

Washington State Volunteer Fire Fighters' and Reserve Officers' Relief and Pension Fund



2021 PENSION EXPERIENCE STUDY



Office of the
State Actuary

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2021 Pension Experience Study

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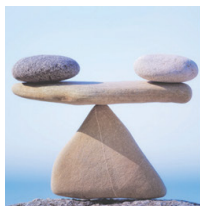


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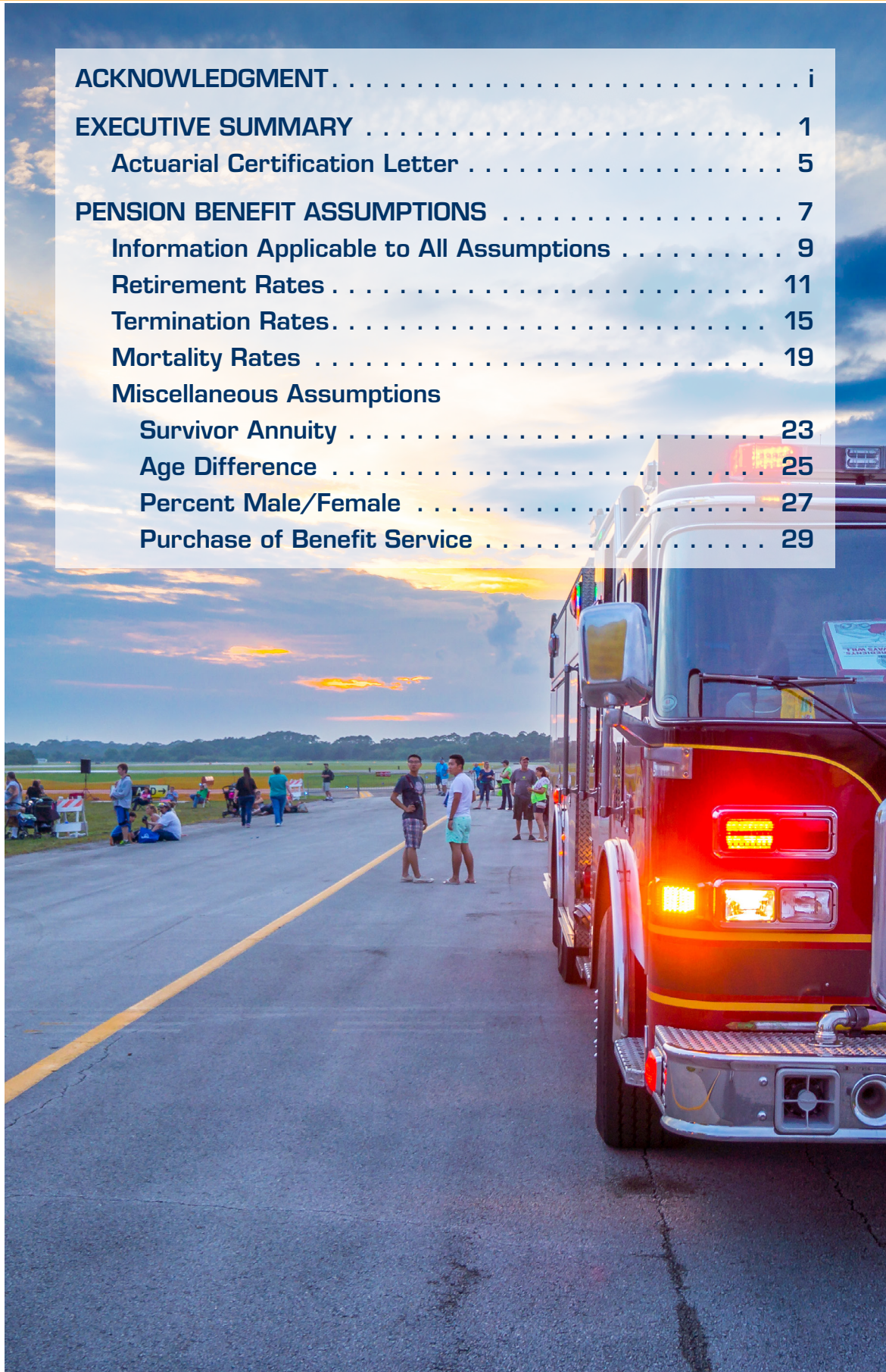
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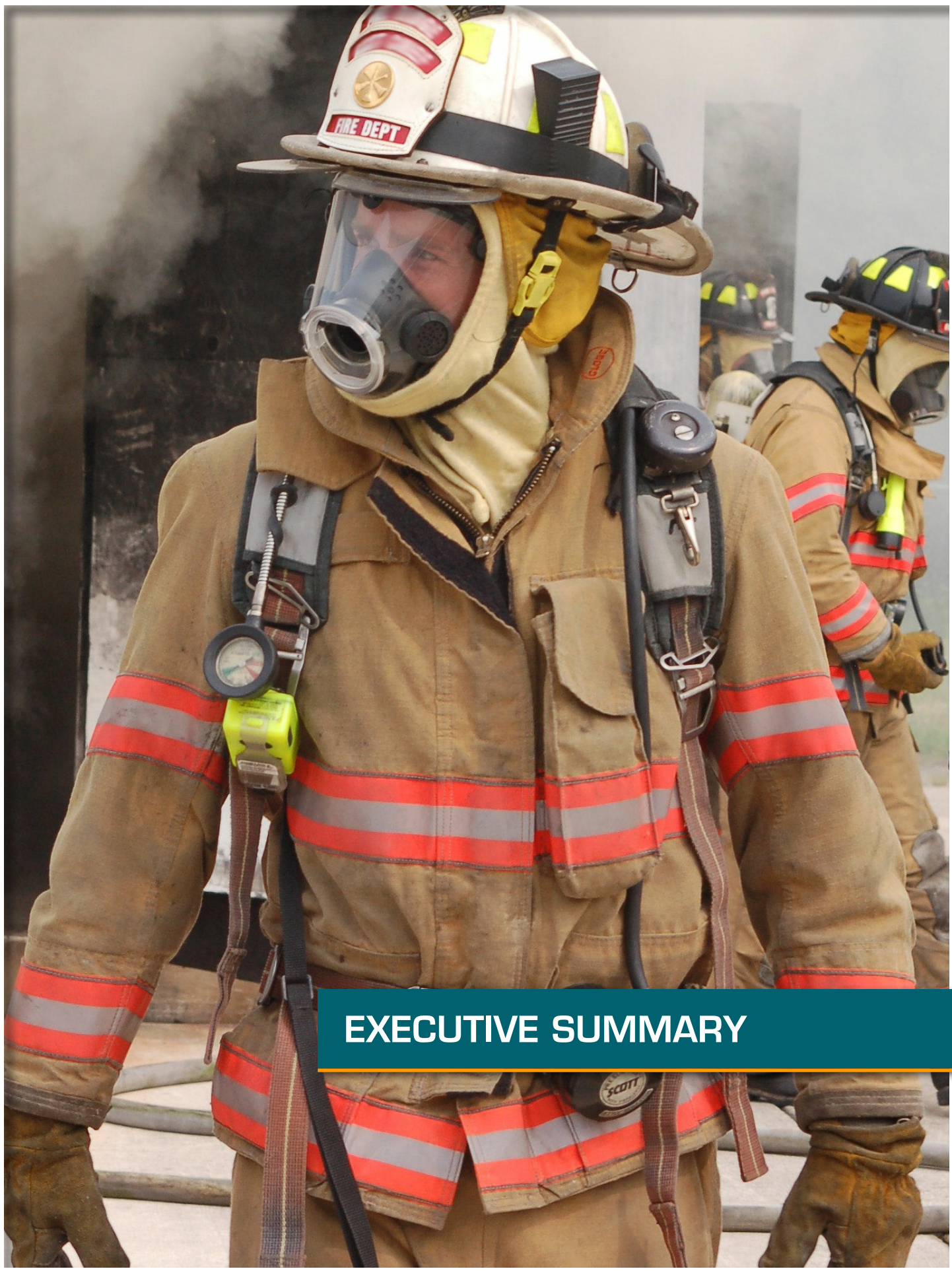
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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report documents the results of an actuarial experience study on the assumptions related to pension benefits for the Volunteer Fire Fighters' and Reserve Officers' (VFF) Relief and Pension Fund. The primary purpose of this experience study is to compare the current demographic assumptions, related to pension benefits, to the actual experience of the plan and apply our professional judgment regarding future expectations to determine if any adjustments are required to ensure our assumptions remain reasonable. Readers should not use this study for other purposes. We also advise readers of this study to seek professional guidance as to its content and interpretation and not to rely upon this communication without such guidance. Distribution of or reliance on only parts of this study could result in its misuse and may mislead others.

Similar to our [2018 Relief Experience Study](#), we will continue to review these pension benefit assumptions approximately every six years. An experience study can take considerable time to perform, so our office studies the pension and relief experience studies during different review cycles.

Please see the forthcoming *2020 Volunteer Fire Fighters' and Reserve Officers' Relief and Pension Fund Actuarial Valuation Report (VAVR)* for the impact on plan liabilities and contribution rates resulting from this pension experience study.

High Level Takeaways

We used ten years of data (2009-2018) to develop the assumptions in this report. We are currently in the early stages of collecting sufficient historical data related to pension assumptions as a result of data quality concerns prior to 2009 (which we documented in those historical actuarial valuation reports). In the future, reliance on additional years of data will help in determining longer-term trends.

Below we summarize the three major categories of demographic assumptions that were studied in this report. Please see the remainder of this report for further information.

- ❖ **Retirement** – We observed fewer retirements than expected, so we reduced retirement rates toward the level of actual experience. In particular, members aged 65 (and older) started collecting their pension benefits later than previously anticipated.
- ❖ **Termination** – We observed a greater number of terminations than expected, so we increased termination rates toward the level of actual experience. The experience data also indicates that approximately 80 percent of terminations occur for members with nine (or fewer) years of service, which is important since members need at least ten years of service to become eligible for an annual pension benefit. We reflected this experience when setting this assumption.
- ❖ **Mortality** – Consistent with our old set of assumptions, we continue to assume future mortality experience will be best modeled by our assumptions for the Public Employees' Retirement System (PERS). These underlying assumptions for PERS were developed by the Society of Actuaries (SOA) and include base mortality rates as well as mortality improvement scales.
 - We selected the “Pub.H-2010” base mortality tables for this plan. Released in January of 2019, these tables are the most recent publication from SOA on the mortality rates of public retirement plan participants at the time of this study.

- We also selected the long-term rates from the SOA MP-2017 mortality improvement scale, which is generally lower than our previous assumptions.
- Lastly, we now apply a different base table for members who are active, retired, disabled, or in beneficiary status.

In addition to Retirement, Termination, and Mortality, we use other demographic assumptions [referred to as Miscellaneous assumptions] in our actuarial valuation model to estimate pension plan costs. In this report, we also include our analysis of each miscellaneous assumption. Ultimately, we recommended minor updates to these assumptions where appropriate, which generally had a small impact on the plan.



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Actuarial Certification Letter Volunteer Fire Fighters’ and Reserve Officers’ Relief and Pension Fund 2021 Pension Experience Study April 2021

This report documents the results of an actuarial experience study on the assumptions related to pension benefits for the Volunteer Fire Fighters’ and Reserve Officers’ (VFF) Relief and Pension Fund defined under [Chapter 41.24](#) of the Revised Code of Washington. The primary purpose of this experience study is to compare the current demographic assumptions, related to pension benefits, to the actual experience of the plan and apply our professional judgment regarding future expectations to determine if any adjustments are required to ensure our assumptions remain reasonable. This report should not be used for other purposes.

These assumptions will be incorporated into our forthcoming *2020 VFF Actuarial Valuation Report*. We will continue to review these pension benefit assumptions as appropriate or approximately every six years. This analysis will become outdated with the release of the next pension experience study. Please replace this report with our next report when available.

The experience study results summarized in this report involve methods for analyzing past experience and applying professional judgment in setting new assumptions for VFF. We believe that the methods used, and the assumptions developed in this study, are reasonable and are in conformity with Actuarial Standards of Practice (ASOPs) as of the date of this publication.

The Board for Volunteer Fire Fighters and Reserve Officers (BVFF) provided us with member and beneficiary data. We did not perform an audit of BVFF data. We relied on all the information as complete and accurate, and checked BVFF data for reasonableness. In our opinion, this information is adequate and reasonable for purposes of this study. BVFF and the Office of the State Actuary are working together to further improve the quality of the data. We use this data for documenting plan experience, which impacts the assumptions we set (among other applications). More reliable data improves our assumption setting process because it allows us to analyze trends in the underlying data and more accurately project future liabilities.

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,

Lisa Won, ASA, FCA, MAAA
Deputy State Actuary

Michael Harbour, ASA, MAAA
Actuary



PENSION BENEFIT ASSUMPTIONS

INFORMATION APPLICABLE TO ALL ASSUMPTIONS

Purpose

Certain data, assumptions, and methodology we used apply to all assumptions within this experience study. The purpose of this section is to summarize this information to help avoid repetitive language within this report. This section is also intended to document further information related to applicable law changes.

Unless noted otherwise, the data, assumptions, and methods are consistent with the 2018 VAVR.

Data

Unless noted otherwise, we relied on ten years of experience study records (2009-2018) to develop assumptions within this report. The time period for data is shorter relative to the other state retirement systems found in the [2013-18 Demographic Experience Study](#).

However, we chose not to include data prior to 2009 due to data quality concerns. Since 2009, the staff for BVFF have made significant improvements in collecting and processing data.

Assumptions

A member of the pension plan can be a volunteer firefighter, Reserve Law Enforcement Officer (RLEO), or Emergency Medical Technician (EMT). These volunteer types could exhibit different choices (behaviors), but we elected not to set assumptions specific to each group. As of the 2018 VAVR, approximately 98 percent of the pension plan members are volunteer firefighters so we do not expect unique assumptions would materially change estimated plan liabilities.

Further, we do not expect gender will significantly impact the assumptions selected for the pension plan. Unless noted otherwise, we combined genders when studying and developing assumptions and thus establish assumptions that take into consideration the natural gender distribution within the plan.

Methodology

In general, we moved the new assumptions in the direction of historical experience and applied our professional judgment regarding expectations for the future. In addition, we looked for opportunities to simplify assumptions and how they are modeled, while maintaining reasonable accuracy of the measurements.

When examining historical experience, a table that summarizes “actual” experience relative to what was “expected” can be informative. Typically, the “actual” represents the number of members leaving via a specific decrement (such as retirements, terminations, or deaths) during the study period, and the “expected” represents the assumed number of eligible members that left. In general, an Actual-to-Expected Ratio (Ratio) less than 1.00 indicates an over-estimation of an assumption. Similarly, a Ratio above 1.00 indicates an under-estimation of an assumption. Unless noted otherwise, the Ratio will move closer to 1.00 under our new set of assumptions.

Historical experience is helpful, but the future behavior of members may differ. The economic environment and general trends in demographics can influence the rate at which members leave the pension system (as well as recent law changes). We used our professional judgment and relied on input from BVFF staff when assessing these factors. Lastly, we used our professional judgment to simplify assumptions where appropriate.

Law Changes

As of the publication of this report, only one bill was passed by the Washington State Legislature that impacts pension members since the *Volunteer Fire Fighter Relief and Pension Fund 2008-13 Pension Experience Study*.

[Engrossed Substitute Senate Bill \(ESSB\) 5829](#) (Chapter 144, 2020 Session), which enhanced benefits for current and future retirees. This law change increases the base retirement benefit from \$50 to \$100, as well as allows for service accruals beyond 25 years. Furthermore, this law change will increase future fixed contribution rates for volunteer firefighters and expected rates for RLEOs and EMTs. Please see the link for further details.

RETIREMENT RATES

What Is the Retirement Rates Assumption and How Do We Use It?

The Retirement Rates assumption represents the probability that a retirement-eligible individual will stop volunteering and start collecting their pension benefits. In analyzing historical data, our goal is to establish assumptions that best represent when benefits will be paid from the trust fund each year in the future.

This assumption is generally age-based. However, where appropriate, we set assumptions that vary by service-level.

High-Level Takeaways

The probability of retirement generally increases with age and service until the plan's normal retirement age of 65. We also observed higher rates of retirement for members who earn unreduced benefits with 25 years of service.

The actual number of retirements we observed in the data was less than expected based on the old retirement assumptions. Members aged 65 (and older) commenced retirement later than initially anticipated. As a result, we reduced the retirement rates assumption to move in the direction of the plan experience. We also simplified the assumptions we selected for ages 60-64 given the stability in observed retirement experience at those ages.

Data, Assumptions, and Methodology

We relied on ten years of experience study records (2009-2018).

For each year, we counted the members who were eligible to retire at the beginning of the year (exposures), and the members of this group who left volunteer service during the year (retirements). At each age, we divided the number of retirements by the number of exposures to arrive at an observed, or actual, retirement rate. For this study, we also examined retirement rates based on a service criterion of less than 25 years and at least 25 years. We specifically reviewed this service-based threshold due to the significant early retirement factors that apply to members with less than 25 years of service.

Results

We began by analyzing actual plan experience against the old assumptions. The following table shows the year-by-year Actual and Expected retirements. The old assumptions estimated a higher number of retirements than the plan actually experienced from 2009 through 2018, where we observed a 0.70 Actual-to-Expected Ratio overall.

PENSION BENEFIT ASSUMPTIONS

Retirement Experience by Year Under Old Assumptions			
Year	Actual	Expected	Ratio
2009	84	144	0.58
2010	138	172	0.80
2011	122	176	0.69
2012	141	187	0.76
2013	142	194	0.73
2014	143	214	0.67
2015	138	204	0.68
2016	154	220	0.70
2017	138	219	0.63
2018	168	229	0.73
Total	1,368	1,959	0.70

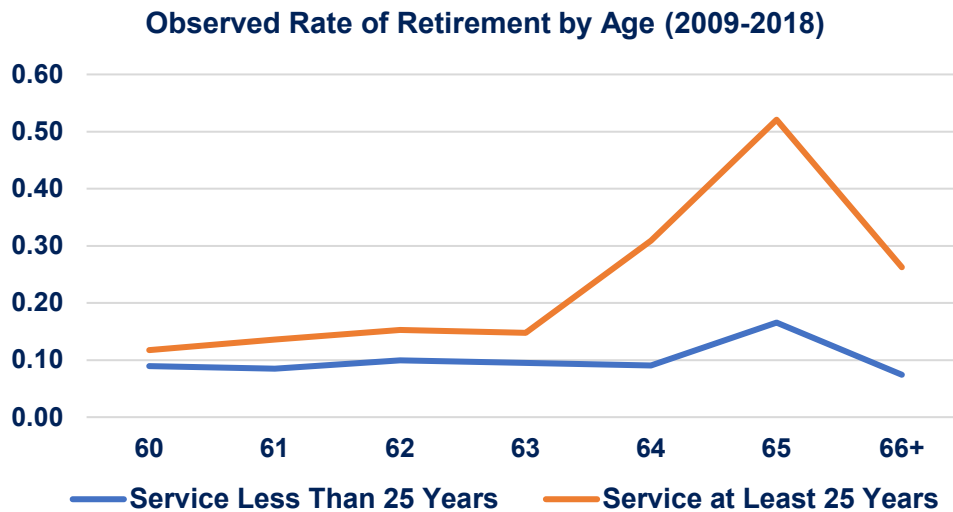
The previous table is informative in showing where the annual retirement rate experience has trended. Over the period, the old assumption consistently over-estimated the number of retirements. However, the retirement rates assumption is generally age-based so we also examined this trend as shown in the following table.

Retirement Experience by Age Under Old Assumptions			
Age	Actual	Expected	Ratio
60	138	94	1.46
61	138	113	1.22
62	147	127	1.15
63	125	92	1.36
64	181	106	1.71
65	235	441	0.53
66+	404	985	0.41
Total	1,368	1,959	0.70

As the data indicates, plan experience was mixed before and after age 65. We under-estimated retirements prior to age 65, and we over-estimated retirements at age 65 and older.

Another factor impacting retirement behavior is the amount of service. A member that accrues 25 years of service¹ has historically retired earlier than members with less than 25 years. The following graph displays the actual rate of retirement based upon the amount of service a member has earned. Consequently, we decided to retain retirement rates that vary by age and whether a member has earned 25 years of service.

¹ Please see the 2018 VAVR and the remainder of this experience study report for details on the difference between membership and benefit service. For purposes of this analysis, any reference to service pertains to membership service.



As part of our previous demographic experience study, we had insufficient data subsequent to the passage of [House Bill 2823](#) (Chapter 60, Laws of 2010) to set a retirement assumption for members at least age 65 with 25 years of service or more. Under that bill, members can retire, begin collecting a retirement benefit, and continue to volunteer without suspension of their benefit. Using our professional judgement at that time, we assumed a high percentage of members (90 percent) would retire as soon as they earn an unreduced benefit. However, based upon several more years of data in this demographic experience study, we lowered our retirement rates beginning at age 65 for those with 25 years of service (or more).

Based on our analysis, including **Other Considerations** on the following page, we selected new retirement rates shown in the following table. We also display the old and actual rates for comparison.

Retirement Rates						
Age	Service < 25			Service ≥ 25		
	Old	Actual	New	Old	Actual	New
60	0.07	0.09	0.10	0.07	0.12	0.15
61	0.09	0.08	0.10	0.09	0.14	0.15
62	0.11	0.10	0.10	0.11	0.15	0.15
63	0.09	0.09	0.10	0.09	0.15	0.15
64	0.12	0.09	0.10	0.12	0.31	0.35
65	0.38	0.17	0.20	0.90	0.52	0.50
66+	0.19	0.07	0.15	0.90	0.26	0.35

The following table summarizes the expected retirements under the new assumption as well as how that changes the Actual-to-Expected Ratio.

PENSION BENEFIT ASSUMPTIONS

Retirement Experience by Age Under New Assumptions			
Age	Actual	Expected	Ratio
60	138	166	0.83
61	138	156	0.88
62	147	146	1.01
63	125	129	0.97
64	181	204	0.89
65	235	241	0.98
66+	404	529	0.76
Total	1,368	1,570	0.87

Other Considerations

- ❖ **Law Changes** – We also considered how retirement rates can be impacted by law changes since the previous demographic experience study.
 - **ESSB 5829 (Chapter 144, 2020 Session)** – We evaluated adjusting our retirement assumptions to reflect these new benefit provisions. Ultimately, we elected not to directly modify the retirement rates as a result of this bill because the increase in the annual retirement benefit is likely not large enough to influence retirement behavior.
- ❖ **Exclusion of Terminations** – Retirement rates are commonly represented by members who leave active membership and immediately start collecting their retirement benefits. Given this, we considered excluding termination experience for members that are eligible for retirement. As the following table illustrates, terminations represent a significant number who stop volunteering, especially for members in their early 60s.

Retirement Eligible Members			
Age	Lives	Retirement	Termination
60	1,349	19	119
61	1,253	22	116
62	1,159	58	89
63	1,022	49	76
64	883	131	50
65	706	212	23
66+	2,323	309	95

We performed cost analysis and determined the difference between assuming immediate commencement of retirement benefits and deferral to normal retirement age is not material. Based on this analysis, we chose to include termination experience (for members eligible to retire) in the development of retirement rates, thus simplifying the structure of our assumptions and how we model these benefits.

TERMINATION RATES

What Is the Termination Rates Assumption and How Do We Use It?

The Termination Rates assumption represents the probability that an active member will stop volunteering for reasons other than disability or retirement. The goal of this assumption is to estimate the number of terminated members who leave active volunteering and either elect a return of contributions or defer commencement of their retirement benefit.

This assumption is service-based, where the assumed likelihood of termination is dependent upon the number of years of volunteer service a member has rendered.

High-Level Takeaways

The highest rates of termination occur for members early in their volunteering career, and steadily decrease as they accrue additional service.

The actual number of terminations we observed in the data was greater than expected under our old termination assumptions. As a result, we increased the termination rates assumption to move in the direction of the plan experience. We also simplified the assumption by structuring it into five-year increments.

Data, Assumptions, and Methodology

We relied on ten years of experience study records (2009-2018).

For each year, we counted the members who were not eligible to retire at the beginning of the year (exposures), and the members of this group who left volunteer service during the year (terminations). At each service level, we divided the number of terminations by the number of exposures to arrive at an observed, or actual, termination rate. Any members eligible for retirement that terminated were counted as retirements and included in the development of our **Retirement Rates**.

Results

We began by analyzing actual plan experience against the old assumptions. The following table shows the year-by-year Actual and Expected terminations. The old assumptions estimated a lower number of terminations than the plan actually experienced from 2009 through 2018, where we observed a 1.12 Actual-to-Expected Ratio overall.

PENSION BENEFIT ASSUMPTIONS

Termination Experience by Year Under Old Assumptions			
Year	Actual	Expected	Ratio
2009	1,581	1,349	1.17
2010	1,410	1,333	1.06
2011	1,493	1,355	1.10
2012	1,304	1,320	0.99
2013	1,449	1,300	1.11
2014	1,293	1,235	1.05
2015	1,434	1,225	1.17
2016	1,429	1,184	1.21
2017	1,301	1,140	1.14
2018	1,370	1,117	1.23
Total	14,064	12,558	1.12

The previous table is informative in showing where the annual termination rate experience has trended. Over the period, the old assumption consistently under-estimated the number of terminations. However, the termination rates assumption is service-based so we also examined this trend as shown in the following table.

Termination Experience by Service Level Under Old Assumptions			
Service	Actual	Expected	Ratio
0-4	7,281	6,836	1.07
5-9	3,766	3,120	1.21
10-14	1,375	1,138	1.21
15-19	615	500	1.23
20-24	421	349	1.20
25+	606	614	0.99
Total	14,064	12,558	1.12

This table illustrates that the under-estimation of terminations occurs over most service level cohorts as well. We further observed that the number of terminations is highest for members early in their volunteering careers, but steadily decrease as years of service increase. More specifically, we note that approximately 80 percent of terminations occur for members with nine (or fewer) years of service, which is important since members need at least ten years of service to become eligible for an annual retirement benefit. Given these considerations, we chose to continue to structure our termination rates as service-based assumptions.

Based on our analysis, including **Other Considerations** on the following page, we selected new termination rates shown in the following table. We also display the old and actual rates for comparison.

PENSION BENEFIT ASSUMPTIONS

Termination Rates			
Service	Old*	Actual*	New
0-4	0.18	0.20	0.19
5-9	0.13	0.16	0.15
10-14	0.09	0.11	0.11
15-19	0.06	0.07	0.07
20-24	0.06	0.07	0.07
25+	0.10	0.10	0.09

*Estimated rates, for each 5-year increment, based on headcounts.

The following table summarizes the expected terminations under the new assumption as well as how that changes the Actual-to-Expected Ratio.

Termination Experience by Service Level Under New Assumptions			
Service	Actual	Expected	Ratio
0-4	7,281	7,050	1.03
6-9	3,766	3,535	1.07
10-14	1,375	1,354	1.02
15-19	615	578	1.06
20-24	421	426	0.99
25+	606	555	1.09
Total	14,064	13,498	1.04

Other Considerations

- ❖ **Law Changes** – We also considered how termination rates can be impacted by law changes since the previous demographic experience study.
 - **ESSB 5829 (Chapter 144, 2020 Session)** – We evaluated adjusting our termination assumptions to reflect these new benefit provisions. While this bill could change termination behavior for members with at least 25 years of service, we think the impact will be minimal and consequently did not make a material adjustment to the assumptions we selected.
- ❖ **Data Adjustments** – We considered, but did not make, data adjustments similar to the Termination Rates developed as part of the *2013-18 Demographic Experience Study* for the other Washington State retirement systems. While employees may have a short break in service between jobs that’s important to recognize, we believe volunteers are fundamentally different since participation is not related to their livelihood (i.e., income).
- ❖ **Unique Assumptions at Each Service Level** – We considered a termination assumption that changes for every year of accrued service, but ultimately selected a more simplified approach that sets the assumption in five-year service increments. We believe this simplicity increases the overall credibility of the data used in setting the assumptions and does not materially change results.

- ❖ **Age-Based Table** – We did not evaluate the application of age-based termination rates because of the strong observed relationship between service level and termination behavior, which is consistent with the other Washington State retirement systems.
- ❖ **Supplemental Assumptions** – Upon termination, we assume vested members will not withdraw their accumulated contributions because we expect the value of the retirement benefit will exceed the value of returned contributions.

MORTALITY RATES

What Is the Mortality Rates Assumption and How Do We Use It?

The Mortality Rates assumption is primarily used to estimate how long pension benefits will be paid after retirement. We also use these assumptions to determine the probability that a member will survive until retirement. This assumption is typically based on age and gender.

The goal of this assumption is to estimate the probability of death in a given year for both the member and any eligible survivors. We also set assumptions for how we expect mortality rates to improve over time.

High-Level Takeaways

The VFF mortality experience data is limited and not statistically credible, thus we chose not to develop mortality assumptions based on plan experience. Instead, we relied on our analysis for the other Washington State retirement systems from the *2013-18 Demographic Experience Study* for comparison purposes and to help establish new mortality assumptions for VFF.

Consistent with our old assumption for VFF, we continue to assume future mortality experience will be best modeled by our mortality assumptions for PERS. One notable change is the structure of the mortality rates assumption. Specifically, we now set different assumptions for members who are active, retired, disabled, or in beneficiary status. This change in methodology reflects evolving practice in this area nationally.

Our new mortality assumption expects both lower and higher rates of mortality compared to the old assumption, dependent on the age, gender, and status. In general, the new assumptions anticipate members will not live quite as long. On average, we expect retirees and survivors will receive one fewer year of pension benefits.

Data, Assumptions, and Methodology

The development of mortality rates includes three components:

- ❖ **Base Mortality Table** – This is a table of mortality rates, by age and gender, which is developed over an observed time period. A third party, such as SOA, typically develops this table from experience across many retirement plans.
- ❖ **Mortality Improvement Scale** – This scale is used to reflect the assumption that life expectancy will increase in the future. This assumption is also developed by SOA and is applied to the base mortality tables for each projected year which reduces mortality rates and thus increases longevity in future years.
- ❖ **Age Offsets** – These are optional adjustments made to the base mortality table to more closely match plan experience. They “offset” the mortality rate assigned at each age to reflect a healthier or less healthy population. Offsets are determined using historical experience specific to the plan being studied.

Over the ten-year experience study period (2009-2018), we observed 1,600 deaths in VFF which is not sufficient to develop a mortality rates assumption. Data is considered more credible the larger the available sample size. When very precise assumptions are set, such as a mortality rate at a specific age, full credibility in the data becomes harder to obtain. With insufficient credibility, analysis of the data can be a misleading or an inaccurate representation of the

PENSION BENEFIT ASSUMPTIONS

population as a whole. To increase the reliability of our results, we relied on the results from the *2013-18 Demographic Experience Study*. Please see this study for further background on underlying components of mortality rates including base mortality tables, mortality improvement scale, and age offsets.

We recognize volunteers in VFF may be full-time employees of another Washington State retirement system (or the private sector) and we would ideally rely on the mortality rates that best captures their assumed longevity based on their profession. However, we do not have information on what these volunteers do for full-time employment. Given this limitation, we anticipate PERS mortality rates will reasonably model the experience of these volunteers.

Results

The old assumptions, based on the *2007-12 Demographic Experience Study*, were developed with reliance on private sector data from the early 1990s. New national mortality tables have become available since the development of the old assumptions including base mortality tables that rely on data from public retirement systems. As a result, we did not consider retaining the old assumptions.

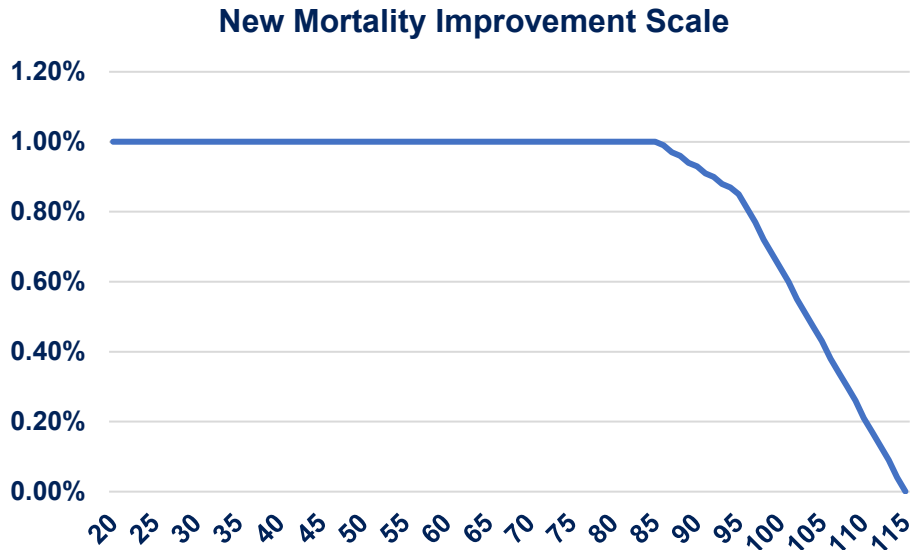
During the *2013-18 Demographic Experience Study*, we selected the PubG.H-2010 tables developed by SOA as our new base table mortality assumption for PERS. There are separate tables developed for teachers, public safety, and general public employees, but we rely on the latter given our uncertainty of VFF members' full-time professions and the reasonable fit of the PERS experience. Released in January of 2019, these tables are the most recent publication from SOA on the mortality rates of public retirement plan participants at the time of this study. Additionally, mortality rates now change based on a member's status (such as active or retired) within the plan. The following table displays the new base mortality rates under each member status category.

New Base Mortality Rates*								
Age	Active and Terminated Vested		Service Retirees		Survivors		Disabled**	
	Male	Female	Male	Female	Male	Female	Male	Female
20	0.0004	0.0001	N/A	N/A	Active Rates		0.0041	0.0023
30	0.0005	0.0002	N/A	N/A	Active Rates		0.0041	0.0027
40	0.0008	0.0004	N/A	N/A	Active Rates		0.0072	0.0063
50	0.0018	0.0010	N/A	N/A	Active Rates		0.0170	0.0148
60	0.0038	0.0021	0.0081	0.0047	Retiree Rates		0.0272	0.0204
70	0.0082	0.0053	0.0182	0.0116	0.0187	0.0120	0.0434	0.0315
80	0.0203	0.0141	0.0539	0.0355	0.0571	0.0396	0.0807	0.0643
90	0.1578	0.1212	0.1578	0.1212	0.1471	0.1191	0.1696	0.1449
100	0.3359	0.2944	0.3359	0.2944	0.3359	0.2944	0.3359	0.2944

*The new base mortality rates are summarized in the table and rounded for display purposes. A complete list of our new base mortality tables can be found in our [Actuarial Assumptions](#) webpage. Displayed rates are as of 2010 and do not incorporate any mortality improvement.

**Only applicable to permanently disabled members (who receive a relief annuity benefit).

We also selected the SOA’s long-term rates of the MP-2017 mortality improvement scale to project future improvements at a generally lower rate than previously assumed. The determination of this assumption requires a significant amount of data, so we relied on the *2013-18 Demographic Experience Study* and believe those conclusions are also reasonable for VFF. As shown in the following graph, this assumption is a 1 percent improvement in mortality rates per year for ages younger than 86.



Note: Please see the *2013-18 Demographic Experience Study* for rates by age.

The long-term MP-2017 mortality improvement scale projects mortality rates for every year after the 2010 base table. We use “generational” mortality, under which a member is assumed to receive additional mortality improvements in each future year, throughout their lifetime. As an example, in 2020, the mortality rate for a 50-year old active VFF member would be:

$$(\text{PubG.H-2010 rate}) \times (\text{MP-2017 scale})^{(2020-2010)}$$

or roughly $0.00177 * (100\%-1\%)^{10} = 0.0016$

Please see the *2013-18 Demographic Experience Study* for further information, including background/analysis on the base tables and mortality improvement scales.

To assess the reasonableness of our new assumptions, we analyzed actual VFF plan experience against the new PERS mortality assumptions. For this comparison, we counted both the number of members at the beginning of each year (exposures), and the number of deaths across the ten years of experience study records. The following table shows the Actual and Expected deaths by member status. In total, the new assumptions estimated a higher number of deaths than the plan actually experienced from 2009 through 2018, where we observed a 0.95 Actual-to-Expected Ratio overall. As can be seen from the table, approximately 90 percent of the observed deaths were from service retirees.

PENSION BENEFIT ASSUMPTIONS

Mortality Experience* Under New Assumptions			
	Actual	Expected	Ratio
Actives	73	151	0.48
Retirees	1,439	1,426	1.01
Survivors	88	112	0.79
Total	1,600	1,688	0.95

**We removed terminated vested members from our actual and expected counts due to potential data quality concerns.*

The following table summarizes the components of the mortality assumption, including the change in the base mortality table, age offsets, and mortality improvement scale based on the member's status within the system. Please see the 2018 VAVR for old base mortality rates which contain the age offsets as well as the mortality improvement scale used in the valuation.

Summary of Mortality Assumptions				
Status	Base Table	Offsets Males	Offsets Females	Mortality Improvement Scale
Old Assumptions				
Active*	RP-2000 (Healthy)	(1)	(1)	100% Scale BB
Retiree	Same as Active			
Survivor	Same as Active			
Disabled	RP-2000 (Disabled)	0	0	100% Scale BB
New Assumptions				
Active*	PubG.H-2010 (Employee)	0	0	MP-2017 (ultimate rate)
Retiree	PubG.H-2010 (Healthy Retiree)	0	0	MP-2017 (ultimate rate)
Survivor	PubG.H-2010 (Contingent Survivor)	0	0	MP-2017 (ultimate rate)
Disabled	PubG.H-2010 (Disabled Retiree)	0	0	MP-2017 (ultimate rate)

**Includes members who terminated but have not commenced retirement benefits.*

Other Considerations

- ❖ **Public Safety Mortality** – Given the level of risk associated with volunteer firefighter job duties, we considered using mortality rates consistent with those we selected for the Law Enforcement Officers' and Fire Fighters' Retirement System. While we do not know the primary occupation of these volunteers, we ultimately concluded based upon actual VFF mortality experience that the application of PERS mortality continues to be reasonable.
- ❖ **Age Offsets** – We considered applying age offsets to the active and survivor mortality tables since the historical VFF data shows healthier experience than the assumption. However, since there are limited deaths in these statuses, we expect experience to vary quite a bit over time. As such, we retained the PERS mortality assumptions without additional adjustments for age offsets.

MISCELLANEOUS ASSUMPTIONS: SURVIVOR ANNUITY

What Is the Survivor Annuity Assumption and How Do We Use It?

A Survivor Annuity assumption is used to estimate the rate at which survivors receive an annuity benefit (or pension) when an active or terminated vested member dies. When a death occurs prior to commencement of a retirement pension, eligible survivors have the option to select an actuarially reduced annuity or take a refund of the member's contributions.

High-Level Takeaways

We chose a 65 percent assumption that applies to all ages. In essence, this assumption represents our expectation for the portion of the VFF population that is married. We assume the spouse will always select the pension benefit for reasons stated later in the section.

A simplified assumption was selected because of limited plan data, and the fact that the survivor annuity assumption is a very small percent of total plan expected pension liabilities.

Data, Assumptions, and Methodology

We reviewed ten years of experience study records (2009-2018) and calculated the actual survivor annuity rate by dividing the number of survivors that selected an annuity benefit (observations) by the total number of deaths (exposures). Ultimately, we did not use the data to set an assumption due to certain limitations. Specifically, the experience data set has fewer than 100 records of pre-retirement death, and it includes non-vested members (i.e., those who did not volunteer for at least ten years) where the survivor is not eligible to select an annuity.

Results

The old assumption, based on analysis for the other Washington State retirement systems during the *2007-12 Demographic Experience Study*, assumed consistency with PERS Plan 2. We decided to move away from this approach because the refund of VFF member contributions is significantly smaller relative to PERS Plan 2. Furthermore, some VFF employers make pension contributions on behalf of members, so a survivor may not be eligible for a return on contributions. Based on this information, we assume all eligible survivors would select a pension benefit in this plan.

An assumption for the likelihood of having a survivor, also known as Percent Married, was studied as part of the *2018 Relief Experience Study*. During that study, we assumed a flat 65 percent for all ages. We had similar takeaways for survivors of Plan 3 members during the *2013-18 Demographic Experience Study* since that assumption is tied to percent married as well.

Given the limited amount of plan data and the assumption's relatively minor impact to the overall pension liabilities, we simplified this assumption and applied one constant rate for all ages. This is a large change for ages less than 50 but we determined it is not material because of (1) the low likelihood of member death, (2) the ten years of service vesting requirement, and (3) the survivor benefit is typically smaller at these ages.

PENSION BENEFIT ASSUMPTIONS

The following table outlines the old and new assumptions we ultimately selected.

Survivor Annuity Assumption		
Age	Old*	New
Less than age 50	0.06	0.65
Ages 50 to 59	0.37	0.65
Age 60 or older	0.62	0.65

**Assumption is summarized for display purposes.*

Other Considerations

- ❖ **Plan Experience** – As discussed in the **Data, Assumptions, and Methodology** section, the data is limited and we did not use it to set an assumption. However, we did consider the plan experience and summarized this information in the following table.

Survivor Annuity Experience (2009-2018)			
Age	Exposure*	Observations	Survivor Annuity Rate
Less than age 50	16	0	0.00
Ages 50 to 59	19	7	0.37
Age 60 or older	38	16	0.42
Total	73	23	0.32

**Includes all non-vested pre-retirement death experience.*

- This experience indicated that survivors of older members are more likely to select an annuity benefit. This relationship correlates to the likelihood of being married at each age and a typically larger accrued benefit at older ages.
- ❖ **Age-Based Table** – We considered the application of age-based rates that are consistent with experience, but ultimately chose a simplified assumption since the assumption is not considered material to plan costs. We did not consider a service-based table for this assumption.
- ❖ **Law Changes** – We also considered how this assumption can be impacted by law changes since the previous demographic experience study.
 - **ESSB 5829 (Chapter 144, 2020 Session)** – We considered adjusting our survivor annuity assumption to reflect higher member contributions from this bill. Ultimately, we decided the increase in contributions will not materially influence this assumption since the pension benefit has also increased under this legislation.

MISCELLANEOUS ASSUMPTIONS: AGE DIFFERENCE

What Is the Age Difference Assumption and How Do We Use It?

The Age Difference assumption represents the difference in age between a member and their qualifying beneficiary. This assumption is typically gender-based and helps us estimate the cost of survivor benefits.

If an active or terminated vested member of the pension plan dies, their qualifying beneficiary is eligible for either a survivor annuity or a refund of the member's contributions. In the event the beneficiary elects to receive a survivor annuity, our valuation model needs the age of the beneficiary to estimate the survivor benefits that would be payable throughout his or her lifetime. Separately, a beneficiary is eligible for a one-time lump sum and an annual relief pension payable for the beneficiaries' lifetime if the cause of death is duty-related.

However, the age of a member's beneficiary is generally not reported for active or terminated members. Therefore, we use the Age Difference assumption to estimate the beneficiary's age relative to the age of the member in order to model possible future benefits.

Retired members that select a joint-and-survivor option would also have an eligible beneficiary. If the age of that beneficiary is not reported to us, then we rely on the Age Difference assumption.

High-Level Takeaways

Our old assumption (+3 age difference for male members, and -1 age difference for female members) was based on the *2007-2012 Demographic Experience Study*; the assumption did not change for the *2013-18 Demographic Experience Study*. We also reviewed VFF plan experience, which confirms this assumption remains reasonable.

Data, Assumptions, and Methodology

We relied on service retiree data from the 2018 VAVR. More specifically, we focused on members who elected a joint-and-survivor pension upon retirement.

This information helped us calculate the difference in age between retirees and their beneficiaries. We believe this is reasonable for current active and terminated vested members (and their spouses).

Results

The following table summarizes the service retiree counts, as well as the average age of the member and their beneficiary.

Current Retirees Electing a Joint-and-Survivor Pension				
	Count	Average Member Age	Average Beneficiary Age	Difference
Male	911	75	72	+3
Female	21	72	74	-2

PENSION BENEFIT ASSUMPTIONS

We will note that the limited female counts are not sufficient on their own for establishing an age difference assumption. Also, this data excludes approximately 100 records of retirees who selected a joint-and-survivor pension but do not have a beneficiary age reported. For these records, our valuation relies on the Age Difference assumption. We will work with the Board to collect this information in future valuations.

Our assumption continues to rely on analysis from the most recent demographic experience study for Washington State retirement systems (*2013-18 Demographic Experience Study*). We compared these assumptions to our VFF plan experience, which helped us confirm that these assumptions remain reasonable. The following table outlines the old and new assumptions, which have not changed.

Age Difference Assumption		
Member	Old	New
Male	+3	+3
Female	-1	-1

Note: Age Difference is Member Age less Spouse Age.

Other Considerations

- ❖ None.

MISCELLANEOUS ASSUMPTIONS: PERCENT MALE/FEMALE

What Is the Percent Male/Female Assumption and How Do We Use It?

The Percent Male/Female assumption is used to assign a default gender for valuation data records that contain missing gender information. Some of our demographic assumptions, such as mortality, vary by gender and thus require this information.

This assumption is also used when developing gender-neutral administrative factors for the plan.

High-Level Takeaways

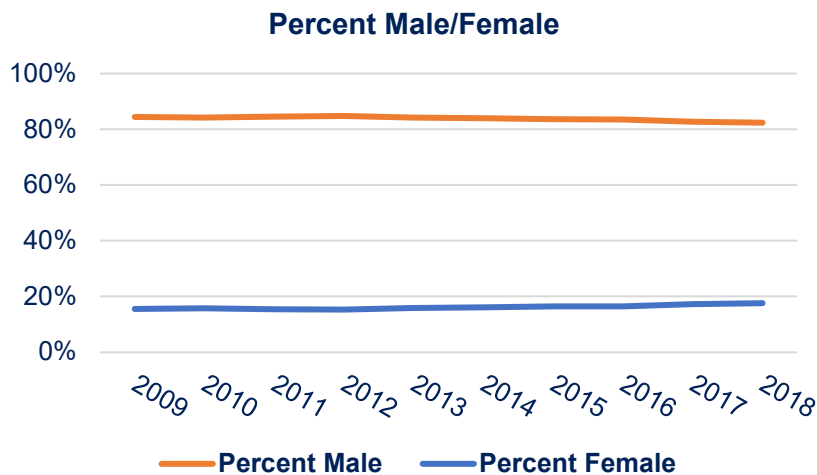
We selected a new assumption that reflects a slightly lower male to female ratio than previously assumed. This is primarily based upon recent trends in the data and input from BVFF staff.

Data, Assumptions, and Methodology

We relied on ten years of experience study records (2009-2018). No special assumptions or methods were used to develop this assumption.

Results

The portion of active male and female members, relative to total population, has slightly changed over the ten-year period. The following graph summarizes the shift in percentage of male and female volunteers.



PENSION BENEFIT ASSUMPTIONS

Based on the graph on the previous page and BVFF staff's expectation that more females will volunteer in the future, we chose to assume a lower male to female ratio. We believe the number of females relative to the number of males will continue to increase. The following table outlines the old and new assumptions.

Percent Male/Female Assumption		
	Old	New
Percent Male	90%	80%
Percent Female	10%	20%

Other Considerations

- ❖ None.

MISCELLANEOUS ASSUMPTIONS: PURCHASE OF BENEFIT SERVICE

What Is the Purchase of Benefit Service Assumption and How Do We Use It?

Members have the option to purchase service for years of volunteering where they missed paying pension fees. The Purchase of Benefit Service assumption is used to estimate the benefit service a volunteer will retire with (and hence the amount of their retirement benefit).

If a member misses making a pension contribution in any year following enrollment in the pension plan, they can make the contribution at a later date. Interest is added at a rate of 1 percent per month.

High-Level Takeaways

We continue to assume all eligible members will purchase service credit for each year they did not make past pension contributions. In other words, we estimate pension benefits for valuation purposes based upon the membership service.

Data, Assumptions, and Methodology

We relied on service retiree data from the 2018 VAVR. More specifically, we compared the years of benefit service to membership service (or total years of volunteering) for each current retiree.

Results

The following table illustrates that most retirees have benefit service amounts that equal their membership service. Overall, we observed that total benefit service is approximately 95 percent of total membership service. This suggests that estimating future pension benefits for active members based solely on membership service is reasonable.

PENSION BENEFIT ASSUMPTIONS

Summary of Benefit Service Relative to Membership Service at Retirement						
Members with Benefit Service Equal to Membership Service			Members Who Missed Benefit Service Payments			Total*
Count	Average Benefit/ Membership Service		Count	Average Benefit Service	Average Membership Service	
FY 2009	122	23.8	58	17.6	21.5	95%
FY 2010	120	23.7	82	18.1	21.4	94%
FY 2011	131	23.9	67	17.6	21.7	94%
FY 2012	159	23.6	95	17.7	20.9	95%
FY 2013	141	23.6	61	16.0	20.4	94%
FY 2014	147	23.7	63	17.3	21.1	95%
FY 2015	125	23.5	61	17.7	21.2	95%
FY 2016	147	23.9	59	18.0	21.1	96%
FY 2017	158	23.9	59	18.1	22.1	95%
FY 2018	152	23.5	52	17.2	21.0	96%

**The Total represents the ratio of aggregate benefit service divided by aggregate membership service across all new retirees in each given year.*

The data suggests that approximately 95 percent of eligible benefit service is either earned or purchased by retirement. Given this, we will continue to assume all available benefit service is purchased upon retirement. This assumption adds slight conservatism in the results, but we do not believe this approach would materially impact the contribution rates adopted by the Board or overall plan funding.

Other Considerations

- ❖ **Law Changes** – We also considered how this assumption can be impacted by law changes since the previous demographic experience study.
 - **ESSB 5829 (Chapter 144, 2020 Session)** – We considered adjusting our purchase of benefit service assumptions to reflect higher member contributions from this bill. Ultimately, we decided the increase in contributions will not materially influence this assumption since the cost of making the contribution is substantially less than the value of the increased pension benefit.

Washington State Volunteer Fire Fighters' and Reserve Officers' Relief and Pension Fund

2021 Pension Experience Study



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