

Actuarial Section

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Actuary's Certification Letter



Cavanaugh Macdonald

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The experience and dedication you deserve

October 19, 2018

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, 2018, for the purpose of determining contribution rates for fiscal year 2020. Actuarial valuations are prepared annually for the Missouri State Employees' Plan (MSEP) and the Judicial Plan. The board of trustees is responsible for establishing and maintaining the funding policies for both plans. The major findings of the valuations are contained in this section, which reflects the plan provisions in place on June 30, 2018, as amended by legislation passed by the 2018 legislature.

There have been no new plan provisions reflected since the prior valuation. However, based on authority granted by legislation in 2017, the board of trustees established a voluntary buyout program for inactive-vested members. The program allowed members to voluntarily elect to cash out their future monthly benefit in exchange for a one-time lump sum payment equal to 60% of the actuarial present value of their retirement benefit.

In July 2018, after extensive analysis, the MOSERS board adopted a 7.25% assumed nominal rate of investment return, effective with the June 30, 2018 actuarial valuation, along with a schedule to systematically lower the assumed nominal rate of investment return by 15 basis points per year until reaching 6.95% in the June 30, 2020 actuarial valuation.

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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Actuarial Section

The Board of Trustees
October 19, 2018
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Future actuarial measurements may differ significantly from the current measurements presented in the June 30, 2018 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, 2018 valuation reports. Accordingly, additional determinations may be needed for other purposes.

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, 2018, were also prepared as of June 30, 2018, for purposes of fulfilling financial accounting requirements for the plans under Governmental Accounting Standard Number 67 (GASB 67). The assumptions used in the funding valuation were also used for GASB 67 calculations (7.25% is the 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, 2018 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.

Handwritten signature of Patrice A. Beckham in cursive.

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

Handwritten signature of Bryan K. Hoge in cursive.

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. 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 7.50% to 7.25%.
- **General wage growth** – The assumption was lowered from 3.00% to 2.75%.
- **Payroll growth** – The assumption was lowered from 3.00% to 2.50%.
- **Unfunded actuarial accrued liability amortization method** – The method was changed from amortizing the entire unfunded actuarial accrued liability as a single base to using a “layered” bases approach.
- **Actuarial value of assets** – The 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.

Actuarial Assumptions

Economic Assumptions

- **Investment return** – 7.25%, compounded annually, net of investment expenses. (7.50% June 30, 2017 valuation)
 - This assumption will change to 7.10% for the June 30, 2019 valuation and 6.95% for the June 30, 2020 valuation and thereafter, absent board action.
- **Inflation** – 2.50% per year
- **Payroll growth** – 2.50% per year
- **Cost-of-living adjustment (COLA)** – 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect; 2.00% on a compounded basis when no minimum COLA is in effect
- **Interest on member contributions** – 1.50% per year

Actuarial Section

Demographic Assumptions

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

MSEP/MSEP 2000/MSEP2011

- **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 June 30, 2018							
Retirement Age	Normal Retirement			Percent Retiring	Early Retirement		
	MSEP/MSEP 2000				MSEP 2011	MSEP/MSEP 2000	MSEP 2011
	Percent Retiring				Percent Retiring	Percent Retiring	Percent Retiring
	1 st Year	2 nd Year	3 rd Year				
48	20%						
49	20	10%					
50	20	10	21%				
51	20	10	21				
52	20	10	21				
53	20	10	21				
54	20	10	21				
55	20	10	21	45%			
56	20	10	21	45			
57	20	10	21	35	2.4%		
58	20	10	21	35	3.1		
59	20	10	21	30	3.0		
60	20	10	21	35	5.1		
61	19	10	21	25	6.0		
62	18	22	29	40	6.0	10.0%	
63	16	18	24	30	6.0	10.0	
64	15	17	17	20	6.0	10.0	
65	19	19	27	30		50.0	
66	24	25	28	25		50.0	
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 | June 30, 2018

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 Retiring Within the Next Year | June 30, 2018

Years of Service	Percent Retiring	
	Male	Female
0-1	8.0%	8.0%
1-2	8.0	8.0
2-3	8.0	8.0
3-4	8.0	8.0
4-5	12.0	12.0
5-6	12.0	12.0
6-7	12.0	12.0
7+	35.0	35.0

Actuarial Section

MSEP
**Separations From Active Employment Before Service Retirement
 and Individual Pay Increase Assumptions | June 30, 2018**

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 | June 30, 2018

Years of Service	Rates by Service*			
	Inflation	Productivity	Merit	Total
1	2.50%	0.25%	5.75%	8.50%
2	2.50	0.25	2.50	5.25
3	2.50	0.25	1.50	4.25
4	2.50	0.25	1.25	4.00
5	2.50	0.25	1.00	3.75
9	2.50	0.25	0.75	3.50
10	2.50	0.25	0.50	3.25
21+	2.50	0.25	0.25	3.00

* General Assembly members have a flat 2.75% assumption.

Judicial Plan

**Separations From Active Employment Before
Service Retirement and Individual Pay Increase Assumptions | June 30, 2018**

Sample Ages	Death		Disability		Service Index	Termination	
	Male	Female	Male	Female		Male	Female
25	0.03%	0.01%	0.01%	0.01%	1	0.040%	0.040%
30	0.03	0.02	0.02	0.01	2	0.010	0.023
35	0.04	0.03	0.03	0.02	3	0.013	0.023
40	0.05	0.04	0.04	0.03	4	0.013	0.023
45	0.07	0.05	0.05	0.04	5	0.013	0.023
50	0.13	0.09	0.08	0.07	6-10	0.013	0.023
55	0.24	0.16	0.13	0.12	11-15	0.017	0.023
60	0.42	0.23	0.20	0.19	16+	0.010	0.010
65	0.74	0.33	0.20	0.19			
70	1.23	0.55	0.20	0.19			

Judicial Plan

Pay Increase Assumptions | June 30, 2018

Sample Ages	Merit & Seniority	Inflation	Increase Next Year
25	2.45%	2.50%	4.95%
30	2.45	2.50	4.95
35	1.73	2.50	4.23
40	1.01	2.50	3.51
45	0.85	2.50	3.35
50	0.79	2.50	3.29
55	0.69	2.50	3.19
60	0.25	2.50	2.75
65	0.25	2.50	2.75
70	0.25	2.50	2.75

Actuarial Section

Miscellaneous Technical Assumptions | June 30, 2018

- **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.

- *MSEP 2011*

- 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, 2018. It was brought forward to June 30, 2018, by adding one month of service for all active 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, 2018. It was brought forward to June 30, 2018, by adding one month of service for all active 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.

Actuarial Section

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]
2009	\$ 7,876,079,342	\$ 9,494,806,715	\$ 1,618,727,373	83.0%	\$ 2,002,402,087	80.8%
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

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]
2009	\$ 81,337,881	\$ 369,106,841	\$ 287,768,960	22.0%	\$ 45,505,512	632.4%
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

See Required Schedule of Employer Contributions on page 60.

Pension Trust Funds

Summary of Member Data Included in Valuations | June 30, 2018

Active Members

Plans	Number	Payroll	Group Averages		
			Salary	Age (Yrs.)	Service (Yrs.)
MSEP					
Regular state employees	45,288	\$1,771,249,595	\$ 39,111	45.1	10.6
Elected officials	6	659,976	109,996	45.0	2.2
Legislative clerks	10	348,806	34,881	67.2	19.8
Legislators	192	6,907,919	35,979	52.8	5.5
Uniformed water patrol	10	704,722	70,472	42.0	16.2
Conservation department	1,359	60,574,106	44,573	44.5	14.1
School-term salaried employees	923	72,540,065	78,592	57.9	22.0
Administrative law judges	18	2,157,813	119,879	60.4	23.8
Total MSEP	47,806	\$1,915,143,002	40,061	45.4	10.9
Judicial Plan	415	\$ 59,551,874	\$ 143,498	56.4	11.5

Retired Lives

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age (Yrs.)
MSEP				
Retirement	42,836	\$ 680,963,952	\$ 15,897	70.1
Disability	1	2,244	2,244	62.0
Survivor of active member	1,720	18,702,132	10,873	62.8
Survivor of retired member	3,650	45,203,520	12,385	75.7
Total MSEP	48,207	\$ 744,871,848	15,452	70.3
Judicial Plan	569	\$ 36,337,236	\$ 63,862	76.5

Others

Plans	Inactive-Vested	Inactive-Nonvested	Leave of Absence	Long-Term Disability
MSEP	15,476	15,619	178	732
Judicial Plan	26	0	0	0

Actuarial Section

Active Members by Attained Age and Years of Service | June 30, 2018

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	2,285	12							2,297	\$ 66,959,769
25-29	3,910	589	15						4,514	150,760,890
30-34	2,796	1,464	505	15					4,780	177,768,481
35-39	1,995	1,291	1,340	532	22				5,180	201,733,420
40-44	1,587	1,047	1,084	1,222	470	8			5,418	222,189,315
45-49	1,496	995	981	1,239	1,365	415	42		6,533	272,538,758
50-54	1,293	987	907	1,148	1,147	918	350	27	6,777	289,232,544
55-59	1,176	895	937	1,175	1,024	612	425	146	6,390	271,037,305
60-64	685	645	734	781	654	355	231	148	4,233	183,922,716
65+	199	303	300	288	227	135	104	128	1,684	78,999,804
Totals	17,422	8,228	6,803	6,400	4,909	2,443	1,152	449	47,806	\$ 1,915,143,002

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

Group Averages: Age – 45.4 years • Service – 10.9 years • Annual pay – \$40,061

Judicial Plan

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
< 39	19	2						21	\$ 2,859,645
40-44	19	7	3					29	4,068,416
45-49	21	13	8	3				45	6,358,885
50-54	23	20	10	16	1			70	10,115,116
55-59	28	18	14	16	11	2		89	12,721,791
60-64	12	14	18	14	20	9	8	95	13,822,265
65+	1	7	15	21	11	5	6	66	9,605,756
Totals	123	81	68	70	43	16	14	415	\$ 59,551,874

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

Group Averages: Age – 56.4 years • Service – 11.5 years • Annual pay – \$143,498

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	Annual Average Pay	% Increase in Average Pay
2009	55,057	\$ 2,002,402,087	\$ 36,370	3.5%
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

Judicial Plan

Schedule of Active Member Valuation Data				
Valuation Date as of June 30	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
2009	397	\$ 45,505,512	\$ 114,623	(20.12)%
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	0.80
2018	415	59,551,874	143,498	1.20

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
2009	General employees	Retirement	2,195	\$ 37,338,992	852	\$ 9,903,887
		Survivor of active	82	996,258	54	390,167
		Survivor of retired	251	3,077,466	110	827,564
		Disability	0	876	1	4,237
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	21	746,414	8	120,396
		Survivor of active	0	5,137	1	14,128
		Survivor of retired	4	84,108	2	20,473
	Elected officials	Retirement	2	105,141	0	0
		Survivor of active	0	2,997	0	0
		Survivor of retired	0	1,274	0	0
	ALJs	Retirement	3	168,517	2	90,337
		Survivor of retired	2	57,238	1	27,354
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
	ALJs	Retirement	3	113,877	1	46,794
		Survivor of retired	0	7,332	0	0

Source of Data: MOSERS benefit payment database as of June 30, 2018.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2018.

Rolls at End of Year					
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances	
27,942	\$ 425,200,398	6.90%	\$ 15,217	1.76%	
1,364	12,095,246	5.28	8,867	3.10	
2,259	22,538,130	11.09	9,977	4.15	
10	33,055	(9.23)	3,306	(0.15)	
13	55,953	0.00	4,304	0.00	
1	2,624	0.00	2,624	0.00	
262	5,207,953	13.66	19,878	8.03	
13	146,210	(5.79)	11,247	1.45	
56	771,979	8.98	13,785	5.09	
14	620,135	20.42	44,295	3.21	
1	77,924	4.00	77,924	4.00	
1	33,117	4.00	33,117	4.00	
26	1,177,522	7.11	45,289	2.99	
11	275,852	12.15	25,077	1.95	
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	2.28	
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	

Retirees and Beneficiaries Added and Removed continued on pages 112-113.

Actuarial Section

Retirees and Beneficiaries Added and Removed continued from pages 110-111.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2011	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
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	

Source of Data: MOSERS benefit payment database as of June 30, 2018.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2018.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
31,365	\$ 480,509,154	6.79%	\$ 15,320	0.12%
1,417	13,526,323	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
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

Retirees and Beneficiaries Added and Removed continued on pages 114-115.

Actuarial Section

Retirees and Beneficiaries Added and Removed continued from pages 112-113.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
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
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

Source of Data: MOSERS benefit payment database as of June 30, 2018.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2018.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
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
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

Retirees and Beneficiaries Added and Removed continued on pages 116-117.

Actuarial Section

Retirees and Beneficiaries Added and Removed continued from pages 114-115.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
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
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

Source of Data: MOSERS benefit payment database as of June 30, 2018.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2018.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
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
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	673,924	0.00	44,928	0.00
2	112,085	2.13	56,043	2.13
3	83,954	1.69	27,985	1.70
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

Retirees and Beneficiaries Added and Removed continued on pages 118-119.

Actuarial Section

Retirees and Beneficiaries Added and Removed continued from pages 116-117.

MSEP

Fiscal Year Ended June 30	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
2017	General employees	Retirement	2,774	\$ 43,603,596	1,266	\$17,194,704
		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
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

Source of Data: MOSERS benefit payment database as of June 30, 2018.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2018.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
41,403	\$ 643,101,731	4.28%	\$ 15,533	0.49%
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
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

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
2009	Retirement	30	\$ 1,922,615	15	\$ 957,943
	Survivor of active	1	59,484	0	0
	Survivor of retired	9	418,266	2	61,344
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

Retirees and Beneficiaries Added and Removed continued from page 120

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
326	\$ 19,624,545	5.17%	\$ 60,198	0.33%
37	1,056,425	5.97	28,552	3.10
103	3,139,829	12.83	30,484	5.16
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

Actuarial Section

Short-Term Solvency Test | Last Ten Fiscal Years

MSEP

Fiscal Year	Actuarial Accrued Liabilities for						
	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)		(1)	(2)	(3)
2009	\$ 0	\$ 4,737,859,976	\$ 4,756,946,739	\$ 7,876,079,342	100.0%	100.0%	66.0%
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

Judicial Plan

Fiscal Year	Actuarial Accrued Liabilities for						
	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)		(1)	(2)	(3)
2009	\$ 0	\$ 231,505,591	\$ 137,601,250	\$ 81,337,881	100.0%	35.1%	0.0%
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	154,480,572	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	176,495,255	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

Analysis of Financial Experience | Year Ended June 30, 2018

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		Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
	\$ Millions	Valuation Date June 30
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$ 4,279.9	2009 (5.2)
Asset adjustment for GASB 75	3.7	2010 (4.0)
Normal cost from last valuation	146.4	2011 (2.4)
Actual employer and member contributions	(407.9)	2012 (4.7)
Administrative expenses	9.8	2013 (2.8)
Interest accrual	317.6	2014 2.1
Expected UAAL before changes	4,349.5	2015 (0.9)
Change from voluntary buyout program	(40.5)	2016 (3.2)
Change from any changes in benefits, assumptions, or methods	354.3	2017 (1.6)
Expected UAAL after changes	4,663.3	2018 (0.9)
Less: Actual UAAL at end of year	(4,782.3)	
Gain (loss) during year from experience	\$ (119.0)	
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$13,445)	(0.9)%	

Judicial		Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
	\$ Millions	Valuation Date June 30
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$412.6	2009 (1.8)
Asset adjustment for GASB 75	0.1	2010 (1.1)
Normal cost from last valuation	12.1	2011 (0.4)
Actual employer and member contributions	(37.8)	2012 (0.6)
Administrative expenses	0.2	2013 (2.6)
Interest accrual	30.5	2014 1.5
Expected UAAL before changes	417.7	2015 (1.5)
Change from any changes in benefits, assumptions, or methods	12.3	2016 0.1
Expected UAAL after changes	430.0	2017 (0.3)
Less: Actual UAAL at end of year	(431.6)	2018 (0.3)
Gain (loss) during year from experience	\$ (1.6)	
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$582.8)	(0.3)%	

Comparison of Plans for General State Employees | June 30, 2018

MSEP

Benefit Provisions	MSEP (closed plan)
Membership eligibility	<ul style="list-style-type: none"> Employed prior to July 1, 2000 in a permanent position normally requiring at least 1,040 hours of work per year and vested in MSEP.
Vesting	<ul style="list-style-type: none"> 5 years
Base benefit formula	<ul style="list-style-type: none"> .016 x FAP x service <i>In the past, formula increases have been passed along to MSEP retirees.</i>
Temporary benefit formula	<ul style="list-style-type: none"> Not available
Benefit payment options	<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
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> If hired before August 28, 1997, will receive 4-5% each year until reaching the 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). If hired on or after August 28, 1997, annual COLA will be based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	<ul style="list-style-type: none"> Age 65 with 5 years of service Age 60 with 15 years of service “Rule of 80” – at least age 48 with age and service equaling 80 or more <i>Age 50 if first became eligible prior to August 28, 2003</i>
Early retirement eligibility	<ul style="list-style-type: none"> Age 55 with 10 years of service <i>Base benefit will be reduced ½ of 1% (.005) for each month member’s age is younger than normal retirement.</i>
Death before retirement	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of average compensation.
In-service COLA	<ul style="list-style-type: none"> COLA given for service beyond age 65. COLA provisions are determined by employment date.
BackDROP	<ul style="list-style-type: none"> Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP.
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 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.
Member contributions	<ul style="list-style-type: none"> None

MSEP 2000

MSEP 2011

<ul style="list-style-type: none"> • Employed for the first time on or after July 1, 2000, but prior to January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year. • If left state employment prior to becoming vested and returned to employment on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work per year. 	<ul style="list-style-type: none"> • Employed for the first time on or after January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year.
<ul style="list-style-type: none"> • 5 years • .017 x FAP x service <i>Future formula increases, if any, will not be passed along to retirees.</i> 	<ul style="list-style-type: none"> • 5 years* • .017 x FAP x service <i>Future formula increases, if any, will not be passed along to retirees.</i>
<ul style="list-style-type: none"> • .008 x FAP x service <i>Available to those who retire under the "Rule of 80."</i> 	<ul style="list-style-type: none"> • .008 x FAP x service <i>Available to those who retire under the "Rule of 90."</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 	<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
<ul style="list-style-type: none"> • 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%).
<ul style="list-style-type: none"> • Age 62 with 5 years of service "Rule of 80" – at least age 48 with age and service equaling 80 or more <i>Age 50 if first became eligible prior to August 28, 2003</i> <i>Inactive-vested members not eligible for "Rule of 80."</i> 	<ul style="list-style-type: none"> • Age 67 with 5 years of service* • "Rule of 90" – at least age 55 with age and service equaling 90 or more <i>Inactive-vested members not eligible for "Rule of 90."</i>
<ul style="list-style-type: none"> • Age 57 with 5 years of service <i>Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.</i> 	<ul style="list-style-type: none"> • Age 62 at the time of termination with 5 years of service* <i>Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.</i> <i>Inactive-vested members are not eligible.</i>
<ul style="list-style-type: none"> • Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death (<i>no minimum service requirement</i>). <ul style="list-style-type: none"> – Survivor benefit to eligible spouse or children no less than 50% of average compensation. 	<ul style="list-style-type: none"> • Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death (<i>no minimum service requirement</i>). <ul style="list-style-type: none"> – Survivor benefit to eligible spouse or children no less than 50% of average compensation.
<ul style="list-style-type: none"> • Not available 	<ul style="list-style-type: none"> • Not available
<ul style="list-style-type: none"> • Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP. 	<ul style="list-style-type: none"> • Not available
<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 qualifying public sector service at full actuarial cost. 	<ul style="list-style-type: none"> • May purchase qualifying public sector service at full actuarial cost.
<ul style="list-style-type: none"> • May transfer service under 104.1090 from other systems with written agreements to transfer required funds. 	<ul style="list-style-type: none"> • Not available
<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • 4% of pay

* Effective January 1, 2018

Comparison of Plans for Legislators | June 30, 2018

MSEP

Benefit Provisions	MSEP (closed plan)
Membership eligibility	<ul style="list-style-type: none"> Elected to the General Assembly and employed prior to July 1, 2000 and vested in MSEP.
Vesting	<ul style="list-style-type: none"> 3 full-biennial assemblies (6 years)
Base benefit formula	<ul style="list-style-type: none"> Biennial assemblies x \$150 <i>In the past, formula increases have been passed along to MSEP retirees.</i>
Temporary benefit formula	<ul style="list-style-type: none"> Not available
Benefit payment options	<ul style="list-style-type: none"> Life income annuity <i>Unreduced</i> joint & 50% survivor Joint & 100% survivor Life income with 60 guaranteed payments Life income with 120 guaranteed payments
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> If sworn in before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). If sworn in on or after August 28, 1997, COLA will be based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	<ul style="list-style-type: none"> Age 55 with 3 full-biennial assemblies or “Rule of 80” – at least age 48 with age and service equaling 80 or more
Early retirement eligibility	<ul style="list-style-type: none"> Not available
Death before retirement	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of the rate of compensation.
In-service COLA	<ul style="list-style-type: none"> COLA given for service beyond age 65. COLA provisions are determined by employment date.
BackDROP	<ul style="list-style-type: none"> Not available
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 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.
Member contributions	<ul style="list-style-type: none"> None

MSEP 2000	MSEP 2011
<ul style="list-style-type: none"> Elected to the General Assembly and employed on or after July 1, 2000, but prior to January 1, 2011 	<ul style="list-style-type: none"> Elected to the General Assembly and first employed in a benefit-eligible position on or after January 1, 2011
<ul style="list-style-type: none"> 3 full-biennial assemblies (6 years) 	<ul style="list-style-type: none"> 3 full-biennial assemblies (6 years)
<ul style="list-style-type: none"> (Active legislator's pay ÷ 24) x service <i>Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.</i> 	<ul style="list-style-type: none"> (Active legislator's pay ÷ 24) x service <i>Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.</i>
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> Life income annuity 	<ul style="list-style-type: none"> Life income annuity
<ul style="list-style-type: none"> Joint & 50% survivor 	<ul style="list-style-type: none"> Joint & 50% survivor
<ul style="list-style-type: none"> Joint & 100% survivor 	<ul style="list-style-type: none"> Joint & 100% survivor
<ul style="list-style-type: none"> Life income with 120 guaranteed payments 	<ul style="list-style-type: none"> Life income with 120 guaranteed payments
<ul style="list-style-type: none"> Life income with 180 guaranteed payments 	<ul style="list-style-type: none"> Life income with 180 guaranteed payments
<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member of the general assembly. 	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active member of the general assembly.
<ul style="list-style-type: none"> Age 55 with 3 full-biennial assemblies or 	<ul style="list-style-type: none"> Age 62 at time of termination with 3 full-biennial assemblies or
<ul style="list-style-type: none"> "Rule of 80" – at least age 50 with age and service equaling 80 or more <i>Inactive-vested members not eligible for "Rule of 80."</i> 	<ul style="list-style-type: none"> "Rule of 90" – at least age 55 with age and service equaling 90 or more <i>Inactive-vested members not eligible for "Rule of 90."</i>
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. 	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children.
<ul style="list-style-type: none"> Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of rate of compensation. 	<ul style="list-style-type: none"> Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of rate of compensation.
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<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 qualifying public sector service at full actuarial cost. 	<ul style="list-style-type: none"> May purchase qualifying public sector service at full actuarial cost.
<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds. 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 4% of pay

Comparison of Plans for Statewide Elected Officials | June 30, 2018

MSEP

Benefit Provisions	MSEP (closed plan)
Membership eligibility	<ul style="list-style-type: none"> Elected to state office and employed prior to July 1, 2000, and vested in MSEP
Vesting	<ul style="list-style-type: none"> 4 years (1 term)
Base benefit formula	<ul style="list-style-type: none"> Less than 12 years of service FAP x .016 x service 12 or more years of service Monthly statutory compensation x .50 <i>In the past, formula increases have been passed along to MSEP retirees.</i>
Temporary benefit formula	<ul style="list-style-type: none"> Not available
Benefit payment options	<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
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> Less than 12 years of service <ul style="list-style-type: none"> If sworn in before August 28, 1997, will receive 4-5% each year until they reach 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). If sworn in between August 28, 1997, and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the average CPI (0-5%). 12 or more years of service <ul style="list-style-type: none"> 12 or more years of service will receive a COLA based on increases in statutory compensation for the highest position held. Sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). Sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the average CPI (0-5%).
Normal retirement eligibility	<ul style="list-style-type: none"> Age 60 with 15 years of service or “Rule of 80” – at least age 50 with age and service equaling 80 or more
Early retirement eligibility	<ul style="list-style-type: none"> Age 55 with 10 years of service
Death before retirement	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of current pay.
In-service COLA	<ul style="list-style-type: none"> COLA provisions determined by amount of service relative to 12 years and date of employment.
BackDROP	<ul style="list-style-type: none"> Not available
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 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.
Member contributions	<ul style="list-style-type: none"> None

MSEP 2000

MSEP 2011

<ul style="list-style-type: none"> Elected to state office and employed for the first time on or after July 1, 2000, but prior to January 1, 2011 	<ul style="list-style-type: none"> Elected to state office and employed for the first time in a benefit-eligible position on or after January 1, 2011
<ul style="list-style-type: none"> 4 years (1 term) 	<ul style="list-style-type: none"> 4 years (1 term)
<ul style="list-style-type: none"> (Active elected official's 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> 	<ul style="list-style-type: none"> (Active elected official's 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>
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<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 	<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
<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active statewide elected official. 	<ul style="list-style-type: none"> Benefit adjustment based on increase in pay for an active statewide elected official.
<ul style="list-style-type: none"> Age 55 with 4 years of service or "Rule of 80" – at least age 50 with age and service equaling 80 or more <i>Inactive-vested members not eligible for "Rule of 80."</i> 	<ul style="list-style-type: none"> Age 62 with 4 years of service or "Rule of 90" – at least age 55 with age and service equaling 90 or more at the time of termination <i>Inactive-vested members not eligible for "Rule of 90."</i>
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of current pay. 	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of current pay.
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Not available
<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 qualifying public sector service at full actuarial cost. 	<ul style="list-style-type: none"> May purchase qualifying public sector service at full actuarial cost.
<ul style="list-style-type: none"> May transfer service under 104.1090 from other systems with written agreements to transfer required funds. 	<ul style="list-style-type: none"> Not available
<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 4% of pay

Comparison of Plans for Judges | June 30, 2018

Judicial Plan

Benefit Provisions	Judicial Plan (closed plan)
Membership eligibility	<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.
Vesting	<ul style="list-style-type: none"> • Immediate
Base benefit formula	<ul style="list-style-type: none"> • Monthly pay x .50 = monthly base benefit
Temporary benefit formula	<ul style="list-style-type: none"> • Not available
Benefit payment options	<ul style="list-style-type: none"> • Life income annuity • Automatic <i>unreduced</i> joint and 50% survivor option <i>If married at least two continuous years immediately preceding judges death.</i>
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> • If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%) • If hired on or after August 28, 1997, based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	<ul style="list-style-type: none"> • Age 62 with 12 years service • Age 60 with 15 years service • Age 55 with 20 years service
Reduced retirement eligibility	<ul style="list-style-type: none"> • Age 60 if less than 15 years service • Age 62 if less than 12 years service
Death before retirement	<ul style="list-style-type: none"> • Non duty-related death <ul style="list-style-type: none"> – Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.
In-service COLA	<ul style="list-style-type: none"> • Judges who are at least age 60 and work beyond the date first eligible for unreduced benefits will receive COLAs for each year worked beyond normal retirement eligibility. COLA provisions are determined by date of employment.
BackDROP	<ul style="list-style-type: none"> • Not available
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 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.
Member contributions	<ul style="list-style-type: none"> • None

Judicial Plan 2011

- 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; 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 appointed or elected a judge and employed in a benefit-eligible position as a judge for the first time on or after January 1, 2011.

- Immediate

- Monthly pay x .50 = monthly base benefit

- Not available

- Life income annuity

- Joint & 50% survivor

- Joint & 100% survivor

- Life income with 120 guaranteed payments

- Life income with 180 guaranteed payments

- Based on 80% of the percentage increase in the average CPI (0-5%)

- Age 67 with 12 years service

- Age 62 with 20 years service

- Age 67 if less than 12 years service

- Age 62 if less than 20 years service

- Non duty-related death

- Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.

- Not available

- Not available

- May purchase qualifying public sector service at full actuarial cost.

- May transfer state service to other positions covered by MOSERS under 104.800.

- 4% of pay

Comparison of Plans for Uniformed Members of the Water Patrol* | June 30, 2018

MSEP

Benefit Provisions	MSEP (closed plan)	MSEP 2000
Membership eligibility	<ul style="list-style-type: none"> Employed prior to July 1, 2000 in a permanent position normally requiring at least 1,040 hours of work a year, and vested in MSEP. 	<ul style="list-style-type: none"> Employed for the first time on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year. Members who left state employment prior to becoming vested and returned to work on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year.
Vesting	<ul style="list-style-type: none"> 5 years of service 	<ul style="list-style-type: none"> 5 years of service
Base benefit formula	<ul style="list-style-type: none"> 1.6% x FAP x service increased by 33.3% 	<ul style="list-style-type: none"> 1.7% x FAP x service
Temporary benefit formula	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> 0.8% x FAP x service <i>(must retire under "Rule of 80")</i>
Benefit payment options	<ul style="list-style-type: none"> Life income annuity <i>Unreduced</i> joint and 50% survivor Joint & 100% survivor 60 or 120 guaranteed payments 	<ul style="list-style-type: none"> Life income annuity Joint & 50% survivor Joint & 100% survivor 120 or 180 guaranteed payments
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met, the rate is based on 80% of the percentage increase in the average CPI (0-5%). If hired on or after August 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%).
Normal retirement eligibility	<ul style="list-style-type: none"> Age 55 with 5 years of service "Rule of 80" – minimum age 48 	<ul style="list-style-type: none"> Age 62 with 5 years of service "Rule of 80" – minimum age 48
Early retirement eligibility	<ul style="list-style-type: none"> Not available 	<ul style="list-style-type: none"> Age 57 with 10 years of service
Death before retirement	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of current pay. 	<ul style="list-style-type: none"> Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> Survivor benefit to eligible spouse or children no less than 50% of current pay.
In-service COLA	<ul style="list-style-type: none"> COLA given for service beyond age 65. COLA provisions are determined by employment date. 	<ul style="list-style-type: none"> Not available
BackDROP	<ul style="list-style-type: none"> Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP. 	<ul style="list-style-type: none"> Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.
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 qualifying 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 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 104.1090.
Member contributions	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None

* 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, 2018

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, 2018

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

Active Members

Classification	Requirement
<p>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.</p>	<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.
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.
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

There were no changes in the MSEP or Judicial benefit plan provisions this year.

Actuarial Present Values | June 30, 2018

MSEP

Actuarial Present Value June 30, 2018	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	\$ 5,333,470,332	\$ 740,784,567	\$ 4,592,685,765
Disability benefits likely to be paid to present active members who become totally and permanently disabled	158,683,272	100,701,244	57,982,028
Survivor benefits likely to be paid to widow(er)s and children of present active members who die before retiring	63,062,882	17,164,086	45,898,796
Separation benefits likely to be paid to present active members	224,061,215	149,538,530	74,522,685
Active member totals	\$ 5,779,277,701	\$ 1,008,188,427	4,771,089,274
Members on leave of absence & LTD			
Service retirement benefits based on service rendered before the valuation date			98,279,095
Inactive-vested members			
Service retirement benefits based on service rendered before the valuation date			649,828,722
Retired lives			8,073,692,664
Pending refunds			19,874,206
Total actuarial accrued liability			13,612,763,961
Less: actuarial value of assets			8,830,410,210
Unfunded actuarial accrued liability			\$ 4,782,353,751
Funded ratio			64.9%

Actuarial Section

Actuarial Present Values | June 30, 2018

Judicial Plan

Actuarial Present Value June 30, 2018	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	\$ 253,121,720	\$ 75,009,370	\$ 178,112,350
Disability benefits likely to be paid to present active members who become totally and permanently disabled	1,436,998	1,300,956	136,042
Survivor benefits likely to be paid to widow(er)s and children of present active members who die before retiring	5,389,300	3,350,950	2,038,350
Separation benefits likely to be paid to present active members	8,848,882	9,298,238	(449,356)
Active member totals	\$ 268,796,900	\$ 88,959,514	179,837,386
Inactive-vested members			12,225,596
Retired lives			401,725,610
Total actuarial accrued liability			593,788,592
Less: actuarial value of assets			162,135,045
Unfunded actuarial accrued liability			\$ 431,653,547
Funded ratio			27.3%