actuarial Contribution Rate is calculated prior to the application of the Contribution Rate Funding Policy which determines the Required Contribution Rate.

The long-term financial health of IPERS is heavily dependent on two key items: (1) future investment returns and (2) systematic contributions to the System at the full actuarially determined rate. Given the System's current funded status, the Actuarial Contribution Rate, and the Required Contribution Rate, the System's funded ratio is expected to improve over the long term, assuming all actuarial assumptions are met in the future and contributions are made according to the current Contribution Rate Funding Policy.

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 each year 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 from the actuarial assumptions.

Risk evaluation is an important part of managing any defined benefit plan. A separate Risk Study was prepared for the Iowa Public Employees' Retirement System in March 2019 that included a comprehensive evaluation of the various risks facing the System, using both qualitative and quantitative analysis. The findings and conclusions of the report were presented to the Investment Board on March 22, 2019. The Risk Report included various types of quantitative analysis including stress tests, sensitivity analysis, and stochastic modeling. A brief discussion of certain key risks is included in Section VI of this report, but for a more comprehensive discussion please see the full Risk Report, dated March 2019. While the Risk Report was based on the 2018 valuation, we believe that the key findings and analysis remain relevant.

We conclude this executive summary by presenting comparative statistics and actuarial information on both the June 30, 2022, and June 30, 2021, valuations. All figures shown include the Regular membership, Sheriffs and Deputies, and the Protection Occupation group.

SUMMARY OF HISTORICAL CHANGE IN IPERS UNFUNDED ACTUARIAL LIABILITY

($Millions)	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Unfunded Actuarial Liability (BOY[1])	1,255	1,867	2,176	2,289	2,507	2,266	2,665	4,895	4,931	5,682	5,916
• **Expected Change**											
– **From Amortization Method**	24	36	42	22	49	44	52	95	96	110	115
– **Contributions different than Actuarial Rate**	61	87	103	125	118	127	140	248	218	65	21
• **Investment Experience**	402	75	(89)	(235)	(622)	5	1,903	666	(66)	168	(15)
• **Liability and Other Experience**	125	82	57	242	187	214	135	(185)	(17)	(109)	(250)
• **Benefit Enhancements**	0	29	0	0	0	6	0	(674)	0	0	0
• **Change in Assumptions/Methods**	0	0	0	64	27	3	0	(114)	417	0	0
• **Change in Actuarial Software**	0	0	0	0	0	0	0	0	103	0	0
• **FED Transfer**	0	0	0	0	0	0	0	0	0	0	0
Unfunded Actuarial Liability (EOY[2])	1,867	2,176	2,289	2,507	2,266	2,665	4,895	4,931	5,682	5,916	5,787

1 = Beginning of Year
2 = End of Year

Note: The amounts shown in each year are not additive because they are calculated on each valuation date and, therefore, represent a value at a different point in time.

SUMMARY OF HISTORICAL CHANGE IN IPERS UNFUNDED ACTUARIAL LIABILITY (continued)

($Millions)	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Unfunded Actuarial Liability (BOY[1])	5,787	5,544	5,455	5,586	6,968	6,815	6,477	6,587	4,960
• **Expected Change**									
– **From Amortization Method**	99	72	54	52	185	43	14	12	(95)
– **Contributions different than Actuarial Rate**	0	(20)	(38)	(58)	(57)	0	(8)	(30)	(20)
• **Investment Experience**	(527)	(171)	236	(102)	(162)	(229)	146	(1,768)	(277)
• **Liability and Other Experience**	(29)	30	(121)	57	(154)	(152)	(42)	159	90
• **Benefit Enhancements**	0	0	0	0	0	0	0	0	0
• **Change in Assumptions/Methods**	215	0	0	1,433	35	0	0	0	(43)
• **Change in Actuarial Software**	0	0	0	0	0	0	0	0	0
• **FED Transfer**	(1)	0	0	0	0	0	0	0	0
Unfunded Actuarial Liability (EOY[2])	5,544	5,455	5,586	6,968	6,815	6,477	6,587	4,960	4,615

1 = Beginning of Year
2 = End of Year

Note: The amounts shown in each year are not additive because they are calculated on each valuation date and, therefore, represent a value at a different point in time.

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
PRINCIPAL RESULTS

	June 30, 2022	June 30, 2021	% Chg
SYSTEM MEMBERSHIP			
1. Active Membership			
- Number of Members (excluding Retired/Reemployed)			
i) Regular	167,004	164,267	1.7
ii) Sheriffs & Deputies	1,724	1,675	2.9
iii) Protection Occupation	7,419	7,362	0.8
iv) Total	176,147	173,304	1.6
- Projected Payroll for Upcoming Fiscal Year	$9,279M	$8,925M	4.0
- Average Projected Salary	$52,680	$51,497	2.3
2. Inactive Membership			
- Number Not in Pay Status	83,557	78,515	6.4
- Number of Retirees/Beneficiaries	131,420	128,589	2.2
- Average Annual Benefit	$18,713	$18,252	2.5
ASSETS AND LIABILITIES			
1. Net Assets (excluding FED reserve)			
- Market Value	$40,186M	$42,890M	(6.3)
- Actuarial Value	39,354M	37,585M	4.7
2. Present Value of Future Benefits			
- Retired Members	$24,154M	$23,244M	3.9
- Inactive Members	1,317M	1,208M	9.0
- Active Members	27,589M	26,649M	3.5
- Total Present Value of Future Benefits*	$53,060M	$51,100M	3.8
3. Actuarial Liability*	$43,970M	$42,545M	3.3
4. Unfunded Actuarial Liability	$4,615M	$4,960M	(7.0)
5. Funded Ratio			
a. Actuarial Value Assets/Actuarial Liability	89.50%	88.34%	1.3
b. Market Value Assets/Actuarial Liability	91.40%	100.81%	(9.3)
SYSTEM CONTRIBUTIONS			
Required Contribution Rate, Regular Members**	15.73%	15.73%	0.0
Employer Contribution Rate	9.44%	9.44%	0.0
Employee Contribution Rate	6.29%	6.29%	0.0
Total Actuarial Contribution Rate	13.96%	14.14%	(1.3)
Shortfall/(Margin)	(1.77%)	(1.59%)	11.3

Note: Totals may not add due to rounding

M = ($)Millions

* Difference between measures is the Present Value of Future Normal Costs

** Contribution rates for Sheriffs and Deputies are 8.51% for employers, 8.51% for employees
Contribution rates for Protection Occupation are 9.31% for employers, 6.21% for employees

SECTION II

SYSTEM ASSETS

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In this section, the values assigned to the assets held by the System are presented. These assets are valued on two different bases: the market value and the actuarial value.

Market Value of Net Assets

For certain accounting statement purposes, System assets are valued at current market prices. These values represent the "snapshot" of the fair value of System assets as of the valuation date.

Actuarial Value of Net Assets

The market value of assets may not necessarily be the best measure of the System's ongoing ability to meet its obligations.

To arrive at a suitable value for the actuarial valuation, a technique for determining the actuarial value of assets is used which dampens volatility in the market value while still indirectly recognizing market value. The specific technique follows:

Step 1: Determine the expected value of plan assets at the current valuation date using the actuarial assumption for investment return on the prior actuarial value of assets and the actual receipts and disbursements of the fund for the previous 12 months.

Step 2: Subtract the expected value determined in Step 1 from the total market value of the Fund at the current valuation date.

Step 3: Multiply the difference between market and expected values determined in Step 2 by 25%.

Step 4: Add the expected value of Step 1 and the product of Step 3 to determine the actuarial value of assets.

Step 5: Verify the preliminary actuarial value of assets in Step 4 is not more than 120% of the market value of assets, nor less than 80% of the market value. If it is, adjust the actuarial value of assets so it falls within the 80% - 120% corridor.

EXHIBIT 1

ANALYSIS OF NET ASSETS AT MARKET VALUES

($ Millions)

	June 30, 2022		June 30, 2021	
	Amount	% of Total	Amount	% of Total
Cash & Equivalents	$ 385	1.0%	$ 510	1.2%
Capital Assets, Receivables and Payables	(1,093)	(2.7)	(772)	(1.8)
Domestic Equity	7,844	19.5	9,251	21.6
International Equity	8,258	20.5	9,649	22.5
Fixed Income	10,484	26.1	12,677	29.5
Private Real Assets	3,555	8.8	2,361	5.5
Private Equity/Debt	10,111	25.2	8,653	20.2
Securities Lending Collateral Pool	642	1.6	561	1.3
TOTAL NET ASSETS	$ 40,186	100.0%	$ 42,890	100.0%
FED Reserve (Before current year transfer)	0		0	
Current Year FED Transfer Payable	0		0	
Net Retirement System Assets	$ 40,186		$ 42,890	

EXHIBIT 2

SUMMARY OF FUND ACTIVITY
(Market Value)

	Regular Membership	Sheriffs & Deputies	Protection Occupation	FED Reserve	Total
NET RETIREMENT SYSTEM ASSETS ON JUNE 30, 2021	$39,637,744,850	$957,673,108	$2,294,457,724	$0	$42,889,875,682
REVENUE					
Employer contributions	802,174,389	12,090,552	38,936,581	0	853,201,522
Member contributions	534,964,616	12,090,675	25,971,934	0	573,027,225
Service purchase	4,498,449	49,638	62,226	0	4,610,313
Investment income	(1,402,476,963)	(33,988,091)	(81,510,510)	0	(1,517,975,564)
Total Revenue	($60,839,509)	($9,757,226)	($16,539,769)	$0	($87,136,504)
DISBURSEMENTS					
Benefit payments	2,324,075,936	42,858,053	100,588,837	0	2,467,522,826
Member refunds	57,001,120	933,870	6,581,755	0	64,516,745
Administrative expenses	13,444,754	112,635	498,713	0	14,056,102
Investment expenses	64,905,994	1,572,953	3,772,269	0	70,251,216
Total Disbursements	$2,459,427,804	$45,477,511	$111,441,574	$0	$2,616,346,889
PRELIMINARY NET ASSETS ON JUNE 30, 2022	$37,117,477,537	$902,438,371	$2,166,476,381	$0	$40,186,392,289
TRANSFERS					
Membership changes	(1,868,156)	6,015,656	(4,147,500)	0	0
FED Reserve	0	0	0	0	0
ADJUSTED NET ASSETS ON JUNE 30, 2022	$37,115,609,381	$908,454,027	$2,162,328,881	$0	$40,186,392,289

EXHIBIT 3

ACTUARIAL VALUE OF NET ASSETS

	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
1. Actuarial Value of Assets as of June 30, 2021	$34,734,902,134	$839,015,517	$2,011,069,645	$37,584,987,296
2. Actual Receipts/Disbursements				
a. Contributions	1,341,637,454	24,230,865	64,970,741	1,430,839,060
b. Benefit Payments and Refunds	2,381,077,056	43,791,923	107,170,592	2,532,039,571
c. Net Change	(1,039,439,602)	(19,561,058)	(42,199,851)	(1,101,200,511)
3. Expected Value of Assets as of June 30, 2022 [(1) x 1.07] + [(2c) x $(1.07)^{.5}$]	36,091,140,599	877,512,487	2,108,192,655	39,076,845,741
4. Preliminary Market Value of Assets as of June 30, 2022	37,117,477,537	902,438,371	2,166,476,381	40,186,392,289
5. Difference Between Market and Expected Values (4) - (3)	1,026,336,938	24,925,884	58,283,726	1,109,546,548
6. Preliminary Actuarial Value of Assets as of June 30, 2022 (3) + [(5) x 25%]	36,347,724,834	883,743,958	2,122,763,587	39,354,232,379
7. Transfers				
a. Membership changes	(1,829,472)	5,891,087	(4,061,615)	0
b. FED Reserve	0	0	0	0
8. Initial Actuarial Value of Assets as of June 30, 2022	$36,345,895,362	$889,635,045	$2,118,701,972	$39,354,232,379
9. Determination of Corridor				
a. 80% of Market Value of Assets	29,692,487,505	726,763,222	1,729,863,105	32,149,113,832
b. 120% of Market Value of Assets	44,538,731,257	1,090,144,832	2,594,794,657	48,223,670,746
10. Final Actuarial Value of Assets as of June 30, 2022 (8), but not less than (9a), nor greater than (9b)	$36,345,895,362	$889,635,045	$2,118,701,972	$39,354,232,379

EXHIBIT 4

HISTORICAL COMPARISON (ACTUARIAL AND MARKET)

Value as of June 30	Actuarial Value of Net Assets (AVA)	Market Value of Net Assets (MVA)	AVA/MVA
2003	16,120,476,011	14,915,941,546	108%
2004	16,951,942,539	16,726,227,853	101%
2005	17,951,490,071	18,224,067,613	99%
2006	19,144,036,519	19,847,676,903	96%
2007	20,759,628,415	22,624,387,015	92%
2008	21,857,423,183	21,844,112,206	100%
2009	21,123,979,941	17,603,316,618	120%
2010	21,537,458,560	19,538,971,423	110%
2011	22,575,309,199	22,772,344,651	99%
2012	23,530,094,461	23,024,773,746	102%
2013	24,711,096,187	24,756,663,715	100%
2014	26,460,428,085	28,038,549,893	94%
2015	27,915,379,103	28,429,834,829	98%
2016	29,033,696,587	28,326,433,656	102%
2017	30,472,423,914	30,779,116,326	99%
2018	31,827,755,864	32,314,588,595	98%
2019	33,324,327,606	34,010,680,731	98%
2020	34,485,656,745	34,047,692,112	101%
2021	37,584,987,296	42,889,875,682	88%
2022	39,354,232,379	40,186,392,289	98%

Values are for all three membership groups, but exclude the Favorable Experience Dividend Reserve Account.

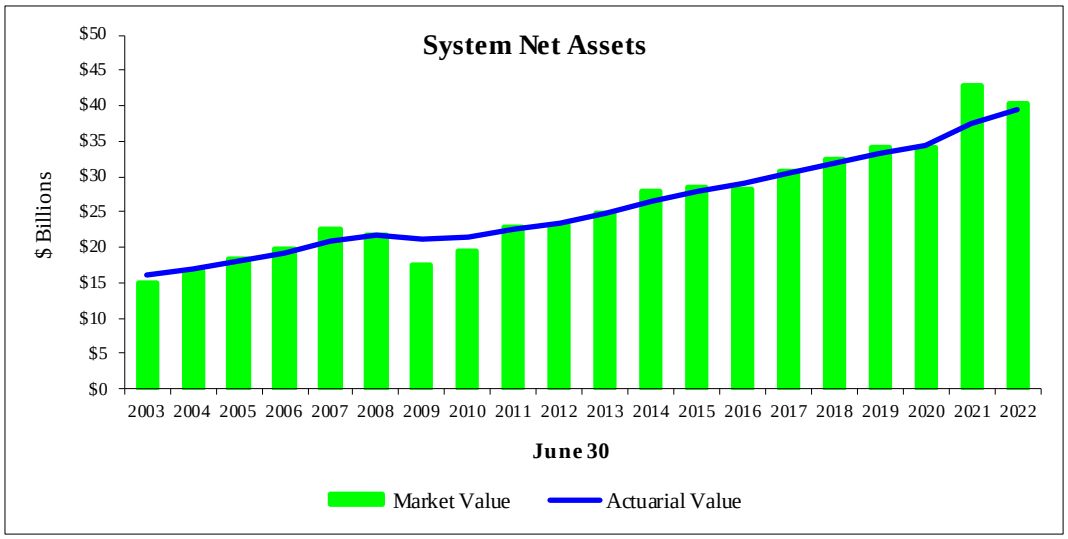

EXHIBIT 5

SUMMARY OF FAVORABLE EXPERIENCE DIVIDEND RESERVE

1. Initial Market Value of FED Reserve as of June 30, 2022	$	0
2. Transfer to Membership Groups		0
3. Final Value of FED Reserve as of June 30, 2022 (1) - (2)	$	0

SECTION III

SYSTEM LIABILITIES

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SECTION III

SYSTEM LIABILITIES

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. There are several methods used to allocate the cost of benefits to members' working lifetimes. These mathematical techniques are called actuarial cost methods.

The method used for this valuation is referred to as the "entry age normal" actuarial cost method. In general, under this method, a contribution that is a level percent of rates of pay is determined for each member, which if paid from date of hire to retirement date, will finance all future benefit payments. The level percent of pay that is developed is called the **"normal cost"**. The sum of the individual normal cost dollar amounts is divided by expected covered payroll of current actives to determine the normal cost rate for the System.

The actuarial liability is that portion of the present value of future benefits (PVFB) that will not be paid by the normal costs in future years. The difference between this liability and the actuarial value of assets as of the same date is referred to as the **unfunded actuarial liability (UAL).** If contributions exceed the normal cost for the year, after allowing for interest on the previous balance of the UAL, this liability will be reduced. Benefit changes, experience gains and losses, and changes in actuarial assumptions or procedures will also have an effect on the total actuarial liability and on the portion of it that is unfunded.

The UAL is projected to the following year to reflect the time lag from the valuation date to the date the contribution rates are effective and is then amortized according to the Actuarial Amortization Method adopted by the Investment Board.

Effective with the June 30, 2008, valuation, a transfer of assets is performed as of June 30th for all employees whose membership group changed since the prior valuation. The purpose behind the transfer is to better match the assets and liabilities for each membership group by having both the assets and liabilities for each member reside in their current membership group. When employees move between membership groups, an asset transfer for valuation purposes is made based on the funded ratio of their former group prior to the transfer. The asset transfer calculation is determined by multiplying the actuarial liability of the employee transferring by the funded ratio of their former group just prior to the transfer. The asset values after the transfers and the liabilities for the employees reside in their current membership group and are used to prepare the final valuation results.

A summary of the number of employees who transferred is shown below:

From	To		
	Regular	Sheriffs and Deputies	Protection Occupation
Regular		12	251
Sheriffs and Deputies	8		19
Protection Occupation	251	82	

The impact on the UAL from the transfer is shown below:

Regular	Sheriffs and Deputies	Protection Occupation
($4,061,949)	$782,979	$3,051,417

EXHIBIT 6

NET IMPACT OF MEMBER TRANSFERS DURING FY 2022

	Regular Members	Sheriffs/ Deputies	Protection Occupation
Preliminary Actuarial Liability	$41,096,045,523	$843,361,146	$2,030,535,490
Net Effect of Transfers	(5,290,231)	6,316,599	(1,253,921)
Final Actuarial Liability	$41,090,755,292	$849,677,745	$2,029,281,569
Preliminary Actuarial Value of Assets*	$36,347,123,644	$884,101,425	$2,123,007,310
Net Effect of Transfers	(1,228,282)	5,533,620	(4,305,338)
Final Actuarial Value of Assets	$36,345,895,362	$889,635,045	$2,118,701,972
Preliminary Unfunded Actuarial Liability	$4,748,921,879	($40,740,279)	($92,471,820)
Net Effect of Transfers	(4,061,949)	782,979	3,051,417
Final Unfunded Actuarial Liability	$4,744,859,930	($39,957,300)	($89,420,403)
Preliminary Funded Ratio	88.44%	104.83%	104.55%
Final Funded Ratio	88.45%	104.70%	104.41%

* Reflects asset transfers which occurred during FY 2022 and are based on the amounts in the System's asset statements, but not the transfer amounts which will result from membership changes during the prior year. The amounts disclosed in the System's assets statements were: ($613,902) for Regular Members, $365,026 for Sheriffs and Deputies, and $248,876 for Protection Occupation. These transfer amounts reflected in the Preliminary Actuarial Value of Assets are adjusted based on the ratio of the Preliminary Actuarial Value of Assets to the Preliminary Market Value of Assets, or: ($601,190) for Regular Members, $357,467 for Sheriffs and Deputies, and $243,723 for Protection Occupation.

EXHIBIT 7

PRESENT VALUE OF FUTURE BENEFITS
as of June 30, 2022

The actuarial present value of future benefits represents the current value of benefits expected to ultimately be earned by the current members of the System as of the valuation date.

	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
Active Members				
Retirement benefits	$23,417,690,480	$574,343,210	$1,242,294,939	$25,234,328,629
Death benefits	208,698,004	6,521,822	19,411,219	234,631,045
Termination benefits	1,411,010,596	29,693,357	183,287,105	1,623,991,058
Disability benefits	420,870,692	18,884,279	56,696,504	496,451,475
Inactive Members				
Vested members	1,047,542,197	14,994,191	84,843,481	1,147,379,869
Nonvested members	164,338,398	405,488	4,393,049	169,136,935
Retired Members and Beneficiaries	22,646,842,963	453,337,835	1,054,117,486	24,154,298,284
Total Present Value of Future Benefits	$49,316,993,330	$1,098,180,182	$2,645,043,783	$53,060,217,295

EXHIBIT 8

UNFUNDED ACTUARIAL LIABILITY
as of June 30, 2022

	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
1. Present Value of Future Benefits	$49,316,993,330	$1,098,180,182	$2,645,043,783	$53,060,217,295
2. Present Value of Future Normal Costs	8,226,238,038	248,502,437	615,762,214	9,090,502,689
3. Actuarial Liability (1) - (2)	$41,090,755,292	$849,677,745	$2,029,281,569	$43,969,714,606
4. Actuarial Value of Net Assets	36,345,895,362	889,635,045	2,118,701,972	39,354,232,379
5. Unfunded Actuarial Liability (3) - (4)	$4,744,859,930	($39,957,300)	($89,420,403)	$4,615,482,227
6. Funded Ratio (4) / (3)	88.45%	104.70%	104.41%	89.50%

EXHIBIT 9

CALCULATION OF ACTUARIAL (GAIN)/LOSS AND ANY TRANSFER TO THE FAVORABLE EXPERIENCE DIVIDEND RESERVE
Based on the June 30, 2022 Actuarial Valuation

The Favorable Experience Dividend (FED) reserve account was created by legislation in 1998. The main purpose of the account is to help offset the negative impact of postretirement inflation for members who retired after June 30, 1990. The law provided that a portion of the favorable actuarial experience, if any, in subsequent years would be transferred to the FED reserve. Legislation passed in 2000 capped the FED reserve at ten years of expected payouts at the maximum level. Further legislation in 2006 prohibited further transfers to the FED until the System has no remaining UAL. The System currently has an UAL so no transfer is to be made this year.

1. June 30, 2021 Unfunded Actuarial Liability	$	4,959,661,454
2. Normal Cost for year ending June 30, 2022		899,166,385
3. Employer and Employee Contributions*		1,426,228,747
4. Change due to membership transfers		(227,553)
5. Change due to FED transfer		0
6. Change due to assumptions		(42,533,419)
7. Expected Unfunded Actuarial Liability as of June 30, 2022 $[(1) + (2)] * 1.07 - (3) * (1.07)^{.5} + (4) + (5) + (6)$		4,750,882,328
8. Actual Unfunded Actuarial Liability as of June 30, 2022		4,615,482,227
9. (Gain)/loss (8) - (7)		(135,400,101)
10. Portion of gain to transfer to FED		N/A
11. Amount of Actuarial Value of Assets to transfer to FED	$	0
12. Market value of FED transfer	$	0

* Does not include service purchases

EXHIBIT 10

ACTUARIAL (GAIN)/LOSS BY GROUP
Based on the June 30, 2022 Actuarial Valuation

	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
1. Expected Actuarial Liability				
a. Actuarial Liability at June 30, 2021	$39,777,935,943	$816,703,678	$1,950,009,129	$42,544,648,750
b. Normal Cost for FY 2022	819,393,998	20,853,881	58,918,506	899,166,385
c. Benefit Payments for FY 2022	(2,381,077,056)	(43,791,923)	(107,170,592)	(2,532,039,571)
d. Interest on (a), (b), and (c) at 7.0%	2,759,884,893	57,122,235	136,937,404	2,953,944,532
e. Transfers and Service Purchases	(636,999)	6,367,945	(1,189,554)	4,541,392
f. Assumption Changes	(116,176)	(10,068,705)	(32,348,538)	(42,533,419)
g. Expected Actuarial Liability as of June 30, 2022	$40,975,384,603	$847,187,111	$2,005,156,355	$43,827,728,069
2. Actuarial Liability at June 30, 2022	$41,090,755,292	$849,677,745	$2,029,281,569	$43,969,714,606
3. Actuarial Liability (Gain)/Loss (2) - (1g)	$115,370,689	$2,490,634	$24,125,214	$141,986,537
4. Expected Actuarial Value of Assets				
a. Actuarial Value of Assets at June 30, 2021	$34,734,902,134	$839,015,517	$2,011,069,645	$37,584,987,296
b. Contributions for FY 2022	1,341,637,454	24,230,865	64,970,741	1,430,839,060
c. Benefit Payments for FY 2022	(2,381,077,056)	(43,791,923)	(107,170,592)	(2,532,039,571)
d. Interest on (a), (b), and (c) at 7.0%	2,395,678,067	58,058,028	139,322,861	2,593,058,956
e. Transfers	(1,829,472)	5,891,087	(4,061,615)	0
f. Expected Actuarial Value of Assets as of June 30, 2022	$36,089,311,127	$883,403,574	$2,104,131,040	$39,076,845,741
5. Actuarial Value of Assets at June 30, 2022	$36,345,895,362	$889,635,045	$2,118,701,972	$39,354,232,379
6. Actuarial Value of Assets (Gain)/Loss (4f) - (5)	($256,584,235)	($6,231,471)	($14,570,932)	($277,386,638)
7. Net Actuarial (Gain)/Loss (3) + (6)	($141,213,546)	($3,740,837)	$9,554,282	($135,400,101)

SECTION IV

SYSTEM CONTRIBUTIONS

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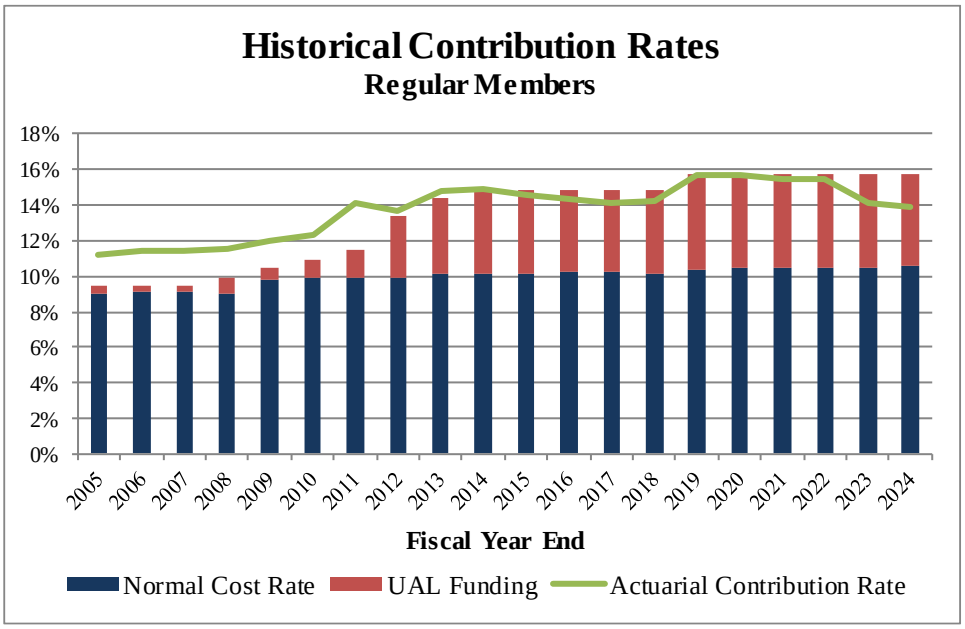
Under the actuarial funding method described in Appendix C, the actuarial contribution rate consists of two elements:

(1) the normal cost rate and
(2) the contribution rate to amortize the unfunded actuarial liability as a level percent of payroll.

The unfunded actuarial liability represents the difference between the portion of the present value of future benefits allocated to service credited prior to the valuation date by the actuarial cost method and the actuarial value of assets as of that date.

In 2006 and 2010, legislation was passed that increased the statutory contribution rate for Regular members. Beginning with the 2011 valuation (applicable for contributions for FY 2013), the Investment Board was given the authority to set the Required Contribution Rate for Regular members subject to certain statutory limitations. A historical summary of the actual contribution rate and the actuarial contribution rate is shown in the graph below:



Effective with the June 30, 2008, valuation, a transfer of assets is performed on June 30th for all split service members (those members with service in more than one membership group) whose membership group changed since the prior valuation. In addition, IPERS also transfers assets for certain split service members who have not changed groups since the last valuation. As a result, all assets and liabilities for each member reside in their current membership group. When members move between membership groups, an asset transfer for valuation purposes is made based on the funded ratio of their former group prior to the transfer. The asset transfer calculation is determined by multiplying the actuarial liability of the members transferring by the funded ratio of their former group just prior to the transfer. The asset values after the transfers and the liabilities for the members reside in their current membership group and are used to prepare the final valuation results.

EXHIBIT 11

ACTUARIAL BALANCE SHEET
as of June 30, 2022

	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
ASSETS				
Actuarial value of assets	$36,345,895,362	$889,635,045	$2,118,701,972	$39,354,232,379
Present value of future normal costs	8,226,238,038	248,502,437	615,762,214	9,090,502,689
Present value of future contributions to amortize unfunded actuarial liability	4,744,859,930	(39,957,300)	(89,420,403)	4,615,482,227
Total Net Assets	$49,316,993,330	$1,098,180,182	$2,645,043,783	$53,060,217,295
LIABILITIES				
Present Value of Future Benefits:				
Retired Members and Beneficiaries	$22,646,842,963	$453,337,835	$1,054,117,486	$24,154,298,284
Active Members	25,458,269,772	629,442,668	1,501,689,767	27,589,402,207
Inactive Members	1,211,880,595	15,399,679	89,236,530	1,316,516,804
Total Liabilities	$49,316,993,330	$1,098,180,182	$2,645,043,783	$53,060,217,295

EXHIBIT 12

PROJECTED UNFUNDED ACTUARIAL LIABILITY ON JUNE 30, 2023

	Regular Membership	Sheriffs & Deputies	Protection Occupation
1. FYE 2023 Required Contribution Rate	15.73%	17.52%	15.52%
2. Normal Cost Rate	10.60%	16.78%	15.31%
3. Contribution Rate Applied to Fund the UAL for FYE 2023 (1) - (2)	5.13%	0.74%	0.21%
4. Unfunded Actuarial Liability/(Surplus) on June 30, 2022	$ 4,744,859,930	$ (39,957,300)	$ (89,420,403)
5. Projected Payroll for FYE 2023	$ 8,833,142,651	$ 141,117,723	$ 438,080,226
6. Projected UAL on June 30, 2023 [(4) x 1.07] - [(3) x (5) x $1.07^{.5}$]	$ 4,608,268,239	$ (43,834,513)	$ (96,631,454)

EXHIBIT 13

UAL AMORTIZATION BASES
REGULAR MEMBERS

Amortization Bases	Original Amount	Remaining Payments*	Projected July 1, 2023 Balance	Annual Payment**
2014 Initial UAL	$ 5,592,056,086	22	$ 6,092,675,707	$ 406,156,983
2015 Experience	(193,648,198)	13	(178,445,264)	(17,432,256)
2016 Experience	21,763,596	14	20,449,770	1,885,731
2017 Experience	(158,062,524)	15	(150,685,262)	(13,181,983)
2017 Assumption Changes	1,435,708,789	15	1,368,699,870	119,734,198
2018 Experience	(310,129,854)	16	(300,529,837)	(25,049,864)
2018 Assumption Changes	75,130,979	16	72,805,312	6,068,493
2019 Experience	(384,733,612)	17	(377,530,325)	(30,097,600)
2020 Experience	67,832,112	18	67,176,074	5,139,454
2021 Experience	(1,670,503,783)	19	(1,664,627,021)	(122,585,491)
2022 Experience	(351,647,258)	20	(351,647,258)	(24,992,447)
2022 Assumption Changes	9,926,473	20	9,926,473	705,499
Total			**$ 4,608,268,239**	**$ 306,350,717**

* Payments begin July 1, 2023.

** Payment amount reflects mid-year timing.

1. Total UAL Amortization Payments	$	306,350,717
2. Projected Payroll for FYE 2023	$	8,833,142,651
3. Projected Payroll for FYE 2024 (2) x 1.0325	$	9,120,219,787
4. UAL Amortization Payment Rate (1) / (3)		3.36%

Note: Based on the Actuarial Amortization Method, adopted by the Investment Board, annual net experience gains/losses are amortized over a new, closed 20-year period.

EXHIBIT 14

UAL AMORTIZATION BASES
SHERIFFS & DEPUTIES

Amortization Bases	Original Amount	Remaining Payments*	Projected July 1, 2023 Balance	Annual Payment**
2022 Initial UAL	(43,834,513)	30	(43,834,513)	(2,418,439)
Total			**$ (43,834,513)**	**$ (2,418,439)**

* Payments begin July 1, 2023.

** Payment amount reflects mid-year timing.

1. Total UAL Amortization Payments	$	(2,418,439)
2. Projected Payroll for FYE 2023	$	141,117,723
3. Projected Payroll for FYE 2024 (2) x 1.0325	$	145,704,049
4. UAL Amortization Payment Rate (1) / (3)		(1.66%)

Note: Based on the Actuarial Amortization Method, adopted by the Investment Board, once a group has a surplus the prior amortization bases will be eliminated and the surplus will be amortized over an open 30-year period.

EXHIBIT 15

UAL AMORTIZATION BASES
PROTECTION OCCUPATION

Amortization Bases	Original Amount	Remaining Payments*	Projected July 1, 2023 Balance	Annual Payment**
2022 Initial UAL	(96,631,454)	30	(96,631,454)	(5,331,352)
Total			**$ (96,631,454)**	**$ (5,331,352)**

* Payments begin July 1, 2023.

** Payment amount reflects mid-year timing.

1. Total UAL Amortization Payments	$	(5,331,352)
2. Projected Payroll for FYE 2023	$	438,080,226
3. Projected Payroll for FYE 2024 (2) x 1.0325	$	452,317,833
4. UAL Amortization Payment Rate (1) / (3)		(1.18%)

Note: Based on the Actuarial Amortization Method, adopted by the Investment Board, once a group has a surplus the prior amortization bases will be eliminated and the surplus will be amortized over an open 30-year period.

EXHIBIT 16

ANALYSIS OF CONTRIBUTION RATE

The actuarial cost method used to determine the required level of annual contributions by the employees and the employers to support the expected benefits is the Entry Age Normal Cost Method. Under this method, the total cost is comprised of the normal cost rate and the unfunded actuarial liability payment. The payment to amortize the unfunded actuarial liability is determined as a level percentage of payroll, based on the Actuarial Amortization Method, adopted by the Investment Board. This method was revised by the Investment Board in September 2013 (see Appendix C). The contribution rate developed in this exhibit is based on the Funding Policy and the June 30, 2022 actuarial valuation and applies to the fiscal year beginning July 1, 2023 and ending June 30, 2024.

	Regular Membership	Sheriffs & Deputies	Protection Occupation
1. Normal Cost Rate	10.60%	16.78%	15.31%
2. UAL Contribution Rate for FY 2024	3.36%	(1.66%)	(1.18%)
3. Funded Ratio as of June 30, 2022	88.5%	104.7%	104.4%
Funded Ratio as of June 30, 2021	87.3%	102.7%	103.1%
Funded Ratio as of June 30, 2020	82.9%	99.1%	99.4%
4. UAL Contribution Rate Applicable for FY 2024* (2) if positive	3.36%	0.00%	0.00%
5. Actuarial Contribution Rate for FY 2024 (1) + (4)	13.96%	16.78%	15.31%
6. Required Contribution Rate for FY 2023	15.73%	17.52%	15.52%
7. Required Contribution Rate for FY 2024**	15.73%	17.02%	15.52%
Employer Contribution Rate	9.44%	8.51%	9.31%
Employee Contribution Rate	6.29%	8.51%	6.21%

* The UAL Contribution Rate is allowed to be negative only if the funded ratio was at least 110% in each of the past three years.

** The Required Contribution Rate is the Actuarial Contribution Rate, but not more than 1% greater than the prior year's Required Contribution Rate for Regular Members, nor lower than the prior year's Required Contribution Rate unless the difference is at least 0.50% and the funded ratio is at least 95%, in which case the Required Contribution Rate is the prior year's Required Contribution Rate less 0.50% for all groups.

EXHIBIT 17

UNFUNDED ACTUARIAL LIABILITY AMORTIZATION SCHEDULE REGULAR MEMBERS

This schedule illustrates the theoretical funding of the UAL over the remaining amortization period assuming all assumptions are met in the future (no experience gains or losses) and the Actuarial Contribution Rate (rather than the Required Contribution Rate) is contributed in future years. As a result, the years to full funding shown here will vary from the number of years disclosed in the Executive Summary of this report.

Fiscal Year Ending June 30	Projected Active Member Payroll	Unfunded Actuarial Liability (BOY)	Annual Contributions	
			Dollars	% of Payroll
	----------$ in millions----------			
2024	9,120	4,608	306	3.36
2025	9,417	4,614	316	3.36
2026	9,723	4,610	327	3.36
2027	10,039	4,595	337	3.36
2028	10,365	4,567	348	3.36
2029	10,702	4,527	359	3.36
2030	11,050	4,472	371	3.36
2031	11,409	4,401	383	3.36
2032	11,779	4,313	396	3.36
2033	12,162	4,205	409	3.36
2034	12,558	4,077	422	3.36
2035	12,966	3,926	436	3.36
2036	13,387	3,751	450	3.36
2037	13,822	3,548	491	3.55
2038	14,271	3,289	504	3.53
2039	14,735	2,998	348	2.36
2040	15,214	2,848	391	2.57
2041	15,709	2,643	455	2.90
2042	16,219	2,357	461	2.84
2043	16,746	2,045	701	4.19
2044	17,290	1,463	770	4.45
2045	17,852	769	795	4.45
2046	18,433	0	0	0.00

Note that the outstanding balance of the UAL increases for one year before starting to decline. This pattern is due to use of the level percent of payroll amortization methodology where the dollar amount of the UAL payment increases with expected payroll in future years. The current valuation results for the Sheriffs & Deputies and Protection Occupation groups have a negative UAL, which will be amortized over an open 30-year period. Consequently, no table is displayed.

SECTION V

HISTORICAL FUNDING AND OTHER INFORMATION

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In this section, we provide some historical information regarding the funding progress of the System. These exhibits retain some of the information that used to be required for accounting purposes and are included because they provide relevant information on the System's historical funding.

EXHIBIT 18

SUMMARY OF VALUATION MEMBERSHIP

	June 30, 2022	June 30, 2021
Active Employees:		
Vested	97,948	98,399
Not yet vested	78,199	74,905
Total active employees	176,147	173,304
Retirees and beneficiaries currently receiving benefits*	131,420	128,589
Inactive vested members entitled to benefits but not yet receiving them	25,734	25,279
Inactive, nonvested members entitled to a refund of contributions**	57,823	53,236

* Retired/reemployed members are included in retiree counts, but not the active or inactive counts. Counts are 8,520 for 2022 and 9,321 for 2021.

** Includes deceased vested inactive members with employee contributions still held by the System.

EXHIBIT 19

SCHEDULE OF FUNDING PROGRESS

Actuarial Valuation Date	Net Actuarial Value of Assets (a)	Actuarial Liability (AL) (b)	Unfunded AL (UAL) (b-a)	Funded Ratio (a/b)	Actual Covered Payroll (P/R)* (c)	UAL as a Percentage of Covered P/R [(b-a)/c]
6/30/03	$16,120,476,011	$17,987,374,960	1,866,898,949	89.62%	$4,881,100,238	38.25%
6/30/04	16,951,942,539	19,128,410,606	2,176,468,067	88.62%	5,072,027,906	42.91%
6/30/05	17,951,490,071	20,240,098,667	2,288,608,596	88.69%	5,236,860,886	43.70%
6/30/06	19,144,036,519	21,651,122,419	2,507,085,900	88.42%	5,523,863,321	45.39%
6/30/07	20,759,628,415	23,026,113,782	2,266,485,367	90.16%	5,781,706,199	39.20%
6/30/08	21,857,423,183	24,522,216,589	2,664,793,406	89.13%	6,131,445,367	43.46%
6/30/09	21,123,979,941	26,018,593,823	4,894,613,882	81.19%	6,438,643,124	76.02%
6/30/10	21,537,458,560	26,468,419,650	4,930,961,090	81.37%	6,571,182,005	75.04%
6/30/11	22,575,309,199	28,257,080,114	5,681,770,915	79.89%	6,574,872,719	86.42%
6/30/12	23,530,094,461	29,446,197,486	5,916,103,025	79.91%	6,786,158,720	87.18%
6/30/13	24,711,096,187	30,498,342,320	5,787,246,133	81.02%	6,880,131,134	84.12%
6/30/14	26,460,428,085	32,004,456,088	5,544,028,003	82.68%	7,099,277,280	78.09%
6/30/15	27,915,379,103	33,370,318,731	5,454,939,628	83.65%	7,326,348,141	74.46%
6/30/16	29,033,696,587	34,619,749,147	5,586,052,560	83.86%	7,556,515,720	73.92%
6/30/17	30,472,423,914	37,440,382,029	6,967,958,115	81.39%	7,863,160,443	88.62%
6/30/18	31,827,755,864	38,642,833,653	6,815,077,789	82.36%	7,983,219,527	85.37%
6/30/19	33,324,327,606	39,801,338,797	6,477,011,191	83.73%	8,151,043,468	79.46%
6/30/20	34,485,656,745	41,072,427,540	6,586,770,795	83.96%	8,391,856,350	78.49%
6/30/21	37,584,987,296	42,544,648,750	4,959,661,454	88.34%	8,648,783,536	57.35%
6/30/22	39,354,232,379	43,969,714,606	4,615,482,227	89.50%	9,018,019,950	51.18%

* Covered payroll amount provided by the System.
Note: Includes all three membership groups.

EXHIBIT 20

SCHEDULE OF EMPLOYER CONTRIBUTIONS

The Employer Actuarial Contribution Rate (ACR) is determined as a rate of pay as part of the annual valuation. The dollar amounts displayed in this table are based on analysis by IPERS each year to consider the actual contributions received (using the actual contribution rate in effect) and then determining what the ACR amount would have been on the same payroll.

	Actuarial Contribution Rate (ACR)				Percentage of ACR Contributed			
Fiscal Year Ending	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
6/30/03	$270,363,338	$5,670,239	$13,738,478	$289,772,054	99.2%	100.0%	100.0%	99.2%
6/30/04	309,006,609	5,489,797	14,263,836	328,760,242	90.3%	100.0%	100.0%	90.9%
6/30/05	341,552,685	6,236,611	15,391,729	363,181,025	84.7%	100.0%	100.0%	85.6%
6/30/06	364,424,911	6,228,675	16,888,833	387,542,419	82.7%	100.0%	100.0%	83.8%
6/30/07	387,578,925	6,577,652	17,723,013	411,879,590	82.2%	100.0%	100.0%	83.3%
6/30/08	408,882,080	6,301,171	17,644,966	432,828,217	96.4%	100.0%	100.0%	87.2%
6/30/09	441,951,764	6,365,911	24,736,688	473,054,363	86.9%	100.0%	100.0%	87.8%
6/30/10	467,839,274	6,725,778	27,328,184	501,893,236	88.7%	100.0%	100.0%	89.5%
6/30/11	530,692,453	7,994,058	29,711,050	568,397,561	81.1%	100.0%	100.0%	82.3%
6/30/12	528,525,785	8,999,273	30,864,449	568,389,507	98.1%	100.0%	100.0%	98.2%
6/30/13	573,480,969	9,246,766	32,118,873	614,846,608	97.8%	100.0%	100.0%	98.0%
6/30/14	596,983,323	9,583,512	32,434,713	639,001,548	100.0%	100.0%	100.0%	100.0%
6/30/15	602,423,393	9,588,844	32,548,775	644,561,012	102.1%	102.4%	101.7%	101.9%
6/30/16	618,051,508	9,427,481	32,612,466	660,091,455	103.7%	110.4%	102.2%	103.7%
6/30/17	628,387,062	9,507,927	33,623,646	671,518,635	105.0%	110.1%	102.4%	105.0%
6/30/18	641,386,156	9,753,998	33,724,988	684,865,142	104.7%	108.3%	102.6%	104.7%
6/30/19	722,765,827	11,468,737	37,547,744	771,782,308	100.0%	100.0%	100.0%	100.0%
6/30/20	741,160,205	10,570,255	35,771,734	787,502,194	100.2%	109.9%	105.8%	100.6%
6/30/21	753,395,571	10,720,930	36,727,006	800,843,507	101.9%	109.7%	104.3%	102.1%
6/30/22	791,572,690	11,352,563	38,794,548	841,719,801	101.4%	106.5%	100.4%	101.4%

EXHIBIT 21

EXPECTED BENEFIT PAYMENTS

The following table shows the expected benefit payments to be made over the next 20 years. These payments include those expected to be made to current retirees and beneficiaries, current active members, and current deferred vested members (included in the active values) if all actuarial assumptions are met in future years. The benefits reflected include expected refunds and death benefits as well as retirement benefit payments.

These payouts do not include any current non-vested inactive members, any future members, or any FED payments.

Fiscal Year End	Actives at 6/30/22	Retirees at 6/30/22	Total
2023	$170,846,000	$2,453,065,000	$2,623,911,000
2024	306,887,000	2,410,324,000	2,717,211,000
2025	444,761,000	2,365,219,000	2,809,980,000
2026	583,376,000	2,317,659,000	2,901,035,000
2027	725,034,000	2,267,431,000	2,992,465,000
2028	868,753,000	2,214,519,000	3,083,272,000
2029	1,014,037,000	2,158,924,000	3,172,961,000
2030	1,166,830,000	2,100,573,000	3,267,403,000
2031	1,322,149,000	2,039,193,000	3,361,342,000
2032	1,478,610,000	1,974,720,000	3,453,330,000
2033	1,639,456,000	1,907,942,000	3,547,398,000
2034	1,803,656,000	1,838,753,000	3,642,409,000
2035	1,969,614,000	1,766,802,000	3,736,416,000
2036	2,135,495,000	1,692,199,000	3,827,694,000
2037	2,306,516,000	1,615,052,000	3,921,568,000
2038	2,480,372,000	1,535,553,000	4,015,925,000
2039	2,657,118,000	1,453,951,000	4,111,069,000
2040	2,837,274,000	1,370,558,000	4,207,832,000
2041	3,019,614,000	1,285,760,000	4,305,374,000
2042	3,202,046,000	1,200,010,000	4,402,056,000

Note: Cash flows are the expected future non-discounted payments to current members. These numbers exclude refund payouts to current non-vested inactives and assume future retirees elect the normal form of annuity payment (Option 2) and future withdrawals elect refunds according to valuation assumptions. All three membership groups are included.

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SECTION VI

RISK CONSIDERATIONS

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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 each year 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. A separate Risk Study was prepared for the Iowa Public Employees' Retirement System in March 2019 that included a comprehensive evaluation of the various risks facing the System, using both qualitative and quantitative analysis. The findings and conclusions of the report were presented to the Investment Board on March 22, 2019. The Risk Report included various types of quantitative analysis including stress tests, sensitivity analysis, and stochastic modeling. A brief discussion of certain key risks is included in this report, but for a more comprehensive discussion please see the full Risk Report, dated March 2019. While this Risk Report was based on the June 30, 2018 valuation, we believe that the key results and analysis remain generally relevant.

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

- economic risks, such as investment return and inflation.
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages; and
- external risks such as the regulatory and political environment (these are not included in ASOP 51).

The IPERS Contribution Rate Funding Policy is designed to help IPERS manage contribution and funding risks. It is a positive factor in risk assessment because it permits the Required Contribution Rate to increase based on the results of the actuarial valuation but limits any reduction to the Required Contribution Rate until the group is at least 95% funded.

The most significant negative risk factor for IPERS and most retirement systems is investment returns because of the volatility of returns and the size of plan assets compared to payroll (see Exhibit 22). A perusal of historical rates over 10-20 years reveals that the actual return each year is rarely close to the average return for the same period. This is an expected result given the underlying capital market assumptions and the asset allocation.

A key demographic risk for all retirement systems, including IPERS, is improvements in mortality (longevity) differing from anticipated. While the actuarial assumptions reflect small, continuous improvements in mortality experience 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, the COVID-19 pandemic has reminded us that 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, or a new endemic disease. This type of event is also significant, although the experience is more easily absorbed by the System.

When the actuarial valuation is performed each year, it determines the funded ratio, unfunded actuarial liability and the contribution rates needed to fully fund the System based on IPERS funding policy. The contributions needed (normal cost plus UAL amortization) are expressed as a percent of payroll which is consistent with how contributions are collected. Because the amortization payment on the unfunded actuarial liability is determined using the level percent of payroll methodology, an assumption must be used to develop

the payment schedule for the amortization of the UAL. The current payroll growth assumption for IPERS is 3.25% per year which implicitly assumes that the number of active members remains stable over time.

The funding of the System could be negatively impacted if there was a material decline in the IPERS' active membership. When the payroll of IPERS declines, it requires an increase in the contribution rate to fund the System even if the UAL is unchanged. While the dollar amount of the UAL payment might be the same, the contribution rate has to increase to collect the same dollar amount. A decline in IPERS active membership could occur for a number of reasons, but the risk is likely different for the three groups. If the state of Iowa experiences severe and prolonged fiscal challenges, the number of State employees might be reduced. Alternatively, if there is a decline in the student population, it could reduce the need to maintain the current level of teachers. Another possibility that could impact the number of active members is a shift in the way education is delivered, with higher utilization of online teaching. Regardless of the cause for the decline, a substantial decrease in the active membership could pose a risk to the stability of contribution rates.

The risk to the Regular membership of IPERS is likely mitigated because IPERS covers a diverse population across the entire state of Iowa and, as a result, is less vulnerable to significant decreases in the size of the active membership because changes often do not impact all of the various groups. The largest portion of the Regular membership is school employees which again, includes many different school districts across the state, thereby reducing the likelihood of a consistent reduction of active members across all school employers.

A significant decrease in the Sheriffs and Deputies or Protection Occupation groups may be less likely given the type of jobs covered and the ability of the state and counties to severely reduce the size of the covered group. However, because these groups are much smaller, modest changes could be more noticeable as a percentage of membership.

A common theme for most retirement plans is that risks change as a plan matures. Because this is a fundamental issue, ASOP 51 gives special attention to requiring the disclosure of appropriate measures of how a plan is maturing. In this section, we provide a number of illustrations to help demonstrate this trend. The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. It is worth noting that the three membership groups in IPERS (Regular, Sheriffs and Deputies, and Protection Occupation) have some differences that relate to the nature of retirement eligibility and the historical inclusion of certain employment categories. This uniqueness can help explain why certain events may affect the groups differently.

EXHIBIT 22

ASSET VOLATILIITY RATIO

As a retirement system matures, the size of the market value of assets increases 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.

	Market Value of Assets ($ Millions)			Actual Covered Payroll* ($ Millions)			Asset Volatility Ratio		
Fiscal Year End	Regular Members	Sheriffs & Deputies	Protection Occupation	Regular Members	Sheriffs & Deputies	Protection Occupation	Regular Members	Sheriffs & Deputies	Protection Occupation
6/30/09	$16,592.7	$312.5	$698.1	$6,059.4	$85.9	$293.3	2.74	3.64	2.38
6/30/10	18,375.9	353.3	809.7	6,180.7	84.8	305.7	2.97	4.17	2.65
6/30/11	21,365.7	422.9	983.8	6,185.9	90.5	298.5	3.45	4.67	3.30
6/30/12	21,567.5	437.4	1,019.9	6,377.4	93.3	315.5	3.38	4.69	3.23
6/30/13	23,137.3	484.5	1,134.8	6,473.8	93.6	312.7	3.57	5.18	3.63
6/30/14	26,157.8	559.3	1,321.5	6,679.7	97.7	321.9	3.92	5.72	4.11
6/30/15	26,480.4	578.3	1,371.1	6,893.3	100.5	332.6	3.84	5.76	4.12
6/30/16	26,341.4	588.1	1,396.9	7,114.9	105.9	335.8	3.70	5.56	4.16
6/30/17	28,575.3	649.7	1,554.2	7,405.5	109.5	348.2	3.86	5.93	4.46
6/30/18	29,962.9	693.6	1,658.1	7,515.6	115.2	352.4	3.99	6.02	4.71
6/30/19	31,494.6	739.2	1,776.8	7,667.8	117.6	365.7	4.11	6.29	4.86
6/30/20	31,493.9	749.7	1,804.1	7,887.4	122.1	382.4	3.99	6.14	4.72
6/30/21	39,637.7	957.7	2,294.5	8,123.5	126.9	398.4	4.88	7.55	5.76
6/30/22	37,115.6	908.5	2,162.3	8,468.5	133.0	416.6	4.38	6.83	5.19

* Covered payroll amounts provided by the System.

Note: The impact of asset smoothing is not reflected in the impact on the ACR and amortization of the asset loss is over 20 years. Current year assumptions are used for all years shown.

EXHIBIT 22

HISTORICAL ASSET VOLATILITY RATIO
(continued)

Fiscal Year End	Asset Volatility Ratio: Regular Members	Asset Volatility Ratio: Sheriffs & Deputies	Asset Volatility Ratio: Protection Occupation	Increase in ACR with a One-Time Return 10% Lower than Assumed: Regular Members	Increase in ACR with a One-Time Return 10% Lower than Assumed: Sheriffs & Deputies	Increase in ACR with a One-Time Return 10% Lower than Assumed: Protection Occupation
6/30/09	2.74	3.64	2.38	1.95%	2.59%	1.69%
6/30/10	2.97	4.17	2.65	2.11%	2.96%	1.88%
6/30/11	3.45	4.67	3.30	2.45%	3.32%	2.35%
6/30/12	3.38	4.69	3.23	2.40%	3.33%	2.30%
6/30/13	3.57	5.18	3.63	2.54%	3.68%	2.58%
6/30/14	3.92	5.72	4.11	2.79%	4.07%	2.92%
6/30/15	3.84	5.76	4.12	2.73%	4.09%	2.93%
6/30/16	3.70	5.56	4.16	2.63%	3.95%	2.96%
6/30/17	3.86	5.93	4.46	2.74%	4.21%	3.17%
6/30/18	3.99	6.02	4.71	2.84%	4.28%	3.35%
6/30/19	4.11	6.29	4.86	2.92%	4.47%	3.45%
6/30/20	3.99	6.14	4.72	2.84%	4.36%	3.35%
6/30/21	4.88	7.55	5.76	3.47%	5.37%	4.09%
6/30/22	4.38	6.83	5.19	3.11%	4.85%	3.69%

Note: The impact of asset smoothing is not reflected in the impact on the ACR and amortization of the asset loss is over 20 years. Current year assumptions are used for all years shown.

EXHIBIT 23

HISTORICAL CASH FLOWS

The net cash flow of a system, as a percentage of the beginning of year asset value, indicates the sensitivity of the system to short-term investment returns. Net cash flow is equal to contributions less benefits payments and expenses. Mature plans can have large amounts of benefit payments compared to contributions, particularly if they are well funded. In fact, this is one reason for prefunding retirement benefits - so a portion of investment return can help to pay plan benefits. When there is negative cash flow, investment losses in the short-term are compounded by the net withdrawal from plan assets leaving a smaller asset base to try to recover from the investment losses. Large negative cash flows can also create liquidity needs.

Fiscal Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments and Expenses	Net Cash Flow	Net Cash Flow as a Percent of MVA
6/30/08	$21,844,112,206	$634,189,547	$1,081,702,594	($447,513,047)	(2.05%)
6/30/09	17,603,316,618	695,559,397	1,159,167,389	(463,607,992)	(2.63%)
6/30/10	19,538,971,423	755,210,092	1,250,296,562	(495,086,470)	(2.53%)
6/30/11	22,772,344,651	789,353,899	1,418,667,406	(629,313,507)	(2.76%)
6/30/12	23,024,773,746	942,394,013	1,504,467,980	(562,073,967)	(2.44%)
6/30/13	24,756,663,715	1,019,108,941	1,608,482,773	(589,373,832)	(2.38%)
6/30/14	28,038,549,893	1,082,521,228	1,706,250,521	(623,729,293)	(2.22%)
6/30/15	28,429,834,829	1,115,600,029	1,804,360,197	(688,760,168)	(2.42%)
6/30/16	28,326,433,656	1,176,666,912	1,904,921,736	(728,254,824)	(2.57%)
6/30/17	30,779,116,326	1,182,392,100	2,009,453,153	(827,061,053)	(2.69%)
6/30/18	32,314,588,595	1,202,788,183	2,126,106,199	(923,318,016)	(2.86%)
6/30/19	34,010,680,731	1,294,438,481	2,238,353,408	(943,914,927)	(2.78%)
6/30/20	34,047,692,112	1,327,864,560	2,332,726,605	(1,004,862,045)	(2.95%)
6/30/21	42,889,875,682	1,371,872,312	2,432,662,727	(1,060,790,415)	(2.47%)
6/30/22	40,186,392,289	1,430,839,060	2,546,095,673	(1,115,256,613)	(2.78%)

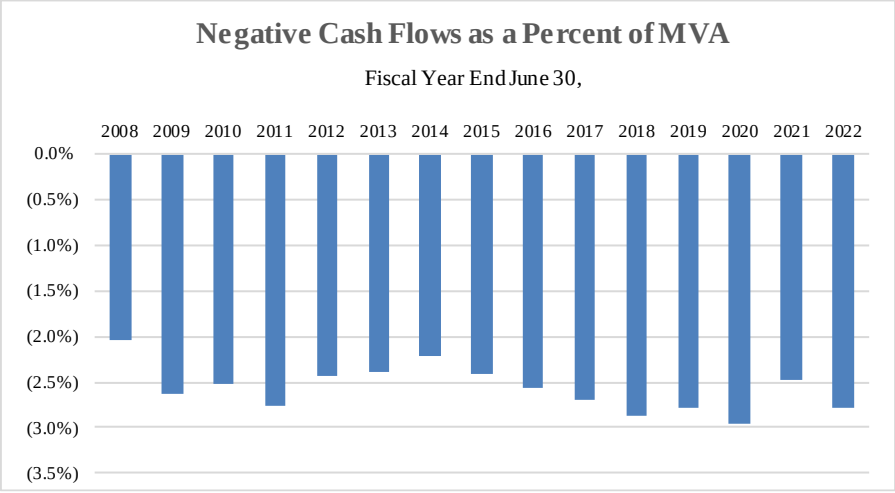


EXHIBIT 24

LIABILITY MATURITY MEASUREMENTS

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations indicated by an increasing ratio of retirees to active members and a growing percentage of retiree liability. 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.

The retirement system is also growing larger with respect to the sponsoring entities, as can be seen by the ratio of actuarial liability to payroll.

Regular Members

Fiscal Year End	Retiree Liability (a)	Total Actuarial Liability (b)	Retiree Percentage (a) / (b)	Covered Payroll (c)	Ratio (b) / (c)
6/30/07	$8,941,802,561	$22,023,863,090	40.6%	$5,510,430,731	4.00
6/30/08	9,611,150,768	23,332,771,315	41.2%	5,763,634,079	4.05
6/30/09	10,238,166,793	24,733,483,621	41.4%	6,059,370,512	4.08
6/30/10	11,293,531,095	25,080,605,814	45.0%	6,180,689,916	4.06
6/30/11	12,698,425,109	26,752,154,635	47.5%	6,185,889,267	4.32
6/30/12	13,573,602,957	27,852,385,453	48.7%	6,377,421,205	4.37
6/30/13	14,329,968,181	28,799,324,938	49.8%	6,473,818,092	4.45
6/30/14	15,230,657,798	30,204,846,287	50.4%	6,679,683,181	4.52
6/30/15	16,028,939,271	31,451,851,955	51.0%	6,893,254,991	4.56
6/30/16	16,768,695,428	32,577,657,593	51.5%	7,114,861,564	4.58
6/30/17	18,304,044,337	35,176,950,577	52.0%	7,405,484,923	4.75
6/30/18	19,516,533,248	36,289,160,885	53.8%	7,515,600,156	4.83
6/30/19	20,276,746,842	37,324,200,774	54.3%	7,667,747,786	4.87
6/30/20	21,098,889,528	38,469,643,936	54.8%	7,887,362,749	4.88
6/30/21	21,804,010,789	39,777,935,943	54.8%	8,123,447,536	4.90
6/30/22	22,646,842,963	41,090,755,292	55.1%	8,468,458,536	4.85

EXHIBIT 24
(continued)

Sheriffs & Deputies

Fiscal Year End	Retiree Liability (a)	Total Actuarial Liability (b)	Retiree Percentage (a) / (b)	Covered Payroll (c)	Ratio (b) / (c)
6/30/07	$105,514,847	$345,220,872	30.6%	$78,112,455	4.42
6/30/08	119,881,091	374,066,361	32.0%	81,485,774	4.59
6/30/09	150,926,387	412,167,101	36.6%	85,935,900	4.80
6/30/10	169,436,571	447,627,643	37.9%	84,755,693	5.28
6/30/11	185,018,412	475,559,019	38.9%	90,506,138	5.25
6/30/12	195,188,608	502,716,830	38.8%	93,265,452	5.39
6/30/13	223,706,198	533,033,438	42.0%	93,607,893	5.69
6/30/14	240,964,615	556,135,092	43.3%	97,693,639	5.69
6/30/15	266,693,628	591,002,036	45.1%	100,469,418	5.88
6/30/16	281,179,979	624,791,635	45.0%	105,868,170	5.90
6/30/17	325,186,602	691,205,752	47.0%	109,516,368	6.31
6/30/18	341,195,487	697,339,410	48.9%	115,222,566	6.05
6/30/19	366,389,579	730,785,263	50.1%	117,564,234	6.22
6/30/20	384,403,732	766,018,806	50.2%	122,072,903	6.28
6/30/21	445,975,611	816,703,678	54.6%	126,886,204	6.44
6/30/22	453,337,835	849,677,745	53.4%	132,983,997	6.39

EXHIBIT 24
(continued)

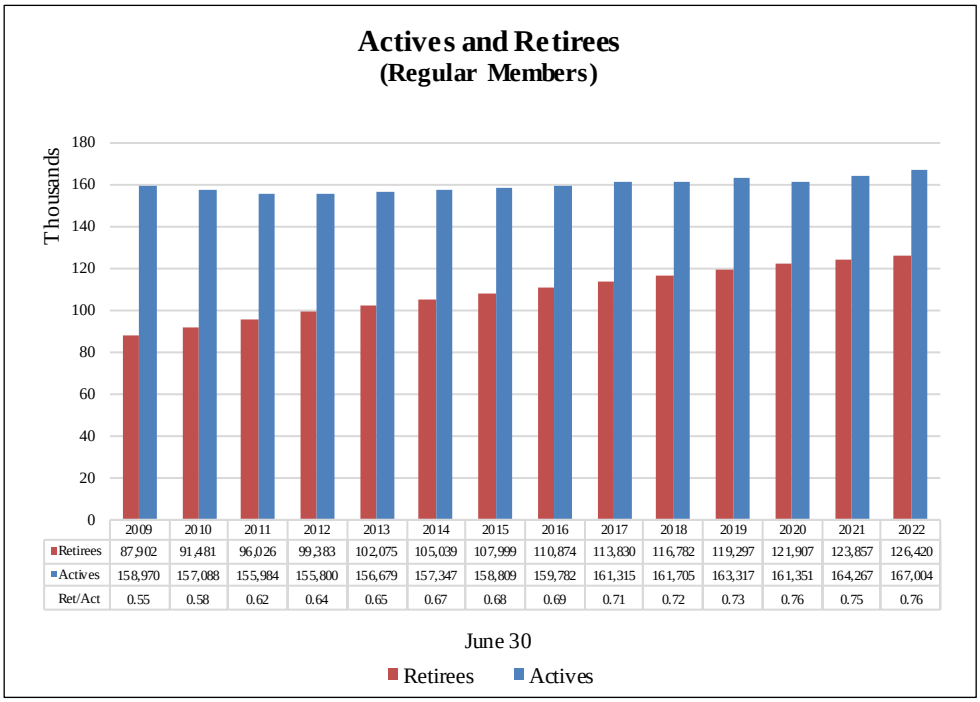
Protection Occupation

Fiscal Year End	Retiree Liability (a)	Total Actuarial Liability (b)	Retiree Percentage (a) / (b)	Covered Payroll (c)	Ratio (b) / (c)
6/30/07	$169,925,365	$657,029,820	25.9%	193,163,013	3.40
6/30/08	191,726,385	815,378,913	23.5%	286,325,514	2.85
6/30/09	234,387,583	872,943,101	26.9%	293,336,712	2.98
6/30/10	306,902,663	940,186,193	32.6%	305,736,396	3.08
6/30/11	368,833,144	1,029,366,460	35.8%	298,477,314	3.45
6/30/12	383,175,993	1,091,095,203	35.1%	315,472,063	3.46
6/30/13	446,902,048	1,165,983,944	38.3%	312,705,149	3.73
6/30/14	503,104,371	1,243,474,709	40.5%	321,900,460	3.86
6/30/15	547,545,074	1,327,464,740	41.2%	332,623,732	3.99
6/30/16	607,529,406	1,417,299,919	42.9%	335,785,986	4.22
6/30/17	705,541,965	1,572,225,700	44.9%	348,159,152	4.52
6/30/18	801,836,796	1,656,333,358	48.4%	352,396,805	4.70
6/30/19	862,732,452	1,746,352,760	49.4%	365,731,448	4.77
6/30/20	922,989,793	1,836,764,798	50.3%	382,420,698	4.80
6/30/21	993,550,318	1,950,009,129	51.0%	398,449,796	4.89
6/30/22	1,054,117,486	2,029,281,569	51.9%	416,577,417	4.87

EXHIBIT 25

HISTORICAL ACTIVE AND RETIREE COUNTS

The funding of a mature retirement system is more sensitive to the impact of variations in actual versus expected experience (actuarial experience gains and losses). The larger the system's assets and liabilities are in comparison to the contribution or revenue base that supports it (covered payroll for IPERS), the greater the risk of contribution rate volatility. One measure of plan maturity is the ratio of the number of members receiving benefits to the number of active members, sometimes called the support ratio. The revenue base supporting the system is usually proportionate to the number of active members, so a relatively high support ratio indicates a larger system (assets and liabilities) relative to its revenue base. All three membership groups reflect a trend of increasing support ratios.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Retirees	87,902	91,481	96,026	99,383	102,075	105,039	107,999	110,874	113,830	116,782	119,297	121,907	123,857	126,420
Actives	158,970	157,088	155,984	155,800	156,679	157,347	158,809	159,782	161,315	161,705	163,317	161,351	164,267	167,004
Ret/Act	0.55	0.58	0.62	0.64	0.65	0.67	0.68	0.69	0.71	0.72	0.73	0.76	0.75	0.76

EXHIBIT 25
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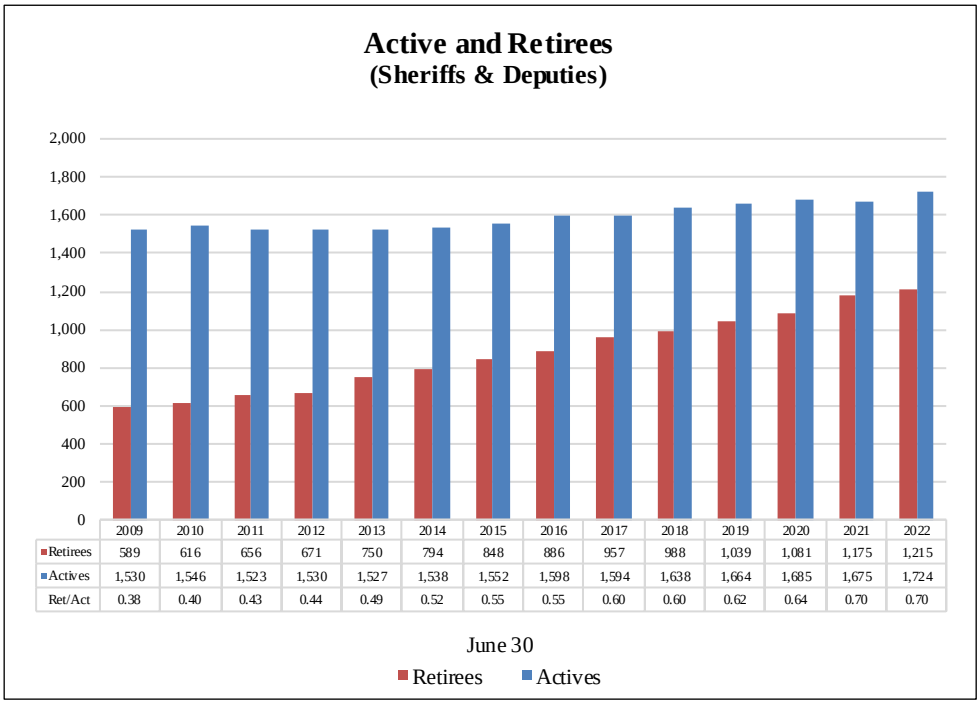
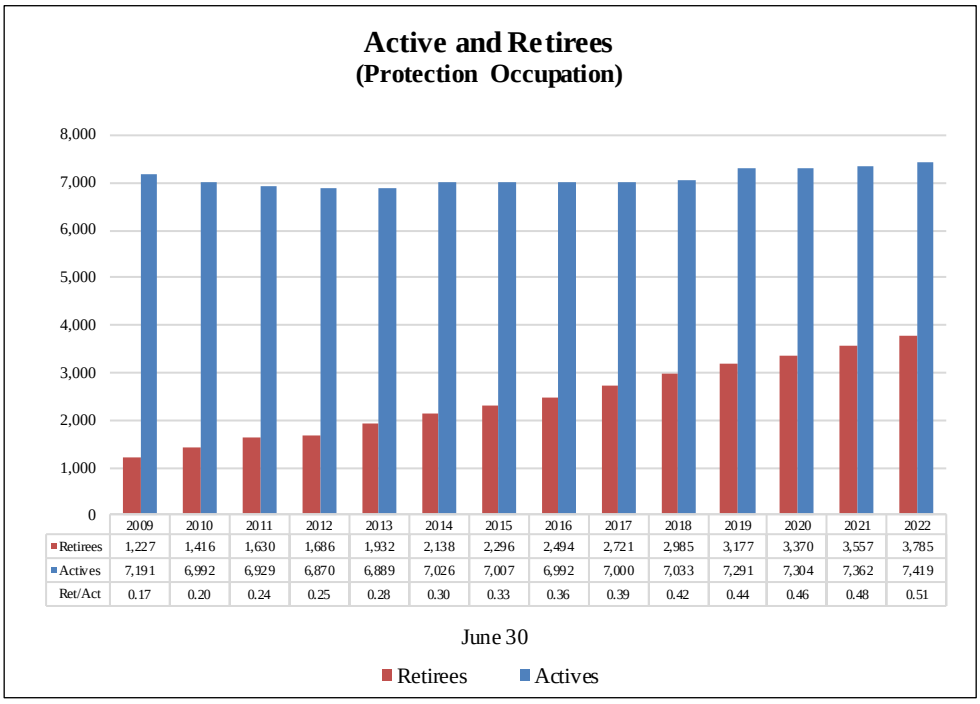


	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Retirees	589	616	656	671	750	794	848	886	957	988	1,039	1,081	1,175	1,215
Actives	1,530	1,546	1,523	1,530	1,527	1,538	1,552	1,598	1,594	1,638	1,664	1,685	1,675	1,724
Ret/Act	0.38	0.40	0.43	0.44	0.49	0.52	0.55	0.55	0.60	0.60	0.62	0.64	0.70	0.70



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Retirees	1,227	1,416	1,630	1,686	1,932	2,138	2,296	2,494	2,721	2,985	3,177	3,370	3,557	3,785
Actives	7,191	6,992	6,929	6,870	6,889	7,026	7,007	6,992	7,000	7,033	7,291	7,304	7,362	7,419
Ret/Act	0.17	0.20	0.24	0.25	0.28	0.30	0.33	0.36	0.39	0.42	0.44	0.46	0.48	0.51

EXHIBIT 26

IMPACT OF FUNDING POLICY

Prior to the 2011 valuation, Regular members (about 95% of the active membership) contributed according to fixed contribution rates set in statute. For many years, the fixed contribution rate was less than the actuarial contribution rate and the System's funded status declined. Beginning with the 2011 valuation (which set contribution rates for FY 2013), IPERS was given the statutory authority to set the Required Contribution Rate for Regular members, subject to a maximum change of 1.00% per year. Since that time, contributions have been equal to or greater than the Actuarial Contribution Rate. The remaining 5% of the active members, the Sheriffs and Deputies and the Protection Occupation groups, have historically contributed at the Actuarial Contribution Rate which was subject to change each year as actual versus expected experience unfolded. These groups now contribute based on the same funding policy as is used for the Regular members.

The following graph compares the funded ratios of the three IPERS membership groups, illustrating the clear advantage of contributing the full Actuarial Contribution Rate.

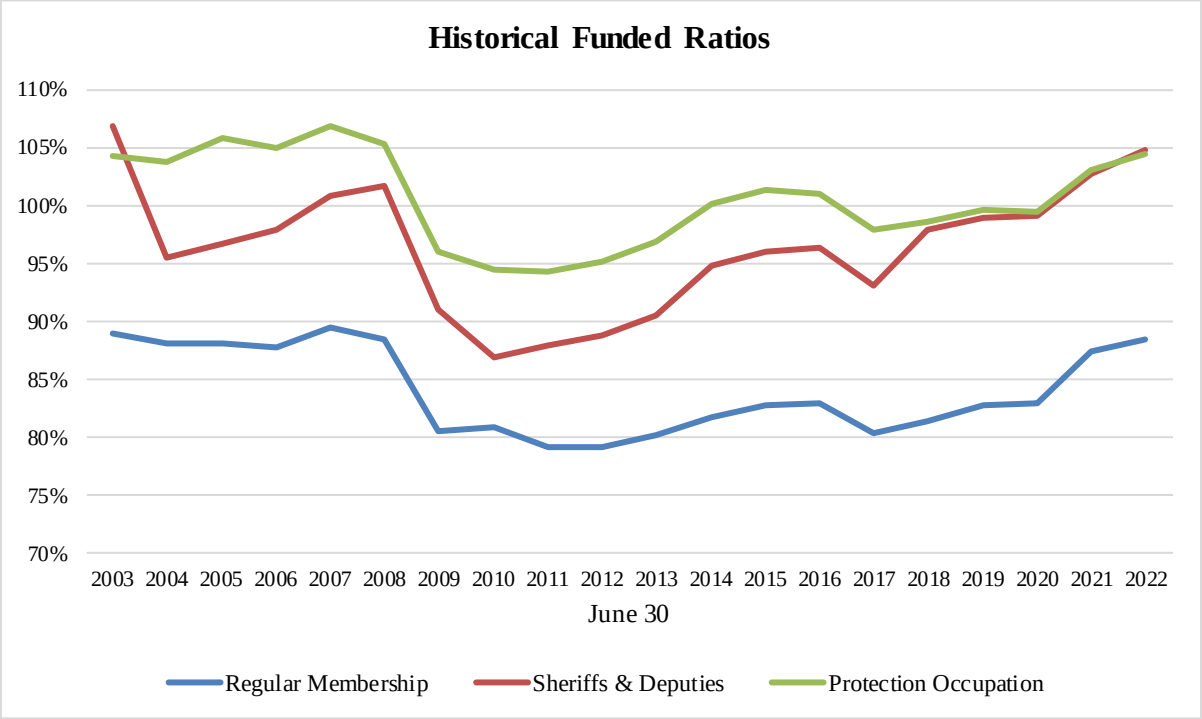


EXHIBIT 27

COMPARISON OF VALUATION RESULTS UNDER ALTERNATE INVESTMENT RETURN ASSUMPSION

Regular Members

This exhibit compares the key June 30, 2022, valuation results over five 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 ($ in millions).

Investment Return Assumption	**6.50%**	**6.75%**	**7.00%**	**7.25%**	**7.50%**
Contributions for FY 2024					
Total Normal Cost	11.92%	11.24%	10.60%	10.01%	9.46%
Unfunded Actuarial Liability	5.21%	4.28%	3.36%	2.44%	1.53%
Actuarial Contribution Rate	17.13%	15.52%	13.96%	12.45%	10.99%
Required Contribution Rate	16.73%	15.73%	15.73%	15.73%	15.73%
Employer Contribution Rate	10.04%	9.44%	9.44%	9.44%	9.44%
Employee Contribution Rate	6.69%	6.29%	6.29%	6.29%	6.29%
Contribution Shortfall/(Margin)	0.40%	(0.21%)	(1.77%)	(3.28%)	(4.74%)
Actuarial Liability	$43,474.7	$42,256.2	$41,090.8	$39,975.5	$38,907.7
Actuarial Value of Assets	36,345.9	36,345.9	36,345.9	36,345.9	36,345.9
Unfunded Actuarial Liability	$7,128.8	$5,910.3	$4,744.9	$3,629.6	$2,561.8
Funded Ratio	83.60%	86.01%	88.45%	90.92%	93.42%

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

EXHIBIT 27
(continued)

Sheriffs & Deputies

This exhibit compares the key June 30, 2022, valuation results over five 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 ($ in millions).

Investment Return Assumption	**6.50%**	**6.75%**	**7.00%**	**7.25%**	**7.50%**
Contributions for FY 2024					
Total Normal Cost	18.87%	17.79%	16.78%	15.83%	14.95%
Unfunded Actuarial Liability	0.48%	0.00%	0.00%	0.00%	0.00%
Actuarial Contribution Rate	19.35%	17.79%	16.78%	15.83%	14.95%
Required Contribution Rate	19.35%	17.79%	17.02%	17.02%	17.02%
Employer Contribution Rate	9.67%	8.89%	8.51%	8.51%	8.51%
Employee Contribution Rate	9.68%	8.90%	8.51%	8.51%	8.51%
Contribution Shortfall/(Margin)	0.00%	0.00%	(0.24%)	(1.19%)	(2.07%)
Actuarial Liability	$900.0	$874.3	$849.7	$826.1	$803.6
Actuarial Value of Assets	889.6	889.6	889.6	889.6	889.6
Unfunded Actuarial Liability	$10.3	($15.4)	($40.0)	($63.5)	($86.0)
Funded Ratio	98.85%	101.76%	104.70%	107.69%	110.71%

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

EXHIBIT 27
(continued)

Protection Occupation

This exhibit compares the key June 30, 2022, valuation results over five 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 ($ in millions).

Investment Return Assumption	**6.50%**	**6.75%**	**7.00%**	**7.25%**	**7.50%**
Contributions for FY 2024					
Total Normal Cost	17.13%	16.19%	15.31%	14.49%	13.72%
Unfunded Actuarial Liability	0.48%	0.00%	0.00%	0.00%	0.00%
Actuarial Contribution Rate	17.61%	16.19%	15.31%	14.49%	13.72%
Required Contribution Rate	17.61%	16.19%	15.52%	15.02%	15.02%
Employer Contribution Rate	10.57%	9.71%	9.31%	9.01%	9.01%
Employee Contribution Rate	7.04%	6.48%	6.21%	6.01%	6.01%
Contribution Shortfall/(Margin)	0.00%	0.00%	(0.21%)	(0.53%)	(1.30%)
Actuarial Liability	$2,150.9	$2,088.7	$2,029.3	$1,972.4	$1,917.9
Actuarial Value of Assets	2,118.7	2,118.7	2,118.7	2,118.7	2,118.7
Unfunded Actuarial Liability	$32.2	($30.0)	($89.4)	($146.3)	($200.8)
Funded Ratio	98.50%	101.43%	104.41%	107.42%	110.47%

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

APPENDIX A

SUMMARY STATISTICS ON SYSTEM MEMBERSHIP

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APPENDIX A

SUMMARY STATISTICS ON SYSTEM MEMBERSHIP

TABLE OF CONTENTS

RECONCILIATION OF ACTIVE MEMBERS

Below is a summary of the changes in active members (excluding retired re-employed members) between June 30, 2021 and June 30, 2022.

	Regular Membership	Sheriffs & Deputies	Protection Occupation	Total
6/30/2021 Starting count	164,267	1,675	7,362	173,304
New actives	19,812	73	1,034	20,919
Returning actives	3,673	6	104	3,783
Nonvested Terminations	(9,077)	(13)	(339)	(9,429)
Elected Refund	(3,179)	(15)	(220)	(3,414)
Vested Terminations	(3,184)	(31)	(273)	(3,488)
Total Withdrawals	(15,440)	(59)	(832)	(16,331)
Deaths	(266)	(3)	(11)	(280)
Disability Retirements	(63)	(6)	(5)	(74)
AE Benefits	(210)	0	(1)	(211)
Service Retirements	(4,818)	(36)	(210)	(5,064)
Total Retirements	(5,091)	(42)	(216)	(5,349)
Other/transfer	49	74	(22)	101
6/30/2022 Ending count	167,004	1,724	7,419	176,147

HISTORICAL SUMMARY OF MEMBERS

The following table displays selected historical data (including Regular, Sheriffs and Deputies, and Protection Occupation groups) as available.

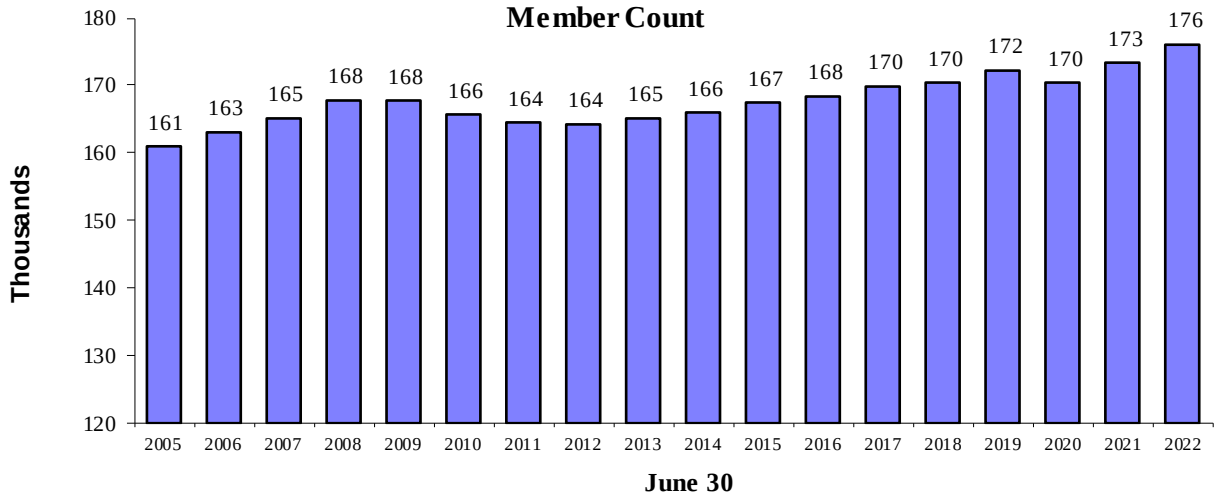
Valuation Date June 30	Total Count	Number	Average					Number			Active/Retired Ratio
			Age	Entry Age	Service	Annual Pay ($)	% Change	Retired Reemployed	Inactive Vested	Retired	
1998	241,767	148,917	44.7	33.2	11.5	26,767	2.8%		31,202	61,648	2.42
1999	250,168	152,440	44.8	33.4	11.4	27,322	2.1%	4,853	34,332	63,396	2.40
2000	249,970	153,039	44.8	33.2	11.6	29,032	6.3%	5,050	31,219	65,712	2.33
2001	255,963	154,610	45.0	33.5	11.5	30,341	4.5%	4,886	32,650	68,703	2.25
2002	264,974	158,467	45.1	33.8	11.3	32,119	5.9%	5,387	34,792	71,715	2.21
2003	268,813	159,310	45.2	33.8	11.4	31,950	-0.5%	6,126	35,375	74,128	2.15
2004	272,573	160,003	45.4	33.8	11.6	33,082	3.5%	6,438	35,788	76,782	2.08
2005	267,214	160,876	45.6	33.8	11.8	34,066	3.0%	6,592	26,919	79,419	2.03
2006	271,007	163,052	45.7	34.0	11.7	35,475	4.1%	8,044	25,918	82,037	1.99
2007	276,421	165,216	45.7	34.0	11.7	36,615	3.2%	7,848	26,435	84,770	1.95
2008	282,778	167,823	45.7	34.1	11.6	38,515	5.2%	8,523	27,626	87,309	1.92
2009	294,076	167,691	46.0	34.2	11.8	40,326	4.7%	8,427	28,240	89,718	1.87
2010	287,611	165,626	46.0	34.1	11.9	40,635	0.8%	8,347	28,472	93,513	1.77
2011	291,825	164,436	45.8	34.1	11.7	40,782	0.4%	8,321	29,077	98,312	1.67
2012	294,996	164,200	45.8	34.2	11.6	42,223	3.5%	8,265	29,119	101,677	1.61
2013	299,793	165,095	45.7	34.1	11.6	42,404	0.4%	9,925	28,443	104,640	1.58
2014	302,558	165,911	45.7	34.1	11.6	44,225	4.3%	9,931	28,713	107,934	1.54
2015	306,154	167,368	45.6	34.1	11.5	45,247	2.3%	10,295	27,659	111,127	1.51
2016	309,572	168,372	45.5	34.0	11.5	46,399	2.5%	10,608	26,960	114,240	1.47
2017	313,401	169,909	45.4	34.1	11.3	47,425	2.2%	10,787	25,984	117,508	1.45
2018	316,824	170,376	45.3	34.0	11.3	47,989	1.2%	10,601	25,693	120,755	1.41
2019	320,574	172,272	45.2	34.0	11.2	48,658	1.4%	10,793	24,789	123,513	1.39
2020	322,789	170,340	45.0	33.8	11.2	50,611	4.0%	10,530	26,091	126,358	1.35
2021	327,172	173,304	44.8	33.7	11.1	51,497	1.8%	9,321	25,279	128,589	1.35
2022	333,301	176,147	44.6	33.8	10.8	52,680	2.3%	8,520	25,734	131,420	1.34

Note: The Total Count figure represents the number of members valued in this report, with the exception of nonvested inactive members. The Retired Reemployed figure represents the number of members who have both an in-pay record and a not-in-pay record.

SUMMARY OF ACTIVE MEMBERS

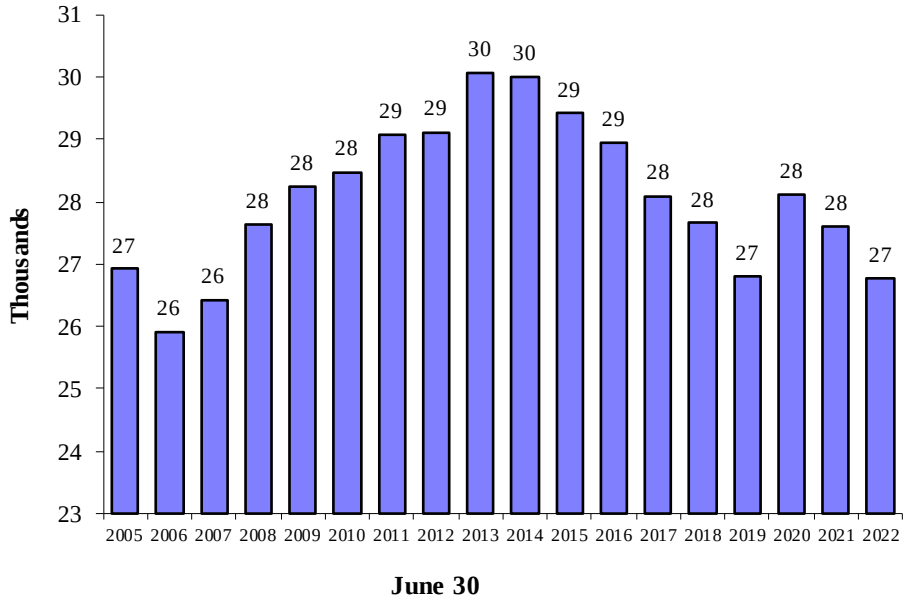
	Regular Membership	Sheriffs & Deputies	Protection Occupations	Total 6/30/2022	Total 6/30/2021	Percent Change
Total Active Members	167,004	1,724	7,419	176,147	173,304	1.6
Projected Payroll* (millions)	$8,707	$138	$434	$9,279	$8,925	4.0
Average Age	44.8	40.1	40.3	44.6	44.8	(0.4)
Average Entry Age	34.0	26.6	30.5	33.8	33.7	0.3
Average Projected Salary	$52,138	$80,259	$58,480	$52,680	$51,497	2.3
Retired Reemployed	7,124	125	240	7,489	7,003	6.9

*Payroll figures as of June 30 are actual amounts paid during the prior fiscal year, increased by the assumed salary increase factor for the upcoming fiscal year.



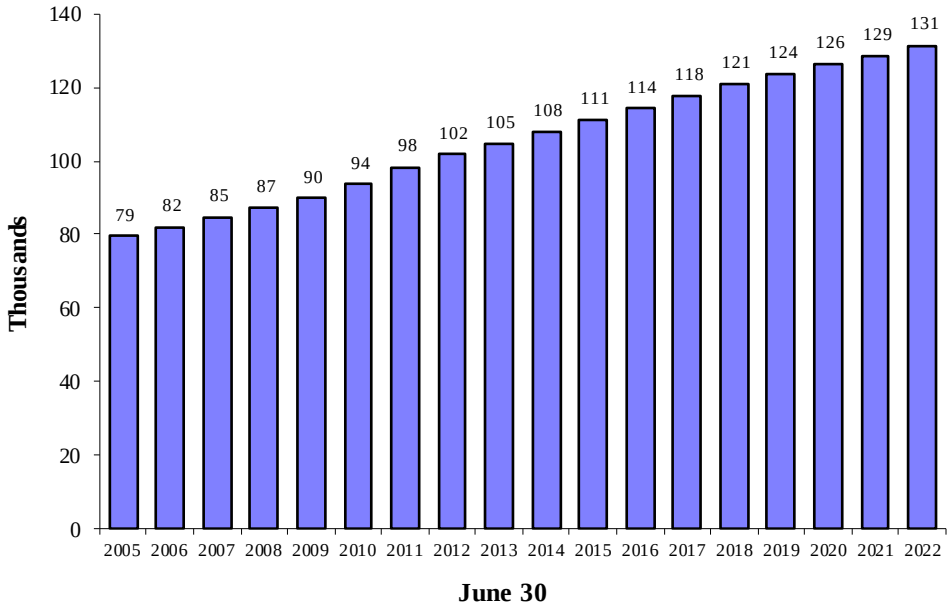
SUMMARY OF INACTIVE VESTED MEMBERS

	Regular Membership	Sheriffs & Deputies	Protection Occupations	Total 6/30/2022	Total 6/30/2021	Percent Change
Inactive Vested	24,356	142	1,236	25,734	25,279	1.8%
Inactive Retired Reemployed	992	10	29	1,031	2,318	(55.5%)
Total Inactive Vested	25,348	152	1,265	26,765	27,597	(3.0%)



SUMMARY OF RETIRED MEMBERS AND BENEFICIARIES

Regular Membership	Sheriffs & Deputies	Protection Occupations	Total 6/30/2022	Total 6/30/2021	Percent Change
126,420	1,215	3,785	131,420	128,589	2.2%



AGE AND SERVICE DISTRIBUTION AS OF JUNE 30, 2022 FOR ACTIVE MEMBERS*

Males and Females - Regular Membership

	Years of Service																			
	0 to 5		5 to 10		10 to 15		15 to 20		20 to 25		25 to 30		30 to 35		35 to 40		40 and over		Total	
Age	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary
Under 25	8,864	21,849	88	32,259	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	8,952	21,951
25-29	11,601	36,679	3,202	46,451	29	45,543	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	14,832	38,806
30-34	7,839	37,227	7,586	51,705	2,310	56,624	35	47,277	0	NA	0	NA	0	NA	0	NA	0	NA	17,770	45,949
35-39	6,930	37,223	5,252	52,838	5,415	62,074	1,918	67,073	23	56,058	0	NA	0	NA	0	NA	0	NA	19,538	51,260
40-44	6,375	36,130	4,805	49,754	3,758	61,476	5,288	70,448	1,567	72,597	10	70,470	0	NA	0	NA	0	NA	21,803	54,461
45-49	4,860	37,168	3,890	47,699	2,995	57,843	2,852	67,059	4,084	75,220	1,067	77,884	12	65,447	0	NA	0	NA	19,760	56,770
50-54	4,040	36,976	3,270	47,446	2,895	53,431	2,869	60,561	3,141	68,908	3,596	78,071	920	79,555	10	65,339	1	88,040	20,742	58,051
55-59	3,730	32,784	2,623	44,830	2,355	49,485	2,694	53,491	2,856	59,946	2,440	69,051	2,266	79,639	496	78,153	11	65,388	19,471	54,448
60-64	3,941	26,117	2,502	39,181	1,890	46,457	2,011	49,774	2,421	52,640	1,872	58,653	1,048	68,354	825	78,378	424	68,008	16,934	46,724
65-69	3,040	17,266	1,644	27,890	862	37,299	620	45,913	602	48,147	468	55,231	283	59,815	169	72,411	250	71,590	7,938	32,861
70 & over	3,402	18,939	1,746	17,145	753	17,940	262	20,336	99	20,541	40	31,693	35	41,831	11	76,482	40	65,941	6,388	19,012
Totals	64,622	32,055	36,608	46,233	23,262	54,905	18,549	61,773	14,793	65,460	9,493	70,573	4,564	75,475	1,511	77,537	726	69,115	174,128	47,879

*Including retired/reemployed members. Salary amounts are actual reported earnings from prior year, annualized for members with less than one year of service.

AGE AND SERVICE DISTRIBUTION AS OF JUNE 30, 2022 FOR ACTIVE MEMBERS*

Males and Females - Sheriffs and Deputies

Years of Service

	0 to 5		5 to 10		10 to 15		15 to 20		20 to 25		25 to 30		30 to 35		35 to 40		40 and over		Total	
Age	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary
Under 25	67	55,277	1	71,726	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	68	55,519
25-29	150	63,453	83	71,418	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	233	66,290
30-34	58	65,358	150	74,150	51	77,039	2	76,125	0	NA	0	NA	0	NA	0	NA	0	NA	261	72,776
35-39	52	63,514	83	73,810	119	75,840	66	79,328	0	NA	0	NA	0	NA	0	NA	0	NA	320	74,030
40-44	23	59,054	31	74,242	44	79,978	113	81,085	44	91,820	1	67,775	0	NA	0	NA	0	NA	256	79,880
45-49	10	67,540	13	73,016	25	75,342	38	77,218	124	86,653	33	86,998	1	61,613	0	NA	0	NA	244	82,459
50-54	23	40,459	10	73,559	10	79,351	32	79,548	53	83,210	73	89,270	10	94,621	0	NA	0	NA	211	79,992
55-59	31	23,968	14	39,344	6	74,861	9	74,494	13	84,506	15	93,419	24	94,930	14	87,228	0	NA	126	66,769
60-64	17	34,567	13	34,309	2	60,053	3	26,096	7	93,425	8	78,115	6	83,905	8	89,871	4	118,365	68	61,865
65-69	17	10,150	5	25,239	4	26,747	0	NA	1	75,358	2	125,415	1	100,858	2	73,631	5	83,622	37	37,788
70 & over	9	8,180	9	12,757	4	15,487	2	18,233	1	25,734	0	NA	0	NA	0	NA	0	NA	25	12,503
Totals	457	54,390	412	69,107	265	75,050	265	78,549	243	86,621	132	88,882	42	92,629	24	86,976	9	99,063	1,849	72,300

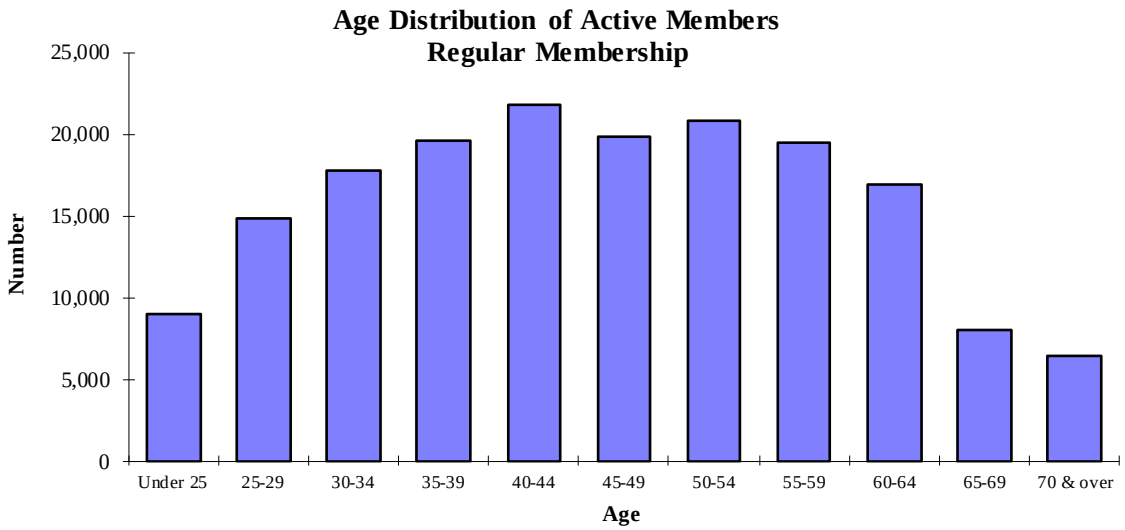
*Including retired/reemployed members. Salary amounts are actual reported earnings from prior year, annualized for members with less than one year of service.

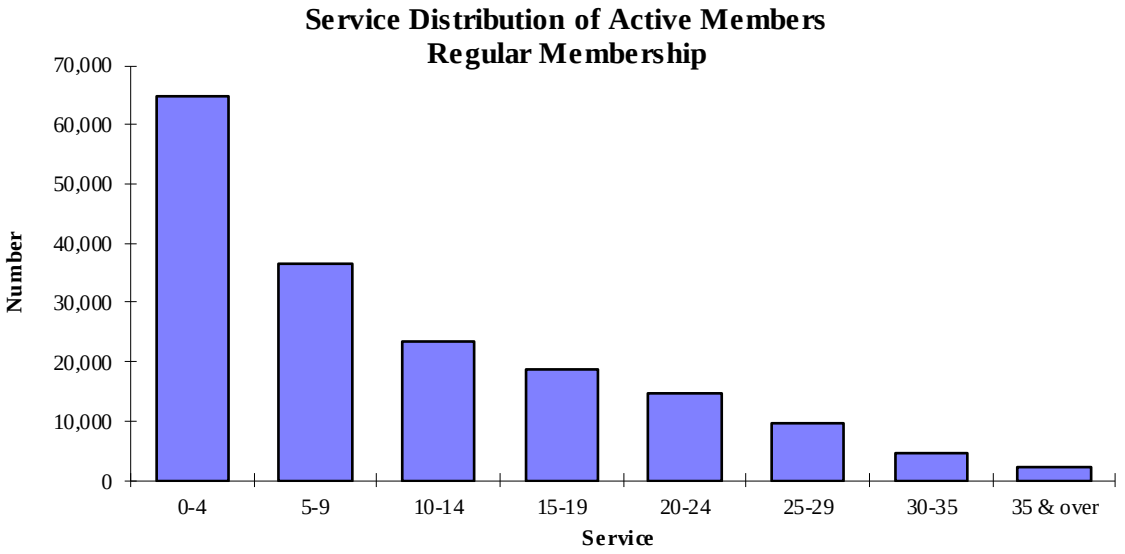
AGE AND SERVICE DISTRIBUTION AS OF JUNE 30, 2022 FOR ACTIVE MEMBERS*

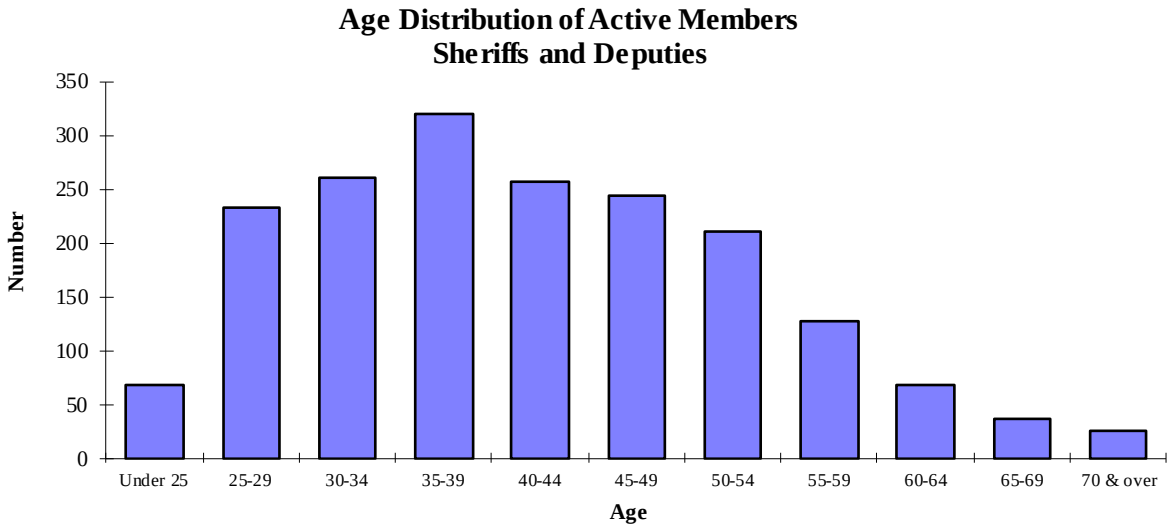
Males and Females - Protection Occupation

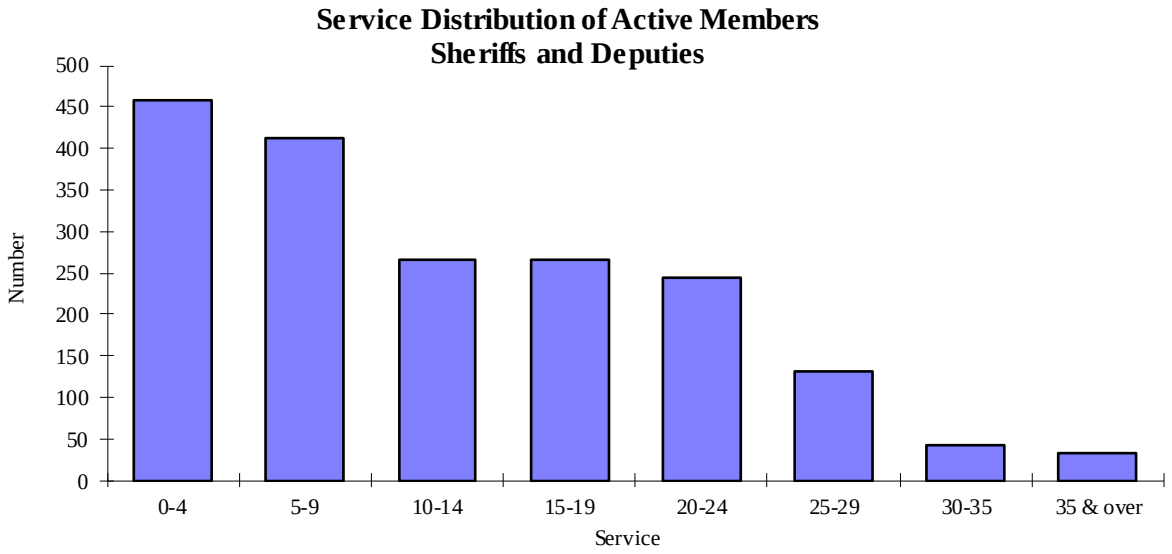
	Years of Service																			
	0 to 5		5 to 10		10 to 15		15 to 20		20 to 25		25 to 30		30 to 35		35 to 40		40 and over		Total	
Age	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary	No.	Avg. Salary
Under 25	716	34,237	5	45,298	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	721	34,313
25-29	741	43,006	219	54,874	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	960	45,713
30-34	504	43,730	391	58,297	107	63,786	2	25,762	0	NA	0	NA	0	NA	0	NA	0	NA	1,004	51,504
35-39	361	42,996	255	58,268	273	67,035	104	69,383	1	140,173	0	NA	0	NA	0	NA	0	NA	994	56,375
40-44	268	41,667	180	57,616	179	66,502	242	72,577	89	70,740	5	66,833	0	NA	0	NA	0	NA	963	59,850
45-49	195	41,312	125	54,293	125	62,341	154	71,527	200	72,147	70	73,730	1	91,184	0	NA	0	NA	870	61,301
50-54	146	41,405	93	55,236	114	58,938	143	65,329	174	72,863	172	77,489	49	81,303	2	69,691	0	NA	893	64,247
55-59	124	40,265	73	51,048	76	58,632	101	66,889	104	70,057	67	76,782	51	73,248	12	82,532	0	NA	608	60,999
60-64	104	29,836	56	54,010	48	57,421	54	55,047	49	63,390	32	61,915	16	69,929	24	72,846	8	85,964	391	52,426
65-69	56	16,134	26	28,182	18	42,336	20	56,364	14	56,199	3	37,735	11	58,749	2	64,162	7	88,893	157	37,085
70 & over	56	20,016	29	12,735	8	21,295	2	3,298	0	NA	2	53,045	0	NA	1	92,725	0	NA	98	19,041
Totals	3,271	39,538	1,452	55,127	948	62,960	822	68,188	631	70,875	351	74,554	128	74,811	41	75,588	15	87,331	7,659	53,530

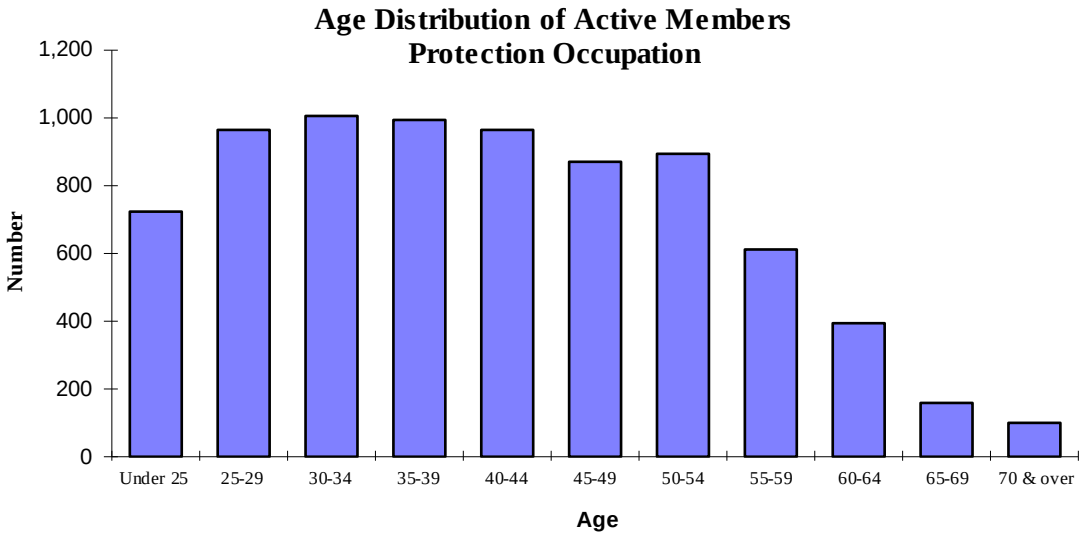
*Including retired/reemployed members. Salary amounts are actual reported earnings from prior year, annualized for members with less than one year of service.

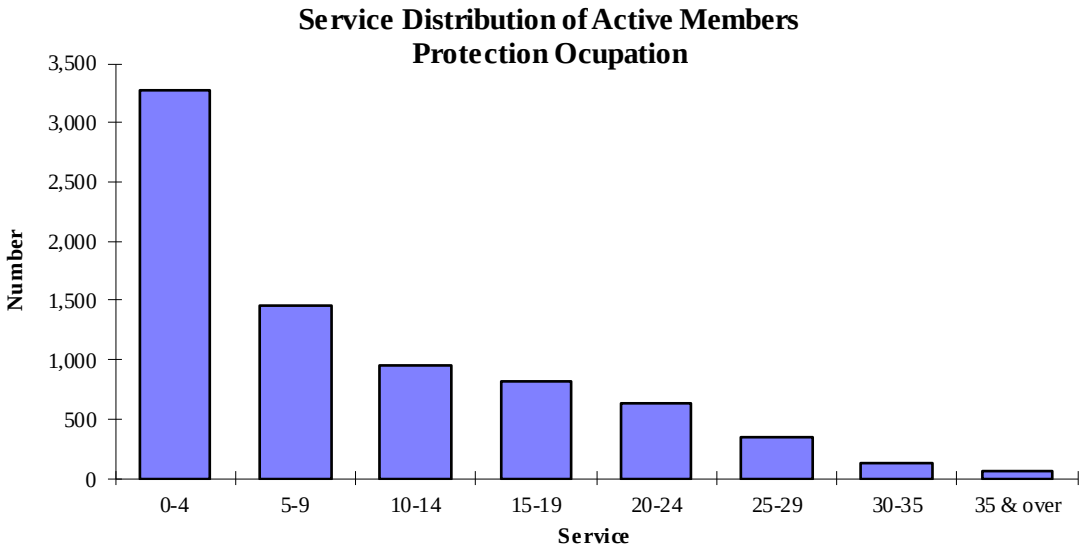

Age Distribution of Active Members
Regular Membership
Number
25,000
20,000
15,000
10,000
5,000
0
Under 25
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 & over
Age


Service Distribution of Active Members
Regular Membership
Number
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
0-4
5-9
10-14
15-19
20-24
25-29
30-35
35 & over
Service


Age Distribution of Active Members
Sheriffs and Deputies
Number
350
300
250
200
150
100
50
0
Under 25
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 & over
Age


Service Distribution of Active Members
Sheriffs and Deputies
Number
500
450
400
350
300
250
200
150
100
50
0
0-4
5-9
10-14
15-19
20-24
25-29
30-35
35 & over
Service


Age Distribution of Active Members
Protection Occupation
1,200
1,000
800
600
400
200
0
Number
Under 25
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 & over
Age


Service Distribution of Active Members
Protection Ocupation
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Number
0-4
5-9
10-14
15-19
20-24
25-29
30-35
35 & over
Service

AGE AND SERVICE DISTRIBUTION AS OF JUNE 30, 2022 FOR INACTIVE VESTED MEMBERS*

Males and Females - Regular Membership

	Years of Service																			
	0 to 5		5 to 10		10 to 15		15 to 20		20 to 25		25 to 30		30 to 35		35 to 40		40 and over		Total	
Age	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.
Under 25	0	NA	0	NA	1	70,671	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	1	70,671
25-29	0	NA	45	32,479	2	34,666	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	47	32,572
30-34	17	10,582	544	39,344	95	44,129	1	53,245	0	NA	0	NA	0	NA	0	NA	0	NA	657	39,313
35-39	173	25,004	1,132	38,034	560	48,695	47	46,718	1	71,391	0	NA	0	NA	0	NA	0	NA	1,913	40,207
40-44	326	26,147	1,433	37,569	785	48,745	248	54,057	26	53,640	1	28,065	0	NA	0	NA	0	NA	2,819	40,956
45-49	287	25,500	1,428	34,879	843	43,542	391	53,171	144	60,242	7	71,454	0	NA	0	NA	0	NA	3,100	39,934
50-54	337	25,019	1,667	30,682	1,096	38,505	558	50,438	254	58,323	100	62,822	12	73,030	0	NA	0	NA	4,024	37,748
55-59	350	20,301	1,757	25,735	1,151	30,537	546	37,562	279	48,974	122	65,042	35	62,280	3	68,873	0	NA	4,243	31,102
60-64	590	13,830	1,661	22,772	966	26,394	496	32,039	280	37,489	85	43,415	10	38,905	6	79,057	0	NA	4,094	25,018
65-69	1,371	10,054	975	15,609	348	19,635	139	21,488	59	22,661	26	36,608	8	58,468	2	35,983	2	64,255	2,930	14,259
70 & over	1,053	6,397	308	11,933	86	9,742	42	14,146	22	13,346	7	30,091	1	11,737	1	29,395	0	NA	1,520	8,151
Totals	4,504	14,335	10,950	29,465	5,933	36,590	2,468	42,370	1,065	47,649	348	56,317	66	59,465	12	65,194	2	64,255	25,348	30,931

*Including inactive retired/reemployed members

AGE AND SERVICE DISTRIBUTION AS OF JUNE 30, 2022 FOR INACTIVE VESTED MEMBERS*

Males and Females - Sheriffs and Deputies

	Years of Service																			
	0 to 5		5 to 10		10 to 15		15 to 20		20 to 25		25 to 30		30 to 35		35 to 40		40 and over		Total	
Age	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.
Under 25	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
25-29	2	58,529	3	56,767	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	57,472
30-34	2	54,327	16	59,273	4	69,652	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	22	60,710
35-39	5	54,903	12	62,164	4	67,046	2	61,825	0	NA	0	NA	0	NA	0	NA	0	NA	23	61,405
40-44	3	37,062	13	49,416	6	54,325	5	64,446	3	66,130	0	NA	0	NA	0	NA	0	NA	30	53,339
45-49	5	39,704	10	46,958	11	51,603	4	69,149	5	72,920	1	78,604	0	NA	0	NA	0	NA	36	54,321
50-54	2	57,537	7	45,580	6	54,749	5	61,315	3	61,906	0	NA	0	NA	0	NA	0	NA	23	54,562
55-59	2	22,274	2	53,661	1	71,913	0	NA	1	71,505	0	NA	0	NA	0	NA	0	NA	6	49,214
60-64	4	6,358	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	4	6,358
65-69	1	9,755	2	4,588	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	3	6,310
70 & over	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Totals	26	38,644	65	52,495	32	57,524	16	64,316	12	68,351	1	78,604	0	NA	0	NA	0	NA	152	53,852

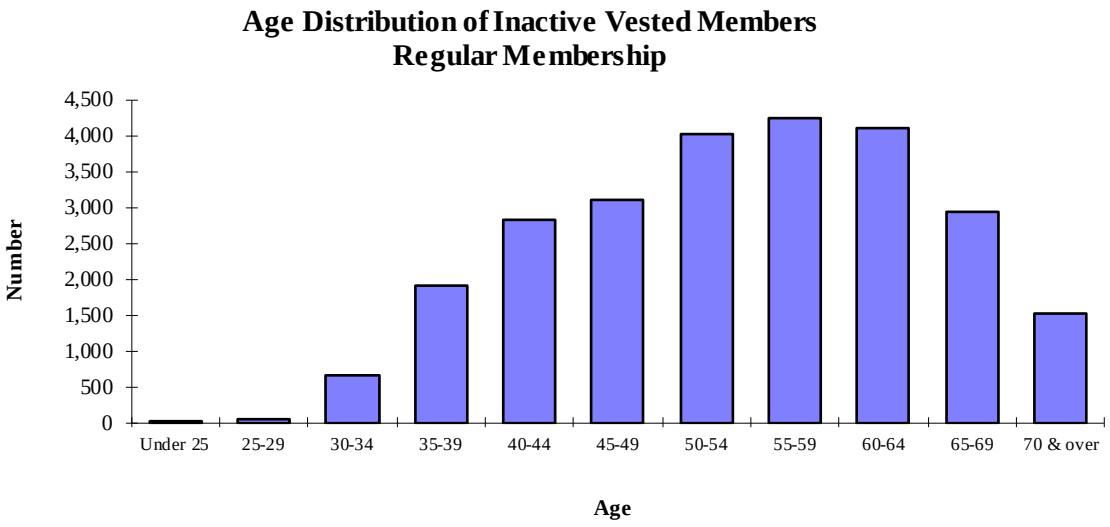
*Including inactive retired/reemployed members

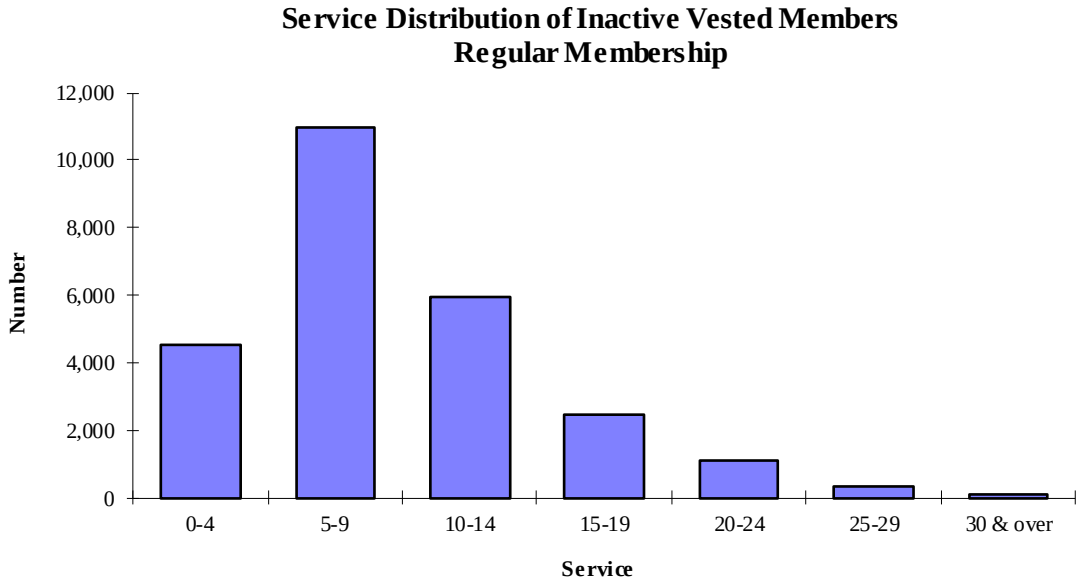
AGE AND SERVICE DISTRIBUTION AS OF JUNE 30, 2022 FOR INACTIVE VESTED MEMBERS*

Males and Females - Protection Occupation

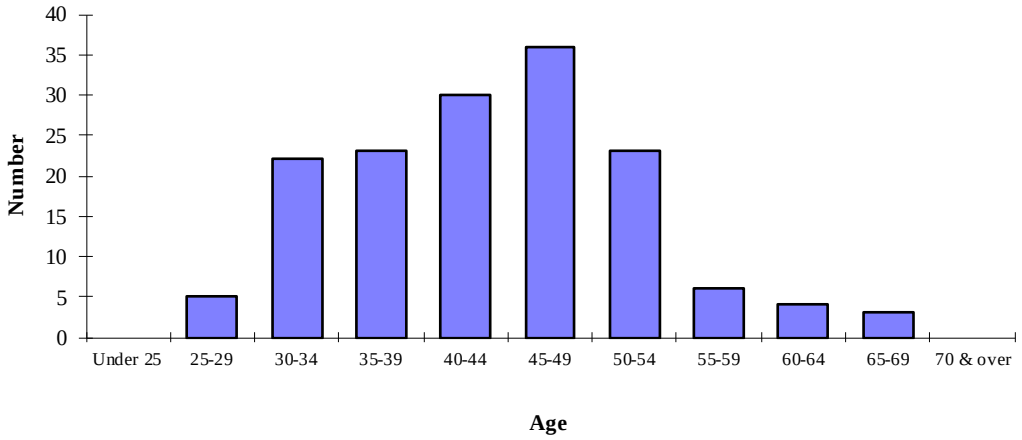
	Years of Service																			
	0 to 5		5 to 10		10 to 15		15 to 20		20 to 25		25 to 30		30 to 35		35 to 40		40 and over		Total	
Age	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.	No.	Avg. Sal.
Under 25	4	17,224	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	4	17,224
25-29	26	36,459	28	37,317	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	54	36,904
30-34	44	30,658	78	39,503	9	46,855	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	131	37,037
35-39	28	24,625	106	33,967	43	48,235	10	44,996	0	NA	0	NA	0	NA	0	NA	0	NA	187	36,439
40-44	24	24,200	105	30,762	56	44,852	21	59,059	7	58,956	0	NA	0	NA	0	NA	0	NA	213	37,443
45-49	18	35,763	63	30,814	41	42,120	27	48,595	11	60,493	4	75,399	0	NA	0	NA	0	NA	164	40,189
50-54	11	28,349	69	26,835	46	32,134	24	38,553	25	53,420	13	59,596	1	79,651	1	62,788	0	NA	190	35,892
55-59	21	18,387	47	23,875	36	30,316	17	34,997	17	51,438	6	59,208	1	65,788	0	NA	0	NA	145	30,966
60-64	45	11,538	26	17,896	20	16,377	8	20,361	5	27,465	2	37,228	0	NA	0	NA	0	NA	106	15,912
65-69	35	8,164	12	12,148	4	11,046	3	4,335	3	18,768	0	NA	0	NA	0	NA	0	NA	57	9,562
70 & over	8	7,113	3	3,436	2	14,339	1	4,801	0	NA	0	NA	0	NA	0	NA	0	NA	14	7,192
Totals	264	22,120	537	30,713	257	37,760	111	42,371	68	51,201	25	60,241	2	72,720	1	62,788	0	NA	1,265	33,151

*Including inactive retired/reemployed members

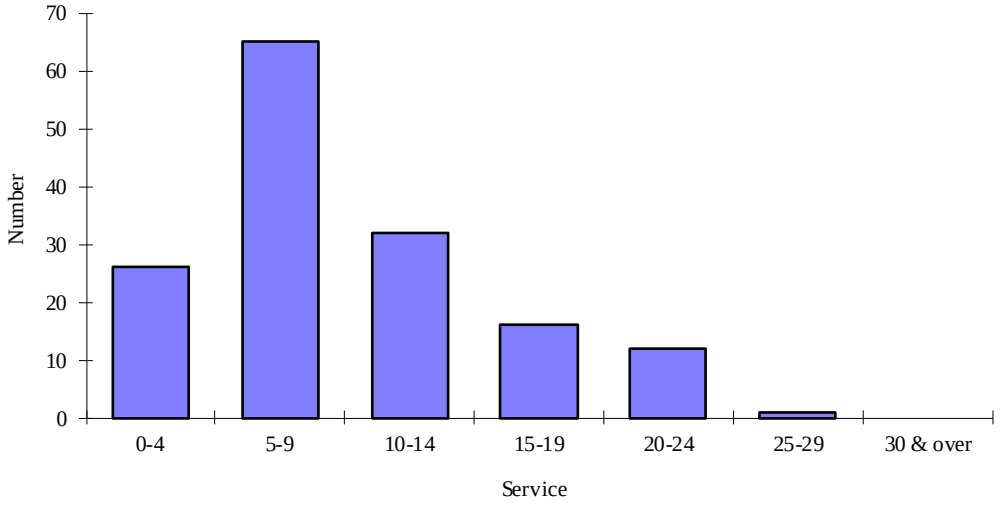

Age Distribution of Inactive Vested Members
Regular Membership
Number
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Under 25
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 & over
Age


Service Distribution of Inactive Vested Members
Regular Membership
Number
12,000
10,000
8,000
6,000
4,000
2,000
0
0-4
5-9
10-14
15-19
20-24
25-29
30 & over
Service

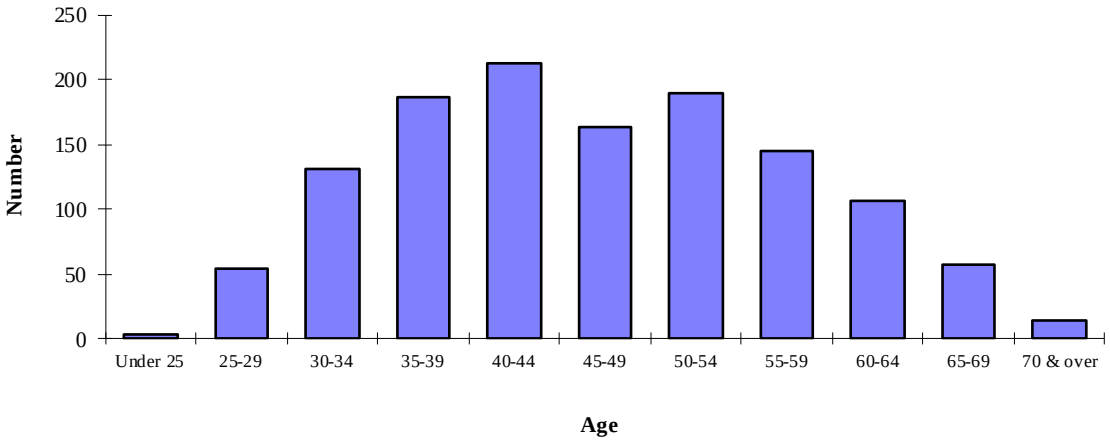
Age Distribution of Inactive Vested Members
Sheriffs and Deputies



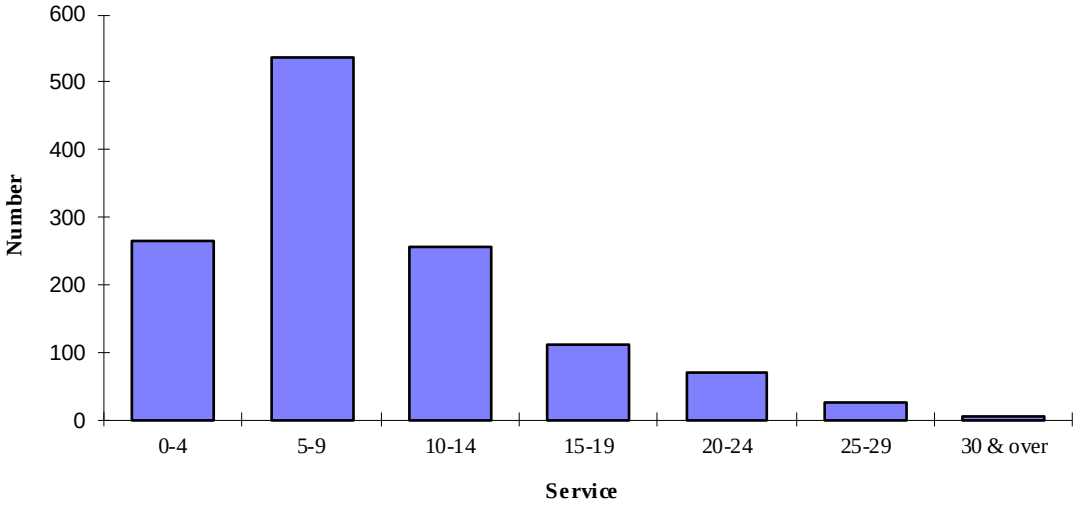
Service Distribution of Inactive Vested Members
Sheriffs and Deputies



Age Distribution of Inactive Vested Members
Protection Occupation



Service Distribution of Inactive Vested Members
Protection Occupation



ANALYSIS OF RETIREES AND BENEFICIARIES

Males and Females - Regular Membership

	Number of Members and Beneficiaries									Average
Age	Option 1	Option 2	Option 3	Option 4	Contingent Beneficiary	Option 5	Option 6	Period Certain	Total	Annual Benefit
Under 40	3	2	1	0	66	2	5	12	91	$8,114
40 to 44	8	4	4	1	28	0	5	9	59	9,468
45 to 49	14	5	5	6	56	2	10	9	107	9,022
50 to 54	33	30	8	19	106	9	32	4	241	12,837
55 to 59	552	610	221	237	188	222	927	8	2,965	24,582
60 to 64	2,084	2,764	953	914	442	987	4,093	16	12,253	25,498
65 to 69	4,642	6,317	2,491	1,909	745	2,033	7,877	22	26,036	21,855
70 to 74	6,028	7,572	3,822	2,214	1,150	2,498	7,695	32	31,011	19,951
75 to 79	4,835	5,802	3,352	1,663	1,323	2,065	4,064	16	23,120	16,649
80 to 84	3,624	3,516	2,251	1,546	1,293	1,586	1,239	4	15,059	13,386
85 to 89	2,524	2,085	1,204	1,263	1,067	1,136	153	1	9,433	10,809
90 to 94	1,284	1,123	513	504	586	506	21	1	4,538	7,918
95 to 99	371	365	139	125	166	148	0	0	1,314	6,123
100 & up	35	73	19	8	21	36	1	0	193	5,174
Counts	26,037	30,268	14,983	10,409	7,237	11,230	26,122	134	126,420	$18,287
% of Total	20.6%	23.9%	11.9%	8.2%	5.7%	8.9%	20.7%	0.1%	100.0%	

ANALYSIS OF RETIREES AND BENEFICIARIES

Males and Females - Sheriffs and Deputies

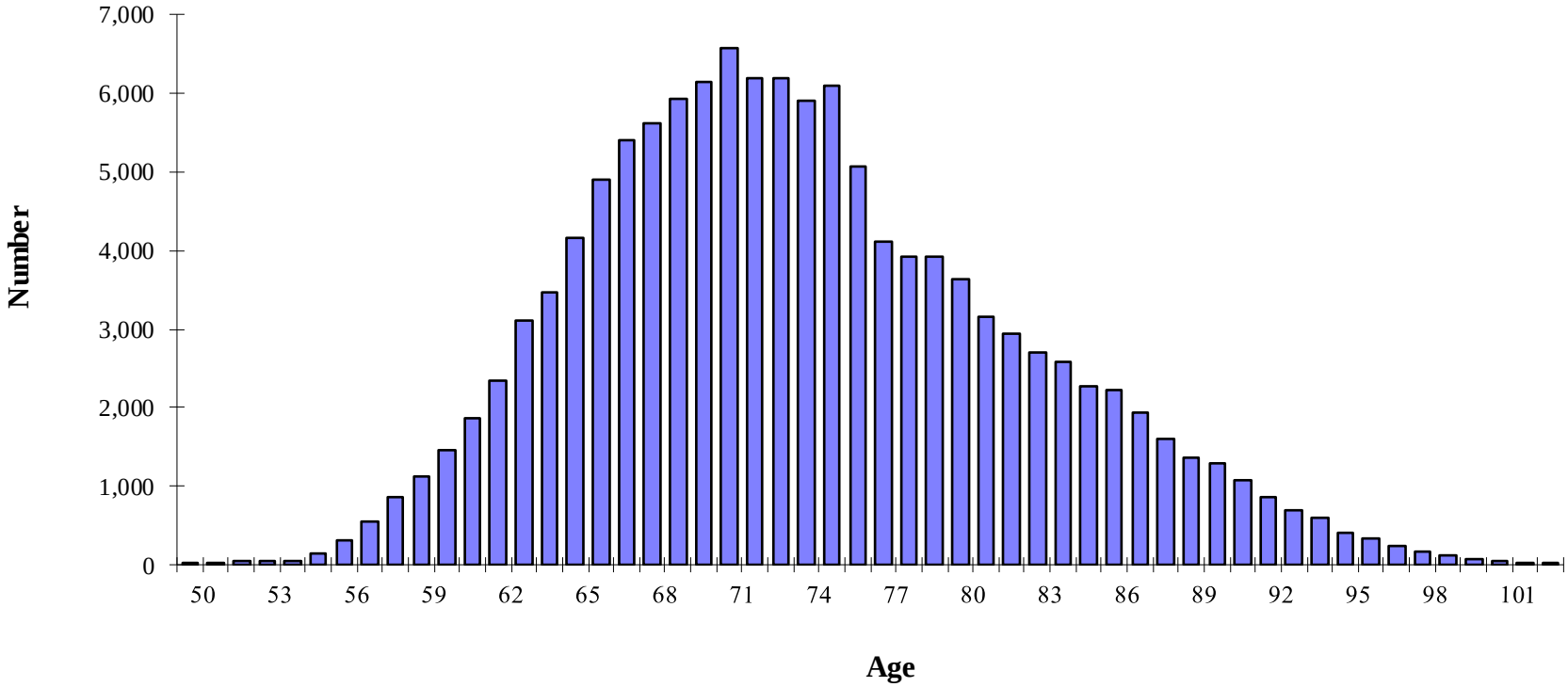
	Number of Members and Beneficiaries									Average
Age	Option 1	Option 2	Option 3	Option 4	Contingent Beneficiary	Option 5	Option 6	Period Certain	Total	Annual Benefit
Under 40	1	0	0	1	0	0	0	0	2	$27,942
40 to 44	1	0	1	4	4	0	2	0	12	29,782
45 to 49	1	0	0	1	2	0	3	0	7	24,180
50 to 54	10	5	1	24	3	2	35	0	80	47,274
55 to 59	27	23	9	25	7	7	95	0	193	44,041
60 to 64	28	16	16	40	11	6	82	0	199	42,096
65 to 69	37	31	19	47	27	16	88	0	265	37,505
70 to 74	36	31	12	32	14	11	82	0	218	32,976
75 to 79	28	10	9	21	17	6	34	0	125	25,482
80 to 84	14	8	4	19	10	5	3	0	63	22,350
85 to 89	13	3	2	10	11	2	3	0	44	15,062
90 to 94	0	1	0	1	4	0	0	0	6	12,619
95 to 99	0	0	0	0	1	0	0	0	1	4,923
100 & up	0	0	0	0	0	0	0	0	0	NA
Counts	196	128	73	225	111	55	427	0	1,215	$35,972
% of Total	16.3%	10.5%	6.0%	18.5%	9.1%	4.5%	35.1%	0.0%	100.0%	

ANALYSIS OF RETIREES AND BENEFICIARIES

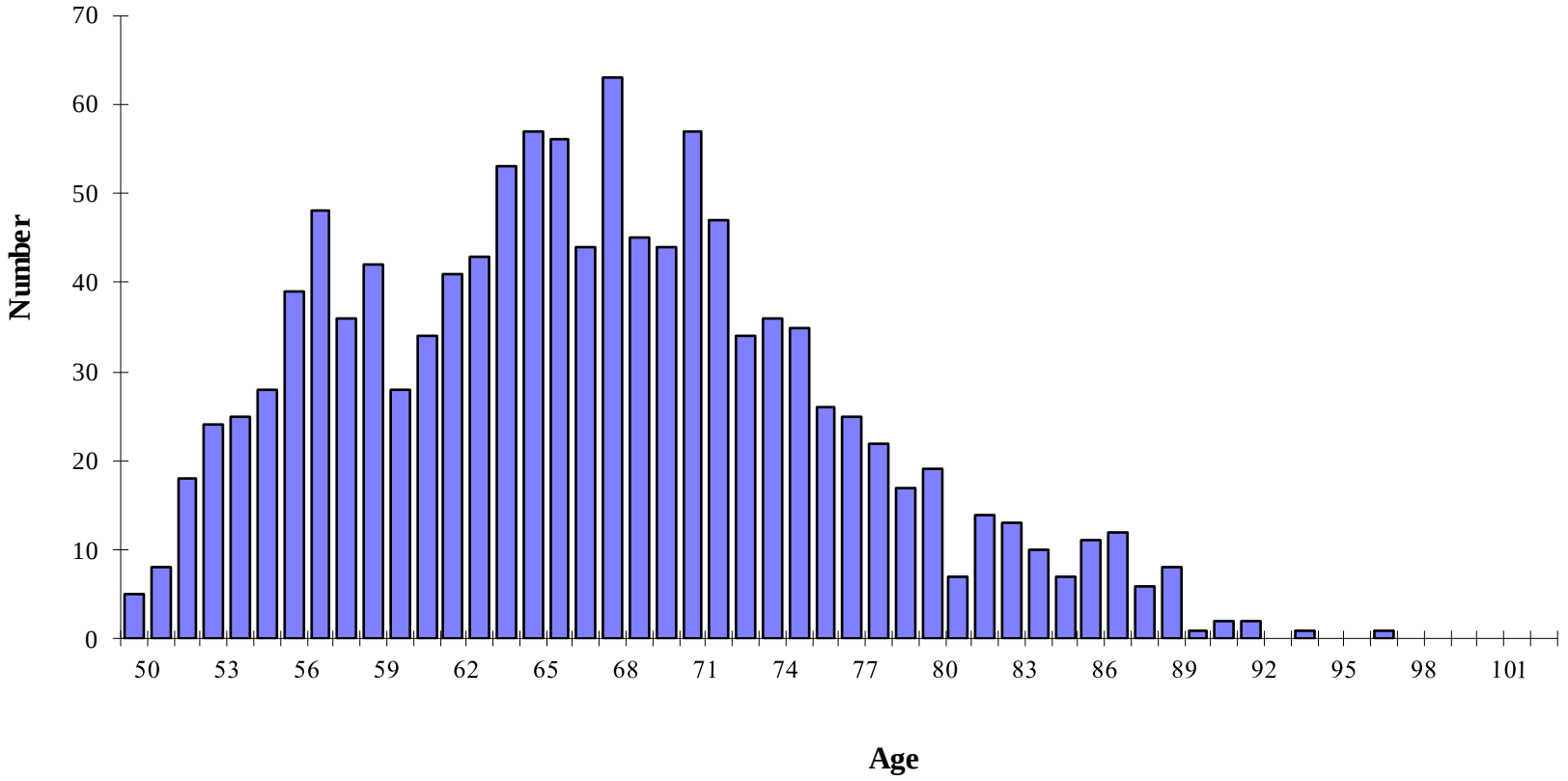
Males and Females - Protection Occupation

	Number of Members and Beneficiaries									Average
Age	Option 1	Option 2	Option 3	Option 4	Contingent Beneficiary	Option 5	Option 6	Period Certain	Total	Annual Benefit
Under 40	1	0	0	4	3	0	0	0	8	$22,777
40 to 44	0	2	0	3	5	0	0	0	10	14,915
45 to 49	2	0	1	3	3	1	5	1	16	24,966
50 to 54	6	0	1	9	11	3	8	1	39	24,645
55 to 59	62	66	37	79	11	14	158	0	427	33,702
60 to 64	133	127	49	147	34	30	307	0	827	33,538
65 to 69	169	145	42	138	48	51	325	0	918	28,664
70 to 74	151	161	65	114	56	35	232	1	815	25,263
75 to 79	81	72	26	60	50	22	105	1	417	19,905
80 to 84	43	36	18	43	38	5	30	0	213	16,311
85 to 89	15	4	3	14	19	4	3	0	62	12,634
90 to 94	5	2	2	6	14	1	0	0	30	11,497
95 to 99	1	0	0	1	1	0	0	0	3	9,535
100 & up	0	0	0	0	0	0	0	0	0	NA
Counts	669	615	244	621	293	166	1,173	4	3,785	$27,385
% of Total	17.8%	16.2%	6.4%	16.4%	7.7%	4.4%	31.0%	0.1%	100.0%	

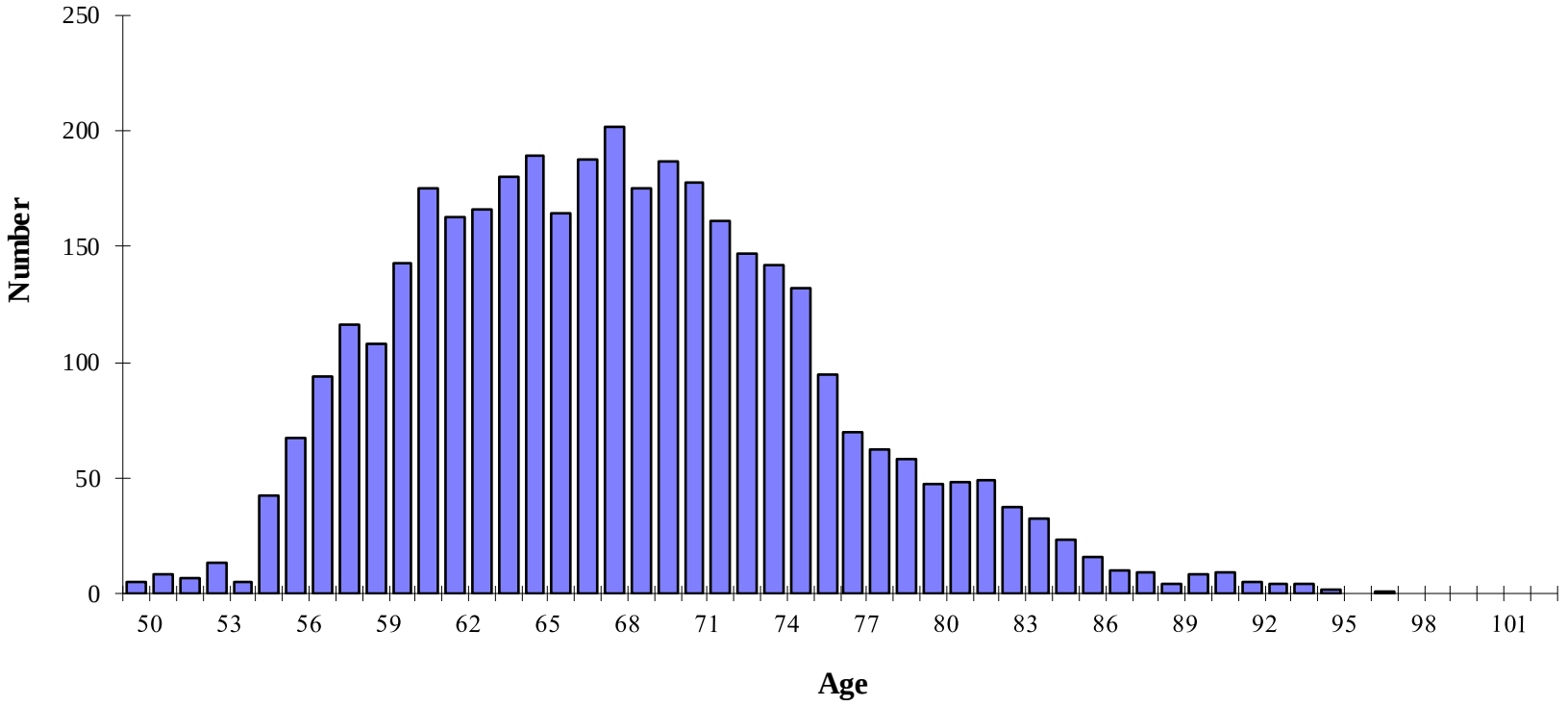
Age Distribution of Retirees & Beneficiaries
Regular Membership



Age Distribution of Retirees & Beneficiaries
Sheriffs and Deputies



Age Distribution of Retirees & Beneficiaries
Protection Occupation



SUMMARY OF DATA FILE RECONCILIATION

The following table reconciles the data we received from IPERS to the final membership counts used in the valuation.

Records on the in-pay data file	131,705
Removed those no longer entitled to benefits	(285)
Removed those who have filed for benefits but are not receiving	0
Added those still entitled to benefits	0
Records used in the valuation	131,420
Records on the not-in-pay data file	269,562
Records removed because the member has received all benefits	(19)
Records removed because member is deceased	(1,319)
Records used in the valuation*	268,224

* These records are allocated as follows:

Active members	176,147
Retired, reemployed members	8,520
Vested inactive members	25,734
Nonvested inactive members	57,823
Total	268,224

Nonvested inactive members include deceased vested inactive members with employee contributions still held by the System. Records that had no remaining benefit or had passed away prior to the valuation date were removed.

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APPENDIX B

SUMMARY OF PLAN PROVISIONS

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Chapter 97B of the Iowa code sets out the IPERS provisions, which are briefly summarized as follows:

Participation: In general, the System covers people in non-federal public employment within the State of Iowa. Membership is mandatory if a person is in covered employment. Exceptions to this are set out in the law. Notable exceptions are those covered by another public system in Iowa (such as judges, state patrol, and policemen and firemen in cities having civil service), employees of the Regents' institutions, and employees of the community colleges who elect alternative coverage.

Service Credit: A member will receive membership credit for service rendered after July 4, 1953 (special rules apply to service before this date). Service is counted to the complete quarter of a calendar year. A member will not receive credit for more than four quarters of service in a calendar year regardless of the number of employers reporting covered wages for that member. A calendar year is the 12-month period beginning January 1 and ending December 31.

Members may purchase service under specified conditions. To make such a purchase, the member must pay the actuarial cost of such service.

REGULAR MEMBERS:

Average Salary: The average of the member's highest three years of covered wages. Effective July 1, 2012 the average of a member's highest five years of covered wages, but not less than the member's highest three years as of June 30, 2012, if vested at that time.

Age and Service Requirements for Benefits:

Normal Retirement	Earliest of the first day of the month of the member's 65th birthday, age 62 with 20 years of service or Rule of 88 (age plus service equals/exceeds 88), with a minimum of age 55.
Early Retirement	First day of any month starting with the month of the member's 55th birthday but preceding the normal retirement date.
Inactive Vested Benefit	Four years of service (seven years effective July 1, 2012). Prior to July 1, 2005 inactive members could become eligible for a vested benefit merely by reaching age 55.
Pre-retirement Death Benefit	Upon death of a member before benefits have started.
Disability Benefit	Upon meeting requirements to be vested, if the active or inactive member begins receiving federal Social Security disability or Railroad Retirement disability benefits.

Retirement Benefits:

Normal Retirement	An annuity equal to 2% of Average Salary for each year of service up to 30 years plus 1% of Average Salary for each of the next 5 years of service. Maximum years of service recognized for benefit accrual purposes is 35 with a resulting maximum benefit of 65% of Average Salary (Option 2).
Early Retirement	An annuity, determined in the same manner as for normal retirement. However, a reduction of 0.25% per month is applied for each month the benefit commences prior to normal retirement age (based on service at early retirement). Effective July 1, 2012, the reduction changed to 0.50% per month and applies to each month that the benefit commences before age 65. Transition rules apply if members have service both before and after July 1, 2012.
Pre-retirement Death Benefits	Beneficiaries of members may receive a lump sum determined by a formula that includes how much the member contributed to IPERS, years of service, highest year's salary, and other factors. Beneficiaries may have the option of receiving a monthly benefit based on the present value of the member's accrued benefit at death.
Disability Benefits	An annuity, payable immediately, equal to the Normal Retirement Benefit without an early retirement adjustment.

Termination Benefits:

Less than four* years of Service (Nonvested)	A refund of all of the member's accumulated contributions.
Four* or more years of Service (Vested)	At the member's election either: (1) a refund of all of the member's accumulated contributions plus a portion (years of service divided by 30) of the employer's contributions with interest, or (2) a deferred benefit determined in the same manner as for normal retirement. Payments can begin at normal or early retirement.

* Effective July 1, 2012 seven years of service for those not vested at that time.

Form of Annuity:	The base form, or normal form, is a life annuity with a guaranteed return of employee contributions (Option 2).

Optional Forms of Payment:	*Option 1:* The member specifies a dollar amount, in $1,000 increments, that the member wishes to have paid to a designated beneficiary following the death of the member. The death benefit will be in the form of a single payment and cannot exceed the amount of a member's own accumulated contributions to IPERS, and it cannot lower the member's benefit as calculated under Option 2 by more than 50%. *Option 3:* After the member's death, all benefits cease. *Option 4:* The member receives a reduced monthly benefit so that a lifetime monthly benefit may be provided after the member's death to the person named by the member as the contingent annuitant. The member specifies what benefit the contingent annuitant will receive after the death of the member. The monthly benefit can be the same as the member's monthly benefit or three-fourths, one-half, or one-fourth of the amount. These choices may be restricted if the contingent annuitant is not the member's spouse and is more than ten years younger than the member. *Option 5:* If the member dies before ten full years (120 months of payments) have ended, the member's beneficiary will receive a monthly benefit for the remainder of the ten years. Members who have attained age 90 as of the first month of entitlement are not allowed to select this option. *Option 6:* The member receives a reduced monthly benefit so that a lifetime monthly benefit may be provided after the member's death to the person named by the member as the contingent annuitant. In addition, the monthly amounts are also reduced to pay for a pop-up feature. The pop-up feature provides that if the contingent annuitant dies before the member, the member's benefit will pop back up to what it would have been under IPERS Option 2, and death benefits may be payable to the member's designated beneficiary if certain conditions are met.
Actuarial Equivalent Lump Sum Payment:	If a vested member is entitled to receive a benefit and it is less than $50 per month under Option 2, the member shall receive a retirement benefit in an actuarial equivalent lump sum payment. The lump sum will include the member's and employer's accumulated contributions.
Post-retirement Benefit Increases:	Annual dividends are paid to those retired prior to July 1, 1990. Effective with the November 2000 dividend payment, the dividend is adjusted by the least of the following percentages: (1) the change in the CPI, (2) percentage certified to by the actuary as affordable by the System, and (3) 3%.

Favorable Experience Dividend (FED):

For members who retired after June 30, 1990, a favorable experience dividend (FED) reserve account has been established under Iowa Code §97B.49F(2). The main purpose of this account is to help offset the negative effects of postretirement inflation. All members and beneficiaries who receive a monthly allowance qualify for favorable experience dividend payments. Each November, IPERS determines if a FED payment should be paid the following January subject to the following conditions:

- The member must be retired one year.
- The FED rate cannot exceed 3%.
- The FED payment will be issued in a lump sum in January.
- The FED payment is not guaranteed.

The formula is as follows:
(December's Monthly benefit) X (12 months) X (Rate) X (Full calendar years retired) = FED

Source of Funds:

Regular Membership:

Contribution Rates

Time Period	Employees**	Employer	Total
Prior to 7/1/07	3.70%	5.75%	9.45%
7/1/07 – 6/30/08	3.90%	6.05%	9.95%
7/1/08 – 6/30/09	4.10%	6.35%	10.45%
7/1/09 – 6/30/10	4.30%	6.65%	10.95%
7/1/10 – 6/30/11	4.50%	6.95%	11.45%
7/1/11 – 6/30/12	5.38%	8.07%	13.45%
7/1/12 and later	Determined by Contribution Rate Funding Policy*		

* Change in contribution rate cannot exceed 1.0% per year.
** Employee rate is 40% of total contribution rate.

SHERIFFS/DEPUTIES AND PROTECTION OCCUPATION:

Average Salary:

The average of the member's highest three years of covered wages

Age and Service Requirements for Benefits:

Normal Retirement

Generally age 55. However, a member of the Sheriffs and Deputy Sheriffs may retire at age 50 with 22 years of service.

Inactive Vested Benefit	Four years of service. Prior to July 1, 2005 inactive members could become eligible for vested benefits merely by reaching age 55.
Pre-retirement Death Benefit	Upon death of a member before benefits have started.
Disability Benefit	Upon meeting requirements to be vested, (i) if the active or inactive member begins receiving federal Social Security or Railroad Retirement disability benefits, or (ii) upon being determined by IPERS to be disabled under the provisions of Iowa Code section 97B.50A. The disability benefits under Iowa Code section 97B.50A must be applied for through IPERS within one (1) year after termination of employment. Benefits under Iowa Code section 97B.50A may be paid for in-service disability or ordinary disability.

Retirement Benefits:

Normal Retirement	60% of Average Salary after completion of 22 years of service, plus an additional 1.5% of Average Salary for years of service greater than 22 but not more than 30. Maximum formula is 72% of Average Salary.
Pre-retirement Death Benefit	Beneficiaries of members may receive a lump sum determined by a formula that includes how much the member contributed to IPERS, years of service, highest year's salary, and other factors. Beneficiaries may have the option of receiving a monthly benefit based on the present value of the member's accrued benefit at death.
Disability Benefits	An annuity, payable immediately, equal to the Normal Retirement Benefit, without an adjustment. The benefit is the greater of the Normal Retirement Benefit and either 50% (for ordinary disability) or 60% (for in-service disability) of Average Salary.

Termination Benefits:

Less than four years of Service (Non-vested)	A refund of all of the member's accumulated contributions.
Four or more years of Service (Vested)	At the member's election either: (1) a refund of all of the member's accumulated contributions plus a portion (years of service divided by 22) of the employer's contributions with interest, or

(2) a deferred benefit determined in the same manner as for normal retirement. Payments begin at normal retirement.

Form of Annuity:

The base form, or normal form, is a life annuity with a guaranteed return of employee contributions (Option 2).

Optional Forms of Payment:

Option 1: The member specifies a dollar amount, in $1,000 increments, that the member wishes to have paid to a designated beneficiary following the death of the member. The death benefit will be in the form of a single payment and cannot exceed the amount of a member's own accumulated contributions to IPERS, and it cannot lower the member's benefit as calculated under Option 2 by more than 50%.

Option 3: After the member's death, all benefits cease.

Option 4: The member receives a reduced monthly benefit so that a lifetime monthly benefit may be provided after the member's death to the person named by the member as the contingent annuitant. The member specifies what benefit the contingent annuitant will receive after the death of the member. The monthly benefit can be the same as the member's monthly benefit or three-fourths, one-half, or one-fourth of the amount. These choices may be restricted if the contingent annuitant is not the member's spouse and is more than ten years younger than the member.

Option 5: If the member dies before ten full years (120 months of payments) have ended, the member's beneficiary will receive a monthly benefit for the remainder of the ten years. Members who have attained age 90 as of the first month of entitlement are not allowed to select this option.

Option 6: The member receives a reduced monthly benefit so that a lifetime monthly benefit may be provided after the member's death to the person named by the member as the contingent annuitant. In addition, the monthly amounts are also reduced to pay for a pop-up feature. The pop-up feature provides that if the contingent annuitant dies before the member, the member's benefit will pop back up to what it would have been under IPERS Option 2, and death benefits may be payable to the member's designated beneficiary if certain conditions are met.

Level Income Payment Option: A Level Income payment alternative is authorized for members of the Sheriffs and Deputies group and the Protection Occupation group. This alternative applies to all IPERS retirement options listed above except Option 6. The Level Income payment

alternative permits a member to receive a relatively level income both before and after age 62 when benefits from IPERS and Social Security are combined. Higher IPERS benefits are paid prior to age 62. When the member reaches age 62, the member's IPERS benefit is permanently reduced. This amount is determined when the member retires and is not recomputed based on the actual Social Security benefit.

Actuarial Equivalent Lump Sum Payment: If a vested member is entitled to receive a benefit and it is less than $50 per month under Option 2, the member shall receive a retirement benefit in an actuarial equivalent lump sum payment. The lump sum will include the member's and employer's accumulated contributions.

Post-retirement Benefit Increases: Annual dividends are paid to those retired prior to July 1, 1990. Effective with the November 2000 dividend payment, the dividend is adjusted by the least of the following percentages: (1) the change in the CPI, (2) percentage certified to by the actuary as affordable by the System, and (3) 3%.

Favorable Experience Dividend (FED): For members who retired after June 30, 1990, a favorable experience dividend (FED) reserve account has been established under Iowa Code §97B.49F(2). The main purpose of this account is to help offset the negative effects of postretirement inflation. All members and beneficiaries who receive a monthly allowance qualify for favorable experience dividend payments. Each November, IPERS determines if a FED payment should be paid the following January subject to the following conditions:

- The member must be retired one year.
- The FED rate cannot exceed 3%.
- The FED payment will be issued in a lump sum in January.
- The FED payment is not guaranteed.

The formula is as follows:
(December's Monthly benefit) x (12 months) x (Rate) x (Full calendar years retired) = FED

Source of Funds:

Sheriffs and Deputies: Determined by Contribution Rate Funding Policy. Employees contribute 50% and employers contribute 50%.

Protection Occupation: Determined by Contribution Rate Funding Policy. Employees contribute 40% and employers contribute 60%.

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APPENDIX C

ACTUARIAL ASSUMPTIONS AND METHODS

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Sound financing of any retirement system requires that benefits accruing to its members shall be paid for during their active working lifetime so that when a member (or his beneficiary) becomes entitled to a benefit, the monies necessary to provide such benefit shall be on hand. In this way, the cost of benefits for present active members will not become a liability to future members and taxpayers.

The principal purpose of an actuarial valuation is to calculate, on the basis of certain assumptions, the present value of benefits that are payable in the future from the system to present members (and their beneficiaries) and the present value of future contributions to be made by the members and their employers. Having calculated such present values, the level of annual contribution to the system required to fund (or pay for) the benefits, in accordance with the above stated principle of sound financing, may be determined.

VALUATION ASSUMPTIONS

Retirement System contribution requirements and actuarial present values are calculated by applying experience assumptions to the benefit provisions and census (member) information of the Retirement System, using the actuarial cost method.

The principal areas of risk which require experience assumptions about future activities of the Retirement System are:

- long-term rates of investment return to be generated by the assets of the system
- patterns of pay increases to members
- rates of mortality among members, retirants and beneficiaries
- rates of withdrawal of active members
- rates of disability among active members
- the age patterns of actual retirements

In making a valuation, the monetary effect of each assumption is calculated for as long as a present member survives -- a period of time which can be as long as a century.

Actual experience of the Retirement System will not coincide exactly with assumed experience. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experiences. The result is a continual series of adjustments to the computed contribution rate, or alternatively to the amortization period for the unfunded actuarial liability.

From time to time, one or more of the assumptions are modified to reflect experience trends (but not random or temporary year to year fluctuations). A complete review of the actuarial assumptions was completed in 2022, based on experience from July 1, 2017 through June 30, 2021. The Investment Board has adopted and approved the use of the actuarial assumptions presented in the 2022 Experience Study, with the exception of an explicit assumption to fund administrative expenses. The following is a summary of the assumptions and methods used in the valuation:

ECONOMIC ASSUMPTIONS:

Rate of Inflation (effective June 30, 2017)

2.60% per annum

Rate of Crediting Interest on Contribution Balances (effective June 30, 2017)

3.50% per annum, compounded annually

Rate of Investment Return (effective June 30, 2017)

7.00% per annum, compounded annually, net of expenses.

Wage Growth Assumption (effective June 30, 2017)

3.25% per annum based on 2.60% inflation assumption and 0.65% real wage inflation.

Payroll Increase Assumption (effective June 30, 2017)

3.25% per year

Cost of Living Adjustments Assumption (effective June 30, 2017)

2.60% for members who retired before July 1, 1990. No cost-of-living adjustments are assumed to be granted to future retirees

DEMOGRAPHIC ASSUMPTIONS:

Rates of Mortality

Pre-Retirement (effective June 30, 2022)

State		
	Male	PubG-2010 Employee Table, Generational using MP-2021, 2 Year age setback
	Female	PubG-2010 Employee Table, Generational using MP-2021, 2 Year age setback
School		
	Male	PubG-2010 Employee Table, Generational using MP-2021, 4 Year age setback
	Female	PubG-2010 Employee Table, Generational using MP-2021, 8 Year age setback
Other		
	Male	PubG-2010 Employee Table, Generational using MP-2021, 4 Year age setback
	Female	PubG-2010 Employee Table, Generational using MP-2021, 8 Year age setback

Sheriffs/Deputies and Protection Occupation	
Male	PubG-2010 Employee Table, Generational using MP-2021, 4 Year age setback
Female	PubG-2010 Employee Table, Generational using MP-2021, 2 Year age setback

5% of active deaths are assumed to be service related for non-regular members.

Post-Retirement (effective June 30, 2022)

State	PubG-2010 Healthy Annuitant, Generational using MP-2021
Male	2 Year age set forward, 8% increase below age 75, 5% decrease above age 75
Female	2 Year age set forward, 20% increase below age 75, 10% decrease above age 75
School	PubG-2010 Healthy Annuitant, Generational using MP-2021
Male	No age adjustment, 20% decrease in rates below age 75
Female	1 Year age setback, 10% increase below age 75, 6% increase above age 75
Other	PubG-2010 Healthy Annuitant, Generational using MP-2021
Male	2 Year age set forward, 3% decrease at all ages
Female	No age adjustment, 4% decrease at all ages
Sheriffs/Deputies and Protection Occupation	PubS-2010 Healthy Annuitant, Generational using MP-2021
Male	3 Year age set forward
Female	2 Year age set forward, 4% decrease at all ages
Beneficiaries:	Same as members
Disabled Members	
Regular	PubG-2010 Disabled Mortality, Generational using MP-2021
Male	7 Year age set forward
Female	5 Year age set forward
Sheriffs/Deputies and Protection Occupation	PubG-2010 Disabled Mortality, Generational using MP-2021
Male	3 Year age set forward
Female	3 Year age set forward

Retirement Rates (effective June 30, 2022)

Upon meeting the requirements for early retirement, the following rates apply to Regular Members:

	Assumed Retirement Rates – Early		
Age	State	School	Other
55	4.0%	5.0%	4.0%
56	4.0%	5.0%	4.0%
57	4.0%	5.0%	4.0%
58	4.0%	5.0%	4.0%
59	4.0%	7.0%	4.0%
60	5.0%	10.0%	5.0%
61	15.0%	10.0%	8.0%
62	15.0%	13.0%	11.0%
63	15.0%	13.0%	11.0%
64	15.0%	15.0%	11.0%

Upon reaching the requirements for normal retirement (unreduced benefits), the following rates apply:

	Assumed Retirement Rates – Select Unreduced		
Age	State	School	Other
55	25.0%	26.0%	19.0%
56	20.0%	26.0%	19.0%
57	20.0%	26.0%	19.0%
58	20.0%	26.0%	19.0%
59	20.0%	26.0%	19.0%
60	20.0%	26.0%	19.0%
61	20.0%	33.0%	19.0%
62	30.0%	35.0%	27.0%
63	35.0%	30.0%	20.0%
64	30.0%	30.0%	25.0%
65	30.0%	30.0%	40.0%

	Assumed Retirement Rates – Ultimate Unreduced		
Age	State	School	Other
56	15.0%	20.0%	12.0%
57	15.0%	20.0%	12.0%
58	15.0%	20.0%	12.0%
59	15.0%	21.0%	12.0%
60	15.0%	23.0%	15.0%
61	20.0%	28.0%	20.0%
62	35.0%	35.0%	27.0%
63	30.0%	30.0%	20.0%
64	30.0%	30.0%	25.0%
65	30.0%	45.0%	40.0%
66	30.0%	35.0%	30.0%
67	20.0%	25.0%	20.0%
68	20.0%	25.0%	20.0%
69	35.0%	40.0%	40.0%
70	100.0%	100.0%	100.0%

	Assumed Retirement Rates	
Age	Sheriffs and Deputies	Protection Occupation
50	17.0%	
51	15.0%	
52	15.0%	
53	15.0%	
54	15.0%	
55	15.0%	25.0%
56	15.0%	10.0%
57	15.0%	10.0%
58	15.0%	10.0%
59	15.0%	10.0%
60	15.0%	10.0%
61	15.0%	15.0%
62	30.0%	30.0%
63	30.0%	25.0%
64	30.0%	25.0%
65	100.0%	100.0%

Terminated vested members are assumed to retire at age 62 (55 for Sheriffs/Deputies and Protection Occupation groups).

For Regular membership, retired reemployed members are assumed to retire at a rate of 25% per year until age 80 when all are assumed to retire.

All retirees are assumed to elect a modified cash refund annuity (Option 2).

Rates of Disablement (effective June 30, 2022)

	Assumed Rates					
	Males			Females		
Age	State	School	Other	State	School	Other
27	0.017%	0.018%	0.016%	0.016%	0.018%	0.016%
32	0.017%	0.018%	0.016%	0.016%	0.018%	0.016%
37	0.026%	0.031%	0.024%	0.024%	0.027%	0.024%
42	0.043%	0.050%	0.040%	0.032%	0.036%	0.032%
47	0.085%	0.088%	0.088%	0.056%	0.063%	0.058%
52	0.153%	0.128%	0.208%	0.144%	0.117%	0.126%
57	0.221%	0.207%	0.400%	0.248%	0.171%	0.224%
62	0.289%	0.286%	0.576%	0.400%	0.234%	0.320%

Assumed Rates Sheriffs/Deputies Protection Occupation*	
Age	Rate
27	0.130%
32	0.130%
37	0.130%
42	0.150%
47	0.200%
52	0.240%
57	0.320%
62	0.430%

* 66.67% of disabilities are assumed to be in-service disabilities.

Rates of Termination of Employment (effective June 30, 2022)

Regular Membership

	Male			Female		
Years of Service	State	School	Other	State	School	Other
1	14.00%	14.20%	17.50%	14.20%	14.20%	19.99%
5	5.25%	6.60%	7.00%	6.60%	6.60%	8.35%
10	2.40%	2.70%	3.75%	3.25%	2.70%	4.93%
15	1.60%	1.70%	2.55%	2.00%	1.70%	3.36%
20	1.10%	1.20%	1.90%	1.30%	1.20%	2.66%
25	1.00%	1.00%	1.40%	1.00%	1.00%	1.98%
30	1.00%	1.00%	1.00%	1.00%	1.00%	1.30%

Sheriffs/Deputies and Protection Occupation

Years of Service	Sheriffs/Deputies	Protection Occupation
1	6.00%	11.50%
5	2.50%	6.50%
10	1.15%	3.75%
15	1.00%	2.35%
20	1.00%	1.60%
25	1.00%	1.25%
30	1.00%	1.25%

Probability of Electing a Deferred Vested Benefit (effective June 30, 2018)

	Regular Membership					
	Male			Female		
Years of Service	State	School	Other	State	School	Other
5	62.0%	74.0%	62.0%	56.0%	80.0%	70.0%
10	71.0%	79.0%	71.0%	62.0%	80.0%	73.0%
15	76.0%	84.0%	76.0%	72.0%	85.0%	80.0%
20	81.0%	89.0%	81.0%	82.0%	90.0%	85.0%
25	86.0%	94.0%	86.0%	92.0%	95.0%	90.0%
30	90.0%	95.0%	90.0%	100.0%	100.0%	90.0%

	Sheriffs/Deputies and Protection Occupation
Years of Service	Rate
5	53.0%
10	65.0%
15	85.0%
20	95.0%
25	100.0%
30	100.0%

Rates of Salary Increase* (effective June 30, 2018)

	Annual Increase			
Years of Service	State	School	Other	Sheriffs/Deputies and Protection Occupation
1	14.25%	16.25%	14.25%	16.25%
5	7.75%	5.75%	5.35%	5.75%
10	5.50%	4.55%	4.55%	4.55%
15	4.45%	3.75%	4.05%	4.05%
20	3.85%	3.40%	3.75%	3.75%
25	3.60%	3.25%	3.65%	3.75%
30	3.35%	3.25%	3.65%	3.25%
35+	3.25%	3.25%	3.25%	3.25%

* Includes 3.25% wage growth

Marriage Assumption

100% of members are assumed to be married, with males 3 years older than females.

ACTUARIAL COST METHOD (adopted 1996)

The actuarial cost method is a procedure for allocating the actuarial present value of pension plan benefits and expenses to time periods. The method used for the valuation is known as the entry age normal actuarial cost method. Under this method, a total contribution rate is determined which consists of two parts: (i) the normal cost rate and (ii) the unfunded actuarial liability (UAL) rate. The entry age normal cost method has the following characteristics:

(i) The annual normal costs for each individual active member are sufficient to accumulate the value of the member's pension at time of retirement.

(ii) Each annual normal cost is a constant percentage of the member's year by year projected compensation rates.

The entry age normal actuarial cost method allocates the actuarial present value of each member's projected benefits on a level basis over the member's compensation rates between the entry age of the member and the assumed exit ages.

ACTUARIAL AMORTIZATION METHOD (adopted 2013)

The portion of the actuarial present value of benefits allocated to the valuation year is called the normal cost. The portion of the actuarial present value of benefits not provided for by the actuarial present value of future normal costs is called the actuarial liability. Deducting the actuarial value of assets from the actuarial liability determines the unfunded actuarial liability (UAL). The one-year lag between the valuation date and the date the contribution rate is effective is reflected in calculating the corresponding amortization payment. The UAL is amortized according to the Actuarial Amortization Method adopted by the Investment Board and summarized below:

1. Amortization payments will be calculated as a level percentage of payroll.
2. For the actuarial valuation prepared as of June 30, 2013, the amortization period of the UAL shall be 30-year open for all membership groups.
3. For the actuarial valuation prepared as of June 30, 2014:
4. The UAL for each membership group shall be amortized over a 30-year closed period.
5. This will be designated as the initial UAL base for subsequent valuations and it will be amortized over the remaining years of the 30-year closed period set on June 30, 2014.
6. For each valuation subsequent to June 30, 2014, annual net experience gains/losses for each membership group will be amortized over a new, closed 20-year period.
7. Subsequent plan amendments or changes in actuarial assumptions or methods that create a change in the UAL will be amortized over a demographically appropriate period selected by the Investment Board at the time that the change is incurred.
8. The dollar amount of the UAL payment for purposes of computing the UAL component of the actuarial and required contribution rate will be the sum of the amortization payments for each amortization schedule divided by the total projected payroll. Unless the plan has been 110 percent funded for the current and prior two years, a negative amortization payment shall be ignored.

9. If the valuation shows that the group has surplus, the prior amortization bases will be eliminated and one base equal to the amount of surplus shall be established. The amortization period of a surplus shall be a 30-year open period for all groups.

ACTUARIAL VALUE OF ASSETS SMOOTHING METHOD (adopted 2007)

The market value of assets, representing a fair value of System assets, may not necessarily be the best measure of the System's ongoing ability to meet its obligations.

To arrive at a suitable value for the actuarial valuation, a technique for determining the actuarial value of assets is used which dampens volatility in the market value while still indirectly recognizing market value. The specific technique follows:

Step 1: Determine the expected value of plan assets at the current valuation date using the actuarial assumption for investment return applied to the prior actuarial value and the actual receipts and disbursements of the fund for the previous 12 months.

Step 2: Subtract the expected value determined in Step 1 from the total market value of the Fund at the current valuation date.

Step 3: Multiply the difference between market and expected values determined in Step 2 by 25%.

Step 4: Add the expected value of Step 1 and the product of Step 3 to determine the actuarial value of assets.

Step 5: Verify the preliminary actuarial value of assets in Step 4 is not more than 120% of the market value of assets nor less than 80% of the market value. If it is, adjust the actuarial value of assets so it falls within the 80% - 120% corridor.

TECHNICAL VALUATION PROCEDURES

Data Procedures

In-pay members:

If a birth date is not available, the member is assumed to be 80. If a retirement date is also not available, the member is assumed to have retired at 65.

If a beneficiary birth date is needed but not supplied, husbands are assumed to be 3 years older than wives.

Not in-pay members:

If a birth date is not available, the member is assumed to be the average age of the members with the same status.

If gender is not provided, regular members are assumed to be female and Sheriffs/Deputies and Protection Occupation members are assumed to be male.

Salaries for first year members are annualized based on the number of quarters with wages.

Membership Transfers

IPERS provides a code in the valuation data to indicate that a member is in a membership group (Regular, Sheriffs and Deputies and Protection Occupation) different from that on the prior valuation date. The actuarial liability for these members is calculated under the assumptions and provisions of the prior membership group. A preliminary funded ratio (before asset transfer) is determined for the three membership groups. Assets are then transferred from the prior to the current membership group based on the funded ratio of the prior group times the actuarial liability of the member in the prior group. Then, the members are revalued in the current membership group for purposes of valuation calculations.

Other Valuation Procedures

No actuarial accrued liability in excess of the unclaimed member contribution balance is held for nonvested, inactive members. Inactive vested members who have died are treated in the same manner.

The wages used in the projection of benefits and liabilities are considered earnings for the current year ending June 30, increased by the salary scale.

The calculations for the actuarial contribution rate are determined as of mid-year. This is a reasonable estimate since contributions are made throughout the year.

The projected IRC Section 415 limit for active participants was not valued. The impact was assumed to be *de minimus*.

The compensation limitation under IRC Section 401(a)(17) is considered in this valuation.

No future additions to, or payments from, the Favorable Experience Dividend (FED) Reserve Account or the Supplemental Accounts for Active Members (SAAM) are reflected in the valuation. The FED and SAAM were first developed in a funding framework in which the Regular membership contribution rate was a fixed contribution rate, set in statute, which had been constant for many years. Legislation has subsequently made the contribution rate variable and the IPERS Board has developed a funding policy to guide them in setting the statutory contribution rate. There are some interactions between a variable contribution rate and the rules for the FED and SAAM transfers that we believe may not reflect the original intent of the FED and SAAM. Given the intent, we anticipate that the issues described here may encourage a review of the statutes and policies related to the FED and SAAM. Therefore, the potential liability from the FED and SAAM are not reflected in this valuation.

APPENDIX D

DEFINITION OF TERMS

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Accrued Service	Service credited under the system that was rendered before the date of the actuarial valuation.
Actuarial Assumptions	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.
Actuarial Cost Method	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of retirement system benefits between future normal cost and actuarial accrued liability. Sometimes referred to as the "actuarial funding method."
Actuarial Equivalent	A single amount or series of amounts of equal value to another single amount or series of amounts computed on the basis of a given set of actuarial assumptions.
Actuarial Liability	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 accrued liability."
Actuarial Present Value	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.
Amortization	Paying off an interest-discounted amount with periodic payments of interest and principal, as opposed to paying off with lump sum payment.
Experience Gain (Loss)	The difference between actual experience and actuarial assumptions anticipated experience during the period between two actuarial valuation dates.
Normal Cost	The actuarial present value of retirement system benefits allocated to the current year by the actuarial cost method.

Unfunded Actuarial Liability

The difference between actuarial liability and the actuarial value of assets. Sometimes referred to as "unfunded accrued liability" or "unfunded liability".

Most retirement systems have unfunded actuarial liability. They arise anytime new benefits are added and anytime an actuarial loss is realized.

APPENDIX E

CONTRIBUTION RATE FUNDING POLICY

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Background:
IPERS is charged with setting a "Required Contribution Rate" for each membership category within IPERS that will discharge its liabilities. Iowa Code §97B.11(3)(d) provides the basic framework for implementing this charge by stating:

> The Required Contribution Rate that is set by the system for a membership category shall be the contribution rate the system actuarially determines, based upon the most recent actuarial valuation of the system and using the actuarial methods, assumptions, and funding policy approved by the Investment Board, is the rate required by the system to discharge its liabilities as a percentage of the covered wages of members in that membership category. However, the Required Contribution Rate set by the system for members in regular service for a fiscal year shall not vary by more than one percentage point from the Required Contribution Rate for the prior fiscal year.

Goal:
To establish policy and procedures in setting contribution rates that combined with investment income will fund the benefits specified in Chapter 97B of the Iowa Code.

To move towards fully funding the benefits (100 percent or greater funded ratio) in as expeditious manner as is reasonable within the guidelines acknowledged herein.

Procedure:
The Investment Board shall retain a consulting actuary to conduct an annual actuarial valuation of assets and liabilities. The consulting actuary shall use the entry age normal cost method and all other actuarial assumptions and methods approved by the Investment Board.

In the annual valuation process, the consulting actuary shall calculate an Actuarial Contribution Rate and a Required Contribution Rate pursuant to this policy. Each shall be calculated as a level percent of pay.

There is a one-year lag between the completion of an annual actuarial valuation report and the fiscal year to which the contribution rates calculated therein are applied. Therefore, the Actuarial Contribution Rate and the Required Contribution Rate declared in the annual valuation process are applicable to the fiscal year immediately following the completion of the valuation report (for example the rates declared in the report presented to the Investment Board in December 2013 are applicable to the rates for the fiscal year beginning July 1, 2014).

Actuarial Contribution Rate (ACR):
1. ACR is the combined employer and employee contribution rate that is the minimum rate necessary to fund the benefits using the actuarial assumptions and methods approved by the Investment Board.

2. A separate ACR shall be determined for each membership group within IPERS according to this policy.

3. The ACR shall consist of:

    a. Normal cost and an amortization payment (not less than zero) of any unfunded actuarial liability.
    b. Normal cost may only be offset by a negative amortization payment after a membership group has attained a funded ratio of 110 percent or greater for 3 consecutive years.

Required Contribution Rate:

1. The Required Contribution Rate is the combined employer and employee rate payable pursuant to this policy and Iowa Code §97B.11(3)(d).

2. The Required Contribution Rate shall be determined by comparing the ACR determined in the annual valuation process to the Required Contribution Rate of the previous year.

    a. If the ACR is less than the previous Required Contribution Rate by fewer than 50 basis points, then the Required Contribution Rate shall remain unchanged from the previous year.

    b. If the ACR is less than the previous Required Contribution Rate by 50 basis points or more, then the Required Contribution Rate shall be lowered by 50 basis points provided the funded ratio of the membership group is 95 percent or higher.

    c. If the ACR is greater than the Required Contribution Rate of the previous year, then the Required Contribution Rate shall be:

        i. Increased to be equal to ACR for Sheriffs and Deputies.
        ii. Increased to be equal to ACR for Protection Occupation Members.
        iii. Increased to be equal to ACR for Regular Members, or one percentage point greater than the prior year's Required Contribution Rate, whichever is smaller.

Policy Guidelines:

In adopting actuarial assumptions and methods to be used in setting contribution rates, the Investment Board shall strive to provide a balance among the following:

1. Stability in contribution rates (such as use of smoothing and amortization schedules that do not produce dramatic swings in the required contributions from year to year).

2. Disciplined funding approach (such as requiring full payment of normal cost and an amortization payment towards the unfunded actuarial liability and deferring decreases in contribution rates until strong funded ratios are attained).

3. Interperiod equity (such as shortening the amortization schedule when reasonable and amortization of retroactive benefit enhancements over a reasonable time period such as the average working lifetime for active members and the average life expectancy of retired members).

4. Support an affordable, sustainable plan (in consultation with the Benefits Advisory Committee review affordability of required contribution rates and/or the benefit provisions).

5. At a minimum, this policy will be reviewed in conjunction with the quadrennial experience study.

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
CERTIFICATION

This Addendum is being prepared solely for the purpose of providing the information required under Chapter 97 D.5 of the Iowa code. Calculations are based on the following prescribed methods:

Actuarial cost method: Entry Age Normal
Amortization method: Level percent of payroll
Amortization period: 30 years, open period

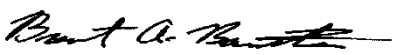
All other assumptions, methodologies, and System provisions used are consistent with those used in the June 30, 2022 valuation for the Iowa Public Employees' Retirement System.

The results shown in this Addendum may not be consistent with those in the June 30, 2022 valuation. The June 30, 2022 valuation results were determined in accordance with generally accepted actuarial principles and practices that are consistent with the Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying opinion and supporting recommendations of the American Academy of Actuaries. The results shown in this Addendum are not necessarily based on the methodologies adopted by the System.

We are available to answer any questions on the material contained in this report, or to provide explanations or further details as may be appropriate.

The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

Patrice A. Beckham, FSA, EA, FCA, MAAA — October 27, 2022 (Date)



Brent A. Banister, PhD, FSA, EA, FCA, MAAA — October 27, 2022 (Date)

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
SUMMARY OF VALUATION RESULTS UNDER PRESCRIBED METHODOLOGY PER CHAPTER 97 D.5

This addendum report has been prepared to present the results of a valuation of the Iowa Public Employees' Retirement System as of June 30, 2022, based on the prescribed methodology under Chapter D.5.

The unfunded actuarial accrued liability has been amortized as a level percent of payroll over 30 years. The payroll growth assumption used was 3.25%.

A summary of results from the current and the prior valuation follows.

	Regular Membership Actuarial Valuation as of	
	June 30, 2022	**June 30, 2021**
Summary of Costs		
Normal cost	10.60%	10.49%
UAL amortization	2.79%	3.11%
Total	13.39%	13.60%
Less Employee Contribution Rate	(6.29%)	(6.29%)
Employer Required Contribution Rate	7.10%	7.31%
Funded Status		
Actuarial liability	$41,090,755,292	$39,777,935,943
Actuarial value of assets	36,345,895,362	34,734,902,134
Unfunded actuarial liability	$4,744,859,930	$5,043,033,809
Funded Ratio	88.5%	87.3%
Asset Values		
Market value of assets (MVA)	$37,115,609,381	$39,637,744,850
Actuarial Value of Assets (AVA)	36,345,895,362	34,734,902,134
MVA/AVA	102%	114%

	Sheriffs and Deputies Actuarial Valuation as of	
	June 30, 2022	**June 30, 2021**
Summary of Costs		
Normal cost	16.78%	16.93%
UAL amortization	(1.66%)	(1.03%)
Total	15.12%	15.90%
Less Employee Contribution Rate	(8.51%)	(8.76%)
Employer Required Contribution Rate	6.61%	7.14%
Funded Status		
Actuarial liability	$849,677,745	$816,703,678
Actuarial value of assets	889,635,045	839,015,517
Unfunded actuarial liability	($39,957,300)	($22,311,839)
Funded Ratio	104.7%	102.7%
Asset Values		
Market value of assets (MVA)	$908,454,027	$957,673,108
Actuarial Value of Assets (AVA)	889,635,045	839,015,517
MVA/AVA	102%	114%

	Protection Occupation Group* Actuarial Valuation as of	
	June 30, 2022	**June 30, 2021**
Summary of Costs		
Normal cost	15.31%	15.30%
UAL amortization	(1.18%)	(0.84%)
Total	14.13%	14.46%
Less Employee Contribution Rate	(6.21%)	(6.21%)
Employer Required Contribution Rate	7.92%	8.25%
Funded Status		
Actuarial liability	$2,029,281,569	$1,950,009,129
Actuarial value of assets	2,118,701,972	2,011,069,645
Unfunded actuarial liability	($89,420,403)	($61,060,516)
Funded Ratio	104.4%	103.1%
Asset Values		
Market value of assets (MVA)	$2,162,328,881	$2,294,457,724
Actuarial Value of Assets (AVA)	2,118,701,972	2,011,069,645
MVA/AVA	102%	114%

* Includes all public safety members other than Sheriffs and Deputies.