

ACTUARIAL VALUATION REPORT

Law Enforcement Officers' and Fire Fighters'
Plan 2 Retirement Board



Office of the State Actuary
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2019

2019

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Law Enforcement Officers' and Fire Fighters'
Plan 2 Retirement Board

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Letter of Introduction Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2 Actuarial Valuation Report As of June 30, 2019 November 2020

As required under [Chapter 41.45](#) of the Revised Code of Washington (RCW), this report documents the results of an actuarial valuation of the Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2 (LEOFF 2).

The primary purpose of this valuation is to determine contribution requirements for LEOFF 2 for the 2021-23 Biennium based on a June 30, 2019, measurement date and under the funding policy established by the LEOFF 2 Retirement Board (the Board). This valuation also provides information on the funding progress and developments in the plan over the past year.

This report is organized into four sections.

- ❖ Summary of Key Results.
- ❖ Actuarial Exhibits.
- ❖ Participant Data.
- ❖ Appendices.

The **Summary of Key Results** section provides a high-level summary of the valuation results for LEOFF 2 and a commentary on risk. The **Actuarial Exhibits** and **Participant Data** sections of the report provide detailed actuarial asset and liability information and participant data. The **Appendices** provide access to a summary of the principal actuarial assumptions and methods, major plan provisions, and additional information used to prepare this valuation.

The Board has received the 2019 Recognition Award for Funding from the Public Pension Coordinating Council (PPCC). The PPCC is a coalition of three national retirement associations, which establish Public Pension Standards that reflect minimum expectations for public retirement system management, administration, and funding.

We encourage you to submit any questions you might have concerning this report to our mailing address or our e-mail address at state.actuary@leg.wa.gov. We also invite you to visit our website (leg.wa.gov/osa), for further information regarding the actuarial funding of the Washington State retirement systems.

Sincerely,

Luke Masselink, ASA, EA, MAAA
Senior Actuary

Mitch DeCamp
Senior Actuarial Analyst

I. SUMMARY OF KEY RESULTS



Intended Use

The purpose of this report is to develop contribution rates required to fund LEOFF Plan 2 for the 2021-23 Biennium based on a June 30, 2019, measurement date, and the funding policy described in this section. This report provides information on the contribution rates, funding progress, and developments in the plan over the past year. This report also discloses the data, assumptions, and methods we—the Office of the State Actuary (OSA)—used to develop the contribution rates. This report is not intended to satisfy the accounting requirements under the Governmental Accounting Standards Board (GASB) rules.

Similarly, this actuarial valuation is not intended to report on the overall health or financial condition of LEOFF Plan 2. Such information can be found in the [Report on Financial Condition](#) (RFC), which we issue every two years. The key measures we use in the RFC to assess the health of the pension plan include funding level, adequacy and affordability of contributions, and risk.

The information developed in this report does not consider impacts to LEOFF Plan 2 from the COVID-19 health crisis, which began after the measurement date of June 30, 2019. We have created an [educational page](#) to help interested parties understand how COVID-19 may impact the Washington State retirement systems.

Commentary on Risk

Actuarial Standards of Practice (ASOP) guide actuaries when performing and communicating their work. [ASOP Number 51](#) is specific to communicating risk in defined benefit pension plans, particularly in how actual future measurements may differ significantly from expected future measurements. In the course of developing our actuarial valuation, we make hundreds of assumptions, such as the level of returns on future investments, the rate of mortality for retirees, and the number of members contributing to the pension system annually. In some cases, small changes in these assumptions or unexpected plan experience can lead to significant changes in measurements, like the calculation of a plan's contribution rates or the projection of a plan's funded status. This can affect plan risk, and these sensitivities can evolve as the plans grow and mature over time. The Legislature's response to these changes and their action governing the state's pension system also affects plan risk.

To help readers better understand some of these risks and their potential impacts, we have developed a [Commentary on Risk](#) webpage. In the [Actuarial Exhibits](#) section of this report, we have also included the impact to LEOFF Plan 2's funded status from changes in discount rates and mortality improvement, two of our most impactful assumptions. As noted above, for risk commentary specific to COVID-19, please see our dedicated [educational webpage](#) on potential impacts to the Washington State retirement systems.

Contribution Rates

We determine the member, employer, and state contribution rates as a percentage of salary based on the long-term funding policy adopted by the Board. The following summary table shows contribution rates based on the 2019 valuation, along with rates from the previous valuation. Throughout this report, we reconcile how plan experience compared to our assumptions over the valuation year. In doing so, we compare the contribution rates calculated under this valuation against those rates calculated under the 2018 valuation. Please note, however, that the contribution rates expressed for the 2018 valuation were not collected, as that was not a rate-setting year under the current contribution rate-setting cycle. The [Actuarial Exhibits](#) section of this report shows how we developed the contribution rates for 2019.

Calculated Contribution Rates		
	2019	2018
Member	7.68%	8.67%
Employer*	4.61%	5.20%
State	3.07%	3.47%

**Excludes administrative expense rate.*

Projected Contribution Rates

In addition to calculating contribution rates in this report, we also estimate contribution rates for future biennia based upon projected assets and liabilities. These projected rates can be found on our [website](#). Please note that these projected rates are subject to change based on modifications to plan provisions, assumptions, and the actual experience of the plan.

Contribution Rate-Setting Cycle

Under current Washington State law, in July of even-numbered years, the Board reviews the basic contribution rates calculated by the Board-retained actuary. These rates are based on an actuarial valuation performed on asset, participant, and plan information compiled in odd-numbered years. In calculating basic contribution rates, the Board-retained actuary applies the statutory funding policies described in this section. The Board then adopts contribution rates for LEOFF 2 as provided under [RCW 41.26.720\(1\)\(a\)](#). The adopted rates remain in place for the ensuing biennium, subject to revision by the Legislature.

	Contribution Rates		
	2019-21 Adopted	2021-23 Calculated	2021-23 Adopted*
Member	8.59%	7.68%	8.53%
Employer**	5.15%	4.61%	5.12%
State	3.44%	3.07%	3.41%

*Adopted for period 2021-25.

**Excludes administrative expense rate.

The calculated rates for the 2021-23 Biennium are based on the funding policy described in the next section. The Board adopted rates for the 2021-23 Biennium equal to 100 percent of the Entry Age Normal Cost (EANC). Adopting rates equal to 100 percent EANC contribution rates supports one of the Board's funding goals of stable rates.

[RCW 41.45.070](#) requires that a temporary and supplemental contribution rate increase be charged to fund the cost of benefit enhancements enacted following the adoption of the basic rates. Supplemental contribution rates, if enacted, are included in the basic rates at the beginning of the next contribution rate-setting cycle.

Funding Policy

Washington State relies on systematic actuarial funding to finance the on-going cost of the state retirement systems. The LEOFF 2 funding policy splits the required contribution rate by 50 percent for members, 30 percent for employers, and 20 percent for the state. Under this financing approach, we reduce the cost of future pension payments by the expected long-term return on invested contributions. The investment of these contributions is under the direction of the Washington State Investment Board (WSIB). [RCW 43.33A.110](#) requires WSIB to maximize investment returns at a prudent level of risk.

The state's funding policy is found in RCW 41.45 — Actuarial Funding of State Retirement Systems. It includes the following goals:

- ❖ Provide a dependable and systematic process for funding the benefits to members and retirees of the Washington State Retirement Systems.
- ❖ Fully amortize the total cost of LEOFF 1 no later than June 30, 2024.
- ❖ Continue to fully fund LEOFF 2 as provided by law.
- ❖ Establish long-term employer contribution rates that will remain a relatively predictable proportion of future state budgets.
- ❖ Fund, to the extent feasible, all benefits over the working lives of those members so that the taxpayers who receive the benefit of those members' service pay the cost of those benefits.

If all actuarial assumptions are realized and all future contributions required under this funding policy are made, we expect the funding policy to accumulate sufficient assets to provide for all future benefits for current members when due.

The Board revised their long-term funding policy in 2019 to reduce minimum contribution rates to 90 percent of the EANC when the plan-funded ratio meets or exceeds 105 percent. The minimum rates remain at 100 percent of the EANC when the plan-funded ratio is below 105 percent.

Comments on 2019 Results

Many factors influence how actuarial valuation results change from one measurement date to the next. Those factors include changes in the plan provisions, assumptions and methods, covered population, and experience that varies from our expectations.

For this valuation, we observed no significant changes in the population or plan provisions. This valuation reflects updates to the demographic assumptions consistent with our [2013-18 Demographic Experience Study](#). The new assumptions were adopted by the Board at their June 2020 meeting and generally lead to lower plan costs. See the [Actuarial Gain/Loss](#) section for the contribution rate impact from the new assumptions.

In terms of annual plan experience, the actual rate of investment return on the Market Value of Assets (MVA) was 8.89 percent, which was above the assumed rate of 7.40 percent. The rate of investment return on the Actuarial Value of Assets (AVA) was 10.36 percent.

Detailed gain and loss information can be found in the [Actuarial Exhibits](#) section of this report. Please see the [Actuarial Certification Letter](#) for additional comments on the valuation results.

Actuarial Liabilities

The following table summarizes key measures of actuarial liability along with the liabilities from last year's valuation. The Future Value of Fully Projected Benefits represents the total expected value of all future benefit payments for all members as of the valuation date.

The Present Value of Fully Projected Benefits represents today's value of the Future Value of Fully Projected Benefits when we discount future benefit payments with the valuation interest rate. In other words, if we invest the Present Value of Fully Projected Benefits as a lump sum amount at the valuation date and earn the currently assumed valuation interest rate each year, we expect there would be enough money to pay all future benefit payments for current members.

Actuarial Liabilities		
(Dollars in Millions)	2019	2018
Future Value of Fully Projected Benefits	\$118,647	\$108,950
Present Value of Fully Projected Benefits	\$16,096	\$14,846
Present Value of Accrued Benefits	\$11,992	\$11,066
Valuation Interest Rate	7.40%	7.40%



The Present Value of Accrued Benefits identifies the portion of the present value of future benefits that has been accrued as of the valuation date based on the Entry Age Normal (EAN) actuarial cost method.

See the [Actuarial Exhibits](#) section of this report for a summary of actuarial liabilities. For projected benefit payments by year, please visit the [Interactive Reports](#) page on our website. Also, see the [Glossary](#) on our website for brief explanations of the actuarial terms.

Assets

The following table shows the MVA and AVA along with approximate rates of investment return. To limit the volatility in contribution rates and funded status due to short-term market fluctuations, we smooth (or defer recognition of) the difference between actual and expected annual investment returns over a period not to exceed eight years. The number of years over which we smooth is dependent on the magnitude of the gain or loss.

The AVA equals the MVA less the Total Deferred Investment Gains and (Losses) at the valuation date. The AVA can never be less than 70 percent or greater than 130 percent of the MVA. See the [Actuarial Exhibits](#) section of this report for additional information on the plan's assets and for the development of the AVA.

The 2019 asset information displayed above and throughout this report exclude the \$22.0 million held in the LEOFF 2 Benefit Improvement Account (BIA) and have been further reduced by \$300 million payable to the BIA effective July 1, 2019 ([C 366 L 19](#)). The 2018 MVA excludes both transfers as well, however the \$300 million July 1, 2019, transfer is discounted back to the June 30, 2018, measurement date at the valuation interest rate. This reduced the 2018 MVA by \$279 million. This amount is included as a 2018 disbursement in the table above.

Assets		
(Dollars in Millions)	2019	2018
Market Value of Assets (MVA)¹	\$13,916	\$12,706
Actuarial Value of Assets (AVA)	13,294	11,972
Member/Employer Contributions	377	349
Disbursements	316	549
Investment Return	1,154	1,125
Other	\$16	\$24
MVA Return²	8.89%	10.20%
AVA Return³	10.36%	10.02%

¹ Both MVA figures have been reduced to reflect all transfers to the BIA. This includes \$300 million payable to the BIA effective July 1, 2019. For more information, see the next paragraph.

² Dollar-weighted rate of return on the MVA, net of expenses.

³ The AVA is used in determining contribution rates.

Funded Status

Funded status is one of many measures that helps explain the health of a pension plan. A history of funded status measured consistently over a defined period helps readers evaluate a plan's funding progress over time. The funded status represents the portion of the actuarial accrued liability covered by today's actuarial assets. A plan with a 100 percent funded ratio has one dollar in actuarial assets for each dollar of accrued liability at the valuation date. A plan with a funded ratio of at least

100 percent is generally considered to be on target with its financing plan. However, a plan more/less than 100 percent funded is not automatically considered over-funded/at-risk. The table above displays the funded status for LEOFF 2.

Funded Status		
(Dollars in Millions)	2019	2018
a. Entry Age Normal Accrued Liability	\$11,992	\$11,066
b. Market Value of Assets*	13,916	12,706
c. Deferred Gains/(Losses)	623	734
d. Actuarial Value of Assets (b - c)	13,294	11,972
Unfunded Liability (a - d)	(\$1,302)	(\$906)
Funded Ratio (d / a)	111%	108%

Note: Totals may not agree due to rounding.

*2018 and 2019 Market Value of Assets reduced for the LEOFF 2 BIA asset transfer.

Participant Data

The following table summarizes the participant data used in the actuarial valuation for the plan year ending June 30, 2019, along with information from last year's valuation. See the **Participant Data** section of this report for additional information.

Participant Data		
	2019	2018
Active Members		
Number	18,557	18,130
Total Salaries (in Millions)	\$2,117	\$1,982
Average Annual Salary	\$114,085	\$109,319
Average Age	42.8	43.1
Average Service	13.6	13.9
Retirees and Beneficiaries		
Number	6,064	5,436
Average Annual Benefit	\$51,119	\$48,843
Terminated Members		
Number Vested	969	934
Number Non-Vested*	2,193	2,055

**Members who terminated without a vested lifetime benefit but are eligible for a refund of their employee contributions with interest that currently reside in the trust.*

Key Assumptions

The following table displays key economic assumptions used in the actuarial valuation. There were no changes in these assumptions from our prior year's valuation.

Key Assumptions	
Valuation Interest Rate	7.40%
Salary Increase	3.50%
Inflation	2.75%
Growth in Membership*	1.25%

**Applies to the LEOFF 1 funding method only.*



II. ACTUARIAL EXHIBITS





Office of the State Actuary

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Actuarial Certification Letter Law Enforcement Officers’ and Fire Fighters’ Retirement System Plan 2 Actuarial Valuation Report As of June 30, 2019 November 2020

This report documents the results of an actuarial valuation of the Law Enforcement Officers’ and Fire Fighters’ Retirement System Plan 2 (LEOFF 2) as defined under [Chapter 41.26](#) of the Revised Code of Washington (RCW). The primary purpose of this valuation is to determine contribution requirements for the retirement plan for the 2021-23 Biennium based on a June 30, 2019, measurement date, consistent with the prescribed funding policy established by the LEOFF 2 Retirement Board (the Board). This valuation also provides information on the funding progress and developments in the plan over the past year. This valuation report should not be used for other purposes. Please replace this report with a more recent report when available.

Future actuarial measurements may differ significantly from the current measurements presented in this report if plan experience differs from that anticipated by the assumptions, or if changes occur in the methods, assumptions, plan provisions, or applicable law. The [Risk Assessment](#) page of our website provides further information on the range and likelihood of potential outcomes that vary from expected results. The [Commentary on Risk](#) page of our website provides additional risk education.

The valuation results summarized in this report involve calculations that require assumptions about future economic and demographic events. We believe that the assumptions and methods used in the underlying valuation are reasonable and appropriate for the primary purpose stated above. However, the use of another set of assumptions and methods could also be reasonable and could produce materially different results. Actual results may vary from our expectations.

The economic and demographic assumptions used in this valuation were adopted by the Board. Please see our [2019 Economic Experience Study](#) for further information on the economic assumptions. We developed the demographic assumptions used in this valuation during the [2013-18 Demographic Experience Study](#). The Legislature prescribed the actuarial cost and asset valuation method. In our opinion, all methods, assumptions, and calculations are reasonable and are in conformity with generally accepted actuarial principles and standards of practice as of the date of this publication.

The Department of Retirement Systems (DRS) provided us with audited member and beneficiary data. We checked the data for reasonableness as appropriate based on the purpose of the valuation. The Washington State Investment Board (WSIB) and DRS provided audited financial and asset information. We relied on all the information provided as complete and accurate, however we did adjust the assets to reflect an expected future transfer to the LEOFF 2 Benefit



Improvement Account (BIA) consistent with [RCW 41.26.805](#). In our opinion, this information is adequate and substantially complete for purposes of this valuation.

The asset smoothing method adopted during the 2003 Legislative Session (Chapter 11, Laws of 2003, E1) was intended to address the volatility of contribution rates under the aggregate funding method when used in combination with the existing asset allocation policy of WSIB. The combination of the current asset smoothing method with any other funding method or asset allocation policy may not be appropriate.

The Board's rate adoption for 2021-25 represents a continuation of their funding goal to produce stable contribution rates. Measured as of June 30, 2019, the adopted rates exceed the requirements under the aggregate actuarial cost method (the "plan's cost method") and the Board's funding policy that was adopted in 2019. Adopting contribution rates in excess of the requirements under the plan's cost method may lead to assets being collected in excess of what will be required to pay benefits. Adopting contribution rates in excess of the Board's funding policy increases the likelihood of that outcome. However, the actual experience of the plan, including future investment returns, will ultimately determine the cost of plan benefits and that cost may vary from what we expect under current assumptions.

The undersigned, with actuarial credentials, meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. While this report is intended to be complete, we are available to offer extra advice and explanations as needed.

Sincerely,

Luke Masselink, ASA, EA, MAAA
Senior Actuary

Matthew M. Smith, FCA, EA, MAAA
State Actuary

Contribution Rates

Member and Employer Rate Summary

	2019	2018
Member	7.68%	8.67%
Employer*	4.61%	5.20%
State (Normal Cost)	3.07%	3.47%
State (Plan 1 UAAL)	0.00%	0.00%
Total State	3.07%	3.47%

*Excludes administrative expense rate.

Development of Employer/State Rates

a. Total Normal Cost	15.36%
b. Member Normal Cost (a x 50%)	7.68%
c. Total Employer/State Normal Cost (a - b)	7.68%
d. State Normal Cost (a x 20%)	3.07%
e. Employer Normal Cost (c - d)*	4.61%
f. Cost to Amortize UAAL**	0.00%
g. Total Employer Contribution Rate (e + f)***	4.61%

*Excludes administrative expense rate.

**Prior funding policy required the state to amortize any LEOFF 1 Unfunded Actuarial Accrued Liability no later than June 30, 2024, using projected salaries of both LEOFF 1 and LEOFF 2 members.

***The state pays 20% of the total normal cost for LEOFF 2. This reduces the total employer contribution rate from 7.68% to 4.61%.



The following table shows the development of the normal cost rates. Consistent with the Board's funding policy, the normal cost rates include minimum contribution rates to provide stable and adequate contribution rates over time. Based on the plan's current funded status, the minimum rates are 90 percent of the normal cost calculated under the EAN actuarial cost method. Please see the [Glossary](#) for a more detailed explanation of EAN.

We provide additional contribution rate calculations on the [Interactive Reports](#) page of our website. This interactive report calculates member and employer contribution rates that vary based on the asset valuation method and discount rate that the user selects.

Development of Normal Cost Rates	
<i>(Dollars in Millions)</i>	
1. Calculated Member Normal Cost Rate	
a. Future Value of Fully Projected Benefits	\$118,647
b. Present Value of Fully Projected Benefits	16,095
c. Valuation Assets	13,294
d. Unfunded Fully Projected Benefits (b - c)	2,802
e. Plan 1 Present Value of Future Salaries (PVS)	N/A
f. Plan 2 PVS	24,130
g. Weighted PVS (2e + 2f)	\$48,260
h. Member Normal Cost (d / g)	5.81%
i. Member Minimum Contribution Rate	7.68%
j. Member Contribution Rate with Minimum	7.68%
k. Change In Plan Provisions (Laws of 2020)	0.00%
l. Calculated Member Contribution Rate (j + k)	7.68%
2. Calculation of Employer/State Normal Cost Rate	
a. Present Value of Fully Projected Benefits	\$16,095
b. Valuation Assets	13,294
c. Unfunded Fully Projected Benefits (a - b)	2,802
d. Present Value of Member Contributions	1,401
e. Employer/State Responsibility (c - d)	\$1,401
f. Plan 2 PVS	\$24,130
g. Employer/State Normal Cost (e / f)	5.81%
h. Employer/State Minimum Contribution Rate	7.68%
i. Employer/State Contribution Rate with Minimum	7.68%
j. Change In Plan Provisions (Laws of 2020)	0.00%
k. Calculated Total Employer/State Contribution Rate (i + j)	7.68%
3. Adopted Contribution Rates for 2021-2023	
a. Member Contribution Rate*	8.53%
b. Employer Contribution Rate (a - c)*	5.12%
c. State Contribution Rate*	3.41%
d. Total Contribution Rate (a + b + c)	17.06%

Note: Totals may not agree due to rounding.

*LEOFF 2 rate: 50% Employee, 30% Employer, 20% State.



Actuarial Liabilities

We report the present and future value of benefit payments by year on our website. We also show how the present value of these benefit payments varies by interest rate assumptions. For more information or to view projected benefit payments, please visit the [Interactive Reports](#) page of our website.

Actuarial Liabilities		
(Dollars in Millions)	Present Value of Fully Projected Benefits	Entry Age Normal Accrued Liability
Active Members		
Retirement	\$10,001	\$6,569
Termination	169	28
Death	110	14
Disability	543	291
Return of Contributions on Termination	111	(33)
Return of Contributions on Death	83	47
Total Active	\$11,018	\$6,914
Inactive Members		
Terminated Vested	\$250	\$250
Terminated Non-Vested*	\$16	\$16
Service Retired**	4,398	4,398
Disability Retired	281	281
Survivors	132	132
Total Inactive	\$5,077	\$5,077
Laws of 2020	1	0
2019 Total	\$16,096	\$11,992
2018 Total	\$14,846	\$11,066

Note: Totals may not agree due to rounding.

*Members who terminated without a vested lifetime benefit but are eligible for a refund of their employee contributions with interest that currently reside in the trust.

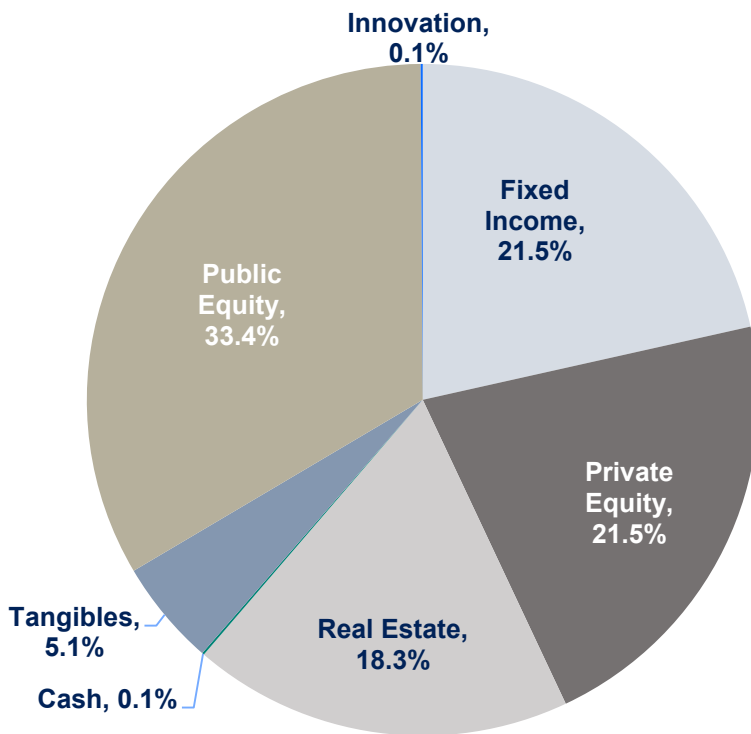
**Includes liability from individuals who are entitled to a portion of the primary member's benefit (legal order payees).

The "Return of Contributions (ROC) on Termination" in the Entry Age Normal Accrued Liability section of the table is negative. This is a result of how these benefits are accrued, over a member's working career, under the EAN actuarial cost method. The accrued liability for a given benefit provision is the difference between (1) today's value of all future benefits for that benefit definition and (2) how much of those future benefits are assumed to be accrued over the rest of the member's career. Item (1) is essentially split into annual "pieces" that are spread evenly across a career from first hire date to last assumed exit. Item (2) is how many more "pieces" they have left to accrue. For benefits like ROC on Termination, while we assume members that are eligible for retirement will no longer elect a ROC benefit when they exit the system, they are still accruing the level piece of item (2) each year until they retire. So in this example of retirement eligible active employees, item (1) is zero but item (2) is positive. This means we get a negative number when subtracting item (2) from item (1).

Please note GASB mandates this methodology for the accrued liability calculation in financial reporting. We use the same methods in this report – a funding valuation – for easier comparison with financial reporting results. An alternative method is to calculate the accrued liability through the date last eligible for the benefit instead of the end of career. This would eliminate the negative accrued liability components seen above.

Plan Assets

Retirement Commingled Trust Fund (CTF) Asset Allocation



Source: Washington State Investment Board.

Cash: Highly liquid, very safe investments that can be easily converted into cash, such as Treasury Bills and money-market funds.

Fixed Income: Securities representing debt obligations and usually having fixed payments and maturities. Different types of fixed income securities include government and corporate bonds, mortgage-backed securities, asset-backed securities, convertible issues, and may also include money-market instruments.

Innovation: Fund that provides the ability to invest in a broad range of assets that fall outside the traditional asset classes or management style of existing asset classes.

Public Equity: Shares of U.S. and non-U.S. corporations that trade on public exchanges or "over-the-counter." The ownership of a corporation is represented by shares that are claimed on the corporation's earnings and assets.

Private Equity: The infusion of equity capital into a private company (one that is not available on the public markets). Private equity investments include securities that are not listed on a public exchange and are not easily accessible to most individuals. These investments range from initial capital in start-up enterprises to leveraged buyouts of mature corporations.

Real Estate: An externally-managed selection of partnership investments with the majority of the partnerships invested in high-quality real estate leased to third parties.

Tangibles: The tangible asset portfolio invests in sectors such as infrastructure, timber, agriculture, natural resources, commodities, or other sectors consistent with the goals of the asset class.

Each asset class is unique in terms of expected return, standard deviation, and correlation to other asset classes. Please see page 45 of the [2019 Economic Experience Study](#) for more information.

The assets displayed below and throughout this report exclude the \$22.0 million held in the LEOFF 2 BIA and have been further reduced by \$300 million payable to the BIA effective July 1, 2019 (C 366 L 19). Under RCW 41.26.805, assets held in the BIA are not included when calculating contribution rates.

Change in Market Value of Assets	
<i>(Dollars in Millions)</i>	
2018 Market Value*	\$12,985
Revenue	
Contributions	
Member	188
Employer/State	189
Total Contributions	377
Investment Return	1,154
Restorations**	16
Transfers In	0
Miscellaneous	0
Total Revenue	\$1,547
Disbursements	
Monthly Benefits	305
Refunds	9
Total Benefits	314
Transfers Out	0
Expenses	2
Total Disbursements	\$0
Payables	\$316
2019 Market Value	\$14,216
Adjustments to Market Value***	(\$300)
2019 Adjusted Market Value (MV)	\$13,916
2019 Actuarial Value (AV)	\$13,294
Ratio (AV / MV)	96%

Note: Totals may not agree due to rounding.

*Due to adjustments from the expected BIA asset transfer, the 2018 MVA for LEOFF 2 in the table above does not match the 2018 MVA for LEOFF 2 in the 2018 Actuarial Valuation Report.

**Includes additional annuity purchases and service credit purchases.

***Reflects BIA asset transfer.

Investment Gains and (Losses) for Prior Year	
<i>(Dollars in Millions)</i>	
a. 2018 Market Value*	\$12,942
b. Total Cash Flow	64
c. 2019 Market Value*	14,159
d. Actual Return (c - b - a)	\$1,154
e. Weighted Asset Amount	\$12,974
f. Expected Return (7.4% x e)	960
g. Investment Gain/(Loss) for Prior Year (d - f)	193
h. Dollar-Weighted Rate of Return*	8.89%

Note: Totals may not agree due to rounding.

*Source: Washington State Investment Board.

Calculation of Actuarial Value of Assets			
<i>(Dollars in Millions)</i>			
a. Market Value at 6/30/2019			\$13,916
Deferred Gains and (Losses)			
Plan Year	Smoothing	Years	
Ending	Period	Remaining	
6/30/2019	2	1	97
6/30/2018	3	1	85
6/30/2017	7	4	387
6/30/2016	6	2	(166)
6/30/2014	8	2	219
b. Total Deferral			\$623
c. Market Value less Deferral (a - b)			\$13,294
d. 70% of Market Value of Assets			\$9,742
e. 130% of Market Value of Assets			\$18,091
f. Actuarial Value of Assets*			\$13,294

Note: Totals may not agree due to rounding. The gain/(loss) for 6/30/2015, has been fully realized.

*Actuarial Value of Assets can never be less than 70% or greater than 130% of the Market Value of Assets.



Funded Status

In our actuarial valuation report, we calculate a plan's funded status by comparing the plan's current assets, determined under an asset valuation method, to the actuarial accrued liability of its members calculated under an actuarial cost method. Funded status can vary significantly depending on the purpose of the measurement and the assumptions and methods used to determine the funded status.

Based on the purpose of the measurement, actuaries can select from several acceptable actuarial cost methods when measuring a plan's funded status. The cost methods vary in the manner they allocate benefits to past and future time periods. Generally speaking, benefits allocated to past service are considered accrued (or earned). Please see the [Glossary](#) on our website for an explanation of the actuarial cost methods we use in this actuarial valuation.

Consistent with financial reporting under GASB requirements, we report funded status using the EAN actuarial cost method. However, the funded status measures we share in this report may still vary from those presented in the [DRS Comprehensive Annual Financial Report](#). These differences occur because the assumptions and methods applied to determine contribution requirements (under a funding valuation) may not apply for financial reporting under GASB accounting standards (an accounting valuation). Put another way, these measurements still represent distinct measurements for specific purposes and the results may vary between the two reports.

To determine the present value (today's value) of accrued benefits we discount future benefits to the valuation date using the valuation interest rate. This rate is adopted by the Board and is intended to be consistent with the long-term expected return under the plan's funding policy. (Note: This discount rate may vary from the rate used for financial reporting under GASB accounting standards.)

In addition to the valuation interest rate, we use the same long-term assumptions to develop the funded status measure in this report that we use to determine the contribution requirements of the plan. We don't expect the assumptions to match actual experience over short-term periods. However, we do expect these assumptions to reasonably approximate average annual experience over long-term periods. This measure of funded status is consistent with the Board's current funding policy and financing plan for future retirement benefits.

For reporting funded status and calculating contribution requirements, we also use an asset valuation method to determine the AVA. This asset valuation method smooths the inherent volatility in the MVA by deferring a portion of annual investment gains or losses for a certain number of years. Investment gains and losses occur when the annual return on investments varies from the long-term assumed rate. To determine the 2019 investment gains or losses, we used an investment return assumption of 7.40 percent. The AVA provides a more stable measure of the plan's assets on an ongoing basis.

With this background in mind, we display the funded status on an "actuarial value" basis in the following table. For the actuarial value basis, we use the assumed long-term rate of return and AVA consistent with the plan's funding policy.

It's also reasonable and acceptable to report funded status using other assumptions and methods. The resulting funded status will change with the use of assumptions and methods that vary from what we present in this report. Please visit the [Interactive Reports](#) page of our website for funded status measures that vary by interest rate assumptions and asset valuation methods.

We include information for LEOFF 1 because the prior funding policy required the state to amortize any LEOFF 1 Unfunded Actuarial Accrued Liability (UAAL) no later than June 30, 2024, using projected salaries of both LEOFF 1 and LEOFF 2 members. Given LEOFF 1 is currently fully funded, no UAAL exists. If a positive UAAL in LEOFF 1 re-emerges, future funding policy may vary from the past funding policy.

Generally speaking, under current funding policy, when a plan is less/more than 100 percent funded, we expect higher/lower contribution requirements in the near term to return the plan to a 100 percent funded status over time. A plan with a funded status above 100 percent will require future contributions if the plan

has not yet accumulated sufficient assets to pay both the expected cost of benefits that have been earned today and the expected cost of benefits that will be earned by current members in the future. As of the valuation date, and under the data, assumptions and methods used for this actuarial valuation, only LEOFF 1 has sufficient assets to cease ongoing contributions.

The funded status presented in this report are not sufficient to determine whether a plan has enough assets to terminate or settle the plan obligations.

The funded status depends on numerous assumptions. Two of the most significant assumptions are the mortality rates, which estimate how long we expect members to live, and the interest rate or expected return on plan assets. A key component of the mortality assumption is the rate at which mortality is expected to improve in the future. To show this, we doubled the current mortality improvement assumption, i.e., longer lifespans than our best estimate, and assumed no future improvements, shorter lifespans than our best estimate.

Funded Status on an Actuarial Value Basis*

(Dollars in Millions)	LEOFF 1	LEOFF 2
EAN Accrued Liability	\$4,077	\$11,992
Valuation Assets	\$5,734	\$13,294
Unfunded Liability	(\$1,657)	(\$1,302)
Funded Ratio		
2019	141%	111%
2018	135%	108%
2017	131%	109%
2016	126%	105%
2015	125%	105%
2014	127%	107%

*Liabilities valued using the EAN cost method at an interest rate of 7.5% for LEOFF 1 and 7.4% for LEOFF 2. All assets have been valued under the actuarial asset method.

Sensitivity of Funded Ratios to Mortality Rates

(Dollars in Millions)	No Mortality Improvement	Best Estimate Mortality	Double Mortality Improvement
Accrued Liability	\$11,333	\$11,992	\$12,652
Valuation Assets	\$13,294	\$13,294	\$13,294
Unfunded Liability	\$1,961	\$1,302	\$642
Funded Ratio	117%	111%	105%

Sensitivity of Funded Ratios to Interest Rates

(Dollars in Millions)	1% Lower 6.4%	Best Estimate 7.4%	1% Higher 8.4%
Accrued Liability	\$13,853	\$11,992	\$10,468
Valuation Assets	\$13,294	\$13,294	\$13,294
Unfunded Liability	(\$559)	\$1,302	\$2,825
Funded Ratio	96%	111%	127%



Actuarial Gain/Loss

The following table displays actuarial gains and losses, expressed as contribution rate changes. Actuaries use gain/loss analysis to compare actual changes to assumed changes from various sources with respect to assets, liabilities, and salaries. We also use this analysis to determine:

- ❖ The accuracy of our valuation model and annual processing.
- ❖ Why contribution rates changed.
- ❖ The reasonableness of the actuarial assumptions.

Actuarial gains will reduce contribution rates; actuarial losses will increase contribution rates. Under a reasonable set of actuarial assumptions, actuarial gains and losses will offset over long-term experience periods.

Change in State Contribution Rate by Source	
Change in Rate	LEOFF 2*
2018 Rate Before Laws of 2019	3.43%
Remove Rate Floor	(0.84%)
2018 Adjusted Rate	2.59%
Liabilities	
Salaries	0.13%
Termination	(0.01%)
Retirement	0.01%
Disability	0.00%
Mortality	0.00%
Return to Work	0.33%
Other Liabilities	0.04%
Total Liability Gains/Losses	0.50%
Assets**	
Contributions	(0.13%)
Disbursements	0.01%
Investment Returns	(0.33%)
Asset Gains/Losses	(0.45%)
Incremental Changes	
Plan Change	0.00%
Method Change	0.01%
Assumption Change	0.00%
Correction Change	0.00%
Experience Study Change	(0.10%)
Total Incremental Changes Gains/Losses	(0.09%)
Present Value of Future Salaries Gains/Losses	(0.23%)
Other Gains/Losses	(0.00%)
Total Change	(0.27%)
2019 Preliminary Rate	2.32%
Increase from Applied Rate Floor	0.75%
Laws of 2020	0.00%
2019 Adjusted Rate	3.07%

*The state contribution rate to LEOFF 2 is 20% of the Normal Cost.

**Asset Gain/Loss performed on AVA not MVA.



III. PARTICIPANT DATA



Overview of System Membership

LEOFF 2 membership includes fire fighters; emergency medical technicians; law enforcement officers including sheriffs; university, port, and city police officers; and enforcement officers with the Department of Fish and Wildlife.

The following table shows participant data changes from last year's valuation to this year's valuation. We divide the participant data into two main categories:

- ❖ **Actives** – Members accruing benefits in the plan.
- ❖ **Annuitants** – Members and beneficiaries receiving benefits from the plan.

Active Membership By Employer	
State Agencies	151
Higher Education	119
Counties	3,005
County Sub Divisions	449
First Class Cities	5,318
Other Cities	5,093
Ports	216
Fire Districts	4,206
Total	18,557

Reconciliation of Active and Annuitant Data	
2018 Actives	18,130
Transfers	0
Hires/Rehires	1,358
New Retirees	(554)
Deaths	(9)
Terminations	(368)
2019 Actives	18,557
2018 Annuitants	5,436
New Retirees*	644
Annuitant Deaths	(34)
New Survivors	22
Other	(4)
2019 Annuitants	6,064
Ratio of Actives to Annuitants	3.06

*Includes service and disability retirees.



Summary of Plan Participants

Summary of Plan Participants		
	2019	2018
Active Members		
Number	18,557	18,130
Total Salaries (Millions)	\$2,117	\$1,982
Average Age	42.8	43.1
Average Service	13.6	13.9
Average Salary	\$114,085	\$109,319
Terminated Members		
Vested	969	934
Non-Vested*	2,193	2,055
Total Terminated	3,162	2,989
Annuitants		
Service Retired**	5,312	4,733
Disability Retired	473	446
Survivors	279	257
Total Annuitants	6,064	5,436
Average Monthly Benefit, All Annuitants	\$4,260	\$4,070
Number of New Service Retirees	614	575
Average Monthly Benefit, New Service Retirees	\$4,942	\$4,896

*Members who terminated without a vested lifetime benefit but are eligible for a refund of their employee contributions with interest that currently reside in the trust.

**Includes retirements from active and terminated with vested status.

Retirement Age and Service		
	2019	2018
All Retired Law Enforcement Officers		
Average Entry Age	32.4	32.6
Average Age at Retirement	55.9	55.8
Average Service at Retirement	23.5	23.2
All Retired Fire Fighters		
Average Entry Age	31.5	31.6
Average Age at Retirement	57.0	56.9
Average Service at Retirement	25.5	25.3
All Members who Retired in the Last Year (With 21-25 Years of Service)		
Average Monthly Final Average Salary	\$8,967	\$8,610



IV. APPENDICES

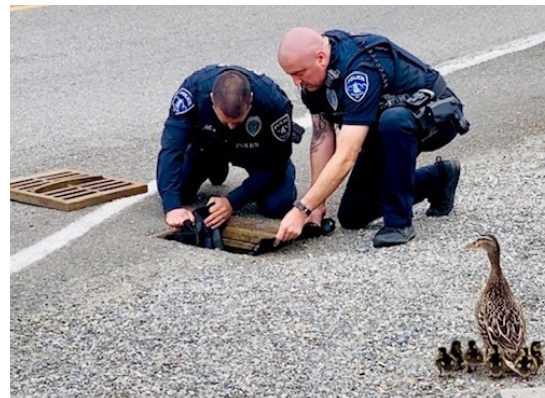


Actuarial Methods and Assumptions

To calculate the contribution rates necessary to pre-fund a plan's benefits, an actuary uses an actuarial cost method, an asset valuation method, a funding policy, economic assumptions, and demographic assumptions. The sections below list the methods and assumptions that change regularly or are new since the last actuarial valuation report. Please see the [Actuarial Methods](#) web page for descriptions of the actuarial cost methods and asset valuation method we use for this valuation, and please see the [Actuarial Assumptions](#) web page for descriptions of all remaining assumptions.

FREQUENTLY CHANGING ASSUMPTIONS

We make an assumption to project the value of accumulated employee contributions with interest if a member elects a refund of contributions instead of a deferred retirement allowance upon termination. We selected an assumption of 8.60 percent, which is between contribution rates calculated in the last valuation and our estimation of long-term rates. We will no longer update this assumption annually and instead maintain the assumption until the next experience study. We will continue to monitor the assumption and update as appropriate.



CHANGES IN METHODS AND ASSUMPTIONS SINCE THE LAST VALUATION

- ❖ We updated our demographic assumptions based on the results of our latest demographic experience study. This study is completed every six years and includes updates to a wide range of assumptions, including rates of termination, retirement and mortality. Please see the full report for more details.
- ❖ We updated the Joint-and-Survivor (J&S) and Early Retirement Factors (ERFs) in our model. These factors are used to value benefits for early retirement and survivors of members that die prior to retirement. These factors match the J&S and ERFs that DRS plans to implement on October 1, 2020.
- ❖ We simplified our modeling of medical premium reimbursements for survivors of duty-related deaths.
- ❖ We changed our method to updating certain data items that change annually. Examples include the public safety duty-related death lump sum and the Washington State average wage. We have set these values at 2018 and will project into the future using assumptions until the next demographic experience study in 2025. Please see our website for more information regarding this method change.

Summary of Plan Provisions

The summary of key plan provisions used in the actuarial valuation are provided in two sets of tables. The table below contains plan provisions that can change frequently, while the provisions that change less frequently can be found on the [Summary of Plan Provisions](#) page of our website.

The table below and those on our website present high-level summaries and are not meant to be exhaustive lists. For complete details of plan provisions, please refer to the statutes governing the retirement systems or contact the plan administrator (DRS). In the unlikely event that information contained in these summary tables conflicts with state law, the law takes precedence.

Summary of Frequently Changing Plan Provisions	
	Plan 2
COLA	Lesser of CPI* or 3%
Material Plan Provision	
Changes Since Last Valuation	None
*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bellevue, WA - All.	

The Office of the State Actuary's Website

Our website (leg.wa.gov/osa) contains additional information and educational material not included in this report. The site also contains an archive of other recent studies that OSA has produced. The following is a list of materials found on our website that could be useful to the reader.

GLOSSARY

Definitions for frequently used actuarial and pension terms.

AGE DISTRIBUTIONS

Tables summarizing valuation statistics by member/annuitant age.

HISTORICAL DATA

Table summarizing valuation statistics by valuation period.

2019 REPORT ON FINANCIAL CONDITION AND ECONOMIC EXPERIENCE STUDY

Report examining the financial health of the retirement systems and long-term economic assumptions.

2013-2018 DEMOGRAPHIC EXPERIENCE STUDY

Most recent report examining demographic behavior.

2016 RISK ASSESSMENT

Information examining the effect of unexpected experience on the retirement plan.

COMMENTARY ON RISK

Educational information on the risks inherent in our actuarial measurements and how these measurements could vary under different circumstances.

CONTRIBUTION RATE PROJECTIONS

Forecasts for future contribution rates based on projected assets and liabilities.

INTERACTIVE REPORTS

Set of reports displaying funded status, projected benefit payments, and contribution rates that vary by key inputs the user selects.





Office of the State Actuary

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