

ASSET-LIABILITY STUDY UPDATE

EMPLOYEES' RETIREMENT SYSTEM
OF RHODE ISLAND

NOVEMBER 2023

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ASSET/LIABILITY STUDY UPDATE

- **At the September SIC meeting, a detailed set of alternative portfolio mixes was reviewed.**
- **Today's discussion includes additional output for two of the portfolio mixes.**
- **NEPC and ERSRI Staff have prepared a recommendation for the SIC to be discussed at today's meeting.**
- **An updated study timeline is included on the following slide.**

ASSET/LIABILITY STUDY TIMELINE

Step/Milestone	Timing
Asset/Liability Study Kickoff Discussion	February – COMPLETE
NEPC Coordinates with Plan Actuary on Data Needs	February – COMPLETE
Preliminary Capital Market Assumption Discussion	March – COMPLETE
Finalize Capital Market Assumptions	April – COMPLETE
NEPC Receives Actuarial Forecasts	June – COMPLETE
NEPC Prepares Baseline Forecast Results	July – COMPLETE
Discussion of Baseline Output and Scenario Analysis	July – COMPLETE
Discuss Alternative Portfolios and Preliminary Findings	August – COMPLETE
Continue Discussion of Alternative Portfolios and Review Liquidity Study	September – COMPLETE
NEPC and State of RI Staff Prepare Recommendation	September / October - COMPLETE
Final Recommendation Delivered to SIC	November SIC Meeting – Today’s Discussion
Portfolio Implementation Discussion	Post-A/L Study



Note: Timing is estimated and subject to change.

DISCUSSION OF ALTERNATIVE PORTFOLIOS



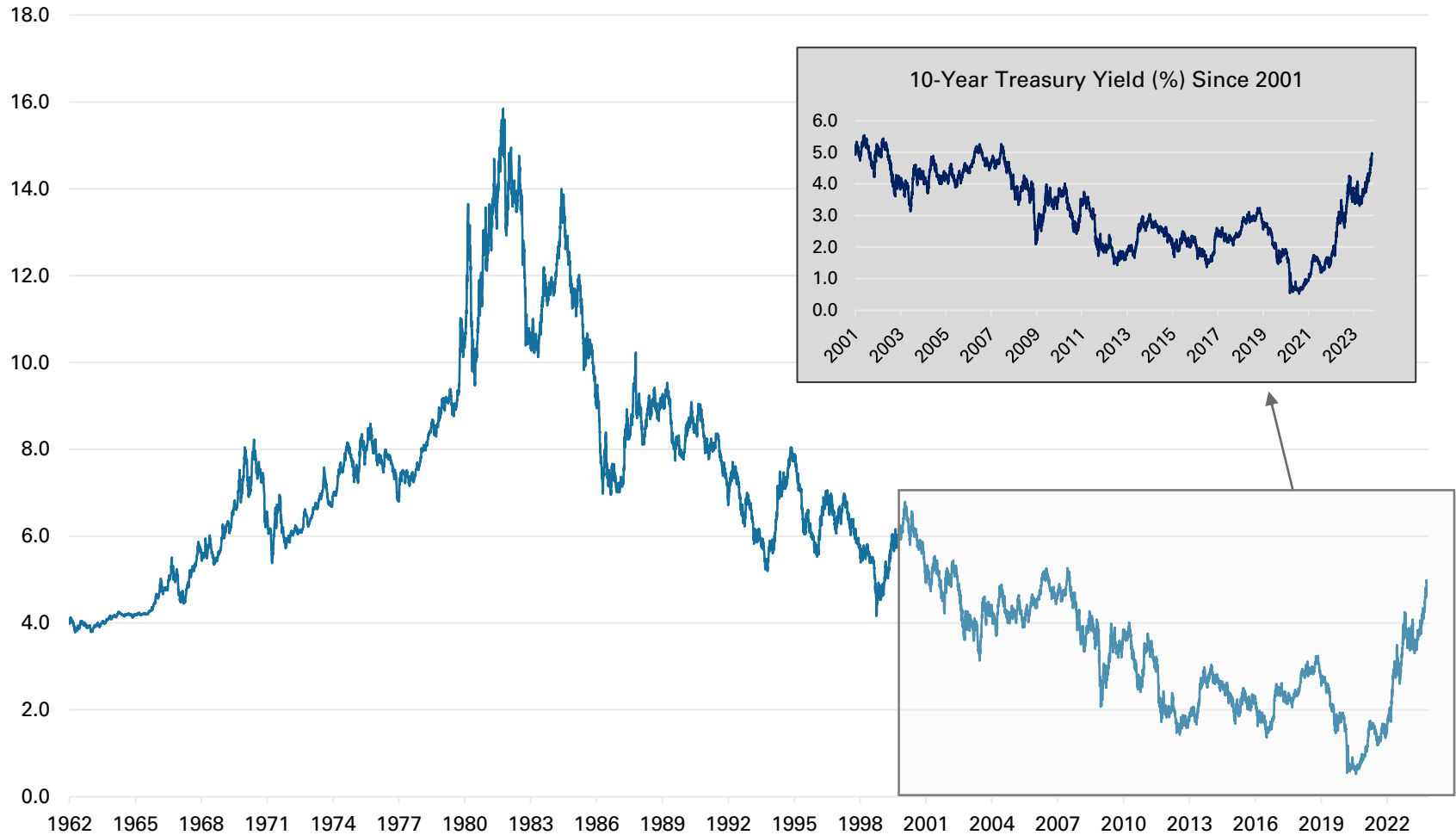
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ALTERNATIVE PORTFOLIO OVERVIEW

- **At the September SIC meeting, there was a request to review two of the alternative portfolios in greater detail**
 - Similar Return / Lower Risk
 - Higher Return / Similar Risk
- **Detailed output is shown for each of these portfolios alongside the Current Target portfolio**
- **We have also included a portfolio which eliminates emerging market debt from the Current Target and shifts the allocation to Liquid Credit**
 - If the SIC decides to stay with the Current Target portfolio, we would still suggest removing emerging market debt

MARKET ENVIRONMENT

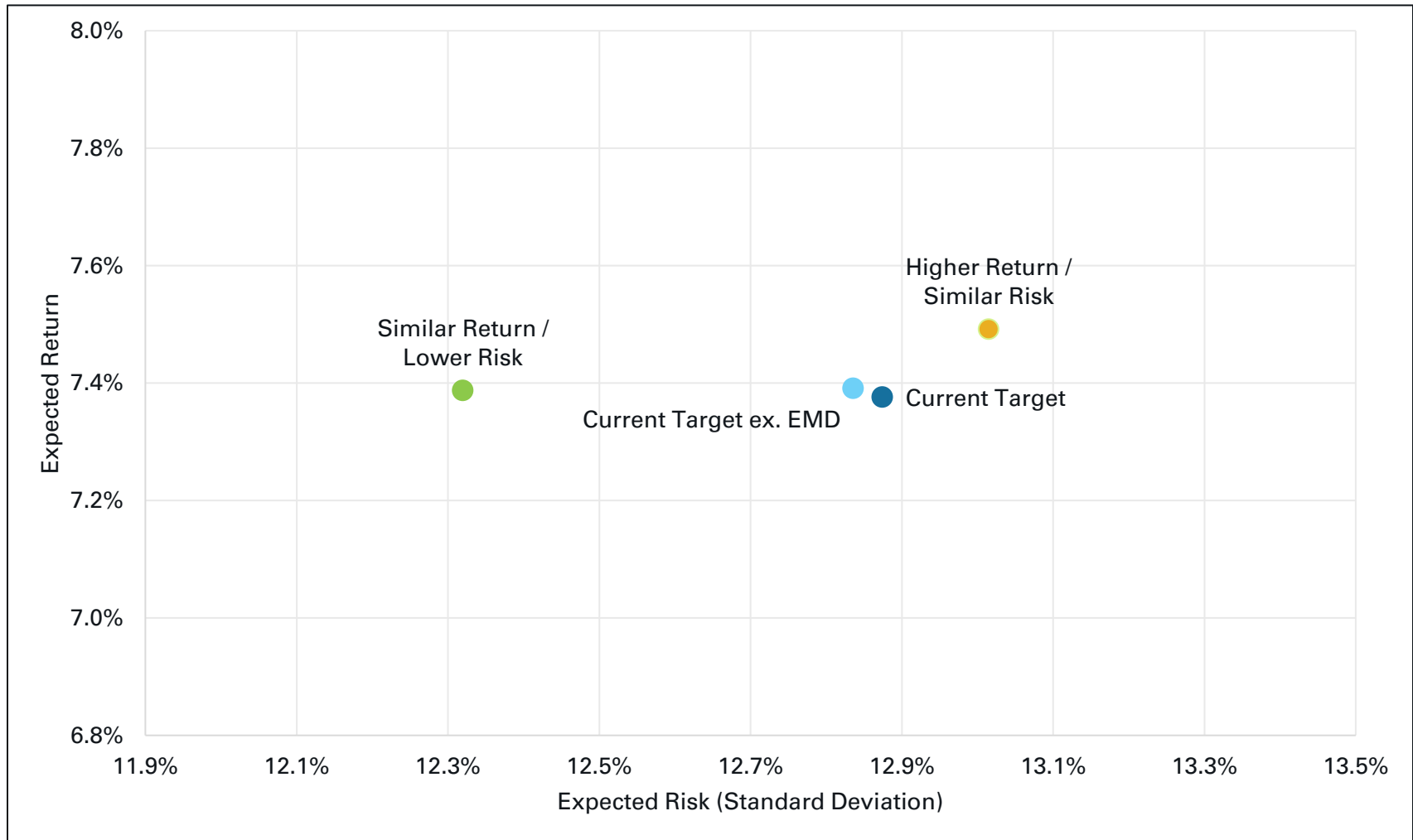
10 Year US Treasury Yield (%)



Source: St. Louis Federal Reserve. As of October 20, 2023



PORTFOLIO ALLOCATIONS – RETURN/RISK



10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk. See appendix for details.

PORTFOLIO ALLOCATION DETAIL

		Current Target	Current Target ex. EMD	Similar Return Lower Risk	Higher Return Similar Risk
Growth	Global Equity	40.0%	40.0%	35.0%	42.0%
	Private Equity	12.5%	12.5%	12.5%	13.5%
	Non-Core Real Estate	2.5%	2.5%	2.5%	1.5%
	Private Growth	15.0%	15.0%	15.0%	15.0%
	TOTAL GROWTH	55.0%	55.0%	50.0%	57.0%

Income	Equity Options	2.0%	2.0%	2.0%	2.0%
	Liquid Credit	3.0%	5.0%	6.0%	5.0%
	EMD (Blended)	2.0%	0.0%	0.0%	0.0%
	CLO Mezz/Equity	2.0%	2.0%	2.0%	2.0%
	Private Credit	3.0%	3.0%	5.0%	5.0%
	TOTAL INCOME	12.0%	12.0%	15.0%	14.0%

Stability	Long Treasuries	5.0%	5.0%	5.0%	8.0%
	Systematic Trend	5.0%	5.0%	5.0%	5.0%
	CPC	10.0%	10.0%	10.0%	13.0%
	Core Real Estate	4.0%	4.0%	4.0%	3.0%
	Private Real Assets (ex-Real Estate)	4.0%	4.0%	4.0%	3.0%
	Inflation Protection	8.0%	8.0%	8.0%	6.0%
	Inv. Grade Fixed (ex-Treasuries)	6.5%	6.5%	8.5%	4.0%
	Absolute Return	6.5%	6.5%	6.5%	4.0%
	Strategic Cash	2.0%	2.0%	2.0%	2.0%
	Volatility Protection	15.0%	15.0%	17.0%	10.0%
TOTAL STABILITY	33.0%	33.0%	35.0%	29.0%	

Increase in allocation relative to Current Target

Decrease in allocation relative to Current Target



PORTFOLIO ALLOCATION SUMMARY OUTPUT

	Current Target	Current Target ex. EMD	Similar Return Lower Risk	Higher Return Similar Risk
FORECASTED RISK/RETURN				
Expected Return – Arithmetic	8.1%	8.1%	8.0%	8.2%
Expected Return – Geometric	7.4%	7.4%	7.4%	7.5%
Expected Risk	12.9%	12.8%	12.3%	13.0%
Expected Sharpe Ratio	0.38	0.38	0.39	0.38
LIQUIDITY				
% Daily/Weekly	62%	64%	62%	66%
% Monthly	4%	2%	2%	2%
% Quarterly	7%	7%	7%	4%
% Illiquid	28%	28%	30%	28%
PORTFOLIO CHARACTERISTICS				
Beta To Global Equity	0.71	0.71	0.69	0.74
Interest Rate Duration (years)	1.57	1.50	1.70	1.85
Portfolio Yield (%)	2.10%	2.13%	2.22%	2.15%
Portfolio Income (\$mm)	\$224.7	\$227.6	\$237.5	\$230.0



10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk. See appendix for details.

Illiquid asset classes = Private Equity, Non-Core Real Estate, CLO Mezz/Equity, Private Credit, Core Real Estate, Private Real Assets, Absolute Return

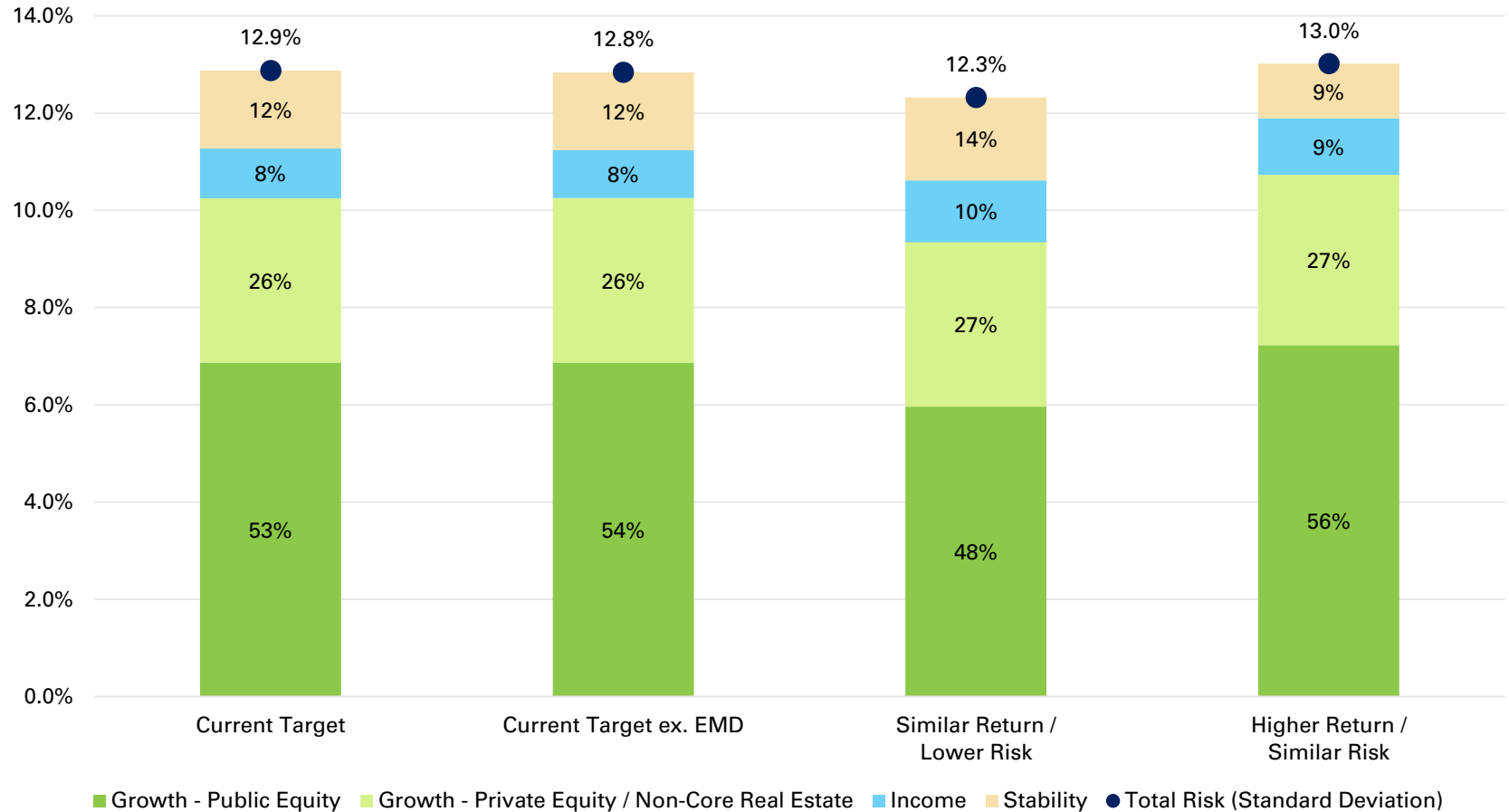
STOCHASTIC OUTPUT

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

	Current Target	Similar Return / Lower Risk	Higher Return / Similar Risk
50 th Percentile 2032 Funded Status	88.5%	88.5%	89.2%
75 th Percentile 2032 Funded Status	108.1%	107.2%	109.2%
25 th Percentile 2032 Funded Status	72.1%	72.8%	72.6%
Probability of 80% Funded in 2032	63.6%	64.3%	64.5%
Funded Status Volatility	9.1%	8.7%	9.3%
50 th Percentile FY2035 Contribution Rate	22.2%	22.2%	21.9%
75 th Percentile FY2035 Contribution Rate	29.3%	29.1%	29.1%
25 th Percentile FY2035 Contribution Rate	13.6%	14.0%	13.0%
Probability of >30% Contribution Rate	23.1%	22.3%	22.7%
Contribution Rate Volatility	3.5%	3.4%	3.5%

RISK DECOMPOSITION

Portfolio Risk (Standard Deviation) Decomposition



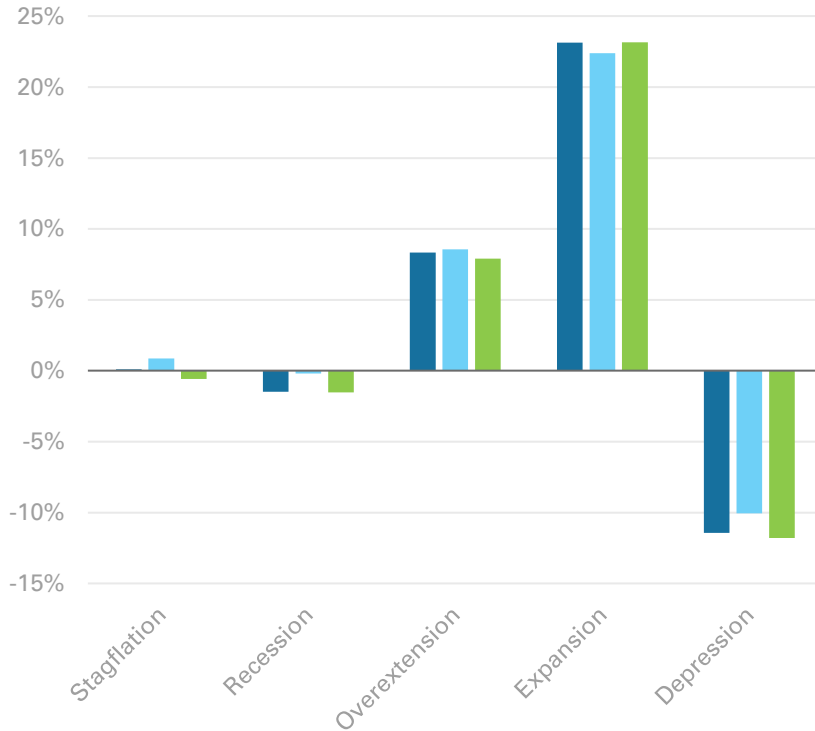
Numbers shown in bar chart are the percentage of total risk for the portfolio. May not add due to rounding.



SCENARIO ANALYSIS

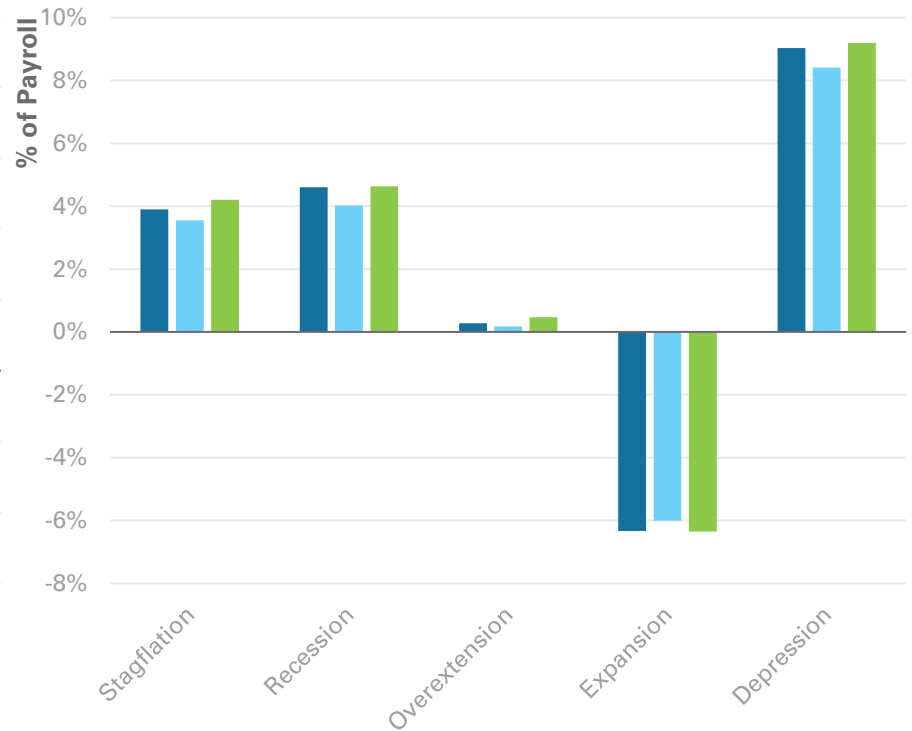
EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

5-yr Change in Funded Ratio



■ Current Policy
 ■ Similar Return / Lower Risk
 ■ Higher Return / Similar Risk

5-yr Change in Board Contribution Rate



■ Current Policy
 ■ Similar Return / Lower Risk
 ■ Higher Return / Similar Risk

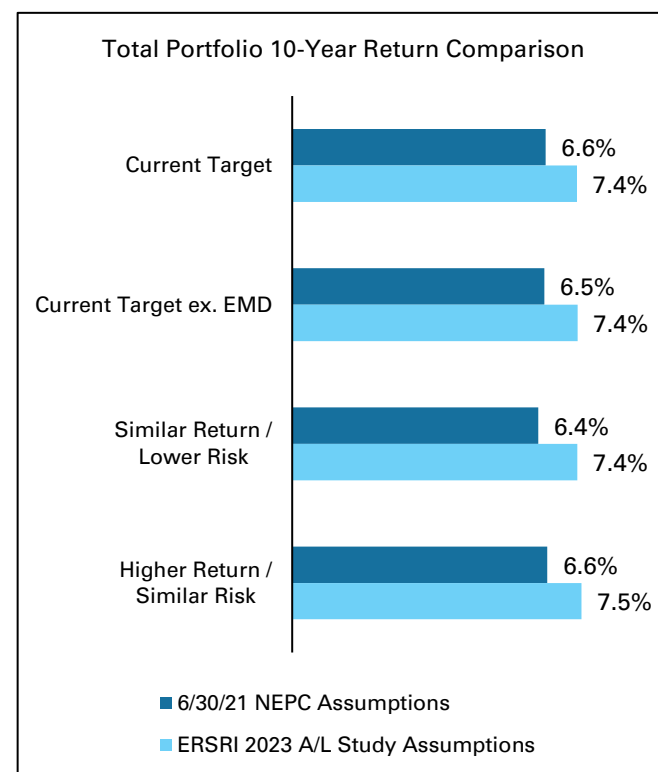
Notes: Change in funded ratio represents change in percentage points from 7/1/22 funded ratio of 58.7% for State EEs; change in contribution rate represents change in percentage points from FY2025 employer contribution rate of 28.5% for State EEs



IMPACT OF CURRENT MARKET CONDITIONS

- As a point of comparison, we calculated the expected return for each portfolio using NEPC's 2021 capital market assumptions.
- We used June 2021 assumptions which represented a much lower interest rate environment relative to current market conditions.

		6/30/21 NEPC 10YR Geometric Return	ERSRI 2023 A/L Study 10YR Geometric Return	Difference
Growth	Global Equity	7.6%	7.5%	0.1%
	Private Equity	8.9%	9.6%	-0.7%
	Non-Core Real Estate	7.8%	7.7%	0.1%
	Private Growth	9.6%	9.5%	0.1%
	TOTAL GROWTH	8.2%	8.2%	0.0%
Income	Equity Options	4.1%	5.8%	-1.7%
	Liquid Credit	3.1%	7.5%	-4.4%
	EMD (Blended)	4.8%	6.7%	-1.9%
	CLO Mezz/Equity	5.1%	7.1%	-2.0%
	Private Credit	6.4%	9.2%	-2.8%
	TOTAL INCOME	4.9%	7.5%	-2.6%
Stability	Long Treasuries	1.4%	4.0%	-2.6%
	Systematic Trend	3.8%	4.8%	-1.0%
	CPC	2.9%	4.6%	-1.7%
	Core Real Estate	4.8%	4.7%	0.1%
	Private Real Assets (ex-Real Estate)	6.3%	7.0%	-0.7%
	Inflation Protection	5.9%	6.1%	-0.2%
	Inv. Grade Fixed (ex-Treasuries)	2.4%	5.3%	-3.0%
	Absolute Return	4.2%	5.6%	-1.4%
	Strategic Cash	1.2%	3.2%	-2.0%
	Volatility Protection	3.1%	5.2%	-2.1%
	TOTAL STABILITY	3.9%	5.4%	-1.5%



ERSRI 2023 A/L Study 10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk. See appendix for details.
 6/30/21 assumptions based on NEPC's standard 10-year asset class assumptions.



RECOMMENDATION

- We believe the “Similar Return / Lower Risk” portfolio is appropriate for the ERSRI Pension Plan
- The recommended portfolio eliminates emerging market debt, diversifies portfolio risk, and maintains a sufficient level of return
- Additionally, the recommended portfolio maintains significant liquidity to meet cash needs
- The changes are relatively modest with a 5% reduction in public equity with a corresponding increase in private credit and investment grade fixed income.

		Current Target	Recommended
Growth	Global Equity	40.0%	35.0%
	Private Equity	12.5%	12.5%
	Non-Core Real Estate	2.5%	2.5%
	Private Growth	15.0%	15.0%
	TOTAL GROWTH	55.0%	50.0%

Income	Equity Options	2.0%	2.0%
	Liquid Credit	3.0%	6.0%
	EMD (Blended)	2.0%	0.0%
	CLO Mezz/Equity	2.0%	2.0%
	Private Credit	3.0%	5.0%
	TOTAL INCOME	12.0%	15.0%

Stability	Long Treasuries	5.0%	5.0%
	Systematic Trend	5.0%	5.0%
	CPC	10.0%	10.0%
	Core Real Estate	4.0%	4.0%
	Private Real Assets (ex-Real Estate)	4.0%	4.0%
	Inflation Protection	8.0%	8.0%
	Inv. Grade Fixed (ex-Treasuries)	6.5%	8.5%
	Absolute Return	6.5%	6.5%
	Strategic Cash	2.0%	2.0%
	Volatility Protection	15.0%	17.0%
TOTAL STABILITY	33.0%	35.0%	



APPENDIX



ERSRI FINAL ASSET CLASS ASSUMPTIONS

		Current Target	10-Year Arithmetic Returns				10-Year Geometric Return*	NEPC Expected Risk
			NEPC	Meketa	Cliffwater	Average		
Growth	Global Equity	40.0%	7.7%	10.1%	8.8%	8.9%	7.5%	18.1%
	Private Equity	12.5%	11.8%	12.5%	12.3%	12.2%	9.6%	25.7%
	Non-Core Real Estate	2.5%	6.7%	8.1%	12.5%	9.1%	7.7%	18.5%
	Private Growth	15.0%	10.9%	11.8%	12.3%	11.7%	9.5%	23.4%
	TOTAL GROWTH	55.0%	8.3%	10.6%	9.9%	9.6%	8.2%	18.9%
Income	Equity Options	2.0%	6.5%	7.4%	5.0%	6.3%	5.8%	11.1%
	Liquid Credit	3.0%	7.7%	8.5%	7.5%	7.9%	7.5%	9.5%
	EMD (Blended)	2.0%	7.9%	7.1%	7.1%	7.4%	6.7%	12.6%
	CLO Mezz/Equity	2.0%	6.1%	8.7%	7.1%	7.3%	7.1%	7.6%
	Private Credit	3.0%	9.4%	10.3%	9.6%	9.8%	9.2%	11.8%
	TOTAL INCOME	12.0%	7.7%	8.6%	7.5%	7.9%	7.5%	9.3%
Stability	Long Treasuries	5.0%	4.6%	4.9%	4.2%	4.6%	4.0%	11.8%
	Systematic Trend	5.0%	6.2%	5.3%	4.1%	5.2%	4.8%	9.3%
	CPC	10.0%	5.4%	5.1%	4.2%	4.9%	4.6%	7.8%
	Core Real Estate	4.0%	5.0%	4.9%	7.1%	5.7%	4.7%	15.0%
	Private Real Assets (ex-Real Estate)	4.0%	7.2%	7.8%	8.0%	7.7%	7.0%	12.4%
	Inflation Protection	8.0%	6.1%	6.4%	7.6%	6.7%	6.1%	11.8%
	Inv. Grade Fixed (ex-Treasuries)	6.5%	5.8%	5.3%	5.6%	5.6%	5.3%	7.7%
	Absolute Return	6.5%	6.9%	5.6%	5.3%	5.9%	5.6%	8.6%
	Strategic Cash	2.0%	4.0%	3.1%	2.5%	3.2%	3.2%	0.6%
	Volatility Protection	15.0%	6.0%	5.1%	5.0%	5.4%	5.2%	6.1%
	TOTAL STABILITY	33.0%	5.8%	5.4%	5.4%	5.5%	5.4%	6.5%
TOTAL PORTFOLIO		100.0%	7.4%	8.6%	8.1%	8.1%	7.4%	12.9%

*10-Year Geometric Returns based on Average Arithmetic Return and NEPC Expected Risk.

Based on NEPC's 12/31/2023 assumptions, Meketa's 2023 assumptions, and Cliffwater's 2023 assumptions.



ASSET CLASS MAPPING & ASSUMPTIONS

		Current Target	Liquidity Category	Equity Beta	Interest Rate Duration (Years)	Yield
Growth	Global Equity	40.0%	Daily/Weekly	1.00	0.00	2.07%
	Private Equity	12.5%	Illiquid	1.25	0.00	N/A
	Non-Core Real Estate	2.5%	Illiquid	0.50	0.00	N/A
	Private Growth	15.0%				
	TOTAL GROWTH	55.0%				

Income	Equity Options	2.0%	Monthly	0.80	0.00	N/A
	Liquid Credit	3.0%	Daily/Weekly	0.70	3.50	8.14%
	EMD (Blended)	2.0%	Monthly	0.60	7.10	6.78%
	CLO Mezz/Equity	2.0%	Illiquid	0.80	3.00	10.33%
	Private Credit	3.0%	Illiquid	0.85	1.50	N/A
	TOTAL INCOME	12.0%				

Stability	Long Treasuries	5.0%	Daily/Weekly	0.00	16.00	4.13%
	Systematic Trend	5.0%	Daily/Weekly	0.00	0.00	N/A
	CPC	10.0%				
	Core Real Estate	4.0%	Illiquid	0.40	0.00	N/A
	Private Real Assets (ex-Real Estate)	4.0%	Illiquid	0.50	0.00	N/A
	Inflation Protection	8.0%				
	Inv. Grade Fixed (ex-Treasuries)	6.5%	Daily/Weekly	0.20	6.50	5.72%
	Absolute Return	6.5%	Quarterly	0.00	0.00	N/A
	Strategic Cash	2.0%	Daily/Weekly	0.00	0.00	5.42%
	Volatility Protection	15.0%				
	TOTAL STABILITY	33.0%				

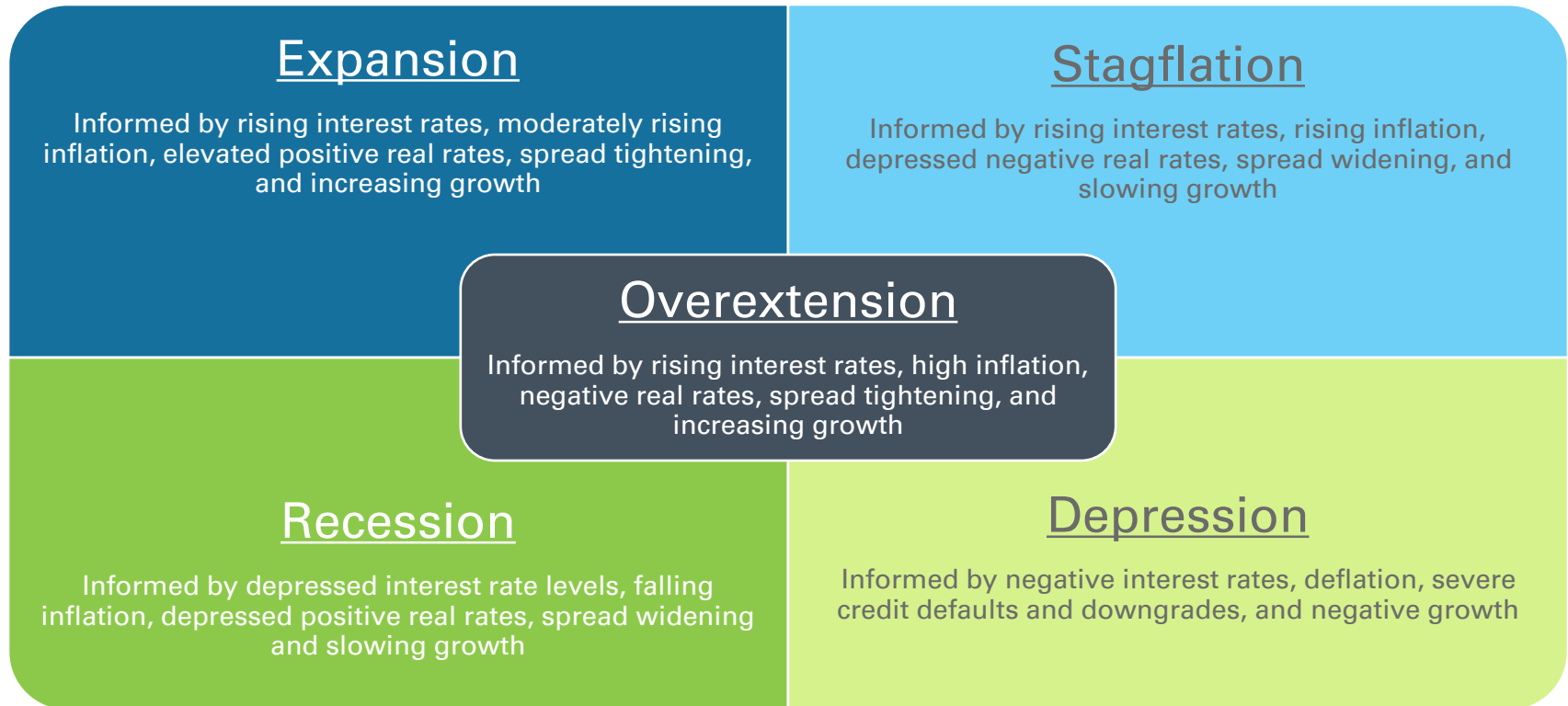
Equity market beta, interest rate duration, and yield are estimated based on representative characteristics of each asset class. Not intended to be a specific projection based on actual portfolio holdings.



SCENARIO ANALYSIS: REGIME CHANGES

NEPC scenario analysis highlights the impact of shifting economic and market regimes on the portfolio and potential asset allocation mixes

- Risk asset returns are informed by credit returns which are based on changes in real rate, inflation, and credit spreads experienced across market regimes



SCENARIO ANALYSIS: REGIME RETURNS

Expansion Scenario Return*

Cash: 2.7%
Treasuries: 5.4%
Long Treasuries: 8.5%
US TIPS: 5.1%
US IG Credit: 8.1%
High Yield Bonds: 8.0%
US Large-Cap Equity: 10.2%
Emerging Market Equity: 17.9%
Commodities: 12.1%

Depression Scenario Return*

Cash: 0.8%
Treasuries: 5.4%
Long Treasuries: 10.0%
US TIPS: 5.4%
US IG Credit: 7.0%
High Yield Bonds: 2.1%
US Large-Cap Equity: -8.1%
Emerging Market Equity: -22.8%
Commodities: 12.9%

Overextension Scenario Return*

Cash: 5.4%
Treasuries: 4.0%
Long Treasuries: 2.6%
US TIPS: 7.0%
US IG Credit: 4.7%
High Yield Bonds: 5.8%
US Large-Cap Equity: 2.3%
Emerging Market Equity: 4.5%
Commodities: 13.4%

Recession Scenario Return*

Cash: 1.2%
Treasuries: 5.0%
Long Treasuries: 8.5%
US TIPS: 4.8%
US IG Credit: 7.3%
High Yield Bonds: 8.2%
US Large-Cap Equity: -2.9%
Emerging Market Equity: -5.0%
Commodities: 11.2%

Stagflation Scenario Return*

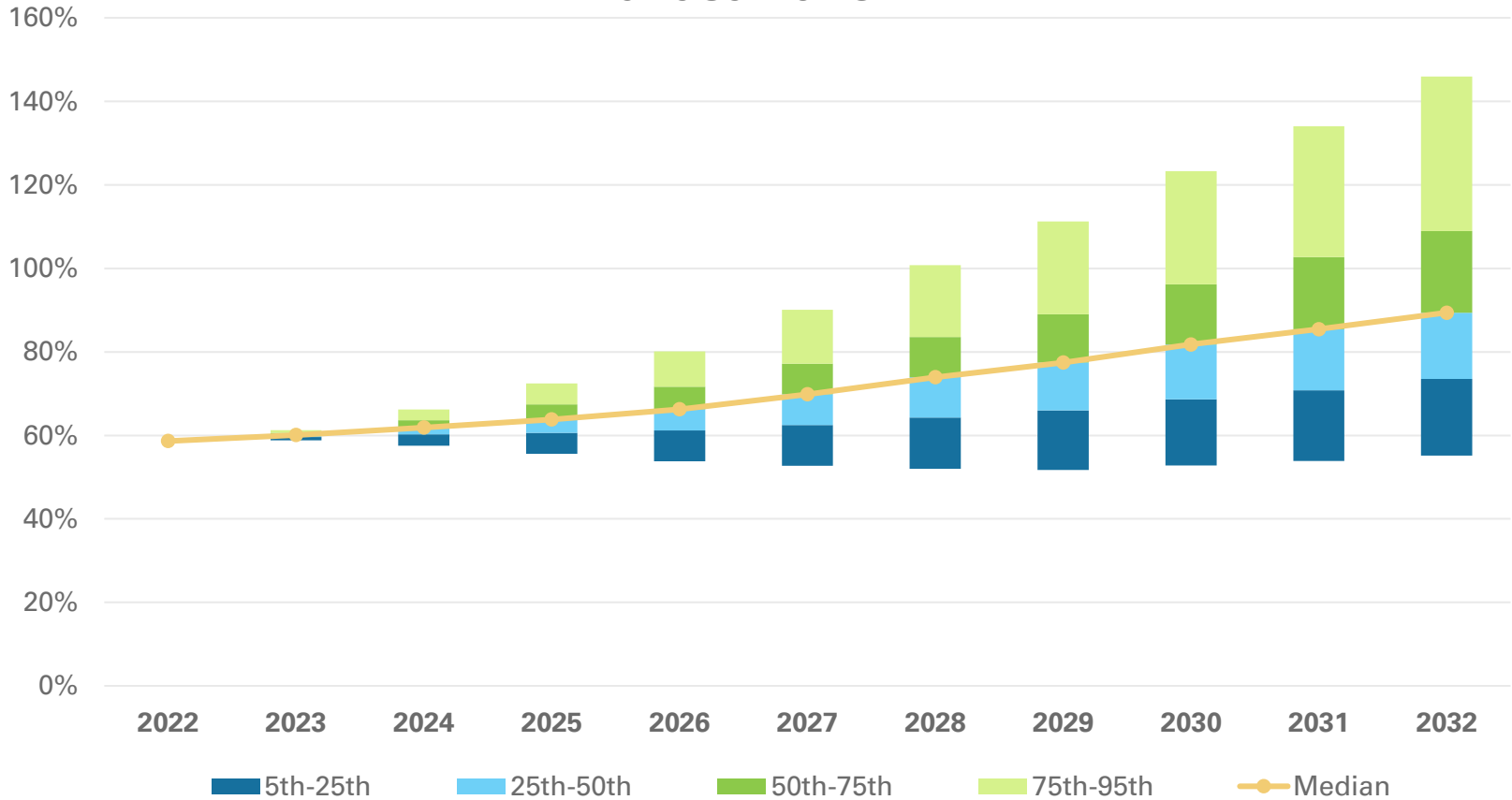
Cash: 6.4%
Treasuries: 2.6%
Long Treasuries: -1.6%
US TIPS: 9.5%
US IG Credit: 3.1%
High Yield Bonds: 7.0%
US Large-Cap Equity: -2.4%
Emerging Market Equity: -3.9%
Commodities: 23.5%

Scenario returns are a 5 year annualized returns

STOCHASTIC FUNDED STATUS – CURRENT POLICY

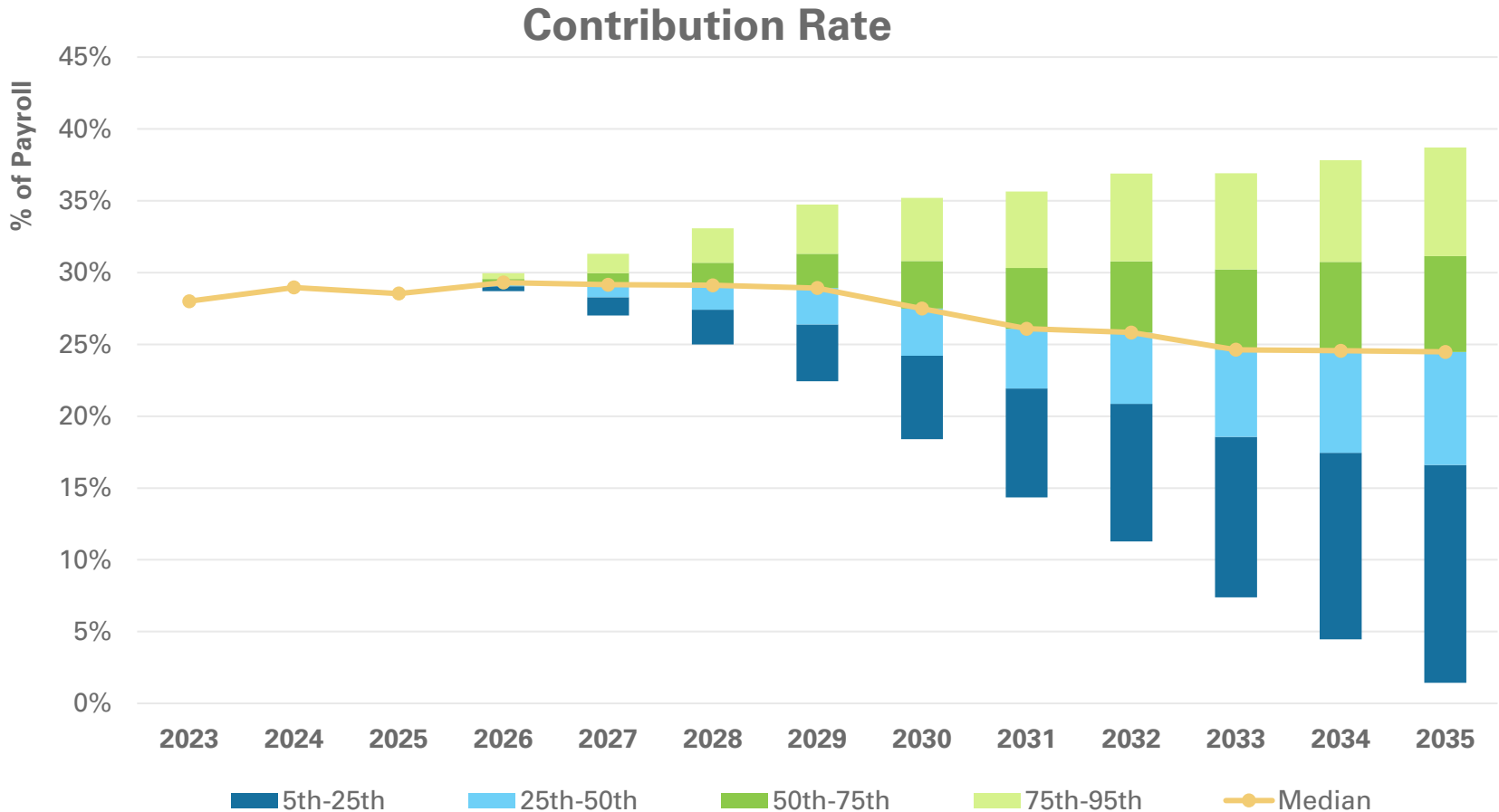
EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND

Funded Ratio



STOCHASTIC CONTRIBUTION RATE – CURRENT POLICY

EMPLOYEES' RETIREMENT SYSTEM OF RHODE ISLAND



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Past performance is no guarantee of future results.

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The goal of this report is to provide a basis for substantiating asset allocation recommendations. The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.

Information on market indices was provided by sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.

The projection of liabilities in this report uses standard actuarial projection methods and does not rely on actual participant data. Asset and liability information was received from the plan's actuary, and other projection assumptions are stated in the report.

All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.

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