



TEAMWORK

The Driving Force Behind
State Employee Pensions

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

Comprehensive Annual Financial Report
Fiscal Year Ended June 30, 2019



TEAMWORK

The Driving Force Behind
State Employee Pensions

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, 2019

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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 plan
through a commitment to

Excellence. Always.

VALUES

Quality • Respect • Integrity

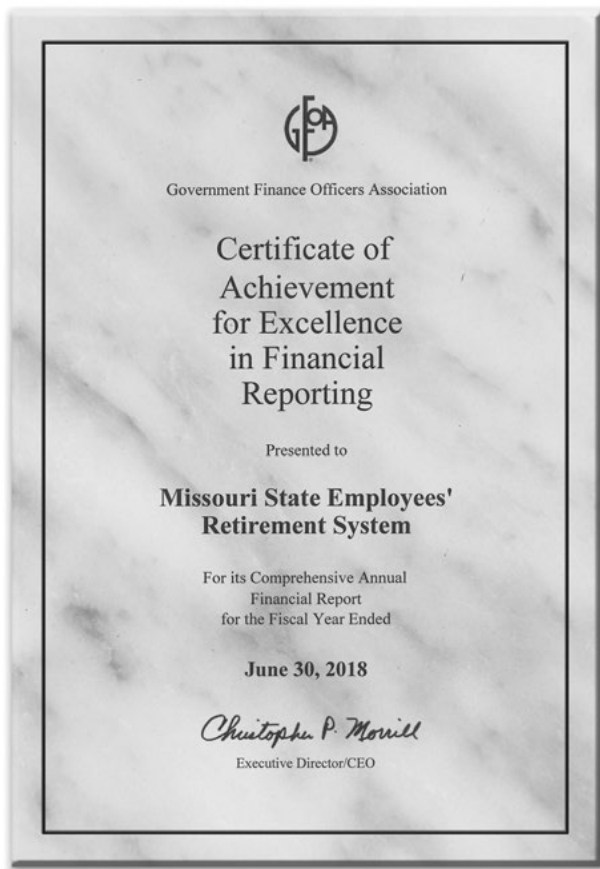
Openness • Accountability



*A solid plan today helps provide
a secure future tomorrow.*

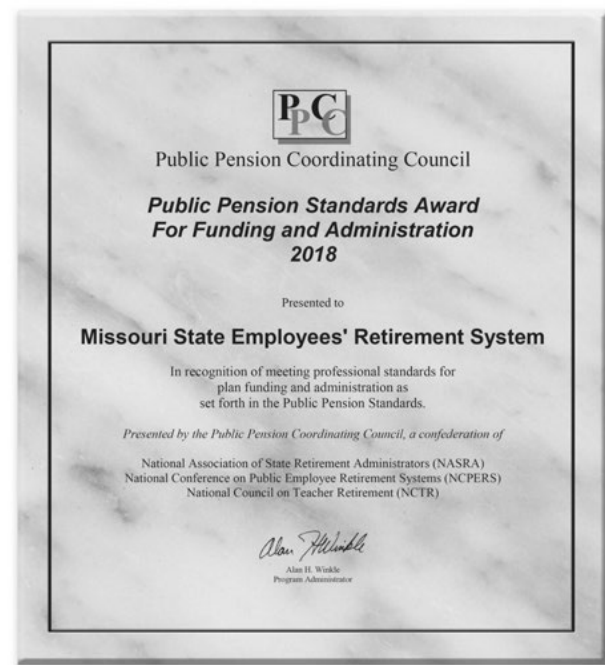
Introductory Section

Professional Awards



Certificate of Achievement for Excellence in Financial Reporting

MOSERS' *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2018, 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 30th 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 2018, 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



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(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 18, 2019

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, 2019. During fiscal year 2019, 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, 2019, MOSERS serves 47,278 active employees and pays 50,281 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 pension trust fund 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 4.3%, net of fees, for fiscal year 2019. The total fund returned 1.8% more than would have been expected through passive investing in the benchmarks. During fiscal year 2019, our staff reduced investment management fees by \$9 million. 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 2019, the Board continued the reduction of the assumed rate of return on investments, as set forth in the Board's funding policy. This reduction resulted in an assumed rate of return of 7.10%, reduced from 7.25%. The Board's intention is to further reduce the assumed rate to 6.95%, effective June 30, 2020. 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, 2019, the MSEP was 62.9% pre-funded and the Judicial Plan was 27.9% pre-funded on an actuarial basis. The MSEP experienced a decrease from the June 30, 2018, funded status of 64.9%. The Judicial Plan reflected an increase from the June 30, 2018, funded status of 27.3%.

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 \$432 million to MOSERS for fiscal year 2020, which will fully fund the Board-certified employer contribution rate. 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 2018 meeting. On June 10, 2019, Governor Parson signed the fiscal year 2020 budget bills passed by the General Assembly, including the MOSERS appropriation contained in HB 2005.
- **Senate Bill 185** – This bill provided for the continued participation in MOSERS for the Missouri Housing Development Commission and the Environmental Improvement and Energy Resources Authority. This bill was signed by Governor Parson on June 6, 2019.

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. Tegrit began implementation of their Arrivos product in fiscal year 2019. Data cleansing work continues with the help of ICON Integration.
- **New Public Website** – Through a collaborative staff effort, we developed an entirely new public website to replace the previous website, which was last remodeled more than 10 years ago. The new website was developed to increase customer satisfaction by enhancing the user experience, increase efficiency and self-service, and decrease risk. It also uses an improved infrastructure optimized for mobile design. The public website is MOSERS' most frequent means of interaction with our stakeholders, with more than 10,000 visitors per week.
- **Transition of New Portfolio** – After conducting a robust analysis, the MOSERS Board of Trustees, adopted a modified asset allocation and *Investment Policy Statement*. The *Investment Policy Statement* sets forth how the System's assets will be managed. Staff began the implementation of the modified portfolio in fiscal year 2019 and the asset allocation will be transitioned over a three year period.
- **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 strategic planning initiatives will focus on the four key areas of: plan sustainability and investments, customer service and stakeholder communication, organizational health and operational excellence, and modernization. The adopted strategic plan is available for review on the MOSERS public website.
- **Rewrite of the MOSERS Governance Policies** – A rewrite of the Boards governance policies was completed in fiscal year 2019. With review and analysis through the work of the Strategic Planning and Governance Committee and staff, the Board approved the updated governance policies. This review included the separation of the majority of the investment governance policies into the *Investment Policy Statement*.
- **Creation of Audit Committee and Issuance of RFP for External Audit Services** – During fiscal year 2019, the MOSERS Board of Trustees formed an Audit Committee comprised of three Board members. The Audit Committee plays an important role in providing structured, systematic oversight of MOSERS' risk management and internal control practices. At the Audit Committee's direction, staff issued a request for proposal for external auditing services and the Board selected Eide Bailly, LLP to provide those services.

Awards

MOSERS received the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA) for its comprehensive annual financial report for the fiscal year ended June 30, 2018. This was the 30th 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).

MOSERS received the Workplace Possibilities Champion Award from The Standard Insurance Company in fiscal year 2019. This award recognizes excellence in education efforts to members about the Workplace Possibilities Program and in results achieved helping employees stay at work or return to work. Through this program, eligible employees who may be having difficulty performing job duties due to a medical condition are offered consultations that may lead to providing accommodations or services to promote a healthier work place.

The Missouri Deferred Compensation Plan, administered through MOSERS, also received two awards from Pensions & Investments. The highest achievement, a first place Eddy Award, was received for their “What’s Your Excuse” video series highlighting common excuses people use for not saving for retirement. The Missouri Deferred Compensation Plan also received a second place award for their “Easy Enrollment Postcard” campaign.

The National Association of Government Defined Contribution Administrators, Inc. (NAGDCA) awarded the State of Missouri Deferred Compensation Plan the 2018 Leadership Recognition Award for the plan's redesign of their RetirementTrack calculator. The Leadership Awards recognize 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 2019 was “teamwork.” Whether it was in service to our membership through the design of a new public website, service to our community after a tornado struck our area in May, or service to each other when supporting fellow staff members, the MOSERS’ staff embodied the idea of team. Our team expands when we consider the trust that has been placed in MOSERS by our members, employers, and other stakeholders. Together, we will celebrate our successes and navigate our challenges into the future. We know our members rely on their benefits now and far into the future. The decisions and initiatives completed by the Board and our staff this year all work together to foster the long-term sustainability of the System. 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 2020. 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 18, 2019

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, 2019. This report is one of MOSERS' finest examples of collaboration and an organization-wide team effort.

During the year ended June 30, 2019, the Board of Trustees established a Board Audit Committee. This 3-member committee reviewed and recommended a new external auditing firm as part of a formal procurement process. This committee will continue to function as an extension of the Board and will assist in providing recommendations relative to the organization's initiatives for areas such as risk management, internal audit, and external financial statements.

Our Board and staff members worked on several initiatives in the last fiscal year, some of which included:

- developing and adopting the MOSERS Strategic Plan for July 1, 2019 – June 30, 2022;
- continuing the systematic reduction of the MOSERS investment rate of return assumption, consistent with the Board's funding policy;
- beginning the 36-month transition of the Board-adopted investment portfolio and conducting ongoing analysis of each asset allocation category; and
- producing brief videos to provide stakeholders with timely information about Board meetings and action taken at these meetings.

On behalf of the Board and staff, I would like to recognize former State Treasurer Eric Schmitt and Mr. Don Martin for their hard work and dedication while serving as trustees. Representative Rusty Black and Gary Findlay (elected by retired membership) joined the Board as new trustees during the fiscal year. Trustees devote many hours in fulfilling their fiduciary duties.

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.

With another fiscal year in full swing, 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



Seth Kelly

Deputy Executive Director – Investments/Chief Investment Officer

- Shannon Davidson
Deputy Chief Investment Officer
- Patrick Morgan
Investment Legal & Compliance Counsel

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 and serves at its pleasure. The executive director acts as advisor to the Board on all matters pertaining to the System, contracts for professional services, 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 interfaces with the investment custodian, internal investment managers, Office of Administration accounting, 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 host 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, forms, brochures, and the annual report. 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's design.

Outside Professional Services

Actuary

- Cavanaugh Macdonald Consulting, LLC

Auditor

- Eide Bailly, LLP

Governmental Consultant

- Gamble & Schlemeier, Ltd.

Information Technology Consultants

- CherryRoad Technologies
- World Wide Technology

Legal Counsel

- Purrington Moody Weil, LLP
- Thompson Coburn, LLP

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
- Summit Strategies Group
General Asset Consultant
- TimberLink Consulting, LLC
Timberland Consultant
- Verus Advisory, Inc.
Board Investment Consultant

Investment Risk Management

- MSCI BarraOne

Master Custodian

- Bank of New York Mellon

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.
- Catterton Partners
- Cornwall Capital Management, LP
- DRI Capital, Inc.
- EIG Global Energy Partners, LLC
- Elliott International Capital Advisors, Inc.
- Eton Park 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

Outside Professional Services continued on page 16

Outside Professional Services continued from page 15

- King Street Capital Management, LP
- 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.
- Resource Management Service, LLC
- Silchester International Investors
- Silver Creek Capital Management, LLC
- Silver Lake Partners, LP
- Silver Point Capital, LP
- SIR Capital Management, LP
- Siris Capital Group, LLC
- State Street Global Advisors
- StepStone Group
- Stone Harbor Investment Partners, LP
- Visium Asset Management, LP
- Voya Financial
- Wellington Management Company, LLP

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.



*Our commitment to your financial future
is a team goal worth sharing.*

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, 2019, 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, 2019, 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 54-61 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's 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 and 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.

The image shows a handwritten signature in cursive script that reads "Eide Bailly LLP".

October 18, 2019

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, 2019. 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 *Statements of Net Position* of the internal service funds are 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 *Statements 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 *Statements of Cash Flows* of the internal service funds report the financial transactions of the fiscal year of the internal service funds on a cash basis. 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 Missouri State Employees' Plan (MSEP) increased by \$0.4 billion from \$4.8 billion at June 30, 2018, to \$5.2 billion at June 30, 2019, with a corresponding decrease in funded percentage from 64.9% to 62.9%. The UAAL for the Judicial Plan increased by \$13.6 million from \$431.7 million at June 30, 2018, to \$445.3 million at June 30, 2019, with an increase in funded percentage from 27.3% to 27.9%. The primary reason for the increase in the UAAL in both plans was a reduction in the assumed rate of investment return from 7.25% to 7.10% and the recognition of prior year losses.

To determine the UAAL of the plans, 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 of assets is used to determine plan net position. The net position of the MSEP Fund at June 30, 2019, was \$6.0 billion, an increase from \$5.6 billion as of June 30, 2018. The net position of the Judicial Plan Fund at June 30, 2019, was \$0.5 billion, an increase from \$0.4 billion as of June 30, 2018. The net position as a percentage of total pension liability decreased from 59.0% at June 30, 2018, to 56.7% at June 30, 2019, for the MSEP Fund and increased from 25.3% to 25.6% for the Judicial Plan Fund.

Financial Reporting Highlights

- MOSERS' net position restricted for pensions decreased by \$109.9 million during the year ended June 30, 2019. On June 30, 2019, total plan assets (including net capital assets of \$4.9 million) were \$12.2 billion, exceeding total liabilities of \$4.1 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, decreased \$1.2 million for the MSEP and increased \$1.2 million for the Judicial Plan, or (0.1%) and 2.0% respectively, over the last fiscal year.
- Total contributions during fiscal year 2019 were \$469.1 million, up from \$451.0 million in fiscal year 2018. Based upon the June 30, 2017 actuarial valuation, the fiscal year 2019 actuarial required employer contribution rates were determined to be 20.21% for the MSEP and 63.71% for the Judicial Plan.
- Investment income, net of related fees, was \$319.2 million. Investments of the pension trust funds generated a time-weighted rate of return of 4.3%, net of fees, for the year, down from the prior year's return of 7.4%. The money-weighted rate of return, net of investment expenses for fiscal year 2019, was 4.1%.
- Investment manager fees were \$40.7 million in fiscal year 2019, down from \$49.1 million in fiscal year 2018. The lower manager fees were driven by investment staff reducing exposure to higher fee managers. An accounting gain of \$3.8 million was experienced this year on incentive fees. This gain on incentive fees was due to poor performance on alternative assets that reversed fees incurred in prior years. Incentive fees expense was \$40.8 million in fiscal year 2018.
- Member benefit payments were \$880.4 million in fiscal year 2019, up \$26.6 million from \$853.8 million in fiscal year 2018. Service transfers and refunds totaled \$9.0 million in fiscal year 2019, down \$59.6 million from \$68.6 million in fiscal year 2018 due primarily to the buyout program offered during the prior year.
- Administrative expenses totaled \$9.3 million in fiscal year 2019, compared to \$10.2 million in fiscal year 2018. MOSERS experienced a decrease in administrative expense because it entered into the application development stage of the new pension administration system at the beginning of the fiscal year and began capitalizing project costs. MOSERS capitalized a total of \$2.1 million in project costs incurred during the year, which includes staff payroll costs of \$0.7 million.
- The internal service fund's net position increased by \$0.2 million. This change is primarily due to interest income earned on cash and short term instruments in the fund.
- In prior years, MOSERS financial statements netted interest paid to counterparties in reverse repurchase agreement with interest income. To improve transparency and better comply with GAAP, the current year financial statements separately disclose interest expense on reverse repurchase agreements. The respective income generated from assets purchased with the proceeds from reverse purchase agreements is also being separately disclosed in the *Statement of Changes in Fiduciary Net Position*. This change in reporting has no effect on beginning or ending net position.

The schedules on pages 21-25 present summary comparative financial statements of the pension trust funds and internal service funds for fiscal year 2019 and fiscal year 2018. For each schedule, there is a brief summary of the significant changes noted in those schedules.

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 mosers@mosers.org.

Pension Trust Funds
Summary Comparative Statements of Fiduciary Net Position

	As of June 30, 2019	As of June 30, 2018	Amount of Change	Percentage Change
Assets				
Cash and short-term instruments	\$ 263,269,711	\$ 2,379,956	\$ 260,889,755	10,961.96%
Receivables	346,692,311	152,195,889	194,496,422	127.79
Investments	11,596,260,814	12,065,659,652	(469,398,838)	(3.89)
Capital assets, net of accumulated depreciation	4,887,103	3,237,785	1,649,318	50.94
Other assets	75,750	44,847	30,903	68.91
Total assets	12,211,185,689	12,223,518,129	(12,332,440)	(0.10)
Deferred outflow of resources	743,472	301,182	442,290	146.85
Liabilities				
Administrative expense payables	1,666,007	3,007,015	(1,341,008)	(44.60)
Investment activities payable	202,258,228	170,776,608	31,481,620	18.43
Obligations under repurchase agreements	3,921,700,618	3,853,968,794	67,731,824	1.76
MOSERS investment portfolio liability (MIP)	3,470,132	4,014,950	(544,818)	(13.57)
Net OPEB liability	7,666,038	7,272,038	394,000	5.42
Total liabilities	4,136,761,023	4,039,039,405	97,721,618	2.42
Deferred inflow of resources	369,869	71,907	297,962	414.37
Net positions restricted for pensions	\$ 8,074,798,269	\$ 8,184,707,999	\$ (109,909,730)	(1.34)

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 decreased by \$110 million from \$8.18 billion in fiscal year 2018 to \$8.07 billion in fiscal year 2019. The decrease was due to the negative cash flow generated by benefit payments in excess of contribution and investment revenue.

The increase in cash and receivables is primarily related to investment activity, including the timing of investment transactions that had not settled by June 30, and more accrued interest receivable on fixed income securities.

Administrative expense payables decreased and investment related payables increased as a result of the timing of normal business and investing activity.

Prior year amounts were reclassified to conform to the current year's presentation.

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, 2019	Year Ended June 30, 2018	Amount of Change	Percentage Change
Additions				
Contributions	\$ 469,065,954	\$ 450,974,449	\$ 18,091,505	4.01%
Net investment income	319,211,119	589,611,104	(270,399,985)	(45.86)
Miscellaneous income	500,793	548,581	(47,788)	(8.71)
Total additions	788,777,866	1,041,134,134	(252,356,268)	(24.24)
Deductions				
Benefit payments	880,399,391	853,758,969	26,640,422	3.12
Service transfers and refunds	9,015,238	68,609,753	(59,594,515)	(86.86)
Administrative expenses	9,272,967	10,209,941	(936,974)	(9.18)
Total deductions	898,687,596	932,578,663	(33,891,067)	(3.63)
Net increase (decrease)	(109,909,730)	108,555,471	(218,465,201)	(201.25)
Net position beginning of year	8,184,707,999	8,076,152,528	108,555,471	1.34
Net positions restricted for pensions	<u>\$ 8,074,798,269</u>	<u>\$ 8,184,707,999</u>	<u>\$ (109,909,730)</u>	<u>(1.34)</u>

The 4.01% increase in contributions received is primarily attributable to an increase in contribution rates from 19.45% in fiscal year 2018 to 20.21% in fiscal year 2019, and an increase in the growing percentage of MSEP 2011 tier members who contribute 4% of pay.

The decrease in investment income from fiscal year 2018 to fiscal year 2019 is attributable to market performance. The fund returned 4.3% in fiscal year 2019 compared to 7.4% in fiscal year 2018. 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 120-131 of the *Actuarial Section* of this report.

Service transfers and refunds decreased by \$59.6 million to more historically normal amounts with the conclusion of the buyout program that was offered briefly during the prior fiscal year.

MOSERS experienced a decrease in administrative expense because it entered into the application development stage of the new pension administration system at the beginning of the fiscal year and began capitalizing project costs. MOSERS capitalized a total of \$2.1 million in project costs incurred during the year, which includes \$0.7 million in staff payroll costs.

*Internal Service Funds***Summary Comparative Statements of Net Position**

	As of June 30, 2019	As of June 30, 2018	Amount of Change	Percentage Change
Assets				
Premiums receivable	\$ 957,787	\$ 945,148	\$ 12,639	1.34%
Short-term instruments	6,919,257	4,294,253	2,625,004	61.13
Capital assets, net of accumulated depreciation	6,947	12,800	(5,853)	(45.73)
Total assets	7,883,991	5,252,201	2,631,790	50.11
Liabilities				
Premiums payable	5,170,302	2,493,654	2,676,648	107.34
Deferred revenue	2,008,209	2,083,270	(75,061)	(3.60)
Other liabilities	239,771	397,165	(157,394)	(39.63)
Total liabilities	7,418,282	4,974,089	2,444,193	49.14
Unrestricted net position	\$ 465,709	\$ 278,112	\$ 187,597	67.45

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 increase in short-term instruments and premiums payable is attributable to the timing of remitting premiums received to The Standard.

The slight decrease in other liabilities is due to expenses allocated from the pension trust fund 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 2019 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.

*Internal Service Funds***Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position**

	Year Ended June 30, 2019	Year Ended June 30, 2018	Amount of Change	Percentage Change
Operating revenues				
Premium receipts	\$ 31,342,778	\$ 31,119,232	\$ 223,546	0.72%
Deferred compensation receipts	1,215,000	800,000	415,000	51.88
Miscellaneous income	494,722	480,120	14,602	3.04
Total operating revenues	33,052,500	32,399,352	653,148	2.02
Operating expenses				
Premium disbursements	31,325,399	31,100,612	224,787	0.72
Premium refunds	17,379	14,211	3,168	22.29
Administrative expenses	1,649,467	1,587,344	62,123	3.91
Total operating expenses	32,992,245	32,702,167	290,078	0.89
Net operating income (loss)	60,255	(302,815)	363,070	119.90
Nonoperating revenues				
Gain on sale of capital assets	145	0	145	100.00
Investment income	127,197	85,806	41,391	48.24
Total nonoperating revenues	127,342	85,806	41,536	48.41
Net revenues over (under) expenses	187,597	(217,009)	404,606	186.45
Net position beginning of year	278,112	495,121	(217,009)	(43.83)
Net position end of year	\$ 465,709	\$ 278,112	\$ 187,597	67.45

Activity within the internal service fund during the year was consistent with prior years. There were less than a 1% differences between current and prior year amounts for premium receipts and disbursements.

Deferred compensation receipts and investment income 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, 2019	Year Ended June 30, 2018	Amount of Change	Percentage Change
Cash flows from operating activities	\$ 2,497,662	\$ (81,359)	\$ 2,579,021	3,169.93%
Cash flows from noncapital financing activities	0	(13)	13	100.00
Cash flows from capital and related financing activities	145	0	145	100.00
Cash flows from investing activities	(2,497,807)	81,372	(2,579,179)	(3,169.61)
Net change in cash	0	0	0	
Cash balances beginning of year	0	0	0	
Cash balances end of year	\$ 0	\$ 0	\$ 0	

The increase in cash flows from operating activities, and the corresponding decrease 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 and LTD programs.

Pension Trust Funds

Statements of Fiduciary Net Position

As of June 30, 2019

	MSEP	Judicial Plan	Total
Assets			
Cash and short-term instruments	\$ 258,150,981	\$ 5,118,730	\$ 263,269,711
Receivables			
Contributions	16,858,706	1,654,698	18,513,404
Investment income	130,844,194	2,594,436	133,438,630
Investment sales	190,586,775	3,779,038	194,365,813
Other receivables	373,154	1,310	374,464
Total receivables	338,662,829	8,029,482	346,692,311
Investments and derivatives			
Investments - cash equivalents	666,664,890	13,218,923	679,883,813
Investments - treasuries	5,548,030,564	110,008,773	5,658,039,337
Investments - fixed income	2,157,725,600	42,785,105	2,200,510,705
Investments - equity	36,997,220	733,597	37,730,817
Investments - real estate investments	103,453,514	2,051,321	105,504,835
Investments - alternatives and limited partnerships	2,833,673,274	56,187,311	2,889,860,585
Investments - derivative instruments	24,250,650	480,072	24,730,722
Total investments and derivatives	11,370,795,712	225,465,102	11,596,260,814
Capital assets, net of accumulated depreciation	4,849,082	38,021	4,887,103
Prepaid and other expenses	75,161	589	75,750
Total assets	11,972,533,765	238,651,924	12,211,185,689
Deferred outflow of resources	737,689	5,783	743,472
Liabilities			
Administrative and benefit expense payables	1,017,604	7,979	1,025,583
Employee vacation and overtime liability	635,443	4,981	640,424
Payable for investments purchased	128,066,274	2,539,354	130,605,628
Management and incentive fees payable	10,435,156	206,913	10,642,069
Investment activities payable	59,824,309	1,186,222	61,010,531
Obligations under repurchase agreements	3,845,451,330	76,249,288	3,921,700,618
MOSERS investment portfolio liability (MIP)	3,402,663	67,469	3,470,132
Net OPEB liability	7,606,404	59,634	7,666,038
Total liabilities	4,056,439,183	80,321,840	4,136,761,023
Deferred inflow of resources	366,992	2,877	369,869
Net position restricted for pensions	\$ 7,916,465,279	\$ 158,332,990	\$ 8,074,798,269

See accompanying *Notes to the Basic Financial Statements*.

Pension Trust Funds

Statements of Changes in Fiduciary Net Position

For the Year Ended June 30, 2019

	MSEP	Judicial Plan	Total
Additions			
<i>Contributions</i>			
Employer contributions	\$ 394,150,042	\$ 38,604,668	\$ 432,754,710
Member contributions	31,286,632	1,138,101	32,424,733
Member purchases of service credit	1,293,774	0	1,293,774
Service transfer contributions	2,592,737	0	2,592,737
Total contributions	429,323,185	39,742,769	469,065,954
<i>Investment activity</i>			
Investing activity income:			
Net appreciation in fair value of investments	(16,141,843)	(309,878)	(16,451,721)
Interest	85,188,242	1,635,402	86,823,644
Dividends	2,782,582	53,418	2,836,000
Other	272,180	5,226	277,406
Total investing activity income	72,101,161	1,384,168	73,485,329
Investing activity expenses:			
Management and incentives fees	(43,529,841)	(835,655)	(44,365,496)
Custody and other fees	(829,195)	(15,919)	(845,114)
Consultant fees	(432,091)	(8,295)	(440,386)
Internal investment activity expenses	(3,895,964)	(34,740)	(3,930,704)
Total investing activity expenses	(48,687,091)	(894,609)	(49,581,700)
Reverse repurchase agreement activity:			
Income from assets in reverse repurchase funds	380,096,337	7,296,900	387,393,237
Interest expense from reverse repurchase agreements	(90,351,229)	(1,734,518)	(92,085,747)
Total net income from reverse repurchase agreement activity	289,745,108	5,562,382	295,307,490
Total net investment income	313,159,178	6,051,941	319,211,119
Miscellaneous income	496,898	3,895	500,793
Total additions	742,979,261	45,798,605	788,777,866
Deductions			
Benefit payments	769,612,853	37,585,484	807,198,337
BackDROP payments	72,882,398	0	72,882,398
Buyout and lump sum payments	318,656	0	318,656
Service transfer payments	3,001,189	0	3,001,189
Contribution refunds	6,006,484	7,565	6,014,049
Administrative expenses	9,200,826	72,141	9,272,967
Total deductions	861,022,406	37,665,190	898,687,596
Net (decrease) increase in net position	(118,043,145)	8,133,415	(109,909,730)
Net position restricted for pensions:			
Beginning of year	8,034,508,424	150,199,575	8,184,707,999
End of year	\$ 7,916,465,279	\$ 158,332,990	\$ 8,074,798,269

See accompanying *Notes to the Basic Financial Statements*.

*Internal Service Funds***Statement of Net Position***As of June 30, 2019*

	Total
Assets	
<i>Current assets</i>	
Premiums receivable	\$ 957,787
Short-term instruments	6,919,257
Total current assets	7,877,044
Capital assets	27,250
Accumulated depreciation	(20,303)
Net capital assets	6,947
Total assets	7,883,991
Liabilities	
<i>Current liabilities</i>	
Premiums payable	5,170,302
Other liabilities	239,771
Total current liabilities	5,410,073
Deferred revenue	2,008,209
Total liabilities	7,418,282
Net Position	
Unrestricted net position	465,709
Total net position	\$ 465,709

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, 2019*

	Total
Operating revenues	
Premium receipts	\$ 31,342,778
Deferred compensation receipts	1,215,000
Miscellaneous income	494,722
Total operating revenues	33,052,500
Operating expenses	
Premium disbursements	31,325,399
Premium refunds	17,379
Administrative expenses	1,649,467
Total operating expenses	32,992,245
Net operating income	60,255
Nonoperating revenues	
Gain on sale of capital assets	145
Interest income	127,197
Total nonoperating revenues	127,342
Net revenues over expenses	187,597
Net position beginning of year	278,112
Net position end of year	\$ 465,709

See accompanying *Notes to the Basic Financial Statements*.

Internal Service Funds

Statement of Cash Flows

For the Year Ended June 30, 2019

	Total
Cash flows from operating activities	
Cash received from employers and members	\$ 32,961,861
Payments to outside carriers	(28,723,812)
Refund of premiums to members	(17,379)
Cash payments to employees for services	(1,307,186)
Cash payments to other suppliers of goods and services	(415,822)
Net cash provided by operating activities	2,497,662
Cash flows from capital and related financing activities	
Proceeds from the sale of capital assets	145
Net cash provided by capital and related financing activities	145
Cash flows from investing activities	
Purchase of short term instruments	(1,229,601,920)
Proceeds from sale and maturities of short term instruments	1,226,976,916
Cash received from investing activities	127,197
Net cash (used) by investing activities	(2,497,807)
Net increase (decrease) in cash	0
Cash balances beginning of year	0
Cash balances end of year	\$ 0
Reconciliation of net operating income to net cash provided by operating activities	
Net operating income	\$ 60,255
<i>Adjustments to reconcile net operating income to net cash provided (used) by operating activities</i>	
Depreciation expense	5,853
Change in assets and liabilities:	
(Increase) in operational accounts receivable	(12,639)
Increase in operational liabilities	2,444,193
Total adjustments	2,437,407
Net cash provided by operating activities	\$ 2,497,662

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, 2019, the employer contribution rate was 20.21% 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 changes in the market value of assets 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, 2019 and 2018, the ratio of actuarial value of assets to market value of assets was 110.9% and 109.9%, respectively, for the MSEP.

Per the June 30, 2019 actuarial valuation, membership in the MSEP consisted of the following:

Retirees and beneficiaries currently receiving benefits		49,696
Active		
Vested	29,373	
Nonvested	17,491	46,864
Inactive		
Vested (not yet receiving benefits)*	16,873	
Nonvested (with contribution balances)	18,852	35,725
Total membership		132,285

**Includes 175 members on leave of absence and 682 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, 2019 were 20.21% 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; or if the member was on workers compensation leave of absence or medical leave of absence due to an employee illness, the amount of pay the member would have received, but for such leave of absence as reported and verified by the employing department; or if the member was employed for less than 36 months, 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 5 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 hired 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 hired 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 5 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 5 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 5 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 circuit court appointed after February 29, 1972, 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, 2019 actuarial valuation, membership in the Judicial Plan consisted of the following:

Retirees and beneficiaries currently receiving benefits		585
Active		
Vested	414	
Nonvested	0	414
Inactive		
Vested (not yet receiving benefits)		36
Total membership		1,035

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Employer contributions are determined through annual actuarial valuations. Employer contributions for fiscal year 2019 were 63.71% 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;
- 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 serving 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 142-143 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.

MOSERS uses ICMA-RC as an external provider for record keeping. Total plan assets were \$2,237,733,599 as of June 30, 2019.

Record keeping of individual accounts and management of investment options are paid from charges to the participants and investment option asset-based fee reimbursement arrangements. Participants in the plan manage individual accounts by choosing investment options from the available fund lineup. MOSERS' role is to oversee the plan, choose external providers and investment options, and develop communications to plan participants. During the year ended June 30, 2019, a total of \$2,904,187 was collected from a combination of \$1,922,242 in investment option asset-based fee reimbursements and \$981,945 in participant fees.

Effective July 1, 2012, new permanent full-time and part-time employees are automatically enrolled at 1% of pay into the State of Missouri Deferred Compensation Plan. As of June 30, 2019, 18,117 currently active employees have been automatically enrolled in the plan since inception. There are 16,570 employees who continue to contribute to the plan, making the opt-out rate 8.5%.

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 \$3,470,132, of the units invested in the MIP by Deferred Compensation participants.

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, the Missouri State Insured Defined Benefit Insurance Plan, and the State of Missouri Deferred Compensation Plan 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

For purposes of measuring the net OPEB liability, deferred outflows of resources and deferred inflows of resources related to OPEB, and OPEB expense, information about the fiduciary net position and additions to/deductions from fiduciary net position have been determined on the same basis as they are reported. 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, 2019, 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, 2019.

Schedule of Internally Managed Leverage - Old Portfolio

Old Portfolio (83% 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	\$ 1,986,279,605	31.0%	\$ 2,224,931,883	34.7%	38.0%
Nominal bonds	1,340,932,910	20.9	2,787,877,942	43.5	44.0
Commodities	337,258,691	5.3	1,086,644,833	16.9	20.0
Inflation-protected bonds	953,793,455	14.9	2,343,316,387	36.5	39.0
Alternative beta	1,796,780,647	28.0	1,796,780,647	28.0	31.0
Total old portfolio	\$ 6,415,045,308	100.0%	\$ 10,239,551,692	159.6%	172.0%

Schedule of Internally Managed Leverage - New Portfolio

New Portfolio (17% of Total Fund)	Fair Value Capital	Percent of Investments at Fair Value	Market Exposure	Percent of Investments at Market Exposure	Policy Exposure
Growth	\$ 548,167,871	40.5%	\$ 549,682,452	40.6%	45.0%
Income	290,260,212	21.4	483,073,724	35.7	35.0
Inflation hedge	258,022,015	19.1	521,526,262	38.5	40.0
Alternative beta	257,477,438	19.0	257,477,438	19.0	20.0
Total new portfolio	\$ 1,353,927,536	100.0%	\$ 1,811,759,876	133.8%	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*	Weighted Average Long-Term Expected Nominal Return
Opportunistic global equities	38.0%	8.3%	3.1%
Nominal bonds	44.0	3.3	1.5
Commodities	20.0	7.8	1.6
Inflation-protected bonds	39.0	2.4	0.9
Alternative beta	31.0	6.6	2.0
Cash and cash equivalents**	(72.0)	0.0	(0.7)
	100.0%		8.4%
Correlation/Volatility Adjustment			(0.7)%
Long-Term Expected Net Nominal Return			7.7
Long-Term Expected Geometric Net Real Return			5.2

* 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*	Weighted Average Long-Term Expected Nominal Return
Global public equities	30.0%	7.7%	2.3%
Global private equities	15.0	9.3	1.4
Long treasuries	25.0	3.5	0.9
Core bonds	10.0	3.1	0.3
Commodities	5.0	5.5	0.3
TIPS	25.0	2.7	0.7
Private real assets	5.0	7.1	0.3
Public real assets	5.0	7.7	0.4
Hedge funds	5.0	4.8	0.2
Alternative beta	10.0	5.3	0.5
Private credit	5.0	9.5	0.5
Cash and cash equivalents**	(40.0)	0.0	0.0
	100.0%		7.8%
Correlation/Volatility Adjustment			(0.6)%
Long-Term Expected Net Nominal Return			7.2
Long-Term Expected Geometric Net Real Return			5.3

* 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 4.10% for the year ended June 30, 2019. 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, 2019	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	\$ 5,658,039,337	\$ 5,658,039,337	\$ 0	\$ 0
Repurchase agreements	1,380,000,000	0	1,380,000,000	0
Fixed income securities				
Corporate bonds and asset backed securities	321,681,140	0	321,681,140	0
U.S. government agencies	298,915,000	0	298,915,000	0
Non U.S. sovereign	51,947,866	0	51,947,866	0
Collateralized mortgage obligations	15,441,083	0	15,441,083	0
Total fixed income securities	687,985,089	0	687,985,089	0
Equities				
Real estate	105,504,835	105,504,835	0	0
Master limited partnerships	37,730,817	37,730,817	0	0
Total equities	143,235,652	143,235,652	0	0
Exchange traded funds				
U.S. fixed income index	132,525,616	132,521,866	3,750	0
Total investment by fair value level	8,001,785,694	5,933,796,855	2,067,988,839	0
Investments measured at the NAV				
Commingled international equity funds	777,779,669			
Hedge funds	1,506,550,860			
Private equity funds	549,054,295			
Private real estate and timber funds	56,475,761			
Total investments measured at the NAV	2,889,860,585			
Total investments measured at fair value	10,891,646,279	5,933,796,855	2,067,988,839	0
Investment derivative instruments				
Future contracts	24,686,818	24,686,818	0	0
Interest rate swap	43,904	0	43,904	0
Total investment derivative instruments	24,730,722	24,686,818	43,904	0
Investments at cost or cost plus accrued interest:				
Cash held in investment accounts	679,883,813			
Total investments	11,596,260,814	5,958,483,673	2,068,032,743	0
Obligations under repurchase agreements	(3,921,700,618)			
Total investments, net of obligations under repurchase agreements	\$ 7,674,560,194	\$ 5,958,483,673	\$ 2,068,032,741	\$ 0

Investments Measured at the Net Asset Value

	June 30, 2019	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period (Days)
Commingled international equity funds	\$ 777,779,669	\$ 0	Daily, Monthly	1-10
Active hedge funds				
Long/short equity	111,107,188	0	Quarterly, Annually	30-45
Merger arbitrage	129,416,249	0	Monthly	45
Equity market neutral	87,891,420	0	Quarterly	90
Event driven	240,034,000	0	Semi-annually	60
Macro	183,388,222	0	Monthly, Quarterly	30
Risk premia	287,917,786	0	Monthly	30
Risk parity	213,626,740	0	Monthly	15
Fund-of-funds	216,254,099	0	Monthly	95
Pending liquidated hedge funds	36,915,156	0		
Private equity funds	549,054,295	229,224,115		
Private real estate and timber funds	56,475,761	9,796,918		
Total investments measured at net asset value (NAV)	<u>\$ 2,889,860,585</u>	<u>\$ 239,021,033</u>		

- **Commingled international equity funds** – Two international equity funds are considered to be commingled in nature.
- **Long/short equity hedge funds** – Consisting of two funds, this strategy invests both long and short in U.S. and global equity securities, with a goal of adding growth and minimizing market exposure. Due to contractual lock-up restrictions, these investments remain restricted for anywhere ranging from four to 12 months.
- **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 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 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. Due to contractual lock-up restrictions, approximately 50% of the value of these investments is eligible for redemption semi-annually. The remaining 50% of the value of these investments remains restricted for 12 months.
- **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 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 redeemable at least monthly, and is not subject to lock-up restrictions.
- **Risk parity fund** – Consisting of one fund, this strategy attempts to build a more efficient portfolio through an equal risk methodology. The fund takes long only positions across equity indices, developed nominal bonds, TIPS, commodities and credit. Diversification benefits decrease both the expected return and volatility, thus requiring leverage to maintain a similar return to a more conventional portfolio. This investment is redeemable monthly, and not 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 redeemable monthly, and is not subject to lock-up restrictions.
- **Pending liquidated hedge funds** – Consisting of 12 funds which have been fully redeemed as of June 30, 2019, for which MOSERS is awaiting final distribution of the proceeds.
- **Private equity, real estate, and timber funds** – MOSERS' private equity portfolio consists of 44 funds with exposure to buyout funds, distressed funds, infrastructure, energy, royalty funds, and special situations. The real estate portfolio, comprised of four funds, invests mainly in U.S. commercial real estate. The timber portfolio consists of one fund which invests in global timberland. The fair values of the majority of these funds has 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, 2019, MOSERS' fixed income assets that are not U.S. Government guaranteed represented 33% 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 46 of the notes.

Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

Fixed Income Security Type	Fair Value June 30, 2019	Percent of all Fixed Income Assets	Weighted Average Credit Quality	Ratings Dispersion Requiring Further Disclosure
U.S. government agencies	\$ 298,915,000	3.6%	AA+	See below
Asset-backed securities	31,469	0.0	Not rated	See below
Collateralized mortgage obligations	15,441,083	0.2	AA+	See below
Corporate bonds	321,689,006	3.8	BBB+	See below
Non-U.S. sovereign	51,908,531	0.6	BBB	See below
Total nongov't fixed income securities	687,985,089	8.2		
Bank deposits	650,000,000	7.7	FDIC insured	None
Nongov't. guaranteed repurchase agreements	870,000,000	10.3	Not rated	None
Pooled investments	30,033,000	0.4	AAA	None
Total nongov't. guaranteed securities	\$ 2,238,018,089	26.6%		
U.S. government securities held in portfolio	\$ 5,658,039,337	67.3		
Repurchase agreement with U.S. government securities held as collateral	510,000,000	6.1		
Total fixed income securities	\$ 8,406,057,426	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	\$ 494,028	\$ 0
AA	298,915,000	0	15,441,083	23,777,138	1,241,335
A	0	0	0	122,422,338	12,124,404
BBB	0	0	0	166,104,710	25,595,691
BB	0	0	0	8,890,791	12,530,173
B	0	0	0	0	416,927
Not rated	0	31,469	0	0	0
	\$ 298,915,000	\$ 31,469	\$ 15,441,083	\$ 321,689,006	\$ 51,908,531

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, 2019	Percent of all Fixed Income Assets	Weighted Average Effective Duration (Years)	Interest Rate Risk Requiring Further Disclosure
U.S. treasuries	\$ 5,658,039,337	67.3%	9.8	See below
U.S. government agencies	298,915,000	3.6	0.2	None
Asset-backed securities	31,469	0.0	0.1	None
Collateralized mortgage obligations	15,441,083	0.2	0.1	None
Corporate bonds	321,689,006	3.8	4.3	None
Non-U.S. sovereign	51,908,531	0.6	5.7	None
Bank deposits	650,000,000	7.7	0.0	None
Repurchase agreements	1,380,000,000	16.4	0.0	None
Pooled investments	30,033,000	0.4	0.0	None
	<u>\$ 8,406,057,426</u>	<u>100.0%</u>	<u>6.8</u>	

Effective Duration Analysis of U.S. Treasuries

Maturity	Fair Value June 30, 2019	Average Effective Duration of the Security Type (Years)	Contribution to Effective Duration (Years)
Less than 1 year to maturity	\$ 149,908,827	0.0	0.0
1- to 10-year maturities	3,023,162,223	4.1	2.2
Long coupon treasuries	2,484,968,287	17.3	7.6
	<u>\$ 5,658,039,337</u>		<u>9.8</u>

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 1.82% to 3.00% with maturities of one to five days.

The yield earned by the counterparties on the reverse repo transactions ranged from 1.76% to 2.66% 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 market value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held approximately \$65.5 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 \$11.5 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, 2019	Fair Value Including Accrued Interest of Repurchase Agreements June 30, 2019	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	\$ 520,254,684	\$ 510,000,000	\$ 10,254,684	
U.S. government agencies	326,400,000	320,000,000	6,400,000	
Common stock	599,136,726	550,000,000	49,136,726	
Accrued interest	0	289,367	(289,367)	
	<u>\$ 1,445,791,410</u>	<u>\$ 1,380,289,367</u>	<u>\$ 65,502,043</u>	4.7%

Reverse Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2019	Fair Value Including Accrued Interest of Reverse Repos June 30, 2019	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	\$ 3,959,129,607	\$ 3,921,700,618	\$ 37,428,989	
Receivables	(692,723)	0	(692,723)	
Accrued interest	0	25,252,407	(25,252,407)	
	<u>\$ 3,958,436,884</u>	<u>\$ 3,946,953,025</u>	<u>\$ 11,483,859</u>	0.3%

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, 2019, is highlighted in the table below.

Currency Exposures by Asset Class

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Alternatives	Total
Australian Dollar	\$ 5,329,037	\$ 577,281	\$ 543,859	\$ 0	\$ 6,450,177
Brazilian Real	0	7,017,956	5,141,884	0	12,159,840
Canadian Dollar	3,450,505	10,546,835	400,214	0	14,397,554
Chilean Peso	0	710,102	2,308,611	0	3,018,713
Chinese Yuan Renminbi	0	547,438	0	0	547,438
Colombian Peso	0	255,204	4,139,040	0	4,394,244
Czech Koruna	2,025	142,883	1,165,891	0	1,310,799
Danish Krone	0	3,256,824	0	0	3,256,824
Egyptian Pound	0	105,950	0	0	105,950
Euro	(523,936)	104,027,274	2,154,676	633,856	106,291,870
Hong Kong Dollar	(4,346,710)	81,161,335	0	0	76,814,625
Hungarian Forint	0	259,575	0	0	259,575
Indian Rupee	0	8,245,427	0	0	8,245,427
Indonesian Rupiah	0	1,940,756	6,326,554	0	8,267,310
Israeli Shekel	0	23	0	0	23
Japanese Yen	(1,647,314)	208,991,454	0	0	207,344,140
Kazakhstani Tenge	0	0	127,825	0	127,825
Malaysian Ringgit	0	1,980,640	1,644,468	0	3,625,108
Mexican Peso	0	3,794,954	6,769,746	0	10,564,700
New Taiwan Dollar	0	41,073,334	0	0	41,073,334
Pakistani Rupee	0	15,919	0	0	15,919
Peruvian Nuevo Sol	0	0	1,388,584	0	1,388,584
Philippine Peso	0	1,020,402	0	0	1,020,402
Polish Zloty	0	1,052,473	6,111,912	0	7,164,385
Qatari Riyal	0	907,215	0	0	907,215
Romanian New Leu	0	0	1,036,469	0	1,036,469
Russian Ruble	0	1,565,910	5,193,799	0	6,759,709
Saudi Riyal	0	1,247,444	0	0	1,247,444
Singapore Dollar	0	21,661,903	0	0	21,661,903
South African Rand	(994,436)	9,303,293	5,948,124	0	14,256,981
South Korean Won	(1,081,385)	28,027,576	569,198	0	27,515,389
Swiss Franc	0	63,964,158	0	0	63,964,158
Thai Baht	10,365	13,830,532	3,192,826	0	17,033,723
Turkish Lira	0	6,702,137	1,877,223	0	8,579,360
United Arab Emirates Dirham	0	602,206	0	0	602,206
United Kingdom Pound Sterling	(1,553,229)	96,365,542	363,446	0	95,175,759
Uruguayan Peso	0	0	105,151	0	105,151
	\$ (1,355,078)	\$ 720,901,955	\$ 56,509,500	\$ 633,856	\$ 776,690,233

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, 2019.

Futures Contracts

Futures Contract	Notional Value	Exposure
Currency futures	\$ (287,392,982)	\$ (2,371,900)
Fixed income futures	343,899,815	15,157,528
Equity index futures	417,679,461	8,952,603
Commodity futures	(45,464,215)	2,948,587
Total	\$ 428,722,079	\$ 24,686,818

Foreign Currency Forward Contracts

Currency	Net Notional Long (Short)	Exposure
Argentine Peso	\$ 754,005	\$ 42,956
Brazilian Real	1,432,602	45,405
Chilean Peso	137,767	1,422
Czech Koruna	1,611,780	47,471
Euro	57,623	416
Hungarian Forint	1,630,257	7,023
Indonesian Rupiah	(201,737)	1,228
Mexican Peso	(2,025,983)	1,622
Polish Zloty	(567,929)	(11,387)
Romanian Leu	(519,029)	(5,704)
Russian Ruble	(915,595)	(42,979)
Thai Baht	372,832	7,029
Turkish Lira	(204,361)	141
South African Rand	(1,253,862)	(18,291)
U.S. Dollar	(232,018)	0
Foreign currency forward contract asset	\$ 76,352	\$ 76,352

Swap Contracts

Counterparty Credit Rating	Notional Value	Exposure
Total return swaps - equity		
A+	\$ 970,886,368	\$ 18,711,150
A	34,269,765	1,404,422
Total	\$ 1,005,156,133	\$ 20,115,572
Total return swaps - fixed income		
A+	\$ 1,150,878,936	\$ 26,292,770
Total	\$ 1,150,878,936	\$ 26,292,770
Total return swaps - commodities		
A+	\$ 571,551,161	\$ 19,758,845
Total	\$ 571,551,161	\$ 19,758,845

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, 2019, the change in fair value in the swap contracts resulted in a loss of \$113.0 million of investment income. The change in fair value in the futures contracts resulted in a gain of \$13.8 million of investment income. The change in fair value in the foreign exchange contracts resulted in a loss of \$0.7 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 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 market value for domestic loans and 105% of market 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 2019.

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

Below are schedules of the capital asset account balances for the pension trust funds and the internal service funds – State of Missouri Deferred Compensation Plan for the year ended June 30, 2019.

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, 2018	\$ 267,286	\$ 0	\$ 4,243,182	\$ 1,401,509	\$ 736,316	\$ 6,648,293
Additions	0	2,140,057	0	225,103	5,268	2,370,428
Deletions	0	0	(163,366)	(270,690)	(3,028)	(437,084)
Capital Assets June 30, 2019	267,286	2,140,057	4,079,816	1,355,922	738,556	8,581,637
Accumulated depreciation						
Balances June 30, 2018	0	0	1,990,155	1,075,926	344,427	3,410,508
Depreciation expense	0	0	106,038	213,490	280,717	600,245
Deletions	0	0	(52,555)	(261,752)	(1,912)	(316,219)
Accumulated depreciation June 30, 2019	0	0	2,043,638	1,027,664	623,232	3,694,534
Net capital assets June 30, 2019	\$ 267,286	\$ 2,140,057	\$ 2,036,178	\$ 328,258	\$ 115,324	\$ 4,887,103

Internal Service Funds

Capital Assets

	Furniture, Fixtures and Equipment	Software	Total Capital Assets
Capital assets			
Balances June 30, 2018	\$ 22,300	\$ 4,950	\$ 27,250
Additions	0	0	0
Capital Assets June 30, 2019	22,300	4,950	27,250
Accumulated depreciation			
Balances June 30, 2018	9,959	4,491	14,450
Depreciation expense	5,394	459	5,853
Deletions	0	0	0
Accumulated depreciation June 30, 2019	15,353	4,950	20,303
Net capital assets June 30, 2019	\$ 6,947	\$ 0	\$ 6,947

Note 5 – Employers' Net Pension Liability

The components of net pension liability as of June 30, 2019, are in the *Schedule of Employers' Net Pension Liability* below.

Schedule of Employers' Net Pension Liability

	MSEP	Judicial Plan
Total pension liability	\$ 13,957,626,309	\$ 617,482,705
MOSERS' fiduciary net position	7,916,465,279	158,332,990
Employers' net pension liability	\$ 6,041,161,030	\$ 459,149,715
Plan net position as a percentage of the total pension liability	56.72%	25.64%
Covered payroll	\$ 1,950,272,350	\$ 60,594,362
Employers' net pension liability as a percentage of covered payroll	309.76%	757.74%

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, 2019, is \$13,957,626,309 for MSEP and \$617,482,705 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2019, and a measurement date of June 30, 2019, 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, 2019
Actuarial cost method	Entry age normal
Amortization period	30 years
Asset valuation method	Market value
Investment rate of return	7.10%
Projected salary increases	2.85 – 8.35% (MSEP) 2.6 – 4.8% (Judicial Plan)
Rate of payroll growth	2.35%
COLAs	4.00%/1.88%*
Price inflation	2.35%

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.

* On a compound basis, 4.00% for the first 12 years, 3.06% for the 13th year, and 1.88% per year thereafter. When no minimum COLA is in effect, the annual COLA is assumed to be 1.88% (80% of the 2.35% price inflation), on a compounded basis.

The discount rate used to measure the total pension liability was 7.10%. 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 7.10% 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, 2019, calculated using the discount rate of 7.10%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1% lower (6.10%) or 1% higher (8.10%) than the current rate.

Sensitivity of Net Pension Liability to Changes in the Discount Rate

Employers' Net Pension Liability	1% Decrease (6.10)%	Current Discount Rate (7.10)%	1% Increase (8.10)%
MSEP	\$ 7,621,213,358	\$ 6,041,161,030	\$ 4,712,721,302
Judicial Plan	\$ 522,723,811	\$ 459,149,715	\$ 404,862,436

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 116.

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 of 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, 2019, 27,641 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, 2019, was \$1,876,577. 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, 2019, 146 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 (\$19,110 for the year ended June 30, 2019). 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 32,431 members covered under the program as of June 30, 2019. This insured defined benefit coverage is financed on a percentage of covered payroll (0.55%). Purchased as group policy, LTD is administered by The Standard. The cost for the year ended June 30, 2019, was \$8,226,590. 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.mhcp.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, 2018, employers were required to contribute 4.29% for the period July 1, 2017, through December 31, 2017, and 4.24% for the period January 1, 2018, through June 30, 2018, of gross active employee payroll toward their required contributions. 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, 2019, MOSERS reported a liability of \$7,666,038 for its proportionate share of the net OPEB liability. The net OPEB liability was measured as of June 30, 2018, 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, 2018, MOSERS proportionate share was 0.4375%. For the year ended June 30, 2019, MOSERS recognized OPEB expense of \$581,214. As of June 30, 2019, 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	\$ 0	\$ 117,406
Changes of assumptions	0	201,517
Net difference between projected and actual earnings on plan investments	11,607	0
Changes in proportion and differences between MOSERS contributions and proportionate share of contributions	400,590	50,946
MOSERS contributions subsequent to the measurement date	331,275	0
	<u>\$ 743,472</u>	<u>\$ 369,869</u>

The \$331,275 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

2020	\$	5,311
2021		5,311
2022		5,310
2023		5,487
2024		2,453
Thereafter		18,456
Total	\$	42,328

Actuarial Assumptions

The collective total OPEB liability for the June 30, 2018, measurement date was determined by an actuarial valuation as of July 1, 2017, with updated procedures used to roll forward the total OPEB liability to June 30, 2018. This actuarial valuation used the following actuarial assumptions:

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

Valuation year	July 1, 2017 - June 30, 2018
Actuarial cost method	Entry age normal, level percent of payroll
Asset valuation method	Market value
Discount rate (blended)	5.90%
Projected payroll growth rate	4.0%
Inflation rate	3.0%
Health care cost trend rate (medical & prescription drugs combined)	
Nonmedicare	6.25%
	(rate decreases by 0.25% per year until an ultimate rate of 5.0% in fiscal year 2023 and later)
Medicare	7.25%
	(rate decreases by 0.25% per year until an ultimate rate of 5.0% in fiscal year 2027 and later)

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 5.9% 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 of MOSERS' proportionate share of the Net OPEB Liability to Changes in the Discount Rate

The following table presents MOSERS' net OPEB liability, calculated using a discount rate of 5.9%, 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 (4.9%)	Current Discount Rate (5.9%)	1% Increase in Discount Rate (6.9%)
Net OPEB liability	\$ 9,017,390	\$ 7,666,038	\$ 6,592,711

Sensitivity of MOSERS' proportionate share of the Net OPEB Liability 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	\$ 6,561,768	\$ 7,666,038	\$ 9,058,438

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	20.0%	5.7%
Mid cap stocks	10.0	6.0
Small cap stocks	10.0	6.0
High-yield bonds	10.0	2.9
BarCap aggregate bonds	20.0	1.4
Long government/credit	25.0	1.6
Cash equivalents	5.0	0.3

Note 8 – Commitments

As of June 30, 2019, MOSERS has \$239.0 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, 2019, the remaining commitments on these agreements was approximately \$9.0 million.

Note 9 – Contingencies

There were no contingencies which would have a material impact on the financial statements as of June 30, 2019.

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.

Pension Trust Funds

Schedule of Changes in Employers' Net Pension Liability

For Years Ended June 30, 2014 – 2019*

MSEP

	2014	2015
Total pension liability		
Service cost	\$ 158,116,026	\$ 150,412,577
Interest on the total pension liability	869,878,195	896,451,618
Benefit changes	0	0
Difference between expected and actual experience	12,376,237	(27,983,267)
Assumption changes	0	(57,568,553)
Benefit payments and member refunds	(680,436,107)	(728,265,800)
Net change in total pension liability	359,934,351	233,046,575
Total pension liability - beginning	11,134,637,484	11,494,571,835
Total pension liability - ending (a)	\$ 11,494,571,835	\$ 11,727,618,410
Plan fiduciary net position		
Employer contributions	\$ 326,370,336	\$ 329,752,832
Employee contributions	14,025,328	18,099,455
Pension plan net investment income (loss)	1,193,952,121	(237,070,529)
Benefit payments and member refunds	(680,436,107)	(728,265,800)
Pension plan administrative expense	(7,336,922)	(8,077,692)
Other	296,369,500	5,434,820
Net change in plan fiduciary net position	1,142,944,256	(620,126,914)
Plan fiduciary net position - beginning	7,993,837,570	9,136,781,826
Plan fiduciary net position - ending (b)	9,136,781,826	8,516,654,912
Net pension liability - ending (a)-(b)	\$ 2,357,790,009	\$ 3,210,963,498
Plan fiduciary net position as a percentage of total pension liability	79.49%	72.62%
Covered payroll	\$ 1,902,719,928	\$ 1,918,527,768
Net pension liability as a percentage of covered payroll	123.92%	167.37%

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

** Some balances have been reclassified since the completion of the GASB 67 valuation. This is due to the adoption of GASB Statement No. 75 (Other Post-Employment Benefits).

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

2016	2017	2018	2019
\$ 149,021,755	\$ 152,766,134	\$ 157,351,979	\$ 158,190,866
913,877,923	945,654,398	956,201,619	956,725,536
0	(1,696,059)	0	0
61,150,083	(104,203,260)	(118,252,032)	7,426,685
656,805,085	202,554,786	351,899,973	74,340,841
(757,310,503)	(793,964,857)	(886,711,473)	(851,821,580)
1,023,544,343	401,111,142	460,490,066	344,862,348
11,727,618,410	12,751,162,753	13,152,273,895	13,612,763,961
\$ 12,751,162,753	\$ 13,152,273,895	\$ 13,612,763,961	\$ 13,957,626,309
\$ 329,957,369	\$ 335,217,422	\$ 379,557,962	\$ 394,150,042
21,684,920	25,439,343	28,303,994	31,286,632
1,740,269	272,595,668	576,188,826	313,159,178
(757,310,503)	(793,964,857)	(886,711,473)	(851,821,580)
(8,489,375)	(8,759,341)	(9,799,256)	(9,200,826)
4,923,622	5,668,849	1,610,073	4,383,409
(407,493,698)	(163,802,916)	89,150,126	(118,043,145)
8,516,654,912	8,109,161,214	7,945,358,298	8,034,508,424
8,109,161,214	7,945,358,298	8,034,508,424	7,916,465,279
\$ 4,642,001,539	\$ 5,206,915,597	\$ 5,578,255,537	\$ 6,041,161,030
63.60%	60.41%	59.02%	56.72%
\$ 1,921,528,936	\$ 1,975,353,105	\$ 1,951,454,817	\$ 1,950,272,350
241.58%	263.59%	285.85%	309.76%

Pension Trust Funds

Schedule of Changes in Employers' Net Pension Liability

For Years Ended June 30, 2014 – 2019*

Judicial Plan

	2014	2015
Total pension liability		
Service cost	\$ 8,990,293	\$ 10,613,686
Interest on the total pension liability	34,013,615	36,161,612
Benefit changes	0	0
Difference between expected and actual experience	13,360,614	5,103,664
Assumption changes	0	0
Benefit payments and member refunds	(29,406,625)	(31,245,906)
Net change in total pension liability	26,957,897	20,633,056
Total pension liability - beginning	435,378,358	462,336,255
Total pension liability - ending (a)	<u>\$ 462,336,255</u>	<u>\$ 482,969,311</u>
Plan fiduciary net position		
Employer contributions	\$ 29,264,877	\$ 32,696,686
Employee contributions	294,810	488,193
Pension plan net investment income (loss)	17,199,701	(3,610,352)
Benefit payments	(29,406,625)	(31,245,906)
Pension plan administrative expense	(105,693)	(123,015)
Other	4,195,049	0
Net change in plan fiduciary net position	\$ 21,442,119	\$ (1,794,394)
Plan fiduciary net position - beginning	111,203,538	132,645,657
Plan fiduciary net position - ending (b)	132,645,657	130,851,263
Net pension liability - ending (a)-(b)	<u>\$ 329,690,598</u>	<u>\$ 352,118,048</u>
Plan fiduciary net position as a percentage of total pension liability	28.69%	27.09%
Covered payroll	\$ 49,587,936	\$ 55,656,457
Net pension liability as a percentage of covered payroll	664.86%	632.66%

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

** Some balances have been reclassified since the completion of the GASB 67 valuation.

This is due to the adoption of GASB Statement No. 75 (Other Post-Employment Benefits).

Schedule of Changes in Employers' Net Pension Liability continued from page 56

2016		2017		2018		2019	
\$	10,932,097	\$	12,945,567	\$	12,997,198	\$	13,573,453
	37,755,240		40,617,091		41,018,371		41,710,768
	0		0		0		0
	(5,036,696)		(10,687,091)		(1,319,696)		978,884
	53,991,379		7,905,466		12,332,042		5,024,057
	(32,989,714)		(33,984,725)		(35,657,248)		(37,593,049)
	64,652,306		16,796,308		29,370,667		23,694,113
	482,969,311		547,621,617		564,417,925		593,788,592
\$	547,621,617	\$	564,417,925	\$	593,788,592	\$	617,482,705
\$	33,642,498	\$	34,246,826	\$	36,892,203	\$	38,604,668
	661,206		786,745		902,319		1,138,101
	28,081		4,680,131		10,677,666		6,051,941
	(32,989,714)		(33,984,725)		(35,657,248)		(37,593,049)
	(136,983)		(150,387)		(181,595)		(72,141)
	0		0		(68,711)		3,895
\$	1,205,088	\$	5,578,590	\$	12,564,634	\$	8,133,415
	130,851,263		132,056,351		137,634,941		150,199,575
	132,056,351		137,634,941		150,199,575		158,332,990
\$	415,565,266	\$	426,782,984	\$	443,589,017	\$	459,149,715
	24.11%		24.39%		25.30%		25.64%
\$	57,421,016	\$	58,591,661	\$	59,417,302	\$	60,594,362
	723.72%		728.40%		746.57%		757.74%

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
2010	\$ 251,226,187	\$ 251,226,187	\$ 0	\$ 1,945,095,321	12.92%
2011	263,418,048	263,418,048	0	1,875,569,816	14.04
2012	263,373,924	263,373,924	0	1,864,069,493	14.13
2013	274,655,284	274,655,284	0	1,880,212,950	14.61
2014	326,370,336	326,370,336	0	1,902,719,928	17.15
2015	329,752,832	329,752,832	0	1,918,527,768	17.19
2016	310,124,928	329,957,369	(19,832,414)	1,921,528,936	17.17
2017	322,772,697	335,217,422	(12,444,725)	1,975,353,105	16.97
2018	379,557,962	379,557,962	0	1,951,454,817	19.45
2019	394,150,042	394,150,042	0	1,950,272,350	20.21

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
2010	\$ 27,029,198	\$ 27,029,198	\$ 0	\$ 46,112,730	58.62%
2011	27,702,682	27,702,682	0	45,888,020	60.37
2012	26,324,526	26,324,526	0	45,835,501	57.43
2013	28,330,649	28,330,649	0	48,697,726	58.18
2014	29,264,877	29,264,877	0	49,587,936	59.02
2015	32,696,686	32,696,686	0	55,656,457	58.75
2016	31,604,527	33,642,498	(2,037,971)	57,421,016	58.59
2017	32,670,710	34,246,826	(1,576,116)	58,591,661	58.45
2018	36,892,203	36,892,203	0	59,417,302	62.09
2019	38,604,668	38,604,668	0	60,594,362	63.71

* 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
2014	19.25%
2015	(2.60)
2016	0.08
2017	3.51
2018	7.57
2019	4.10

** 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, 2019

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, 2019 valuations to determine the FY21 contribution rates. The actuarial value is calculated by recognizing the difference between the actual and expected return on the market 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 7.25%, as of June 30, 2018, to 7.10% per year, as of June 30, 2019, compounded annually (net of investment expenses). The price inflation assumption used was 2.35% per year. Projected salary assumptions were 2.85% to 8.35% for the MSEP and 2.60% to 4.80% 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 1.88% (80% of the 2.35% price inflation), on a compounded basis.

**Actuarial Assumptions and Methods Used to Set
the Actuarially Determined Contributions - Five-Year Review**
MSEP & Judicial

Valuation year	2019	2018	2017	2016	2015
Contribution rate for fiscal year	2021	2020	2019	2018	2017
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	Single base 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	2.35%	2.50%	2.50%	2.50%	2.50%
Cost-of-living adjustment	4% or 1.88%	4% or 2%	4% or 2%	4% or 2%	4% or 2%
Salary increase	varied	varied	varied	varied	varied
Payroll growth	2.35%	2.50%	3.00%	3.00%	3.00%
Investment rate of return	7.10%	7.25%	7.50%	7.65%	8.00%

Schedule of Proportionate Share of the Net OPEB Liability*For the Year Ended June 30, 2019****State Retiree Welfare Benefit Trust**

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

* 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 the Year Ended June 30, 2019****State Retiree Welfare Benefit Trust**

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

* 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, 2019*

Investing activity	MSEP	Judicial Plan	Total
Investment management and incentive fees			
Actis Emerging Markets III & IV - private equity	\$ 779,307	\$ 14,961	\$ 794,268
Alinda Infrastructure Fund I, LP - private equity	14,757	283	15,040
AQR DELTA Sapphire Fund, LP - hedge funds	3,458,155	66,388	3,524,543
AQR Global Risk Premium Fund, LP - beta-balanced	815,548	15,656	831,204
Axiom Asia Private Capital Fund II & III, LP - private equity	1,334,385	25,617	1,360,002
Axxon Brazil Private Equity Fund II - private equity	242,149	4,649	246,798
Bayview Opportunity Domestic, LP - high yield	15,059	289	15,348
Bayview Opportunity Domestic III, LP - real estate	631,296	12,119	643,415
Blackstone Real Estate Partners IV, V, VI, & VII - real estate	758,357	14,559	772,916
Blackstone Topaz Fund, LP - hedge funds	2,994,123	57,480	3,051,603
Blakeney Onyx, LP - emerging markets	116,233	2,231	118,464
Bridgewater Associates Diamond Ridge Fund, LLC - hedge funds	4,158,124	79,826	4,237,950
Bridgewater All Weather, LLC - beta-balanced	1,352,046	25,956	1,378,002
CarVal Investors CVI Global Value Fund A, LP - real estate	13,153	252	13,405
CarVal Investors CVI Global Value Fund A, LP - private debt	13,153	252	13,405
Catalyst Fund III, IV & V, LP - private debt	2,231,370	42,837	2,274,207
Catterton Partners V, LP - private equity	10,806	207	11,013
Cornwall Domestic, LP - hedge funds	132,034	2,535	134,569
DRI Capital LSRC - private equity	165,313	3,174	168,487
EIG Energy Fund XIV, XV, & XVI, LP - private equity	276,130	5,301	281,431
Elliott International, Ltd. - hedge funds	7,483,802	143,670	7,627,472
Farallon Capital Institutional Partners, LP - hedge funds	25,745	494	26,239
Gaoling Fund, LP - hedge funds	(1,712,133)	(32,869)	(1,745,002)
Garnet Sky Investors Company, Ltd. - timber	(768,992)	(14,763)	(783,755)
Gateway Energy & Resource Holdings, LLC - real estate	333,978	6,412	340,390
GCM Equity Partners & Glenview Capital Opportunity Fund, LP - hedge funds	750,463	14,407	764,870
Global Forest Partners GTI7 Institutional Investors Company, Ltd. - timber	33,300	639	33,939
Harvest Fund Advisors - equities	172,204	3,306	175,510
HBK Merger Strategies Offshore Fund, Ltd. - hedge funds	2,911,051	55,885	2,966,936
JLL Partners V & VI, LP - private equity	139,516	2,678	142,194
King Street Capital, LP - hedge funds	(222,556)	(4,273)	(226,829)
Linden Capital Partners II - private equity	633,942	12,170	646,112
Mast Credit Opportunities I, LP - hedge funds	513,265	9,853	523,118
Merit Energy Partners F-II, LP - real estate	83,152	1,596	84,748
MHR Institutional Partners IIA, III & IV, LP - private debt	(1,348,381)	(25,886)	(1,374,267)
Millennium Technology Partners II, LP - private equity	983,002	18,871	1,001,873
NISA Investment Advisors, LLC - passive beta strategies	5,649,461	108,456	5,757,917
OCM Real Estate Opportunities Fund III, LP - real estate	520	10	530
OCM Opportunities Fund IVb, VII & VIIIb, LP - private debt	242,337	4,652	246,989
OCM/GFI Power Opportunities Fund II & III, LP - private equity	349,668	6,713	356,381

Schedules of Investment Expenses continued on page 63

Schedules of Investment Expenses continued from page 62

Investing Activity	MSEP	Judicial Plan	Total
Perry Capital - hedge funds	149	3	152
Pharo Macro Fund, Ltd. - hedge funds	1,901,097	36,496	1,937,593
Resource Management Service Wildwood Timberlands, LLC - timber	(818,801)	(15,719)	(834,520)
Silchester International Investors - int'l developed equity	4,100,393	78,717	4,179,110
Silver Creek Special Opportunities Fund I & II - private equity	63,072	1,211	64,283
Silver Lake Partners II, LP - private equity	83,923	1,611	85,534
SIR Hedged Equity Fund, Ltd. - hedge funds	2,875,526	55,203	2,930,729
State Street Global Advisors - emerging markets	82,585	1,585	84,170
StepStone Capital Buyout Fund I & II, LP - private equity	(709,561)	(13,622)	(723,183)
StepStone Opportunities Fund II, LP - private equity	36,396	699	37,095
Stone Harbor Investment Partners, LP - emerging markets	150,220	2,878	153,098
Total investment management and incentive fees	43,529,841	835,655	44,365,496
Other investment fees			
<i>Investment consultant fees</i>			
Cortex	5,397	103	5,500
Meketa Investment Group	65,002	1,248	66,250
NEPC	105,529	2,026	107,555
Pension Consulting Alliance, LLC	43,335	832	44,167
Summit Strategies, Inc.	150,279	2,885	153,164
TimberLink Consulting	13,491	259	13,750
Verus Advisory, Inc.	49,058	942	50,000
Total investment consultant fees	432,091	8,295	440,386
<i>Investment custodial and other fees</i>			
BNY Mellon (custodial)	370,574	7,115	377,689
BNY Mellon (performance calculation)	170,262	3,269	173,531
MSCI Barra One and Bloomberg (risk management)	288,359	5,535	293,894
Total investment custodial and other fees	829,195	15,919	845,114
Internal investment activity expenses	3,895,964	34,740	3,930,704
Total investing activity expenses	\$ 48,687,091	\$ 894,609	\$ 49,581,700

*Pension Trust Funds***Schedules of Internal Investment Activity Expenses***For the Year Ended June 30, 2019*

	MSEP	Judicial Plan	Total
Personnel services			
Salaries	\$ 2,362,749	\$ 18,524	\$ 2,381,273
Fringe benefits	939,974	7,369	947,343
Total personnel services	3,302,723	25,893	3,328,616
Professional services			
Attorney services	92,266	723	92,989
Total professional services	92,266	723	92,989
Communications			
Telephone	10,076	79	10,155
Total communications	10,076	79	10,155
Facilities			
Utilities	2,768	22	2,790
Lease expense	84,020	659	84,679
Facility maintenance	9,437	74	9,511
Vehicle maintenance and operation	65	1	66
Total facilities	96,290	756	97,046
Software and equipment			
Computer supplies and software	3,412	27	3,439
Loss on sale of equipment	17,623	138	17,761
Total software and equipment	21,035	165	21,200
Education, meetings and travel			
Tuition reimbursement	4,453	35	4,488
Professional development including travel	17,934	141	18,075
Due diligence travel	1,709	13	1,722
Total education, meetings and travel	24,096	189	24,285
General			
Research and information services	317,790	6,683	324,473
Membership dues	19,443	152	19,595
Office supplies	644	5	649
Periodicals and publications	11,601	95	11,696
Total general	349,478	6,935	356,413
Total internal investment activity expenses	\$ 3,895,964	\$ 34,740	\$ 3,930,704

Pension Trust Funds
Schedules of Administrative Expenses
For the Year Ended June 30, 2019

	MSEP	Judicial Plan	Total
Personnel services			
Salaries	\$ 3,874,955	\$ 30,380	\$ 3,905,335
Fringe benefits	2,158,277	16,921	2,175,198
Total personnel services	6,033,232	47,301	6,080,533
Professional services			
Actuarial services	150,294	1,178	151,472
Attorney services	152,136	1,193	153,329
Auditing services	34,989	274	35,263
Banking services	40,489	317	40,806
Consulting services	769,499	6,033	775,532
Total professional services	1,147,407	8,995	1,156,402
Communications			
Video production	2,256	18	2,274
Telephone	57,042	447	57,489
Printing	21,067	165	21,232
Postage and mailing	122,752	962	123,714
Total communications	203,117	1,592	204,709
Facilities			
Depreciation	105,213	825	106,038
Utilities	47,690	374	48,064
Facility maintenance	92,061	722	92,783
Vehicle maintenance and operation	4,273	33	4,306
Total facilities	249,237	1,954	251,191
Software and equipment			
Computer supplies and software	22,523	177	22,700
Depreciation	490,363	3,844	494,207
Maintenance agreements	301,006	2,360	303,366
Equipment rental	137,252	1,076	138,328
Gain on sale of equipment	6,482	51	6,533
Total software and equipment	957,626	7,508	965,134
Education, meetings and travel			
Board travel and meetings	22,658	178	22,836
Professional development including travel	82,661	648	83,309
MOSERS sponsored seminars	86,522	678	87,200
Tuition reimbursement	7,727	61	7,788
Total education, meetings and travel	199,568	1,565	201,133
General			
Advertising	16,520	136	16,656
Research and information services	51,668	405	52,073
Insurance	178,408	1,399	179,807
Membership dues	16,015	126	16,141
Business continuity	55,022	431	55,453
Office supplies	1,559	12	1,571
Periodicals and publications	85,589	671	86,260
Miscellaneous	5,858	46	5,904
Total general	410,639	3,226	413,865
Total administrative expenses	\$ 9,200,826	\$ 72,141	\$ 9,272,967

Schedules of Professional Service Fees

For the Year Ended June 30, 2019

Professional Services	Pension Trust Funds			Internal Service Funds		
	MSEP	Judicial Plan	Total	Life and LTD	Deferred Compensation	Total
Operations administrative expenses						
<i>Actuarial services</i>						
Cavanaugh Macdonald Consulting, LLC	\$ 150,294	\$ 1,178	\$ 151,472	\$ 0	\$ 0	\$ 0
<i>Attorney services</i>						
Thompson Coburn, LLP	152,136	1,193	153,329	0	6,112	6,112
<i>Auditing services</i>						
Eide Bailly	7,442	58	7,500	0	0	0
Williams-Keepers, LLC	27,547	216	27,763	2,430	37,900	40,330
Total auditing services	34,989	274	35,263	2,430	37,900	40,330
<i>Banking services</i>						
Central Bank	40,489	317	40,806	472	0	472
JetPay Services	0	0	0	251	0	251
Total banking services	40,489	317	40,806	723	0	723
<i>Consulting services</i>						
Avtex – information technology	3,119	24	3,143	0	0	0
Charlesworth & Associates – risk management	9,806	77	9,883	0	0	0
CherryRoad Technologies – information technology	79,378	622	80,000	0	0	0
Election America – trustee election	66,672	523	67,195	0	0	0
Gamble & Schlemeier, Ltd. – governmental affairs	26,307	206	26,513	0	0	0
ICON Integration and Design, Inc. – pension administration system	303,338	2,378	305,716	0	0	0
McAfee Public Sector – policy consulting	25,480	200	25,680	0	0	0
Mosaic Governance Advisors, LLC – strategic planning	16,758	131	16,889	0	0	0
Verus Advisory, Inc. – investment consulting	218,289	1,711	220,000	0	0	0
World Wide Technology – information technology	20,239	159	20,398	0	0	0
Other services	113	2	115	0	0	0
Total consulting services	769,499	6,033	775,532	0	0	0
Total operations administrative expenses	1,147,407	8,995	1,156,402	3,153	44,012	47,165
Investment administrative expenses						
<i>Attorney services</i>						
Purrington Moody Weil, LLP	16,402	129	16,531	0	0	0
Thompson Coburn, LLP	75,681	592	76,273	0	0	0
Other services	183	2	185	0	0	0
Total attorney services	92,266	723	92,989	0	0	0
Total investment administrative expenses	92,266	723	92,989	0	0	0
Total professional fees	\$1,239,673	\$ 9,718	\$1,249,391	\$ 3,153	\$ 44,012	\$ 47,165

Information on investment management and consulting fees can be found in the Schedule of Investment Expenses on pages 62-63.

Internal Service Funds
Combined Statements of Net Position
As of June 30, 2019

	Life and LTD	Deferred Compensation	Total
Assets			
<i>Current assets</i>			
Premiums receivable	\$ 957,787	\$ 0	\$ 957,787
Short-term instruments	6,466,825	452,432	6,919,257
Total current assets	7,424,612	452,432	7,877,044
Capital assets	0	27,250	27,250
Accumulated depreciation	0	(20,303)	(20,303)
Net capital assets	0	6,947	6,947
Total assets	7,424,612	459,379	7,883,991
Liabilities			
<i>Current liabilities</i>			
Premiums payable	5,170,302	0	5,170,302
Other liabilities	177,208	62,563	239,771
Total current liabilities	5,347,510	62,563	5,410,073
Deferred revenue	2,008,209	0	2,008,209
Total liabilities	7,355,719	62,563	7,418,282
Net Position			
Unrestricted net position	68,893	396,816	465,709
Total net position	\$ 68,893	\$ 396,816	\$ 465,709

*Internal Service Funds***Combined Statements of Revenues, Expenses, and Changes in Net Position***For Year Ended June 30, 2019*

	Life & LTD	Deferred Compensation	Total
Operating revenues			
Premium receipts	\$ 31,342,778	\$ 0	\$ 31,342,778
Deferred compensation receipts	0	1,215,000	1,215,000
Miscellaneous income	494,722	0	494,722
Total operating revenues	31,837,500	1,215,000	33,052,500
Operating expenses			
Premium disbursements	31,325,399	0	31,325,399
Premium refunds	17,379	0	17,379
Administrative expenses	501,018	1,148,449	1,649,467
Total operating expenses	31,843,796	1,148,449	32,992,245
Net operating (loss) income	(6,296)	66,551	60,255
Nonoperating revenues			
Gain on sale of capital assets	0	145	145
Interest income	121,298	5,899	127,197
Total nonoperating revenues	121,298	6,044	127,342
Net revenues over expenses	115,002	72,595	187,597
Net position (deficit) beginning of year	(46,109)	324,221	278,112
Net position end of year	\$ 68,893	\$ 396,816	\$ 465,709

*Internal Service Funds***Combined Statements of Cash Flows***For the Year Ended June 30, 2019*

	Life & LTD	Deferred Compensation	Total
Cash flows from operating activities			
Cash received from employers and members	\$ 31,746,861	\$ 1,215,000	\$ 32,961,861
Payments to outside carriers	(28,723,812)	0	(28,723,812)
Refund of premiums to members	(17,379)	0	(17,379)
Cash payments to employees for services	(400,122)	(907,064)	(1,307,186)
Cash payments to other suppliers of goods and services	(233,396)	(182,426)	(415,822)
Net cash provided by operating activities	2,372,152	125,510	2,497,662
Cash flows from capital and related financing activities			
Proceeds from the sale of capital assets	0	145	145
Net cash provided by capital and related financing activities	0	145	145
Cash flows from investing activities			
Purchase of short term instruments	(1,160,871,800)	(68,730,120)	(1,229,601,920)
Proceeds from sale and maturities of short term instruments	1,158,378,350	68,598,566	1,226,976,916
Cash received from investing activities	121,298	5,899	127,197
Net cash (used) by investing activities	(2,372,152)	(125,655)	(2,497,807)
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)	\$ (6,296)	\$ 66,551	\$ 60,255
Adjustments to reconcile net operating (loss) to net cash provided (used) by operating activities			
Depreciation expense	0	5,853	5,853
Change in assets and liabilities:			
(Increase) in operational accounts receivable	(12,639)	0	(12,639)
Increase in operational liabilities	2,391,087	53,106	2,444,193
Total adjustments	2,378,448	58,959	2,437,407
Net cash provided by operating activities	\$ 2,372,152	\$ 125,510	\$ 2,497,662

*Internal Service Funds***Schedules of Administrative Expenses***For the Year Ended June 30, 2019*

	Life and LTD	Deferred Compensation	Total
Personnel services			
Salaries	\$ 269,077	\$ 668,463	\$ 937,540
Employee fringe benefits	131,044	289,357	420,401
Total personnel services	400,121	957,820	1,357,941
Professional services			
Attorney services	0	6,112	6,112
Auditing services	2,430	37,900	40,330
Banking services	723	0	723
Total professional services	3,153	44,012	47,165
Communications			
Postage and mailing	8,111	136	8,247
Telephone	3,961	8,778	12,739
Printing	1,463	914	2,377
Video production expense	157	118	275
Total communications	13,692	9,946	23,638
Facilities			
Building use charge	52	10,577	10,629
Utilities	3,312	0	3,312
Maintenance	6,689	0	6,689
Total facilities	10,053	10,577	20,630
Software and equipment			
Computer supplies and equipment	1,406	7,115	8,521
Depreciation	0	5,853	5,853
Equipment maintenance	20,849	11,619	32,468
Equipment rental	9,531	0	9,531
Total software and equipment	31,786	24,587	56,373
Education, meetings and travel			
Board travel and meetings	1,573	0	1,573
Professional development including travel	6,179	13,946	20,125
MOSERS sponsored seminars	6,008	54,678	60,686
Due diligence travel	0	3,108	3,108
Total education, meetings and travel	13,760	71,732	85,492
General			
Advertising	1,145	7,386	8,531
Research and information services	3,588	19,104	22,692
Insurance	12,389	0	12,389
Membership dues	1,112	2,100	3,212
Business continuity	5,943	0	5,943
Office supplies	3,761	920	4,681
Periodicals and publications	108	265	373
Miscellaneous	407	0	407
Total general	28,453	29,775	58,228
Total administrative expenses	\$ 501,018	\$ 1,148,449	\$ 1,649,467



*Our long-term plan helps ensure
that retirement promises are kept.*



Investment Section

Chief Investment Officer's Report



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October 18, 2019

Dear Members,

MOSERS' portfolio returned a time-weighted rate of return of 4.3% for fiscal year 2019. The Fund's policy return (i.e. what we should have expected through benchmark replication) was 2.5%. Comparing what we earned, 4.3%, to what the benchmark return expectation was, 2.5%, resulted in a 1.8% out performance.

The fiscal-year return did not meet our long-term return objective this year. While we do strive to hit the long-term investment return objective each year, this objective is not always realized. This variation is because of investment risk, which all pension plans must take in order to make money. In certain years, the market environment is good and risk taking is rewarded with profits. In years like fiscal year 2019, the environment was not as rewarding and returns were below expectations. The key consideration during all of these outcomes is our long-term earnings relative to our expectations. In 2018, the Board voted to systematically reduce MOSERS' long-term investment return assumption. With this decision, the Board recognized an investment environment that was making it difficult for MOSERS to achieve its long-term return assumption.

The Board also repositioned the portfolio in 2018 to address the challenging return environment. The new Board-adopted portfolio is generally more oriented to growth investments, but maintains a large degree of portfolio balance with significant allocations to core bonds, long duration U.S. treasuries, U.S. TIPS, and trend-following strategies. We began transitioning to the new portfolio during fiscal year 2019 and will continue over the next few years.

The MOSERS staff has been working to reduce the investment fees the portfolio pays, and in fiscal year 2019, the results of those efforts were evident. We reduced our fees by \$54 million, paying \$44 million in total fees (down from \$98 million in fiscal year 2018). In general, there are two components to investment fees: 1) management fees and 2) incentive fees. It is important to convey how we have reduced both components.

Regarding management fees, we cut those costs by \$9 million. Management fees are unavoidable: they are the cost of institutional money management. Regardless of how the market performs, these fees will always reduce our returns to some extent. In fiscal year 2019, we paid \$41 million in management fees (down from \$50 million in fiscal year 2018). This reduction continues a broader trend for MOSERS. Over the past three years, we have decreased MOSERS' annual management fee costs by \$24 million. These fee reductions have come primarily from the decrease of MOSERS use of investments associated with "high fees" like hedge funds and private-equity partnerships.

MOSERS also pays incentive fees, which are common fees within institutional money management. Incentive fees allow the investment manager to share in the profits when returns are above expectations. Because the investment manager does well if the investment does well, the manager has an "incentive" to get the best returns possible. Thus, unlike management fees, incentive fees are connected to performance: the better the performance, the higher the fee; the lower the performance, the lower the fee. Regardless of how the fee is paid, we always require MOSERS' fee arrangements to be reasonable. Over the last three years, we have successfully reduced MOSERS' allocation to manager's that charge incentive fees. This means incentive fees will continue to be a smaller component of MOSERS' fee structure.

I appreciate the opportunity to serve as the chief investment officer at MOSERS. I am a lifelong resident of central Missouri and have personal relationships with many MOSERS beneficiaries. Those relationships allow me to witness the great things that pension plans, like MOSERS, provide to Missouri state employees in retirement. Those relationships also motivate my everyday behavior to produce results that make the future benefits of the retirees secure.

Sincerely,

A handwritten signature in black ink, consisting of a stylized 'S' followed by a horizontal line extending to the right.

Seth Kelly
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 Ranges¹	Benchmark²	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 Barclays 1-10 TIPS	20%
Inflation-protected bonds	8%	5% - 10%	S&P GSCI/BCOM ⁴	39%
Alternative beta	13%	9% - 17%	AQR DELTA ⁵	31%

New Portfolio - Asset Classes	Asset Allocation Policy	Asset Allocation Ranges¹	Benchmark²
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 and timber assets are benchmarked to the Dow Jones U.S. REIT Index and NCREIF Timber, respectively.

⁴ S&P Goldman Sachs Commodity Index/ Bloomberg Commodity Index. The Board approved a three-year transition from S&P GSCI to BCOM beginning August 1, 2016.

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 2019) 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.

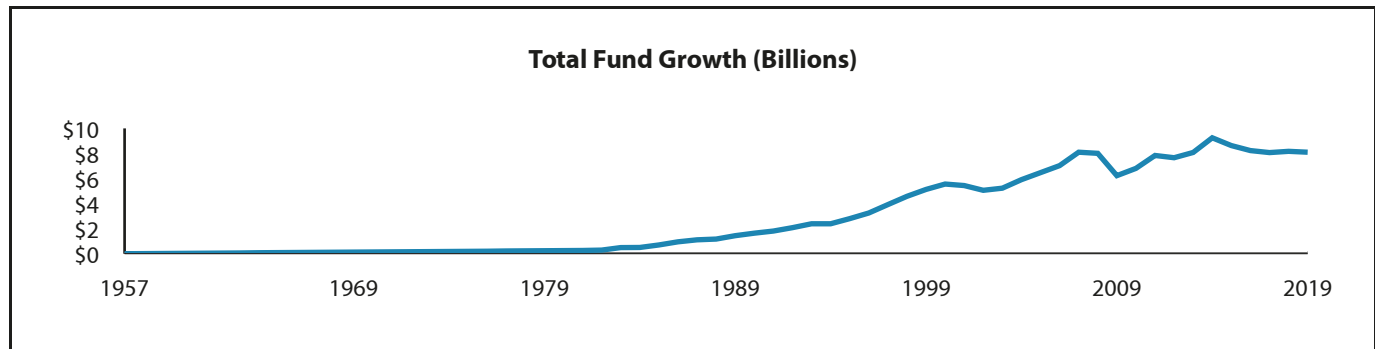
Strategy decisions are made by the CIO to deviate from the policy benchmark weight. The difference between the strategy benchmark return and the policy benchmark return captures the value added by the CIO through strategic decisions to overweight or underweight assets relative to the Board's policy allocation 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, 2019, 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

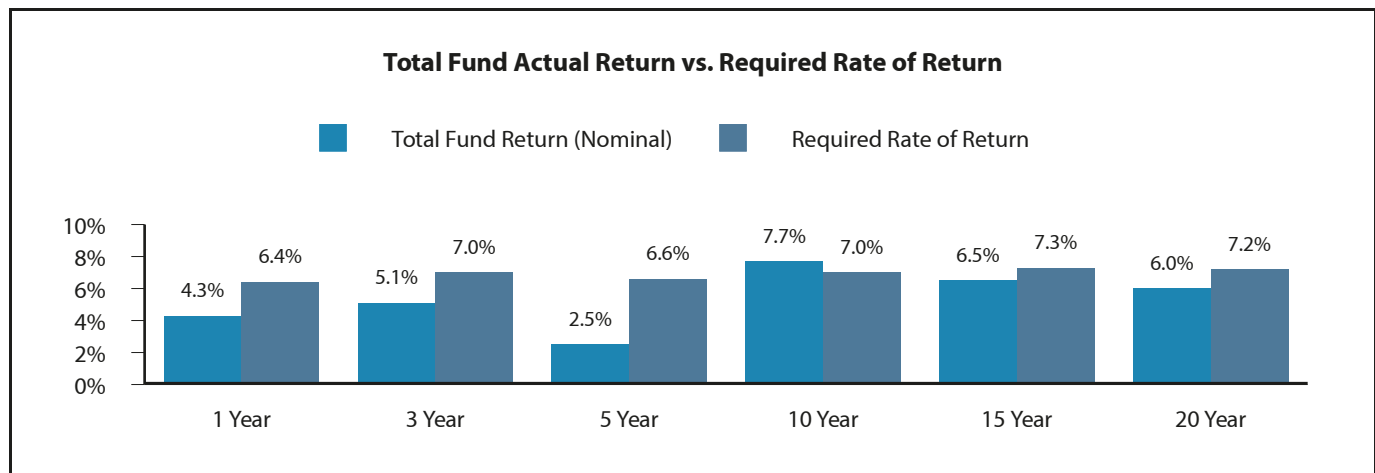
MOSERS' investments generated a time-weighted return of 4.3%, net of fees, for fiscal year 2019. The total fund return exceeded the 1-year policy benchmark of 2.5%. This additional 1.8% investment return produced \$149 million over what would have been earned if the fund had been invested passively in 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 2019 is equal to the RRO of 4.75% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI).²

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, 2019.³

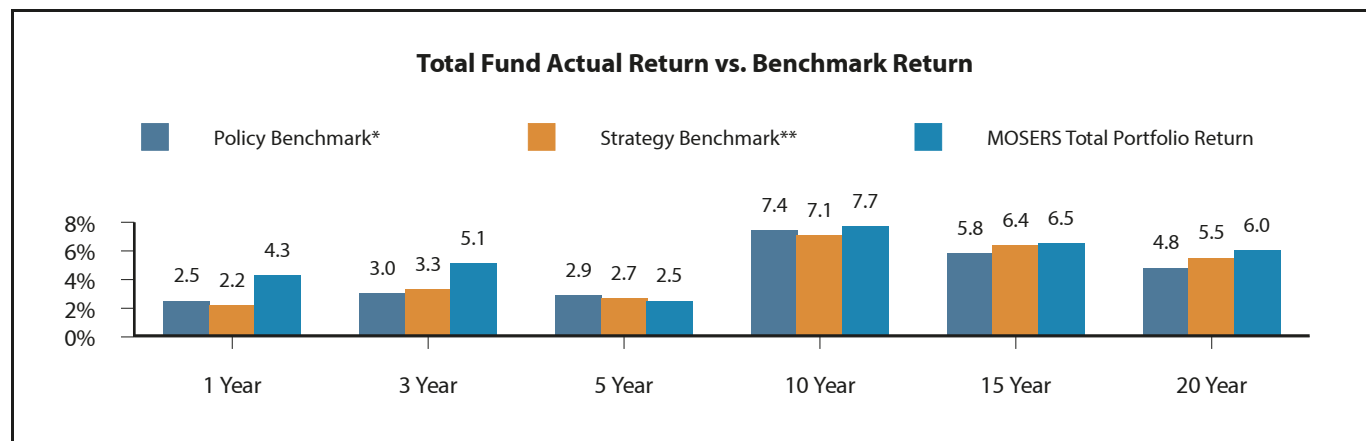


² CPI Source: United States Department of Labor, Bureau of Labor Statistics (not seasonally adjusted).

³ 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 and the strategy benchmark. Returns for the total fund versus these benchmarks are displayed in the following bar chart.



* As of June 30, 2019, the total fund policy benchmark was comprised of the following components: 83% old portfolio policy benchmark, 17% new portfolio policy benchmark.

- 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-indexed bonds policy, and 31% total alternative beta policy. This program did not begin until September 2012.
- 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.

** As of June 30, 2019, the total fund strategy benchmark was comprised of the following components: 83% old portfolio strategy, 17% new portfolio strategy.

- The old portfolio strategy benchmark was comprised of the following components: 34% total opportunistic global equities strategy, 43% total nominal bonds strategy, 17% total commodities strategy, 38% total inflation-indexed bonds strategy, and 27% total alternative beta strategy. This program did not begin until September 2012.
- The new portfolio strategy benchmark was comprised of the following components: 39% total growth strategy, 37% total income strategy, 40% total inflation hedge policy and 19% total alternative betas policy. This program did not begin until January 2019.
- All strategy 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-, 10-, 15-, and 20-year actual performance over performed its policy benchmark by 1.8%, 2.1%, 0.3%, 0.7%, and 1.2%, respectively, with the actual 5-year return trailing the policy benchmarks by (0.4%).

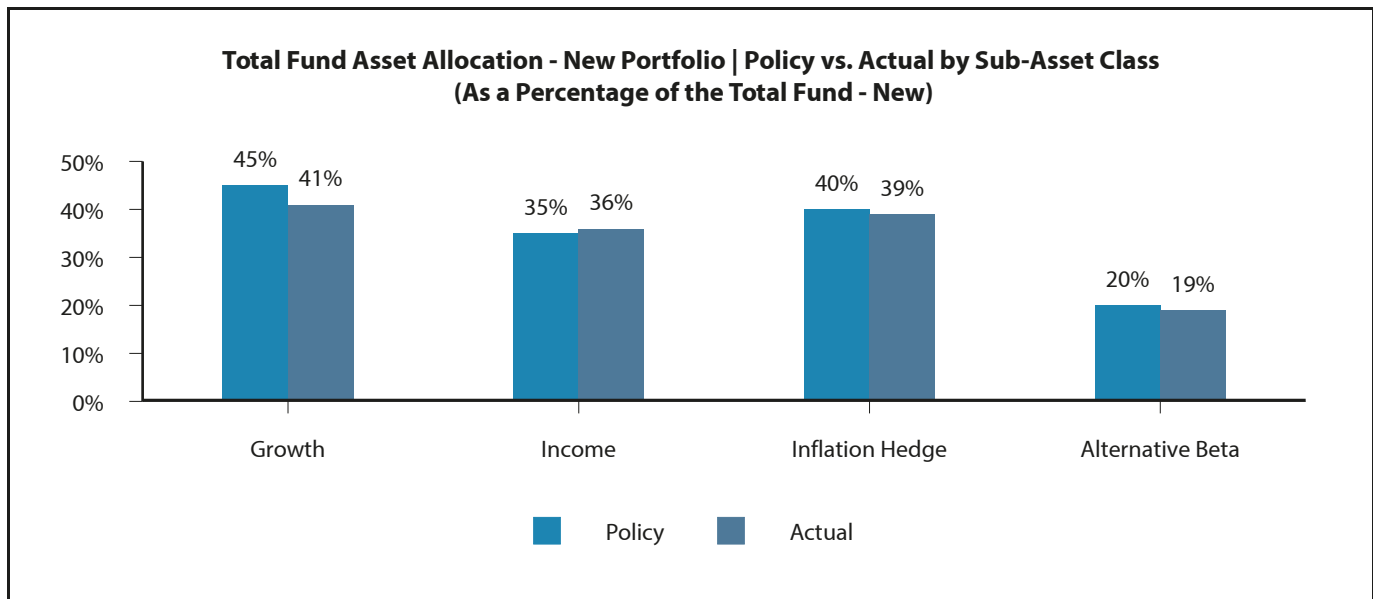
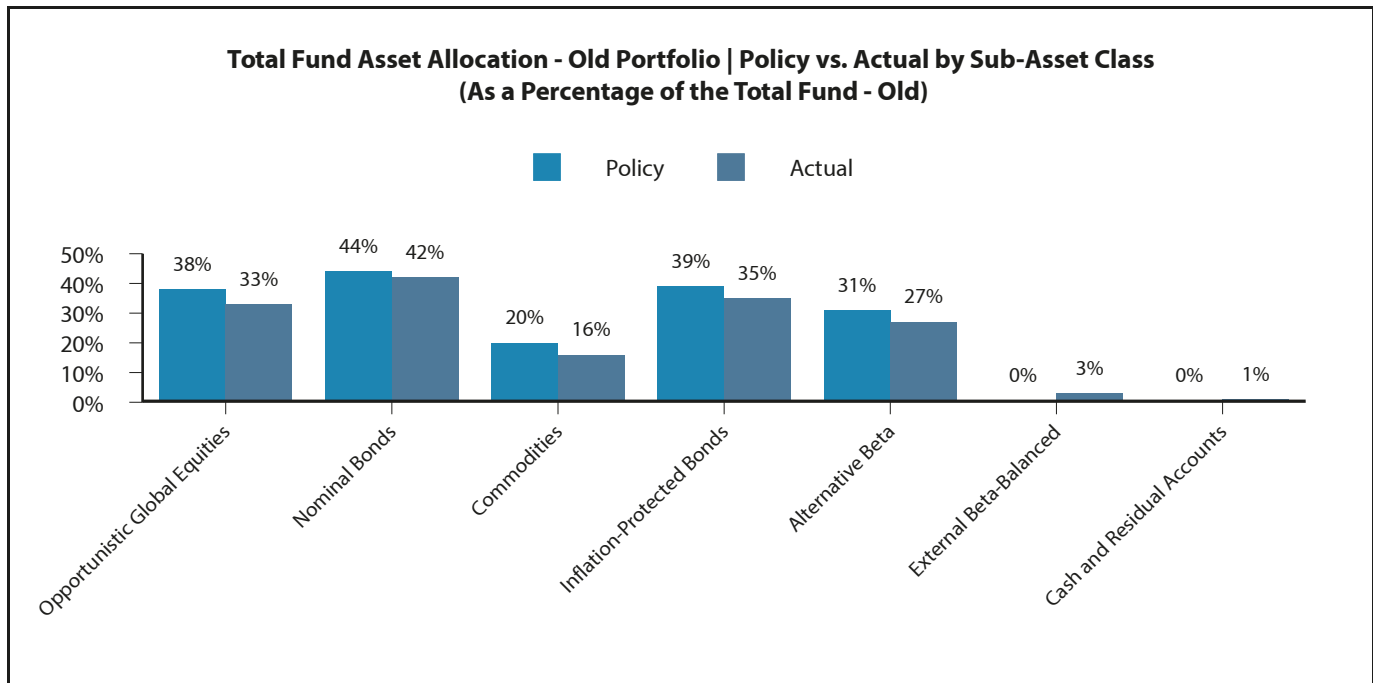
The strategy benchmark is more narrowly defined and focuses on sub-asset class allocation decisions made by the CIO. Comparison of the strategy benchmark to the policy benchmark reflects the component of value added or detracted which can be attributed to the strategic sub-class allocation decisions made by the CIO. Value is added when the strategy benchmark return exceeds the policy benchmark return. Comparison of the strategy benchmark to the total return reflects the component of the value added which can be attributed to the manager implementation (manager hiring and firing) decisions made by the CIO and approved by the external asset consultant. Value is added when the total fund return exceeds the strategy benchmark return.

Total Fund Policy Allocation Overview

As of June 30, 2019, the Board's broad old portfolio policy allocation mix was 38% opportunistic global equities, 44% nominal bonds, 20% commodities, 39% inflation-protected bonds, and 31% alternative beta. The policy target, as of June 30, 2019, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph below.

As of June 30, 2019, the Board's new portfolio broad 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, 2019, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph below.

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.



The asset allocation is built upon the belief that diversification is critical. The tables below reflect the asset classes and their correlation to each other and the statistical performance data, net of fees, of the total fund, as of June 30, 2019.

Total Fund – Correlation Table (5 Years)

	Opportunistic Global Equities	Nominal Bonds	Commodities	Inflation- Protected Bonds	Alternative Beta
Opportunistic global equities	1.00				
Nominal bonds	(0.23)	1.00			
Commodities	0.49	(0.37)	1.00		
Inflation-protected bonds	0.16	0.66	0.18	1.00	
Alternative beta	0.33	0.13	(0.18)	0.04	1.00

Total Fund – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Annualized return	4.3%	5.1%	2.5%	7.7%	6.5%	6.0%
Annualized standard deviation	7.8%	5.8%	6.4%	7.1%	7.9%	8.6%
Sharpe ratio	0.26	0.64	0.26	1.03	0.66	0.49
Excess return*	1.8%	2.1%	(0.4)%	0.3%	0.7%	1.2%
Beta*	0.77	0.76	0.82	0.79	0.75	0.81
Annualized alpha*	2.3%	2.7%	0.2%	1.8%	2.0%	2.0%
Correlation*	0.99	0.98	0.94	0.96	0.95	0.96
Value added in dollars**	\$149M	\$519M	(\$238M)	\$262M	\$1.2B	\$2.7B

* As compared to the total fund policy benchmark.

** MOSERS' earnings above what would have been earned if assets had been invested passively.

Schedule of Brokerage Activity

	Commissions Paid	Volume of Trades*	Shares Traded
B Riley and Co, LLC	\$ 15,022	\$ 9,378,494	500,722
Baird, Robert W & Co, Inc.	11	28,721	1,100
Barclays Capital, Inc.	1,161	21,564,553	205,252
Berstein Sanford C & Co.	224	1,283,084	44,671
BTIG, LLC	16,663	188,473,039	3,323,830
Cantor Fitzgerald & Co.	435	1,368,246	44,505
Citigroup Global Markets	890	740,022	29,951
Cowen and Co.	266	968,374	30,546
Credit Suisse	88,857	48,129,387	4,467
Deutsche Bank Securities, Inc.	4,219	60,825,428	843,582
Friedman, Billings, and Ramsey	298	163,623	9,947
Goldman Sachs & Co.	94	107,327	3,306
Jefferies & Co, Inc.	1,033	6,295,658	204,636
Mizuho Securities USA, Inc.	94	380,105	18,800
Morgan Stanley & Co.	408,364	342,054,101	27,089
Pickering Energy Partners	33	23,171	1,086
Raymond James & Assoc, Inc.	239	213,029	7,967
RBC Capital Markets, LLC	629	3,528,886	118,086
UBS Securities, LLC	54	86,649	2,048
USCA Securities, LLC	182	107,748	6,058
Weeden & Co.	36	44,816	1,826
Wells Fargo Securities, LLC	1,599	7,638,051	273,971
Total	\$ 540,403	\$ 693,402,512	5,703,446

* Volume does not include futures notional value

Schedule of Investment Portfolios by Asset Class

As of June 30, 2019

	Portfolio Value	Percentage of Investments	Market Exposure	Percentage of Investments at Market Exposure
Old Portfolio - 83% of Total Fund				
Global opportunistic equities	\$ 1,986,279,605	29.7%	\$ 2,224,931,883	33.2%
Nominal bonds	1,340,932,910	20.0	2,787,877,942	41.6
Commodities	337,258,691	5.0	1,086,644,833	16.2
Inflation-protected bonds	953,793,455	14.2	2,343,316,387	34.9
Alternative beta	1,796,780,647	26.8	1,796,780,647	26.8
External beta-balanced	215,941,308	3.2	215,941,308	3.2
Residual accounts from old portfolio	32,424,056	0.5	32,424,056	0.5
Cash reserve	45,459,117	0.6	45,459,117	0.6
Total old portfolio	6,708,869,789	100.0%	10,533,376,173	157.0%
New Portfolio - 17% of Total Fund				
Growth	548,167,871	40.5	549,682,452	40.6
Income	290,260,212	21.4	483,073,724	35.7
Inflation hedge	258,022,015	19.1	521,526,262	38.5
Alternative beta	257,477,438	19.0	257,477,438	19.0
Total new portfolio	1,353,927,536	100.0%	1,811,759,876	133.8%
MOSERS Total Fund	\$ 8,062,797,325	100.0%	\$ 12,345,136,049	153.1%
<i>Reconciliation to Statement of Fiduciary Net Position</i>				
Total portfolio value	\$ 8,062,797,325			
Obligations under repurchase agreements	3,921,700,618			
STIF	(262,690,914)			
Investment income receivable	(133,438,630)			
Investment sales receivable	(194,365,813)			
Investment activities payable	61,010,531			
Management and incentive fees payable	10,642,069			
Payable for investments purchased	130,605,628			
Investments per <i>Statement of Fiduciary Net Position</i>	\$ 11,596,260,814			

Schedule of Investment Advisors

Investment Advisors	Style	Portfolio Fair Value
Actis Emerging Markets	Opportunistic global equities – emerging markets	\$ 44,900,440
AQR Capital Management	Alternative beta – multi-strategy	287,917,786
AQR Capital Management	External beta balanced – risk parity	2,314,546
Axiom Asia Private Capital Associates	Opportunistic global equities – emerging markets	98,047,161
Axxon Group	Opportunistic global equities – emerging markets	24,242,590
Bayview Asset Management	Opportunistic global equities – opportunistic mortgages	3,118,447
Blackstone Alternative Asset Management	Alternative beta – fund-of-funds	216,254,406
Blackstone Real Estate Partners	Opportunistic global equities – active real estate	55,430,622
Blakeney Management	Opportunistic global equities – emerging markets	1,166,236
Bridgewater Associates	Alternative beta – global macro	120,780,748
Bridgewater Associates	External beta balanced – risk parity	213,626,740
CarVal Investors	Opportunistic global equities – distressed real estate debt	4,300,000
Catalyst Capital Group	Opportunistic global equities – Canadian distressed debt	79,421,926
Cornwall Capital	Alternative beta – multi-strategy	10,612,999
DRI Capital	Opportunistic global equities – intellectual property	13,005,352
EIG Energy Partners	Opportunistic global equities – energy - mezzanine	58,988,477
Elliott Management Corporation	Alternative beta – multi-strategy	240,034,000
Farallon Capital Partners	Alternative beta – multi-strategy	1,440,000
Gaoling Fund	Opportunistic global equities – long/short - equity	6,610,032
Gateway Energy Partners	Opportunistic global equities – energy - diversified	9,403,575
Glenview Capital Management	Opportunistic global equities – long/short - equity	39,094,901
Glenview Capital Management Sidecar	Opportunistic global equities – active equity	72,012,287
Harvest Fund Advisors	Opportunistic global equities – active MLP	38,587,050
HBK Capital Management	Alternative beta – merger arbitrage	129,416,249
JLL Partners	Opportunistic global equities – corporate buyout	22,660,661
King Street Capital Management	Alternative beta – credit driven	2,118,603
Linden Capital Partners	Opportunistic global equities – corporate buyout	21,867,499
Mast Capital Management	Alternative beta – credit driven	10,690,823
Merit Energy Company	Alternative beta – energy - oil & gas	3,398,368
MHR Fund Management	Alternative beta – distressed debt	76,668,778
Millennium Technology Value Partners	Opportunistic global equities – direct secondaries	20,733,766
NISA Investment Advisors	Opportunistic global equities – passive equities	753,405,427
NISA Investment Advisors	Nominal bonds – passive long term U.S. treasuries	807,497,914
NISA Investment Advisors	Commodities – passive commodities	26,154,759
NISA Investment Advisors	Alternative beta – strategy	702,821,674
NISA Investment Advisors	Inflation-protected bonds – passive TIPS	333,471,025
NISA Investment Advisors	Core bonds – passive core bonds	132,599,157
NISA Investment Advisors	Private credit – passive private credit	17,979,885
NISA Investment Advisors	Public real assets – pass real estate	106,363,931
Oaktree Capital Management	Opportunistic global equities – corporate buyout	6,583,160
Oaktree Capital Management	Opportunistic global equities – distressed debt	11,098,389
Pharo Management	Alternative beta – global macro	62,607,474
Silchester International Investors	Opportunistic global equities – active international equity	683,048,852
Silver Creek Capital Management	Opportunistic global equities – fund-of-funds (special situations)	15,860,086
SIR Capital Management	Alternative beta – equity market neutral	87,891,420
Siris Capital Group	Opportunistic global equities – corporate buyout	17,398,594
State Street Global Advisors	Opportunistic global equities – passive emerging markets	94,730,817
StepStone Group	Alternative beta – fund-of-funds (corporate buyouts)	5,716,147
Stone Harbor Investment Partners	Alternative beta – emerging market debt	54,338,067
TPG-Axon Capital Management	Alternative beta – multi-strategy	1,049,386
Other (each less than \$1M)		3,908,928
Total investment advisors		<u>\$ 5,853,390,160</u>

Total Fund – Top Ten Publicly Traded Separate Account Holdings

Ten Largest Holdings as of June 30, 2019*	Fair Value	Percent of the Total Fund
U.S. Treasury Bond – 2.500% 2045	\$ 147,445,000	1.83%
U.S. Treasury Bond – 3.000% 2047	139,592,406	1.73
U.S. Treasury - CPI Inflation – 0.125% 2022	137,133,829	1.70
U.S. Treasury - CPI Inflation – 0.125% 2023	136,386,674	1.69
Ishares Core U.S. Aggregate	132,521,866	1.64
U.S. Treasury Bond – 3.000% 2045	132,106,125	1.64
U.S. Treasury - CPI Inflation – 0.125% 2024	128,799,274	1.60
U.S. Treasury - CPI Inflation – 0.625% 2021	121,510,592	1.51
U.S. Treasury - CPI Inflation – 0.125% 2021	120,578,806	1.50
U.S. Treasury - CPI Inflation – 0.625% 2024	119,909,988	1.49

* 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, 2019, the total fund policy benchmark was comprised of the following components: 83% old portfolio policy, 17% new portfolio policy.

As of June 30, 2019, 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, 2019, 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.

- *Opportunistic global equities* – As of June 30, 2019, 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 and NCREIF Timber respectively.
- *Nominal bonds* – As of June 30, 2019, the total nominal bonds policy was Bloomberg Barclays Long Treasury.
- *Commodities* – As of June 30, 2019, the total commodities policy was 3% S&P GSCI and 97% BCOM.
- *Inflation-protected bonds* – As of June 30, 2019, the total inflation-protected bonds policy was Barclays U.S. TIPS 1-10 Year.
- *Alternative beta* – As of June 30, 2019, the total alternative beta policy was AQR Delta.

	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Total fund*	4.3 %	5.1 %	2.5 %	7.7 %	6.5 %	6.0 %
Total fund policy benchmark	2.5 %	3.0 %	2.9 %	7.4 %	5.8 %	4.8 %
Old portfolio	4.4 %	5.1 %	2.5 %	N/A	N/A	N/A
Old portfolio policy benchmark	2.4 %	2.9 %	2.8 %	N/A	N/A	N/A
Opportunistic global equities	1.1 %	9.3 %	5.5 %	10.8 %	8.5 %	N/A
Opportunistic global equities policy benchmark	6.70 %	10.9 %	7.9 %	12.1 %	8.5 %	N/A
Nominal bonds	10.0 %	0.4 %	4.8 %	N/A	N/A	N/A
Nominal bonds policy benchmark	10.5 %	0.2 %	4.9 %	N/A	N/A	N/A
Commodities	(11.4)%	(3.3)%	(16.1)%	(4.5)%	(4.0)%	1.1 %
Commodities policy benchmark	(9.9)%	(1.3)%	(14.9)%	(6.0)%	(5.2)%	(0.1)%
Inflation-protected bonds	2.4 %	0.4 %	0.4 %	3.0 %	3.7 %	5.8 %
Inflation-protected bonds policy benchmark	2.8 %	0.8 %	0.7 %	3.1 %	3.7 %	5.7 %
Alternative beta	0.6 %	3.3 %	3.4 %	N/A	N/A	N/A
Alternative beta policy benchmark	(13.4)%	(5.7)%	(0.6)%	N/A	N/A	N/A
External risk parity	9.6 %	8.4 %	4.0 %	N/A	N/A	N/A
Old portfolio policy benchmark	2.4 %	2.9 %	2.8 %	N/A	N/A	N/A
New portfolio	N/A	N/A	N/A	N/A	N/A	N/A
New portfolio policy benchmark	N/A	N/A	N/A	N/A	N/A	N/A

* Time-weighted rates of return on fair values adjusted for cash flows.

Schedule of Investment Manager Fees

For the Year Ended June 30, 2019

	Portfolio Market Value June 30, 2019	Total Fees	Manager Fees	Fund Pass Through Expenses *	Incentive Fees Earned in FY19
Equity					
Blakeney Onyx, LP	\$ 1,166,236	\$ 118,464	\$ 20,518	\$ 59,174	\$ 38,772
Harvest Fund Advisors, LLC	38,587,050	175,510	175,510	0	0
Silchester International Investors	683,048,852	4,179,110	4,179,110	0	0
SSGA Emerging Markets	94,730,817	84,170	84,170	0	0
Total Equity	817,532,955	4,557,254	4,459,308	59,174	38,772
Fixed income					
Stone Harbor Investment Partners	54,338,067	153,100	153,100	0	0
Total fixed income	54,338,067	153,100	153,100	0	0
Multi-asset					
NISA Investment Advisors	2,880,293,772	5,757,915	5,757,915	0	0
Total multi-asset	2,880,293,772	5,757,915	5,757,915	0	0
Alternatives					
Actis Emerging Markets III	4,532,000	202,000	194,000	8,000	0
Actis Emerging Markets IV	40,368,440	592,268	508,000	81,000	3,268
Alinda Infrastructure Fund I, LP	85,210	15,040	2,029	13,011	0
AQR DELTA Sapphire Fund, LP	287,917,786	3,524,543	3,052,519	472,024	0
AQR Global Risk Premium Fund IV, LP	2,314,546	831,204	696,950	134,254	0
Axiom Asia Private Capital Fund II, LP	26,031,468	284,001	255,879	33,039	(4,917)
Axiom Asia Private Capital Fund III, LP	72,015,693	1,076,001	438,750	45,603	591,648
Axxon Brazil Private Equity Fund II B, LP	24,242,590	246,798	204,068	42,730	0
Bayview Opportunity Domestic IIIB, LP	3,118,447	643,415	119,426	122,656	401,333
Bayview Opportunity Domestic, LP	0	15,348	2,874	12,474	0
Blackstone Real Estate Partners IV	597,646	(308,512)	0	29,486	(337,998)
Blackstone Real Estate Partners V	7,281,108	(163,693)	0	12,591	(176,284)
Blackstone Real Estate Partners VI	6,777,539	226,263	37,883	21,889	166,491
Blackstone Real Estate Partners VII	41,371,975	1,018,858	516,520	40,843	461,495
Blackstone Topaz Fund, LP	216,254,099	3,051,603	2,126,767	273,801	651,035
Bridgewater Associates - All Weather @ 12%, LLC	213,626,740	1,378,002	1,168,824	209,178	0
Bridgewater Associates - Diamond Ridge Fund, LLC	120,780,748	4,237,950	4,105,598	132,352	0
CarVal Investors CVI Global Value Fund A, LP - private debt	2,150,000	13,405	0	13,405	0
CarVal Investors CVI Global Value Fund A, LP - real estate	2,150,000	13,405	0	13,405	0
Catalyst Fund Limited Partnership III	37,572,954	989,566	902,460	87,106	0
Catalyst Fund Limited Partnership IV	13,497,581	423,922	337,751	86,171	0
Catalyst Fund Limited Partnership V	28,351,391	860,719	1,977,504	288,514	(1,405,299)
Catterton Partners V, LP	0	11,013	0	11,013	0
Cornwall Domestic, LP	10,612,999	134,569	0	145,187	(10,618)
DRI Capital - LSRC	13,005,352	168,487	0	108,191	60,296
EIG Energy Fund XIV, LP	5,041,694	173,976	134,173	39,803	0

Schedule of Investment Manager Fees continued on page 88

Investment Section

Schedule of Investment Manager Fees continued from page 87

	Portfolio Market Value June 30, 2019	Total Fees	Manager Fees	Fund Pass Through Expenses*	Incentive Fees Earned in FY19
EIG Energy Fund XV, LP	22,415,116	433,946	364,274	69,672	0
EIG Energy Fund XVI, LP	28,346,132	(326,491)	333,374	64,277	(724,142)
Elliott International, Ltd.	240,034,000	7,627,472	3,470,934	2,301,468	1,855,070
Farallon Capital Institutional Partners, LP	1,440,000	26,239	0	0	26,239
Gaoling Fund, LP	6,610,032	(1,745,002)	1,823,464	81,748	(3,650,214)
Garnet Sky Investors Company, Ltd.	0	(783,755)	200,194	141,549	(1,125,498)
Gateway Energy & Resource Holdings, LLC	9,403,575	340,390	1,351	345,796	(6,757)
Glenview Capital Opportunity Fund, LP	39,094,901	563,866	320,421	243,445	0
Glenview Sidecar	72,012,287	201,004	0	201,004	0
Global Forest Partners GTI7 Institutional Investors Company, Ltd.	447,493	33,939	0	33,939	0
HBK Merger Strategies Offshore Fund, Ltd.	129,416,249	2,966,936	940,520	299,255	1,727,161
JLL Partners Fund V, LP	3,815,136	216,450	10,848	8,071	197,531
JLL Partners Fund VI, LP	18,845,525	(74,256)	226,734	21,629	(322,619)
King Street Capital, LP	2,118,603	(238,006)	34,926	0	(272,932)
King Street Capital, Ltd.	42,533	11,177	1,786	0	9,391
Linden Capital Partners II, LP	21,867,499	646,112	395,930	15,548	234,634
Mast Credit Opportunities I, LP	10,690,823	523,119	206,167	316,952	0
Merit Energy Partners F-II, LP	3,398,368	84,748	49,003	35,745	0
MHR Institutional Partners IIA, LP	38,791,842	1,159,584	0	39,127	1,120,457
MHR Institutional Partners III, LP	26,599,245	(3,447,656)	296,247	66,304	(3,810,207)
MHR Institutional Partners IV, LP	21,919,760	913,805	832,153	81,652	0
Millennium Technology Value Partners II	17,155,882	1,001,873	394,875	41,405	565,593
OCM Opportunities Fund VIIIb, LP	2,235,723	196,641	96,977	16,456	83,208
OCM Opportunities Fund VIIIb, LP	8,862,666	246,989	208,559	38,430	0
OCM Power Opportunities Fund III, LP	6,583,160	131,790	150,125	69,621	(87,956)
OCM Real Estate Opportunities Fund III, LP	0	530	0	21,802	(21,272)
OCM/GFI Power Opportunities Fund II, LP	1	27,950	0	34,903	(6,953)
Perry Partners, LP	16,825	152	152	0	0
Pharo Macro Fund, Ltd.	62,607,474	1,937,593	1,178,949	58,098	700,546
Resource Management Service - Wildwood Timberlands, LLC	0	(834,520)	0	0	(834,520)
Silver Creek Special Opportunities Fund I, LP	6,386,475	29,173	0	29,173	0
Silver Creek Special Opportunities Fund II, LP	9,473,611	35,110	0	35,110	0
Silver Lake Partners II, LP	273,700	85,534	0	1,190	84,344
Standard Investment Research Hedged Equity Fund	87,891,420	2,930,729	1,943,186	168,325	819,218
StepStone Capital Buyout Fund I, LP	3,989	14,672	0	13,995	677
StepStone Capital Buyout Fund II, LP	5,511,800	(737,855)	50,483	29,601	(817,939)
StepStone Opportunities Fund II, LP	200,358	37,094	286	32,144	4,664
Total alternatives	2,084,210,209	33,897,227	30,313,893	7,435,160	(3,851,826)
Total fees	\$ 5,836,375,003	\$ 44,365,496	\$ 40,684,216	\$ 7,494,334	\$ (3,813,054)

* 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

During the fiscal year, the economy showed signs of moderating compared to the strength demonstrated in prior years. This resulted in markets being more volatile and most showing lower returns than the prior fiscal year. There was a divergence in asset class performance during the fiscal year with five asset class delivering positive returns and one delivering a negative return. The positive returning asset classes were: opportunistic global equities at 1.1%, nominal bonds at 10.0%, inflation-protected bonds at 2.4%, and alternative betas at 0.6%. Commodities were down 11.4% and were the only major asset class with negative performance this fiscal year. The external risk parity portfolio returned 9.6% during the past year..

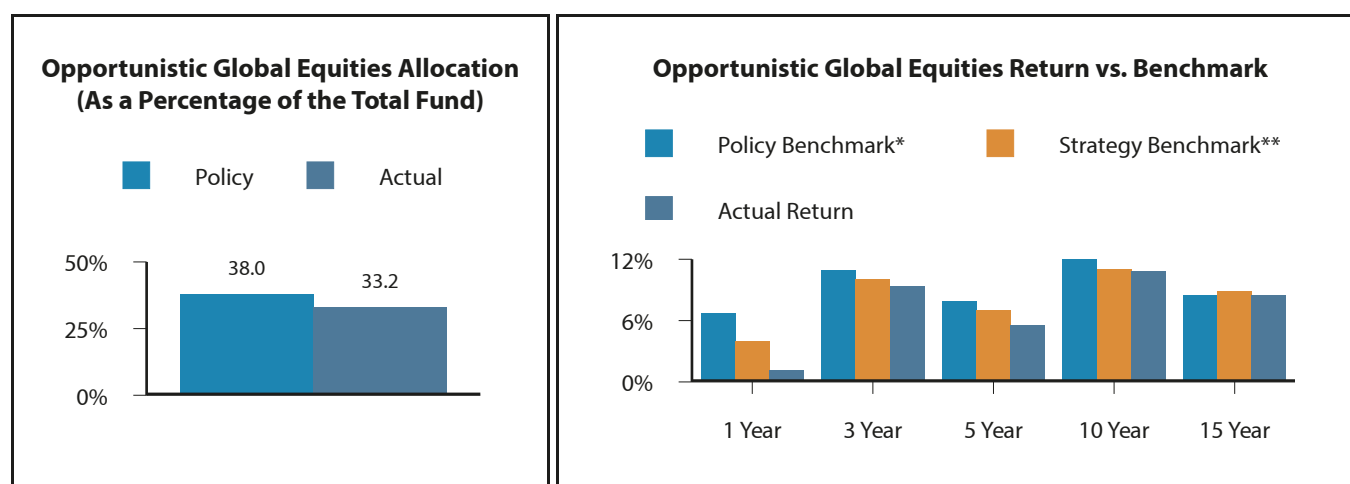
Opportunistic Global Equities

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.

Global equities were up 5.7% during the fiscal year with most of it occurring in the first four months of the last half of the fiscal year. The first six months of the fiscal year were poor for global equities as they were down over 9%. The remaining six months of the fiscal year saw strong performance of over 16.2%. In a continuation from last year, domestic equity returns were stronger than foreign equity markets. Domestic equities returned 10.2% for the fiscal year while developed international equities and emerging markets were up only 1.3% and 1.2%, respectively.

Within the U.S equity market this fiscal year, the utilities and real estate sectors performed best with returns of 19.0% and 16.8%, respectively. The energy and materials sectors were the worst performing sectors with returns of (13.3%) and 3.2%, respectively. Across developed country equity markets, Switzerland and New Zealand posted the best returns during the fiscal year with a 17.9% and 15.7% return, respectively. Austria and Belgium returned the least with a (15.6%) and (10.8%) return, respectively.

The market exposure of the equity portfolio on June 30, 2019, was \$2,224,931,883, representing 33.2% of total market value. The graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the equity allocation returned 1.1% versus 6.7% for the global equity policy benchmark. The underperformance was driven predominantly by manager underperformance within domestic and international equities, a portfolio underweight to domestic equities, and the opportunistic equity portfolio lagging its benchmark by 6.0%. The graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2019, the opportunistic global equities policy was MSCI ACWI Net + .75%.

** As of June 30, 2019, the total opportunistic global equities strategy benchmark was comprised of the following components: 37.7% actual return domestic equity exposure/MSCI US, 1.7% S&P MLP, 43.4% MSCI World ex. U.S. (Net), 7.5% MSCI Emerging Markets (Net), 3.5% MSCI China, and 6.1% Dow Jones Wilshire REIT.

The tables below shows the statistical performance for the opportunistic global equity portfolio as of the fiscal year end.

Opportunistic Global Equities – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year
Return	1.1 %	9.3%	5.5%	10.8%	8.5%
Annualized standard deviation	13.3 %	8.6%	7.8%	8.9%	10.0%
Sharpe ratio	(0.09)	0.92	0.60	1.16	0.72
Excess return*	(5.6)%	(1.60)%	(2.40)%	(1.30)%	0.0%
Beta*	0.80	0.78	0.66	0.72	0.71
Annualized alpha*	(4.3)%	0.7%	0.2%	2.0%	2.3%
Correlation*	0.99	0.95	0.91	0.94	0.93

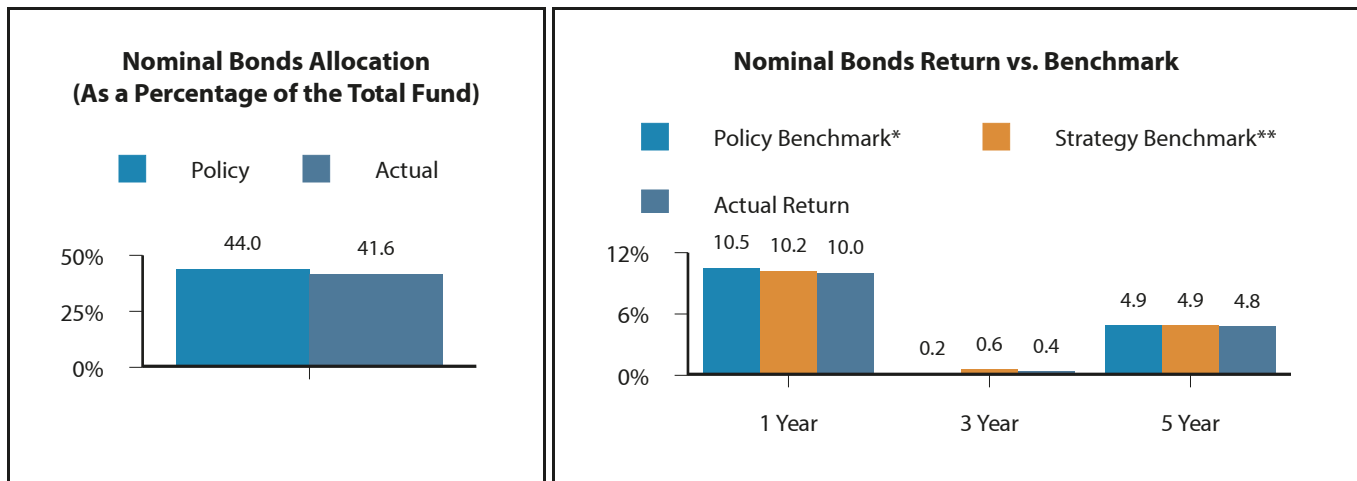
* As compared to the total opportunistic global equities policy benchmark.

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.

The U.S. government bond exposure outperformed most other allocations this year. The 10-year U.S. treasury rate increased a little over 0.85% as the Federal Reserve reversed its tightening monetary policy in the second half of the fiscal year with easing policy. Longer-term treasuries outperformed shorter-term treasuries during the fiscal year. For example, treasuries with a maturity of 20 years and longer returned 12.3%, while treasuries with a maturity under 10 years returned 6.2%.

As of June 30, 2019, the market exposure of the nominal bond portfolio was \$2,787,877,942, representing 41.6% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the nominal bond allocation returned 10.0% versus 10.5% 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 a small drag on performance. The bar chart below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2019, the total nominal bonds policy benchmark was Bloomberg Barclays Long Treasury.

** As of June 30, 2019, the nominal bonds strategy benchmark was comprised of the following components: 94.5% total nominal bonds policy, and 5.5 % Barclays US Treasury Inflation Notes 10+ Year.

The table below shows the statistical performance that occurred within the nominal bond portfolio in fiscal year 2019. There was no commission brokerage activity within the nominal bond portfolio in fiscal year 2019.

Nominal Bonds – Statistical Performance

Portfolio Characteristics

	1 Year	3 Year	5 Year
Return	10.0%	0.4%	4.8%
Annualized standard deviation	11.0%	9.3%	9.9%
Sharpe ratio	0.70	(0.11)	0.39
Excess return*	(0.5)%	0.2%	(0.1)%
Beta*	0.96	0.95	0.96
Annualized alpha*	(0.1)%	0.2%	0.0%
Correlation*	1.00	1.00	1.00

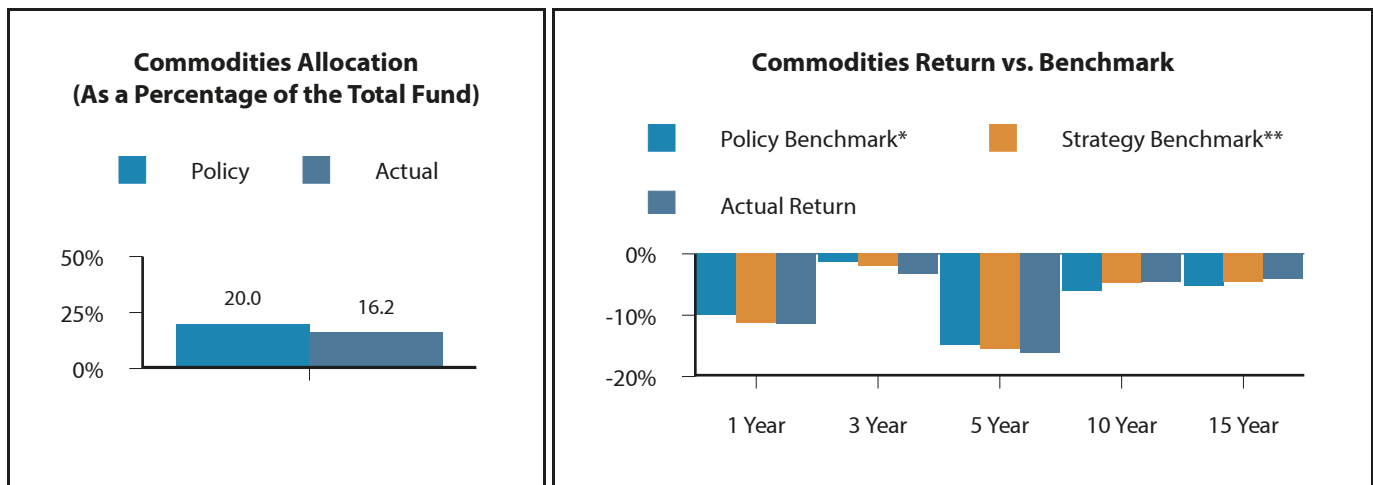
* As compared to the total nominal bonds policy benchmark.

Commodities

It is expected that investments in this asset class will perform well during periods of rising 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.

Commodities reversed last year's positive performance as only one of the four commodity sectors producing positive returns this fiscal year. Energy, after producing a 32.8% return in fiscal year 2018, produced a (16.2%) return in fiscal year 2019, followed by industrial metals at (13.0%). Precious metal was the only positive commodity sector this fiscal year, returning 5.2%. Within these sectors, gold and corn were the best performing commodities with 9.5% and 3.7% returns, respectively. The worst performing commodities during the fiscal year were cotton and natural gas with (24.2%) and (22.5%) returns respectively.

As of June 30, 2019, the market exposure of the commodities portfolio was \$1,086,644,833, representing 16.2% of the total market value. The bar chart below (left) illustrates the actual exposure compared to policy. The commodity allocation returned (11.4%) versus (9.9%) for the commodity policy benchmark for the fiscal year. The primary driver of the underperformance was implementing the exposure through a modified futures roll strategy compared to the benchmark. The actual performance as compared to the policy and strategy benchmarks is illustrated in the bar chart below (right).



* As of June 30, 2019, the commodities policy benchmark was S&P Goldman Sachs Commodity Index and Bloomberg Commodity Index.

** As of June 30, 2019, the commodities strategy benchmark was comprised of the following components: 2.7% Goldman Sachs Commodity Index, 10.9% Bloomberg Commodity Index, 86.4% Bloomberg Roll Select Commodity Index.

The table below shows the statistical performance for the commodities portfolio as of the fiscal year end.

Commodities – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year	20 year
Return	(11.4)%	(3.3)%	(16.1)%	(4.5)%	(4.0)%	1.1%
Annualized standard deviation	11.5%	11.1%	18.6%	17.8%	22.6%	22.3%
Sharpe ratio	(1.19)	(0.42)	(0.91)	(0.28)	(0.23)	(0.03)
Excess return*	(1.6)%	(1.9)%	(1.2)%	1.5%	1.2%	1.2%
Beta*	0.94	0.97	1.05	0.99	1.01	1.01
Annualized alpha*	(2.4)%	(2.0)%	(0.5)%	1.6%	1.4%	1.3%
Correlation*	0.99	0.99	0.99	0.97	0.98	0.99

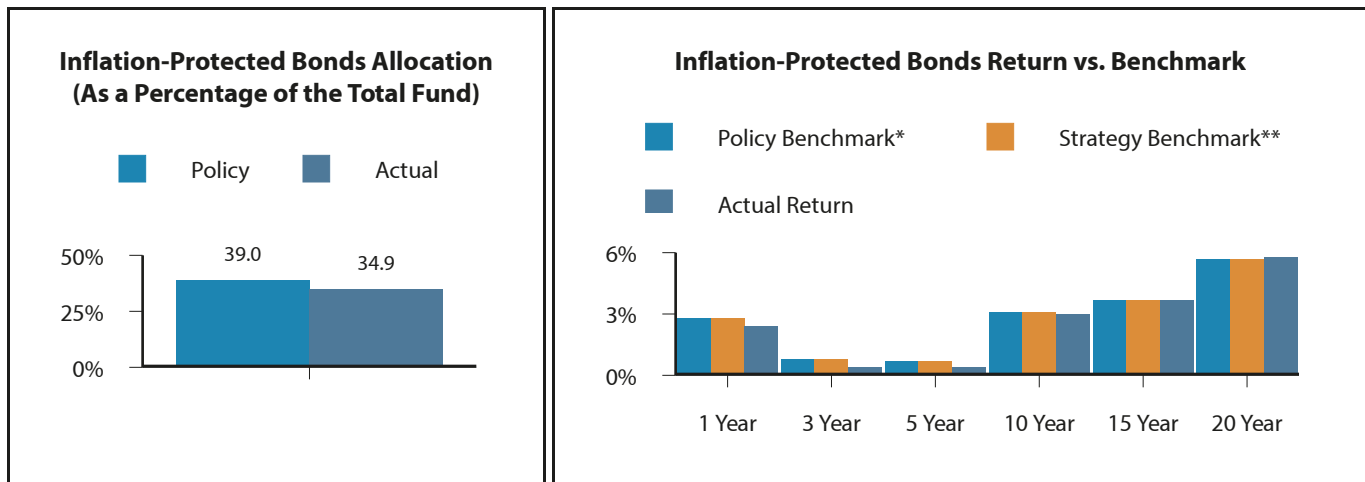
* As compared to the total commodities policy benchmark.

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.

Inflation in the U.S. decreased during the fiscal year to 1.6% year-over-year versus 2.9% as of June 30, 2018. The 10-year real rate (the interest rate after subtracting the inflation rate) on U.S. Treasury Inflation Protected Securities ("TIPS") increased about 0.4% during the fiscal year and the implied inflation rate decreased by about 0.4% resulting in lower performance for inflation-indexed bonds versus nominal bonds.

As of June 30, 2019, the market exposure of the inflation-protected bond portfolio was \$2,343,316,387, representing 34.9% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation-protected bond allocation returned 2.4% versus 2.8% 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 and strategy benchmarks.



* As of June 30, 2019, the inflation-protected bonds policy benchmark was Bloomberg Barclays U.S. TIPS 1-10 YR.

** As of June 30, 2019, the inflation-protected bonds strategy benchmark is equal to the inflation-protected bonds policy.

The table below shows the statistical performance for the inflation-protected bond portfolio as of the fiscal year end.

Inflation-Protected Bonds – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Return	2.4 %	0.4 %	0.4 %	3.0 %	3.7%	5.8%
Annualized standard deviation	2.4 %	2.1 %	2.7 %	4.0 %	5.3%	6.8%
Sharpe ratio	0.03	(0.46)	(0.18)	0.64	0.45	0.59
Excess return*	(0.5)%	(0.4)%	(0.4)%	(0.2)%	0.0%	0.0%
Beta*	1.01	1.00	1.00	1.01	1.00	1.01
Annualized alpha*	(0.5)%	(0.4)%	(0.3)%	(0.2)%	0.0%	0.0%
Correlation*	1.00	1.00	1.00	1.00	1.00	1.00

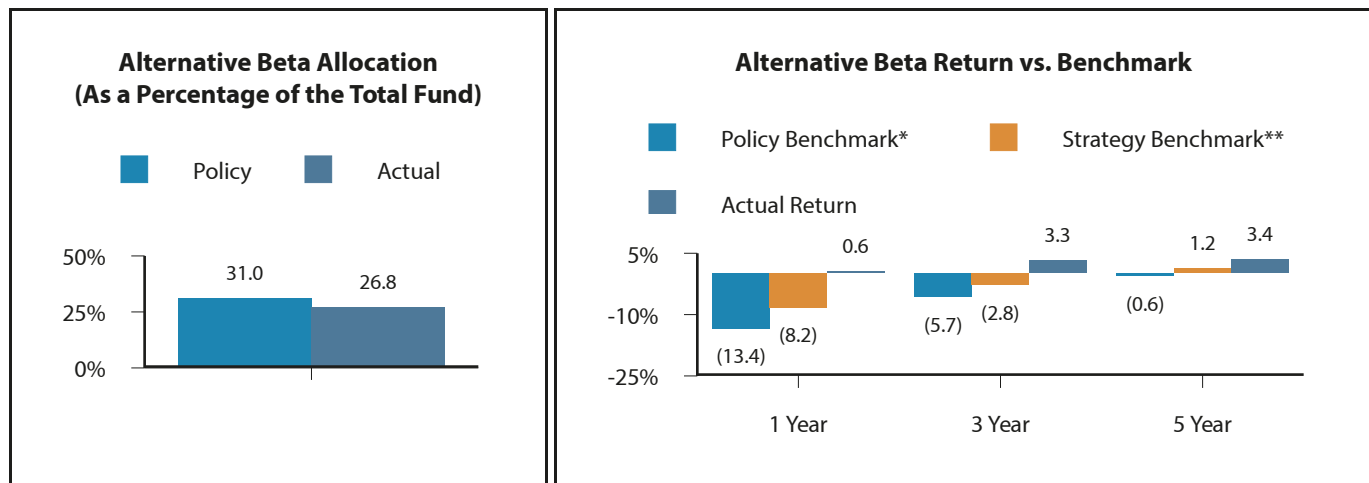
* As compared to the total inflation-protected bonds policy benchmark.

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 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.

The alternative beta benchmark performed poorly during the fiscal year led by weak performance from equity market neutral and dedicated short bias strategies which returned (18.0%) and (13.6%), respectively. Event driven and convertible arbitrage strategies performed best as they returned 4.3% and 3.8% during the fiscal year, respectively.

As of June 30, 2019, the market exposure of the alternative beta portfolio was \$1,796,780,647, representing 26.8% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. The alternative beta allocation returned 0.6% for the fiscal year versus (13.4%) for the alternative beta policy benchmark. The outperformance was attributable to two areas of the portfolio. First, the active hedge fund managers returned 6.1% for the year. Second, there was also outperformance due to the passive alternative beta strategies that returned 1.4% and (7.0%) for the fiscal year. The bar chart below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2019, the alternative beta policy benchmark was AQR Delta.

** As of June 30, 2019, the alternative beta strategy benchmark was comprised of the following components: 58.1% total alternative beta policy, 2.9% JPM GBI-EM Global Diversified, 19.2% S&P Systematic Global Macro Index, 19.1% Barclays U.S. Aggregate Excess Return plus 90 day T-bill and 0.6% actual return of one strategy.

The table below shows the statistical performance for the alternative betas portfolio as of fiscal year end.

Alternative Beta – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year
Return	0.6%	3.3%	3.4%
Annualized standard deviation	3.4%	2.6%	2.6%
Sharpe ratio	(0.49)	0.77	0.97
Excess return*	14.0%	9.1%	4.0%
Beta*	0.48	0.33	0.27
Annualized alpha*	7.4%	5.2%	3.5%
Correlation*	0.80	0.78	0.67

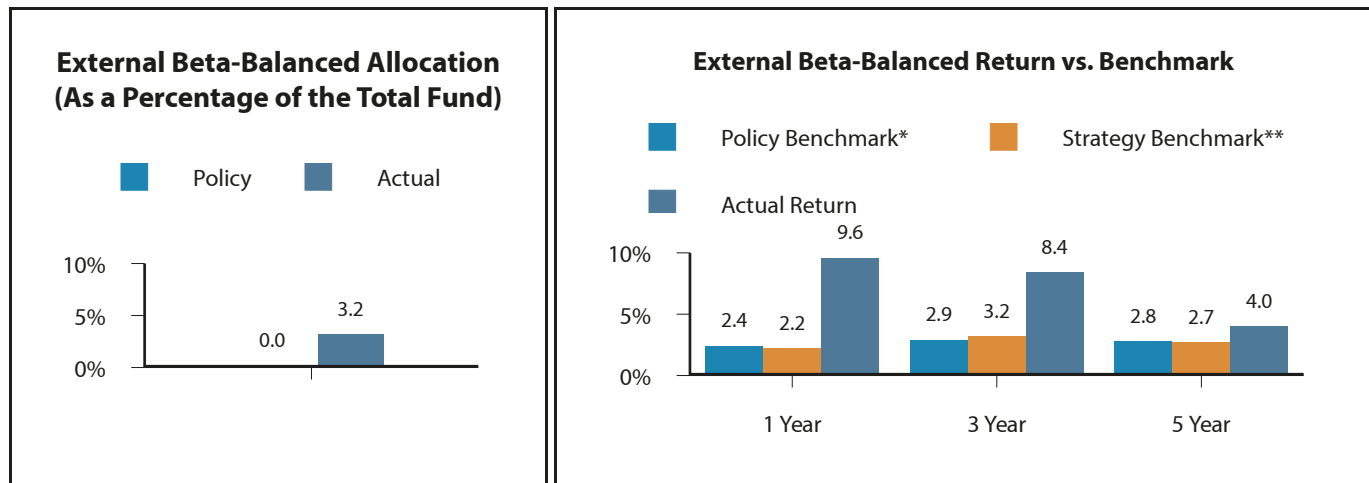
* As compared to the total alternative betas policy benchmark.

External Beta-Balanced

Bridgewater All-Weather and AQR Global Risk Premium are utilized for the external portion of the risk-balanced portfolio, while the internal portion is managed by staff utilizing NISA Investment Advisors to implement the trading and operational aspects of the program.

Bridgewater returned 7.3% for the fiscal year after returning 8.9% last fiscal year. AQR returned 15.8% for the fiscal year after returning 9.1% last fiscal year. These active managers invest in similar asset classes as the internal portfolio but hold them in different weights and have wider active risk boundaries.

As of June 30, 2019, the external risk parity portfolio returned 9.6% for the fiscal year and represented 3.2%, or \$215,941,308 of market value. The bar chart below (left) illustrates the actual exposure compared to policy. These managers hold similar asset classes but can have different weights to those asset classes as compared to their benchmark. As a portfolio, these two managers outperformed their benchmark for the year by 7.2%. The bar chart below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2019, the policy benchmark was the old portfolio policy benchmark.

** As of June 30, 2019, the strategy benchmark was the old portfolio strategy benchmark.

The table below shows the statistical performance for the external risk parity portfolio as of fiscal year end.

External Beta-Balanced – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year
Return	9.6%	8.4%	4.0%
Annualized standard deviation	10.4%	7.7%	8.9%
Sharpe ratio	0.70	0.92	0.36
Excess return*	7.2%	5.7%	1.9%
Beta*	0.93	0.93	1.01
Annualized alpha*	7.1%	5.6%	1.9%
Correlation*	0.89	0.91	0.88

* As compared to the total policy benchmark.

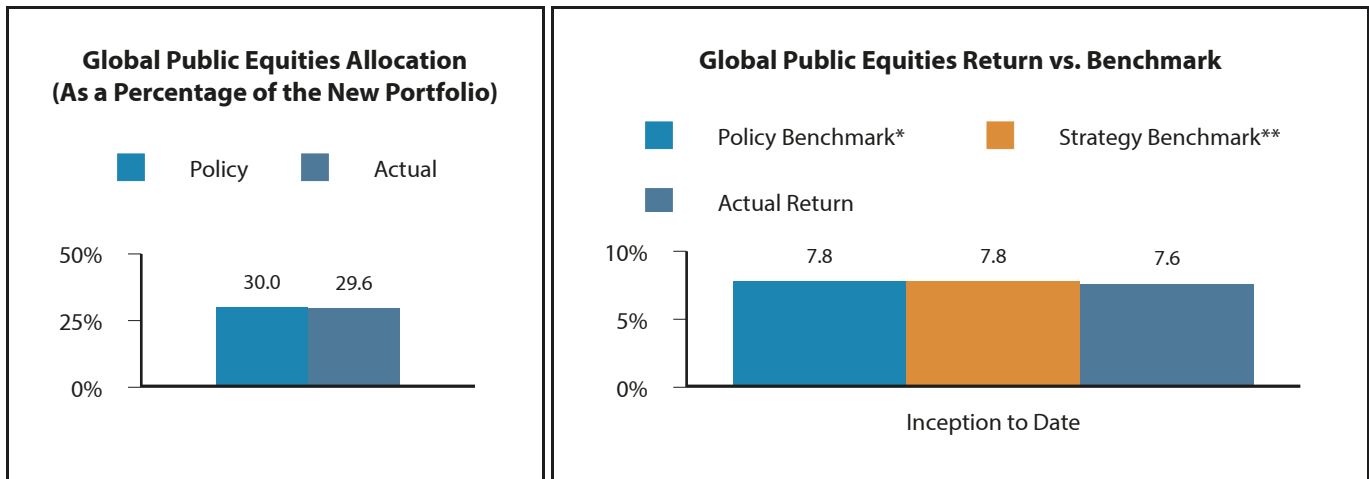
Asset Class Summary - New Portfolio

The new portfolio was initially funded at the end of January 2019; therefore, the performance numbers discussed below are for the five months ended June 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. All four asset buckets had positive performance during the five-month period. The growth bucket returned 6.8%, while the income bucket was up 8.1%. The inflation hedge bucket was up 2.8% and the alternative betas/absolute return bucket returned 0.9%.

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.

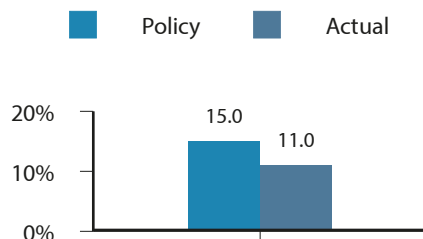
The growth bucket is made up of global public equities and global private equities. As of the fiscal year end, global public equities and global private equities were 73% and 27% of the growth bucket, respectively. For the five months, public equities returned 7.6% versus 7.8% for the policy benchmark. While the objective was to match the return of the benchmark, the slight underperformance was the result of implementation decisions that didn't perfectly match the benchmark return. Private equities, for the five months, returned 5.7% compared to its policy benchmark return of 2.8%. This outperformance was the result of external managers outperforming the benchmark.



* As of June 30, 2019, the public equities policy benchmark was MSCI ACWI Net.

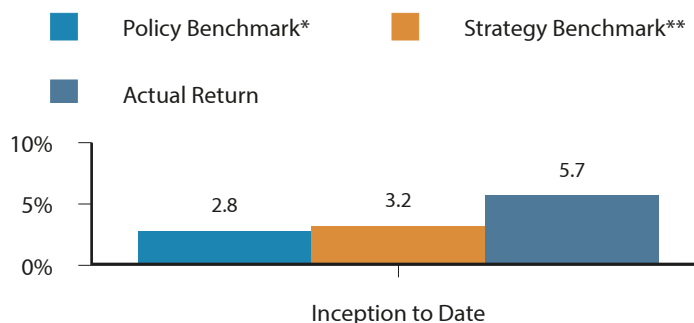
** As of June 30, 2019, the public equities strategy benchmark is equal to the public equities policy benchmark.

Global Private Equities Allocation (As a Percentage of the New Portfolio)



* As of June 30, 2019, the private equities policy benchmark was the Burgess All Equity Universe (weighted by vintage year).

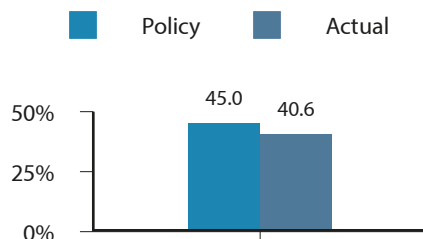
Global Private Equities Return vs. Benchmark



** As of June 30, 2019, the private equities strategy benchmark was comprised of 41.2% private equities policy and 58.9% S&P 600 + 2%.

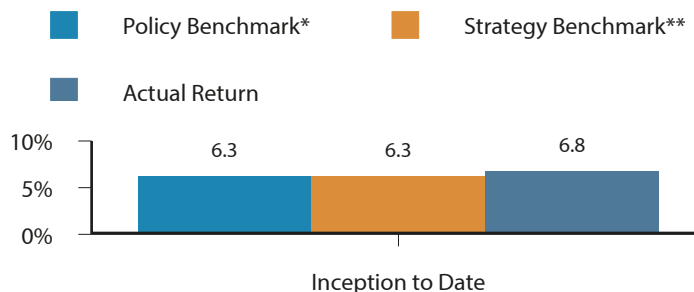
The market exposure of the growth bucket on June 30, 2019, was \$549,682,452 representing 40.6% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. For the five months, the growth allocation returned 6.8% versus 6.3% for the policy benchmark. The outperformance was driven by global private equities outperforming the policy benchmark by 2.9%. The bar chart below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

Total Growth Allocation (As a Percentage of the New Portfolio)



* As of June 30, 2019, the total growth policy benchmark was comprised of 66.7% global public equities policy benchmark and 33.3% global private equities policy benchmark.

Total Growth Return vs. Benchmark



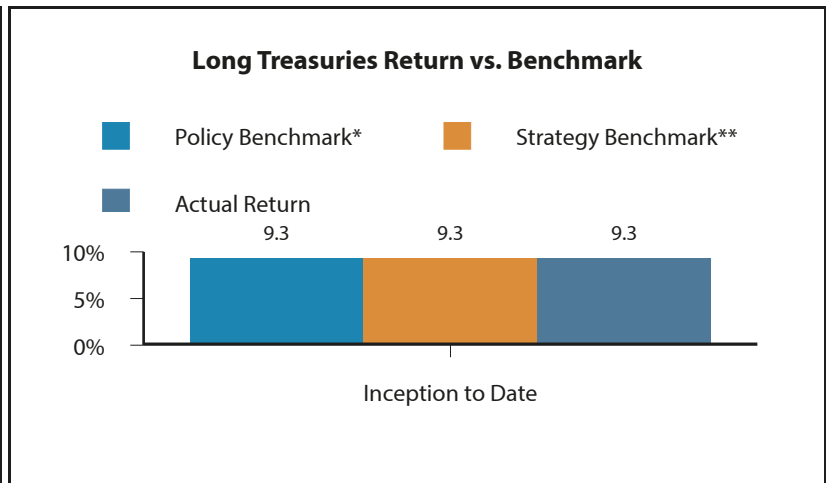
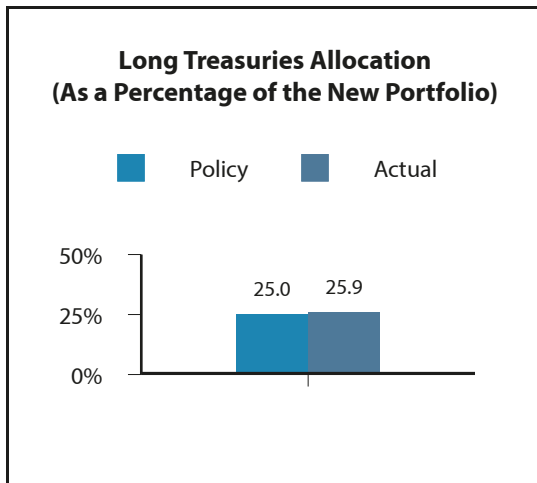
** As of June 30, 2019, the total growth strategy benchmark was comprised of 73.6% global public equities strategy benchmark and 26.4% global private equities strategy benchmark.

Statistical performance is not presented as the portfolio has less than one year of return data.

Income Bucket

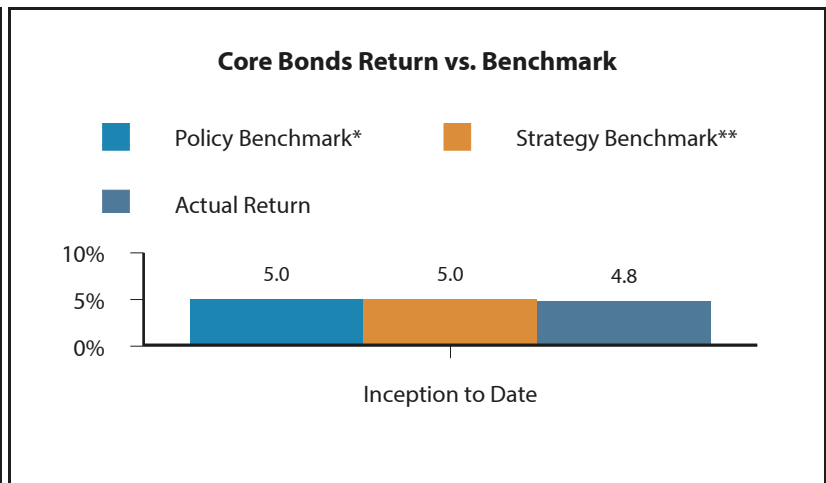
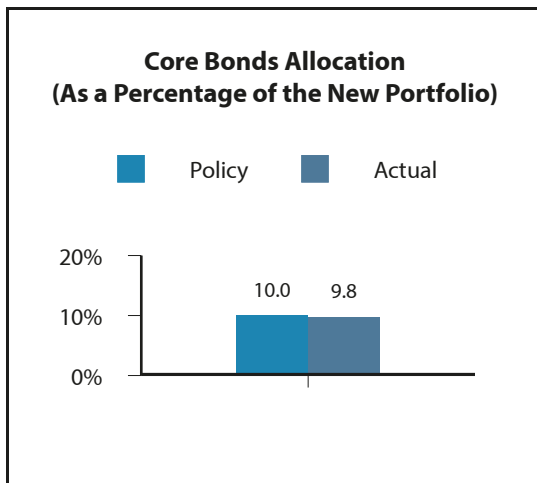
This bucket is designed to provide a source of current income and to reduce overall fund volatility. It is expected that investments in this asset class will perform well in periods of stable or falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have 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 73% and 27% of the income bucket, respectively. For the five months, long treasuries returned 9.3% versus 9.3% for the policy benchmark. The exposure to long treasuries is gained passively with minimal tracking error. Core bonds, for the five months, returned 4.8% compared to its policy benchmark return of 5.0%. This slight underperformance was the result of passively implementing the exposure with an imperfect benchmark tracking solution.



* As of June 30, 2019, the long treasuries policy benchmark was Bloomberg Barclays Long Treasury Index.

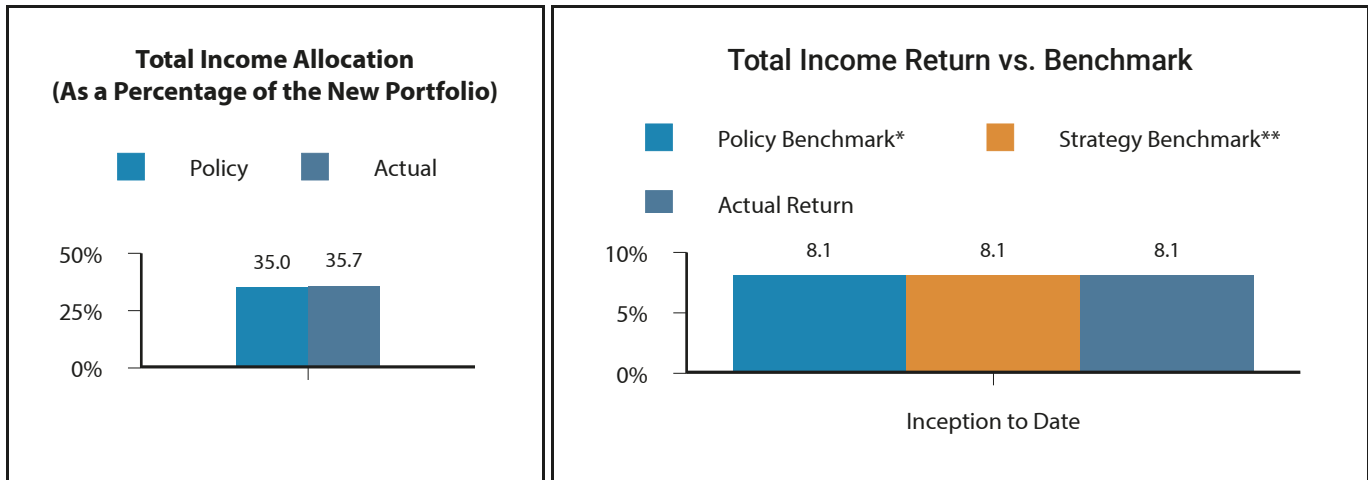
** As of June 30, 2019, the long treasuries strategy benchmark is equal to the long treasuries policy benchmark.



* As of June 30, 2019, the core bonds strategy benchmark is equal to the core bonds policy benchmark.

** As of June 30, 2019, the core bonds strategy benchmark is equal to the core bonds policy benchmark.

As of June 30, 2019, the market exposure of the income bucket was \$483,073,724, representing 35.7% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. For the five months, the income allocation returned 8.1% versus 8.1% 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 and strategy benchmarks.



* As of June 30, 2019, the total income policy benchmark was comprised of 71.4% long treasuries policy benchmark and 28.6% core bonds policy benchmark.

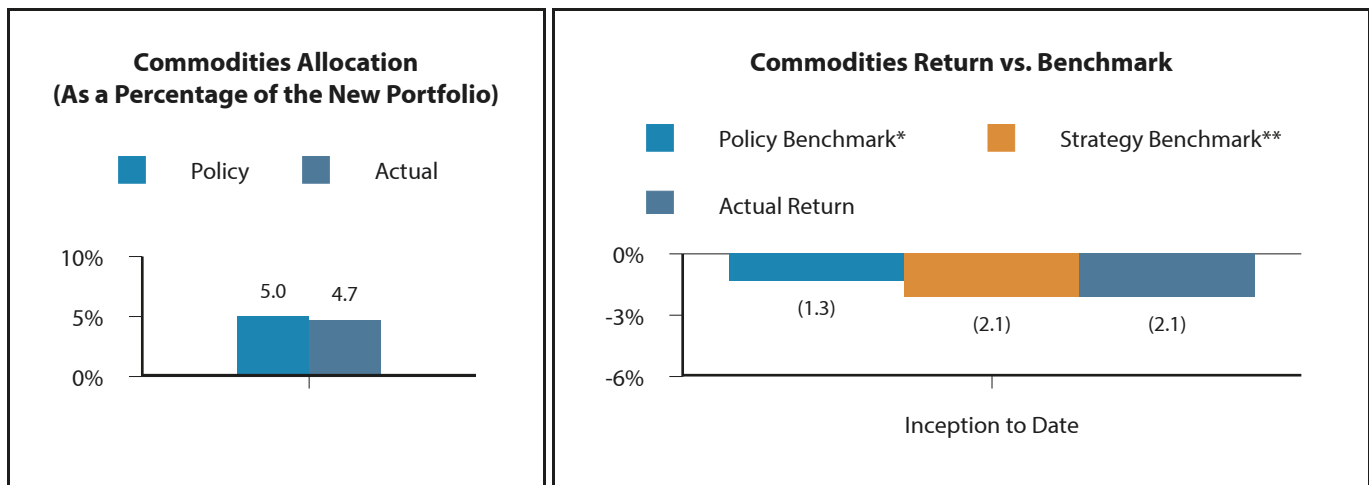
** As of June 30, 2019, the total income strategy benchmark was comprised of 72.5% long treasuries strategy benchmark and 27.5% core bonds strategy benchmark.

Statistical performance is not presented as the portfolio has less than one year of return data.

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.

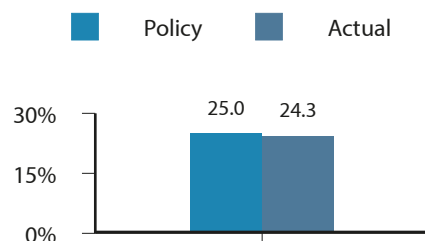
As of the fiscal year end, TIPS were 63% and public real assets were 13% of the inflation hedge bucket. Commodities and private real assets each made up 12% of the inflation hedge bucket. For the five months, TIPS returned 2.9% versus 3.0% for the policy benchmark. There was no internal or external active management strategy utilized during the five months; thus, providing a return that closely matched the benchmark. Commodities, for the five months, returned (2.1%) compared to its policy benchmark return of (1.3%). The primary driver of the underperformance was implementing the exposure through a modified futures roll strategy compared to the benchmark. Public real assets returned 6.5%, for the five months, compared to its policy benchmark return of 6.6%. There was no internal or external active management strategy utilized during the five months; thus, providing a return that closely matched the benchmark. For the five months, private real assets returned 3.8% versus 2.0% for its policy benchmark. This outperformance was due to the portfolio strategically overweighting publicly traded real estate investment trusts instead of core real estate funds.



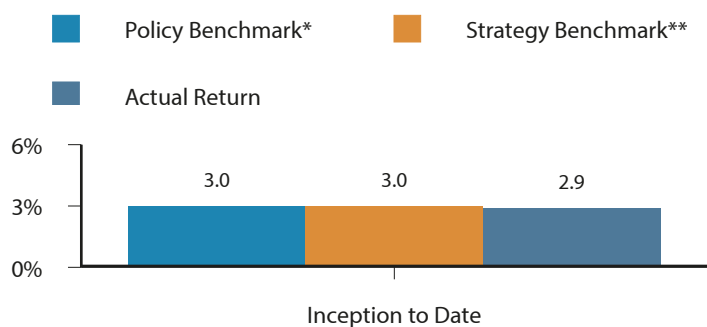
* As of June 30, 2019, the commodities policy benchmark was the Bloomberg Commodity Index (BCOM).

** As of June 30, 2019, the commodities strategy benchmark is equal to the Bloomberg Barclays BCOM Roll Select Index.

TIPS Allocation (As a Percentage of the New Portfolio)



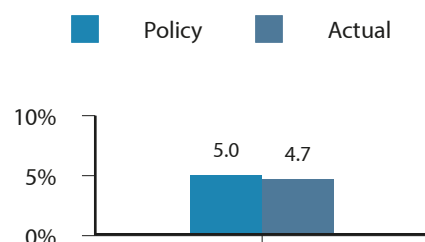
TIPS Return vs. Benchmark



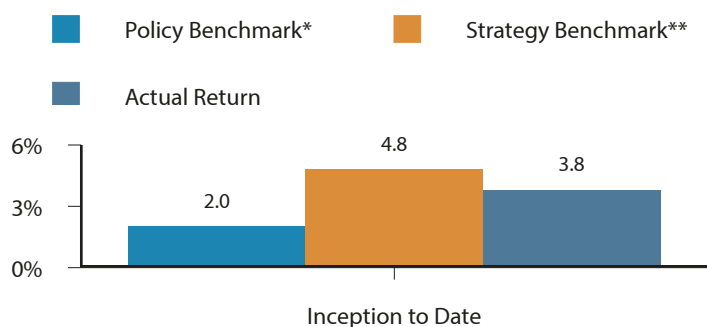
* As of June 30, 2019, the TIPS policy benchmark was the Bloomberg Barclays 1 - 10 year TIPS Index.

** As of June 30, 2019, the TIPS strategy benchmark is equal to the TIPS policy benchmark.

Private Real Assets Allocation (As a Percentage of the New Portfolio)



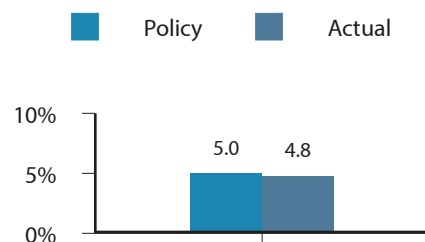
Private Real Assets Return vs. Benchmark



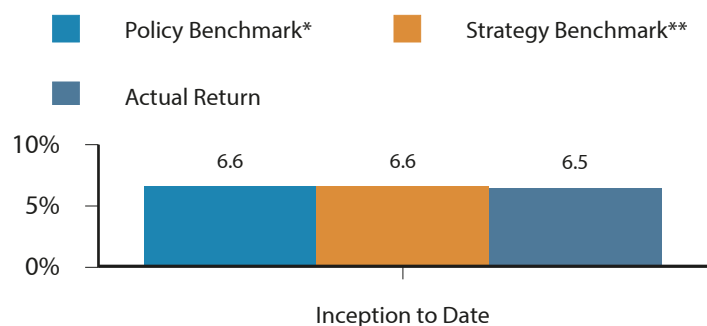
* As of June 30, 2019, the private real assets policy benchmark was the NCREIF Fund Index - Open End Diversified Core Equity (ODCE).

** As of June 30, 2019, the private real assets strategy benchmark was comprised of 37.6% private real assets policy benchmark and 62.4% FTSE NAREIT ALL REITS Index.

Public Real Assets Allocation (As a Percentage of the New Portfolio)



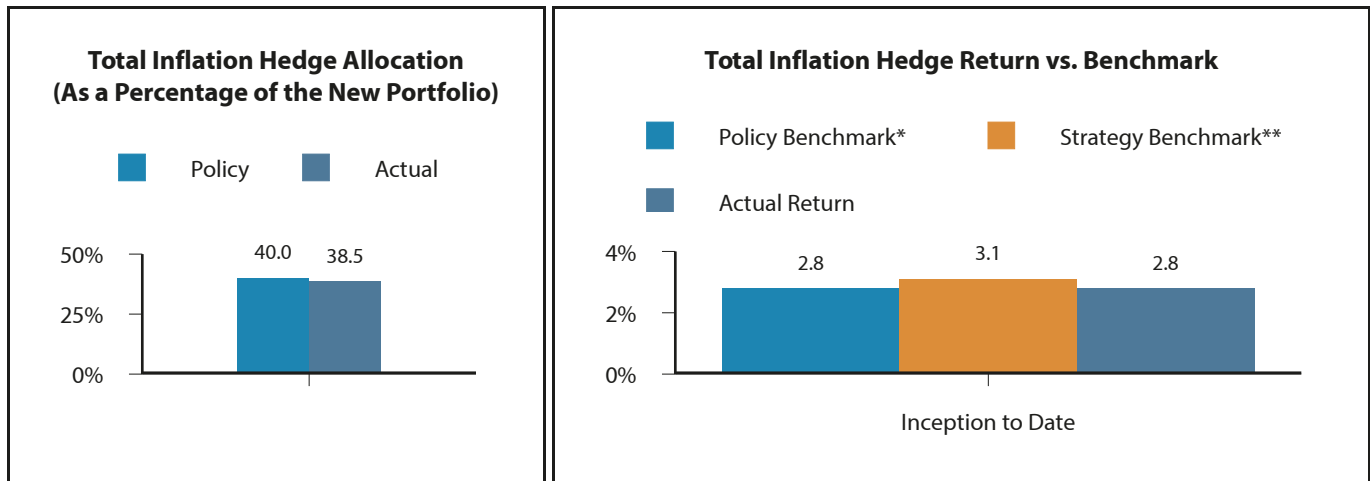
Public Real Assets vs. Benchmark



* As of June 30, 2019, the public real assets policy benchmark was the FTSE NAREIT ALL REITS Index.

** As of June 30, 2019, the public real assets strategy benchmark is equal to the public real assets policy benchmark.

As of June 30, 2019, the market exposure of the inflation hedge bucket was \$521,526,262 representing 38.5% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. For the five months, the inflation hedge allocation returned 2.8%, equal to the policy benchmark. The bar chart below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2019, 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.

** As of June 30, 2019, the total inflation hedge strategy benchmark was comprised of 11.7% commodities strategy benchmark, 63.4% TIPS strategy benchmark, 12.4% private real assets strategy benchmark, and 12.5% public real assets strategy benchmark.

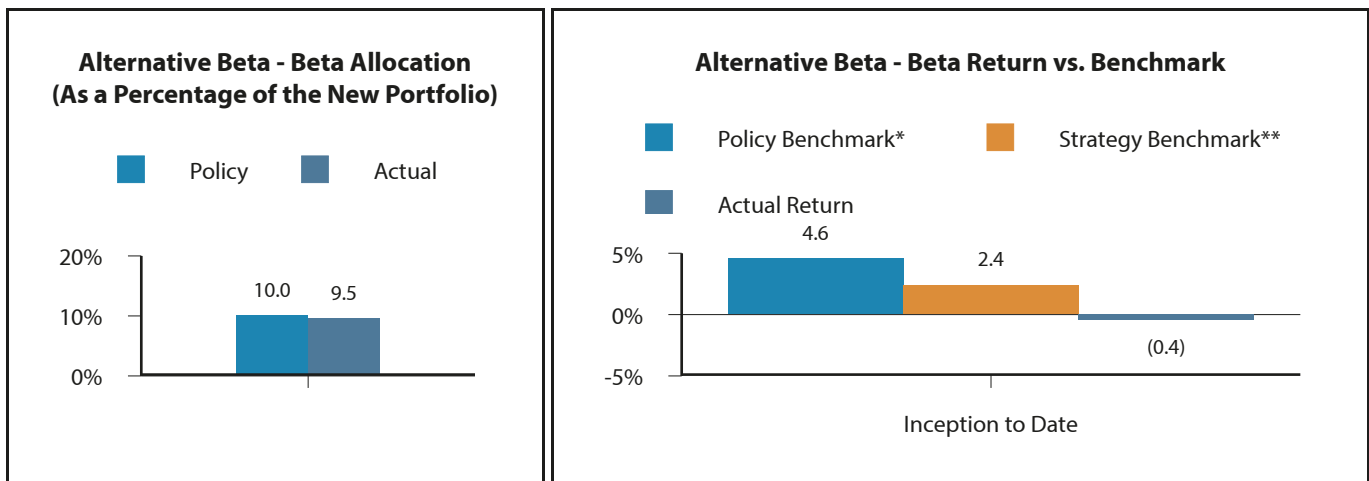
Statistical performance is not presented as the portfolio has less than one year of return data.

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.

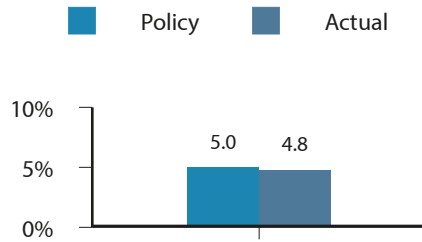
As of the fiscal year end, alternative betas were 50% of the bucket with hedge funds and private credit each making up 25% of the bucket. For the five months, alternative betas returned (0.4%) versus 4.6% for the policy benchmark. The underperformance was primarily related to manager implementation and to a lesser extent a passive implementation decision that underperformed the policy benchmark. Hedge funds, for the five months, returned 1.7% compared to its policy benchmark return of 3.6%. The primary driver of the underperformance was manager selection within hedge fund managers and the decision to strategically overweight alternative betas. For the five months, private credit returned 2.8% versus 5.7% for its policy benchmark. This underperformance was largely due to the external managers within this portfolio underperforming the benchmark by 3.9%.



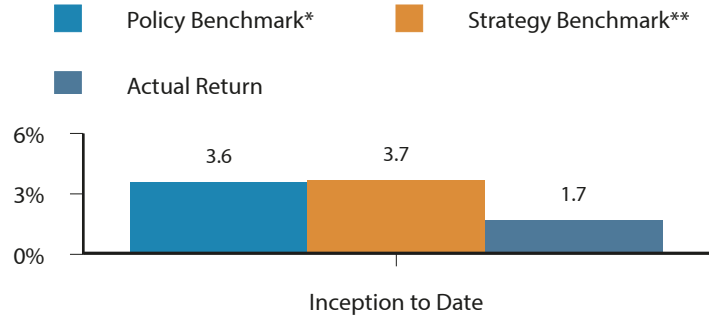
* As of June 30, 2019, the alt beta - beta policy benchmark was the HFRX Macro/CTA Index.

** As of June 30, 2019, the alt beta - beta strategy benchmark is equal to 25% S&P Systematic Global Macro Index and 75% Barclays US Agg Excess Return.

Hedge Funds Allocation (As a Percentage of the New Portfolio)



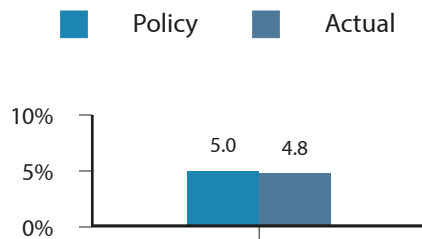
Hedge Funds Return vs. Benchmark



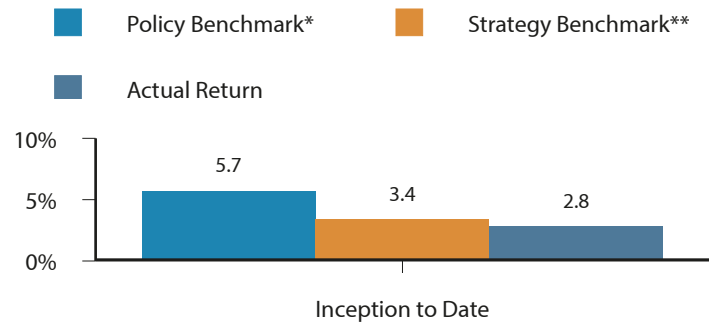
* As of June 30, 2019, the hedge funds policy benchmark was the HFRI Fund Weighted Composite Index.

** As of June 30, 2019, the hedge funds strategy benchmark is comprised of 43.7% hedge funds policy benchmark, 36.1% alt beta - beta strategy benchmark, and 20.2% MSCI ACWI Net Index.

Private Credit Allocation (As a Percentage of the New Portfolio)



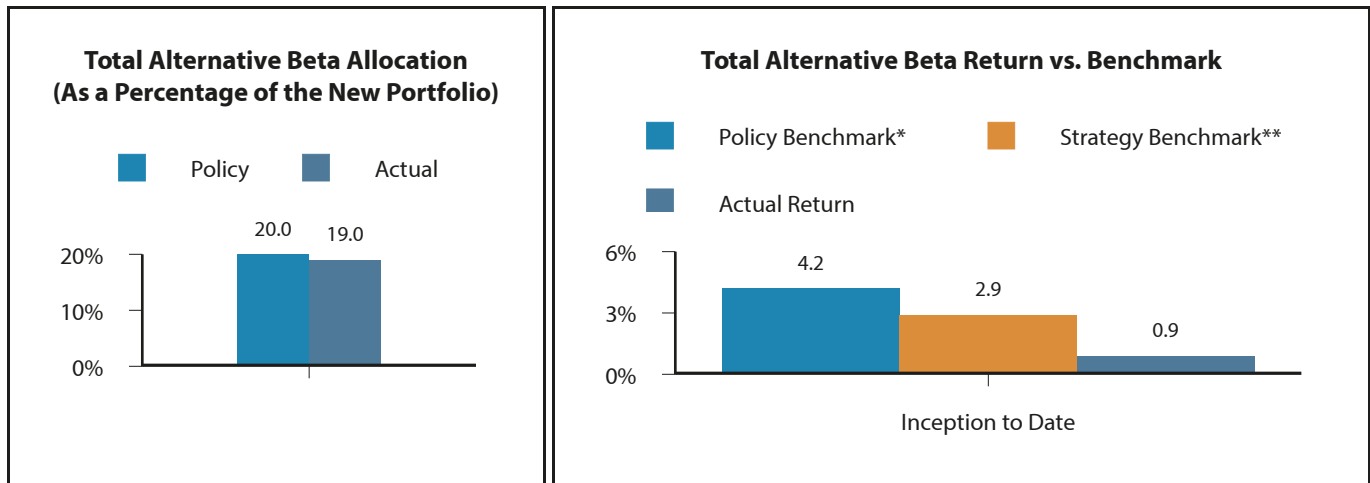
Private Credit Return vs. Benchmark



* As of June 30, 2019, the private credit policy benchmark was the S&P/LSTA US Leveraged Loan Index + 2%.

** As of June 30, 2019, the private credit strategy benchmark was comprised of 45.4% private credit policy benchmark, 13.5% direct hedge fund policy benchmark, 27.7% Bloomberg/Barclays High Yield Index, and 13.3% alternative beta strategy benchmark.

As of June 30, 2019, the market exposure of the alternative beta portfolio was \$257,477,438, representing 19% of total market value. The bar chart below (left) illustrates the actual exposure compared to policy. The alternative betas/ absolute return allocation returned 0.9% for the fiscal year versus 4.2% for the policy benchmark. All three asset classes within this bucket underperformed their policy benchmark over the five month period. The bar chart below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2019, 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.

** As of June 30, 2019, the alternative beta strategy benchmark was comprised of 25.0% direct hedge funds strategy benchmark, 50.1% alternative beta - beta strategy benchmark, and 24.9% private credit strategy benchmark.

Statistical performance is not presented as the portfolio has less than one year of return data.

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*Our dedicated team fuels desire
for progress and growth.*

Actuarial Section

Actuary's Certification Letter



October 18, 2019

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, 2019, for the purpose of determining contribution rates for fiscal year 2021. Actuarial valuations are prepared annually for the Missouri State Employees' Plan (MSEP) and the Judicial 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 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, 2019, as amended by legislation passed by the 2019 legislature.

In July 2018, after extensive analysis, the 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 2019 valuation, including decreases in the following: inflation assumption from 2.50% to 2.35%, investment return assumption from 7.25% to 7.10%, cost of living adjustment (COLA) assumption from 2.00% to 1.88%, general wage growth assumption from 2.75% to 2.60% and the payroll growth assumption from 2.50% to 2.35%. 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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Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE



Future actuarial measurements may differ significantly from the current measurements presented in the June 30, 2019 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, 2019 valuation reports. Accordingly, additional determinations may be needed for other purposes.

Based upon the June 30, 2019 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 MSEP and the Judicial 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, 2019, were also prepared as of June 30, 2019, for purposes of fulfilling financial accounting requirements for the plans under Governmental Accounting Standard Number 67 (GASB 67). The Missouri State Employees' Plan (MSEP) is a cost-sharing multiple employer plan and the Judicial Plan is a single employer plan. The assumptions used in the funding valuation were also used for GASB 67 calculations including the 7.10% 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, 2019 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.

A handwritten signature in cursive script, reading 'Patrice Beckham'.

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

A handwritten signature in cursive script, reading 'Bryan K. Hoge'.

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior 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 a new asset smoothing method effective with the June 30, 2018 valuation. Under the new method, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. No corridor is used with the new method. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.
- **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 7.25% to 7.10%.
 - **Price inflation** – The assumption was lowered from 2.50% to 2.35%.
 - **General wage growth** – The assumption was lowered from 2.75% to 2.60%.
 - **Payroll growth** – The assumption was lowered from 2.50% to 2.35%.
 - **Cost-of-living adjustment (COLA)** – The assumption was lowered from 2.00% to 1.88%.

Actuarial Assumptions

Economic Assumptions

- **Investment return** – 7.10%, compounded annually, net of investment expenses. (7.25% June 30, 2018 valuation)
 - This assumption will change to 6.95% for the June 30, 2020 valuation and thereafter, absent Board action.
- **Inflation** – 2.35% per year
 - This assumption will change to 2.25% for the June 30, 2020 valuation and thereafter, absent Board action.

Payroll growth – 2.35% per year

- This assumption will change to 2.25% for the June 30, 2020 valuation and thereafter, absent Board action.
- **Cost-of-living adjustment (COLA)** – 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect; 1.88% 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		
	Percent Retiring			Percent Retiring		
	1st Year	2nd Year	3rd Year	Percent Retiring	Percent Retiring	Percent Retiring
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*		Disability		Death**	
		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	0.10%	0.10%	0.03%	0.01%
30		10.6	11.0	0.10	0.10	0.03	0.02
35		8.2	8.5	0.10	0.10	0.04	0.03
40		5.8	6.0	0.36	0.36	0.05	0.03
45		4.3	4.5	0.41	0.41	0.07	0.05
50		2.9	3.0	0.57	0.57	0.13	0.08
55		2.9	3.0	0.77	0.77	0.22	0.14
60		2.9	3.0	1.02	1.02	0.40	0.20
65		2.9	3.0	1.23	1.23	0.70	0.30
70		2.9	3.0	1.23	1.23	1.17	0.50

* 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*			Total
	Inflation	Productivity	Merit	
1	2.35%	0.25%	5.75%	8.35%
2	2.35	0.25	2.50	5.10
3	2.35	0.25	1.50	4.10
4	2.35	0.25	1.25	3.85
5	2.35	0.25	1.00	3.60
9	2.35	0.25	0.75	3.35
10	2.35	0.25	0.50	3.10
21+	2.35	0.25	0.25	2.85

* General assembly members have a flat 2.6% 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	Merit & Seniority	Inflation	Increase Next Year
25	2.45%	2.35%	4.80%
30	2.45	2.35	4.80
35	1.73	2.35	4.08
40	1.01	2.35	3.36
45	0.85	2.35	3.20
50	0.79	2.35	3.14
55	0.69	2.35	3.04
60	0.25	2.35	2.60
65	0.25	2.35	2.60
70	0.25	2.35	2.60

Other Assumptions | June 30, 2019

- **Form of payment**

MSEP

- 50% joint and survivor

MSEP 2000/MSEP 2011

- Straight life annuity

Judicial Plan

- **Hired before January 1, 2011** – 50% joint and survivor
- **Hired 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 hired 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 hired 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 hired 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 hired 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, 2019. It was brought forward to June 30, 2019, 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 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, 2019. It was brought forward to June 30, 2019, 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 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]
2010	\$ 7,923,377,393	\$ 9,853,155,445	\$ 1,929,778,052	80.4%	\$ 1,945,095,321	99.2%
2011	8,022,481,408	10,123,544,043	2,101,062,635	79.2	1,875,569,816	112.0
2012	7,897,167,203	10,793,651,577	2,896,484,374	73.2	1,864,069,493	155.4
2013	8,096,436,929	11,134,637,484	3,038,200,555	72.7	1,880,212,950	161.6
2014	8,637,758,955	11,494,571,835	2,856,812,880	75.1	1,902,719,928	150.1
2015	8,792,485,658	11,727,618,410	2,935,132,752	75.0	1,918,527,768	153.0
2016	8,878,057,191	12,751,162,753	3,873,105,562	69.6	1,921,528,936	201.6
2017	8,872,381,848	13,152,273,895	4,279,892,047	67.5	1,941,969,786	220.4
2018	8,830,410,210	13,612,763,961	4,782,353,751	64.9	1,915,143,002	249.7
2019	8,782,383,977	13,957,626,309	5,175,242,332	62.9	1,930,764,635	268.0

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]
2010	\$ 88,976,738	\$ 382,012,773	\$ 293,036,035	23.3%	\$ 46,112,730	635.5%
2011	98,398,628	393,484,589	295,085,961	25.0	45,888,020	643.1
2012	102,266,706	413,332,538	311,065,832	24.7	45,835,501	678.7
2013	111,140,339	435,378,358	324,238,019	25.5	48,697,726	665.8
2014	124,269,105	462,336,255	338,067,150	26.9	49,587,936	681.8
2015	134,349,908	482,969,311	348,619,403	27.8	55,656,457	626.4
2016	143,468,860	547,621,617	404,152,757	26.2	57,421,016	703.8
2017	151,828,631	564,417,925	412,589,294	26.9	58,150,935	709.5
2018	162,135,045	593,788,592	431,653,547	27.3	59,551,874	724.8
2019	172,224,529	617,482,705	445,258,176	27.9	60,380,734	737.4

See *Schedule of Employer Contributions* on page 58.

Pension Trust Funds

Summary of Member Data Included in Valuations

June 30, 2019

Active Members

Valuation Group	Number	Annual Covered Payroll	Group Averages		
			Annual Salary	Age (Yrs)	Service (Yrs)
MSEP					
Regular state employees	44,454	\$ 1,793,297,961	\$ 40,341	45.2	10.5
Elected officials	6	654,754	109,126	46.7	2.4
Legislative clerks	8	323,618	40,452	66.4	21.3
Legislators	192	6,902,692	35,952	52.2	4.0
Uniformed water patrol	10	738,934	73,893	43.0	17.2
Conservation department	1,348	61,049,428	45,289	44.5	14.1
School-term salaried employees	829	65,762,962	79,328	58.2	22.3
Administrative law judges	17	2,034,286	119,664	60.8	24.9
Total MSEP group	46,864	\$ 1,930,764,635	41,199	45.5	10.8
Judicial Plan	414	\$ 60,380,734	\$ 145,847	55.6	10.6

Retired Members and Beneficiaries

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age (Yrs.)
MSEP				
Retirement	44,158	\$ 711,958,404	\$ 16,123	70.4
Disability	1	2,280	2,280	63.0
Survivor of active member	1,728	19,085,520	11,045	63.1
Survivor of retired member	3,809	48,900,516	12,838	75.8
Total MSEP group	49,696	\$ 779,946,720	15,694	70.5
Judicial Plan	585	\$ 38,600,424	\$ 65,984	76.3

Other Members

Plans	Number Inactive-Vested	Number Inactive-Nonvested	Number Leave of Absence	Number Long-Term Disability
MSEP	16,016	18,852	175	682
Judicial Plan	36	0	0	0

Active Members by Attained Age and Years of Service

June 30, 2019

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	2,376	15							2,391	\$ 74,517,568
25-29	3,695	563	11						4,269	147,824,973
30-34	2,774	1,485	468	9					4,736	180,893,664
35-39	2,052	1,228	1,287	463	26				5,056	205,820,334
40-44	1,642	986	1,075	1,156	484	15			5,358	226,049,383
45-49	1,439	939	966	1,083	1,390	407	32		6,256	269,248,069
50-54	1,305	906	883	958	1,138	946	311	17	6,464	281,881,508
55-59	1,215	918	945	1,074	1,079	571	426	134	6,362	276,117,441
60-64	728	636	718	720	663	378	253	158	4,254	187,990,715
65+	265	285	307	261	226	146	104	124	1,718	80,420,980
Totals	17,491	7,961	6,660	5,724	5,006	2,463	1,126	433	46,864	\$ 1,930,764,635

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 – \$41,199

Judicial Plan

	Years of Service to Valuation Date							Totals	
Attained Age	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
< 39	22	2						24	\$ 3,415,811
40-44	27	7						34	4,875,490
45-49	29	10	11	1				51	7,274,271
50-54	25	15	15	10	4			69	10,023,763
55-59	29	21	13	14	12	1		90	13,140,228
60-64	16	15	14	11	23	3	3	85	12,507,139
65+	3	7	9	9	12	13	8	61	9,144,032
Totals	151	77	62	45	51	17	11	414	\$ 60,380,734

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

Group Averages: Age – 55.6 years • Service – 10.6 years • Annual pay – \$145,847

Schedules of Active Member Valuation Data

Last Ten Fiscal Years

MSEP

Schedule of Active Member Valuation Data

Valuation Date as of June 30	Number	Annual Payroll	Average Annual Pay	% Increase in Average Pay
2010	53,478	\$ 1,945,095,321	\$ 36,372	0.01%
2011	51,660	1,875,569,816	36,306	(0.18)
2012	51,332	1,864,069,493	36,314	0.02
2013	50,833	1,880,212,950	36,988	1.86
2014	50,621	1,902,719,928	37,588	1.62
2015	49,980	1,918,527,768	38,386	2.12
2016	49,464	1,921,528,936	38,847	1.20
2017	48,910	1,941,969,786	39,705	2.21
2018	47,806	1,915,143,002	40,061	0.90
2019	46,864	1,930,764,635	41,199	2.84

Judicial Plan

Schedule of Active Member Valuation Data

Valuation Date as of June 30	Number	Annual Payroll	Average Annual Pay	% Increase in Average Pay
2010	402	\$ 46,112,730	\$ 114,708	0.07%
2011	399	45,888,020	115,008	0.26
2012	398	45,835,501	115,165	0.14
2013	400	48,697,726	121,744	5.71
2014	405	49,587,936	122,439	0.57
2015	405	55,656,457	137,423	12.24
2016	408	57,421,016	140,738	2.41
2017	410	58,150,935	141,832	0.78
2018	415	59,551,874	143,498	1.17
2019	414	60,380,734	145,847	1.64

Retirees and Beneficiaries Added and Removed

Last Ten Fiscal Years

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2010	General employees	Retirement	2,298	\$ 34,755,192	833	\$ 9,979,318
		Survivor of active	83	1,054,292	49	276,401
		Survivor of retired	246	3,080,424	117	1,078,265
		Disability	0	830	1	2,985
	Lincoln University - vested	Retirement	1	5,671	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	12	201,562	12	239,880
		Survivor of active	0	3,975	1	16,709
		Survivor of retired	5	78,765	0	0
	Elected officials	Retirement	0	0	1	66,911
		Survivor of active	0	3,117	0	0
		Survivor of retired	1	34,780	0	0
2011	ALJs	Retirement	3	113,877	1	46,794
		Survivor of retired	0	7,332	0	0
	General employees	Retirement	2,850	41,203,358	892	10,670,476
		Survivor of active	65	914,689	46	261,503
		Survivor of retired	298	3,059,195	176	1,670,990
		Disability	0	79	1	1,732
	Lincoln University - vested	Retirement	1	1,780	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	41	601,171	10	185,635
		Survivor of active	0	2,903	1	19,612
		Survivor of retired	5	73,841	2	16,628
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	3,242	0	0
		Survivor of retired	0	1,053	0	0
	ALJs	Retirement	4	212,519	0	0
		Survivor of retired	0	2,599	1	27,724

*Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.*

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
29,407	\$ 449,976,272	5.83%	\$ 15,302	0.56%
1,398	12,873,137	6.43	9,208	3.85
2,388	24,540,289	8.88	10,277	3.01
9	30,900	(6.52)	3,433	3.84
14	61,624	10.14	4,402	0.00
1	2,624	0.00	2,624	0.00
262	5,169,635	(0.74)	19,731	(0.74)
12	133,476	(8.71)	11,123	(1.10)
61	850,744	10.20	13,947	1.18
13	553,224	(10.79)	42,556	(3.93)
1	81,041	4.00	81,041	4.00
2	67,897	105.02	33,949	2.51
28	1,244,605	5.70	44,450	(1.85)
11	283,184	2.66	25,744	2.66
31,365	480,509,154	6.79	15,320	0.12
1,417	13,526,322	5.07	9,546	3.67
2,510	25,928,494	5.66	10,330	0.52
8	29,247	(5.35)	3,656	6.50
15	63,404	2.89	4,227	(3.98)
1	2,624	0.00	2,624	0.00
293	5,585,171	8.04	19,062	(3.39)
11	116,767	(12.52)	10,615	(4.57)
64	907,957	6.73	14,187	1.72
13	553,224	0.00	42,556	0.00
1	84,283	4.00	84,283	4.00
2	68,950	1.55	34,475	1.55
32	1,457,124	17.08	45,535	2.44
10	258,059	(8.87)	25,806	0.24

Retirees and Beneficiaries Added and Removed continued on pages 122-123.

Retirees and Beneficiaries Added and Removed continued from pages 120-121.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2012	General employees	Retirement	2,637	\$ 39,423,910	895	\$ 11,116,063
		Survivor of active	82	1,129,634	34	197,452
		Survivor of retired	282	3,665,503	158	1,416,283
		Disability	0	458	0	0
	Lincoln University - vested	Retirement	0	0	2	11,032
		Survivor of active	0	0	0	0
	Legislators	Retirement	13	229,979	8	139,545
		Survivor of active	0	3,531	0	0
		Survivor of retired	4	80,142	3	52,550
	Elected officials	Retirement	2	86,431	0	0
		Survivor of active	0	3,371	0	0
		Survivor of retired	0	1,336	0	0
	ALJs	Retirement	3	124,248	3	158,072
		Survivor of active	1	25,592	0	0
		Survivor of retired	2	57,704	0	0
2013	General employees	Retirement	2,632	40,416,533	983	12,869,826
		Survivor of active	97	1,080,366	64	400,983
		Survivor of retired	323	4,085,887	150	1,363,799
		Disability	0	696	1	3,854
	Lincoln University - vested	Retirement	2	5,980	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	37	442,937	15	320,292
		Survivor of active	0	3,851	0	0
		Survivor of retired	9	176,283	6	88,725
	Elected officials	Retirement	1	53,873	0	0
		Survivor of active	0	3,506	0	0
		Survivor of retired	0	1,458	0	0
	ALJs	Retirement	4	233,124	2	111,466
		Survivor of active	0	1,024	0	0
		Survivor of retired	2	65,892	1	22,759

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
33,107	\$ 508,817,001	5.89%	\$ 15,369	0.32%
1,465	14,458,505	6.89	9,869	3.38
2,634	28,177,714	8.67	10,698	3.56
8	29,705	1.57	3,713	1.56
13	52,372	(17.40)	4,029	(4.68)
1	2,624	0.00	2,624	0.00
298	5,675,605	1.62	19,046	(0.08)
11	120,298	3.02	10,936	3.02
65	935,549	3.04	14,393	1.45
15	639,655	15.62	42,644	0.21
1	87,654	4.00	87,654	4.00
2	70,286	1.94	35,143	1.94
32	1,423,300	(2.32)	44,478	(2.32)
1	25,592	0.00	25,592	0.00
12	315,763	22.36	26,314	1.97
34,756	536,363,708	5.41	15,432	0.41
1,498	15,137,889	4.70	10,105	2.39
2,807	30,899,802	9.66	11,008	2.90
7	26,546	(10.63)	3,792	2.13
15	58,351	11.42	3,890	(3.45)
1	2,623	(0.04)	2,623	(0.04)
320	5,798,251	2.16	18,120	(4.86)
11	124,149	3.20	11,286	3.20
68	1,023,107	9.36	15,046	4.54
16	693,528	8.42	43,346	1.65
1	91,160	4.00	91,160	4.00
2	71,744	2.07	35,872	2.07
34	1,544,957	8.55	45,440	2.16
1	26,615	4.00	26,615	4.00
13	358,896	13.66	27,607	4.91

Retirees and Beneficiaries Added and Removed continued on pages 124-125.

Retirees and Beneficiaries Added and Removed continued from pages 122-123.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2014	General employees	Retirement	2,612	\$ 37,411,991	944	\$ 12,205,892
		Survivor of active	90	1,095,464	34	262,401
		Survivor of retired	324	3,954,360	157	1,504,423
		Disability	0	408	2	7,391
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	18	239,904	7	95,748
		Survivor of active	0	3,680	0	0
		Survivor of retired	5	39,520	5	44,445
	Elected officials	Retirement	0	0	1	19,605
		Survivor of active	0	2,788	0	0
		Survivor of retired	1	10,811	0	0
	ALJs	Retirement	1	50,072	2	78,138
		Survivor of active	1	27,358	0	0
		Survivor of retired	0	7,404	1	30,930
2015	General employees	Retirement	2,865	43,527,132	1,061	13,940,436
		Survivor of active	111	1,160,798	56	434,928
		Survivor of retired	350	4,399,848	180	1,673,736
		Disability	0	180	1	5,220
	Lincoln University - vested	Retirement	1	2,340	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	16	236,916	4	130,116
		Survivor of active	0	3,432	1	15,180
		Survivor of retired	3	61,956	9	79,944
	Elected officials	Retirement	0	0	0	0
		Survivor of active	1	15,802	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	3	128,952	0	0
		Survivor of active	0	1,452	0	0
		Survivor of retired	0	6,612	0	0

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year					
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances	
36,424	\$ 561,569,807	4.70%	\$ 15,418	(0.09)%	
1,554	15,970,952	5.50	10,277	1.70	
2,974	33,349,739	7.93	11,214	1.87	
5	19,563	(26.31)	3,913	3.19	
15	58,351	0.00	3,890	0.00	
1	2,623	0.00	2,623	0.00	
331	5,942,407	2.49	17,953	(0.92)	
11	127,829	2.96	11,621	2.97	
68	1,018,182	(0.48)	14,973	(0.49)	
15	673,923	(2.83)	44,928	3.65	
1	93,948	3.06	93,948	3.06	
3	82,555	15.07	27,518	(23.29)	
33	1,516,891	(1.82)	45,966	1.16	
2	53,973	102.79	26,987	1.40	
12	335,370	(6.56)	27,948	1.24	
38,227	591,156,503	5.27	15,464	0.30	
1,608	16,696,822	4.54	10,384	1.04	
3,144	36,075,851	8.17	11,475	2.33	
4	14,523	(25.76)	3,631	(7.21)	
16	60,691	4.01	3,793	(2.49)	
1	2,623	0.00	2,623	0.00	
339	6,049,207	1.80	17,844	(0.61)	
10	116,081	(9.19)	11,608	(0.11)	
66	1,000,194	(1.77)	15,154	1.21	
15	673,923	0.00	44,928	0.00	
2	109,750	16.82	54,875	(41.59)	
3	82,555	0.00	27,518	0.00	
36	1,645,843	8.50	45,718	(0.54)	
2	55,425	2.69	27,713	2.69	
12	341,982	1.97	28,499	1.97	

Retirees and Beneficiaries Added and Removed continued on pages 126-127.

Retirees and Beneficiaries Added and Removed continued from pages 124-125.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2016	General employees	Retirement	2,815	\$ 40,917,948	1,147	\$ 15,381,612
		Survivor of active	101	1,023,096	56	377,484
		Survivor of retired	365	4,493,892	222	2,073,192
		Disability	0	108	0	0
	Lincoln University - vested	Retirement	1	3,444	1	3,936
		Survivor of active	0	0	0	0
	Legislators	Retirement	8	107,412	15	427,428
		Survivor of active	0	3,084	0	0
		Survivor of retired	7	173,760	3	50,448
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	5	230,472	2	150,888
		Survivor of active	0	1,176	0	0
		Survivor of retired	2	84,588	2	62,220
2017	General employees	Retirement	2,771	43,468,065	1,265	17,140,831
		Survivor of active	83	1,067,292	52	491,640
		Survivor of retired	381	4,701,360	220	2,029,572
		Disability	0	72	1	3,216
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	28	347,844	15	354,564
		Survivor of active	0	1,512	1	5,328
		Survivor of retired	7	103,872	3	73,068
	Elected officials	Retirement	3	135,531	1	53,873
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	8	445,728	0	0
		Survivor of active	1	31,080	0	0
		Survivor of retired	1	48,108	0	0

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year

Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
39,895	\$ 616,692,839	4.32%	\$ 15,458	(0.04)%
1,653	17,342,434	3.87	10,491	1.03
3,287	38,496,551	6.71	11,712	2.07
4	14,631	0.74	3,658	0.74
16	60,199	(0.81)	3,762	(0.82)
1	2,623	0.00	2,623	0.00
332	5,729,191	(5.29)	17,257	(3.29)
10	119,165	2.66	11,917	2.66
70	1,123,506	12.33	16,050	5.91
15	673,923	0.00	44,928	0.00
2	109,750	0.00	54,875	0.00
3	82,555	0.00	27,518	0.00
39	1,725,427	4.84	44,242	(3.23)
2	56,601	2.12	28,301	2.12
12	364,350	6.54	30,363	6.54
41,401	643,020,073	4.27	15,532	0.48
1,684	17,918,086	3.32	10,640	1.42
3,448	41,168,339	6.94	11,940	1.95
3	11,487	(21.49)	3,829	4.67
16	60,199	0.00	3,762	0.00
1	2,623	0.00	2,623	0.00
345	5,722,471	(0.12)	16,587	(3.88)
9	115,349	(3.20)	12,817	7.55
74	1,154,310	2.74	15,599	(2.81)
17	755,582	12.12	44,446	(1.07)
2	112,176	0.08	56,088	0.08
3	84,372	0.50	28,124	0.50
47	2,171,155	25.83	46,195	4.41
3	87,681	54.91	29,227	3.27
13	412,458	13.20	31,728	4.50

Retirees and Beneficiaries Added and Removed continued on pages 128-129.

Retirees and Beneficiaries Added and Removed continued from pages 126-127.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2018	General employees	Retirement	2,863	\$ 50,678,574	1,285	\$ 17,257,968
		Survivor of active	85	1,002,108	57	538,308
		Survivor of retired	391	5,294,100	271	2,498,204
		Disability	0	36	2	9,288
	Lincoln University - vested	Retirement	0	0	1	2,340
		Survivor of active	0	0	0	0
	Legislators	Retirement	7	105,972	6	107,556
		Survivor of active	0	1,764	1	3,516
		Survivor of retired	4	68,712	4	45,684
	Elected officials	Retirement	1	17,958	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	1	38,332
	ALJs	Retirement	4	293,460	1	51,984
		Survivor of active	0	1,704	0	0
		Survivor of retired	0	4,692	0	0
2019	General employees	Retirement	2,470	48,906,540	1,234	19,766,496
		Survivor of active	78	1,117,968	63	603,996
		Survivor of retired	428	6,364,032	254	2,753,988
		Disability	0	48	0	0
	Lincoln University - vested	Retirement	0	0	1	8,592
		Survivor of active	0	0	0	0
	Legislators	Retirement	37	519,660	12	293,568
		Survivor of active	0	1,332	0	0
		Survivor of retired	7	116,340	4	37,980
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	3	236,916	0	0
		Survivor of active	0	540	0	0
		Survivor of retired	0	6,132	0	0

Source of Data: MOSERS benefit payment database as of June 30, 2019.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2019.

Rolls at End of Year					
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances	
42,979	\$ 676,440,679	5.42%	\$ 15,739	1.34%	
1,712	18,381,886	2.67	10,737	0.92	
3,568	43,964,235	7.26	12,322	3.26	
1	2,235	(63.24)	2,235	(43.58)	
15	57,859	(3.89)	3,857	2.53	
1	2,623	0.00	2,623	0.00	
346	5,720,887	(0.03)	16,534	(0.31)	
8	113,597	(1.47)	14,200	11.61	
74	1,177,338	2.05	15,910	1.94	
18	773,540	2.66	42,974	(3.28)	
2	112,176	0.00	56,088	0.00	
2	46,040	(46.43)	23,020	(18.55)	
50	2,412,631	14.00	48,253	4.65	
3	89,385	3.01	29,795	2.01	
13	417,150	1.29	32,088	1.19	
44,215	705,580,723	4.31	15,958	0.01	
1,727	18,895,858	2.80	10,941	0.02	
3,742	47,574,279	8.21	12,714	0.03	
1	2,283	2.15	2,283	0.02	
14	49,267	(14.85)	3,519	(0.09)	
1	2,623	0.00	2,623	0.00	
371	5,946,979	3.95	16,030	(0.03)	
8	114,929	1.17	14,366	0.01	
77	1,255,698	6.66	16,308	0.03	
18	773,540	0.00	42,974	0.00	
2	114,808	2.35	57,404	0.02	
2	47,030	2.15	23,515	0.02	
53	2,649,547	9.82	49,991	0.04	
3	89,925	0.60	29,975	0.01	
13	423,282	1.47	32,560	0.01	

Retirees and Beneficiaries Added and Removed

Last Ten Fiscal Years

Judicial Plan

Fiscal Year Ended June 30	Benefit Type	Added to Rolls		Removed from Rolls	
		Number	Annual Allowances	Number	Annual Allowances
2010	Retirement	12	\$ 1,137,305	13	\$ 750,021
	Survivor of active	0	32,700	2	32,399
	Survivor of retired	11	436,312	5	130,920
2011	Retirement	36	2,501,248	9	563,214
	Survivor of active	0	14,893	1	35,792
	Survivor of retired	4	167,535	9	206,465
2012	Retirement	18	1,490,554	14	1,074,572
	Survivor of active	0	22,717	0	0
	Survivor of retired	8	371,622	6	218,310
2013	Retirement	27	2,233,387	13	851,802
	Survivor of active	0	28,591	1	33,778
	Survivor of retired	8	355,101	10	288,980
2014	Retirement	18	1,671,667	8	443,807
	Survivor of active	2	66,272	0	0
	Survivor of retired	5	254,117	7	216,813
2015	Retirement	39	3,599,880	21	1,395,888
	Survivor of active	0	34,344	0	0
	Survivor of retired	18	705,444	5	198,348
2016	Retirement	16	1,671,084	14	1,078,356
	Survivor of active	0	15,072	1	43,032
	Survivor of retired	8	368,868	10	354,144
2017	Retirement	21	2,128,128	16	1,239,612
	Survivor of active	0	9,852	0	0
	Survivor of retired	12	497,508	2	87,936
2018	Retirement	23	2,642,868	15	1,074,540
	Survivor of active	0	18,660	1	27,540
	Survivor of retired	9	452,040	7	294,660
2019	Retirement	39	3,749,292	17	1,357,068
	Survivor of active	1	59,556	1	40,824
	Survivor of retired	11	583,896	14	514,704

Retirees and Beneficiaries Added and Removed continued from page 130.

Rolls at End of Year					
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances	
325	\$ 20,011,829	1.97%	\$ 61,575	2.29%	
35	1,056,726	0.03	30,192	5.74	
109	3,445,221	9.73	31,608	3.69	
352	21,949,863	9.68	62,358	1.27	
34	1,035,827	(1.98)	30,466	0.91	
104	3,406,291	(1.13)	32,753	3.62	
356	22,365,845	1.90	62,825	0.75	
34	1,058,544	2.19	31,134	2.19	
106	3,559,603	4.50	33,581	2.53	
370	23,747,431	6.18	64,182	2.16	
33	1,053,358	(0.49)	31,920	2.52	
104	3,625,723	1.86	34,863	3.82	
380	24,975,291	5.17	65,724	2.40	
35	1,119,630	6.29	31,989	0.22	
102	3,663,027	1.03	35,912	3.01	
398	25,951,423	9.28	65,205	1.59	
35	1,087,702	3.26	31,077	(2.64)	
115	4,132,819	13.99	35,938	3.08	
400	26,544,151	2.28	66,360	1.77	
34	1,059,742	(2.57)	31,169	0.30	
113	4,147,543	0.36	36,704	2.13	
405	27,432,667	3.35	67,735	2.07	
34	1,069,594	0.93	31,459	0.93	
123	4,557,115	9.88	37,050	0.94	
408	28,112,479	5.91	68,903	3.83	
33	1,050,862	(0.84)	31,844	2.17	
115	4,304,923	3.79	37,434	1.99	
422	28,936,375	2.93	68,570	(0.48)	
34	1,078,474	2.63	31,720	(0.39)	
110	4,216,735	(2.05)	38,334	2.40	

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)
2010	\$ 0	\$ 5,012,677,769	\$ 4,840,477,676	\$ 7,923,377,393	100.0%	100.0%	60.1%
2011	599,761	5,357,794,617	4,765,149,665	8,022,481,408	100.0	100.0	55.9
2012	5,431,451	5,749,411,068	5,038,809,058	7,897,167,203	100.0	100.0	42.5
2013	14,507,994	6,062,654,441	5,057,475,049	8,096,436,929	100.0	100.0	39.9
2014	27,111,467	6,347,728,717	5,119,731,651	8,637,758,955	100.0	100.0	44.2
2015	42,731,658	6,695,631,737	4,989,255,015	8,792,485,658	100.0	100.0	41.2
2016	60,618,379	7,305,895,284	5,384,649,090	8,878,057,191	100.0	100.0	28.1
2017	78,979,370	7,559,623,100	5,513,671,425	8,872,381,848	100.0	100.0	22.4
2018	103,784,514	8,073,692,664	5,435,286,783	8,830,410,210	100.0	100.0	12.0
2019	128,255,311	8,430,014,973	5,399,356,055	8,782,383,977	100.0	100.0	4.2

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)
2010	\$ 0	\$ 236,113,077	\$ 145,899,696	\$ 88,976,738	100.0%	37.7%	0.0%
2011	59,958	251,532,354	141,892,277	98,398,628	100.0	39.1	0.0
2012	209,817	258,642,149	154,450,572	102,266,706	100.0	39.5	0.0
2013	421,753	274,911,416	160,045,189	111,140,339	100.0	40.3	0.0
2014	716,564	285,124,436	176,469,255	124,269,105	100.0	43.3	0.0
2015	1,204,757	316,042,514	165,722,040	134,349,908	100.0	42.1	0.0
2016	1,855,955	354,715,048	191,050,614	143,468,860	100.0	39.9	0.0
2017	2,232,405	377,099,534	185,085,986	151,828,631	100.0	39.7	0.0
2018	3,124,482	401,725,610	188,938,500	162,135,045	100.0	39.6	0.0
2019	4,421,019	434,204,353	178,857,333	172,224,529	100.0	38.6	0.0

Analysis of Financial Experience

Year Ended June 30, 2019

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	\$ 4,782,353,751	2010	4.0%
Normal cost from last valuation	147,497,311	2011	(2.4)
Actual employer and member contributions	(425,436,674)	2012	(4.7)
Administrative expenses	9,200,826	2013	(2.8)
Interest accrual	342,589,646	2014	2.1
Expected UAAL before changes	4,856,204,860	2015	(0.9)
Change from any changes in benefits, assumptions, or methods	74,340,841	2016	(3.2)
Expected UAAL after changes	4,930,545,701	2017	(1.6)
Less: Actual UAAL at end of year	(5,175,242,332)	2018	(0.9)
Gain (loss) during year from experience	\$ (244,696,631)	2019	(1.8)
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$13,879,745,294)	(1.8)%		

Judicial		Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$ 431,653,547	2010	(1.1)%
Normal cost from last valuation	12,655,900	2011	(0.4)
Actual employer and member contributions	(39,742,769)	2012	(0.6)
Administrative expenses	72,141	2013	(2.6)
Interest accrual	30,799,536	2014	1.5
Expected UAAL before changes	435,438,355	2015	(1.5)
Change from any changes in benefits, assumptions, or methods	5,024,057	2016	0.1
Expected UAAL after changes	440,462,412	2017	(0.3)
Less: Actual UAAL at end of year	(445,258,176)	2018	(0.3)
Gain (loss) during year from experience	\$ (4,795,764)	2019	(0.8)
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$611,479,764)	(0.8)%		

Comparison of Plans for General State Employees

June 30, 2019

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 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 ½ 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 ½ 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.

Benefit Provisions	MSEP 2011
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 for the first time 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 ½ 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, 2019

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"> 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"> 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 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.

Benefit Provisions	MSEP 2011
Membership <i>Elected Members of the General Assembly</i>	<ul style="list-style-type: none"> Employed for the first time 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"> (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
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, 2019

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"> 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"> 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 1/2 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 with at least one 4-year term 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 FAO 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 <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"> 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.

Benefit Provisions	MSEP 2011
Membership <i>Members elected to state office</i>	<ul style="list-style-type: none"> Employed for the first time 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"> (Active Pay ÷ 24) x Service <i>Capped at 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, 2019

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 circuit court appointed after February 29, 1972; 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 15 years of service <i>Age 60</i> Less than 12 years of service <i>Age 62</i> 	<ul style="list-style-type: none"> Less than 1 year 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"> $\text{Monthly pay} \times .50 = \text{Monthly Base Benefit}$ 	<ul style="list-style-type: none"> $\text{Monthly pay} \times .50 = \text{Monthly Base Benefit}$
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, 2019

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, 2019

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, 2019

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 2019 legislative session came to an end on May 17, 2019. The bills passed by the Missouri General Assembly and signed by Governor Parson that affect MOSERS include:

House Bill 5 authorizes the appropriation of \$432 million to MOSERS for fiscal year 2020. This appropriation fully funds the employer contribution rate certified by the Board for the majority of our active member payroll. This dollar amount was generated from the employer contribution rates calculated in the annual actuarial valuations, performed by MOSERS' retained actuarial professionals, and certified by the Board of Trustees at its September 2018 meeting.

Senate Bill 185 provides provisions that support the ongoing participation in MOSERS for the Missouri Housing Development Commission and the Environmental Improvement and Energy Resources Authority.

Actuarial Present Values

June 30, 2019

MSEP

Actuarial Present Value June 30, 2019	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	\$ 5,315,453,978	\$ 739,698,607	\$ 4,575,755,371
Disability benefits likely to be paid to present active members who become totally and permanently disabled	159,803,629	102,082,080	57,721,549
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	63,470,496	17,501,758	45,968,738
Separation benefits likely to be paid to present active members	227,021,237	158,016,990	69,004,247
Active member totals	\$ 5,765,749,340	\$ 1,017,299,435	4,748,449,905
Members on leave of absence & LTD			
Service retirement benefits based on service rendered before the valuation date			94,581,573
Inactive-vested members			
Service retirement benefits based on service rendered before the valuation date			660,192,743
Retired lives			8,430,014,943
Pending refunds			24,387,145
Total actuarial accrued liability			13,957,626,309
Less: actuarial value of assets			8,782,383,977
Unfunded actuarial accrued liability			\$ 5,175,242,332
Funded ratio			62.9%

Actuarial Present Values

June 30, 2019

Judicial Plan

Actuarial Present Value June 30, 2019	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	\$ 239,631,416	\$ 77,555,424	\$ 162,075,992
Disability benefits likely to be paid to present active members who become totally and permanently disabled	1,540,181	1,366,905	173,276
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	5,583,715	3,652,832	1,930,883
Separation benefits likely to be paid to present active members	9,503,811	9,732,708	(228,897)
Active member totals	\$ 256,259,123	\$ 92,307,869	163,951,254
Inactive-vested members			19,327,098
Retired lives			434,204,353
Total actuarial accrued liability			617,482,705
Less: actuarial value of assets			172,224,529
Unfunded actuarial accrued liability			\$ 445,258,176
Funded ratio			27.9%



*We rely on each other to
make your retirement a success.*



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

	2010	2011	2012	2013
MSEP				
Additions				
Employer contributions	\$ 251,226,187	\$ 263,418,048	\$ 263,373,924	\$ 274,655,284
Employee contributions	0	599,761	4,955,399	9,698,883
Member service purchases	3,576,954	2,814,551	2,869,085	3,475,123
Service transfers in	10,009	142,248	2,675,339	2,446,627
Investment income (net of expenses)	859,898,512	1,395,677,299	158,102,123	778,008,348
Other	639,901	659,474	448,463	489,193
Total additions to plan net assets	1,115,351,563	1,663,311,381	432,424,333	1,068,773,458
Deductions				
Benefit payments	543,284,289	597,424,954	611,522,451	646,708,308
Contribution refunds	3,106	0	123,709	622,341
Service transfers out	462,970	17,745,828	588,180	1,911,665
Administrative expenses	7,064,544	7,054,581	7,017,057	7,575,883
Total deductions from plan net position	550,814,909	622,225,363	619,251,397	656,818,197
Change in net position	\$ 564,536,654	\$ 1,041,086,018	\$ (186,827,064)	\$ 411,955,261
Judicial Plan				
Additions				
Employer contributions	\$ 27,029,198	\$ 27,702,682	\$ 26,324,526	\$ 28,330,649
Employee contributions	0	59,958	149,859	211,936
Investment income (net of expenses)	9,909,718	17,460,050	2,061,916	10,724,252
Other	7,374	8,250	5,849	6,743
Total additions to plan net position	36,946,290	45,230,940	28,542,150	39,273,580
Deductions				
Benefit payments	24,230,545	25,488,531	26,821,412	27,802,871
Contribution refunds	0	0	0	0
Administrative expenses	81,414	88,253	91,514	104,428
Total deductions from plan net position	24,311,959	25,576,784	26,912,926	27,907,299
Change in net position	\$ 12,634,331	\$ 19,654,156	\$ 1,629,224	\$ 11,366,281
Internal Service Fund				
Operating revenues				
Premium receipts	\$ 29,098,799	\$ 28,829,638	\$ 28,578,326	\$ 28,961,637
Deferred compensation receipts	69,143,267	54,221,226	17,500,476	0
Miscellaneous income	1,039,369	981,404	608,187	480,120
Total operating revenues	99,281,435	84,032,268	46,686,989	29,441,757
Operating expenses				
Premium disbursements	29,077,825	28,804,638	28,556,036	28,930,950
Deferred compensation disbursements	69,143,267	54,221,226	17,500,476	0
Premium refunds	20,974	24,999	22,291	30,687
Administrative expenses	797,020	826,809	778,529	805,457
Total operating expenses	99,039,086	83,877,672	46,857,332	29,767,094
Non-operating revenues				
Investment income	9,816	11,071	11,068	12,075
Change in net position	\$ 252,165	\$ 165,667	\$ (159,275)	\$ (313,262)

Changes in Net Position continued from page 148.

2014	2015	2016	2017	2018	2019
\$ 326,370,336	\$ 329,752,832	\$ 329,957,369	\$ 335,217,422	\$ 379,557,962	\$ 394,150,042
14,025,328	18,099,455	21,684,920	25,439,343	28,303,993	31,286,632
2,909,423	1,859,005	2,815,749	1,691,046	2,020,720	1,293,774
2,252,206	3,575,815	2,107,873	3,977,803	3,297,251	2,592,737
1,484,709,539	(237,603,530)	1,194,422	272,073,643	578,883,501	313,159,178
450,453	533,001	545,847	522,025	538,600	496,898
1,830,717,285	116,216,578	358,306,180	638,921,282	992,602,027	742,979,261.19
677,097,411	723,994,041	750,440,412	787,300,328	879,148,738	842,813,907
1,421,856	2,479,264	3,798,199	4,820,737	5,502,698	6,006,484
1,916,840	1,792,495	3,071,892	1,843,792	2,060,037	3,001,189
7,336,922	8,077,692	8,489,375	8,759,341	10,024,178	9,200,826
687,773,029	736,343,492	765,799,878	802,724,198	896,735,651	861,022,406
\$ 1,142,944,256	\$ (620,126,914)	\$ (407,493,698)	\$ (163,802,916)	\$ 95,866,376	\$ (118,043,144.81)
\$ 29,264,877	\$ 32,696,686	\$ 33,642,497	\$ 34,246,826	\$ 36,892,203	\$ 38,604,668
294,810	488,193	661,206	786,745	902,320	1,138,101
21,388,261	(3,618,469)	19,273	4,671,168	10,727,603	6,051,941
6,489	8,117	8,808	8,963	9,981	3,895
50,954,437	29,574,527	34,331,784	39,713,702	48,532,107	45,798,605
29,406,625	31,245,906	32,979,706	33,979,837	35,651,489	37,585,484
0	0	10,008	4,888	5,760	7,565
105,693	123,015	136,983	150,387	185,763	72,141
29,512,318	31,368,921	33,126,697	34,135,112	35,843,012	37,665,190
\$ 21,442,119	\$ (1,794,394)	\$ 1,205,087	\$ 5,578,590	\$ 12,689,095	\$ 8,133,415
\$ 29,563,054	\$ 30,177,918	\$ 30,360,162	\$ 28,779,398	\$ 31,119,232	\$ 31,342,778
1,000,000	0	0	700,000	800,000	1,215,000
480,120	480,120	480,120	480,120	480,120	494,722
31,043,174	30,658,038	30,840,282	29,959,518	32,399,352	33,052,500
29,544,110	30,157,271	30,328,802	28,769,588	31,100,612	31,325,399
0	0	0	0	0	0
18,942	20,646	31,360	9,810	14,211	17,379
755,945	960,827	1,015,578	950,121	1,587,344	1,649,467
30,318,997	31,138,744	31,375,740	29,729,519	32,702,167	32,992,245
11,886	12,549	18,777	36,497	85,806	127,342
\$ 736,063	\$ (468,157)	\$ (516,681)	\$ 266,496	\$ (217,009)	\$ 187,597

Deductions from Net Position for Benefits and Refunds by Type

Last Ten Fiscal Years

MSEP

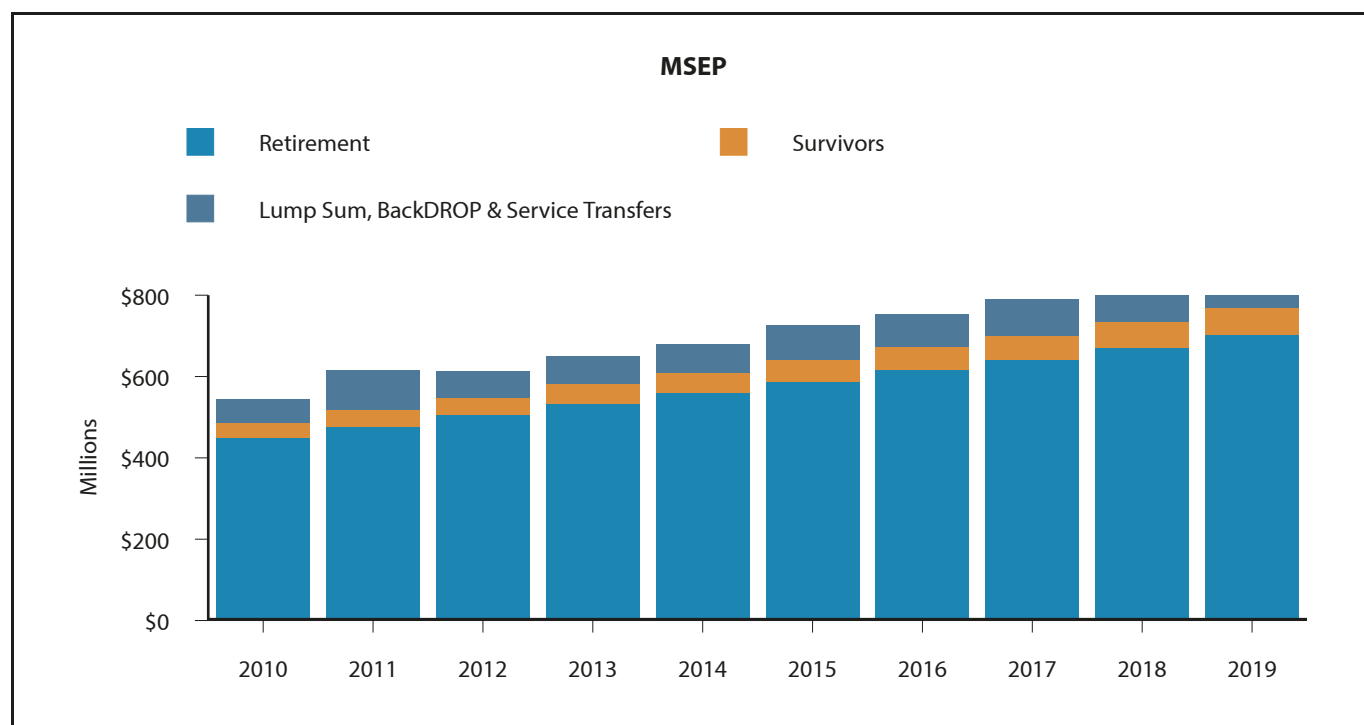
Type of benefit	2010	2011	2012	2013
Retirement	\$ 448,880,110	\$ 476,841,741	\$ 504,555,055	\$ 533,962,630
Survivors	37,718,898	39,968,601	42,963,959	46,659,381
Disability	33,403	29,191	29,503	27,255
Lump sum	409,787	293,147	229,650	191,320
BackDROP & service transfers	56,705,060	98,038,103	64,332,464	67,779,388
Total benefits	\$ 543,747,258	\$ 615,170,783	\$ 612,110,631	\$ 648,619,974

Refunds	\$ 3,106	\$ 0	\$ 123,709	\$ 622,341
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Judicial Plan

Type of benefit	2010	2011	2012	2013
Retirement	\$ 19,784,720	\$ 21,025,904	\$ 22,284,844	\$ 23,123,707
Survivors	4,445,825	4,462,627	4,536,569	4,679,169
Total benefits	\$ 24,230,545	\$ 25,488,531	\$ 26,821,413	\$ 27,802,876

Refunds	\$ 0	\$ 0	\$ 0	\$ 0
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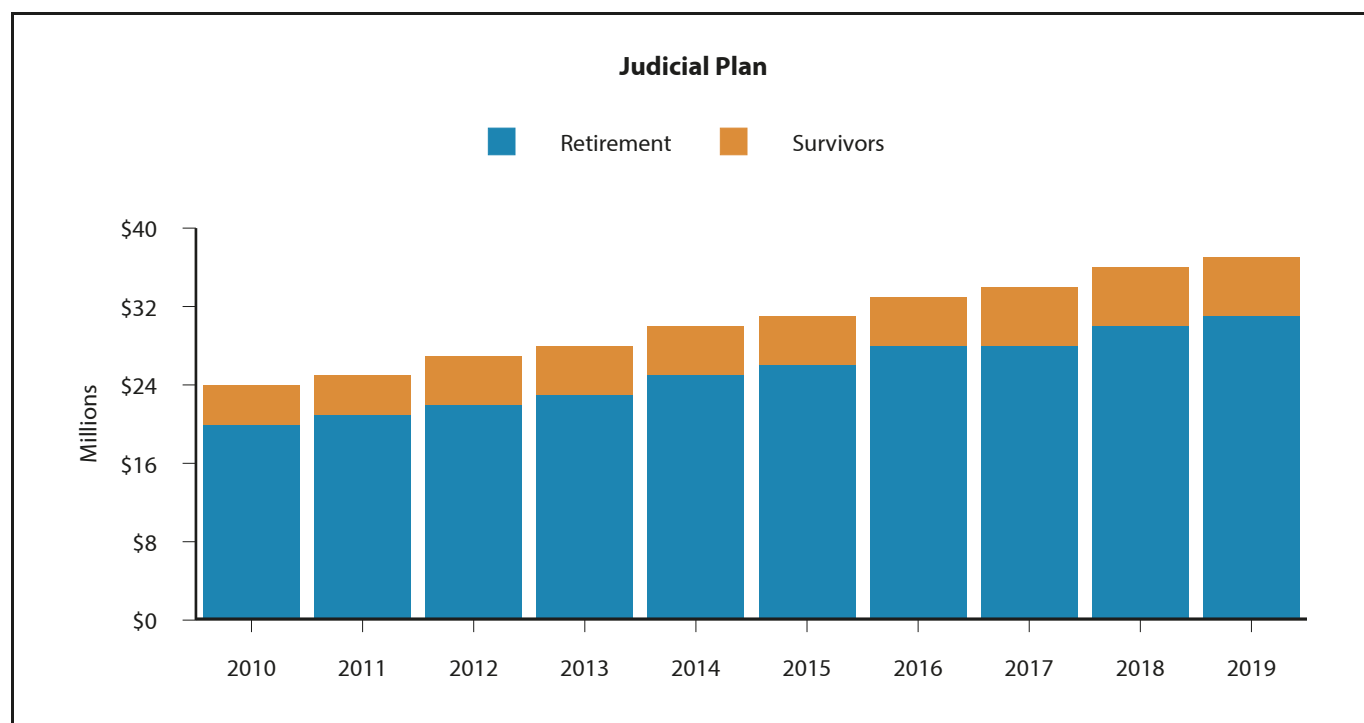


* Disability benefits are included, but amounts are too minimal to visually display in graph.

Source: MOSERS financial records

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

2014	2015	2016	2017	2018	2019
\$ 560,553,490	\$ 586,597,187	\$ 615,708,229	\$ 640,637,749	\$ 670,663,932	\$ 703,117,097
49,922,170	52,940,062	56,495,787	59,628,687	63,081,129	66,493,496
22,468	16,857	15,470	14,821	5,223	2,260
286,184	57,525	267,198	123,005	61,041,258	318,656
68,229,937	86,174,905	81,025,620	88,739,858	86,417,233	75,883,587
\$ 679,014,249	\$ 725,786,536	\$ 753,512,304	\$ 789,144,120	\$ 881,208,775	\$ 845,815,096
\$ 1,421,856	\$ 2,479,264	\$ 3,798,199	\$ 4,820,737	\$ 5,502,698	\$ 6,006,484
24,609,421	26,181,505	27,641,108	28,304,733	29,655,995	31,463,475
4,797,204	5,064,400	5,338,598	5,675,104	5,995,494	6,122,009
\$ 29,406,625	\$ 31,245,905	\$ 32,979,706	\$ 33,979,837	\$ 35,651,489	\$ 37,585,484
\$ 0	\$ 0	\$ 10,008	\$ 4,888	\$ 5,760	\$ 7,565



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

Source: MOSERS' financial records

Pension Trust Funds

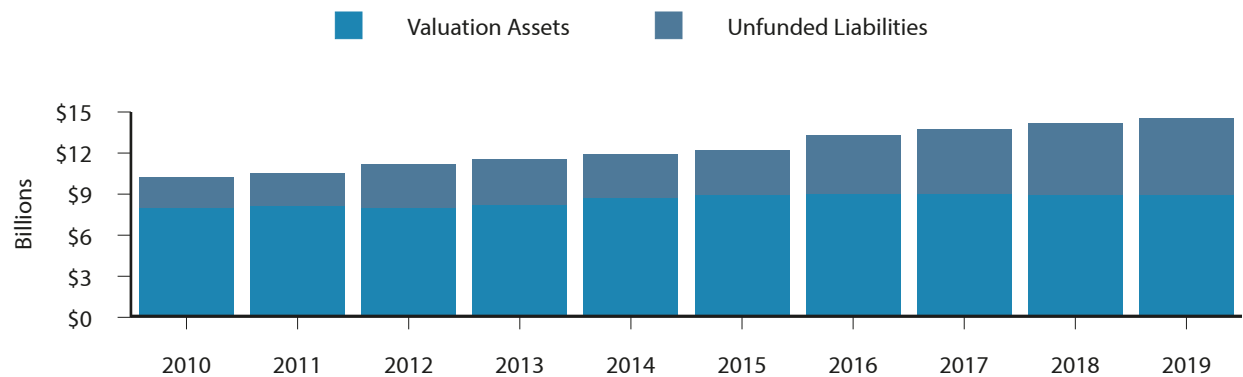
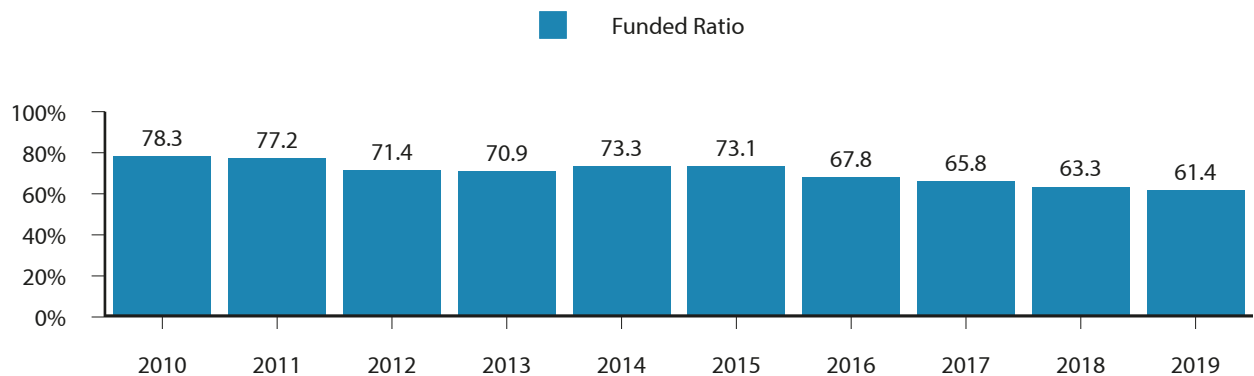
Valuation Assets (Smoothed Market) vs. Pension Liabilities

Last Ten Fiscal Years

MSEP & Judicial Plans Combined

Dollars in Billions

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2010	\$ 8.0124	\$ 2.2228	\$ 10.2352	78.3%
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

Actuarial Accrued Liabilities | All Plans Combined**Valuation Assets as Percent of Pension Liabilities | All Plans Combined**

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

Pension Trust Funds

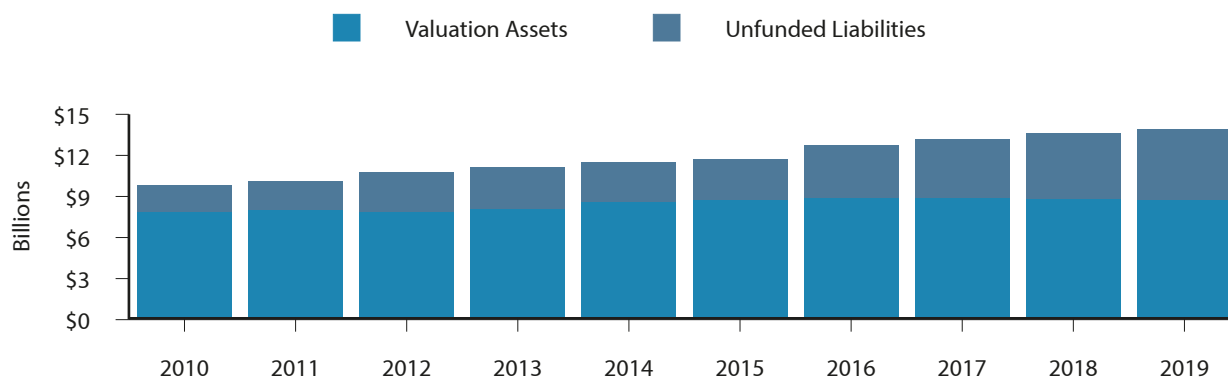
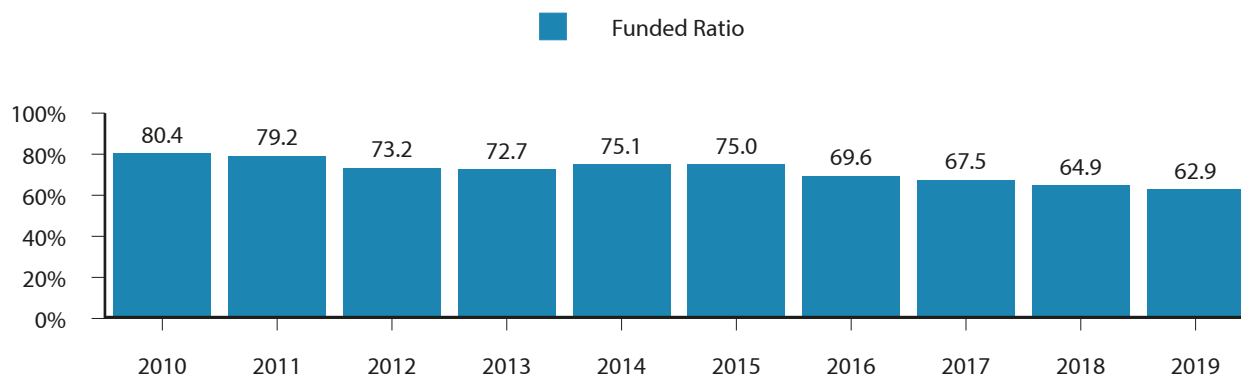
Valuation Assets (Smoothed Market) vs. Pension Liabilities

Last Ten Fiscal Years

MSEP

Dollars in Billions

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2010	\$ 7.9234	\$ 1.9298	\$ 9.8532	80.4%
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

Actuarial Accrued Liabilities | MSEP**Valuation Assets as Percent of Pension Liabilities | MSEP**

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

Pension Trust Funds

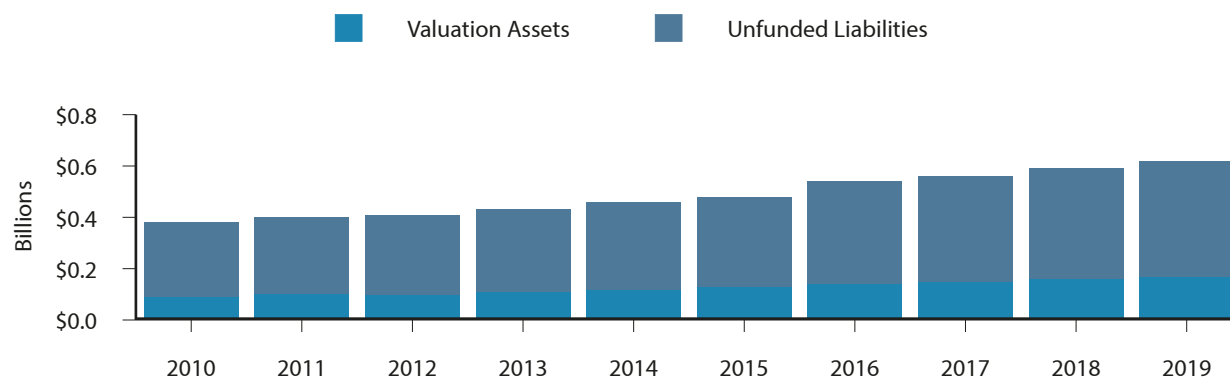
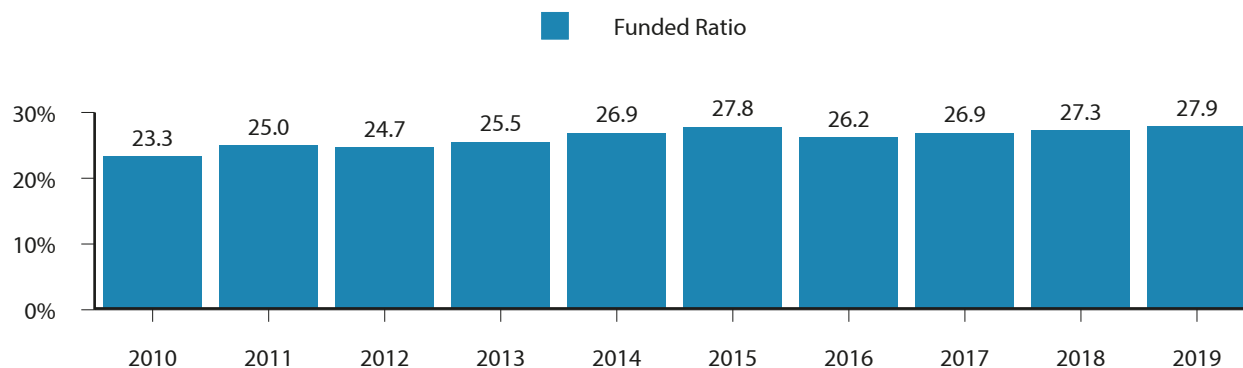
Valuation Assets (Smoothed Market) vs. Pension Liabilities

Last Ten Fiscal Years

Judicial Plan

Dollars in Billions

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2010	\$ 0.0890	\$ 0.2930	\$ 0.3820	23.3%
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

Actuarial Accrued Liabilities | Judicial Plan**Valuation Assets as Percent of Pension Liabilities | Judicial Plan**

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

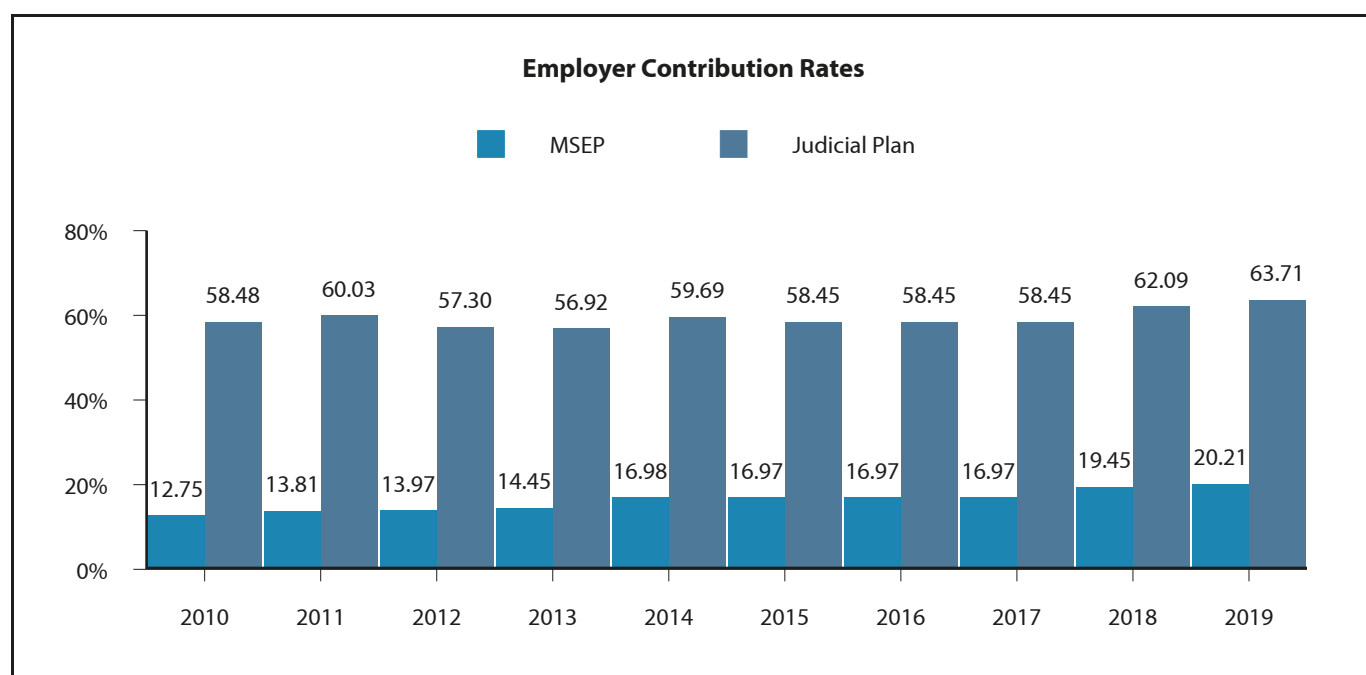
Pension Trust Funds

Employer Contribution Rates as a Percent of Payroll

Last Ten Fiscal Years

Fiscal Year	MSEP	Judicial
2010	12.75%	58.48%
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

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



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

Membership in Retirement Plans

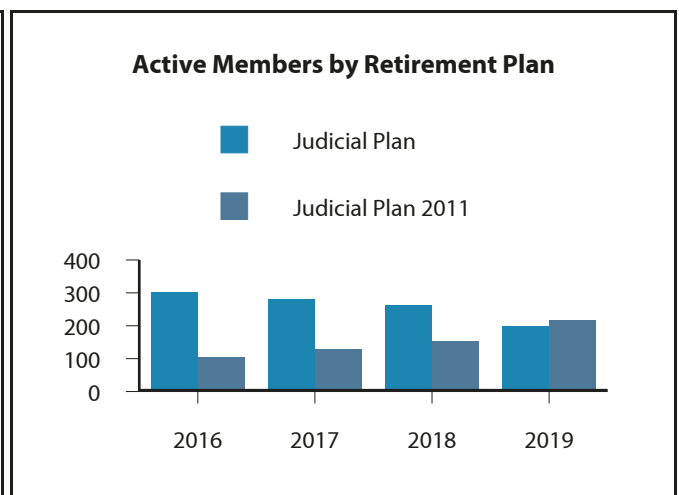
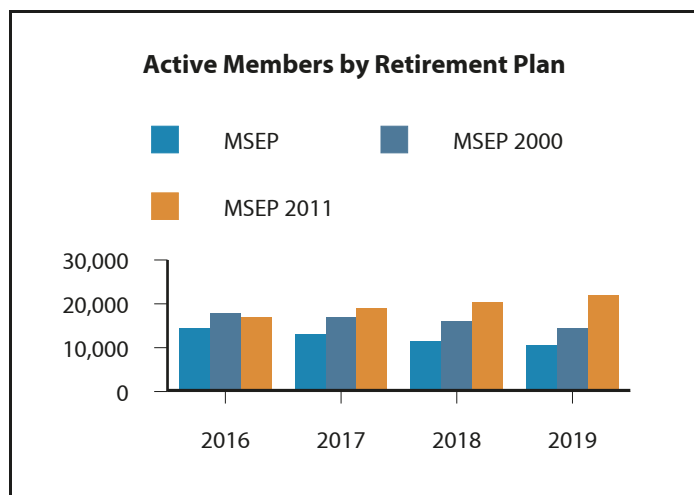
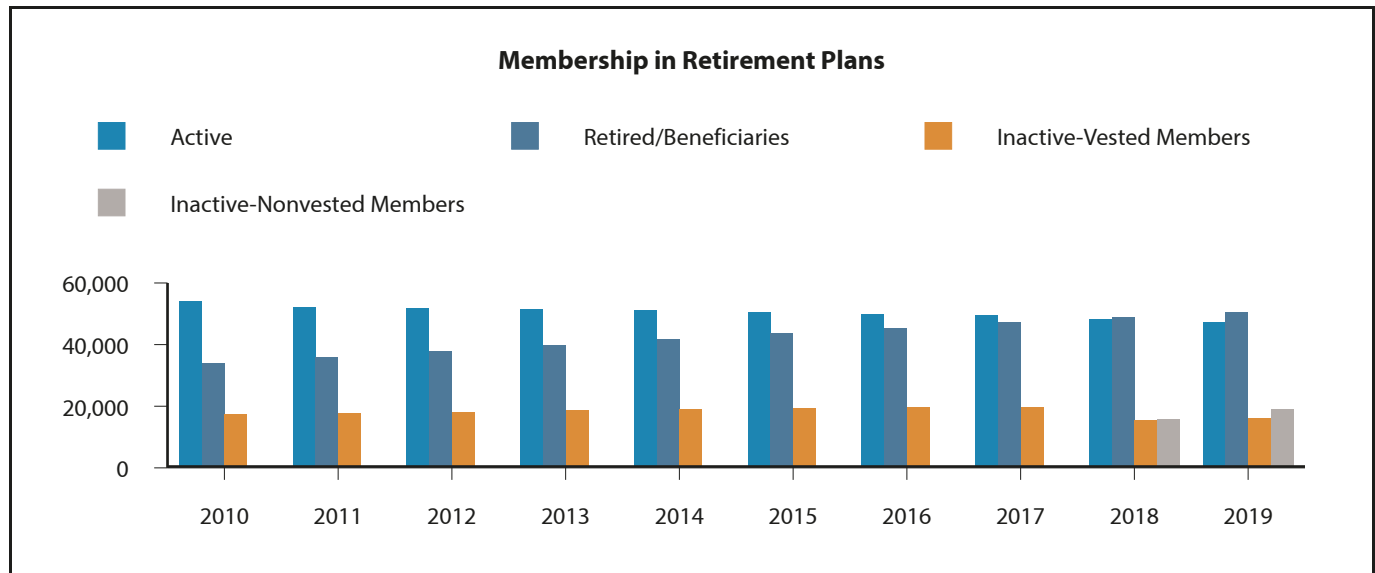
Last Ten Fiscal Years

MSEP & Judicial Plans Combined

Fiscal Year	Active Members	Retirees and Beneficiaries	Inactive-Vested Members*	Inactive-Nonvested Members**	Totals
2010	53,880	33,716	17,441		105,037
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

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

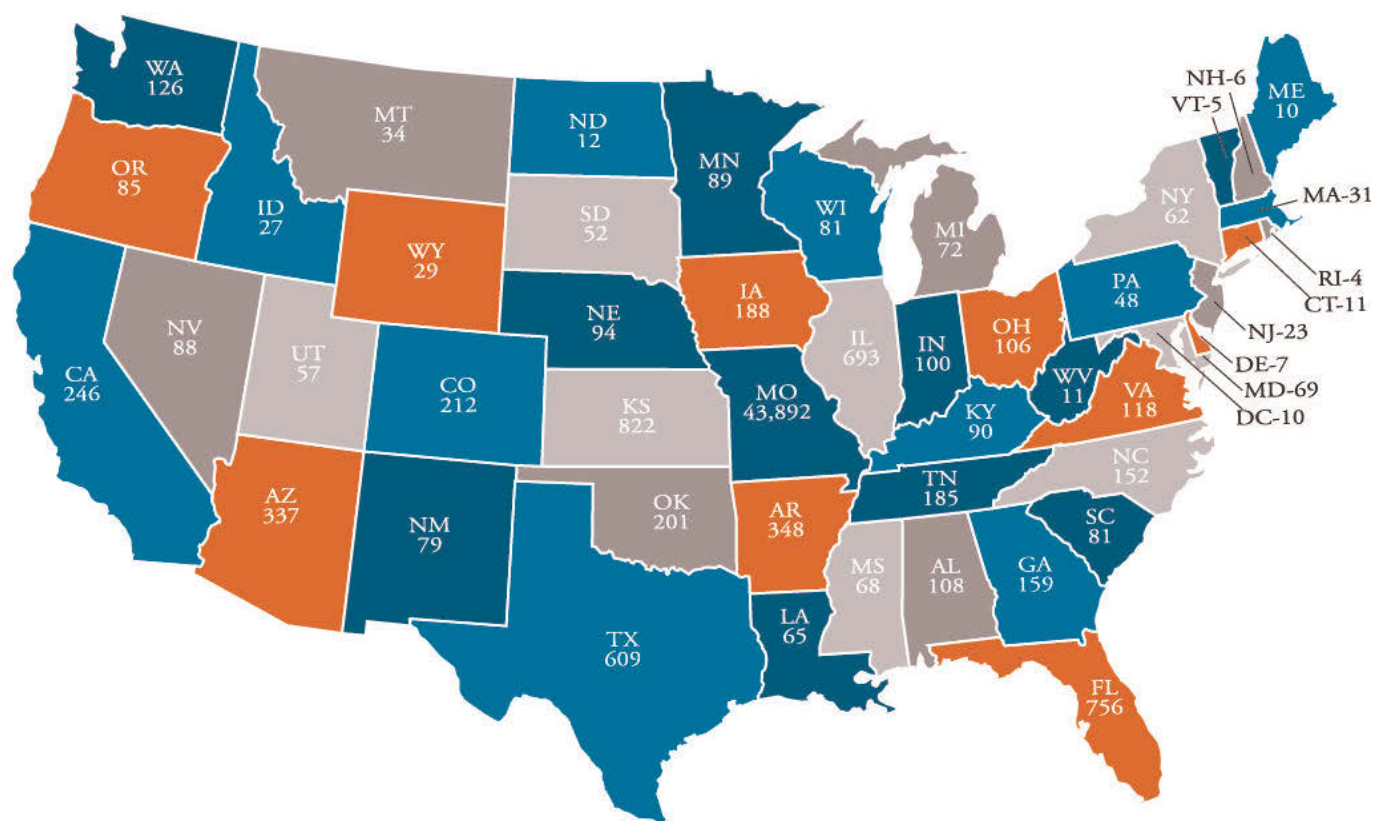
** Inactive-nonvested members of the MSEP 2011 who have not requested a refund of their contributions are now being included in the membership data.



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

Distribution of Benefit Recipients by Location

June 30, 2019



Benefit Recipients Outside the Continental United States

18 Alaska	1 Ecuador	2 Puerto Rico
14 Hawaii	1 Germany	1 Philippines
1 Army Post Office	1 Guam	1 Sweden
1 Argentina	1 Hong Kong	1 Thailand
2 Australia	1 India	2 The Netherlands
1 Brazil	2 Ireland	5 United Kingdom
12 Canada	1 Israel	2 Virgin Islands
1 Costa Rica	2 Italy	
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, 2019

MSEP

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement						
		A	B	C	D	E	F	G
1-250	5,570	2,043	2,625	250	546	1	0	105
251-500	8,374	4,119	2,924	444	777	0	0	110
501-750	5,842	3,429	1,433	316	619	0	0	45
751-1000	5,253	3,821	716	210	466	0	0	40
1001-1250	4,860	4,010	356	129	347	0	0	18
1251-1500	4,130	3,606	150	115	250	0	0	9
1501-1750	3,382	3,042	87	67	183	0	0	3
1751-2000	2,798	2,570	47	47	129	0	0	5
Over 2000	10,032	9,277	92	164	495	0	0	4
Total	50,241	35,917	8,430	1,742	3,812	1	0	339

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	4	0	3	0	1	0	0	0
1251-1500	6	0	5	1	0	0	0	0
1501-1750	5	1	1	0	1	0	0	2
1751-2000	8	0	3	3	1	0	0	1
Over 2000	548	339	60	29	116	0	0	4
Total	595	340	86	34	125	0	0	10

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)

Option Elected									
1	2	3	4	5	6	7	8	9	10
0	15	266	228	330	0	1,220	364	51	3,096
6	36	288	267	538	1	1,812	730	33	4,663
9	24	159	108	385	1	1,241	930	10	2,975
9	30	98	65	364	1	1,229	983	6	2,468
8	20	77	41	508	0	1,106	812	1	2,287
7	9	53	41	485	0	949	605	4	1,977
7	8	51	35	419	0	749	443	0	1,670
7	4	37	16	395	0	636	347	1	1,355
77	20	93	47	1,395	0	2,721	1,351	0	4,328
130	166	1,122	848	4,819	3	11,663	6,565	106	24,819

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	1
6	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	2
5	0	0	0	0	0	0	0	0	3
515	0	0	0	20	0	0	0	1	12
550	0	0	0	21	0	1	0	1	22

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, 2019

MSEP Combined

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	24,329	\$ 350,438,388	\$ 14,404
Unreduced joint & 50% survivor	9,579	190,633,788	19,901
Joint & 100% survivor	8,373	152,323,224	18,192
Life income with 60 guaranteed payments	164	2,158,356	13,161
Life income with 120 guaranteed payments	1017	10,461,552	10,287
Life income with 180 guaranteed payments	696	5,943,096	8,539
Survivor beneficiary	3,809	48,900,528	12,838
Total	47,967	760,858,932	15,862
Disability retirement	1	2,280	2,280
Death-in-service	1,728	19,085,508	11,045
Grand totals	49,696	\$ 779,946,720	15,694

Judicial Plan Combined

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	6	\$ 411,048	\$ 68,508
Unreduced joint & 50% survivor	419	32,058,960	76,513
Joint & 100% survivor	1	11,064	11,064
Survivor beneficiary	125	4,941,228	39,530
Total	551	37,422,300	67,917
Death-in-service	34	1,178,124	34,651
Grand totals	585	\$ 38,600,424	65,984

Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports as of June 30, 2019

Benefits Tabulated by Type of Benefit and by Option

MSEP (Closed Plan)

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	5,903	\$ 91,381,176	\$ 15,480
Unreduced joint & 50% survivor	5,209	104,093,628	19,983
Joint & 100% survivor	3,157	71,186,940	22,549
Life income with 60 guaranteed payments	144	1,851,432	12,857
Life income with 120 guaranteed payments	170	2,118,912	12,464
Survivor beneficiary	2,638	37,521,372	14,223
Total	17,221	308,153,460	17,894
Disability retirement	1	2,280	2,280
Death-in-service	1,437	17,685,096	12,307
Grand totals	18,659	\$ 325,840,836	17,463

MSEP 2000

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	18,376	\$ 258,850,428	\$ 14,086
Unreduced joint & 50% survivor	4,359	86,478,072	19,839
Joint & 100% survivor	5,190	81,024,588	15,612
Life income with 60 guaranteed payments	20	306,924	15,346
Life income with 120 guaranteed payments	842	8,320,932	9,882
Life income with 180 guaranteed payments	689	5,897,028	8,559
Survivor beneficiary	1,171	11,379,156	9,717
Total	30,647	452,257,128	14,757
Death-in-service	289	1,381,956	4,782
Grand totals	30,936	\$ 453,639,084	14,664

MSEP 2011

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	50	\$ 206,784	\$ 4,136
Unreduced joint & 50% survivor	11	62,088	5,644
Joint & 100% survivor	26	111,696	4,296
Life income with 60 guaranteed payments	0	0	0
Life income with 120 guaranteed payments	5	21,708	4,342
Life income with 180 guaranteed payments	7	46,068	6,581
Survivor beneficiary	0	0	0
Total	99	448,344	4,529
Death-in-service	2	18,456	9,228
Grand totals	101	\$ 466,800	4,622

Benefits by Type of Benefit and by Option

Judicial Plan

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	4	\$ 328,320	\$ 82,080
Unreduced joint & 50% survivor	419	32,058,960	76,513
Joint & 100% survivor	0	0	0
Survivor beneficiary	125	4,941,228	39,530
Total	548	37,328,508	68,118
Death-in-service	34	1,178,124	34,651
Grand totals	582	\$ 38,506,632	66,163

Judicial Plan 2011

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life income annuity	2	\$ 82,728	\$ 41,364
Unreduced joint & 50% survivor	0	0	0
Joint & 100% survivor	1	11,064	11,064
Survivor beneficiary	0	0	0
Total	3	93,792	31,264
Death-in-service	0	0	0
Grand totals	3	\$ 93,792	31,264

Source: MOSERS' MSEP and Judicial Plan Actuarial Valuation Reports as of June 30, 2019

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+	
2010	Average monthly benefit	\$ 442	\$ 287	\$ 488	\$ 777	\$ 1,186	\$ 1,606	\$ 2,138	\$ 940
	Average final average salary	\$ 6,215	\$ 2,523	\$ 2,535	\$ 2,890	\$ 3,167	\$ 3,455	\$ 3,845	\$ 2,968
	Number of retirees	2	500	449	351	394	338	222	2,256
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
Ten Years Ended June 30, 2019									
	Average monthly benefit	\$ 270	\$ 322	\$ 531	\$ 839	\$ 1,282	\$ 1,749	\$ 2,255	\$ 1,017
	Average final average salary	\$ 4,757	\$ 2,668	\$ 2,671	\$ 3,077	\$ 3,425	\$ 3,773	\$ 4,074	\$ 3,176
	Number of retirees	52	5,709	4,941	4,179	4,607	4,316	2,238	26,042

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

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+	
2010	Average monthly benefit	\$ 60	\$ 281	\$ 475	\$ 773	\$ 1,179	\$ 1,601	\$ 2,113	\$ 932
	Average final average salary	\$ 4,258	\$ 2,519	\$ 2,519	\$ 2,890	\$ 3,154	\$ 3,456	\$ 3,815	\$ 2,957
	Number of retirees	1	496	446	350	393	337	220	2,243
2011	Average monthly benefit	\$ 39	\$ 302	\$ 472	\$ 802	\$ 1,217	\$ 1,622	\$ 2,124	\$ 992
	Average final average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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
Ten Years Ended June 30, 2019									
	Average monthly benefit	\$ 181	\$ 304	\$ 519	\$ 830	\$ 1,273	\$ 1,744	\$ 2,245	\$ 1,010
	Average final average salary	\$ 4,845	\$ 2,657	\$ 2,659	\$ 3,072	\$ 3,412	\$ 3,770	\$ 4,059	\$ 3,169
	Number of retirees	42	5,570	4,904	4,153	4,594	4,310	2,229	25,802

* 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

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+	
2010	Average monthly benefit	\$ 0	\$ 982	\$ 1,496	\$ 2,245	\$ 0	\$ 3,242	\$ 0	\$ 1,559
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993	\$ 0	\$ 2,993
	Number of retirees	0	4	1	1	0	1	0	7
2011	Average monthly benefit	\$ 0	\$ 992	\$ 1,512	\$ 2,021	\$ 2,744	\$ 3,242	\$ 0	\$ 1,247
	Average final average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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
Ten Years Ended June 30, 2019									
	Average monthly benefit	\$ 393	\$ 989	\$ 1,555	\$ 2,098	\$ 2,744	\$ 3,242	\$ 0	\$ 1,211
	Average final average salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993
	Number of retirees	6	133	23	20	3	2	0	187

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

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts

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+	
2010	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0
2011	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0
2012	Average monthly benefit	\$ 0	\$ 0	\$ 3,781	\$ 0	\$ 0	\$ 0	\$ 0	3,781
	Average final average salary	\$ 0	\$ 0	\$ 8,093	\$ 0	\$ 0	\$ 0	\$ 0	8,093
	Number of retirees	0	0	2	0	0	0	0	2
2013	Average monthly benefit	\$ 0	\$ 0	\$ 4,489	\$ 0	\$ 0	\$ 0	\$ 0	4,489
	Average final average salary	\$ 0	\$ 0	\$ 8,979	\$ 0	\$ 0	\$ 0	\$ 0	8,979
	Number of retirees	0	0	1	0	0	0	0	1
2014	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0
2015	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0
2016	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Number of retirees	0	0	0	0	0	0	0	0
2017	Average monthly benefit	\$ 0	\$ 2,993	\$ 3,099	\$ 0	\$ 5,576	\$ 0	\$ 0	3,889
	Average final average salary	\$ 0	\$ 8,979	\$ 7,207	\$ 0	\$ 11,152	\$ 0	\$ 0	9,113
	Number of retirees	0	1	1	0	1	0	0	3
2018	Average monthly benefit	\$ 1,496	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	1,496
	Average final average salary	\$ 8,979	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	8,979
	Number of retirees	1	0	0	0	0	0	0	1
2019	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	0
	Average final average 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, 2019									
	Average monthly benefit	\$ 0	\$ 2,993	\$ 3,788	\$ 0	\$ 5,576	\$ 0	\$ 0	3,602
	Average final average salary	\$ 0	\$ 8,979	\$ 8,093	\$ 0	\$ 11,152	\$ 0	\$ 0	8,783
	Number of retirees	1	1	4	0	1	0	0	7

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

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts

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+	
2010	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,886	\$ 4,886
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 7,184	\$ 7,184
	Number of retirees	0	0	0	0	0	0	2	2
2011	Average monthly benefit	\$ 0	\$ 0	\$ 721	\$ 0	\$ 0	\$ 3,086	\$ 4,553	\$ 3,200
	Average final average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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 average salary	\$ 0	\$ 0	\$ 2,659	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,659
	Number of retirees	0	0	1	0	0	0	0	1
Ten Years Ended June 30, 2019									
	Average monthly benefit	\$ 0	\$ 69	\$ 724	\$ 1,177	\$ 0	\$ 3,086	\$ 4,551	\$ 2,738
	Average final average salary	\$ 0	\$ 1,291	\$ 2,710	\$ 3,329	\$ 0	\$ 5,077	\$ 6,752	\$ 4,801
	Number of retirees	0	1	3	3	0	2	7	16

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

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+	
2010	Average monthly benefit	\$ 823	\$ 0	\$ 2,827	\$ 0	\$ 4,101	\$ 0	\$ 0	\$ 2,645
	Average final average salary	\$ 8,172	\$ 0	\$ 5,851	\$ 0	\$ 8,202	\$ 0	\$ 0	\$ 7,019
	Number of retirees	1	0	2	0	1	0	0	4
2011	Average monthly benefit	\$ 0	\$ 0	\$ 3,216	\$ 4,101	\$ 0	\$ 0	\$ 0	\$ 3,511
	Average final average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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 average salary	\$ 0	\$ 0	\$ 8,707	\$ 0	\$ 10,230	\$ 0	\$ 0	\$ 9,469
	Number of retirees	0	0	1	0	1	0	0	2
Ten Years Ended June 30, 2019									
	Average monthly benefit	\$ 612	\$ 2,010	\$ 3,279	\$ 4,139	\$ 4,525	\$ 4,751	\$ 4,862	\$ 3,624
	Average final average salary	\$ 6,975	\$ 7,087	\$ 6,616	\$ 8,278	\$ 9,049	\$ 9,502	\$ 9,723	\$ 8,054
	Number of retirees	2	4	7	4	9	2	2	30

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

Source: MOSERS' Pension Administration System

Average Monthly Benefit Amounts

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+	
2010	Average monthly benefit	\$ 458	\$ 1,333	\$ 4,507	\$ 3,802	\$ 0	\$ 5,181	\$ 4,973	\$ 3,972
	Average final average salary	\$ 6,597	\$ 8,000	\$ 9,577	\$ 7,604	\$ 0	\$ 10,362	\$ 9,946	\$ 9,047
	Number of retirees	1	1	2	2	0	2	3	11
2011	Average monthly benefit	\$ 0	\$ 2,188	\$ 4,615	\$ 4,566	\$ 4,807	\$ 4,866	\$ 4,650	\$ 4,384
	Average final average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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 average 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
Ten Years Ended June 30, 2019									
	Average monthly benefit	\$ 817	\$ 2,858	\$ 5,039	\$ 5,350	\$ 5,721	\$ 5,646	\$ 5,564	\$ 5,009
	Average final average salary	\$ 8,881	\$ 9,098	\$ 10,327	\$ 10,701	\$ 11,441	\$ 11,292	\$ 11,128	\$ 10,639
	Number of retirees	7	25	53	59	41	27	27	239

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, 2019

MSEP

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1979 and prior	17	\$ 69,190	\$ 339
1980	9	59,801	554
1981	15	111,918	622
1982	17	148,828	730
1983	5	50,742	846
1984	30	269,429	748
1985	43	362,854	703
1986	67	645,564	803
1987	82	963,350	979
1988	105	1,588,124	1,260
1989	140	2,390,537	1,423
1990	150	2,294,198	1,275
1991	218	4,109,307	1,571
1992	259	4,412,512	1,420
1993	371	6,515,990	1,464
1994	354	6,316,265	1,487
1995	500	9,288,783	1,548
1996	556	10,759,701	1,613
1997	571	10,558,870	1,541
1998	701	13,879,095	1,650
1999	840	16,618,923	1,649
2000	914	17,738,234	1,617
2001	1,942	37,207,365	1,597
2002	1,347	22,386,096	1,385
2003	1,502	26,282,287	1,458
2004	2,039	33,935,928	1,387
2005	1,482	22,465,122	1,263
2006	1,660	23,823,731	1,196
2007	1,978	29,312,755	1,235
2008	1,996	28,956,615	1,209
2009	2,100	31,001,237	1,230
2010	2,192	31,254,144	1,188
2011	2,809	42,196,264	1,252
2012	2,624	36,989,761	1,175
2013	2,732	37,242,528	1,136
2014	2,771	38,583,331	1,160
2015	3,049	44,649,883	1,220
2016	3,043	44,569,667	1,221
2017	2,999	47,928,464	1,332
2018	3,166	50,192,111	1,321
2019	2,846	45,034,723	1,319
	50,241	\$ 783,164,227	\$ 1,299

Source: MOSERS' Pension Administration System

Retirees and Beneficiaries Tabulated by Fiscal Year of Retirement

As of June 30, 2019

Judicial Plan

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1979 and prior	2	\$ 27,797	\$ 1,158
1980	1	22,337	1,861
1981	0	0	0
1982	0	0	0
1983	1	21,941	1,828
1984	1	23,320	1,943
1985	0	0	0
1986	0	0	0
1987	5	224,706	3,745
1988	1	78,249	6,521
1989	2	64,174	2,674
1990	4	221,214	4,609
1991	8	383,568	3,995
1992	3	152,158	4,227
1993	6	275,755	3,830
1994	3	125,818	3,495
1995	10	740,950	6,175
1996	6	296,740	4,121
1997	4	249,262	5,193
1998	12	732,754	5,089
1999	12	781,776	5,429
2000	12	884,770	6,144
2001	14	1,241,242	7,388
2002	13	1,010,457	6,477
2003	17	1,164,484	5,708
2004	16	1,072,153	5,584
2005	13	1,137,742	7,293
2006	12	466,939	3,243
2007	47	3,126,113	5,543
2008	27	1,686,160	5,204
2009	32	1,812,701	4,721
2010	14	838,746	4,993
2011	35	2,112,648	5,030
2012	19	964,274	4,229
2013	29	2,028,687	5,830
2014	24	1,465,026	5,087
2015	53	3,856,671	6,064
2016	26	1,677,271	5,376
2017	35	2,263,381	5,389
2018	31	2,292,942	6,164
2019	45	3,118,071	5,774
	595	\$ 38,642,997	\$ 5,412

Source: MOSERS' Pension Administration System

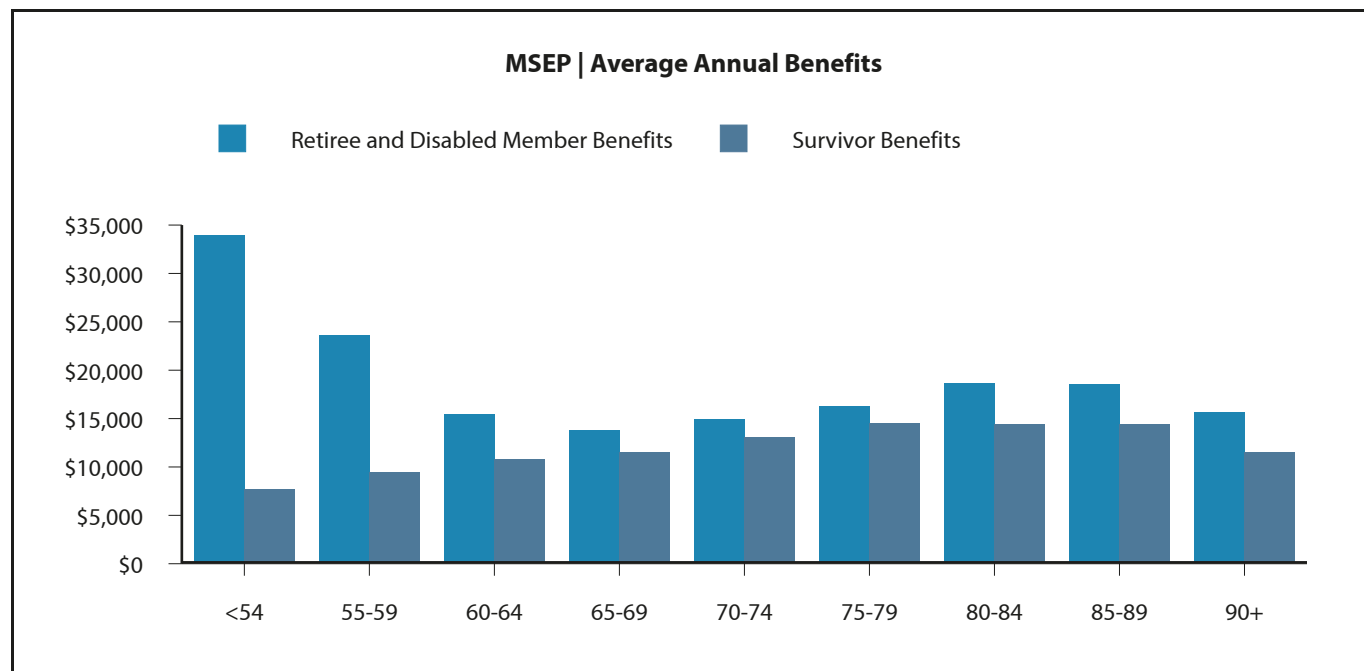
Benefits Tabulated by Attained Ages of Benefit Recipients

As of June 30, 2019

MSEP

Attained Ages	Retirees & Disabled		Beneficiaries		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
<54	460	\$ 15,606,156	574	\$ 4,389,084	1,034	\$ 19,995,240
55-59	3,120	73,789,704	334	3,169,260	3,454	76,958,964
60-64	8,221	126,831,432	533	5,738,820	8,754	132,570,252
65-69	11,662	161,138,616	744	8,529,840	12,406	169,668,456
70-74	9,614	143,706,540	835	10,924,392	10,449	154,630,932
75-79	5,500	89,726,388	802	11,623,416	6,302	101,349,804
80-84	3,071	57,163,428	758	10,939,560	3,829	68,102,988
85-89	1,631	30,261,384	584	8,395,236	2,215	38,656,620
90+	880	13,737,036	373	4,276,428	1,253	18,013,464
Totals	44,159	\$ 711,960,684	5,537	\$ 67,986,036	49,696	\$ 779,946,720

Average age at retirement: 61.5 years • Average age now: 70.5 years



Average annual benefit : \$16,123 retiree and disabled members • \$12,278 beneficiaries

Source: MOSERS' MSEP Plan Actuarial Valuation Report as of June 30, 2019

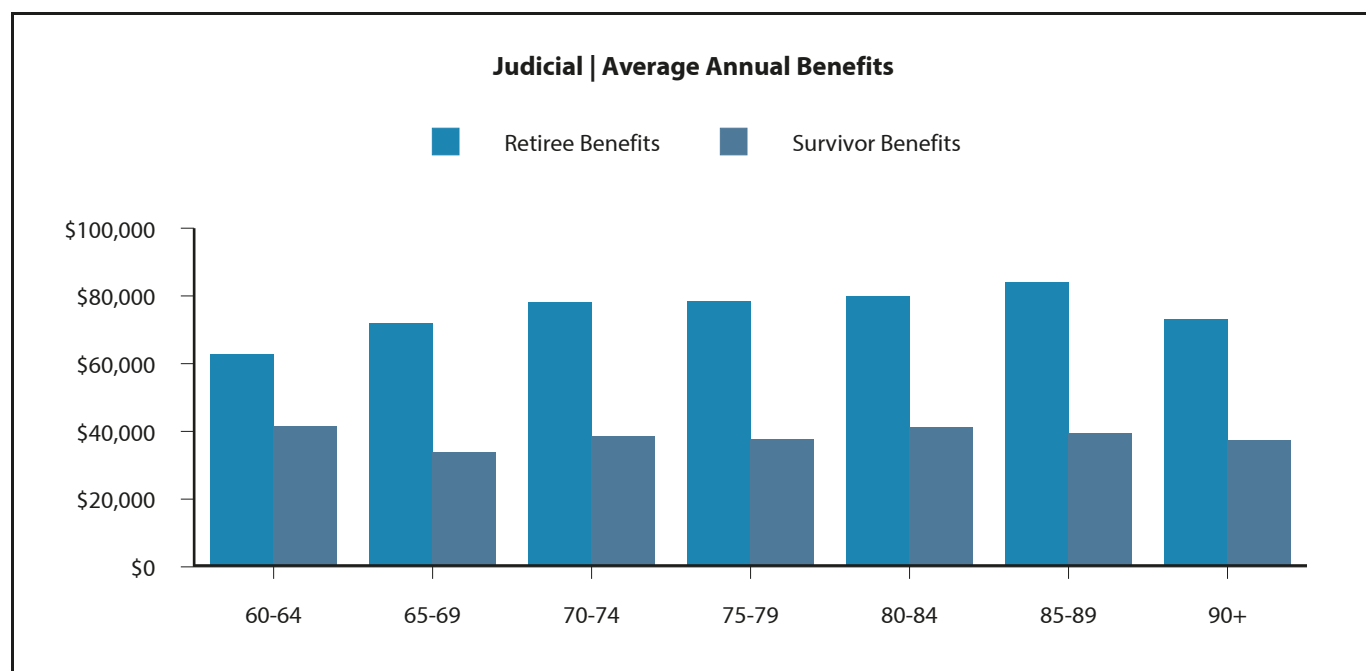
Benefits Tabulated by Attained Ages of Benefit Recipients

As of June 30, 2019

Judicial Plan

Attained Ages	Retirees		Beneficiaries		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
60-64	26	\$ 1,629,936	11	\$ 456,564	37	\$ 2,086,500
65-69	92	6,621,024	12	404,772	104	7,025,796
70-74	149	11,626,080	25	962,664	174	12,588,744
75-79	73	5,726,352	20	752,868	93	6,479,220
80-84	43	3,431,316	23	946,860	66	4,378,176
85-89	28	2,350,872	29	1,140,396	57	3,491,268
90+	15	1,095,492	39	1,455,228	54	2,550,720
Totals	426	\$ 32,481,072	159	\$ 6,119,352	585	\$ 38,600,424

Average age at retirement: 65.7 years • Average age now: 76.3 years



Average benefit paid: \$76,247 retiree and disabled members • \$38,486 beneficiaries

Source: MOSERS' Judicial Plan Actuarial Valuation Report as of June 30, 2019

Principal Participating Employers

Current Year and Nine Years Ago

Participating Employer	2019			2010		
	Covered Employees	Rank	Percent of Membership	Covered Employees	Rank	Percent of Membership
State of Missouri	41,101	1	86.9%	46,148	1	86.5%
Missouri State University	1,816	2	3.8%	1,903	2	3.6
University of Central Missouri	878	3	1.9%	1,178	3	2.2
Southeast Missouri State University	807	4	1.7%	978	4	1.8
Truman State University	567	5	1.2%	678	5	1.3
Northwest Missouri State University	540	6	1.1%	631	6	1.2
Missouri Southern State University	398	7	0.8%	441	7	0.8
Missouri Western State University	396	8	0.8%	416	9	0.8
Lincoln University	298	9	0.6%	430	8	0.8
Harris-Stowe State University	167	10	0.4%	204	10	0.4
All others	310		0.7%	339		0.6
Total	47,278		100.0%	53,346		100.0%

Source: MOSERS' Pension Administration System

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