



Cavanaugh Macdonald
CONSULTING, LLC

The experience and dedication you deserve

**Game Wardens' and Peace Officers' Retirement System
of the State of Montana**



**Actuarial Valuation
As of June 30, 2018**





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

October 1, 2018

Public Employees' Retirement Board
100 North Park, Suite 200
Helena, MT 59620-0139

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Game Wardens' and Peace Officers' Retirement System of the State of Montana (GWORS), prepared as of June 30, 2018.

The purpose of this report is to provide a summary of the funded status of the System as of June 30, 2018. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The valuation indicates that the statutory contribution rates are sufficient to amortize the unfunded accrued liability over a 72-year period. The asset values used to determine unfunded liabilities are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets. Therefore, liability amounts in the report cannot be used to assess a settlement of the obligation.

The promised benefits of the System are included in the actuarially calculated contribution rates, which are developed using the Entry Age Normal Cost Method. Four-year market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 3.50% annually. The assumptions recommended by the actuary and adopted by the Board, are in the aggregate, reasonably related to the experience under the Fund and to reasonable expectations of anticipated experience under the Fund.

This is to certify that Edward Macdonald and Todd Green, Principal and Consulting Actuaries for Cavanaugh Macdonald Consulting, are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. This also certifies that the undersigned have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.



Future actuarial results may differ significantly from the current results presented in this report 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 (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Edward Macdonald', with a stylized, cursive script.

Edward A. Macdonald, ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Todd B. Green', with a stylized, cursive script.

Todd B. Green, ASA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Matthew Yonz', with a stylized, cursive script.

Matthew Yonz, ASA, FCA, MAAA
Actuary



**Game Wardens' and Peace Officers' Retirement System
of the State of Montana**

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Section I: Summary of Results

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below:

VALUATION DATE	June 30, 2018	June 30, 2017
Participant Counts		
Active Members	1,010	1,012
Retirees and Beneficiaries	309	273
Disabled Members*	3	3
Terminated Vested Members	123	114
Terminated Non-Vested Members	382	304
Total**	1,827	1,706
Annual Covered Payroll of Active Members	\$ 50,823,150	\$ 49,381,004
Average Salaries from Covered Payroll	\$ 50,320	\$ 48,795
Annual Retirement Allowances for Retired Members and Beneficiaries	\$ 6,791,585	\$ 5,957,823
Assets		
Actuarial value	\$ 190,849,036	\$ 176,310,592
Market value	193,522,528	175,840,876
Actuarial Accrued Liability (AAL)	\$ 230,077,307	\$ 217,642,368
Unfunded Actuarial Accrued Liability (UAAL)	\$ 39,228,271	\$ 41,331,776
Funded Ratio	82.95%	81.01%
Market Value Rate of Return	8.81%	11.92%
Annual Cost		
Statutory Funding Rate	19.56%	19.56%
Total Normal Rate	16.09%	16.02%
Employee Contribution Rate	<u>10.56%</u>	<u>10.56%</u>
Employer Normal Rate	5.53%	5.46%
Employer Contribution Rate		
Normal Rate	5.53%	5.46%
Administrative Expense Load	0.23%	0.17%
UAAL Rate	<u>3.24%</u>	<u>3.37%</u>
Total Rate	9.00%	9.00%
Amortization Period	72 Years	70 Years
Employer Contribution Rate Necessary to Amortize UAAL over 30 Years		
Normal Rate	5.53%	5.46%
Administrative Expense Load	0.23%	0.17%
UAAL Rate (30-Year Rate)	<u>4.39%</u>	<u>4.54%</u>
Total Rate	10.15%	10.17%
Shortfall/(Surplus)	1.15%	1.17%

* Based on PERB categorization for the annual report. For actuarial purposes, 18 members in 2017 and 18 members in 2018 were valued as disabled members with offsetting reductions to the number of retired members.

** A reconciliation between participant counts used for the annual report and counts for the valuation appears at the beginning of Appendix D.



Section I: Summary of Results

As a result of this actuarial valuation of the benefits in effect under the Game Wardens' and Peace Officers' Retirement System as of June 30, 2018, the statutory employer contributions are sufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System within 72 years. The Funded Ratio is 82.95%.

Calculations based on the Market Value of Assets

MCA 19-2-407 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The June 30, 2018, market value of assets is \$2,673,492 more than the actuarial value of assets. This is due to the smoothing of investment gains and losses over a four-year period. If the market value of assets was used, the amortization period would be 53 years, and the Funded Ratio would be 84.11%.

Additional Details

MCA 19-8 sets the employer contribution at 9.00% of salary and the employee contribution at 10.56%.

The actuarial costs are calculated using the entry age actuarial cost method. This is the method used by most public plans. It is designed to provide a stable contribution rate as a percent of member pay. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law.

Investment Experience

The market assets earned 8.81% net of investment and operating expenses. As a result of prior years' unrecognized gains, the actuarial assets earned 7.01%, which is 0.64% less than the actuarial assumption of 7.65%. The return on the actuarial assets differs from the return on market assets because the actuarial value of assets spreads gains and losses over four years. The chart below shows the annual returns for the past ten years.

Year	Market Return	Actuarial Return	Assumed Investment Return	Market Return over Assumption	Actuarial Return over Assumption
7/1/2008 to 6/30/2009	(20.23)	(0.22)	8.00	(28.23)	(8.22)
7/1/2009 to 6/30/2010	12.21	(0.55)	7.75	4.46	(8.30)
7/1/2010 to 6/30/2011	21.36	1.63	7.75	13.61	(6.12)
7/1/2011 to 6/30/2012	2.31	4.43	7.75	(5.44)	(3.32)
7/1/2012 to 6/30/2013	12.69	11.13	7.75	4.94	3.38
7/1/2013 to 6/30/2014	16.97	12.62	7.75	9.22	4.87
7/1/2014 to 6/30/2015	4.58	9.47	7.75	(3.17)	1.72
7/1/2015 to 6/30/2016	2.11	8.42	7.75	(5.64)	0.67
7/1/2016 to 6/30/2017	11.92	8.15	7.75	4.17	0.40
7/1/2017 to 6/30/2018	8.81	7.01	7.65	1.16	(0.64)

Asset gains or losses result when the return on the actuarial value of assets differs from the actuarial investment return.

Amortization of the UAAL

The statutory contributions are sufficient to amortize the UAAL over a 70-year period at June 30, 2017, and are sufficient to amortize the UAAL over a 72-year period as of June 30, 2018.



Section I: Summary of Results

Funding and Benefits Policy

The Montana Public Employees' Retirement Board has adopted a Funding and Benefits Policy to provide general guidelines to help ensure decisions are made based on sound, consistent, and thoroughly examined criteria. The Funding and Benefits Policy includes guidance on the following topics:

1) Funding Requirement

a) The Funding and Benefits Policy states:

1. The Entry Age Normal Cost Method shall be applied to the projected benefits in determining the Normal Cost and Actuarial Accrued Liability.
2. Asset smoothing can be used in the valuation process to spread the recognition of investment gains and losses over a four-year period.
3. The unfunded actuarial accrued liability should be amortized over a reasonable period of time and should not exceed 30 years on a rolling basis. Generally, the funding period should be constant or decreasing.

b) Analysis: The liabilities of the System are determined using the Entry Age Normal Cost Method and are compared to the actuarial value of assets, which are developed using assets smoothing that recognizes gains and losses over a four-year period. The contributions provided for in statute are sufficient to fully amortize the unfunded actuarially accrued liability over a 72-year period. Currently this exceeds the Boards stated Funding Policy.

2) Funding Objectives

a) The Funding and Benefits Policy states: "The primary objectives are to: 1) ensure that the systems are financially sound and pay all benefits promised using assets accumulated from required employer and member contributions and investment income; and 2) achieve a well-funded status with a range of safety to absorb market volatility without creating a UAL."

b) Analysis: The contributions provided for in statute are not sufficient to fully amortize the unfunded actuarially accrued liability within 30 years. Absent significant investment return, the System is in danger of not ensuring the System will remain financially sound and is risking the ability to pay all benefits promised in the future. In addition, the System is putting at risk the ability to achieve a well-funded status with a range of safety to absorb market volatility without creating additional UAAL.

3) Benefit Enhancements

a) The Funding and Benefits Policy states: "Proposals must provide funding from sources sufficient to cover future costs. Unfunded liabilities created by the proposal must be amortized over a period of time appropriate to the retirement system, but not more than 30 years."

b) Analysis: Without the supplemental funding, a benefit enhancement would increase the amortization period of the unfunded actuarial accrued liability and further delay the goal of achieving a well-funded status with a range of safety to absorb market volatility without creating a UAAL.



Section I: Summary of Results

Sensitivity to Future Experience

The valuation results are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing the ultimate cost. The following illustrations provide simple analyses on how the costs are sensitive to changes in the assumed rate of return.

Investment Return – The investment return generally has the largest impact on the funding of the System.

Impact of Assuming 1.00% Lower Investment Return	
	<u>Funded Ratio</u>
Current Assumption 7.65%	82.95%
Lower Assumption 6.65%	<u>71.64%</u>
Increase / (Decrease)	(11.31)%
	<u>Amortization Period</u>
	<u>Increase / (Decrease)</u>
Current Assumption 7.65%	72 Years
Lower Assumption 6.65%	<u>Does not amortize</u>
Increase / (Decrease)	N/A
Impact of Assuming 0.50% Lower Investment Return	
	<u>Funded Ratio</u>
Current Assumption 7.65%	82.95%
Lower Assumption 7.15%	<u>76.97%</u>
Increase / (Decrease)	(5.98)%
	<u>Amortization Period</u>
	<u>Increase / (Decrease)</u>
Current Assumption 7.65%	72 Years
Lower Assumption 7.15%	<u>Does not amortize</u>
Increase / (Decrease)	N/A



Section I: Summary of Results

Impact of Assuming 0.50% Higher Investment Return	
	<u>Funded Ratio</u>
Current Assumption 7.65%	82.95%
Lower Assumption 8.15%	<u>88.24%</u>
Increase / (Decrease)	5.29%
	<u>Amortization Period</u>
	<u>Increase / (Decrease)</u>
Current Assumption 7.65%	72 Years
Lower Assumption 8.15%	<u>15 Years</u>
Increase / (Decrease)	(57) Years
Impact of Assuming 1.00% Higher Investment Return	
	<u>Funded Ratio</u>
Current Assumption 7.65%	82.95%
Lower Assumption 8.65%	<u>94.16%</u>
Increase / (Decrease)	11.21%%
	<u>Amortization Period</u>
	<u>Increase / (Decrease)</u>
Current Assumption 7.65%	72 Years
Lower Assumption 8.65%	<u>5 Years</u>
Increase / (Decrease)	(67) Years

The future funding status of the System will be determined by the System's experience. The System's actual asset returns and retirement rates, as well as member longevity, salary increases, withdrawal rates, disability rates and future legislation will all impact the funding status of the System. The entry age normal cost method and four-year smoothing of asset gains and losses will help to provide a more orderly funding of the System's liabilities, but will not change the actual experience. The amortization period of the UAAL is not likely to decrease by the expected 1.0 year with each passing actuarial valuation. Instead, the amortization period is expected to decrease more or less than 1.0 years each year, reflecting gains and losses due to experience different than the actuarial assumptions.

Assumption Changes

There have been no assumption changes since the previous valuation.

Benefit Changes

There have been no benefit changes since the previous valuation.

Contribution Changes

There have been no contribution changes since the previous valuation.

Method Changes

There have been no method changes since the previous valuation.



Section I: Summary of Results

Impact of Changes

The following table summarizes how experience has changed the UAAL since the June 30, 2017, Actuarial Valuation. Further detail can be found in Table 10.

Changes in the Unfunded Actuarial Accrued Liability (UAAL)

June 30, 2017 Valuation UAAL	\$41,331,776
Normal Cost (Including Expenses)	7,891,367
Contributions	(10,125,214)
Interest	<u>3,378,282</u>
Expected June 30, 2018 UAAL	\$42,476,211
Experience (Gain)/Loss on Actuarial Liabilities	\$(4,374,424)
Experience (Gain)/Loss on Actuarial Assets	1,126,484
Assumption & Method Changes	0
Plan Changes	<u>0</u>
Total (Gain) / Loss	<u>\$(3,247,940)</u>
June 30, 2018 Valuation UAAL	\$39,228,271



Section I: Summary of Results

Summary

- * The System's actuarial value investment return of 7.01% for the year ended June 30, 2018, is 0.64% less than the actuarial assumption of 7.65%. This represents an asset loss of \$1,126,484 due to investment return less than anticipated. As of June 30, 2018, the market value of assets was \$193,522,528. As of June 30, 2018, the actuarial value of assets was \$190,849,036. The June 30, 2018, market value of assets will be recognized in future actuarial valuations unless it is offset by returns less than the 7.65% assumption.

- * As of June 30, 2018, the amortization period of the UAAL is 72 years. The ultimate goal of the Board's Funding and Benefits Policy is to increase the funded status to a level such that the amortization period is below 30. Absent of significant good investment experience this goal cannot be achieved without increasing employer contributions, member contributions or a combination of the two.

- * The funding of the retirement system will be impacted by future experience, which will sometimes be more favorable than the actuarial assumptions and sometimes less favorable. In particular, investment returns larger and smaller than the 7.65% assumption are expected to have significant impacts on the System's funding progress. In the long term, the favorable experience is needed to offset the less favorable experience. This is the reason for using an actuarial value of assets that allows gains and losses to be smoothed over four years.

- * The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period. Under the level percentage of payroll method, amortization payments will not be large enough to cover interest on the UAL in the beginning of the amortization schedule, which means that as a dollar amount the UAL is expected to grow. After a period of time, amortization payments will be large enough that the amortization payments will cover both interest and principal, and the UAL as a dollar amount will be projected to decrease in each subsequent year. The payroll growth assumption is used to determine the percentage of payroll required over the remaining amortization period to fully amortize the unfunded liability. The payroll growth assumption is 3.50%.



Section II: Assets

Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2018. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

The asset valuation method being used is a four-year smoothing method. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fund's activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 summarizes historical asset returns for the last 10 years including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption. Table 5 summarizes the historical asset values on a market value and actuarial value basis, to the extent it was available. Additional data can be included in this table for future reports, if provided by the System.

**Section II: Assets**

**Table 1:
Statement of Fiduciary Net Position
Fiscal Year Ending June 30**

	<u>2018</u>	<u>2017</u>
ASSETS		
Cash and Short Term Investments	\$ 4,142,842	\$ 4,396,362
Securities Lending Collateral	\$ 1,230,998	\$ 1,001,673
Receivables:		
Interest Receivable	\$ 6,943	\$ 4,222
Accounts Receivable	57,201	24,194
Due from Other Funds	-	-
Due from Primary Government	-	-
Notes Receivable	-	-
Total Receivables	<u>\$ 64,144</u>	<u>\$ 28,416</u>
Investments, at fair value:		
Investment Pools	189,125,428	171,201,691
Other Investments	-	-
Total Investments	<u>\$ 189,125,428</u>	<u>\$ 171,201,691</u>
Capital Assets		
Property and Equipment, at cost, net of Accumulated Depreciation	\$ 366	\$ 366
Intangible Assets, at cost, net of Amortization Expense	410,443	380,981
Total Capital Assets	<u>\$ 410,809</u>	<u>\$ 381,347</u>
TOTAL ASSETS	<u>\$ 194,974,221</u>	<u>\$ 177,009,489</u>
LIABILITIES		
Securities Lending Liability	\$ 1,230,998	\$ 1,001,673
Accounts Payable	96,819	59,362
Unearned Revenue	6,508	6,508
Due to Other Funds	117,368	91,946
Compensated Absences	-	53
OPEB Implicit Rate Subsidy LT	-	9,071
TOTAL LIABILITIES	<u>\$ 1,451,693</u>	<u>\$ 1,168,613</u>
NET POSITION-RESTRICTED FOR PENSION BENEFITS	<u>\$ 193,522,528</u>	<u>\$ 175,840,876</u>

**Section II: Assets**

**Table 2:
Statement of Changes in Fiduciary Net Position
Fiscal Year Ending June 30**

	<u>2018</u>	<u>2017</u>
ADDITIONS		
Contributions:		
Employer	\$ 4,613,066	\$ 4,463,631
Plan Member	5,512,148	5,278,141
Other	-	-
Total Contributions	<u>\$ 10,125,214</u>	<u>\$ 9,741,772</u>
Misc Income	\$ -	\$ -
Investment Income:		
Net Appreciation/(Depreciation) in Fair Value of Investments	\$ 16,627,191	\$ 12,276,496
Investment Earnings	80,898	7,153,767
Security Lending Income	36,397	49,255
Investment Income/(Loss)	<u>\$ 16,744,486</u>	<u>\$ 19,479,518</u>
Investment Expense	(1,156,845)	(870,447)
Security Lending Expense	(14,524)	(19,401)
Net Investment Income/(Loss)	<u>\$ 15,573,117</u>	<u>\$ 18,589,670</u>
Total Additions	<u>\$ 25,698,331</u>	<u>\$ 28,331,442</u>
DEDUCTIONS		
Benefit Payments	\$ 6,522,921	\$ 5,809,910
Refunds/Distributions	1,105,281	1,035,917
Refunds to Other Plans	30,868	-
Transfers to DCRP	-	-
Transfers to MUS-RP	-	-
OPEB Expense	-	549
Administrative Expense	369,184	328,699
Total Deductions	<u>\$ 8,028,254</u>	<u>\$ 7,175,075</u>
NET INCREASE (DECREASE) IN PLAN NET ASSETS	<u>\$ 17,670,077</u>	<u>\$ 21,156,367</u>
NET POSITION-RESTRICTED FOR PENSION BENEFITS BEGINNING OF YEAR	\$ 175,840,876	\$ 154,684,509
ADJUSTMENT	11,575	-
END OF YEAR	<u><u>\$ 193,522,528</u></u>	<u><u>\$ 175,840,876</u></u>



Section II: Assets

**Table 3:
Determination of Actuarial Value of Assets**

Valuation Date June 30:	2017	2018	2019	2020	2021
A. Actuarial Value Beginning of Year	\$ 160,555,482	\$ 176,310,592			
B. Market Value End of Year	175,840,876	193,522,528			
C. Market Value of Beginning of Year	154,684,509	175,840,876			
D. Cash Flow					
D1. Contributions	9,741,772	10,125,214			
D2. Benefit Payments	(6,845,827)	(7,659,070)			
D3. Administrative Expenses	(328,699)	(369,184)			
D4. Investment Expenses	(889,848)	(1,171,369)			
D5. Net	<u>\$ 1,677,398</u>	<u>\$ 925,591</u>			
E. Investment Income					
E1. Market Total: B. - C. - D5.	\$ 19,478,969	\$ 16,756,061			
E2. Assumed Rate	7.75%	7.65%			
E3. Amount for Immediate Recognition C*E2. + ((D1. + D2. + D3.)*E2.*0.5) - D4.	12,977,378	14,703,405			
E4. Amount for Phased-in Recognition E1. - E3.	6,501,591	2,052,656			
F. Phased-in Recognition of Investment Income					
F1. Current Year: 0.25 * E4.	\$ 1,625,398	\$ 513,164	\$ -	\$ -	\$ -
F2. First Prior Year	(2,116,793)	1,625,398	513,164	-	-
F3. Second Prior Year	(1,112,321)	(2,116,793)	1,625,398	513,164	-
F4. Third Prior Year	2,704,050	(1,112,321)	(2,116,793)	1,625,398	513,164
F5. Total Excluded Investment Gain/(Loss)	<u>\$ 1,100,334</u>	<u>\$ (1,090,552)</u>	<u>\$ 21,769</u>	<u>\$ 2,138,562</u>	<u>\$ 513,164</u>
G. Actuarial Value End of Year	\$ 176,310,592	\$ 190,849,036			
A. + D5. + E3. + F5.					



Section II: Assets

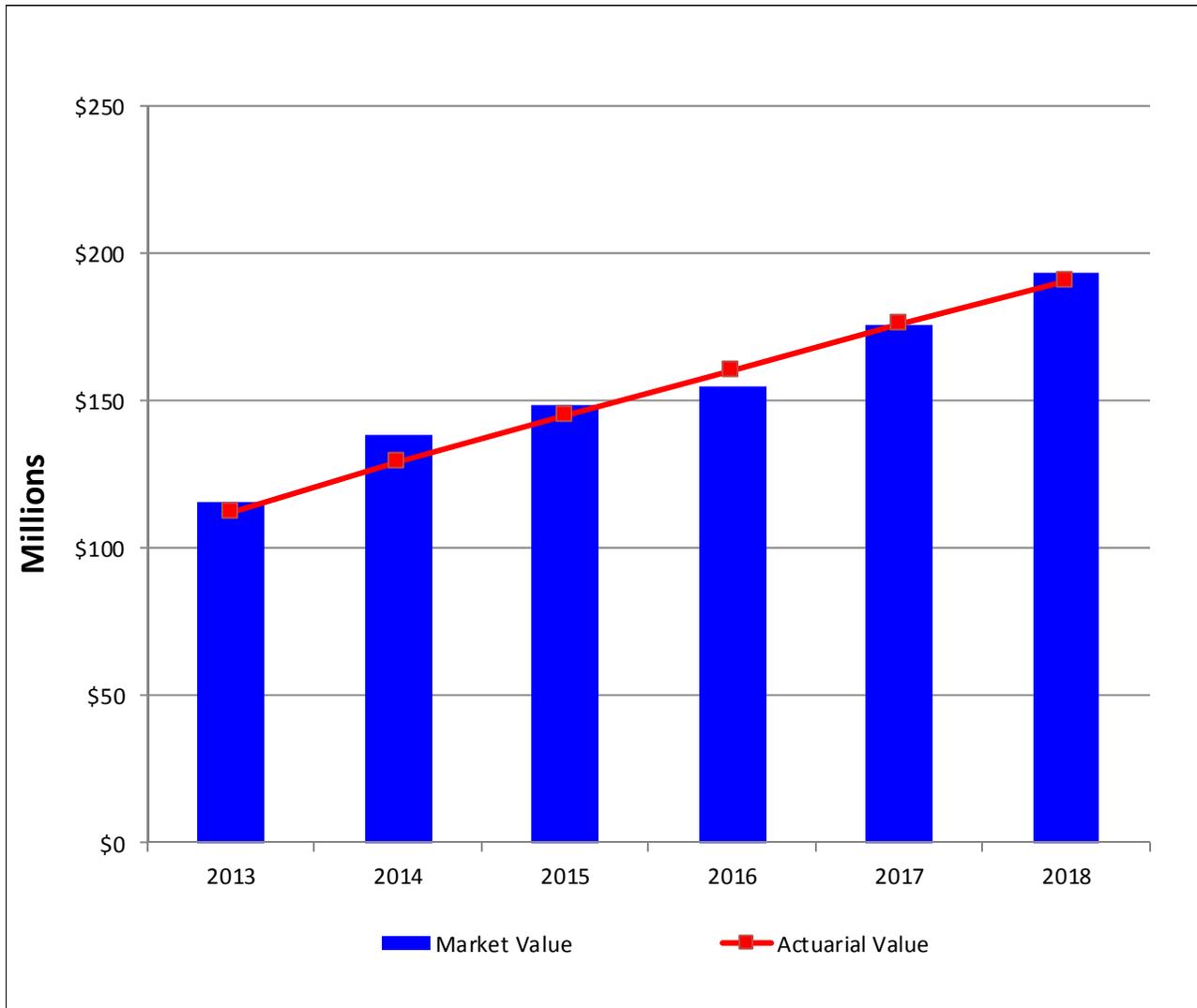
**Table 4:
Historical Investment Returns***

Fiscal Year Ending	Market Returns	Actuarial Returns	Assumed Rate of Return	Actuarial Return Over Assumption
June 30, 2009	(20.23)%	(0.22)%	8.00%	(8.22)%
June 30, 2010	12.21%	(0.55)%	7.75%	(8.30)%
June 30, 2011	21.36%	1.63%	7.75%	(6.12)%
June 30, 2012	2.31%	4.43%	7.75%	(3.32)%
June 30, 2013	12.69%	11.13%	7.75%	3.38%
June 30, 2014	16.97%	12.62%	7.75%	4.87%
June 30, 2015	4.58%	9.47%	7.75%	1.72%
June 30, 2016	2.11%	8.42%	7.75%	0.67%
June 30, 2017	11.92%	8.15%	7.75%	0.40%
June 30, 2018	8.81%	7.01%	7.65%	(0.64)%
10 Year Average	6.66%	6.12%		(1.66)%

* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses paid by the System.



**Table 5:
Market Value of Assets vs. Actuarial Value of Assets**





Section III: Actuarial Present Value of Future Benefits

Actuarial Present Value of Future Benefits

In the previous section, an actuarial valuation was related to an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 6 contains an analysis of the actuarial present value for active members, for retirees, and for beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 6 include the actuarial present value of all future benefits expected to be paid with respect to each member covered as of the valuation date. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial valuation does not recognize liabilities for employees who become members and participate in the System after the valuation date.



Section III: Actuarial Present Value of Future Benefits

**Table 6:
Actuarial Present Value of for Actives,
Retirees, and Beneficiaries**

	<u>June 30, 2018</u> Total	<u>June 30, 2017</u> Total
A. Active Members Liability Due to Probability of		
Retirement	\$ 152,985,361	\$ 152,473,638
Disability	\$ 6,686,897	\$ 6,893,505
In-Service Death	\$ 3,708,819	\$ 3,772,035
Termination	<u>\$ 17,424,867</u>	<u>\$ 17,962,431</u>
Total	\$ 180,805,944	\$ 181,101,609
B. Inactive Members and Annuitants		
Service Retirement	\$ 78,307,539	\$ 67,616,975
Disability Retirement	\$ 5,251,531	\$ 5,220,888
Beneficiaries*	\$ 5,061,893	\$ 5,058,877
Vested Terminated Members	\$ 11,808,587	\$ 10,515,824
Refund of Member Contributions	<u>\$ 1,221,728</u>	<u>\$ 1,790,818</u>
Total	<u>\$ 101,651,278</u>	<u>\$ 90,203,382</u>
C. Grand Total	\$ 282,457,222	\$ 271,304,991

* Includes survivors of active and retired members



Section IV: Employer Contributions

Employer Contributions

In the previous two sections, attention has been focused on the assets and the present value of all future benefits of the System. A comparison of Tables 3 and 6 indicates that there is a shortfall in current actuarial assets to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation sets a schedule of future contributions that will deal with this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. For this valuation, the entry age actuarial cost method has been used. A description of the entry age actuarial cost method is provided in Appendix A. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and the present value of all future benefits are allocated each year between three elements:

- A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;
- A load for administrative expenses; and
- An amount which is used to amortize the UAAL.

The two items described above, normal cost and UAAL, are the keys to understanding the actuarial cost method. Let us first discuss the normal cost.

The normal cost is the theoretical contribution rate, which will meet the ongoing costs of a group of average new employees. Suppose that a group of new employees were covered under a separate fund from which all benefits and to which all contributions and associated investment return were to be paid. Under the entry age actuarial cost method, the normal cost contribution rate is that level percentage of pay which would be exactly right to maintain this fund on a stable basis. If experience were to follow the actuarial assumptions exactly, the fund would be completely liquidated with the last payment to the last survivor of the group.

The assumed investment rate of return is 7.65%, net of investment only. As a result, the actuarially determined contribution must include an amount for administrative expenses expected to occur during the year.

We have determined the normal cost rates separately by type of benefit under the System. These are summarized in Table 7. In Table 7 we also provide a summary of the member and employer statutory contributions.

The term "fully funded" is often applied to a system where contributions for everyone at the normal cost rate will fully pay for the benefits of existing as well as new employees. Often, systems are not fully funded, either because of benefit improvements in the past that have not been completely paid for or actuarial deficiencies that have occurred because experience has not been as anticipated. Under these circumstances, a UAAL exists.



Section IV: Employer Contributions

Table 8 shows how the UAAL was derived for the System. Lines A and B show, respectively, the total present value of future benefits and the portion of the future liability that is expected to be paid from future normal cost contributions, both employer and employee. The future normal cost contributions are the portion of the present value of future benefits that are attributed to future years of service that have not been earned yet by the active membership. Line C shows the actuarial accrued liability. Line D shows the amount of assets available for benefits. Line E shows the UAAL.

The UAAL at any date after establishment of a system is affected by any actuarial gains or losses arising when the actual experience of the system varies from the experience anticipated by the actuarial assumptions used in the valuations. To the extent actual experience as it develops differs from the assumptions used, so also will the actual emerging costs differ from the estimated costs. The impact of these differences in actual experience from the assumptions is included in Section 1, the Summary of Findings.



Section IV: Employer Contributions

**Table 7:
Normal Cost Contribution Rates
As Percentages of Salary**

	<u>June 30, 2018</u> <u>Total</u>	<u>June 30, 2017</u> <u>Total</u>
Service retirements	10.34%	10.36%
Disability retirements	0.90%	0.90%
In Service Death	0.40%	0.40%
Terminations	<u>4.45%</u>	<u>4.36%</u>
Total Normal Rate	<u>16.09%</u>	<u>16.02%</u>
Employee Normal Rate	10.56%	10.56%
Employer Normal Rate	5.53%	5.46%
Administrative Expense Load	0.23%	0.17%
Rate Available to Amortize Unfunded Actuarial Accrued Liability	<u>3.24%</u>	<u>3.37%</u>
Statutory Funding Rate	19.56%	19.56%



Section IV: Employer Contributions

**Table 8:
Unfunded Actuarial Accrued Liability**

	<u>June 30, 2018</u>	<u>June 30, 2017</u>
A. Actuarial present value of all future benefits for present members and former members and their survivors (Table 6)	\$ 282,457,222	\$ 271,304,991
B. Less actuarial present value of total future normal costs for present members	\$ 52,379,915	\$ 53,662,623
C. Actuarial accrued liability	\$ 230,077,307	\$ 217,642,368
D. Less assets available for benefits	\$ 190,849,036	\$ 176,310,592
E. Unfunded actuarial accrued liability	\$ 39,228,271	\$ 41,331,776



Cash Flows

The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a “negative cash flow.” Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system’s investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows.

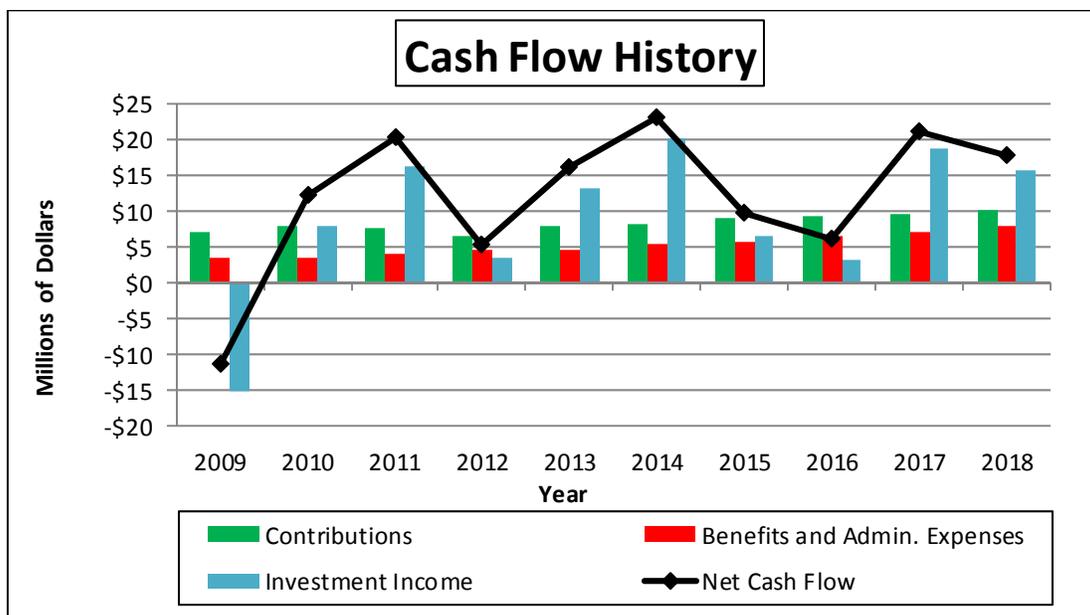
Table 9 shows the System had a positive cash flow for the year ended June 30, 2018. The System’s total cash flow including benefits payments, administrative expenses and investment earnings was \$17.7 million. Of the \$17.7 million, \$15.6 million was due to investment returns.

As long as the System had a positive cash flow, there was no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions.



Section V: Cash Flows

**Table 9:
Cash Flow History
(Dollar amounts in millions)**



Year Ended June 30	Historical Cash Flows			
	Contributions	Benefits & Administrative Expenses	Investment Income	Net Cash Flow
2009	\$ 7.2	\$ 3.4	\$ (15.1)	\$ (11.4)
2010	8.0	3.6	7.9	12.3
2011	7.7	3.9	16.3	20.1
2012	6.6	4.6	3.4	5.4
2013	7.8	4.7	13.1	16.2
2014	8.2	5.4	20.1	22.9
2015	9.0	5.6	6.4	9.8
2016	9.3	6.4	3.2	6.1
2017	9.7	7.2	18.7	21.2
2018	10.1	8.0	15.6	17.7



Section VI: Actuarial Gains of Losses

Actuarial Gains or Losses

An analysis of actuarial gains or losses is performed in conjunction with all regularly scheduled valuations.

The developments of the gains or losses related to the actuarial liability and the assets are shown in Table 10. The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 11. Each gain or loss shown represents our estimate of how much the given type of experience caused the Unfunded Actuarial Accrued Liability or Funding Reserve to change in the period since the previous actuarial valuation.

Gains and losses shown due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic experience studies.

Non-recurring gains and losses result from changes in the actuarial assumptions and benefit improvements.



Section VI: Actuarial Gains of Losses

**Table 10:
Analysis of Actuarial (Gains) or Losses***

A. ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS	
1. Actual Actuarial Accrued Liability as of June 30, 2017:	\$ 217,642,368
2. Normal Cost for this Plan Year (Including Expenses):	7,891,367
3. Interest on items 1 and 2 [(1+2) x 7.65%]:	17,253,331
4. Benefit Payments for this Plan Year (Including Expenses):	(8,028,254)
5. Interest on item [4 x 7.65% x .5]:	(307,081)
6. Expected Actuarial Accrued Liability as of June 30, 2018:	234,451,731
7. Changes due to:	
a. Assumption Changes:	-
b. Plan Amendments:	-
c. Funding Method:	-
d. Actuarial (Gain) / Loss:	\$ (4,374,424)
8. Actual Actuarial Accrued Liability as of June 30, 2018:	\$ 230,077,307
9. Items Affecting Calculation of Unfunded Accrued Actuarial Liability:	
a. Benefit provisions reflected in the unfunded accrued liability (see Appendix C)	
b. Actuarial assumptions and methods used to determine actuarial accrued liability (see Appendix B)	
B. ASSET (GAIN) / LOSS ANALYSIS	
1. Actuarial Value of Assets as of June 30, 2017:	\$ 176,310,592
2. Interest on item [1 x 7.65%]:	13,487,760
3. Contributions for this Plan Year:	10,125,214
4. Interest on item [3. x 7.65% x .5]:	387,289
5. Benefit Payments for this Plan Year (Including Expenses):	(8,028,254)
6. Interest on item [5. x 7.65% x .5]:	(307,081)
7. Expected Actuarial Value of Assets as of June 30, 2018:	\$ 191,975,520
8. Actuarial Value of Assets as of June 30, 2018:	\$ 190,849,036
9. (Gain) / Loss	\$ 1,126,484
C. UNFUNDED ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS	
1. Actual Unfunded Actuarial Accrued Liability as of June 30, 2017:	\$ 41,331,776
2. Normal Cost for this Plan Year (Including Expenses):	7,891,367
3. Contributions for this Plan Year:	(10,125,214)
4. Interest on items 1 - 3: [(1+2) x 7.65% + (3 x 7.65% x .5)]:	3,378,282
5. Expected Unfunded Actuarial Accrued Liability as of June 30, 2018:	\$ 42,476,211
6. Changes due to:	
a. Assumption Changes:	-
b. Plan Amendments:	-
c. Funding Method:	-
d. Actuarial (Gain) / Loss:	\$ (3,247,940)
7. Actual Unfunded Actuarial Accrued Liability as of June 30, :	\$ 39,228,271

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.



Section VI: Actuarial Gains of Losses

**Table 11:
Historical Actuarial (Gains) or Losses*
(Dollar amounts in thousands)**

	UAAL (Gain)/Loss		
	June 30, 2018	June 30, 2017	June 30, 2016
Investment Income			
Investment income was (greater) less than expected based on actuarial value of assets.	\$ 1,126.5	\$ (645.3)	\$ (985.1)
Pay Increases			
Pay increases were (less) greater than expected.	(2,967.0)	\$ 2,355.0	\$ 1,076.8
Age & Service Retirements			
Members retired at (older) younger ages or with (less) greater final average pay than expected	(2,132.4)	\$ (597.5)	\$ 126.9
Disability Retirements			
Disability claims were (less) greater than expected	(219.3)	\$ 324.6	\$ 224.6
Death-in-Service Benefits			
Survivor claims were (less) greater than expected	(22.4)	\$ (16.8)	\$ (20.0)
Withdrawal From Employment			
(More) less reserves were released by withdrawals than expected	(412.2)	\$ 1,481.4	\$ 1,189.3
Death After Retirement			
Retirees (died younger) lived longer than expected	244.1	\$ (491.0)	\$ (266.4)
Data Adjustments and Benefit Payment Timing			
Service purchases, data corrections, etc.	1,148.9	\$ 2,445.1	\$ 1,241.5
Other			
Miscellaneous (gains) and losses	(14.1)	\$ 496.5	\$ 209.7
Total (Gain) or Loss During Period From Financial Experience	\$ (3,247.9)	\$ 5,352.0	\$ 2,797.3
Non-Recurring Items.			
Changes in actuarial assumptions and methods	-	\$ 5,308.2	\$ -
Changes in benefits caused a (gain) loss	-	\$ -	\$ -
Composite (Gain) Loss During Period	\$ (3,247.9)	\$ 10,660.2	\$ 2,797.3

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.



Appendix A: Actuarial Procedures and Methods

The assumptions and methods utilized in the valuation were developed in the six-year experience study for the period ending June 30, 2016.

Tables B-3 through B-6 give rates of decrement for service retirement, disablement, mortality, and other terminations of employment.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The normal cost was first calculated for each individual member. The normal cost rate is defined to equal the total of the individual normal costs, divided by the total pay rate.

The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets and (b) the actuarial present value of future normal costs is called the UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consist of financial information; records of age, sex, service, salary, contribution rates, and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data has been supplied by the System and was accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Administrative and Investment Expenses

The investment expenses of the System are assumed to be funded by investment earnings in excess of 7.65% per year.

Administrative expenses are assumed to equal 0.23% of payroll.

Valuation of Assets

The actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.



Appendix A: Actuarial Procedures and Methods

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 7.65% per year net of investment expenses, compounded annually.

Interest on Member Contributions

Interest on member contributions is assumed to accrue at a rate of 2.75% per annum, compounded annually.

Future Salaries

The rates of annual salary increase assumed for the purpose of the valuation are illustrated in Table B-2. In addition to increases in salary due to merit and longevity, this scale includes an assumed 3.50% annual rate of increase in the general wage level of the membership.

Service Retirement

Table B-3 shows the annual assumed rates of retirement for actives members meeting the service retirement eligibilities.

Disablement

The rates of disablement used in this valuation are illustrated in Table B-4.

Mortality

The mortality rates used in this valuation are illustrated in Table B-5. A written description of each table used is included in Table B-1.

There is sufficient margin in the current mortality tables for possible future improvement in mortality rates and that margin will be reviewed again when the next experience investigation is conducted.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table B-6.

Benefits for Terminating Members

Members terminating with less than five years of service are assumed to request an immediate withdrawal of their contributions with interest. Table B-7 shows the assumed probability of retaining membership in the System among members terminating with five or more years of service.

We estimated the present value of future benefits for terminated vested members based on the greater of the present value of their deferred benefit at age 60 or their available contribution account.

Probability of Marriage & Dependent Children

If death occurs in active status, all members are assumed to have an eligible surviving spouse with no dependent children.



Appendix A: Actuarial Procedures and Methods

Records with no Birth Date

New records with no birth date are assumed to be 37 years old. Records that are not new and have no birth date used the same birth date as the prior year's valuation.

Active Records with a Salary Less than \$1,000

These members are included in the active headcounts, however the pay of these members is not included in the Valuation Projected Salaries summarized in Appendix D. The liability for these members is their accumulated member contributions payable on the valuation date.



Appendix B: Summary of Valuation Assumptions

Table B-1

Summary of Valuation Assumptions

I. Economic assumptions	
A. General wage increases	3.50%
B. Investment return	7.65%
C. Price inflation assumption	2.75%
D. Growth in membership	0.00%
E. Interest on member accounts	2.75%
F. Administrative Expenses as a percentage of payroll	0.23%
II. Demographic assumptions	
A. Individual salary increase due to promotion and longevity	Table B-2
B. Retirement	Table B-3
C. Disablement	Table B-4
D. Mortality among contributing members, service retired members, and beneficiaries. The tables include margins for mortality improvement which is expected to occur in the future. For Males and Females: RP 2000 Combined Employee and Annuitant Mortality Table projected to 2020 using Scale BB, set back one year for males.	Table B-5
E. Mortality among disabled members For Males and Females: RP 2000 Combined Mortality Table.	Table B-5
F. Other terminations of employment	Table B-6
G. Probability of retaining membership in the System upon vested termination	Table B-7



Appendix B: Summary of Valuation Assumptions

Table B-2

Future Salaries

Years of Service	(a) Individual Merit & Longevity	(b) General Wage Increase	(1+(a))*(1+(b)) Total Salary Increase
1	6.30%	3.50%	10.02%
2	4.70	3.50	8.36
3	3.50	3.50	7.12
4	2.70	3.50	6.29
5	2.00	3.50	5.57
6	1.40	3.50	4.95
7	0.90	3.50	4.43
8	0.50	3.50	4.02
9	0.20	3.50	3.71
10 & Up	0.00	3.50	3.50



Appendix B: Summary of Valuation Assumptions

Table B-3
Retirement
Annual Rates

<u>Age</u>	<u>Age 55 with 5 Years of Service</u>	<u>Age 50 with 20 Years of Service</u>
Less than 50	N/A	0%
50	N/A	15.0
51	N/A	15.0
52	N/A	15.0
53	N/A	15.0
54	N/A	15.0
55	15.0	25.0
56	5.0	25.0
57	5.0	25.0
58	5.0	25.0
59	5.0	25.0
60	15.0	15.0
61	15.0	15.0
62	40.0	40.0
63	15.0	15.0
64	15.0	15.0
65 & Over	100.0	100.0

Vested terminations are assumed to retire at their earliest unreduced eligibility.



Appendix B: Summary of Valuation Assumptions

Table B-4
Disablement
Annual Rates

<u>Age</u>	<u>All Members</u>
22	.00%
27	.10
32	.10
37	.10
42	.40
47	.40
52	.40
57	.40
62	.00

75% of disabilities are assumed to be duty-related. All disabilities are assumed to be permanent and without recovery.



Appendix B: Summary of Valuation Assumptions

Table B-5
Mortality
Annual Rates

Age	Contributing Members, Service Retired Members and Beneficiaries		Disabled Members	
	Men	Women	Men	Women
25	0.0354%	0.0195%	0.0376%	0.0207%
30	0.0388	0.0249	0.0444	0.0264
35	0.0661	0.0447	0.0773	0.0475
40	0.0961	0.0665	0.1079	0.0706
45	0.1316	0.1058	0.1508	0.1124
50	0.1879	0.1578	0.2138	0.1676
55	0.3010	0.2458	0.3624	0.2717
60	0.5271	0.4135	0.6747	0.5055
65	0.9041	0.7624	1.2737	0.9706
70	1.4636	1.3151	2.2206	1.6742
75	2.5057	2.2077	3.7834	2.8106
80	4.2816	3.6037	6.4368	4.5879
85	7.3750	6.0833	11.0757	7.7446
90	13.0721	10.5549	18.3408	13.1682
95	21.7835	17.2452	26.7491	19.4509

10% of all member deaths are assumed to be duty-related.



Appendix B: Summary of Valuation Assumptions

Table B-6

**Other Terminations of Employment
Among Members Not Eligible to Retire
Annual Rates**

<u>Years of Service</u>	<u>All Members</u>
0	27.0%
1	22.5
2	18.0
3	13.0
4	13.0
5	7.5
6	7.5
7	7.5
8	7.5
9	7.5
10	4.0
11	4.0
12	4.0
13	4.0
14	4.0
15	3.0
16	3.0
17	3.0
18	3.0
19	3.0
20 & Over	2.0



Table B-7
Probability of Retaining Membership in the System
Upon Vested Termination

<u>Age</u>	<u>Probability of Retaining Membership</u>
Under 35	30%
35	40
36	40
37	40
38	40
39	40
40	50
41	50
42	50
43	50
44	50
45	60
46	60
47	60
48	60
49	60
50 & Over	100

Family Composition

100% of active members are assumed to be married. Female spouses are assumed to be three years younger than males. Actual marital characteristics are used for pensioners.

Vested Benefits for Termination Members

Vested benefits for members who terminated during years ending June 30, 2009 and later were estimated based upon compensation and service information in the census data. For members who terminated prior to June 30, 2008, vested benefits valued were the same as had been calculated by the prior actuary for the June 30, 2008 actuarial valuation.



Appendix C: Summary of Benefit Provisions

- Service credit**
- Service credit is used to determine the amount of a member's retirement benefit.
 - One month of service credit is earned for each month where the member is paid for 160 hours. This includes certain transferred and purchased service.
- Membership service**
- Membership service is used to determine eligibility for vesting, retirement or other benefits.
 - One month of membership service is earned for any month member contributions are made, regardless of the number of hours worked.
 - Eligible members in all systems may purchase service that counts toward membership service.
 - Additionally, eligible active and inactive Sheriffs' Retirement System (SRS) members may purchase 1 for 5 (additional) service that will count as membership service.
- Contributions**
- Member contributions are made through an "employer pick-up" arrangement which results in deferral of taxes on the contributions.
- Compensation**
- Compensation generally means all remuneration paid, excluding certain allowances, benefits, and lump sum payments. Compensation is specifically defined in law and differs amongst the systems.
 - Bonuses paid **on or after** July 1, 2013 to any member will not be treated as compensation for retirement purposes. No member or employer contributions will be paid on bonuses.
- Withdrawal of employee contributions**
- A member is eligible for a withdrawal of their contributions when they terminate service and are either not eligible for or have not taken a retirement benefit.
 - The member receives the accumulated member contributions, which consists of member contributions and regular interest.
 - Upon receipt of a refund of accumulated contributions a member's vested right to a monthly benefit is forfeited.
- Member contributions interest credited (regular interest)**
- Interest is credited to member accounts at the rates determined by the Board.
 - The current interest rate credited to member accounts is 0.77%.
- Working Retiree Limitations**
- Applies to retirement system members who return **on or after** July 1, 2017 to covered employment in the system from which they retired. These limits already applied to SRS members before July 1, 2017.
- Members who return for **less than 480 hours** in a **calendar year**:
 - may not become an active member in the system; and
 - are subject to a \$1 reduction in their retirement benefit for each \$3 earned in excess of \$5,000 in the calendar year.



Appendix C: Summary of Benefit Provisions

- Members who return for **480 or more hours** in a **calendar year**;
 - must become an active member of the system;
 - will stop receiving a retirement benefit from the system;**and**
 - will be eligible for a second retirement benefit if they earn 5 or more years of service credit through their second employment.
- Employee, employer and state contributions apply as follows:
 - Employer contributions and state contributions (if any) must be paid on all working retirees;
 - Employee contributions must be paid on working retirees who return to covered employment for 480 or more hours in a calendar year.

NOTE: PERS has its own limits.

Second Retirement Benefit -

Applies to retirement system members who return on or after July 1, 2017 to active service covered by the system from which they retired.

- If the member works more than 480 hours in a calendar year and accumulates less than 5 years of service credit before terminating again, the member:
 - is not awarded service credit for the period of reemployment;
 - is refunded the accumulated contributions associated with the period of reemployment;
 - starting the first month following termination of service, receives the same retirement benefit previously paid to the member; and
 - does not accrue post-retirement benefit adjustments during the term of reemployment but receives a GABA in January immediately following second retirement.

Second Retirement Benefit (continued)

- If the member works more than 480 hours in a calendar year and accumulates at least 5 years of service credit before terminating again, the member:
 - is awarded service credit for the period of reemployment;
 - starting the first month following termination of service, receives:
 - * the same retirement benefit previously paid to the member; **and**
 - * a second retirement benefit for the period of reemployment calculated based on the laws in effect as of the member's rehire date; **and**
 - does not accrue post-retirement benefit adjustments during the term of reemployment but receives a GABA:
 - * on the initial retirement benefit in January immediately following second retirement; **and**



Appendix C: Summary of Benefit Provisions

- * on the second retirement benefit starting in January after receiving that benefit for at least 12 months.
 - A member who returns to covered service is **not** eligible for a disability benefit.
- Refunds**
- Terminating members eligible to retire may, in lieu of receiving a monthly retirement benefit, refund their accumulated contributions in a lump sum.
 - Terminating members with accumulated contributions between \$200 and \$1,000 who wish to rollover their refund must do so within 90 days of termination of service.
 - Trusts, estates, and charitable organizations listed as beneficiaries are entitled to receive only a lump sum payment.
- Lump-sum payouts**
- Effective July 1, 2017, lump sum payouts in all systems are limited to the member's accumulated contributions rather than the present value of the member's benefit.
- Type of plan**
- Multiple-employer cost sharing
- Membership eligibility**
- Game wardens
 - Warden supervisor
 - State peace officers
- Member contributions**
- 10.56% of member's compensation
- Employer contributions**
- 9.0% of each member's compensation
- Compensation period used in benefit calculation**
- HAC = Highest Average Compensation
 - Hired **prior to** July 1, 2011: HAC is average of the highest 36 consecutive months (or shorter period of total service) of compensation paid to member.
 - Hired **on or after** July 1, 2011: HAC is average of the highest 60 consecutive months (or shorter period of total service) of compensation paid to member.
 - Hired **on or after** July 1, 2013: 110% annual cap on compensation considered as part of a member's HAC.
- Service retirement eligibility and benefit formula**
- Age 50 with 20 years of membership service
 - 2.5% of HAC x years of service credit
- Early retirement eligibility and benefit**
- Age 55 with 5 years of membership service
 - A reduced retirement benefit calculated using the HAC and service credit at early retirement.



Appendix C: Summary of Benefit Provisions

Disability retirement eligibility and benefit formula

Duty-related disability:

- Vested active member
- 5 years of membership service
- **Less than 20 years** of membership: 50% or HAC, or
- **20 years or more** of membership service: 2.5% of HAC x years of service credit

Regular disability:

- Vested member
- The actuarial equivalent of the accrued normal retirement benefit at the time of disability.

Survivor's eligibility and benefit formula

Duty-related deaths: (active member), a monthly survivor benefit to the designated beneficiary equal to:

- **25 years or less** of membership service: 50% of HAC, or
- **More than 25 years** of membership service: 2.5% of HAC x years of service credit.

Non-duty-related deaths:

- Active or inactive member
- Lump-sum refund of the member's accumulated contributions; **or**
- Actuarial equivalent of the service benefit.

- Effective July 1, 2017, beneficiaries of GWPORS members who die prior to retirement are eligible for either a lump-sum benefit or a monthly survivor benefit. The monthly survivor benefit may be paid out as an option 1, 2, 3 or 4, at the survivor's discretion. Previously, statute provided for lump-sum payments only.

Vested eligibility and benefit

- 5 years of membership service
- Accrued normal retirement benefit, payable when eligible for retirement.
- In lieu of a pension, a member may receive a refund of accumulated contributions.
- Upon receipt of a refund of accumulated contributions, a member's vested right to a monthly benefit is forfeited.



Appendix C: Summary of Benefit Provisions

- | | |
|--|--|
| Retirement benefits -
Form of payment | <ul style="list-style-type: none">• Option 1, the normal form of payment is a single life annuity with a refund of any remaining accumulated contributions (account balance) to a designated beneficiary.• Optional Benefits:<ul style="list-style-type: none">• Option 2, a life annuity and joint 100% survivor benefit,• Option 3, a life annuity and joint 50 % survivor benefit, and• Option 4, a life annuity with a period certain.• If a retiring member selects Option 2 or 3 and the contingent annuitant predeceases or is divorced from the member, the retiree may, within 18 months of the death or divorce, choose to revert to the higher Option 1 benefit available at retirement or the retiree may select a different contingent annuitant and/or a different option. |
| Post retirement benefit
increases | <p>For retired members who have been retired at least 12 months, a Guaranteed Annual Benefit Adjustment (GABA) will be made each year in January equal to:</p> <ul style="list-style-type: none">• 3% for members hired before July 1, 2007, and• 1.5% for members hired on or after July 1, 2007 |
| Changes since last
valuation | <ul style="list-style-type: none">• None |



Appendix D: Valuation Data

Valuation Data

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Board Summary (page 1) match the CAFR at the request of the Board. The differences between counts, if any, have no material effect upon the liability calculation.

	<u>Active</u>	<u>Disabled</u>	<u>Retirees and Beneficiaries</u>	<u>Terminated Vested Members</u>	<u>Terminated Non-Vested Members</u>	<u>Total</u>
Participant Counts Used for Valuation	1,010	21	291	123	381	1,826
Disabled Members having attained normal retirement age		(18)	18			
Beneficiaries of Disabled Members						
Beneficiaries with less than one year of certain payments remaining						
Other Adjustments					1	1
Participant Counts shown in the Annual Financial Report	1,010	3	309	123	382	1,827



Appendix D: Valuation Data

This valuation is based upon the membership of the System as of June 30, 2018. Membership data were supplied by the System and has been accepted for valuation purposes without audit. However, tests were performed to ensure that the data are sufficiently accurate for valuation purposes.

The salaries used in the tables and charts which follow are different than the salaries used for the Summary of Results on page 1. The valuation salaries are anticipated to be paid for the following fiscal year, whereas the Summary of Results salaries are applicable in the year ending on the valuation date.

<u>Active Members</u>	<u>Number</u>	<u>Valuation Projected Salaries</u>
Full-Time Members	956	\$ 50,737,102
Part-Time Members	<u>54</u>	<u>\$ 841,756</u>
Total Members	1,010	\$ 51,578,858

Table D-1 contains summaries of the data for contributing members. For full-time members, values shown in the tables are the numbers of members and their total and average annual salaries. For part-time members, only the numbers of members are shown.

Table D-2 presents distributions of the following:

- Members receiving service retirement benefits.
- Members receiving disability retirement benefits.
- Survivors of deceased retired members receiving benefits.
- Survivors of deceased active members.
- Terminated vested members.

Table D-3 is a reconciliation of membership data from June 30, 2017 to June 30, 2018.



Appendix D: Valuation Data

The following is a summary of retired members and beneficiaries currently receiving benefits. The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 40 for an explanation of the number of annuitants used for valuation purposes.

Type of Annuitant	Number	Annual Benefits	Average Annual Benefits
Service Retirement	264	\$ 5,878,033	\$ 22,265
Survivors of Deceased Retired Members	16	380,364	23,773
Survivors of Deceased Active Members	11	131,460	11,951
Total Retirees and Beneficiaries	291	\$ 6,389,857	\$ 21,958
Disability Retirement	21	401,728	19,130
Total Annuitants	312	\$ 6,791,585	\$ 21,768

Terminated Members with Contributions Not Withdrawn	Number
Vested Terminated Members	123
Non-Vested Terminated Members	<u>381</u>
Total Terminated Members	504



**Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2018**

Number of Employees

Age	<u>Completed Years of Service</u>											Totals	
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+
<25	25	13	15	3									56
25 to 29	27	12	23	37	13	1							113
30 to 34	20	15	9	21	48	12							125
35 to 39	11	15	13	27	30	29	8						133
40 to 44	7	9	8	12	23	28	27	5					119
45 to 49	12	8	4	9	24	31	37	15	2				142
50 to 54	5	9	6	11	22	23	27	13	2	1			119
55 to 59	7	4	3	5	16	13	21	9	6	3	1		88
60 to 64	2		1	6	10	13	13	2	3				50
65 to 69					3	5		1					9
70 and up					1		1						2
Totals	116	85	82	131	190	155	134	45	13	4	1	-	956



**Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2018**

Annual Salaries in Thousands

Age	Completed Years of Service											Totals		
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+	
<25	909	537	693	130										2,269
25 to 29	1,062	495	1,054	1,842	656	31								5,140
30 to 34	701	656	403	1,014	2,561	704								6,038
35 to 39	435	700	603	1,348	1,623	1,768	462							6,939
40 to 44	245	371	372	604	1,306	1,694	1,663	361						6,615
45 to 49	517	344	180	434	1,337	1,914	2,268	1,120	145					8,259
50 to 54	186	495	276	610	1,175	1,371	1,649	919	154	65				6,899
55 to 59	317	195	146	316	844	744	1,225	599	444	282	68			5,180
60 to 64	77		41	310	535	717	835	105	156					2,776
65 to 69					186	272		69						526
70 and up					32		65							98
Totals	4,448	3,791	3,768	6,608	10,255	9,215	8,167	3,172	898	347	68	-		50,737



Appendix D: Valuation Data

**Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2018**

Average Annual Salary

Age	Completed Years of Service											Totals	
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+
<25	36,369	41,319	46,194	43,346									40,523
25 to 29	39,340	41,261	45,834	49,785	50,452	30,894							45,490
30 to 34	35,033	43,704	44,728	48,298	53,354	58,645							48,302
35 to 39	39,574	46,643	46,388	49,908	54,098	60,977	57,731						52,170
40 to 44	34,980	41,191	46,501	50,316	56,772	60,509	61,582	72,146					55,587
45 to 49	43,043	42,952	45,112	48,200	55,722	61,748	61,296	74,677	72,272				58,159
50 to 54	37,114	54,967	46,058	55,493	53,400	59,596	61,066	70,683	76,871	64,917			57,974
55 to 59	45,290	48,663	48,590	63,173	52,754	57,231	58,329	66,545	73,966	94,025	68,499		58,859
60 to 64	38,561		40,691	51,690	53,486	55,137	64,259	52,431	51,907				55,511
65 to 69					61,853	54,346		68,754					58,449
70 and up					32,456		65,218						48,837
Totals	38,349	44,602	45,951	50,442	53,972	59,449	60,946	70,495	69,062	86,748	68,499		53,072

The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.



**Table D-1:
Active Members Distribution of
Part-Time Employees
as of June 30, 2018**

Number of Employees

Age	<u>Completed Years of Service</u>											Totals	
	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39		40+
<25	5	1											6
25 to 29	3		3										6
30 to 34	8	1		1	1								11
35 to 39	6			1									7
40 to 44	2				1	1							4
45 to 49	5	1		1	1	2							10
50 to 54					1								1
55 to 59	2				2								4
60 to 64	2					2	1						5
65 to 69													
70 and up													
Totals	33	3	3	3	6	5	1	-	-	-	-	-	54



Appendix D: Valuation Data

**Table D-2:
Distribution of Inactive Lives**

The charts reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 40 for an explanation of the number of annuitants used for valuation purposes.

Members Receiving Service Retirement Benefits as of June 30, 2018

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	\$ -	\$ -
50 to 54	19	522,285	27,489
55 to 59	46	878,576	19,099
60 to 64	65	1,581,087	24,324
65 to 69	58	1,044,779	18,013
70 to 74	43	967,966	22,511
75 to 79	18	388,403	21,578
80 to 84	9	307,416	34,157
85 to 89	2	41,576	20,788
90 and up	4	145,945	36,486
Totals	264	\$ 5,878,033	\$ 22,265

Members Receiving Disability Retirement Benefits as of June 30, 2018

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	3	\$ 45,785	\$ 15,262
50 to 54	2	27,436	13,718
55 to 59	3	56,734	18,911
60 to 64	4	61,932	15,483
65 to 69	4	89,724	22,431
70 to 74	3	71,125	23,708
75 to 79	-	-	-
80 to 84	2	48,992	24,496
85 to 89	-	-	-
90 and up	-	-	-
Totals	21	\$ 401,728	\$ 19,130



Table D-2: Distribution of Inactive Lives

The charts reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 40 for an explanation of the number of annuitants used for valuation purposes.

Survivors of Deceased Retired Members as of June 30, 2018

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	\$ -	\$ -
50 to 54	-	-	-
55 to 59	-	-	-
60 to 64	2	50,392	25,196
65 to 69	1	16,395	16,395
70 to 74	1	15,287	15,287
75 to 79	3	90,738	30,246
80 to 84	2	31,201	15,600
85 to 89	4	128,993	32,248
90 and up	3	47,359	15,786
Totals	16	\$ 380,364	\$ 23,773

Survivors of Deceased Active Members as of June 30, 2018

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	3	\$ 37,208	\$ 12,403
50 to 54	1	\$ 3,614	28,470
55 to 59	1	\$ 28,470	30,113
60 to 64	2	\$ 30,113	7,344
65 to 69	2	\$ 14,689	8,683
70 to 74	2	\$ 17,366	-
75 to 79	-	\$ -	-
80 to 84	-	\$ -	-
85 to 89	-	\$ -	-
90 and up	-	\$ -	-
Totals	11	\$ 131,460	\$ 11,951



**Table D-2:
Distribution of Inactive Lives**

The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 40 for an explanation of the number of annuitants used for valuation purposes.

**Terminated Vested Members as of June 30, 2018
Number of Persons**

<u>Age</u>	<u>Number</u>
<25	
25 to 29	2
30 to 34	10
35 to 39	22
40 to 44	21
45 to 49	32
50 to 54	21
55 to 59	12
60 to 64	3
65 to 69	
70 and above	
Total	123



**Table D-3:
Data Reconciliation**

The following table shows a reconciliation of the participants used in the previous valuation to this valuation. This chart reflects the counts used for valuation purposes as a result of data processing.

	<u>Active Members</u>	<u>Terminated Vested Members</u>	<u>Service Retired Members</u>	<u>Disabled Members</u>	<u>Survivors and Beneficiaries</u>
June 30, 2017 Valuation	1,012	114	228	21	27
Refunds and Non-Vested Terminations	(107)	(1)			
Vested Terminations	(24)	24			
Service Retirements	(26)	(11)	37		
Disability Retirements					
Deaths			(2)		
New Entrants	148		1		
Rehires	7	(3)			
Other					
June 30, 2018 Valuation	1,010	123	264	21	27



Appendix E: Comparative Schedules

Comparative Schedules

This section contains tables that summarize the experience of the System shown in present and past valuation reports.

Table E-1 shows a summary of the active members covered as of the various valuation dates.

Table E-2 shows a summary of the retired and inactive members as of the various valuation dates.

Table E-3 summarizes the contribution rates determined by each annual actuarial valuation.



**Table E-1:
Active Membership Data**

<u>Valuation Date (June 30)</u>	<u>Actives</u>	<u>Annual Salaries in Thousands</u>	<u>Average Annual Salary</u>	<u>Average Age</u>	<u>Average Years of Service</u>	<u>Average Hire Age</u>
2018	1,010	50,823	50,320	42.0	8.1	34.0
2017	1,012	49,381	48,795	42.0	8.1	33.9
2016	989	47,108	47,632	40.2	7.9	32.3
2015	993	44,713	45,029	42.2	7.6	34.6
2014	955	40,458	42,365			
2013	971	39,155	40,324			
2012	972	38,317	39,421			



Appendix E: Comparative Schedules

Table E-2:
Members in Receipt of Annuities and Inactive Membership Data

Table with 9 columns: Valuation Date (June 30), Number, Annual Benefits in Thousands, Average Annual Benefit, Average Current Age, Average Age at Retirement, Average Service at Retirement, Number Vested Terminated, Number Non-Vested Terminated. Rows for years 2012-2018.



Appendix E: Comparative Schedules

**Table E-3:
Contribution Rates**

Valuation Date (June 30)	Contribution Rates			Normal	UAAL
	Employee	Employer	Total	Cost Rate*	Rate**
2018	9.00%	10.56%	19.56%	16.32%	3.24%
2017	9.00	10.56	19.56	16.19	3.37
2016	9.00	10.56	19.56	18.23	1.33
2015	9.00	10.56	19.56	18.41	1.15
2014	9.00	10.56	19.56	18.58	0.98
2013	9.00	10.56	19.56	18.82	0.74
2012	9.00	10.56	19.56	18.98	0.58

* Includes administrative expenses starting with the 2014 Valuation Date

** The UAAL rate is the amount available to amortize the UAAL. It is equal to the total contribution rate, minus the normal cost rate.



Appendix F: Financial Statement Information

The information presented in the required supplementary schedules was determined as part of the actuarial valuation as of June 30, 2018. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2018
Actuarial cost method	Entry Age Normal
Amortization method	Open
Remaining amortization period	30 Years
Asset valuation method	Four-year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.65%
General wage growth*	3.50%
Merit salary increases	0.0% - 6.3%
*Includes inflation	2.75%



Appendix F: Financial Statement Information

Gain and Loss in Accrued Liability During Years Ended June 30 Resulting from Differences Between Assumed Experience and Actual Experience						
Type of Activity	Gain or (Loss) for Year Ending June 30, (expressed in thousands)					
	2013	2014	2015	2016	2017	2018
Investment Income on Actuarial Value of Assets	\$ 3,364	\$ 5,532	\$ 2,264	\$ 985	\$ 645	\$ (1,127)
Combined Liability Experience	1,894	(731)	(2,511)	(3,782)	(5,352)	4,375
(Loss)/Gain During Year from Financial Experier	\$ 5,258	\$ 4,801	\$ (247)	\$ (2,797)	\$ (4,707)	\$ 3,248
Non-Recurring Items	0	0	0	0	(5,308)	0
Composite Gain or (Loss) During Year	\$ 5,258	\$ 4,801	\$ (247)	\$ (2,797)	\$ (10,015)	\$ 3,248

Schedule of Funding Progress (expressed in thousands)						
Valuation Date June 30,	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2018	\$ 190,849	\$ 230,077	83%	\$ 39,228	\$ 50,823	77%
2017	176,311	217,642	81%	41,332	49,381	84%
2016	160,555	191,007	84%	30,452	47,108	65%
2015	145,314	172,160	84%	26,846	44,885	60%
2014	129,429	154,595	84%	25,166	41,637	60%
2013	112,100	139,985	80%	27,885	39,471	71%



Appendix F: Financial Statement Information

Solvency Test Aggregate Accrued Liabilities for (expressed in thousands)								
Valuation Date June 30,	Active Member Contributions	Retirees & Beneficiaries	Active Member Employer Financed Contributions	Actuarial Value of Reported Assets	Portion of Accrued Liability Covered by Reported Assets			
	(1)	(2)	(3)		(1)	(2)	(3)	
2018	\$ 39,605	\$ 88,621	\$ 101,851	\$ 190,849	100%	100%	61%	
2017	39,205	77,897	100,540	176,311	100%	100%	59%	
2016	36,111	65,912	88,984	160,555	100%	100%	66%	
2015	34,396	58,648	79,116	145,314	100%	100%	66%	
2014	32,779	50,062	71,753	129,429	100%	100%	65%	
2013	31,918	43,498	64,569	112,100	100%	100%	57%	



Appendix G: Glossary

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases the definitions have been modified for specific applicability to the Game Wardens' and Peace Officers' Retirement System. Defined terms are capitalized throughout this Appendix.

Accrued Benefit

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gain (Loss)

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.



Appendix G: Glossary

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Entry Age Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

Market Value of Assets

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unaccrued Benefit

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

Unfunded Actuarial Accrued Liability

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