Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

December 6, 2021

Board of Trustees
Omaha School Employees' Retirement System
3215 Cuming Street
Omaha, NE 68131-2024

Re: 2021 Experience Study Report

Dear Trustees:

Attached please find the Experience Study report for the four-year period ending December 31, 2020. No material changes have been made to the draft version of the report that was provided to you at the September Board meeting. This report contains our recommended changes to the current set of actuarial assumptions and methods which would first be reflected in the January 1, 2022 actuarial valuation. Ultimately, you as the Board, have the authority and responsibility of adopting the assumptions and methods used in the valuation. Please note that we will need to be notified of your decision on adopting our recommended changes by the end of January, 2022 in order to reflect the new set of assumptions and methods in the January 1, 2022 actuarial valuation.

If you have any questions or need additional information, please do not hesitate to contact us. We would be happy to be of assistance.

Patrice Beckham

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

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OMAHA SCHOOL EMPLOYEES RETIREMENT SYSTEM

Four Year Experience Study
January 1, 2017 to December 31, 2020

Submitted: December 6, 2021

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December 6, 2021

Board of Trustees
Omaha School Employees' Retirement System
3215 Cuming Street
Omaha, NE 68131

Dear Trustees:

It is a pleasure to submit this report of our investigation of the experience of the Omaha School Employees Retirement System (OSERS) for the period of January 1, 2017 through December 31, 2020.

The purpose of this report is to communicate the results of our review of the actuarial methods and the economic and demographic assumptions to be used in the completion of the January 1, 2022 actuarial valuation. This report includes our recommended changes from the prior assumptions that are intended to better anticipate the emerging experience of the Plan. Actual future experience, however, may still differ from these assumptions. As the actuary for OSERS, our responsibility is to make recommendations for assumption and method changes. Ultimately the Board has the authority to decide whether or not to adopt the recommendations.

In preparing this report, we relied, without audit, on information supplied by the System for the annual actuarial valuations. If any data or other information is inaccurate or incomplete, our analysis and recommendation may be impacted and a revised report may need to be issued.

We hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

We further certify that the assumptions developed in this report satisfy ASB Standards of Practice, in particular, No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations* and No. 35, *Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations*.

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We look forward to our discussions and the opportunity to respond to your questions and comments.

We, Patrice A. Beckham and Bryan K. Hoge, are members of the American Academy of Actuaries, Enrolled Actuaries and Fellows of the Society of Actuaries. We meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

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

Bryan K. Hoge, FSA, EA, FCA, MAAA
Consulting Actuary

The purpose of an actuarial valuation is to provide a timely best estimate of the ultimate costs of a retirement system. Actuarial valuations of the Omaha School Employees Retirement System (OSERS or the System) are prepared annually to determine the actuarial contribution rate to fund the System on an actuarial reserve basis, i.e. the current assets plus future contributions, along with investment earnings will be sufficient to provide the benefits promised by the System. The valuation requires the use of certain assumptions with respect to the occurrence of future events, such as rates of death, disability, termination of employment, retirement age and salary changes to estimate the obligations of the System.

The basic purpose of an experience study is to determine whether the actuarial assumptions currently in use align with the actual emerging experience of the plan and to review if there have been any changes in expectations of future plan experience. This information, along with the professional judgment of the Board, its advisor, and the actury, is used to evaluate the appropriateness of continued use of the current actuarial assumptions. When analyzing experience and assumptions, it is important to recognize that actual experience is reported in the short term while assumptions are intended to be long-term estimates of experience. Therefore, actual experience is expected to vary from study period to study period, without necessarily indicating a change in assumptions is needed.

At the request of the Board, Cavanaugh Macdonald Consulting, LLC (CMC), performed a study of the experience of OSERS, for the four-year period ending December 31, 2020. This report presents the results, analysis, and resulting recommendations of our study. It is anticipated that the changes, if approved by the Board, will first be reflected in the January 1, 2022 actuarial valuation.

These assumptions have been developed in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the applicable Actuarial Standards of Practice adopted by the Actuarial Standards Board (ASB). While the recommended assumptions represent our best estimate of future experience, there are other reasonable assumption sets that could be supported by the results of this experience study. Those other sets of reasonable assumptions could produce liabilities and costs that are either higher or lower.

Our Philosophy

Similar to an actuarial valuation, the calculation of actual and expected experience is a fairly mechanical process, and differences between actuaries in this area are generally minor. However, the setting of assumptions differs, as it is more art than science. In this report, we have recommended changes to certain assumptions. To explain our thought process, we offer a brief summary of our philosophy:

- **Don't Overreact**: When we see significant changes in experience, we generally do not adjust our rates to reflect the entire difference. We will typically recommend rates somewhere between the old rates and the new experience. If the experience during the next study period shows the same result, we will probably recognize the trend at that point in time or at least move further in the direction of the observed experience. On the other hand, if experience returns closer to its prior level, we will not have overreacted, possibly causing volatility in the actuarial contribution rates.

- **Anticipate Trends**: If there is an identified trend that is expected to continue, we believe that this should be recognized. An example is the retiree mortality assumption. It is an established trend that people are living longer. Therefore, we believe the best estimate of liabilities in the valuation should reflect the expected increase in life expectancy.

- **Simplify**: In general, we attempt to identify which factors are significant and eliminate or ignore the ones that do not materially improve the accuracy of the liability projections.

SCOPE OF THIS REPORT

The actuarial valuation utilizes various actuarial methods and two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its impact on the System. Demographic assumptions are based on the emergence of the specific experience of the Systems' members.

All of the major actuarial assumptions that will be used in the January 1, 2022 Actuarial Valuation have been reviewed in this Study. The remainder of this report is divided as follows:

SECTION 2 EXECUTIVE SUMMARY
SECTION 3 ACTUARIAL METHODS
SECTION 4 ECONOMIC ASSUMPTIONS
SECTION 5 DEMOGRAPHIC ASSUMPTIONS
SECTION 6 MORTALITY
SECTION 7 RETIREMENT
SECTION 8 TERMINATION OF EMPLOYMENT

Actuarial Methods

The actuarial methods outlined in the Funding Policy include:

- Entry age normal cost method
- Expected + 25% asset smoothing method
- Amortization of UAAL, as a level percent of payroll, over a closed 30 year period.

As a result of our review of these methodologies, we are recommending that future changes in the UAAL be amortized over separate 25-year closed periods beginning on the date the change is measured. The other actuarial methods are reasonable and we recommend they be retained. Having said that, we recognize that the Board may wish to use an asset smoothing method that is consistent with the methodology used by the Nebraska Public Employees Retirement System, the closed five-year asset smoothing method. That method is commonly used by public plans and meets actuarial standards so such a change is acceptable to Cavanaugh Macdonald if that is the Board's decision.

Economic Assumptions

The following set of economic assumptions is recommended:

	Current Assumptions	Proposed Assumptions
Price Inflation	2.75%	2.35%
Investment Return	7.50%	7.00%
General Wage Growth	3.25%	2.85%
Payroll Growth	3.25%	2.85%

The Nebraska Investment Council is responsible for investing OSERS' trust funds. The long term asset allocation for the OSERS portfolio is the same as that of the Nebraska Public Employees Retirement System (NPERS). Last fall, an experience study was performed for the Nebraska Public Employees Retirement System and the investment return assumption was lowered from 7.50% to 7.00% (inflation of 2.35% plus real return of 4.65%). In order to provide a smoother cost pattern, the Board decided to phase in the proposed change to the inflation assumption of 40 basis points over four years for the plans covered by NPERS. Given the asset allocation for OSERS is the same as NPERS, the NIC invests the funds of both systems, and NPERS is expected to assume responsibililty for the administration of OSERS in several years we believe the same investment return assumption should be used for both systems. Therefore, we recommend the investment return assumption for OSERS be lowered from 7.50% to 7.00%. If a smoother cost pattern is desired, the Board of Trustees may want to consider a phase-in approach similar to that implemented by NPERS

Although we have recommended a specific set of economic assumptions, we recognize there are other sets of economic assumptions which are also reasonable for purposes of funding OSERS. Some actuaries (and/or boards) might be more risk averse and desire a greater degree of conservatism, while others are more risk tolerant and would choose less cautious assumptions. Actuarial Standards of Practice allow for this difference in approach and perspective, as long as the assumptions are reasonable and consistent.

Demographic Assumptions

Based on the observed data and associated analysis, the recommended changes to the current demographic assumptions are:

- Change the mortality assumption to the Pub-2010 General Employees Median Mortality Table. Generational mortality improvements will be modeled using the NPERS projection scale.
- Modify the retirement rates for both certificated and classified members
- Modify the termination of employment rates for both certificated and classified members
- Modify the election of refund at termination for both certificated and classified members and adjust the assumption based on years of service
- Reduce active member marriage assumption from 100% to 85%.

Given the proposed changes to the investment return and mortality assumptions, the Board may want to revisit the definition of actuarial equivalence being used to develop the actuarial factors for optional forms of payment used for members hired on or after July 1, 2018.

Financial Impact

The financial impact of the proposed assumption changes is based on the results of the most recent actuarial valuation, performed as of January 1, 2021. While the actual results for the January 1, 2022 valuation will vary, we expect the change, as a percentage of liabilities and normal cost, to be comparable. The results are shown on the following page.

Estimate of Financial Impact of Assumption Changes
Based on January 1, 2021 Valuation

Dollars In Thousands

	Baseline (Current Assumptions)	Demographic Changes	All Assumption Changes
1. Present Value of Future Benefits	$2,800,790	$2,793,241	$2,927,226
2. Present Value Future Normal Costs	419,434	429,440	449,517
3. Actuarial Accrued Liability (1) – (2)	$2,381,356	$2,363,801	$2,477,709
4. Actuarial Value of Assets	1,467,834	1,467,834	1,467,834
5. Unfunded Actuarial Accrued Liability (UAAL) (3) – (4)	$ 913,522	$ 895,967	$1,009,875
6. Funded Ratio (4) / (3)	61.64%	62.10%	59.24%
7. Normal Cost Rate	12.76%	12.67%	13.35%
8. Administrative Expenses	0.00%	0.00%	0.24%
9. UAAL Payment	14.77%	14.49%	16.19%
10. Actuarial Contribution Rate (7) + (8) + (9)	27.53%	27.16%	29.78%
10. Statutory Contribution Rate	21.66%	21.66%	21.66%
11. Contribution Shortfall/(Surplus) (9) – (10)	5.87%	5.50%	8.12%
12. Additional District Contribution	$ 22,200	$ 20,800	$ 30,514

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This section describes the actuarial methods that are used to determine the actuarial required contribution rate of the System. These methods are part of the Funding Policy adopted by the Board in 2019 and currently in use.

Actuarial Cost Method	Entry Age Normal
Asset Valuation Method	Expected + 25% Method
Amortization Method	Layered amortization with payments as level percent of payroll
Amortization Period	30 years, closed for each layer

ACTUARIAL COST METHOD

The systematic financing of a pension plan requires that contributions be made in an orderly fashion while a member is actively employed, so that the accumulation of these contributions, together with investment earnings should be sufficient to provide promised benefits and cover administration expenses. The actuarial valuation is the process used to determine when money should be contributed; i.e., as part of the budgeting process.

The actuarial valuation will not impact the amount of benefits paid or the actual cost of those benefits. In the long run, actuaries cannot change the costs of the pension plan, regardless of the funding method used or the assumptions selected. However, the choice of actuarial methods and assumptions **will** influence the incidence of costs.

The valuation or determination of the present value of all future benefits to be paid by the System reflects the assumptions that best seem to describe anticipated future experience. The choice of a funding method does not impact the determination of the present value of future benefits. The funding method determines only the incidence or allocation of cost. In other words, the purpose of the funding method is to allocate the present value of future benefits determination into annual costs. In order to do this allocation, it is necessary for the funding method to "break down" the present value of future benefits into two components: (1) that which is attributable to the past (2) and that which is attributable to the future. The excess of that portion attributable to the past over the plan assets is then amortized over a period of years. Actuarial terminology calls the part attributable to the past the "past service liability" or the "actuarial accrued liability". The portion of the present value of future benefits allocated to the future is commonly known as the "present value of future normal costs", with the specific piece of it allocated to the current year being called the "normal cost". The difference between the plan assets and actuarial accrued liability is called the "unfunded actuarial accrued liability".

Two key points should be noted. First, there is no single "correct" funding method. Second, the allocation of the present value of future benefits, and hence cost, to the past for amortization and to the future for annual normal cost payments is not necessarily in a one-to-one relationship with service credits earned in the past and future service credits to be earned.

There are various actuarial cost methods, each of which has different characteristics, advantages and disadvantages. However, Governmental Accounting Standard Board Statement Numbers 67 and 68 require that the Entry Age Normal cost method be used for financial reporting. Most systems do not want to use a different actuarial cost method for funding and financial reporting. In addition, the Entry Age Normal

method has been the most common funding method for public systems for many years. This is the cost method currently used by OSERS.

The rationale of the Entry Age Normal (EAN) cost method is that the cost of each member's benefit is determined to be a level percentage of his salary from date of hire to the end of his employment with the employer. This level percentage multiplied by the member's annual salary is referred to as the normal cost and is that portion of the total cost of the employee's benefit which is allocated to the current year. The portion of the present value of future benefits allocated to the future is determined by multiplying this percentage times the present value of the member's assumed earnings for all future years including the current year. The Entry Age Normal actuarial accrued liability is then developed by subtracting from the present value of future benefits that portion of costs allocated to the future. To determine the unfunded actuarial accrued liability, the value of plan assets is subtracted from the Entry Age Normal actuarial accrued liability. The current year's cost to amortize the unfunded actuarial accrued liability is developed by applying an amortization factor.

It is to be expected that future events will not occur exactly as anticipated by the actuarial assumptions in each year. Actuarial gains/losses from experience under this actuarial cost method can be directly calculated and are reflected as a decrease/increase in the unfunded actuarial accrued liability. Consequently, the gain/loss results in a decrease/increase in the amortization payment, and therefore the contribution rate.

Considering that the Entry Age Normal cost method is the most commonly used cost method by public plans, that it develops a normal cost rate that tends to be stable and less volatile, and is the required cost method under calculations required by Governmental Accounting Standard Numbers 67 and 68, **we recommend the Entry Age Normal actuarial cost method be retained.**

ACTUARIAL VALUE OF ASSETS

In preparing an actuarial valuation, the actuary must assign a value to the assets of the fund. An adjusted market value is often used to smooth out the volatility that is reflected in the market value of assets. This is because most employers would rather have annual costs remain relatively smooth, as a percentage of payroll or in actual dollars, as opposed to a cost pattern that is extremely volatile.

The actuary does not have complete freedom in assigning this value. The Actuarial Standards Board also has basic principles regarding the calculation of a smoothed asset value, Actuarial Standard of Practice No. 44 (ASOP 44), *Selection and Use of Asset Valuation Methods for Pension Valuations.*

ASOP 44 provides that the asset valuation method should bear a reasonable relationship to the market value. Furthermore, the asset valuation method should be likely to satisfy both of the following:

- Produce values within a reasonable range around market value, AND
- Recognize differences from market value in a reasonable amount of time.

In lieu of both of the above, the standard will be met if either of the following requirements is satisfied:

- There is a sufficiently narrow range around the market value, OR
- The method recognizes differences from market value in a sufficiently short period.

These rules or principles prevent the asset valuation methodology from being used to manipulate annual funding patterns. No matter what asset valuation method is used, it is important to note that, like a cost method or actuarial assumptions, the asset valuation method does not affect the true cost of the plan; it only impacts the incidence of cost.

OSERS values assets, for actuarial valuation purposes, based on the principle that the difference between actual and expected investment returns should be subject to partial recognition to smooth out fluctuations in the total return achieved by the fund from year to year. This philosophy is consistent with the long-term nature of a retirement system. Under this method, the actuarial value of the assets is the expected value of assets plus 25% of the difference between market value and expected value, where the expected value is last year's actuarial value, contributions and benefit payments all accumulated at the actuarial investment return assumption. This is mathematically equivalent to using a weighted average of 75% of the expected value and 25% of actual market value.

The current asset valuation method for OSERS also includes what is known as a "corridor", which provides that once the initial determination of the actuarial value of assets is made it is compared to a corridor around market value (80% of market value to 120% of market value). If the initial actuarial value lies outside the corridor, the final actuarial value of assets is set equal to the corresponding corridor value. For example, if the initial calculation of the actuarial value of assets is 132% of market value, the actuarial value is set equal to 120% of market value. We believe the corridor is necessary to ensure actuarial standards are met.

OSERS' funded status is often compared to the Nebraska School Retirement System (NPERS School). The NPERS School system uses a different asset valuation method which recognizes the dollar amount of the difference between the actual investment return and the assumed investment return on the market value of assets equally over a closed five-year period. This is a very common methodology used by public plans and it also meets actuarial standards under ASOP 44.

The purpose of an asset valuation method is to "smooth out" the volatility that occurs in the measurement of assets using pure market value. We believe the current method has provided the desired smoothing of asset experience and complies with actuarial standards of practice. It also converges back to market value of assets more quickly when there are returns both below and above the assumed return. **Our recommendation is to retain the current asset valuation method unless the Board wishes to use the NPERS School methodology to provide consistency of results. Either method will provide the desired smoothing of actual investment experience and is acceptable under actuarial standards of practice.**

AMORTIZATION OF UAAL

As described earlier, actuarial accrued liability is the portion of the actuarial present value of future benefits that are not included in future normal costs. Thus it represents the liability that, in theory, should have been funded through normal costs for past service. Unfunded actuarial accrued liability (UAAL) exists when the actuarial accrued liability exceeds the actuarial value of plan assets. These deficiencies can result from (i) plan improvements that have not been completely paid for, (ii) experience that is less favorable than expected, (iii) assumption changes that increase liabilities, or (iv) contributions that are less than the actuarial contribution rate. If the actuarial value of assets (AVA) exceeds the actuarial accrued liability (AAL), "surplus" exists.

There are a variety of different methods that can be used to amortize the UAAL. **Each method results in a different payment stream and, therefore, has cost implications.** For each methodology, there are three characteristics:

- The period over which the UAAL is amortized,
- The rate at which the amortization payment increases, and
- The number of components of UAAL (separate amortization bases).

Amortization Period: The amortization period can be either closed or open. If it is a closed amortization period, the number of years remaining in the amortization period declines by one in each future valuation. Alternatively, if the amortization period is an open or rolling period, the amortization period does not decline but is reset to the same number each year. This approach, which essentially "refinances" the System's debt (UAAL) every year, is infrequently used given recent trends in the industry.

The length of the amortization period has also changed over the last decade, particularly for systems using the level percent of payroll payment methodology (see below). Based on the professional guidance of actuaries and accountants, the recommended period for actuarial gains/losses is 15 to 20 years and for assumption changes 20-25 years. The goal is to better match the expected working lifetime of the membership at the time the amortization base is created.

Amortization Payment: The level dollar amortization method is similar to the method in which a home owner pays off a mortgage. The liability, once calculated, is financed by a constant fixed dollar amount, based on the amortization period until the liability is extinguished. This results in the liability steadily decreasing while the payments, though remaining level in dollar terms, in all probability decrease as a percentage of payroll. (Even if a plan sponsor's population is not growing, inflationary salary increases will usually be sufficient to increase the aggregate covered payroll).

The rationale behind the level percentage of payroll amortization method is that since normal costs are calculated to be a constant percentage of pay, the unfunded actuarial accrued liability should be paid off in the same manner. In addition, most public retirement systems are financed with contributions that are a level percent of covered payroll. When this method of amortizing the unfunded actuarial accrued liability is adopted, the initial amortization payments are lower than they would be under a level dollar amortization payment method, but the payments increase at a fixed rate each year so that ultimately the annual payment far exceeds the level dollar payment. The expectation is that total payroll will increase at the same rate so that the amortization payments will remain constant, as a percentage of payroll. In the initial years, the level percentage of payroll amortization payment may be less than the interest accruing on the unfunded actuarial accrued liability meaning that even if there are no experience losses, the dollar amount of the unfunded actuarial accrued liability will increase (called negative amortization). This is particularly true if the plan sponsor is paying off the unfunded actuarial accrued liability over a long period, such as 30 years.

Amortization Bases: The UAAL can either be amortized as one single amount or as components or "layers", each with a separate amortization base, payment and period. If the UAAL is amortized as one amount, the UAAL is recalculated each year in the valuation and experience gains/losses or other changes in the UAAL are folded into the single UAAL amortization base. The amortization payment is then the total UAAL divided by an amortization factor for the applicable amortization period.

If separate amortization bases are maintained, the UAAL is composed of multiple amortization bases, each with its own payment schedule and remaining amortization period. In each valuation, the unexpected change in the UAAL is established as a new amortization base over the appropriate amortization period beginning on that valuation date. The UAAL is then the sum of all of the outstanding amortization bases on the valuation date and the UAAL payment is the sum of all of the amortization payments on the existing amortization bases. This approach provides transparency in that the current UAAL is paid off over a fixed period of time and the remaining components of the UAAL are clearly identified in each valuation. Adjustments to the UAAL in future years are also separately identified in each future year. One downside

of this approach is that it can create some discontinuities in contribution rates when UAAL layers/components are fully paid off. If this occurs, it likely would be far in the future, with adequate time to address any adjustments needed.

Current OSERS Actuarial Amortization Method: The current amortization method used by OSERS includes an initial amortization base (established in 2019) with payments over a closed 30-year period, determined as a level percentage of payroll. A new base is created each year that includes all of the unanticipated changes in the UAAL for the year. These new bases are amortized in a consistent time frame and basis. Whenever a plan has a total UAAL of $0 or less (i.e. there is an actuarial surplus), all of the amortization bases are eliminated and the net surplus is amortized over 30 years.

While the current method is not unreasonable, we do note that over the last decade, the Government Finance Officers Association (GFOA) and the Conference of Consulting Actuaries (CCA) have published guidance on their opinion of "best practices" regarding public pension plan funding, including the length of the amortization period. Although these recommendations are not binding, they do point to an increased focus on developing amortization policies that are designed to pay down the UAAL in a meaningful way over a reasonable period. In particular, this guidance would encourage a more rapid amortization of the annual incremental pieces, paying them off in 15 to 20 years, particularly if the level percent of payroll methodology is being used.

The Actuarial Standards Board recently released a third exposure draft of *Actuarial Standard of Practice Number 4, Measuring Pension Obligations and Determining Pension Plan Costs* which includes guidance on the selection of an amortization method. It states that the actuary should select an amortization method for each amortization base that is expected to produce payments that fully amortize the amortization base within a reasonable time period or reduce the outstanding balance by a reasonable amount each year. The current version of ASOP 4 suggests the actuary consider the following in determining a reasonable time period or reasonable amortization amount:

a. whether the amortization period is open or closed;
b. Source of the amortization base;
c. anticipated pattern of amortization payments, including the length of time until payments exceed nominal interest on the outstanding balance;
d. whether the base is positive or negative;
e. duration of the actuarial accrued liability;
f. average remaining working lifetime of active members; and
g. funded status of the plan or period to insolvency.

Given the funding policy of OSERS and the goal of funding with fixed contribution rates, an argument can be made for using an amortization period on the longer end of the reasonable range. However, most of the considerations outlined in ASOP 4 would lead us to recommend a shorter amortization period than the current 30 years. The UAAL is amortized as a level percentage of payroll which creates a pattern of contributions that is back-end loaded, i.e., payments are much higher in the latter part of the amortization period. This contribution pattern results in "negative amortization" wherein the dollar amount of the UAAL increases for several years because the dollar amount of the amortization payment is less than the interest on the UAAL. The period of time the plan experiences negative amortization is dependent on the investment return assumption and the payroll growth assumption. The reduction to both of these assumptions has helped reduce the number of years of negative amortization and the resulting growth in the dollar amount of UAAL, but with an amortization period of 30 years the dollar amount of the UAAL is not expected to be lower than the initial amount for 11 years.

Given trends in the industry, guidance from the Government Finance Officers Association (GFOA), recent guidance from the Actuarial Standards Board about amortization periods, and the State's desire to fund these plans with fixed contribution rates, **we recommend OSERS reduce the current 30 year amortization period for new bases to 25 years.** An amortization period of 20 years would conform better to best practices in the industry, but would also introduce more volatility in the actuarial contribution rate and, therefore, any additional District contributions. To implement the change in the amortization period with minimal financial impact on the short-term valuation results, we suggest the change be made prospectively to new amortization bases and existing amortization bases remain on their current payment schedules. Under the layered amortization method, there are other, considerations that can create volatility or discontinuity in contribution rates. These can be addressed by combining amortization bases or synchronizing the amortization periods to smooth out the UAAL contribution rate in future years.

The following table illustrates the expected impact on contributions over the next seven valuations if future amortization bases for assumption changes and experience gains/losses are amortized over 25 years rather than 30 years. Note that these results rely on the projection models prepared in conjunction with the most recent actuarial valuations and assume that all assumptions are met in future years. Actual results, especially the investment returns each year, will vary from those assumed and therefore the valuation results will also vary. These projections are shown for comparative purposes only.

	Current: 30-Year Layers			25-Year Layers			
Jan 1	Actuarial Rate	Statutory Rate	Shortfall / (Margin)	Actuarial Rate	Statutory Rate	Shortfall / (Margin)	Difference
2022	28.83%	21.66%	7.17%	28.93%	21.66%	7.27%	0.10%
2023	29.41%	21.66%	7.75%	29.56%	21.66%	7.90%	0.15%
2024	29.97%	21.66%	8.31%	30.16%	21.66%	8.50%	0.19%
2025	29.97%	21.66%	8.31%	30.17%	21.66%	8.51%	0.20%
2026	29.94%	21.66%	8.28%	30.16%	21.66%	8.50%	0.22%
2027	29.93%	21.66%	8.27%	30.15%	21.66%	8.49%	0.22%
2028	29.92%	21.66%	8.26%	30.13%	21.66%	8.47%	0.21%

Economic assumptions include price inflation, general wage increase (the across-the-board portion of salary increases), payroll growth, the long-term investment return, interest crediting rate for member accounts, salary increase for individual members, and the cost-of-living adjustment assumptions. Unlike demographic assumptions, economic assumptions do not lend themselves to analysis based solely upon internal historical patterns, because both salary increases and investment return are influenced more by external forces which are difficult to accurately predict over the long term. The investment return and salary increase assumptions are generally selected on the basis of expectations in an inflation-free environment and then increased by the long-term expectation for price inflation.

Sources of data considered in the analysis and selection of the economic assumptions included:

- Historical observations of price and wage inflation statistics and investment returns.
- The 2020 and 2021 Social Security Trustees Reports.
- Future expectations of the Nebraska Investment Council (NIC) and their consultant (Aon Consulting), along with the expectations of other investment consultants (Horizon Actuarial Survey).
- U. S. Department of the Treasury bond rates.
- Forecasts from various sources including the Congressional Budget Office, Federal Reserve Bank and the Survey of Professional Forecasters.
- Assumptions used by other large public retirement systems, based on the Public Fund Survey, published by the National Association of State Retirement Administrators.

Note that some of these sources were published after the COVID-19 pandemic impacted the world economy and some were issued prior to the pandemic. In evaluating the forecasts, we considered the timing on the published information and the potential impact COVID-19 might have had on the forward-looking measurements.

ACTUARIAL STANDARD OF PRACTICE NUMBER 27

Actuarial Standards of Practice are issued by the Actuarial Standards Board to provide guidance to actuaries with respect to certain aspects of performing actuarial work. Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides actuaries with guidance regarding the selection of economic assumptions for measuring pension obligations. Because no one knows what the future holds, an actuary must use professional judgment to estimate possible future economic outcomes, based on a mixture of past experience, future expectations, and professional judgment. Our analysis of the expected rate of return, as well as all other economic assumptions, was performed following the guidance in ASOP 27.

Due to the application of ASOP 27, it may be informative for others to be aware of the basic content of ASOP 27. The standard applies to the selection of economic assumptions to measure obligations under any defined benefit pension plan that is not a social insurance program (e.g., Social Security).

With respect to relevant data, the standard recommends the actuary review appropriate recent and long-term historical economic data but advises the actuary not to give undue weight to recent experience. Furthermore, it advises the actuary to consider that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment. In addition, with respect to any particular valuation, each economic assumption should be consistent with all other economic assumptions over the measurement period.

ASOP 27 recognizes that economic data and analyses are available from a variety of sources, including representatives of the plan sponsor, investment advisors, economists, and other professionals. The actuary is permitted to incorporate the views of experts, but the selection or advice must reflect the actuary's professional judgment.

Recognizing that there is no correct answer, the standard calls for the actuary to select a "reasonable" economic assumption. For this purpose, an assumption is deemed reasonable if it has the following characteristics:

a. it is appropriate for the purpose of the measurement;

b. it reflects the actuary's professional judgment;

c. it takes into account historical and current economic data that is relevant as of the measurement date;

d. it reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and

e. it has no significant bias (i.e., it is neither significantly optimistic nor pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included.

The standard goes on to discuss a "range of reasonable assumptions" which in part states "the actuary should also recognize that different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop both for an individual actuary and across actuarial practice."

The remaining section of this report will address the relevant types of economic assumptions used in the actuarial valuation to determine the obligations of the Nebraska retirement systems. In our opinion, the economic assumptions proposed in this report have been developed in accordance with ASOP No. 27.

The recent experience, and still developing impact, of COVID-19 is likely to influence both demographic experience and economic forecasts, at least in the short term. We will continue to monitor the developments related to COVID-19 and their impact on pension plans over the next year or two and keep the Board advised of any changes we believe should be made.

The following table summarizes the current and proposed economic assumptions:

	Current Assumptions	Proposed Assumptions
Price Inflation	2.75%	2.35%
Real Rate of Return	4.75%	4.65%
Investment Return	7.50%	7.00%
Productivity	0.50%	0.50%
General Wage Growth	3.25%	2.85%
Payroll Growth	3.25%	2.85%
Cost-of-Living Adjustment*	1.50%	1.50%
Interest Credit Rate on Contributions	2.75%	2.35%

* Assumption is 1.00% for members hired on or after July 1, 2013.

If a smoother cost pattern is desired, the Board of Trustees may want to consider a phase-in approach that implements the recommended change over the next four years.

PRICE INFLATION

Use in the Valuation: Price inflation is typically measured by the annual increase in the Consumer Price Index (CPI). This assumption underlies most of the other economic assumption, either directly or indirectly. The current assumption for price inflation, 2.75% per year, was reduced from 3.00% in the last experience study.

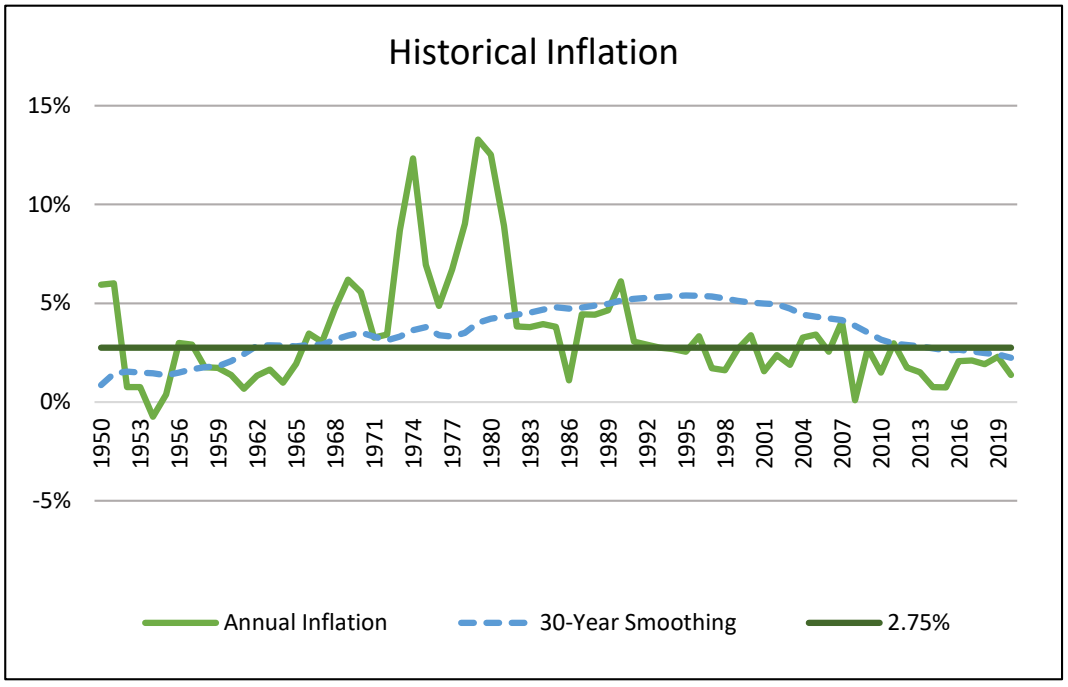
Future price inflation is used directly in developing the actuarial assumption for cost of living increases since they are based on the change in the Consumer Price Index (CPI). OSERS' plan provisions provide for an annual cost of living adjustment of the lesser of 1.5% or CPI-U for members hired prior to July 1, 2013. For members hired on or after July 1, 2013, the annual cost of living adjustment is capped at 1.0% rather than 1.5%. Inflation is used indirectly in the development of the assumptions for investment return, general wage increase, individual salary increases, payroll growth, and the interest crediting rate for employee contributions. Under ASOP 27, the price inflation assumption must be consistent among all economic assumptions.

Past Experience: Although economic activities, in general, and inflation in particular, do not lend themselves to prediction solely on the basis of historical analysis, historical patterns and long-term trends are factors to be considered in developing the inflation assumption. The Consumer Price Index, US City Average, All Urban Consumers, CPI-U, has been used as the basis for reviewing historical levels of price inflation. The following table provides historical annualized rates of the CPI-U over periods ending December 31, 2020.

Periods Ending December 2020	Annualized Rate of Inflation
Last 10 Years	1.74%
Last 15 Years	1.89%
Last 20 Years	2.04%
Last 25 Years	2.14%
Last 30 Years	2.25%
Since 1913 (first available year)	3.11%

Inflation has been low over most of these periods including about 2.1% over the last 25 years and 1.7% over the last 10 years. However, as we write this report, inflation has risen and is currently above 5.0% on a year-over-year basis during the middle of calendar year 2021. It is too soon to know whether this trend is strictly short-term or might be longer term.

The following graph illustrates the historical annual change in price inflation, measured as of December 31, as well as the thirty-year rolling average.



Historical averages are heavily dependent on the period selected. For example, the period of high inflation from 1973 to 1981 has a significant impact on the averages over periods which include these years. Over more recent periods (last 25 years), measured from December 31, 2020, the average annual rate of increase

in the CPI-U has been much lower than the current assumption of 2.75%. Inflation has been 2.25% for the last thirty years and under 2.00% for the last ten years.

Forecasts of Inflation

For our purposes, the assumed inflation rate, and all economic assumptions, should be a forward-looking expectation of future experience. There are several sources to consider that offer expectations for future price inflation although many of these focus on a shorter timeframe than is used for pension funding. These sources are discussed below.

Investment Consultants

Based on Aon's second quarter 2021 capital market assumptions, the ten-year price inflation assumption is 2.2% and the 30-year assumption is 2.1%. Aon is expecting future inflation to remain around 2%, as targeted by the Federal Reserve.

Using the 2021 Horizon Survey, the range of inflation assumptions for the short term (10 years) based on data for 39 consultants included in the survey was 2.0% to 2.8% with a median of 2.0%. For the 24 consultants providing an inflation assumption for a longer period (20-30 years), the median assumption was 2.2% with a range of 1.8% to 2.9%. Note that the 25th to 75th percentile range for long term inflation was 2.0% to 2.3%. These inflation expectations are consistent with Aon's inflation assumptions.

Bond Market Expectations

Additional information to consider in formulating this assumption is obtained from measuring the spread between the nominal yield on treasury securities (bonds) and the inflation indexed yield on TIPS of the same maturity. This is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the period to maturity. As of December 31, 2020, the difference for 30-year bonds implied inflation of 2.02% for the next thirty years. Over the last few years, the bond market has been anticipating inflation of around 2.0% or less over 30 years, in line with the target inflation rate stated by the Federal Reserve. However, market prices for treasuries and TIPS can change rapidly to reflect recent macroeconomic events as we have seen in the 18 months since the COVID-19 pandemic has spread in the United States.

Congressional Budget Office

The report of the Congressional Budget Office, *"An Update To The Budget and Economic Outlook: 2021 to 2031"*, reflects CBO's expectations of average annual price inflation of 2.3% for the CPI-U over the next ten years.

Survey of Professional Forecasters

The Philadelphia Federal Reserve Bank conducts a quarterly survey of the Society of Professional Forecasters. Their forecast for the third quarter of 2021 was for inflation over the next ten years to average 2.44%. Given the current economic conditions, the economic outlook for inflation has risen. The prior 2021 forecasts had 10-year inflation expectations between 2.2% and 2.3%.

Social Security Administration

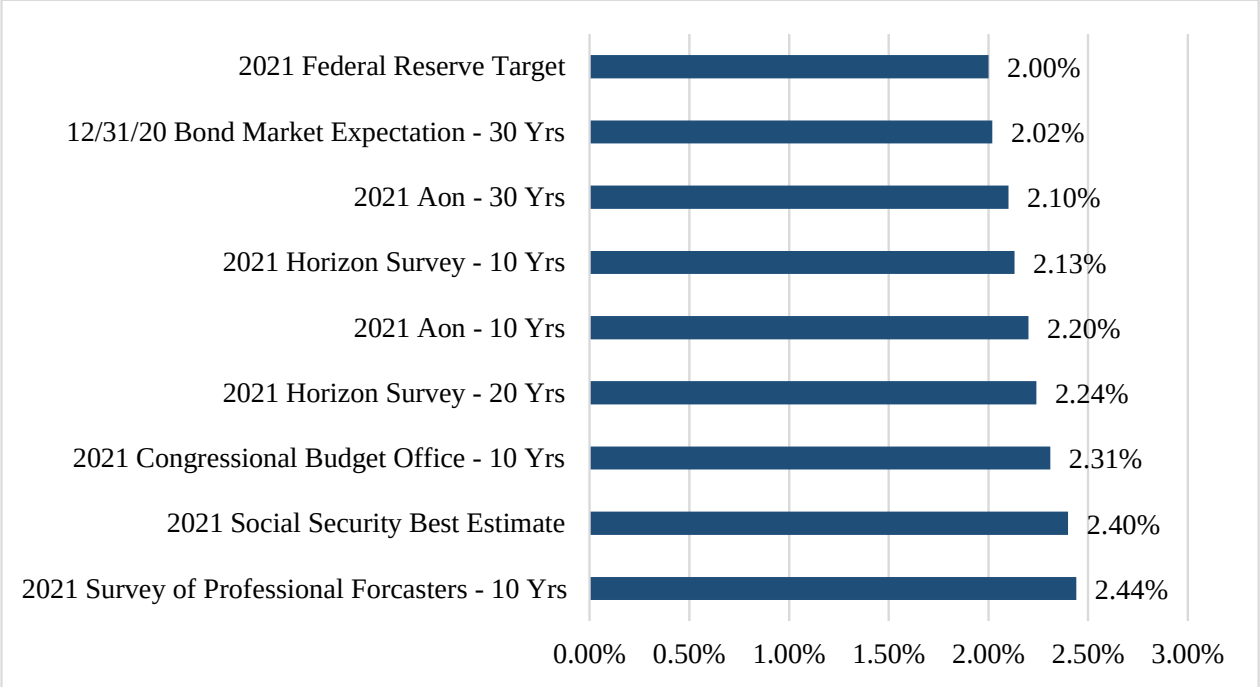
Although many economists forecast lower inflation than the assumption used by most retirement plans, they are generally looking at a shorter time horizon than is appropriate for a pension valuation. To consider a longer, similar time frame, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the most recent report (August 2021), the projected ultimate average annual increase in the CPI over the next 75 years was estimated to be 2.40%, under the intermediate (best estimate) cost assumption. The range of inflation assumptions used in the Social Security 75-year modeling, which includes low, intermediate and high cost scenarios was 1.80% to 3.00%.

Peer System Comparison

While we do not recommend the selection of any assumption based on what other systems use, it does provide another set of relevant information to consider. The National Association of State Retirement Administrators (NASRA) Public Fund Survey collects information on the assumptions used by over 120 large retirement systems. The average inflation assumption in the most recent Public Fund Survey was 2.65% which compares to 3.75% back in the 2001 Survey. Note, however, that the most common assumption is 2.50%. It should be noted that there is a lag in this data as there is with any survey. Data for Systems that have recently conducted an experience study and made a change to this assumption is not captured in the survey data. Based on our knowledge, we believe the current average inflation assumption is 2.50% or lower. Note that we are not using this information directly to set the inflation assumption for OSERS. The real value of this data is it clearly illustrates the marked decline in the inflation assumption over the past two decades which is worth noting.

Comparison of Inflation Expectations

The following graph provides a comparison of the current levels of expected inflation.



The lower inflation over the last 10, 20 and even 30 years, coupled with the low future inflation anticipated by the bond markets, investment consultants, and professional economic forecasters suggests the current inflation assumption of 2.75% is on the high end of the reasonable range. We are recommending the **inflation assumption be lowered to a rate of 2.35%. This change moves the assumption closer to recent inflation levels as well as closer to the levels expected by most economic forecasts.**

Consumer Price Inflation	
Current Assumption	2.75%
Recommended Assumption	2.35%

INVESTMENT RETURN

Use in the Valuation: The investment return assumption reflects the anticipated returns on the current and future assets. It is one of the primary determinants in the allocation of the expected cost of the System's benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. Generally, the investment return assumption should be set with consideration of the asset allocation policy, expected long-term real rates of return on the specific asset classes, the underlying price inflation rate, and investment expenses.

The current investment return assumption is 7.50%. It should be noted that these assumptions are currently net of all investment-related expenses, as well as administrative expenses. This assumption is for the nominal rate of return and is composed of two components. The first component is price inflation (as previously discussed, this assumption is currently 2.75%). Any excess return over price inflation is referred to as the real rate of return. The current assumption for the real rate of return, which is heavily driven by the system's asset allocation and capital market assumptions, is 4.75%.

Long Term Perspective

Because the economy is constantly changing, assumptions about what may occur in the near term are volatile. Asset managers and investment consultants usually focus on this near-term horizon in order to make prudent choices regarding how to invest the trust funds. For actuarial calculations, we typically consider very long periods of time. For example, a newly hired teacher who is 25 years old may work for 35 years, to age 60, and live another 30 years, to age 90 (or longer). The retirement system would receive contributions for the first 35 years and then pay out benefits for the next 30 years. During the entire 65-year period, the system is investing assets related to the member. For such a typical career employee, more than one-half of the investment income earned on assets accumulated to pay benefits is received after the employee retires. In addition, in an open, ongoing system like OSERS, the stream of benefit payments is continually increasing as new hires replace current members who leave covered employment due to death, termination of employment, and retirement. This difference in the time horizon used by actuaries and investment consultants is frequently a source of debate and confusion when setting economic assumptions.

The long term asset allocation for the OSERS portfolio is the same as the Nebraska School Employees Retirement System and the investment responsibility for both plans rests with the NIC. **Therefore, we believe it is appropriate to rely on the analysis that was performed in the fall of 2020 for the Nebraska**

Public Employees' Retirement System (NPERS) and set the investment return assumption for OSERS equal to that used for NPERS, 7.00%.

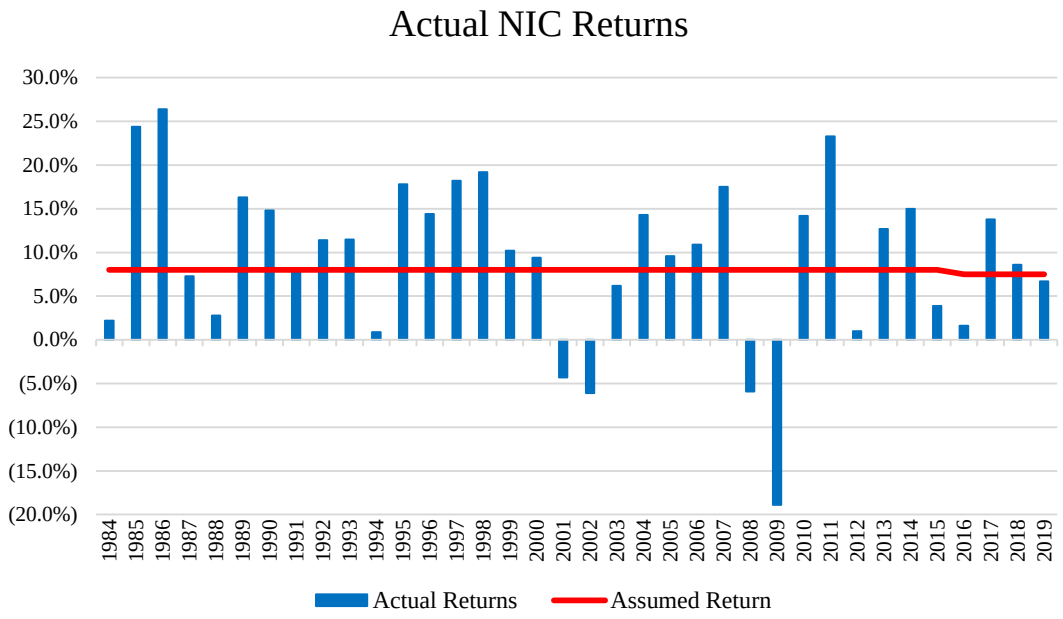
For completeness in this report, the analysis from the NPERS 2020 Experience Study report is included below.

Excerpt from NPERS 2020 Experience Study Report

NPERS Historical Returns

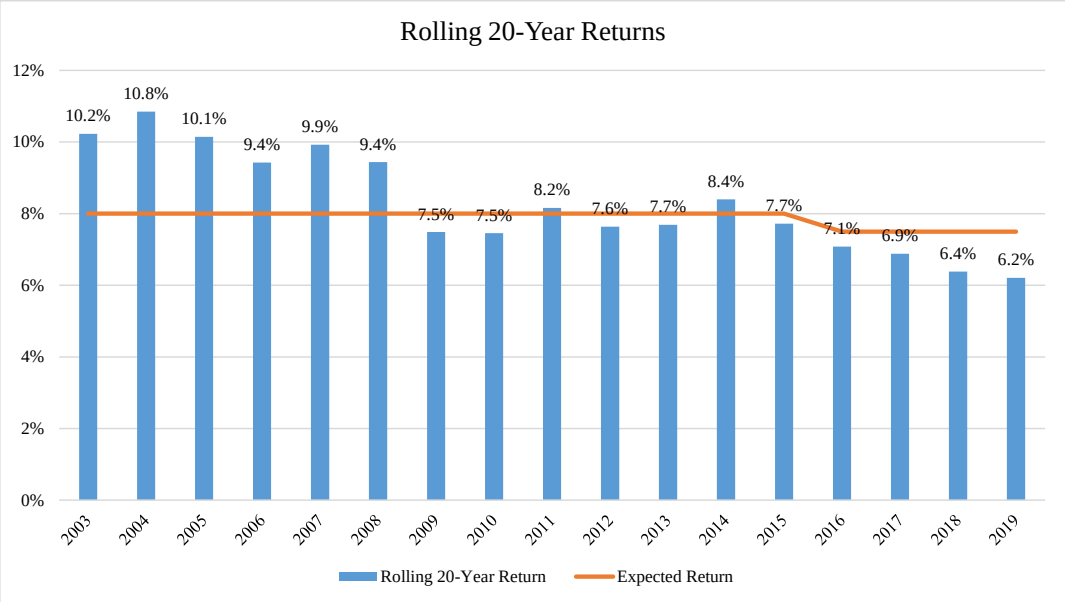
One of the inherent problems with analyzing historical data is that the results can look significantly different depending on the timeframe used, especially if the year-to-year results vary widely. In addition, the asset allocation can also impact the investment returns so comparing results over long periods when different asset allocations were in place may not be meaningful.

The following graph shows the actual fiscal year (June 30) returns for the NPERS portfolio (School Retirement System) for the last 36 years ending June 30, 2019. Despite significant volatility in the results from year to year, the actual geometric (compound) return was 9.9% for the last 10 years, 6.2% for the last 20 years, and 7.4% for the last 30 years.



ANNUALIZED RETURNS through 6/30/19			
5-Year Return:	*6.8%*	*20-Year Return:*	*6.2%*
10-Year Return:	*9.9%*	*30-Year Return:*	*8.3%*

Another way to analyze historical data is to consider the compound return on the NIC's portfolio over longer periods like 20 years. As the graph below illustrates, there is a definite downward trend.



In addition, current expected long-term returns are much lower than those actually earned in the past, especially for the fixed income portion of the portfolio, reflecting a view of the capital markets that differs markedly from what has been experienced in the past.

Forward Looking Analysis

Because the economy is constantly changing, assumptions about what may occur in the near term are volatile. Asset managers and investment consultants usually focus on this near-term horizon so as to make prudent choices regarding how to invest the trust funds, i.e., asset allocation. For actuarial calculations, we typically consider very long periods of time as some current employees will be receiving benefit payments more than 65 years from now.

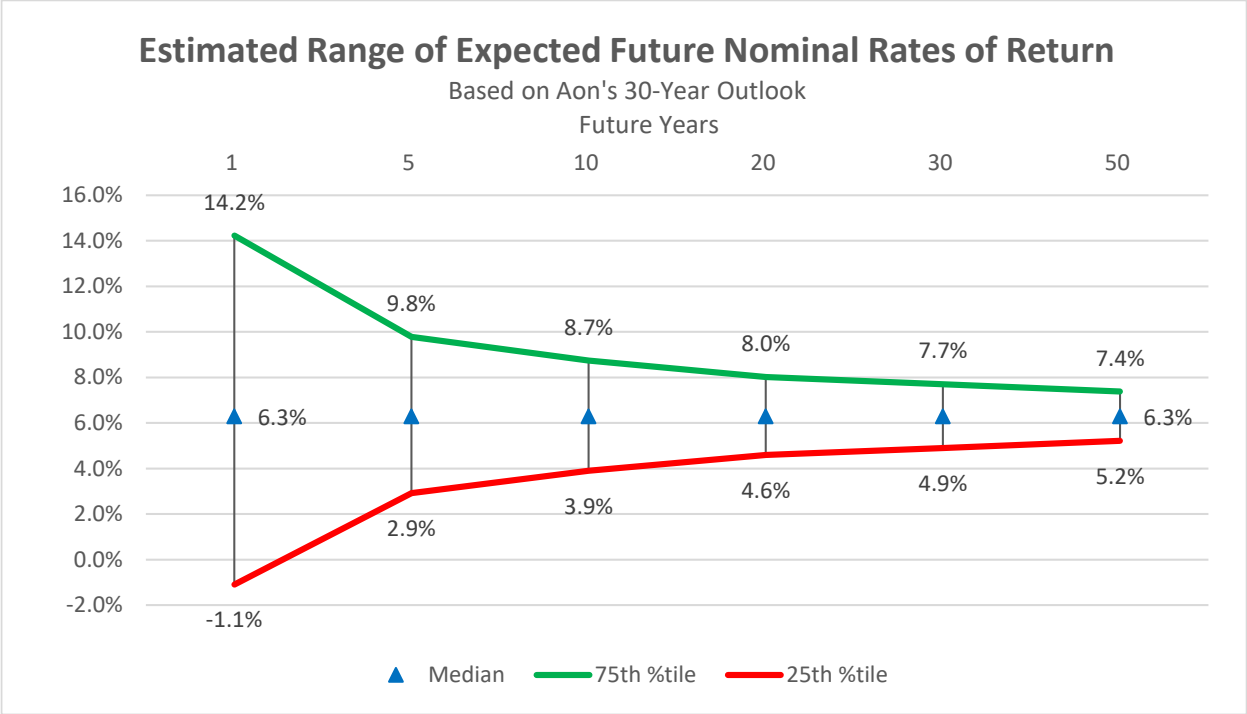
We believe the most appropriate analysis to consider in setting the investment return assumption is to model the future expected returns, given the System's target asset allocation and forward-looking capital market assumptions. However, we are trained as actuaries and not as investment professionals. ASOP 27 provides that the actuary may rely on outside experts in setting economic assumptions. NPERS' assets are held and invested by the Nebraska Investment Council (NIC) who relies on a variety of internal experts and external consultants to assist with investing the funds. As part of their duties, the NIC has its investment consultant, Aon, periodically perform asset-liability studies, along with comprehensive reviews of the expected return of the various asset classes in which the NPERS portfolio is invested. We believe it is appropriate for us to consider the results of Aon's work as one factor in assessing expected future returns.

We also recognize that there can be differences of opinion among investment professionals regarding future return expectations. Horizon Actuarial Services prepares an annual study in which they survey various investment advisors (39 were included in the 2020 study) and provide ranges of results as well as averages. This information provides an additional perspective on what a broad group of investment experts anticipate for future investment returns. We perform our analysis of the expected return using the median return for each asset class in the Horizon Survey as another factor to consider in setting the investment return assumption.

Our forward-looking analysis is based on the current target asset allocation for the system, as shown in the following table:

Asset Class	*Long Term Policy Allocation*
US Equities	*27.0%*
Non-US Equities	*11.5%*
Global Equities	*19.0%*
Fixed Income	*30.0%*
Private Equity	*5.0%*
Real Estate	*7.5%*
Total Fund	*100.0%*

The results in the following graph show the expected range of the compound average nominal returns over time, using Aon's 30-year forecast of capital market assumptions. ***It is important to note that Aon's assumptions are as of June 30, 2020 and, therefore, reflect the impact of the pandemic.*** *As the graph indicates, the median nominal return is 6.3%. While the range of potential results is very high over shorter periods, the range narrows considerably over time. Over a 30-year time span, the results indicate there is a 25% chance that returns will be below 5.2% and a 25% chance they will be above 7.4%. In other words, there is a 50% chance the compound return will be between 5.2% and 7.4%. This also means there is less than a 25% chance of meeting the current assumed rate of return of 7.5%, based on Aon's assumptions.*



Although it is interesting to consider the probability of reaching the nominal expected return, the investment return assumption is developed using the "building block" approach which considers both the price inflation and real return assumption individually. The current nominal assumed rate of return is composed of a price inflation assumption of 2.75% and a real rate of return of 4.75%.

Different firms use different approaches in setting capital market assumptions so we believe it is helpful to consider the assumptions and outlook of investment professionals other than the NIC's consultant. Using the 2020 Horizon Survey, we considered the range of capital market assumptions for the group of 39 investment firms who participated in the survey, which includes most major investment consultants. This provides another point of view from firms familiar with public plans. We believe there is value in considering both sets of capital market assumptions in our analysis.

Frequently investment consultants develop their expected return assumptions based on a timeframe of 5 to 10 years. Therefore, those assumptions may not necessarily be appropriate for the longer timeframe used by actuaries (30 to 50 years). Since both Aon and the Horizon Survey have developed longer term market return assumptions (30 and 20 years respectively), the expected returns from their assumptions are reasonably in line with the timeframe used by actuaries. Due to the timing of Aon's capital market assumptions provided to the NIC in 2020, the set of assumptions as of June 30, 2020 are not really comparable to the Horizon Survey assumptions because of the impact of the pandemic and actions taken by the Federal Reserve Bank. Therefore, both the 3/31/2020 and the 6/30/2020 assumptions are shown below for Aon. The following table summarizes our findings of the expected real returns:

Source	Nominal Return	Consultant's Inflation Assumption	Real Rate of Return
Aon (10 years) 6/30/2020	5.7%	2.0%	**3.7%**
Aon (10 years) 3/31/2020	6.3%	2.1%	**4.2%**
Horizon Survey (10 years) Q1 2020	6.07%	1.98%	**4.09%**
Horizon Survey (20 years) Q1 2020	6.97%	2.17%	**4.80%**
Aon (30 years) 3/31/2020	6.44%	2.10%	**4.34%**
Aon (30 years) 6/30/2020	6.3%	2.1%	**4.2%**

Given the uncertainty of capital market assumptions over a twenty to thirty-year period, the difference between Aon's expected real return and the real return using the median assumption in the Horizon Survey is not material although Aon's expected real returns are somewhat lower.

In addition, most investment consultants update their capital market assumption at least annually, and most commonly each quarter, while an experience study is performed only every four years. Consequently, we are also hesitant to base our assumption solely on the most recent quarterly estimate from the investment consultants because the goal is to have consistency and stability in this assumption as much as possible.

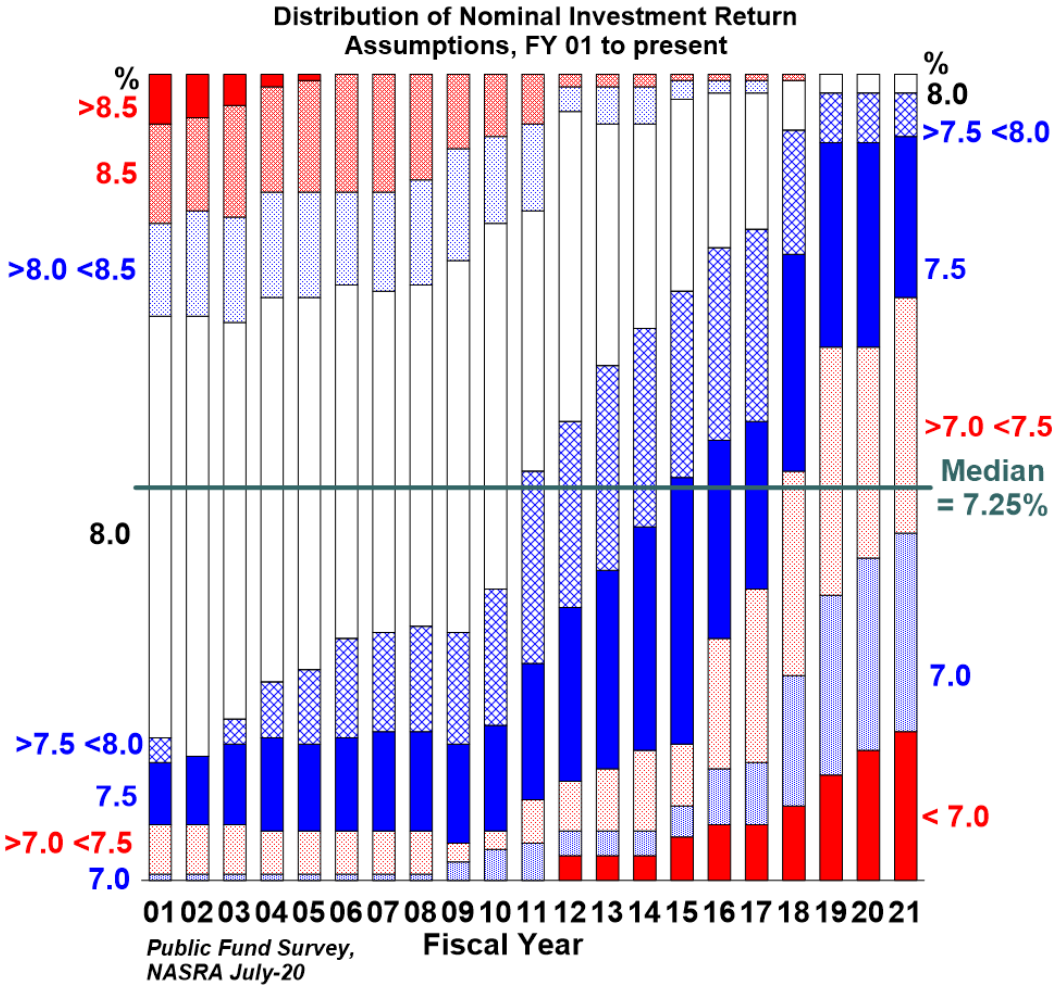
Peer System Comparison

While we do not recommend the selection of an investment return assumption be based on the assumptions used by other systems, it does provide another set of relevant information to consider as long as we recognize that asset allocation and board risk perspective varies from system to system. The following graph shows the change in the distribution of the investment return assumption from fiscal year 2001 through 2021 for the 125+ large public retirement systems included in the National Association of State

Retirement Administrators (NASRA) Public Fund Survey. The assumed rate of return is heavily influenced by the asset allocation of the system, so comparisons must be made cautiously.

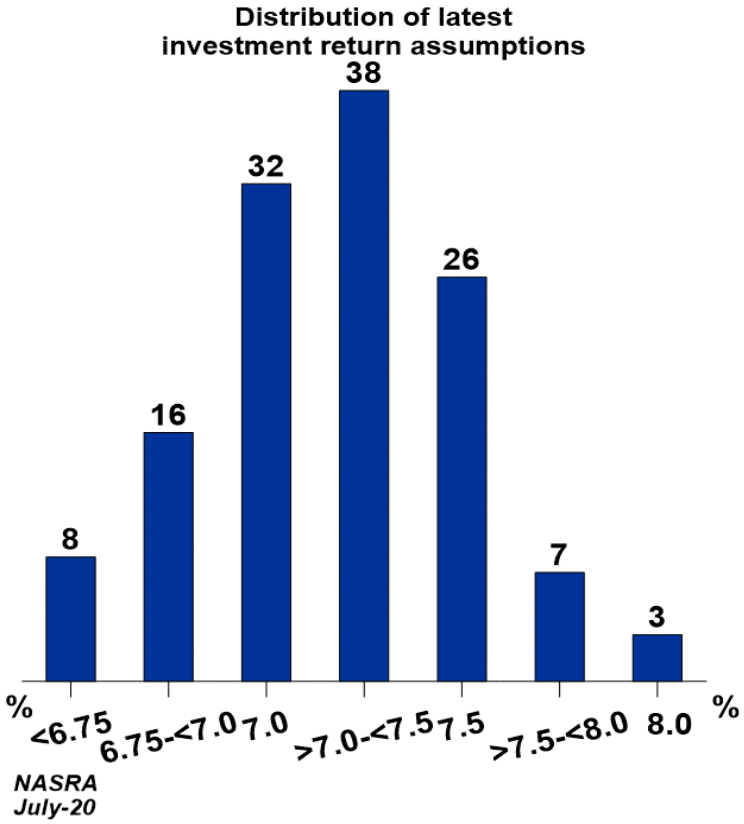
The trends observed in the data are far more valuable than the absolute return data. As the graph below indicates, the investment return assumptions used by public plans have decreased materially over the last decade.

Change in distribution of investment return assumptions, FY 01 to present

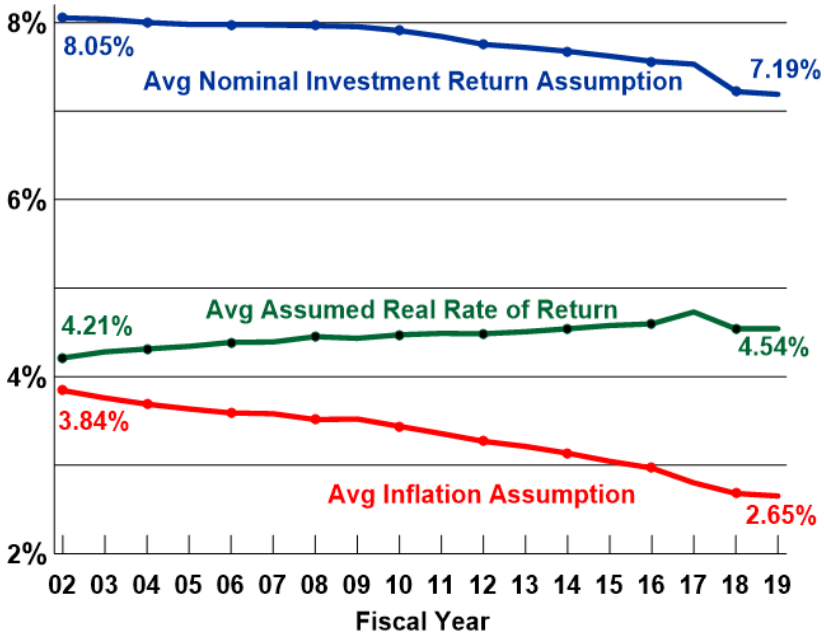


It is worth noting that the median investment return assumption when the last experience study was performed in 2016 was solidly 7.50% but dropped to 7.25% in 2018. The current distribution in July 2020 shows that while the median assumption remains 7.25%, it is moving closer to 7.00%. While 8.00% used to be the most common and the median assumption in the first half of this period (it was also NPERS' assumption), there are only 3 systems out of 130 currently using an 8.0% assumption.

The following graph is based on the same data as the prior graph, but shows only the distribution of the current investment return assumption used by the systems in the Public Fund Survey. Of the total, only 36 of 130, or 28%, use an assumption of 7.5% or higher.



The last two graphs compare the distribution of nominal returns. However, as discussed earlier, the investment return assumption is composed of a price inflation assumption and a real rate of return assumption. The following graph compares the average of each component of the investment return over time. As can be observed, while the price inflation assumption has declined by 1.19% over this period, but the real rate of return has actually increased by 0.33%. We might also note that the average real rate of return is 4.54% compared to NPERS' current real return of 4.75% although asset allocations vary from one system to another so the value of direct comparisons is somewhat limited.



Recommendation for Investment Return Assumption:

By actuarial standards we are required to maintain a long-term perspective in setting all assumptions, including the investment return assumption. Therefore, we believe we must consider both the short-term and long-term expectations in setting this assumption. After reviewing the available information, ***we recommend the investment return assumption be lowered from 7.50% to 7.00%, based on the 2.35% inflation assumption and a real rate of return of 4.65%. Furthermore, we recommend the administrative expense for each Plan be included as a separate component of the actuarial contribution rate.***

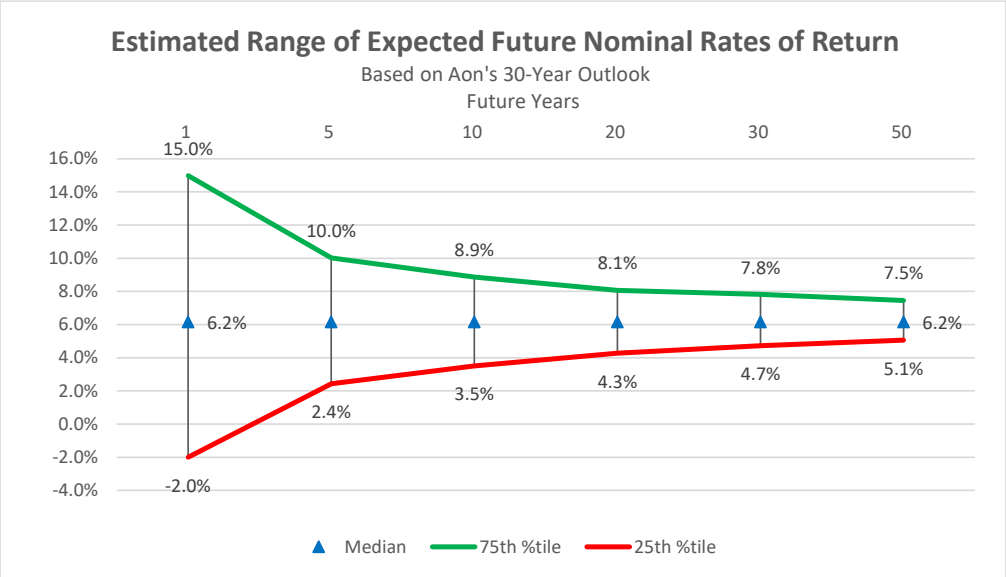
Investment Return	
Current Assumption	*7.50%*
Recommended Assumption	*7.00%*

End of Excerpt from NPERS Experience Study Report

UPDATED INFORMATION ON INVESMENT RETURN ASSUMPTIONS (2021 DATA)

The results in the following graph show the expected range of the compound average nominal returns over time, using Aon's 30-year forecast of capital market assumptions (June 30, 2021 assumptions). As the graph indicates, the median nominal return is down slightly from 2020 to 6.2%. While the range of potential results is very high over shorter periods, the range narrows considerably over time. Over a 30-year time span, the results indicate there is a 25% chance that returns will be below 4.7% and a 25% chance they will be above 7.8%. In other words, there is a 50% chance the compound return will be between 4.7% and

7.8%. This also means there is slightly more than a 25% chance of meeting the current assumed rate of return of 7.5%, based on Aon's assumptions.



Expected returns on both 2020 and 2021 capital market assumptions for both Aon and the Horizon Survey are shown in the following table:

Source	Nominal Return	Consultant's Inflation Assumption	Real Rate of Return
6/30/2020 Aon (10 years)	5.7%	2.0%	**3.7%**
6/30/2021 Aon (10 years)	5.7%	2.2%	**3.5%**
2020 Horizon Survey (10 years)	6.07%	1.98%	**4.09%**
2021 Horizon Survey (10 years)	5.61%	2.13%	**3.48%**
2020 Horizon Survey (20 years)	6.97%	2.17%	**4.80%**
2021 Horizon Survey (20 years	6.55%	2.24%	**4.31%**
6/30/2020 Aon (30 years)	6.3%	2.1%	**4.2%**
6/30/2021 Aon (30 years)	6.2%	2.1%	**4.1%**

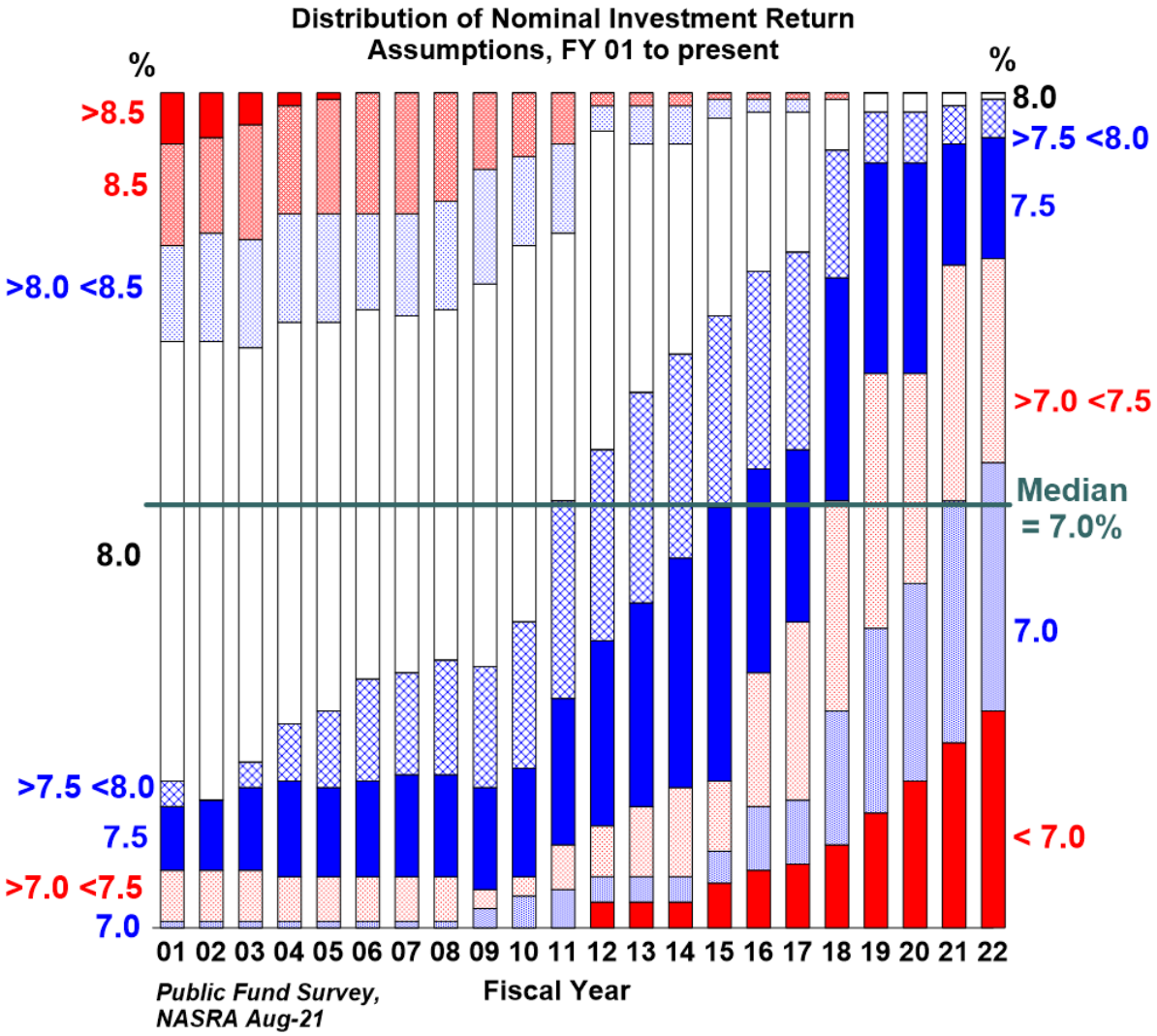
The long term out look for the distribution of investment returns has not changed significantly from the analysis performed for NPERS in late 2020. The 2021 Horizon Survey reflected a more significant decrease in the expected return likely because many of the capital market assumptions in the 2020 Survey were

gathered prior to the Covid-19 pandemic. Based on the 2021 data in the Horizon Survey, the Aon expected return is consistent with the median assumptions in the Horizon Survey.

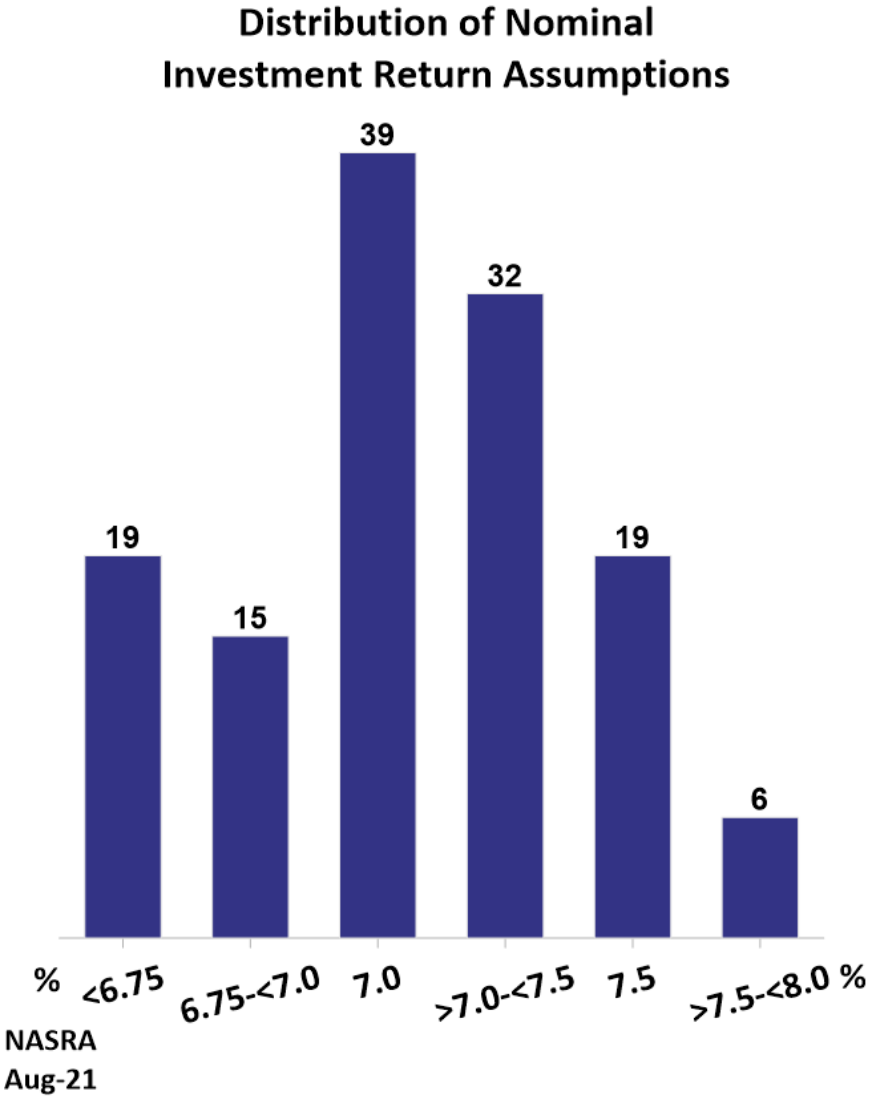
While the information from the capital market assumptions developed by investment consultants is an important piece of our analysis, we recognize that they generally update their capital market assumption at least annually, and most commonly each quarter, while an experience study is performed only every four years. Consequently, we are hesitant to base our assumption solely on the most recent quarterly estimate from the investment consultants because the goal is to have consistency and stability in this assumption as much as possible.

UPDATED NASRA INFORMATION

The most recent data from the NASRA Public Fund Survey (August 2021) is shown in the following graphs. Note the median investment return assumption is now 7.00% compared to 7.25% in 2020.



The following graph shows the number of systems using investment return assumptions in each rate group. As with most surveys, the data is continually changing and we see more systems lowering their rate of return.



INVESTMENT AND ADMINISTRATIVE EXPENSES

The OSERS trust fund pays the administrative expenses of the system in addition to member benefits so an assumption must be made about such expenses. Investment consulting firms, including Aon, typically issue reports that describe their capital market assumptions, which are net of investment-related expenses. Therefore, no direct adjustment to the expected return is necessary to account for investment-related expenses. Active management strategies are used by the NIC and many other retirement systems with the expectation that they will result in investment returns sufficiently above passive index funds to at least cover the increased investment fees. We have assumed that active management strategies would result in the same returns, net of investment expenses, as passive management strategies.

There is some variance of practice on how administrative expenses are handled in the valuation process. The two most common are:

- Explicit: a separate component of the actuarial contribution rate.
- Implicit: an offset or reduction to the investment return assumption.

For OSERS, the past practice has been to set the investment return assumption as the net return after both investment and administrative expenses. Using this methodology, the investment return assumption is theoretically lowered to reflect the impact of paying administrative expenses from investment income. Using this methodology, the adjustment to the investment return assumption would be about 7 basis points. The investment return assumption is typically rounded, so there has not necessarily been an explicit reduction to the investment return assumption for the payment of administrative expenses.

The current GASB accounting standards require administrative expenses to be separately accounted for in disclosure and, more importantly, in the projection of plan assets in future years to determine the discount rate used to calculate the Net Pension Liability. Therefore, technically, the expected long-term rate of return for GASB purposes is net only of investment expenses – not both investment and administrative expenses. If this guidance was followed, as written, the discount rate used to calculate the GASB pension liability for OSERS should be slightly higher than the current 7.50% assumed rate of return. This could lead to some confusion or misunderstanding as to why a rate other than the assumed rate of return in the valuation is being used so the 7.50% assumption has been used. Essentially, the impact of administrative expenses is reflected twice in the projection of plan assets into the future as administrative expenses are directly reflected and the 7.50% long term return assumption is net of administrative expenses. The use of 7.50% for the GASB long-term rate of return has not resulted in a depletion date so we do not believe this approach creates a problem although it could be argued that it does not technically comply with GASB requirements.

To be consistent with the GASB standards and avoid related complexities,as well as enhance the transparency of the System's funding we are recommending a change in the way administrative expenses are reflected in the funding valuation. We recommend an explicit administrative expense charge be added to the normal cost rate as part of the actuarial required contribution rate. Although this change is not required for funding purposes, it is more explicit and direct than the current approach and provides more transparency. In addition, it permits the discount rate in the GASB accounting valuation to be developed on a consistent basis with the funding valuation (assuming assets are not projected to be depleted in the GASB projection of fiduciary net position) and removes any questions about the approach used for GASB reporting. NPERS recently moved to an explicit approach for administrative expenses as well. With NPERS assuming responsibility for the administration of OSERS in a few years, it might make sense to take a consistent approach.

The recommended approach includes a separate expense assumption, determined as a percent of aggregate covered payroll, to be included in the actuarial contribution rate each year. This amount is set in the experience study and remains level until it is reevaluated in the next study. If this approach had been used in the last actuarial valuation, the actuarial contribution rate would have increased as follows:

Administrative Expenses	Covered Payroll	Contribution Rate
881,000	373,700,000	0.24%

Our recommendation is to include a contribution rate of 0.24% of covered payroll in the actuarial contribution rate until the next experience study. Note that actual administrative expenses are directly paid by the trust fund each year so the recommended approach closely models the actual practice.

COST OF LIVING ADJUSTMENTS

OSERS' plan design includes an annual COLA based on actual inflation up to 1.5% (members hired prior to July 1, 2013) or 1.0% (members hired on or after July 1, 2013). Based on the proposed inflation assumption of 2.35% and the expected variability, the assumption for members hired before July 1, 2013 is 1.5% and the assumption for those hired after July 1, 2013 is 1.0%.

GENERAL WAGE INCREASE (GENERAL WAGE INFLATION)

Background: The general wage increase assumption represents the real wage growth over time in the general economy. Another way to think about this assumption is it anticipates how much the pay scales themselves will change from year to year. It does not necessarily indicate how much the pay increases received by individual members will be (the individual salary increase assumption) or how the total covered payroll may change (the payroll growth assumption).

General wage inflation can be thought of as the "across the board" rate of salary increases and is composed of the price inflation assumption combined with an assumption for the real rate of wage increase. In constructing the individual salary increase assumption, the general wage inflation assumption is further combined with an assumption for service-based salary increases (called a merit scale). The individual salary increase assumption is discussed later in this report. Given the current price inflation assumption of 2.75%, the current wage growth assumption of 3.25% implies an assumed real rate of wage increase or real wage growth assumption of 0.50%.

Historical Perspective: Historically, general wage inflation has nearly always exceeded price inflation, at least over longer periods of time. Since 1951, when the National Average Wage Index from the Social Security System began, wage inflation in the general economy has been around 1.0% higher than price inflation. In the last ten years, general wage inflation has been about 0.60% higher than price inflation. Because the National Average Wage is based on all wage earners in the country, it can be influenced by the mix of jobs (full-time vs. part-time, manufacturing vs. service, etc.) as well as by changes in some segments of the workforce that are not seen in all segments (e.g. regional changes or growth in computer technology). Further, if compensation is shifted between wages and benefits, the wage index would not accurately reflect increases in total compensation. OSERS membership is composed exclusively of school employees working in the Omaha metro area, whose wages and benefits are linked as a result of state and local tax revenues, funding allocations, and governing policies. Because the competition for workers can, in the long term, extend across industries and geography, the broad national earnings growth will have some impact on OSERS members. In the shorter term, however, the wage growth of OSERS and the nation may be less directly correlated.

Forecasts of Future Wages: The wage index used for the historical analysis is projected forward by the Office of the Chief Actuary of the Social Security Administration in their 75-year projections. In the August, 2021 report the annual increase in the National Average Wage Index under the intermediate cost assumption (best estimate) was 3.55%, 1.15% higher than the Social Security intermediate inflation assumption of 2.4% per year. The range of the assumed real wage inflation in the 2020 Trustees report was 0.53% to 1.77% per year.

Compensation data gathered and compiled by the Bureau of Labor and Statistics also indicates that public employment is receiving larger increases in compensation than wages alone. In other words, benefits are becoming a larger portion of total compensation. This trend supports the use of a lower general wage increase assumption for those in public employment compared to private employment.

Based on data available and our professional judgment, **we recommend that the long-term assumed real wage increase assumption remain unchanged at 0.50% per year. When coupled with the price inflation assumption of 2.35%, the resulting recommendation for the general wage increase assumption is 2.85%.**

PAYROLL GROWTH

The payment on the unfunded actuarial accrued liability is determined as a level percent of payroll. Therefore, an assumption regarding future annual increases in covered payroll is required. The wage inflation assumption is most commonly used for this purpose. The current assumption of 3.25% is the same as the general wage increase/wage inflation assumption.

The current payroll growth assumption also reflects the assumption that there will be no future growth or decline in number of active members. With no assumed change in the size of the active membership, future salary growth due only to general wage increases is anticipated. If increases should occur not only because of wage increases but also because of additional active members, there will be a larger pool of covered payroll over which to spread the payment on the unfunded actuarial accrued liability, which would result in lower UAAL payments as a percent of payroll. The uncertainties in light of current conditions in public employment and the national economy in general, along with actual experience, argue against anticipating any increase or decrease in active membership for funding purposes.

We recommend the payroll growth assumption, used to amortize the UAAL, be lowered from 3.25% to 2.85%, reflecting the decrease in the general wage increase assumption.

TOTAL SALARY INCREASE

Estimates of future salaries are based on assumptions for two types of increases:

- Increases in each individual's salary due to promotion or longevity (often called a merit scale), and
- Increases in the general wage level of the membership, which are directly related to price and wage inflation.

Our recommended general wage increase assumption is 2.85% (2.35% inflation and 0.50% real wage growth). Therefore, the merit salary scale will be added to the 2.85% general wage increase assumption to develop the total individual salary increase assumption.

As noted above, future salary increases are the result of two components. Actual salary experience is reported in total, rather than by components, so the experience study reviewed total salary increases for the study period. There continues to be considerable pressure on the school district's budget which may have had an impact on the salary increases observed in the study period. In our study, we compared individual salary increases for any member active in any two consecutive periods (e.g. 2017 and 2018, 2018 and 2019, etc.). The average actual increase during this period was 3.85% for Certificated members while the expected increase was 5.39%. The actual increase for Classified members was 3.05% while the expected increase was 4.40%.

The following table shows the salary experience by year for durations 0 through 40 for both the current and prior study period:

2017 – 2020 SALARY EXPERIENCE						
	Certificated			Classified		
Year End	Actual	Expected	A/E Ratio	Actual	Expected	A/E Ratio
2017	6.14%	5.42%	113%	2.04%	4.40%	46%
2018	1.96%	5.40%	36%	1.12%	4.40%	26%
2019	3.16%	5.38%	59%	4.91%	4.36%	113%
2020	4.18%	5.38%	78%	4.42%	4.45%	99%
Total	3.85%	5.39%	71%	3.05%	4.40%	69%

Since price and wage inflation are a component of the salary increase assumption, we would expect actual salary increases to be lower than the current assumption when actual price and wage inflation are lower than the assumption. During the study period, price inflation was around 2.1%, compared to the current assumption of 2.75%, and the increase in the national average wage index was 3.0% compared to the current assumption of 3.25%. The actual salary increases for certificated members with more than 25 years of service (a proxy for actual general wage increases) was 2.0%, close to the increase in price inflation. This information suggests that we could expect actual wage increases reflected in our data to be around 0.75% to 1.25% lower than expected, simply as a function of the overall economy during this period. As illustrated in the table above, the actual increases were about 1.5% lower for Certificated and 1.35% lower for Classified, relatively consistent with the difference in actual and assumed general wage increases so the current merit scale is a relatively good fit overall.

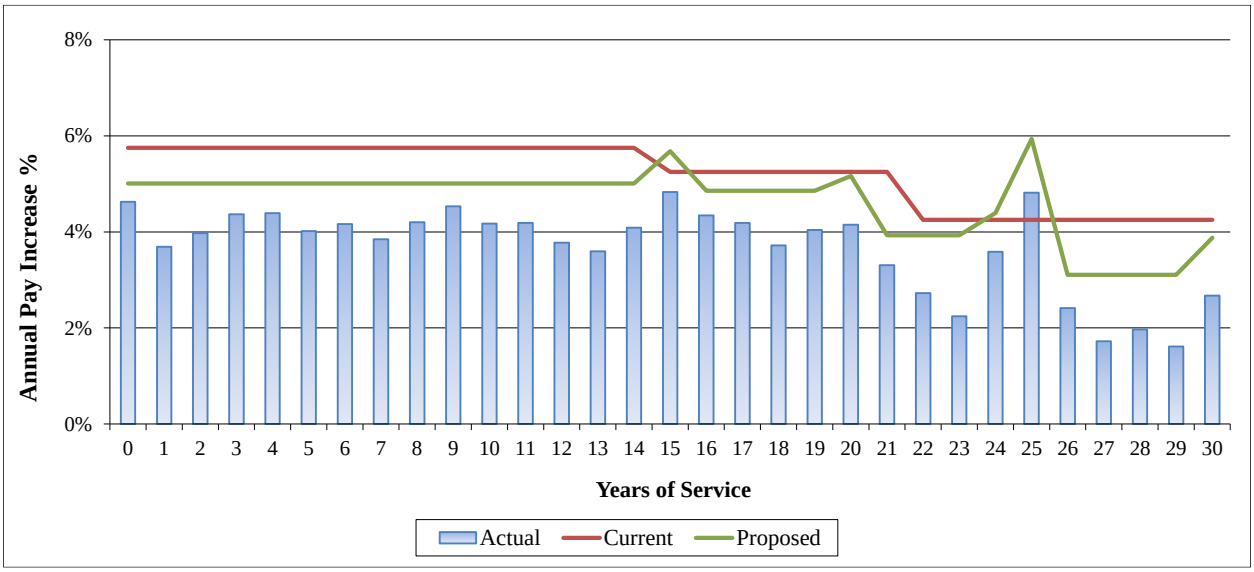
As a result of adjusting the general wage increase assumption from 3.25% to 2.85%, the individual salary increase assumption will be lower than the current assumption. In order to refine the merit salary increase assumption to reflect the actual experience and the current salary schedules in the various labor agreements, we are recommending some modifications to the merit scale.

Certificated Members

Beginning with the last experience study, the contracts with the Omaha Education Association (OEA) have been reviewed to identify the various components of salary increases including adjustment of the salary grids from year to year, salary increases due to movement through the various steps (based on years of experience and additional college credits toward a master's or higher degree). The contracts also reveal salary increases applicable to the Long Service Increment (LSI) pay. Our recommendation for the salary merit scale was developed based on the salary schedules and LSI in the OEA contract four years ago and the recommended changes are based on the most recent OEA contract (2021 -2023). It is to be expected that additional refinements to the assumption may be needed in future years as more data becomes available.

Long service increments of certain dollar amounts for members of the OEA are granted at durations 15, 20, 25, 30, 35 and 40 years. Our assumption reflects this pattern of LSI increases as well as other salary increases expected to occur for active members.

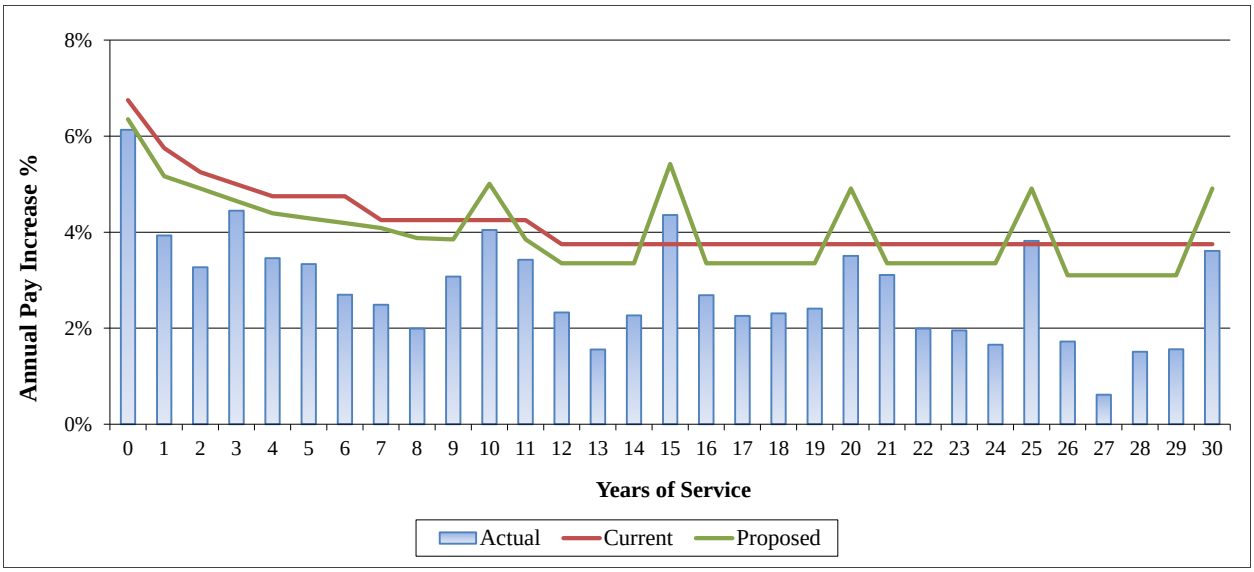
The following graph for durations 0 through 30 shows the current assumption (red line) and the proposed assumption (green line) for the total individual salary increase assumption for certificated members. Note this assumption includes the general wage increase assumption which is 3.25% for the current assumption and 2.85% for the proposed assumption. Both assumptions are higher than the actual wage inflation in the general economy and that is also observed in the OSERS data. As a result, it is to be expected that both the current and proposed assumptions will be higher than the actual experience observed (blue bars). The aggregate expected salary increase under the proposed assumption is 4.83% so the A/E ratio is 81% (actual 3.89% divided by expected of 4.83%).



Classified Members

The long service increments for classified members occur upon completion of 10, 15, 20, 25, and 30 years of service. This pattern was evident in the salary data for the study period and we adjusted the assumption to anticipate "spikes" at those durations (see graph below for analysis of current and proposed assumptions).

We focused on experience for durations one through 30 as there was limited data for durations beyond 30. The following graph shows the current assumption (red line) and the proposed assumption (green line) for the total individual salary increase assumption for certificated members. Note this assumption includes the general wage increase assumption which is 3.25% for the current assumption and 2.85% for the proposed assumption. Both assumptions are higher than the actual wage inflation in the general economy and that is also observed in the OSERS data. As a result, it is to be expected that both the current and proposed assumptions will be higher than the actual experience observed (blue bars). The aggregate expected salary increase under the proposed assumption is 4.19% so the A/E ratio is 74% (actual 3.08% divided by expected of 4.19%).



INTEREST CREDITS ON ACCOUNT BALANCES

Member contribution balances are credited with interest each September 1. The rate is set in State Statute and is "a rate equal to the dailry treasury yield curve for one-year treasury securities, as published by the Secretary of the Treasury of the United States."

In the past, the interest crediting rate has been set equal to the price inflation assumption. We believe this is a reasonable long-term assumption and **recommend lowering the interest crediting rate from 2.75% to 2.35%.**

DEMOGRAPHIC ASSUMPTIONS

Actuarial Standard of Practice No. 35 (ASOP 35) provides guidance to actuaries regarding the selection of demographic and other non-economic assumptions for measuring pension obligations. ASOP 35 states that the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

The actuary should follow the following steps in selecting the demographic assumptions:

1. Identify the types of assumptions. Types of demographic assumptions include but are not limited to retirement, mortality, termination of employment, disability, election of optional forms of payment, administrative expenses, family composition, and treatment of missing or incomplete data. The actuary should consider the purpose and nature of the measurement, the materiality of each assumption, and the characteristics of the covered group in determining which types of assumptions should be incorporated into the actuarial model.

2. Consider the relevant assumption universe. The relevant assumption universe includes experience studies or published tables based on the experience of other representative populations, the experience of the plan sponsor, the effects of plan design, and general trends.

3. Consider the assumption format. The assumption format includes whether assumptions are based on parameters such as gender, age or service. The actuary should consider the impact the format may have on the results, the availability of relevant information, the potential to model anticipated plan experience, and the size of the covered population.

4. Select the specific assumptions. In selecting an assumption the actuary should consider the potential impact of future plan design as well as the factors listed above.

5. Evaluate the reasonableness of the selected assumption. The assumption should be expected to appropriately model the contingency being measured. The assumption should not be anticipated to produce significant actuarial gains or losses.

ASOP 35 General Considerations and Application: Each individual demographic assumption should satisfy the criteria of ASOP 35. In selecting demographic assumptions, the actuary should also consider the internal consistency between the assumptions, materiality, cost effectiveness, and the combined effect of all assumptions. At each measurement date the actuary should consider whether the selected assumptions continue to be reasonable, but the actuary is not required to do a complete assumption study at each measurement date. In addition, ASOP 35 requires the actuary to include a specific assumption with respect to expected mortality improvements after the measurement date. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP 35.

Overview of Analysis: The purpose of a study of demographic experience is to compare what actually happened to the individual members of the System during the study period (January 1, 2017 through December 31, 2020) with what was expected to happen based on the actuarial assumptions. Four years is a relatively short observation period for experience given the assumptions are being set with a long-term time horizon in mind. Therefore, we have considered the results of the prior Experience Study when practical to do so.

It takes a fair amount of data to provide experience study results that are credible for demographic assumptions. Because the membership or certain subsets of the membership are relatively small, some assumptions have been selected based more on our professional judgment of reasonable future outcomes than actual experience. Furthermore, a single study period is a relatively short observation period, particularly given the size of OSERS' membership. Therefore, the System's size limits the full credibility of the findings, particularly when the total group is split into subsets such as certificated/classified and/or male/female. Our recommendations were made, taking these factors into account.

Studies of demographic experience generally involve three steps:

- First, the number of members changing membership status, called decrements, during the study is tabulated by age, duration, gender, group, and membership class as appropriate (active, retired, etc.).

- Next, the number of members expected to change status is calculated by multiplying certain membership statistics, called exposure, by the expected rates of decrement.

- Finally, the number of actual decrements is compared with the number of expected decrements. The comparison is called the actual to expected ratio (A/E Ratio), and is expressed as a percentage.

In general, if the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, sex, or duration deviates significantly from the expected pattern, new assumptions are considered. Recommended revisions are normally not an exact representation of the experience during the observation period. Judgment is required to anticipate future experience from past trends and current evidence, including a determination of the amount of weight (credibility) to assign to the most recent experience.

In our analysis, we use a methodology to analyze the experience that we call a liability-weighted approach. The relative liability of the member is approximated by using the member's compensation and years of service to estimate the benefit level. The exposure and actual occurrences are then multiplied by the benefit level to provide the liability-weighted experience. (For retiree mortality, the weight is simply the benefit amount.) This approach is particularly insightful when analyzing experience in a non-homogenous group. While we reviewed experience on both a count and liability-weighted basis, we have generally found the liability-weighted experience to be a better basis for setting assumptions. Therefore, in most situations we assign more credibility to the liability-weighted results in evaluating experience and developing new assumptions, if necessary.

Revised rates of decrement are tested by recalculating the expected number of decrements during the study period, with results shown as revised A/E Ratios.

ASOP 35 states that the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

	Recommended Revisions	
	Certificated	Classified
Mortality	Yes	Yes
Retirement	Yes	Yes
Termination of Employment	Yes	Yes
Probability of Refund	No	Yes

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MORTALITY

One of the most important demographic assumptions in the valuation is mortality because it projects the length of time benefits are expected to be paid to current and future retirees and beneficiaries. If members live longer than expected, the true cost of future benefit obligations will be greater than stated.

Over the last few generations, rates of mortality have been declining, meaning people are generally living longer. Furthermore, the experience of large, public retirement systems that include school employees indicate that school groups, and teachers in particular, continue to exhibit better mortality than the average working population.

There are distinct differences in the mortality rates of males and females, healthy retired members, disabled retired members and non-retired members. Because of those differences in mortality, these groups are studied separately.

The Society of Actuaries periodically publishes mortality tables derived from large, national studies. In recent years, they have tended to publish families of tables, allowing actuaries to select a table that is based on a subset of data most similar to that of the data the actuary is trying to value. In early 2019, the Society released a set of tables based solely on public plan data. This family of tables, called the Pub-2010 tables, includes tables based not only on the gender and status factors already noted, but also on the type of membership (teachers, public safety, and general government), as well as further breakdowns based on those members who were above or below the median benefit amounts. Because most other recent families of tables had excluded public sector data, the Pub-2010 tables are expected to be quite useful for valuing the benefits for public retirement systems like OSERS.

Actuaries sometimes use various adjustments to these standard mortality tables in order to match the observed mortality rates of a specific retirement system. One of the most common adjustments is an age adjustment that can be either a "set back" or a "set forward". A one-year age set back treats all members as if they were one year younger than they truly are when applying the rates in the mortality table. For example, a one year set back would treat a 61-year old retiree as if he will exhibit the mortality of a 60-year old in the standard mortality table. Another adjustment that can be used is to "scale" a mortality table by multiplying the probabilities of death by factors less than one (to reflect better mortality) or factors greater than one (to reflect poorer mortality). Scaling factors can be applied to an entire table or a portion of the table. Of course, if necessary, actuaries may use both methods to develop an appropriate table to model the mortality of the specific plan population.

An important note in the examination of mortality is that there is a tendency for better mortality to be observed in the portion of the population with higher benefits than in the portion with lower benefits. Because the goal of an actuarial valuation is to model the expected benefit payments to be provided by a system, actuaries will often analyze mortality experience on a benefit-weighted basis rather than simply considering headcounts (number of members dying). This benefit-weighted approach is typically used in the development of standard mortality tables, and so it makes sense to use a consistent basis to evaluate how a mortality table fits the actual experience of a group.

ASOP 35 requires the actuary to make a specific recommendation with respect to future improvements in mortality although it does not require that an actuary assume there will be future improvements. There have been significant improvements in longevity in the past, although there are different opinions about future expectations. We believe it is prudent to anticipate that the trend will continue to some degree in the future. Therefore, we believe it is appropriate to reflect some future mortality improvement as part of the mortality assumption.

There are two widely used ways to reflect future improvements in mortality:

(1) Static table with "margin"
(2) Generational mortality

The first approach to reflecting mortality improvements is through the use of a static mortality table with "margin." Under this approach, the A/E ratio is intentionally targeted to be over 100% so that mortality can improve without creating actuarial losses. This approach is mandated by the Internal Revenue Service for determining minimum funding amounts for corporate pension plans as mortality improvements are projected seven years for retirees and 15 years for actives. While there is no formal guideline for the amount of margin required (how far above 100% is appropriate for the A/E ratio), we typically prefer to have a margin of around 10% at the core retirement ages. The goal is still for the general shape of the curve to be a reasonable fit to the observed experience. Depending on the magnitude and duration of mortality improvement, the margin would decrease and eventually may become insufficient. When that occurs, the assumption would need to be updated.

Another approach, referred to as generational mortality, directly anticipates future improvements in mortality by using a different set of mortality rates for each year of birth, with the rates for later years of birth assuming lower mortality than the rates for earlier years of birth. The varying mortality rates by year of birth create a series of tables that contain "built-in" mortality improvements, e.g., a member who turns age 65 in 2040 has a longer life expectancy than a member who turns age 65 in 2020. When using generational mortality, the A/E ratios for the observed experience are set near 100% as future mortality improvements will be reflected directly in the actuarial valuation process. OSERS has used a generational approach for mortality for many years. This is our preferred approach for addressing future mortality improvements.

The table below shows life expectancy at age 65 based on the Pub-2010 General Employees Mortality Table with generational mortality improvements, an indication of how long a new retiree would expect to receive monthly payments, at various points in time.

	Life Expectancy	
Year	Male	Female
2021	20.7	23.2
2041	21.9	24.3
2061	23.1	25.4

Life expectancy at age 65 in years

We would note that there is a wide range of opinions with respect to future expectations of mortality and the underlying assumptions regarding mortality improvement reflect some subjectivity. However, most public plan actuaries are in agreement that some improvement is likely to occur. The real question is how much it will improve and how rapidly.

Reliable statistical analysis of mortality requires very large data sets. Because of the size of OSERS, there is insufficient data to perform any fully credible analysis. To improve the credibility of our analysis, we aggregated the four years of data from the prior study with the current study period for a total of eight years. Changes in mortality tend to unfold slowly so aggregating the data increased the size of the data, allowing variations due to the size of the group to average out over the study period. In addition, using eight years

of data allows us to include calendar year 2020 and the potential impact of Covid-19 in our analysis without assigning too much weight to that experience. Although actual deaths in 2020 were higher than expected (56 versus 52 expected), the number of excess deaths is relatively small. Given the small data set we are working with, we do not want to exclude a full year of data.

The valuation currently uses generational mortality with separate mortality assumptions for male and female members. The RP-2014 Combined Mortality Table for Males and Females, with a one year age set forward for males and a one-year age setback for females (e.g. a female member age 65 is assumed to exhibit the mortality of a 64 year old), is used to predict the probability of death in each future year. Projection Scale MP-2016 is used to anticipate mortality improvements in future years.

In examining the results of the Experience Study, if the A/E Ratio is greater than 100% the assumptions have predicted fewer deaths than actually occurred (generally an actuarial gain) and with an A/E Ratio less than 100% the assumptions have predicted more deaths than have actually occurred (generally an actuarial loss). Since generational mortality is being used, the A/E Ratio should be around 100% as mortality improvements in future years are directly reflected in the valuation process by projecting lower mortality rates in future years.

Healthy Retiree Mortality – Males: The following table shows the exposures, actual deaths, and expected deaths during the current study period for the key retirement ages of 60 to 85, where the largest exposures are found. The actual to expected ratio (A/E ratio) under the current assumption for each year in the experience study on both a count and benefit-weighted basis is also shown. The variation from year to year is evident; however, this is not unexpected given the size of the group.

				A/E Ratio	
	Exposure	Actual	Expected	Count	Weighted
2017	1,074	19	29	66%	61%
2018	1,096	21	31	68%	49%
2019	1,117	21	33	64%	58%
2020	1,148	36	34	106%	99%
Total	**4,435**	**97**	**127**	**76%**	**68%**

The A/E ratio for males in the prior study, using the current assumption, was 97%. The current experience study indicates that the current assumption for male retirees is predicting far too many deaths on both a count and a benefit-weighted basis, i.e., the A/E ratio is much less than 100%. Mortality changes do not tend to unfold quickly so we are skeptical of the findings and don't want to assign too much credibility to the results. By aggregating the current study period results with the prior study period results, we will recognize the actual data for the current period without over-weighting it and possibly over adjusting the assumption. Over the combined eight-year period, the A/E ratio on a count basis was 92% and on a benefit-weighted basis it was 82%.

Healthy Retiree Mortality – Females: The following chart shows the exposures, actual deaths, and expected deaths for ages 60 to 85, during the current study period. The actual to expected ratio under the current assumption for each year in the experience study on both a count and benefit-weighted basis is also shown. As was observed for males, the experience varies significantly from year to year although the size of the female group is larger than the males. Again, this variation is to be expected given the relatively small size of the group.

				A/E Ratio	
	Exposure	Actual	Expected	Count	Weighted
2017	2,683	49	45	109%	98%
2018	2,782	42	47	89%	73%
2019	2,882	38	49	78%	66%
2020	2,982	56	52	108%	93%
Total	**11,329**	**185**	**193**	**96%**	**82%**

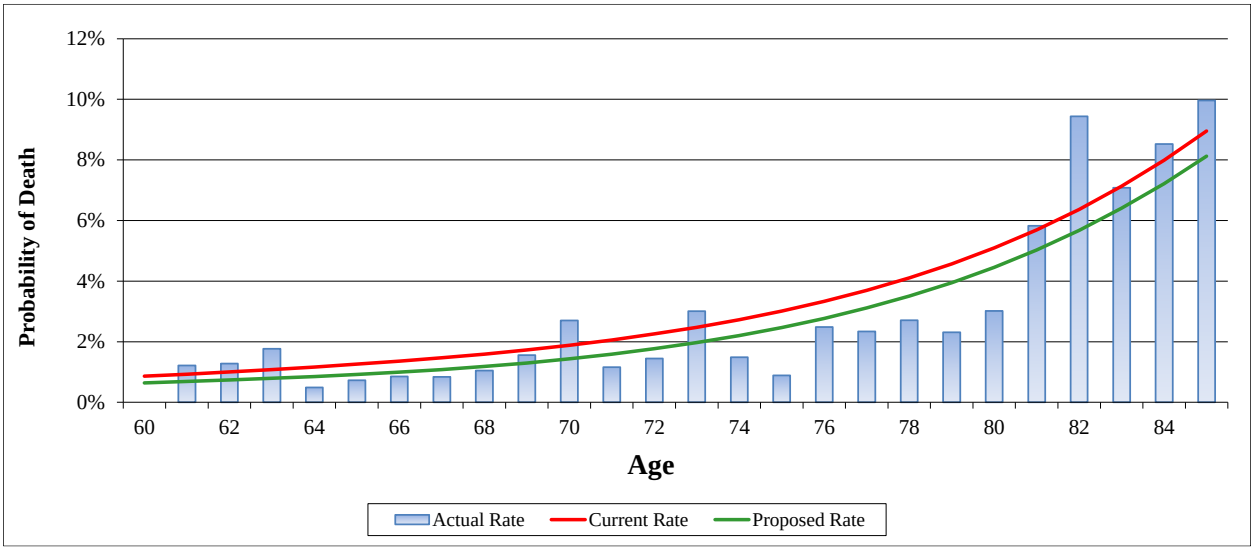
The A/E ratio for females in the prior study, using the current assumption, was 100%. However, in this study period, the experience indicates that the current assumption anticipated more deaths than actually occurred for female retirees on both a count and benefit-weighted basis, i.e., the A/E ratio is less than 100%. The results on a benefit-weighted basis indicate that almost 20% less liability was released due to retiree deaths than was expected which produces actuarial losses (higher liability than expected). We aggregated the current and prior study period results to increase the credibility of the data as discussed earlier for the male group. Over the combined eight-year period, the A/E ratio on a count basis was 101% and on a benefit-weighted basis it was 92%. Given the difference in actual versus expected experience, even given the size of the group, we believe the mortality assumption for females needs to be strengthened.

In setting a new mortality assumption, we first considered the mortality assumption used for the Nebraska School Employees Retirement System , adopted by the PERB at their December, 2020 meeting. However, our analysis indicated that the Nebraska Schools mortality assumption was not a good fit for the OSERS population.

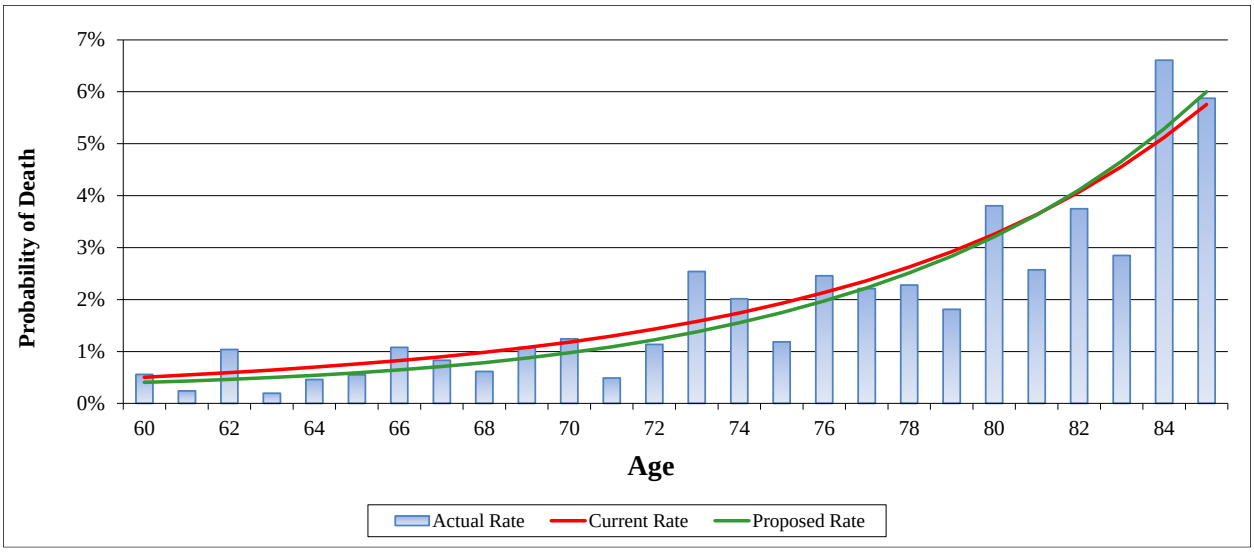
We next attempted to find a standard mortality table, with adjustments if needed, that would be a relatively good fit for the observed experience, with a focus on the key retirement ages of 60 to 85. We looked to the Pub-2010 family of tables as published by the Society of Actuaries (SOA) in January of 2019. **We found that the General Members Median Table provided a good fit to the observed data so we are recommending this assumption for both male and female retiree mortality.**

Graphs of the actual and expected rates under both the current and proposed mortality assumption for males and females are shown below:

Male Mortality Experience



Female Mortality Experience



As shown above, the changes in the mortality rates in the proposed assumption (green line) are smaller for the female group than the male group.

The recommended mortality assumptions are a good fit to the actual experience from ages 60 to 85 as shown below:

	A/E Ratio	
	Count Basis	Benefit-Weighted
Males	111%	100%
Females	110%	102%

Healthy Retiree Mortality- Projected Mortality Improvement

With generational mortality, once the base mortality rates are set by selecting a mortality table that fits the actual experience during the study period, future mortality improvements must be addressed by selecting a mortality improvement scale to anticipate changes in the mortality rates in future years.

The Society of Actuaries (SOA) publishes a mortality improvement scale every year (called the Scale MP-YYYY) along with a tool to permit actuaries to modify the standard projection scale if desired. When we performed the experience study for the Nebraska Public Employees Retirement System (NPERS) in 2020, we developed a customized projection scale for NPERS that generally reflects 75% of the ultimate improvement in the MP-2019 Scale published by the SOA**.** Based on the data available for NPERS, that projection scale was a good fit for the improvements observed in the data over the study period. Therefore, we recommend that OSERS use the NPERS mortality improvement scale in their actuarial valuation to reflect future mortality improvements. Given the unknown impact of COVID-19 on mortality in the longer term and the fact that the mortality improvement scales have consistently overstated actual mortality improvements since 2014, we believe the more modest improvement in mortality, as reflected in the NPERS Projection Scale, is justified. Experience studies are performed every four years so this assumption can be modified, if necessary, as new information unfolds in the next few years.

It should be noted that as we prepare this analysis, the world is in the midst of a pandemic. At this time, we do not believe there is sufficient data to warrant reflecting any dramatic change in the mortality assumption. It is likely the next valuation or two may have more deaths than expected, but this could be followed by a period of fewer than expected deaths if the current deaths from COVID-19 are significantly from groups who would have had higher than expected death rates in the short term. Because there are significant unknowns at this time, we believe it appropriate to utilize the data from the study period to help guide our long-term expectations. We will, of course, review the observed death rates each year as part of the valuation and recommend any changes we believe are appropriate.

We recommend the mortality assumptions be set to the Pub-2010 General Employees Median Mortality Table with generational mortality improvements anticipated using the Nebraska Public Employees Retirement System projection scale.

Beneficiaries: The mortality of beneficiaries applies to the survivors of members who receive a joint and survivor option. There are fewer members receiving benefits under the joint and survivor options which can produce more volatility in the observed mortality rates. Based on the limited data, **we recommend using the Pub-2010 General Members Median Contingent Survivor Mortality Table with generational mortality improvements anticipated using the Nebraska Public Employees Retirement System projection scale for beneficiaries.**

Post-retirement Mortality for Disabled Members: The valuation assumes that disabled members, in general, will not live as long as retired members who met the regular service retirement eligibility. In addition, future life expectancies for disabled members are not expected to increase as significantly as the future life expectancies for healthy retirees.

Because of the limited number of exposures and deaths for disabled members, it makes sense to use the standard disabled table that is the companion to the annuitant mortality table. **We recommend the Pub-2010 Non-Safety Disabled Table be used without generational improvement.**

Active Members: This assumption predicts eligibility for active member death benefits prior to retirement, rather than the expected lifetime for pension payments. In smaller groups like OSERS, the mortality rates for active members are often set by using a consistent basis as is used for healthy retirees. Given the low probability of death while active, the results cannot be credible on their own without much larger numbers of employees than are in OSERS. We prefer to keep the mortality assumption for active and retired members on a consistent basis. **Therefore, we recommend the active member mortality be set to the Pub-2010 General Employees Median Mortality Table for males and females with generational mortality improvements anticipated using the Nebraska Public Employees Retirement System projection scale.**

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RETIREMENT

The valuation uses several different assumptions to anticipate when retirement benefits will commence for active members. One of the most significant factors affecting retirement patterns is, not surprisingly, the provisions governing when a member is eligible to retire. Additionally, provisions regarding eligibility for special benefits, subsidies, options, or any other special features may also influence retirement patterns.

The Omaha School Employees Retirement System currently contains four separate "tiers" of benefits. Tier membership is determined by the member's date of participation:

Benefit Tier	Membership Date
1	Prior to 7/1/2013
2	On/after 7/1/2013 and before 7/1/2016
3	On/after 7/1/2016 and prior to 7/1/2018
4	On/after 7/1/2018

A comparison of the eligibility criteria for early retirement (reduced benefits) and normal retirement (unreduced benefits) is shown in the table below. Unreduced benefits are also payable upon attainment of the Rule of 85 (age and years of service add to at least 85).

	Tier 1	Tier 2	Tier 3	Tier 4
Reduced Retirement	Age 55/10 YOS	Age 55/10 YOS	Age 60/5 YOS	Age 60/5 YOS
Unreduced Retirement	35 YOS 62 and 10 YOS 65 and 5 YOS	35 YOS 62 and 10 YOS 65 and 5 YOS	65 and 5 YOS	65 and 5 YOS
Rule of 85	Age 55	Age 55	Age 55	Age 60

Eligibility requirements for retirement changed for Tiers 3 and 4, as noted above. Because Tiers 3 and 4 were recently implemented, it will be many years before any credible retirement experience for those tiers is available. Therefore, the recommended retirement rates for those tiers are set based solely on our professional judgment.

For this discussion, the focus is on the type of retirement a member is eligible to receive. Early retirement is the term used when the amount of the accrued benefit is reduced by an early retirement factor to reflect the longer expected payment period. Unreduced retirement occurs when such a factor is not applied. Currently, there are separate retirement rates for certificated and classified members, based on early or unreduced retirement (including Rule of 85).

A summary of the actual and expected retirement experience from age 55 to 75 during the study period is shown in the following table:

Retirement Experience					
				A/E Ratio	
	Exposures	Actual	Expected	Count	Weighted
Certificated					
Early retirement	1,281	86	107	80%	82%
Unreduced retirement	1,291	364	442	82%	80%
Classified					
Early retirement	1,304	49	55	89%	89%
Unreduced retirement	1,458	314	361	87%	92%

A more detailed discussion of our findings is included below.

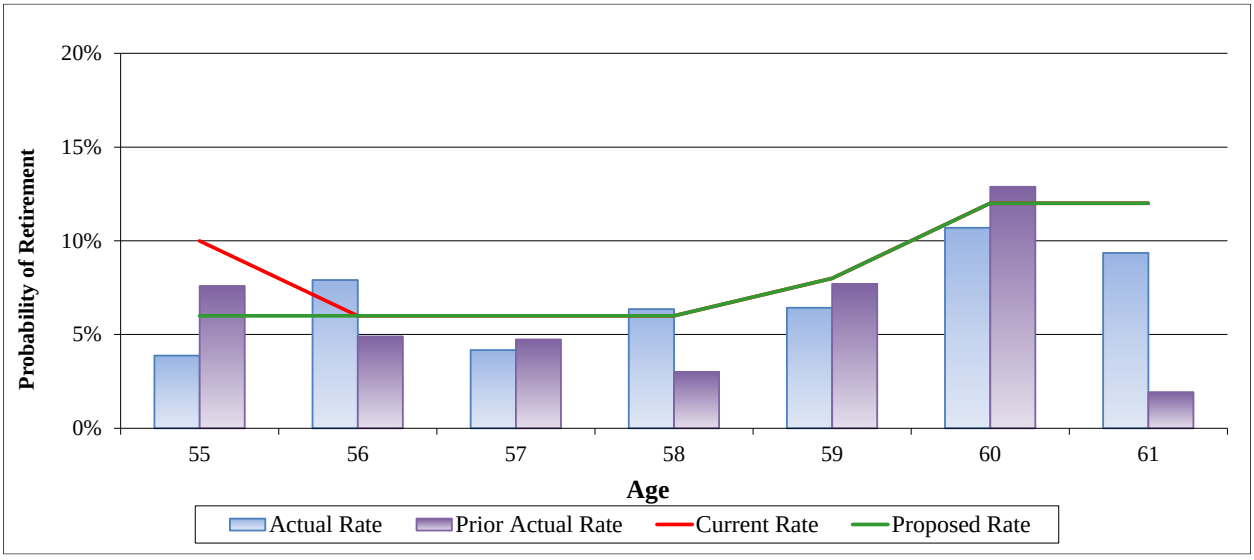
Certificated Retirement Experience

The following table is a summary of the actual service retirements in each category for certificated members for calendar years 2017 through 2020:

Retirements Observations				
	Actual	Expected	A/E Ratio Count	A/E Ratio Weighted
Early (Reduced)	86	107	80%	82%
Select (First Eligible)	100	143	70%	63%
Ultimate	264	299	88%	88%

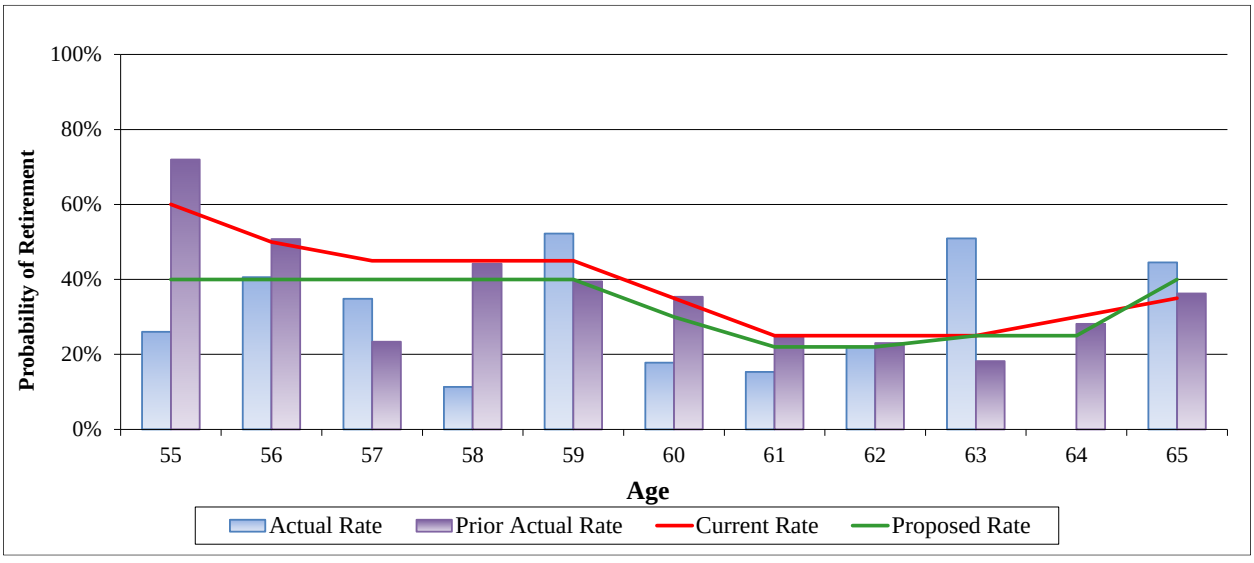
There were fewer retirements than expected as indicated by A/E ratios below 100%, on both a count and weighted basis. We also considered the retirement experience from the prior study period. The biggest difference in retirement patterns between the two periods was for the "select period", when a member is first eligible for unreduced retirement benefits. Using the current assumption, the A/E ratio in the prior study was 102% while the current study showed an A/E ratio of 63%. Based on our review of the current and prior study findings, we are recommending several changes to the retirement assumptions for certificated members.

Certificated Early Retirement



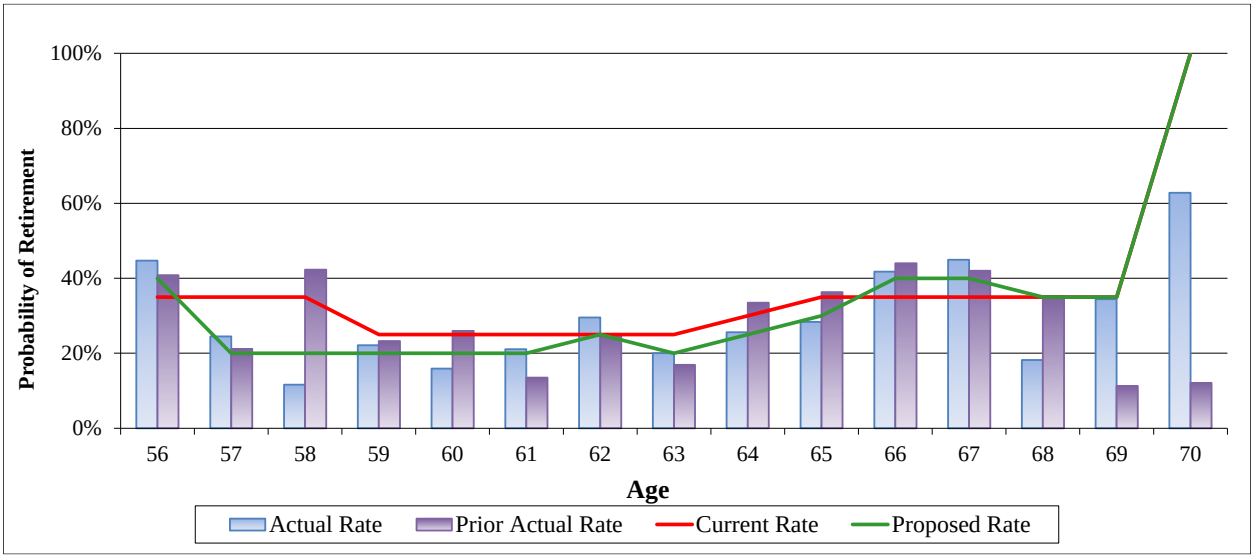
The current assumption is a good fit, in general. Our only recommendation is to lower the retirement rate at age 55 from 10% to 6%. The resulting A/E ratio is 91%.

Certificated First Eligible Retirement



The actual retirement experience at first eligible age for unreduced retirement benefits was very different than observed in the last study, i.e., the A/E ratio was 63% indicating much lower retirement experience than was expected by the current assumption. We are hesitant to fully reflect the rates observed in the current study given the small size of the exposure. Therefore, we recommend partially reflecting the experience in the current study period while also taking the prior study period results into account. The A/E ratio using the proposed assumption is 81%.

Certificated Ultimate Retirement



Given the A/E ratio with the current assumption was 88% on a liability-weighted basis, we are recommending some changes to this assumption to improve the fit of the assumption to the experience observed. The revised A/E ratio using the proposed assumption shown above is 99%.

The following table summarizes the resulting A/E ratios using the recommended assumptions:

Certificated Experience

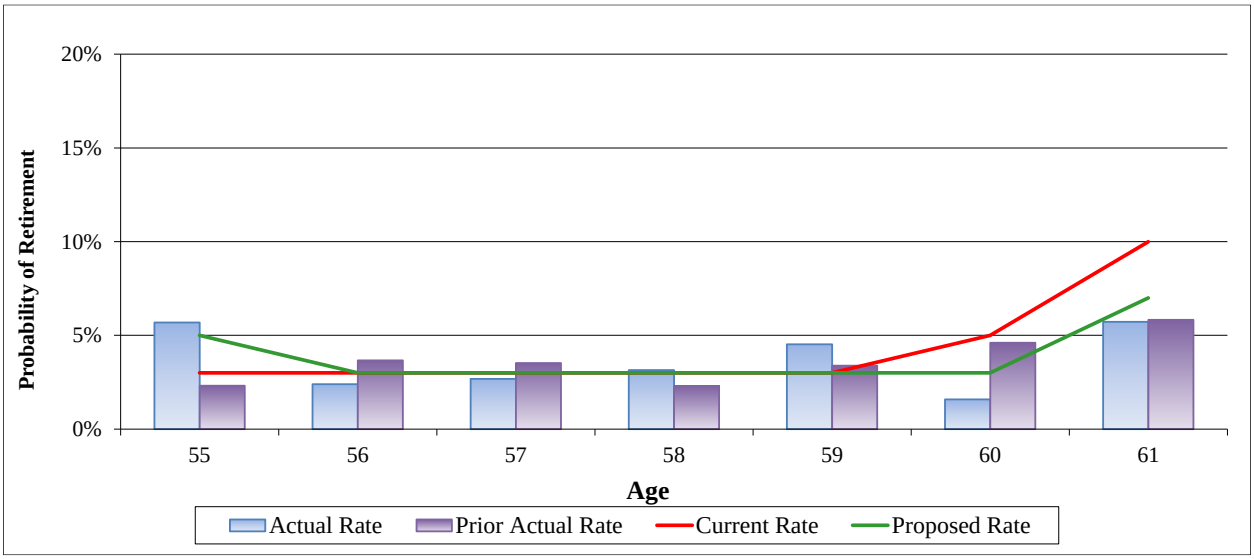
	A/E Ratio			
	Current		Proposed	
Assumption	Count	Weighted	Count	Weighted
Early	80%	82%	88%	91%
Select	70%	63%	85%	81%
Ultimate	88%	88%	97%	99%

Classified Retirement Experience

The following table is a summary of the actual service retirements in each category for classified members for calendar years 2017 through 2020:

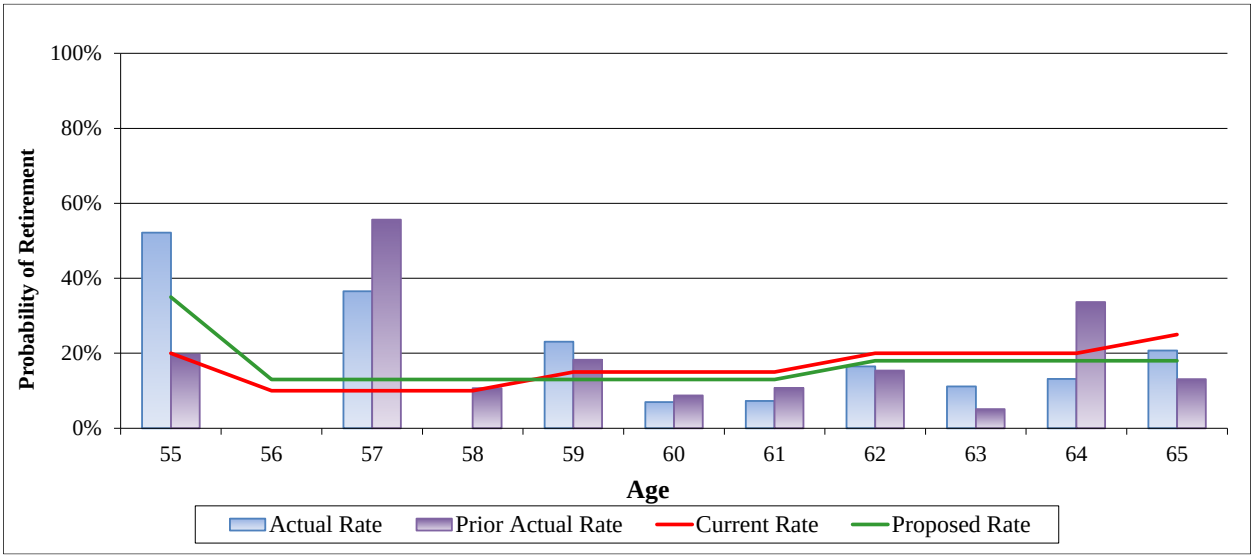
Retirements Observations				
	Actual	Expected	A/E Ratio Count	A/E Ratio Weighted
Early (Reduced)	49	55	89%	89%
Select	55	65	85%	99%
Ultimate	289	451	64%	72%

Classified Early Retirement



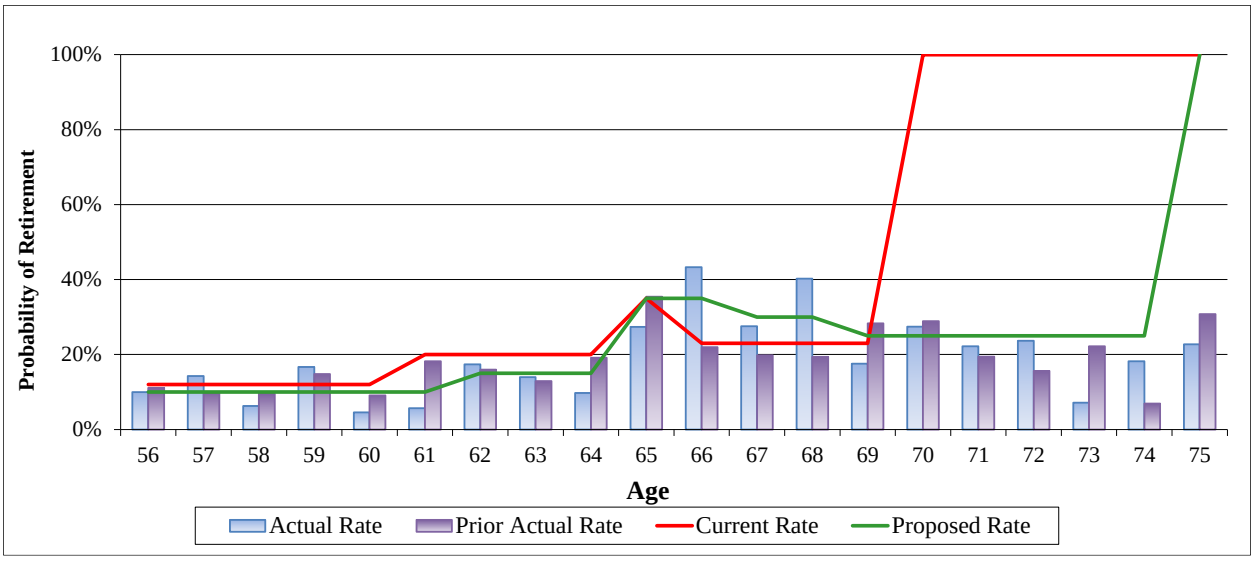
We recommend minor adjustments to the early retirement rates at ages 55, 60 and age 61. The resulting A/E ratio is 97%.

Classified First Eligible Retirement



We recommend adjusting the rates to reflect the aggregate experience over the current and prior study periods, as shown in the graph above**.** The A/E ratio on the proposed assumption is 101% on a weighted basis.

Classified Ultimate Retirement



We recommend adjusting the rates to reflect and better fit the aggregate experience over the current and prior study periods, including extending the assumption to age 75. The A/E ratio using the proposed assumption is 97% on a weighted basis.

Classified Experience

	A/E Ratio			
	Current		Proposed	
Assumption	Count	Weighted	Count	Weighted
Early	89%	89%	99%	97%
Select	85%	99%	96%	101%
Ultimate	64%	72%	90%	97%

Inactive Vested Members: The current assumption is that inactive vested members will retire at the first retirement date at which they are eligible for unreduced benefits. Due to the limited number of exposure, actual analysis was not performed. This is a reasonable expectation and **we recommend the current assumption be retained.**

Miscellaneous Assumptions

There are two minor assumptions that are used in the valuation process. For simplicity, we have included the discussion here.

Marriage Assumption

The current assumption is that 100% of members members are married. This assumption is used to value the pre-retirement death benefit which varies with marital status (which has minor cost implications). The census data provided to us for the annual valuation does not include marital status. Beneficiary information is only reported for those retirees who are receiving a joint and survivor form of payment. With data supplied in this manner, there is no fully credible way to review this assumption. However, the impact of this assumption is quite small and the use of 100% marriage assumption means the survivor provisions are valued conservatively. Although it does not have a material cost impact, **we recommend changing the assumption to 85% of the members are married.**

Age of Beneficiary

The current assumption is that males are three years older than. There is insufficient data to assess this assumption, **We believe the current assumption is a standard assumption used in actuarial valuation for pension plans so it is reasonable. We recommend it be retained.**

DEFINITION OF ACTUARIAL EQUIVALENCE FOR FACTORS

Background

Given we are recommending changes to the investment return assumption and the mortality assumption in this experience study, we believe it is appropriate for the Board to consider updating the definition of actuarial equivalence for members hired on or after July 1, 2018. Reflecting the changes now will result in a smaller adjustment to the resulting benefit amounts compared to waiting until a later date when the assumption changes may be more significant. Changing them now also reduces the amount of any actuarial gains/losses resulting from members electing an optional form of payment at retirement.

For OSERS, the definition of actuarial equivalence only affects the amount of benefit received if a member elects to receive payment under an optional form of benefit. The benefit formula (Final Average Salary * Years of Service * Multiplier) determines the amount of the benefit payable under the normal form of payment, a five-years certain and life annuity. Optional forms are based on this benefit amount multiplied by an optional form factor.

The definition of "actuarial equivalence" for members hired prior to July 1, 2018 is defined in statute. State Statutes 79-978(3)(ii) sets out the definition: "For members hired before July 1, 2018, a unisex mortality table using twenty-five percent of the male mortality and seventy-five percent of the female mortality from the 1994 Group Annuity Mortality Table with a One Year Setback and using an interest rate of eight percent compounded annually." This actuarial equivalent basis in statute for members who were hired before July 1, 2018 remains in place. However, the Board now determines the assumptions for determining actuarial equivalence for optional forms of payment for members hired after June 30, 2018.

There are three primary assumptions that create the actuarial equivalent basis for the actuarial factors:

(1) Mortality assumption,
(2) Interest rate (investment return assumption),
(3) Cost of living adjustment (if the adjustment is variable).

Our recommendation for each assumption is discussed below.

Recommended Assumptions for Actuarial Equivalent Basis for Post June 30, 2018 Members

Mortality

A gender-neutral mortality assumption is needed to comply with legal requirements. In addition, the mortality tables used in the valuation are "generational" meaning that the probabilities of death decrease slightly in each future year, which would result in different life expectancies each year and a change to the actuarial equivalent factors, if used. Rather than update actuarial factors each year, it is common practice to project the mortality rates to a specific year in the future and then use that single set of mortality rates for actuarial equivalent purposes.

Our approach in this study is consistent with the last experience study. To determine the unisex blend of male and female mortality rates, the male/female split of liability for those members nearing retirement was studied. We further examined the actual election patterns for optional forms of payment by gender to determine if any adjustment was needed to reflect different utilization of joint and survivor benefits. The opposite gender blend is used for the mortality assumption of the joint annuitant.

The following mortality assumption is recommended **if** the Board wishes to adopt new assumptions for the definition of "actuarial equivalent":

- Valuation mortality table, projected to 2040 using the mortality projection scale, with a 25% male/75% female blend.

COLA Assumption

The statutory plan provisions include an automatic 1% COLA (not to exceed CPI). Given the price inflation assumption used for funding purposes, the full 1% COLA is assumed. While there is a provision for an additional discretionary COLA when certain funding-related criteria are met, there is no specific adjustment made to the COLA funding assumption. Therefore, we recommend using the 1% COLA assumption for the definition of actuarial equivalence.

Investment Return (Interest Rate) Assumption

For members who were hired on/after July 1, 2018 we recommend an interest rate of 7.00% be used. The optional form factors are calculated by dividing the annuity factor for the normal form of payment by the annuity factor for the optional form of payment. Because the change in the underlying actuarial assumptions impacts both annuity factors in the same direction but not by the same magnitude, the cost impact is somewhat mitigated.

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TERMINATION OF EMPLOYMENT

Not all active members on the valuation date are expected to continue working until retirement. Therefore, a termination of employment assumption is used to anticipate the probability that a member will leave covered employment at any given age. In analyzing the actual results, the number of terminations includes all members reported to have terminated employment. Some of these members subsequently receive refunds of their contributions, some return to active membership and some leave their contributions with the System until retirement and receive a monthly benefit. Explicit assumptions are made regarding the elections made by such terminated vested members. Non-vested members are assumed to elect a refund of their employee contribution account balance.

This section of the report summarizes the results of our study of terminations of employment for reasons other than death, retirement, or disability. Rates of termination can vary by both age and years of service. In general, rates of termination tend to be highest at younger ages and in the early years of employment. There may also be differences in termination patterns between males and females so gender-specific rates are studied.

The current termination of employment assumption is a service-based assumption with employees with lower years of service exhibiting higher incidences of termination than the rates for employees with more years of service. Separate male and female termination rates for classified members are used in the valuation process, but one set of rates is used for all certificated members (both male and female).

Certificated Members

A summary of the experience in the current study period for durations 1 through 25 is displayed in the following tables:

Termination Experience – All Certificated

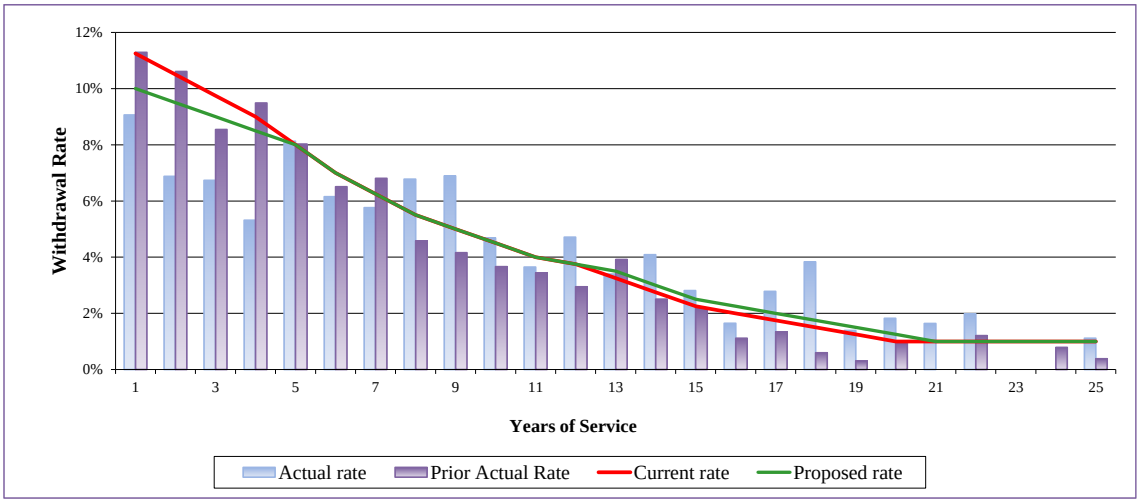
				A/E Ratio	
	Exposures	**Actual**	**Expected**	**Count**	**Weighted**
Calendar Year 2017	3,959	187	240	78%	89%
Calendar Year 2018	4,027	234	244	96%	102%
Calendar Year 2019	3,900	216	228	95%	124%
Calendar Year 2020	3,976	213	235	91%	114%
Total	**15,862**	**850**	**947**	**90%**	**108%**

As the table above illustrates, overall the current assumption is estimating the liability associated with terminations more closely than the number of terminations (liability-weighted A/E ratio is closer to 100%). Given that the current assumptions were developed using the liability-weighted experience in the prior study, this result is consistent with our expecations. Essentially, the terminations are occurring more often among members with lower salaries relative to higher salaried members.

As the graph below shows, the actual experience in this study period (light blue bars) is different than observed in the prior study period (purple bars). In fact, the A/E ratio in the prior study, using the same assumption, was 87%. If the experience in the current period (A/E ratio of 108%) is aggregated with the experience in the prior period (A/E ratio of 87%), the A/E ratio is close to 100%. However, we do believe some adjustment is necessary, with largest adjustment at durations one to four. The recommended

assumption is shown in green in the graph below. The A/E ratio, using the proposed assumption, does not change dramatically (it is 106%), but the fit is better.

Termination Rates: Certificated Males and Females



We reviewed the results for the certificated group separately by male and female, as well in aggregate, and there was not a major difference between the termination patterns for males and females. We continue to recommend one assumption be used for the certificated group. For the classified group, separate assumptions are currently used based on gender and the experience again supports that approach.

Classified Members

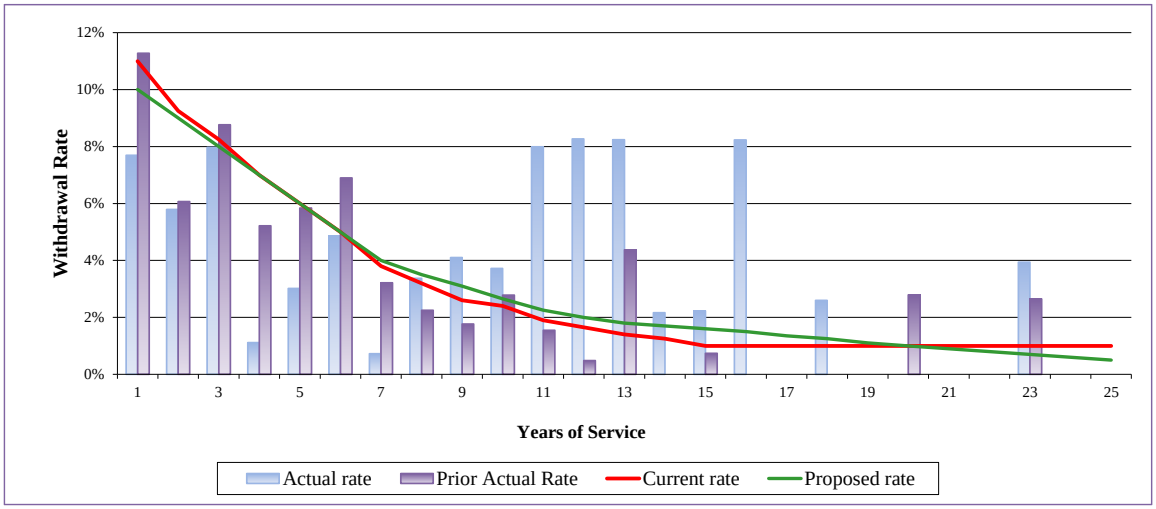
Termination Experience – Classified Males

				A/E Ratio	
	Exposures	**Actual**	**Expected**	**Count**	**Weighted**
Calendar Year 2017	506	26	29	89%	116%
Calendar Year 2018	526	33	31	105%	128%
Calendar Year 2019	513	31	31	101%	141%
Calendar Year 2020	512	18	32	56%	79%
Total	**2,057**	**108**	**123**	**88%**	**116%**

With the exception of 2020, there was more liability released from members terminating than expected. As a result, the A/E ratios were above 100%. As the graph below shows, terminations were much higher than expected at durations 9 through 16, a very different pattern from that observed in the prior study. This termination pattern is not typical and we are hesitant to rely too heavily on the data in this observation period. As a result, we are recommending a few changes to the classified Males assumption in this study, partially reflecting the results in the current study, but trying not to overadjust. When more information is available in the next experience study, additional adjustments can be made if necessary.

The current and recommended assumptions for termination of employment for classified Males is shown in the graph below. The A/E ratio, using the proposed assumption, is 111%.

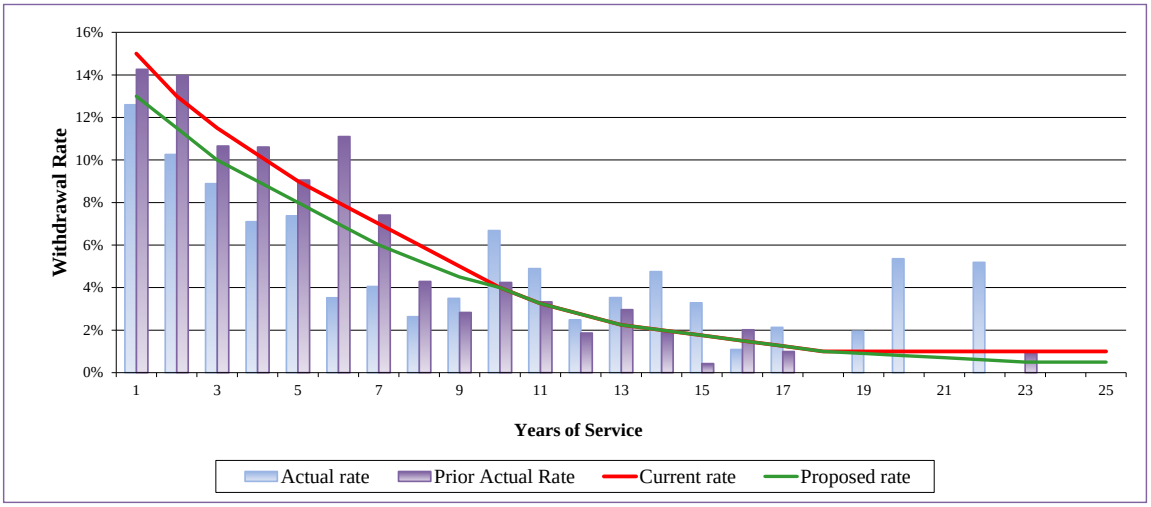
Termination Rates: Classified Males



Termination Experience – Classified Females					
				A/E Ratio	
	Exposures	Actual	Expected	Count	Weighted
Calendar Year 2017	1,180	58	103	57%	56%
Calendar Year 2018	1,207	126	108	116%	118%
Calendar Year 2019	1,112	79	96	82%	84%
Calendar Year 2020	1,080	98	97	102%	102%
Total	**4,579**	**361**	**404**	**89%**	**90%**

The aggregate results are similar to those in the last study which reflected an A/E ratio of 91%. The biggest differences in termination rates for the two periods were for the early durations. Therefore, we recommend some adjustments to the rates for durations one through 10 and some adjustment at later durations. The current and proposed assumptions are shown in the graph below. The resulting A/E, ratio using the proposed assumption, is 100%.

Termination Rates: Classified Females



The A/E ratios using the recommended assumptions are summarized below. As discussed earlier, the recommended assumptions rely on the weighted analysis so the A/E ratios are closer to 100% on that basis than the count basis.

	A/E Ratio	
	Count	Weighted
Certificated	93%	106%
Classified - Males	89%	111%
Classified – Females	101%	100%

VESTED MEMBER ELECTION OF REFUND/DEFERRED BENEFIT

Some members who terminate active employment elect to receive a distribution of their member account balance. Currently, we assume that all non-vested members receive a refund of their account balance at the time of termination. In addition, we assume a certain proportion of terminating vested members also elect a distribution of their member account, thus forfeiting the right to receive a monthly benefit in the future.

Currently, separate assumptions are used for each group. For the certificated group, 20% of terminating members are assumed to take a refund and 80% are assumed to leave their employee account balance in the System and draw a monthly benefit when eligible. For the classified group, 40% are assumed to elect a refund of their employee account balance and forfeit any monthly income and 60% are assumed to leave their funds with the System. The following table shows the number of vested members who terminated and elected to leave their funds with the System.

	Election of Deferred Benefit		
	Actual	**Terminations**	**Percent**
Classified			
• **Less than 11 YOS**	107	164	65%
• **11 or More YOS**	69	92	75%
Total	176	256	69%

There were more terminated vested members who elected to leave their contributions in the System and receive a monthly benefit at retirement eligibility than was anticipated by the current assumption for both groups. In addition, we further analyzed the data by years of service and observed a higher election of deferred benefits by members with more years of service. This seems a reasonable expectation given the general expectation that member with more years of service will have larger benefit amounts and be older.

Given the experience in this study, we are recommending the assumption for classified members be modified to assume that 65% of all terminating members with less than 11 years of service and 75% of all terminating members with 11 or more years of service will elect to leave their money in the System and later receive a monthly benefit.

	Election of Deferred Benefit		
	Actual	**Terminations**	**Percent**
Certificated			
• **Less than 15 YOS**	368	444	83%
• **15 or More YOS**	81	92	88%
Total	449	536	84%

The pattern for certificated members did vary by years of service but not dramatically. Having said that, we believe there should be a higher probability of members leaving their contribution with the System with higher years of service. Therefore, for certificated members, we recommend assuming 80% of members who terminate with less than 15 years of service and 90% who terminated with 15 or more years of service will elect to leave their money in the System and later received a monthly benefit.

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Interest Rate: 7.50% per annum, compounded annually, net of expenses.

Mortality Rates: RP-2014 Mortality Table for males, set forward one year.
RP-2014 Mortality Table for females, set back one year.

Future mortality rates are projected on a generational basis using Scale MP-2016, which reflects the expectation that mortality rates will decline over time.

Disabled retirees use the RP-2014 Disabled Retiree Mortality Table, without generational improvement.

Disability: None assumed.

Termination of Employment: (prior to retirement eligibility) Illustrative rates of termination are as follows:

Certificated:

Duration	Percent Terminating Rate
1	11.25%
5	8.00
10	4.50
15	2.25
20	1.00
25	1.00

Classified:

Duration	Percent Terminating Male	Female
1	11.00%	15.00%
5	6.00	9.00
10	2.40	4.00
15	1.00	1.75
20	1.00	1.00
25	1.00	1.00

Retirement Rates:

Early retirement rates are assumed to occur according to the schedule illustrated below:

Became members before July 1, 2016

Certificated:		Classified:	
Age	Early	Age	Early
55	10%	55	3%
56	6	56	3
57	6	57	3
58	6	58	3
59	8	59	3
60	12	60	5
61	12	61	10

Became members on or after July 1, 2016

Certificated:		Classified:	
Age	Early	Age	Early
60	12%	60	5%
61	12	61	10
62	12	62	10
63	12	63	10
64	12	64	10

Unreduced retirement rates are assumed to occur according to the schedule illustrated below:

Became members before July 1, 2018

Certificated:

Age	1st Year Eligible	Ultimate
55	60%	
56	50	35%
57	45	35
58	45	35
59	45	25
60	35	25
61	25	25
62	25	25
63	25	25
64	30	30
65	35	35
66	35	35
67	35	35
68	35	35
69	100	35
70	100	100

Classified:

Age	1st Year Eligible	Ultimate
55	20%	
56	10	12%
57	10	12
58	10	12
59	15	12
60	15	12
61	15	20
62	20	20
63	20	20
64	20	20
65	25	35
66	20	23
67	20	23
68	20	23
69	20	23
70	100	100

Members hired on or after July 1, 2018

Certificated:

7

Age	1st Year Eligible	Ultimate
60	65%	
61	25	25%
62	25	25
63	25	25
64	30	30
65	35	35
66	35	35
67	35	35
68	35	35
69	100	35
70	100	100

Classified:

Age	1st Year Eligible	Ultimate
60	40%	
61	15	20%
62	20	20
63	20	20
64	20	20
65	25	35
66	20	23
67	20	23
68	20	23
69	20	23
70	100	100

Deferred vested members are assumed to retire at first unreduced retirement age.

Salary Scale: Salaries are assumed to increase according to the schedule illustrated below:

	Annual Salary Increase	
Duration	Certificated	Classified
0	5.75%	6.25%
1	5.75	5.75
2	5.75	5.25
3	5.75	5.00
4-6	5.75	4.75
7-11	5.75	4.25
12-14	5.75	3.75
15-21	5.25	3.75
22+	4.25	3.75

Note: Salaries are assumed to increase by 2.0% for members who have not yet finalized their contract negotiations as of the valuation date.

Pre-Retirement Survivor Annuity: It is assumed that females are three years younger than males, and that all members are married.

Probability of Electing a Refund: The proportion of terminating vested members electing a refund of member contributions:

20% for Certificated members
40% for Classified members

Assumed Interest Rate Credited on Employee Contributions: 2.75% compounded annually.

Inflation (CPI): 2.75% compounded annually.

Total Payroll Growth: 3.25% compounded annually.

Decrement Timing: Middle of year

Cost of Living Adjustments: 1.5% for members hired before 7/1/2013
1.0% for members hired on or after 7/1/2013

Inactive Vested Load: A 5% load on deferred monthly benefits is included to reflect that some inactive vested members' account balances are greater than the present value of their deferred benefit.

Valuation Salary Methodology: Valuation salaries are imputed using each member's contribution amount during the prior year. For members who did not work a full year, their salaries are annualized using current salary rates.

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Interest Rate: 7.00% per annum, compounded annually, net of investment expenses.

Mortality Rates: Active members use the Pub-2010 General Members (Median) Employee Mortality Table projected generationally using the NPERS projection scale.

Retirees use the Pub-2010 General Members (Median) Retiree Mortality Table projected generationally using the NPERS projection scale.

Beneficiaries use the Pub-2010 General Members (Median) Contingent Survivor Mortality Table projected generationally using the NPERS projection scale.

Disabled retirees use the Pub-2010 Non-Safety Disabled Retiree Mortality Table, without generational improvement.

Disability: None assumed.

Termination of Employment: (prior to retirement eligibility) Illustrative rates of termination are as follows:

Certificated:

Duration	Percent Terminating Rate
1	10.00%
5	8.00
10	4.50
15	2.50
20	1.25
25	1.00
30	0.75

Classified:

Duration	Percent Terminating Male	Female
1	10.00%	13.00%
5	6.00	8.00
10	2.65	4.00
15	1.60	1.75
20	1.00	0.80
25	0.50	0.50
30	0.50	0.50

Retirement Rates:

Early retirement rates are assumed to occur according to the schedule illustrated below:

Became members before July 1, 2016

Certificated:		Classified:	
Age	Early	Age	Early
55	6%	55	5%
56	6	56	3
57	6	57	3
58	6	58	3
59	8	59	3
60	12	60	3
61	12	61	7

Became members on or after July 1, 2016

Certificated:		Classified:	
Age	Early	Age	Early
60	12%	60	3%
61	12	61	7
62	12	62	7
63	12	63	7
64	12	64	7

Unreduced retirement rates are assumed to occur according to the schedule illustrated below:

Became members before July 1, 2018

Certificated:

Age	1st Year Eligible	Ultimate
55	40%	
56	40	40%
57	40	20
58	40	20
59	40	20
60	30	20
61	22	20
62	22	25
63	25	20
64	25	25
65	40	30
66	40	40
67	40	40
68	40	35
69	100	35
70	100	100

Classified:

Age	1st Year Eligible	Ultimate
55	35%	
56	13	10%
57	13	10
58	13	10
59	13	10
60	13	10
61	13	10
62	18	15
63	18	15
64	18	15
65	18	35
66	18	35
67	18	30
68	18	30
69	18	25
70	100	25
71	100	25
72	100	25
73	100	25
74	100	25
75	100	100

Members hired on or after July 1, 2018

Certificated:

Age	1st Year Eligible	Ultimate
60	40%	
61	22	20%
62	22	25
63	25	20
64	25	25
65	40	30
66	40	40
67	40	40
68	40	35
69	100	35
70	100	100

Classified:

Age	1st Year Eligible	Ultimate
60	30%	
61	13	10%
62	18	15
63	18	15
64	18	15
65	18	35
66	18	35
67	18	30
68	18	30
69	18	25
70	100	25
71	100	25
72	100	25
73	100	25
74	100	25
75	100	100

Deferred vested members are assumed to retire at first unreduced retirement age.

Salary Scale: Salaries are assumed to increase according to the schedule illustrated below:

	Annual Salary Increase	
Duration	Certificated	Classified
0	4.95%	6.25%
1	4.95	5.10
2	4.95	4.85
3	4.95	4.60
4	4.95	4.35
5	4.95	4.25
6	4.95	4.15
7	4.95	4.05
8-9	4.95	3.85
10	4.95	4.95
11	4.95	3.85
12-14	4.95	3.35
15	5.60	5.35
16-19	4.80	3.35
20	5.10	4.85
21-23	3.90	3.35
24	4.35	3.35
25	5.85	4.85
26-29	3.10	3.10
30	3.85	4.85
31-34	3.10	2.85
35	3.85	3.35
36-39	2.85	2.85
40	3.60	3.85

Note: Salaries are assumed to increase by 2.0% for members who have not yet finalized their contract negotiations as of the valuation date.

Pre-Retirement Survivor Annuity: It is assumed that females are three years younger than males, and that 85% members are married.

Probability of Electing a Refund: The proportion of terminating vested members electing a refund of member contributions:

20% for Certificated members with less than 15 years of service
10% for Certificated members with 15 or more years of service
35% for Classified members with less than 11 years of service
25% for Classified members with 11 or more years of service

Assumed Interest Rate Credited on Employee Contributions: 2.35% compounded annually.

Inflation (CPI): 2.35% compounded annually.

Total Payroll Growth:	2.85% compounded annually.
Decrement Timing:	Middle of year
Cost of Living Adjustments:	1.5% for members hired before 7/1/2013 1.0% for members hired on or after 7/1/2013
Administrative Expense	0.24% of payroll
Inactive Vested Load:	A 5% load on deferred monthly benefits is included to reflect that some inactive vested members' account balances are greater than the present value of their deferred benefit.
Valuation Salary Methodology:	Valuation salaries are imputed using each member's contribution amount during the prior year. For members who did not work a full year, their salaries are annualized using current salary rates.

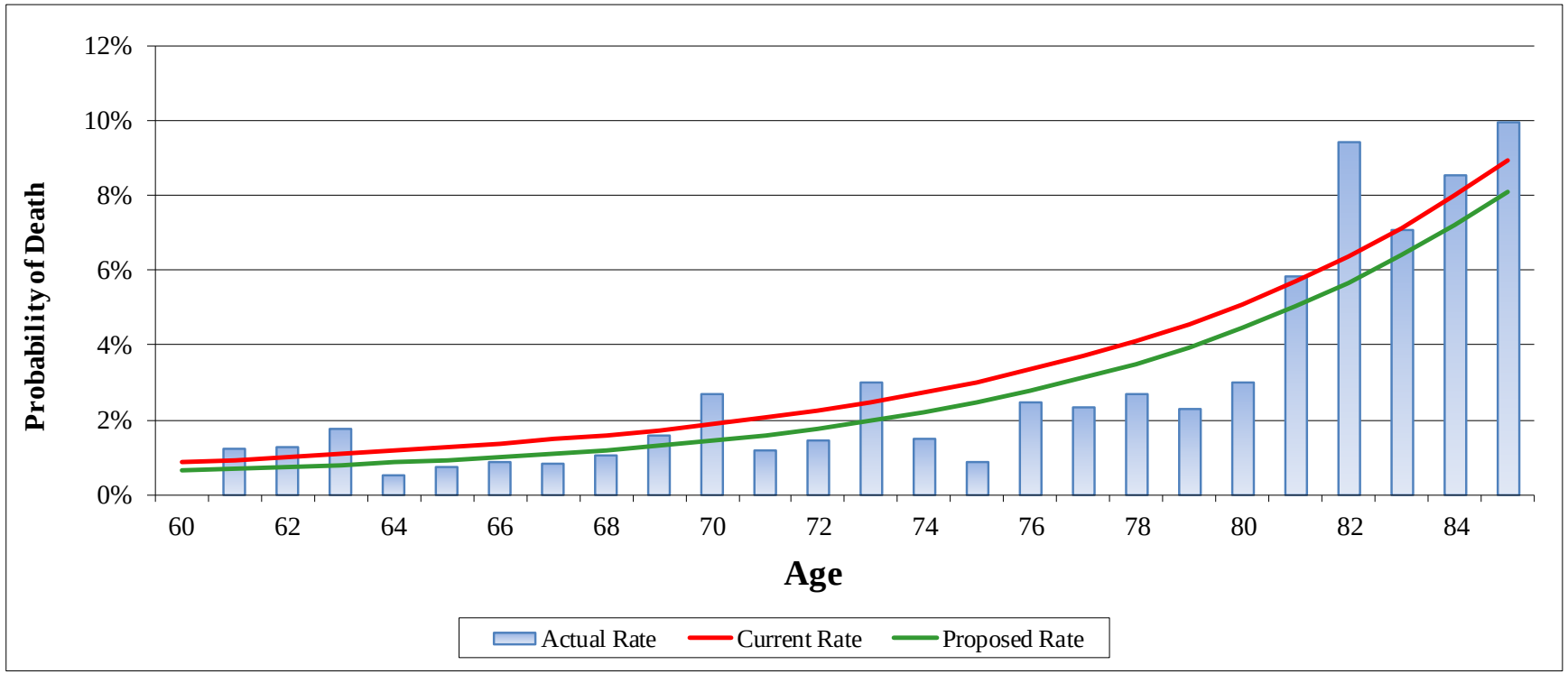
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-1

Probability of Death - Healthy Retirees

Males



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	431,591	526,252	431,713
Actual/Expected		82%	100%

Note: Analysis combines data from previous experience study

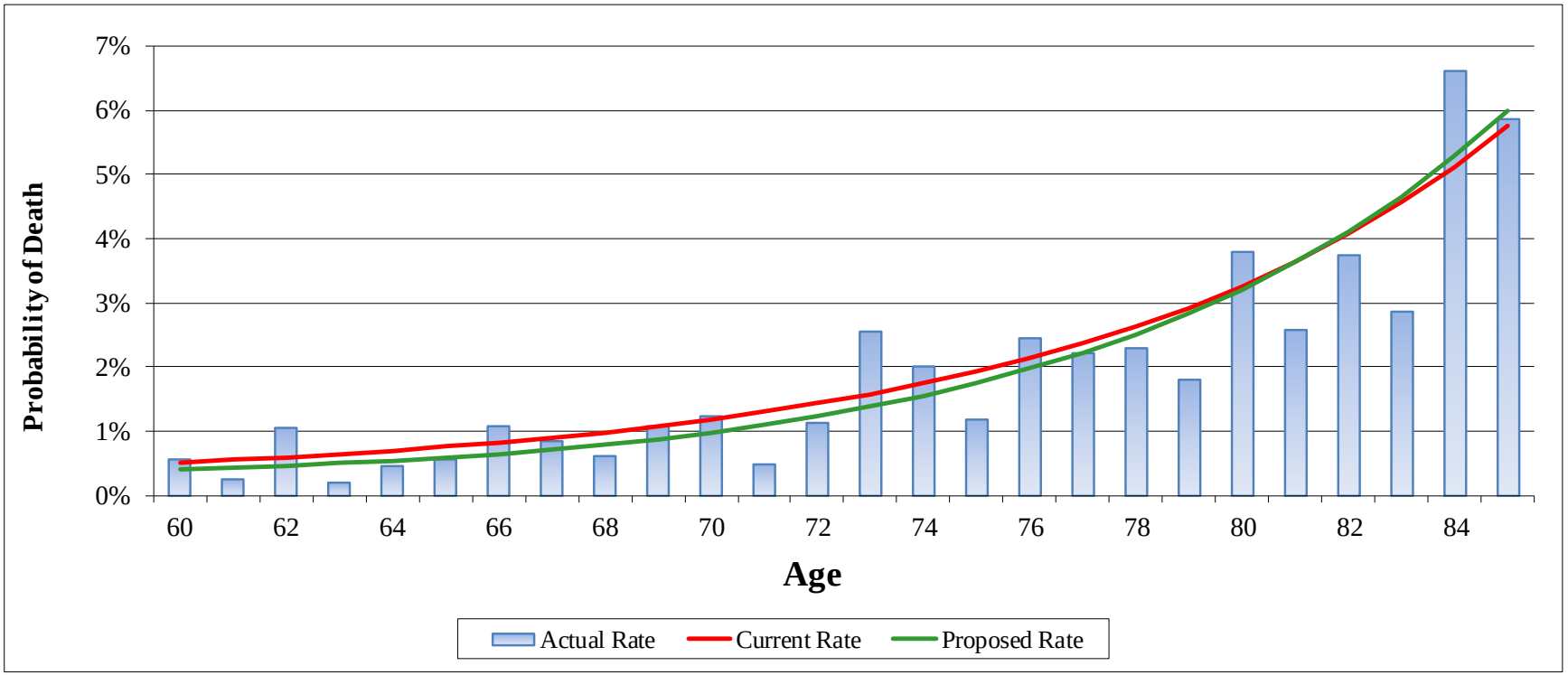
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-2

Probability of Death - Healthy Retirees

Females



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	577,640	629,748	568,707
Actual/Expected		92%	102%

Note: Analysis combines data from previous experience study

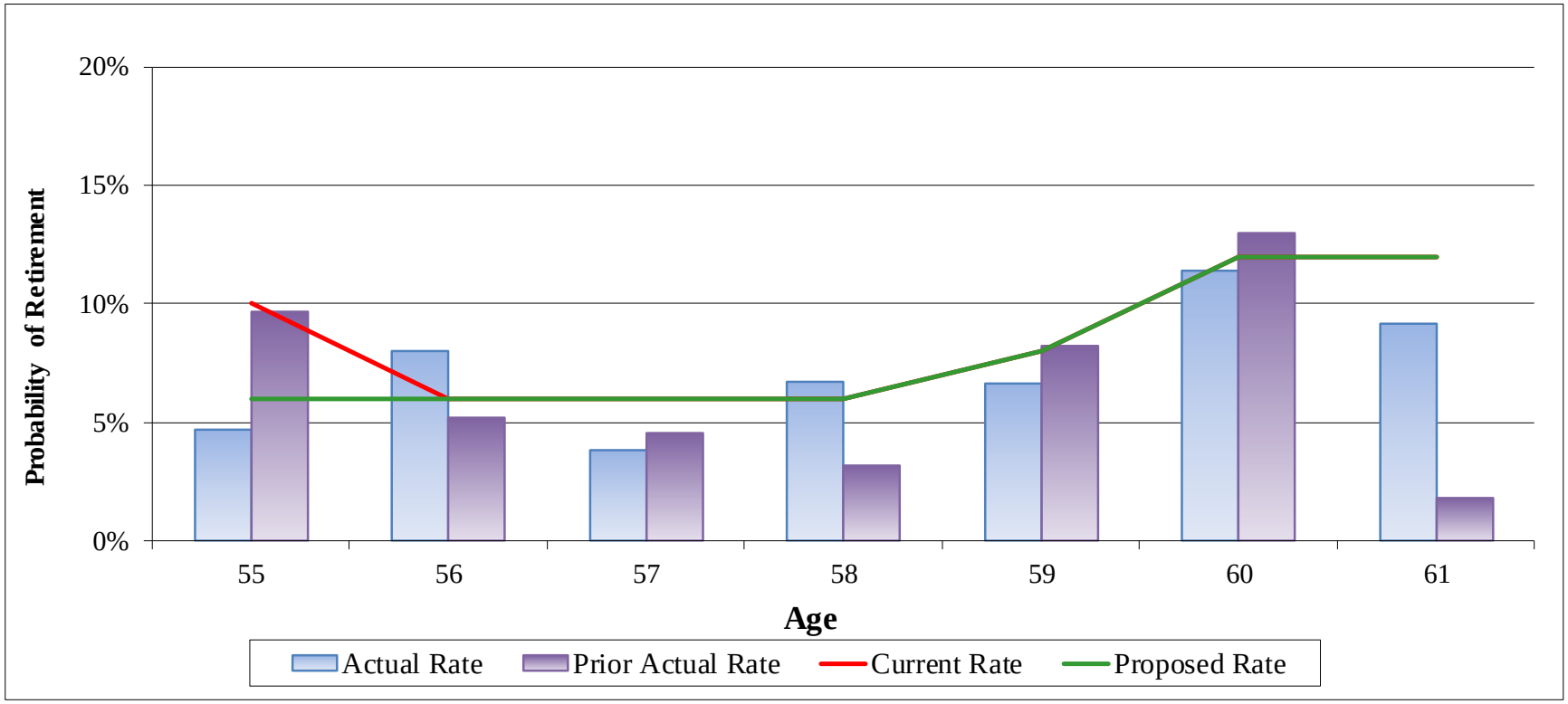
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-3

Retirement Rates

Certificated - Early



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	102	124	112
Actual/Expected		82%	91%

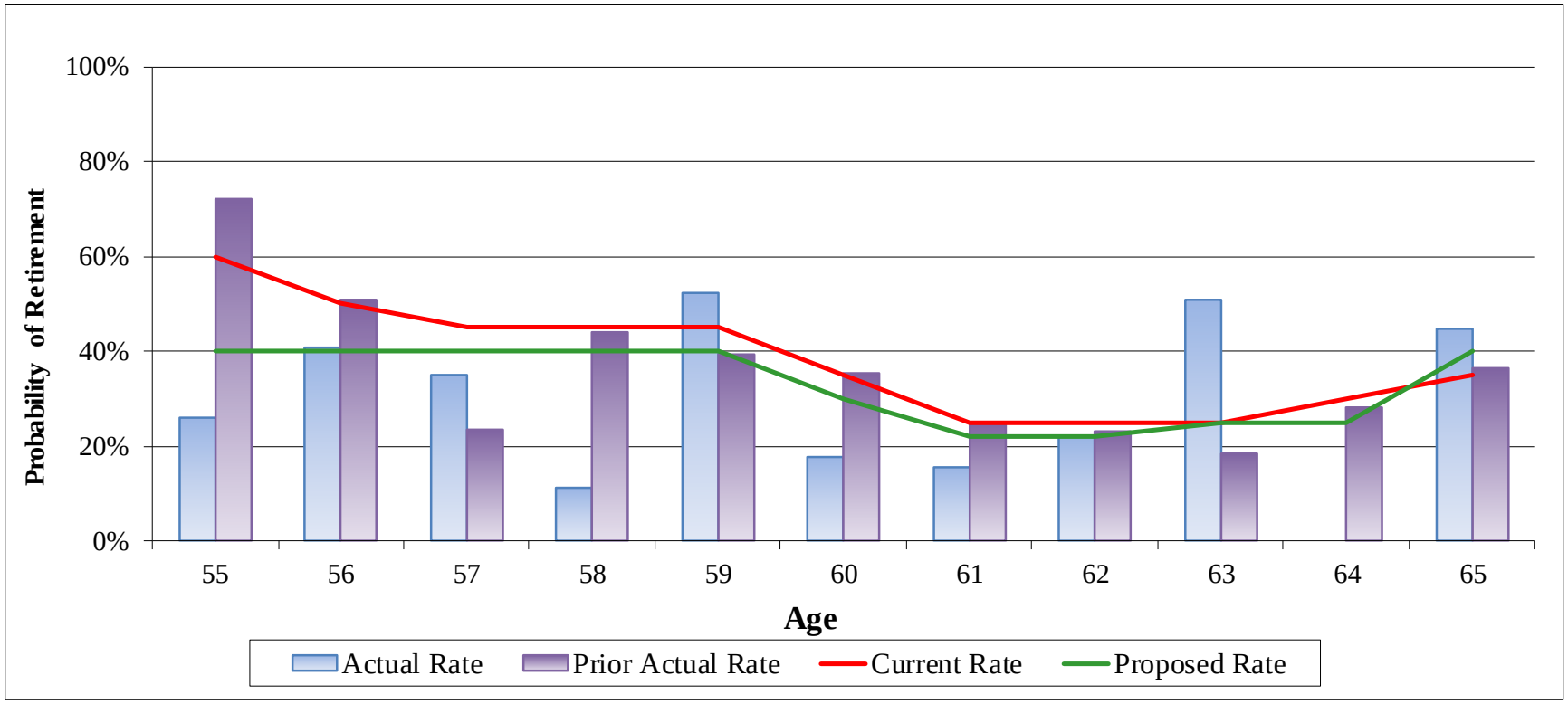
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-4

Retirement Rates

Certificated - Select



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	163	257	201
Actual/Expected		63%	81%

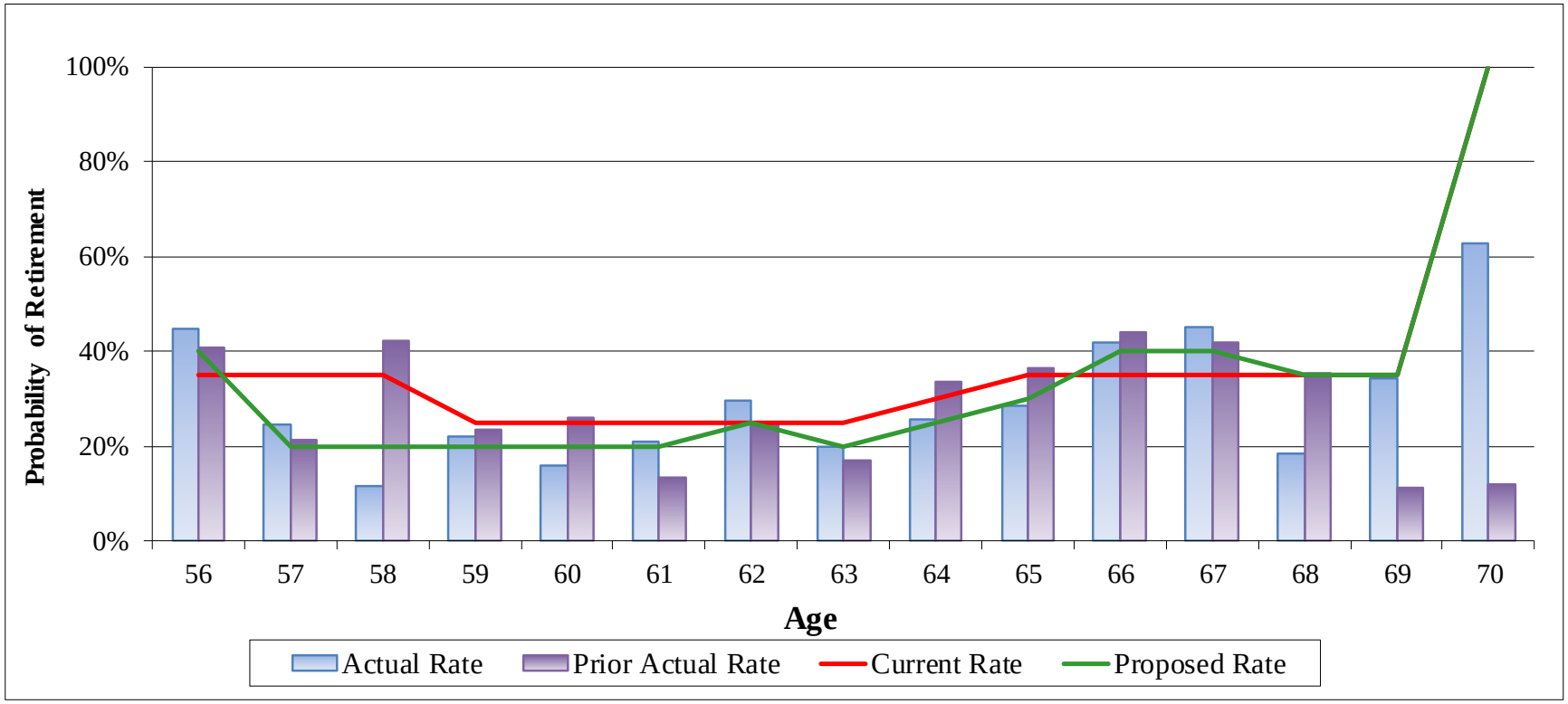
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-5

Retirement Rates

Certificated - Ultimate



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	456	518	462
Actual/Expected		88%	99%

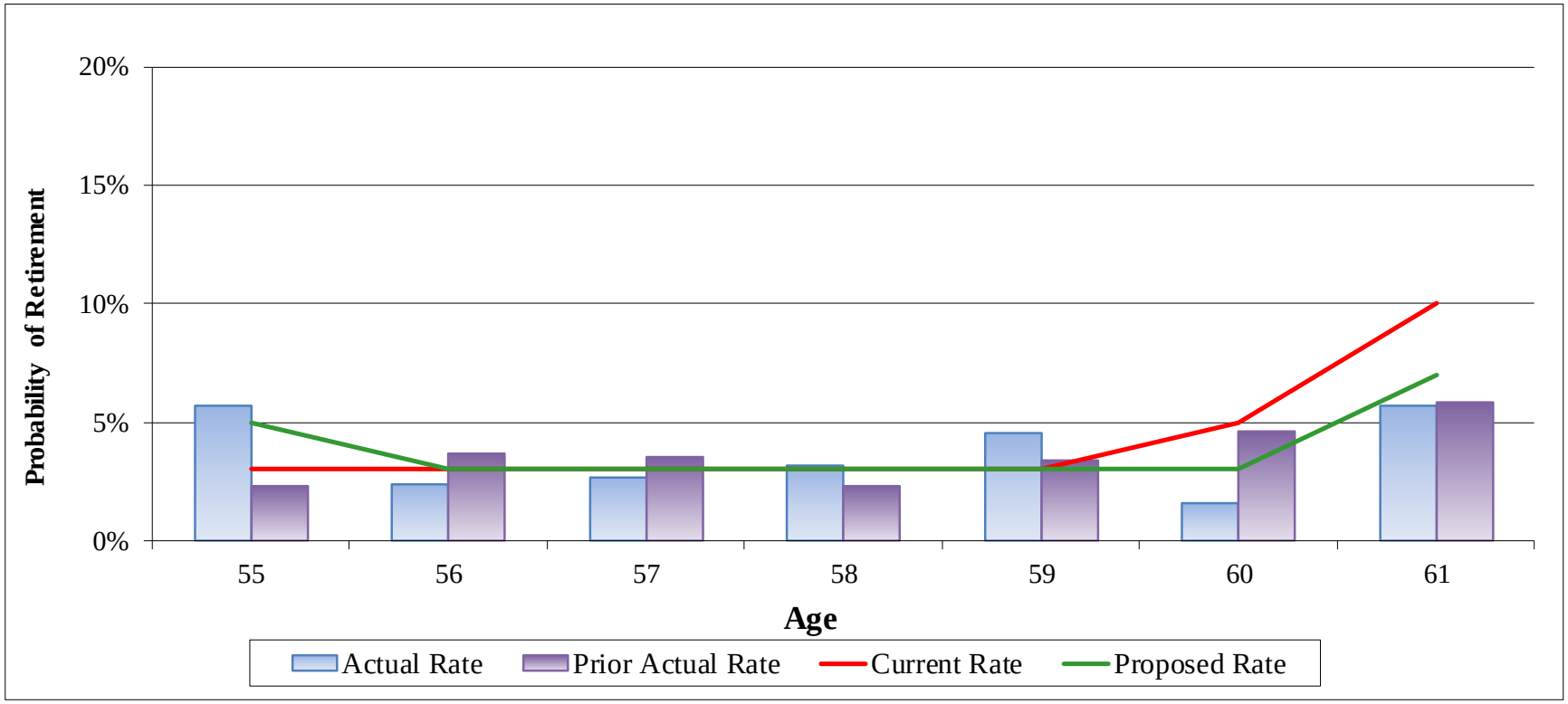
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-6

Retirement Rates

Classified - Early



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	25	28	26
Actual/Expected		89%	97%

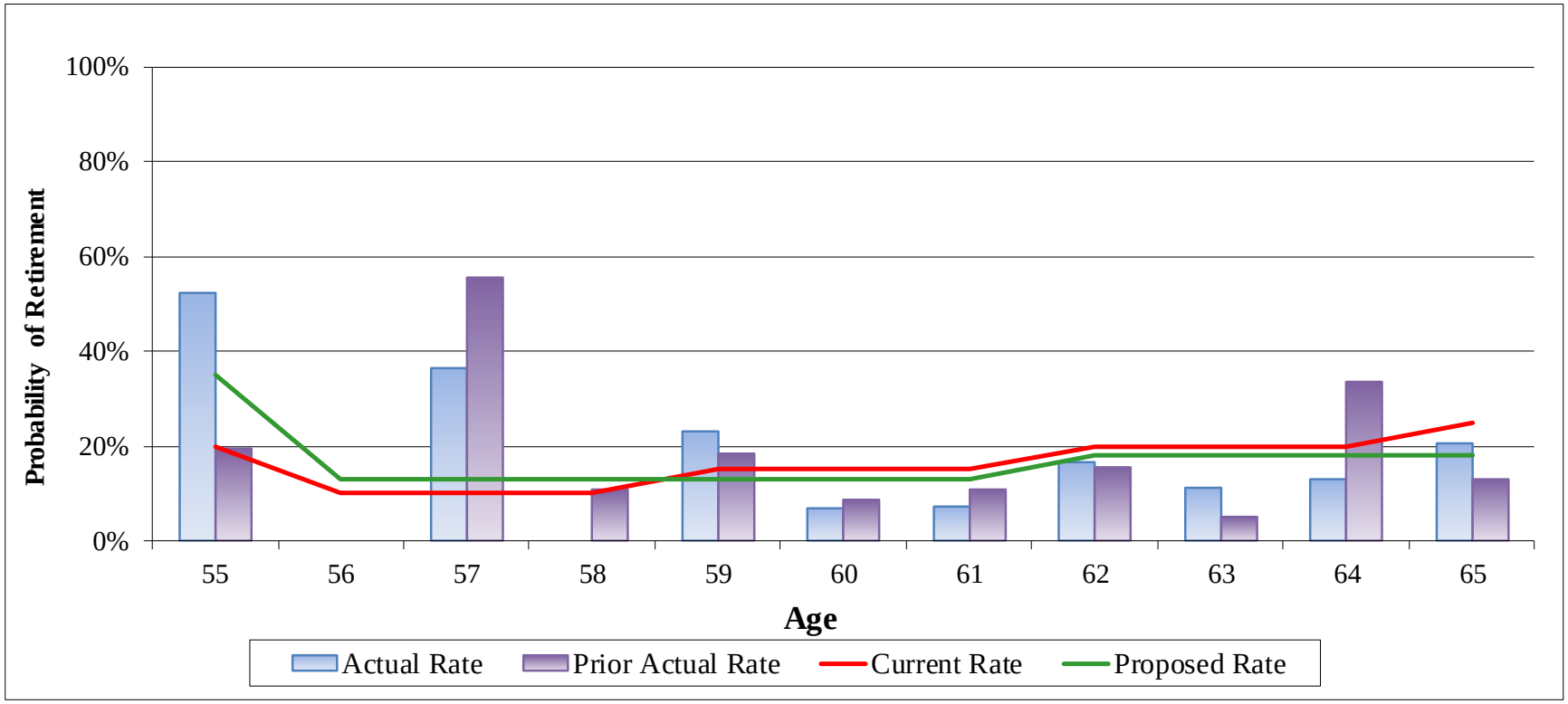
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-7

Retirement Rates

Classified - Select



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	32	32	31
Actual/Expected		99%	101%

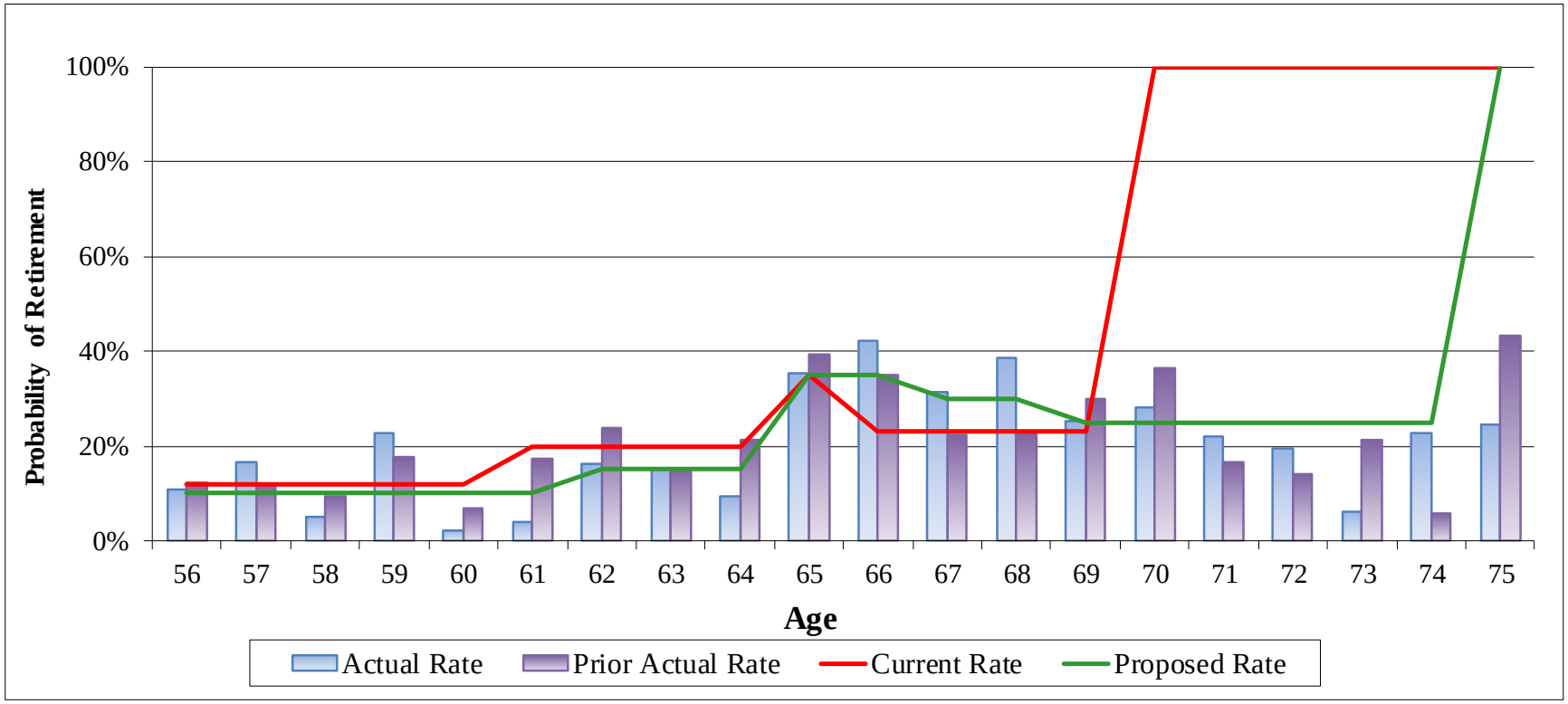
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-8

Retirement Rates

Classified - Ultimate



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	187	261	193
Actual/Expected		72%	97%

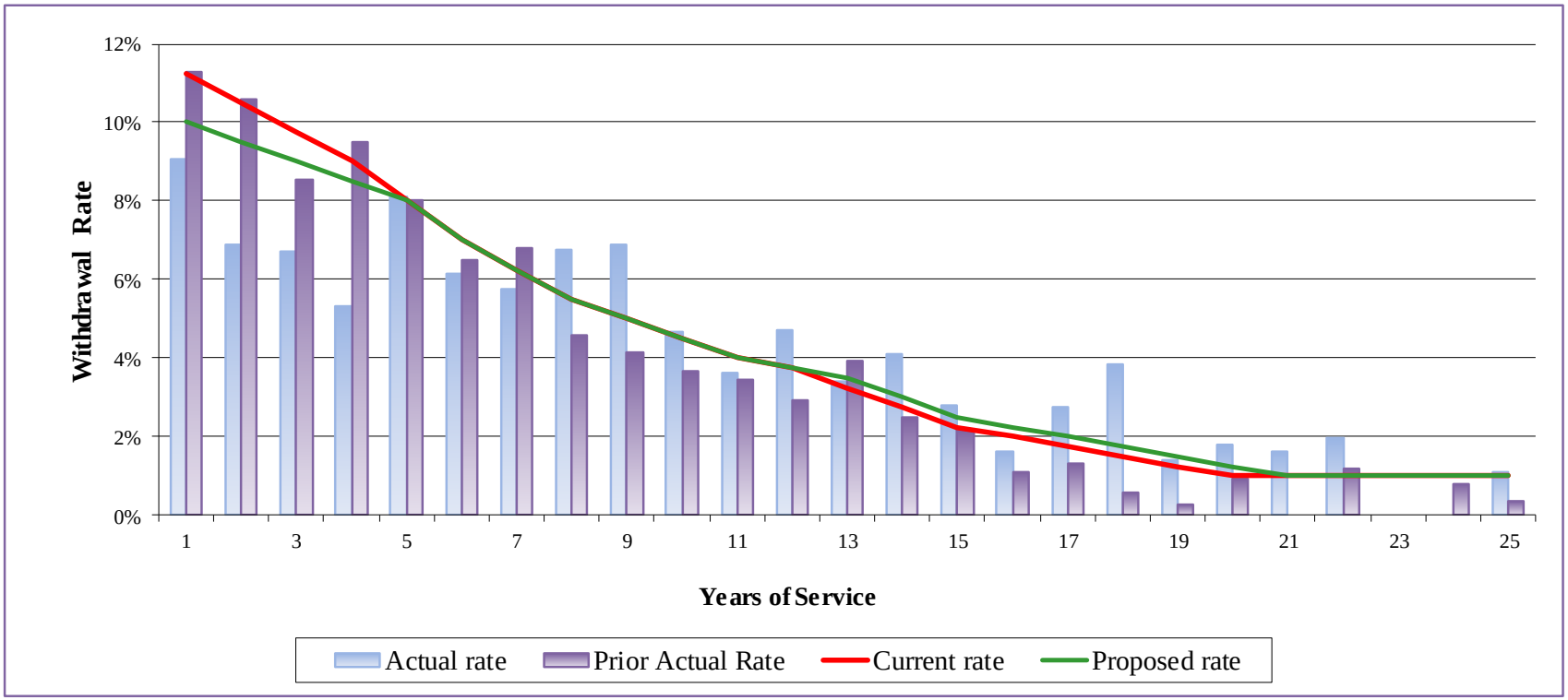
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-9

Rate of Termination of Employment

Certificated



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	305	284	289
Actual/Expected		108%	106%

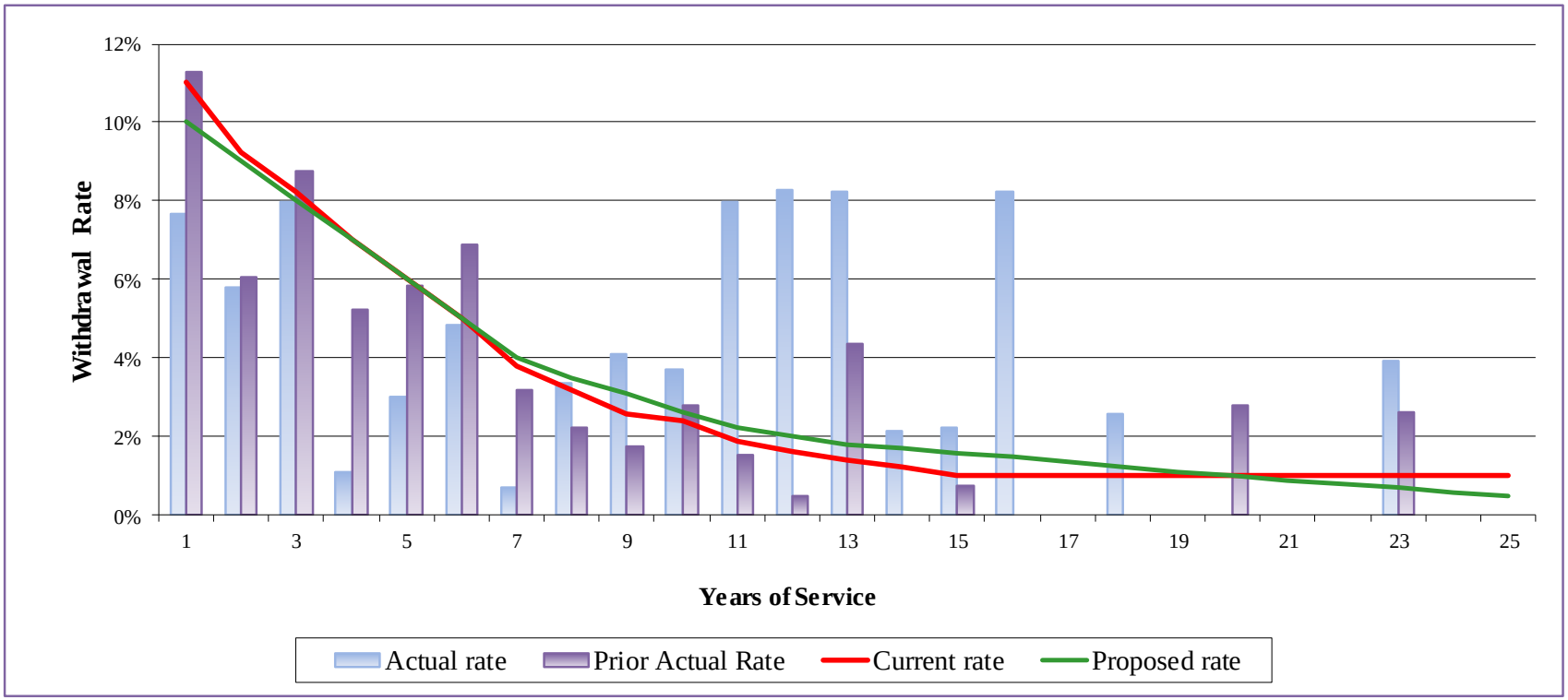
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-10

Rate of Termination of Employment

Classified - Males



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	19	16	17
Actual/Expected		116%	111%

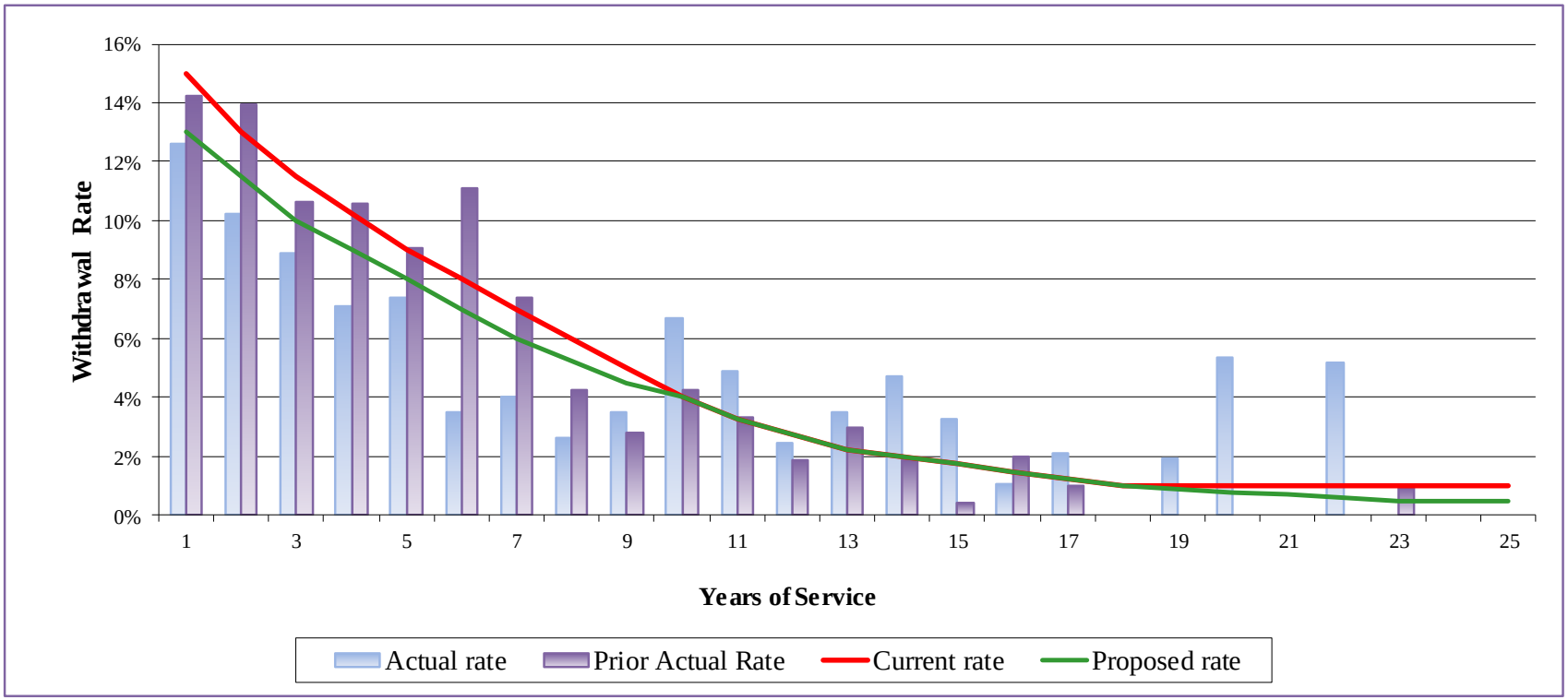
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-11

Rate of Termination of Employment

Classified - Females



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	30	34	30
Actual/Expected		90%	100%

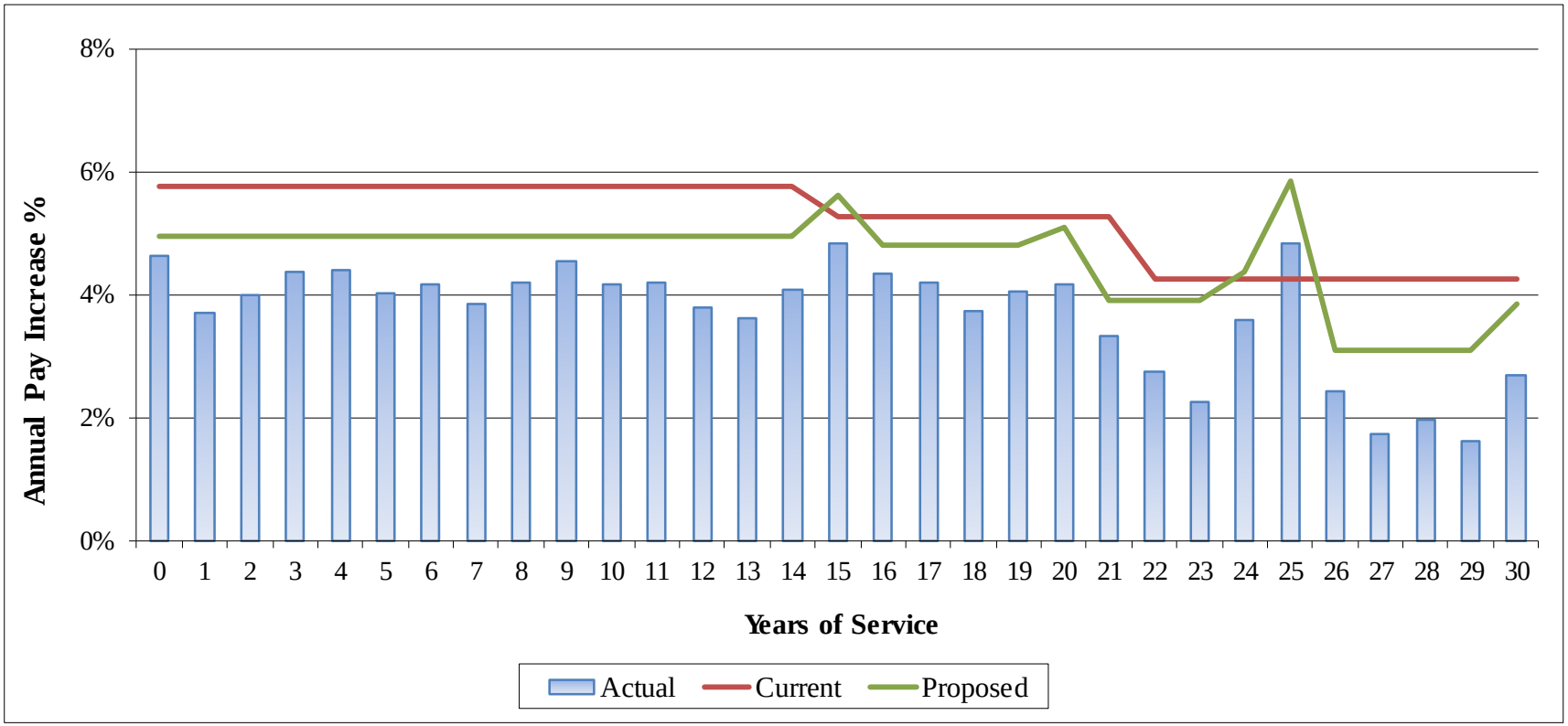
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-12

Total Salary Scale

Certificated



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Average Increase	3.89%	5.39%	4.83%
Actual/Expected		72%	81%

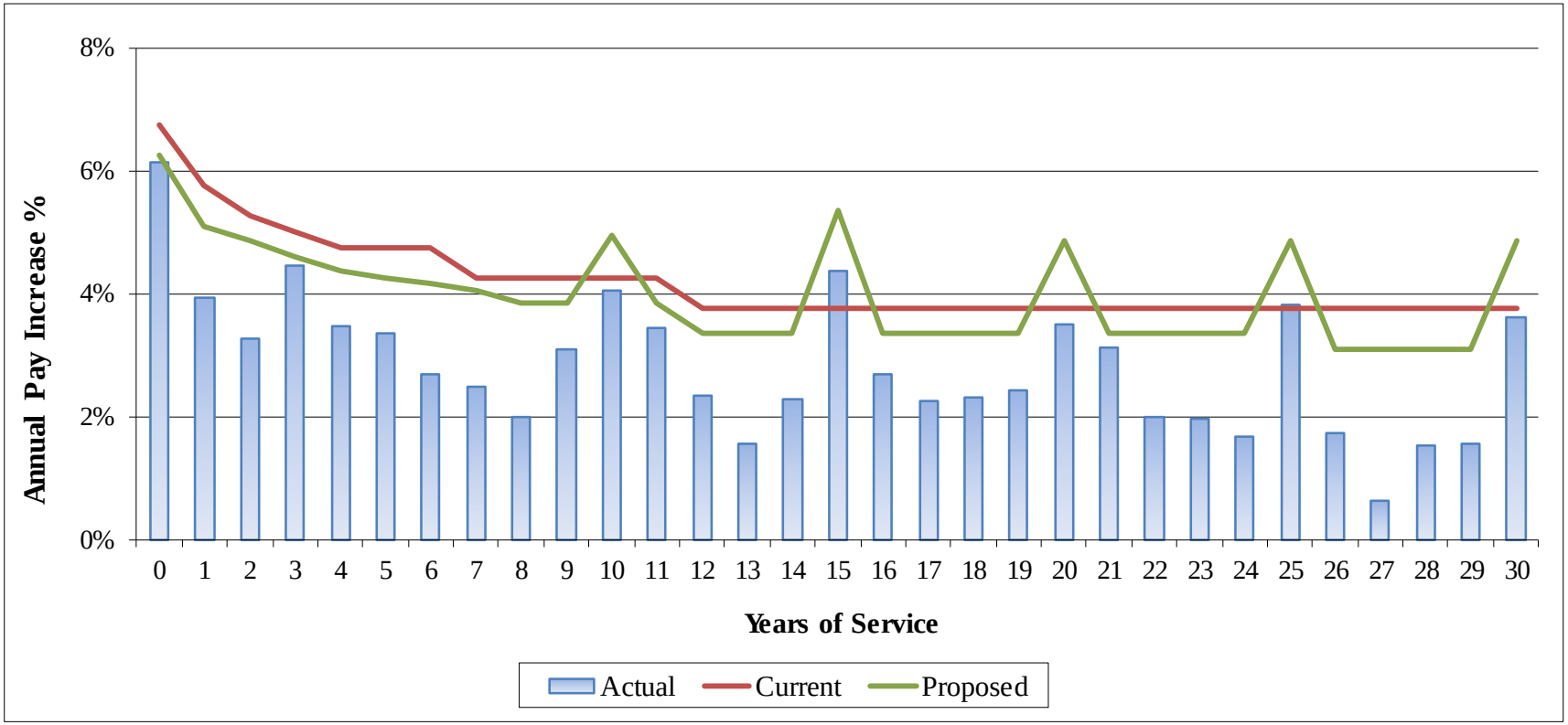
Omaha School Employees' Retirement System

Experience Study 2017-2020

Exhibit C-13

Total Salary Scale

Classified



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Average Increase	3.08%	4.40%	4.19%
Actual/Expected		70%	74%

Data Summary D-1
Probability of Death - Healthy Retirees
Males

Age	Exposure	Actual Deaths	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
60	410,131	–	0.000%	3,538	0.863%	2,630	0.641%
61	447,102	5,431	1.215%	4,159	0.930%	3,086	0.690%
62	590,020	7,551	1.280%	5,918	1.003%	4,377	0.742%
63	717,329	12,677	1.767%	7,758	1.082%	5,703	0.795%
64	849,462	4,179	0.492%	9,910	1.167%	7,249	0.853%
65	1,021,335	7,448	0.729%	12,852	1.258%	9,382	0.919%
66	1,125,749	9,649	0.857%	15,300	1.359%	11,186	0.994%
67	1,131,577	9,468	0.837%	16,627	1.469%	12,230	1.081%
68	1,223,377	12,831	1.049%	19,483	1.593%	14,459	1.182%
69	1,222,804	19,067	1.559%	21,163	1.731%	15,894	1.300%
70	1,289,650	34,871	2.704%	24,312	1.885%	18,512	1.435%
71	1,183,087	13,732	1.161%	24,363	2.059%	18,811	1.590%
72	1,077,656	15,571	1.445%	24,310	2.256%	19,061	1.769%
73	1,004,875	30,224	3.008%	24,901	2.478%	19,810	1.971%
74	919,243	13,668	1.487%	25,076	2.728%	20,260	2.204%
75	901,204	8,021	0.890%	27,137	3.011%	22,251	2.469%
76	831,557	20,692	2.488%	27,707	3.332%	23,043	2.771%
77	725,794	16,965	2.337%	26,804	3.693%	22,606	3.115%
78	620,515	16,804	2.708%	25,470	4.105%	21,754	3.506%
79	586,485	13,551	2.311%	26,797	4.569%	23,164	3.950%
80	523,904	15,812	3.018%	26,696	5.096%	23,338	4.455%
81	457,263	26,648	5.828%	26,029	5.692%	22,990	5.028%
82	411,559	38,853	9.440%	26,209	6.368%	23,364	5.677%
83	351,456	24,881	7.079%	25,065	7.132%	22,513	6.406%
84	311,719	26,577	8.526%	24,914	7.992%	22,501	7.218%
85	265,237	26,419	9.961%	23,755	8.956%	21,541	8.121%
	20,200,091	431,591	2.137%	526,252	2.605%	431,713	2.137%

Data Summary D-2
Probability of Death - Healthy Retirees
Females

Age	Exposure	Actual Deaths	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
60	1,214,013	6,811	0.561%	6,144	0.506%	4,920	0.405%
61	1,454,772	3,510	0.241%	7,968	0.548%	6,297	0.433%
62	1,674,869	17,389	1.038%	9,945	0.594%	7,773	0.464%
63	1,945,310	3,845	0.198%	12,528	0.644%	9,750	0.501%
64	2,167,665	10,025	0.462%	15,148	0.699%	11,758	0.542%
65	2,305,548	12,658	0.549%	17,516	0.760%	13,623	0.591%
66	2,637,520	28,489	1.080%	21,792	0.826%	17,054	0.647%
67	2,698,667	22,428	0.831%	24,307	0.901%	19,180	0.711%
68	2,666,474	16,455	0.617%	26,225	0.984%	20,962	0.786%
69	2,599,463	27,938	1.075%	27,987	1.077%	22,713	0.874%
70	2,455,616	30,462	1.241%	28,995	1.181%	23,935	0.975%
71	2,178,573	10,677	0.490%	28,291	1.299%	23,782	1.092%
72	2,016,070	22,889	1.135%	28,832	1.430%	24,715	1.226%
73	1,774,156	45,084	2.541%	27,987	1.577%	24,467	1.379%
74	1,456,882	29,369	2.016%	25,380	1.742%	22,628	1.553%
75	1,392,004	16,509	1.186%	26,819	1.927%	24,370	1.751%
76	1,312,630	32,287	2.460%	28,005	2.133%	25,901	1.973%
77	1,193,787	26,402	2.212%	28,224	2.364%	26,571	2.226%
78	1,085,325	24,761	2.281%	28,498	2.626%	27,263	2.512%
79	987,979	17,905	1.812%	28,862	2.921%	28,023	2.836%
80	867,747	33,034	3.807%	28,254	3.256%	27,830	3.207%
81	853,292	21,954	2.573%	31,033	3.637%	30,969	3.629%
82	759,479	28,461	3.747%	30,909	4.070%	31,223	4.111%
83	657,956	18,759	2.851%	30,010	4.561%	30,659	4.660%
84	593,979	39,237	6.606%	30,409	5.120%	31,399	5.286%
85	515,790	30,303	5.875%	29,682	5.755%	30,941	5.999%
	41,465,565	577,640	1.393%	629,748	1.519%	568,707	1.372%

Data Summary D-3
Retirement Rates
Certificated - Early
(Liability Weighted)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	309	14	4.661%	30.9	10.000%	18.5	6.000%
56	253	20	8.030%	15.2	6.000%	15.2	6.000%
57	217	8	3.828%	13.0	6.000%	13.0	6.000%
58	197	13	6.725%	11.8	6.000%	11.8	6.000%
59	190	13	6.619%	15.2	8.000%	15.2	8.000%
60	171	20	11.405%	20.6	12.000%	20.6	12.000%
61	144	13	9.178%	17.3	12.000%	17.3	12.000%
	1,482	102	6.859%	124.0	8.369%	111.7	7.536%

Data Summary D-4
Retirement Rates
Certificated - Select
(Liability Weighted)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	188	49	26.032%	113.0	60.000%	75.3	40.000%
56	78	32	40.621%	39.2	50.000%	31.3	40.000%
57	40	14	34.844%	18.2	45.000%	16.2	40.000%
58	32	4	11.305%	14.3	45.000%	12.7	40.000%
59	31	16	52.242%	14.1	45.000%	12.5	40.000%
60	34	6	17.807%	12.0	35.000%	10.3	30.000%
61	20	3	15.355%	5.1	25.000%	4.5	22.000%
62	143	31	21.965%	35.7	25.000%	31.4	22.000%
63	3	2	50.929%	0.8	25.000%	0.8	25.000%
64	1	–	0.000%	0.4	30.000%	0.3	25.000%
65	13	6	44.556%	4.6	35.000%	5.3	40.000%
	586	163	27.849%	257.4	43.965%	200.7	34.282%

Data Summary D-5
Retirement Rates
Certificated - Ultimate
(Liability Weighted)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
56	123	55	44.697%	43.1	35.000%	49.2	40.000%
57	134	33	24.508%	46.9	35.000%	26.8	20.000%
58	102	12	11.617%	35.6	35.000%	20.3	20.000%
59	90	20	22.166%	22.5	25.000%	18.0	20.000%
60	83	13	15.927%	20.7	25.000%	16.6	20.000%
61	98	21	21.105%	24.6	25.000%	19.7	20.000%
62	98	29	29.522%	24.4	25.000%	24.4	25.000%
63	194	39	20.010%	48.6	25.000%	38.9	20.000%
64	168	43	25.599%	50.5	30.000%	42.1	25.000%
65	153	43	28.368%	53.5	35.000%	45.8	30.000%
66	145	61	41.758%	50.8	35.000%	58.0	40.000%
67	102	46	44.936%	35.6	35.000%	40.6	40.000%
68	55	10	18.229%	19.1	35.000%	19.1	35.000%
69	46	16	34.399%	16.0	35.000%	16.0	35.000%
70	26	16	62.818%	26.1	100.000%	26.1	100.000%
	1,616	456	28.217%	517.9	32.045%	461.7	28.569%

Data Summary D-6
Retirement Rates
Classified - Early
(Liability Weighted)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	101	6	5.685%	3.0	3.000%	5.1	5.000%
56	91	2	2.399%	2.7	3.000%	2.7	3.000%
57	107	3	2.680%	3.2	3.000%	3.2	3.000%
58	112	4	3.145%	3.4	3.000%	3.4	3.000%
59	109	5	4.522%	3.3	3.000%	3.3	3.000%
60	93	1	1.581%	4.6	5.000%	2.8	3.000%
61	82	5	5.722%	8.2	10.000%	5.7	7.000%
	695	25	3.656%	28.4	4.090%	26.1	3.761%

Data Summary D-7
Retirement Rates
Classified - Select
(Liability Weighted)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
55	14	7	52.172%	2.7	20.000%	4.8	35.000%
56	9	0	0.000%	0.9	10.000%	1.1	13.000%
57	7	3	36.565%	0.7	10.000%	0.9	13.000%
58	6	0	0.000%	0.6	10.000%	0.8	13.000%
59	12	3	23.099%	1.8	15.000%	1.5	13.000%
60	18	1	7.004%	2.7	15.000%	2.3	13.000%
61	11	1	7.302%	1.7	15.000%	1.5	13.000%
62	85	14	16.524%	17.0	20.000%	15.3	18.000%
63	4	0	11.140%	0.8	20.000%	0.7	18.000%
64	2	0	13.143%	0.3	20.000%	0.3	18.000%
65	11	2	20.739%	2.6	25.000%	1.9	18.000%
	178	32	17.710%	31.9	17.915%	31.2	17.537%

Data Summary D-8
Retirement Rates
Classified - Ultimate
(Liability Weighted)

Age	Exposure	Actual Retirements	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
56	17	2	10.842%	2.0	12.000%	1.7	10.000%
57	24	4	16.575%	2.9	12.000%	2.4	10.000%
58	26	1	4.911%	3.1	12.000%	2.6	10.000%
59	30	7	22.714%	3.6	12.000%	3.0	10.000%
60	28	1	2.318%	3.4	12.000%	2.8	10.000%
61	42	2	3.954%	8.4	20.000%	4.2	10.000%
62	56	9	16.325%	11.3	20.000%	8.4	15.000%
63	130	20	15.272%	26.0	20.000%	19.5	15.000%
64	119	11	9.310%	23.7	20.000%	17.8	15.000%
65	106	37	35.213%	37.2	35.000%	37.2	35.000%
66	80	34	42.270%	18.5	23.000%	28.1	35.000%
67	52	16	31.240%	11.9	23.000%	15.6	30.000%
68	41	16	38.548%	9.5	23.000%	12.4	30.000%
69	30	8	25.413%	7.0	23.000%	7.6	25.000%
70	24	7	28.281%	24.1	100.000%	6.0	25.000%
71	20	4	22.029%	19.6	100.000%	4.9	25.000%
72	17	3	19.533%	17.4	100.000%	4.4	25.000%
73	12	1	6.084%	11.8	100.000%	3.0	25.000%
74	10	2	22.560%	10.5	100.000%	2.6	25.000%
75	9	2	24.619%	9.1	100.000%	9.1	100.000%
	874	187	21.437%	261.0	29.853%	193.3	22.109%

Data Summary D-9
Rate of Termination of Employment
Certificated
(Liability Weighted)

Duration	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
1	63	6	9.062%	7.1	11.250%	6.3	10.000%
2	126	9	6.878%	13.2	10.500%	11.9	9.500%
3	186	13	6.737%	18.1	9.750%	16.8	9.000%
4	223	12	5.312%	20.1	9.000%	19.0	8.500%
5	262	21	8.123%	20.9	8.000%	20.9	8.000%
6	249	15	6.151%	17.4	7.000%	17.4	7.000%
7	248	14	5.765%	15.5	6.250%	15.5	6.250%
8	270	18	6.774%	14.8	5.500%	14.8	5.500%
9	289	20	6.892%	14.4	5.000%	14.4	5.000%
10	328	15	4.684%	14.8	4.500%	14.8	4.500%
11	395	14	3.644%	15.8	4.000%	15.8	4.000%
12	466	22	4.710%	17.5	3.750%	17.5	3.750%
13	472	16	3.398%	15.3	3.250%	16.5	3.500%
14	491	20	4.088%	13.5	2.750%	14.7	3.000%
15	471	13	2.807%	10.6	2.250%	11.8	2.500%
16	450	7	1.644%	9.0	2.000%	10.1	2.250%
17	485	13	2.780%	8.5	1.750%	9.7	2.000%
18	538	21	3.829%	8.1	1.500%	9.4	1.750%
19	539	7	1.392%	6.7	1.250%	8.1	1.500%
20	510	9	1.821%	5.1	1.000%	6.4	1.250%
21	472	8	1.640%	4.7	1.000%	4.7	1.000%
22	374	7	1.978%	3.7	1.000%	3.7	1.000%
23	315	0	0.000%	3.2	1.000%	3.2	1.000%
24	303	0	0.000%	3.0	1.000%	3.0	1.000%
25	279	3	1.112%	2.8	1.000%	2.8	1.000%
	8,803	305	3.468%	283.9	3.225%	289.3	3.286%

Data Summary D-10
Rate of Termination of Employment
Classified - Males
(Liability Weighted)

Duration	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
1	7	1	7.695%	0.8	11.000%	0.7	10.000%
2	18	1	5.788%	1.7	9.250%	1.6	9.000%
3	23	2	7.969%	1.9	8.250%	1.8	8.000%
4	27	0	1.112%	1.9	7.000%	1.9	7.000%
5	29	1	3.019%	1.7	6.000%	1.7	6.000%
6	27	1	4.864%	1.4	5.000%	1.4	5.000%
7	26	0	0.724%	1.0	3.800%	1.1	4.000%
8	29	1	3.368%	0.9	3.200%	1.0	3.500%
9	24	1	4.098%	0.6	2.600%	0.7	3.100%
10	16	1	3.715%	0.4	2.400%	0.4	2.650%
11	17	1	7.990%	0.3	1.900%	0.4	2.250%
12	23	2	8.270%	0.4	1.650%	0.5	2.000%
13	26	2	8.242%	0.4	1.400%	0.5	1.800%
14	26	1	2.162%	0.3	1.250%	0.4	1.700%
15	29	1	2.225%	0.3	1.000%	0.5	1.600%
16	25	2	8.235%	0.3	1.000%	0.4	1.500%
17	25	0	0.000%	0.3	1.000%	0.3	1.350%
18	19	0	2.596%	0.2	1.000%	0.2	1.250%
19	24	0	0.000%	0.2	1.000%	0.3	1.100%
20	25	0	0.000%	0.3	1.000%	0.3	1.000%
21	22	0	0.000%	0.2	1.000%	0.2	0.900%
22	20	0	0.000%	0.2	1.000%	0.2	0.800%
23	18	1	3.936%	0.2	1.000%	0.1	0.700%
24	16	0	0.000%	0.2	1.000%	0.1	0.600%
25	8	0	0.000%	0.1	1.000%	0.0	0.500%
	549	19	3.375%	15.9	2.903%	16.7	3.034%

Data Summary D-11
Rate of Termination of Employment
Classified - Females
(Liability Weighted)

Duration	Exposure	Actual Terminations	Actual Rate	Current Expected	Current Rate	Proposed Expected	Proposed Rate
1	12	2	12.598%	1.9	15.000%	1.6	13.000%
2	26	3	10.260%	3.4	13.000%	3.0	11.500%
3	32	3	8.887%	3.7	11.500%	3.2	10.000%
4	37	3	7.099%	3.8	10.250%	3.3	9.000%
5	36	3	7.371%	3.2	9.000%	2.8	8.000%
6	35	1	3.520%	2.8	8.000%	2.4	7.000%
7	37	2	4.051%	2.6	7.000%	2.2	6.000%
8	38	1	2.630%	2.3	6.000%	2.0	5.250%
9	43	2	3.488%	2.2	5.000%	1.9	4.500%
10	37	2	6.680%	1.5	4.000%	1.5	4.000%
11	37	2	4.892%	1.2	3.250%	1.2	3.250%
12	34	1	2.480%	0.9	2.750%	0.9	2.750%
13	34	1	3.533%	0.8	2.250%	0.8	2.250%
14	30	1	4.751%	0.6	2.000%	0.6	2.000%
15	32	1	3.285%	0.6	1.750%	0.6	1.750%
16	31	0	1.092%	0.5	1.500%	0.5	1.500%
17	33	1	2.124%	0.4	1.250%	0.4	1.250%
18	29	0	0.000%	0.3	1.000%	0.3	1.000%
19	28	1	1.950%	0.3	1.000%	0.3	0.900%
20	25	1	5.359%	0.3	1.000%	0.2	0.800%
21	19	0	0.000%	0.2	1.000%	0.1	0.700%
22	16	1	5.186%	0.2	1.000%	0.1	0.600%
23	12	0	0.000%	0.1	1.000%	0.1	0.500%
24	8	0	0.000%	0.1	1.000%	0.0	0.500%
25	4	0	0.000%	0.0	1.000%	0.0	0.500%
	706	30	4.277%	33.7	4.767%	30.2	4.274%

Data Summary D-12
Total Salary Scale
Certificated

Duration	Initial Salary (Millions)	Subsequent Salary (Millions)	Actual Rate	Current Expected (Millions)	Current Rate	Proposed Expected (Millions)	Proposed Rate
0	7.6	8.0	4.63%	8.0	5.75%	8.0	4.95%
1	52.7	54.6	3.69%	55.7	5.75%	55.3	4.95%
2	54.8	57.0	3.97%	58.0	5.75%	57.5	4.95%
3	53.2	55.6	4.37%	56.3	5.75%	55.9	4.95%
4	50.3	52.6	4.39%	53.2	5.75%	52.8	4.95%
5	46.8	48.7	4.02%	49.5	5.75%	49.1	4.95%
6	38.2	39.8	4.16%	40.4	5.75%	40.1	4.95%
7	33.0	34.2	3.85%	34.9	5.75%	34.6	4.95%
8	31.5	32.8	4.20%	33.3	5.75%	33.0	4.95%
9	30.6	32.0	4.53%	32.4	5.75%	32.2	4.95%
10	34.6	36.1	4.17%	36.6	5.75%	36.4	4.95%
11	38.9	40.5	4.19%	41.1	5.75%	40.8	4.95%
12	42.2	43.8	3.78%	44.6	5.75%	44.3	4.95%
13	40.9	42.4	3.59%	43.3	5.75%	43.0	4.95%
14	39.8	41.4	4.09%	42.1	5.75%	41.8	4.95%
15	36.6	38.4	4.83%	38.5	5.25%	38.7	5.60%
16	34.0	35.5	4.34%	35.8	5.25%	35.6	4.80%
17	35.3	36.8	4.19%	37.2	5.25%	37.0	4.80%
18	36.7	38.0	3.72%	38.6	5.25%	38.4	4.80%
19	34.9	36.3	4.04%	36.7	5.25%	36.5	4.80%
20	31.7	33.0	4.15%	33.4	5.25%	33.3	5.10%
21	28.6	29.6	3.31%	30.1	5.25%	29.7	3.90%
22	22.4	23.0	2.73%	23.4	4.25%	23.3	3.90%
23	18.4	18.8	2.24%	19.2	4.25%	19.1	3.90%
24	17.2	17.8	3.59%	17.9	4.25%	18.0	4.35%
25	16.3	17.0	4.82%	16.9	4.25%	17.2	5.85%
26	15.1	15.5	2.41%	15.8	4.25%	15.6	3.10%
27	13.4	13.7	1.72%	14.0	4.25%	13.9	3.10%
28	12.1	12.3	1.97%	12.6	4.25%	12.5	3.10%
29	10.6	10.8	1.61%	11.1	4.25%	11.0	3.10%
30	8.8	9.1	2.68%	9.2	4.25%	9.2	3.85%
	967.3	1,005.0	3.89%	1,019.7	5.39%	1,013.5	4.83%

Data Summary D-13
Total Salary Scale
Classified

Duration	Initial Salary (Millions)	Subsequent Salary (Millions)	Actual Rate	Current Expected (Millions)	Current Rate	Proposed Expected (Millions)	Proposed Rate
0	7.8	8.3	6.13%	8.3	6.75%	8.3	6.25%
1	15.1	15.7	3.93%	16.0	5.75%	15.9	5.10%
2	17.9	18.5	3.27%	18.8	5.25%	18.7	4.85%
3	15.4	16.1	4.45%	16.1	5.00%	16.1	4.60%
4	14.0	14.5	3.46%	14.7	4.75%	14.6	4.35%
5	12.3	12.8	3.34%	12.9	4.75%	12.9	4.25%
6	10.1	10.4	2.70%	10.6	4.75%	10.6	4.15%
7	9.0	9.2	2.49%	9.3	4.25%	9.3	4.05%
8	8.3	8.5	1.99%	8.7	4.25%	8.6	3.85%
9	8.7	9.0	3.08%	9.1	4.25%	9.0	3.85%
10	8.8	9.2	4.05%	9.2	4.25%	9.3	4.95%
11	8.9	9.2	3.43%	9.3	4.25%	9.2	3.85%
12	9.3	9.5	2.33%	9.7	3.75%	9.6	3.35%
13	9.0	9.2	1.55%	9.4	3.75%	9.3	3.35%
14	8.0	8.2	2.27%	8.3	3.75%	8.3	3.35%
15	7.8	8.2	4.36%	8.1	3.75%	8.2	5.35%
16	7.0	7.2	2.69%	7.3	3.75%	7.3	3.35%
17	7.3	7.5	2.26%	7.6	3.75%	7.6	3.35%
18	6.9	7.1	2.31%	7.2	3.75%	7.2	3.35%
19	6.8	6.9	2.41%	7.0	3.75%	7.0	3.35%
20	6.5	6.7	3.51%	6.7	3.75%	6.8	4.85%
21	5.4	5.6	3.11%	5.6	3.75%	5.6	3.35%
22	4.9	5.0	1.99%	5.1	3.75%	5.1	3.35%
23	4.2	4.2	1.96%	4.3	3.75%	4.3	3.35%
24	3.3	3.4	1.66%	3.5	3.75%	3.5	3.35%
25	2.6	2.7	3.82%	2.7	3.75%	2.7	4.85%
26	3.2	3.3	1.72%	3.4	3.75%	3.3	3.10%
27	2.5	2.5	0.61%	2.6	3.75%	2.5	3.10%
28	2.1	2.2	1.51%	2.2	3.75%	2.2	3.10%
29	1.7	1.7	1.56%	1.8	3.75%	1.8	3.10%
30	1.3	1.3	3.61%	1.3	3.75%	1.3	4.85%
	236.3	243.6	3.08%	246.8	4.40%	246.2	4.19%