

Distance Changed the Game Plan but not the Goal.



Missouri State Employees' Retirement System
A Pension Trust Fund of the State of Missouri

Comprehensive Annual Financial Report
Fiscal Year Ended June 30, 2020



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#STRATEGY • #VISION • #GOALS
• #GOALS • #LEADERSHIP • #C
• #TECHNOLOGY • #PROGRESS
#FOCUS • #MANAGEMENT • #GRO
• #BENEFITS • #TEAMWORK • #CO
#VISION • #GOALS • #MANAGEMENT
#GROWTH • #COMMUNICATION •
• #STRATEGY • #PROGRESS • #INVEST
#FOCUS • #MANAGEMENT • #GROWTH
#BENEFITS • #TEAMWORK • #COMMUNIC
• #TECHNOLOGY • #PROGRESS • #INVEST
• #GOALS • #FOCUS • #MANAGEMENT • #C



Ronda Stegmann
Executive Director

Lori Woratzeck
Deputy Executive Director
Chief Financial Officer

*Report prepared by the staff of the
Missouri State Employees' Retirement System*

Missouri State Employees' Retirement System
A Pension Trust Fund of the State of Missouri

Comprehensive Annual Financial Report
Fiscal Year Ended June 30, 2020

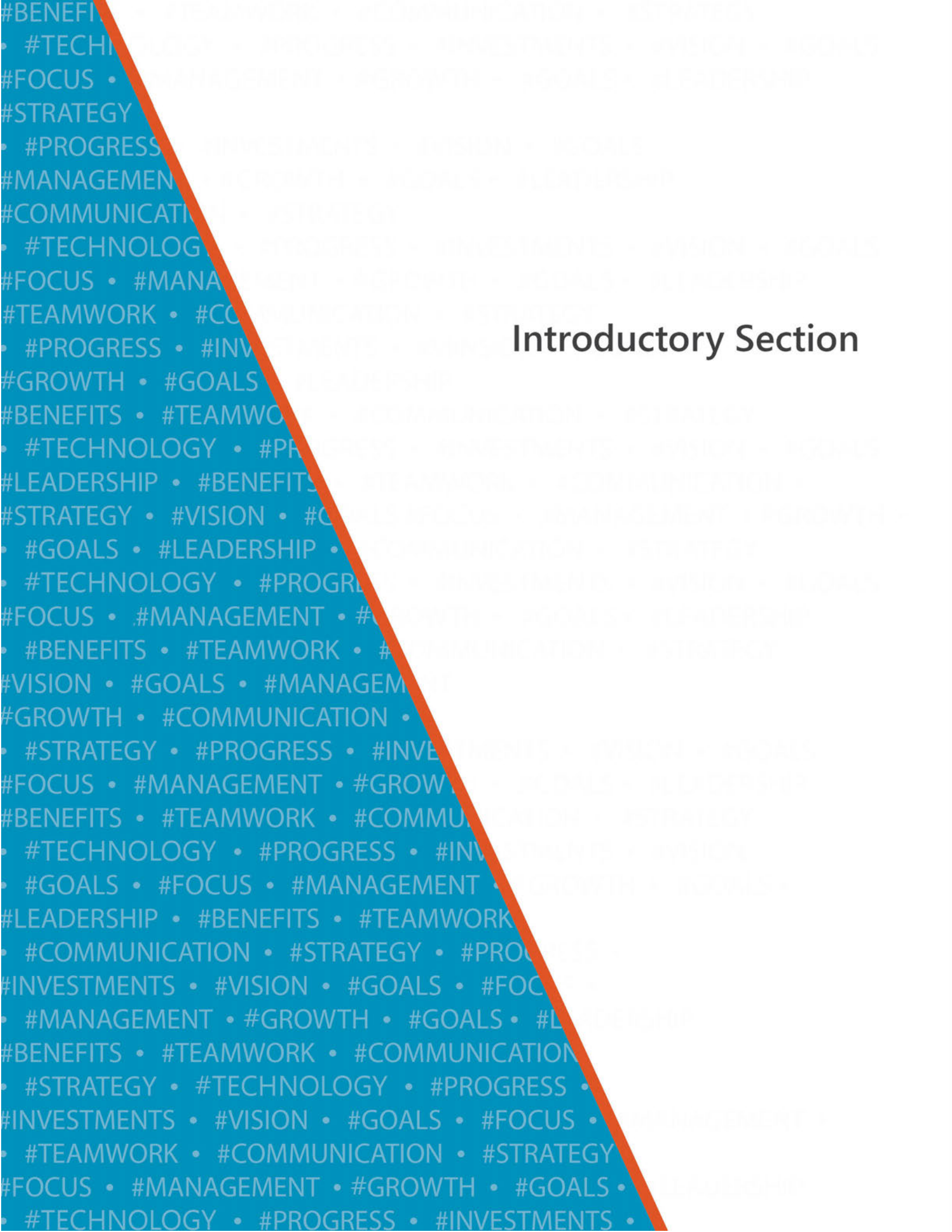
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MISSION
MOSERS exists to advance
the financial security of its members.

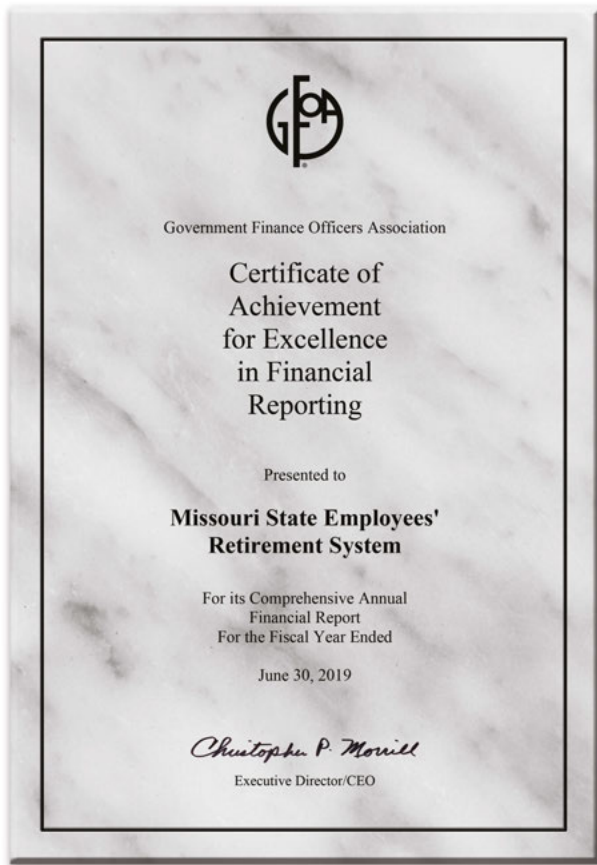
VISION
We endeavor to:
Exceed customer expectations
Educate stakeholders
Ensure sound investment practices
Encourage responsible funding of the plans,
all through a commitment to
Excellence Always.

VALUES
Quality
Respect
Integrity
Openness
Accountability



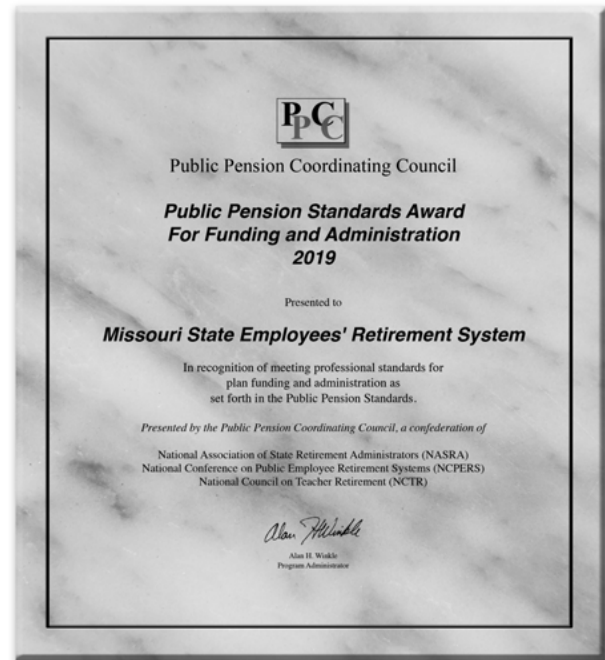
Introductory Section

Professional Awards



Certificate of Achievement for Excellence in Financial Reporting

MOSERS' *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2019, was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA). This was the 31st consecutive year that MOSERS has received this prestigious award. The Certificate of Achievement is the highest form of recognition for excellence in state and local government financial reporting. To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report (CAFR). The CAFR must satisfy generally accepted accounting principles, applicable legal requirements, and GFOA reporting standards.



Public Pension Standards Award

MOSERS received the Public Pension Standards Award from the Public Pension Coordinating Council (PPCC) in 2019, in recognition of meeting professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

Letter of Transmittal



PO Box 209, Jefferson City, MO 65102-0209
(573) 632-6100 • (800) 827-1063 | (573) 632-6103 (fax)
mosers@mosers.org (email)

Visit us at 907 Wildwood Drive or www.mosers.org

October 16, 2020

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, MO 65109

To the Board of Trustees and Members of MOSERS:

We are pleased to submit the *Comprehensive Annual Financial Report (CAFR)* of the Missouri State Employees' Retirement System (MOSERS) for the fiscal year ended June 30, 2020. During fiscal year 2020, the Board and staff worked extensively and collaboratively on solutions to ensure the fiscal sustainability of MOSERS for current and future members. I would like to thank our trustees for their dedication and commitment.

This CAFR is designed to provide an overview of the financial condition of MOSERS while also satisfying the reporting requirements of state law as stipulated in Sections 104.480, 104.1006, and 105.661 of the Revised Statutes of Missouri (RSMo), as amended. In addition to the *Introductory Section*, the MOSERS CAFR also contains a *Financial Section*, *Investment Section*, *Actuarial Section* and *Statistical Section*. This report is available on our website at www.mosers.org or in paper format upon request.

Profile of MOSERS

MOSERS is a cost-sharing multiple-employer defined benefit pension plan that was established in 1957 by state law for the purpose of providing retirement benefits to most state employees. MOSERS is governed by an 11-member Board of Trustees (the Board). As of June 30, 2020, MOSERS serves 46,417 active employees and pays 51,447 benefit recipients.

In addition to retirement benefits, MOSERS administers term life and long-term disability insurance for most state employees. MOSERS provides these benefits through insured defined benefit plans with The Standard Insurance Company (The Standard). We maintain membership information on those eligible and manage an internal service fund to track premiums collected from employers and payments made to The Standard.

MOSERS oversees the State of Missouri Deferred Compensation Plan (MO Deferred Comp). We administer this plan through a contractual relationship with ICMA-RC as the third-party record keeper. The plan provides various investment options to participants who retain responsibility for the investment of their individual accounts. MOSERS accounts for administrative costs through an internal service fund. MO Deferred Comp issues separate audited financial statements reflecting member investment activity.

Additionally, MOSERS oversees the Colleges and Universities Retirement Plan (CURP), a mandatory 401(a) defined contribution plan for education employees hired after June 30, 2002 by the regional colleges and universities that participate in MOSERS. The employer contribution rate is set at a flat 6% of pay with a 2% of pay employee contribution for employees hired after July 1, 2018. TIAA is responsible for third-party administration and for providing investment products to plan members.

Financial Statements

The financial statements in this report were prepared in accordance with accounting principles generally accepted in the United States. Management is responsible for the preparation of this report and the fairness and integrity of the information presented herein. Some amounts included in the financial statements and elsewhere may be based on estimates and judgments. Management is responsible for maintaining a system of adequate internal controls designed to provide reasonable, but not absolute, assurance that assets are properly safeguarded and that the financial statements are fairly stated. We believe that the internal controls currently in place support this purpose and that the financial statements and accompanying schedules are fairly presented in all material respects.

Eide Bailly, LLP, our independent external auditors, conducted an audit of the *Basic Financial Statements* in accordance with U.S. generally accepted auditing standards. This audit and the financial statements and related notes are presented in the *Financial Section* of this report.

Management's Discussion and Analysis in the *Financial Section* serves as an introduction to, and overview of, the financial statements. Additional financial information can be found in the financial statements and schedules included in the *Financial Section* of this report.

MOSERS is considered a component unit of the state of Missouri for financial reporting purposes and, as such, the financial statements in this report are also included in the *State of Missouri Comprehensive Annual Financial Report*.

Investments

The MOSERS investment portfolio generated a time-weighted return of 5.2%, net of fees, for fiscal year 2020. The total fund returned 3.2% more than would have been expected through passive investing in the benchmarks. Additional detailed information regarding MOSERS' investments, including policies and strategies, can be found in the *Investment Section* of this report.

Actuarial Information

The Board contracts with Cavanaugh Macdonald Consulting, LLC to perform an actuarial valuation of each plan every year. The valuations use economic and demographic assumptions adopted by the Board based upon experience studies conducted at least every five years. The most recent full experience study was adopted effective June 30, 2016.

During fiscal year 2020, the Board continued the reduction of the assumed rate of return on investments, as set forth in the Board's funding policy that reduced the assumed rate of return by 15 basis points per year over a three-year period. Effective June 30, 2020, the assumed rate of return is 6.95%. This is the final scheduled reduction per the funding policy. To allow for more predictable and stable contribution rates, MOSERS' funding is based upon the actuarial value of assets, which smooths asset gains and losses over a five-year period. As of June 30, 2020, the MSEP was 61.1% pre-funded and the Judicial Plan was 28.9% pre-funded on an actuarial basis. The MSEP experienced a decrease from the June 30, 2019 funded status of 62.9%. The Judicial Plan reflected an increase from the June 30, 2019 funded status of 27.9%.

The required certification letter from the Board's retained actuary is included at the beginning of the *Actuarial Section*. Additional information regarding the financial condition of the pension trust funds can be found in the *Actuarial Section* of this report.

Legislative Changes

- **House Bill 2005** – The General Assembly authorized the appropriation of \$476 million to MOSERS for fiscal year 2021, which will fully fund the Board certified employer contribution rates. This dollar amount was generated from the contribution rates calculated in the annual actuarial valuations performed by MOSERS' retained actuarial professionals and certified by the MOSERS Board of Trustees at its September 2019 meeting. On June 30, 2020, Governor Parson signed the fiscal year 2021 budget bills passed by the General Assembly, including the MOSERS appropriation contained in House Bill 2005.

Introductory Section

- **SS for SCS for HB 1467 & HB 1934** – This legislation covered several public pension plans. As it relates to MOSERS, the bill contained provisions to allow a retired MOSERS member to remove their former spouse as a survivor beneficiary upon divorce and receive an adjusted annuity amount under certain criteria. The bill also included a judicial buyout provision allowing an active judge to elect to receive a lump-sum payment equal to no less than sixty percent of the present value of the member's vested MSEP benefit.

Administrative Initiatives

MOSERS' staff was engaged in several administrative initiatives during the year. The more notable items are listed below.

- **Project Phoenix** – MOSERS' dedicated project team continues to work on the replacement of our pension administration system. MOSERS remains engaged with ICON Integration & Design for data profiling, analysis, and conditioning services, along with Linea Solutions for project oversight and change management services. Tegrit, utilizing their Arrivos platform, is proving to offer many opportunities for operational efficiency and further systems integration. We are approximately 31% complete at year end. Current projections indicate a late 2022 deployment.
- **Transition of New Portfolio** – The implementation of the modified portfolio began in fiscal year 2019, and as of June 30, 2020, approximately 58% of the transition has been completed. The estimated completion of the transition will be in the spring of 2021.
- **Implementation of MOSERS Strategic Plan** – The MOSERS Board of Trustees approved an organizational-wide strategic plan for a three-year cycle beginning July 1, 2019 through June 30, 2022. The end of fiscal year 2020 marks the completion of the first year of MOSERS' strategic plan. During the first year, nine initiatives were completed and nine additional initiatives are in progress and are expected to be completed by the end of the strategic planning cycle.
- **Review and rewrite of the MOSERS Board Rules** – A review of MOSERS Board Rules began in fiscal year 2020. The Strategic Planning and Governance Committee, along with staff, worked together to review the current Board Rules, discussed changes to the current rules, and began drafting additional Board Rules to be completed in fiscal year 2021.
- **Request for proposal (RFP) for Life and Long-Term Disability Insurance** – At the request of the Board, staff developed an RFP to solicit quotations from experienced insurance companies to provide MOSERS' members with group life and group voluntary life insurance and long-term disability insurance. MOSERS entered into a new five-year agreement with The Standard. Compared to the current agreement, employers, in total, will save approximately \$13.9 million in premiums over the five-year period.

Awards

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to MOSERS for its Comprehensive Annual Financial Report for the fiscal year ended June 30, 2019. This was the 31st consecutive year that MOSERS has received this prestigious award. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized Comprehensive Annual Financial Report. The report must satisfy generally accepted accounting principles and applicable legal requirements. A Certificate of Achievement is valid for a period of one year only. We believe that our current Comprehensive Annual Financial Report continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

MOSERS received the Public Pension Coordinating Council (PPCC), Public Pension Standards Award, in recognition of meeting the professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

In May 2020, the MOSERS website received the first place award from the National Association of Government Communicators (NAGC). The annual NAGC Blue Pencil and Gold Screen awards recognize excellence in government communication at all levels of government across the nation.

Introductory Section

The Missouri Deferred Compensation Plan, administered through MOSERS, was one of five defined contribution plans honored in November 2019 at the Pensions & Investments' West Coast Defined Contribution conference. The plan received an Excellence & Innovation Award for our recent efforts to enhance employee's retirement security by creatively addressing reoccurring participant questions using two of the plan's calculators, RetirementTrack and Grow Your Retirement Savings. The endeavor aimed to increase financial knowledge and influence employees to set goals and increase their contributions to a meaningful amount without overwhelming or inundating the average plan participant. To promote and help employees better understand the tools, staff developed a calculator walk-through detailing what to enter and where to click as well as fun videos with real life examples of why these tools are important and how easy they are to use to get the most sought after answers quickly.

The National Association of Government Defined Contribution Administrators, Inc. (NAGDCA) awarded the State of Missouri Deferred Compensation Plan the 2019 Leadership Recognition Award for the plan's transition of their external field representatives, also known as education specialists, to internal MOSERS employees. This award recognizes MOSERS for outstanding achievement in the Plan Design & Administration category. The Leadership Awards highlight plans who demonstrate excellence and innovation in retirement plan design, participant education, technology, and/or effective communication methods in government defined contribution plans.

These prestigious awards recognize MOSERS for financial and professional standards of excellence and reflect the dedication and competence of the MOSERS staff.

Conclusion

This report is a product of the combined efforts of the MOSERS staff and advisors functioning under the Board's leadership. It is intended to provide complete and reliable information that facilitates the management decision making process, serves as a means for determining compliance with legal requirements, and allows for the evaluation of responsible guardianship of System funds.

Copies of this report are provided to the Governor, State Auditor, and the Joint Committee on Public Employee Retirement of the General Assembly. Their support contributes to the success of MOSERS.

It is clear that one of the core concepts held at MOSERS in fiscal year 2020 was "teamwork." With the global pandemic event, MOSERS rallied our team members and technology to quickly move into a remote working environment. Together, we ensured ongoing service to our membership and stakeholders, including timely and accurate benefit payments each month. Together, we will continue to navigate these extraordinary times and strive to fulfill our mission of advancing the financial security of our members. We know our members rely on their benefits now and far into the future. The MOSERS staff will continue to "roll up our sleeves" and work hard for our members, the Board, and all our stakeholders as we move into fiscal year 2021. It is our honor to work for this great state and its citizens.

Respectfully submitted,



Ronda Stegmann
Executive Director



Lori Woratzeck
Deputy Executive Director/Chief Financial Officer

Letter from the Board Chairwoman



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mosers@mosers.org (email)

Visit us at 907 Wildwood Drive or www.mosers.org

October 16, 2020

Dear Members:

On behalf of the MOSERS Board of Trustees, I am pleased to present the *MOSERS Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2020. This report is one of MOSERS' finest examples of collaboration and an organization-wide team effort.

During the year ended June 30, 2020, the Board of Trustees continued its work on behalf of the MOSERS membership. While the global pandemic required MOSERS to modify the way we conduct business, our Board and staff members continued to work on key initiatives over the last fiscal year, some of which included:

- continuing the systematic reduction of the MOSERS investment rate of return assumption, consistent with the Board's funding policy;
- transitioning the Board-adopted investment portfolio while also successfully navigating significant volatility in investment markets;
- unveiling MOSERS' new award winning public website; and
- maintaining robust communication with our membership during the ever-changing landscape of 2020.

MOSERS was very fortunate to have Board continuity over fiscal year 2020 with no movement in Board membership. The steadfast composition did not mean that every Board member agreed on every item in all instances, but rather provided an increased opportunity for vibrant and robust deliberation relative to the decision-making process.

During my tenure as Board chairwoman, I have witnessed the substantial amount of time and service our trustees have dedicated to MOSERS. I am proud to lead this fine group of fiduciaries in acting in the best interest of our members. Together, with staff, we continue to further our core mission of advancing the financial security of our members.

As we look to fiscal year 2021 and the promise that it holds, I wish to thank the MOSERS staff for their ongoing dedication and professionalism. I also wish to express my appreciation to you, our members, for your commitment and service to this great state and its citizens. As a fellow state employee, I know many of the challenges that accompany public service. As a team, we will continue to navigate those challenges and celebrate our successes. I am honored to serve as one of your representatives on the MOSERS Board.

If you ever have any questions, please contact us at MOSERS, P.O. Box 209, Jefferson City, MO 65102, call us at (800) 827-1063, or visit our website at www.mosers.org.

Sincerely,

Crystal Wessing, Chairwoman
Board of Trustees

Board of Trustees



Crystal Wessing – Chairwoman
Elected Active Member



Gary Metzger – Vice Chairman
Governor Appointed Member

Representative Rusty Black
House Appointed Member

Gary Findlay
Elected Retired Member

Treasurer Scott Fitzpatrick
Ex-Officio Member



Jenny Jacobs
Elected Active Member



Joe Keifer
Governor Appointed Member



Commissioner Sarah Steelman
Office of Administration
Ex-Officio Member

Senator Wayne Wallingford
Senate Appointed Member

Senator Gina Walsh
Senate Appointed Member

Representative John Wiemann
House Appointed Member



Administrative Organization



Ronda Stegmann

Executive Director

- Cindy Rehmeier
Manager, Defined Contribution Plans
- Nicki Russell
Chief Auditor
- Candy Smith
Communications Manager & Public Information Officer
- Abby Spieler
General Counsel
- Lisa Verslues
Human Resources Officer



Lori Woratzeck

Deputy Executive Director – Operations/Chief Financial Officer

- Andrea Binkley
Chief Benefits Officer
- Stacy Gillmore
Chief Technology Officer
- Carson Lepper
Project Manager
- Jeremy Pond
Controller



Shannon Davidson

Deputy Executive Director – Investments/Chief Investment Officer

- Scott Hankins
Managing Director - Investment Risk & Operations
- Tyson Rehfeld
Managing Director - Markets & Strategy

About MOSERS



Purpose

MOSERS was established September 1, 1957, and is governed by laws of the State of Missouri.

MOSERS administers retirement, survivor, life insurance, and long-term disability benefits, as well as deferred compensation plan management to its members.

MOSERS administers benefits for most state employees, including general state employees, employees of 10 regional colleges and universities, members of the Missouri General Assembly, statewide elected officials, judges, administrative judges, and legal advisors. MOSERS is responsible for administering benefits as set forth in state law and bears a fiduciary obligation to the state employees who are its members.

Administration

State law provides that responsibility for the administration of MOSERS is vested in an 11-member Board of Trustees. The Board is comprised of the following:

- two members of the Senate appointed by the President Pro Tem of the Senate;
- two members of the House of Representatives appointed by the Speaker of the House;
- two members appointed by the Governor;
- the State Treasurer;
- the Commissioner of Administration; and
- three System members: two active members elected by the active and inactive-vested members, and one retiree elected by the retired members.

The day-to-day management of MOSERS is delegated to the executive director who is appointed by the Board. The executive director acts as advisor to the Board on all matters pertaining to the System, and employs the remaining staff needed to manage the System.

Organization

The executive director, deputy executive director, and chief investment officer are responsible for planning, organizing, and administering the operations of the System under the broad policy guidance and direction of the Board.

Executive

The executive staff provide administrative support by assisting the executive director and deputy executive director in the major legal, financial, operational, and oversight functions. Human resources, which includes oversight of general building maintenance, is also represented in this section. Responsible for business continuity preparation and planning, this section also coordinates activities and processes for the organization that facilitate strategic thinking, planning, and implementation.

MOSERS' office is divided into six administrative sections that perform specific functions for the System.

Accounting

The staff in this section are responsible for all financial records of the programs administered by MOSERS, including the preparation of financial and statistical reports and purchasing functions for MOSERS. This team works with the investment custodian, internal investment managers, Office of Administration accounting team, state of Missouri employers, life insurance companies, actuaries, banks, and the IRS. They are also responsible for all billing, payment processing, and balancing of member and employer contributions.

Benefits

Staff in the benefits section are responsible for all member data, benefit verifications and inceptions, as well as contact with members regarding the benefit programs administered by MOSERS (retirement, life insurance, and long-term disability insurance). This team also conducts educational seminars in 16-plus cities around the state each year and hosts webinars to inform members about their MOSERS benefits.

Communications

Communications staff are responsible for presenting information in clear and concise ways to facilitate effective, well-informed decision-making, planning, and action. They produce materials for members regarding the benefits administered by MOSERS including publications such as newsletters, handbooks, and forms and brochures. Additionally, this team works in conjunction with information technology staff on electronic materials and tools such as the public, Board, secure member and internal websites, social media, and member emails.

Information Technology

The information technology section provides computer and technical design support for MOSERS' administrative activities. This team is responsible for developing and maintaining the automated systems used to administer benefits. They are also responsible for the document imaging system, network, unified communication system, and personal computers.

Information technology and communications staff are jointly responsible for MOSERS' websites.

Investments

The investments staff provides investment management and consulting services to the System. Primary functions include managing assets internally, selecting external managers for portions of the portfolio, researching and implementing portfolio allocation shifts and rebalancing, providing technical advice, serving as a liaison to the investment community, and informing and advising the Board and executive director on financial, economic, and political developments which may affect the System. This team works closely with external investment consultants, legal counsel, and the executive director.

Project Management

This team is responsible for implementing a new pension administration system to replace MOSERS' legacy system. This includes business process mapping and analysis to identify efficiencies and mitigate risk, as well as working closely with multiple external vendors focused on data preparation and system design.

Outside Professional Services

Actuary

- Cavanaugh Macdonald Consulting, LLC

Auditor

- Eide Bailly, LLP

Governmental Consultant

- Gamble & Schlemeier, Ltd.

Legal Counsel

- Ice Miller, LLP
- Purrington Moody Weil, LLP
- Thompson Coburn, LLP

Information Technology Consultants

- Avtex
- CherryRoad Technologies
- Indelible, LLC
- Huber & Associates
- Norlem Technology Consulting
- SHI International Corp

Pension System Administration Consultants

- ICON Integration and Design, Inc.
- Linea Solutions
- Tegrit

Risk Management Consultant

- Charlesworth & Associates, LLC

Third-Party Administrators

- ICMA-RC
Deferred Compensation Plan
- The Standard Insurance Company
Life Insurance & Long-Term Disability Insurance
- TIAA
Colleges & Universities Retirement Plan

Investment Management Consultants

- Blackstone Alternative Asset Management, LP
Specialty Consultant - Hedge Funds
- Meketa Investment Group
Specialty Consultant - Public Markets
- NEPC, LLC
Specialty Consultant - Private Markets
- Verus Advisory, Inc.
Board Investment Consultant

Master Custodian

- Bank of New York Mellon

Securities Lending Advisor

- Deutsche Bank, AG New York Branch

Investment Advisors

- Actis Emerging Markets, LLP
- Alinda Capital Partners, LLC
- Alliance Bernstein Defined
Contribution Investments
- AQR Capital Management, LLC
- Axiom Asia Private Capital
- Axxon Management, LP
- Bayview Asset Management, LLC
- BlackRock Financial Management, Inc.
- Blackstone Alternative Asset Management, LP
- Blackstone Real Estate Advisors
- Blakeney Management, Ltd.
- Bridgewater Associates, LP
- CarVal Investors, LLC
- Catalyst Capital Group, Inc.
- CBRE Global Investors, Inc.
- Cornwall Capital Management, LP
- DRI Capital, Inc.
- EIG Global Energy Partners, LLC
- Elliott International Capital Advisors, Inc.
- Eton Park Capital Management, LP
- ExodusPoint Capital Management, LP
- Farallon Capital Management, LLC
- Gaoling Fund, LP
- Glenview Capital Management, LLC
- Global Forest Partners, LP
- Harvest Fund Advisors, LLC
- HBK Investments, LP
- JLL Partners, LP
- Kennedy Capital Management, Inc.

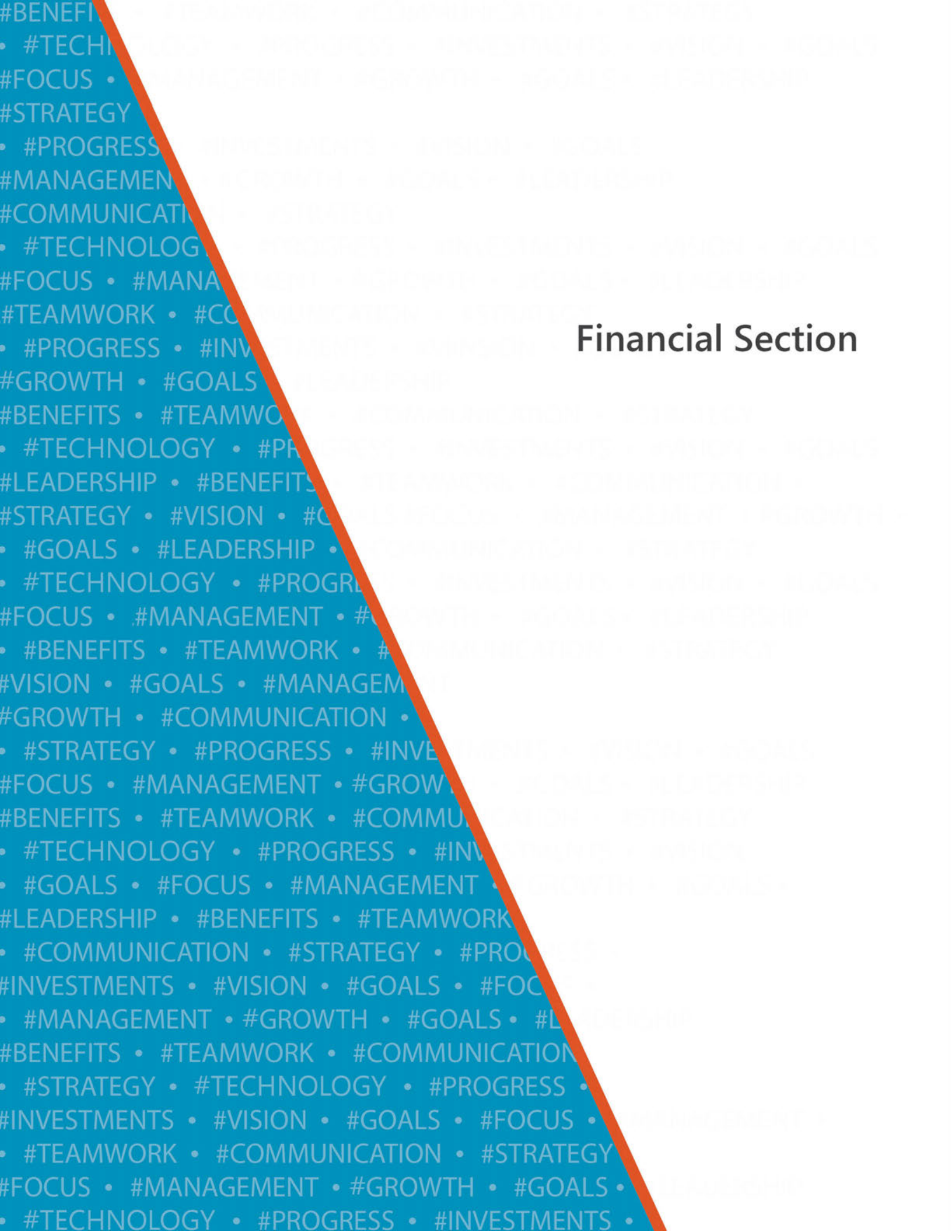
Outside Professional Services continued on page 16

Introductory Section

Outside Professional Services continued from page 15

- King Street Capital Management, LP
- Lasalle Investment Management, Inc.
- Linden Capital Partners, LLC
- Mast Capital Management, LLC
- Merit Energy Company
- MHR Institutional Partners, LLC
- Millennium Technology Value Partners, LP
- Moon Capital Management, LP
- NISA Investment Advisors, LLC
- Oaktree Capital Management, LP
- Perry Partners, LLC
- Pharo Global Advisors, Ltd.
- Portfolio Advisors, LLC
- Resource Management Service, LLC
- Silchester International Investors
- Silver Creek Capital Management, LLC
- Silver Lake Partners, LP
- SIR Capital Management, LP
- Siris Capital Group, LLC
- State Street Global Advisors
- StepStone Group
- Stone Harbor Investment Partners, LP
- Visium Asset Management, LP
- Voleon Capital Management, LP
- Voya Financial

The Schedule of Brokerage Activity can be found on page 82. Investment management, custodial and consulting fees can be found in the Schedule of Investment Manager Fees on page 87. Additional information on investment managers can also be found in the Investment Section of this report.



Financial Section



Independent Auditor's Report

To the Board of Trustees
Missouri State Employees' Retirement System
Jefferson City, Missouri

Report on Financial Statements

We have audited the accompanying financial statements of the pension and other trust funds and aggregate remaining fund information of the Missouri State Employees' Retirement System (MOSERS), a pension (and other employee benefit) trust fund of the state of Missouri, which comprise the statements of fiduciary net position as of June 30, 2020, and the related statements of changes in fiduciary net position, for the year then ended, and the related notes to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

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Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the pension and other trust funds and aggregate remaining fund information of MOSERS as of June 30, 2020, and the respective changes in financial position and, where applicable, cash flows thereof for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the *Management's Discussion and Analysis* and *Required Supplementary Information* on pages 19-25 and 56-63 be presented to supplement the *Basic Financial Statements*. Such information, although not a part of the *Basic Financial Statements*, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the *Basic Financial Statements* in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the *Required Supplementary Information* in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the *Basic Financial Statements*, and other knowledge we obtained during our audit of the *Basic Financial Statements*. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Information

Our audit was conducted for the purpose of forming an opinion on the financial statements that collectively comprise MOSERS' *Basic Financial Statements* as a whole. The *Introductory, Investment, Actuarial, Statistical Sections* and *Additional Supplemental Schedules* as listed in the table of contents are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional supplementary information accompanying financial information listed as *Additional Supplemental Schedules* in the table of contents are the responsibility of management and were derived from and relate directly to the underlying accounting and other records used to prepare the *Basic Financial Statements*. Such information has been subjected to the auditing procedures applied in the audit of the *Basic Financial Statements* and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the *Basic Financial Statements* or to the *Basic Financial Statements* themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the accompanying financial information listed as supplemental schedules are fairly stated, in all material respects, in relation to the *Basic Financial Statements* as a whole.

The *Introductory, Investment, Actuarial, Statistical Sections* have not been subjected to the auditing procedures applied in the audit of the *Basic Financial Statements* and, accordingly, we do not express an opinion or provide any assurance on them.



Boise, Idaho

October 16, 2020

Management's Discussion and Analysis

This discussion and analysis of the Missouri State Employees' Retirement System (MOSERS) provides an overview of the retirement system's financial activities for the fiscal year ended June 30, 2020. It is intended to be used in conjunction with the *Transmittal Letter* beginning on page 6 and *Basic Financial Statements and Notes to the Basic Financial Statements*, beginning on page 26 of this report.

Using This Financial Report

This Comprehensive Annual Financial Report (CAFR) reflects the activities of MOSERS as reported in the *Statements of Fiduciary Net Position* and the *Statements of Changes in Fiduciary Net Position*, which begin on page 26. These statements are prepared in conformity with generally accepted accounting principles. The *Notes to the Basic Financial Statements* are an integral part of the financial statements and include additional information not readily evident in the statements themselves. The *Required Supplementary Information (RSI)* and *Additional Financial Information* following the *Notes to the Basic Financial Statements* provide historical information and additional details considered useful in evaluating the condition of the plan.

See the *Actuarial Section* of this report for a detailed discussion of the actuarial value of assets and liabilities and the funded status of the plans.

The *Basic Financial Statements* contained in this section of the CAFR consist of:

- The *Statements of Fiduciary Net Position* report the pension trust funds' assets, deferred outflows, liabilities, deferred inflows, and resulting net position, where total assets plus deferred outflows less current liabilities and deferred inflows equal net position held in trust for future pension benefits available at the end of the fiscal year. It is a snapshot of the financial position of the pension trust funds at that specific point in time.
- The *Statements of Changes in Fiduciary Net Position* summarize the pension trust funds' financial transactions that have occurred during the fiscal year where additions less deductions equal the change in net position. It supports the change that has occurred to the prior year's net position on the *Statements of Fiduciary Net Position*.
- The *Statement of Net Position* of the internal service funds is similar to the *Statements of Fiduciary Net Position* in that it is also a snapshot of the financial position of the internal service funds where net position plus liabilities equals assets.
- The *Statement of Revenues, Expenses, and Changes in Net Position* of the internal service funds is similar to the *Statements of Changes in Fiduciary Net Position* in that it also reports a summary of the financial activity that occurred over the period of the fiscal year where revenues less expenses equals net revenue and supports the change to the prior year's net position.
- The *Statement of Cash Flows* of the internal service funds reports the cash activity of the fiscal year of the internal service funds. The focus of this statement is on the sources and uses of cash within the internal service funds.
- The *Notes to the Basic Financial Statements* are an integral part of the above financial statements and include additional information not readily evident in the statements themselves.

Funding Analysis

The unfunded actuarial accrued liability (UAAL) for the Missouri State Employees' Plan (MSEP) increased by \$0.3 billion from \$5.2 billion at June 30, 2019, to \$5.5 billion at June 30, 2020, with a corresponding decrease in funded percentage from 62.9% to 61.1%. The UAAL for the Judicial Plan decreased by \$1.2 million from \$445.3 million at June 30, 2019, to \$444.1 million at June 30, 2020, with an increase in funded percentage from 27.9% to 28.9%. The assumed rate of investment return was reduced from 7.10% to 6.95% effective July for both the MSEP and the Judicial Plan, which has a negative impact on the funded status and UAAL. The Judicial Plan had a positive change in net position this year because contributions and investment earnings exceeded benefit payments. MSEP, on the other hand, experienced a decrease in fund net position because benefit payments exceeded contributions and investment earnings.

To determine the UAAL of the plans for setting contribution rates, MOSERS uses a smoothed value of assets which recognizes market gains and losses on the actuarial value of assets over a closed five-year period. For GASB 67 financial statement reporting purposes, the market value actuarial method is used to determine the net pension liability. The net pension liability of the MSEP Fund at June 30, 2020, was \$6.3 billion, an increase from \$6.0 billion as of June 30, 2019. The net pension liability of the Judicial Plan Fund at June 30, 2020, was \$0.5 billion, relatively consistent with June 30, 2019. The fund net position as a percentage of total pension liability decreased from 56.7% at June 30, 2019, to 55.5% at June 30, 2020, for the MSEP Fund and increased from 25.6% to 26.8% for the Judicial Plan Fund.

Financial Reporting Highlights

- MOSERS' net position restricted for pensions increased by \$3.3 million during the year ended June 30, 2020. On June 30, 2020, total plan assets (including net capital assets of \$7.5 million) were \$11.9 billion, exceeding total liabilities of \$3.8 billion, resulting in a net position held in trust for pension benefits of \$8.1 billion.
- Covered payroll, from which both employee and employer contributions are calculated, increased \$56.6 million for the MSEP and increased \$0.8 million for the Judicial Plan, or 2.9% and 1.3% respectively, over the last fiscal year.
- Total contributions during fiscal year 2020 were \$516.6 million, up from \$469.1 million in fiscal year 2019. Based upon the June 30, 2018 actuarial valuation, the fiscal year 2020 actuarial required employer contribution rates were determined to be 21.77% for the MSEP and 63.80% for the Judicial Plan.
- Investment income, net of related fees, was \$408.5 million. Investments of the pension trust funds generated a time-weighted rate of return of 5.2%, net of fees, for the year, up from the prior year's return of 4.3%. The money-weighted rate of return, net of investment expenses for fiscal year 2020, was 5.2%.
- Investment manager fees were \$35.6 million in fiscal year 2020, down from \$40.7 million in fiscal year 2019. The lower manager fees were driven by investment staff reducing exposure to higher fee managers. Incentive fees in fiscal year 2020 were \$4.4 million, which was an increase of \$8.2 million, over the 2019 gain on a net reversal of incentive fees of \$(3.8) million.
- Member benefit payments were \$904.4 million in fiscal year 2020, up \$24.0 million from \$880.4 million in fiscal year 2019. Service transfers and refunds totaled \$9.0 million in fiscal year 2020, relatively consistent with fiscal year 2019.
- Administrative expenses totaled \$8.5 million in fiscal year 2020, compared to \$9.3 million in fiscal year 2019. MOSERS experienced a decrease in administrative expense due to a variety of factors, including less professional fees, depreciation and other expenses. In addition to the \$8.5 million in administrative expenses, MOSERS capitalized a total of \$2.7 million in project costs incurred during the year, which includes staff payroll costs of \$0.8 million. These capitalized software development project costs will be amortized over the estimated useful life the new pension administration system.
- The fiscal impact of MOSERS' response to the COVID-19 pandemic during fiscal year 2020 was not significant to MOSERS' overall financial results. MOSERS spent approximately \$61,000 on expenses and capital assets related to the COVID-19 pandemic in fiscal year 2020. These expenses included air filtration equipment, equipment to facilitate working remotely, and supplies. These costs were partially offset by savings associated with reduced facility usage and travel savings. MOSERS estimates that it experienced a net increase in costs of approximately \$25,000 during fiscal year 2020 to maintain business continuity and protect the health and safety of its members and employees.

The schedules on pages 21-25 present summary comparative financial statements of the pension trust funds and internal service funds for fiscal year 2020 and fiscal year 2019. For each schedule, there is a brief summary of the significant changes noted in that schedule.

Requests for Information

This financial report is designed to provide a general overview of the System's finances for all those interested in the System. Questions concerning any of the information provided in this report or requests for additional information should be addressed to MOSERS at P.O. Box 209, Jefferson City, MO 65102 or by email at FOLArequest@mosers.org.

Pension Trust Funds

Summary Comparative Statements of Fiduciary Net Position

	As of June 30, 2020	As of June 30, 2019	Amount of Change	Percentage Change
Assets				
Cash and short-term instruments	\$ 4,903,993	\$ 263,269,711	\$ (258,365,718)	(98.14)%
Receivables	395,470,195	346,692,311	\$ 48,777,884	14.07
Investments	11,463,190,890	11,596,260,814	\$ (133,069,924)	(1.15)
Capital assets, net of accumulated depreciation	7,530,526	4,887,103	\$ 2,643,423	54.09
Other assets	17,717	75,750	\$ (58,033)	(76.61)
Total assets	11,871,113,321	12,211,185,689	\$ (340,072,368)	(2.78)
Deferred outflow of resources	899,535	743,472	\$ 156,063	20.99
Liabilities				
Administrative and other payables	5,240,423	1,666,007	\$ 3,574,416	214.55
Investment activities payable	342,104,677	202,258,228	\$ 139,846,449	69.14
Obligations under repurchase agreements	3,434,907,955	3,921,700,618	\$ (486,792,663)	(12.41)
MOSERS investment portfolio liability (MIP)	3,481,031	3,470,132	\$ 10,899	0.31
Net OPEB liability	7,695,160	7,666,038	\$ 29,122	0.38
Total liabilities	3,793,429,246	4,136,761,023	\$ (343,331,777)	(8.30)
Deferred inflow of resources	465,011	369,869	\$ 95,142	25.72
Net positions restricted for pensions	\$ 8,078,118,599	\$ 8,074,798,269	\$ 3,320,330	0.04

The largest components of the net position of the pension trust funds are the cash and short-term instruments, receivables, and investments, less obligations under repurchase agreements (which represents the amount of money MOSERS is borrowing to lever the portfolio).

MOSERS' net position restricted for pension benefits slightly increased by \$3.3 million, to end at \$8.078 billion in fiscal year 2020. Net position did not change significantly from last year because contributions and investments revenue only slightly exceeded benefit payments and administrative expenses.

The change in cash and receivables is primarily related to the timing of investment activity, including the timing of investment transactions that had not settled by June 30.

Administrative and other payables increased and investment activities payable increased as a result of the timing of normal business and investing activity.

Obligations under repurchase agreements decreased because MOSERS is transitioning to a new portfolio that is using less leverage.

Detailed information regarding MOSERS' investment portfolio is included in the *Investment Section* of this report.

Pension Trust Funds

Summary Comparative Statements of Changes in Fiduciary Net Position

	Year Ended June 30, 2020	Year Ended June 30, 2019	Amount of Change	Percentage Change
Additions				
Contributions	\$ 516,580,486	\$ 469,065,954	\$ 47,514,532	10.13%
Net investment income	408,517,012	319,211,119	89,305,893	27.98
Miscellaneous income	133,952	500,793	(366,841)	(73.25)
Total additions	925,231,450	788,777,866	136,453,584	17.30
Deductions				
Benefit payments	904,429,822	880,399,391	24,030,431	2.73
Service transfers and refunds	9,008,684	9,015,238	(6,554)	(0.07)
Administrative expenses	8,472,614	9,272,967	(800,353)	(8.63)
Total deductions	921,911,120	898,687,596	23,223,524	2.58
Net increase (decrease)	3,320,330	(109,909,730)	113,230,060	103.02
Net position beginning of year	8,074,798,269	8,184,707,999	(109,909,730)	(1.34)
Net positions restricted for pensions	\$ 8,078,118,599	\$ 8,074,798,269	\$ 3,320,330	0.04

The 10.13% increase in contributions received is primarily attributable to an increase in contribution rates from 20.21% in fiscal year 2019 to 21.77% in fiscal year 2020, and an increase in the growing percentage of MSEP 2011 tier members who contribute 4% of pay.

The increase in net investment income from fiscal year 2019 to fiscal year 2020 is attributable to market performance. The fund returned 5.2% in fiscal year 2020 compared to 4.3% in fiscal year 2019. The *Investment Section* of this report contains additional information regarding investments activity.

The total benefit payments increased as a result of an increase in the number of benefit recipients plus cost-of-living adjustments provided to existing benefit recipients. Detailed schedules of these changes can be viewed on pages 116-117 of the *Actuarial Section* of this report.

MOSERS experienced a decrease in administrative expense due to a variety of factors, including less professional fees, depreciation and other expenses. In addition to the \$8.5 million in administrative expenses, MOSERS capitalized a total of \$2.7 million in project costs incurred during the year, which includes staff payroll costs of \$0.8 million.

Internal Service Funds

Summary Comparative Statements of Net Position

	As of June 30, 2020	As of June 30, 2019	Amount of Change	Percentage Change
Assets				
Premiums receivable	\$ 1,002,946	\$ 957,787	\$ 45,159	4.71%
Short-term instruments	5,592,351	6,919,257	(1,326,906)	(19.18)
Capital assets, net of accumulated depreciation	0	6,947	(6,947)	(100.00)
Total assets	6,595,297	7,883,991	(1,288,694)	(16.35)
Deferred outflow of resources	13,340	0	13,340	100.00
Liabilities				
Premiums payable	2,462,189	5,170,302	(2,708,113)	(52.38)
Deferred revenue	1,879,564	2,008,209	(128,645)	(6.41)
Other liabilities	1,565,665	239,771	1,325,894	552.98
Total liabilities	5,907,418	7,418,282	(1,510,864)	(20.37)
Deferred inflow of resources	8,133	0	8,133	100.00
Unrestricted net position	\$ 693,086	\$ 465,709	\$ 227,377	48.82

The slight increase in premiums receivable is attributable to normal fluctuations in the month-end balance of life and long-term disability insurance premiums receivable during the year, which are dependent on the number of members participating and amount of their coverage.

The decrease in short-term instruments and premiums payable is attributable to the timing of remitting premiums received to the vendor that underwrites the insurance activities.

The increase in other liabilities is the result of an allocation of expenses from pension trust funds to the internal service fund, but not yet paid for by the fund.

Long-term disability premiums are paid by the state on all active employees based upon a blended rate estimated by MOSERS. The Standard is paid the actual rate based upon active employees that are not yet eligible to retire. The deferred revenue balance represents amounts paid by the state in excess of that needed to pay the premiums. The reduction in deferred revenue during fiscal year 2020 reflects a lower amount received than was needed to pay the premiums. This amount reduced the deferred revenue balance. This balance is estimated to continue to decrease in the future. The Standard is the insurance company that underwrites the life insurance and long-term disability programs.

Internal Service Funds

Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position

	Year Ended June 30, 2020	Year Ended June 30, 2019	Amount of Change	Percentage Change
Operating revenues				
Premium receipts	\$ 32,582,558	\$ 31,342,778	\$ 1,239,780	3.96%
Deferred compensation receipts	1,315,076	1,215,000	100,076	8.24
Miscellaneous income	484,075	494,722	(10,647)	(2.15)
Total operating revenues	34,381,709	33,052,500	1,329,209	4.02
Operating expenses				
Premium disbursements	32,549,567	31,325,399	1,224,168	3.91
Premium refunds	32,991	17,379	15,612	89.83
Administrative expenses	1,625,602	1,649,467	(23,865)	(1.45)
Total operating expenses	34,208,160	32,992,245	1,215,915	3.69
Net operating income (loss)	173,549	60,255	113,294	188.02
Nonoperating revenues				
Gain on sale of capital assets	0	145	(145)	(100.00)
Investment income	53,828	127,197	(73,369)	(57.68)
Total nonoperating revenues	53,828	127,342	(73,514)	(57.73)
Net revenues over (under) expenses	227,377	187,597	39,780	21.21
Net position beginning of year	465,709	278,112	187,597	67.45
Net position end of year	\$ 693,086	\$ 465,709	\$ 227,377	48.82

Premium receipts and disbursements were slightly higher this year due to a slight increase in covered payroll and also an increase in enrollments in optional insurance products.

Deferred compensation receipts were greater this year due to greater cash receipts from the State of Missouri Deferred Compensation Plan's third-party record keeper, which collects deferred compensation contributions directly from employers.

Internal Service Funds

Summary Comparative Statements of Cash Flows

	Year Ended June 30, 2020	Year Ended June 30, 2019	Amount of Change	Percentage Change
Cash flows from (used for) operating activities	\$ (1,380,734)	\$ 2,497,662	\$ (3,878,396)	(155.28)%
Cash flows from noncapital financing activities	0	145	(145)	(100.00)
Cash flows from (used for) investing activities	1,380,734	(2,497,807)	3,878,541	155.28
Net change in cash	0	0	0	
Cash balances beginning of year	0	0	0	
Cash balances end of year	\$ 0	\$ 0	\$ 0	

The decrease in cash flows from operating activities, and the corresponding increase in cash flows from investing activities is due to timing differences between the receipt of premiums from employers and participants, and the remittance of those funds to The Standard. The Standard is the insurance company that underwrites the life insurance and long-term disability programs.

Pension Trust Funds

Statements of Fiduciary Net Position

As of June 30, 2020

	MSEP	Judicial Plan	Total
Assets			
Cash and short-term instruments	\$ 4,806,082	\$ 97,911	\$ 4,903,993
Receivables			
Contributions	18,481,427	1,690,103	20,171,530
Investment income	206,474,889	4,206,367	210,681,256
Investment sales	156,500,854	3,188,281	159,689,135
Due from other funds	0	4,729,158	4,729,158
Other receivables	199,116	0	199,116
Total receivables	381,656,286	13,813,909	395,470,195
Investments and derivatives			
Investments - custodial bank cash and currency	58,476,141	1,191,293	59,667,434
Investments - treasuries	4,734,478,097	96,452,171	4,830,930,268
Investments - fixed income	1,145,866,749	23,343,932	1,169,210,681
Investments - equities	893,300,338	18,198,576	911,498,914
Investments - real estate investments	397,684,384	8,101,742	405,786,126
Investments - alternatives and limited partnerships	1,720,855,915	35,057,780	1,755,913,695
Investments - derivative instruments	(2,429,484)	(49,494)	(2,478,978)
Investments - cash equivalents	2,286,089,859	46,572,891	2,332,662,750
Total investments and derivatives	11,234,321,999	228,868,891	11,463,190,890
Capital assets, net of accumulated depreciation	7,530,526	0	7,530,526
Prepaid and other expenses	17,717	0	17,717
Total assets	11,628,332,610	242,780,711	11,871,113,321
Deferred outflow of resources	898,164	1,371	899,535
Liabilities			
Administrative and benefit expense payables	1,257,253	6,758	1,264,011
Employee vacation and overtime liability	737,372	6,537	743,909
Payable for investments purchased	237,813,634	4,844,809	242,658,443
Management and incentive fees payable	11,495,083	234,181	11,729,264
Investment activities payable	85,965,653	1,751,317	87,716,970
Obligations under repurchase agreements	3,366,328,134	68,579,821	3,434,907,955
MOSERS investment portfolio liability (MIP)	3,411,530	69,501	3,481,031
Due to other funds	3,232,503	0	3,232,503
Net OPEB liability	7,694,904	256	7,695,160
Total liabilities	3,717,936,066	75,493,180	3,793,429,246
Deferred inflow of resources	464,175	836	465,011
Net position restricted for pensions	\$ 7,910,830,533	\$ 167,288,066	\$ 8,078,118,599

 See accompanying *Notes to the Basic Financial Statements*.

Pension Trust Funds

Statements of Changes in Fiduciary Net Position

For the Year Ended June 30, 2020

	MSEP	Judicial Plan	Total
Additions			
Contributions			
Employer contributions	\$ 436,895,653	\$ 39,174,515	\$ 476,070,168
Member contributions	35,141,960	1,314,570	36,456,530
Member purchases of service credit	1,388,992	0	1,388,992
Service transfer contributions	2,664,796	0	2,664,796
Total contributions	476,091,401	40,489,085	516,580,486
Investment activity			
Investing activity income:			
Net appreciation in fair value of investments	(312,028,302)	(6,356,731)	(318,385,033)
Interest	13,546,075	275,965	13,822,040
Dividends	174,382,347	3,552,443	177,934,790
Other	253,058	5,156	258,214
Total investing activity income	(123,846,822)	(2,523,167)	(126,369,989)
Investing activity expenses:			
Management and incentives fees	(45,241,017)	(921,664)	(46,162,681)
Custody and other fees	(598,509)	(12,193)	(610,702)
Consultant fees	(582,049)	(5,160)	(587,209)
Internal investment activity expenses	(4,032,395)	(82,149)	(4,114,544)
Total investing activity expenses	(50,453,970)	(1,021,166)	(51,475,136)
Reverse repurchase agreement activity:			
Income from assets in reverse repurchase funds	649,454,973	13,230,887	662,685,860
Interest expense from reverse repurchase agreements	(74,799,878)	(1,523,845)	(76,323,723)
Total net income from reverse repurchase agreement activity	574,655,095	11,707,042	586,362,137
Total net investment income	400,354,303	8,162,709	408,517,012
Miscellaneous income	133,952	0	133,952
Total additions	876,579,656	48,651,794	925,231,450
Deductions			
Benefit payments	800,896,058	39,622,268	840,518,326
BackDROP payments	63,666,199	0	63,666,199
Buyout and lump-sum payments	245,297	0	245,297
Service transfer payments	3,784,195	0	3,784,195
Contribution refunds	5,224,489	0	5,224,489
Administrative expenses	8,398,164	74,450	8,472,614
Total deductions	882,214,402	39,696,718	921,911,120
Net (decrease) increase in net position	(5,634,746)	8,955,076	3,320,330
Net position restricted for pensions:			
Beginning of year	7,916,465,279	158,332,990	8,074,798,269
End of year	\$ 7,910,830,533	\$ 167,288,066	\$ 8,078,118,599

See accompanying Notes to the Basic Financial Statements.

Internal Service Funds

Statement of Net Position

As of June 30, 2020

	Total
Assets	
<i>Current assets</i>	
Premiums receivable	\$ 1,002,946
Short-term instruments	5,592,351
Total current assets	6,595,297
Total assets	6,595,297
Deferred outflows of resources	13,340
Liabilities	
<i>Current liabilities</i>	
Premiums payable	2,462,189
Due to other funds	1,496,655
Other liabilities	66,521
Total current liabilities	4,025,365
Deferred revenue	1,879,564
Net OPEB liability	2,489
Total liabilities	5,907,418
Deferred inflow of resources	8,133
Net Position	
Unrestricted net position	693,086
Total net position	\$ 693,086

See accompanying *Notes to the Basic Financial Statements*.

Internal Service Funds

Statement of Revenues, Expenses, and Changes in Net Position

For the Year Ended June 30, 2020

	Total
Operating revenues	
Premium receipts	\$ 32,582,558
Deferred compensation receipts	1,315,076
Miscellaneous income	484,075
Total operating revenues	<u>34,381,709</u>
Operating expenses	
Premium disbursements	32,549,567
Premium refunds	32,991
Administrative expenses	1,625,602
Total operating expenses	<u>34,208,160</u>
Net operating income	173,549
Nonoperating revenues	
Interest income	53,828
Total nonoperating revenues	<u>53,828</u>
Net revenues over expenses	227,377
Net position beginning of year	465,709
Net position end of year	<u><u>\$ 693,086</u></u>

See accompanying *Notes to the Basic Financial Statements*.

Internal Service Funds

Statement of Cash Flows

For the Year Ended June 30, 2020

	Total
Cash flows from operating activities	
Cash received from employers and members	\$ 35,474,501
Payments to outside carriers	(35,261,818)
Refund of premiums to members	(32,991)
Cash payments to employees for services	(1,041,529)
Cash payments to other suppliers of goods and services	(518,897)
Net cash (used) provided by operating activities	<u>(1,380,734)</u>
Cash flows from investing activities	
Purchase of short-term instruments	(1,956,190,851)
Proceeds from sale and maturities of short-term instruments	1,957,517,757
Cash received from investing activities	53,828
Net cash provided (used) by investing activities	<u>1,380,734</u>
Net increase (decrease) in cash	0
Cash balances beginning of year	0
Cash balances end of year	<u>\$ 0</u>
Reconciliation of net operating income to net cash provided by operating activities	
Net operating income	\$ 173,549
<i>Adjustments to reconcile net operating income to net cash provided (used) by operating activities</i>	
Depreciation expense	6,947
Change in assets and liabilities:	
(Increase) in operational accounts receivable	(45,159)
Deferred outflows of resources	(13,340)
Increase (decrease) in operational liabilities	(1,513,353)
Net OPEB liability	2,489
Deferred inflows of resources	8,133
Total adjustments	<u>(1,554,283)</u>
Net cash (used) provided by operating activities	<u>\$ (1,380,734)</u>

See accompanying *Notes to the Basic Financial Statements*.

Notes to the Basic Financial Statements

Note 1 – Plan Descriptions and Contribution Information

The MSEP and the Judicial Plan are pension plans covering substantially all state of Missouri employees and judges.

Missouri State Employees' Plan (MSEP)

The MSEP is a cost-sharing multiple-employer, defined benefit public employee retirement plan with two benefit structures known as the MSEP (closed plan) and MSEP 2000 (which includes the MSEP 2011 tier), which are administered by the Missouri State Employees' Retirement System (MOSERS) in accordance with Sections 104.010 and 104.312 to 104.1215 of the Revised Statutes of Missouri (RSMo). As established under Section 104.320, RSMo, MOSERS is a body corporate and an instrumentality of the state. In the System are vested the powers and duties specified in Sections 104.010 and 104.312 to 104.1215, RSMo, and such other powers as may be necessary or proper to enable it, its officers, employees, and agents to carry out fully and effectively all the purposes of Sections 104.010 and 104.312 to 104.1215, RSMo.

Responsibility for the operation and administration of the System is vested in the 11-member MOSERS Board of Trustees (the Board) as defined by state law. Due to the nature of MOSERS' reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the MSEP is considered a pension trust fund of the state of Missouri, and is included in the state's financial reports as a pension trust fund.

The Board intends to follow a financing pattern which computes and requires contribution amounts which, expressed as a percent of active member payroll, will remain approximately level from year to year and from one generation of citizens to the next. For the year ended June 30, 2020, the employer contribution rate was 21.77% of covered payroll.

Complete recognition of the year-to-year swings in the fair value of System assets would produce contribution rate changes that would run counter to the "approximately level" goal. A common actuarial practice, referred to as asset smoothing, is used to address that issue. Recognizing the difference between the actual and assumed investment returns over a closed, five-year period helps ensure a more stable contribution rate.

At any point in time, the ratio of actuarial to fair value of assets will be more or less than the fair value but, if the smoothing method is prudent and properly constructed, those values will converge over time. As of June 30, 2020 and 2019, the ratio of actuarial value of assets to fair value of assets was 110.1% and 110.9%, respectively, for the MSEP.

Per the June 30, 2020 actuarial valuation, membership in the MSEP consisted of the following:

Retirees and beneficiaries currently receiving benefits		50,857
Active		
Vested	28,790	
Nonvested	17,209	45,999
Inactive		
Vested (not yet receiving benefits)*	17,198	
Nonvested (with contribution balances)	21,735	38,933
Total membership		135,789

* Includes 247 members on leave of absence and 651 members on long-term disability

Generally, all full-time state employees, employed before July 2000, who became vested and were not covered under another state-sponsored retirement plan, are eligible for membership in the MSEP (closed plan). Full-time state employees who were employed after July 1, 2000, but before January 1, 2011, are members of the MSEP 2000.

Those first employed in a benefit-eligible position on or after January 1, 2011, are members of the MSEP 2011 tier of the MSEP 2000.

MOSERS participates as an employer in the MSEP and MSEP 2000, including the MSEP 2011 tier.

Unless otherwise delineated, data for MSEP is inclusive of members in the MSEP 2000 and MSEP 2011, which all provide defined benefit pension, survivor, life insurance, and long-term disability benefits.

Employer contributions for the MSEP are determined through annual actuarial valuations. The required contributions are expressed as a percentage of covered payroll. The state of Missouri and its component employers make required contributions to the plans. Employer contributions for the fiscal year ended June 30, 2020 were 21.77% of covered payroll. Members of MSEP and MSEP 2000 do not make employee contributions. Members of MSEP 2011 tier are required to contribute 4% of covered payroll.

Final average pay (FAP), is the average pay of a member for the 36 full, consecutive months of service before termination of employment when the member's pay was greatest. If the member was on workers compensation leave of absence or medical leave of absence due to an employee illness, or on long term disability, FAP is the amount of pay the member would have received, but for such leave of absence as reported and verified by the employing department. If the member was employed for less than 36 months, FAP is the average monthly pay of a member during the period for which the member was employed.

For a summary of benefits for general state employees, legislators, and statewide elected officials under the MSEP, MSEP 2000, and MSEP 2011 tier, refer to the *Summary of Plan Provisions* in the *Actuarial Section* of this report.

MSEP (closed plan)

General state employees are fully vested for benefits upon accruing five years of credited service. Under the MSEP, general employees may retire with full benefits upon the earliest of attaining:

- Age 65 with 5 years of service;
- Age 60 with 15 years of service; or
- Age 48 with age and service equaling 80 or more – “Rule of 80.”

General employees may retire early at age 55 with at least 10 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.6% multiplied by the final average pay multiplied by years of credited service.

Members employed prior to August 28, 1997 receive cost-of-living adjustments (COLAs) annually based on 80% of the percentage increase in the average consumer price index (CPI) from one year to the next, with a minimum rate of 4% and maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. Members employed on or after August 28, 1997, and members who have met their COLA cap receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, inactive-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, members must have left state employment on or after October 1, 1984, and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, and meet age requirements. In addition, if members left state employment on or after August 28, 1997, and prior to September 1, 2002, the present value of their benefit must be less than \$10,000.

MSEP 2000

General state employees are fully vested for benefits upon accruing 5 years of credited service. Under the MSEP 2000, general employees may retire with full benefits upon the earliest of attaining:

- Age 62 with 5 years of service; or
- Age 48 with age and service equaling 80 or more – “Rule of 80.”

General employees may retire early at age 57 with at least five years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

Those retiring under the “Rule of 80” receive an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service, which is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

MSEP 2011 Tier

On July 19, 2010, legislation was signed into law adding a new tier (MSEP 2011) to the MSEP 2000 defined benefit pension plan. This tier includes all members first employed in a benefit-eligible position on or after January 1, 2011.

Legislation signed into law on July 14, 2017, changed the original vesting requirement of 10 years to five years for actively employed members of the MSEP 2011, effective January 1, 2018.

Under the MSEP 2011, general employees may retire with full benefits upon the earliest of attaining:

- Age 67 with 5 years of service; or
- Age 55 with age and service equaling 90 or more – “Rule of 90.”

General employees may retire early at age 62 with at least five years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

Those retiring under “Rule of 90” receive an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service, which is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Judicial Plan

The Judicial Plan is a single-employer, defined benefit public employee retirement plan administered in accordance with Sections 476.445 to 476.690, RSMo. Responsibility for the operation and administration of the Judicial Plan is vested in the MOSERS Board of Trustees. Due to the nature of MOSERS’ reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the Judicial Plan is considered a pension trust fund of the state of Missouri financial reporting entity and is included in the state’s financial reports as a pension trust fund.

Judges and commissioners of the supreme court or the court of appeals, judges of any circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, justices of the peace, commissioners or deputy commissioners of the probate division of the circuit court appointed after February 29, 1972, in a first class county having a charter form of government in a city not within a county, commissioners of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo, commissioners of the drug court or commissioners of any family court are eligible for membership in the Judicial Plan. The Judicial Plan provides defined benefit pension, survivor, life insurance, and disability benefits. Members are immediately vested.

Per the June 30, 2020 actuarial valuation, membership in the Judicial Plan consisted of the following:

Retirees and beneficiaries currently receiving benefits		590
Active		
Vested	418	
Nonvested	0	418
Inactive		
Vested (not yet receiving benefits)		35
Total membership		1,043

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Employer contributions are determined through annual actuarial valuations. For the year ended June 30, 2020, the employer contribution rate was 63.80% of covered payroll. The state of Missouri makes the employer contribution to the Judicial Plan. Members of Judicial Plan (closed plan) do not make employee contributions. Members of the Judicial Plan 2011 tier are required to contribute 4% of covered payroll.

Judicial Plan (closed plan)

Members of the Judicial Plan may retire with full benefits upon the earliest of attaining:

- Age 62 with 12 years of service; or
- Age 60 with 15 years of service; or
- Age 55 with 20 years of service.

Employees may retire early at age 62 with less than 12 years of service or age 60 with less than 15 years of service with a reduced benefit that is based upon years of service relative to 12 or 15 years.

In the Judicial Plan, the base benefit for members with 12 or more years of service is equivalent to 50% of compensation on the highest court served.

Members first employed prior to August 28, 1997, receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, with a minimum rate of 4% and a maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. Members first employed on or after August 28, 1997, and members who have met their COLA cap receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, inactive-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, they must have left state employment on or after August 28, 1997, and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, and have a benefit present value of less than \$10,000.

Judicial Plan 2011 Tier

On July 19, 2010, an additional tier of the defined benefit Judicial Plan was signed into law. This tier (Judicial Plan 2011) includes all new judicial members first employed as a judge on or after January 1, 2011.

Under the Judicial Plan 2011, members may retire with full benefits upon the earliest of attaining:

- Age 67 with 12 years of service; or
- Age 62 with 20 years of service;

Judicial Plan 2011 members may retire early at age 67 with less than 12 years of service with reduced benefits, or age 62 with less than 20 years of service with a reduced benefit based on years of service.

For a more detailed summary of benefits for members of the Judicial Plan, refer to the *Summary of Plan Provisions* in the *Actuarial Section* of this report.

Administrative Law Judges and Legal Advisors' Plan

On April 26, 2005, Senate Bill 202 was enacted, which terminated the Administrative Law Judges and Legal Advisors' Plan (ALJLAP) for new hires only. Under this legislation, administrative law judges and legal advisors (ALJs) who assume a position after April 26, 2005, who would have otherwise been covered by the ALJLAP, will instead participate in the MSEP or the MSEP 2000, depending on when they initially became state employees. For fiscal years 2005 and after, all liabilities and assets of the ALJLAP were transferred and combined with the MSEP. Membership totals for the ALJLAP are included in the MSEP in all relevant sections of this report.

Missouri State Insured Defined Benefit Insurance Plan

The Missouri State Insured Defined Benefit Insurance Plan is administered through, and underwritten by, The Standard Insurance Company (The Standard), which is a third-party administrator with oversight by MOSERS. It provides basic life insurance in an amount equal to one times annual salary while actively employed (with a \$15,000 minimum) to eligible members of the MSEP, MSEP 2000 (except employees of the Missouri Department of Conservation and certain state colleges and universities), MSEP 2011, Judicial Plan, Judicial Plan 2011, and certain members of the Public School Retirement System (PSRS).

The plan also provides duty-related death benefits, optional life insurance for active employees and retirees who are eligible for basic coverage, and a long-term disability insurance plan for eligible members. For a more detailed description of insurance benefits, refer to page 128-129 in the *Actuarial Section* of this report.

Due to the nature of MOSERS' reliance on funding from the state of Missouri and its component employers, and the overall control of the plan document by the legislative and executive branches of state government, the Missouri State Insured Defined Benefit Insurance Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as an internal service fund.

State of Missouri Deferred Compensation Plan (MO Deferred Comp)

MO Deferred Comp is a retirement savings plan for state of Missouri employees, including faculty and staff at 10 state colleges and universities. Money invested in the plan provides income in retirement to supplement the member's defined benefit pension and Social Security benefits. Funds are automatically deducted from the employee's pay and placed in their account. The participant decides how the money will be invested. Employees may also roll over eligible pre-tax distributions from other qualified retirement plans.

The MO Deferred Comp plan is comprised of a 457 deferred compensation plan for employee contributions and a related 401(a) plan for an employer incentive match contribution. MOSERS uses ICMA-RC as an external provider for record keeping for the plans. These plans have separately issued financial statements. The net position of these plans was approximately \$1,656 million and \$644 million as of June 30, 2020 for the 457 and 401(a) plans, respectively.

MOSERS unitizes investments for the purpose of allowing participants in the State of Missouri Deferred Compensation Plan the option to invest in the MOSERS investment portfolio (MIP). For financial reporting purposes, investments throughout this CAFR are reported in whole and include 0.03%, or approximately \$3 million, of the units invested in the MIP by Deferred Compensation participants. Effective June 30, 2017, the option to invest in the MIP fund was no longer available to Plan participants. All participants invested in the MIP fund as of that date may continue to defer into it, but no rollovers or new elections are permitted.

Audited financial statements for the State of Missouri Deferred Compensation Plan can be viewed online at www.modeferrredcomp.org.

Colleges & Universities Retirement Plan (CURP)

The Colleges & Universities Retirement Plan (CURP) is a defined contribution plan administered by MOSERS for education employees (as determined by the university) at nine Missouri state universities. Retirement income from the plan is dependent upon the employee's plan account balance at retirement. The employee's plan account balance is built from mandatory contributions to the plan and the investment returns generated from employee-selected investment options. To be eligible for the CURP, the employee must:

- meet the definition of "education employee" as defined by their employer, and
- be employed in this position for the first time on or after July 1, 2002, and
- not have previous employment in a position covered by another defined benefit pension plan administered by MOSERS, and
- be employed at a participating regional Missouri university.

After six years of participation in CURP, the employee may transfer to a MOSERS defined benefit pension plan and will immediately become a vested member of the MSEP 2000 or MSEP 2011, depending on their hire date. By transferring to MOSERS the employee forfeits all rights to future participation in CURP (i.e., they can't go back to CURP). However, the employee will continue to own and control their CURP account.

Note 2 – Summary of Significant Accounting Policies

Basis of Accounting

The financial statements of the MSEP, the Judicial Plan, and the Internal Service Fund were prepared using the accrual basis of accounting. The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the U.S. that apply to governmental accounting.

Contributions are recognized as revenues when due, pursuant to statutory requirements. Benefits and refunds are recognized when due and payable and expenses are recorded when the corresponding liabilities are incurred regardless of when contributions are received or payment is made. The direct method of reporting cash flows is used.

Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the accompanying financial statements and disclosures. Actual results could differ from those estimates.

Method Used to Value Investments

Investment assets are reported at fair value, in accordance with Standards issued by the Governmental Accounting Standards Board (see Note 3 for discussion of the valuation methodology for investment assets). The *Schedule of Investments and Derivative Instruments Measured at Fair Value* in Note 3 presents the fair value information of the investments as reported on the *Statements of Fiduciary Net Position* of the pension trust funds.

MOSERS Participation in Other Post-Employment Benefit (OPEB) Programs

Other Post-employment Benefit (OPEB) related items, including: Net OPEB liability, deferred outflows of resources, deferred inflows of resources, net OPEB expense, fiduciary net assets, additions to and deductions from fiduciary net assets have been determined on the same basis as they are reported by MCHCP. For this purpose, employer contributions are recognized as revenue when due and payable. Benefits are recognized when due and payable in accordance with the terms of the Plan (see *Note 7 – MCHCP Post-Employment Retiree Health Care OPEB Program*).

Capital & Intangible Assets

The MOSERS building and other capital assets are stated at cost less accumulated depreciation. Intangible assets include software applications and are stated at costs less accumulated amortization. Intangible assets are reported with capital assets in the *Statements of Changes in Fiduciary Net Position*. Capital and intangible assets are depreciated on a straight-line basis over their estimated useful lives.

Note 3 – Cash and Investments

Cash Deposits with Financial Institutions

MOSERS requires its business bank to collateralize amounts on deposit that exceed the Federal Deposit Insurance Corporation (FDIC) insured amount. The types of collateral security shall be included on a list maintained by the State Treasurer's office in accordance with Section 30.270 RSMo. Securities pledged as collateral are held in agency by a separate bank. As of June 30, 2020, all deposit balances with MOSERS' business bank were fully collateralized.

Deposits with MOSERS' business bank are invested in short-term repurchase agreements to earn interest. These items are reported with cash and short-term instruments in the *Statements of Fiduciary Net Position* of the pension trust funds, and with short-term instruments in the *Statements of Net Position* of the internal service funds.

Investment Policy

Section 104.440, RSMo allows the Board of Trustees to invest the trust fund assets in accordance with the prudent person rule. In 2015, MOSERS completed a transition to a portfolio that shifted from a return-driven process to a risk-driven process using an allocation approach that focuses on fundamental economic factors such as growth and inflation as well as other factors with expected return values such as credit, carry, and illiquidity. In June 2018, the Board voted to transition the portfolio to a new asset allocation, which includes four broad categories: growth, income, inflation hedge, and alternative betas/absolute return.

MOSERS’ policy, with respect to the allocation of invested assets, is established and may be amended by the Board of Trustees’ majority vote. The Board’s guiding principles with respect to the investment of MOSERS’ assets are to preserve the long-term corpus of the Fund, maximize total return within prudent risk parameters, and act in the exclusive interest of the members of the System. The Board has developed a policy allocation that is designed to achieve the long-term required return objectives of the System, given certain risk constraints. The current asset allocation reflects a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio’s overall volatility.

The Board has authorized staff to create and maintain an internally managed beta-balanced portfolio that utilizes a modest amount of leverage in order to balance the risk allocations equally across the five asset classes contained in that portfolio. The leverage is limited to 1.83 times beta-balanced capital. The limit may also be stated as 183% of beta-balanced capital. In June 2018, the Board authorized staff to transition to a new portfolio that utilizes a modest amount of leverage in order to more evenly distribute the risk allocations equally across the 11 asset classes contained in that portfolio. The leverage is limited to 1.50 times capital. The limit may also be stated as 150% of capital. The transition from the old portfolio to the new portfolio began in January 2019. The tables below illustrate the fair value, market exposure, and policy exposure of the old portfolio and the new portfolio by asset class as of June 30, 2020.

Schedule of Internally Managed Leverage - Old Portfolio

Old Portfolio (42% of Total Fund)	Fair Value Capital	Percent of Investments at Fair Value	Market Exposure	Percent of Investments at Market Exposure	Policy Exposure
Opportunistic global equities	\$ 1,105,132,410	33.2%	\$ 1,357,937,984	40.8%	38.0%
Nominal bonds	530,832,018	15.9	1,332,375,801	40.0	44.0
Commodities	239,151,989	7.2	642,073,473	19.3	20.0
Inflation-protected bonds	472,593,549	14.2	1,232,492,649	37.0	39.0
Alternative beta	982,998,813	29.5	982,998,813	29.5	31.0
Total old portfolio	\$ 3,330,708,779	100.0%	\$ 5,547,878,720	166.6%	172.0%

Schedule of Internally Managed Leverage - New Portfolio

New Portfolio (58% of Total Fund)	Fair Value Capital	Percent of Investments at Fair Value	Market Exposure	Percent of Investments at Market Exposure	Policy Exposure
Growth	\$ 1,776,929,966	37.9%	\$ 2,206,991,169	47.1%	45.0%
Income	1,013,895,278	21.7	1,556,334,433	33.2	35.0
Inflation hedge	937,235,640	20.0	1,791,595,694	38.3	40.0
Alternative beta	957,204,230	20.4	955,707,726	20.4	20.0
Total new portfolio	\$ 4,685,265,114	100.0%	\$ 6,510,629,022	139.0%	140.0%

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate rates of expected future rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future rates of return by the target asset allocation percentage and by adjusting for expected inflation, volatility and correlations. Best estimates of the real rates of return expected for both the old and new portfolio are summarized by asset class in the tables below.

Target Asset Allocation - Old Portfolio

Asset Class	Policy Allocation	Long-Term Expected Nominal Return*	Long-Term Expected Real Return	Weighted Average Long-Term Expected Nominal Return
Opportunistic global equities	38.0%	8.3%	5.8%	3.1%
Nominal bonds	44.0	3.3	0.8	1.5
Commodities	20.0	7.8	5.3	1.6
Inflation-protected bonds	39.0	2.4	(0.1)	0.9
Alternative beta	31.0	6.6	4.1	2.0
Cash and cash equivalents**	(72.0)	1.0	(1.5)	(0.7)
	<u>100.0%</u>			
			Correlation/volatility adjustment	(0.7)
			Long-term expected net nominal return	7.7
			Less: investment inflation assumption	(2.5)
			Long-term expected geometric net real return	<u>5.2 %</u>

* Long-term expected arithmetic returns of the asset classes at the time of the asset allocation study for each portfolio.

** Cash and cash equivalents policy allocation amounts are negative due to use of leverage.

Target Asset Allocation - New Portfolio

Asset Class	Policy Allocation	Long-Term Expected Nominal Return*	Long-Term Expected Real Return	Weighted Average Long-Term Expected Nominal Return
Global public equities	30.0%	7.7%	5.8%	2.3%
Global private equities	15.0	9.3	7.4	1.4
Long treasuries	25.0	3.5	1.6	0.9
Core bonds	10.0	3.1	1.2	0.3
Commodities	5.0	5.5	3.6	0.3
TIPS	25.0	2.7	0.8	0.7
Private real assets	5.0	7.1	5.2	0.3
Public real assets	5.0	7.7	5.8	0.4
Hedge funds	5.0	4.8	2.9	0.2
Alternative beta	10.0	5.3	3.4	0.5
Private credit	5.0	9.5	7.6	0.5
Cash and cash equivalents**	(40.0)	0.0	0.0	0.0
	<u>100.0%</u>			
			Correlation/volatility adjustment	(0.6)
			Long-term expected net nominal return	7.2
			Less: investment inflation assumption	(1.9)
			Long-term expected geometric net real return	<u>5.3 %</u>

* Long-term expected arithmetic returns of the asset classes at the time of the asset allocation study for each portfolio.

** Cash and cash equivalents policy allocation amounts are negative due to use of leverage.

Money-Weighted Rate of Return

The annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 5.2% for the year ended June 30, 2020. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for changing amounts actually invested.

Fair Value Measurement

MOSERS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset and give the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (level 1 measurements) and the lowest priority to unobservable inputs (level 3 measurements).

- **Level 1** – Unadjusted quoted prices for identical instruments in active markets.
- **Level 2** – Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which all significant inputs are observable.
- **Level 3** – Valuations derived from valuation techniques in which significant inputs are unobservable.

Investments that are measured at fair value using the net asset value (NAV) per share (or its equivalent) as a practical expedient are not classified in the fair value hierarchy.

The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and should not be perceived as the particular investment's risk.

In instances where inputs used to measure fair value fall into different levels in the fair value hierarchy, fair value measurements in their entirety are categorized based on the lowest level input that is significant to the valuation. MOSERS' assessment of the significance of particular inputs to these fair value measurements requires judgment and considers factors specific to each asset or liability. The tables on pages 40-41 show the fair value leveling of the investments.

Debt, equities, and investment derivatives classified in level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities.

Debt securities classified in level 2 have non-proprietary information that was readily available to market participants from multiple independent sources, which are known to be actively involved in the market. Pricing inputs may include market quotations, yields, maturities, call features and ratings. Derivative securities classified in level 2 are securities whose values are derived daily from associated traded securities.

Fair values for the equity real estate investments are based on appraisals. Fair values of the limited partnership investments are based on valuations of the underlying companies of the limited partnerships as reported by the general partner. Certain limited partnerships reflect values and related performance on a quarter lag basis due to the nature of those investments and the time it takes to value them. Fair value of the commingled funds is determined based on the underlying asset values. The remaining assets are primarily valued by the System's master custodian using the last trade price information supplied by various pricing data vendors.

Investments and Derivative Instruments Measured at Fair Value

June 30, 2020	Total	Fair Value Measurement Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Investment by fair value level				
Treasuries				
U.S. government securities	\$ 4,830,930,268	\$ 4,825,557,401	\$ 0	\$ 5,372,867
Repurchase agreements	1,050,000,000	0	1,050,000,000	0
Fixed income securities				
Corporate bonds and asset-backed securities	318,308,951	0	314,268,502	4,040,449
U.S. government agencies	330,882,790	0	330,882,790	0
Non U.S. sovereign	635,222	0	635,222	0
Collateralized mortgage obligations	9,673,143	0	9,673,143	0
Total fixed income securities	659,500,106	0	655,459,657	4,040,449
Equities				
Real estate	405,786,127	405,635,171	150,956	0
Other	39,016,160	38,949,473	0	66,687
Total equities	444,802,287	444,584,644	150,956	66,687
Exchange traded funds				
U.S. fixed income index	118,768,660	118,768,660	0	0
Total investment by fair value level	7,104,001,321	5,388,910,705	1,705,610,613	9,480,003
Investments measured at the NAV				
Commingled funds - equity funds	872,482,754			
Commingled funds - fixed income funds	390,941,915			
Commingled funds - short-term investment funds	532,659,000			
Hedge funds	1,298,312,268			
Private equity funds	420,078,956			
Private real estate and timber funds	37,522,470			
Total investments measured at the NAV	3,551,997,363			
Total investments measured at fair value	10,655,998,684	5,388,910,705	1,705,610,613	9,480,003
Investment derivative instruments				
Future contracts	(2,478,978)	(2,478,978)	0	0
Total investment derivative instruments	(2,478,978)	(2,478,978)	0	0
Investments at cost or cost plus accrued interest:				
Cash held in investment accounts	809,671,184			
Total investments	11,463,190,890	5,386,431,727	1,705,610,613	9,480,003
Obligations under repurchase agreements	(3,434,907,955)			
Total investments, net of obligations under repurchase agreements	\$ 8,028,282,935	\$ 5,386,431,727	\$ 1,705,610,613	\$ 9,480,003

Investments Measured at the Net Asset Value

	June 30, 2020	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period (Days)
Commingled fund - equity funds	\$ 872,482,754		Daily, Monthly	2-10
Commingled fund - fixed income funds	390,941,915		Daily	2
Commingled fund - short-term investment funds	532,659,000		Daily	0
Active hedge funds				
Merger arbitrage	138,968,100		Monthly	45
Equity market neutral	91,419,763		Quarterly	90
Event driven	193,563,000		Semi-annually	60
Marco	155,201,837		Monthly, Quarterly	30
Risk premia	212,472,572		Monthly	30
Quantitative	65,800,537		Monthly	30
Multi strategy	68,380,981		Quarterly	90
Fund-of-funds	359,251,396		Monthly	95
Pending liquidated hedge funds	13,254,082			
Private equity funds	420,078,956	\$ 350,638,950		
Private real estate and timber funds	37,522,470	139,636,107		
Total investments measured at the net asset value (NAV)	<u>\$ 3,551,997,363</u>	<u>\$ 490,275,057</u>		

- **Commingled fund - equity funds** – Four equity funds are considered to be commingled in nature. Each are valued at the NAV held at the end of the period based upon the fair value of the underlying investments.
- **Commingled fund - fixed income funds** – Two fixed income funds are considered to be commingled in nature. Each are valued at the NAV held at the end of the period based upon the fair value of the underlying investments.
- **Commingled fund - short term investment funds** – Two short-term investment funds are considered to be commingle in nature. Each are valued at the NAV held at the end of the period based upon the fair value of the underlying investments.
- **Merger arbitrage hedge fund** – Consisting of one fund, this strategy invests in the common stock of companies that are involved in publicly announced mergers and seeks to generate attractive returns while dampening volatility. This investment is valued at the NAV, is redeemable monthly, and is not subject to lock-up restrictions.
- **Equity market neutral hedge fund** – Consisting of one fund, this strategy invests both long and short in U.S. and global equity securities, with the goal of having little to no net market exposure. This investment is valued at the NAV, is redeemable quarterly, and is not subject to lock-up restrictions.
- **Event driven hedge fund** – Consisting of one fund, this strategy seeks to gain an advantage from pricing inefficiencies that may occur in the onset or aftermath of a corporate action or related event. This investment is valued at the NAV, is redeemable semi-annually, and is not subject to lock-up restrictions.
- **Macro hedge funds** – Consisting of two funds, this strategy seeks to take advantage of macroeconomic dislocations between countries by trading a number of different markets and financial instruments. These investments are valued at the NAV, are redeemable monthly and quarterly, and are not subject to lock-up restrictions.
- **Risk premia hedge fund** – Consisting of one fund, this strategy seeks to capture hedge fund betas through the use of systematic, bottoms up security selection across major hedge fund strategies. Style premia such as value, momentum and carry help build the long/short portfolios. This investment is valued at the NAV, is redeemable at least monthly, and is not subject to lock-up restrictions.
- **Quantitative hedge funds** – Consisting of two funds, this strategy attempts to achieve uncorrelated returns using advanced statistical methods to select securities across liquid public markets. These investments are valued at the NAV, are redeemable monthly, and are not subject to lock-up restrictions.

- **Multi strategy hedge fund** – Consisting of one fund, this fund aims to pursue varying strategies in order to diversify risks and reduce volatility. This investment is valued at the NAV, is redeemable quarterly, but is subject to lock-up restrictions.
- **Fund-of-funds** – Consisting of one fund, this fund seeks to provide diversification by holding a number of funds within a single fund structure. This investment is valued at the NAV, is redeemable monthly, and is not subject to lock-up restrictions.
- **Pending liquidated hedge funds** – Consisting of 11 funds which have been fully redeemed as of June 30, 2020, for which MOSERS is awaiting final distribution of the proceeds, which will be received upon sale of the underlying investments or upon completion of the audit of the firm's annual financial statements.
- **Private equity, real estate, and timber funds** – MOSERS' private equity portfolio consists of 43 funds with exposure to buyout funds, distressed funds, infrastructure, energy, secondary, royalty funds, and special situations. The real estate portfolio, comprised of six funds, invests mainly in U.S. commercial real estate. The timber portfolio consists of one fund in liquidation which invests in global timberland. The fair values of the majority of these funds have been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received as underlying investments within the funds are liquidated, which, on average, can occur over the span of five to 10 years.

Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations to MOSERS. As of June 30, 2020, MOSERS' fixed income assets that are not U.S. government guaranteed represented 39.1% of fixed income securities. In preparing this report, credit risk associated with all fixed income holdings, including collateral for repurchase agreements has been included. The tables below summarize MOSERS' fixed income security exposure levels and credit qualities.

As a matter of practice, there are no overarching limitations for credit risk exposures within the overall fixed income portfolio. Each individual portfolio within fixed income is managed in accordance with operational guidelines that are specific as to permissible credit quality ranges, exposure levels within individual quality tiers, and average credit quality.

Credit risk for derivative instruments held by the System results from counterparty risk assumed by MOSERS. This is essentially the risk that the counterparty to a MOSERS transaction will be unable to meet its obligation. Information regarding MOSERS' credit risk related to derivatives is found under the derivatives disclosures on page 47 of the notes.

The commingled funds - investment grade fixed income is invested and reinvested primarily in a portfolio of debt securities with the objective of approximating as closely as practicable the total rate of return of the market for debt securities as defined by the *Bloomberg Barclays U.S. Aggregate Bond Index*. The average rating for the underlying securities within this fund is AA.

The commingled funds - high yield fixed income is invested and reinvested primarily in a portfolio of U.S. dollar denominated below investment-grade corporate debt obligations (including private placements and 144A issues) with the objective of approximating the total rate of return of the *BofA Merrill Lynch U.S. High Yield Constrained Index*. The average rating for the underlying securities within this fund is BB.

Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

Fixed Income Security Type	Fair Value June 30, 2020	Percent of all Fixed Income Assets	Weighted Average Credit Quality	Ratings Dispersion Requiring Further Disclosure
U.S. government agencies	\$ 330,882,790	4.0%	AA+	See below
Asset-backed securities	571,723	0.0	AA-	See below
Collateralized mortgage obligations	9,673,143	0.1	AA+	See below
Corporate bonds	317,737,228	3.9	BBB+	See below
Non-U.S. sovereign	635,222	0.0	A	See below
Total nongov't fixed income securities	659,500,106	8.0		
Bank deposits	750,000,000	9.1	FDIC insured	None
Nongov't. guaranteed repurchase agreements	875,000,000	10.7	Not rated	None
Commingled funds - investment grade fixed income	345,179,897	4.2	Not rated	None
Commingled funds - high yield fixed income	45,762,018	0.6	Not rated	None
Pooled instruments	532,659,000	6.5	AAA	None
Total nongov't. guaranteed securities	\$ 3,208,101,021	39.1%		
U.S. government securities held in portfolio	\$ 4,830,930,268	58.8		
Repurchase agreement with U.S. government securities held as collateral	175,000,000	2.1		
Total fixed income securities	\$ 8,214,031,289	100.0%		

Ratings Dispersion Detail - Fair Value

Credit Rating Level	U.S. Government Agencies	Asset-Backed Securities	Collateralized Mortgage Obligations	Corporate Bonds	Non-U.S. Sovereign
AAA	\$ 0	\$ 0	\$ 0	\$ 2,012,971	\$ 0
AA	330,882,790	0	9,673,143	13,927,443	0
A	0	545,485	0	119,727,839	635,222
BBB	0	0	0	178,588,289	0
BB	0	0	0	3,071,706	0
Not rated	0	26,238	0	408,980	0
	\$ 330,882,790	\$ 571,723	\$ 9,673,143	\$ 317,737,228	\$ 635,222

Interest Rate Risk

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. This risk is managed by using the effective duration or option adjusted methodology. It is widely used in the management of fixed income assets by quantifying the risk of interest rate changes. This methodology takes into account optionality on bonds and scales the risk of price changes on bonds depending upon the degree of change in rates and the slope of the yield curve. Within the investment policy, operational guidelines specify the degree of interest rate risk taken within the System’s fixed income portfolios, with the exception of some portfolios in which credit risk is the predominant factor and is also controlled by specific guidelines. MOSERS believes that the reporting of effective duration found in the tables below quantifies to the fullest extent possible the interest rate risk of the System’s fixed income securities.

MOSERS invests in mortgage-backed securities, which have embedded within them the option of being called, whereby the issuer has the option to keep the debt outstanding in rising interest rate environments or repay the debt in declining interest rate environments, a factor that advantages the issuer. This risk is incorporated within the effective duration calculation used in the interest rate risk analysis.

Effective Duration of Fixed Income Assets by Security Type

Fixed Income Security Type	Fair Value June 30, 2020	Percent of all Fixed Income Assets	Weighted Average Effective Duration (Years)	Interest Rate Risk Requiring Further Disclosure
U.S. treasuries	\$ 4,830,930,268	58.8%	9.8	See below
U.S. government agencies	330,882,790	4.0	0.2	None
Asset-backed securities	571,723	0.0	6.0	None
Collateralized mortgage obligations	9,673,143	0.1	0.1	None
Corporate bonds	317,737,228	3.9	4.7	None
Non-U.S. sovereign	635,222	0.0	2.3	None
Bank deposits	750,000,000	9.1	0.0	None
Repurchase agreements	1,050,000,000	12.8	0.0	None
Commingled funds - investment grade fixed income	345,179,897	4.2	6.0	None
Commingled funds - high yield fixed income	45,762,018	0.6	3.9	None
Pooled instruments	532,659,000	6.5	0.0	None
	\$ 8,214,031,289	100.0%	6.2	

Effective Duration Analysis of U.S. Treasuries

Maturity	Fair Value June 30, 2020	Average Effective Duration of the Security Type (Years)	Contribution to Effective Duration (Years)
Less than 1 year to maturity	\$ 555,584,996	0.0	0.0
1- to 10-year maturities	2,332,976,143	4.9	2.4
Long coupon treasuries	1,942,369,129	18.5	7.4
	\$ 4,830,930,268		9.8

Repurchase Agreements

Tri-party repurchase agreements (repos) are a secured loan by a financial institution with the collateral held at a custodian bank. In a tri-party repo transaction, MOSERS transfers cash to a financial institution and the financial institution transfers securities to the custodian bank. Simultaneously, the financial institution promises to repay the loan in the future plus interest in exchange for the return of the securities.

Reverse repurchase agreements (reverse repos) are used to convert securities into cash. In a reverse repo transaction, MOSERS transfers securities that are owned in the portfolio to a financial institution and the financial institution transfers cash to MOSERS. Simultaneously, MOSERS promises to repay the loan in the future plus interest in exchange for the return of the securities.

Typical collateral for repos and reverse repos include treasury securities, agency securities, mortgage-backed securities, investment grade corporate bonds, commercial paper, and common stock. Repos and reverse repos are typically done for an overnight term; however, they can be done for a longer term. MOSERS enters into repo transactions to earn interest on short-term funds and enters into reverse repos to finance the purchase of additional securities.

The yield earned by MOSERS on the repo transactions ranged from 0.01% to 5.50% with maturities of one to five days.

The yield earned by the counterparties on the reverse repo transactions ranged from 0.00% to 2.54% and had maturities of one month to one year. The maturities of the investments made with reverse repo proceeds generally have maturities of one to 30 years.

In repo transactions, MOSERS may have credit risk if the counterparty fails to repay the loan and the value of the securities held as collateral falls below the loan balance. To minimize this risk, MOSERS requires the financial institution to send collateral with a fair value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held approximately \$63.2 million of counterparty collateral in excess to the repo balance.

In a reverse repo transaction, MOSERS may be subject to credit risk if the counterparty fails to return the securities and the value of the securities held as collateral rise above the loan balance. To minimize this risk, MOSERS sends the minimum amount of collateral required by the financial institution and requires the financial institution to revalue the collateral and return excess collateral on a daily basis. As of fiscal year end, counterparties held approximately \$58.8 million of MOSERS' collateral in excess to the reverse repo balance.

The tables below summarize MOSERS' exposure for repo and reverse repo transactions.

Tri-Party Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2020	Fair Value Including Accrued Interest of Repurchase Agreements June 30, 2020	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	\$ 178,500,581	\$ 175,000,000	\$ 3,500,581	
U.S. government agencies	255,000,000	250,000,000	5,000,000	
Common stock	679,741,455	625,000,000	54,741,455	
Accrued interest	0	5,451	(5,451)	
	<u>\$ 1,113,242,036</u>	<u>\$ 1,050,005,451</u>	<u>\$ 63,236,585</u>	6.0%

Reverse Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2020	Fair Value Including Accrued Interest of Repurchase Agreements June 30, 2020	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	\$ 3,503,036,730	\$ 3,434,907,955	\$ 68,128,775	
Receivables	(7,067,638)	0	(7,067,638)	
Accrued interest	0	2,219,913	(2,219,913)	
	<u>\$ 3,495,969,092</u>	<u>\$ 3,437,127,868</u>	<u>\$ 58,841,224</u>	1.7 %

Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates will adversely impact the fair value of an investment. MOSERS' currency risk exposures, or exchange rate risk, primarily reside within MOSERS' international equity investment holdings. MOSERS' implementation policy allows external managers to decide what action to take regarding their respective portfolio's foreign currency exposures using currency forward contracts. MOSERS' exposure to foreign currency risk in U.S. dollars, as of June 30, 2020, is highlighted in the table below.

Currency Exposures by Asset Class

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Alternatives	Total
Australian Dollar	\$ 8,043,939	\$ 1,304,336	\$ 34,814	\$ 0	\$ 9,383,089
Brazilian Real	0	10,321,453	0	0	10,321,453
Canadian Dollar	5,224,588	5,364,187	28,825	0	10,617,600
Chilean Peso	0	1,040,425	133,503	0	1,173,928
Chinese Yuan Renminbi	0	9,114,566	0	0	9,114,566
Colombian Peso	7	301,613	115,924	0	417,544
Czech Koruna	(692)	224,245	0	0	223,553
Danish Krone	0	3,338,423	0	0	3,338,423
Egyptian Pound	0	233,734	0	0	233,734
Euro	2,584,022	83,738,323	(385,087)	39,382	85,976,640
Hong Kong Dollar	(6,535,295)	90,101,063	0	0	83,565,768
Hungarian Forint	0	453,305	0	0	453,305
Indian Rupee	0	15,968,368	0	0	15,968,368
Indonesian Rupiah	0	2,978,556	0	0	2,978,556
Israeli Shekel	0	57,290	0	0	57,290
Japanese Yen	(4,032,612)	168,361,625	(109,746)	0	164,219,267
Malaysian Ringgit	0	3,514,376	0	0	3,514,376
Mexican Peso	174	4,714,139	0	0	4,714,313
New Taiwan Dollar	0	40,492,696	0	0	40,492,696
New Zealand Dollar	0	61,095	0	0	61,095
Norwegian Krone	0	97,223	0	0	97,223
Pakistani Rupee	0	40,144	0	0	40,144
Philippines Peso	0	1,619,888	0	0	1,619,888
Polish Zloty	80	1,439,273	0	0	1,439,353
Qatari Riyal	0	1,599,841	0	0	1,599,841
Russian Ruble	0	4,726,455	116,774	0	4,843,229
Saudi Riyal	0	5,235,258	0	0	5,235,258
Singapore Dollar	120	10,583,536	0	0	10,583,656
South African Rand	(560,121)	14,198,333	0	0	13,638,212
South Korean Won	(2,423,229)	35,309,207	1,450,200	0	34,336,178
Swedish Krona	88	572,553	0	0	572,641
Swiss Franc	0	50,873,765	0	0	50,873,765
Thai Baht	0	9,791,356	0	0	9,791,356
Turkish Lira	0	3,428,250	0	0	3,428,250
United Arab Emirates Dirham	0	1,067,719	0	0	1,067,719
United Kingdom Pound Sterling	1,175,090	73,899,017	23,019	0	75,097,126
	\$ 3,476,159	\$ 656,165,636	\$ 1,408,226	\$ 39,382	\$ 661,089,403

Derivatives

Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indexes. They include futures contracts, swap contracts, options contracts, and forward foreign currency exchange. The following tables summarize the various contracts in the portfolio as of June 30, 2020.

Futures Contracts

Futures Contract	Notional Value	Exposure
Currency futures	\$ (149,081,854)	\$ (770,384)
Fixed income futures	54,762,229	(478,711)
Equity index futures	279,520,435	2,035,984
Commodity futures	(79,971,944)	(3,265,867)
Total	\$ 105,228,866	\$ (2,478,978)

Foreign Currency Forward Contracts

Currency	Net Notional Long (Short)	Exposure
Euro	\$ (555,362)	\$ 618
U.S. Dollar	555,980	0
Foreign currency forward contract asset	\$ 618	\$ 618

Swap Contracts

Counterparty Credit Rating	Notional Value	Exposure
Total return swaps - equity		
A+	\$ 1,980,626,724	\$ 113,860,069
A	102,937,311	7,809,824
Total	\$ 2,083,564,035	\$ 121,669,893
Total return swaps - fixed income		
A+	\$ 295,674,382	\$ 6,296,085
A	587,600,167	14,634,657
Total	\$ 883,274,549	\$ 20,930,742
Total return swaps - commodities		
A+	\$ 537,315,431	\$ 71,192
A	34,639,265	130,521
Total	\$ 571,954,696	\$ 201,713

While the Board has no formal policy specific to derivatives, the MOSERS investment implementation program, through its external managers, holds investments in futures contracts, swap contracts, and forward foreign currency exchange. MOSERS enters into these certain derivative instruments as investments primarily to enhance the performance and reduce the volatility of its portfolio. It enters swaps and futures contracts to gain or hedge exposure to certain markets and to manage interest rate risk and enters into forward foreign currency exchange contracts primarily to hedge foreign currency exposure.

The notional values associated with these derivative instruments are generally not recorded in the financial statements; however, the fair values of these instruments are recorded in the *Statements of Fiduciary Net Position* and the total changes in fair value for the year are included as net appreciation in fair value of investments in the *Statements of Changes in Fiduciary Net Position*. For the year ended June 30, 2020, the change in fair value in the swap contracts resulted in a loss of \$214.7 million of investment income. The change in fair value in the futures contracts resulted in a gain of \$63.9 million of investment income. The change in fair value in the foreign exchange contracts resulted in a loss of \$0.3 million of investment income. MOSERS does not anticipate additional significant market risk from the derivative arrangements.

MOSERS could be exposed to risk if the counterparties to the contracts are unable to meet the terms of the contracts. MOSERS' investment managers seek to control this risk through counterparty credit evaluations and approvals, counterparty credit limits, and exposure monitoring procedures. MOSERS anticipates that the counterparties will be able to satisfy their obligations under the contracts. Investments in limited partnerships and commingled funds may include derivatives that are not shown in the derivative totals.

Securities Lending Program

The Board of Trustees' *Investment Policy Statement* permits the pension trust funds to participate in a securities lending program. Fixed income, international equity and domestic equity securities of the pension trust funds are loaned to participating brokers who provide collateral in the form of cash, U.S. Treasury or government agency securities, or letters of credit issued by approved banks. Collateral must be provided in the amount of 102% of fair value for domestic loans and 105% of fair value for international loans. MOSERS does not have the authority to pledge or sell collateral securities, without borrower default.

There was no securities lending activity in fiscal year 2020.

Note 4 – Capital Assets

Office building, furniture, fixtures, equipment and software costing \$1,000 or more are capitalized. Capital assets are valued at cost and reported net of accumulated depreciation. Improvements, which increase the useful life of the property, are also capitalized. The cost of internally developed software incurred during the application development state, including staff payroll costs, are capitalized in accordance with GASB Statement 51. Maintenance and repairs are charged to expense as incurred. Depreciation is computed using the straight-line method over the estimated useful life of the related assets according to the following guidelines:

- 5 years for furniture, fixtures, and equipment
- 40 years for building
- 5 years for software and licensing

Schedules of the capital asset account balances for the year ended June 30, 2020 are as follows:

Pension Trust Funds

Capital Assets

	Land	CIP - Internally Developed Pension Admin. System	Building and Building Improvements	Furniture, Fixtures and Equipment	Software	Total Capital Assets
Capital assets						
Balances June 30, 2019	\$ 267,286	\$ 2,140,057	\$ 4,079,816	\$ 1,378,222	\$ 743,506	\$ 8,608,887
Additions	0	2,737,676	38,868	166,370	5,268	2,948,182
Deletions	0	0	(133,640)	(100,687)	(4,950)	(239,277)
Capital assets June 30, 2020	267,286	4,877,733	3,985,044	1,443,905	743,824	11,317,792
Accumulated depreciation						
Balances June 30, 2019	0	0	2,043,638	1,043,017	628,182	3,714,837
Depreciation expense	0	0	104,685	118,335	92,865	315,885
Deletions	0	0	(138,608)	(99,898)	(4,950)	(243,456)
Accumulated depreciation June 30, 2020	0	0	2,009,715	1,061,454	716,097	3,787,266
Net capital assets June 30, 2020	\$ 267,286	\$ 4,877,733	\$ 1,975,329	\$ 382,451	\$ 27,727	\$ 7,530,526

Note 5 – Employers’ Net Pension Liability

The components of net pension liability as of June 30, 2020, are in the *Schedule of Employers’ Net Pension Liability* below.

Schedule of Employers’ Net Pension Liability

	MSEP	Judicial Plan
Total pension liability	\$ 14,258,408,888	\$ 624,847,011
MOSERS' fiduciary net position	7,910,830,533	167,288,066
Employers’ net pension liability	\$ 6,347,578,355	\$ 457,558,945
Plan net position as a percentage of the total pension liability	55.48%	26.77%
Covered payroll	\$ 2,006,870,248	\$ 61,402,061
Employers’ net pension liability as a percentage of covered payroll	316.29%	745.18%

An actuarial valuation of an ongoing plan involves estimates of the reported amounts and assumptions about the probability of occurrence of events far into the future. Examples include assumptions about future employment, mortality, and future salary increases. Amounts determined regarding the net pension liability are subject to continual revision as actual results are compared with past expectations and new estimates are made about the future. The *Schedule of Changes in Employers’ Net Pension Liability* presents multi-year trend information about whether the plan fiduciary net positions are increasing or decreasing over time relative to the total pension liability. These schedules are presented in the *Required Supplementary Information*. The total pension liability, as of June 30, 2020, is \$14,258,408,888 for MSEP and \$624,847,011 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2020, and a measurement date of June 30, 2020, using generally accepted actuarial procedures.

Actuarial Assumptions Used to Determine Net Pension Liability

In July 2018, the Board made several changes to actuarial methods and assumptions based upon a review of actuarial methods and economic assumptions performed by its outside actuarial consultant. Based upon this study, the Board voted to reduce the investment return assumption to 7.25% with a 2.5% inflation assumption, effective June 30, 2018; then to 7.10% with a 2.35% inflation assumption, effective June 30, 2019; and then to 6.95% with a 2.25% inflation assumption, effective June 30, 2020, and thereafter.

Summary of Actuarial Assumptions for the MSEP & the Judicial Plan Used to Determine Net Pension Liability

Valuation date	June 30, 2020
Actuarial cost method	Entry age normal
Amortization period	30 years
Asset valuation method	Market value
Investment rate of return	6.95%
Projected salary increases	2.75 – 8.25% (MSEP) 2.50 – 4.70% (Judicial Plan)
Rate of payroll growth	2.25%
COLAs	4.00%/1.80%*
Price inflation	2.25%

Mortality rates are based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120% for the MSEP and 98% for the Judicial Plan. The preretirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females for the MSEP.

An experience study covering the five-year period ended June 30, 2015, was performed in 2016.

* 4.00% compounded annually, when a minimum COLA of 4.00% is in effect. 1.80% compounded annually, when no minimum COLA is in effect (80% of price inflation).

The discount rate used to measure the total pension liability was 6.95%. The projection of cash flows used to determine the discount rate assumed that contributions from participating employers will be made using the actuarially determined rates. Based on those assumptions, MOSERS’ fiduciary net position was projected to be available to make all the projected future benefit payments of the current plan members. As a result, the long-term expected rate of return on pension plan investments of 6.95% was applied to all periods of projected benefit payments to determine the total pension liability.

The table below presents the net pension liability of the plans, as of June 30, 2020, calculated using the discount rate of 6.95%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1% lower (5.95%) or 1% higher (7.95%) than the current rate.

Sensitivity of Net Pension Liability to Changes in the Discount Rate

Employers’ Net Pension Liability	1% Decrease (5.95)%	Current Discount Rate (6.95)%	1% Increase (7.95)%
MSEP	\$ 7,948,076,582	\$ 6,347,578,355	\$ 5,001,434,609
Judicial Plan	\$ 520,117,555	\$ 457,558,945	\$ 403,982,082

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 112.

Note 6 – Retiree Life Insurance and Long-Term Disability Insurance Programs

In addition to the defined benefit pension provided through MOSERS, the state of Missouri also funds, either partially or in its entirety, retiree life insurance, and long-term disability insurance programs for eligible members. These insurance programs are underwritten by The Standard. MOSERS collects premiums for participants of these programs and remits them to the The Standard on behalf on the state of Missouri.

Retiree Life Insurance

Members who retire on or after October 1, 1985, are eligible for \$5,000 of state-sponsored basic life insurance coverage if they retire directly from active employment. As of June 30, 2020, 28,324 retirees were participating in the program. This insured defined benefit coverage is financed on a percentage of payroll (.115%) and is purchased as a group policy through The Standard. The cost for the year ended June 30, 2020, was \$1,937,852. Premiums are contributed entirely by the state and its component employers as provided by Section 104.515, RSMo.

Retirees of the Department of Labor and Industrial Relations (DOLIR), who retired prior to January 1, 1996, are eligible for state-sponsored insured defined benefit insurance coverage in the same amount of coverage they were receiving through the DOLIR. As of June 30, 2020, 126 retirees were participating in the program. The coverage for this closed group is purchased as a group policy at a current cost of \$2.07 per thousand dollars of coverage, per month, per eligible participant (\$16,422 for the year ended June 30, 2020). Premiums are paid entirely by the DOLIR as provided by Section 288.225, RSMo. Retirees of the DOLIR who retired on or after January 1, 1996, are eligible for \$5,000 of state-sponsored life insurance coverage if they retire directly from active employment. They are included in the group described in the preceding paragraph.

Long-Term Disability Insurance (LTD)

MOSERS provides LTD coverage for eligible members and generally includes those active members of MOSERS' retirement plans who do not have other disability coverage and are not yet eligible to receive normal (unreduced) retirement benefits.

There were 31,737 members covered under the program as of June 30, 2020. This insured defined benefit coverage is financed on a percentage of covered payroll (0.55%). Purchased as a group policy, LTD is administered by The Standard. The cost for the year ended June 30, 2020, was \$8,385,281. Premiums are contributed by the state and its component employers as provided for by Section 104.515, RSMo.

Note 7 – MCHCP Post-Employment Retiree Health Care OPEB Program

MOSERS participates as an employer in a cost-sharing, multiple-employer, defined benefit, other post-employment benefits plan, the State Retiree Welfare Benefit Trust (SRWBT), operated by Missouri Consolidated Health Care Plan (MCHCP). Employees may participate at retirement if eligible to receive a monthly retirement benefit from MOSERS. The terms and conditions governing post-employment benefits are vested with the MCHCP Board of Trustees within the authority granted under Chapter 103, Sections 103.003 through 103.178, RSMo. The SRWBT does not issue a separate stand-alone financial report. Financial activity of the SRWBT is included in the *MCHCP Comprehensive Annual Financial Report* as a fiduciary fund and is intended to present only the financial position of the activities attributable to the SRWBT. Additionally, MCHCP is considered a component unit of the state of Missouri reporting entity and is included in the state’s financial report.

The Plan’s financial statements are available on MCHCP’s website at www.mchcp.org.

Benefits

The SRWBT was established and organized on June 27, 2008, pursuant to Sections 103.003 through 103.178, RSMo, to provide health and welfare benefits for the exclusive benefit of current and future retired employees of the state and their dependents who meet eligibility requirements, except for those retired members covered by other OPEB plans of the state. MCHCP’s three medical plans offer the same basic coverage such as preventative care, freedom to choose care from a nationwide network of primary care providers, specialists, pharmacies, and hospitals, usually at a lower negotiated group discount and the same covered benefits for both medical and pharmacy. Benefits are the same in all three plans; other aspects differ such as premium, deductible and out-of-pocket costs. Retiree benefits are the same as for active employees, until they are Medicare eligible.

Contributions

Contributions are established, and may be amended by the MCHCP Board of Trustees, with the authority granted under Chapter 103, Sections 103.003 through 103.178, RSMo. For the fiscal year ended June 30, 2019, employers were required to contribute 4.99% of gross active employee payroll for the periods July 1, 2018, through January 31, 2019; 6.19% for the periods February 1, 2019 through April 15, 2019; and 4.33% for the periods April 16, 2019, through June 30, 2019. Employees do not contribute to this plan. No payables to the plan were outstanding at year end.

OPEB Liabilities, OPEB Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources

At June 30, 2020, MOSERS reported a liability of \$7,697,649 for its proportionate share of the net OPEB liability. The net OPEB liability was measured as of June 30, 2019, and the total OPEB liability used to calculate the net OPEB liability was determined by an actuarial valuation as of that date. MOSERS' proportion of the net OPEB liability was based on a projection of its long-term share of contributions to the OPEB plan relative to the projected contributions of all participating entities, actuarially determined. At June 30, 2019, MOSERS' proportionate share was 0.4352%. For the year ended June 30, 2020, MOSERS recognized OPEB expense of \$305,311. As of June 30, 2020, MOSERS reported deferred outflows of resources and deferred inflows of resources as follows:

Deferred Outflows/Inflows of Resources Related to Post-Employment Retiree Health Care

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience	\$ 272,239	\$ 103,191
Changes of assumptions	0	326,063
Net difference between projected and actual earnings on plan investments	12,335	0
Changes in proportion and differences between MOSERS' contributions and proportionate share of contributions	316,791	43,890
MOSERS' contributions subsequent to the measurement date	311,510	0
	\$ 912,875	\$ 473,144

The \$311,510 currently reported as deferred outflows of resources related to OPEB resulting from MOSERS' contributions subsequent to the measurement date will be recognized as a reduction of the net OPEB liability in the year ended June 30, 2020. Other amounts reported as deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

Deferred Outflows/Inflows of Resources Related to Post-Employment Retiree Health Care to be Recognized in Future Years

Year Ending June 30	
2021	\$ 16,616
2022	16,615
2023	16,792
2024	13,756
2025	12,861
Thereafter	51,581
Total	\$ 128,221

Actuarial Assumptions

The collective total OPEB liability for the June 30, 2019, measurement date was determined by an actuarial valuation as of July 1, 2018, with updated procedures used to roll forward the total OPEB liability to June 30, 2019. This actuarial valuation used the following actuarial assumptions:

Summary of MCHCP's Actuarial Assumptions for Post-Employment Retiree Health Care

Valuation year	July 1, 2018 - June 30, 2019
Actuarial cost method	Entry age normal, level percentage of payroll
Asset valuation method	Market value
Discount rate (blended)	5.24%
Projected payroll growth rate	4.0%
Inflation rate	3.0%
Health care cost trend rate (medical & prescription drugs combined)	
Non-Medicare	6.0%
	(rate decreases by 0.25% per year until an ultimate rate of 5.0% in fiscal year 2023 and later)
Medicare	10.0%
	(rate changes to 22.0% in fiscal year 2021, 10.0% in fiscal year 2022 and 2023, 9.5% in fiscal 2024, 9.0% in fiscal 2025, 8.5% in fiscal 2026, then 8.0% in fiscal 2027, decreasing by 1.0% per year to an ultimate rate of 5.0% in fiscal year 2030 and after.)

Mortality: RP-2016 for Employees/Annuitants without collar adjustments using Scale MP-2016.

The last experience study was conducted for the period July 1, 2008, through June 30, 2012. The last independent actuarial review of the reasonableness and accuracy of actuarial assumptions, actuarial cost methods, and valuations was conducted as of June 30, 2018.

Discount Rate

A discount rate of 5.24% was used to measure the total OPEB liabilities. The projection of cash flows used to determine the discount rate assumed that contributions from plan members will be made at the current contribution rates and the contributions will be made at statutorily required rates, actuarially determined. This discount rate was determined as a blend of the best estimate of the expected return on plan assets and the 20-year high quality municipal bond rate as of the measurement date. For years where expected benefit payments can be covered by projected trust assets, expected returns are used. For years where payments are not expected to be covered by trust assets, the municipal Bond Buyer 20-Bond General Obligation Index rate is utilized.

Sensitivity to Changes in the MCHCP Discount Rate

The following table presents MOSERS' net OPEB liability, calculated using a discount rate of 5.24%, as well as what the net OPEB liability would be if it were calculated using a discount rate that is one percent lower or one percent higher:

Sensitivity of the Net MCHCP OPEB Liability to Changes in Discount Rate

	1% Decrease in Discount Rate (4.24%)	Current Discount Rate (5.24%)	1% Increase in Discount Rate (6.24%)
Net OPEB liability	\$ 9,135,350	\$ 7,697,649	\$ 6,559,357

Sensitivity to Changes in the Health Care Cost Trend Rates

The following table presents MOSERS' net OPEB liability, calculated using the current trend rate, as well as what the net OPEB liability would be if it were calculated using a trend rate that is one percent lower or one percent higher:

Sensitivity of the Net MCHCP OPEB Liability to Changes in Health Care Cost Trend Rates

	1% Decrease in Trend Rates	Current Trend Rates	1% Increase in Trend Rates
Net OPEB liability	\$ 6,473,006	\$ 7,697,649	\$ 9,254,457

Long-Term Expected Rate of Return

The target allocation and expected real rate of return for each major asset class are listed below:

MCHCP's Long-Term Expected Rate of Return

Asset Class	Target Allocation	Expected Real Rate of Return
Large cap stocks	16.0%	8.5%
Mid cap stocks	7.0	8.8
Small cap stocks	7.0	8.8
High-yield bonds	5.0	9.0
BarCap aggregate bonds	63.0	3.7
Cash equivalents	2.0	3.3

Note 8 – Commitments

As of June 30, 2020, MOSERS has \$490.3 million in unfunded commitments in the private asset class.

MOSERS has contracted with various software and consulting firms to provide and implement a pension administration system at a cost of approximately \$9.3 million. In addition to the cost of the System, MOSERS has engaged consultants to assist with project governance, change management, and data validation. The contracts for these consulting services have an approximate cost of \$2.0 million. As of June 30, 2020, the remaining commitments on these agreements was approximately \$7.5 million.

Note 9 – Contingencies

There were no contingencies which would have a material impact on the financial statements as of June 30, 2020.

Note 10 – Risk Management

MOSERS is exposed to various risks of loss related to natural disasters, errors, and omissions, loss of assets, torts, etc. MOSERS has chosen to cover such losses through the purchase of commercial insurance to help mitigate some of the exposure to those risks.

Schedule of Changes in Employers' Net Pension Liability - MSEP

For Years Ended June 30, 2014 – 2020*

MSEP

	2020	2019
Total pension liability		
Service cost	\$ 159,559,528	\$ 158,190,866
Interest on the total pension liability	960,644,327	956,725,536
Benefit changes	0	0
Difference between expected and actual experience	(70,371,777)	7,426,685
Assumption changes	124,766,739	74,340,841
Benefit payments and member refunds	(873,816,238)	(851,821,580)
Net change in total pension liability	300,782,579	344,862,348
Total pension liability - beginning	13,957,626,309	13,612,763,961
Total pension liability - ending (a)	\$ 14,258,408,888	\$ 13,957,626,309
Plan fiduciary net position		
Employer contributions	\$ 436,895,653	\$ 394,150,042
Employee contributions	35,141,960	31,286,632
Pension plan net investment income (loss)	400,354,303	313,159,178
Benefit payments and member refunds	(873,816,238)	(851,821,580)
Pension plan administrative expense	(8,398,164)	(9,200,826)
Other	4,187,740	4,383,409
Net change in plan fiduciary net position	(5,634,746)	(118,043,145)
Plan fiduciary net position - beginning	7,916,465,279	8,034,508,424
Plan fiduciary net position - ending (b)	7,910,830,533	7,916,465,279
Net pension liability - ending (a)-(b)	\$ 6,347,578,355	\$ 6,041,161,030
Plan fiduciary net position as a percentage of total pension liability	55.48%	56.72%
Covered payroll	\$ 2,006,870,248	\$ 1,950,272,350
Net pension liability as a percentage of covered payroll	316.29%	309.76%

* Schedule is intended to show last 10 fiscal years and will be displayed as it becomes available.

Schedule of Changes in Employers' Net Pension Liability - MSEP (continued)

For Years Ended June 30, 2014 – 2020*

	2018	2017	2016	2015	2014
\$	157,351,979	\$ 152,766,134	\$ 149,021,755	\$ 150,412,577	\$ 158,116,026
	956,201,619	945,654,398	913,877,923	896,451,618	869,878,195
	0	(1,696,059)	0	0	0
	(118,252,032)	(104,203,260)	61,150,083	(27,983,267)	12,376,237
	351,899,973	202,554,786	656,805,085	(57,568,553)	0
	(886,711,473)	(793,964,857)	(757,310,503)	(728,265,800)	(680,436,107)
	460,490,066	401,111,142	1,023,544,343	233,046,575	359,934,351
	13,152,273,895	12,751,162,753	11,727,618,410	11,494,571,835	11,134,637,484
\$	13,612,763,961	\$ 13,152,273,895	\$ 12,751,162,753	\$ 11,727,618,410	\$ 11,494,571,835
\$	379,557,962	\$ 335,217,422	\$ 329,957,369	\$ 329,752,832	\$ 326,370,336
	28,303,994	25,439,343	21,684,920	18,099,455	14,025,328
	576,188,826	272,595,668	1,740,269	(237,070,529)	1,193,952,121
	(886,711,473)	(793,964,857)	(757,310,503)	(728,265,800)	(680,436,107)
	(9,799,256)	(8,759,341)	(8,489,375)	(8,077,692)	(7,336,922)
	1,610,073	5,668,849	4,923,622	5,434,820	296,369,500
	89,150,126	(163,802,916)	(407,493,698)	(620,126,914)	1,142,944,256
	7,945,358,298	8,109,161,214	8,516,654,912	9,136,781,826	7,993,837,570
	8,034,508,424	7,945,358,298	8,109,161,214	8,516,654,912	9,136,781,826
\$	5,578,255,537	\$ 5,206,915,597	\$ 4,642,001,539	\$ 3,210,963,498	\$ 2,357,790,009
	59.02%	60.41%	63.60%	72.62%	79.49%
\$	1,951,454,817	\$ 1,975,353,105	\$ 1,921,528,936	\$ 1,918,527,768	\$ 1,902,719,928
	285.85%	263.59%	241.58%	167.37%	123.92%

Schedule of Changes in Employers' Net Pension Liability - Judicial Plan

For Years Ended June 30, 2014 – 2020*

Judicial Plan

	2020	2019
Total pension liability		
Service cost	\$ 13,119,646	\$ 13,573,453
Interest on the total pension liability	42,458,800	41,710,768
Benefit changes	0	0
Difference between expected and actual experience	(14,933,643)	978,884
Assumption changes	6,341,771	5,024,057
Benefit payments and member refunds	(39,622,268)	(37,593,049)
Net change in total pension liability	7,364,306	23,694,113
Total pension liability - beginning	617,482,705	593,788,592
Total pension liability - ending (a)	\$ 624,847,011	\$ 617,482,705
Plan fiduciary net position		
Employer contributions	\$ 39,174,515	\$ 38,604,668
Employee contributions	1,314,570	1,138,101
Pension plan net investment income (loss)	8,162,709	6,051,941
Benefit payments	(39,622,268)	(37,593,049)
Pension plan administrative expense	(74,450)	(72,141)
Other	0	3,895
Net change in plan fiduciary net position	\$ 8,955,076	\$ 8,133,415
Plan fiduciary net position - beginning	158,332,990	150,199,575
Plan fiduciary net position - ending (b)	167,288,066	158,332,990
Net pension liability - ending (a)-(b)	\$ 457,558,945	\$ 459,149,715
Plan fiduciary net position as a percentage of total pension liability	26.77%	25.64%
Covered payroll	\$ 61,402,061	\$ 60,594,362
Net pension liability as a percentage of covered payroll	745.18%	757.74%

* Schedule is intended to show last 10 fiscal years and will be displayed as it becomes available.

Schedule of Changes in Employers' Net Pension Liability - Judicial Plan (continued)

For Years Ended June 30, 2014 – 2020*

2018		2017		2016		2015		2014	
\$	12,997,198	\$	12,945,567	\$	10,932,097	\$	10,613,686	\$	8,990,293
	41,018,371		40,617,091		37,755,240		36,161,612		34,013,615
	0		0		0		0		0
	(1,319,696)		(10,687,091)		(5,036,696)		5,103,664		13,360,614
	12,332,042		7,905,466		53,991,379		0		0
	(35,657,248)		(33,984,725)		(32,989,714)		(31,245,906)		(29,406,625)
	29,370,667		16,796,308		64,652,306		20,633,056		26,957,897
	564,417,925		547,621,617		482,969,311		462,336,255		435,378,358
\$	593,788,592	\$	564,417,925	\$	547,621,617	\$	482,969,311	\$	462,336,255
\$	36,892,203	\$	34,246,826	\$	33,642,498	\$	32,696,686	\$	29,264,877
	902,319		786,745		661,206		488,193		294,810
	10,677,666		4,680,131		28,081		(3,610,352)		17,199,701
	(35,657,248)		(33,984,725)		(32,989,714)		(31,245,906)		(29,406,625)
	(181,595)		(150,387)		(136,983)		(123,015)		(105,693)
	(68,711)		0		0		0		4,195,049
\$	12,564,634	\$	5,578,590	\$	1,205,088	\$	(1,794,394)	\$	21,442,119
	137,634,941		132,056,351		130,851,263		132,645,657		111,203,538
	150,199,575		137,634,941		132,056,351		130,851,263		132,645,657
\$	443,589,017	\$	426,782,984	\$	415,565,266	\$	352,118,048	\$	329,690,598
	25.30%		24.39%		24.11%		27.09%		28.69%
\$	59,417,302	\$	58,591,661	\$	57,421,016	\$	55,656,457	\$	49,587,936
	746.57%		728.40%		723.72%		632.66%		664.86%

Pension Trust Funds
Schedule of Employer Contributions
 Last Ten Fiscal Years

MSEP

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution*	Contribution Deficiency (Excess)	Covered Payroll**	Contributions as a Percentage of Covered Payroll
2020	\$ 436,895,653	\$ 436,895,653	\$ 0	\$ 2,006,870,248	21.77%
2019	394,150,042	394,150,042	0	1,950,272,350	20.21
2018	379,557,962	379,557,962	0	1,951,454,817	19.45
2017	322,772,697	335,217,422	(12,444,725)	1,975,353,105	16.97
2016	310,124,928	329,957,369	(19,832,414)	1,921,528,936	16.97
2015	329,752,832	329,752,832	0	1,918,527,768	16.97
2014	326,370,336	326,370,336	0	1,902,719,928	16.98
2013	274,655,284	274,655,284	0	1,880,212,950	14.45
2012	263,373,924	263,373,924	0	1,864,069,493	13.97
2011	263,418,048	263,418,048	0	1,875,569,816	13.81

Judicial Plan

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution*	Contribution Deficiency (Excess)	Covered Payroll**	Contributions as a Percentage of Covered Payroll
2020	\$ 39,174,515	\$ 39,174,515	\$ 0	\$ 61,402,061	63.80%
2019	38,604,668	38,604,668	0	60,594,362	63.71
2018	36,892,203	36,892,203	0	59,417,302	62.09
2017	32,670,710	34,246,826	(1,576,116)	58,591,661	58.45
2016	31,604,527	33,642,498	(2,037,971)	57,421,016	58.45
2015	32,696,686	32,696,686	0	55,656,457	58.45
2014	29,264,877	29,264,877	0	49,587,936	59.69
2013	28,330,649	28,330,649	0	48,697,726	56.92
2012	26,324,526	26,324,526	0	45,835,501	57.30
2011	27,702,682	27,702,682	0	45,888,020	60.03

* Since the percent of payroll contributions rate was applied to the pension payroll during the fiscal year, the actuarially determined contribution is equal to the actual contribution. In fiscal years 2016 and 2017, excess contributions were made because the actuarially determined contribution rate fell below the Board-established minimum contribution rate.

** For fiscal years 2016 and prior, covered payroll totals from the valuation report were used, which includes actual covered payroll from July through May with estimated amounts for June. For fiscal years 2017 and forward, covered payroll totals used are actual covered payroll from July through June, as reported in the GASB 67 report.

Pension Trust Funds

Schedule of Annual Money-Weighted Rate of Return on Investments*

Year Ended June 30	Annual Money-Weighted Rate of Return - Net of Investment Expense
2020	5.25%
2019	4.10
2018	7.57
2017	3.51
2016	0.08
2015	(2.60)
2014	19.25

** Schedule is intended to show last 10 fiscal years and will be displayed as it becomes available.*

Pension Trust Funds

Notes to the Schedules of Required Supplementary Information

Actuarial Methods and Assumptions for Valuations Performed as of June 30, 2020

The entry-age actuarial cost method of valuation is used in determining liabilities and normal cost. Regular actuarial valuations provide valuable information about the composite change in the unfunded actuarial accrued liabilities (whether or not the liabilities are increasing or decreasing, and by how much). Since the future cannot be predicted with precision, actual experience is expected to differ from assumed experience. Differences occurring in the past between assumed experience and actual experience (actuarial gains and losses) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments (principal and interest), which are expressed as a percent of payroll. A layered, closed 30-year amortization period was used for the June 30, 2020 valuations to determine the fiscal year 2022 contribution rates. The actuarial value is calculated by recognizing the difference between the actual and expected return on the fair value of assets each year over a closed five-year period. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.

The investment return rate assumption was reduced from 7.10%, as of June 30, 2019, to 6.95% per year, as of June 30, 2020, compounded annually (net of investment expenses). The price inflation assumption used was 2.25% per year. Projected salary assumptions were 2.75% to 8.25% for the MSEP and 2.50% to 4.70% for the Judicial Plan. The assumption used for annual post-retirement benefit increases (COLAs) is 4.0% (on a compound basis) when a minimum COLA is in effect. When no minimum COLA is in effect, the annual COLA is assumed to be 1.80% (80% of the 2.25% price inflation), on a compounded basis.

Actuarial Assumptions and Methods Used to Set the Actuarially Determined Contributions - Five-Year Review

MSEP & Judicial

Valuation year	2020	2019	2018	2017	2016
Contribution rate for fiscal year	2022	2021	2020	2019	2018
Actuarial cost method	Entry Age Normal	Entry Age Normal	Entry Age Normal	Entry Age Normal	Entry Age Normal
Amortization method	Layered bases approach - Level percentage of payroll	Layered bases approach - Level percentage of payroll	Layered bases approach - Level percentage of payroll	Single base approach - Level percentage of payroll	Single base approach - Level percentage of payroll
Amortization periods	Closed 30-year period	Closed 30-year period	Closed 30-year period	Closed 30-year period	Closed 30-year period
Inflation	2.25%	2.35%	2.50%	2.50%	2.50%
Cost-of-living adjustment	4% or 1.80%	4% or 1.88%	4% or 2%	4% or 2%	4% or 2%
Salary increase	varied	varied	varied	varied	varied
Payroll growth	2.25%	2.35%	2.50%	3.00%	3.00%
Investment rate of return	6.95%	7.10%	7.25%	7.50%	7.65%

Schedule of Proportionate Share of the Net OPEB Liability

For Years Ended June 30, 2018 – 2020*

State Retiree Welfare Benefit Trust

	2020	2019	2018
MOSERS' proportion of the net OPEB liability	0.4352%	0.4375%	0.4121%
MOSERS' proportionate share of the net OPEB liability	\$ 7,697,649	\$ 7,666,038	\$ 7,272,038
MOSERS' covered payroll	\$ 7,370,032	\$ 7,056,668	\$ 6,669,717
MOSERS' proportionate share of the net OPEB liability as a percentage of its covered payroll	104.45%	108.64%	109.03%
Plan fiduciary net position as a percentage of the total OPEB liability	7.31%	6.90%	6.64%

* The amounts presented in this schedule were determined as of the previous fiscal year end. Intended to show information for 10 years, data for additional years will be displayed as it becomes available.

Schedule of Employer Contributions for OPEB

For Years Ended June 30, 2018 – 2020*

	2020	2019	2018
Contractually required contribution	\$ 311,510	\$ 331,275	\$ 301,182
Contributions in relation to the contractually required contribution	\$ 311,510	\$ 331,275	\$ 301,182
Contribution deficiency (excess)	\$ 0	\$ 0	\$ 0
MOSERS' covered payroll	\$ 7,569,252	\$ 7,370,032	\$ 7,056,668
Contributions as a percentage of covered payroll	4.12%	4.49%	4.27%

* Intended to show information for 10 years, data for additional years will be displayed as it becomes available.

Schedules of Investment Expenses

For the Year Ended June 30, 2020

Investing activity	MSEP	Judicial Plan	Total
Investment management and incentive fees			
Equity			
Blakeney Onyx, LP	\$ 33,089	\$ 674	\$ 33,763
Harvest Fund Advisors, LLC	153,994	3,137	157,131
Silchester International Investors	3,169,958	64,579	3,234,537
SSGA Emerging Markets	41,015	836	41,851
Fixed income			
Stone Harbor Investment Partners	110,166	2,244	112,410
Multi-asset			
Blackrock	61,379	1,250	62,629
NISA Investment Advisors	5,695,919	116,039	5,811,958
Alternatives			
Actis Emerging Markets III	126,424	2,576	129,000
Actis Emerging Markets IV	627,939	12,793	640,732
AQR DELTA Sapphire Fund, LP	2,935,496	59,803	2,995,299
Axiom Asia Private Capital Fund II, LP	343,693	7,002	350,695
Axiom Asia Private Capital Fund III, LP	703,870	14,339	718,209
Axxon Brazil Private Equity Fund II B, LP	258,371	5,264	263,635
Bayview Opportunity Domestic IIIb, LP	127,183	2,591	129,774
Blackstone Real Estate Partners IV	479,082	9,760	488,842
Blackstone Real Estate Partners V	(278,046)	(5,664)	(283,710)
Blackstone Real Estate Partners VI	206,243	4,202	210,445
Blackstone Real Estate Partners VII	4,061	83	4,144
Blackstone Topaz Fund, LP	2,609,394	53,159	2,662,553
Blackstone Topaz Private Credit	138,439	2,820	141,259
Bridgewater Associates - All Weather @ 12%, LLC	704,848	14,359	719,207
Bridgewater Associates - Diamond Ridge Fund, LLC	3,953,415	80,540	4,033,955
CarVal Investors CVI Global Value Fund A, LP - private debt	12,623	257	12,880
CarVal Investors CVI Global Value Fund A, LP - real estate	12,623	257	12,880
Catalyst Fund Limited Partnership III	695,628	14,171	709,799
Catalyst Fund Limited Partnership IV	313,327	6,383	319,710
Catalyst Fund Limited Partnership V	2,308,216	47,024	2,355,240
Cornwall Domestic, LP	67,965	1,385	69,350
DRI Capital - LSRC	357,923	7,292	365,215
EIG Energy Fund XIV, LP	82,149	1,674	83,823
EIG Energy Fund XV, LP	378,631	7,714	386,345
EIG Energy Fund XVI, LP	(865,172)	(17,625)	(882,797)
Elliott International Limited	9,292,212	189,303	9,481,515
Exodus Point	727,349	14,818	742,167
Farallon Capital Institutional Partners, LP	(55,060)	(1,122)	(56,182)
Gaoling Fund, LP	26,410	538	26,948

Schedule of Investment Expenses continued on page 65

Schedules of Investment Expenses (continued)

For the Year Ended June 30, 2020

Investing activity	MSEP	Judicial Plan	Total
Gateway Energy & Resource Holdings, LLC	\$ 338,395	\$ 6,894	\$ 345,289
Glenview Capital Opportunity Fund, LP	494,514	10,074	504,588
Glenview Sidecar	101,031	2,058	103,089
Global Forest Partners GTI7 Institutional Investors Company Ltd.	3,175	65	3,240
HBK Merger Strategies Offshore Fund, Ltd.	3,310,028	67,433	3,377,461
JLL Partners Fund V, LP	(187,963)	(3,829)	(191,792)
JLL Partners Fund VI, LP	(1,623,779)	(33,080)	(1,656,859)
Kennedy Capital	186,928	3,808	190,736
King Street Capital, LP	35,759	729	36,488
King Street Capital, Ltd.	623	13	636
Linden Capital Partners II, LP	1,108,445	22,581	1,131,026
Mast Credit Opportunities I, LP	44,869	914	45,783
Merit Energy Partners F-II, LP	36,882	751	37,633
MHR Institutional Partners IIA, LP	(76,831)	(1,565)	(78,396)
MHR Institutional Partners III, LP	301,347	6,139	307,486
MHR Institutional Partners IV, LP	915,209	18,645	933,854
Millennium Technology Value Partners II	(256,267)	(5,221)	(261,488)
OCM Opportunities Fund VIIIb, LP	(6,598)	(134)	(6,732)
OCM Opportunities Fund VIIIb, LP	199,918	4,073	203,991
OCM Power Opportunities Fund III, LP	(295,709)	(6,024)	(301,733)
OCM/GFI Power Opportunities Fund II, LP	(46)	(1)	(47)
Perry Partners, LP	118	2	120
Pharo Macro Fund, Ltd.	1,325,665	27,007	1,352,672
Silver Creek Special Opportunities Fund I, LP	29,119	593	29,712
Silver Creek Special Opportunities Fund II, LP	33,442	681	34,123
Silver Lake Partners II, LP	(24,803)	(505)	(25,308)
Standard Investment Research Hedged Equity Fund	2,775,871	56,551	2,832,422
StepStone Capital Buyout Fund II, LP	78,848	1,606	80,454
StepStone Opportunities Fund II, LP	38,739	789	39,528
Voleon Investors Fund, LP	203,784	4,152	207,936
Voleon Institutional Strategies Fund, LP	589,548	12,010	601,558
Total investment management and incentive fees	45,241,017	921,664	46,162,681
Other investment fees			
<i>Investment consultant fees</i>			
Meketa Investment Group	264,861	2,348	267,209
NEPC	317,188	2,812	320,000
Total investment consultant fees	582,049	5,160	587,209
<i>Investment custodial and other fees</i>			
BNY Mellon (custodial)	371,576	7,570	379,146
BNY Mellon (performance calculation)	226,933	4,623	231,556
Total investment custodial and other fees	598,509	12,193	610,702
Internal investment activity expenses	4,032,395	82,149	4,114,544
Total investing activity expenses	\$ 50,453,970	1,021,166	\$ 51,475,136

Pension Trust Funds

Schedules of Internal Investment Activity Expenses

For the Year Ended June 30, 2020

Personnel services

Salaries	\$ 2,458,734
Fringe benefits	957,983
Total personnel services	<u>3,416,717</u>

Professional services

Attorney services	143,096
Total professional services	<u>143,096</u>

Communications

Telephone	8,744
Total communications	<u>8,744</u>

Facilities

Utilities	5,555
Lease expense	84,088
Facility maintenance	9,979
Total facilities	<u>99,622</u>

Software and equipment

Computer supplies and software	4,781
Total software and equipment	<u>4,781</u>

Education, meetings and travel

Professional development including travel	15,553
Due diligence travel	3,751
Total education, meetings and travel	<u>19,304</u>

General

Research and information services	402,236
Membership dues	9,539
Office supplies	15
Periodicals and publications	10,490
Total general	<u>422,280</u>
Total internal investment activity expenses	<u>\$ 4,114,544</u>

Pension Trust Funds
Schedules of Administrative Expenses
For the Year Ended June 30, 2020

Personnel services	
Salaries	\$ 4,167,657
Fringe benefits	1,987,567
Total personnel services	<u>6,155,224</u>
Professional services	
Actuarial services	151,534
Attorney services	80,715
Auditing services	67,890
Consulting services	602,162
Total professional services	<u>902,301</u>
Communications	
Video production	3,789
Telephone	49,872
Printing	33,366
Postage and mailing	155,023
Total communications	<u>242,050</u>
Facilities	
Utilities	95,810
Facility maintenance	72,036
Vehicle maintenance and operation	3,569
Total facilities	<u>171,415</u>
Software and equipment	
Computer supplies and software	71,682
Maintenance agreements	486,092
Equipment rental	71,896
Gain on sale of equipment	(39,185)
Total software and equipment	<u>590,485</u>
Education, meetings and travel	
Board travel and meetings	9,783
Professional development including travel	66,109
MOSERS sponsored seminars	75,316
Due diligence	4,399
Tuition reimbursement	8,732
Total education, meetings and travel	<u>164,339</u>
General	
Advertising	5,506
Banking services	45,692
Employee services	3,855
Research and information services	26,903
Insurance	185,410
Membership dues	17,078
Business continuity	85,954
Office supplies	19,345
Periodicals and publications	2,995
Depreciation	308,938
Miscellaneous	24,350
Insurance activities fiscal agent fees	(479,226)
Total general	<u>246,800</u>
Total administrative expenses	<u>\$ 8,472,614</u>

Schedules of Professional Service Fees

For the Year Ended June 30, 2020

Professional Services	Pension Trust Funds	Internal Service Funds
Operations administrative expenses		
<i>Actuarial services</i>		
Cavanaugh Macdonald Consulting, LLC	\$ 151,534	\$ 0
<i>Attorney services</i>		
Ice Miller, LLP	19,124	0
Thompson Coburn, LLP	61,591	6,359
Total attorney services	80,715	6,359
<i>Auditing services</i>		
Eide Bailly	67,890	33,450
<i>Consulting services</i>		
Avtex – information technology	25,679	0
Charlesworth & Associates – risk management	36,085	0
CherryRoad Technologies – information technology	165,600	0
Gamble & Schlemeier, Ltd. – governmental affairs	26,967	0
Huber & Associates – information technology	52,006	0
Indelible, LLC – information technology	5,000	0
Norlem Technology Consulting – information technology	6,140	0
SHI International Corp – information technology	11,920	0
Verus Advisory, Inc. – investment consulting	272,500	0
Other consulting services	265	0
Total consulting services	602,162	0
Total operations administrative expenses	902,301	39,809
Investment administrative expenses		
<i>Attorney services</i>		
Purrington Moody Weil, LLP	3,753	0
Thompson Coburn, LLP	138,184	0
Other attorney services	1,159	0
Total attorney services	143,096	0
Total investment administrative expenses	143,096	0
Total professional fees	\$ 1,045,397	\$ 39,809

Information on investment management and consulting fees can be found in the Schedule of Investment Expenses on pages 64-65.

Capitalized professional service fees for the pension administration system

<i>Consulting services</i>	
ICON Integration and Design, Inc.	\$ 250,327
Linea Solutions	188,552
Tegrit	1,532,928
Total consulting services	\$ 1,971,807

Internal Service Funds

Combined Statements of Net Position

As of June 30, 2020

	Life and LTD	Deferred Compensation	Total
Assets			
<i>Current assets</i>			
Premiums receivable	\$ 1,002,946	\$ 0	\$ 1,002,946
Short-term instruments	4,897,697	694,654	5,592,351
Total current assets	5,900,643	694,654	6,595,297
Total assets	5,900,643	694,654	6,595,297
Deferred outflows of resources	0	13,340	13,340
Liabilities			
<i>Current liabilities</i>			
Premiums payable	2,462,189	0	2,462,189
Due to other funds	1,434,957	61,698	1,496,655
Other liabilities	4,546	61,975	66,521
Total current liabilities	3,901,692	123,673	4,025,365
Deferred revenue	1,879,564	0	1,879,564
Net OPEB liability	0	2,489	2,489
Total liabilities	5,781,256	126,162	5,907,418
Deferred inflow of resources	0	8,133	8,133
Net Position			
Unrestricted net position	119,387	573,699	693,086
Total net position	\$ 119,387	\$ 573,699	\$ 693,086

Internal Service Funds

Combined Statements of Revenues, Expenses, and Changes in Net Position

For Year Ended June 30, 2020

	Life & LTD	Deferred Compensation	Total
Operating revenues			
Premium receipts	\$ 32,582,558	\$ 0	\$ 32,582,558
Deferred compensation receipts	0	1,315,076	1,315,076
Miscellaneous income	484,075	0	484,075
Total operating revenues	33,066,633	1,315,076	34,381,709
Operating expenses			
Premium disbursements	32,549,567	0	32,549,567
Premium refunds	32,991	0	32,991
Administrative expenses	480,120	1,145,482	1,625,602
Total operating expenses	33,062,678	1,145,482	34,208,160
Net operating income	3,955	169,594	173,549
Nonoperating revenues			
Interest income	46,539	7,289	53,828
Total nonoperating revenues	46,539	7,289	53,828
Net revenues over expenses	50,494	176,883	227,377
Net position beginning of year	68,893	396,816	465,709
Net position end of year	\$ 119,387	\$ 573,699	\$ 693,086

Internal Service Funds

Combined Statements of Cash Flows

For the Year Ended June 30, 2020

	Life & LTD	Deferred Compensation	Total
Cash flows from operating activities			
Cash received from employers and members	\$ 34,159,425	\$ 1,315,076	\$ 35,474,501
Payments to outside carriers	(35,261,818)	0	(35,261,818)
Refund of premiums to members	(32,991)	0	(32,991)
Cash payments to employees for services	0	(1,041,529)	(1,041,529)
Cash payments to other suppliers of goods and services	(480,283)	(38,614)	(518,897)
Net cash (used) provided by operating activities	(1,615,667)	234,933	(1,380,734)
Cash flows from investing activities			
Purchase of short-term instruments	(1,948,347,710)	(7,843,141)	(1,956,190,851)
Proceeds from sale and maturities of short-term instruments	1,949,916,838	7,600,919	1,957,517,757
Cash received from investing activities	46,539	7,289	53,828
Net cash provided (used) by investing activities	1,615,667	(234,933)	1,380,734
Net increase (decrease) in cash	0	0	0
Cash balances beginning of year	0	0	0
Cash balances end of year	\$ 0	\$ 0	\$ 0
Reconciliation of net operating (loss) income to net cash provided by operating activities			
Net operating income (loss)	\$ 3,955	\$ 169,594	\$ 173,549
<i>Adjustments to reconcile net operating (loss) to net cash provided (used) by operating activities</i>			
Depreciation expense	0	6,947	6,947
Change in assets and liabilities:			
(Increase) in operational accounts receivable	(45,159)	0	(45,159)
Deferred outflows of resources	0	(13,340)	(13,340)
Increase (decrease) in operational liabilities	(1,574,463)	61,110	(1,513,353)
Net OPEB liability	0	2,489	2,489
Deferred inflows of resources	0	8,133	8,133
Total adjustments	(1,619,622)	65,339	(1,554,283)
Net cash (used) provided by operating activities	\$ (1,615,667)	\$ 234,933	\$ (1,380,734)

Internal Service Funds
Schedules of Administrative Expenses
For the Year Ended June 30, 2020

Personnel services	
Salaries	\$ 681,818
Employee fringe benefits	303,917
Total personnel services	<u>985,735</u>
Professional services	
Attorney services	6,359
Auditing services	33,450
Total professional services	<u>39,809</u>
Communications	
Video production expense	865
Telephone	7,356
Printing	263
Postage and mailing	262
Total communications	<u>8,746</u>
Facilities	
Building use charge	10,000
Maintenance	574
Total facilities	<u>10,574</u>
Software and equipment	
Computer supplies and equipment	6,042
Maintenance agreements	12,435
Total software and equipment	<u>18,477</u>
Education, meetings and travel	
Professional development including travel	6,983
MOSERS sponsored seminars	45,609
Due diligence travel	1,945
Total education, meetings and travel	<u>54,537</u>
General	
Advertising	7,085
Banking services	894
Research and information services	3,897
Membership dues	1,455
Periodicals and publications	8,220
Depreciation	6,947
Administrative expenses allocation	479,226
Total general	<u>507,724</u>
Total administrative expenses	<u>\$ 1,625,602</u>



Investment Section

Chief Investment Officer's Report



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October 16, 2020

Dear Members,

I am pleased to present the *Investment Section* of the *MOSERS Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2020.

To say the year was a wild ride in the world of investments may be an understatement. Fueled by strong returns in the equity and bond markets, MOSERS' year-to-date portfolio return in late February was up around 8.0%. Then, the COVID-19 pandemic began to take its toll on the markets, with global equities losing 36.0% of their value by mid-March. MOSERS' portfolio was not immune to this: our year-to-date return fell to a low of (9.0)%. Then, from late March through June, our portfolio rallied, eventually ending the year with a return of 5.2% (net of fees and expenses).

Although the losses experienced from late February to mid-March were significant, they were mitigated by the diversifying assets present in the portfolio. Specifically, our meaningful allocation to "safer" assets, such as long duration U.S. Treasuries and U.S. Treasury Inflation Protection Securities (TIPS), shielded our portfolio from greater losses. In addition, the loss in value on "riskier" assets, such as equities and high-yielding instruments, allowed us to invest at opportune prices, boosting the portfolio in the market's second-quarter rally.

The combination of the above led the portfolio to post a one-year return that ranked in the top 1% of all public pension funds with assets greater than \$1 billion, according to the Investor Force universe rankings (71 funds in the universe).

Other highlights for the year include the following:

- Our one-year return exceeded the policy return (i.e. the return expectation set by the Board) by 3.2%, benefiting the fund by over \$250 million.
- The one-year total risk, as measured by standard deviation, for the total fund was less than total fund policy (9.5% vs 11.2%).
- Management fees paid to external managers in fiscal year 2020 were \$35.6 million. The amount represented a savings of \$5.1 million compared to fiscal year 2019 and was the lowest amount of management fees paid by the fund since fiscal year 2004.

As mentioned in last year's CIO letter, the Board adopted new asset allocations for MOSERS' portfolio in 2018. Compared to recent allocations, this one emphasizes growth investments, such as equities, but is still balanced by significant allocations to safer, diversifying assets such as U.S. Treasuries and U.S. TIPS. In fiscal year 2019, staff began transitioning to this new portfolio and, by the end of fiscal year 2020, had completed 58% of that transition. We expect to complete this transition before the end of the fiscal year 2021.

As a lifetime Missourian, I am honored to play a part in the secured retirement benefits of the fine members of this System. I thank Executive Director Ronda Stegmann and the Board of Trustees for allowing me the opportunity to serve.

Sincerely,

D. Shannon Davidson
Chief Investment Officer

Investment Policy Summary

The investment policy summary serves as a reference point for management of System assets and outlines MOSERS' investment philosophy and practices. Investments within this report are presented on the basis of fair value using a variety of sources such as appraisals, valuations of underlying companies and assets for limited partnerships and commingled funds, and through fair values obtained from the investment custodian.

The purpose of MOSERS' investment program is to ensure that MOSERS' members and beneficiaries receive their benefits at a reasonable and predictable cost to the employers. Plan assets may be invested, reinvested, and managed by MOSERS' investment staff or third-party investment managers, subject to the terms, conditions, and limitations provided by law and contracts, where applicable.

The MOSERS Board of Trustees (the Board), charged with the responsibility for investing the assets of the System in a manner consistent with fiduciary standards set forth in the prudent person rule, has adopted the following objectives and philosophies to guide all investment related decisions.

Investment Objective

- Develop a Real Return Objective (RRO) intended to keep contribution rates at a reasonable level over long periods of time, absent changes in actuarial assumptions.
- Establish an asset allocation policy that is expected to meet the RRO, while minimizing the impact of the portfolio investments' volatility on the contribution rate.
- Maximize long-term investment returns by exposing plan assets to a prudent level of risk in order to support the goal of having sufficient funds available to meet projected benefit payment obligations.
- Monitor costs associated with the efficient implementation of the asset allocation policy through the use of internal and external resources.

Investment Philosophy

- A key risk to the portfolio is asset shortfall where assets are insufficient to meet promised benefit obligations. As a result, the Board will strive to minimize the potential for long-term impact from disproportionate drawdowns.
- MOSERS is willing to take measured risks for which it expects to be compensated, and will seek to avoid risks, which may not be appropriately rewarded.
- The Board will employ a disciplined, objective, and quantitatively-driven asset/liability analysis process with the goal of determining the optimal asset allocation policy to meet the investment objectives.
- In order to meet the RRO, it is necessary for the portfolio to maintain a significant allocation to growth (i.e., equity) assets. As a result, equity risk is expected to be the key contributor to the overall risk of the portfolio's investments (Total Fund). In recognition of this, the Board's asset allocation policy will seek to mitigate the risk from large equity market declines.
- Strategic asset allocation is a significant factor influencing long-term investment performance and asset volatility. The asset allocation targets, determined by the Board, will be adhered to through clearly defined rebalancing guidelines.
- The Board will seek to cause the total fund to be broadly diversified and risk-balanced in view of the fact that not all strategies will add value at all times, which should mitigate the impact of negative market environments over its long-term investment horizon.
- Risk management and performance benchmarking are integral to the investment program. The Board will establish and regularly monitor appropriate absolute and relative return risk as well as other key risks that affect the total fund.
- The Board will employ industry-accepted benchmarks for all major asset classes, using published market indices where feasible.
- Costs meaningfully impact investment returns and will be a consideration in all investment program decisions. Investment performance shall be reported net of fees to incorporate the full impact of fees and costs.

Roles and Responsibilities

Board of Trustees

The Board of Trustees (the Board) bears the ultimate fiduciary responsibility for the investment of System assets. Members of the Board must adhere to state law and prudent standards of diligence with respect to their duties as investment fiduciaries. Accordingly, they are required to discharge their duties in the interest of plan participants. They must also “act with the same care, skill, prudence, and diligence under prevailing circumstances that a prudent person, acting in a similar capacity and familiar with those matters, would use in the conduct of a similar enterprise with similar aims.”¹ Specifically related to investments, the Board is responsible for prudent oversight, governance, and management of the System’s assets.

Executive Director

The executive director is appointed by, and serves at the pleasure of, the Board. Pursuant to its authority to delegate functions to employees of the System under Section 104.1069, RSMo., the Board of Trustees has delegated to the executive director the responsibility to manage the staff that oversees and executes MOSERS’ investment program. The executive director selects, evaluates, and terminates the chief investment officer and is responsible for monitoring the investment program compliance, as established by policies set forth by the Board.

Chief Investment Officer (CIO) and Internal Staff

The CIO serves at the pleasure of the executive director and has primary responsibility for the overall direction of the investment program. The CIO works with the Board investment consultant and executive director in advising the Board on policies related to the investment program. The CIO has primary responsibility to make hiring and termination decisions related to money managers with the approval of the staff investment consultant. The CIO is also charged with the responsibility of making strategic allocation decisions within parameters established by Board policy. Other responsibilities of the CIO include monitoring the investment of System assets, oversight of external money managers and the internally managed portfolios, and keeping the Board apprised of situations that merit their attention. The internal investment staff is accountable to the CIO.

External Consultants

The Board investment consultant serves at the pleasure of the Board. The Board investment consultant's primary duty is to provide the Board with independent and objective investment advice and assist the Board in making decisions and overseeing the investment program. Specifically, the Board investment consultant assists the Board in developing investment policy, recommends asset allocation policy as requested by the Board, and assists the Board in oversight of the investment program.

Staff investment consultants serve at the pleasure of the CIO. The primary responsibilities of the staff investment consultants are to provide independent and objective investment advice to the staff. Among other duties, as applicable, each staff investment consultant agrees in writing to the CIO’s proposed hiring or termination of external investment management firms and third-party plan administrators.

Chief Auditor

The chief auditor reports administratively to the executive director and functionally to the Board. The chief auditor is independent of the System’s investment operations and, among other duties, is responsible for providing objective audit and review services for investment operations. It is the chief auditor’s objective to promote adequate and effective internal controls at a reasonable cost.

Master Custodian

Bank of New York Mellon serves as the master custodian of the System’s assets except in cases where investments are held in partnerships, commingled accounts, or unique asset classes where it is impossible for them to do so. The master custodian is responsible for maintaining the official book of records, providing performance reports, and serving as an additional layer of risk control in the safekeeping of System assets.

¹ Section 105.688, RSMo - Investment Fiduciaries, Duties.

Asset Allocation

Determining the System's asset allocation is one of the most important decisions in the investment management process. The Board, with advice from the Board investment consultant and the CIO, adopted a new portfolio allocation in July 2018 that is designed to provide the highest probability of meeting or exceeding the System's investment objectives at a controlled level of risk and with liquidity that is acceptable to the Board. The Board has adopted a plan to transition from the old portfolio allocation to the new portfolio allocation over a period of time in order to lessen the impact of market volatility. In determining the optimum mix of assets, the Board considers five factors:

- The expected risk of each asset class.
- The expected rate of return for each asset class.
- The correlation between the rates of return of the asset classes.
- The investment objectives and risk constraints of the fund.
- The impact of the portfolio's volatility on the contribution rate.

While the Board maintains a set policy allocation mix, they have taken steps to provide flexibility by granting authority to the CIO to make strategic allocation decisions to capitalize on attractively valued opportunities within prudent risk constraints. This flexibility has allowed the System to take advantage of changing market conditions. The table below illustrates the policy asset allocation and ranges formally adopted by the Board for the old and new portfolio.

Asset Allocation

Old Portfolio - Asset Classes	Risk Allocation Policy	Risk Allocation Ranges ¹	Benchmark ²	Benchmark Weight
Opportunistic global equity	36%	25% - 47%	MSCI ACWI ³ + .75%	38%
Nominal bonds	24%	17% - 31%	Bloomberg Barclays Long Treasury	44%
Commodities	19%	13% - 25%	Bloomberg Commodity Index (BCOM) ⁴	20%
Inflation-protected bonds	8%	5% - 10%	Bloomberg Barclays 1-10 TIPS	39%
Alternative beta	13%	9% - 17%	AQR DELTA ⁵	31%

New Portfolio - Asset Classes	Asset Allocation Policy	Asset Allocation Ranges ¹	Benchmark ²
Total growth	45%	35% - 55%	Blended
Global public equities	30%	15% - 45%	MSCI ASCWI
Global private equities	15%	5% - 20%	Burgiss All Equity Universe (weighted by vintage year)
Total income	35%	30% - 40%	Blended
Long treasuries	25%	20% - 30%	Bloomberg Barclays Long Treasury
Core bonds	10%	5% - 15%	Bloomberg Barclays Aggregate Bond
Total inflation hedge	40%	35% - 45%	Blended
Commodities	5%	0% - 10%	Bloomberg Commodity Index (BCOM)
TIPS	25%	20% - 30%	Bloomberg Barclays 1 - 10 yr TIPS
Private real assets	5%	0% - 10%	NCREIF ODCE
Public real assets	5%	0% - 10%	NAREIT Index
Total alternative beta	20%	15% - 25%	Blended
Hedge funds	5%	0% - 10%	HFRI Fund Weighted Composite Index
Alternative beta	10%	5% - 15%	HRFX Macro/CTA
Private credit	5%	0% - 10%	S&P/LSTA U.S. Leveraged Loan Index + 2%

¹ The Board has granted the CIO the authority to operate within the risk allocation and policy asset allocation ranges.

² Benchmarks are net of MOSERS' actual leveraging costs on borrowed assets.

³ Morgan Stanley Capital International All Country World Index (net dividends). Legacy real estate benchmarked to the Dow Jones U.S. REIT Index.

⁴ Bloomberg Commodity Index

⁵ A diversified risk-balanced portfolio of liquid hedge fund risk premia managed by AQR Capital net of management fees.

Rebalancing

It is the responsibility of staff to ensure that the asset allocation adheres to the System's rebalancing policy. MOSERS utilizes a combination of cash market and derivative transactions to maintain the total portfolio's allocation at the broad policy level. Month-end reviews are conducted to bring the portfolio back within allowable ranges of the broad policy targets.

Risk Controls

MOSERS' investment program faces numerous risks; however, the primary risk to MOSERS is that the assets will not support the liabilities over long periods of time. In order to control this risk and numerous other risks that face the System, the Board has taken the following steps, on an ongoing basis, to help protect the System:

- Actuarial valuations are performed each year to ensure the System is on track to meet the funding objectives of the plan. In addition, every five years an external audit of the actuary is conducted to ensure that the assumptions being made and calculation methods being utilized are resulting in properly computed liabilities.
- Asset/liability studies are conducted at least once every five years. The purpose of these studies is to ensure that the current portfolio design is structured to meet the System's liabilities. During these studies, investment expectations are also reexamined in more detail.
- An investment policy statement is in place to ensure that Board policies are clearly identified. Within these documents, desired outcomes are identified, responsibilities for individuals are identified in relation to particular areas of the portfolio's management, and details are provided for measuring outcomes. Reporting requirements are clearly identified to ensure appropriate checks and balances are in place. In addition, annual performance audits are conducted to ensure the performance measurement tools and methodologies being utilized are proper.

Performance Objectives and Monitoring Process

Generating returns net of expenses equaling the RRO (4.75% in fiscal year 2020) plus inflation remains the primary performance objective for the total portfolio.

The reason for the long-term focus on this objective is to preclude the temptation to overreact to events in the marketplace that have no relevance in the management of the relationship between the System's assets and liabilities. The resulting dilemma is the conflicting need to evaluate investment policy implementation decisions over shorter time frames while maintaining the longer-term focus necessary to manage and measure the fund's performance relative to the RRO. To address this problem, the Board evaluates performance relative to policy and strategy benchmarks. This helps to evaluate the Board's broad policy decisions and the staff and external consultant's implementation decisions. Policy benchmarks measure broad investment opportunities of each sub-asset class in which MOSERS has chosen to invest. The strategy benchmarks represent decisions made by the CIO to strategically deviate from the policy asset allocation for each sub-asset class. The return of the strategy benchmarks are determined based upon the actual weight of the asset class multiplied by the appropriate benchmark.

The policy and strategy benchmarks are used in the following manner to evaluate Board and staff decisions:

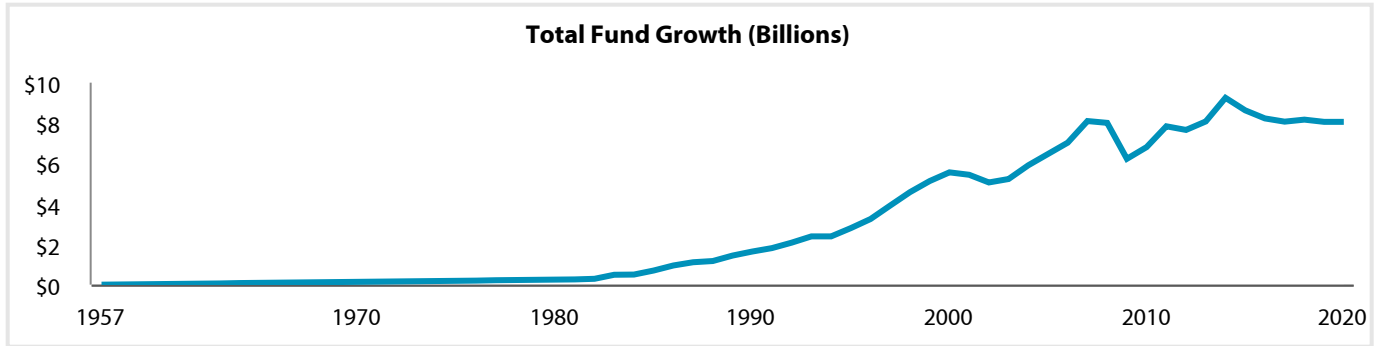
- **Board Decisions:** The value added through Board policy decisions is measured by the difference between the total fund policy benchmark return and the RRO. This difference captures the value added by the Board through their policy asset allocation decisions relative to the return necessary to fund the System's liabilities. A policy benchmark return greater than the RRO reflects the achievement of the RRO goals. A policy benchmark return less than the RRO reflects losses or shortfalls in performance in funding the liabilities. These policy decisions are measured over long periods of time.
- **CIO and External Consultants' Decisions:** There are two components to decisions made by the CIO and external consultants, which are monitored by the Board on an ongoing basis. They are: 1) strategic allocation decisions, and 2) implementation decisions.

Strategy decisions are made by the CIO to deviate from the policy benchmark weight. The difference between the strategy benchmark return and the policy benchmark return captures the value added by the CIO through strategic decisions to overweight or underweight assets relative to the Board's policy allocation decisions. A strategy benchmark return greater than the policy benchmark return reflects value added through the strategic decisions. A strategy benchmark return less than the policy benchmark return reflects losses to the fund's performance based upon strategy decisions. Strategy decisions should be measured over all periods of time with majority weight placed on outcomes that have occurred over a market cycle. Implementation decisions are money manager selection choices made by the CIO with the approval of the appropriate external consultant that the decision was made in accordance with the Board's adopted policy. The value added through these decisions is measured by the difference between the actual portfolio return and the strategy benchmark return. This difference captures the value added through these external manager selection decisions. An actual portfolio return greater than the strategy benchmark return reflects value added through these external manager selection decisions. An actual portfolio return less than the strategy benchmark return reflects losses to the fund's performance based upon implementation decisions. Implementation decisions should be measured over all periods of time with a majority weight placed on outcomes that have occurred over a market cycle.

The Board reviews performance information on a quarterly basis to help ensure adequate monitoring of the fund's overall performance objectives.

Total Fund Review

As of June 30, 2020, the MOSERS investment portfolio had a fair value of \$8.1 billion. The graph below illustrates the growth of MOSERS’ portfolio since the System’s inception.



Investment Performance

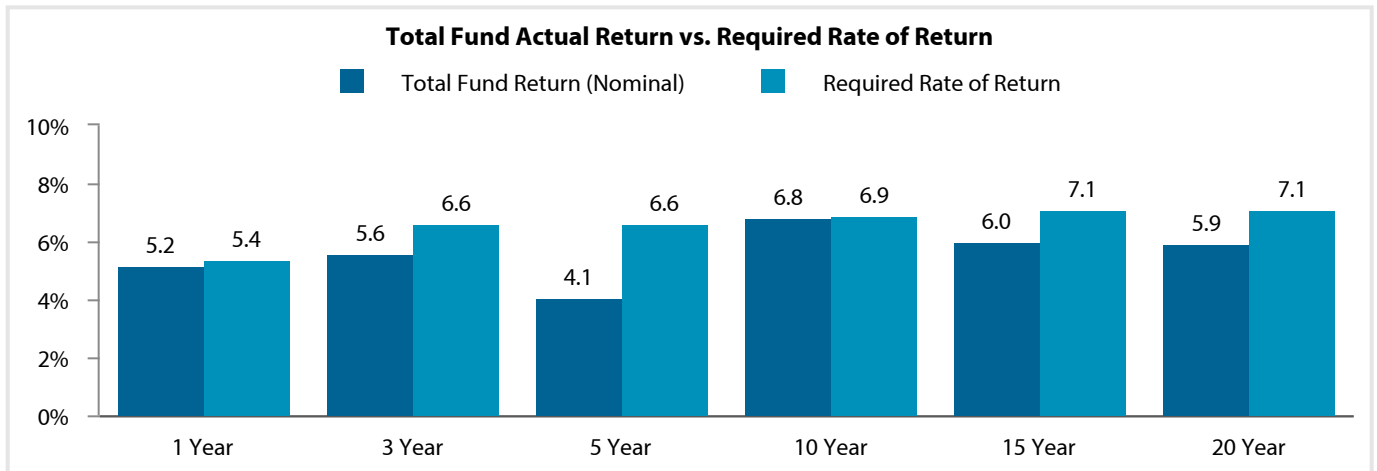
MOSERS’ investments generated a time-weighted return of 5.2%, net of fees, for fiscal year 2020. The total fund return exceeded the 1-year policy benchmark of 2.0%. This additional 3.2% investment return produced \$251 million over what would have been earned if the fund had been invested passively in the policy benchmark.

Investment Performance vs. Required Rate of Return

The total fund investment return is compared to a required rate of return. The required rate of return is established by the Board to determine how well the fund is performing over the long term in order to meet future plan obligations after accounting for inflation. The required rate of return for fiscal year 2020 is equal to the RRO of 4.75% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI).¹

Given the volatility of the investment markets, the portfolio should not be expected to meet the required rate of return every year. A review of long periods of time is best to evaluate whether or not the total return has kept pace with the System’s funding objectives.

As indicated in the following bar chart, MOSERS’ investment returns trailed the required rate of return by 1.2% over the 20-year period ended June 30, 2020.²

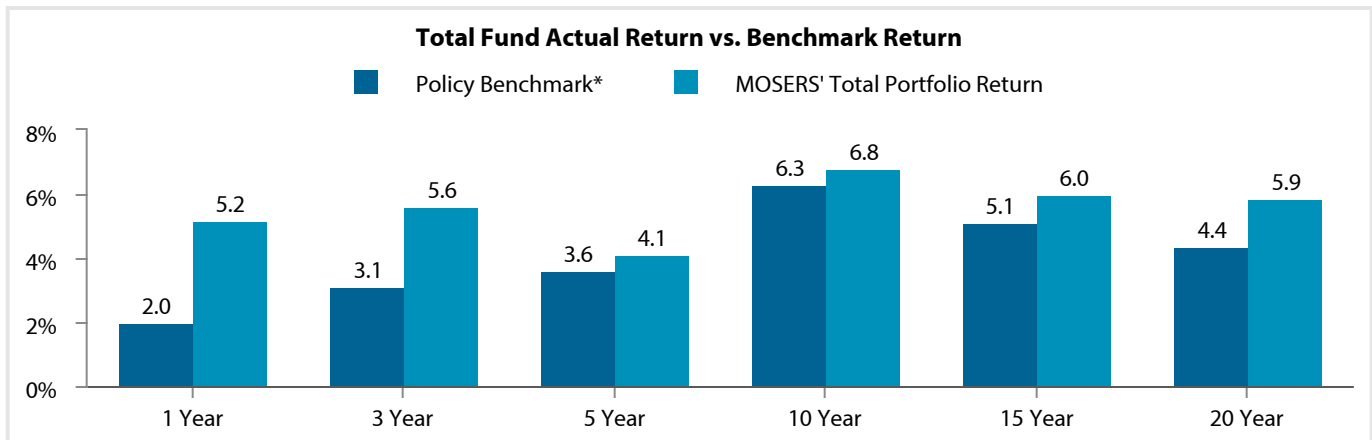


¹ CPI Source: United States Department of Labor, Bureau of Labor Statistics (not seasonally adjusted).

² Performance returns are calculated using a time-weighted rate of return on fair values.

Investment Performance vs. Benchmark Comparisons

In addition to measuring performance relative to the required rate of return, the Board also compares fund returns to the policy benchmark. Returns for the total fund versus policy benchmarks are displayed in the following bar chart.



* As of June 30, 2020, the total fund policy benchmark was comprised of the following components: 44% old portfolio policy benchmark, 56% new portfolio policy benchmark

- As of June 30, 2020, the old portfolio policy benchmark was comprised of the following components: 38% total opportunistic global equities policy, 44% total nominal bonds policy, 20% total commodities policy, 39% total inflation-protected bonds policy and 31% total alternative beta policy. This program did not begin until September 2012.
- As of June 30, 2020, the new portfolio policy benchmark was comprised of the following components: 45% total growth policy, 35% total income policy, 40% total inflation hedge policy and 20% total alternative betas policy. This program did not begin until January 2019.
- All policy return components are adjusted for financing cost associated with programs.

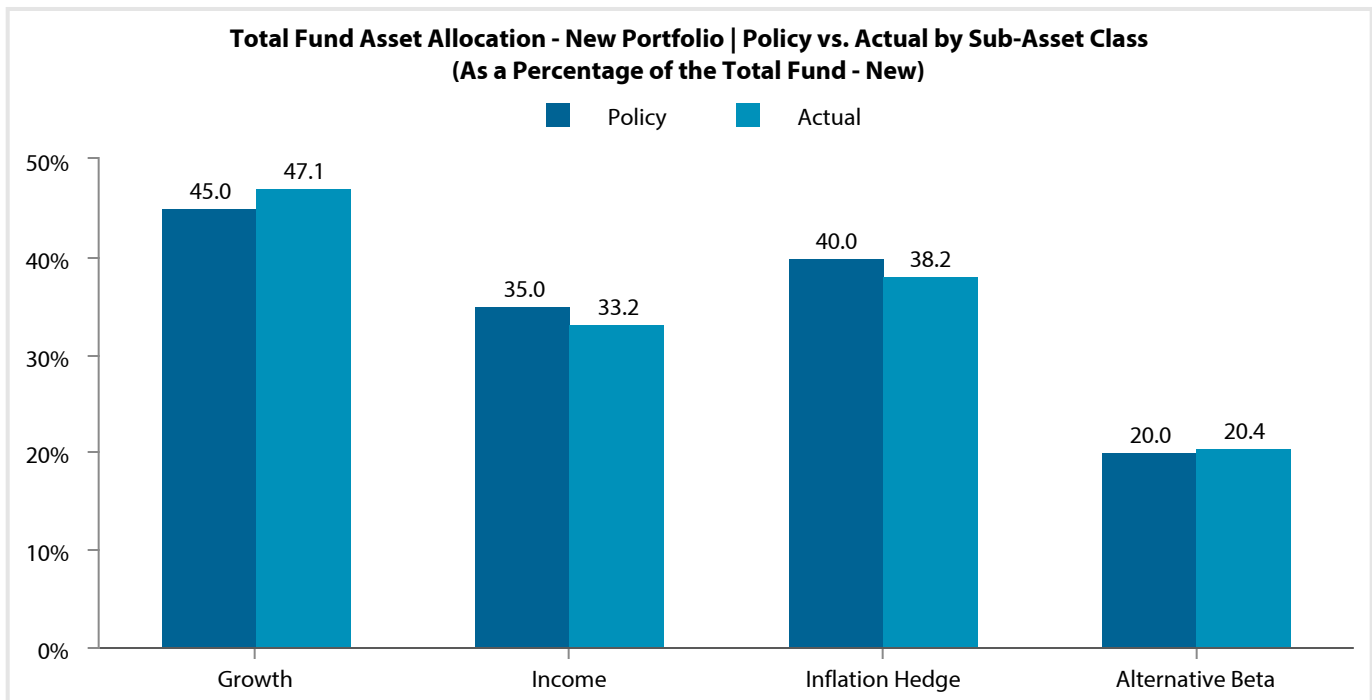
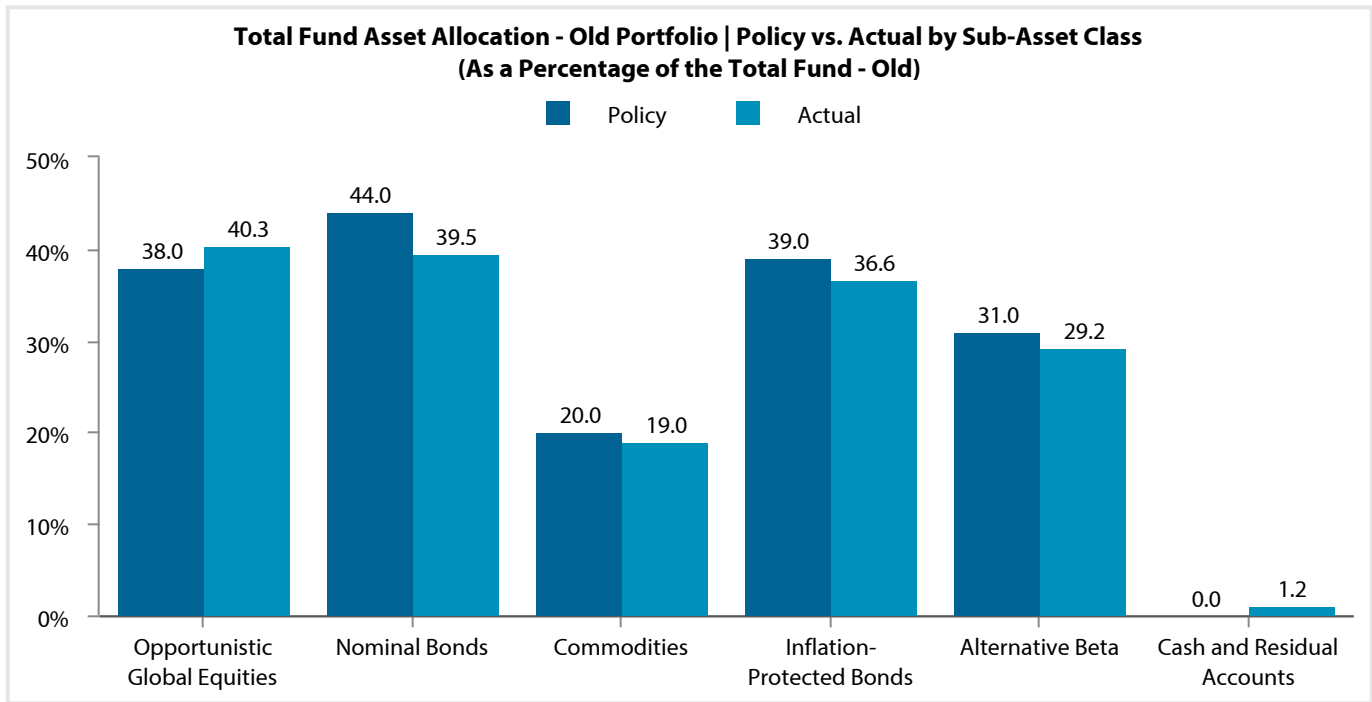
The policy benchmark provides an indication of the returns that could have been achieved (excluding transaction costs) by a portfolio invested in the designated benchmarks for each asset class at the percentage weights allocated to each asset class in MOSERS’ policy asset allocation. Comparison of the total return to the policy benchmark reflects the total value added or detracted by the CIO through strategic and manager implementation decisions. Value is added when the total fund return exceeds the policy benchmark return. The total fund 1-, 3-, 5-, 10-, 15-, and 20-year actual performance over performed its policy benchmark by 3.2%, 2.5%, 0.5%, 0.5%, 0.9%, and 1.5%, respectively.

Total Fund Policy Allocation Overview

As of June 30, 2020, the Board’s old portfolio policy allocation mix was 38% opportunistic global equities, 44% nominal bonds, 20% commodities, 39% inflation-protected bonds, and 31% alternative beta. As of June 30, 2020, the policy for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph on the following page.

As of June 30, 2020, the Board’s new portfolio policy allocation mix was 45% growth assets, 35% income assets, 40% inflation assets, and 20% alternative betas/absolute return assets. The policy target, as of June 30, 2020, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph on the following page.

The Board has granted authority to the CIO to make strategic decisions. A strategic decision should be thought of as any decision that might cause MOSERS’ actual portfolio to differ from the policy asset allocation. This has allowed MOSERS to capitalize on investment opportunities at the margin by overweighting asset classes that are viewed as “cheap” relative to their historical norm and under-weighting asset classes that are “expensive” relative to their historical norm.



Schedule of Brokerage Activity

	Commissions Paid	Volume of Trades*	Shares Traded
B Riley and Co., LLC	\$ 8,615	\$ 7,276,321	287,525
Baird, Robert W & Co., Inc.	29	155,062	2,850
Barclays Capital, Inc.	24,806	209,914,072	4,958,196
Berstein Sanford C & Co.	805	6,196,966	160,992
BTIG, LLC	56,779	46,328,818	3,188,508
Cantor Fitzgerald & Co.	119	49,377	3,965
Cap Institutional Services, Inc.	61	17,992	2,031
Citigroup Global Markets	2,386	534,933	79,535
CJS Securities, Inc.	273	81,890	6,825
Cowen and Co.	137	621,656	27,401
Credit Suisse	71,603	54,895,007	2,221
Davidson & Co., Inc.	2,122	809,368	53,045
Dougherty & Co., Inc.	1,062	251,992	34,285
Electronic Brokerage Systems	38	369,117	7,609
Goldman Sachs & Co.	116	185,698	4,711
Imperial Capital, LLC	16	2,324	806
Jefferies & Co., Inc.	10,554	87,231,030	2,010,330
JMP Securities	45	15,751	1,131
Jones Trading Institutional Services	93	14,294	4,641
Keefe Bruyette + Woods, Inc.	315	99,680	8,286
Keybank Capital Markets, Inc.	244	91,382	6,098
Knight Equity Markets, LP	65,991	53,464,517	5,618,603
Ladenburg Thalman & Co.	213	59,172	7,103
Mizuho Securities USA, Inc.	35	168,995	7,023
MKM Partners, LLC	581	161,198	15,700
Morgan Stanley & Co.	429,222	563,248,651	3,296,939
National Financial Services Corporation	481	99,520	17,607
Northland Securities, Inc.	3,489	848,447	117,208
Pershing, LLC	449	27,193	22,445
Piper Sandler Co.	15,479	16,098,911	1,476,051
Raymond James & Associates, Inc.	158	42,945	5,178
RBC Capital Markets, LLC	1,061	5,798,949	207,192
Roth Capital Partners, LLC	600	182,914	18,310
Sidoti and Co., LLC	99	21,543	4,640
Sterne Agee & Leach, Inc.	173	49,430	4,320
Stifel Nicolaus	78	40,881	1,959
UBS Securities, LLC	812	356,153	27,080
Virtu Americas, LLC	25	108,035	5,000
Wedbush Morgan Securities, Inc.	1,344	361,111	43,821
Wells Fargo Securities, LLC	6,587	22,523,099	1,112,240
William Blair & Co.	997	432,477	32,733
Total	\$ 708,092	\$ 1,079,236,871	22,892,143

* Volume does not include futures notional value

Schedule of Investment Portfolios by Asset Class

As of June 30, 2020

	Portfolio Value	Percentage of Investments	Market Exposure	Percentage of Investments at Market Exposure
Old Portfolio - 42% of Total Fund				
Global opportunistic equities	\$ 1,105,132,410	33.2%	\$ 1,357,937,984	40.8%
Nominal bonds	530,832,018	15.9	1,332,375,801	40.0
Commodities	239,151,989	7.2	642,073,473	19.3
Inflation-protected bonds	472,593,549	14.2	1,232,492,649	37.0
Alternative beta	982,998,813	29.5	982,998,813	29.5
Total old portfolio	3,330,708,779	100.0	5,547,878,720	166.6
New Portfolio - 58% of Total Fund				
Growth	1,776,929,966	38.0	2,206,991,169	47.1
Income	1,013,895,278	21.6	1,556,334,433	33.2
Inflation hedge	937,235,640	20.0	1,791,595,694	38.2
Alternative beta	957,204,230	20.4	955,707,726	20.4
Total new portfolio	4,685,265,114	100.0	6,510,629,022	138.9
Residual accounts from old portfolio	23,273,196	0.3	23,273,196	0.3
Cash reserve	17,301,560	0.2	17,301,560	0.2
MOSERS Total Fund	\$ 8,056,548,649	100.0%	\$ 12,099,082,498	150.2%
<i>Reconciliation to Statement of Fiduciary Net Position</i>				
Total portfolio value	\$ 8,056,548,649			
Obligations under repurchase agreements	3,434,907,955			
Receivable - investment income	(210,681,256)			
Receivable - investment sales	(159,689,135)			
Investment activities payable	87,716,970			
Management and incentive fee payable	11,729,264			
Payable for investments purchased	242,658,443			
Investments per <i>Statement of Fiduciary Net Position</i>	<u>\$ 11,463,190,890</u>			

Total Fund – Top Ten Publicly Traded Separate

Ten Largest Holdings as of June 30, 2020*		Fair Value	Percent of the Total Fund
U.S. Treasury Bond - 3.375% 2048	\$	154,414,891	1.92%
U.S. Treasury Bond CPI Inflation - 0.125% 2023		130,209,213	1.62
U.S. Treasury Bond CPI Inflation - 0.125% 2022		124,880,543	1.55
U.S. Treasury Bond CPI Inflation - 0.125% 2024		118,596,242	1.47
U.S. Treasury Bond CPI Inflation - 0.375% 2023		111,320,433	1.38
U.S. Treasury Bond - 2.750% 2047		107,399,438	1.33
U.S. Treasury Bond CPI Inflation - 0.125% 2022		105,168,281	1.31
U.S. Treasury Bond - 2.875% 2043		101,601,938	1.26
U.S. Treasury Bond CPI Inflation - 0.250% 2025		101,522,737	1.26
U.S. Treasury Bond CPI Inflation - 0.625% 2024		100,631,796	1.25

* For a complete list of holdings, contact MOSERS.

Schedule of Investment Results

1-, 3-, 5-, 10-, 15- and 20-Year Periods

Total Fund – As of June 30, 2020, the total fund policy benchmark was comprised of the following components: 42% old portfolio policy, 58% new portfolio policy.

As of June 30, 2020, the old portfolio policy benchmark was comprised of the following components: 38% total opportunistic global equities policy, 44% total nominal bonds policy, 20% total commodities policy, 39% total inflation-protected bonds policy, and 31% total alternative beta policy. All policy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

As of June 30, 2020, the new portfolio policy benchmark was comprised of the following components: 45% total growth policy, 35% total income policy, 40% total inflation hedge policy and 20% total alternative betas policy. This program did not begin until January 2019.

Old portfolio

- *Opportunistic global equities* – As of June 30, 2020, the opportunistic global equities policy was MSCI ACWI Net + .75%. Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. Select REIT Index.
- *Nominal bonds* – As of June 30, 2020, the total nominal bonds policy was Barclays Long Treasury.
- *Commodities* – As of June 30, 2020, the total commodities policy was BCOM.
- *Inflation-protected bonds* – As of June 30, 2020, the total inflation-protected bonds policy was Barclays U.S. TIPS 1-10 Year.
- *Alternative beta* – As of June 30, 2020, the total alternative beta policy was AQR Delta.

New portfolio

- *Growth* – As of June 30, 2020, the total growth policy was 33% MSCI ACWI Net and 67% Burgiss all equity universe weighted by vintage year.
- *Income* – As of June 30, 2020, the total income policy was 29% Bloomberg Barclays aggregate bond and 71% Bloomberg Barclays long treasury.
- *Inflation hedge* – As of June 30, 2020, the total inflation hedge policy was 12.5% BCOM, 62.5% Bloomberg Barclays 1-10 year TIPS, 12.5% NCREIF ODCE and 12.5% FTSE NAREIT ALL REITS.
- *Alternative beta* – As of June 30, 2020, the total alternative beta policy was 25% HFRI Fund Weighted Composite Index, 50% HFRX Macro/ CTA and 25% S&P/ LSTA U.S. Leverage Loan Index + 2%.

Schedule of Investment Results (continued)

	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Total fund*	5.2 %	5.6 %	4.1 %	6.8 %	6.0 %	5.9 %
Total fund policy benchmark	2.0 %	3.1 %	3.6 %	6.3 %	5.1 %	4.4 %
Old portfolio	5.6 %	5.8 %	4.2 %	N/A	N/A	N/A
Old portfolio policy benchmark	(1.2)%	1.9 %	2.9 %	N/A	N/A	N/A
Opportunistic global equities	(5.2)%	2.4 %	3.6 %	8.8 %	7.2 %	N/A
Opportunistic global equities policy benchmark	1.1 %	5.9 %	7.2 %	10.6 %	7.5 %	N/A
Nominal bonds	24.0 %	10.4 %	8.1 %	N/A	N/A	N/A
Nominal bonds policy benchmark	23.3 %	10.4 %	8.1 %	N/A	N/A	N/A
Commodities	(14.6)%	(4.6)%	(11.3)%	(6.8)%	(6.3)%	(2.0)%
Commodities policy benchmark	(18.5)%	(4.9)%	(10.4)%	(7.4)%	(7.7)%	(3.4)%
Inflation-protected bonds	3.9 %	2.1 %	1.6 %	2.4 %	3.3 %	5.5 %
Inflation-protected bonds policy benchmark	3.5 %	2.3 %	1.8 %	2.6 %	3.4 %	5.5 %
Alternative beta	(1.9)%	0.5 %	1.8 %	N/A	N/A	N/A
Alternative beta policy benchmark	(28.0)%	(16.5)%	(8.4)%	N/A	N/A	N/A
New portfolio	4.7 %	N/A	N/A	N/A	N/A	N/A
New portfolio policy benchmark	7.9 %	N/A	N/A	N/A	N/A	N/A
Growth	(2.5)%	N/A	N/A	N/A	N/A	N/A
Growth policy benchmark	2.1 %	N/A	N/A	N/A	N/A	N/A
Income	19.1 %	N/A	N/A	N/A	N/A	N/A
Income policy benchmark	19.4 %	N/A	N/A	N/A	N/A	N/A
Inflation hedge	(1.5)%	N/A	N/A	N/A	N/A	N/A
Inflation hedge policy benchmark	(0.6)%	N/A	N/A	N/A	N/A	N/A
Alternative beta	(2.8)%	N/A	N/A	N/A	N/A	N/A
Alternative beta policy benchmark	0.8 %	N/A	N/A	N/A	N/A	N/A

* Results are based on time-weighted rates of return on fair values adjusted for cash flows.

Schedule of Investment Manager Fees

For the Year Ended June 30, 2020

	Portfolio Fair Value June 30, 2020	Total Fees	Manager Fees	Fund Pass Through Expenses *	Incentive Fees Earned in FY20
Equity					
Blakeney Onyx, LP	\$ 30,697	\$ 33,763	\$ 3,015	\$ 30,748	\$ 0
Harvest Fund Advisors, LLC	0	157,131	157,131	0	0
Silchester International Investors	497,134,682	3,234,537	3,234,537	0	0
SSGA Emerging Markets	0	41,851	41,851	0	0
Total equity	497,165,379	3,467,282	3,436,534	30,748	0
Fixed income					
Stone Harbor Investment Partners	0	112,410	112,410	0	0
Total fixed income	0	112,410	112,410	0	0
Multi-asset					
Blackrock	766,295,576	62,629	62,629	0	0
NISA Investment Advisors	2,886,558,866	5,811,958	5,811,958	0	0
Total multi-asset	3,652,854,442	5,874,587	5,874,587	0	0
Alternatives					
Actis Emerging Markets III	1,812,000	129,000	0	129,000	0
Actis Emerging Markets IV	22,205,000	640,732	531,000	113,000	(3,268)
AQR DELTA Sapphire Fund, LP	212,472,572	2,995,299	2,589,003	406,296	0
Axiom Asia Private Capital Fund II, LP	25,906,013	350,695	230,291	32,389	88,015
Axiom Asia Private Capital Fund III, LP	73,849,251	718,209	394,875	43,280	280,054
Axxon Brazil Private Equity Fund II B, LP	12,570,010	263,635	215,899	47,736	0
Bayview Opportunity Domestic IIIb, LP	948,159	129,774	43,093	72,416	14,265
Blackstone Real Estate Partners IV	731,314	488,842	0	16,490	472,352
Blackstone Real Estate Partners V	2,548,944	(283,710)	0	7,023	(290,733)
Blackstone Real Estate Partners VI	3,765,303	210,445	0	29,851	180,594
Blackstone Real Estate Partners VII	30,027,363	4,144	383,803	25,232	(404,891)
Blackstone Topaz Fund, LP	266,701,926	2,662,553	2,230,612	206,508	225,433
Blackstone Topaz Private Credit	92,549,470	141,259	128,895	12,364	0
Bridgewater Associates - All Weather @ 12%, LLC	0	719,207	618,440	100,767	0
Bridgewater Associates - Diamond Ridge Fund, LLC	93,898,984	4,033,955	3,908,147	125,808	0
CarVal Investors CVI Global Value Fund A, LP - private debt	1,000,000	12,880	0	12,880	0
CarVal Investors CVI Global Value Fund A, LP - real estate	1,000,000	12,880	0	12,880	0
Catalyst Fund Limited Partnership III	14,527,531	709,799	642,688	67,111	0
Catalyst Fund Limited Partnership IV	5,750,752	319,710	248,480	71,230	0
Catalyst Fund Limited Partnership V	20,566,946	2,355,240	1,973,532	381,708	0
Cornwall Domestic, LP	5,660,980	69,350	0	69,350	0
DRI Capital - LSRC	12,035,286	365,215	0	229,237	135,978
EIG Energy Fund XIV, LP	2,551,077	83,823	0	83,823	0
EIG Energy Fund XV, LP	12,065,145	386,345	302,688	83,657	0
EIG Energy Fund XVI, LP	24,700,606	(882,797)	302,306	42,415	(1,227,518)

Schedule of Investment Manager Fees continued on page 88

Schedule of Investment Manager Fees (continued)

For the Year Ended June 30, 2020

	Portfolio Fair Value June 30, 2020	Total Fees	Manager Fees	Fund Pass Through Expenses*	Incentive Fees Earned in FY20
Elliott International Limited	\$ 193,563,000	\$ 9,481,515	\$ 3,652,269	\$ 1,796,805	\$ 4,032,441
Exodus Point	68,380,981	742,167	0	0	742,167
Farallon Capital Institutional Partners, LP	1,006,396	(56,182)	0	0	(56,182)
Gaoling Fund, LP	0	26,948	103,686	0	(76,738)
Gateway Energy & Resource Holdings, LLC	5,503,566	345,289	0	345,289	0
Glenview Capital Opportunity Fund, LP	3,109,667	504,588	264,006	240,582	0
Glenview Sidecar	0	103,089	0	103,089	0
Global Forest Partners GTI7 Institutional Investors Company Ltd.	449,547	3,240	1,712	1,528	0
HBK Merger Strategies Offshore Fund, Ltd.	138,968,100	3,377,461	1,018,949	333,509	2,025,003
JLL Partners Fund V, LP	3,041,179	(191,792)	0	6,254	(198,046)
JLL Partners Fund VI, LP	11,528,185	(1,656,859)	209,064	13,571	(1,879,494)
Kennedy Capital	40,411,690	190,736	190,736	0	0
King Street Capital, LP	1,821,350	36,488	31,660	0	4,828
King Street Capital, Ltd.	42,011	636	636	0	0
Linden Capital Partners II, LP	18,852,086	1,131,026	404,072	12,359	714,595
Mast Credit Opportunities I, LP	1	45,783	45,783	0	0
Merit Energy Partners F-II, LP	3,004,064	37,633	37,633	0	0
MHR Institutional Partners IIA, LP	34,138,556	(78,396)	0	20,006	(98,402)
MHR Institutional Partners III, LP	17,860,651	307,486	284,187	23,299	0
MHR Institutional Partners IV, LP	31,195,995	933,854	857,822	76,032	0
Millennium Technology Value Partners II	13,061,022	(261,488)	354,939	60,079	(676,506)
OCM Opportunities Fund VIIIb, LP	180,182	(6,732)	4,568	11,499	(22,799)
OCM Opportunities Fund VIIIb, LP	6,495,571	203,991	173,066	30,925	0
OCM Power Opportunities Fund III, LP	5,153,004	(301,733)	130,614	37,020	(469,367)
OCM/GFI Power Opportunities Fund II, LP	1	(47)	0	(92)	45
Perry Partners, LP	8,031	120	120	0	0
Pharo Macro Fund, Ltd.	61,302,853	1,352,672	1,231,527	54,751	66,394
Silver Creek Special Opportunities Fund I, LP	5,273,416	29,712	0	29,712	0
Silver Creek Special Opportunities Fund II, LP	8,216,430	34,123	0	34,123	0
Silver Lake Partners II, LP	25,998	(25,308)	0	2,293	(27,601)
Standard Investment Research Hedged Equity Fund	91,419,763	2,832,422	1,778,497	171,839	882,086
StepStone Capital Buyout Fund II, LP	635,030	80,454	20,222	60,232	0
StepStone Opportunities Fund II, LP	62,493	39,528	0	42,024	(2,496)
Voleon Investors Fund, LP	15,444,777	207,936	161,716	46,220	0
Voleon Institutional Strategies Fund, LP	50,355,760	601,558	502,626	98,932	0
Total alternatives	1,770,355,988	36,708,402	26,203,862	6,074,331	4,430,209
Total fees	\$ 5,920,375,809	\$ 46,162,681	\$ 35,627,393	\$ 6,105,079	\$ 4,430,209

* Fund pass through expenses are administrative expenses charged to the fund and paid by the limited partners (including MOSERS), in addition to the management fee. These expenses may include, but are not limited to, accounting, audit, legal, and custody expenses directly related to the administration of the underlying fund investments.

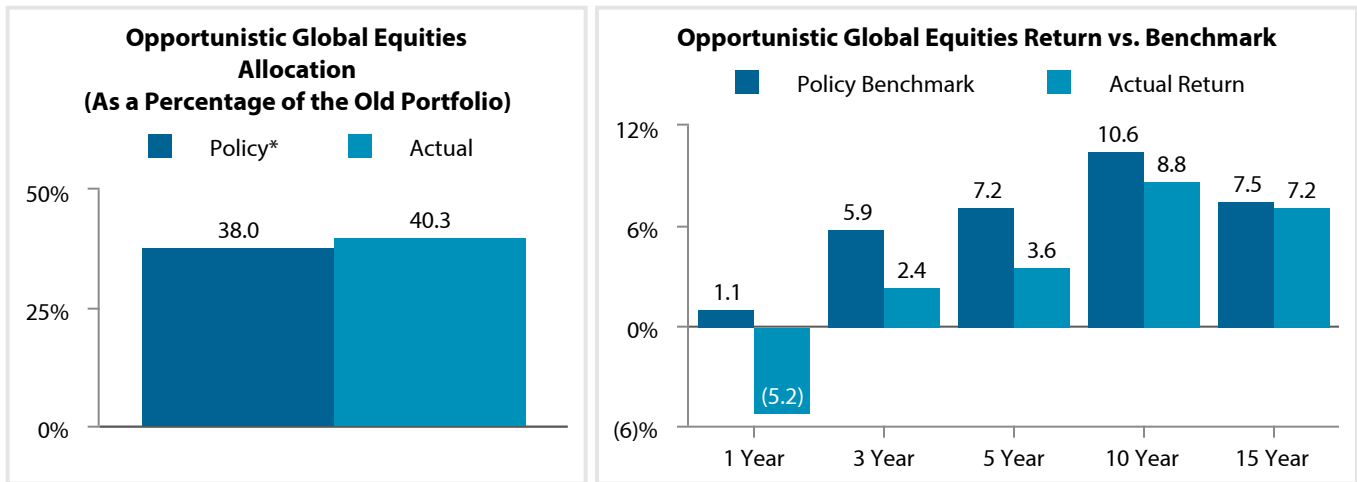
Asset Class Summary - Old Portfolio

The portfolio consists of five broad asset buckets: opportunistic global equities, nominal bonds, commodities, inflation-protected bonds, and alternative betas. Only nominal bonds and inflation-protected bonds had positive performance during the fiscal year. The remaining three, all had negative performance.

Opportunistic Global Equities

It is expected that investments in this asset class will perform well during periods of rising economic growth and/or falling inflation. Investments in this asset class include U.S. and non-U.S. equity investments with varying characteristics related to market capitalization and investment style. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

The market exposure of the equity portfolio on June 30, 2020, was \$1,357,937,984, representing 40.3% of total fair value. The graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the equity allocation returned (5.2%) versus 1.1% for the global equity policy benchmark. The underperformance was driven by manager underperformance within domestic and international equities, a portfolio overweight to value and energy sectors, and the opportunistic equity portfolio lagging its benchmark. The graph below (right) illustrates actual performance as compared to the policy benchmark.

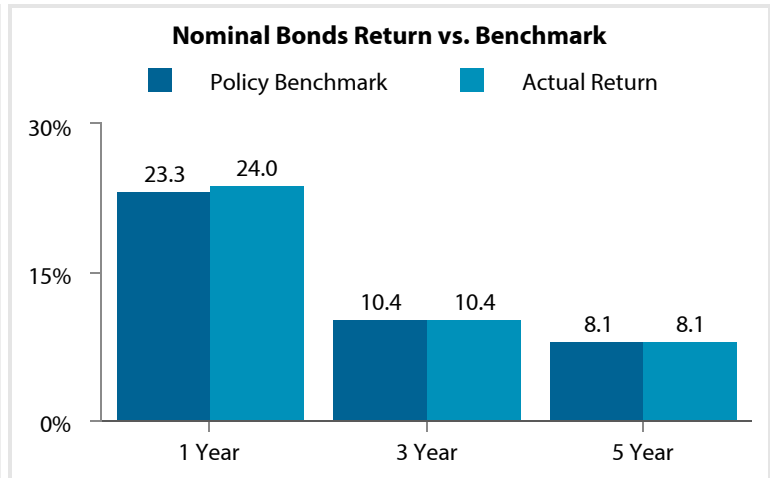
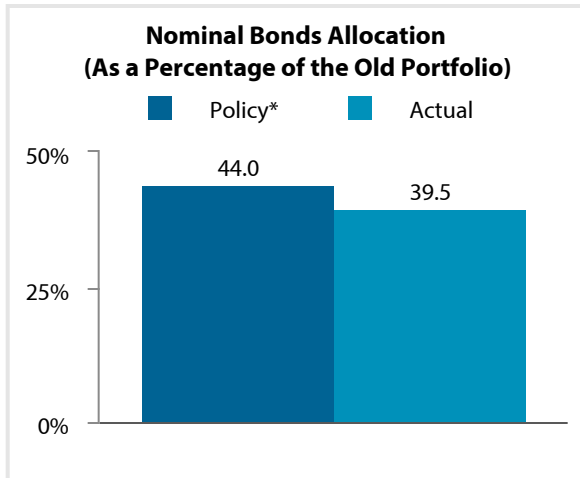


* As of June 30, 2020, the opportunistic global equities policy was MSCI ACWI Net + .75%.

Nominal Bonds

It is expected that investments in this asset class will perform well in periods of falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized or guaranteed by the U.S. Government, its agencies, or its instrumentalities. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this portfolio.

As of June 30, 2020, the market exposure of the nominal bond portfolio was \$1,332,375,801, representing 39.5% of total fair value of the old portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the nominal bond allocation returned 24.0% versus 23.3% for the nominal bond policy benchmark. A strategic decision preferring to own TIPS in lieu of nominal treasuries detracted from performance and implementation decisions were slightly additive to performance. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.

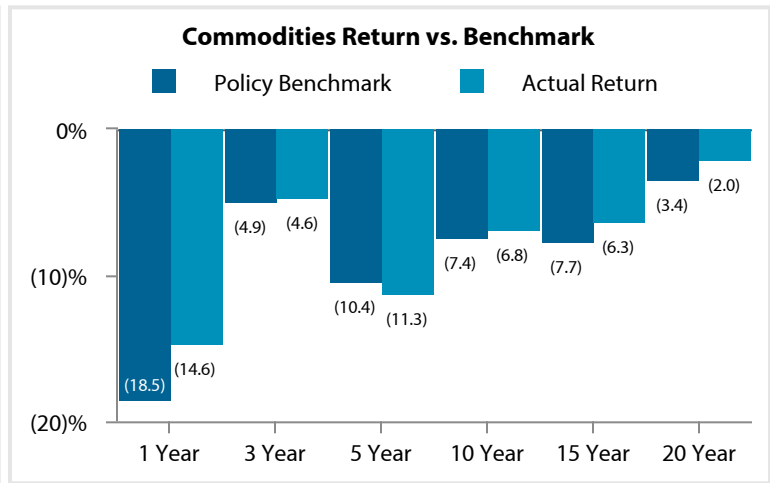
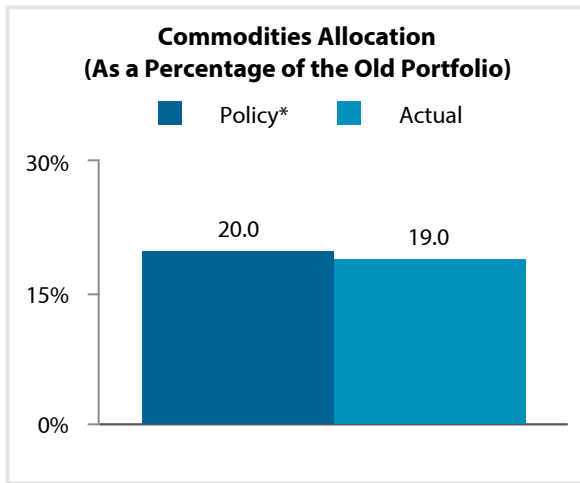


* As of June 30, 2020, the total nominal bonds policy benchmark was Bloomberg Barclays Long Treasury.

Commodities

It is expected that investments in this asset class will perform well during periods of economic growth and rising inflation. Investments in the asset class may include investments in raw materials, materials required in the manufacturing of finished products, the owners of raw goods, and the producers of raw materials. Because this asset class is invested in all U.S. dollar denominated commodities there is no currency exposure as part of this portfolio.

As of June 30, 2020, the market exposure of the commodities portfolio was \$642,073,473, representing 19.0% of the total fair value of the old portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. The commodity allocation returned (14.6%) versus (18.5%) for the commodity policy benchmark. The primary driver of the outperformance was implementing the exposure through a modified futures roll strategy compared to the benchmark. The actual performance as compared to the policy benchmark is illustrated in the bar chart below (right).

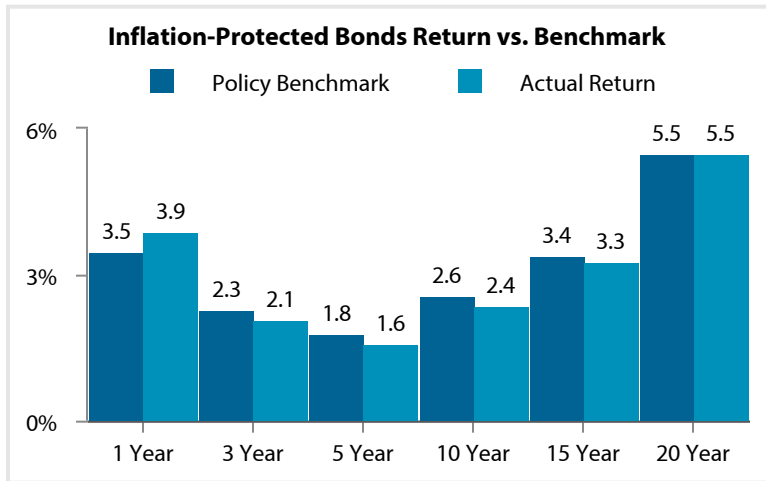
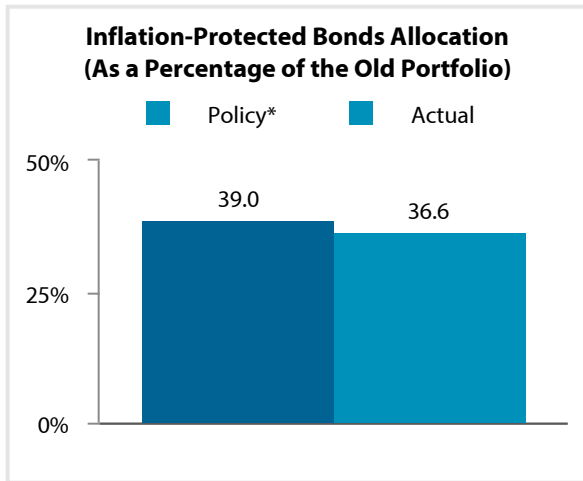


* As of June 30, 2020, the commodities policy benchmark was Bloomberg Commodity Index.

Inflation-Protected Bonds

It is expected that investments in this asset class will perform well during periods of falling economic growth and rising inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized, or guaranteed by the U.S. Government, its agencies, or its instrumentalities. All such securities must derive a significant portion of their value from changes in the respective issuer’s domestic inflation. Because this asset class is invested in all U.S. bonds, there is no foreign currency exposure as part of this portfolio.

As of June 30, 2020, the market exposure of the inflation-protected bond portfolio was \$1,232,492,649, representing 36.6% of total fair value of the portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation-protected bond allocation returned 3.9% versus 3.5% for the inflation-protected bond policy benchmark. There was no internal or external active management strategy utilized during the year; thus providing a return that closely matched the benchmark. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.

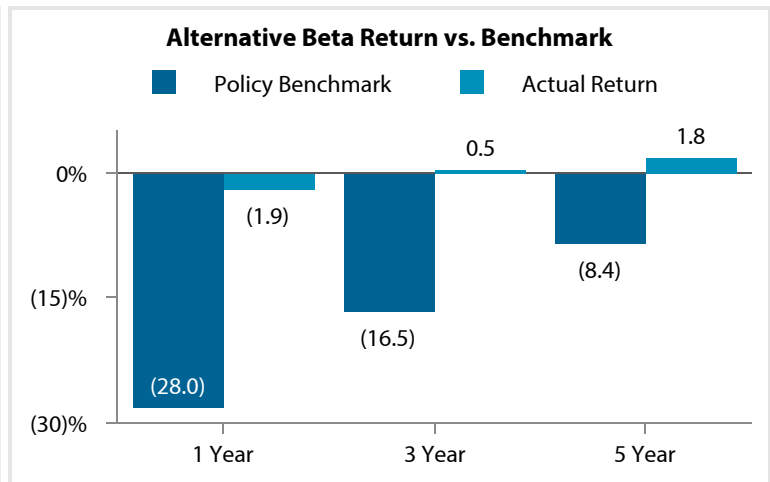
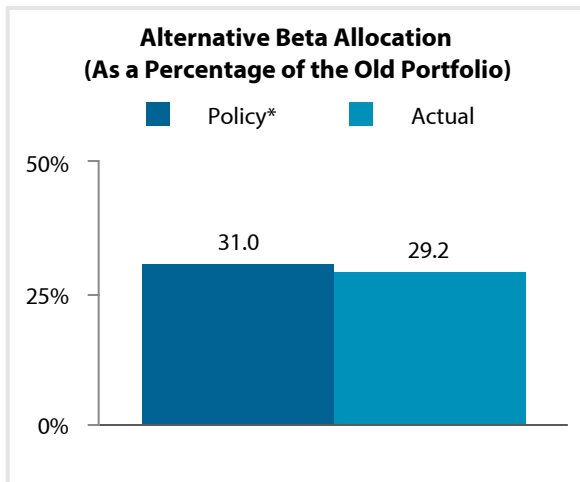


* As of June 30, 2020, the inflation-protected bonds policy benchmark was Bloomberg Barclays U.S. TIPS 1-10 YR.

Alternative Beta

This asset class represents a collection of strategies, commonly referred to as hedge fund or alternative betas, because they access risk premiums that provide a reasonable return for the risk taken and are diversifying to the other market risks in the portfolio. Alternative betas are expected to produce positive returns with the distinction that they can be obtained passively at fees lower than active hedge fund managers. In addition to, and as a result of the multitude of strategies being deployed, it is expected that this asset class will provide meaningful diversification to the portfolio. While the sensitivities to economics will be dependent on positioning at the time, it is expected that these betas will have their best returns in rising growth environments and their worst returns in falling growth environments. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

As of June 30, 2020, the market exposure of the alternative beta portfolio was \$982,998,813, representing 29.2% of total fair value of the old portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. The alternative beta allocation returned (1.9%) for the fiscal year versus (28.0%) for the alternative beta policy benchmark. The outperformance was attributable to the active hedge fund managers who collectively represented approximately 45% of the allocation and returned 1.9% for the year. There was also outperformance due to the passive alternative beta strategies that returned 4.5% and 9.4% for the fiscal year. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



* As of June 30, 2020, the alternative beta policy benchmark was AQR Delta.

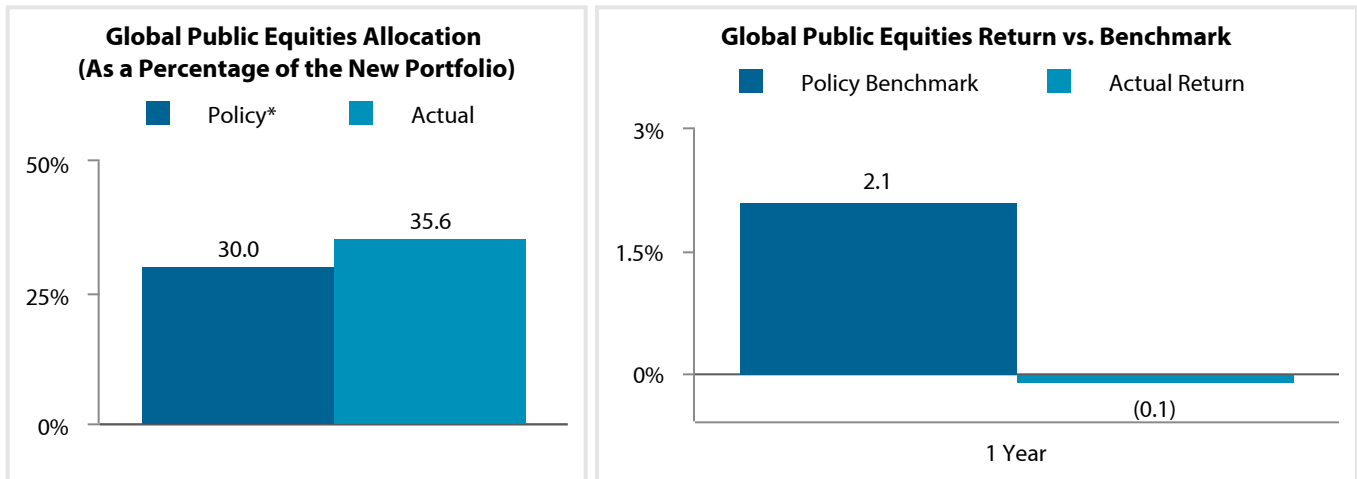
Asset Class Summary - New Portfolio

The new portfolio was initially funded at the end of January 2019. The portfolio consists of four broad asset buckets: growth, income, inflation hedge, and alternative betas/absolute return. Each of these asset buckets are made up of a number of different asset classes. Only one asset bucket had positive performance during the fiscal year. The growth bucket returned negative 2.5%, while the income bucket was up 19.1%. The inflation hedge bucket was down 1.5% and the alternative betas/absolute return bucket returned negative 2.8%.

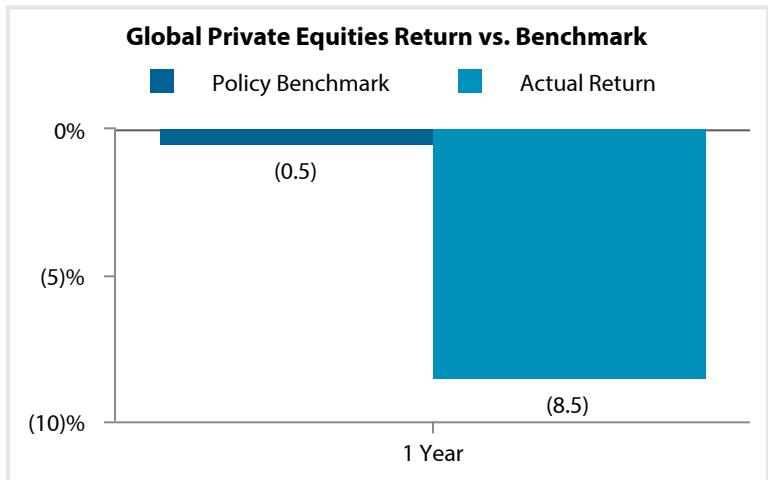
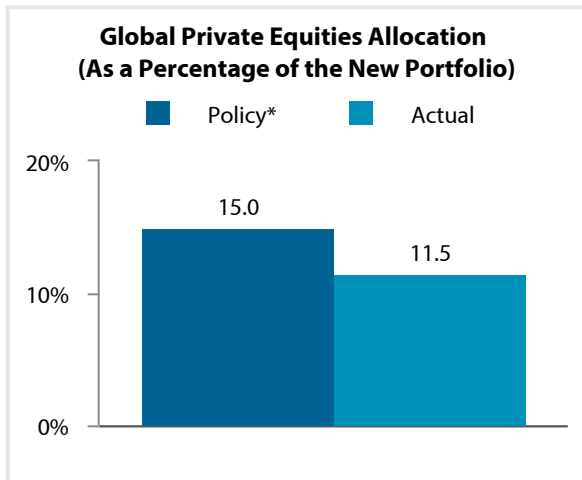
Growth Bucket

This bucket is designed to provide capital appreciation and provide access to a form of equity-risk premium and liquidity risk premium. In addition, it is expected that investments in this category would perform well in periods of rising economic growth. Investments in this asset class include U.S. and non-U.S. equity investments with varying characteristics related to market capitalization and investment style. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this bucket.

The growth bucket is made up of global public equities and global private equities. As of the fiscal year end, global public equities and global private equities were 76% and 24% of the growth bucket, respectively. For the fiscal year, public equities returned (0.1)% versus 2.1% for the policy benchmark. Private equities, for the fiscal year, returned (8.5%) compared to its policy benchmark return of (0.5%). This underperformance was the result of manager implementation that underperformed the benchmark.

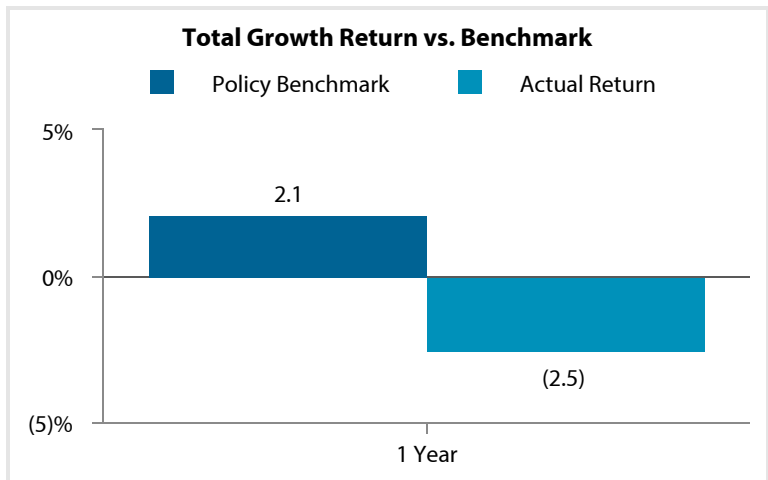
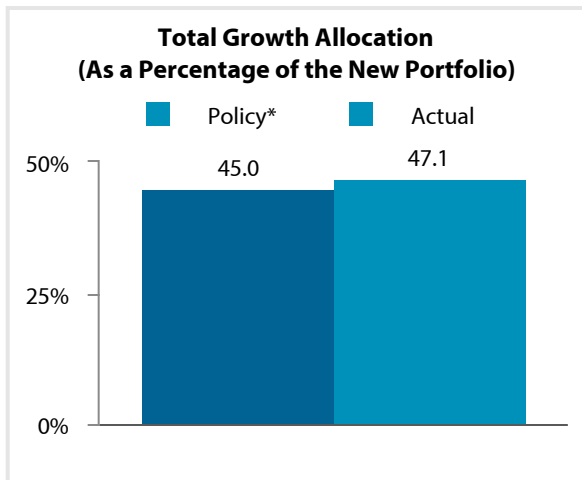


* As of June 30, 2020, the public equities policy benchmark was MSCI ACWI Net.



* As of June 30, 2020, the private equities policy benchmark was the Burgiss All Equity Universe (weighted by vintage year).

The market exposure of the growth bucket on June 30, 2020, was \$2,206,991,169, representing 47.1% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the growth allocation returned (2.5%) versus 2.1% for the policy benchmark. The underperformance was driven by global private equities underperforming the policy benchmark by 8.0%. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.

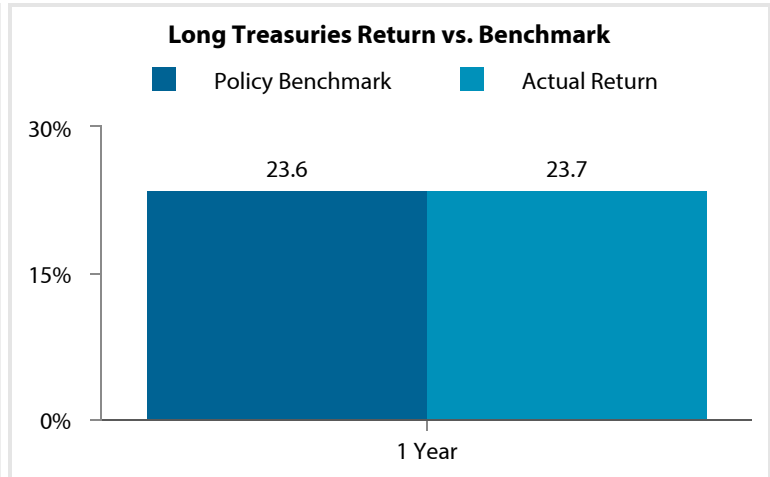
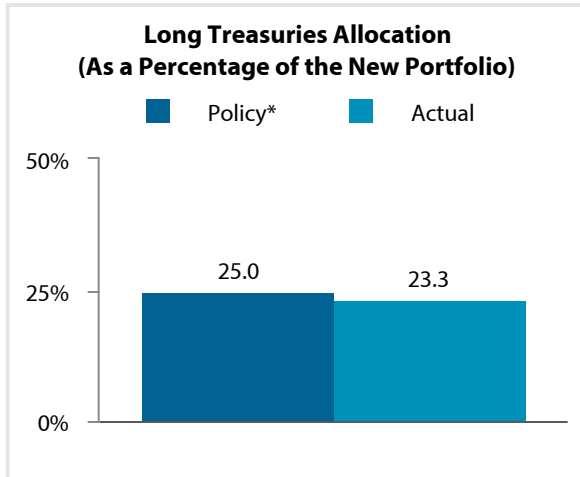


* As of June 30, 2020, the total growth policy benchmark was comprised of 66.7% global public equities policy benchmark and 33.3% global private equities policy benchmark.

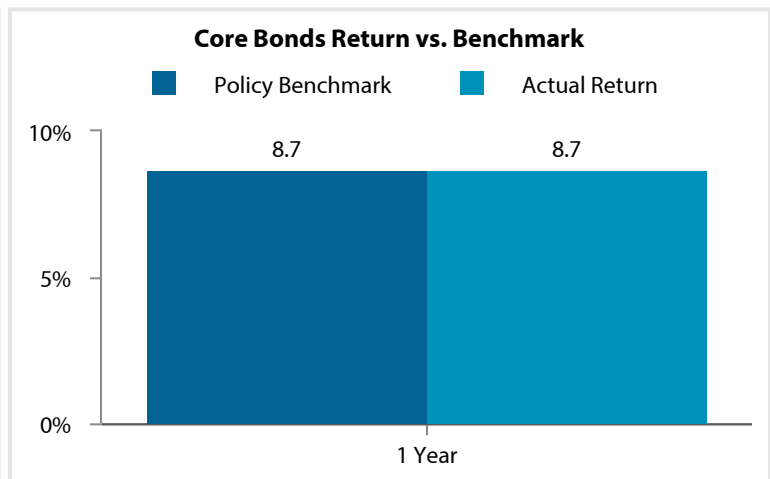
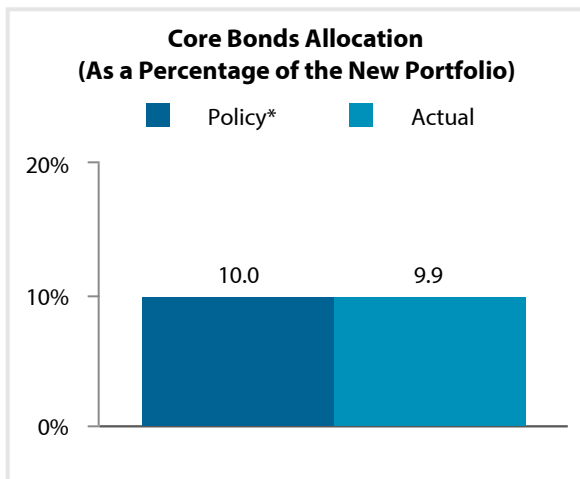
Income Bucket

This bucket is designed to provide a source of current income and to reduce overall fund volatility. It is expected that investments in this asset class will perform well in periods of stable or falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized, or guaranteed by the U.S. Government, its agencies, or its instrumentalities, debt issued by corporations, and securitized debt. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this bucket.

The income bucket is made up of long treasuries and core bonds. As of the fiscal year end, long treasuries and core bonds were 70% and 30% of the income bucket, respectively. For the fiscal year, long treasuries returned 23.7% versus 23.6% for the policy benchmark. The exposure to long treasuries is gained passively with minimal tracking error. Core bonds, for the fiscal year, returned 8.7% compared to its policy benchmark return of 8.7%. There is minimal tracking error as the result of passively implementing the exposure with an exchange traded fund and passive index fund.



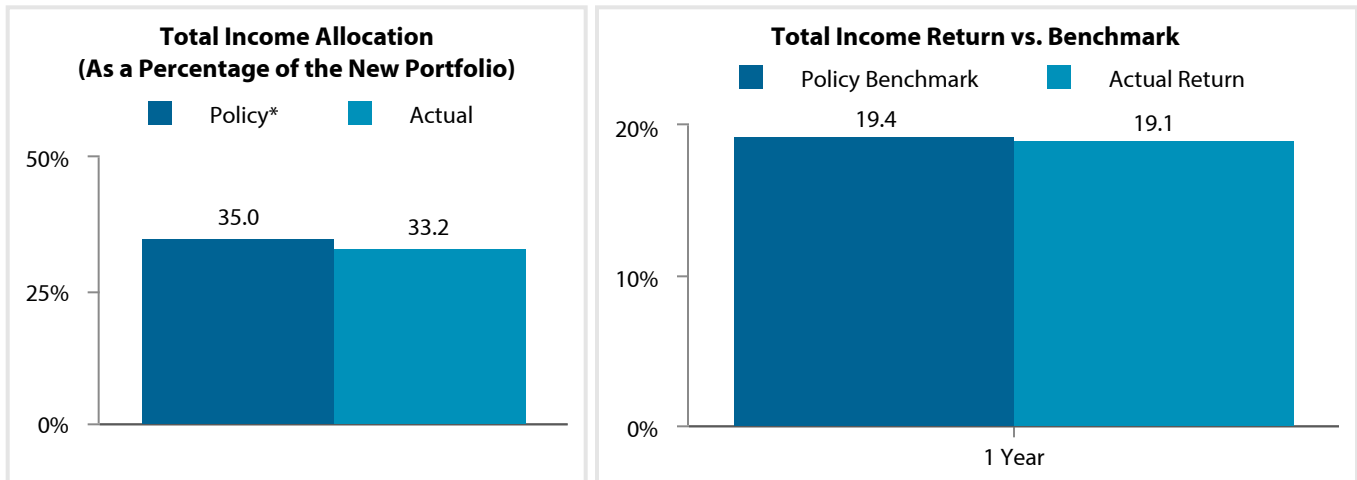
* As of June 30, 2020, the long treasuries policy benchmark was Bloomberg Barclays Long Treasury Index.



* As of June 30, 2020, the core bonds strategy benchmark was Bloomberg Barclays Aggregate Bond Index.

Investment Section

As of June 30, 2020, the market exposure of the income bucket was \$1,556,334,433, representing 33.2% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the income allocation returned 19.1% versus 19.4% for the income bucket policy benchmark. There are no strategic positions in the income bucket so it tracks the benchmark closely. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.

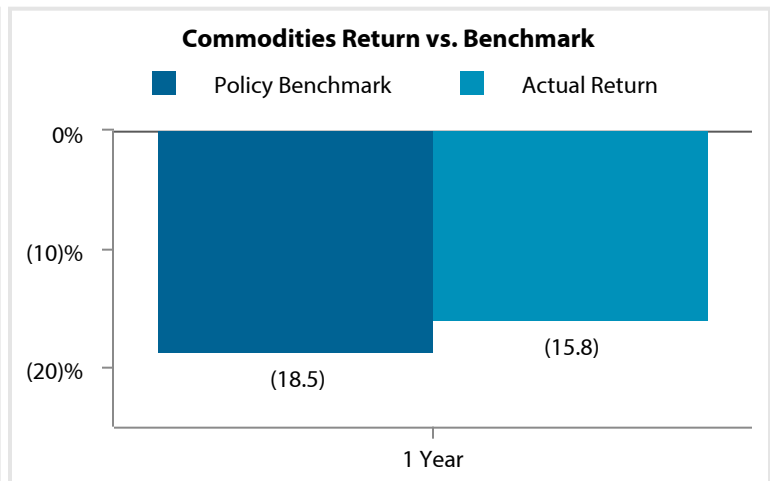
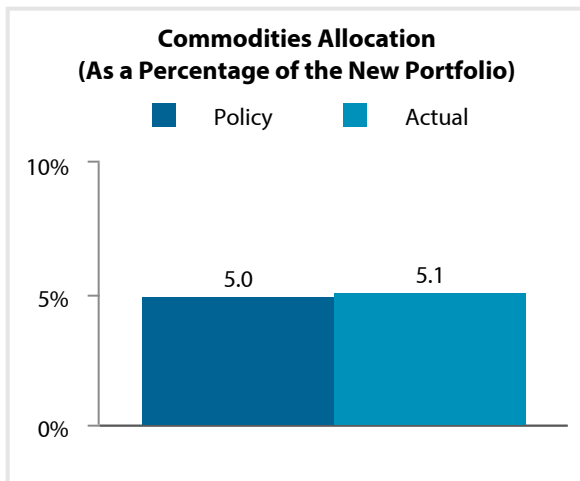


** As of June 30, 2020, the total income policy benchmark was comprised of 71.4% long treasuries policy benchmark and 28.6% core bonds policy benchmark.*

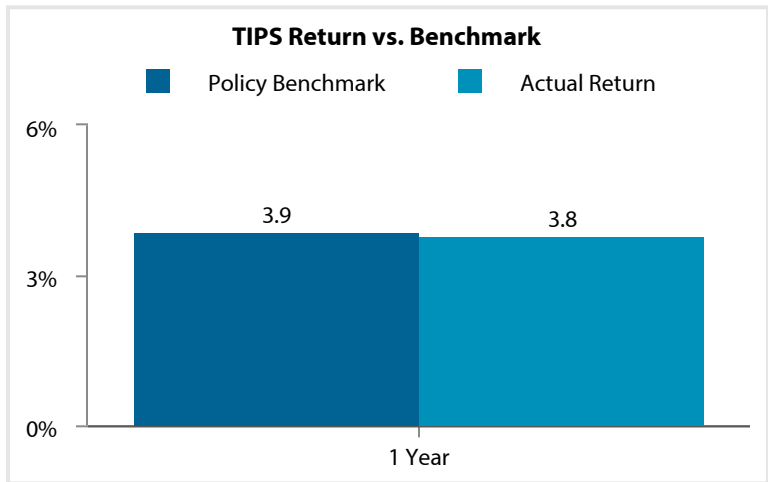
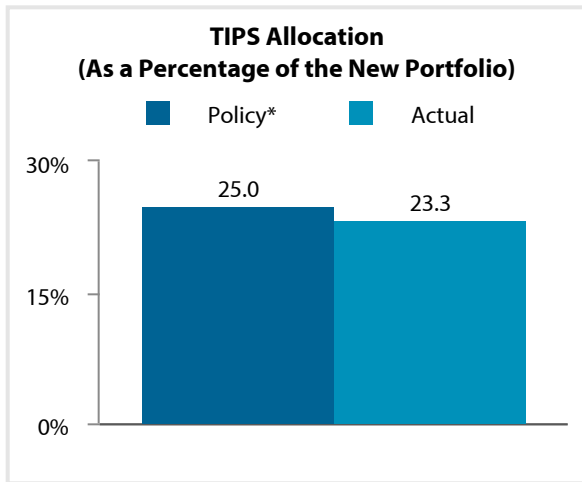
Inflation Hedge Bucket

It is expected that investments in this asset class will perform well during periods of rising inflation. Investments in this asset class include U.S. Government treasury inflation protected securities (TIPS), commodities, private real estate, and public real estate. TIPS are designed to provide a source of current income and protect against actual inflation. It is expected that investments in this asset class will perform well during periods of falling economic growth and rising inflation. Commodities are designed to provide protection from an unexpected rise in inflation. In addition, it is expected that investments in this category would perform well in periods of rising economic growth. Public and private real assets are designed to provide capital appreciation and income; as well as, exposure to equity and liquidity risk premium. It is expected that investments in this category would perform well in periods of rising economic growth and rising inflation. Because this asset class is invested primarily in U.S. denominated assets, there is not expected to be meaningful foreign currency exposure as part of this bucket.

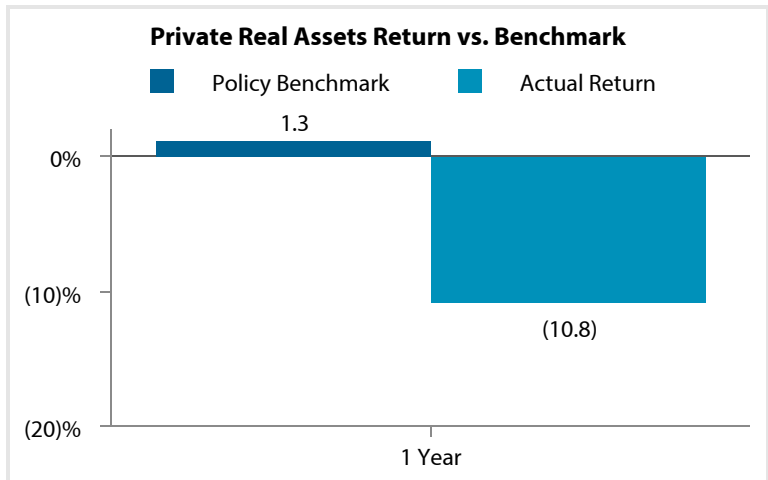
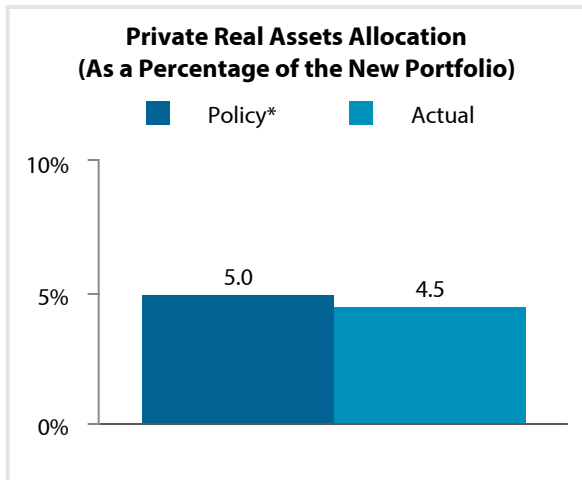
As of the fiscal year end, TIPS were 61% and public real assets were 14% of the inflation hedge bucket. Commodities and private real assets each made up 13% of the inflation hedge bucket. For the fiscal year, TIPS returned 3.8% versus 3.9% for the policy benchmark. There was no internal or external active management strategy utilized during the fiscal year; thus, providing a return that closely matched the benchmark. Commodities, for the fiscal year, returned (15.8%) compared to its policy benchmark return of (18.5%). The primary driver of the outperformance was implementing the exposure through a modified futures roll strategy compared to the benchmark. Public real assets returned (8.5%), for the fiscal year, compared to its policy benchmark return of (8.4%). There was no internal or external active management strategy utilized during the fiscal year; thus, providing a return that closely matched the benchmark. For the fiscal year, private real assets returned (10.8%) versus 1.3% for its policy benchmark. This underperformance was due to the portfolio holding publicly traded real estate investment trusts as a short-term placeholder for core real estate funds as well as external managers underperforming during the period.



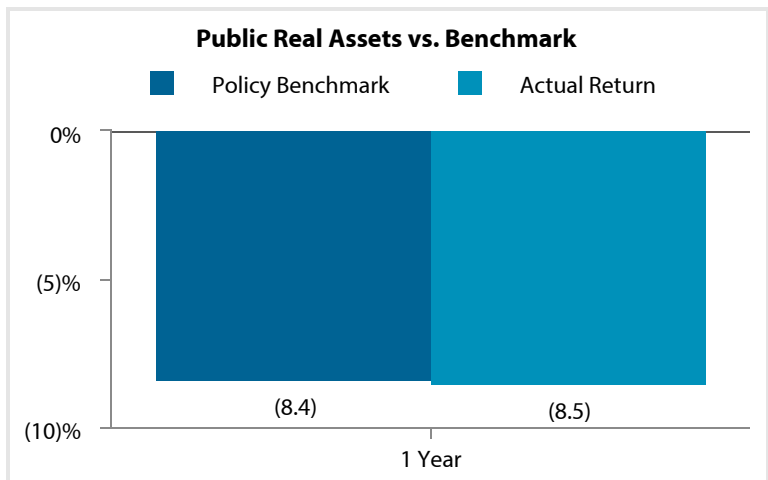
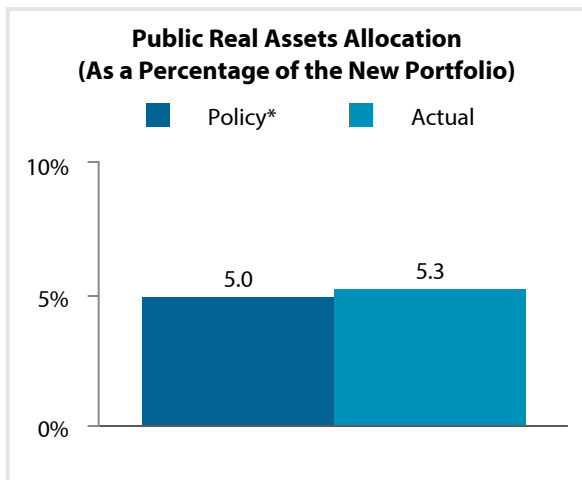
* As of June 30, 2020, the commodities policy benchmark was the Bloomberg Commodity Index (BCOM).



* As of June 30, 2020, the TIPS policy benchmark was the Bloomberg Barclays 1 - 10 year TIPS Index.



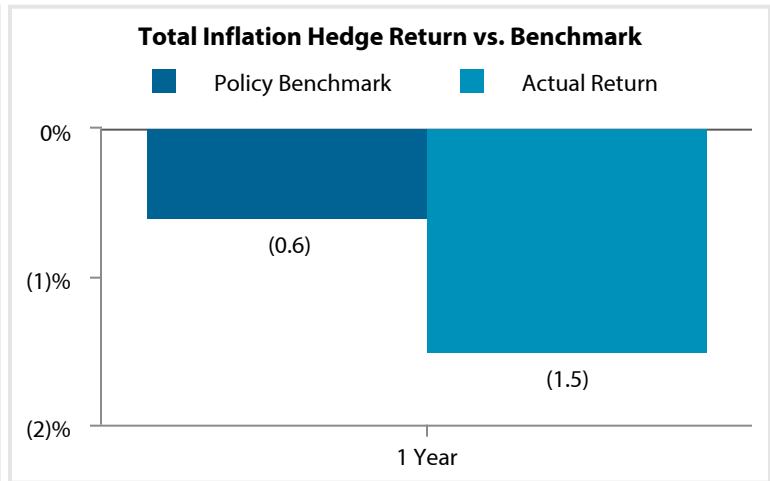
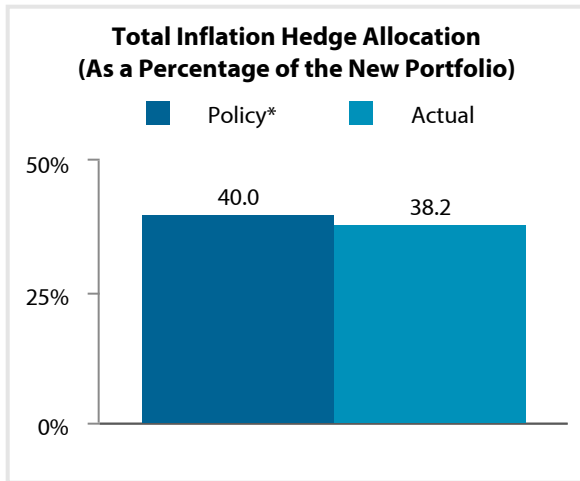
* As of June 30, 2020, the private real assets policy benchmark was the NCREIF Fund Index - Open End Diversified Core Equity (ODCE).



* As of June 30, 2020, the public real assets policy benchmark was the FTSE NAREIT ALL REITS Index.

Investment Section

As of June 30, 2020, the market exposure of the inflation hedge bucket was \$1,791,595,694 representing 38.2% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation hedge allocation returned (1.5%) versus (0.6%) for the policy benchmark. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



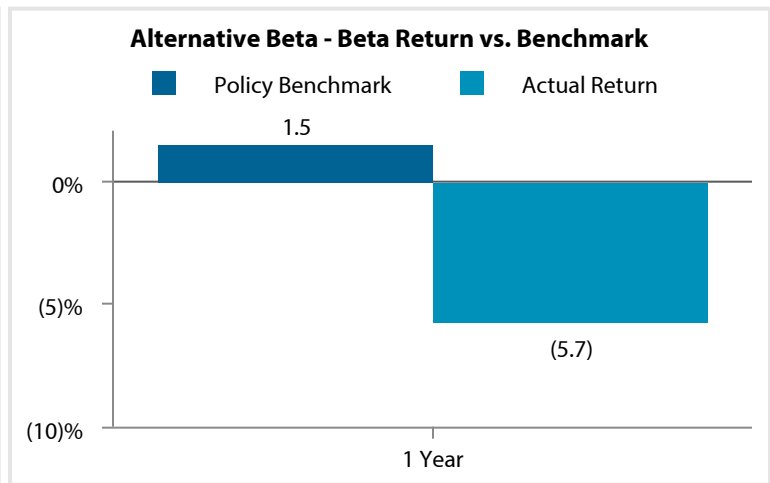
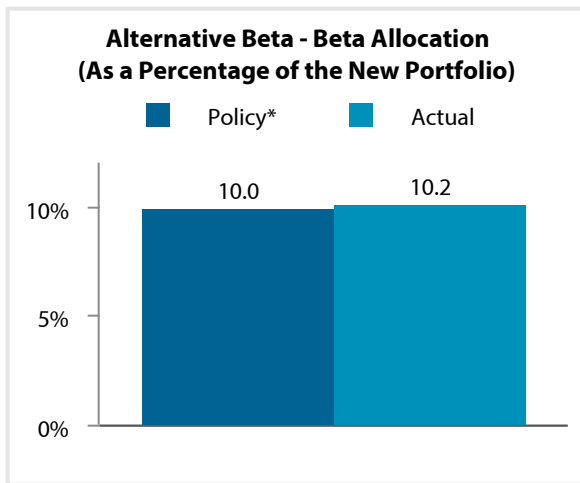
* As of June 30, 2020, the total inflation hedge policy benchmark was comprised of 12.5% commodities policy benchmark, 62.5% TIPS policy benchmark, 12.5% private real assets policy benchmark, and 12.5% public real assets policy benchmark.

Alternative Betas/Absolute Return Bucket

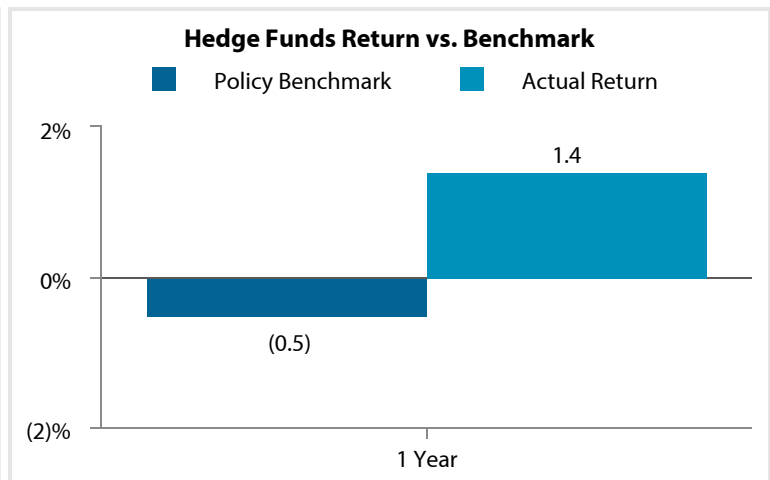
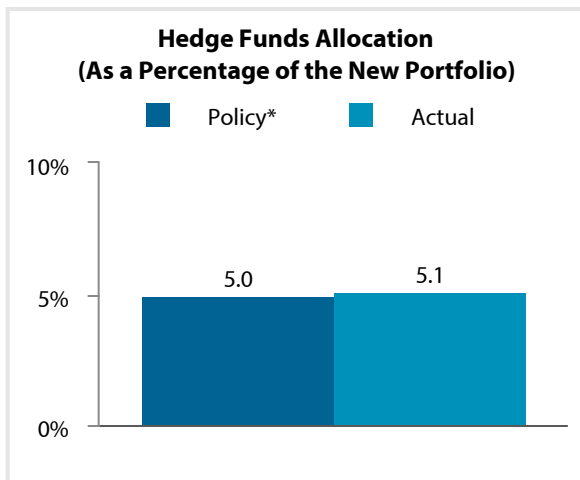
This asset class represents hedge funds, alternative betas, and private credit. Alternative betas and hedge funds are designed to provide a source of stable returns and low correlations with traditional asset strategies. In addition, it is expected that investments in this category would perform well across multiple economic environments. Private credit is designed to provide a source of current income and provide access to a form of credit risk premium. It is expected that investments in this category would perform well in periods of rising economic growth.

As a result of the multitude of strategies being deployed, it is expected that this asset class will provide meaningful diversification to the portfolio. While the sensitivities to economics will be dependent on positioning at the time, it is expected that these betas will have their best returns in rising growth environments and their worst returns in falling growth environments. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this bucket.

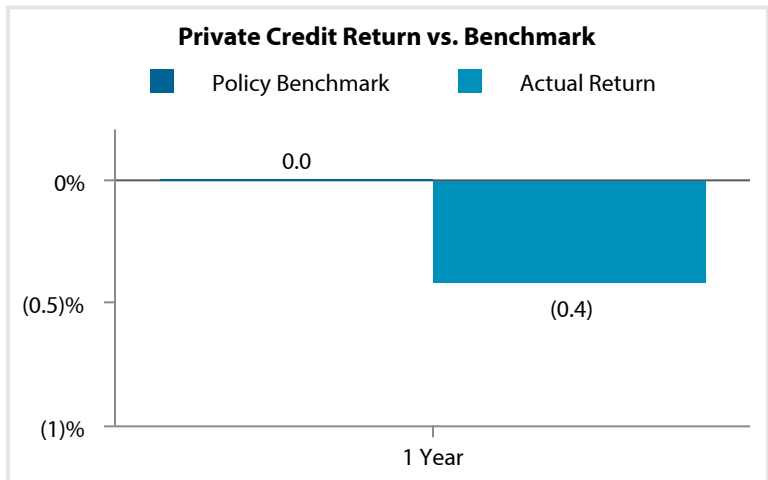
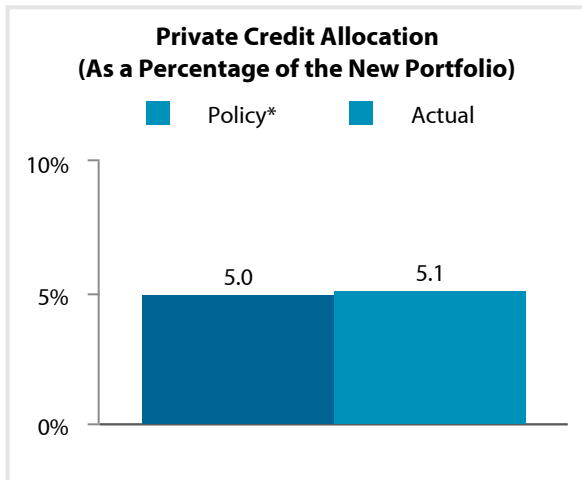
As of the fiscal year end, alternative betas were 50% of the bucket with hedge funds and private credit each making up 25% of the bucket. For the fiscal year, alternative betas returned (5.7%) versus 1.5% for the policy benchmark. The underperformance was primarily related to manager implementation. Hedge funds, for the fiscal year, returned 1.4% compared to its policy benchmark return of (0.5%). The primary driver of the outperformance was manager selection within hedge fund managers. For the fiscal year, private credit returned (0.4%) versus 0.0% for its policy benchmark. This underperformance was largely due to the external managers within this portfolio underperforming the benchmark.



* As of June 30, 2020, the alt beta - beta policy benchmark was the HFRX Macro/CTA Index.

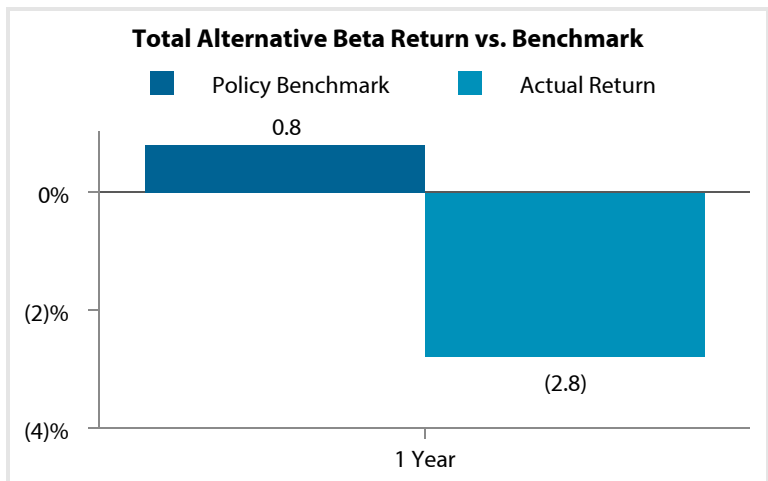
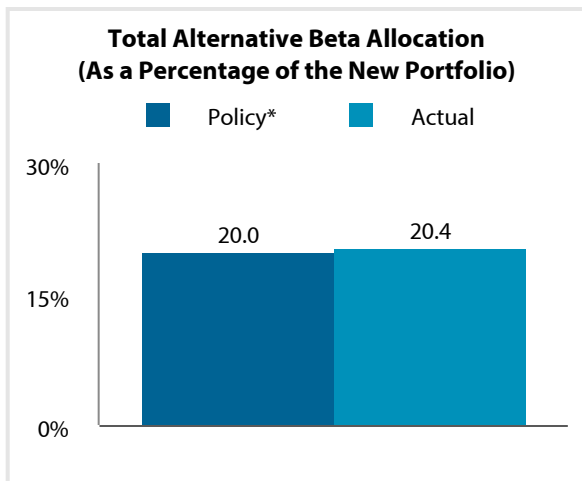


* As of June 30, 2020, the hedge funds policy benchmark was the HFRI Fund Weighted Composite Index.

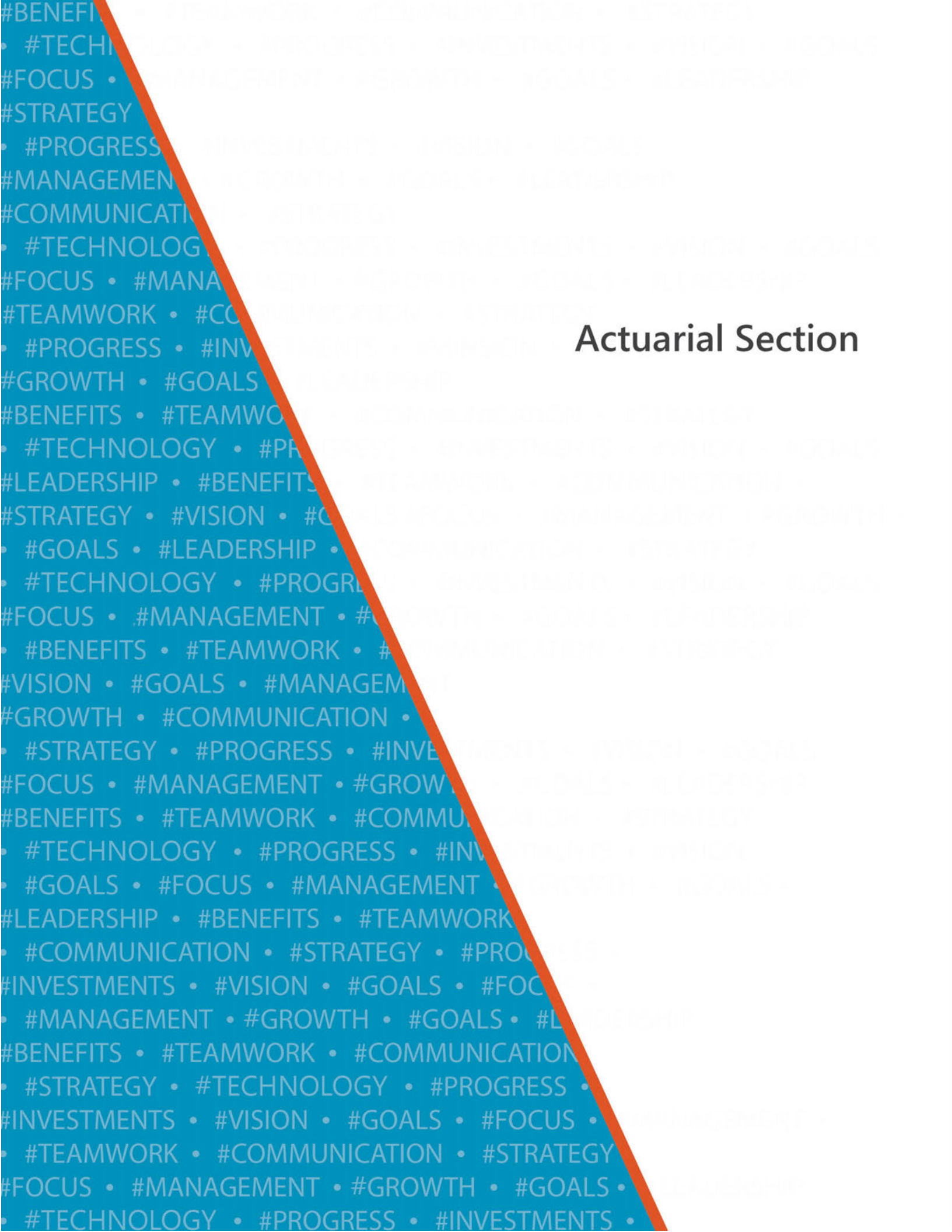


* As of June 30, 2020, the private credit policy benchmark was the S&P/LSTA US Leveraged Loan Index + 2%.

As of June 30, 2020, the market exposure of the alternative beta portfolio was \$955,707,726, representing 20.4% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. The alternative betas/absolute return allocation returned (2.8%) for the fiscal year versus 0.8% for the policy benchmark. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



* As of June 30, 2020, the alternative beta policy benchmark was comprised of 25.0% direct hedge funds policy benchmark, 50.0% alternative beta - beta policy benchmark, and 25.0% private credit policy benchmark.



Actuarial Section

Actuary's Certification Letter



Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

October 13, 2020

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Missouri State Employees' Retirement System (MOSERS) as of June 30, 2020, for the purpose of determining contribution rates for fiscal year 2022. Actuarial valuations are prepared annually for the Missouri State Employees' Plan (MSEP) and the Judicial Retirement Plan. The funding policy for both plans includes the Entry Age Normal actuarial cost method and the level percent of payroll methodology for the unfunded actuarial accrued liability (UAAL), which are set statutorily. The Board of Trustees is responsible for selecting the asset valuation method, amortization period and methodology for both plans. The selection of the amortization period reflects the Board's desire to reach full funding within thirty years. The major findings of the valuations are contained in this section, which reflects the plan provisions in place on June 30, 2020, as amended by any legislation passed by the 2020 legislature.

In July 2018, after extensive analysis, the MOSERS Board adopted a plan to phase in a change in the full set of economic assumptions over a three year period (2018 through 2020 valuations). The scheduled changes to the economic assumptions were implemented in the 2020 valuation, including decreases in the following: inflation assumption from 2.35% to 2.25%, investment return assumption from 7.10% to 6.95%, cost of living adjustment (COLA) assumption from 1.88% to 1.80%, general wage growth assumption from 2.60% to 2.50% and the payroll growth assumption from 2.35% to 2.25%. For more detail, see the valuation 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, statutory provisions, member data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, and other factors for the plans have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the plans and reasonable expectations); meet applicable Actuarial Standards of Practice (ASOPs); and which, in combination, offer our best estimate of anticipated experience affecting the plans. Nevertheless, the emerging costs of the plans will vary from those presented herein to the extent actual experience differs from that projected by the actuarial assumptions. The Board of Trustees has the final decision regarding the appropriateness of the assumptions and adopted them, as indicated in Appendix D of our *MSEP Actuarial Valuation Report* and Appendix C of our *Judges Actuarial Valuation Report*.

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Future actuarial measurements may differ significantly from the current measurements presented in the June 30, 2020 valuation reports due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

Actuarial computations presented in this section are for purposes of determining the recommended and statutory funding amounts for the plans. The calculations have been made on a basis consistent with our understanding of the plans' funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results shown in the June 30, 2020 valuation reports. Accordingly, additional determinations may be needed for other purposes.

Based upon the June 30, 2020 valuation results, annual projection forecasting and the presumption that future contributions will be made at the full actuarial contribution rate, it is our opinion that the current funding policy will systematically accumulate assets sufficient to fund all future benefits of both the Missouri State Employees' Plan (MSEP) and the Judicial Retirement Plan, if all actuarial assumptions are met.

We provided the information used by staff to prepare the following schedules in the *Actuarial Section: Schedules of Funding Progress, Active Members by Attained Age and Years of Service, Schedules of Active Member Valuation Data, Short-Term Solvency Test, and Analysis of Financial Experience*. We also provided the information used by staff to prepare the following schedules in the *Financial Section: Schedule of Employers' Net Pension Liability, Sensitivity of Net Pension Liability to Changes in the Discount Rate, Schedule of Changes in Employers' Net Pension Liability* and the *Schedule of Employer Contributions*.

Actuarial computations, based on the actuarial valuations performed as of June 30, 2020, were also prepared as of June 30, 2020, for purposes of fulfilling financial accounting requirements for the plans under Governmental Accounting Standard Number 67 (GASB 67). The MSEP is a cost-sharing multiple employer plan and the Judicial Retirement Plan is a single employer plan. The assumptions used in the funding valuation were also used for GASB 67 calculations including the 6.95% assumed rate of return used in the funding valuation. In addition, the entry age normal actuarial cost method, which is required to be used under GASB 67, is also used in the funding valuations. The actuarial assumptions and methods meet the parameters set by ASOPs, as issued by the Actuarial Standards Board, and generally accepted accounting principles (GAAP) applicable in the United States of America as promulgated by the Governmental Accounting Standards Board (GASB). Additional information related to GASB 67 can be found in the Financial Section of this report.

The consultants who worked on this assignment are pension actuaries. Cavanaugh Macdonald Consulting, LLC's advice is not intended to be a substitute for qualified legal or accounting counsel.

We certify that, to the best of our knowledge and belief, the June 30, 2020 actuarial valuation reports are complete and accurate and have been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

Sincerely,

A handwritten signature in cursive script that reads 'Patrice Beckham'.

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

A handwritten signature in cursive script that reads 'Bryan K. Hoge'.

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

Summary of Actuarial Assumptions

Actuarial Methods

Calculation of Normal Cost and Actuarial Accrued Liability

The funding method used to determine the normal cost and actuarial accrued liability was the entry age actuarial cost method described below.

- **Entry age actuarial cost method** – Under the entry age normal cost method, the actuarial present value of each member’s projected benefit is allocated on a level basis over the member’s compensation between the entry age of the member and their assumed exit age. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.
- **Calculation of the actuarial value of assets (AVA)** – The Board adopted the current asset smoothing method effective with the June 30, 2018 valuation. Under the current method, the difference between the actual and assumed investment return on the fair value of assets is recognized evenly over a five-year period. No corridor is used with this method. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.
- **Amortization of the unfunded actuarial accrued liability (UAAL)** – Beginning with the June 30, 2018, valuation, the UAAL is amortized using a “layered” approach. Under this method, the “Legacy UAAL”, as determined in the June 30, 2018 valuation, is amortized over a closed 30-year period. Subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 30-year periods. Any change in the System's benefit structure shall be amortized over a closed period of 20 years, as set out in state statutes. The total UAAL amortization payment is the sum of the payments for each of the amortization bases.

Changes in Methods and Assumptions Since the Prior Year

An experience study which analyzed the System’s economic assumptions was performed in 2018 and the results were presented to the Board. Below is a summary of the changes to methods and assumptions since the prior year:

- **Investment return** – The assumption was lowered from 7.10% to 6.95%.
- **Price inflation** – The assumption was lowered from 2.35% to 2.25%.
- **General wage growth** – The assumption was lowered from 2.60% to 2.50%.
- **Payroll growth** – The assumption was lowered from 2.35% to 2.25%.
- **Cost-of-living adjustment (COLA)** – The assumption was lowered from 1.88% to 1.80%.

Actuarial Assumptions

Economic Assumptions

- **Investment return** – 6.95%, compounded annually, net of investment expenses. (7.10% as of the June 30, 2019 valuation)
- **Inflation** – 2.25% per year
- **Payroll growth** – 2.25% per year
- **Cost-of-living adjustment (COLA)** – 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect; 1.80% on a compounded basis when no minimum COLA is in effect
- **Interest on member contributions** – 1.50% per year

Demographic Assumptions

- **Mortality** – The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement

MSEP/MSEP 2000/MSEP 2011

- **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%
- **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females
- **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

Judicial Plan

- **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%
- **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015
- **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA). Assumptions were adopted based on the June 30, 2016 experience study and the June 30, 2018 Report on Economic Assumptions.

MSEP

Percent of Eligible Active Members Retiring Within the Next Year

Retirement Age	Normal Retirement			Early Retirement		
	MSEP/MSEP 2000			MSEP 2011	MSEP/MSEP 2000	MSEP 2011
	Percent Retiring			Percent Retiring	Percent Retiring	Percent Retiring
	1st Year	2nd Year	3rd Year			
48	20%					
49	20	10%				
50	20	10	21%			
51	20	10	21			
52	20	10	21			
53	20	10	21			
54	20	10	21			
55	20	10	21	45%		
56	20	10	21	45		
57	20	10	21	35	2.4%	
58	20	10	21	35	3.1	
59	20	10	21	30	3.0	
60	20	10	21	35	5.1	
61	19	10	21	25	6.0	
62	18	22	29	40	6.0	10%
63	16	18	24	30	6.0	10
64	15	17	17	20	6.0	10
65	19	19	27	30		50
66	24	25	28	25		50
67	10	25	23	20		
68	20	25	23	20		
69	20	25	23	20		
70	20	25	23	20		
71	20	25	23	20		
72	20	25	23	20		
73	20	25	23	20		
74	20	25	23	20		
75	50	50	23	50		
76	50	50	23	50		
77	75	75	23	75		
78	100	100	100	100		

Judicial Plan

Percent of Eligible Active Members Retiring Within the Next Year

Retirement Age	Normal Retirement				Early Retirement	
	Judicial Plan		Judicial Plan 2011		Judicial Plan	
	Percent Retiring		Percent Retiring		Percent Retiring	
	Male	Female	Male	Female	Male	Female
55	20%	3%				
56	16	3				
57	13	3				
58	9	3				
59	5	3				
60	8	8				
61	5	8				
62	8	8	30%	35%	6%	3%
63	10	8	20	20	6	3
64	12	8	15	20	6	3
65	12	15	30	50	6	3
66	20	15	25	25	6	3
67	20	15	20	25	6	3
68	30	15	20	25	6	3
69	30	15	30	50	6	3
70	100	100	100	100	100	100

Elected Officials and Legislators

Percent of Active Members Terminating Within the Next Year

Years of Service	Percent Terminating	
	Male	Female
0-1	8%	8%
1-2	8	8
2-3	8	8
3-4	8	8
4-5	12	12
5-6	12	12
6-7	12	12
7+	35	35

MSEP

Separations From Active Employment Before Service Retirement Assumptions

Sample Ages	Years of Service	Termination*		Death**		Disability	
		Male	Female	Male	Female	Male	Female
	0	24.0%	27.5%				
	1	19.0	21.5				
	2	15.5	16.3				
	3	13.3	13.5				
	4	11.2	11.3				
25	5+	13.5	14.0	0.03%	0.01%	0.10%	0.10%
30		10.6	11.0	0.03	0.02	0.10	0.10
35		8.2	8.5	0.04	0.03	0.10	0.10
40		5.8	6.0	0.05	0.03	0.36	0.36
45		4.3	4.5	0.07	0.05	0.41	0.41
50		2.9	3.0	0.13	0.08	0.57	0.57
55		2.9	3.0	0.22	0.14	0.77	0.77
60		2.9	3.0	0.40	0.20	1.02	1.02
65		2.9	3.0	0.70	0.30	1.23	1.23
70		2.9	3.0	1.17	0.50	1.23	1.23

* Does not apply to elected officials and legislators.

** 2% of the deaths in active service are assumed to be duty-related.

MSEP

Pay Increase Assumptions

Years of Service	Rates by Service*			
	Inflation	Productivity	Merit	Total
1	2.25%	0.25%	5.75%	8.25%
2	2.25	0.25	2.50	5.00
3	2.25	0.25	1.50	4.00
4	2.25	0.25	1.25	3.75
5	2.25	0.25	1.00	3.50
9	2.25	0.25	0.75	3.25
10	2.25	0.25	0.50	3.00
21+	2.25	0.25	0.25	2.75

* General assembly members have a flat 2.5% assumption.

Judicial Plan
Separations From Active Employment Before Service Retirement
Due to Death and Disability Assumptions

Sample Ages	Death		Disability	
	Male	Female	Male	Female
25	0.03%	0.01%	0.01%	0.01%
30	0.03	0.02	0.02	0.01
35	0.04	0.03	0.03	0.02
40	0.05	0.04	0.04	0.03
45	0.07	0.05	0.05	0.04
50	0.13	0.09	0.08	0.07
55	0.24	0.16	0.13	0.12
60	0.42	0.23	0.20	0.19
65	0.74	0.33	0.20	0.19
70	1.23	0.55	0.20	0.19

Judicial Plan
Separations From Active Employment Before Service Retirement
Due to Terminations Assumptions

Service Index	Male	Female
1	0.040%	0.040%
2	0.010	0.023
3	0.013	0.023
4	0.013	0.023
5	0.013	0.023
6-10	0.013	0.023
11-15	0.017	0.023
16+	0.010	0.010

Judicial Plan
Pay Increase Assumptions

Sample Ages	Inflation	Productivity	Merit	Increase Next Year
25	2.25%	0.25%	2.20%	4.70%
30	2.25	0.25	2.20	4.70
35	2.25	0.25	1.48	3.98
40	2.25	0.25	0.76	3.26
45	2.25	0.25	0.60	3.10
50	2.25	0.25	0.54	3.04
55	2.25	0.25	0.44	2.94
60	2.25	0.25	0.00	2.50
65	2.25	0.25	0.00	2.50
70	2.25	0.25	0.00	2.50

Other Assumptions | June 30, 2020

- **Form of payment**

MSEP

- 50% joint and survivor

MSEP 2000/MSEP 2011

- Straight life annuity

Judicial Plan

- **First employed before January 1, 2011** – 50% joint and survivor
- **First employed on or after January 1, 2011** – Straight life annuity

- **Marital status**

MSEP/MSEP 2000/MSEP 2011

- **Percent married** – 70% married at retirement, 60% of those dying in active service are married
- **Spouse’s age** – Females assumed to be three years younger than males

Judicial Plan

- **Percent married** – 100% married
- **Spouse’s age** – Females assumed to be four years younger than males

- **Pay increase timing** – Pay increases are assumed to occur at the beginning of the fiscal year.
- **Decrement timing** – Decrements of all types are assumed to occur mid-year.
- **Eligibility testing** – Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
- **Benefit service** – Exact fractional service is used to determine the amount of the benefit payable.
- **Decrement relativity** – Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
- **Decrement operation** – Disability and withdrawal do not operate during normal retirement eligibility.
- **Other liability adjustments**

MSEP/MSEP 2000/MSEP 2011

- Pre-retirement survivor benefits for spouse of an inactive-vested member. These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member.

Age	Male	Female
<30	1.57	1.31
30-39	1.24	1.13
40-49	1.09	1.05
>50	1.02	1.01

- **Incidence of contributions** – Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
 - **Retirement election**
- MSEP 2000*
- All regular state employees first employed on or before June 30, 2000, are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62.
 - Elected officials, general assembly, and uniformed water patrol members first employed before July 1, 2000, are assumed to elect MSEP at retirement.

- **Service adjustment**

MSEP/MSEP 2000/MSEP 2011

- It is assumed that each member will be granted eight months of service credit; four months for unused leave upon retirement and four months for military service purchases. For members first employed on or after January 1, 2011, it is assumed that each member will be granted five months for unused leave.

- **Forfeitures**

MSEP 2011

- For those first employed on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.

Judicial Plan

- No vested members are assumed to take a refund of employee contributions.

- **Salary and benefit limits** – For purposes of the valuation, no limits were applied to member compensation or benefits.

- **Commencement age for deferred vested benefit** – normal retirement date

- **Data Adjustments**

MSEP/MSEP 2000/MSEP 2011

Active and retired member data was reported as of May 31, 2020. It was brought forward to June 30, 2020, by adding one month of service for all active members, one month of contributions and interest for MSEP 2011 members, and the June COLA for certain retired members. Financial information continues to be reported annually as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with less than a \$100 annualized salary were assumed to receive the average active member pay.

When the option of choosing plans is available, inactive-vested members are reported with two records, one with benefits under the MSEP and one with benefits under the MSEP 2000. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

For any retired member who has elected a joint and survivor benefit, yet has no beneficiary date of birth provided, it was assumed that the beneficiary is three years younger for male retirees and three years older for female retirees.

For members reported with no gender, the member is assumed to be male.

Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

Judicial Plan

Active and retired member data was reported as of May 31, 2020. It was brought forward to June 30, 2020, by adding one month of service for all active members, one month of contributions and interest for Judicial Plan 2011 members, and the June COLA for certain retired members. Financial information continues to be reported annually as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the statutory deadline.

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

Other Technical Valuation Procedures

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or older than the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

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

Pension Trust Funds

Employer Schedule of Funding Progress

Last Ten Fiscal Years

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

MSEP

Actuarial Valuation Date as of June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
2020	\$ 8,711,224,151	\$ 14,258,408,888	\$ 5,547,184,737	61.1%	\$ 1,980,910,473	280.0%
2019	8,782,383,977	13,957,626,309	5,175,242,332	62.9	1,930,764,635	268.0
2018	8,830,410,210	13,612,763,961	4,782,353,751	64.9	1,915,143,002	249.7
2017	8,872,381,848	13,152,273,895	4,279,892,047	67.5	1,941,969,786	220.4
2016	8,878,057,191	12,751,162,753	3,873,105,562	69.6	1,921,528,936	201.6
2015	8,792,485,658	11,727,618,410	2,935,132,752	75.0	1,918,527,768	153.0
2014	8,637,758,955	11,494,571,835	2,856,812,880	75.1	1,902,719,928	150.1
2013	8,096,436,929	11,134,637,484	3,038,200,555	72.7	1,880,212,950	161.6
2012	7,897,167,203	10,793,651,577	2,896,484,374	73.2	1,864,069,493	155.4
2011	8,022,481,408	10,123,544,043	2,101,062,635	79.2	1,875,569,816	112.0

Judicial Plan

Actuarial Valuation Date as of June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
2020	\$ 180,713,310	\$ 624,847,011	\$ 444,133,701	28.9%	\$ 61,450,808	722.7%
2019	172,224,529	617,482,705	445,258,176	27.9	60,380,734	737.4
2018	162,135,045	593,788,592	431,653,547	27.3	59,551,874	724.8
2017	151,828,631	564,417,925	412,589,294	26.9	58,150,935	709.5
2016	143,468,860	547,621,617	404,152,757	26.2	57,421,016	703.8
2015	134,349,908	482,969,311	348,619,403	27.8	55,656,457	626.4
2014	124,269,105	462,336,255	338,067,150	26.9	49,587,936	681.8
2013	111,140,339	435,378,358	324,238,019	25.5	48,697,726	665.8
2012	102,266,706	413,332,538	311,065,832	24.7	45,835,501	678.7
2011	98,398,628	393,484,589	295,085,961	25.0	45,888,020	643.1

See *Schedule of Employer Contributions* on page 60.

Pension Trust Funds

Summary of Member Data Included in Valuations

June 30, 2020

Active Members

Valuation Group	Number	Annual Covered Payroll	Group Averages		
			Annual Salary	Age (Yrs)	Service (Yrs)
MSEP					
Regular state employees	43,661	\$ 1,845,831,503	\$ 42,276	45.3	10.5
Elected officials	6	659,976	109,996	47.7	3.3
Legislative clerks	7	292,357	41,765	67.1	21.6
Legislators	193	6,943,847	35,978	53.2	4.8
Uniformed water patrol	10	755,115	75,512	44.0	18.6
Conservation department	1,323	61,857,763	46,756	44.8	14.5
School-term salaried employees	783	62,661,147	80,027	58.4	22.4
Administrative law judges	16	1,908,765	119,298	62.0	25.6
Total MSEP group	45,999	\$ 1,980,910,473	43,064	45.5	10.8
Judicial Plan	418	\$ 61,450,808	\$ 147,012	55.7	10.8

Retired Members and Beneficiaries

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age (Yrs.)
MSEP				
Retirement	45,176	\$ 738,747,900	\$ 16,353	70.7
Disability	1	2,316	2,316	64.0
Survivor of active member	1,728	19,459,464	11,261	63.7
Survivor of retired member	3,952	52,328,328	13,241	76.1
Total MSEP group	50,857	\$ 810,538,008	15,938	70.8
Judicial Plan	590	\$ 40,112,028	\$ 67,986	76.6

Other Members

Plans	Number Inactive-Vested	Number Inactive-Nonvested	Number Leave of Absence	Number Long-Term Disability
MSEP	16,300	21,735	247	651
Judicial Plan	35	0	0	0

Active Members by Attained Age and Years of Service

June 30, 2020

MSEP

Attained Age	Years of Service to Valuation Date								Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	No.	Valuation Payroll
< 24	2,348	13							2,361	\$ 76,937,066
25-29	3,501	603	2						4,106	150,141,161
30-34	2,690	1,624	349	7					4,670	186,351,402
35-39	2,013	1,344	1,170	404	17				4,948	210,697,939
40-44	1,575	1,066	1,001	1,118	451	20			5,231	230,055,094
45-49	1,462	957	879	1,002	1,323	432	24		6,079	274,202,269
50-54	1,296	892	816	871	1,180	944	316	21	6,336	288,793,496
55-59	1,283	951	862	964	1,067	609	432	106	6,274	283,203,301
60-64	783	670	652	676	664	361	249	180	4,235	193,594,165
65+	258	323	266	281	238	145	116	132	1,759	86,934,580
Totals	17,209	8,443	5,997	5,323	4,940	2,511	1,137	439	45,999	\$ 1,980,910,473

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Group Averages: Age – 45.5 years • Service – 10.8 years • Annual pay – \$43,064

Judicial Plan

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
< 39	19	4						23	\$ 3,187,680
40-44	24	12						36	5,228,470
45-49	27	14	9					50	7,065,291
50-54	23	18	11	12	2			66	9,707,244
55-59	20	34	13	11	9	2		89	13,228,243
60-64	11	19	16	9	20	11	3	89	13,203,039
65+	2	10	13	9	8	13	10	65	9,830,841
Totals	126	111	62	41	39	26	13	418	\$ 61,450,808

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Group Averages: Age – 55.7 years • Service – 10.8 years • Annual pay – \$147,012

Schedules of Active Member Valuation Data

Last Ten Fiscal Years

MSEP

Schedule of Active Member Valuation Data

Valuation Date as of June 30	Participating Employers	Number	Annual Payroll	Average Annual Pay	% Increase in Average Pay
2020	17	45,999	\$ 1,980,910,473	\$ 43,064	4.53%
2019	17	46,864	1,930,764,635	41,199	2.84
2018	18	47,806	1,915,143,002	40,061	0.90
2017	18	48,910	1,941,969,786	39,705	2.21
2016	18	49,464	1,921,528,936	38,847	1.20
2015	18	49,980	1,918,527,768	38,386	2.12
2014	18	50,621	1,902,719,928	37,588	1.62
2013	18	50,833	1,880,212,950	36,988	1.86
2012	18	51,332	1,864,069,493	36,314	0.02
2011	17	51,660	1,875,569,816	36,306	(0.18)

Judicial Plan

Schedule of Active Member Valuation Data

Valuation Date as of June 30	Participating Employers	Number	Annual Payroll	Average Annual Pay	% Increase in Average Pay
2020	1	418	\$ 61,450,808	\$ 147,012	0.80%
2019	1	414	60,380,734	145,847	1.64
2018	1	415	59,551,874	143,498	1.17
2017	1	410	58,150,935	141,832	0.78
2016	1	408	57,421,016	140,738	2.41
2015	1	405	55,656,457	137,423	12.24
2014	1	405	49,587,936	122,439	0.57
2013	1	400	48,697,726	121,744	5.71
2012	1	398	45,835,501	115,165	0.14
2011	1	399	45,888,020	115,008	0.26

Retirees and Beneficiaries Added and Removed - MSEP

Last Ten Fiscal Years

Benefit Type	Fiscal Year Ended June 30		Added to Rolls		Removed from Rolls		Rolls at End of Year		Percentage Increase/(Decrease)	
	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances	Average Annual Allowances	Annual Allowances	Average Annual Allowances	
2020										
Retirees	2,393	\$ 47,592,468	1,347	\$ 21,088,044	45,723	\$ 741,506,764	\$ 16,217	3.71%	1.33%	
Beneficiaries	506	7,538,112	358	3,849,576	5,720	72,199,103	12,622	5.38	2.66	
2019										
Retirees	2,510	49,663,164	1,247	20,068,656	44,677	715,002,340	16,004	4.32	1.37	
Beneficiaries	513	7,606,344	321	3,395,964	5,572	68,510,567	12,296	6.55	2.88	
2018										
Retirees	2,875	51,096,000	1,295	17,429,136	43,414	685,407,832	15,788	5.17	1.34	
Beneficiaries	480	6,373,080	334	3,124,044	5,380	64,300,187	11,952	5.32	2.46	
2017										
Retirees	2,810	44,397,240	1,282	17,552,484	41,834	651,740,968	15,579	4.30	0.49	
Beneficiaries	473	5,953,224	276	2,599,608	5,234	61,051,151	11,664	5.81	1.83	
2016										
Retirees	2,829	41,259,384	1,165	15,963,864	40,306	624,896,212	15,504	4.22	(0.08)	
Beneficiaries	475	5,779,596	283	2,563,344	5,037	57,697,535	11,455	5.90	1.87	
2015										
Retirees	2,885	43,895,520	1,066	14,075,772	38,642	599,600,692	15,517	5.23	0.28	
Beneficiaries	465	5,649,900	246	2,203,788	4,845	54,481,283	11,245	6.75	1.93	
2014										
Retirees	2,631	37,702,375	956	12,406,774	36,823	569,780,944	15,474	4.65	(0.11)	
Beneficiaries	421	5,141,385	197	1,842,199	4,626	51,035,171	11,032	6.91	1.73	
2013										
Retirees	2,676	41,153,143	1,001	13,305,438	35,148	544,485,343	15,491	5.39	0.37	
Beneficiaries	431	5,418,267	221	1,876,266	4,402	47,735,985	10,844	8.01	2.86	
2012										
Retirees	2,655	39,865,026	908	11,424,712	33,473	516,637,638	15,434	5.83	0.30	
Beneficiaries	371	4,966,813	195	1,666,285	4,192	44,193,984	10,542	8.07	3.53	
2011										
Retirees	2,896	42,018,907	903	10,857,843	31,726	488,197,324	15,388	6.82	0.11	
Beneficiaries	368	4,057,521	226	1,996,457	4,016	40,893,456	10,183	5.31	1.58	

Retirees and Beneficiaries Added and Removed - Judicial Plan

Last Ten Fiscal Years

Benefit Type	Fiscal Year Ended June 30		Added to Rolls		Removed from Rolls		Rolls at End of Year		Percentage Increase/(Decrease)	
	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances	Annual Allowances	Average Annual Allowances
2020										
Retirees	21	\$ 2,245,320	9	\$ 753,144	447	\$ 34,113,254	\$ 76,316	4.57%	1.77%	
Beneficiaries	7	397,068	11	449,532	151	5,914,245	39,167	(0.88)	1.75	
2019										
Retirees	39	3,749,292	17	1,357,068	435	32,621,078	74,991	7.91	2.46	
Beneficiaries	12	643,452	15	555,528	155	5,966,709	38,495	1.50	3.46	
2018										
Retirees	23	2,642,868	15	1,074,540	413	30,228,854	73,193	5.47	3.43	
Beneficiaries	9	470,700	8	322,200	158	5,878,785	37,208	2.59	1.94	
2017										
Retirees	21	2,128,128	16	1,239,612	405	28,660,526	70,767	3.20	1.93	
Beneficiaries	12	507,360	2	87,936	157	5,730,285	36,499	7.90	1.03	
2016										
Retirees	16	1,671,084	14	1,078,356	400	27,772,010	69,430	2.18	1.67	
Beneficiaries	8	383,940	11	397,176	147	5,310,861	36,128	(0.25)	1.79	
2015										
Retirees	39	3,599,880	21	1,395,888	398	27,179,282	68,290	8.82	3.90	
Beneficiaries	18	739,788	5	198,348	150	5,324,097	35,494	11.32	1.67	
2014										
Retirees	18	1,671,667	8	443,807	380	24,975,290	65,724	5.17	2.40	
Beneficiaries	7	320,389	7	216,813	137	4,782,657	34,910	2.21	2.21	
2013										
Retirees	27	2,233,387	13	851,802	370	23,747,430	64,182	6.18	2.16	
Beneficiaries	8	383,692	11	322,758	137	4,679,081	34,154	1.32	3.54	
2012										
Retirees	18	1,490,554	14	1,074,572	356	22,365,845	62,825	1.90	0.75	
Beneficiaries	8	394,339	6	218,310	140	4,618,147	32,987	3.96	2.48	
2011										
Retirees	36	2,501,248	9	563,214	352	21,949,863	62,358	9.68	1.27	
Beneficiaries	4	182,428	10	242,257	138	4,442,118	32,189	(1.33)	2.96	

Short-Term Solvency Test

Last Ten Fiscal Years

MSEP

Actuarial Accrued Liabilities for

Fiscal Year	Member Contributions (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
					(1)	(2)	(3)
2020	\$ 157,133,312	\$ 8,701,290,590	\$ 5,399,984,986	\$ 8,711,224,151	100.0%	98.3%	0.0%
2019	128,255,311	8,430,014,973	5,399,356,055	8,782,383,977	100.0	100.0	4.2
2018	103,784,514	8,073,692,664	5,435,286,783	8,830,410,210	100.0	100.0	12.0
2017	78,979,370	7,559,623,100	5,513,671,425	8,872,381,848	100.0	100.0	22.4
2016	60,618,379	7,305,895,284	5,384,649,090	8,878,057,191	100.0	100.0	28.1
2015	42,731,658	6,695,631,737	4,989,255,015	8,792,485,658	100.0	100.0	41.2
2014	27,111,467	6,347,728,717	5,119,731,651	8,637,758,955	100.0	100.0	44.2
2013	14,507,994	6,062,654,441	5,057,475,049	8,096,436,929	100.0	100.0	39.9
2012	5,431,451	5,749,411,068	5,038,809,058	7,897,167,203	100.0	100.0	42.5
2011	599,761	5,357,794,617	4,765,149,665	8,022,481,408	100.0	100.0	55.9

Judicial Plan

Actuarial Accrued Liabilities for

Fiscal Year	Member Contributions (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
					(1)	(2)	(3)
2020	\$ 5,991,360	\$ 436,014,583	\$ 182,841,068	\$ 180,713,310	100.0%	40.1%	0.0%
2019	4,421,019	434,204,353	178,857,333	172,224,529	100.0	38.6	0.0
2018	3,124,482	401,725,610	188,938,500	162,135,045	100.0	39.6	0.0
2017	2,232,405	377,099,534	185,085,986	151,828,631	100.0	39.7	0.0
2016	1,855,955	354,715,048	191,050,614	143,468,860	100.0	39.9	0.0
2015	1,204,757	316,042,514	165,722,040	134,349,908	100.0	42.1	0.0
2014	716,564	285,124,436	176,469,255	124,269,105	100.0	43.3	0.0
2013	421,753	274,911,416	160,045,189	111,140,339	100.0	40.3	0.0
2012	209,817	258,642,149	154,450,572	102,266,706	100.0	39.5	0.0
2011	59,958	251,532,354	141,892,277	98,398,628	100.0	39.1	0.0

Analysis of Financial Experience

Year Ended June 30, 2020

Actual experience will never coincide exactly with assumed experience (except by coincidence). Gains and losses may offset each other over a period of years, but sizable year-to-year variations from assumed experience are common. Detail on the analysis of the financial experience is shown below.

MSEP		Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$ 5,175,242,332	2020	(2.3)%
Normal cost from last valuation	148,981,819	2019	(1.8)
Actual employer and member contributions	(472,037,613)	2018	(0.9)
Administrative expenses	8,398,164	2017	(1.6)
Interest accrual	361,842,933	2016	(3.2)
Expected UAAL before changes	5,222,427,635	2015	(0.9)
Change from any changes in benefits, assumptions, or methods	124,766,739	2014	2.1
Refinement of COLA programming	(121,303,254)	2013	(2.8)
Expected UAAL after changes	5,225,891,120	2012	(4.7)
Less: Actual UAAL at end of year	(5,547,184,737)	2011	(2.4)
Gain (loss) during year from experience	<u>\$ (321,293,617)</u>		
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$14,208,067,714)	(2.3)%		

Judicial		Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$ 445,258,176	2020	(0.2)%
Normal cost from last valuation	12,249,903	2019	(0.8)
Actual employer and member contributions	(40,489,085)	2018	(0.3)
Administrative expenses	74,450	2017	(0.3)
Interest accrual	31,072,955	2016	0.1
Expected UAAL before changes	448,166,399	2015	(1.5)
Change from any changes in benefits, assumptions, or methods	6,341,771	2014	1.5
Refinement of COLA programming	(11,806,199)	2013	(2.6)
Expected UAAL after changes	442,701,971	2012	(0.6)
Less: Actual UAAL at end of year	(444,133,701)	2011	(0.4)
Gain (loss) during year from experience	<u>\$ (1,431,730)</u>		
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$633,438,883)	(0.2)%		

Comparison of Plans for General State Employees

June 30, 2020

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Eligible members employed in permanent positions, which normally requires at least 1,040 hours of work per year</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> First employed on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 5 years 	<ul style="list-style-type: none"> 5 years
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 10 years of service <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i> 	<ul style="list-style-type: none"> Age 57 + 5 years of service <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i>
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 65 + 5 years of service Age 60 + 15 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> 	<ul style="list-style-type: none"> Age 62 + 5 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> .016 x FAP x Service <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> .017 x FAP x Service <i>Future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> .008 x FAP x Service <i>Available to members retiring under Rule of 80</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Must work at least 2 years beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable) 	<ul style="list-style-type: none"> Must work at least 2 year beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable)
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Employed before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Employed on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Based on 80% of the percentage increase in the average CPI (0-5%)
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Applicable COLA rate (if eligible) 	<ul style="list-style-type: none"> Not available

Comparison of Plans for General State Employees (continued)

June 30, 2020

Benefit Provisions	MSEP 2011
Membership <i>Eligible members employed in permanent positions, which normally requires at least 1,040 hours of work per year</i>	<ul style="list-style-type: none"> • First employed on or after January 1, 2011, or • Returned to employment after electing the buyout option in fiscal year 2018
Member Contributions	<ul style="list-style-type: none"> • 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> • 5 years
Service Purchases	<ul style="list-style-type: none"> • May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> • Not available
Death Prior to Retirement	<ul style="list-style-type: none"> • Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. <i>Payable the month following the member's death; for inactive-vested, payable when member would have reached normal retirement eligibility</i> • Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible to receive reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 62 + 5 years of service at time of termination <i>Base benefit reduced 1/2 of 1% (.005) for each month age is younger than normal retirement</i> <i>Inactive-vested members ineligible</i>
Normal Retirement <i>Eligible to receive unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 67 + 5 years of service • Rule of 90 – (at least age 55) Age + years of service = 90 or more at time of termination <i>Inactive-vested members ineligible for Rule of 90</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> • .017 x FAP x Service <i>Future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> • .008 x FAP x Service <i>Available to members retiring under Rule of 90</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> • Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> • Life Income Annuity • Joint & 50% Survivor • Joint & 100% Survivor • Life Income with 120 Guaranteed Payments • Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> • Based on 80% of the percentage increase in the average CPI (0-5%)
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> • Not available

Comparison of Plans for Legislators

June 30, 2020

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Elected Members of the General Assembly</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> first employed on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 3 biennial assemblies (6 years) 	<ul style="list-style-type: none"> 3 biennial assemblies (6 years)
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 3 full-biennial assemblies or Rule of 80 – (at least age 48) Age + years of service = 80 or more 	<ul style="list-style-type: none"> Age 55 + 3 full-biennial assemblies or Rule of 80 – (at least age 50) Age + years of service = 80 or more <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> Biennial Assemblies x \$150 <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> (Active Pay ÷ 24) x Service <i>Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Sworn in before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Sworn in on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Applicable COLA rate (if eligible) 	<ul style="list-style-type: none"> Not available

Comparison of Plans for Legislators (continued)

June 30, 2020

Benefit Provisions	MSEP 2011
Membership <i>Elected Members of the General Assembly</i>	<ul style="list-style-type: none"> • First employed on or after January 1, 2011, or • Returned to employment after electing the buyout option in fiscal year 2018
Member Contributions	<ul style="list-style-type: none"> • 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> • 3 biennial assemblies (6 years)
Service Purchases	<ul style="list-style-type: none"> • May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> • Not available
Death Prior to Retirement	<ul style="list-style-type: none"> • Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. <i>Payable the month following the member's death; for inactive-vested, payable when member would have reached normal retirement eligibility</i> • Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible to receive reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Not available
Normal Retirement <i>Eligible to receive unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 62 + 3 full-biennial assemblies or • Rule of 90 – (at least age 55) Age + years of service = 90 or more at time of termination <i>Inactive-vested members ineligible for Rule of 90</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> • $(\text{Active Pay} \div 24) \times \text{Service}$ <i>Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> • Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> • Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> • Life Income Annuity • Joint & 50% Survivor • Joint & 100% Survivor • Life Income with 120 Guaranteed Payments • Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> • Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> • Not available

Comparison of Plans for Statewide Elected Officials

June 30, 2020

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Members elected to state office</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> First employed on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 4 years (1 term) 	<ul style="list-style-type: none"> 4 years (1 term)
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 10 years of service <i>Base benefit reduced ½ of 1% (.005) for each month age is younger than normal retirement</i> 	<ul style="list-style-type: none"> Not available
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 65 + 4 years of service or Age 60 + 15 years of service or Rule of 80 – (at least age 50) Age + years of service = 80 or more 	<ul style="list-style-type: none"> Age 55 + 4 years of service or Rule of 80 – (at least age 50) Age + years of service = 80 or more <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> Less than 12 years of service FAP x .016 x Service 12+ years of service Monthly Statutory Comp. x .50 <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> (Active Pay ÷ 24) x Service <i>Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Sworn in before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Sworn in on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 12+ years of service In addition to applicable COLA above, benefit will be recalculated for increases in statutory compensation for highest position held. 	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> Applicable COLA rate (if eligible) 	<ul style="list-style-type: none"> Not available

Comparison of Plans for Statewide Elected Officials (continued)

June 30, 2020

Benefit Provisions	MSEP 2011
Membership <i>Members elected to state office</i>	<ul style="list-style-type: none"> • First employed on or after January 1, 2011, or • Returned to employment after electing the buyout option in fiscal year 2018
Member Contributions	<ul style="list-style-type: none"> • 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> • 4 years (1 term)
Service Purchases	<ul style="list-style-type: none"> • May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> • Not available
Death Prior to Retirement	<ul style="list-style-type: none"> • Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. <i>Payable the month following the member's death; for inactive-vested, payable when member would have reached normal retirement eligibility</i> • Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of current pay. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible to receive reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Not available
Normal Retirement <i>Eligible to receive unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> • Age 62 + 4 years of service or • Rule of 90 – (at least age 55) Age + years of service = 90 or more at time of termination <i>Inactive-vested members ineligible for Rule of 90</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> • $(\text{Active Pay} \div 24) \times \text{Service}$ <i>Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> • Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> • Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> • Life Income Annuity • Joint & 50% Survivor • Joint & 100% Survivor • Life Income with 120 Guaranteed Payments • Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> • Benefit adjustment based on increase in pay for an active member
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> • Not available

Comparison of Plans for Judges

June 30, 2020

Benefit Provisions	Judicial Plan (Closed Plan)	Judicial Plan 2011
Membership	<ul style="list-style-type: none"> Must be a judge or commissioner of the supreme court or the court of appeals; a judge of any circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections; a justice of the peace, or a commissioner or deputy commissioner of the probate division of the circuit court appointed after February 29, 1972, in a first class county having a charter form of government in a city not withing a county; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court; or a commissioner of any family court. 	<ul style="list-style-type: none"> Must be a judge or commissioner of the supreme court or court of appeals, judge of any circuit, probate, or magistrate court, court of common pleas, court of criminal corrections, justice of the peace, or commissioner or deputy commissioner of the circuit court; commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court; or commissioner of any family court appointed or elected as a judge and employed in a benefit-eligible position as a judge for the first time on or after January 1, 2011
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 4% of pay
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> Automatic the day you become a member 	<ul style="list-style-type: none"> Automatic the day you become a member
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase qualifying public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death Survivor benefit paid to eligible spouse equal to 50% of benefit the member would have received based on service to age 70. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death Survivor benefit paid to eligible spouse equal to 50% of benefit the member would have received based on service to age 70. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Less than 12 years of service <i>Age 62</i> Less than 15 years of service <i>Age 60</i> 	<ul style="list-style-type: none"> Less than 12 years of service <i>Age 67</i> Less than 20 years of service <i>Age 62</i>
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 62 + 12 years of service Age 60 + 15 years of service Age 55 + 20 years of service 	<ul style="list-style-type: none"> Age 67 + 12 years of service Age 62 + 20 years of service
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> $Monthly\ pay \times .50 = Monthly\ Base\ Benefit$ 	<ul style="list-style-type: none"> $Monthly\ pay \times .50 = Monthly\ Base\ Benefit$
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity (if unmarried) Automatic Unreduced Joint & 50% Survivor 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Sworn in before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Sworn in on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Based on 80% of the percentage increase in the CPI (0-5%)
In-Service COLA <i>Service beyond age 60</i>	<ul style="list-style-type: none"> Judges who work beyond normal retirement have increased benefits upon retirement. 	<ul style="list-style-type: none"> Not available

Comparison of Plans for Uniformed Members of the Water Patrol*

June 30, 2020

Benefit Provisions	MSEP (Closed Plan)	MSEP 2000
Membership <i>Eligible members hired in permanent positions which normally requires at least 1,040 hours of work per year</i>	<ul style="list-style-type: none"> Employed prior to July 1, 2000 and vested in the MSEP 	<ul style="list-style-type: none"> Employed for the first time on or after July 1, 2000, but prior to January 1, 2011 Left state employment prior to becoming vested and returned to employment on or after July 1, 2000
Member Contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
Vesting <i>Eligible for future pension</i>	<ul style="list-style-type: none"> 5 years 	<ul style="list-style-type: none"> 5 years
Service Purchases	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost 	<ul style="list-style-type: none"> May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase public sector service at full actuarial cost
Service Transfers	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.800 	<ul style="list-style-type: none"> May transfer state service to other positions covered by MOSERS under 104.1090
Death Prior to Retirement	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i> 	<ul style="list-style-type: none"> Nonduty-related death (<i>vested members</i>) Survivor benefit paid using joint & 100% survivor option to eligible spouse or 80% of life income annuity paid to eligible children. Duty-related death (<i>no min. service requirement</i>) Survivor benefit to eligible spouse or children no less than 50% of average compensation. <i>Payable the month following the member's death</i>
Early Retirement <i>Eligible for reduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Age 57 + 10 years of service
Normal Retirement <i>Eligible for unreduced pension benefit once age and service requirements are met</i>	<ul style="list-style-type: none"> Age 55 + 5 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> 	<ul style="list-style-type: none"> Age 62 + 5 years of service Rule of 80 – (at least age 48) Age + years of service = 80 or more <i>Age 50 if first became eligible prior to Aug. 28, 2003</i> <i>Inactive-vested members ineligible for Rule of 80</i>
Base Benefit <i>Payable for life</i>	<ul style="list-style-type: none"> .016 x FAP x Service increased by 33% <i>Future formula increases, if any, may be passed along to retirees</i> 	<ul style="list-style-type: none"> .017 x FAP x Service <i>Future formula increases, if any, will not be passed along to retirees</i>
Temporary Benefit <i>Stops at age 62</i>	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> .008 x FAP x Service <i>Available to members retiring under Rule of 80</i>
BackDROP <i>Lump-sum payment at retirement in addition to reduced monthly pension</i>	<ul style="list-style-type: none"> Must work at least 2 years beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable) 	<ul style="list-style-type: none"> Must work at least 2 year beyond normal retirement eligibility to be eligible; elect BackDROP at retirement (if applicable)
Benefit Payment Options <i>Determines whether or not a benefit will be paid to anyone after member's death</i>	<ul style="list-style-type: none"> Life Income Annuity Unreduced Joint & 50% Survivor Joint & 100% Survivor Life Income with 60 Guaranteed Payments Life Income with 120 Guaranteed Payments 	<ul style="list-style-type: none"> Life Income Annuity Joint & 50% Survivor Joint & 100% Survivor Life Income with 120 Guaranteed Payments Life Income with 180 Guaranteed Payments
Cost-of-Living Adjustment (COLA) <i>Helps offset effects of inflation increasing the cost of goods and services</i>	<ul style="list-style-type: none"> Employed before Aug. 28, 1997 Receive 4-5% each year until reaching 65% COLA cap. After reaching cap, the rate is based on 80% of the percentage increase in the average CPI (0-5%) Employed on/after Aug. 28, 1997 Based on 80% of the percentage increase in the average CPI (0-5%) 	<ul style="list-style-type: none"> Based on 80% of the percentage increase in the average CPI (0-5%)
In-Service COLA <i>Service beyond age 65</i>	<ul style="list-style-type: none"> COLA given for service beyond age 65 <i>COLA provisions determined by employment date</i> 	<ul style="list-style-type: none"> Not available

* Eligibility for membership in the MSEP and MSEP 2000 is closed for uniformed members of the water patrol. Employees hired on or after January 1, 2011, are members of the Missouri Department of Transportation and Patrol Employees' Retirement System (MPERS).

Life Insurance Plans

June 30, 2020

MOSERS administers basic and optional term life insurance plans for eligible state employees and retirees.

Active Members*

Plan Provision	Requirement
<ul style="list-style-type: none"> • Basic life insurance An amount equal to one times annual salary (with a minimum of \$15,000) while actively employed. 	<ul style="list-style-type: none"> • Actively employed in an eligible state position resulting in membership in MOSERS.
<ul style="list-style-type: none"> • Duty-related death benefit Duty-related death benefit equivalent to two times the annual salary the member was earning at the time of death in addition to the basic life insurance amount of one times annual salary. 	<ul style="list-style-type: none"> • Actively employed in an eligible state position resulting in membership in MOSERS.
<ul style="list-style-type: none"> • Optional life insurance Additional life insurance may be purchased in a flat amount in multiples of \$10,000 not to exceed the maximum (lesser of six times annual salary or \$800,000). Spouse coverage may be purchased in multiples of \$10,000 up to a maximum of \$100,000; however, the amount of spouse coverage cannot exceed the amount of optional life insurance coverage the member has purchased. Coverage for children is available in a flat amount of \$10,000 per child. 	<ul style="list-style-type: none"> • Actively employed in an eligible state position resulting in membership in MOSERS.

* *Terminating employees may convert coverage up to the amount they had as an active employee at individual rates. Not available to employees of the Department of Conservation or colleges and universities except Lincoln University and State Technical College of Missouri.*

Retired Members

Plan Provision	Requirement
<ul style="list-style-type: none"> • Basic life insurance at retirement \$5,000 basic life insurance during retirement. 	<ul style="list-style-type: none"> • Must retire directly from active employment.
<ul style="list-style-type: none"> • Optional life insurance at retirement (MSEP) An employee may retain up to the lesser of \$60,000 or the amount of optional life insurance coverage held at the time of retirement at the group rate and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. 	<ul style="list-style-type: none"> • Must retire directly from active employment.
<ul style="list-style-type: none"> • Optional life insurance at retirement (MSEP 2000) Under "Rule of 80", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to \$60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. 	<ul style="list-style-type: none"> • Must retire directly from active employment.
<ul style="list-style-type: none"> • Optional life insurance at retirement (MSEP 2011) Under "Rule of 90", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to \$60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates. 	<ul style="list-style-type: none"> • Must retire directly from active employment.

Note: Insured employees may port their life insurance and their dependent life insurance when their coverage has been reduced or terminated if they meet certain qualifications.

Long-Term Disability (LTD) Insurance Plans

June 30, 2020

MOSERS administers the LTD Plan for eligible state employees who become disabled during active employment.

Active Members

Classification	Requirement
<ul style="list-style-type: none"> • General state employees, legislators, and elected state officials Members of MOSERS in a position normally requiring 1,040 hours of work a year are covered under the LTD plan, unless they work for a state agency which has its own LTD plan. 	<ul style="list-style-type: none"> • Eligible participants receive 60% of their compensation minus primary Social Security, Workers' Compensation, and employer provided income. Benefits commence after 90 days of disability or when sick leave benefits are no longer payable, whichever occurs last. LTD benefits cease upon the earliest of (i) when disability ends, (ii) when the member is first eligible for normal retirement benefits or is receiving early retirement benefits, (iii) upon a member's death, (iv) the date benefits become payable under any other group long-term disability insurance plan, or (v) the date the member fails to provide proof of continued disability and entitlement to LTD benefits.
<ul style="list-style-type: none"> • Water patrol 	<ul style="list-style-type: none"> • Uniformed members who are eligible for statutory occupational disability receive benefits equal to 50% of compensation with no offset for Social Security at the time of disability. For nonoccupational disabilities, eligible participants receive the same benefit as general employees.
<ul style="list-style-type: none"> • Judges 	<ul style="list-style-type: none"> • In addition to the disability benefits provided to general employees, judges may receive benefits under the state constitution. Participants may receive 50% of salary until the current term expires.

Changes in Plan Provisions

The 2020 legislative session came to an end on May 15, 2020. The bills passed by the Missouri General Assembly and signed by Governor Parson that affect MOSERS include:

House Bill 1467 & House Bill 1934 - Modifies provision regarding various pension systems. As it relates to MOSERS, the proposal:

- **Divorce After Retirement** - Allows a retired MOSERS member divorced on or after January 1, 2021, to remove their former spouse as a survivor beneficiary upon divorce and receive an adjusted annuity amount. To do so, the divorce decree must provide for the sole retention by the MOSERS member of all rights in the annuity and that the former spouse is not entitled to any survivor benefit under MOSERS. Members who divorced prior to January 1, 2021, may remove their former spouse as a survivor and receive an adjusted annuity if the parties obtain an amended or modified dissolution decree, after January 1, 2021, which provides the MOSERS member all rights in the annuity and the former spouse is immediately removed as the survivor beneficiary.
- **Judicial Buyout** - Allows an active judge to elect to receive a lump-sum payment equal to no less than sixty percent of the present value of the member's vested MSEP benefit. Any active judge who elects to take the lump-sum payment will forfeit all creditable service and future rights to receive retirement annuity benefits from MSEP and is not eligible to receive any long-term disability benefits.

House Bill 2005 - The General Assembly authorized the appropriation of \$476.8 million to MOSERS for fiscal year 2021. This appropriation fully funds the Board certified employer contribution rate. This amount was generated from the employer contribution rates calculated in the annual actuarial valuations performed by MOSERS' retained actuarial professionals and certified by MOSERS Board of Trustees at its September 2019 Board meeting.

Actuarial Present Values

June 30, 2020

MSEP

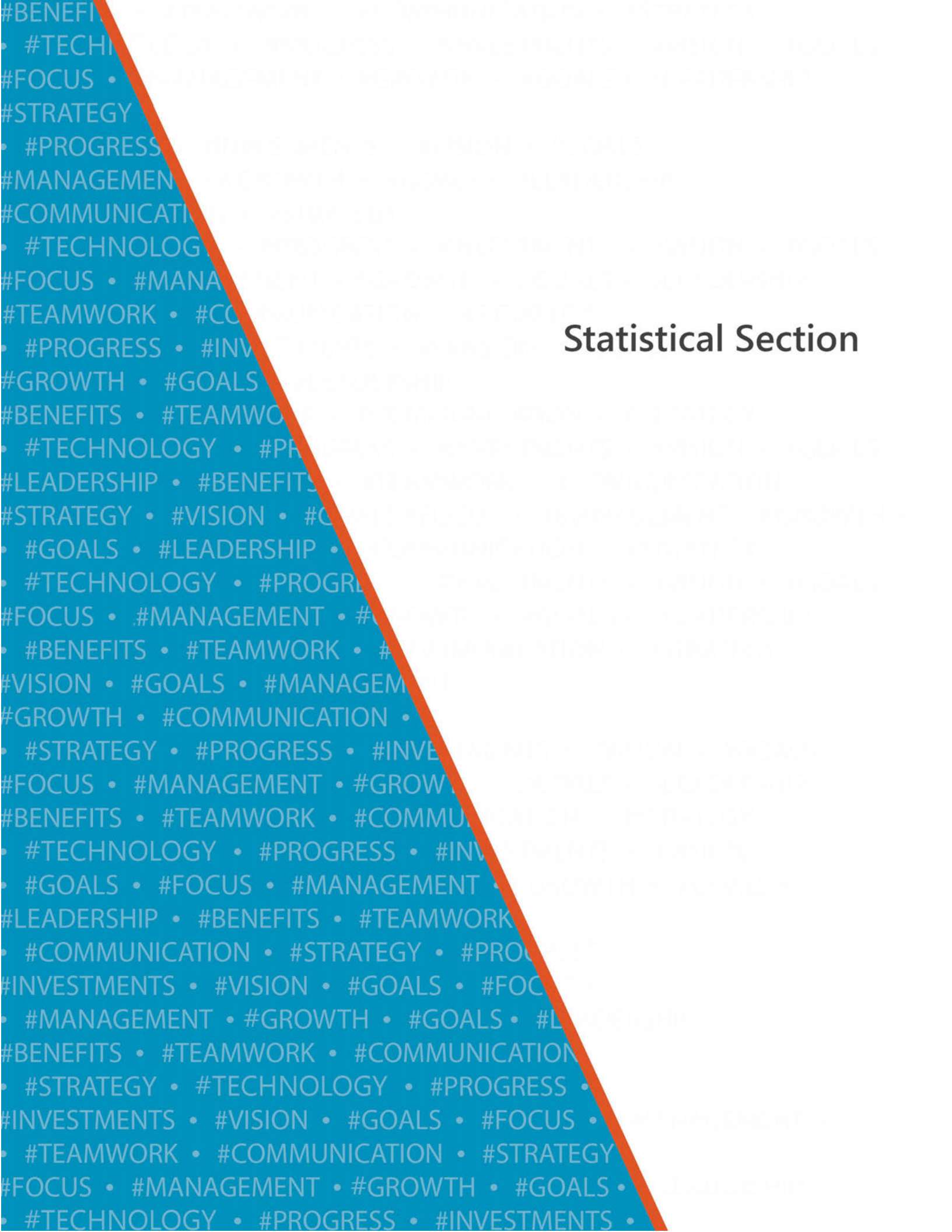
Actuarial Present Value June 30, 2020	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
Active members			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	\$ 5,340,667,720	\$ 756,900,070	\$ 4,583,767,650
Disability benefits likely to be paid to present active members who become totally and permanently disabled	163,130,395	104,867,857	58,262,538
Survivor benefits likely to be paid to widows/widowers and children of present active members who die before retiring	63,683,397	18,041,815	45,641,582
Separation benefits likely to be paid to present active members	225,729,919	164,638,374	61,091,545
Active member totals	<u>\$ 5,793,211,431</u>	<u>\$ 1,044,448,116</u>	4,748,763,315
Members on leave of absence & LTD			
Service retirement benefits based on service rendered before the valuation date			89,435,430
Inactive-vested members			
Service retirement benefits based on service rendered before the valuation date			690,065,179
Retired lives			8,701,290,590
Pending refunds			28,854,374
Total actuarial accrued liability			<u>14,258,408,888</u>
Less: actuarial value of assets			<u>8,711,224,151</u>
Unfunded actuarial accrued liability			<u>\$ 5,547,184,737</u>
Funded ratio			61.1%

Actuarial Present Values

June 30, 2020

Judicial Plan

Actuarial Present Value June 30, 2020	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
Active members			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	\$ 247,658,089	\$ 76,019,676	\$ 171,638,413
Disability benefits likely to be paid to present active members who become totally and permanently disabled	1,531,536	1,338,531	193,005
Survivor benefits likely to be paid to widows/widowers and children of present active members who die before retiring	5,300,341	3,520,374	1,779,967
Separation benefits likely to be paid to present active members	9,517,097	9,386,218	130,879
Active member totals	<u>\$ 264,007,063</u>	<u>\$ 90,264,799</u>	173,742,264
Inactive-vested members			15,090,164
Retired lives			436,014,583
Total actuarial accrued liability			624,847,011
Less: actuarial value of assets			180,713,310
Unfunded actuarial accrued liability			<u>\$ 444,133,701</u>
Funded ratio			28.9%



Statistical Section

Overview

The *Statistical Section* presents detailed information as a context for understanding what the information in the *Financial Statements*, note disclosures, and *Required Supplementary Information* says about MOSERS' overall financial health.

Financial Trends Information

- *Changes in Fiduciary Net Position* – This schedule presents financial trend information for the most recent 10 fiscal years.
- *Deductions from Net Position for Benefits and Refunds by Type* – This information is intended to help the reader assess how benefit payments have changed over time.
- *Valuation Assets (Smoothed Market) vs. Pension Liabilities* – This information is intended to help the reader assess how MOSERS' funded status has changed over time.

Revenues Information

- *Employer Contribution Rates as a Percent of Payroll* – This information is intended to help the reader assess how MOSERS' contribution requirements have changed over time.

Operating & Economic Information

- *Membership in Retirement Plans* – This information is intended to help the reader assess how MOSERS' membership has changed over time.
- *Distribution of Benefit Recipients by Location* – This information is intended to help the reader evaluate where MOSERS distributes annuity payments.
- *Benefit Recipients by Type of Retirement and Option Elected* – This information is intended to help the reader understand the stratification of benefit payments by amount and elected option.
- *Benefits by Type of Benefit and by Option* – This information is intended to help the reader understand the actuarially determined annual and average monthly benefit amounts by benefit type and option.
- *Average Monthly Benefit Amounts* – This information is intended to help the reader evaluate how benefit payments have changed over time. Figures have been stratified based on years of credited service.
- *Retirees and Beneficiaries – Retirees and Beneficiaries Tabulated by Fiscal Year of Retirement* – This information is intended to help the reader understand how long current retirees have been in retirement.
- *Benefits Tabulated by Attained Ages of Benefit Recipients* – This information is intended to help the reader understand the actuarially determined annual and average monthly benefit amounts by type of recipient, and age of recipient.
- *Principal Participating Employers* – This information is intended to help the reader understand MOSERS' most significant sources of contribution revenue, and how it has changed over time.

Changes in Fiduciary Net Position

Last Ten Fiscal Years

	2020	2019	2018	2017
MSEP				
<i>Additions</i>				
Employer contributions	\$ 436,895,653	\$ 394,150,042	\$ 379,557,962	\$ 335,217,422
Employee contributions	35,141,960	31,286,632	28,303,993	25,439,343
Member service purchases	1,388,992	1,293,774	2,020,720	1,691,046
Service transfers in	2,664,796	2,592,737	3,297,251	3,977,803
Investment income (net of expenses)	400,354,303	313,159,178	578,883,501	272,073,643
Other	133,952	496,898	538,600	522,025
Total additions to plan net assets	876,579,656	742,979,261	992,602,027	638,921,282
<i>Deductions</i>				
Benefit payments	864,807,554	842,813,907	879,148,738	787,300,328
Contribution refunds	5,224,489	6,006,484	5,502,698	4,820,737
Service transfers out	3,784,195	3,001,189	2,060,037	1,843,792
Administrative expenses	8,398,164	9,200,826	10,024,178	8,759,341
Total deductions from plan net position	882,214,402	861,022,406	896,735,651	802,724,198
Change in net position	\$ (5,634,746)	\$ (118,043,145)	\$ 95,866,376	\$ (163,802,916)
Judicial Plan				
<i>Additions</i>				
Employer contributions	\$ 39,174,515	\$ 38,604,668	\$ 36,892,203	\$ 34,246,826
Employee contributions	1,314,570	1,138,101	902,320	786,745
Investment income (net of expenses)	8,162,709	6,051,941	10,727,603	4,671,168
Other	0	3,895	9,981	8,963
Total additions to plan net position	48,651,794	45,798,605	48,532,107	39,713,702
<i>Deductions</i>				
Benefit payments	39,622,268	37,585,484	35,651,489	33,979,837
Contribution refunds	0	7,565	5,760	4,888
Administrative expenses	74,450	72,141	185,763	150,387
Total deductions from plan net position	39,696,718	37,665,190	35,843,012	34,135,112
Change in net position	\$ 8,955,076	\$ 8,133,415	\$ 12,689,095	\$ 5,578,590
Internal Service Fund				
<i>Operating revenues</i>				
Premium receipts	\$ 32,582,558	\$ 31,342,778	\$ 31,119,232	\$ 28,779,398
Deferred compensation receipts	1,315,076	1,215,000	800,000	700,000
Miscellaneous income	484,075	494,722	480,120	480,120
Total operating revenues	34,381,709	33,052,500	32,399,352	29,959,518
<i>Operating expenses</i>				
Premium disbursements	32,549,567	31,325,399	31,100,612	28,769,588
Deferred compensation disbursements	0	0	0	0
Premium refunds	32,991	17,379	14,211	9,810
Administrative expenses	1,625,602	1,649,467	1,587,344	950,121
Total operating expenses	34,208,160	32,992,245	32,702,167	29,729,519
<i>Non-operating revenues</i>				
Investment income	53,828	127,342	85,806	36,497
Change in net position	\$ 227,377	\$ 187,597	\$ (217,009)	\$ 266,496

Changes in Net position continued on page 135

Changes in Fiduciary Net Position (continued)

Last Ten Fiscal Years

	2016	2015	2014	2013	2012	2011
\$	329,957,369	\$ 329,752,832	\$ 326,370,336	\$ 274,655,284	\$ 263,373,924	\$ 263,418,048
	21,684,920	18,099,455	14,025,328	9,698,883	4,955,399	599,761
	2,815,749	1,859,005	2,909,423	3,475,123	2,869,085	2,814,551
	2,107,873	3,575,815	2,252,206	2,446,627	2,675,339	142,248
	1,194,422	(237,603,530)	1,484,709,539	778,008,348	158,102,123	1,395,677,299
	545,847	533,001	450,453	489,193	448,463	659,474
	358,306,180	116,216,578	1,830,717,285	1,068,773,458	432,424,333	1,663,311,381
	750,440,412	723,994,041	677,097,411	646,708,308	611,522,451	597,424,954
	3,798,199	2,479,264	1,421,856	622,341	123,709	0
	3,071,892	1,792,495	1,916,840	1,911,665	588,180	17,745,828
	8,489,375	8,077,692	7,336,922	7,575,883	7,017,057	7,054,581
	765,799,878	736,343,492	687,773,029	656,818,197	619,251,397	622,225,363
\$	(407,493,698)	\$ (620,126,914)	\$ 1,142,944,256	\$ 411,955,261	\$ (186,827,064)	\$ 1,041,086,018
\$	33,642,497	\$ 32,696,686	\$ 29,264,877	\$ 28,330,649	\$ 26,324,526	\$ 27,702,682
	661,206	488,193	294,810	211,936	149,859	59,958
	19,273	(3,618,469)	21,388,261	10,724,252	2,061,916	17,460,050
	8,808	8,117	6,489	6,743	5,849	8,250
	34,331,784	29,574,527	50,954,437	39,273,580	28,542,150	45,230,940
	32,979,706	31,245,906	29,406,625	27,802,871	26,821,412	25,488,531
	10,008	0	0	0	0	0
	136,983	123,015	105,693	104,428	91,514	88,253
	33,126,697	31,368,921	29,512,318	27,907,299	26,912,926	25,576,784
\$	1,205,087	\$ (1,794,394)	\$ 21,442,119	\$ 11,366,281	\$ 1,629,224	\$ 19,654,156
\$	30,360,162	\$ 30,177,918	\$ 29,563,054	\$ 28,961,637	\$ 28,578,326	\$ 28,829,638
	0	0	1,000,000	0	17,500,476	54,221,226
	480,120	480,120	480,120	480,120	608,187	981,404
	30,840,282	30,658,038	31,043,174	29,441,757	46,686,989	84,032,268
	30,328,802	30,157,271	29,544,110	28,930,950	28,556,036	28,804,638
	0	0	0	0	17,500,476	54,221,226
	31,360	20,646	18,942	30,687	22,291	24,999
	1,015,578	960,827	755,945	805,457	778,529	826,809
	31,375,740	31,138,744	30,318,997	29,767,094	46,857,332	83,877,672
	18,777	12,549	11,886	12,075	11,068	11,071
\$	(516,681)	\$ (468,157)	\$ 736,063	\$ (313,262)	\$ (159,275)	\$ 165,667

Deductions from Net Position for Benefits and Refunds by Type

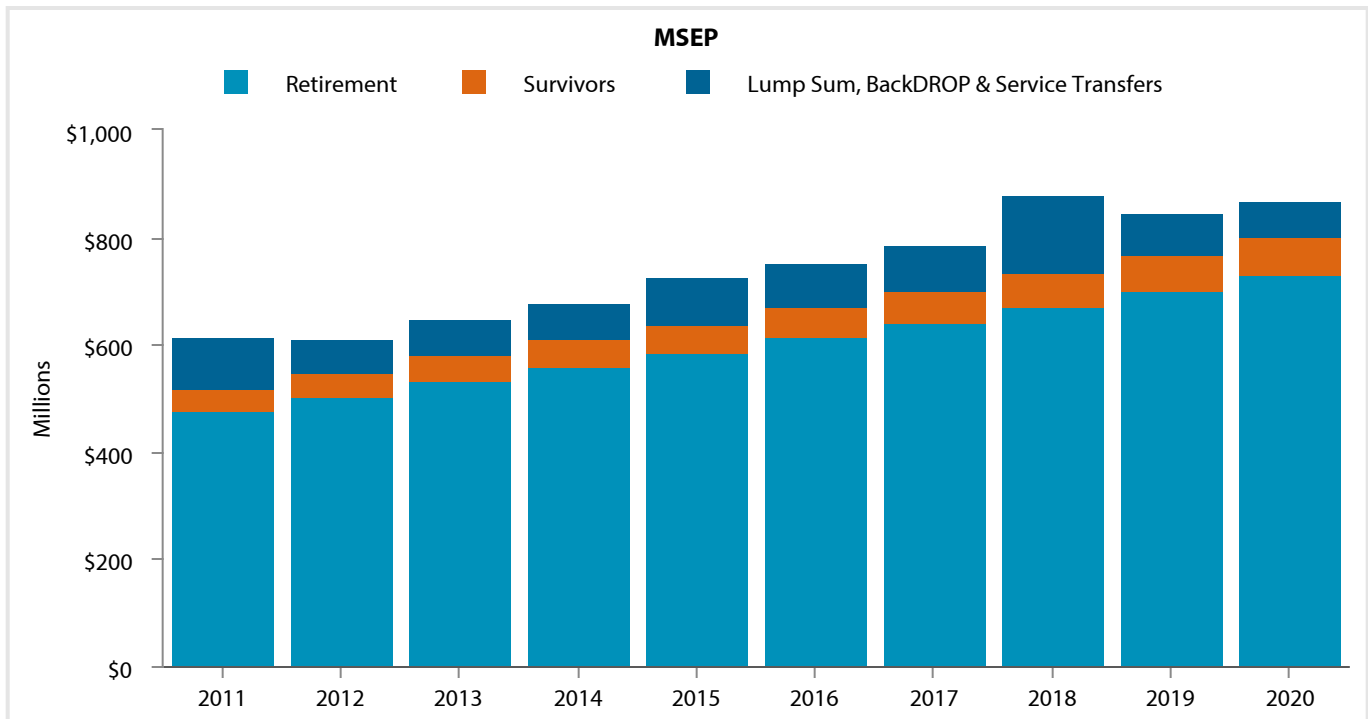
Last Ten Fiscal Years

MSEP

Type of benefit	2011	2012	2013	2014
Retirement	\$ 476,841,741	\$ 504,555,055	\$ 533,962,630	\$ 560,553,490
Survivors	39,968,601	42,963,959	46,659,381	49,922,170
Disability	29,191	29,503	27,255	22,468
Lump-sum	293,147	229,650	191,320	286,184
BackDROP & service transfers	98,038,103	64,332,464	67,779,388	68,229,937
Total benefits	\$ 615,170,783	\$ 612,110,631	\$ 648,619,974	\$ 679,014,249
Refunds	\$ 0	\$ 123,709	\$ 622,341	\$ 1,421,856

Judicial Plan

Type of benefit	2011	2012	2013	2014
Retirement	\$ 21,025,904	\$ 22,284,844	\$ 23,123,707	\$ 24,609,421
Survivors	4,462,627	4,536,569	4,679,169	4,797,204
Total benefits	\$ 25,488,531	\$ 26,821,413	\$ 27,802,876	\$ 29,406,625
Refunds	\$ 0	\$ 0	\$ 0	\$ 0



* Disability benefits are included, but amounts are too minimal to visually display in graph.

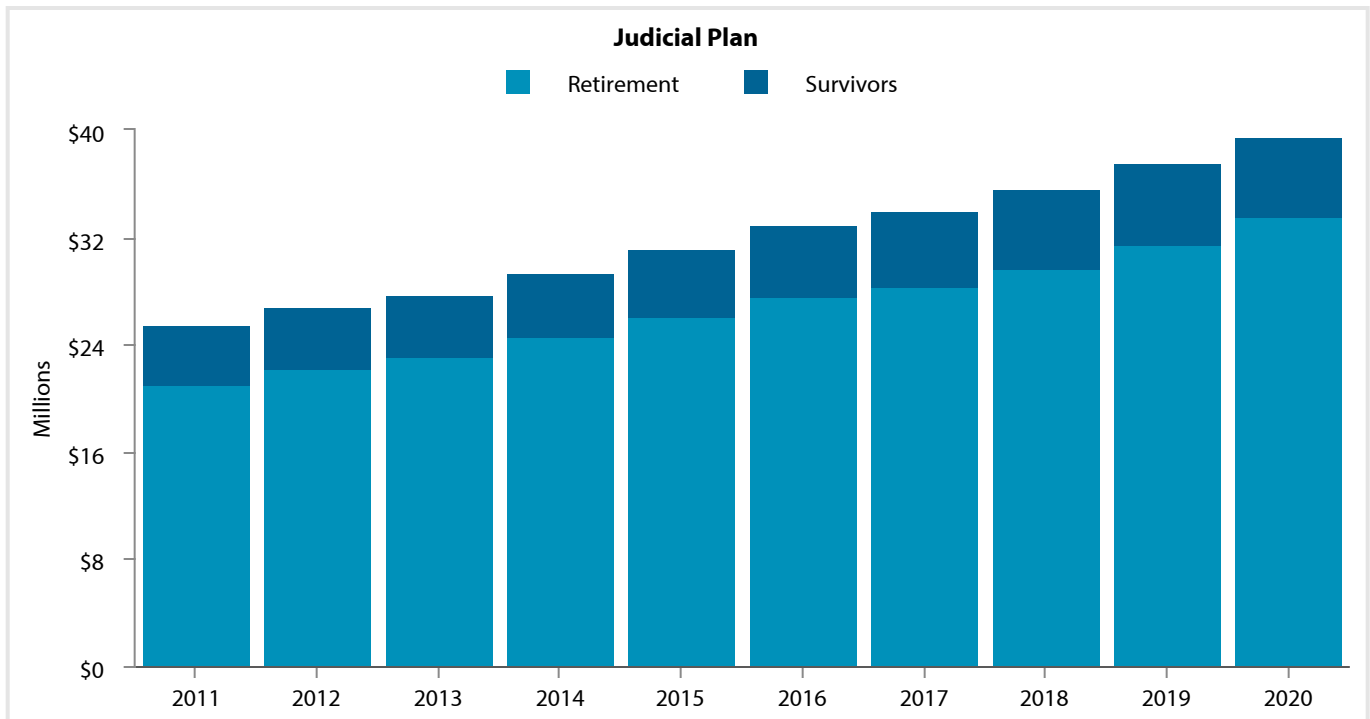
Source: MOSERS' financial records

Deductions from Net Position for Benefits and Refunds by Type (continued)

Last Ten Fiscal Years

2015	2016	2017	2018	2019	2020
\$ 586,597,187	\$ 615,708,229	\$ 640,637,749	\$ 670,663,932	\$ 703,117,097	\$ 730,310,371
52,940,062	56,495,787	59,628,687	63,081,129	66,493,496	70,583,387
16,857	15,470	14,821	5,223	2,260	2,300
57,525	267,198	123,005	61,041,258	318,656	245,297
86,174,905	81,025,620	88,739,858	86,417,233	75,883,587	67,450,394
\$ 725,786,536	\$ 753,512,304	\$ 789,144,120	\$ 881,208,775	\$ 845,815,096	\$ 868,591,749
\$ 2,479,264	\$ 3,798,199	\$ 4,820,737	\$ 5,502,698	\$ 6,006,484	\$ 5,224,489

2015	2016	2017	2018	2019	2020
\$ 26,181,505	\$ 27,641,108	\$ 28,304,733	\$ 29,655,995	\$ 31,463,475	\$ 33,577,616
5,064,400	5,338,598	5,675,104	5,995,494	6,122,009	6,044,652
\$ 31,245,905	\$ 32,979,706	\$ 33,979,837	\$ 35,651,489	\$ 37,585,484	\$ 39,622,268
\$ 0	\$ 10,008	\$ 4,888	\$ 5,760	\$ 7,565	\$ 0



* Disability benefits are included, but amounts are too minimal to visually display in graph.

Source: MOSERS' financial records

Pension Trust Funds

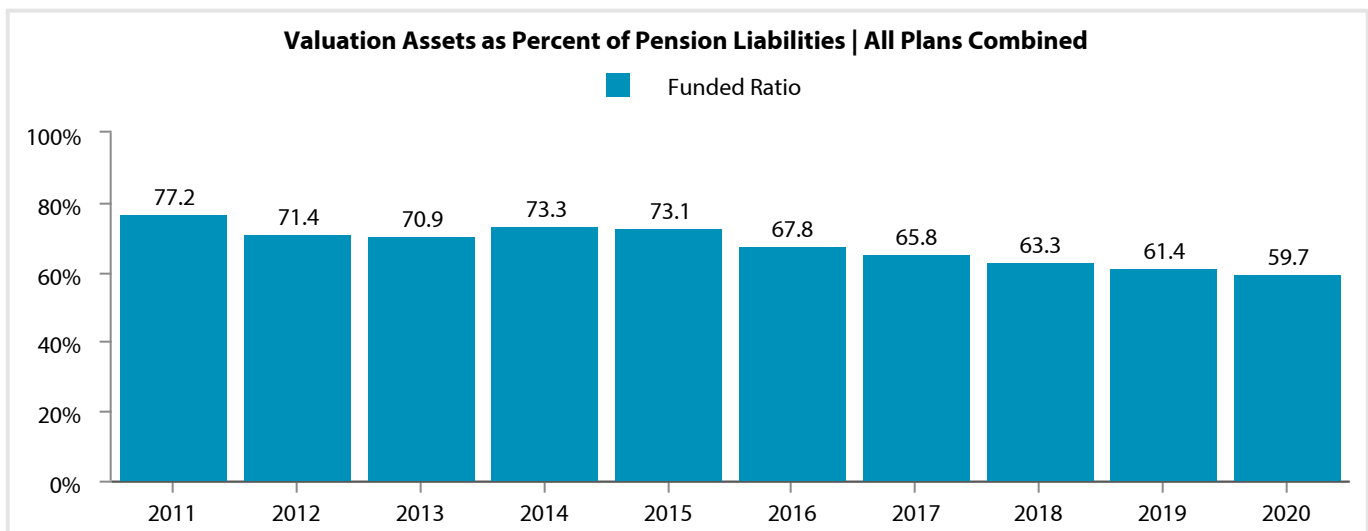
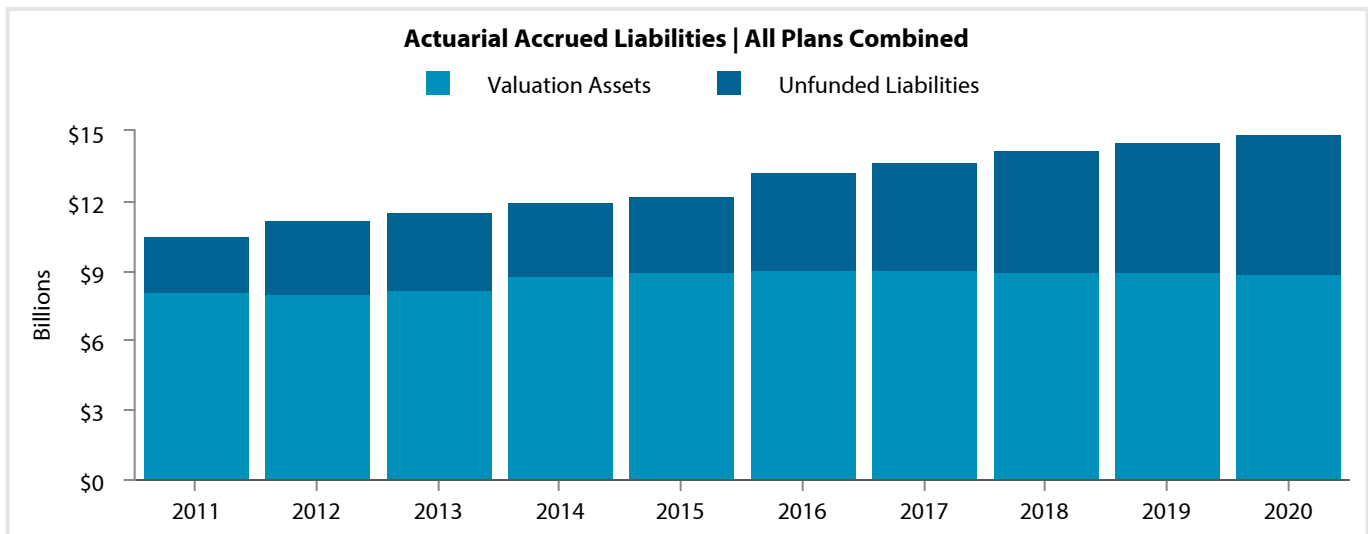
Valuation Assets (Smoothed Market) vs. Pension Liabilities

Last Ten Fiscal Years

MSEP & Judicial Plans Combined

Dollars in Billions

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2011	\$ 8.1209	\$ 2.3961	\$ 10.5170	77.2%
2012	7.9994	3.2076	11.2070	71.4
2013	8.2076	3.3624	11.5700	70.9
2014	8.7620	3.1949	11.9569	73.3
2015	8.9268	3.2838	12.2106	73.1
2016	9.0215	4.2773	13.2988	67.8
2017	9.0242	4.6925	13.7167	65.8
2018	8.9925	5.2140	14.2066	63.3
2019	8.9546	5.6205	14.5751	61.4
2020	8.8919	5.9913	14.8833	59.7



Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports, most recent 10 years.

Pension Trust Funds

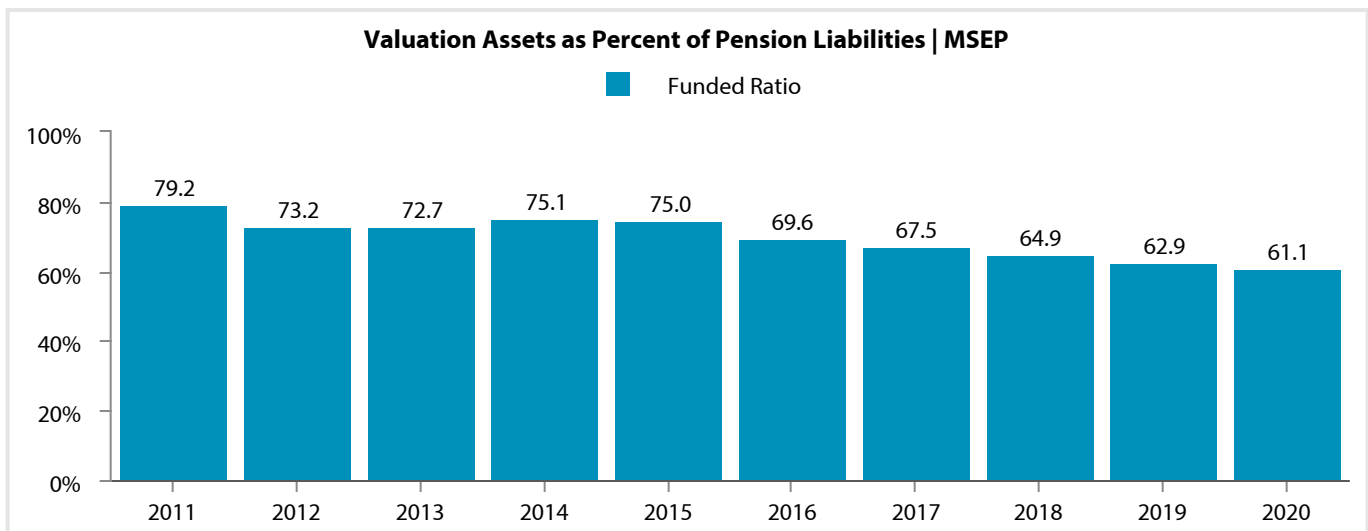
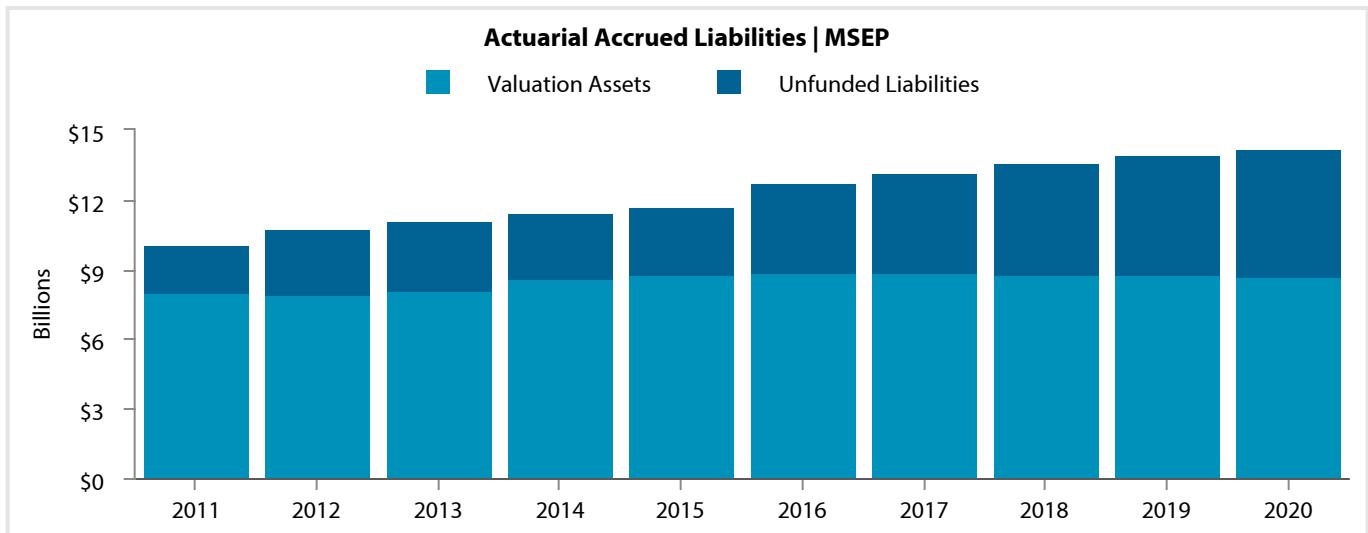
Valuation Assets (Smoothed Market) vs. Pension Liabilities (continued)

Last Ten Fiscal Years

MSEP

Dollars in Billions

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2011	\$ 8.0225	\$ 2.1011	\$ 10.1235	79.2%
2012	7.8972	2.8965	10.7937	73.2
2013	8.0964	3.0382	11.1346	72.7
2014	8.6378	2.8568	11.4946	75.1
2015	8.7925	2.9351	11.7276	75.0
2016	8.8781	3.8731	12.7512	69.6
2017	8.8724	4.2799	13.1523	67.5
2018	8.8304	4.7824	13.6128	64.9
2019	8.7824	5.1752	13.9576	62.9
2020	8.7112	5.5472	14.2584	61.1



Source: MOSERS' MSEP Actuarial Valuation Reports, most recent 10 years

Pension Trust Funds

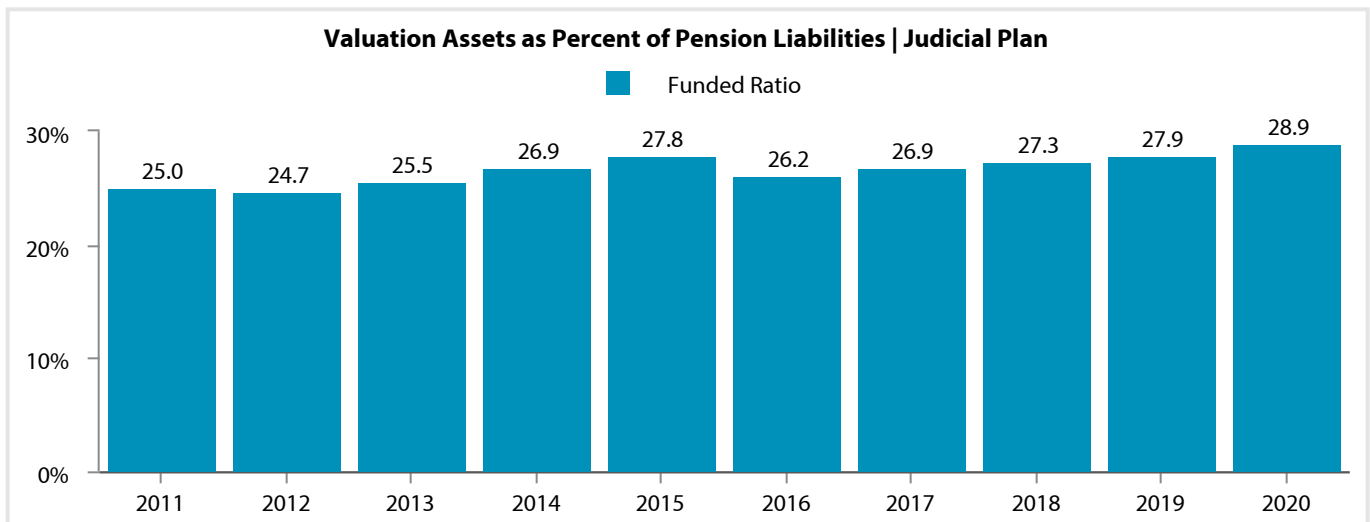
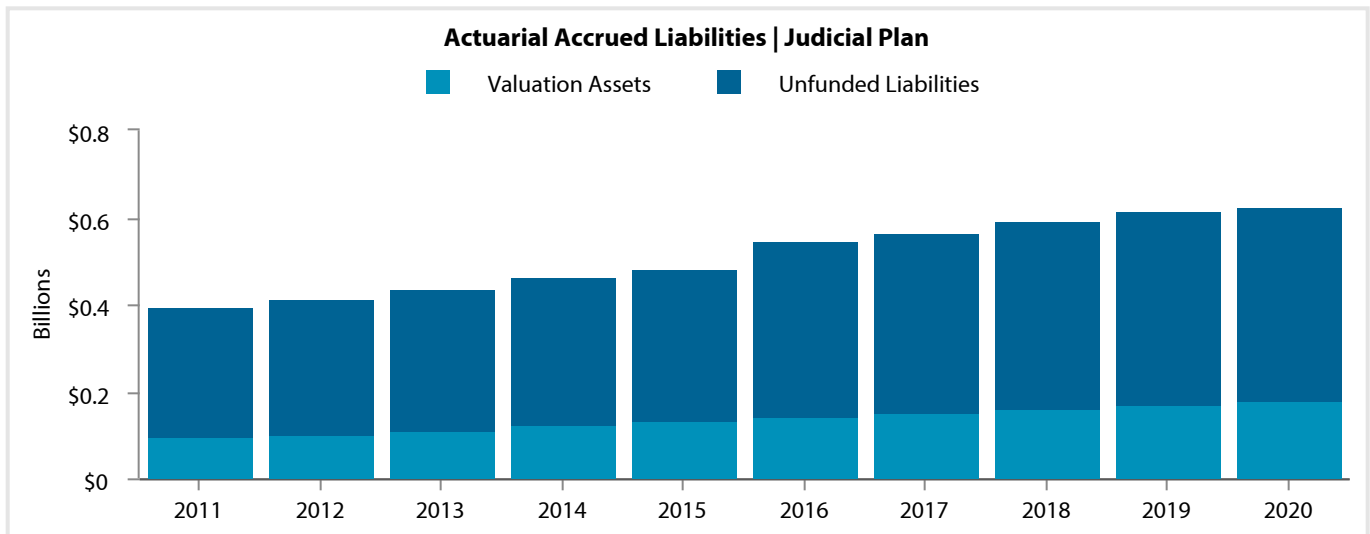
Valuation Assets (Smoothed Market) vs. Pension Liabilities (continued)

Last Ten Fiscal Years

Judicial Plan

Dollars in Billions

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2011	\$ 0.0984	\$ 0.2951	\$ 0.3935	25.0%
2012	0.1023	0.3111	0.4133	24.7
2013	0.1111	0.3242	0.4354	25.5
2014	0.1243	0.3381	0.4623	26.9
2015	0.1343	0.3486	0.4830	27.8
2016	0.1435	0.4042	0.5476	26.2
2017	0.1518	0.4126	0.5644	26.9
2018	0.1621	0.4317	0.5938	27.3
2019	0.1722	0.4453	0.6175	27.9
2020	0.1807	0.4441	0.6248	28.9



Source: MOSERS' Judicial Plan Actuarial Valuation Reports, most recent 10 years

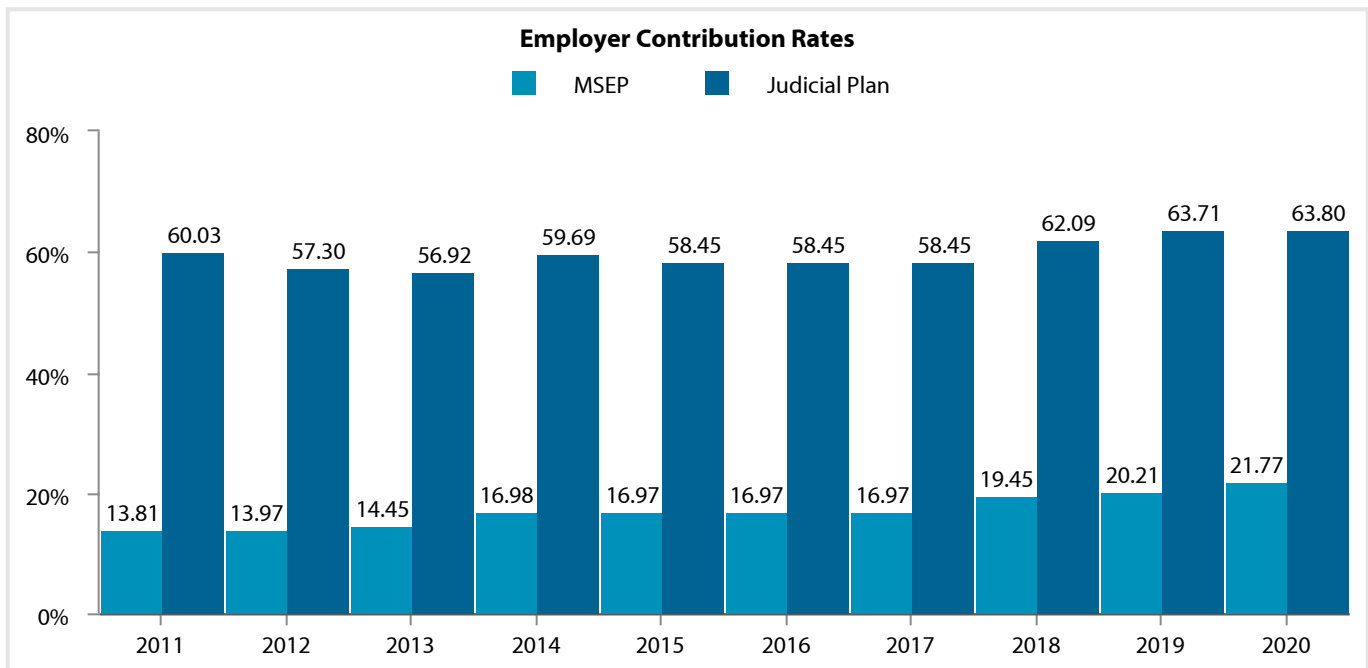
Pension Trust Funds

Employer Contribution Rates as a Percent of Payroll

Last Ten Fiscal Years

Fiscal Year	MSEP	Judicial
2011	13.81%	60.03%
2012	13.97	57.30
2013	14.45	56.92
2014	16.98	59.69
2015	16.97	58.45
2016	16.97	58.45
2017	16.97	58.45
2018	19.45	62.09
2019	20.21	63.71
2020	21.77	63.80

Note: In addition to the employer contribution rates, MOSERS also receives a fixed 4% employee contribution from MSEP 2011 and Judicial Plan 2011 members.



Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports, most recent 10 years

Membership in Retirement Plans

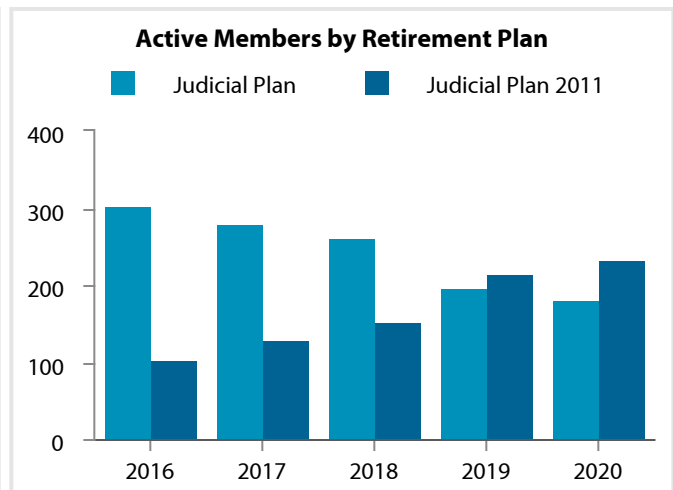
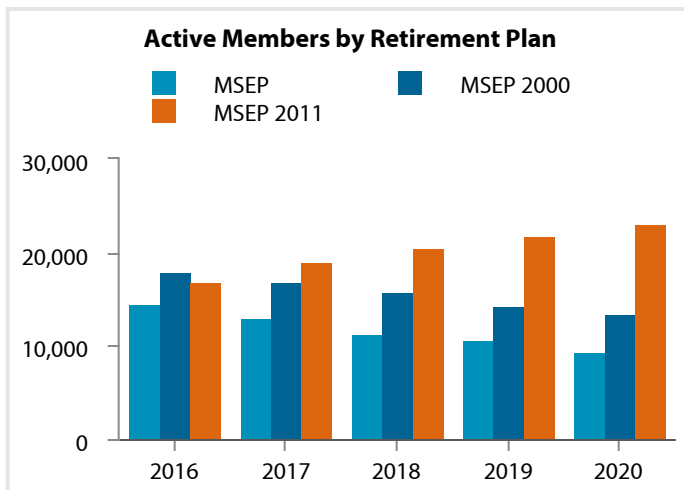
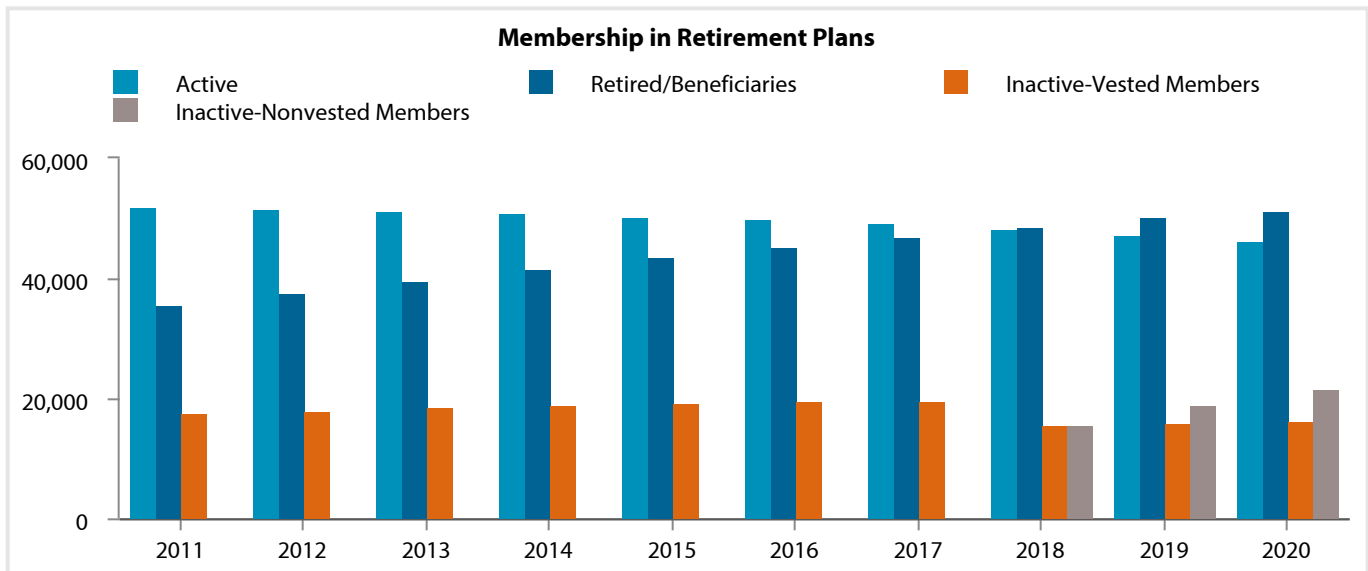
Last Ten Fiscal Years

MSEP & Judicial Plans Combined

Fiscal Year	Active Members	Retirees and Beneficiaries	Inactive-Vested Members*	Inactive-Nonvested Members**	Totals
2011	52,059	35,801	17,757		105,617
2012	51,730	37,796	18,075		107,601
2013	51,233	39,636	18,581		109,450
2014	51,026	41,511	18,957		111,494
2015	50,385	43,503	19,319		113,207
2016	49,872	45,368	19,538		114,778
2017	49,320	47,119	19,603		116,042
2018	48,221	48,776	15,502	15,619	128,118
2019	47,278	50,281	16,052	18,852	132,463
2020	46,417	51,447	16,335	21,735	135,934

* Excludes members on leave of absence and long-term disability.

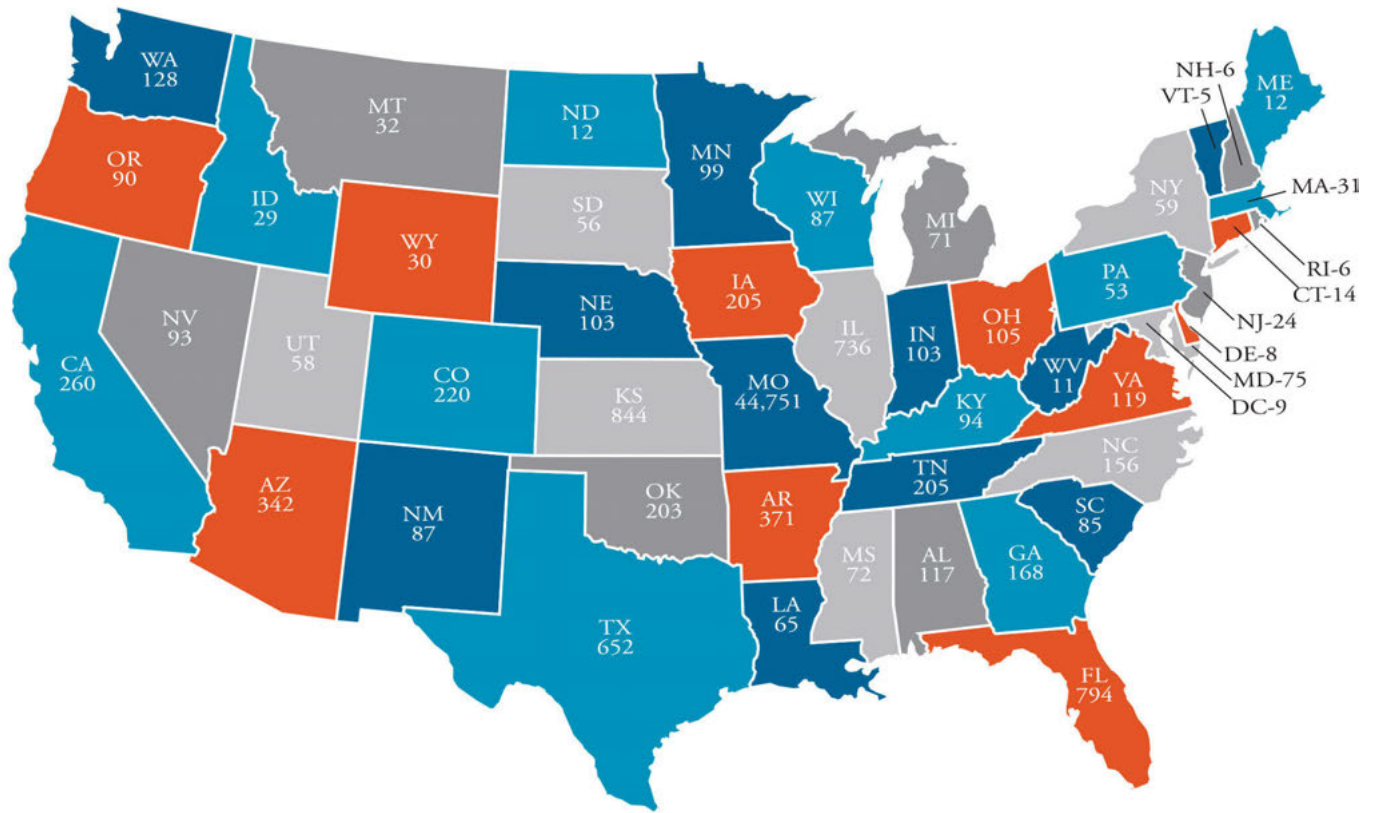
** Inactive-nonvested members of the MSEP 2011 who have not requested a refund of their contributions are now being included in the membership data.



Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports, most recent 10 years

Distribution of Benefit Recipients by Location

June 30, 2020



Benefit Recipients Outside the Continental United States

23 Alaska	1 Ecuador	3 Puerto Rico
13 Hawaii	2 Guam	1 Philippines
1 APO	1 Germany	1 Spain
1 Argentina	1 Hong Kong	2 Sweden
2 Australia	1 India	2 Thailand
1 Brazil	2 Ireland	2 The Netherlands
12 Canada	1 Israel	5 United Kingdom
1 Costa Rica	2 Italy	4 Virgin Islands
1 Croatia	1 Latvia	
1 Czech Republic	1 Marshall Islands	

Source: MOSERS' Pension Administration System

Benefit Recipients by Type of Retirement and Option Elected

June 30, 2020

MSEP

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement						
		A	B	C	D	E	F	G
1-250	5,565	2,053	2,618	241	544	1	0	108
251-500	8,484	4,167	2,977	446	787	0	0	107
501-750	5,936	3,477	1,463	307	640	0	0	49
751-1000	5,259	3,771	754	209	487	0	0	38
1001-1250	5,008	4,110	360	139	381	0	0	18
1251-1500	4,271	3,727	161	113	261	0	0	9
1501-1750	3,485	3,121	100	67	195	0	0	2
1751-2000	2,864	2,635	41	52	131	0	0	5
Over 2000	10,569	9,754	100	166	543	0	0	6
Total	51,441	36,815	8,574	1,740	3,969	1	0	342

Judicial Plan

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement						
		A	B	C	D	E	F	G
1-250	2	0	1	0	1	0	0	0
251-500	10	0	7	0	2	0	0	1
501-750	6	0	3	0	2	0	0	1
751-1000	6	0	3	1	1	0	0	1
1001-1250	5	0	3	0	1	0	0	1
1251-1500	5	0	3	1	1	0	0	0
1501-1750	7	1	3	0	0	0	0	3
1751-2000	8	0	3	2	2	0	0	1
Over 2000	554	350	59	29	111	0	0	5
Total	603	351	85	33	121	0	0	13

Type of Retirement

A - Normal retirement

B - Early retirement

C - Survivor of active

D - Survivor of retired

E - Disability

F - Occupational disability (Water Patrol)

G - Ex-spouse

Source: MOSERS' Pension Administration System

Benefit Recipients by Type of Retirement and Option Elected (continued)

June 30, 2020

Option Elected									
1	2	3	4	5	6	7	8	9	10
0	15	274	233	334	0	1,252	328	41	3,088
6	34	291	280	559	1	1,841	699	37	4,736
10	21	168	108	410	0	1,275	900	12	3,032
10	32	109	75	384	1	1,215	922	7	2,504
6	16	76	44	515	0	1,143	841	1	2,366
6	11	51	44	489	0	989	608	3	2,070
7	11	57	34	434	0	783	456	0	1,703
3	3	33	14	413	0	652	350	1	1,395
79	24	99	54	1,456	0	2,830	1,447	0	4,580
127	167	1,158	886	4,994	2	11,980	6,551	102	25,474

Option Elected									
1	2	3	4	5	6	7	8	9	10
2	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	1
4	0	0	0	1	0	0	0	0	1
3	0	0	0	0	0	1	0	0	2
3	0	0	0	0	0	0	0	0	2
5	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	3
6	0	0	0	0	0	0	0	0	2
521	0	0	0	19	0	0	0	1	13
557	0	0	0	20	0	1	0	1	24

Option Elected

- 1 - Automatic Joint & 50% Survivor
- 2 - Life Income with 60 Guaranteed Payments
- 3 - Life Income with 120 Guaranteed Payments
- 4 - Life Income with 180 Guaranteed Payments
- 5 - Joint & 50% Survivor
- 6 - Joint & 75% Survivor
- 7 - Joint & 100% Survivor
- 8 - Unreduced Joint & 50% Survivor
- 9 - Automatic Minor Survivor
- 10 - No Survivor Option (includes pop-ups)

Benefits Tabulated by Type of Benefit and by Option

June 30, 2020

MSEP Combined

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	24,954	\$ 365,220,252	\$ 14,636
Unreduced joint & 50% survivor	9,701	197,567,172	20,366
Joint & 100% survivor	8,573	156,554,736	18,261
Life income with 60 guaranteed payments	165	2,313,612	14,022
Life income with 120 guaranteed payments	1,048	10,753,704	10,261
Life income with 180 guaranteed payments	735	6,338,448	8,624
Survivor beneficiary	3,952	52,328,304	13,241
Total	49,128	791,076,228	16,102
Disability retirement	1	2,316	2,316
Death-in-service	1,728	19,459,464	11,261
Grand totals	50,857	\$ 810,538,008	15,938

Judicial Plan Combined

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	6	\$ 419,796	\$ 69,966
Unreduced joint & 50% survivor	429	33,639,060	78,413
Joint & 100% survivor	1	11,220	11,220
Survivor beneficiary	121	4,865,652	40,212
Total	557	38,935,728	69,903
Death-in-service	33	1,177,380	35,678
Grand totals	590	\$ 40,113,108	67,988

Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports as of June 30, 2020

Benefits Tabulated by Type of Benefit and by Option (continued)

June 30, 2020

MSEP (Closed Plan)

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	5,870	\$ 94,249,572	\$ 16,056
Unreduced joint & 50% survivor	5,195	107,707,236	20,733
Joint & 100% survivor	3,147	72,551,196	23,054
Life income with 60 guaranteed payments	145	2,000,988	13,800
Life income with 120 guaranteed payments	177	2,209,968	12,486
Survivor beneficiary	2,669	39,535,764	14,813
Total	17,203	318,254,724	18,500
Disability retirement	1	2,316	2,316
Death-in-service	1,422	17,915,784	12,599
Grand totals	18,626	\$ 336,172,824	18,049

MSEP 2000

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	18,983	\$ 270,573,936	\$ 14,253
Unreduced joint & 50% survivor	4,491	89,783,028	19,992
Joint & 100% survivor	5,379	83,827,140	15,584
Life income with 60 guaranteed payments	20	312,624	15,631
Life income with 120 guaranteed payments	866	8,521,860	9,840
Life income with 180 guaranteed payments	725	6,285,276	8,669
Survivor beneficiary	1,283	12,792,540	9,971
Total	31,747	472,096,404	14,871
Death-in-service	301	1,515,792	5,036
Grand totals	32,048	\$ 473,612,196	14,778

MSEP 2011

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	101	\$ 396,744	\$ 3,928
Unreduced joint & 50% survivor	15	76,908	5,127
Joint & 100% survivor	47	176,400	3,753
Life income with 60 guaranteed payments	0	0	0
Life income with 120 guaranteed payments	5	21,876	4,375
Life income with 180 guaranteed payments	10	53,172	5,317
Survivor beneficiary	0	0	0
Total	178	725,100	4,074
Death-in-service	5	27,888	5,578
Grand totals	183	\$ 752,988	4,115

Benefits Tabulated by Type of Benefit and by Option (continued)

June 30, 2020

Judicial Plan

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	4	\$ 335,808	\$ 83,952
Unreduced joint & 50% survivor	428	33,605,916	78,518
Joint & 100% survivor	0	0	0
Survivor beneficiary	121	4,865,652	40,212
Total	553	38,807,376	70,176
Death-in-service	33	1,177,380	35,678
Grand totals	586	\$ 39,984,756	68,233

Judicial Plan 2011

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	2	\$ 83,988	\$ 41,994
Unreduced joint & 50% survivor	1	33,144	33,144
Joint & 100% survivor	1	11,220	11,220
Survivor beneficiary	0	0	0
Total	4	128,352	32,088
Death-in-service	0	0	0
Grand totals	4	\$ 128,352	32,088

Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports as of June 30, 2020

Average Monthly Benefit Amounts

Last Ten Fiscal Years

MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2011	Average monthly benefit	\$ 367	\$ 336	\$ 492	\$ 819	\$ 1,220	\$ 1,652	\$ 2,142	\$ 1,006
	Average final average salary	\$ 1,442	\$ 2,631	\$ 2,507	\$ 3,063	\$ 3,234	\$ 3,523	\$ 3,884	\$ 3,063
	Number of retirees	4	601	498	444	495	495	280	2,817
2012	Average monthly benefit	\$ 126	\$ 303	\$ 521	\$ 818	\$ 1,232	\$ 1,624	\$ 2,271	\$ 939
	Average final average salary	\$ 7,854	\$ 2,572	\$ 2,648	\$ 3,050	\$ 3,295	\$ 3,488	\$ 4,109	\$ 3,055
	Number of retirees	5	592	537	407	473	373	196	2,583
2013	Average monthly benefit	\$ 251	\$ 326	\$ 523	\$ 753	\$ 1,243	\$ 1,697	\$ 2,017	\$ 928
	Average final average salary	\$ 3,744	\$ 2,665	\$ 2,593	\$ 2,814	\$ 3,314	\$ 3,637	\$ 3,689	\$ 3,011
	Number of retirees	5	600	558	386	438	388	204	2,579
2014	Average monthly benefit	\$ 280	\$ 308	\$ 520	\$ 809	\$ 1,199	\$ 1,691	\$ 2,207	\$ 937
	Average final average salary	\$ 4,426	\$ 2,675	\$ 2,614	\$ 3,029	\$ 3,229	\$ 3,650	\$ 3,999	\$ 3,066
	Number of retirees	5	636	507	370	436	392	199	2,545
2015	Average monthly benefit	\$ 219	\$ 315	\$ 522	\$ 801	\$ 1,268	\$ 1,723	\$ 2,217	\$ 999
	Average final average salary	\$ 5,058	\$ 2,596	\$ 2,624	\$ 2,954	\$ 3,416	\$ 3,729	\$ 4,016	\$ 3,119
	Number of retirees	6	644	519	437	450	487	250	2,793
2016	Average monthly benefit	\$ 151	\$ 307	\$ 506	\$ 819	\$ 1,300	\$ 1,838	\$ 2,360	\$ 1,016
	Average final average salary	\$ 3,284	\$ 2,623	\$ 2,600	\$ 3,020	\$ 3,445	\$ 3,968	\$ 4,204	\$ 3,175
	Number of retirees	6	611	502	430	505	423	215	2,692
2017	Average monthly benefit	\$ 309	\$ 339	\$ 562	\$ 946	\$ 1,365	\$ 1,860	\$ 2,391	\$ 1,116
	Average final average salary	\$ 4,658	\$ 2,731	\$ 2,849	\$ 3,426	\$ 3,641	\$ 4,030	\$ 4,291	\$ 3,406
	Number of retirees	9	518	508	459	440	477	239	2,650
2018	Average monthly benefit	\$ 402	\$ 338	\$ 584	\$ 922	\$ 1,420	\$ 1,887	\$ 2,511	\$ 1,148
	Average final average salary	\$ 5,977	\$ 2,815	\$ 2,899	\$ 3,323	\$ 3,802	\$ 4,096	\$ 4,538	\$ 3,488
	Number of retirees	7	523	475	486	520	515	208	2,734
2019	Average monthly benefit	\$ 198	\$ 369	\$ 609	\$ 886	\$ 1,356	\$ 1,840	\$ 2,321	\$ 1,131
	Average final average salary	\$ 5,081	\$ 2,907	\$ 2,900	\$ 3,076	\$ 3,637	\$ 3,978	\$ 4,206	\$ 3,390
	Number of retirees	3	484	388	409	456	428	225	2,393
2020	Average monthly benefit	\$ 270	\$ 321	\$ 602	\$ 901	\$ 1,375	\$ 1,822	\$ 2,391	\$ 1,110
	Average final average salary	\$ 5,379	\$ 2,677	\$ 3,012	\$ 3,149	\$ 3,707	\$ 3,967	\$ 4,329	\$ 3,390
	Number of retirees	8	475	378	378	447	441	172	2,299
Ten Years Ended June 30, 2020									
	Average monthly benefit	\$ 264	\$ 325	\$ 540	\$ 850	\$ 1,299	\$ 1,768	\$ 2,278	\$ 1,032
	Average final average salary	\$ 4,793	\$ 2,682	\$ 2,710	\$ 3,099	\$ 3,474	\$ 3,817	\$ 4,118	\$ 3,213
	Number of retirees	58	5,684	4,870	4,206	4,660	4,419	2,188	26,085

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts (continued)

Last Ten Fiscal Years

General Employees in the MSEP*

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2011	Average monthly benefit	\$ 39	\$ 302	\$ 472	\$ 802	\$ 1,217	\$ 1,622	\$ 2,124	\$ 992
	Average final salary	\$ 925	\$ 2,612	\$ 2,486	\$ 3,052	\$ 3,234	\$ 3,518	\$ 3,862	\$ 3,055
	Number of retirees	3	571	491	440	494	492	278	2,769
2012	Average monthly benefit	\$ 126	\$ 290	\$ 502	\$ 805	\$ 1,232	\$ 1,617	\$ 2,271	\$ 932
	Average final salary	\$ 7,854	\$ 2,557	\$ 2,626	\$ 3,036	\$ 3,295	\$ 3,475	\$ 4,109	\$ 3,045
	Number of retirees	5	584	532	404	473	372	196	2,566
2013	Average monthly benefit	\$ 169	\$ 301	\$ 502	\$ 746	\$ 1,234	\$ 1,697	\$ 1,995	\$ 921
	Average final salary	\$ 4,244	\$ 2,653	\$ 2,568	\$ 2,813	\$ 3,295	\$ 3,637	\$ 3,645	\$ 3,001
	Number of retirees	3	574	551	384	437	388	203	2,540
2014	Average monthly benefit	\$ 262	\$ 298	\$ 514	\$ 803	\$ 1,195	\$ 1,691	\$ 2,207	\$ 935
	Average final salary	\$ 5,382	\$ 2,663	\$ 2,612	\$ 3,029	\$ 3,230	\$ 3,650	\$ 3,999	\$ 3,065
	Number of retirees	3	629	503	368	435	392	199	2,529
2015	Average monthly benefit	\$ 219	\$ 301	\$ 517	\$ 786	\$ 1,268	\$ 1,723	\$ 2,208	\$ 994
	Average final salary	\$ 5,058	\$ 2,581	\$ 2,623	\$ 2,947	\$ 3,416	\$ 3,729	\$ 4,007	\$ 3,116
	Number of retirees	6	633	517	433	450	487	249	2,775
2016	Average monthly benefit	\$ 151	\$ 297	\$ 506	\$ 819	\$ 1,285	\$ 1,838	\$ 2,343	\$ 1,011
	Average final salary	\$ 3,284	\$ 2,617	\$ 2,600	\$ 3,020	\$ 3,420	\$ 3,968	\$ 4,184	\$ 3,168
	Number of retirees	6	603	502	430	502	423	213	2,679
2017	Average monthly benefit	\$ 230	\$ 313	\$ 551	\$ 934	\$ 1,355	\$ 1,853	\$ 2,379	\$ 1,109
	Average final salary	\$ 5,026	\$ 2,710	\$ 2,839	\$ 3,414	\$ 3,624	\$ 4,016	\$ 4,265	\$ 3,395
	Number of retirees	6	500	504	456	439	476	238	2,619
2018	Average monthly benefit	\$ 220	\$ 329	\$ 577	\$ 921	\$ 1,397	\$ 1,887	\$ 2,511	\$ 1,142
	Average final salary	\$ 5,477	\$ 2,813	\$ 2,889	\$ 3,321	\$ 3,762	\$ 4,096	\$ 4,538	\$ 3,477
	Number of retirees	6	517	474	485	517	515	208	2,722
2019	Average monthly benefit	\$ 198	\$ 340	\$ 594	\$ 868	\$ 1,345	\$ 1,840	\$ 2,321	\$ 1,126
	Average final salary	\$ 5,081	\$ 2,903	\$ 2,885	\$ 3,077	\$ 3,624	\$ 3,978	\$ 4,206	\$ 3,390
	Number of retirees	3	463	384	403	454	428	225	2,360
2020	Average monthly benefit	\$ 237	\$ 307	\$ 597	\$ 901	\$ 1,360	\$ 1,814	\$ 2,391	\$ 1,105
	Average final salary	\$ 5,720	\$ 2,658	\$ 3,012	\$ 3,149	\$ 3,682	\$ 3,952	\$ 4,329	\$ 3,381
	Number of retirees	7	468	376	378	445	440	172	2,286
Ten Years Ended June 30, 2020									
	Average monthly benefit	\$ 192	\$ 307	\$ 529	\$ 841	\$ 1,290	\$ 1,762	\$ 2,270	\$ 1,026
	Average final average salary	\$ 4,252	\$ 2,677	\$ 2,704	\$ 3,059	\$ 3,382	\$ 3,691	\$ 4,156	\$ 3,172
	Number of retirees	48	5,542	4,834	4,181	4,646	4,413	2,181	25,845

* Excludes legislators, elected officials, water patrol, and administrative law judges.

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts (continued)

Last Ten Fiscal Years

Legislators in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2011	Average monthly benefit	\$ 0	\$ 992	\$ 1,512	\$ 2,021	\$ 2,744	\$ 3,242	\$ 0	\$ 1,247
	Average final salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993
	Number of retirees	0	30	4	4	1	1	0	40
2012	Average monthly benefit	\$ 0	\$ 1,069	\$ 1,659	\$ 2,225	\$ 0	\$ 0	\$ 0	\$ 1,335
	Average final salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	7	3	1	0	0	0	11
2013	Average monthly benefit	\$ 374	\$ 907	\$ 1,513	\$ 2,120	\$ 0	\$ 0	\$ 0	\$ 1,036
	Average final salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	2	25	5	2	0	0	0	34
2014	Average monthly benefit	\$ 307	\$ 1,051	\$ 1,496	\$ 1,995	\$ 2,744	\$ 0	\$ 0	\$ 1,296
	Average final salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 2,993
	Number of retirees	2	6	3	2	1	0	0	14
2015	Average monthly benefit	\$ 0	\$ 977	\$ 1,735	\$ 2,162	\$ 0	\$ 0	\$ 0	\$ 1,315
	Average final salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	10	2	3	0	0	0	15
2016	Average monthly benefit	\$ 0	\$ 1,048	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,048
	Average final salary	\$ 0	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	7	0	0	0	0	0	7
2017	Average monthly benefit	\$ 499	\$ 954	\$ 1,580	\$ 1,995	\$ 0	\$ 0	\$ 0	\$ 1,041
	Average final salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	2	17	3	1	0	0	0	23
2018	Average monthly benefit	\$ 0	\$ 1,122	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,122
	Average final salary	\$ 0	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	6	0	0	0	0	0	6
2019	Average monthly benefit	\$ 0	\$ 1,017	\$ 1,496	\$ 2,117	\$ 2,744	\$ 0	\$ 0	\$ 1,327
	Average final salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	21	2	6	1	0	0	30
2020	Average monthly benefit	\$ 499	\$ 956	\$ 1,621	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,053
	Average final salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	1	6	2	0	0	0	0	9
Ten Years Ended June 30, 2020									
	Average monthly benefit	\$ 408	\$ 988	\$ 1,563	\$ 2,091	\$ 2,744	\$ 3,242	\$ 0	\$ 1,190
	Average final average salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993
	Number of retirees	7	135	24	19	3	1	0	189

Note: COLA increases are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts (continued)

Last Ten Fiscal Years

Elected Officials in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members	
		<5	5-10	11-15	16-20	21-25	26-30	31+		
2011	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0	0
2012	Average monthly benefit	\$ 0	\$ 0	\$ 3,781	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	3,781
	Average final salary	\$ 0	\$ 0	\$ 8,093	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	8,093
	Number of retirees	0	0	2	0	0	0	0	0	2
2013	Average monthly benefit	\$ 0	\$ 0	\$ 4,489	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	4,489
	Average final salary	\$ 0	\$ 0	\$ 8,979	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	8,979
	Number of retirees	0	0	1	0	0	0	0	0	1
2014	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0	0
2015	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0	0
2016	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0	0
2017	Average monthly benefit	\$ 0	\$ 2,993	\$ 3,099	\$ 0	\$ 5,576	\$ 0	\$ 0	\$ 0	3,889
	Average final salary	\$ 0	\$ 8,979	\$ 7,207	\$ 0	\$ 11,152	\$ 0	\$ 0	\$ 0	9,113
	Number of retirees	0	1	1	0	1	0	0	0	3
2018	Average monthly benefit	\$ 1,496	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	1,496
	Average final salary	\$ 8,979	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	8,979
	Number of retirees	1	0	0	0	0	0	0	0	1
2019	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0	0
2020	Average monthly benefit	\$ 0	\$ 3,234	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	3,234
	Average final salary	\$ 0	\$ 9,703	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	9,703
	Number of retirees	0	1	0	0	0	0	0	0	1
Ten Years Ended June 30, 2020										
	Average monthly benefit	\$ 1,496	\$ 3,114	\$ 3,788	\$ 0	\$ 5,576	\$ 0	\$ 0	\$ 0	3,556
	Average final average salary	\$ 8,979	\$ 9,341	\$ 8,093	\$ 0	\$ 11,152	\$ 0	\$ 0	\$ 0	8,898
	Number of retirees	1	2	4	0	1	0	0	0	8

Note: COLA increases are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts (continued)

Last Ten Fiscal Years

Uniformed Water Patrol in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2011	Average monthly benefit	\$ 0	\$ 0	\$ 721	\$ 0	\$ 0	\$ 3,086	\$ 4,553	\$ 3,200
	Average final salary	\$ 0	\$ 0	\$ 2,964	\$ 0	\$ 0	\$ 5,077	\$ 6,912	\$ 5,388
	Number of retirees	0	0	1	0	0	2	2	5
2012	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 959	\$ 0	\$ 0	\$ 0	\$ 959
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 2,794	\$ 0	\$ 0	\$ 0	\$ 2,794
	Number of retirees	0	0	0	1	0	0	0	1
2013	Average monthly benefit	\$ 0	\$ 69	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 69
	Average final salary	\$ 0	\$ 1,291	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,291
	Number of retirees	0	1	0	0	0	0	0	1
2014	Average monthly benefit	\$ 0	\$ 0	\$ 780	\$ 0	\$ 0	\$ 0	\$ 0	\$ 780
	Average final salary	\$ 0	\$ 0	\$ 2,507	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,507
	Number of retirees	0	0	1	0	0	0	0	1
2015	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,539	\$ 4,539
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 6,321	\$ 6,321
	Number of retirees	0	0	0	0	0	0	1	1
2016	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,221	\$ 4,221
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 6,375	\$ 6,375
	Number of retirees	0	0	0	0	0	0	2	2
2017	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 1,079	\$ 0	\$ 0	\$ 0	\$ 1,079
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 2,846	\$ 0	\$ 0	\$ 0	\$ 2,846
	Number of retirees	0	0	0	1	0	0	0	1
2018	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 1,492	\$ 0	\$ 0	\$ 0	\$ 1,492
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 4,347	\$ 0	\$ 0	\$ 0	\$ 4,347
	Number of retirees	0	0	0	1	0	0	0	1
2019	Average monthly benefit	\$ 0	\$ 0	\$ 671	\$ 0	\$ 0	\$ 0	\$ 0	\$ 671
	Average final salary	\$ 0	\$ 0	\$ 2,659	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,659
	Number of retirees	0	0	1	0	0	0	0	1
2020	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0
Ten Years Ended June 30, 2020									
	Average monthly benefit	\$ 0	\$ 69	\$ 724	\$ 1,177	\$ 0	\$ 3,086	\$ 4,417	\$ 2,431
	Average final average salary	\$ 0	\$ 1,291	\$ 8,130	\$ 9,987	\$ 0	\$ 10,154	\$ 32,895	\$ 62,455
	Number of retirees	0	1	3	3	0	2	5	14

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts (continued)

Last Ten Fiscal Years

Administrative Law Judges and Legal Advisors in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2011	Average monthly benefit	\$ 0	\$ 0	\$ 3,216	\$ 4,101	\$ 0	\$ 0	\$ 0	\$ 3,511
	Average final salary	\$ 0	\$ 0	\$ 6,433	\$ 8,202	\$ 0	\$ 0	\$ 0	\$ 7,023
	Number of retirees	0	0	2	1	0	0	0	3
2012	Average monthly benefit	\$ 0	\$ 2,493	\$ 0	\$ 4,378	\$ 0	\$ 4,204	\$ 0	\$ 3,692
	Average final salary	\$ 0	\$ 8,756	\$ 0	\$ 8,756	\$ 0	\$ 8,408	\$ 0	\$ 8,640
	Number of retirees	0	1	0	1	0	1	0	3
2013	Average monthly benefit	\$ 0	\$ 0	\$ 2,657	\$ 0	\$ 4,134	\$ 0	\$ 4,450	\$ 3,747
	Average final salary	\$ 0	\$ 0	\$ 5,314	\$ 0	\$ 8,267	\$ 0	\$ 8,900	\$ 7,494
	Number of retirees	0	0	1	0	1	0	1	3
2014	Average monthly benefit	\$ 0	\$ 2,433	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,433
	Average final salary	\$ 0	\$ 8,146	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 8,146
	Number of retirees	0	1	0	0	0	0	0	1
2015	Average monthly benefit	\$ 0	\$ 2,259	\$ 0	\$ 3,012	\$ 0	\$ 0	\$ 0	\$ 2,636
	Average final salary	\$ 0	\$ 7,936	\$ 0	\$ 6,023	\$ 0	\$ 0	\$ 0	\$ 6,980
	Number of retirees	0	1	0	1	0	0	0	2
2016	Average monthly benefit	\$ 0	\$ 853	\$ 0	\$ 0	\$ 3,811	\$ 0	\$ 0	\$ 3,072
	Average final salary	\$ 0	\$ 3,508	\$ 0	\$ 0	\$ 7,623	\$ 0	\$ 0	\$ 6,594
	Number of retirees	0	1	0	0	3	0	0	4
2017	Average monthly benefit	\$ 401	\$ 0	\$ 0	\$ 5,065	\$ 0	\$ 5,298	\$ 5,273	\$ 4,009
	Average final salary	\$ 5,777	\$ 0	\$ 0	\$ 10,129	\$ 0	\$ 10,596	\$ 10,546	\$ 9,262
	Number of retirees	1	0	0	1	0	1	1	4
2018	Average monthly benefit	\$ 0	\$ 0	\$ 3,860	\$ 0	\$ 5,313	\$ 0	\$ 0	\$ 4,950
	Average final salary	\$ 0	\$ 0	\$ 7,720	\$ 0	\$ 10,625	\$ 0	\$ 0	\$ 9,899
	Number of retirees	0	0	1	0	3	0	0	4
2019	Average monthly benefit	\$ 0	\$ 0	\$ 4,353	\$ 0	\$ 5,115	\$ 0	\$ 0	\$ 4,734
	Average final salary	\$ 0	\$ 0	\$ 8,707	\$ 0	\$ 10,230	\$ 0	\$ 0	\$ 9,469
	Number of retirees	0	0	1	0	1	0	0	2
2020	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,630	\$ 5,323	\$ 0	\$ 4,861
	Average final salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 9,260	\$ 10,647	\$ 0	\$ 9,722
	Number of retirees	0	0	0	0	2	1	0	3
Ten Years Ended June 30, 2020									
	Average monthly benefit	\$ 401	\$ 2,010	\$ 3,460	\$ 4,139	\$ 4,588	\$ 4,942	\$ 4,862	\$ 3,887
	Average final average salary	\$ 5,777	\$ 7,087	\$ 6,921	\$ 8,278	\$ 9,176	\$ 9,884	\$ 9,723	\$ 8,369
	Number of retirees	1	4	5	4	10	3	2	29

Note: COLA increases are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts (continued)

Last Ten Fiscal Years

Judicial Plan

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2011	Average monthly benefit	\$ 0	\$ 2,188	\$ 4,615	\$ 4,566	\$ 4,807	\$ 4,866	\$ 4,650	\$ 4,384
	Average final salary	\$ 0	\$ 7,994	\$ 9,299	\$ 9,132	\$ 9,613	\$ 9,732	\$ 9,299	\$ 9,187
	Number of retirees	0	4	9	10	5	3	5	36
2012	Average monthly benefit	\$ 1,740	\$ 2,353	\$ 4,561	\$ 4,621	\$ 0	\$ 5,020	\$ 0	\$ 3,684
	Average final salary	\$ 9,114	\$ 7,797	\$ 10,179	\$ 9,241	\$ 0	\$ 10,040	\$ 0	\$ 9,055
	Number of retirees	1	5	4	4	0	1	0	15
2013	Average monthly benefit	\$ 0	\$ 2,277	\$ 4,234	\$ 4,625	\$ 5,444	\$ 5,452	\$ 5,293	\$ 4,699
	Average final salary	\$ 0	\$ 8,123	\$ 8,696	\$ 9,251	\$ 10,888	\$ 10,904	\$ 10,585	\$ 9,767
	Number of retirees	0	2	6	4	5	4	2	23
2014	Average monthly benefit	\$ 0	\$ 2,310	\$ 4,571	\$ 5,151	\$ 5,117	\$ 4,869	\$ 5,293	\$ 4,313
	Average final salary	\$ 0	\$ 8,259	\$ 9,143	\$ 10,303	\$ 10,233	\$ 9,738	\$ 10,585	\$ 9,435
	Number of retirees	0	4	6	3	3	1	1	18
2015	Average monthly benefit	\$ 1,114	\$ 3,140	\$ 5,572	\$ 5,572	\$ 5,970	\$ 5,572	\$ 5,848	\$ 5,392
	Average final salary	\$ 11,143	\$ 9,419	\$ 11,143	\$ 11,143	\$ 11,940	\$ 11,143	\$ 11,697	\$ 11,253
	Number of retirees	1	3	7	10	7	4	7	39
2016	Average monthly benefit	\$ 0	\$ 4,193	\$ 5,575	\$ 5,452	\$ 6,166	\$ 5,844	\$ 0	\$ 5,545
	Average final salary	\$ 0	\$ 11,688	\$ 11,503	\$ 10,903	\$ 12,332	\$ 11,688	\$ 0	\$ 11,569
	Number of retirees	0	2	3	5	4	2	0	16
2017	Average monthly benefit	\$ 602	\$ 4,487	\$ 5,506	\$ 6,054	\$ 5,878	\$ 6,178	\$ 5,931	\$ 5,293
	Average final salary	\$ 8,136	\$ 11,696	\$ 11,367	\$ 12,108	\$ 11,756	\$ 12,355	\$ 11,861	\$ 11,574
	Number of retirees	2	3	2	4	6	4	2	23
2018	Average monthly benefit	\$ 0	\$ 4,549	\$ 5,525	\$ 6,114	\$ 5,989	\$ 6,238	\$ 6,365	\$ 5,955
	Average final salary	\$ 0	\$ 12,477	\$ 11,947	\$ 12,227	\$ 11,978	\$ 12,477	\$ 12,730	\$ 12,259
	Number of retirees	0	1	4	4	4	4	3	20
2019	Average monthly benefit	\$ 603	\$ 0	\$ 5,658	\$ 6,025	\$ 6,037	\$ 6,074	\$ 6,074	\$ 5,653
	Average final salary	\$ 9,520	\$ 0	\$ 11,371	\$ 12,051	\$ 12,075	\$ 12,147	\$ 12,147	\$ 11,758
	Number of retirees	2	0	10	13	7	2	4	38
2020	Average monthly benefit	\$ 0	\$ 3,163	\$ 5,389	\$ 6,415	\$ 6,237	\$ 6,256	\$ 6,415	\$ 5,875
	Average final salary	\$ 0	\$ 12,653	\$ 10,927	\$ 12,830	\$ 12,501	\$ 12,511	\$ 12,830	\$ 12,132
	Number of retirees	0	1	5	1	7	4	1	19
Ten Years Ended June 30, 2020									
	Average monthly benefit	\$ 877	\$ 2,932	\$ 5,089	\$ 5,422	\$ 5,796	\$ 5,762	\$ 5,669	\$ 5,122
	Average final average salary	\$ 9,262	\$ 9,284	\$ 10,407	\$ 10,844	\$ 11,596	\$ 11,524	\$ 11,338	\$ 10,825
	Number of retirees	6	25	56	58	48	29	25	247

Note: COLA increases are excluded from the above for comparison purposes.

Source: MOSERS' Pension Administration System

Retirees and Beneficiaries Tabulated by Fiscal Year of Retirement

As of June 30, 2020

MSEP

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1980 and prior	23	\$ 105,506	\$ 382
1981	13	89,801	576
1982	12	100,031	695
1983	4	47,027	980
1984	23	200,462	726
1985	35	299,371	713
1986	53	501,911	789
1987	71	864,176	1,014
1988	86	1,378,009	1,335
1989	117	1,999,098	1,424
1990	128	1,948,882	1,269
1991	182	3,568,331	1,634
1992	226	3,929,419	1,449
1993	318	5,847,121	1,532
1994	313	5,689,716	1,515
1995	457	8,618,338	1,572
1996	498	9,989,987	1,672
1997	533	10,206,220	1,596
1998	651	13,295,929	1,702
1999	798	16,174,985	1,689
2000	874	17,364,419	1,656
2001	1,869	36,624,842	1,633
2002	1,287	21,761,675	1,409
2003	1,450	25,932,884	1,490
2004	1,969	33,561,810	1,420
2005	1,433	22,349,636	1,300
2006	1,603	23,536,503	1,224
2007	1,916	28,894,289	1,257
2008	1,953	28,723,536	1,226
2009	2,049	30,550,356	1,242
2010	2,134	30,968,385	1,209
2011	2,748	41,926,107	1,271
2012	2,574	36,738,657	1,189
2013	2,683	36,639,882	1,138
2014	2,712	37,994,040	1,167
2015	2,996	44,166,624	1,228
2016	2,996	44,491,796	1,238
2017	2,947	47,809,808	1,352
2018	3,120	50,362,614	1,345
2019	2,829	45,517,591	1,341
2020	2,758	42,547,879	1,286
	51,441	\$ 813,317,653	\$ 1,318

Source: MOSERS' Pension Administration System

Retirees and Beneficiaries Tabulated by Fiscal Year of Retirement (continued)

As of June 30, 2020

Judicial Plan

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1980 and prior	3	\$ 51,115	\$ 1,420
1981	0	0	0
1982	0	0	0
1983	1	22,369	1,864
1984	0	0	0
1985	0	0	0
1986	0	0	0
1987	5	228,470	3,808
1988	1	79,384	6,615
1989	2	65,428	2,726
1990	4	225,155	4,691
1991	7	349,336	4,159
1992	3	154,365	4,288
1993	5	255,164	4,253
1994	3	127,796	3,550
1995	10	754,877	6,291
1996	6	302,820	4,206
1997	4	253,745	5,286
1998	10	606,162	5,051
1999	12	794,468	5,517
2000	11	802,856	6,082
2001	14	1,260,837	7,505
2002	13	1,025,708	6,575
2003	15	1,053,086	5,850
2004	15	1,055,561	5,864
2005	13	1,155,653	7,408
2006	12	474,636	3,296
2007	44	3,070,816	5,816
2008	27	1,733,276	5,350
2009	31	1,822,842	4,900
2010	13	812,183	5,206
2011	35	2,166,725	5,159
2012	19	988,451	4,335
2013	28	1,977,891	5,887
2014	23	1,457,959	5,282
2015	53	3,961,971	6,230
2016	26	1,714,337	5,495
2017	32	2,168,843	5,648
2018	31	2,360,814	6,346
2019	48	3,319,863	5,764
2020	24	1,518,155	5,271
	603	\$ 40,173,117	\$ 5,552

Source: MOSERS' Pension Administration System

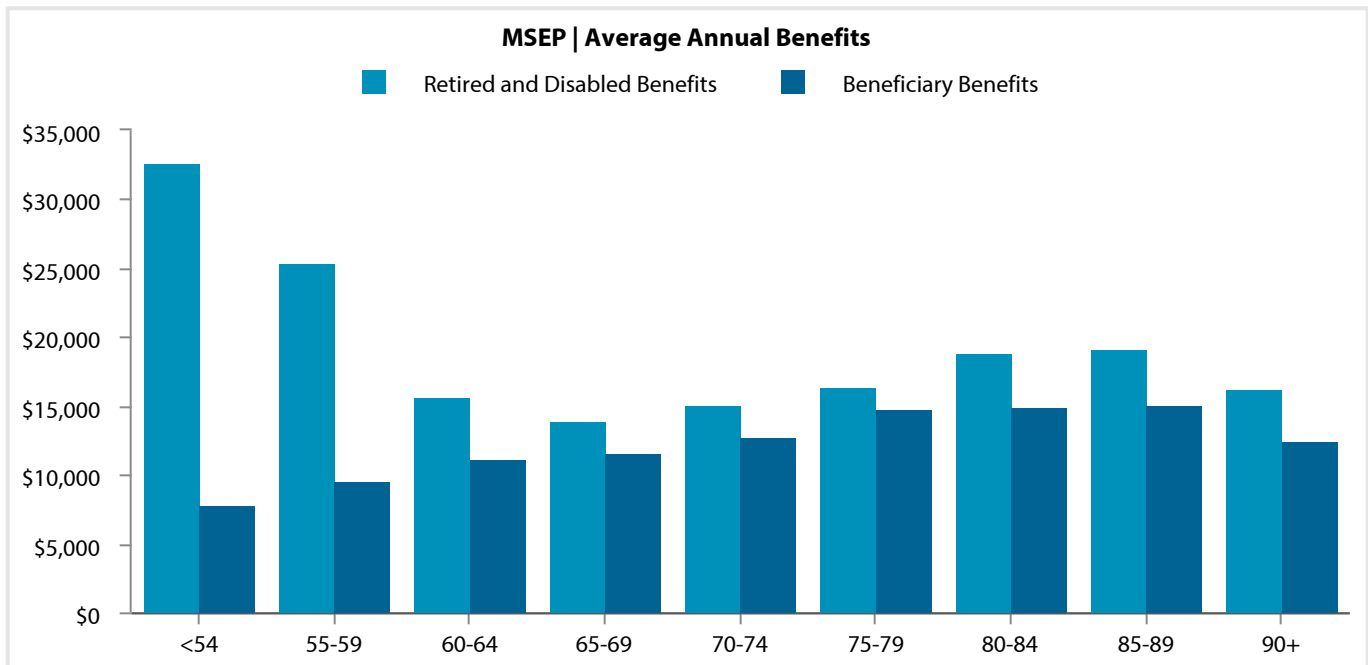
Benefits Tabulated by Attained Ages of Benefit Recipients

As of June 30, 2020

MSEP

Attained Ages	Retired and Disabled		Beneficiaries		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
<54	442	\$ 14,468,340	543	\$ 4,240,320	985	\$ 18,708,660
55-59	2,910	73,890,672	327	3,140,052	3,237	77,030,724
60-64	8,091	126,757,680	534	5,943,396	8,625	132,701,076
65-69	11,613	161,734,884	726	8,463,648	12,339	170,198,532
70-74	10,385	157,074,048	943	12,075,168	11,328	169,149,216
75-79	5,875	96,338,688	823	12,137,268	6,698	108,475,956
80-84	3,289	61,907,076	756	11,295,024	4,045	73,202,100
85-89	1,646	31,475,904	623	9,415,572	2,269	40,891,476
90+	926	15,102,924	405	5,077,344	1,331	20,180,268
Totals	45,177	\$ 738,750,216	5,680	\$ 71,787,792	50,857	\$ 810,538,008

Average age at retirement: 61.4 years • Average age now: 70.8 years



Average annual benefit : \$16,352 retired and disabled • \$12,639 beneficiaries

Source: MOSERS' MSEP Actuarial Valuation Report as of June 30, 2020

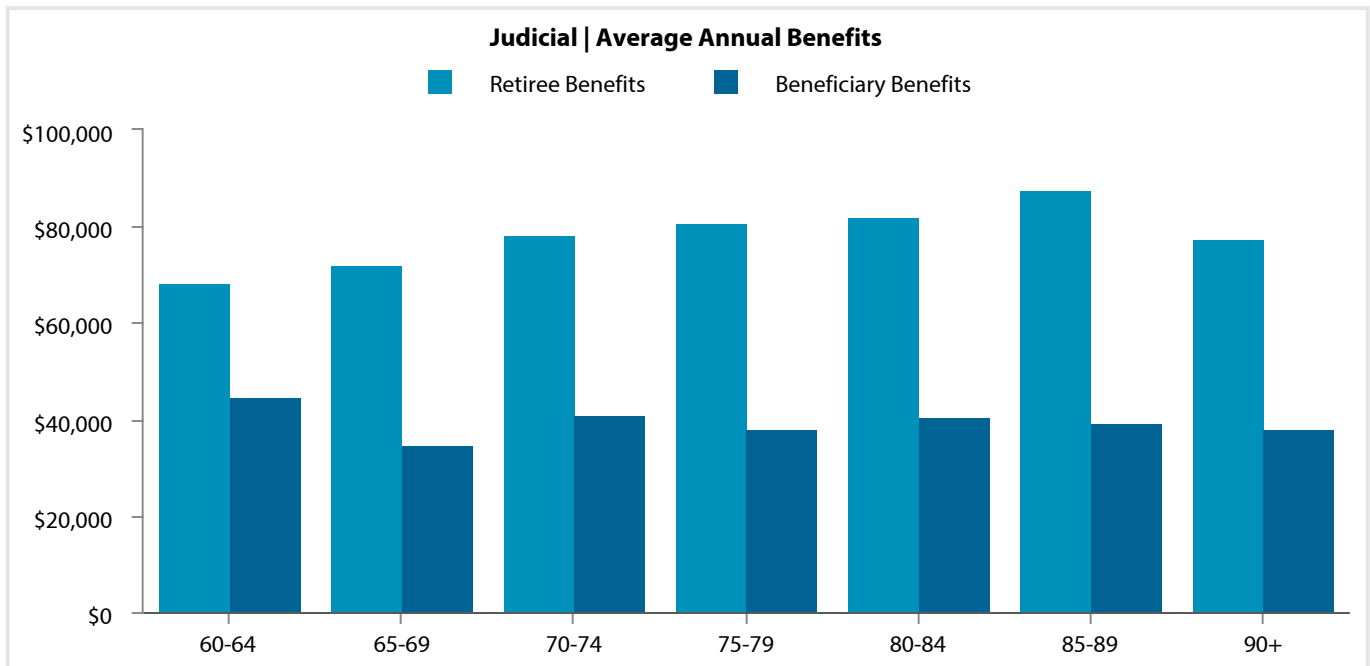
Benefits Tabulated by Attained Ages of Benefit Recipients (continued)

As of June 30, 2020

Judicial Plan

Attained Ages	Retirees		Beneficiaries		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
60-64	23	\$ 1,571,940	9	\$ 404,916	32	\$ 1,976,856
65-69	84	6,052,320	13	450,600	97	6,502,920
70-74	151	11,834,880	21	859,488	172	12,694,368
75-79	83	6,709,704	27	1,029,480	110	7,739,184
80-84	46	3,783,228	25	1,013,472	71	4,796,700
85-89	31	2,718,324	22	866,232	53	3,584,556
90+	18	1,398,600	37	1,418,844	55	2,817,444
Totals	436	\$ 34,068,996	154	\$ 6,043,032	590	\$ 40,112,028

Average age at retirement: 65.5 years • Average age now: 76.6 years



Average benefit paid: \$78,140 retirees • \$39,240 beneficiaries

Source: MOSERS' Judicial Plan Actuarial Valuation Report as of June 30, 2020

Principal Participating Employers

Current Year and Nine Years Ago

Participating Employer	2020			2011		
	Covered Employees	Rank	Percent of Membership	Covered Employees	Rank	Percent of Membership
State of Missouri	40,101	1	86.9%	45,034	1	86.5%
Missouri State University	1,791	2	3.9	1,857	2	3.6
University of Central Missouri	879	3	1.9	1,125	3	2.2
Southeast Missouri State University	808	4	1.8	952	4	1.8
Northwest Missouri State University	545	5	1.2	624	6	1.2
Truman State University	507	6	1.1	650	5	1.2
Missouri Southern State University	383	7	0.8	443	7	0.9
Missouri Western State University	323	8	0.7	413	9	0.8
Lincoln University	293	9	0.6	437	8	0.7
Harris-Stowe State University	191	10	0.4	186	10	0.4
All others	309		0.7	341		0.7
Total	46,130		100.0%	52,062		100.0%

Source: MOSERS' Pension Administration System

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