



HAMPSHIRE COUNTY RETIREMENT SYSTEM

**ACTUARIAL VALUATION
as of
January 1, 2022**

KMS Actuarial, LLC
52 Hunt Road
Kingston, NH 03848

October, 2022



October 24, 2022

Hampshire County Retirement Board
99 Industrial Drive
Suite 2
Northampton, MA 01060-2326

Dear Board Members:

We are pleased to present the enclosed report providing the results of our actuarial valuation of the Hampshire County Retirement System as of January 1, 2022. Our valuation was performed in accordance with the provisions contained in Chapter 32 of the Massachusetts General Laws, "M.G.L.", as of January 1, 2022. Disclosures under GASB Statement No. 67, Financial Reporting for Pension Plans (GASB 67) and GASB Statement No. 68, Accounting and Financial Reporting for Pensions (GASB 68) are provided in a separate report.

The principal results of our valuation are summarized in Section 2. The Summary of Plan Provisions and Actuarial Assumptions and Methods are shown in Sections 5 and 6, respectively. Section 7 summarizes the demographic profile of active members, retired plan members and beneficiaries and disabled plan members. Asset information and actuarial liabilities are presented in Section 2. The development of the required appropriations pursuant to Chapter 32 of the M.G.L. is shown in Section 3, including a 30-year forecast of the required appropriations and projected cash flows. Section 4 includes a summary of valuation information for PERAC as well as information relating to the primary risks to the System and an assessment of those risks.

This valuation is based upon member data provided by the Hampshire County Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Retirement Board. Although we did not audit the data used in the valuation, we believe that the information is complete and reliable.

Liabilities presented in this report are based on a long-term investment return rate assumption of 6.9%, net of investment expense, compounded annually.

This report was completed in accordance with generally accepted actuarial standards and procedures, and conforms to the Code of Professional Conduct of the American Academy of Actuaries. The actuarial assumptions used in the determination of costs are reasonably related to the experience of the System and to reasonable expectations, and represent our best estimate of anticipated long-term experience under the System.

K M S A C T U A R I E S

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Future actuarial valuation results may differ significantly from the current results presented in this report. Examples of potential sources of volatility include plan experience differing from that anticipated by the economic or demographic assumptions, the effect of new entrants, changes in economic or demographic assumptions, the effect of law changes and the delayed effect of smoothing techniques.

Our valuation follows generally accepted actuarial methods and we perform such tests as we consider necessary to assure the accuracy of the results. The amounts presented in this report have been appropriately determined according to the actuarial assumptions and methods stated herein.

This report is intended for the sole use of the Hampshire County Retirement Board and is intended to provide information to comply with the stated purpose of the report. It may not be appropriate for other purposes.

The undersigned credentialed actuaries are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinion contained herein. They are available to answer any questions with regard to this report.

Respectfully submitted,



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SECTION 1 - EXECUTIVE SUMMARY

Background

We have completed the Actuarial Valuation of the Hampshire County Retirement System as of January 1, 2022. This valuation is based upon census data provided by the Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Hampshire County Retirement Board. Information for the prior valuation completed as of January 1, 2020 was obtained from the valuation report prepared by KMS Actuaries, LLC.

Massachusetts General Laws

The valuation was prepared in accordance with Chapter 32 of the Massachusetts General Laws ("M.G.L."). The results are based on the active, inactive and retired members and beneficiaries as of December 31, 2021, the assets as of December 31, 2021 and assumptions regarding investment returns, salary increases, mortality, turnover, disability and retirement.

The valuation does not take into consideration:

- ◆ Changes in the law after the valuation date,
- ◆ Transfers between retirement systems pursuant to Section 3(8)(c) of Chapter 32, although an estimated payment towards the net 3(8)(c) transfers is added to the annual appropriation,
- ◆ State-mandated benefits and
- ◆ Cost-of-living increases granted to members in pay status between 1982 and 1997.

GASB Statement Numbers 67 and 68

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, Financial Reporting for Pension Plans, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, Accounting and Financial Reporting for Pensions, replaced the requirements of Statement No. 27.

The pension standards reflect changes from those previously in place regarding how governments calculate total pension liability and pension expense. Further, the standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

The required disclosures and notes under GASB Statement Number 67 and 68 for the fiscal year ending December 31, 2021 are provided in a separate report.

Assets

This valuation is based upon asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Hampshire County Retirement Board. The market value of assets increased from \$359,018,033 as of December 31, 2019 to \$476,562,413 as of December 31, 2021. During the plan years ended 2020 and 2021, the market value rates of return were 12.19% and 18.27%, respectively.

The actuarial value of assets increased from \$348,431,141 as of January 1, 2020 to \$428,906,172 as of January 1, 2022. During the plan years ended 2020 and 2021, the rates of return on the actuarial value of assets were 9.19% and 12.03%, respectively.

SECTION 1 - EXECUTIVE SUMMARY

Changes Since the Last Valuation

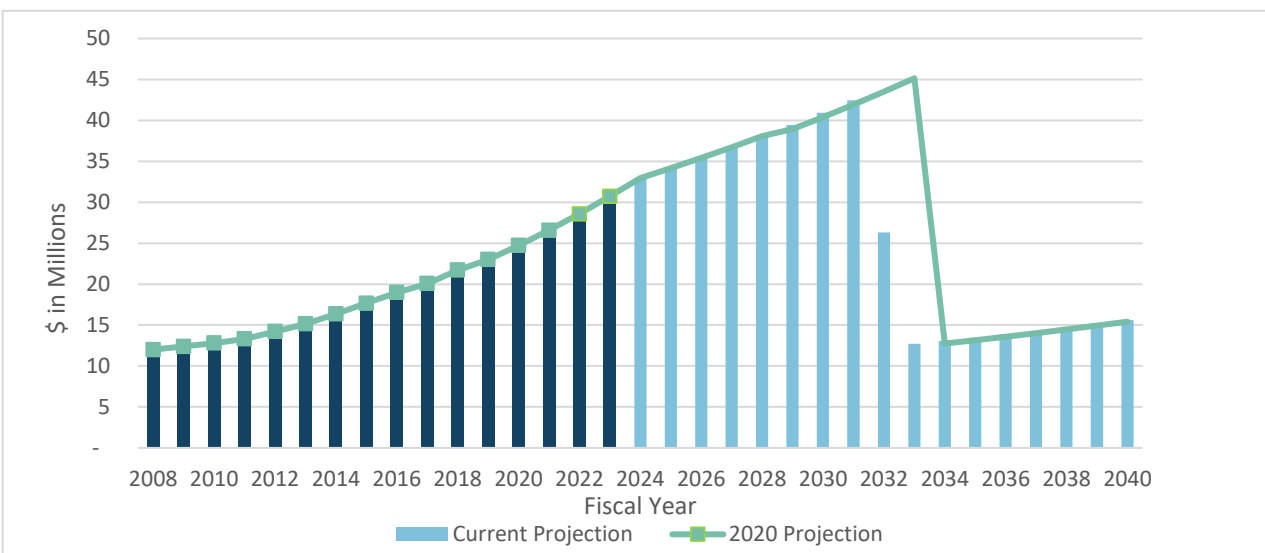
During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease from \$210,332,032 as of January 1, 2020 to \$191,535,717 as of January 1, 2022, for a total decrease of \$18,796,315. The actual unfunded actuarial accrued liability, before any assumption or plan changes, was \$178,520,962, resulting in an actuarial gain of \$13,014,755. The actuarial gain was primarily due to an asset gain of approximately \$26,297,000 and a demographic experience loss of approximately \$13,282,000. The details of the gain and loss analysis are provided in Section 2, Actuarial Experience.

Appropriations

The funding appropriation for each year is computed as the sum of the normal cost, net 3(8)(c) transfers and an amortization payment to pay off the Unfunded Actuarial Liability, adjusted for semi-annual payments of the appropriation made July 1 and January 1. The appropriation calculated as of the January 1, 2022 valuation is \$29,301,506, and is made up of a normal cost payment of \$8,016,095, net 3(8)(c) transfers of \$1,046,453, and an amortization payment of \$20,238,958. The amortization method is an increasing amortization of the unfunded actuarial accrued liability at 4% over 10 years and is expected to fully pay the unfunded actuarial accrued liability by the year 2032. The development of the appropriation as of January 1, 2022 is presented in Section 3, Annual Appropriations.

For fiscal year 2023, we show the actual appropriation developed under the previous funding schedule and reported on the PERAC "Required Fiscal Year 2023 Appropriation" letter dated December 2, 2021 of \$30,713,712. For fiscal year 2024, we developed an annual appropriation of \$32,953,641, which is made up of a normal cost of \$8,700,132 and net 3(8)(c) transfers of \$1,100,000 and payment toward the unfunded actuarial accrued liability of \$23,153,509. The unfunded actuarial accrued liability is expected to be fully paid by 2032. The Board adopted a schedule that sets the annual appropriations to no less than the amounts shown in the funding schedule adopted by the Board from the January 1, 2020 actuarial valuation. The current funding schedule is shown in Section 3, Exhibit 3.1.

The chart below shows the historical (navy bars) and projected (blue bars) annual appropriations compared to the projected amounts shown in the prior valuation and funding schedule (green line).



SECTION 1 - EXECUTIVE SUMMARY

Hampshire Council of Governments (HCOG)

This valuation reflects the elimination of the Hampshire Council of Governments (HCOG) unit and the associated reduction in liability due to the transfer of all inactive members and 65 retirees to the State Retirement System (SRS). The liability reduction is offset by approximately \$1.162 million in liability that is still due to be transferred to the SRS. The \$1.162 million liability value was provided by the Hampshire County Retirement System via email on June 9, 2022 and consists of trust earnings of \$576,900 and \$296,084 on the annuity savings and annuity reserve funds for inactive and retired members, respectively and \$289,617 of retired members annuity reserve fund balances.

Plan Provisions

All Plan provisions used in this valuation are the same as those used in the prior valuation and are summarized in Section 5, Summary of Plan Provisions.

Actuarial Assumptions and Methods

Some Actuarial Assumptions and Methods used in this valuation have changed since the last valuation, including decreasing the investment return rate from 7.15% to 6.90% and updating the mortality and mortality improvement rates. Changing these assumptions resulted in a net increase in the unfunded actuarial accrued liability of \$15,677,412 and an increase in the employer normal cost of \$800,281. The Actuarial Assumptions and Methods utilized in this valuation are detailed in Section 6, Actuarial Assumptions and Methods.

Census Data

As of January 1, 2022, there are 1,981 active members who may be eligible for benefits in the future, 1,304 retirees and beneficiaries, 851 inactives and 88 disabled retirees. Summaries of the active, retired and disabled employees are included in Section 7, Plan Member Information.

SECTION 1 - EXECUTIVE SUMMARY

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

Valuation Date	January 1, 2022	January 1, 2020	% Change
Census Data			
Active Members	1,981	1,968	0.7%
Valuation Salary	\$96,030,745	\$89,417,455	7.4%
Average Salary	\$48,476	\$45,436	6.7%
Retired Members and Beneficiaries	1,304	1,272	2.5%
Total Annual Retirement Allowance	\$30,307,098	\$27,503,908	10.2%
Average Annual Retirement Allowance	\$23,242	\$21,623	7.5%
Disabled Members	88	85	3.5%
Total Annual Retirement Allowance	\$3,177,275	\$2,914,899	9.0%
Average Annual Retirement Allowance	\$36,105	\$34,293	5.3%
Inactive Members	851	723	17.7%
Annuity Savings Fund	\$7,408,482	\$6,882,546	7.6%
Funded Status			
Actuarial Accrued Liability (AAL)	\$606,316,440	\$558,763,173	8.5%
Market Value of Assets (MVA)	\$476,562,413	\$359,018,033	32.7%
Unfunded Accrued Liability on MVA	\$129,754,027	\$199,745,140	(35.0%)
Funded Status on MVA	78.6%	64.3%	22.2%
Actuarial Value of Assets (AVA)	\$428,906,172	\$348,431,141	23.1%
Unfunded Accrued Liability on AVA	\$177,410,268	\$210,332,032	(15.7%)
Funded Status on AVA	70.7%	62.4%	13.3%
Appropriations			
Fiscal Year 2022	N/A	\$28,570,895	N/A
Fiscal Year 2023	\$30,713,712	\$30,713,712	0.0%
Fiscal Year 2024	\$32,953,641	\$32,953,641	0.0%
Fiscal Year 2025	\$34,164,178	\$34,164,178	0.0%

SECTION 2 - PRINCIPAL VALUATION RESULTS

Market Value of Assets

Asset information is reported annually to the Public Employee Retirement Administration Commission by the Hampshire County Retirement Board. The Market Value of Assets for the three most recent calendar years are as follows:

Calendar Year	2021	2020	2019
Trust Fund Composition at Year-End			
Cash	\$4,672,747	\$13,151,977	\$3,982,274
Short-Term Investments	0	0	0
Fixed Income Securities	0	0	0
Equities	0	0	0
Pooled Short Term Funds	0	0	0
Pooled Domestic Equity Funds	113,556,554	81,248,848	64,019,755
Pooled International Equity Funds	85,293,033	101,449,192	75,676,573
Pooled Global Equity Funds	0	0	0
Pooled Domestic Fixed Income Funds	122,082,112	102,484,591	100,497,250
Pooled International Fixed Income Funds	0	0	0
Pooled Global Fixed Income Funds	0	22,518,406	30,858,871
Pooled Alternative Investments	72,375,837	44,288,224	35,557,442
Pooled Real Estate Funds	77,562,890	35,729,405	47,818,694
Pooled Domestic Balanced Funds	0	0	0
Pooled International Balanced Funds	0	0	0
Hedge Funds	0	0	0
PRIT Cash	0	0	0
PRIT Fund	0	0	0
Interest Due & Accrued	0	0	0
Prepaid Expenses	0	0	0
Accounts Receivable	1,075,053	1,116,318	611,839
Land	0	0	0
Buildings	0	0	0
Accumulated Depreciation - Buildings	0	0	0
Accounts Payable	(55,813)	(6,845)	(4,665)
Total Market Value of Assets	\$476,562,413	\$401,980,116	\$359,018,033

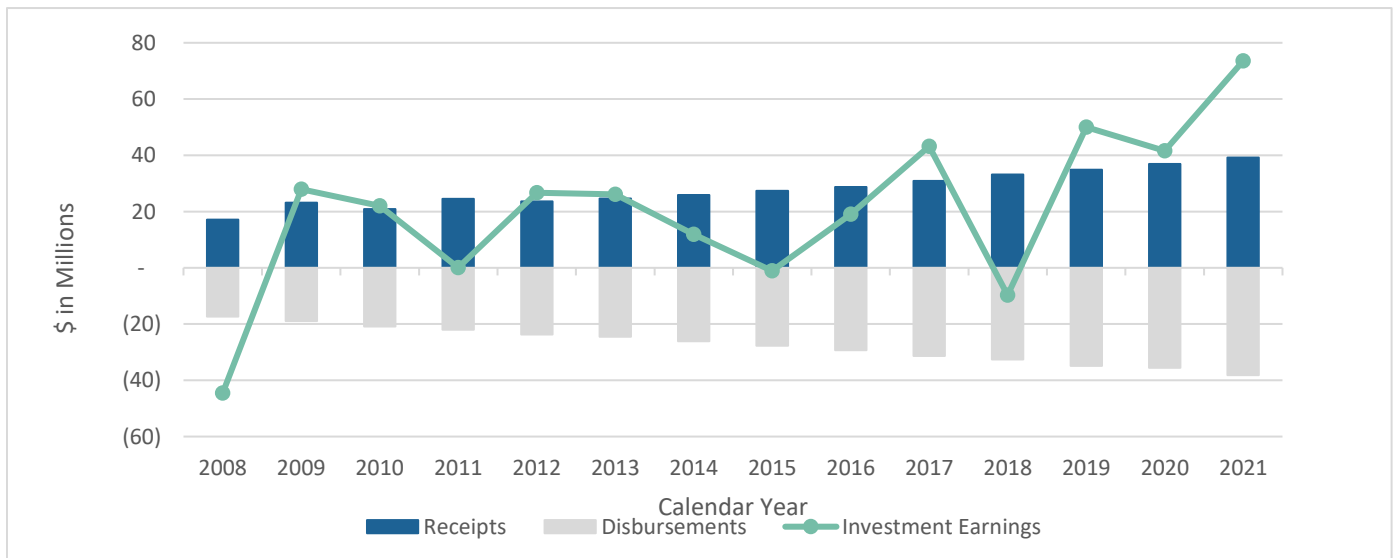
SECTION 2 - PRINCIPAL VALUATION RESULTS

Market Value of Assets

Calendar Year	2021	2020	2019
Funds			
Annuity Savings Fund	\$86,317,449	\$85,970,280	\$84,012,091
Annuity Reserve Fund	29,753,816	27,647,165	26,885,385
Special Military Service Fund	58,832	58,821	64,939
Pension Fund	3,628,706	8,435,240	12,492,759
Expense Fund	0	0	0
Pension Reserve Fund	356,803,610	279,868,610	235,562,859
Total Market Value of Assets	\$476,562,413	\$401,980,116	\$359,018,033
Asset Activity			
Market value as of Beginning of Year	\$401,980,116	\$359,018,033	\$309,026,162
Contributions and Receipts	39,208,998	36,890,178	34,840,752
Benefit Payments and Expenses	(38,174,209)	(35,539,113)	(34,916,090)
Investment Return	73,547,508	41,611,018	50,067,209
Total Market Value of Assets	\$476,562,413	\$401,980,116	\$359,018,033

Rate of Return 18.27% 12.19% 16.88%

Below are the receipts and disbursements during the last 14 years. The green line reflects investment earnings, which vacillate as investment markets fluctuate. Blue bars indicate contributions, from employees and employers, and grey bars show benefit payments and administrative expenses.



SECTION 2 - PRINCIPAL VALUATION RESULTS

Actuarial Value of Assets

The Actuarial Value of Assets is the market value of assets as of the valuation date adjusted to phase in investment gains and losses over a 5-year period, further constrained to be within 10% of the market value of assets. Investment gains and losses are the excess or deficiency of the expected returns over the actual returns.

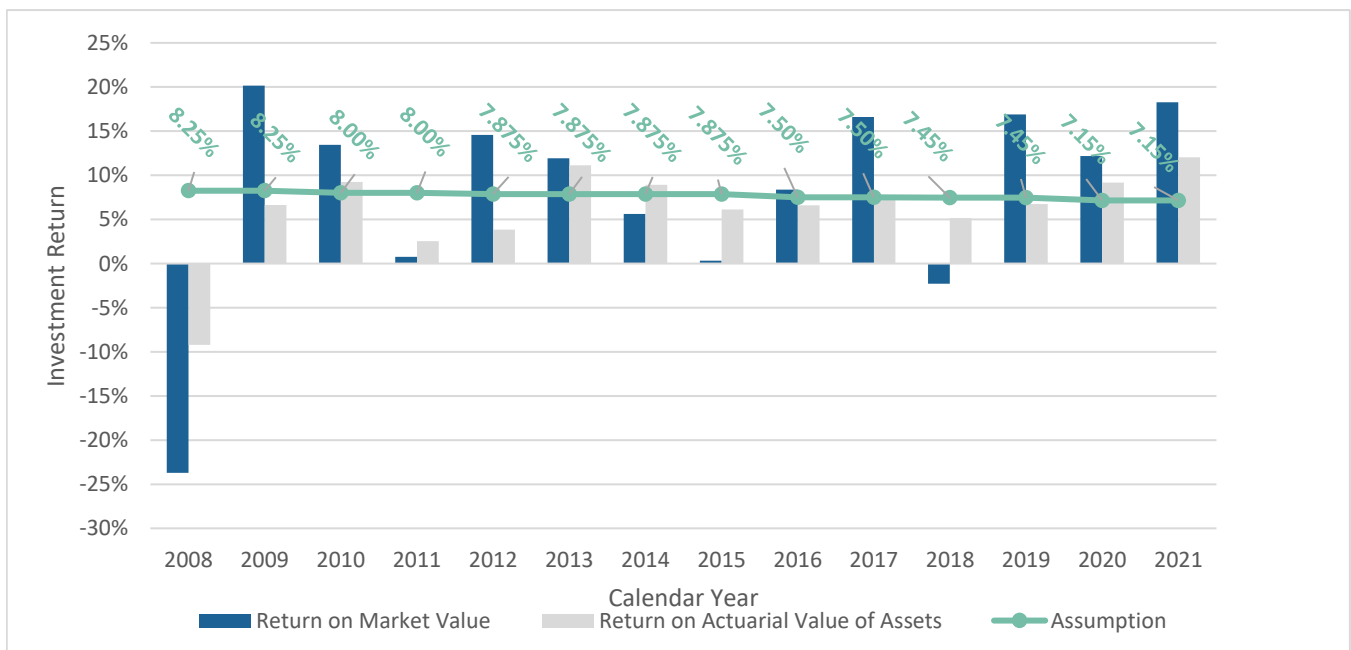
Valuation Date	January 1, 2022	January 1, 2021	January 1, 2020	
1. Expected Market Value of Assets				
a. Market Value of Assets as of prior January 1	\$401,980,116	\$359,018,033	\$309,026,162	
b. Prior Year Contributions and Receipts	39,208,998	36,890,178	34,840,752	
c. Prior Year Benefit Payments and Expenses	(38,174,209)	(35,539,113)	(34,916,090)	
d. Expected Investment Return Rate	7.15%	7.15%	7.45%	
e. Expected Investment Return	28,778,572	25,718,090	23,019,643	
f. Expected Market Value of Assets	\$431,793,477	\$386,087,188	\$331,970,467	
2. Prior Year Gain/(Loss)				
a. Market Value of Assets as of January 1	\$476,562,413	\$401,980,116	\$359,018,033	
b. Expected Market Value of Assets	431,793,477	386,087,188	331,970,467	
c. Prior Year Gain /(Loss)	\$44,768,936	\$15,892,928	\$27,047,566	
3. Phase-In of Asset Gains and Losses				
Calendar Year	Gain / (Loss)	Unrecognized Gain / (Loss)	Unrecognized Gain / (Loss)	Unrecognized Gain / (Loss)
a. 2021	\$44,768,936	\$35,815,149	\$0	\$0
b. 2020	15,892,928	9,535,757	12,714,342	0
c. 2019	27,047,566	10,819,026	16,228,540	21,638,053
d. 2018	(33,392,359)	(6,678,472)	(13,356,944)	(20,035,415)
e. 2017	22,564,986	0	4,512,997	9,025,994
f. 2016	(208,701)	0	0	(41,740)
g. Total Deferred Gains/(Losses)	\$49,491,460	\$20,098,935	\$10,586,892	

SECTION 2 - PRINCIPAL VALUATION RESULTS

Actuarial Value of Assets

Valuation Date	January 1, 2022	January 1, 2021	January 1, 2020
4. Actuarial Value of Assets			
a. Market Value of Assets	\$476,562,413	\$401,980,116	\$359,018,033
b. Deferred Gains/(Losses)	49,491,460	20,098,935	10,586,892
c. Market Value of Assets Less Deferred Gains/(Losses)	\$427,070,953	\$381,881,181	\$348,431,141
d. 90% of Market Value of Assets	428,906,172	361,782,104	323,116,230
e. 110% of Market Value of Assets	524,218,654	442,178,128	394,919,836
f. Actuarial Value of Assets, a., but not less than b. and not greater than c.	\$428,906,172	\$381,881,181	\$348,431,141
g. Ratio of Actuarial Value of Assets to Market Value of Assets	90.0%	95.0%	97.1%
5. Rate of Return on Actuarial Value of Assets for Prior Calendar Year			
	12.03%	9.19%	6.75%

Below are the investment returns during the last 14 years. The green line reflects the investment return actuarial assumption. Blue bars indicate investment return rates on market value of assets, and grey bars show investment return rates on actuarial value of assets.



SECTION 2 - PRINCIPAL VALUATION RESULTS

Actuarial Liabilities

The **Actuarial Present Value of Future Benefits** is the present value of the cost to finance all benefits payable in the future, discounted to reflect the probability of payment and the time value of money. Below is the Actuarial Present Value of Future Benefits from the current valuation and the prior valuation:

Valuation Date	January 1, 2022	January 1, 2020
Actives	\$420,409,604	\$383,260,261
Retired Members and Beneficiaries	314,418,527	282,344,513
Disabled Members	37,282,814	33,930,195
Inactive Members	7,408,482	6,882,546
Total Present Value of Future Benefits	\$779,519,427	\$706,417,515

The **Actuarial Accrued Liability** is the portion of the Actuarial Present Value of Future Benefits which is allocated to all periods prior to a valuation year and therefore is not provided for by future Normal Costs. Below is the Actuarial Accrued Liability from the current valuation and the prior valuation:

Valuation Date	January 1, 2022	January 1, 2020
Actives	\$247,206,617	\$235,605,919
Retired Members and Beneficiaries	314,418,527	282,344,513
Disabled Members	37,282,814	33,930,195
Inactive Members	7,408,482	6,882,546
Total Actuarial Accrued Liability	\$606,316,440	\$558,763,173

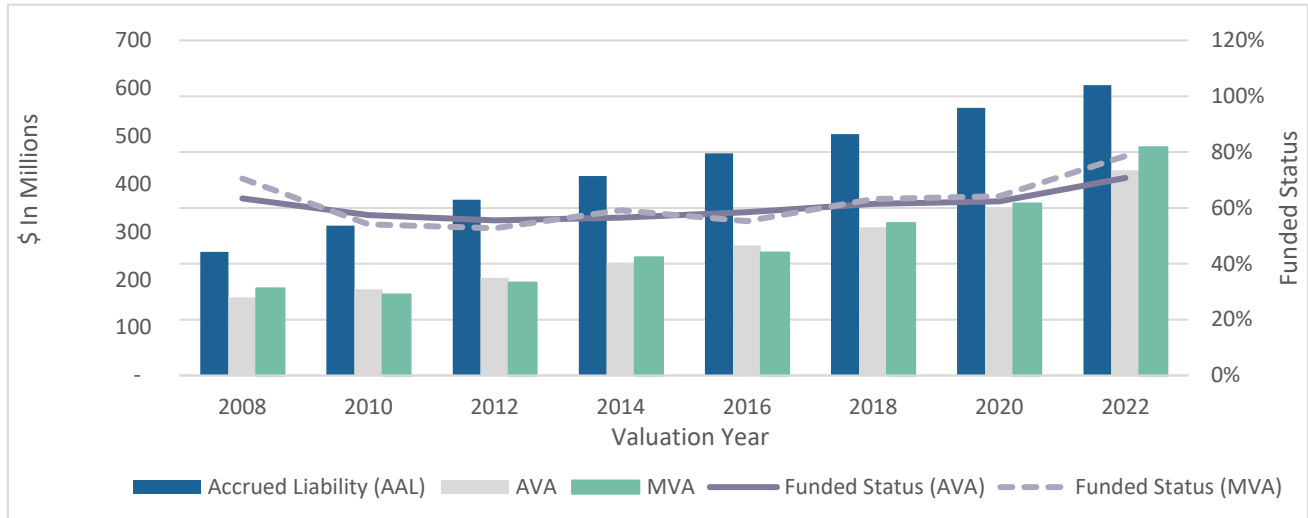
The **Unfunded Actuarial Accrued Liability** is the difference between the Actuarial Accrued Liability and the Actuarial Value of Assets as of the valuation date. The **Funded Status** is the Actuarial Value of Assets divided by the Actuarial Accrued Liability and is a point-in-time measurement of the amount of assets set aside to cover actuarial accrued liabilities. Below is the Unfunded Actuarial Accrued Liability and Funded Status from the current valuation and the prior valuation:

Valuation Date	January 1, 2022	January 1, 2020
Unfunded Actuarial Accrued Liability		
a. Actuarial Accrued Liability	\$606,316,440	\$558,763,173
b. Actuarial Value of Assets	428,906,172	348,431,141
c. Unfunded Actuarial Accrued Liability (a. - b.)	\$177,410,268	\$210,332,032
d. Funded Status (b. divided by a.)	70.7%	62.4%

SECTION 2 - PRINCIPAL VALUATION RESULTS

Actuarial Liabilities

Below are the accrued liabilities, asset values (actuarial and market) and funded status for each of the last 8 valuations. The purple solid line reflects the funded status on an actuarial value of assets (AVA) basis and the purple dotted line reflects the funded status on a market value (MVA) basis. Blue bars indicate actuarial accrued liabilities, grey bars indicate actuarial value of assets and green bars indicate market value of assets.



The **Normal Cost** is the portion of the Actuarial Present Value of Future Benefits which is allocated to a valuation year. Only active employees who have not reached Normal Retirement Age incur a Normal Cost. Below is the Normal Cost from the current valuation and the prior valuation:

Valuation Date	January 1, 2022	January 1, 2020
Total Normal Cost	\$15,923,710	\$14,261,729
As of Percentage of Salary	16.6%	15.9%
Employee Normal Cost	\$8,858,936	\$8,188,033
As of Percentage of Salary	9.2%	9.2%
Administrative Expenses	\$951,321	\$1,000,000
As a Percentage of Salary	1.0%	1.1%
Net Employer Normal Cost	\$8,016,095	\$7,073,696
As a Percentage of Salary	8.3%	7.9%

SECTION 2 - PRINCIPAL VALUATION RESULTS

Actuarial Experience

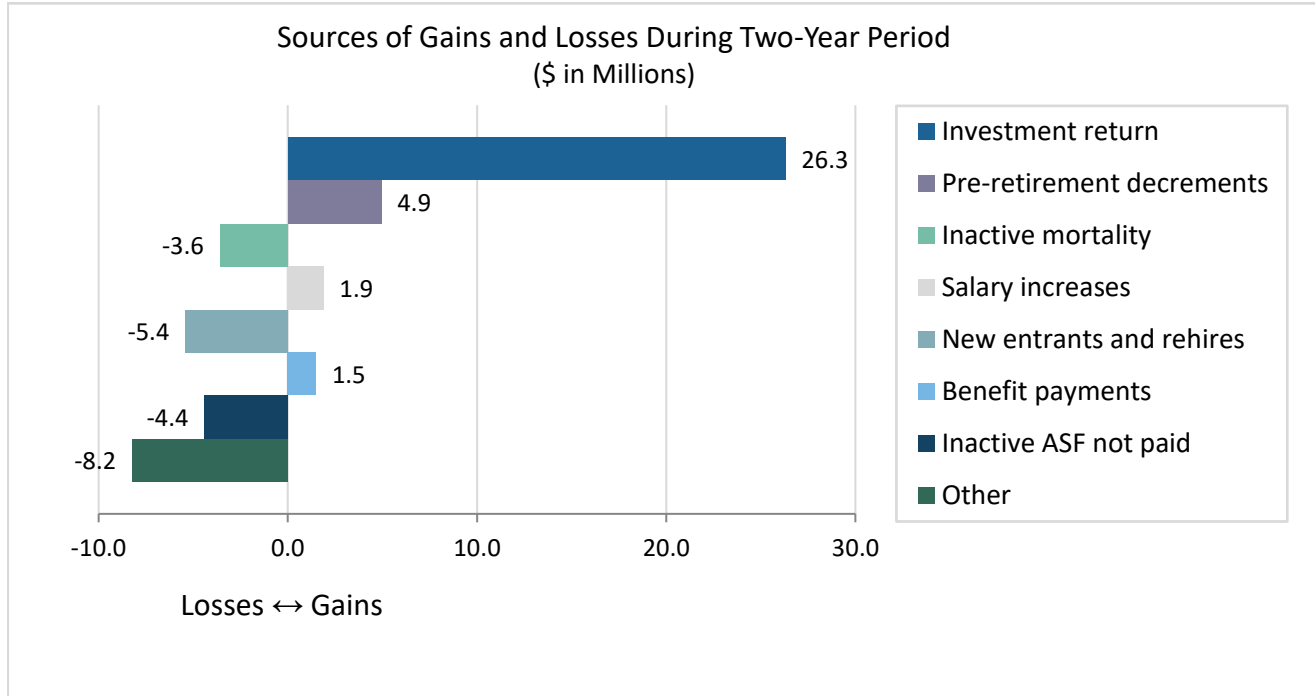
In performing the actuarial valuation, various assumptions are made regarding mortality, retirement, disability and withdrawal rates as well as salary increases and investment returns. A comparison of the results of the current valuation and the prior valuation is made to determine how closely actual experience relates to expected. During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease by \$18,796,315. Below is the development of the Actuarial Gain for the current 2-year period:

Calendar Year Ending	December 31, 2021	December 31, 2020
Expected Unfunded Actuarial Accrued Liability		
1. Unfunded Actuarial Accrued Liability, Beginning of Year	\$202,443,213	\$210,332,032
2. Normal Cost, Beginning of Year	14,212,351	14,261,729
3. Total Contributions	39,208,998	36,890,178
4. Interest (full year on 1. and 2., one-half year on 3.)	14,089,151	14,739,630
5. Expected Unfunded Actuarial Accrued Liability	\$191,535,717	\$202,443,213
6. Unfunded Actuarial Accrued Liability (before changes)	178,520,962	
7. (Gain)/Loss (6. - 5.)	(\$13,014,755)	
Asset Gain/(Loss)		
1. Actuarial Value of Assets, Beginning of Year	\$381,881,181	\$348,431,141
2. Contributions and Receipts	39,208,998	36,890,178
3. Benefit Payments and Expenses	(38,174,209)	(35,539,113)
4. Assumed Rate of Return (prior valuation)	7.15%	7.15%
5. Expected Return	27,341,498	24,961,127
6. Actuarial Value of Assets, End of Year	\$428,906,172	\$381,881,181
7. Actual Return	45,990,202	32,098,975
8. Actual Rate of Return	12.03%	9.19%
9. Asset Gain/(Loss) (7. - 5.)	18,648,704	7,137,848
10. Total Asset Gain/(Loss), 2-Year Period	\$26,296,908	

SECTION 2 - PRINCIPAL VALUATION RESULTS

Actuarial Experience

Below are the various sources of gains and losses over the 2-year period. The asset gain during the period was \$26,296,908, and the total demographic loss during the period was \$13,282,153, which totals to an overall gain of \$13,014,755.



Unfunded Actuarial Accrued Liability

1. Changes due to:	
a. Asset Gain	(\$26,296,908)
b. Demographic Experience Loss	13,282,153
c. Total Gain Prior to Changes	(13,014,755)
d. Plan Change (HCOG Transfer to SRS)	(12,399,813)
e. Assumption and Method Changes	
Mortality and Mortality Improvement Rates	(4,388,293)
Investment Return Rate	15,677,412
Total	<u>11,289,119</u>
f. Total Decrease (including changes)	(14,125,449)
2. Unfunded Actuarial Accrued Liability, End of Year	\$177,410,268

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Annual Appropriations

The Annual Appropriation is determined in accordance with the requirements set forth in Sections 22D and 22F of Chapter 32 of the Massachusetts General Laws ("M.G.L."). The appropriation is comprised of the annual employer normal cost and amortization payments to pay the unfunded actuarial accrued liability. Below are the details of the annual appropriations for the current and prior valuations, adjusted for semi-annual payments made July 1 and January 1. The appropriations shown are based on the results of the valuation and do not account for any adjustments made to appropriations in the selected funding schedule.

Valuation Date	January 1, 2022	January 1, 2020
1. Early Retirement Incentive Plan (2002)		
Fully Funded Year	2028	2028
Investment Return Rate	6.90%	7.15%
Balance as of Valuation Date	\$1,308,649	\$1,637,481
Amortization Amount	\$256,036	\$257,416
Increasing Rate	0.00%	0.00%
Remaining Payment Period from Valuation Date	6	8
2. Early Retirement Incentive Plan (2003)		
Fully Funded Year	2028	2028
Investment Return Rate	6.90%	7.15%
Balance as of valuation date	\$1,384,957	\$1,732,964
Amortization Amount	\$270,965	\$272,426
Increasing Rate	0.00%	0.00%
Remaining Payment Period from Valuation Date	6	8
3. Unfunded Actuarial Accrued Liability		
Fully Funded Year	2032	2033
Balance as of Valuation Date	\$174,716,662	\$206,961,587
Amortization Amount	\$19,711,957	\$18,923,265
Increasing Rate	4.00%	4.00%
Remaining Payment Period from Valuation Date	10	13
4. Total Amortization Payments	\$20,238,958	\$19,453,107
5. Normal Cost	\$8,016,095	\$7,073,696
6. Net 3(8)(c) Transfers	\$1,046,453	\$1,044,632
7. Total Appropriation as of January 1	\$29,301,506	\$27,571,435
8. Adjusted for Semi-Annual Payments as of July 1 and January 1	\$30,800,857	\$29,032,790

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibit 3.1 - 30-Year Forecast of Annual Appropriations

Fiscal Year Ending	Employer Normal Cost	Amortization Payment of UAL	Amortization Payment of ERI 2002	Amortization Payment of ERI 2003	Net 3(8)(c) Transfers	Total Employer Cost	Increase over Prior Year	Unfunded Actuarial Accrued Liability
2023	\$8,477,447	\$20,582,297	\$269,137	\$284,831	\$1,100,000	\$30,713,712		\$177,410,268
2024	8,700,132	22,599,543	269,136	284,830	1,100,000	32,953,641	7.29%	168,156,791
2025	8,982,886	23,527,326	269,136	284,830	1,100,000	34,164,178	3.67%	156,213,363
2026	9,274,829	24,492,891	269,137	284,831	1,100,000	35,421,688	3.68%	142,502,319
2027	9,576,262	25,497,778	269,137	284,830	1,100,000	36,728,007	3.69%	126,863,268
2028	9,887,490	26,543,572	269,136	284,831	1,100,000	38,085,029	3.69%	109,123,191
2029	10,208,834	28,154,971	-	-	1,100,000	39,463,805	3.62%	89,095,515
2030	10,540,621	29,287,614	-	-	1,100,000	40,928,235	3.71%	66,610,562
2031	10,883,190	30,466,335	-	-	1,100,000	42,449,525	3.72%	41,422,292
2032	11,236,894	13,977,738	-	-	1,100,000	26,314,632	-38.01%	13,297,317
2033	11,602,093	-	-	-	1,100,000	12,702,093	-51.73%	-
2034	11,979,161	-	-	-	1,100,000	13,079,161	2.97%	-
2035	12,368,484	-	-	-	1,100,000	13,468,484	2.98%	-
2036	12,770,460	-	-	-	1,100,000	13,870,460	2.98%	-
2037	13,185,499	-	-	-	1,100,000	14,285,499	2.99%	-
2038	13,614,029	-	-	-	1,100,000	14,714,029	3.00%	-
2039	14,056,485	-	-	-	1,100,000	15,156,485	3.01%	-
2040	14,513,320	-	-	-	1,100,000	15,613,320	3.01%	-
2041	14,985,003	-	-	-	1,100,000	16,085,003	3.02%	-
2042	15,472,015	-	-	-	1,100,000	16,572,015	3.03%	-
2043	15,974,855	-	-	-	1,100,000	17,074,855	3.03%	-
2044	16,494,038	-	-	-	1,100,000	17,594,038	3.04%	-
2045	17,030,094	-	-	-	1,100,000	18,130,094	3.05%	-
2046	17,583,573	-	-	-	1,100,000	18,683,573	3.05%	-
2047	18,155,039	-	-	-	1,100,000	19,255,039	3.06%	-
2048	18,745,077	-	-	-	1,100,000	19,845,077	3.06%	-
2049	19,354,292	-	-	-	1,100,000	20,454,292	3.07%	-
2050	19,983,307	-	-	-	1,100,000	21,083,307	3.08%	-
2051	20,632,764	-	-	-	1,100,000	21,732,764	3.08%	-
2052	21,303,328	-	-	-	1,100,000	22,403,328	3.09%	-

If FY2024 appropriation is made on July 1, 2023, payment is \$32,413,013 (discount of \$540,628).

If FY2025 appropriation is made on July 1, 2024, payment is \$33,603,690 (discount of \$560,488).

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Exhibit 3.2 - 30-Year Forecast of Cash Flow

Calendar Year	Market Value of Assets, BOY	Benefit Payments	Employee Contributions	Employer Contributions	Investment Return	Market Value of Assets, EOY
2022	\$476,562,413	\$42,692,745	\$8,858,936	\$29,272,150	\$34,040,952	\$506,041,706
2023	506,041,706	36,953,364	9,146,851	31,403,042	36,439,929	546,078,164
2024	546,078,164	38,575,145	9,444,124	32,554,651	39,246,466	588,748,260
2025	588,748,260	40,250,057	9,751,058	33,750,948	42,236,641	634,236,850
2026	634,236,850	42,089,672	10,067,967	34,993,676	45,419,502	682,628,323
2027	682,628,323	43,679,759	10,395,176	36,284,640	48,815,310	734,443,690
2028	734,443,690	45,314,264	10,733,019	37,596,298	52,447,995	789,906,738
2029	789,906,738	46,902,346	11,081,842	38,989,441	56,340,353	849,416,028
2030	849,416,028	48,501,719	11,442,002	40,436,677	60,516,025	913,309,013
2031	913,309,013	50,131,918	11,813,867	25,087,212	63,834,945	963,913,119
2032	963,913,119	51,735,894	12,197,818	12,137,316	66,404,241	1,002,916,600
2033	1,002,916,600	54,064,009	12,594,247	12,496,029	69,067,266	1,043,010,133
2034	1,043,010,133	56,496,889	13,003,560	12,866,400	71,803,584	1,084,186,788
2035	1,084,186,788	59,039,249	13,426,176	13,248,808	74,612,608	1,126,435,131
2036	1,126,435,131	61,696,015	13,862,527	13,643,644	77,493,437	1,169,738,724
2037	1,169,738,724	64,472,336	14,313,059	14,051,313	80,444,818	1,214,075,578
2038	1,214,075,578	67,373,591	14,778,233	14,472,231	83,465,108	1,259,417,559
2039	1,259,417,559	70,405,403	15,258,526	14,906,828	86,552,235	1,305,729,745
2040	1,305,729,745	73,573,646	15,754,428	15,355,550	89,703,650	1,352,969,727
2041	1,352,969,727	76,884,460	16,266,447	15,818,855	92,916,283	1,401,086,852
2042	1,401,086,852	80,344,261	16,795,107	16,297,217	96,186,486	1,450,021,401
2043	1,450,021,401	83,959,753	17,340,948	16,791,127	99,509,978	1,499,703,701
2044	1,499,703,701	87,737,942	17,904,529	17,301,088	102,881,784	1,550,053,160
2045	1,550,053,160	91,686,149	18,486,426	17,827,624	106,296,165	1,600,977,226
2046	1,600,977,226	95,812,026	19,087,235	18,371,272	109,746,551	1,652,370,258
2047	1,652,370,258	100,123,567	19,707,570	18,932,588	113,225,456	1,704,112,305
2048	1,704,112,305	104,629,128	20,348,066	19,512,147	116,724,399	1,756,067,789
2049	1,756,067,789	109,337,439	21,009,378	20,110,542	120,233,810	1,808,084,080
2050	1,808,084,080	114,257,624	21,692,183	20,728,384	123,742,933	1,859,989,956
2051	1,859,989,956	119,399,217	22,397,179	21,366,306	127,239,714	1,911,593,938

SECTION 3 - CHAPTER 32 OF M.G.L. APPROPRIATIONS

Forecast Notes

Exhibit 3.1:

- ◆ The Employer Normal Cost is expected to increase 3.25% per year.
- ◆ The Unfunded Actuarial Accrued Liability ("UAL") is computed as of January 1 of each year assuming no future gains or losses.
- ◆ The Amortization Payment of UAL is an increasing payment at 4% paid over 10 years through 2032.
- ◆ The Amortization Payment of the Early Retirement Incentive Plan (2002) is a level payment paid over 6 year(s) through 2028.
- ◆ The Amortization Payment of the Early Retirement Incentive Plan (2003) is a level payment paid over 6 year(s) through 2028.
- ◆ Net 3(8)(c) transfers are a level dollar amount based on the net transfers expected to be paid by the Hampshire County Retirement Board during the current year offset by the amount received during the same period.
- ◆ Total Employer Cost is the sum of the Employer Normal Cost, net 3(8)(c) transfers and the Amortization of the UAL, all computed as of January 1 of each year and adjusted for semi-annual payments made on July 1 and January 1.
- ◆ For fiscal year 2023, we show the actual appropriation developed under the previous funding schedule of \$30,713,712. For fiscal years 2024 and later, the Board has selected a funding schedule that fully amortizes the unfunded actuarial accrued liability by 2032.

Exhibit 3.2:

- ◆ Expected benefit payments include payments expected to be made to retired members, beneficiaries, disabled members and active members expected to retire. In addition, expected benefit payments include distribution of the annuity savings fund attributed to inactive members.
- ◆ Benefit payments exclude cost-of-living increases granted to members in pay status between 1982 and 1997. In addition, benefit payments are as expected for the first ten years of the forecast, then increase by the greater of 4.5% per year thereafter or the expected future payments for the current population projected by our computer model.
- ◆ Calendar year cash flow entries are developed as of each January 1.

SECTION 4 - DISCLOSURES

4.1 - GASB 67 and GASB 68 Disclosures

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, *Financial Reporting for Pension Plans*, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, replaced the requirements of Statement No. 27.

The pension standards reflect changes from those previously in place regarding how governments calculate total pension liability and pension expense. Further, the standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

GASB 67 requires defined benefit pension plans, such as the Hampshire County Retirement System, to present a statement of fiduciary net position (pension plan assets) and a statement of changes in fiduciary net position. Further, the statement requires that notes to financial statements include descriptive information such as the types of benefits provided, the classes of plan members covered and the composition of the pension plan's retirement board. Finally, GASB 67 requires pension plans to present in required supplementary information the sources of the changes in the net pension liability and information about the actuarially determined contributions compared with the actual contributions made to the plan and related ratios.

GASB 67 and GASB 68 require projected benefit payments be discounted to their actuarial present value using the single rate that reflects:

- (1) a long-term expected rate of return on pension plan investments *to the extent that the pension plan's assets are sufficient to pay benefits and pension plan assets are expected to be invested using a strategy to achieve that return and*
- (2) a tax-exempt, high-quality municipal bond rate *to the extent that the conditions for use of the long-term expected rate of return are not met.*

GASB 68 establishes standards for measuring and recognizing liabilities, deferred outflows of resources, deferred inflows of resources and pension expense by state and local governments.

The effective date for GASB 67 is for plan years beginning after June 15, 2013, which is the fiscal year ending December 31, 2014 for the Hampshire County Retirement System. The effective date for GASB 68 is for employers' fiscal years beginning after June 15, 2014. The GASB report, submitted under separate cover and prepared as of December 31, 2021 (the measurement date), presents information to assist the Hampshire County Retirement Board in providing the required information under GASB 68 to participating employers.

SECTION 4 - DISCLOSURES

4.2 - PERAC Disclosure Information

The most recent actuarial valuation of the System was prepared by KMS Actuaries, LLC as of January 1, 2022.

Normal Cost - Employees	\$8,858,936	9.2% of payroll
Normal Cost - Employers	\$8,016,095	8.3% of payroll
Actuarial Liability - Active Members	\$247,206,617	41% of total AAL
Actuarial Liability - Retired and Inactive Members	359,109,823	59% of total AAL
Total Actuarial Liability (AAL)	<u>\$606,316,440</u>	
System Assets	\$428,906,172	
Unfunded Actuarial Accrued Liability	\$177,410,268	
Funded Status	70.7%	

Principal actuarial assumptions used in the valuation:

Investment Return	6.90%
Rate of Salary Increase	Based on service, 6% graded down to 4.25% for Group 1 Based on service, 7% graded down to 4.75% for Group 4

SECTION 4 - DISCLOSURES

4.3 - Risk Measures

The Hampshire County Retirement System is subject to certain risks that could affect the plan's future financial condition. Here we identify the primary risks to the System, provide some background information about those risks, and provide an assessment of those risks in accordance with Actuarial Standards of Practice (ASOP) 51.

Risk is the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience. Examples of potential risks that may be reasonably anticipated to significantly affect the future financial condition of the plan include the following:

- ◆ **Investment Risk** - the potential that investment returns will be different than expected.
- ◆ **Asset/Liability Mismatch Risk** - the potential that changes in asset values are not matched by changes in the value of liabilities.
- ◆ **Interest Rate Risk** - the potential that interest rates will be different than expected.
- ◆ **Longevity and Other Demographic Risks** - the potential that mortality or other demographic experience will be different than expected.
- ◆ **Contribution Risk** - the potential of actual future contributions deviating from expected future contributions. For example, that actual contributions are not made in accordance with the plan's funding policy, that other anticipated payments to the plan are not made, or that material changes occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base.

We have provided several risk measures in this section that we believe are most significant for the plan. However, we believe that a more rigorous assessment of risk would be beneficial to the Board to understand the risks identified above, such as:

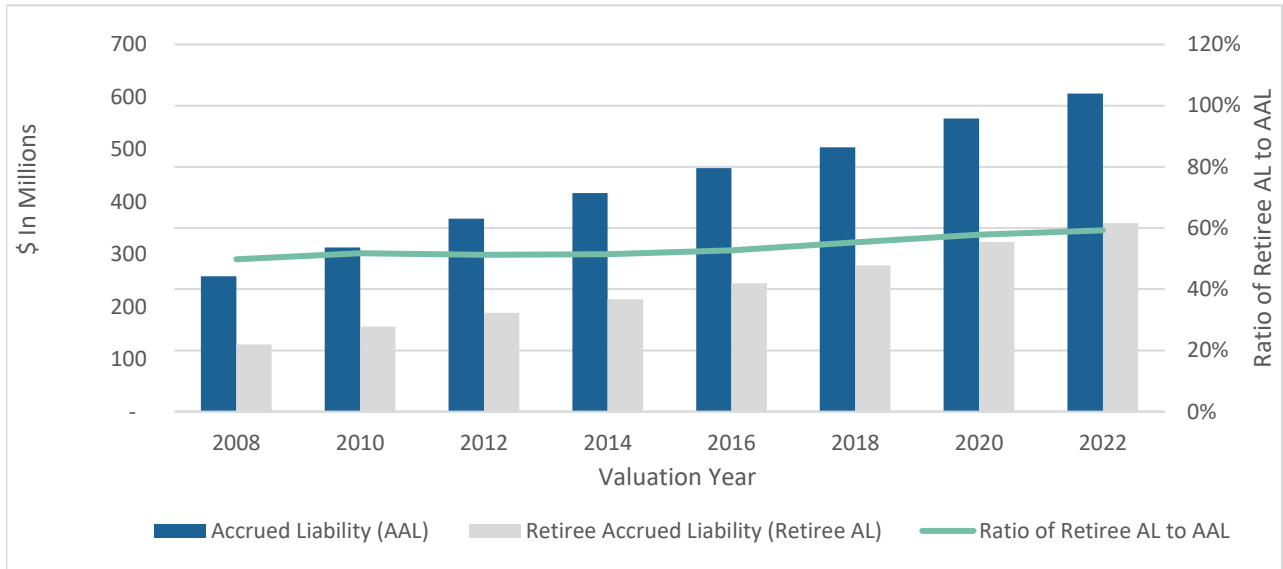
- ◆ **Scenario Test** - a process for assessing the impact of one possible event, or several simultaneous or sequentially occurring possible events, on a plan's financial condition.
- ◆ **Sensitivity Test** - a process for assessing the impact of a change in an actuarial assumption on an actuarial measurement.
- ◆ **Stochastic Modeling** - a process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes.
- ◆ **Stress Test** - a process for assessing the impact of adverse changes in one or relatively few factors affecting a plan's financial condition.

SECTION 4 - DISCLOSURES

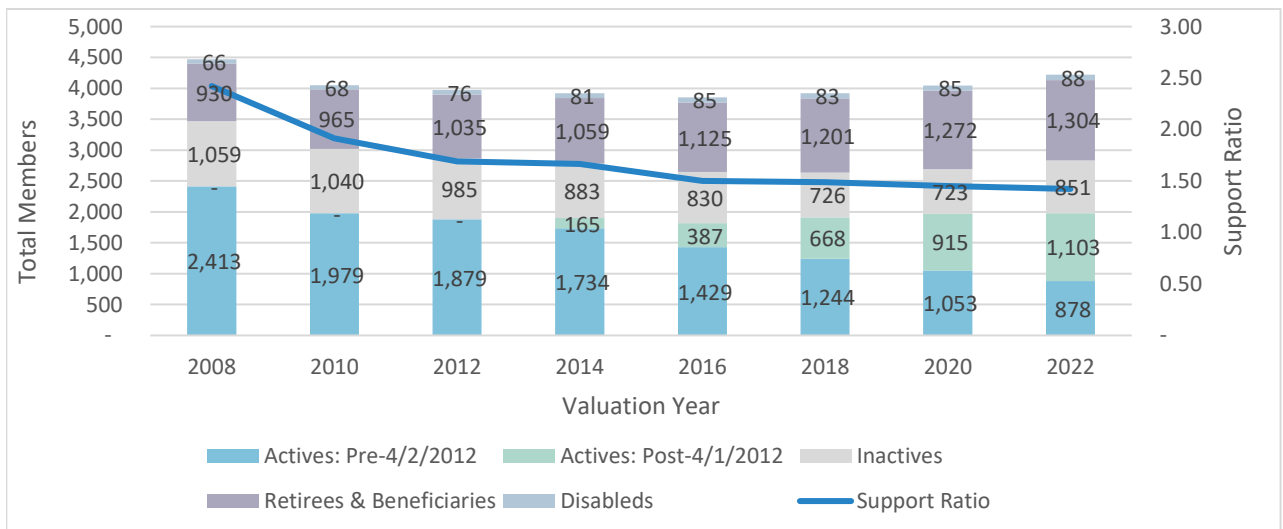
4.3 - Risk Measures

Maturity Measures

As retirement systems mature they become much more sensitive to risks. This is because a higher proportion of the actuarial liability is attributable to participants who are no longer active. Plan maturity measures are helpful in understanding the risks associated with a plan. One such maturity measure is the ratio of the system's retiree liability to its total liability. A retirement system in its infancy will have a very low ratio of retiree liability to total liability. As the system matures, the ratio starts increasing. A mature plan will often have a ratio above 60%. For the Hampshire County Retirement System and other retirement systems in the United States these ratios have been steadily increasing in recent years.



Another maturity measure is the ratio of actives to retirees, or support ratio. A retirement system in its infancy will have a very high ratio of active to retired members. As the system matures, and members retire, the support ratio starts declining. A mature system will often have a support ratio near or below one.



SECTION 4 - DISCLOSURES

4.3 - Risk Measures

Volatility Indices

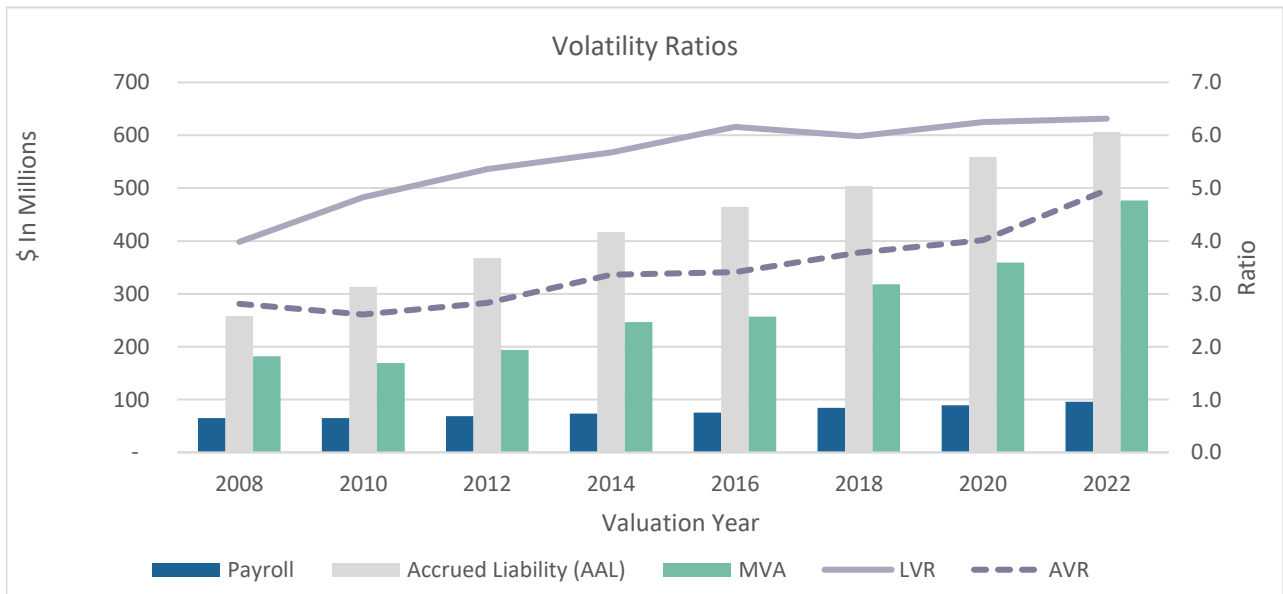
Volatility indices are measures of the relative sensitivity of employer contributions to changes in assets or liabilities. Below we present two such indices - the Asset Volatility Ratio (AVR) and the Liability Volatility Ratio (LVR):

Asset Volatility Ratio (AVR)

The Asset Volatility Ratio (AVR) is the ratio of the Market Value of Assets (MVA) to Payroll. Systems with a higher AVR experience more volatile employer contributions (as a percentage of payroll) due to investment return. This ratio indicates a measure of the system's current contribution volatility. The AVR increases over time but generally tends to stabilize as the system matures.

Liability Volatility Ratio (LVR)

The Liability Volatility Ratio (LVR) is the ratio of the Actuarial Accrued Liability (AAL) to Payroll. Systems with a higher LVR experience more volatile employer contributions (as a percentage of payroll) due to the investment return assumption and changes in liability. This ratio indicates a longer-term potential for contribution volatility. The AVR, described above, will tend to move close to the LVR as the system matures.

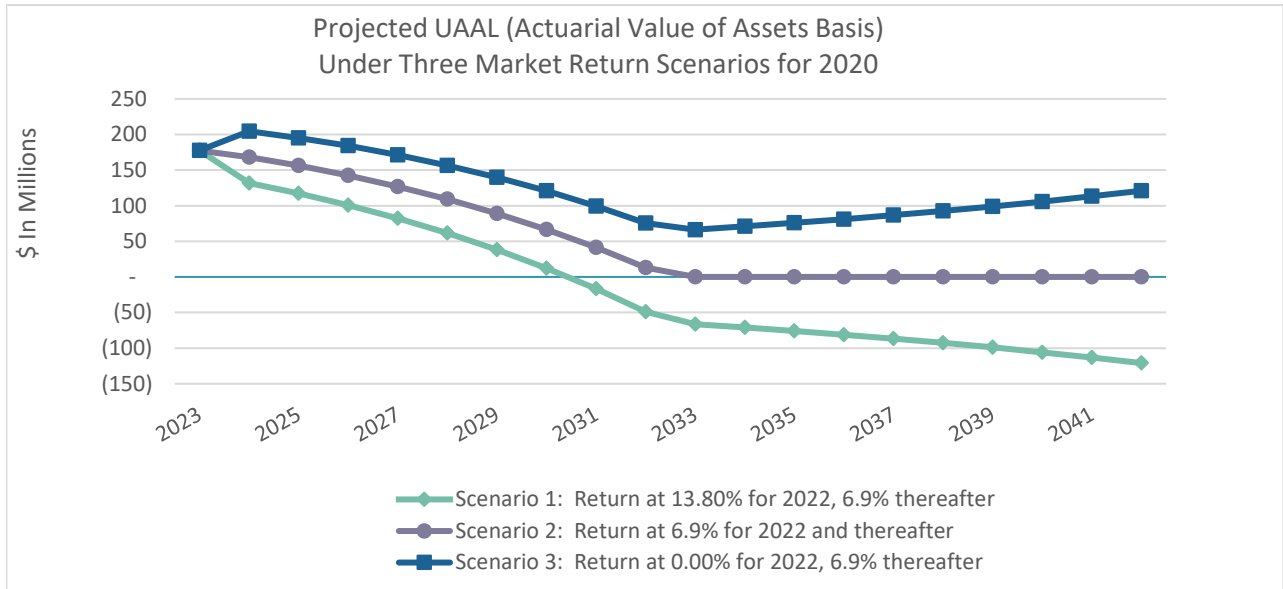


SECTION 4 - DISCLOSURES

4.3 - Risk Measures

Market Return Scenarios

Below we illustrate the projected effect on funding levels of a single year of investment return above or below the assumed investment return. Scenario 1 assumes a one-year return of 2 times the assumed return and the expected return thereafter, Scenario 2 assumes assets earn the expected return every year and Scenario 3 assumes a one-year return of 0% and the expected return thereafter.



Sensitivity Analysis

The following presents the Actuarial Accrued Liability and Funded Status calculated using the investment return rate of 6.9%, as well as what the Actuarial Accrued Liability and Funded Status would be if it were calculated using an investment return rate 1-percentage point lower (5.9%) or 1-percentage point higher (7.9%) than the assumed investment return rate:

	1% Decrease (5.9%)	Current Investment Return Rate (6.9%)	1% Increase (7.9%)
Actuarial Accrued Liability	\$676,267,777	\$606,316,440	\$547,210,880
% Change	12%		-10%
Actuarial Value of Assets	\$428,906,172	\$428,906,172	\$428,906,172
Unfunded Actuarial Accrued Liability	247,361,605	177,410,268	118,304,708
% Change	39%	N/A	-33%
Funded Status	63.4%	70.7%	78.4%

SECTION 4 - DISCLOSURES

4.3 - Risk Measures

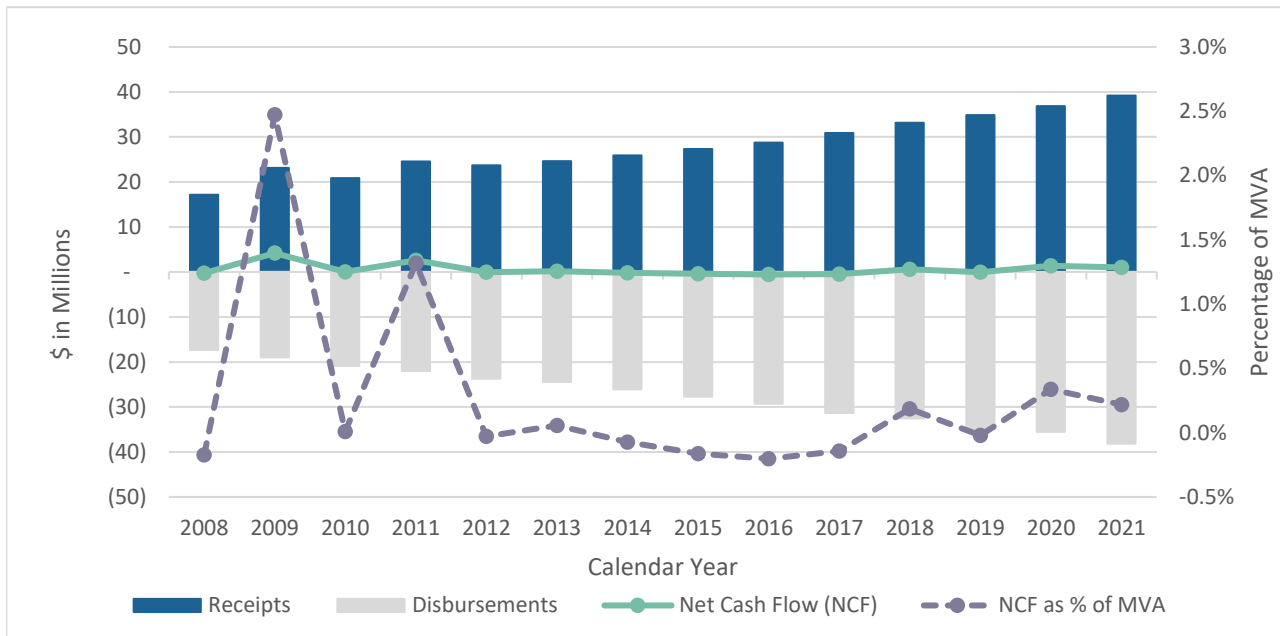
Duration

Duration is another measure that is used to describe how the present value of a cash flow series changes when small changes are made to the underlying interest rates. The duration of the Hampshire County Retirement System is 11, and this represents an approximate percentage change in the Actuarial Accrued Liability for each 1% change to the investment return rate.

Net Cash Flow (NCF)

Net cash flow (NCF) during a year is the difference between contributions, both employer and employee, paid into the System and benefit payments and expenses paid from the System. If the level of benefit payments plus expenses is greater than contributions, then the System has negative NCF. Mature plans generally have a negative NCF as the number of retirees grows. When a System has negative NCF, then additional cash from existing assets are needed to pay the pension benefits.

Historical NCF since 2008 is shown in the next graph. Blue bars indicate contributions, from employees and employers, and grey bars show benefit payments and administrative expenses. The NCF is represented by the green line. The dashed purple line (which corresponds to the right-hand axis) provides the NCF as a percentage of the Market Value of Assets. As of December 31, 2021, the NCF was positive \$1.0 million, which represents 0.2% of the Market Value of Assets. The NCF falls within the range of -0.2% to 2.5% of total assets over the 14-year period.



SECTION 5 - SUMMARY OF PLAN PROVISIONS

Administration There are 104 contributory retirement systems for public employees in Massachusetts. Each system is governed by a retirement board and all boards, although operating independently, are governed by Chapter 32 of the Massachusetts General Laws, Chapter 34B, Section 19 and other applicable statutes. This law in general provides uniform benefits, uniform contribution requirements and a uniform accounting and funds structure for all systems.

Participation Participation is mandatory for all full-time employees. Eligibility with respect to part-time, provisional, temporary, seasonal or intermittent employment is governed by regulations promulgated by the local retirement board, and approved by PERAC. Membership is optional for certain elected officials.

Membership Groups There are four membership groups in the Retirement System:

Group 1	General employees, including clerical, administrative, technical and all other employees not otherwise classified.
Group 2	Certain specified hazardous duty positions.
Group 3	State police officers and inspectors.
Group 4	Local police officers, firefighters and other specified hazardous positions.

For members in more than one group, participation will be proportional.

Member Contributions Member contributions vary depending on the most recent date of membership:

Prior to 1975	5% of Salary
1975 - 1983	7% of Salary
1984 - June 30, 1996	8% of Salary
July 1, 1996 - present	9% of Salary
1979 - present	An additional 2% of Salary in excess of \$30,000.
Group 1 members hired on or after April 2, 2012	6% of Salary with 30 or more years of creditable service.

Rate of Interest Interest on regular deductions made after January 1, 1984 is a rate established by PERAC in consultation with the Commissioner of Banks. The rate is obtained from the average rates paid on individual savings accounts by a representative sample of at least ten financial institutions.

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Retirement Age

The mandatory retirement age for some Group 2 and Group 4 members is age 65. Most Group 2 and Group 4 members may remain in service after reaching age 65. Group 4 members who are employed in certain public safety positions are required to retire at age 65. There is no mandatory retirement age for members in Group 1.

Salary

Gross regular compensation. This does not include bonuses, overtime, severance pay, unused sick leave credit or other similar compensation. For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. §401(a)(17). For 2022, the limit is 64% of \$305,000, or \$195,200.

Average Salary

Membership before April 2, 2012 ♦ Average annual rate of regular compensation received during the three consecutive years that produce the highest average, or, if greater, during the last three years (whether or not consecutive) preceding retirement.

Membership on or after April 2, 2012 ♦ Average annual rate of regular compensation received during the five consecutive years that produce the highest average, or, if greater, during the last five years (whether or not consecutive) preceding retirement.

Creditable Service

The period during which a member contributes to the retirement system plus certain periods of military service and “purchased” service.

Benefit Rate

The benefit rate varies with the member's retirement age, Group, membership date and years of creditable service at retirement. Each year a member retires prior to the age at which the 2.5% maximum benefit rate applies, a reduction is applied to each year of age under the maximum age. The maximum age and reduction for each Group and membership date is as follows:

	Group 1	Group 2	Group 4
2.5% for Membership before April 2, 2012:			
Maximum age:	65	60	55
Reduction:	0.1%	0.1%	0.1%
2.5% for Membership on or after April 2, 2012 (less than 30 years of service):			
Maximum age:	67	62	57
Reduction:	0.15%	0.15%	0.15%
2.5% for Membership on or after April 2, 2012 (30+ years of service):			
Maximum age:	67	62	57
Reduction:	0.125%	0.125%	0.125%

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Superannuation Retirement

Eligibility if membership before April 2, 2012	<ul style="list-style-type: none">♦ completion of 20 years of Creditable Service, or♦ attainment of age 55 if hired prior to 1978, or♦ attainment of age 55 with 10 years of Creditable Service, if hired after 1978.
Eligibility if membership on or after April 2, 2012	<ul style="list-style-type: none">♦ attainment of age 60 with 10 years of Creditable Service if classified in Group 1♦ attainment of age 55 with 10 years of Creditable Service if classified in Group 2♦ attainment of age 55 if classified in Group 4
Benefit Amount	Product of the member's Benefit Rate, Average Salary and Creditable Service.
Maximum Benefit	80% of the member's Average Salary.
Veteran's Benefit	Additional benefit of \$15 per year of Creditable Service, up to a maximum of \$300.

Deferred Vested

Eligibility	<ul style="list-style-type: none">♦ completion of ten or more years of Creditable Service.♦ elected officials hired prior to 1978, completion of six years of Creditable Service.
Benefit Amount	Accrued benefit payable commencing at age 55, or the completion of 20 years of Creditable Service, or may be deferred until later at the participant's option.

Withdrawal of Contributions

- Contributions may be withdrawn upon termination of employment.
- ♦ Members hired on or after January 1, 1984 who terminate with less than ten years of Creditable Service receive contributions plus interest on the Annuity Savings Account at an annual rate of 3%.
 - ♦ All other withdrawals receive contributions plus 100% of the regular interest that has accrued to the Annuity Savings Account.

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Ordinary Disability Retirement	Eligibility	Non-job related disability after completion of ten years of Creditable Service.
	Benefit Amount for Group 1 membership before April 2, 2012 or Group 2 or Group 4	Superannuation benefit determined if the member is age 55, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
	Benefit Amount for Group 1 membership on or after April 2, 2012	Superannuation benefit determined if the member is age 60, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
Accidental Disability Retirement	Eligibility	Disabled as a result of an accident in the performance of duties. There is no minimum age or service requirement.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of \$15 per year of Creditable Service, up to a maximum of \$300.
	Supplemental Dependent Allowance	Additional allowance of \$1010.28 per year for each child until age 18 (or age 22 if a full-time student).
Non-Occupational Death	Eligibility	For members with at least two years of creditable service who die while in active service, but not due to occupational injury.
	Benefit Amount	Benefit as if Option C had been elected. Minimum benefit of \$500 per month for surviving spouse, \$120 per month for first child and \$90 per month for each additional child.

SECTION 5 - SUMMARY OF PLAN PROVISIONS

Accidental Death	Eligibility	For members who die as a result of an occupational injury.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of \$15 per year of creditable service, up to a maximum of \$300.
	Supplemental Dependent Allowance	Additional allowance of \$1010.28 per year for each child until age 18 (or age 22 if a full-time student).

Cost-of-Living Adjustment (COLA) In accordance with the adoption of Chapter 17 of the Acts of 1997, the granting of a Cost-of-Living Adjustment will be determined by an annual vote by the Retirement Board. The amount of increase will be based upon the Consumer Price Index, limited to a maximum of 3.0%, beginning on July 1. All retirees, disabled retirees and beneficiaries who have been receiving benefit payments for at least one year as of July 1 are eligible for the adjustment. The maximum amount of pension benefit subject to a COLA is \$13,000. All COLAs granted to members after 1981 and prior to July 1, 1998 are deemed to be an obligation of the Commonwealth of Massachusetts and are not the liability of the Retirement System.

Optional Forms of Payment A member may elect to receive his or her retirement allowance, payable in monthly installments, in one of three forms of payment:

- ◆ Option A – Total annual allowance commencing at retirement and terminating at member's death.
- ◆ Option B – A reduced annual allowance commencing at retirement with death benefit equal to excess of member contributions plus credited interest to retirement over annuity benefit paid to member.
- ◆ Option C – A reduced annual allowance commencing at retirement with 66⅔% of benefit continued to designated beneficiary upon death of member. For members who retired on or after January 12, 1988, if the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement. For members who retired prior to January 12, 1988, if the System has accepted Section 288 of Chapter 194 of the Acts of 1998 and the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Valuation Date January 1, 2022

Investment Return 6.90% per year. Previously, 7.15% per year.
 The investment return assumption is a long-term assumption based on capital market expectations by asset class, historical returns and professional judgment. We considered analysis prepared by PRIM's investment advisor using a building block approach and using the target asset allocation, expected returns by asset class and risk analysis to determine a long-term expected average annual rate of return.

Annuity Savings Fund Interest Rate 2.00% per year

Amortization Method *Unfunded Actuarial Accrued Liability (UAL):*
 Increasing dollar amount at 4% to reduce the Unfunded Actuarial Accrued Liability to zero on or before June 30, 2032.

Early Retirement Incentive Program (ERI) for 2002:
 Level dollar amount to reduce the Unfunded Actuarial Accrued Liability attributable to the 2002 ERI to zero on or before June 30, 2028.

Early Retirement Incentive Programs (ERI) for 2003:
 Level dollar amount to reduce the Unfunded Actuarial Accrued Liability attributable to the 2003 ERI to zero on or before June 30, 2028.

Salary Scale The assumed annual rates for salary increases including longevity are illustrated by the following rates:

Years of Service	Groups 1 and 2	Group 4
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.00%
3	5.25%	5.75%
4	5.25%	5.25%
5	4.75%	5.25%
6	4.75%	4.75%
7	4.50%	4.75%
8	4.50%	4.75%
9+	4.25%	4.75%

The salary scale assumption is a long-term estimate derived from historical data, current and recent market expectations and professional judgment.

Cost-of-Living Allowance Cost-of-Living Allowances (COLA) are assumed to be 3% of the pension amount, capped at \$390 per year.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Inflation 2.4% per year, based on current economic data, analyses from economists and other experts, and professional judgment.

Payroll Growth 3.25% per year, based on historical data, current and recent market expectations and professional judgment.

Mortality Rates RP-2014 Blue Collar Mortality Table with full generational mortality improvement using Scale MP-2020. For disabled members, RP-2014 Blue Collar Mortality Table set forward one year with full generational mortality improvement using Scale MP-2020.

General Employees: 55% of deaths are job-related.

Police and Fire: 90% of deaths are job-related.

PERAC completed a local system retiree mortality study in 2019 and selected the RP-2014 Blue Collar Mortality Table with full generational mortality improvement using Scale MP-2018 and subsequently updated the mortality improvement scale to MP-2020 in 2022. The underlying tables with generational mortality improvement selected reasonably reflect the mortality experience of the System as of the valuation date based on historical and current demographic data as well as professional judgement.

Turnover Rates Illustrative turnover rates are shown below:

Creditable Service	Groups 1 and 2	Group 4
0	0.1500	0.0150
10	0.0540	0.0150
20	0.0200	0.0000
30	0.0000	0.0000

Disability Rates Illustrative disability rates are shown below:

Attained Age	Groups 1 and 2	Group 4
20	0.0001	0.0010
30	0.0003	0.0030
40	0.0010	0.0030
50	0.0019	0.0125
60	0.0028	0.0085

General Employees: 55% of disabilities are accidental and 45% are ordinary.

Police and Fire: 90% of disabilities are accidental and 10% are ordinary.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Retirement Rates

Illustrative retirement rates are shown below:

Attained Age	Groups 1 and 2		Group 4
	Male	Female	Male & Female
50	0.0100	0.0150	0.0200
51	0.0100	0.0150	0.0200
52	0.0100	0.0200	0.0200
53	0.0100	0.0250	0.0500
54	0.0200	0.0250	0.0750
55	0.0200	0.0550	0.1500
56	0.0250	0.0650	0.1000
57	0.0250	0.0650	0.1000
58	0.0500	0.0650	0.1000
59	0.0650	0.0650	0.1500
60	0.1200	0.0500	0.2000
61	0.2000	0.1300	0.2000
62	0.3000	0.1500	0.2500
63	0.2500	0.1250	0.2500
64	0.2200	0.1800	0.3000
65	0.4000	0.1500	1.0000
66	0.2500	0.2000	1.0000
67	0.2500	0.2000	1.0000
68	0.3000	0.2500	1.0000
69	0.3000	0.2000	1.0000
70	1.0000	1.0000	1.0000

The turnover, disability and retirement rates are based on PERAC's most recent experience analysis of local retirement systems which reviewed age, gender and job group. The assumptions reflect this analysis as well as professional judgment.

Actuarial Cost Method

Individual Entry Age Normal.

Actuarial Asset Method

The Actuarial Value of Assets is the market value of assets as of the valuation date reduced by the sum of:

- a) 80% of gains and losses of the prior year,
- b) 60% of gains and losses of the second prior year,
- c) 40% of gains and losses of the third prior year, and
- d) 20% of gains and losses of the fourth prior year.

Investment gains and losses are determined by the excess or deficiency of the expected return over the actual return on the market value. The actuarial valuation of assets is further constrained to be not less than 90% or more than 110% of market value.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Census Data	Census data as of the valuation date were submitted by the Retirement Board.
Asset Data	Asset information is reported annually to the Public Employee Retirement Administration Commission by the Hampshire County Retirement Board.
Dependents	80% of all members will be survived by a spouse. Age assumption for spouses is that males are assumed to be three years older than females.
Net Section 3(8)(c) Transfers	Reimbursements paid to and received from other retirement systems for that portion of a retiree's pension that is based on service earned in another retirement system. Net 3(8)(c) transfers are assumed to be \$1,100,000 per year.
Administrative Expenses	<p>The anticipated administrative expenses for the fiscal year. For Fiscal Year 2023, the administrative expenses were assumed to be \$1,000,000 and are anticipated to increase 3.25% per year.</p> <p>The administrative expense assumption is based on information relating to the System's administrative expenses provided by the Retirement System.</p>
Hampshire Council of Governments (HCOG)	An additional liability of approximately \$1.162 million is included for additional liability due to the State Retirement System (SRS) as a result of the transfer of HCOG retirees to the SRS. The additional liability value was provided by the Hampshire County Retirement System via email on June 9, 2022.

SECTION 7 - PLAN MEMBER INFORMATION

Exhibit 7.1 - Summary of Census Data as of January 1, 2022

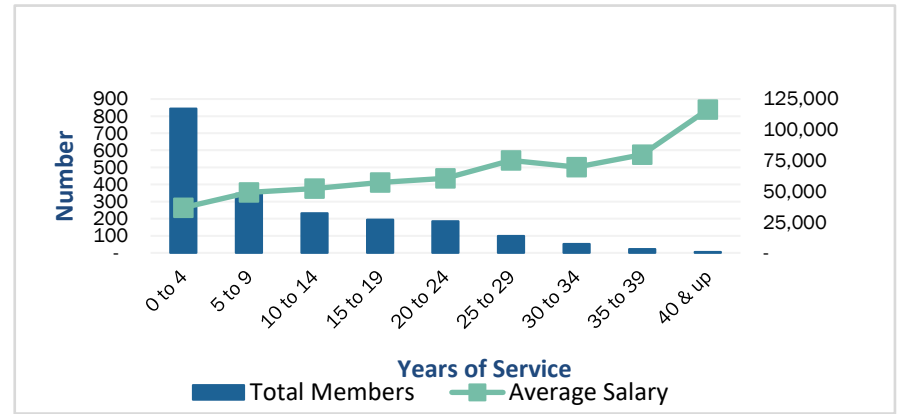
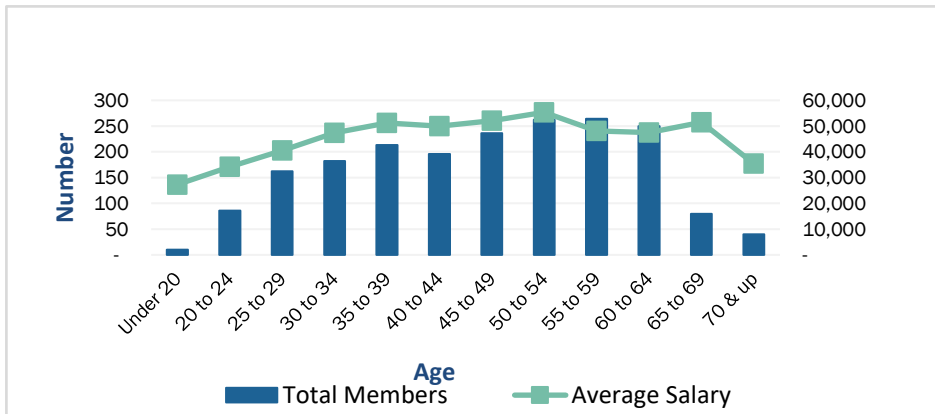
Census data as of December 31, 2021 was provided to us by the Retirement Board. We performed edits on the data to ensure that it is reasonable and complete and made certain assumptions regarding any missing or invalid data so that results are not materially affected. Presented on the following pages are summaries of the demographic profile of active members (Exhibit 7.2) and retired plan members and beneficiaries and disabled plan members (Exhibit 7.3). Below, we present a comparison of the census data from the current and prior valuations:

Valuation Date	January 1, 2022	January 1, 2020	% Change
Census Data			
Active Members	1,981	1,968	0.7%
Average Age	47.0	47.3	(0.7%)
Average Service	10.1	10.6	(5.1%)
Valuation Salary	\$96,030,745	\$89,417,455	7.4%
Average Salary	\$48,476	\$45,436	6.7%
Retired Members and Beneficiaries	1,304	1,272	2.5%
Average Age	72.8	72.7	0.1%
Total Annual Retirement Allowance	\$30,307,098	\$27,503,908	10.2%
Average Annual Retirement Allowance	\$23,242	\$21,623	7.5%
State Reimbursed COLAs	\$99,956	\$119,972	(16.7%)
Total System-Funded Retirement Allowance	\$30,207,142	\$27,383,936	10.3%
Disabled Members	88	85	3.5%
Average Age	65.3	64.3	1.5%
Total Annual Retirement Allowance	\$3,177,275	\$2,914,899	9.0%
Average Annual Retirement Allowance	\$36,105	\$34,293	5.3%
State Reimbursed COLAs	\$18,246	\$21,035	(13.3%)
Total System-Funded Retirement Allowance	\$3,159,029	\$2,893,864	9.2%
Inactive Members	851	723	17.7%
Annuity Savings Fund	\$7,408,482	\$6,882,546	7.6%

SECTION 7 - PLAN MEMBER INFORMATION

Exhibit 7.2 - Active Members by Age and Years of Service as of January 1, 2022

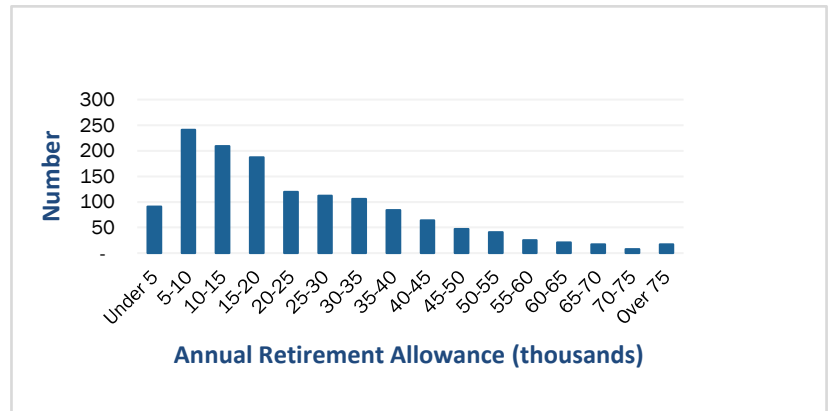
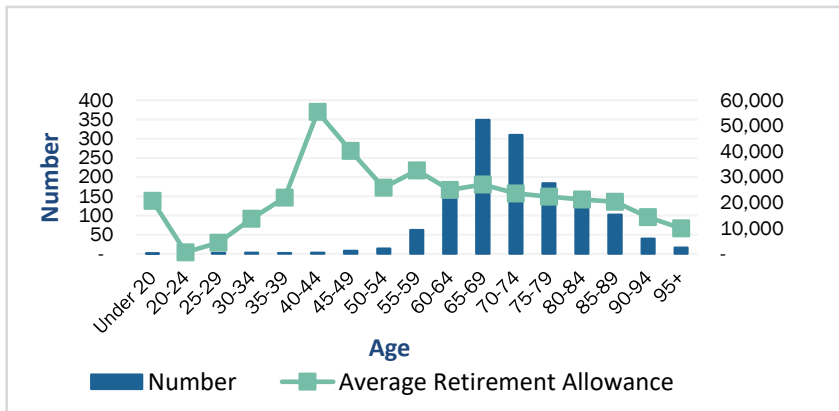
Attained Age	Years of Service									Total	Total Salary	Average Salary
	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up			
Under 20	10	-	-	-	-	-	-	-	-	10	273,016	27,302
20 to 24	83	3	-	-	-	-	-	-	-	86	2,942,006	34,209
25 to 29	136	26	-	-	-	-	-	-	-	162	6,573,815	40,579
30 to 34	120	43	18	1	-	-	-	-	-	182	8,627,145	47,402
35 to 39	111	50	34	17	1	-	-	-	-	213	10,916,007	51,249
40 to 44	76	53	25	25	16	1	-	-	-	196	9,804,268	50,022
45 to 49	98	34	27	24	37	15	1	-	-	236	12,298,821	52,114
50 to 54	66	40	43	28	36	34	14	1	-	262	14,498,016	55,336
55 to 59	75	47	34	38	29	17	16	8	-	264	12,695,153	48,088
60 to 64	54	24	37	42	50	20	12	9	2	250	11,865,526	47,462
65 to 69	11	18	9	14	10	10	3	2	3	80	4,119,224	51,490
70 & up	4	8	6	5	6	2	6	2	1	40	1,417,748	35,444
Total	844	346	233	194	185	99	52	22	6	1,981	96,030,745	48,476
Average Salary	36,744	49,167	52,344	57,177	60,604	75,070	69,587	79,910	116,377			
Average Age:							47.0	Average Service:		10.1		



SECTION 7 - PLAN MEMBER INFORMATION

Exhibit 7.3 - Annual Retirement Allowances as of January 1, 2022

Attained Age	Service Retirements		Disability Retirements		Beneficiaries	
	Number	Annual Retirement Allowance	Number	Annual Retirement Allowance	Number	Annual Retirement Allowance
Under 20	0	0	0	0	1	20,680
20-24	0	0	0	0	1	621
25-29	0	0	0	0	2	8,533
30-34	0	0	0	0	3	41,145
35-39	0	0	1	31,400	1	12,613
40-44	0	0	3	166,228	0	0
45-49	1	60,037	5	246,752	2	14,351
50-54	2	31,061	6	242,616	6	87,942
55-59	47	1,596,953	9	294,734	6	127,409
60-64	127	3,176,095	18	656,633	14	129,957
65-69	315	8,541,905	14	496,020	20	407,036
70-74	263	6,354,984	18	571,221	29	381,308
75-79	156	3,563,451	7	225,278	21	309,747
80-84	118	2,613,677	3	87,675	15	185,319
85-89	79	1,692,916	3	129,066	20	245,854
90-94	32	462,318	1	29,652	7	82,517
95+	12	123,150	0	0	4	35,519
Total	1,152	28,216,547	88	3,177,275	152	2,090,551
Average Age	72.9		65.3		71.9	
Average Retirement Allowance		24,494		36,105		13,754



SECTION 8 - GLOSSARY OF TERMS

Actuarial Accrued Liability – That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

Actuarial Assumptions – Assumptions, based upon past experience or standard tables, used to predict the occurrence of future events affecting the commencement, amount and duration of pension benefits, such as: changes in compensation, mortality, withdrawal, disablement and retirement; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

Actuarial Cost Method (or Funding Method) – A procedure for allocating the Actuarial Present Value of all past and future pension plan benefits to the current year (Normal Cost) and the past (Actuarial Accrued Liability).

Actuarial Gain or Loss (or Experience Gain or Loss) – A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between the valuation date and the most recent immediately preceding valuation date.

Actuarial Present Value – The dollar value on the valuation date of all benefits expected to be paid to current members based upon the Actuarial Assumptions and the terms of the Plan.

Amortization Payment – That portion of the pension plan appropriation which represents payments made to pay interest on and the reduction of the Unfunded Accrued Liability.

Annual Statement – The statement submitted by the local retirement board to PERAC each year that describes the asset holdings and Fund balances as of December 31 and the transactions during the calendar year that affected the financial condition of the retirement system.

Annuity Reserve Fund – The fund into which total accumulated Member Contributions, including interest, is transferred at the time a member retires, and from which annuity payments are made.

Annuity Savings Fund – The fund in which Member Contributions plus interest credited are held for active members and for former members who have not withdrawn their contributions and are not yet receiving a benefit (inactive members).

Assets – The total value of the investments held by the Plan trust that are for the payment of promised benefits. Employer appropriations and Member Contributions, as well as investment earnings, are added to the Plan trust. Benefit payments and other disbursements are withdrawn from the Plan trust. For valuation purposes, assets are usually measured at market value.

Cost of Benefits – The estimated payment from the pension system for benefits for the fiscal year.

Expense Fund – The fund into which the appropriation for administrative expenses is paid and from which all such expenses are paid.

SECTION 8 - GLOSSARY OF TERMS

Funded Ratio – The Actuarial Value of Assets expressed as a percentage of the Actuarial Accrued Liability.

Funding Schedule – The schedule based upon the most recently approved actuarial valuation which sets forth the amount which would be appropriated to the pension system in accordance with Section 22D and Section 22F of M.G.L. Chapter 32.

GASB – Governmental Accounting Standards Board.

Normal Cost – Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is expected to accrue in the current fiscal year. The Employee Normal Cost is the amount of the expected Member Contributions for the current fiscal year. The Employer Normal Cost is the difference between the Total Normal Cost and the Employee Normal Cost.

Pension Fund – The fund into which appropriation amounts as determined by PERAC are paid and from which pension benefits are paid.

Pension Reserve Fund – The fund which shall be credited with all amounts set aside by a system for the purpose of establishing a reserve to meet future pension liabilities. These amounts would include excess interest earnings.

Present Value of Future Benefits – The actuarial present value of the cost to finance benefits payable in the future, discounted to reflect the expected effects of the time value of money and the probabilities of payment.

Special Fund for Military Service Credit – The fund which is credited with amounts paid by the retirement board equal to the amount which would have been contributed by a member during a military leave of absence as if the member had remained in active service of the retirement board. In the event of retirement or a non-job related death, such amount is transferred to the Annuity Reserve Fund. In the event of termination prior to retirement or death, such amount shall be transferred to the Pension Fund.

Total Pension Liability – The portion of the Actuarial Present Value attributable to past service in accordance with the Entry Age cost method as stipulated by GASB Statement Number 67 (GASB 67).

Unfunded Actuarial Accrued Liability – The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.