



New York City Retirement Systems Part II Experience Study Report - POLICE and FIRE

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Ms. Krista Olson
Deputy Comptroller for Budget
New York City Comptroller's Office
1 Centre Street, 8th Floor
New York, NY 10007

Re: Part II Experience Study Report – POLICE and FIRE

Dear Ms. Olson:

We are pleased to present the enclosed Part II Experience Study report for the five New York City Retirement Systems ("NYCRS") containing Milliman's proposed assumptions, along with an updated Milliman Experience Study Tool.

- New York City Employees' Retirement System ("NYCERS")
- Teachers' Retirement System of the City of New York ("TRS")
- Board of Education Retirement System of the City of New York ("BERS")
- **New York City Police Pension Fund ("POLICE")**
- **New York City Fire Pension Fund ("FIRE")**

This report includes Sections IV and V for POLICE and FIRE.

The purpose of the Part II Experience Study report is to provide proposed demographic and economic assumptions to be used in the actuarial valuations performed by the Office of the Actuary (OA) for these systems based on our observations of the experience data and various discussions and meetings with Office of the Actuary. The experience includes data from 2012 – 2017 used in prior experience studies, along with updates for the 4-year period ending June 30, 2021.

This report incorporates analysis performed with the Milliman Experience Study Tool (MEST). MEST enables examination of the experience of the systems using many data elements such as age, service, plan, employee group, etc. The MEST has been further updated to display a comparison of the proposed assumptions as if they were in effect during the experience study period.

Part II Experience Study Report – POLICE and FIRE
New York City Retirement Systems

This work product was prepared solely for New York City Comptroller's Office for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by staffs of Office of the Comptroller and the OA. This information includes, but is not limited to, statutory provisions, employee data, administrative policies, and financial information. Since the results are dependent on the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our calculations may need to be revised.

Milliman's work product was prepared exclusively for the New York City Office of the Comptroller, for a specific and limited purpose. It is a complex, technical analysis that requires a high-level of knowledge concerning NYCRS' operations, and is based on NYCRS' data, which Milliman has not audited. Milliman's work product is not intended to be used by, or for the benefit of, any third party for any purpose. Any third-party recipient of Milliman's work product who desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its specific needs.

On the basis of the foregoing, 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 Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Code of Professional Conduct, amplifying Opinions, and supporting Recommendations of the American Academy of Actuaries.

We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

The consultants who worked on this assignment are actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel. The signing actuaries are independent of NYCRS. We are not aware of any relationship that would impair the objectivity of our work.

Ms. Krista Olson
January 7, 2025
Page 3

We would like to thank the staffs of the Office of the Comptroller and the Office of the Actuary (OA) for their cooperation. Their prompt and courteous responses to our questions and requests for information were of valuable assistance to us and are greatly appreciated.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "GB", with a stylized flourish at the end.

Glenn D. Bowen, FSA, EA, MAAA

A handwritten signature in black ink, appearing to read "Scott Porter", in a cursive style.

Scott Porter, FSA, EA, MAAA

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TABLE OF CONTENTS

Executive Summary	1
POLICE	3
FIRE	4
Introduction	5
Section IV –New York City Police Pension Fund (POLICE)	19
Rates of Salary Increase	21
<i>Summary</i>	<i>31</i>
<i>Assumption Tables</i>	<i>32</i>
Overtime.....	34
<i>Baseline.....</i>	<i>37</i>
<i>Dual Retirement</i>	<i>43</i>
<i>Dual Disability.....</i>	<i>46</i>
<i>Summary</i>	<i>49</i>
<i>Assumption Tables.....</i>	<i>50</i>
Withdrawal	52
<i>Summary</i>	<i>57</i>
<i>Assumption Tables.....</i>	<i>58</i>
Retirement.....	60
<i>Tier 3</i>	<i>71</i>
<i>Summary</i>	<i>72</i>
<i>Assumption Tables.....</i>	<i>73</i>
Disability.....	77
Ordinary Disability.....	78
<i>Summary</i>	<i>86</i>
<i>Assumption Tables.....</i>	<i>87</i>
Accidental Disability.....	90
<i>Members Who Are Eligible for WTC Benefits (Tiers 1 and 2)</i>	<i>90</i>
<i>Members Who Are Not Eligible for WTC Benefits (Tiers 1 and 2).....</i>	<i>99</i>
<i>Tier 3 Members</i>	<i>104</i>
<i>Summary</i>	<i>104</i>
<i>Assumption Tables.....</i>	<i>105</i>
Pre-retirement Death	109
Ordinary Death.....	110
<i>Males</i>	<i>113</i>
<i>Females.....</i>	<i>115</i>
<i>Summary</i>	<i>117</i>
Accidental Death.....	118
<i>Summary</i>	<i>122</i>
<i>Assumption Tables.....</i>	<i>123</i>

Postretirement Mortality.....	127
Postretirement Mortality – Service Retirees.....	129
<i>Service Retirees - Males</i>	134
<i>Service Retirees - Females</i>	139
<i>Summary</i>	143
<i>Assumption Tables</i>	144
Postretirement Mortality – Disability Retirees	150
<i>Disabled Retirees - Males</i>	155
<i>Disabled Retirees - Females</i>	160
<i>Summary</i>	164
<i>Assumption Tables</i>	165
Postretirement Mortality – Contingent Beneficiaries	171
<i>Contingent Beneficiaries - Males</i>	176
<i>Contingent Beneficiaries - Females</i>	180
<i>Summary</i>	183
<i>Assumption Tables</i>	185
Section V –New York City Fire Pension Fund (FIRE)	191
Rates of Salary Increase	193
<i>Summary</i>	203
<i>Assumption Tables</i>	204
Overtime.....	206
<i>Baseline</i>	209
<i>Dual Retirement</i>	215
<i>Dual Disability</i>	218
<i>Summary</i>	222
<i>Assumption Tables</i>	223
Withdrawal	225
<i>Summary</i>	229
<i>Assumption Tables</i>	231
Retirement.....	233
<i>Tier 3</i>	241
<i>Summary</i>	242
<i>Assumption Tables</i>	243
Disability.....	247
Ordinary Disability.....	248
<i>Summary</i>	252
<i>Assumption Tables</i>	253
Accidental Disability.....	255
<i>Members Who Are Eligible for WTC Benefits (Tiers 1 and 2)</i>	255
<i>Members Who Are Not Eligible for WTC Benefits (Tiers 1 and 2 plus Tier 3 Enhanced)</i>	260
<i>Tier 3 Members</i>	265
<i>Summary</i>	265
<i>Assumption Tables</i>	266

Pre-retirement Death	270
Ordinary Death.....	271
<i>Males and Females</i>	274
<i>Summary</i>	275
Accidental Death.....	276
<i>Summary</i>	279
<i>Assumption Tables</i>	280
Postretirement Mortality.....	284
Postretirement Mortality – Service Retirees.....	286
<i>Service Retirees – Males and Females</i>	291
<i>Summary</i>	295
<i>Assumption Tables</i>	296
Postretirement Mortality – Disability Retirees	302
<i>Disabled Retirees – Males and Females</i>	307
<i>Summary</i>	311
<i>Assumption Tables</i>	312
Postretirement Mortality – Contingent Beneficiaries	318
<i>Contingent Beneficiaries - Males</i>	323
<i>Contingent Beneficiaries - Females</i>	327
<i>Summary</i>	331
<i>Assumption Tables</i>	332

Executive Summary

This report summarizes the Part II Experience Study performed by Milliman of the five New York City Retirement Systems (“NYCRS”):

- Section I - New York City Employees’ Retirement System (NYCERS)
- Section II - Teachers’ Retirement System of the City of New York (TRS)
- Section III - Board of Education Retirement System of the City of New York (BERS)
- **Section IV - New York City Police Pension Fund (POLICE)**
- **Section V - New York City Fire Pension Fund (FIRE)**

This report includes Sections IV and V for POLICE and FIRE.

The primary purpose of the Part II Experience Study Report is to provide proposed actuarial assumptions based on the experience for the indicated systems:

- This report provides information on key pre-retirement demographic assumptions - withdrawal, retirement and disability – used in the actuarial valuations performed by the OA.
- This report provides information on key salary-related actuarial assumptions – rates of salary increase and overtime.
- This report provides information on the pre-retirement and postretirement mortality assumptions used in the actuarial valuations performed by the OA.
- This report is supplemented by Excel files containing full age service tables detailing the proposed assumptions.

The experience study includes information for the 10-year period ending June 30, 2021 as provided by the OA. This includes data from 2012 – 2017 contained in the historical database along with updates for the 4-year period ending June 30, 2021 completed by Milliman.

The following is a summary of the proposed assumptions and the potential impact on plan liabilities for POLICE and FIRE. Milliman was not engaged to perform a replication nor determine the cost impact of the proposed assumptions. Therefore, the comments reflect our thoughts on the potential impact, but will ultimately depend on the current active membership based on analysis to be conducted by OA.

POLICE

Summary of Police Proposed Assumptions		
Decrement	Proposed Assumption	Potential Impact
Salary	Lower salary increases.	Reducing salary increases will result in lower plan liabilities.
Overtime	Higher overtime percentages, especially for retirement eligible members.	Higher overtime will result in higher plan liabilities.
Withdrawal	Lower rates of terminations for longer service members.	Reducing withdrawal rates results in higher plan liabilities.
Retirement	Higher rates of retirement.	Higher rates of retirement result in higher plan liabilities.
Ordinary Disability	Higher ordinary disability rates under 20 years of service and elimination of the assumption for retirement eligible members.	Higher rates of ordinary disability result in higher plan liabilities plus eliminating retirement eligible members will result in higher plan liabilities.
Accidental Disability	Reduction in accidental disability retirements for those eligible for WTC benefits and those not eligible.	Reducing rates of accidental disability would result in lower plan liabilities.
Ordinary Death	Higher mortality rates.	Increasing rates of mortality results in lower plan liabilities.
Accidental Death	Lower mortality rates.	Reducing rates of accidental mortality results in lower plan liabilities.
Post Retirement Mortality		
Service Retirees	Proposed assumption consistent with industry standards adjusted for experience. Higher projected annuity factors for ages until early 60s and lower for older ages.	Anticipating higher liability for active members but potentially lower liability for retirees. Actual impact to be determined by OA.
Disabled Retirees	Proposed assumption consistent with industry standards, increasing projected life expectancy.	Higher life expectancies are anticipated to increase plan liabilities.
Contingent Beneficiaries	Proposed assumption consistent with industry standards, decreasing projected life expectancy.	Lower life expectancies are anticipated to decrease plan liabilities.

Overall, we believe the changes in overtime, withdrawal, retirement, ordinary disability and postretirement mortality that are anticipated to increase plan liabilities will exceed the impact of the changes in rates of salary increase, accidental disability, accidental death, ordinary death and postretirement mortality for retirees that are anticipated to decrease plan liabilities. The net effect is likely an increase in plan liabilities.

FIRE

The following is a summary of our observations regarding the experience of FIRE.

Summary of Fire Proposed Assumptions		
Decrement	Proposed Assumption	Potential Impact
Salary	Lower salary increases	Reducing salary increases will result in lower plan liabilities.
Overtime	Higher overtime percentages, especially for retirement eligible members.	Higher overtime will result in higher plan liabilities.
Withdrawal	Nearly no change in assumption.	Would have an insignificant impact on plan liabilities.
Retirement	No change in the assumption.	No impact on plan liabilities.
Ordinary Disability	No change in the assumption other than to have it not apply for retirement eligible members.	Eliminating retirement eligible members will result in higher plan liabilities.
Accidental Disability	Reduction in accidental disability retirements for those eligible for WTC benefits and those not eligible.	Reducing rates of accidental disability would result in lower plan liabilities.
Ordinary Death	No change in the assumption.	No impact on plan liabilities.
Accidental Death	No change in the assumption.	No impact on plan liabilities.
Post Retirement Mortality		
Service Retirees	Proposed assumption consistent with industry standards adjusted for experience. Higher projected annuity factors for ages until early 60s and lower for older ages.	Anticipating higher liability for active members but potentially lower liability for retirees. Actual impact to be determined by OA.
Disabled Retirees	Proposed assumption consistent with industry standards adjusted for experience. Higher projected annuity factors for ages until early 60s and lower for older ages.	Anticipating higher liability for active members but potentially lower liability for retirees. Actual impact to be determined by OA.
Contingent Beneficiaries	Proposed assumption consistent with industry standards, decreasing projected life expectancy.	Lower life expectancies are anticipated to decrease plan liabilities.

The changes in overtime, ordinary disability and postretirement mortality are anticipated to increase plan liabilities. The changes in rates of salary increase, accidental disability and postretirement mortality for retirees are anticipated to decrease plan liabilities. The actual implementation by OA will need to determine if the net effect is an increase or decrease in plan liabilities.

Introduction

Part II Experience Study Introduction

Milliman's focus for Part II of the experience study is to provide proposed actuarial assumptions reflecting the experience during the 10-year study period July 1, 2011 – June 30, 2021. The experience data used in our review splits this study period into three periods:

- Prior period: July 1, 2011 – June 30, 2017 (2012 – 2017), which includes updates made by Milliman to the historical data, primarily in 2017.
- Two-year period July 1, 2017 – June 30, 2019 (2018 – 2019)
- Two-year period July 1, 2019 – June 30, 2021 (2020 – 2021)

Throughout this report we refer to plan years by the end of the plan year. For example, 2012 refers to the period July 1, 2011 to June 30, 2012; 2021 refers to the period July 1, 2020 to June 30, 2021.

The proposed assumptions are based on our observations using the Milliman Experience Study Tool (MEST) which creates customized experience summaries for the chosen study periods. This report includes various graphs and charts produced by MEST.

This report focuses on key pre-retirement decrements – withdrawal, retirement and disability – and the mortality assumptions – pre-retirement and postretirement as well as the salary increase and assumed overtime assumptions.

Selection of Actuarial Assumptions

The purpose of the actuarial valuation is to analyze the resources needed to meet the current and future obligations of the System. To provide the best estimate of the long-term funded status of the System, the actuarial valuation should be predicated on methods and assumptions that will estimate the future obligations of the System in a reasonable manner.

An actuarial valuation uses various methods and two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its long-term impact on the System, or to the operation of the System itself. Demographic assumptions are based on the specific experience of the System's members.

Actuarial Standard of Practice (ASOP) No. 35 (please note that ASOP 35 was recently replaced by an updated version of ASOP 27 but the standard remains largely the same) governs the selection of demographic and other noneconomic 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 appropriate for the purpose of the measurement reflecting historical and current demographic data, that reflects the actuary's professional judgment and estimate of future experience, and that contains no significant bias, i.e., it is not significantly optimistic or pessimistic.

Choosing actuarial assumptions requires the application of actuarial judgment. It is unlikely that any two actuaries, given the same set of experience statistics, would arrive at exactly the same set of actuarial assumptions for any system as complex as NYCERS. Even allowing for minor

variations that occur because of the variability of the underlying statistics and possible data anomalies, differences among actuarial approaches will occur in analyzing trends. Some actuaries prefer to match the results of recent experience very closely in setting future assumptions, while other actuaries will use recent experience as a guide but tend to change existing assumptions gradually over time. Valid arguments can be made for either approach.

Milliman's approach in selecting proposed assumptions was to primarily reflect an assumption that was in between the current assumption and the experience. There are circumstances where the proposed assumptions may reflect the experience to a greater degree, especially if there was a change in the assumption structure. For example, the proposed retirement assumption may reflect a distinction based on years of service that was not reflected in the current assumption. In these circumstances, the proposed retirement assumption may reflect the distinction contained in the experience data to a greater extent.




Experience Analysis Process

The general procedure in a study of demographic experience is to first determine the number of participants who were exposed to the possibility of retirement, withdrawal, disability, etc. We refer to these events as decrements. The next step is to determine how many actually retired, withdrew, became disabled, etc. Dividing the number of terminations in each age and service cell by the number exposed to the possibility of termination in that cell produces the rate of decrement.

In reviewing the actual rates of decrement, we compare them to the current assumed rates used in the actuarial valuations. For this purpose, the assumed rates are those used in the most recent actuarial valuation report, the June 30, 2020 lag actuarial valuation. For example, the assumed rates of withdrawal that apply in 2016 in this analysis are based on the assumptions from the 2020 lag actuarial valuation, not the assumptions in effect in 2016.

To compare actual rates of decrement to assumed rates of decrement, we produce actual to expected ratios ("A/E" ratio). These ratios compare actual decrements (one set due to retirement, a different set due to withdrawal, a different set due to disability, etc.) with expected decrements based on the actuarial assumptions. An A/E ratio that is greater than one indicates that there were more actual decrements than expected and a ratio that is less than one indicates that there were fewer actual decrements than expected. For example, a ratio of 1.5 means that 50% more members left the plan for that cause than expected. A ratio of 0.8 means that 20% fewer members left the plan for that cause than expected.

To assist reviewers in assessing whether an assumption may need to be modified or not, we incorporated a color-coded metric to indicate how far the actual experience is from that expected:

- A green circle  indicates that the experience is within 10% of that assumed, that is, the A/E ratio is in the range 0.9 – 1.1.
- An orange triangle  indicates that the experience is within 50% of that assumed, but not within 10%, that is, the A/E ratio is in the range 0.5 – 0.9 or 1.1 to 1.5.
- A red diamond  indicates that the experience is outside 50% of what was assumed, that is, the A/E ratio is smaller than 0.5 or greater than 1.5.

Please note that the color-coded symbols are meant to assist the reader to determine how far the actual experience is from that expected. Many factors are used to determine if an assumption

should be modified – reason for the deviation, credibility of the data, anticipation that experience in the future would be consistent with the prior experience, actuarial judgment, etc.

Historical Database Update

The OA provided separate historical databases with experience from 2001 to 2017 for each of the systems, the valuation files for the four-year period 2018 – 2021, detailed descriptions of the various codes contained in the data, and year by year status reconciliations or flow of lives. Milliman reviewed and updated the historical database to ensure completeness and consistency. We verified that the member valuation data provided to us was consistent with the flow of lives and updated the historical database accordingly. The historical database was imported into the MEST and we reviewed to ensure that the number of exposures and actual decrements were captured reasonably. In our review, we noticed that the 2017 status distribution in the historical database did not match the flow of lives or was inconsistent with information contained in the 2018 data. We updated the 2017 status for consistency with the 2018 data.

While the Historical Database contains the status used in each actuarial valuation, there are situations in which this status may not indicate the actual cause of decrement. Two such situations relate to disability retirements and members on leave of absence.

Disability Retirements

There are instances in which members may have applied for disability retirement, but the application had not been approved by the time the data was provided for the annual actuarial valuation. In this situation, a member status could be classified as a termination, leave of absence, etc. in one valuation file but as a disability retirement in a subsequent valuation file. In these situations, we modified the status in the historical database to reflect the eventual approval of the disability retirement. For any record who was active during the study period (2011 or later) and had a subsequent inactive status followed by a disability retirement, the years with an inactive status code were changed to the indicated disability retirement status. These adjustments are applied after any adjustments for leave of absence noted in the following section.

Please note that approvals for disability retirement that took place after June 30, 2021 for members who are indicated as terminated in the experience data are not reflected in this analysis which, consequently, underestimates the number of disability retirements, especially in the latter years of the study.

Leave of Absence

During the study period, the OA used different terminology for identifying members on leave of absence such as active off payroll, nonvested terminated, etc. In the prior experience study, records with a status code of leave of absence had this status code modified to reflect a subsequent event as if that subsequent event occurred when the leave of absence (LOA) occurred. We applied similar adjustments to the status codes in the historical database. LOA status codes exist for years 2016 and 2017 where the prior actuary did not have sufficient information to make an adjustment as well as on the valuation data added for years 2018 – 2021. The following summarizes the adjustments made when a record has a LOA code (“C”):

- If the status code in the year before the LOA code is an “F”, the LOA code was changed to a termination code (“F”).

- If the record has three consecutive LOA codes, then all LOA codes are changed to a termination code (“F”).
- If the record has an active status within 2 years after the first LOA code, then the LOA codes are changed to a rehire status code (“B”).
- If the record has an inactive status within 2 years after the first LOA code, then the LOA codes are changed to that inactive status code.

Due to this methodology, records will retain a LOA status code if:

- It first occurred in 2020 and remained a LOA status code in 2021.
- It first occurred in 2021.

Consistent with past practice, any member with a LOA status code was not included as a decrement because some of these members subsequently returned to active status. Furthermore, all remaining LOA status codes in 2020 are counted as exposures for withdrawal purposes. Therefore, all else being equal, the overall rates of termination are smaller during the two-year period 2020 – 2021 than in other years. Due to this situation, these years are primarily excluded from the analysis. We do note that the vast majority of records with a LOA status code do terminate employment (withdrawal, retire, become disabled, etc.).

Salary Adjustments

For POLICE and FIRE, base salary was set to the valuation data field labeled “BaseSal w WageAdj” and “BaseSalary_WC”, respectively. For 2018, the field was “BaseSalary” for FIRE. Prior to 2018, base salary was not specified in the historical database. It was developed equal to the field labeled “Salary_Base” divided by the assumed overtime percentage for each year contained in the database ($\text{Salary_BaseYY} / (1 + \text{assumed overtime percentage})$). For years prior to 2018, the overtime percentage used was based on the assumption used in the 2016 lag valuation report. If a record’s overtime amount (field Salary_Overtime) was \$0 for a particular year, the assumed overtime percentage was set to 0%.

Pension Benefits

The amount of a member’s pension is used in the retiree mortality analysis as typically members with higher pension benefits would have lower rates of mortality. Bolton was the first actuary to incorporate pension benefits in the historical database beginning with fiscal year 2015. This process is also consistent with the method used by the Society of Actuaries in producing industry-wide tables. For consistency, we utilized the same process as Bolton which reflected a member’s fixed annuity and cost-of-living-increase. If an annual pension benefit was less than \$10,000, \$10,000 was used for amount-weighting purposes.

The following table lists the fields used:

Field	Description
Pen1 Amount	Subchapter 1 records
PayAnn	Subchapter 2 records
PayPen	Subchapter 2 records
AMTSUP ¹	Subchapter 2 records
¹ If VSFECODE was B or Y, the AMTSUP was increased by \$12,000.	

Exposures and Decrements

An exposure is a member who is subject to the particular contingency being studied. For example, an active member who has met the conditions for retirement is a retirement exposure. If they have not met that condition, then they are a withdrawal exposure. The following section describes the rules used to determine exposures and decrements in this analysis:

- Any record considered an active employee in the indicated actuarial valuation is considered an exposure for pre-retirement decrements. This includes status codes of “A” and “B”. For withdrawal purposes, records with a LOA status code of “C” are also included as exposures.
- Members indicated as terminations during the year who do not meet the conditions for retirement are reflected in the termination decrement.
- Members indicated as retirements during the year, or members indicated as terminations who do meet the conditions for retirement, are reflected in the retirement decrement.
- Exposures for ordinary disability exclude service periods prior to the eligibility conditions. For example, if 10 years of service is required to receive an ordinary disability benefit, the exposures exclude all members prior to 10 years of service.

Age and Service Calculations

Age was determined as age nearest on July 1 based on the date of birth and the indicated valuation year. Service is based on the service field contained in each year’s valuation data as imported into the Historical Database and rounded to the nearest integer.

Due to the rounding of ages and service calculations, it may appear that some members retire before they are eligible. For example, POLICE and FIRE records may appear to retire with 19 years of service, but in fact, they have retired once they attained 20 years of service. We made an adjustment for these members in this situation.

Milliman Experience Study Tool (MEST)

The purpose of the MEST is to analyze the experience by System using the status codes in the historical database. The MEST allows easy review of the experience by plan or other parameters for each System.

There are four primary charts in MEST for each decrement page. In addition, each of the four charts can be displayed on a service basis, age basis or year-by-year basis. Each of these pages is available for comparison to the current or the proposed assumptions. A tool bar at the top of page allows the user to select how the information is displayed.



The following chart shows withdrawal decrements based on service. The chart includes the actual number of withdrawals, expected number, and the total number. An actual withdrawal rate is computed and compared to the assumption.

A walkthrough of these charts in MEST has been described below using the withdrawal decrement tab as an example.

The following charts show withdrawal decrements based on service. The chart includes the actual number of withdrawals, expected number, and the total number. The actual withdrawal rate is computed and compared to the current assumption.

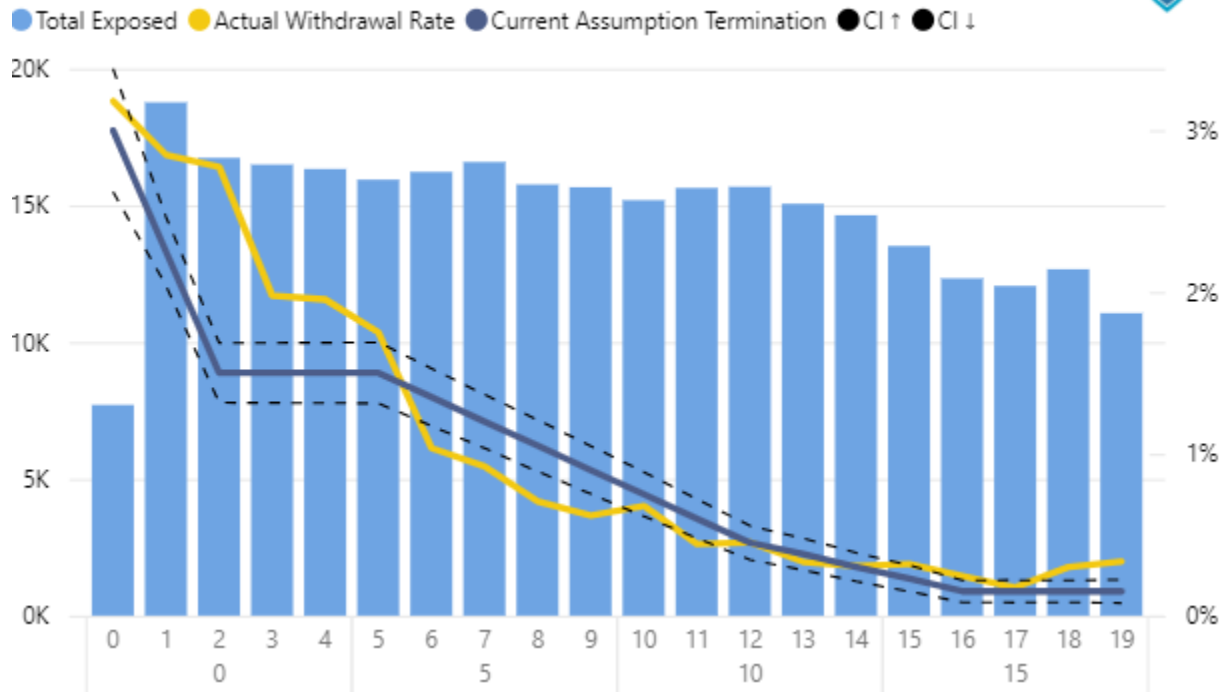
Service	Actual Withdrawals	Expected Withdrawals	Total Exposed	Actual Withdrawal Rate	Current Assumption Termination	Ratio Act/Exp Term
0	245	231.1	7,703	3.18%	3.00%	1.06
1	534	422.2	18,763	2.85%	2.25%	1.26
2	464	251.0	16,735	2.77%	1.50%	1.85
3	326	247.4	16,490	1.98%	1.50%	1.32
4	319	244.9	16,328	1.95%	1.50%	1.30
5	279	239.1	15,939	1.75%	1.50%	1.17
6	168	219.0	16,222	1.04%	1.35%	0.77
7	153	199.0	16,585	0.92%	1.20%	0.77
8	111	165.5	15,762	0.70%	1.05%	0.67
9	97	141.0	15,662	0.62%	0.90%	0.69
10	103	113.9	15,188	0.68%	0.75%	0.90
11	69	93.8	15,635	0.44%	0.60%	0.74
12	71	70.6	15,678	0.45%	0.45%	1.01
13	50	57.2	15,057	0.33%	0.38%	0.87
14	45	43.9	14,638	0.31%	0.30%	1.02
15	43	31.1	13,514	0.32%	0.23%	1.38
16	30	18.5	12,329	0.24%	0.15%	1.62
17	21	18.1	12,054	0.17%	0.15%	1.16
18	38	19.0	12,664	0.30%	0.15%	2.00
19	37	16.6	11,059	0.33%	0.15%	2.23
Total	3,203	2,842.8	294,005	1.09%	0.97%	1.13

In this version, the actual withdrawal rate is computed and compared to the proposed assumption.

Service	Actual Withdrawals	Expected Withdrawals Proposed	Total Exposed	Actual Withdrawal Rate	Proposed Assumption Termination	Act/Exp Proposed Term
0	245	250.3	7,703	3.18%	3.25%	● 0.98
1	534	516.0	18,763	2.85%	2.75%	● 1.03
2	464	376.5	16,735	2.77%	2.25%	▲ 1.23
3	326	329.8	16,490	1.98%	2.00%	● 0.99
4	319	285.7	16,328	1.95%	1.75%	▲ 1.12
5	279	239.1	15,939	1.75%	1.50%	▲ 1.17
6	168	202.8	16,222	1.04%	1.25%	▲ 0.83
7	153	165.9	16,585	0.92%	1.00%	● 0.92
8	111	134.0	15,762	0.70%	0.85%	▲ 0.83
9	97	117.5	15,662	0.62%	0.75%	▲ 0.83
10	103	98.7	15,188	0.68%	0.65%	● 1.04
11	69	86.0	15,635	0.44%	0.55%	▲ 0.80
12	71	70.6	15,678	0.45%	0.45%	● 1.01
13	50	52.7	15,057	0.33%	0.35%	● 0.95
14	45	36.6	14,638	0.31%	0.25%	▲ 1.23
15	43	27.0	13,514	0.32%	0.20%	◆ 1.59
16	30	24.7	12,329	0.24%	0.20%	▲ 1.22
17	21	24.1	12,054	0.17%	0.20%	▲ 0.87
18	38	25.3	12,664	0.30%	0.20%	◆ 1.50
19	37	22.1	11,059	0.33%	0.20%	◆ 1.67
Total	3,203	3,085.4	294,005	1.09%	1.05%	● 1.04

The following chart compares the actual withdrawal rate (yellow line) to the current assumption (blue line) by service (or by age or plan year depending on selection). The blue bars show the number of exposures allowing the user to identify situations where there are relatively few exposures for that bucket and that the data may not be fully credible. In addition, the dotted lines display the confidence intervals on the current assumption.

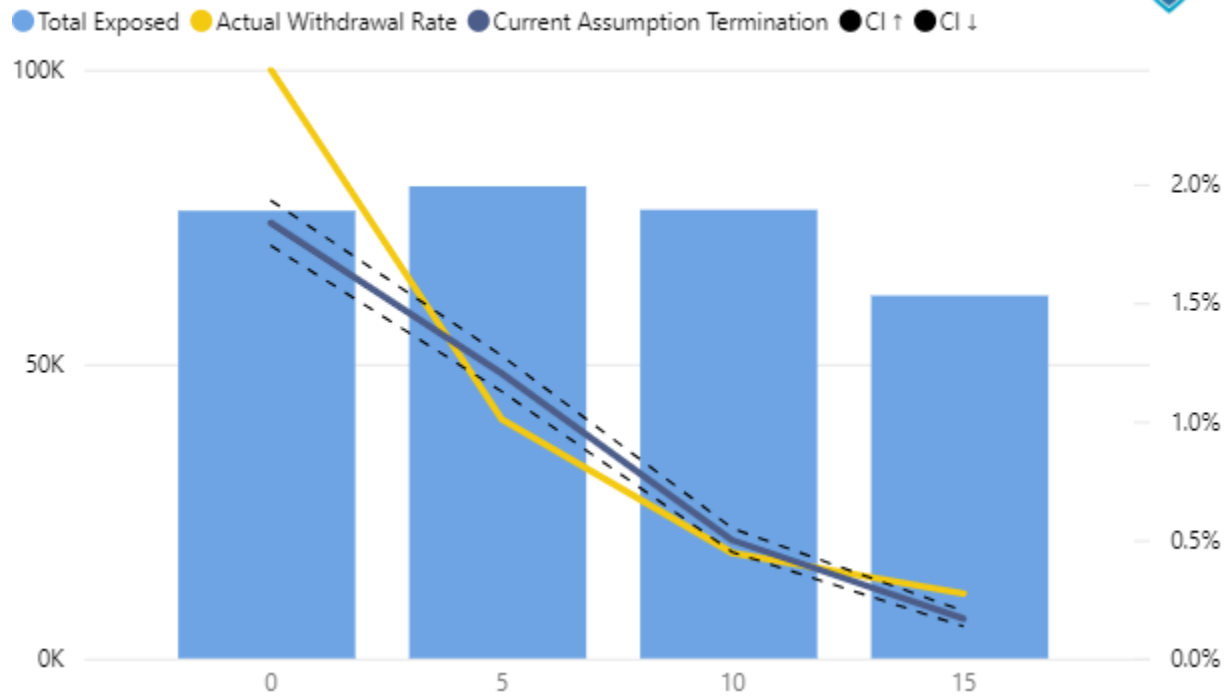
Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Service



Also, this chart can be used to review the experience in 5-year service or age bins. In the chart above, the second row in the x-axis shows 0, 5, 10, etc. indicating the service bin from 0-4 years, 5-9 years, 10-14 years, etc.

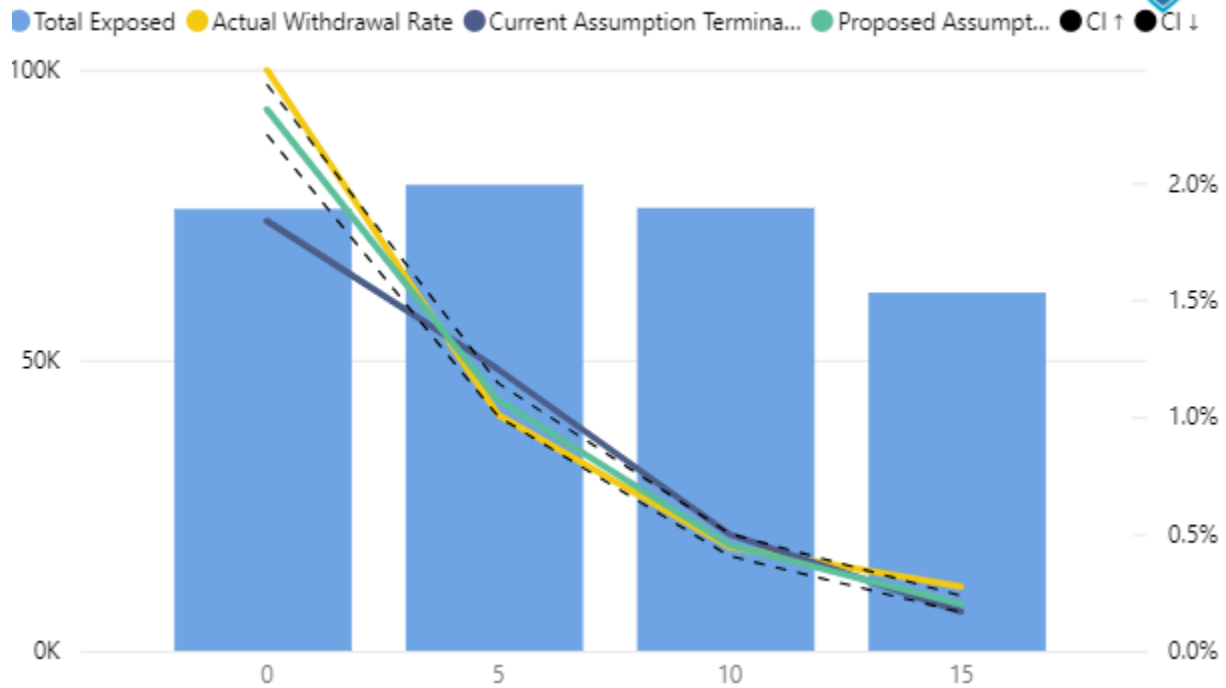
The following chart shows the results based on service bins.

Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Service



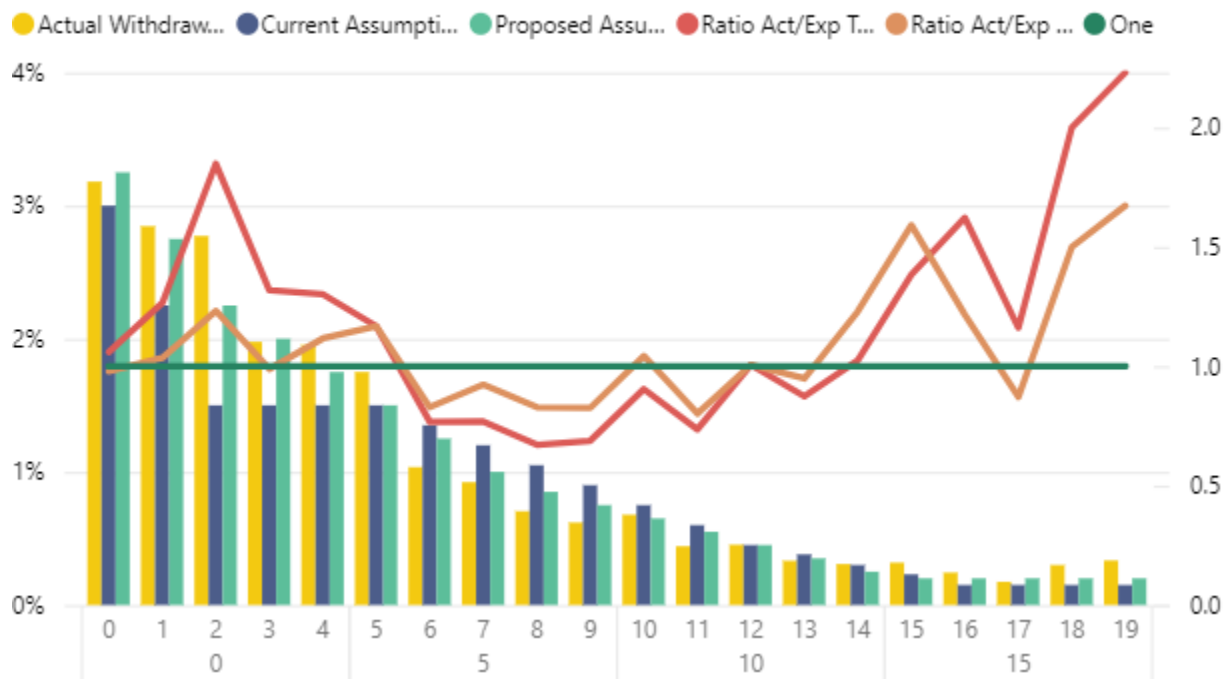
The following chart shows the results based on service bins based on the proposed assumptions (green line) in addition to the current assumption (yellow line). In addition, the dotted lines display the confidence intervals on the proposed assumption.

Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Service



In the next chart, the A/E ratio is graphed as the red line under the current assumptions and as the orange line under the proposed assumptions, and compared to the green line which is the 1.0 baseline (meaning that the actual experience is equal to that assumed). This provides the user with a different viewpoint in comparing the results of the study. The actual withdrawal rate (yellow bars), the current assumption (blue bars) and the proposed assumption (green bars) are shown on the graph.

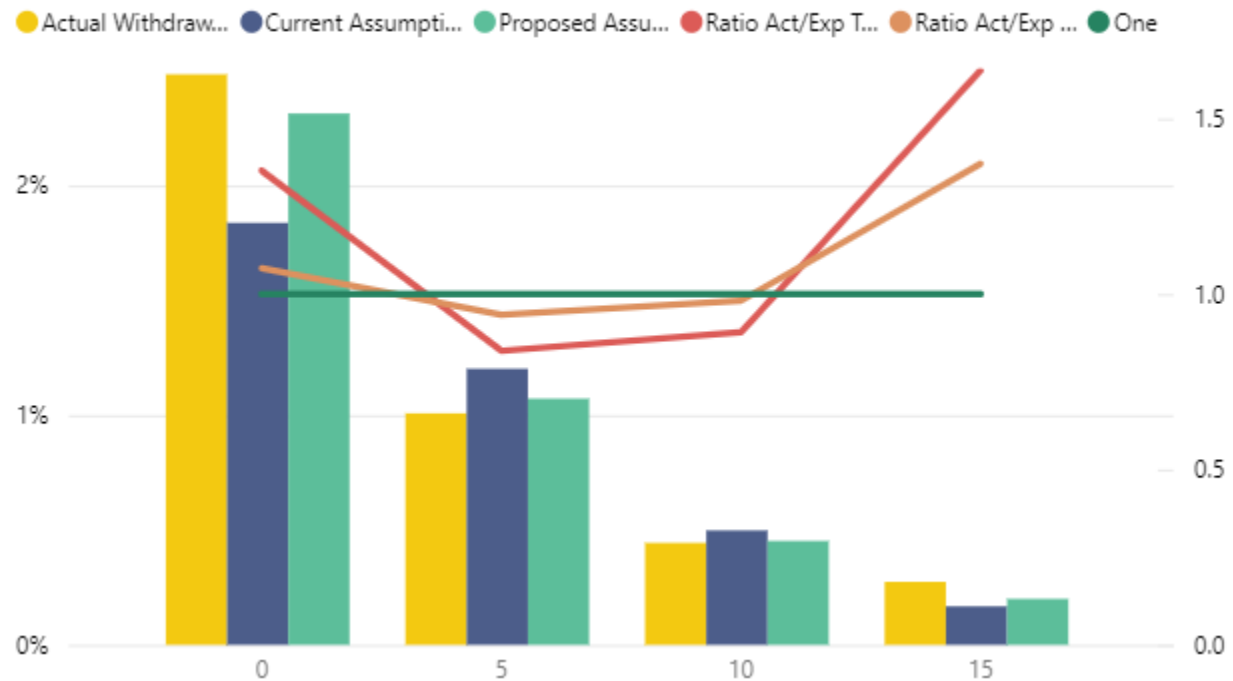
Withdrawal Rate - Actual, Expected, and Ratio; by Service



Also, this chart can be used to review the experience in 5-year service or age bins. In the chart above, the second row in the x-axis shows 0, 5, 10, etc. indicating the service bin from 0-4 years, 5-9 years, 10-14 years, etc.

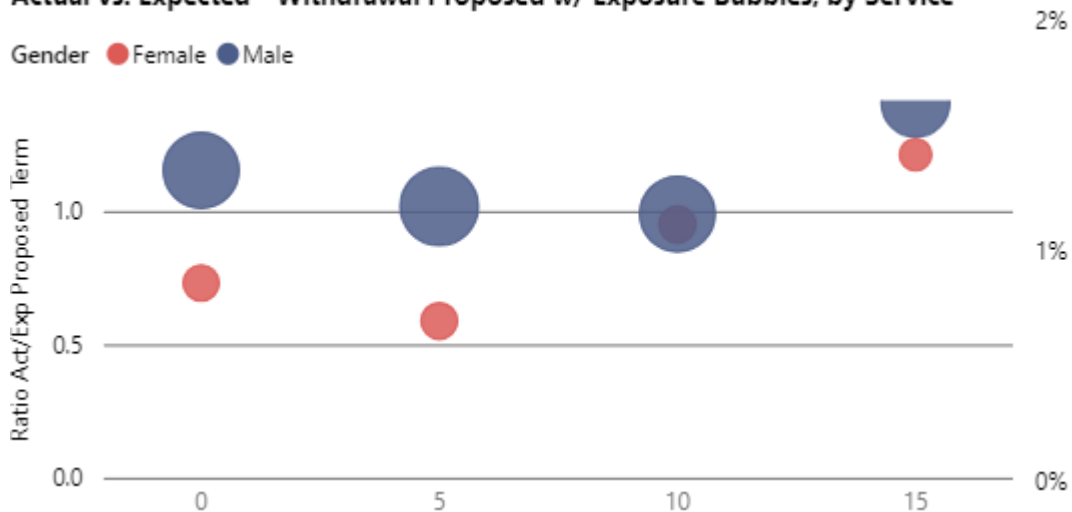
The following chart shows the results based on service bins.

Withdrawal Rate - Actual, Expected, and Ratio; by Service



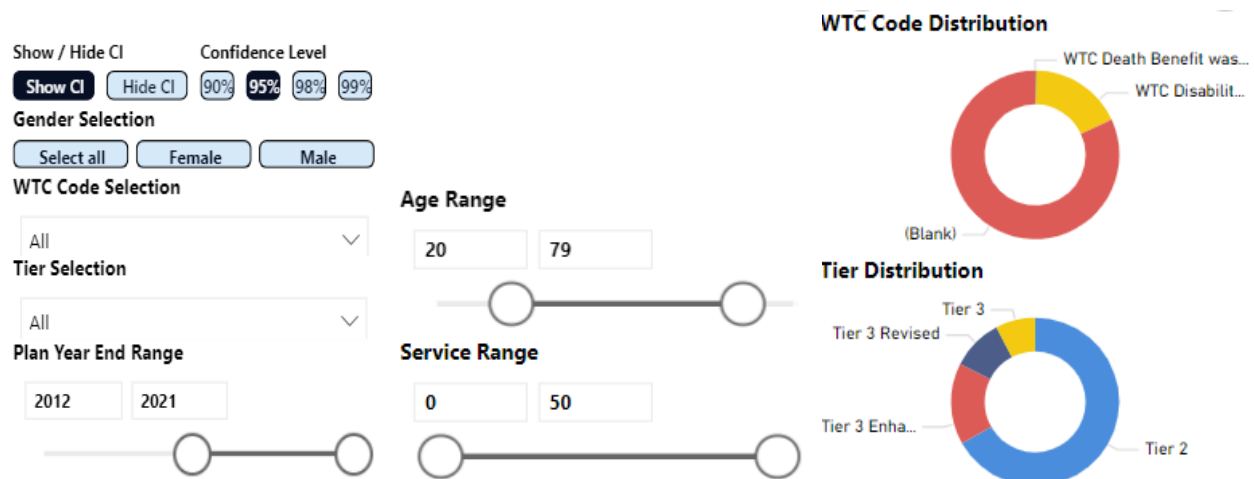
Finally, a bubble chart displaying the A/E ratios by gender is shown. The size of the bubble reflects the number of exposures. The following chart shows the results based on service bins.

Actual vs. Expected - Withdrawal Proposed w/ Exposure Bubbles; by Service



In MEST, there are various items that the user can select. Once a selection is made, the charts update in real time and the totals are based on the selections.

- WTC Code selections – a drop-down box allows the user to select the available World Trade Center benefit codes used for police and fire.
- Tier selections – a drop-down box allows the user to select the available tier codes for that system.
- Gender – male or female or both can be selected.
- Plan Year End Range – the user can select the specific years (years selected must be consecutive). Plan year 2021 contains the experience from July 1, 2020 to June 30, 2021.
- Age and Service Ranges – can be adjusted and combined with the different displays to delve deeper into the experience. For example, if a user wants to view the results by age for those who terminated with 10 or more years of service, the user can select the service range from 10 years to up to the maximum contained in the data and view results by age.
- WTC Code and Tier distributions provide the user with the number of exposures in each bucket (hover over the indicated cell). The user can select a specific plan or tier to see how those results differ from the totals, but we recommend using the drop-down boxes above.
- Confidence intervals – the user can select to review results under the 90th, 95th, 98th, or 99th percentiles.



Section IV –New York City Police Pension Fund (POLICE)

Exposures and Decrements

To set the exposures and actual decrements for POLICE, the eligibility criteria for retirement is 20 years of service. Thus, if a member has not accrued 20 years of service, the member would be considered a withdrawal exposure whereas a member with 20 or more years of service is considered a retirement exposure. Members with 19 years of service in their last active record with a status code of retirement the following year were included as retirements with 20 years of service.

Tier 3 was effective for new hires beginning no earlier than July 1, 2009. Therefore, all retirement data is for Tier 2 members, except for a few exposures under Tier 1.

Using the age and service slider tools, a user can drill down to view the results that reflect a variety of conditions such as retirement at first eligibility.

OA's retirement assumptions vary based on the member's first eligibility (20 years of service) or thereafter.

Rates of Salary Increase

The rates of salary increase reflect three components 1) price inflation, 2) real wage inflation and 3) merit increases. The combination of price inflation and real wage inflation is known as wage inflation. The current wage inflation is 3%, which reflects a price inflation assumption of 2.5% and 0.5% real wage inflation.

Based on the 2024 and 2023 OASDI Trustees report issued by Social Security, wage inflation from 2012 to 2020 had a cumulative compound average of 2.93%. Including the rate for 2021 of 9.04%, the average increased to 3.53%. However, in our analysis of the experience, we did not notice any large increases in wages during 2021. This is typical with government sector employees with union affiliations where salary increases are specified in contracts negotiated for a 3- to 5-year period. Thus, wage increases for these employees may not adjust as quickly as for other employment sectors included in the Social Security Trustees report.

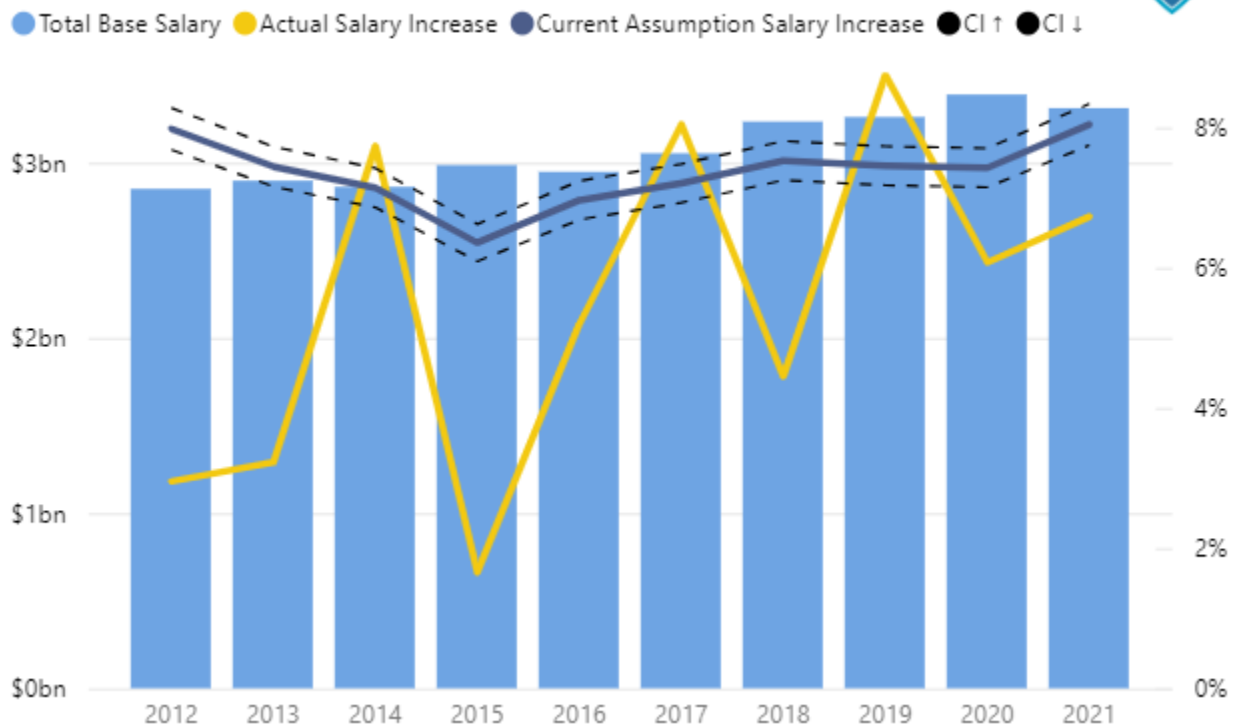
For purposes of our analysis, we believe the 3% current wage inflation is representative of the actual experience during the study period. While inflation has been higher since 2021, we propose no changes to the inflation assumption of 2.5% and wage inflation assumptions of 3%. Therefore, we have developed proposed salary increases based on total salary increases during the indicated period. The merit portion is equal to the total less the 3% wage inflation.

For purposes of salary increases only members with a status code of A in consecutive years are included. Members with a LOA status code are excluded.

Although salary increases for government employees may respond less quickly to changes in inflation, using salary experience from many years in the past may not necessarily be indicative of future salary increases as they may not include changes negotiated in union contracts such as general increases, longevity payments, or other salary items. We reviewed the salary increases by year and determined what we believe was the most reasonable period to compare to the current assumption and develop proposed assumptions.

The following chart shows the experience by year for the age range 22 to 59 and for the service range 0 to 34.

Exposure Distribution w/ Salary Increase - Actual and Expected; by Year



Salary increases for POLICE varied significantly from one year to the next. There was a substantial increase in 2014 followed by a decrease in 2015 as well as spikes in 2017 and 2019. For POLICE, we focused on the 6-year period from 2016 – 2021, which appears to be the most stable period.

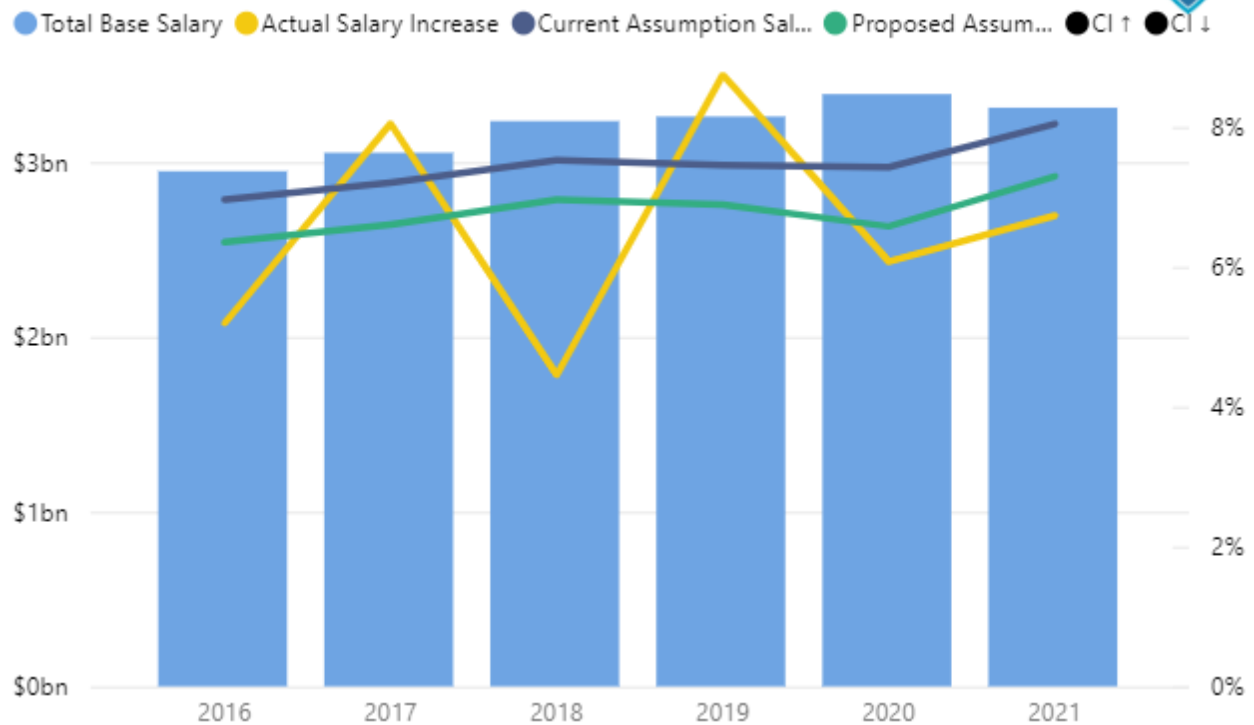
The current assumed rates of salary increases vary by service. The proposed assumption also varies by service. Overall, lower rates of salary increases are proposed.

The following charts show the experience for salary increases by year, for the age range (22 to 59), and for the service range (0 to 34) from 2016 to 2021. The actual rate of salary increases averaged 6.55% whereas the overall expected rate of increase averaged 7.45% based on the current assumptions and 6.79% based on the proposed assumptions.

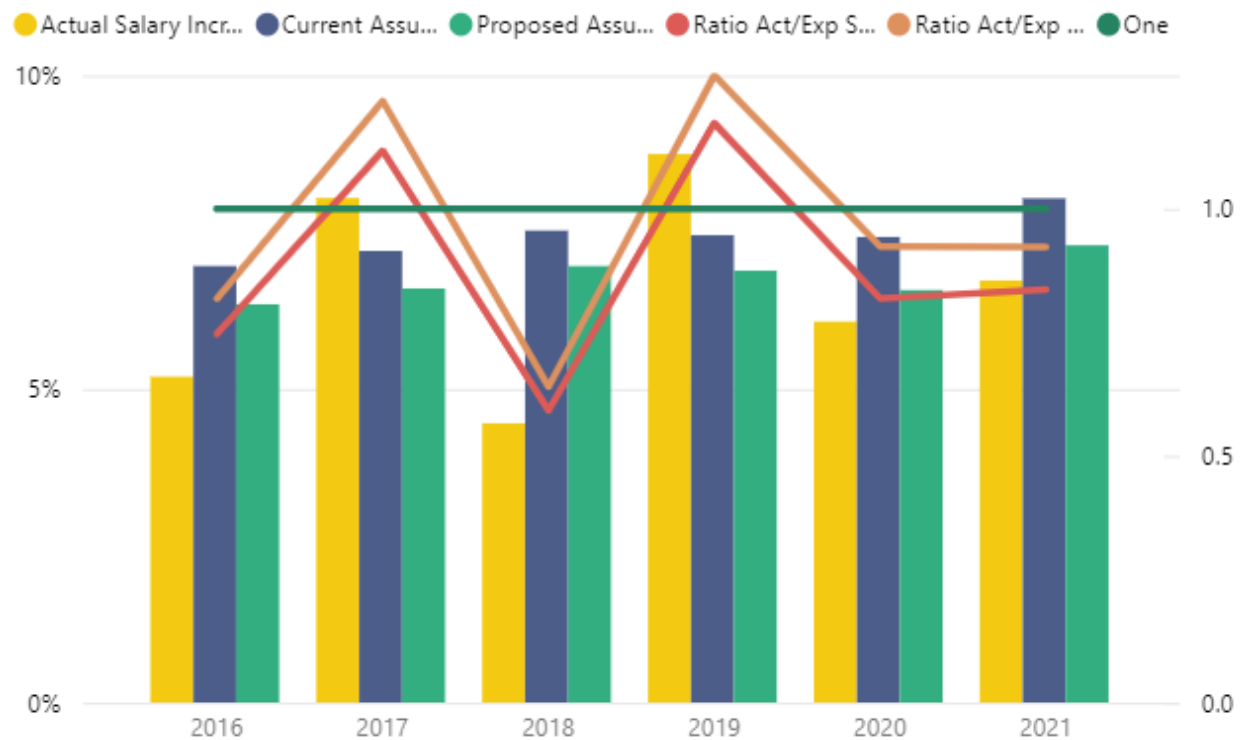
Plan Year	Exposed	Base Salary	Actual Salary	Expected Salary	Actual Salary Increase	Current Assumption Salary Increase	Ratio Act/Exp Salary Increase
2016	32,632	\$2,947.6M	\$3,100.8M	3,152.8M	5.20%	6.96%	▲ 0.75
2017	33,869	\$3,053.3M	\$3,299.0M	3,273.2M	8.05%	7.20%	▲ 1.12
2018	34,344	\$3,234.3M	\$3,378.3M	3,477.8M	4.45%	7.53%	▲ 0.59
2019	34,392	\$3,260.6M	\$3,545.8M	3,503.6M	8.75%	7.45%	▲ 1.17
2020	33,991	\$3,388.6M	\$3,594.5M	3,640.2M	6.07%	7.42%	▲ 0.82
2021	32,516	\$3,311.1M	\$3,534.0M	3,577.4M	6.73%	8.04%	▲ 0.84
Total	201,744	\$19,195.5M	\$20,452.3M	20,624.9M	6.55%	7.45%	▲ 0.88

Plan Year	Exposed	Base Salary	Actual Salary	Expected Salary Proposed	Actual Salary Increase	Proposed Assumption Salary Increase	Act/Exp Proposed Salary Increase
2016	32,632	\$2,947.6M	\$3,100.8M	\$3,134.8M	5.20%	6.35%	▲ 0.82
2017	33,869	\$3,053.3M	\$3,299.0M	\$3,254.9M	8.05%	6.60%	▲ 1.22
2018	34,344	\$3,234.3M	\$3,378.3M	\$3,459.4M	4.45%	6.96%	▲ 0.64
2019	34,392	\$3,260.6M	\$3,545.8M	\$3,485.1M	8.75%	6.89%	▲ 1.27
2020	33,991	\$3,388.6M	\$3,594.5M	\$3,611.5M	6.07%	6.58%	● 0.92
2021	32,516	\$3,311.1M	\$3,534.0M	\$3,552.6M	6.73%	7.29%	● 0.92
Total	201,744	\$19,195.5M	\$20,452.3M	\$20,498.4M	6.55%	6.79%	● 0.96

Exposure Distribution w/ Salary Increase - Actual and Expected; by Year



Salary Increase - Actual, Expected, and Ratio; by Year

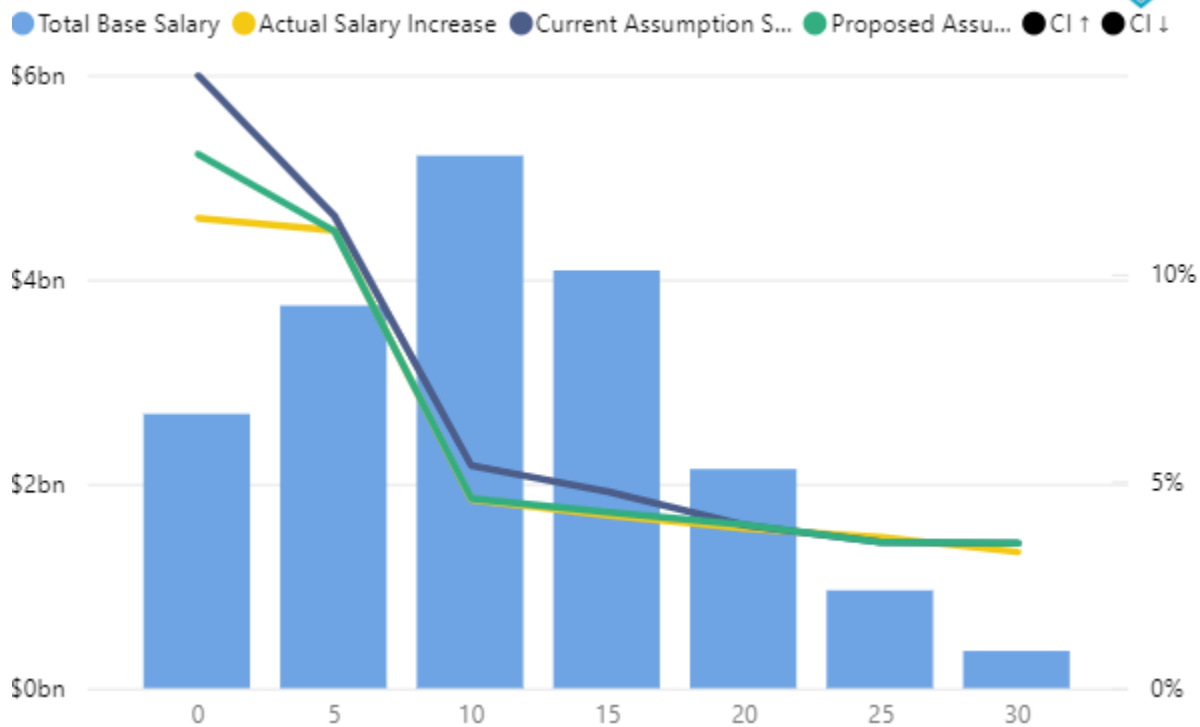


The following charts show the experience by service (0 to 34 years) from 2016 to 2021 first compared to the current assumption and then to the proposed assumption. This resulted in an increase in the A/E ratio from 0.88 to 0.96 for ages 22 to 59.

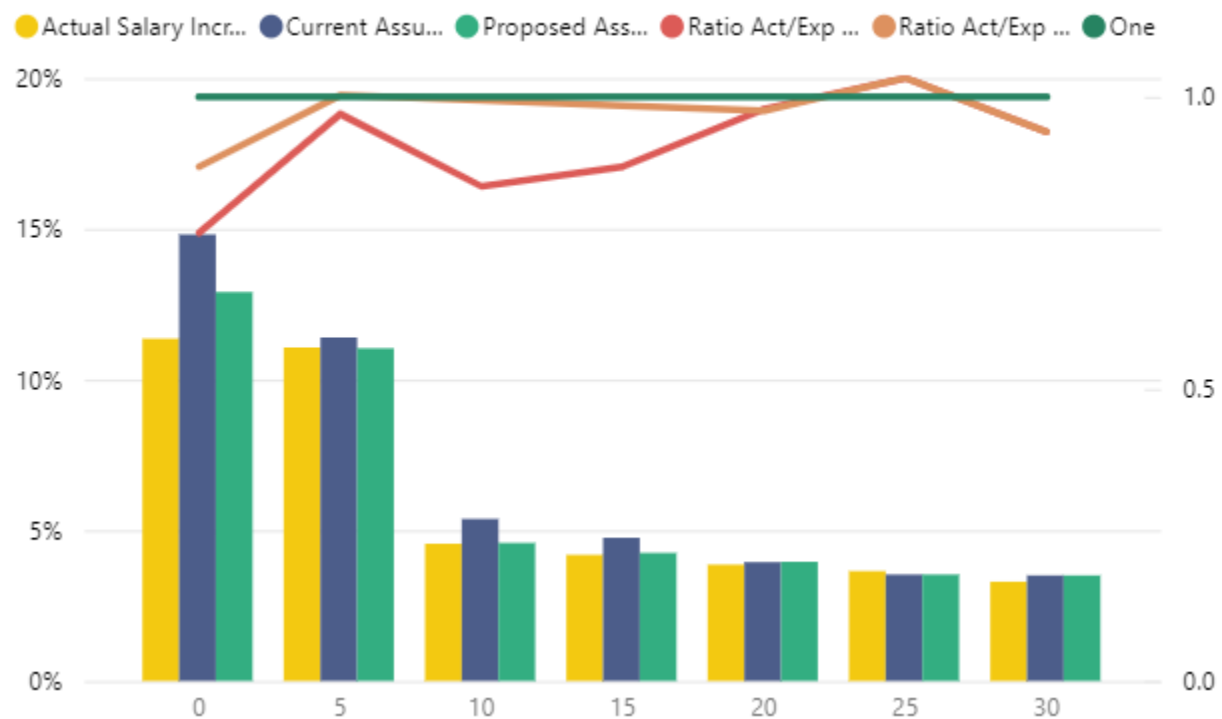
Service	Exposed	Base Salary	Actual Salary	Expected Salary	Actual Salary Increase	Current Assumption Salary Increase	Ratio Act/Exp Salary Increase
0	5,055	\$235.4M	\$251.3M	242.4M	6.77%	3.00%	2.26
1	11,425	\$546.2M	\$611.0M	589.9M	11.87%	8.00%	1.48
2	11,034	\$582.6M	\$653.5M	664.1M	12.18%	14.00%	0.87
3	10,843	\$640.3M	\$716.4M	749.1M	11.89%	17.00%	0.70
4	10,313	\$680.0M	\$757.0M	836.4M	11.32%	23.00%	0.49
5	9,022	\$640.6M	\$925.2M	903.2M	44.44%	41.00%	1.08
6	7,199	\$717.6M	\$750.8M	750.6M	4.63%	4.60%	1.01
7	7,789	\$781.5M	\$808.7M	819.0M	3.48%	4.80%	0.72
8	7,830	\$780.6M	\$814.0M	819.6M	4.29%	5.00%	0.86
9	8,279	\$823.8M	\$859.4M	878.1M	4.33%	6.60%	0.66
10	9,506	\$952.9M	\$1,005.3M	1,003.4M	5.50%	5.30%	1.04
11	9,971	\$1,027.7M	\$1,074.1M	1,081.1M	4.51%	5.20%	0.87
12	10,386	\$1,103.6M	\$1,149.1M	1,159.9M	4.12%	5.10%	0.81
13	10,156	\$1,090.2M	\$1,137.0M	1,144.7M	4.29%	5.00%	0.86
14	9,492	\$1,036.6M	\$1,082.7M	1,101.9M	4.45%	6.30%	0.71
15	9,123	\$1,007.6M	\$1,058.4M	1,054.9M	5.05%	4.70%	1.07
16	7,391	\$827.8M	\$861.9M	865.9M	4.12%	4.60%	0.90
17	6,860	\$775.0M	\$803.3M	809.9M	3.66%	4.50%	0.81
18	7,018	\$801.6M	\$833.9M	836.8M	4.04%	4.40%	0.92
19	5,835	\$676.4M	\$701.7M	714.9M	3.74%	5.70%	0.66
20	4,209	\$501.3M	\$522.1M	522.3M	4.15%	4.20%	0.99
21	3,711	\$446.4M	\$464.9M	464.3M	4.13%	4.00%	1.03
22	3,610	\$442.9M	\$458.5M	460.2M	3.52%	3.90%	0.90
23	3,370	\$417.2M	\$432.8M	433.0M	3.75%	3.80%	0.99
24	2,665	\$337.0M	\$349.3M	349.5M	3.65%	3.70%	0.99
25	2,155	\$279.5M	\$289.1M	289.5M	3.44%	3.60%	0.96
26	1,694	\$224.6M	\$233.6M	232.5M	4.01%	3.50%	1.15
27	1,334	\$181.9M	\$188.0M	188.3M	3.32%	3.50%	0.95
28	1,078	\$148.1M	\$154.0M	153.3M	3.98%	3.50%	1.14
29	886	\$123.7M	\$128.0M	128.0M	3.50%	3.50%	1.00
30	711	\$100.6M	\$104.0M	104.1M	3.35%	3.50%	0.96
31	594	\$85.2M	\$88.1M	88.2M	3.42%	3.50%	0.98
32	490	\$71.4M	\$73.9M	73.9M	3.47%	3.50%	0.99
33	395	\$59.4M	\$61.2M	61.5M	3.05%	3.50%	0.87
34	315	\$48.5M	\$50.0M	50.2M	2.99%	3.50%	0.86
Total	201,744	\$19,195.5M	\$20,452.3M	20,624.9M	6.55%	7.45%	0.88

Service	Exposed	Base Salary	Actual Salary	Expected Salary Proposed	Actual Salary Increase	Proposed Assumption Salary Increase	Act/Exp Proposed Salary Increase
0	5,055	\$235.4M	\$251.3M	\$254.2M	6.77%	8.00%	▲ 0.85
1	11,425	\$546.2M	\$611.0M	\$606.3M	11.87%	11.00%	● 1.08
2	11,034	\$582.6M	\$653.5M	\$658.3M	12.18%	13.00%	● 0.94
3	10,843	\$640.3M	\$716.4M	\$729.9M	11.89%	14.00%	▲ 0.85
4	10,313	\$680.0M	\$757.0M	\$782.0M	11.32%	15.00%	▲ 0.75
5	9,022	\$640.6M	\$925.2M	\$916.0M	44.44%	43.00%	● 1.03
6	7,199	\$717.6M	\$750.8M	\$751.7M	4.63%	4.75%	● 0.97
7	7,789	\$781.5M	\$808.7M	\$812.8M	3.48%	4.00%	▲ 0.87
8	7,830	\$780.6M	\$814.0M	\$813.8M	4.29%	4.25%	● 1.01
9	8,279	\$823.8M	\$859.4M	\$862.9M	4.33%	4.75%	● 0.91
10	9,506	\$952.9M	\$1,005.3M	\$1,005.3M	5.50%	5.50%	● 1.00
11	9,971	\$1,027.7M	\$1,074.1M	\$1,076.5M	4.51%	4.75%	● 0.95
12	10,386	\$1,103.6M	\$1,149.1M	\$1,150.5M	4.12%	4.25%	● 0.97
13	10,156	\$1,090.2M	\$1,137.0M	\$1,136.5M	4.29%	4.25%	● 1.01
14	9,492	\$1,036.6M	\$1,082.7M	\$1,080.7M	4.45%	4.25%	● 1.05
15	9,123	\$1,007.6M	\$1,058.4M	\$1,058.0M	5.05%	5.00%	● 1.01
16	7,391	\$827.8M	\$861.9M	\$860.9M	4.12%	4.00%	● 1.03
17	6,860	\$775.0M	\$803.3M	\$806.0M	3.66%	4.00%	● 0.91
18	7,018	\$801.6M	\$833.9M	\$833.6M	4.04%	4.00%	● 1.01
19	5,835	\$676.4M	\$701.7M	\$703.4M	3.74%	4.00%	● 0.93
20	4,209	\$501.3M	\$522.1M	\$522.6M	4.15%	4.25%	● 0.98
21	3,711	\$446.4M	\$464.9M	\$464.3M	4.13%	4.00%	● 1.03
22	3,610	\$442.9M	\$458.5M	\$460.2M	3.52%	3.90%	● 0.90
23	3,370	\$417.2M	\$432.8M	\$433.0M	3.75%	3.80%	● 0.99
24	2,665	\$337.0M	\$349.3M	\$349.5M	3.65%	3.70%	● 0.99
25	2,155	\$279.5M	\$289.1M	\$289.5M	3.44%	3.60%	● 0.96
26	1,694	\$224.6M	\$233.6M	\$232.5M	4.01%	3.50%	▲ 1.15
27	1,334	\$181.9M	\$188.0M	\$188.3M	3.32%	3.50%	● 0.95
28	1,078	\$148.1M	\$154.0M	\$153.3M	3.98%	3.50%	▲ 1.14
29	886	\$123.7M	\$128.0M	\$128.0M	3.50%	3.50%	● 1.00
30	711	\$100.6M	\$104.0M	\$104.1M	3.35%	3.50%	● 0.96
31	594	\$85.2M	\$88.1M	\$88.2M	3.42%	3.50%	● 0.98
32	490	\$71.4M	\$73.9M	\$73.9M	3.47%	3.50%	● 0.99
33	395	\$59.4M	\$61.2M	\$61.5M	3.05%	3.50%	▲ 0.87
34	315	\$48.5M	\$50.0M	\$50.2M	2.99%	3.50%	▲ 0.86
Total	201,744	\$19,195.5M	\$20,452.3M	\$20,498.4M	6.55%	6.79%	● 0.96

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service

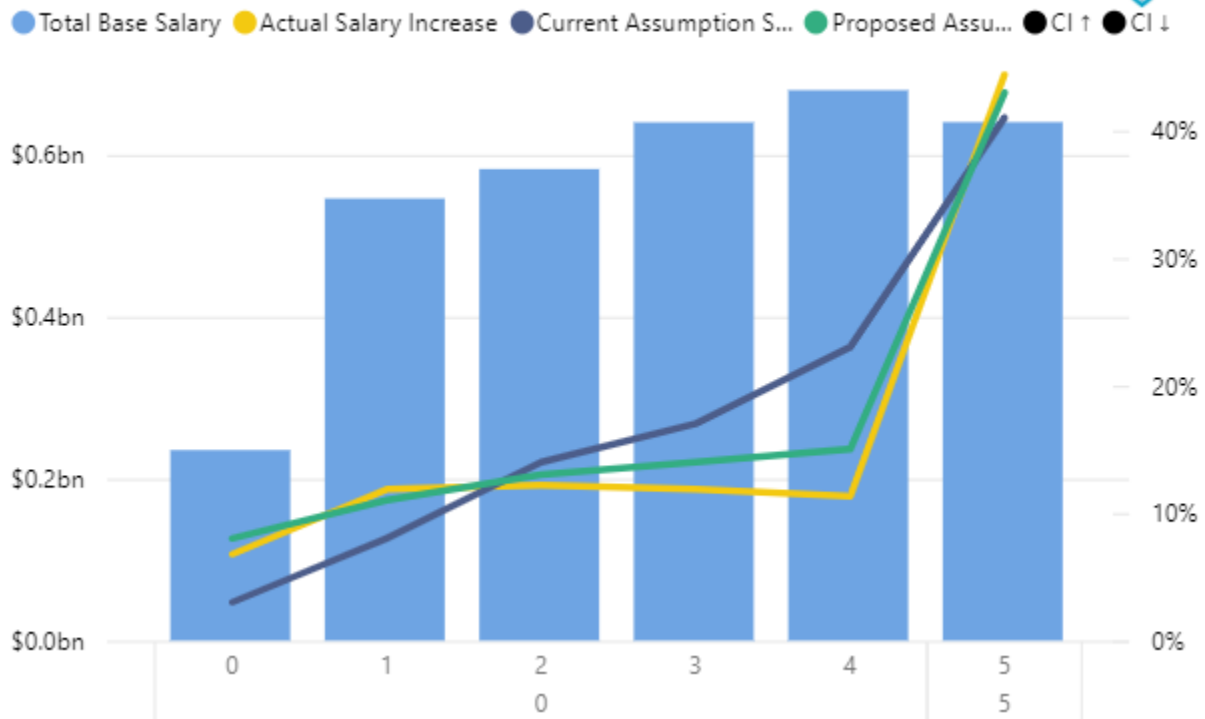


Salary Increase - Actual, Expected, and Ratio; by Service

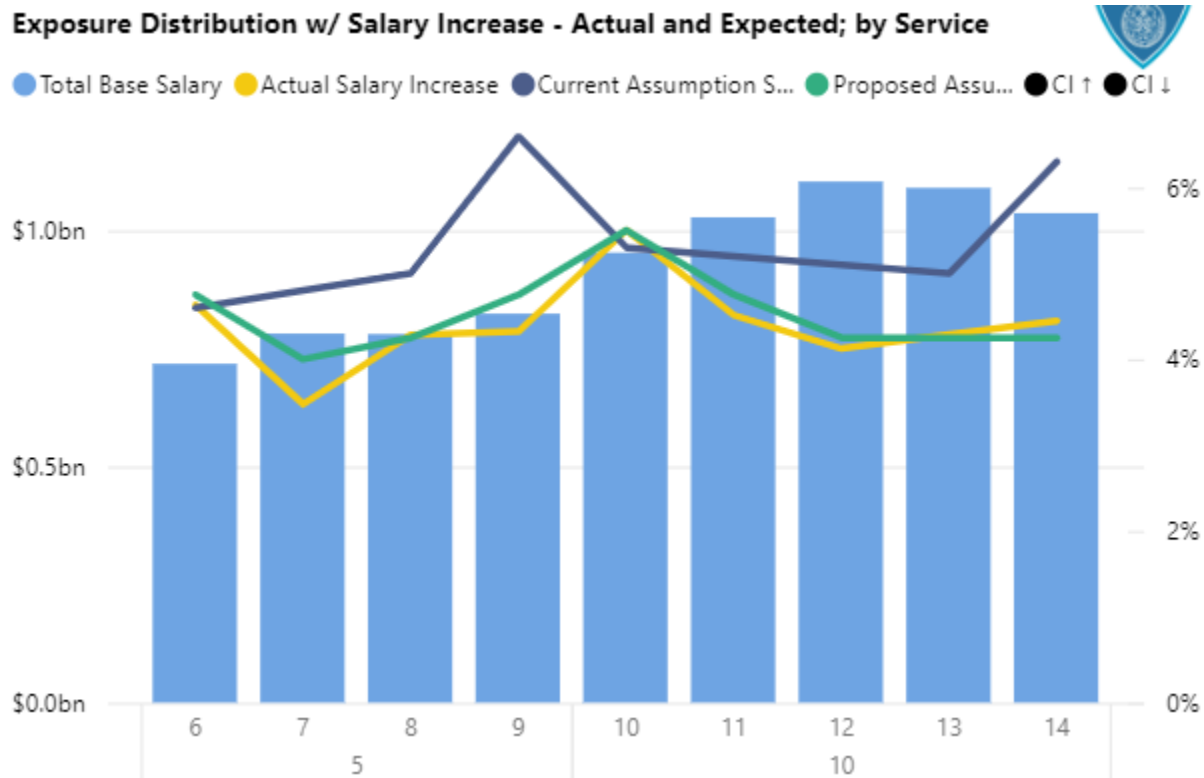


This chart shows the results by service for the service range 0 to 5 years, which decreased the assumed rate of salary increases from 19.86% to 18.70% as compared to the actual rate of 17.73%. This resulted in an increase in the A/E ratio from 0.89 to 0.95 for ages 22 to 59.

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service

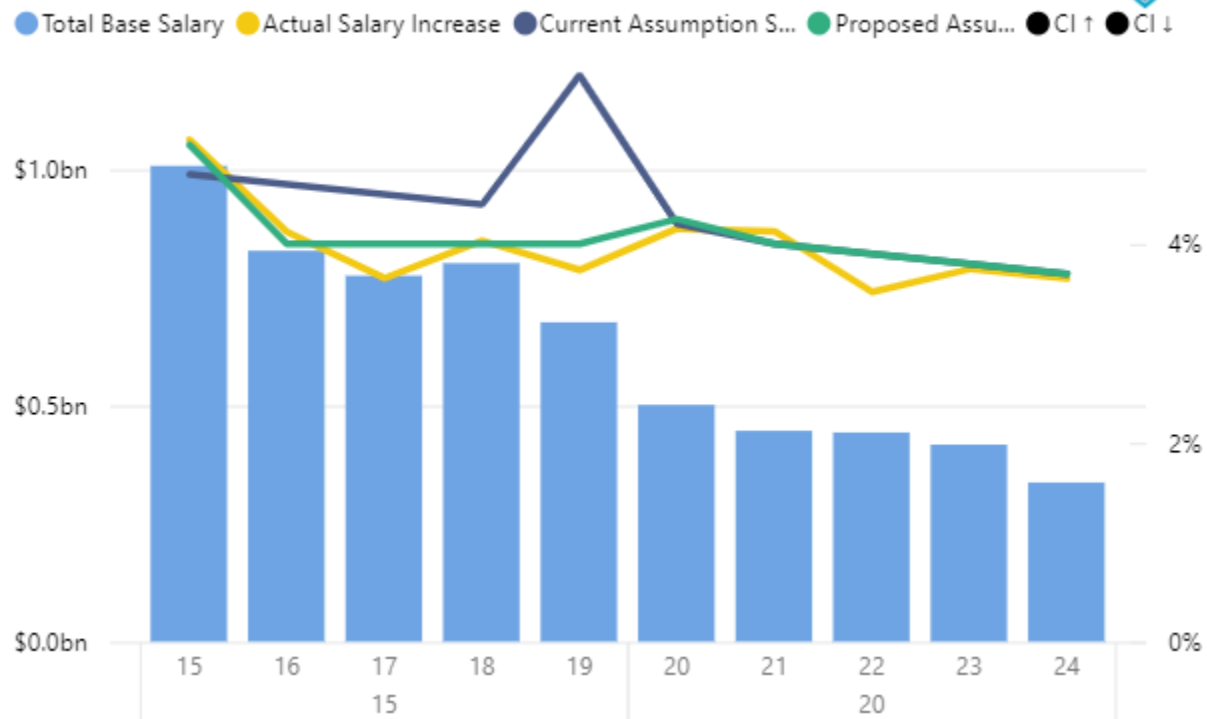


This chart shows the results by year for the service range 6 to 14 years, which decreased the assumed rate of salary increases from 5.34% to 4.52% as compared to the actual rate of 4.41%. This resulted in an increase in the A/E ratio from 0.83 to 0.97 for ages 22 to 59.

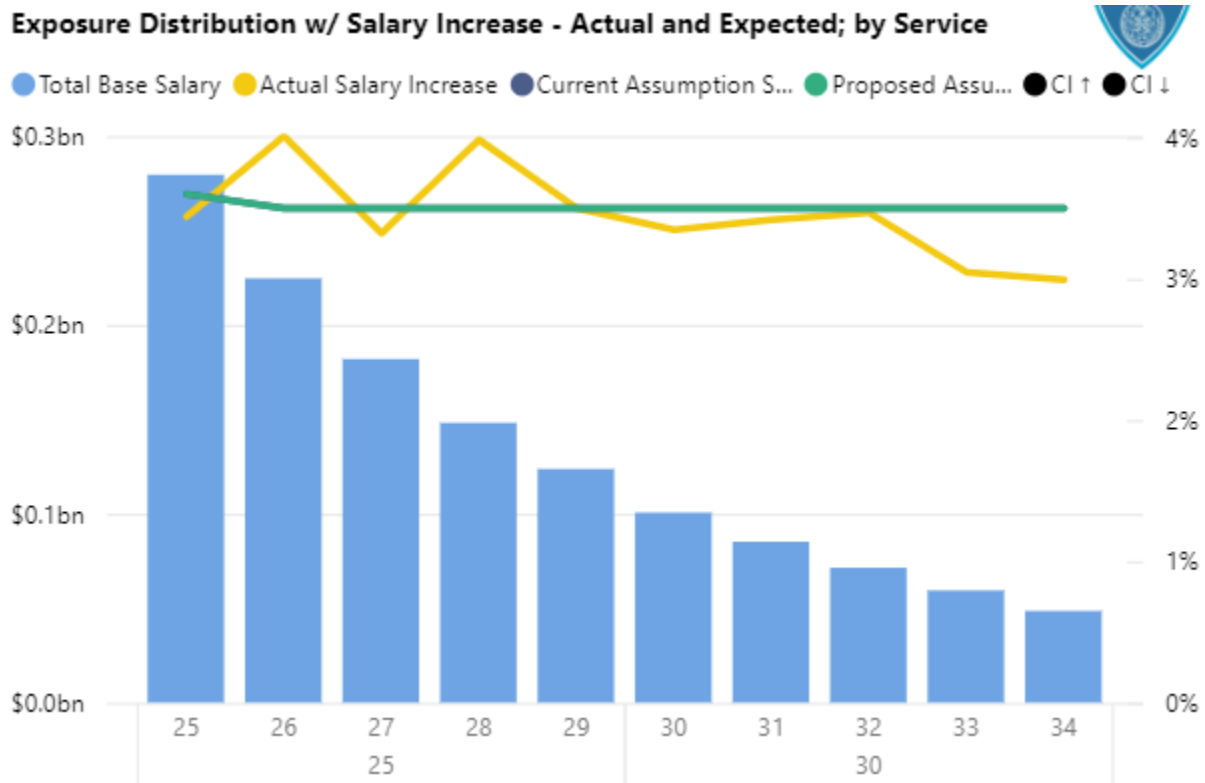


This chart shows the results by service for the service range 15 to 24 years, which decreased the assumed rate of salary increases from 4.47% to 4.15% as compared to the actual rate of 4.07%. This resulted in an increase in the A/E ratio from 0.91 to 0.98 for ages 22 to 59.

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service



This chart shows the results by service for the service range 25 to 34 years, where the assumed rate of salary increases remained at 3.52% as compared to the actual rate of 3.55%. This resulted in an A/E ratio of 1.01 for ages 22 to 59.



Summary

In total, the proposed rates of salary increases are lower than the current assumptions, except for the first few years of service. We would anticipate that this would decrease plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT ASSUMPTION ANNUAL RATES OF MERIT AND SALARY INCREASE		
Years of Service	Merit Increase	Salary Increase ¹
0	0.00%	3.00%
1	5.00%	8.00%
2	11.00%	14.00%
3	14.00%	17.00%
4	20.00%	23.00%
5	38.00%	41.00%
6	1.60%	4.60%
7	1.80%	4.80%
8	2.00%	5.00%
9	3.60%	6.60%
10	2.30%	5.30%
11	2.20%	5.20%
12	2.10%	5.10%
13	2.00%	5.00%
14	3.30%	6.30%
15	1.70%	4.70%
16	1.60%	4.60%
17	1.50%	4.50%
18	1.40%	4.40%
19	2.70%	5.70%
20	1.20%	4.20%
21	1.00%	4.00%
22	0.90%	3.90%
23	0.80%	3.80%
24	0.70%	3.70%
25	0.60%	3.60%
26	0.50%	3.50%
27	0.50%	3.50%
28	0.50%	3.50%
29	0.50%	3.50%
30+	0.50%	3.50%

¹ Salary increase is the general wage increase of 3% plus the merit increase

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED ASSUMPTION ANNUAL RATES OF MERIT AND SALARY INCREASE		
Years of Service	Merit Increase	Salary Increase ¹
0	5.00%	8.00%
1	8.00%	11.00%
2	10.00%	13.00%
3	11.00%	14.00%
4	12.00%	15.00%
5	40.00%	43.00%
6	1.75%	4.75%
7	1.00%	4.00%
8	1.25%	4.25%
9	1.75%	4.75%
10	2.50%	5.50%
11	1.75%	4.75%
12	1.25%	4.25%
13	1.25%	4.25%
14	1.25%	4.25%
15	2.00%	5.00%
16	1.00%	4.00%
17	1.00%	4.00%
18	1.00%	4.00%
19	1.00%	4.00%
20	1.25%	4.25%
21	1.00%	4.00%
22	0.90%	3.90%
23	0.80%	3.80%
24	0.70%	3.70%
25	0.60%	3.60%
26	0.50%	3.50%
27	0.50%	3.50%
28	0.50%	3.50%
29	0.50%	3.50%
30+	0.50%	3.50%

Overtime

Overtime is considered pensionable earnings in determining a member's final average salary and benefit payable under the plan. OA applies a percentage increase to the member's base salary to account for assumed overtime. The percentage varies by years of service, tier, and whether the individual is expected to retire or become disabled within the next year.

The valuation data contains actual overtime earned during the prior year. For example, overtime contained in the 2019 data is for the year July 1, 2018 to June 30, 2019. We refer to this as 2019 overtime. The rate of overtime is defined as the amount of overtime for the year divided by the average of the member's base salary as of current year and the prior year. Therefore, 2019 overtime percentage is determined based on the average of the base salary as of July 1, 2018 and July 1, 2019.

The overtime percentage is only calculated for members with a status code of A in consecutive years. Members with a LOA status code are excluded.

Separate rates of overtime are applied if the member is expected to retire or become disabled in the following year. These are referred to as Dual Retirement or Dual Disability. We measured the rates of overtime in these situations for members who actually became disabled or retired the following year. For example, a dual overtime percentage applies in 2019 for a member who retired or became disabled in 2020. In the MEST, we developed codes S1 and D1 to identify these situations.

In addition, we also separately measured rates of overtime for those who were two years prior to retirement or disability. For example, we reviewed whether or not the 2019 overtime percentage was higher than otherwise for members who retired in 2021 or lower than otherwise for members who became disabled in 2021. In the MEST, we developed codes S2 and D2 to identify these situations.

These measures allowed us to determine if there was a spike in the amount of overtime just at the time of retirement relative to baseline (all other years). In all situations, we did not find that overtime was higher two years prior for retirement or lower two years prior for disability. For purposes of this report, the experience for members two years prior to retirement or disability is included in the Baseline analysis.

For POLICE, we found that overtime one year prior for retirement was not higher than for members of the same service who did not retire. Therefore, the proposed assumption does not include a separate dual retirement assumption.

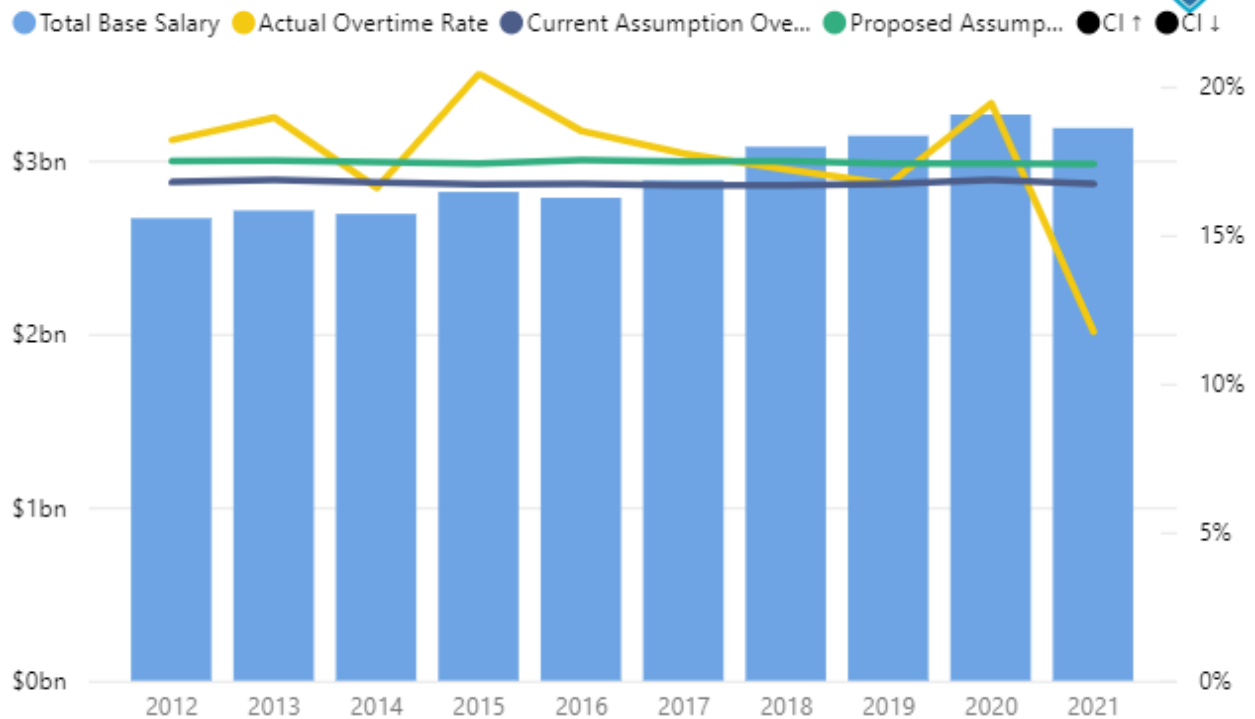
The proposed assumption varies by service and dual disability. We also recommend applying the same assumptions for all tiers.

The following charts show the experience for overtime percentage by year, for the age range (22 to 59), and for the service range (0 to 34) from 2012 to 2021. The actual overtime percentage for all types of overtime averaged 17.48% whereas the overall expected overtime percentage averaged 16.75% based on the current assumptions and 17.45% based on the proposed assumptions.

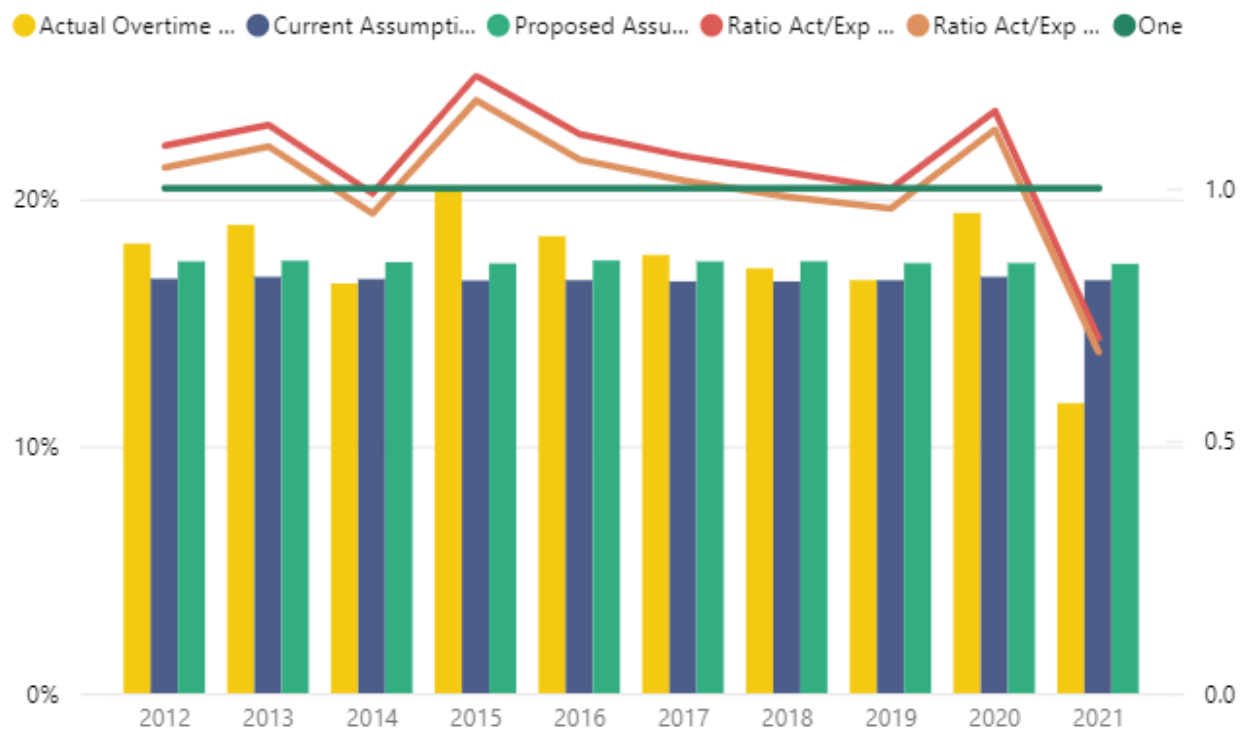
Plan Year	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
2012	30,369	\$2,709.0M	\$493.0M	454.6M	18.20%	16.78%	1.08
2013	31,128	\$2,759.0M	\$523.2M	465.1M	18.96%	16.86%	1.13
2014	31,029	\$2,800.5M	\$464.6M	469.6M	16.59%	16.77%	0.99
2015	31,399	\$2,844.0M	\$581.1M	475.1M	20.43%	16.71%	1.22
2016	31,208	\$2,860.9M	\$529.4M	478.4M	18.50%	16.72%	1.11
2017	32,071	\$3,005.4M	\$533.1M	501.0M	17.74%	16.67%	1.06
2018	32,915	\$3,152.6M	\$542.3M	525.5M	17.20%	16.67%	1.03
2019	33,732	\$3,279.6M	\$548.3M	548.2M	16.72%	16.72%	1.00
2020	33,339	\$3,364.2M	\$653.9M	567.1M	19.44%	16.86%	1.15
2021	31,877	\$3,296.9M	\$387.1M	551.1M	11.74%	16.72%	0.70
Total	319,067	\$30,072.1	\$5,255.9M	5,035.6M	17.48%	16.75%	1.04

Plan Year	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
2012	30,369	\$2,709.0M	\$493.0M	\$473.6M	18.20%	17.48%	1.04
2013	31,128	\$2,759.0M	\$523.2M	\$483.1M	18.96%	17.51%	1.08
2014	31,029	\$2,800.5M	\$464.6M	\$488.8M	16.59%	17.45%	0.95
2015	31,399	\$2,844.0M	\$581.1M	\$494.8M	20.43%	17.40%	1.17
2016	31,208	\$2,860.9M	\$529.4M	\$501.2M	18.50%	17.52%	1.06
2017	32,071	\$3,005.4M	\$533.1M	\$525.3M	17.74%	17.48%	1.01
2018	32,915	\$3,152.6M	\$542.3M	\$551.3M	17.20%	17.49%	0.98
2019	33,732	\$3,279.6M	\$548.3M	\$571.0M	16.72%	17.41%	0.96
2020	33,339	\$3,364.2M	\$653.9M	\$585.8M	19.44%	17.41%	1.12
2021	31,877	\$3,296.9M	\$387.1M	\$573.1M	11.74%	17.38%	0.68
Total	319,067	\$30,072.1	\$5,255.9M	\$5,247.9M	17.48%	17.45%	1.00

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Year



Overtime Assumption - Actual, Expected, and Ratio; by Year



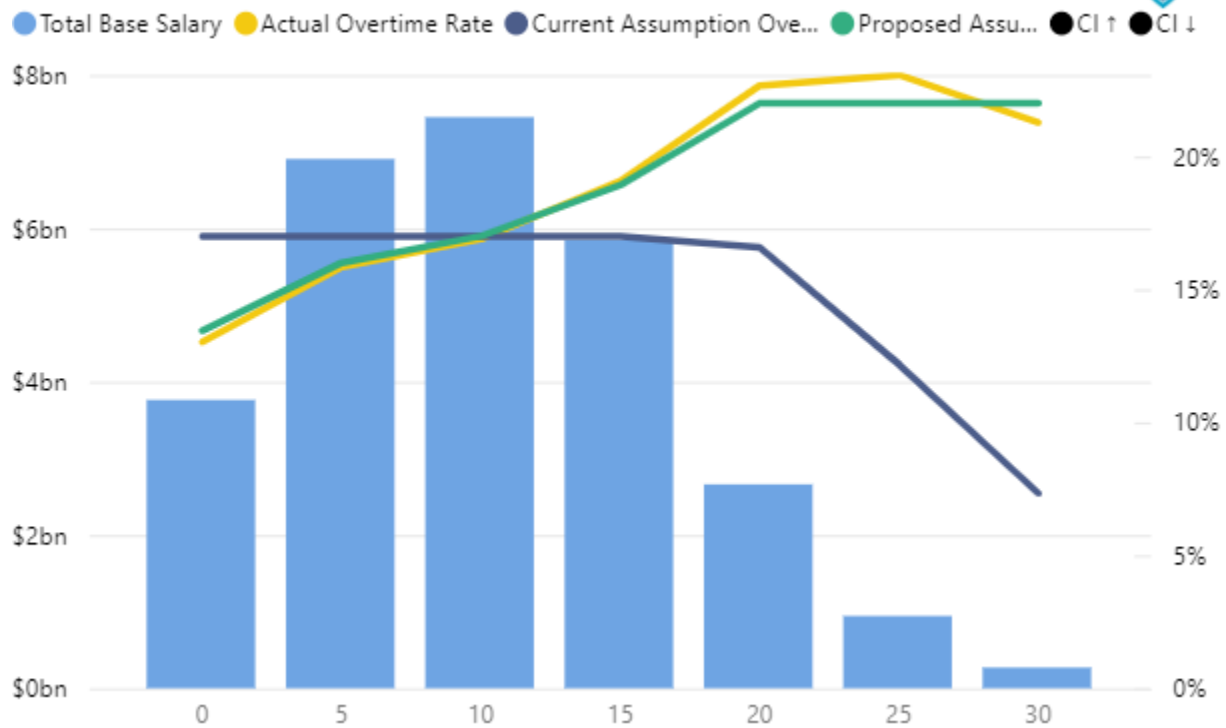
Baseline

The following charts show the experience for Baseline overtime percentage by service, for the age range (22 to 59), and for the service range (0 to 34) from 2012 to 2021. The actual Baseline overtime percentage averaged 17.34% whereas the overall expected overtime percentage averaged 16.71% based on the current assumptions and 17.34% based on the proposed assumptions. This resulted in a decrease in the A/E ratio from 1.04 to 1.00.

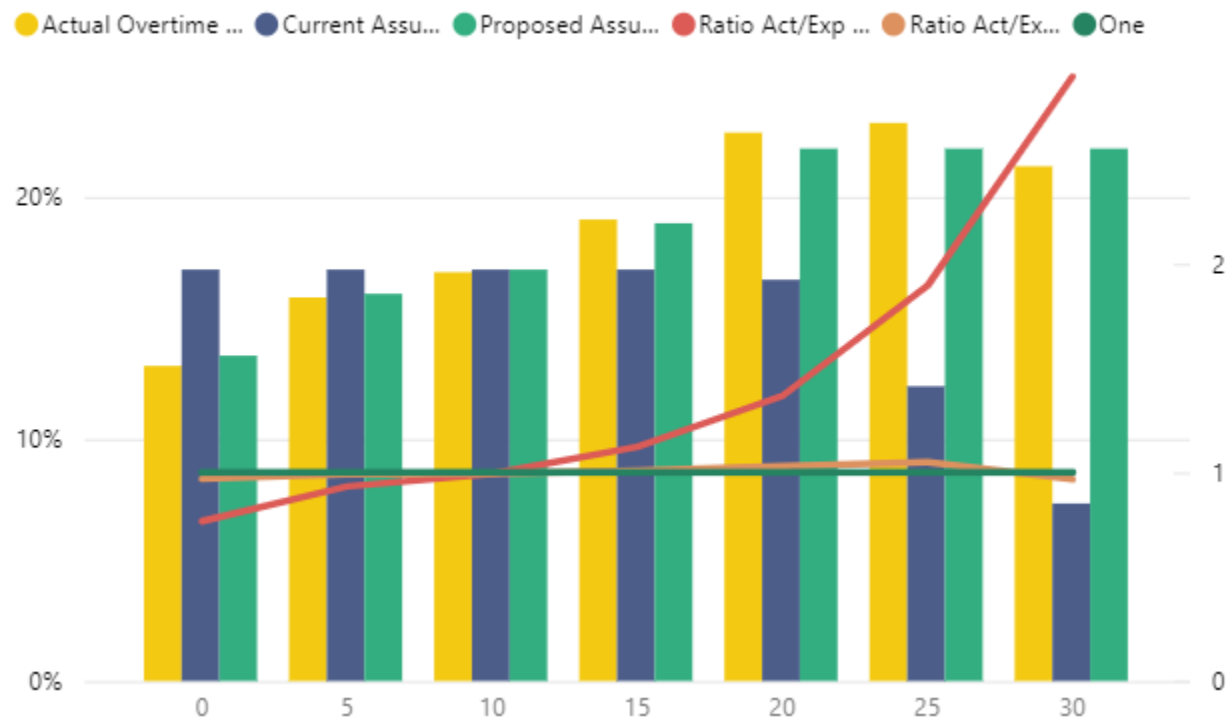
Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
0	4,533	\$210.5M	\$24.4M	35.8M	11.60%	17.00%	▲ 0.68
1	17,720	\$879.7M	\$103.4M	149.6M	11.75%	17.00%	▲ 0.69
2	15,884	\$869.1M	\$110.4M	147.8M	12.70%	17.00%	▲ 0.75
3	15,781	\$959.4M	\$130.3M	163.1M	13.58%	17.00%	▲ 0.80
4	15,652	\$1,050.1M	\$148.3M	178.5M	14.12%	17.00%	▲ 0.83
5	15,362	\$1,250.9M	\$199.5M	212.7M	15.95%	17.00%	● 0.94
6	15,701	\$1,477.0M	\$234.8M	251.1M	15.89%	17.00%	● 0.93
7	16,036	\$1,542.4M	\$240.3M	262.2M	15.58%	17.00%	● 0.92
8	15,256	\$1,478.7M	\$231.3M	251.4M	15.64%	17.00%	● 0.92
9	15,038	\$1,471.0M	\$238.7M	250.1M	16.23%	17.00%	● 0.95
10	14,530	\$1,454.8M	\$239.3M	247.3M	16.45%	17.00%	● 0.97
11	15,022	\$1,535.7M	\$259.2M	261.1M	16.88%	17.00%	● 0.99
12	15,021	\$1,574.7M	\$262.8M	267.7M	16.69%	17.00%	● 0.98
13	14,401	\$1,526.2M	\$258.3M	259.5M	16.92%	17.00%	● 1.00
14	13,962	\$1,501.6M	\$263.0M	255.3M	17.52%	17.00%	● 1.03
15	12,799	\$1,399.5M	\$244.1M	237.9M	17.44%	17.00%	● 1.03
16	11,590	\$1,273.7M	\$231.4M	216.5M	18.17%	17.00%	● 1.07
17	11,328	\$1,246.1M	\$241.6M	211.8M	19.39%	17.00%	▲ 1.14
18	10,550	\$1,174.9M	\$233.8M	199.7M	19.90%	17.00%	▲ 1.17
19	7,493	\$847.1M	\$182.1M	144.0M	21.50%	17.00%	▲ 1.26
20	6,168	\$708.1M	\$156.2M	120.4M	22.06%	17.00%	▲ 1.30
21	5,458	\$633.1M	\$143.6M	107.6M	22.69%	17.00%	▲ 1.33
22	4,771	\$561.3M	\$128.4M	95.4M	22.88%	17.00%	▲ 1.35
23	3,846	\$459.6M	\$105.0M	73.5M	22.84%	16.00%	▲ 1.43
24	2,790	\$338.1M	\$78.7M	50.7M	23.28%	15.00%	◆ 1.55
25	2,282	\$279.2M	\$64.9M	39.1M	23.24%	14.00%	◆ 1.66
26	1,861	\$230.0M	\$53.4M	29.9M	23.21%	13.00%	◆ 1.79
27	1,528	\$190.8M	\$44.0M	22.9M	23.07%	12.00%	◆ 1.92
28	1,197	\$150.3M	\$33.9M	15.0M	22.54%	10.00%	◆ 2.25
29	842	\$106.0M	\$24.4M	9.5M	22.98%	9.00%	◆ 2.55
30	716	\$91.7M	\$20.3M	7.3M	22.17%	8.00%	◆ 2.77
31	516	\$67.0M	\$14.7M	4.7M	21.88%	7.00%	◆ 3.13
32	393	\$51.5M	\$10.9M	3.6M	21.21%	7.00%	◆ 3.03
33	278	\$37.2M	\$7.5M	2.6M	20.20%	7.00%	◆ 2.89
34	195	\$26.5M	\$4.8M	1.9M	18.20%	7.00%	◆ 2.60
Total	306,500	\$28,653.7	\$4,967.8M	4,787.2M	17.34%	16.71%	● 1.04

Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
0	4,533	\$210.5M	\$24.4M	\$23.2M	11.60%	11.00%	1.05
1	17,720	\$879.7M	\$103.4M	\$105.6M	11.75%	12.00%	0.98
2	15,884	\$869.1M	\$110.4M	\$113.0M	12.70%	13.00%	0.98
3	15,781	\$959.4M	\$130.3M	\$134.3M	13.58%	14.00%	0.97
4	15,652	\$1,050.1M	\$148.3M	\$157.5M	14.12%	15.00%	0.94
5	15,362	\$1,250.9M	\$199.5M	\$200.1M	15.95%	16.00%	1.00
6	15,701	\$1,477.0M	\$234.8M	\$236.3M	15.89%	16.00%	0.99
7	16,036	\$1,542.4M	\$240.3M	\$246.8M	15.58%	16.00%	0.97
8	15,256	\$1,478.7M	\$231.3M	\$236.6M	15.64%	16.00%	0.98
9	15,038	\$1,471.0M	\$238.7M	\$235.4M	16.23%	16.00%	1.01
10	14,530	\$1,454.8M	\$239.3M	\$247.3M	16.45%	17.00%	0.97
11	15,022	\$1,535.7M	\$259.2M	\$261.1M	16.88%	17.00%	0.99
12	15,021	\$1,574.7M	\$262.8M	\$267.7M	16.69%	17.00%	0.98
13	14,401	\$1,526.2M	\$258.3M	\$259.5M	16.92%	17.00%	1.00
14	13,962	\$1,501.6M	\$263.0M	\$255.3M	17.52%	17.00%	1.03
15	12,799	\$1,399.5M	\$244.1M	\$244.9M	17.44%	17.50%	1.00
16	11,590	\$1,273.7M	\$231.4M	\$229.3M	18.17%	18.00%	1.01
17	11,328	\$1,246.1M	\$241.6M	\$236.8M	19.39%	19.00%	1.02
18	10,550	\$1,174.9M	\$233.8M	\$235.0M	19.90%	20.00%	1.00
19	7,493	\$847.1M	\$182.1M	\$177.9M	21.50%	21.00%	1.02
20	6,168	\$708.1M	\$156.2M	\$155.8M	22.06%	22.00%	1.00
21	5,458	\$633.1M	\$143.6M	\$139.3M	22.69%	22.00%	1.03
22	4,771	\$561.3M	\$128.4M	\$123.5M	22.88%	22.00%	1.04
23	3,846	\$459.6M	\$105.0M	\$101.1M	22.84%	22.00%	1.04
24	2,790	\$338.1M	\$78.7M	\$74.4M	23.28%	22.00%	1.06
25	2,282	\$279.2M	\$64.9M	\$61.4M	23.24%	22.00%	1.06
26	1,861	\$230.0M	\$53.4M	\$50.6M	23.21%	22.00%	1.05
27	1,528	\$190.8M	\$44.0M	\$42.0M	23.07%	22.00%	1.05
28	1,197	\$150.3M	\$33.9M	\$33.1M	22.54%	22.00%	1.02
29	842	\$106.0M	\$24.4M	\$23.3M	22.98%	22.00%	1.04
30	716	\$91.7M	\$20.3M	\$20.2M	22.17%	22.00%	1.01
31	516	\$67.0M	\$14.7M	\$14.7M	21.88%	22.00%	0.99
32	393	\$51.5M	\$10.9M	\$11.3M	21.21%	22.00%	0.96
33	278	\$37.2M	\$7.5M	\$8.2M	20.20%	22.00%	0.92
34	195	\$26.5M	\$4.8M	\$5.8M	18.20%	22.00%	0.83
Total	306,500	\$28,653.7	\$4,967.8M	\$4,968.1M	17.34%	17.34%	1.00

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Service

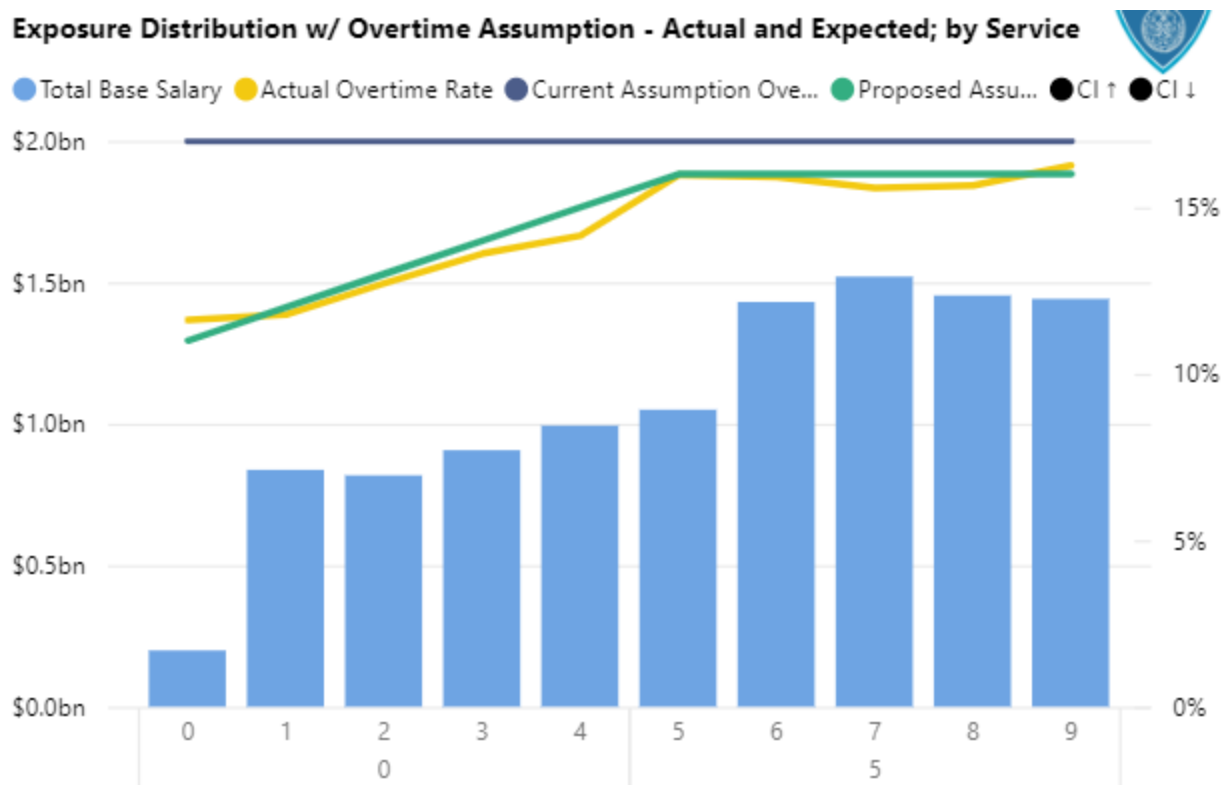


Overtime Assumption - Actual, Expected, and Ratio; by Service

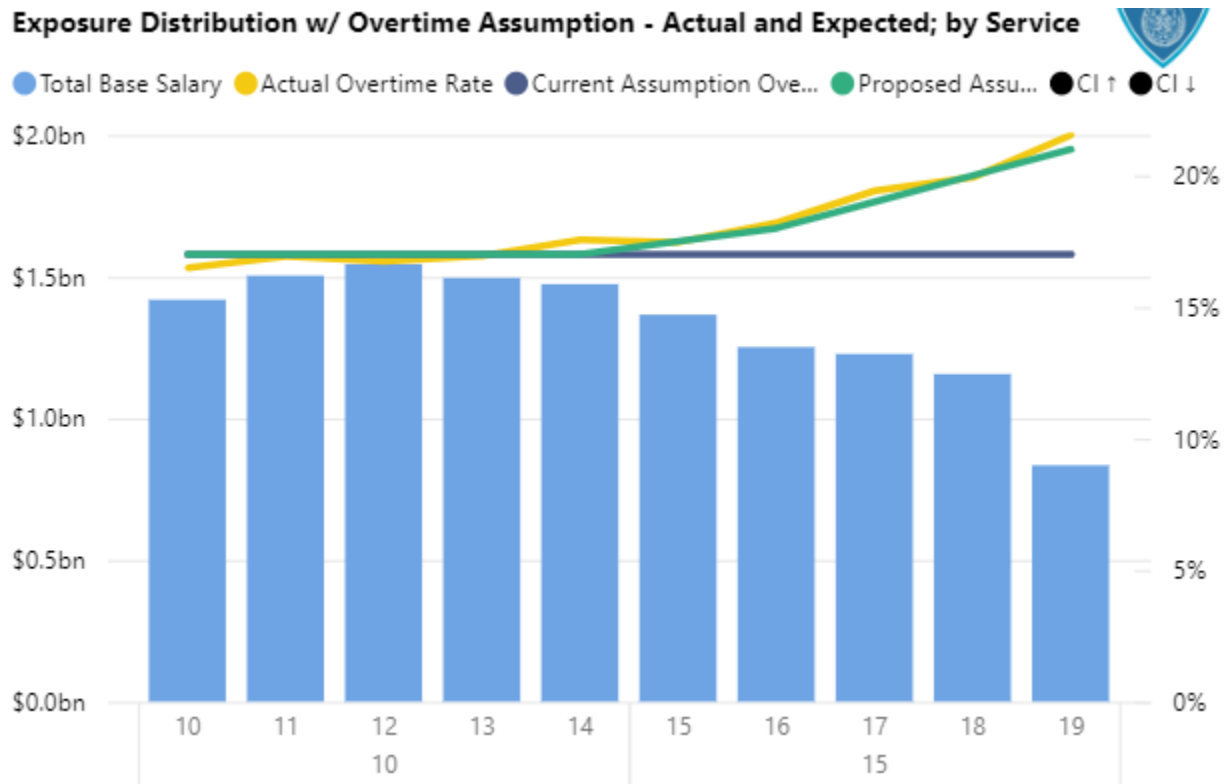


The current assumption did not vary by service until late in a member's career and then began to decrease at 23 years of service. The actual experience showed the overtime percentage was positively correlated with service. The proposed assumption varies by service; beginning at 20 years of service the same overtime percentage is proposed for all service periods. The proposed overtime percentage at this point is 22% which is similar to the current assumption applied at dual retirement of 21% before declining at 23 years of service. Increasing the assumed rate for all members eligible for retirement appears to have eliminated the need to include a dual retirement assumption.

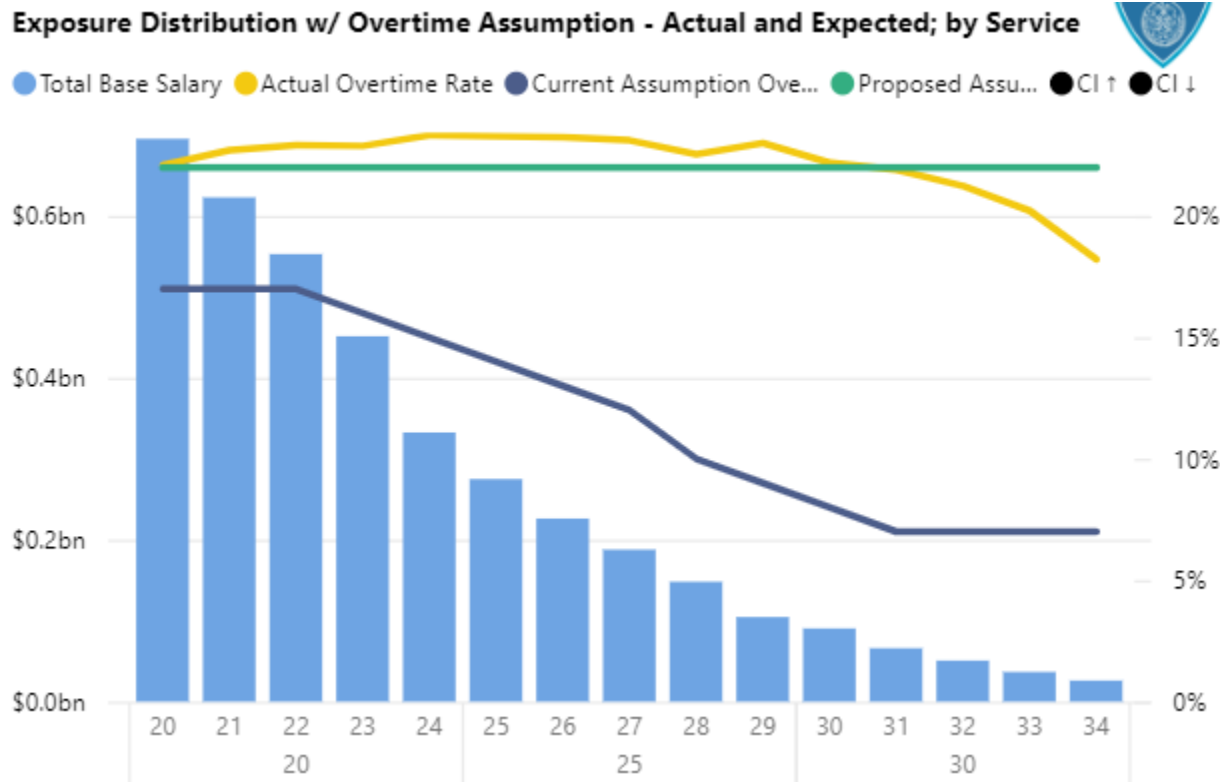
This chart shows the experience for Baseline overtime percentage by service for the service range 0 to 9 years, where the assumed overtime percentage decreased from 17.00% to 15.09% as compared to the actual rate of 14.85%. This resulted in an increase in the A/E ratio from 0.87 to 0.98 for ages 22 to 59.



This chart shows the experience for Baseline overtime percentage by service for the service range 10 to 19 years, where the assumed overtime percentage increased from 17.00% to 17.84% as compared to the actual rate of 17.85%. This resulted in a decrease in the A/E ratio from 1.05 to 1.00 for ages 22 to 59.



This chart shows the experience for Baseline overtime percentage by service for the service range 20 to 34 years, where the assumed overtime percentage increased from 14.86% to 22.00% as compared to the actual rate of 22.66%. This resulted in a decrease in the A/E ratio from 1.53 to 1.03 for ages 22 to 59.



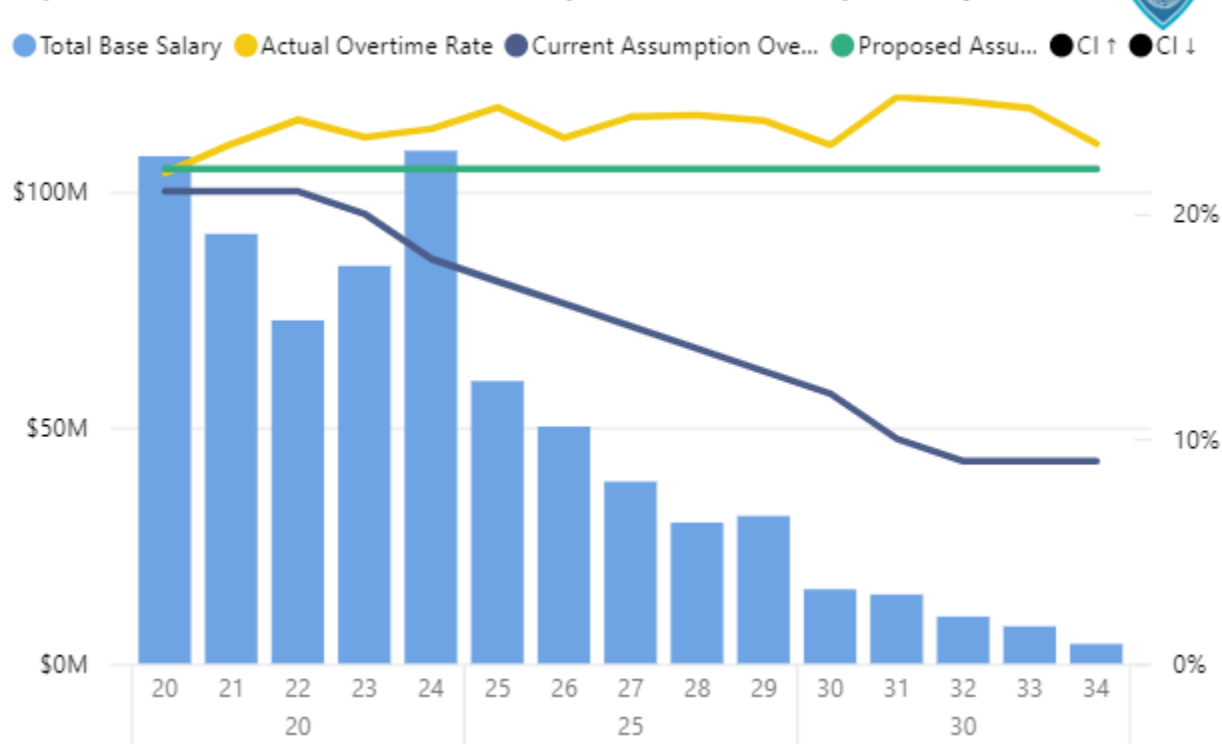
Dual Retirement

The following charts show the experience for Dual Retirement overtime percentage by service, for the age range (40 to 59), and for the service range (20 to 34) from 2012 to 2020. The actual Dual Retirement overtime percentage averaged 23.52% as compared to Baseline overtime percentage of 18.03%. Since these percentages were similar, we propose to use the Baseline assumption for Dual Retirement. This resulted in a decrease in the A/E ratio from 1.30 to 1.07.

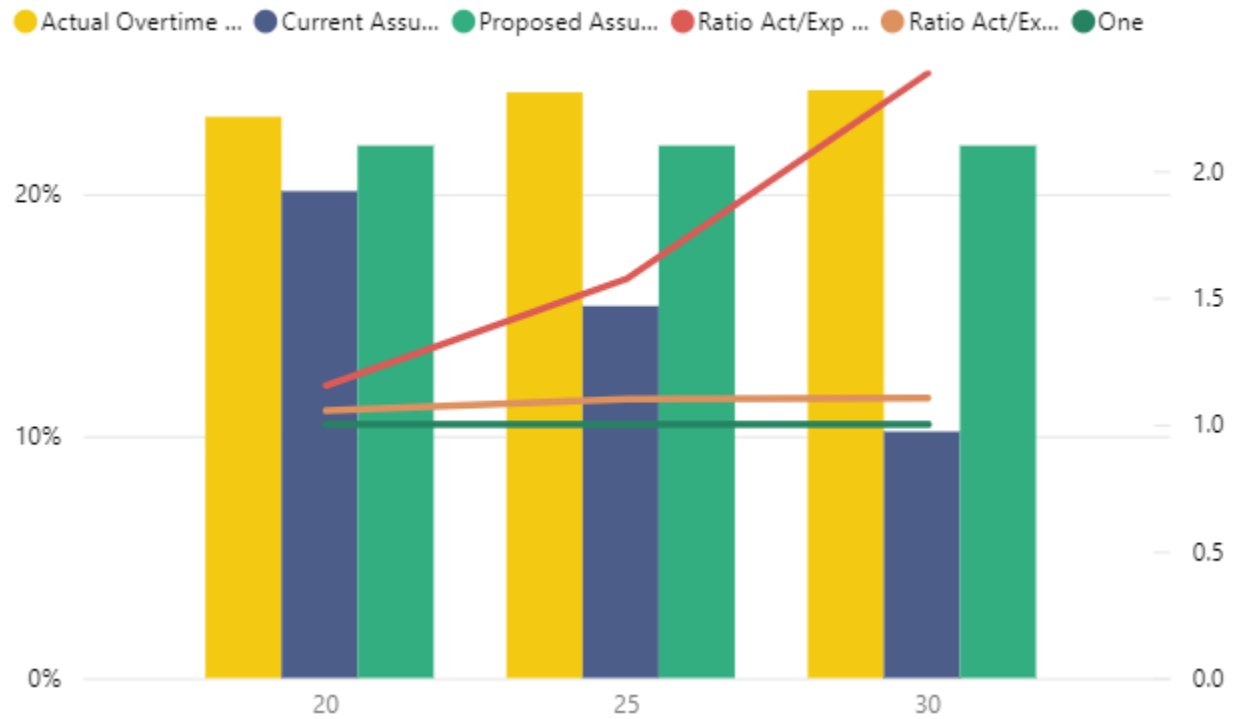
Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
20	973	\$109.6M	\$23.9M	23.0M	21.78%	21.00%	1.04
21	800	\$92.5M	\$21.4M	19.4M	23.08%	21.00%	1.10
22	621	\$74.0M	\$17.9M	15.5M	24.15%	21.00%	1.15
23	733	\$85.8M	\$20.0M	17.2M	23.36%	20.00%	1.17
24	935	\$110.5M	\$26.2M	19.9M	23.72%	18.00%	1.32
25	495	\$61.0M	\$15.1M	10.4M	24.68%	17.00%	1.45
26	413	\$51.4M	\$12.0M	8.2M	23.33%	16.00%	1.46
27	310	\$39.2M	\$9.5M	5.9M	24.28%	15.00%	1.62
28	238	\$30.4M	\$7.4M	4.3M	24.38%	14.00%	1.74
29	247	\$31.8M	\$7.7M	4.1M	24.13%	13.00%	1.86
30	125	\$16.0M	\$3.7M	1.9M	23.04%	12.00%	1.92
31	114	\$14.9M	\$3.8M	1.5M	25.17%	10.00%	2.52
32	76	\$10.2M	\$2.5M	0.9M	24.99%	9.00%	2.78
33	60	\$8.0M	\$2.0M	0.7M	24.68%	9.00%	2.74
34	31	\$4.2M	\$1.0M	0.4M	23.10%	9.00%	2.57
Total	6,171	\$739.6M	\$174.0M	133.3M	23.52%	18.03%	1.30

Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
20	973	\$109.6M	\$23.9M	\$24.1M	21.78%	22.00%	0.99
21	800	\$92.5M	\$21.4M	\$20.4M	23.08%	22.00%	1.05
22	621	\$74.0M	\$17.9M	\$16.3M	24.15%	22.00%	1.10
23	733	\$85.8M	\$20.0M	\$18.9M	23.36%	22.00%	1.06
24	935	\$110.5M	\$26.2M	\$24.3M	23.72%	22.00%	1.08
25	495	\$61.0M	\$15.1M	\$13.4M	24.68%	22.00%	1.12
26	413	\$51.4M	\$12.0M	\$11.3M	23.33%	22.00%	1.06
27	310	\$39.2M	\$9.5M	\$8.6M	24.28%	22.00%	1.10
28	238	\$30.4M	\$7.4M	\$6.7M	24.38%	22.00%	1.11
29	247	\$31.8M	\$7.7M	\$7.0M	24.13%	22.00%	1.10
30	125	\$16.0M	\$3.7M	\$3.5M	23.04%	22.00%	1.05
31	114	\$14.9M	\$3.8M	\$3.3M	25.17%	22.00%	1.14
32	76	\$10.2M	\$2.5M	\$2.2M	24.99%	22.00%	1.14
33	60	\$8.0M	\$2.0M	\$1.8M	24.68%	22.00%	1.12
34	31	\$4.2M	\$1.0M	\$0.9M	23.10%	22.00%	1.05
Total	6,171	\$739.6M	\$174.0M	\$162.7M	23.52%	22.00%	1.07

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Service



Overtime Assumption - Actual, Expected, and Ratio; by Service



Dual Disability

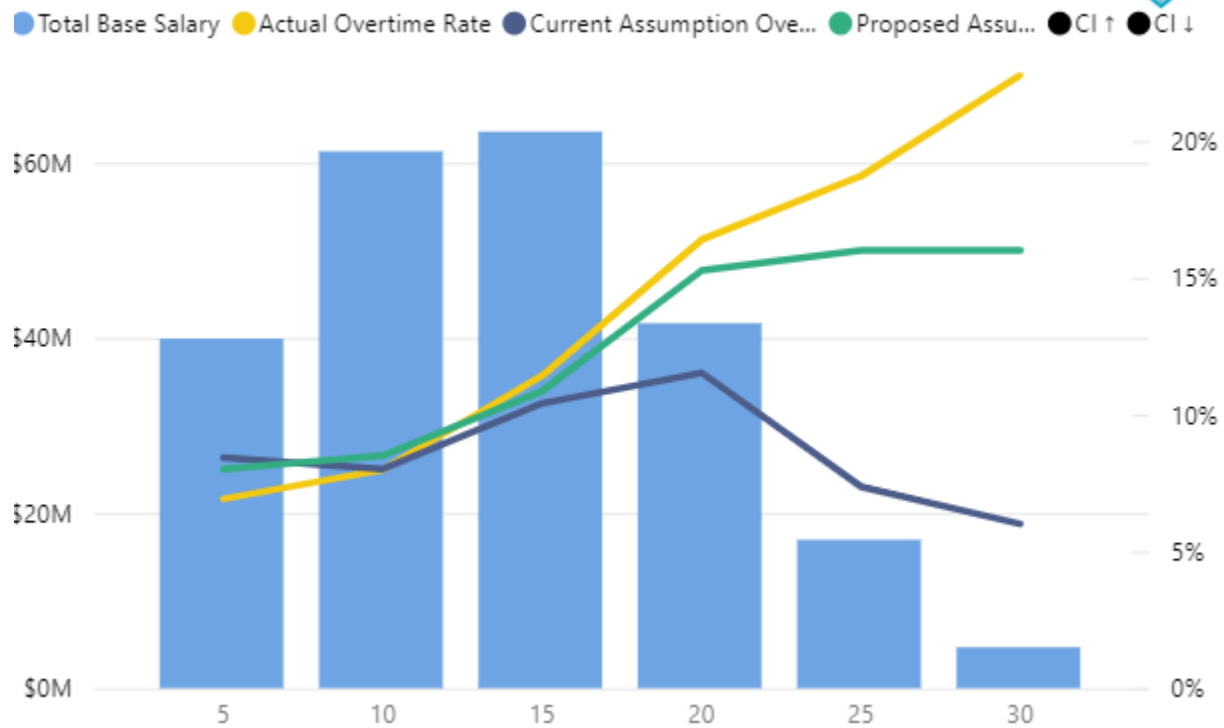
The current assumption varied by service increasing beginning at 16 years of service but then declining beginning at 23 years of service. Similar to Baseline, the actual Dual Disability experience showed the overtime percentage was positively correlated with service. The proposed assumption is set to 50% - 75% of the proposed Baseline rates depending on service.

The following charts show the experience for Dual Disability overtime percentage by service, for the age range (22 to 59), and for the service range (5 to 34) from 2012 to 2020. The actual Dual Disability overtime percentage averaged 11.34% whereas the overall expected overtime percentage averaged 9.30% based on the current assumptions and 11.00% based on the proposed assumptions. This resulted in a decrease in the A/E ratio from 1.22 to 1.03.

Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
5	47	\$3.7M	\$0.3M	0.3M	6.77%	8.91%	▲ 0.76
6	72	\$6.6M	\$0.4M	0.6M	5.49%	8.68%	▲ 0.63
7	74	\$6.9M	\$0.3M	0.6M	4.56%	8.58%	▲ 0.53
8	92	\$8.8M	\$0.6M	0.7M	7.11%	8.25%	▲ 0.86
9	162	\$15.5M	\$1.3M	1.3M	8.48%	8.22%	● 1.03
10	134	\$13.3M	\$0.9M	1.1M	6.81%	8.06%	▲ 0.84
11	123	\$12.3M	\$0.9M	1.0M	7.46%	8.00%	● 0.93
12	125	\$12.7M	\$1.4M	1.0M	10.61%	8.00%	▲ 1.33
13	134	\$13.6M	\$1.0M	1.1M	7.40%	8.00%	● 0.92
14	105	\$10.9M	\$0.8M	0.9M	7.55%	8.00%	● 0.94
15	97	\$10.0M	\$0.9M	0.8M	9.35%	8.00%	▲ 1.17
16	94	\$9.9M	\$0.8M	0.9M	8.37%	9.00%	● 0.93
17	94	\$10.1M	\$1.0M	1.0M	10.15%	10.00%	● 1.02
18	130	\$13.5M	\$1.5M	1.5M	10.80%	11.00%	● 0.98
19	194	\$21.4M	\$3.2M	2.6M	14.73%	12.00%	▲ 1.23
20	95	\$10.4M	\$1.4M	1.3M	13.11%	12.00%	● 1.09
21	95	\$11.0M	\$1.8M	1.3M	16.34%	12.00%	▲ 1.36
22	67	\$7.9M	\$1.3M	0.9M	16.15%	12.00%	▲ 1.35
23	51	\$6.2M	\$1.1M	0.7M	17.44%	11.00%	◆ 1.59
24	57	\$6.9M	\$1.4M	0.7M	20.64%	10.00%	◆ 2.06
25	38	\$4.6M	\$0.8M	0.4M	17.46%	9.00%	◆ 1.94
26	25	\$3.1M	\$0.6M	0.2M	19.52%	8.00%	◆ 2.44
27	28	\$3.4M	\$0.5M	0.2M	15.88%	7.00%	◆ 2.27
28	30	\$3.8M	\$0.7M	0.2M	19.09%	6.00%	◆ 3.18
29	17	\$2.3M	\$0.5M	0.1M	23.41%	6.00%	◆ 3.90
30	9	\$1.2M	\$0.3M	0.1M	21.14%	6.00%	◆ 3.52
31	10	\$1.3M	\$0.3M	0.1M	23.35%	6.00%	◆ 3.89
32	5	\$0.7M	\$0.2M	0.0M	25.92%	6.00%	◆ 4.32
33	8	\$1.2M	\$0.3M	0.1M	23.77%	6.00%	◆ 3.96
34	3	\$0.4M	\$0.1M	0.0M	13.46%	6.00%	◆ 2.24
Total	2,215	\$233.7M	\$26.5M	21.7M	11.34%	9.30%	▲ 1.22

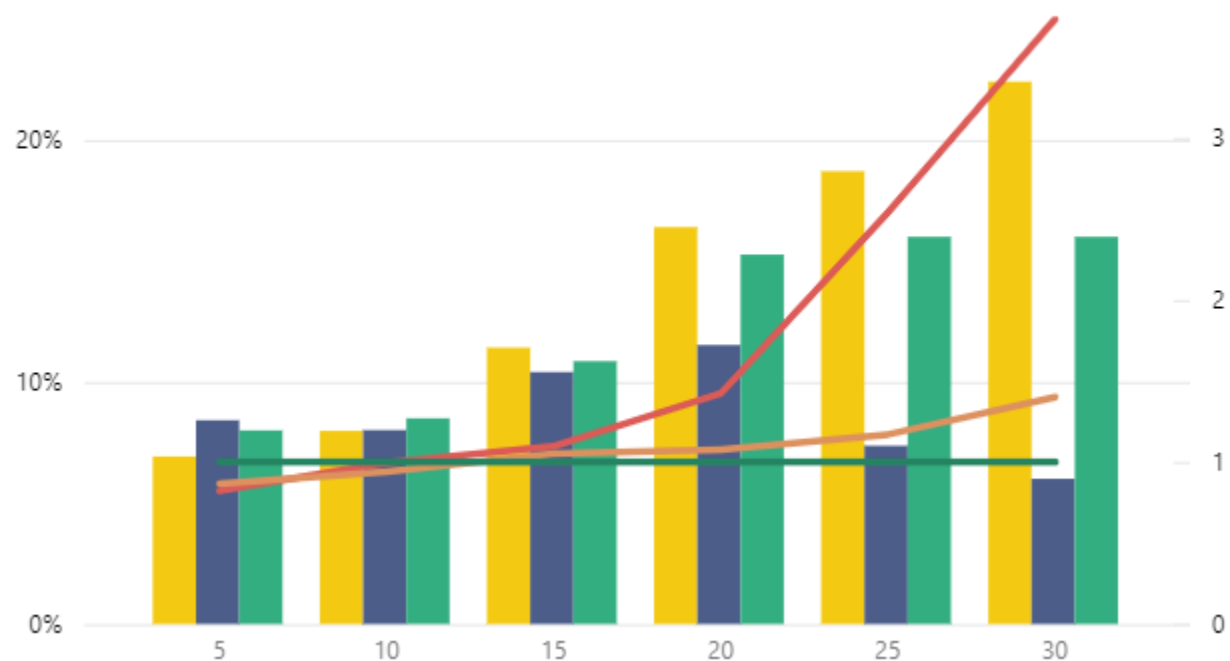
Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
5	47	\$3.7M	\$0.3M	\$0.3M	6.77%	8.00%	▲ 0.85
6	72	\$6.6M	\$0.4M	\$0.5M	5.49%	8.00%	▲ 0.69
7	74	\$6.9M	\$0.3M	\$0.6M	4.56%	8.00%	▲ 0.57
8	92	\$8.8M	\$0.6M	\$0.7M	7.11%	8.00%	▲ 0.89
9	162	\$15.5M	\$1.3M	\$1.2M	8.48%	8.00%	● 1.06
10	134	\$13.3M	\$0.9M	\$1.1M	6.81%	8.50%	▲ 0.80
11	123	\$12.3M	\$0.9M	\$1.0M	7.46%	8.50%	▲ 0.88
12	125	\$12.7M	\$1.4M	\$1.1M	10.61%	8.50%	▲ 1.25
13	134	\$13.6M	\$1.0M	\$1.2M	7.40%	8.50%	▲ 0.87
14	105	\$10.9M	\$0.8M	\$0.9M	7.55%	8.50%	▲ 0.89
15	97	\$10.0M	\$0.9M	\$0.9M	9.35%	9.00%	● 1.04
16	94	\$9.9M	\$0.8M	\$0.9M	8.37%	9.00%	● 0.93
17	94	\$10.1M	\$1.0M	\$1.0M	10.15%	9.50%	● 1.07
18	130	\$13.5M	\$1.5M	\$1.6M	10.80%	12.00%	▲ 0.90
19	194	\$21.4M	\$3.2M	\$2.7M	14.73%	12.50%	▲ 1.18
20	95	\$10.4M	\$1.4M	\$1.4M	13.11%	13.00%	● 1.01
21	95	\$11.0M	\$1.8M	\$1.8M	16.34%	16.00%	● 1.02
22	67	\$7.9M	\$1.3M	\$1.3M	16.15%	16.00%	● 1.01
23	51	\$6.2M	\$1.1M	\$1.0M	17.44%	16.00%	● 1.09
24	57	\$6.9M	\$1.4M	\$1.1M	20.64%	16.00%	▲ 1.29
25	38	\$4.6M	\$0.8M	\$0.7M	17.46%	16.00%	● 1.09
26	25	\$3.1M	\$0.6M	\$0.5M	19.52%	16.00%	▲ 1.22
27	28	\$3.4M	\$0.5M	\$0.5M	15.88%	16.00%	● 0.99
28	30	\$3.8M	\$0.7M	\$0.6M	19.09%	16.00%	▲ 1.19
29	17	\$2.3M	\$0.5M	\$0.4M	23.41%	16.00%	▲ 1.46
30	9	\$1.2M	\$0.3M	\$0.2M	21.14%	16.00%	▲ 1.32
31	10	\$1.3M	\$0.3M	\$0.2M	23.35%	16.00%	▲ 1.46
32	5	\$0.7M	\$0.2M	\$0.1M	25.92%	16.00%	◆ 1.62
33	8	\$1.2M	\$0.3M	\$0.2M	23.77%	16.00%	▲ 1.49
34	3	\$0.4M	\$0.1M	\$0.1M	13.46%	16.00%	▲ 0.84
Total	2,215	\$233.7M	\$26.5M	\$25.7M	11.34%	11.00%	● 1.03

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Service



Overtime Assumption - Actual, Expected, and Ratio; by Service

Legend: Actual Overtime ... (Yellow Bar), Current Assu... (Dark Blue Bar), Proposed Assu... (Green Bar), Ratio Act/Exp ... (Red Line), Ratio Act/Ex... (Orange Line), One (Green Line)



Summary

In total, the proposed overtime percentages are anticipated to increase a member's anticipated pensionable earnings under the plan, which would increase plan liabilities. It would also increase the assumed amount of employee contributions received, especially for members with at least 20 years of service, which would partially offset the increase in the employer's portion of the normal cost.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT ASSUMPTION					
OVERTIME AS A PERCENTAGE OF BASE PAY					
Years of Service	All Tiers Baseline	Tier 1 and Tier 2 Dual Service	Tier 1 and Tier 2 Dual Disability	Tier 3, Tier 3 Revised, & Tier 3 Enhanced Dual Service	Tier 3, Tier 3 Revised, & Tier 3 Enhanced Dual Disability
0	17.00%	21.00%	8.00%	20.00%	12.00%
1	17.00%	21.00%	8.00%	20.00%	12.00%
2	17.00%	21.00%	8.00%	20.00%	12.00%
3	17.00%	21.00%	8.00%	20.00%	12.00%
4	17.00%	21.00%	8.00%	20.00%	12.00%
5	17.00%	21.00%	8.00%	20.00%	12.00%
6	17.00%	21.00%	8.00%	20.00%	12.00%
7	17.00%	21.00%	8.00%	20.00%	12.00%
8	17.00%	21.00%	8.00%	20.00%	12.00%
9	17.00%	21.00%	8.00%	20.00%	12.00%
10	17.00%	21.00%	8.00%	20.00%	12.00%
11	17.00%	21.00%	8.00%	20.00%	12.00%
12	17.00%	21.00%	8.00%	20.00%	12.00%
13	17.00%	21.00%	8.00%	20.00%	12.00%
14	17.00%	21.00%	8.00%	20.00%	12.00%
15	17.00%	21.00%	8.00%	20.00%	12.00%
16	17.00%	21.00%	9.00%	20.00%	12.00%
17	17.00%	21.00%	10.00%	20.00%	13.00%
18	17.00%	21.00%	11.00%	20.00%	13.00%
19	17.00%	21.00%	12.00%	20.00%	14.00%
20	17.00%	21.00%	12.00%	20.00%	14.00%
21	17.00%	21.00%	12.00%	20.00%	14.00%
22	17.00%	21.00%	12.00%	20.00%	14.00%
23	16.00%	20.00%	11.00%	18.00%	13.00%
24	15.00%	18.00%	10.00%	17.00%	12.00%
25	14.00%	17.00%	9.00%	16.00%	11.00%
26	13.00%	16.00%	8.00%	15.00%	10.00%
27	12.00%	15.00%	7.00%	14.00%	9.00%
28	10.00%	14.00%	6.00%	13.00%	8.00%
29	9.00%	13.00%	6.00%	12.00%	7.00%
30	8.00%	12.00%	6.00%	10.00%	6.00%
31	7.00%	10.00%	6.00%	9.00%	6.00%
32	7.00%	9.00%	6.00%	9.00%	6.00%
33	7.00%	9.00%	6.00%	9.00%	6.00%
34+	7.00%	9.00%	6.00%	9.00%	6.00%

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED ASSUMPTION		
OVERTIME AS A PERCENTAGE OF BASE PAY		
Years of Service	Baseline and Dual Retirement ¹	Dual Disability ²
0	11.00%	5.50%
1	12.00%	6.00%
2	13.00%	6.50%
3	14.00%	7.00%
4	15.00%	7.50%
5	16.00%	8.00%
6	16.00%	8.00%
7	16.00%	8.00%
8	16.00%	8.00%
9	16.00%	8.00%
10	17.00%	8.50%
11	17.00%	8.50%
12	17.00%	8.50%
13	17.00%	8.50%
14	17.00%	8.50%
15	17.50%	9.00%
16	18.00%	9.00%
17	19.00%	9.50%
18	20.00%	12.00%
19	21.00%	12.50%
20	22.00%	13.00%
21	22.00%	16.00%
22	22.00%	16.00%
23	22.00%	16.00%
24	22.00%	16.00%
25	22.00%	16.00%
26	22.00%	16.00%
27	22.00%	16.00%
28	22.00%	16.00%
29	22.00%	16.00%
30+	22.00%	16.00%

¹ Dual retirement rate applies in year before assumed retirement

² Dual disability rate applies in year before assumed disability

Withdrawal

The current withdrawal assumption varies by service. The proposed assumption also varies by service. Overall, this results in an increase in the assumed rates of withdrawal, especially at 5 or fewer years of service with lower assumed rates of withdrawal at higher years of service.

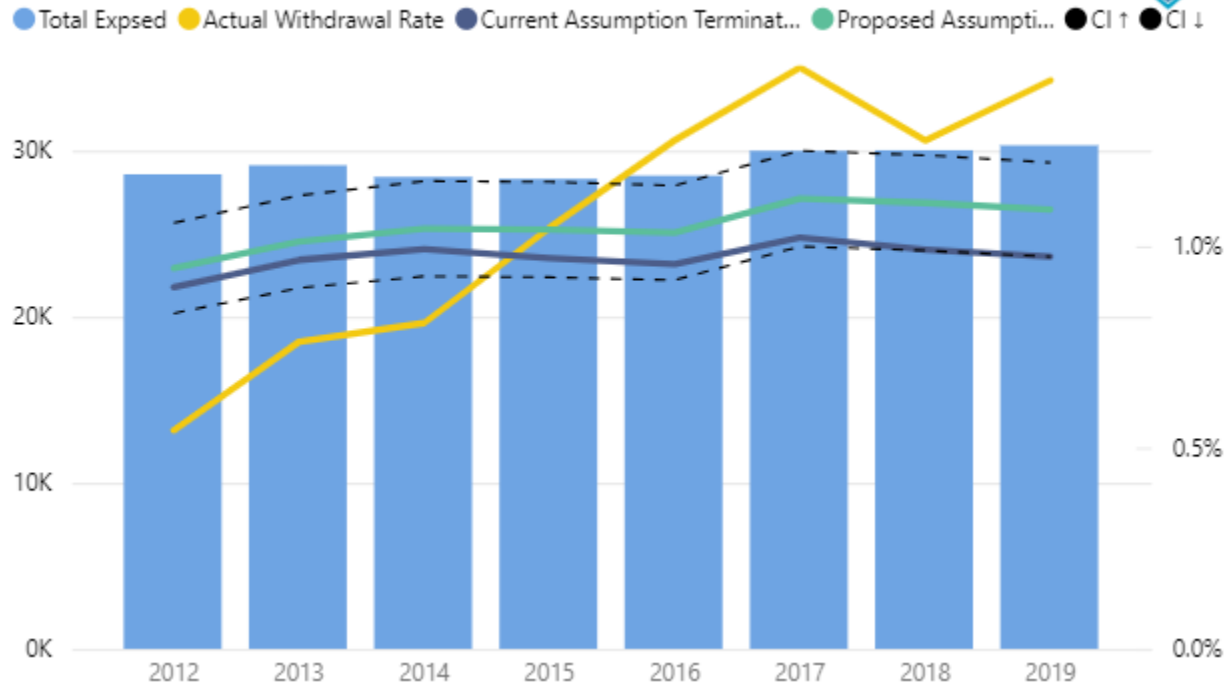
The analysis reflected years from 2012 - 2019 as the rate of termination during 2020 and 2021 may be artificially low due to members with a LOA status code. A record with a LOA status code is included as an exposure and not a decrement.

The following charts show the experience of withdrawal by year, for the age range (22 to 59) and service range (0 to 19 years). The actual rate of withdrawal averaged 1.07% whereas the overall expected rate of withdrawal averaged 0.97% based on the current assumptions and 1.05% based on the proposed assumptions.

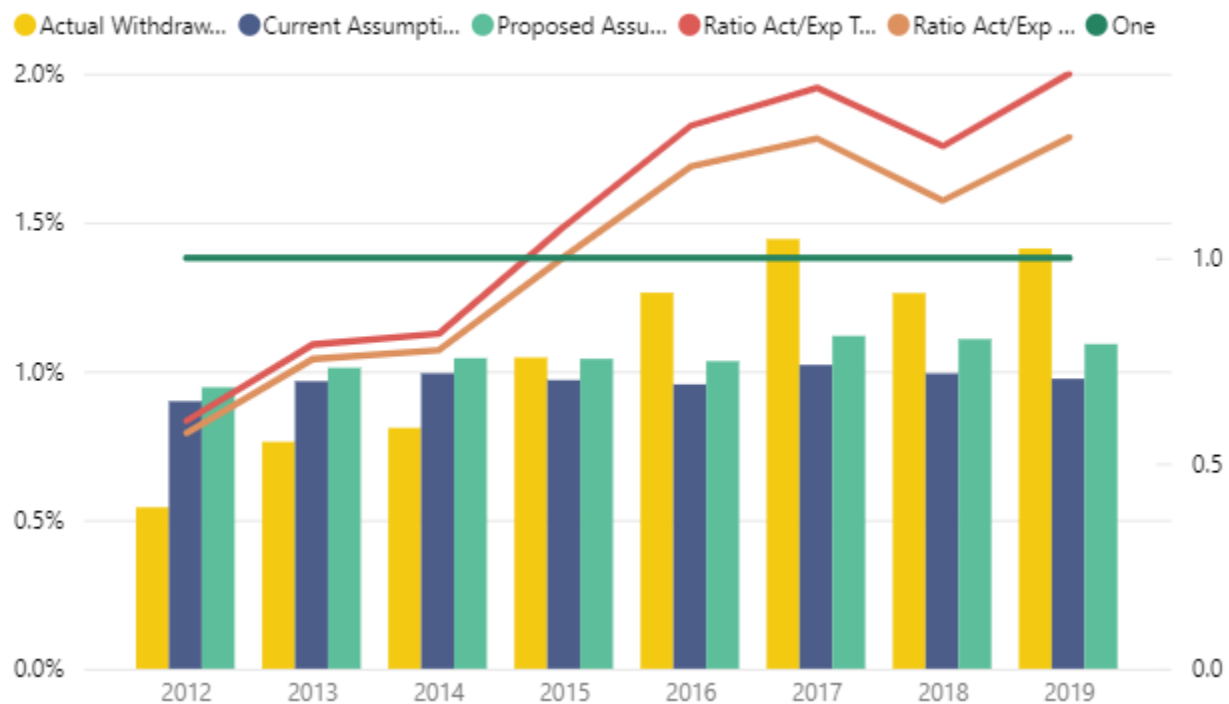
Plan Year	Actual Withdrawals	Expected Withdrawals	Total Exposed	Actual Withdrawal Rate	Current Assumption Termination	Ratio Act/Exp Term
2012	155	256.8	28,573	0.54%	0.90%	▲ 0.60
2013	222	281.3	29,116	0.76%	0.97%	▲ 0.79
2014	230	282.1	28,418	0.81%	0.99%	▲ 0.82
2015	296	274.6	28,303	1.05%	0.97%	● 1.08
2016	360	272.3	28,493	1.26%	0.96%	▲ 1.32
2017	433	306.2	29,991	1.44%	1.02%	▲ 1.41
2018	379	297.8	30,024	1.26%	0.99%	▲ 1.27
2019	428	295.4	30,315	1.41%	0.97%	▲ 1.45
Total	2,503	2,266.4	233,233	1.07%	0.97%	▲ 1.10

Plan Year	Actual Withdrawals	Expected Withdrawals Proposed	Total Exposed	Actual Withdrawal Rate	Proposed Assumption Termination	Act/Exp Proposed Term
2012	155	270.2	28,573	0.54%	0.95%	▲ 0.57
2013	222	294.4	29,116	0.76%	1.01%	▲ 0.75
2014	230	296.6	28,418	0.81%	1.04%	▲ 0.78
2015	296	294.7	28,303	1.05%	1.04%	● 1.00
2016	360	294.4	28,493	1.26%	1.03%	▲ 1.22
2017	433	335.4	29,991	1.44%	1.12%	▲ 1.29
2018	379	332.6	30,024	1.26%	1.11%	▲ 1.14
2019	428	330.7	30,315	1.41%	1.09%	▲ 1.29
Total	2,503	2,449.1	233,233	1.07%	1.05%	● 1.02

Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Year



Withdrawal Rate - Actual, Expected, and Ratio; by Year

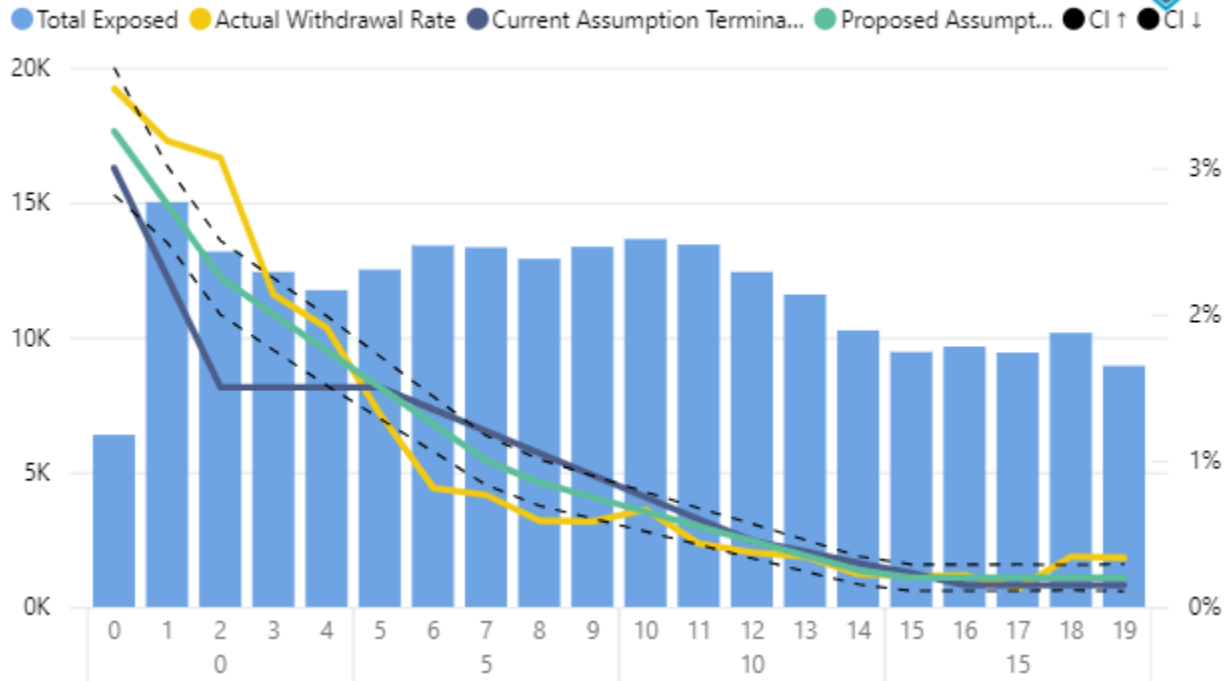


The following charts show the experience by service (0 to 19 years) in the experience study period first compared to the current assumption and then to the proposed assumption. This resulted in a decrease in the A/E ratio from 1.10 to 1.02 for ages 22 to 59.

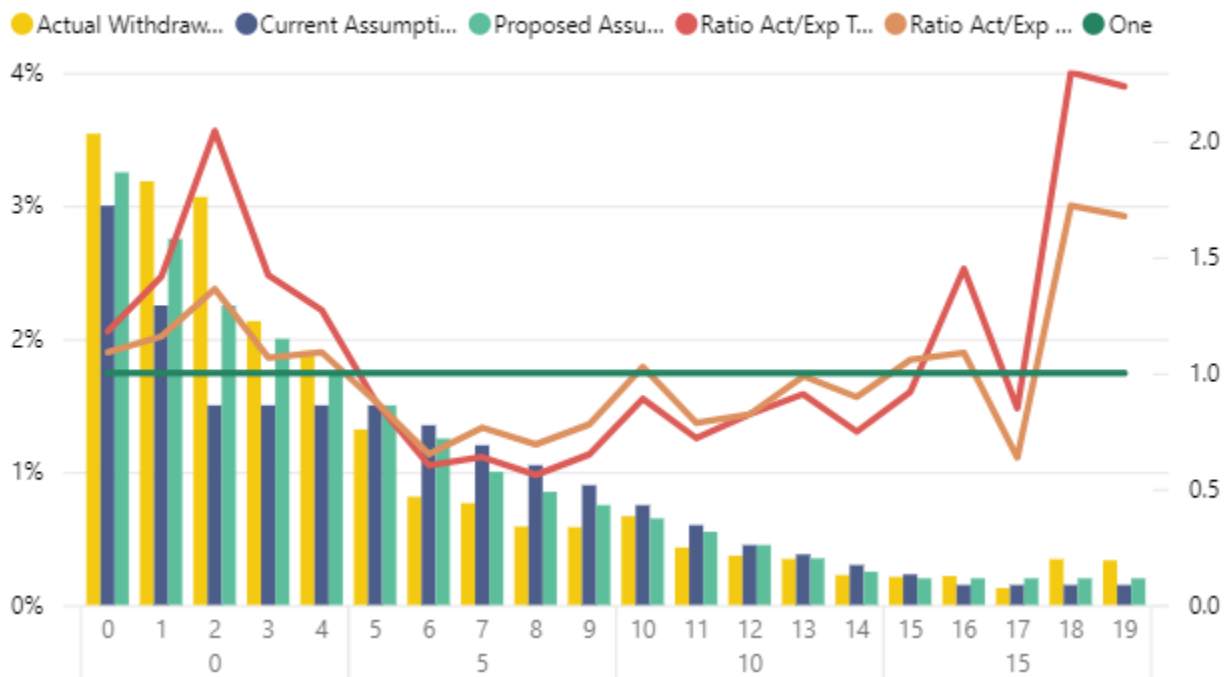
Service	Actual Withdrawals	Expected Withdrawals	Total Exposed	Actual Withdrawal Rate	Current Assumption Termination	Ratio Act/Exp Term
0	226	191.5	6,383	3.54%	3.00%	▲ 1.18
1	478	337.8	15,014	3.18%	2.25%	▲ 1.41
2	404	197.6	13,176	3.07%	1.50%	◆ 2.04
3	265	186.3	12,422	2.13%	1.50%	▲ 1.42
4	224	176.2	11,747	1.91%	1.50%	▲ 1.27
5	165	187.6	12,509	1.32%	1.50%	▲ 0.88
6	109	180.9	13,400	0.81%	1.35%	▲ 0.60
7	102	160.0	13,335	0.76%	1.20%	▲ 0.64
8	76	135.5	12,908	0.59%	1.05%	▲ 0.56
9	78	120.2	13,353	0.58%	0.90%	▲ 0.65
10	91	102.3	13,640	0.67%	0.75%	▲ 0.89
11	58	80.6	13,436	0.43%	0.60%	▲ 0.72
12	46	55.9	12,423	0.37%	0.45%	▲ 0.82
13	40	44.0	11,582	0.35%	0.38%	● 0.91
14	23	30.8	10,256	0.22%	0.30%	▲ 0.75
15	20	21.7	9,456	0.21%	0.23%	● 0.92
16	21	14.5	9,655	0.22%	0.15%	▲ 1.45
17	12	14.1	9,431	0.13%	0.15%	▲ 0.85
18	35	15.2	10,163	0.34%	0.15%	◆ 2.30
19	30	13.4	8,944	0.34%	0.15%	◆ 2.24
Total	2,503	2,266.4	233,233	1.07%	0.97%	▲ 1.10

Service	Actual Withdrawals	Expected Withdrawals Proposed	Total Exposed	Actual Withdrawal Rate	Proposed Assumption Termination	Act/Exp Proposed Term
0	226	207.4	6,383	3.54%	3.25%	● 1.09
1	478	412.9	15,014	3.18%	2.75%	▲ 1.16
2	404	296.5	13,176	3.07%	2.25%	▲ 1.36
3	265	248.4	12,422	2.13%	2.00%	● 1.07
4	224	205.6	11,747	1.91%	1.75%	● 1.09
5	165	187.6	12,509	1.32%	1.50%	▲ 0.88
6	109	167.5	13,400	0.81%	1.25%	▲ 0.65
7	102	133.3	13,335	0.76%	1.00%	▲ 0.76
8	76	109.7	12,908	0.59%	0.85%	▲ 0.69
9	78	100.1	13,353	0.58%	0.75%	▲ 0.78
10	91	88.7	13,640	0.67%	0.65%	● 1.03
11	58	73.9	13,436	0.43%	0.55%	▲ 0.78
12	46	55.9	12,423	0.37%	0.45%	▲ 0.82
13	40	40.5	11,582	0.35%	0.35%	● 0.99
14	23	25.6	10,256	0.22%	0.25%	▲ 0.90
15	20	18.9	9,456	0.21%	0.20%	● 1.06
16	21	19.3	9,655	0.22%	0.20%	● 1.09
17	12	18.9	9,431	0.13%	0.20%	▲ 0.64
18	35	20.3	10,163	0.34%	0.20%	◆ 1.72
19	30	17.9	8,944	0.34%	0.20%	◆ 1.68
Total	2,503	2,449.1	233,233	1.07%	1.05%	● 1.02

Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Service



Withdrawal Rate - Actual, Expected, and Ratio; by Service



Summary

In total, the proposed rates of withdrawal have increased the anticipated number of terminations. Typically, higher rates of withdrawal will result in a decrease in plan liabilities. However, lower assumptions are proposed for longer service members, and we would anticipate that these changes would increase plan liabilities. The actual impact will depend on the demographics of the active membership.

Assumption Tables

The following table shows the current rate assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF TERMINATION	
Years Of Service	Rate
0	3.000%
1	2.250%
2	1.500%
3	1.500%
4	1.500%
5	1.500%
6	1.350%
7	1.200%
8	1.050%
9	0.900%
10	0.750%
11	0.600%
12	0.450%
13	0.380%
14	0.300%
15	0.230%
16	0.150%
17	0.150%
18	0.150%
19	0.150%
20	N/A

The following table shows the proposed rate assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF TERMINATION	
Years of Service	Rate
0	3.25%
1	2.75%
2	2.25%
3	2.00%
4	1.75%
5	1.50%
6	1.25%
7	1.00%
8	0.85%
9	0.75%
10	0.65%
11	0.55%
12	0.45%
13	0.35%
14	0.25%
15	0.20%
16	0.20%
17	0.20%
18	0.20%
19	0.20%
20	N/A

Retirement

The current retirement assumption varies by age and first eligibility for retirement. We propose retirement assumptions that vary by age and years of service. First eligibility is defined as 20 years of service for Tier 1 and 2 members and as 25 years of service for Tier 3 members. The proposed retirement assumption reflects the experience of members having higher rates of retirement at 25 and 30 years of service. In the 25th year of service, all longevity salary adjustments are included in pensionable earnings.

In addition, there are separate rates that apply to Tier 3 members prior to 25 years of service. Tier 3 became effective July 1, 2009, and requires 20 years of service to retire. Therefore, there is no retirement experience associated with this tier. However, using the experience for Tier 1 and Tier 2 members, we have extrapolated proposed assumptions for these members.

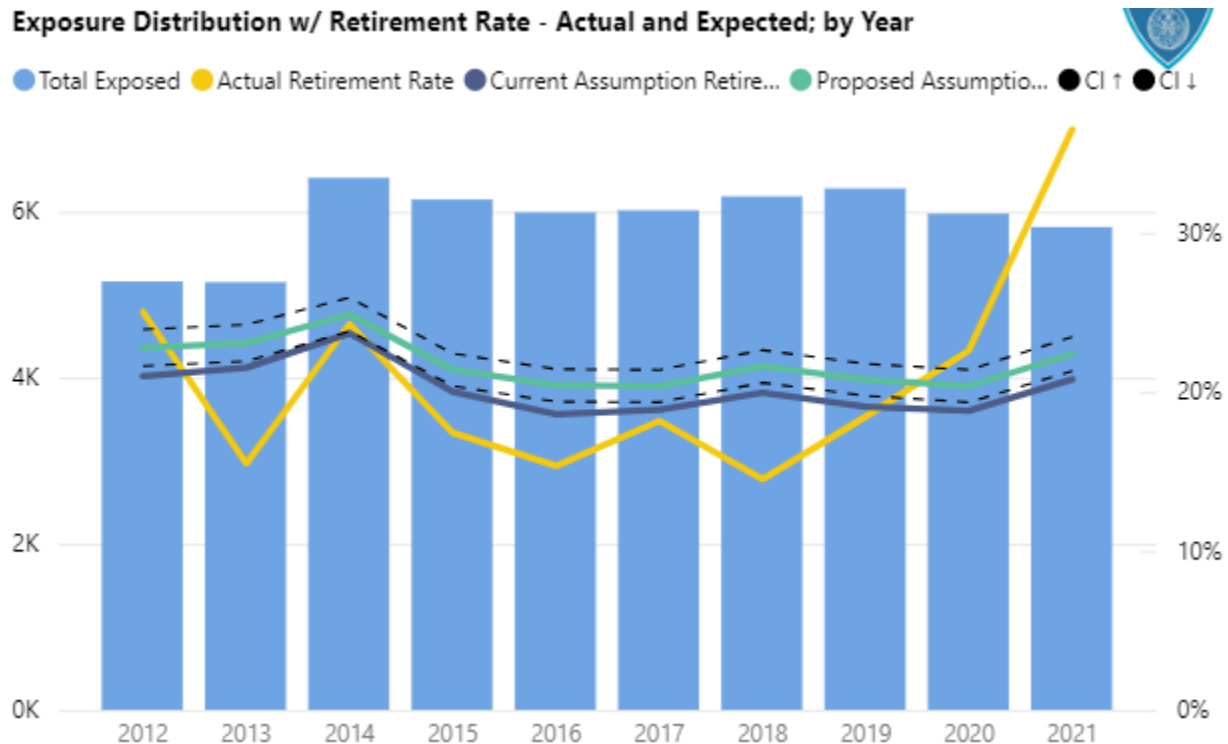
Please note that members who retired with World Trade Center (WTC) benefits are considered accidental disability retirements for purposes of this analysis, thus potentially reducing the number of service retirements. Our analysis reviewed the experience for members who were eligible and were not eligible for WTC benefits. We propose the same retirement rates apply to both groups.

The following table shows the retirement experience by year, for the age range (40 to 62) and service range (20 to 39 years). The actual rate of retirement averaged 20.73% whereas the overall expected rate of retirement averaged 20.21% based on the current assumptions and 21.77% based on the proposed assumptions.

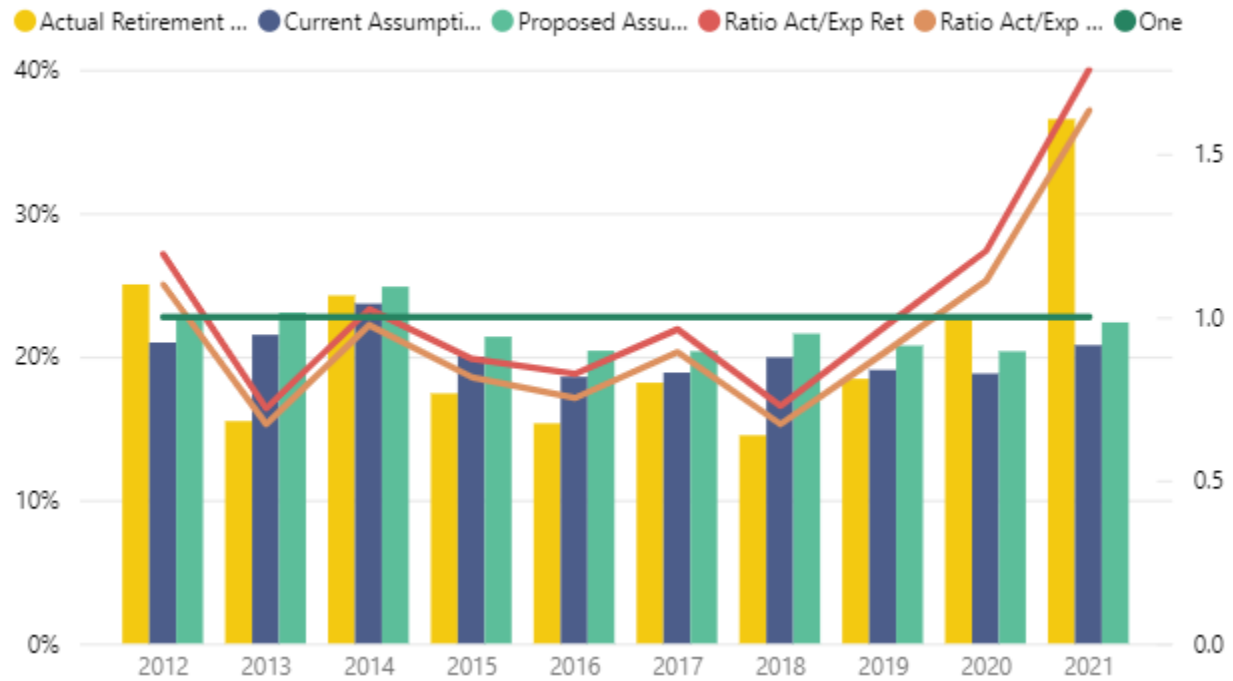
Plan Year	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
2012	1,291	1,082.0	5,159	25.02%	20.97%	▲ 1.19
2013	798	1,107.8	5,150	15.50%	21.51%	▲ 0.72
2014	1,554	1,517.5	6,407	24.25%	23.68%	● 1.02
2015	1,071	1,228.9	6,146	17.43%	19.99%	▲ 0.87
2016	919	1,112.9	5,991	15.34%	18.58%	▲ 0.83
2017	1,093	1,135.4	6,015	18.17%	18.88%	● 0.96
2018	897	1,232.8	6,183	14.51%	19.94%	▲ 0.73
2019	1,158	1,197.0	6,279	18.44%	19.06%	● 0.97
2020	1,352	1,123.9	5,975	22.63%	18.81%	▲ 1.20
2021	2,125	1,208.6	5,814	36.55%	20.79%	◆ 1.76
Total	12,258	11,946.9	59,119	20.73%	20.21%	● 1.03

Plan Year	Actual Retirements	Expected Retirements Proposed	Total Exposed	Actual Retirement Rate	Proposed Assumption Retirement	Ratio Act/Exp Proposed Ret
2012	1,291	1,174.7	5,159	25.02%	22.77%	1.10
2013	798	1,187.9	5,150	15.50%	23.07%	0.67
2014	1,554	1,593.1	6,407	24.25%	24.87%	0.98
2015	1,071	1,313.8	6,146	17.43%	21.38%	0.82
2016	919	1,222.2	5,991	15.34%	20.40%	0.75
2017	1,093	1,224.6	6,015	18.17%	20.36%	0.89
2018	897	1,335.1	6,183	14.51%	21.59%	0.67
2019	1,158	1,303.3	6,279	18.44%	20.76%	0.89
2020	1,352	1,216.5	5,975	22.63%	20.36%	1.11
2021	2,125	1,301.1	5,814	36.55%	22.38%	1.63
Total	12,258	12,872.3	59,119	20.73%	21.77%	0.95

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Year



Retirement Rate - Actual, Expected, and Ratio; by Year

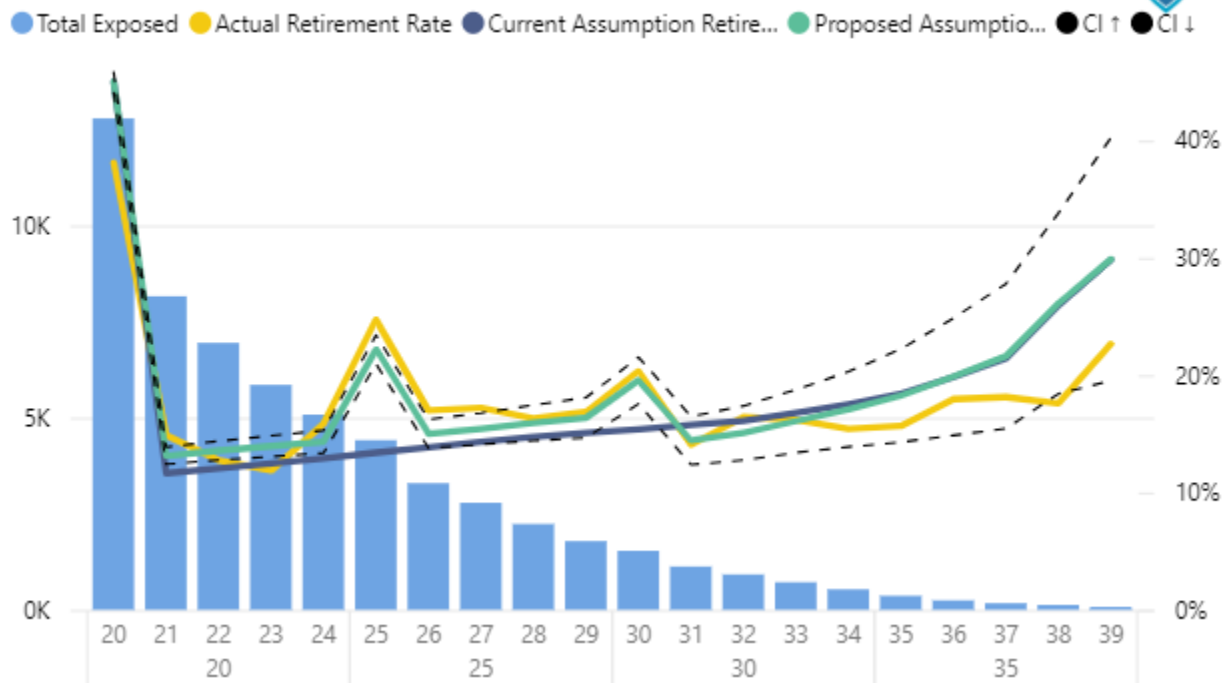


The following charts display the experience by service for the age range (40 to 62) with at least 20 years of service during the period 2012 – 2021 for the current and proposed assumptions. This resulted in a decrease in the A/E ratio from 1.03 to 0.95, which is primarily due to increases in rates of retirement after first eligibility (21 or more years of service). After first eligibility, the A/E ratio decreased from 1.19 to 1.04.

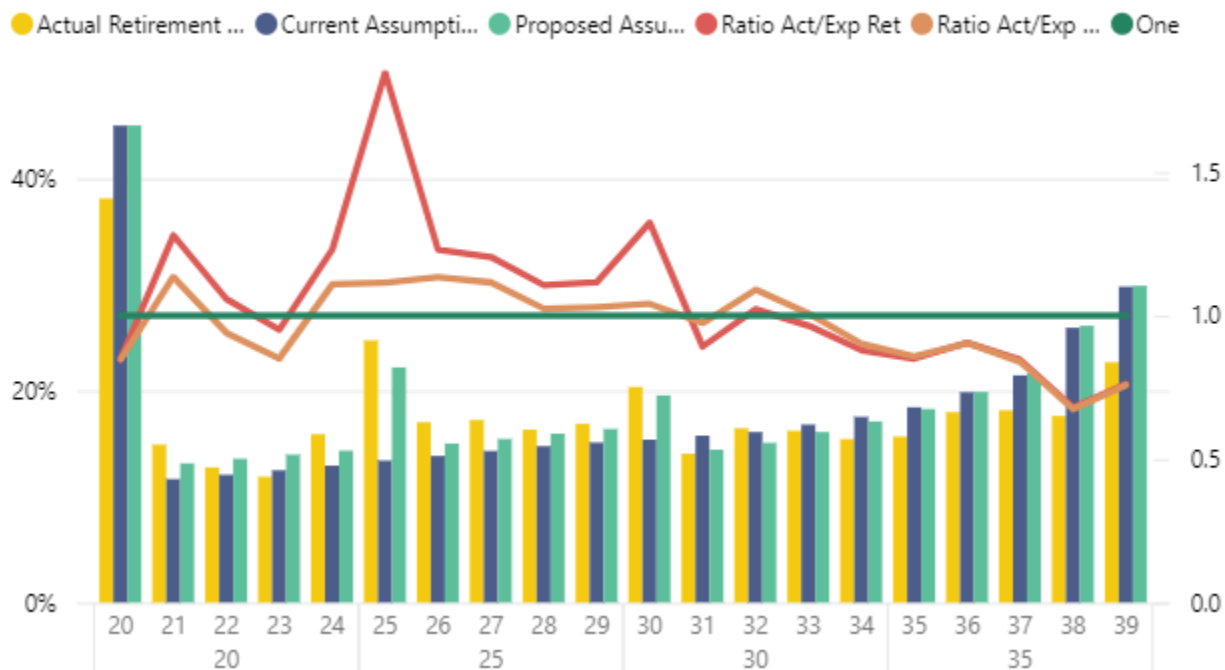
Service	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
20	4,873	5,751.5	12,782	38.12%	45.00%	▲ 0.85
21	1,215	949.6	8,156	14.90%	11.64%	▲ 1.28
22	885	836.7	6,943	12.75%	12.05%	● 1.06
23	694	729.7	5,850	11.86%	12.47%	● 0.95
24	806	655.7	5,076	15.88%	12.92%	▲ 1.23
25	1,091	590.7	4,412	24.73%	13.39%	◆ 1.85
26	560	455.3	3,293	17.01%	13.83%	▲ 1.23
27	479	397.9	2,783	17.21%	14.30%	▲ 1.20
28	364	329.2	2,232	16.31%	14.75%	▲ 1.11
29	301	269.5	1,786	16.85%	15.09%	▲ 1.12
30	312	235.7	1,534	20.34%	15.36%	▲ 1.32
31	158	177.1	1,125	14.04%	15.74%	▲ 0.89
32	151	147.8	919	16.43%	16.08%	● 1.02
33	116	120.2	716	16.20%	16.79%	● 0.97
34	82	93.2	532	15.41%	17.52%	▲ 0.88
35	57	67.0	364	15.66%	18.42%	▲ 0.85
36	44	48.6	245	17.96%	19.84%	● 0.91
37	31	36.7	171	18.13%	21.43%	▲ 0.85
38	22	32.4	125	17.60%	25.92%	▲ 0.68
39	17	22.4	75	22.67%	29.80%	▲ 0.76
Total	12,258	11,946.9	59,119	20.73%	20.21%	● 1.03

Service	Actual Retirements	Expected Retirements Proposed	Total Exposed	Actual Retirement Rate	Proposed Assumption Retirement	Act/Exp Proposed Ret
20	4,873	5,753.3	12,782	38.12%	45.01%	▲ 0.85
21	1,215	1,070.9	8,156	14.90%	13.13%	▲ 1.13
22	885	941.6	6,943	12.75%	13.56%	● 0.94
23	694	815.8	5,850	11.86%	13.95%	▲ 0.85
24	806	727.0	5,076	15.88%	14.32%	▲ 1.11
25	1,091	978.8	4,412	24.73%	22.18%	▲ 1.11
26	560	494.0	3,293	17.01%	15.00%	▲ 1.13
27	479	429.4	2,783	17.21%	15.43%	▲ 1.12
28	364	355.5	2,232	16.31%	15.93%	● 1.02
29	301	292.4	1,786	16.85%	16.37%	● 1.03
30	312	299.8	1,534	20.34%	19.54%	● 1.04
31	158	162.2	1,125	14.04%	14.42%	● 0.97
32	151	138.4	919	16.43%	15.06%	● 1.09
33	116	115.1	716	16.20%	16.08%	● 1.01
34	82	90.9	532	15.41%	17.09%	● 0.90
35	57	66.5	364	15.66%	18.26%	▲ 0.86
36	44	48.7	245	17.96%	19.86%	● 0.90
37	31	37.0	171	18.13%	21.61%	▲ 0.84
38	22	32.6	125	17.60%	26.11%	▲ 0.67
39	17	22.4	75	22.67%	29.88%	▲ 0.76
Total	12,258	12,872.3	59,119	20.73%	21.77%	● 0.95

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Service



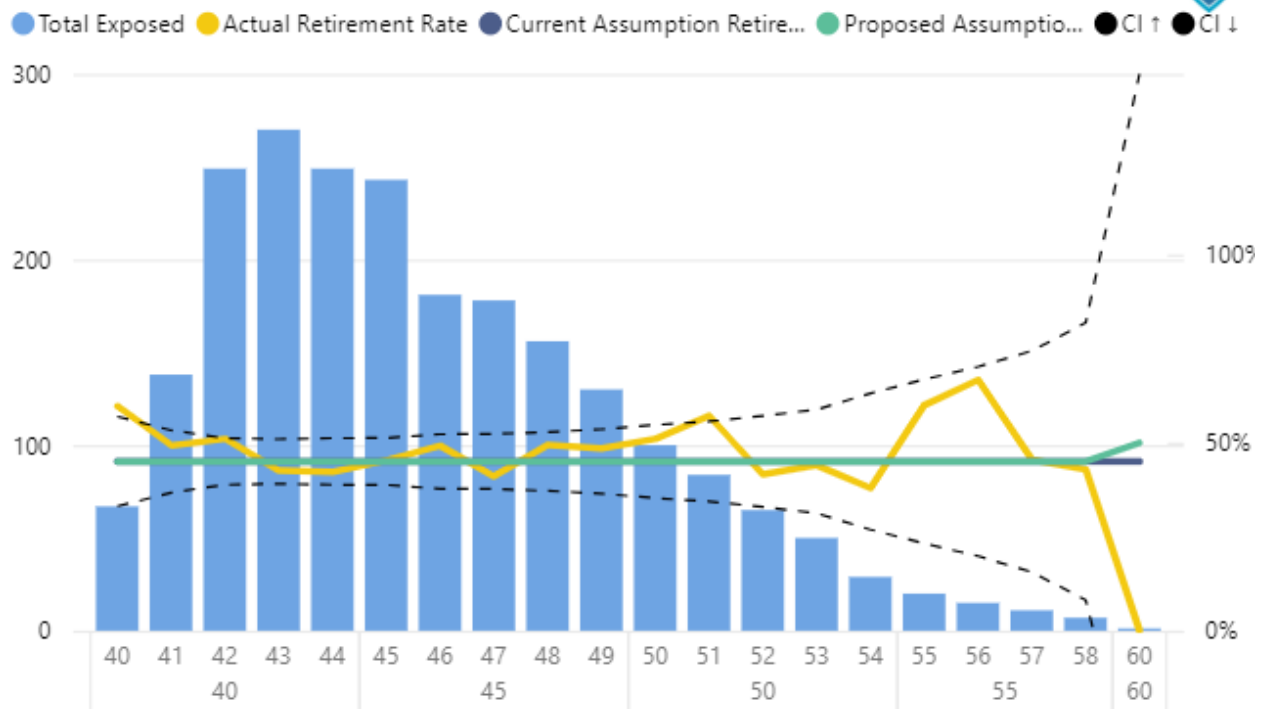
Retirement Rate - Actual, Expected, and Ratio; by Service



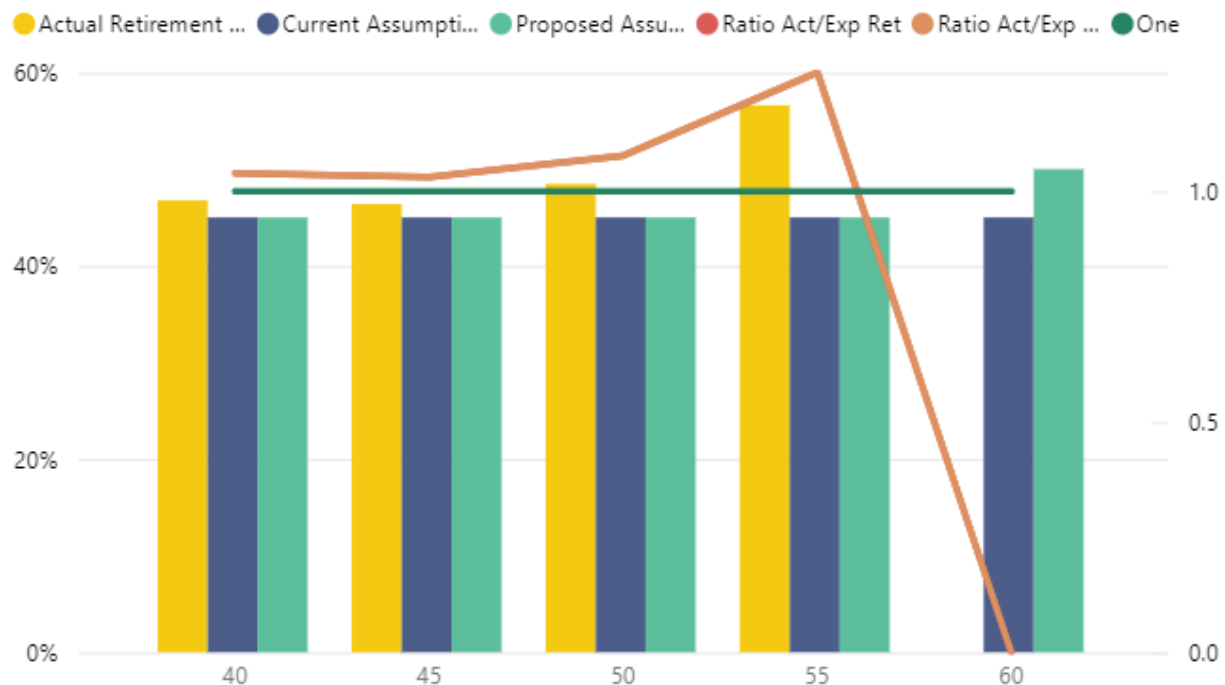
The following charts display the experience of first eligibility (20 years of service) by age based on the age range (40 to 62) for the proposed assumption, excluding those eligible for WTC benefits. No change is proposed for the rate of retirement at first eligibility, which has been influenced by the availability of WTC benefits. When the experience at first eligibility is reviewed for those not indicated as having filed for WTC benefits, the rate of retirement was 47% versus the assumed rate of 45%.

Age	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
40	291	214.7	477	61.01%	45.00%	▲ 1.36
41	459	507.6	1,128	40.69%	45.00%	● 0.90
42	687	809.1	1,798	38.21%	45.00%	▲ 0.85
43	754	924.3	2,054	36.71%	45.00%	▲ 0.82
44	641	774.0	1,720	37.27%	45.00%	▲ 0.83
45	598	719.5	1,599	37.40%	45.00%	▲ 0.83
46	516	598.5	1,330	38.80%	45.00%	▲ 0.86
47	420	509.8	1,133	37.07%	45.00%	▲ 0.82
48	369	414.9	922	40.02%	45.00%	▲ 0.89
49	332	361.8	804	41.29%	45.00%	● 0.92
50	251	276.8	615	40.81%	45.00%	● 0.91
51	213	204.8	456	46.71%	44.91%	● 1.04
52	150	153.9	342	43.86%	45.00%	● 0.97
53	98	102.6	228	42.98%	45.00%	● 0.96
54	59	60.3	134	44.03%	45.00%	● 0.98
55	47	45.0	100	47.00%	45.00%	● 1.04
56	42	33.7	75	56.00%	45.00%	▲ 1.24
57	19	17.6	39	48.72%	45.00%	● 1.08
58	10	9.0	20	50.00%	45.00%	▲ 1.11
59	5	5.4	12	41.67%	45.00%	● 0.93
60	2	1.8	4	50.00%	45.00%	▲ 1.11
61	3	1.8	4	75.00%	45.00%	◆ 1.67
62	2	1.4	3	66.67%	45.00%	▲ 1.48
Total	5,968	6,748.2	14,997	39.79%	45.00%	▲ 0.88

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Age



Retirement Rate - Actual, Expected, and Ratio; by Age

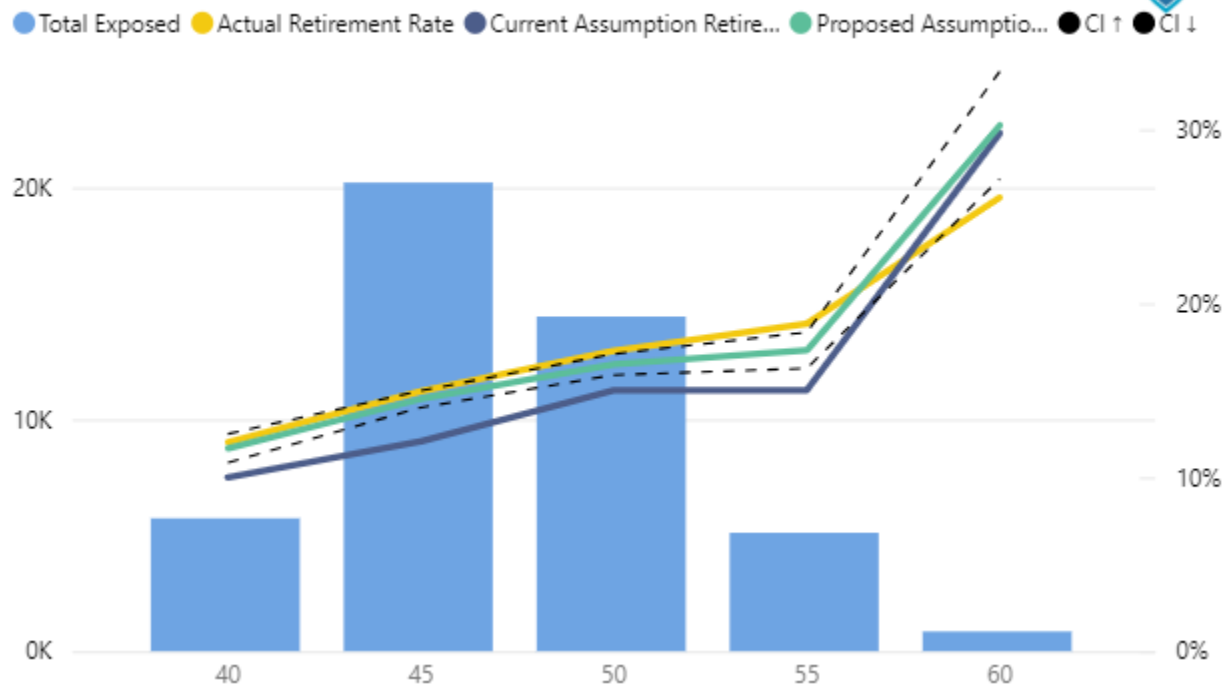


The following charts display the experience by age based on the age range (40 to 62) and service range (21 to 39) for the period 2012 – 2021 for the current and proposed assumptions, excluding experience at first eligibility. The actual rate of retirement averaged 15.94% whereas the overall expected rate of retirement averaged 13.37% based on the current assumptions and 15.36% based on the proposed assumptions. This resulted in a decrease in the A/E ratio from 1.19 to 1.04.

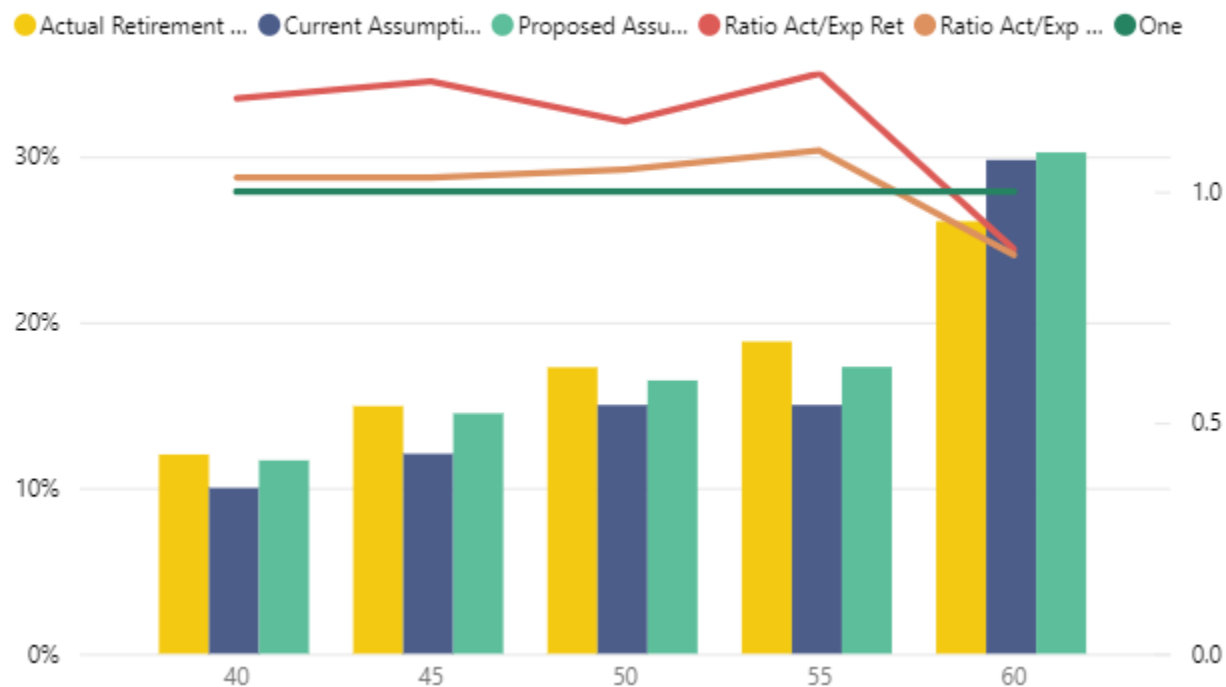
Age	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
40	0	1.7	17	0.00%	10.00%	0.00
41	23	19.3	193	11.92%	10.00%	1.19
42	102	82.8	828	12.32%	10.00%	1.23
43	236	182.9	1,829	12.90%	10.00%	1.29
44	328	286.6	2,867	11.44%	10.00%	1.14
45	496	357.7	3,577	13.87%	10.00%	1.39
46	594	444.3	4,039	14.71%	11.00%	1.34
47	639	509.5	4,246	15.05%	12.00%	1.25
48	632	553.2	4,256	14.85%	13.00%	1.14
49	658	572.8	4,093	16.08%	13.99%	1.15
50	659	562.7	3,751	17.57%	15.00%	1.17
51	548	497.6	3,317	16.52%	15.00%	1.10
52	484	426.6	2,844	17.02%	15.00%	1.13
53	433	369.0	2,461	17.59%	14.99%	1.17
54	369	308.9	2,059	17.92%	15.00%	1.19
55	328	241.8	1,612	20.35%	15.00%	1.36
56	227	184.4	1,229	18.47%	15.00%	1.23
57	165	145.0	967	17.06%	15.00%	1.14
58	119	110.1	734	16.21%	15.00%	1.08
59	123	85.0	567	21.69%	15.00%	1.45
60	67	78.4	392	17.09%	20.00%	0.85
61	52	81.6	272	19.12%	30.00%	0.64
62	103	93.5	187	55.08%	50.00%	1.10
Total	7,385	6,195.4	46,337	15.94%	13.37%	1.19

Age	Actual Retirements	Expected Retirements Proposed	Total Exposed	Actual Retirement Rate	Proposed Assumption Retirement	Act/Exp Proposed Ret
40	0	1.7	17	0.00%	10.00%	0.00
41	23	20.3	193	11.92%	10.50%	1.13
42	102	91.1	828	12.32%	11.00%	1.12
43	236	210.6	1,829	12.90%	11.52%	1.12
44	328	345.0	2,867	11.44%	12.03%	0.95
45	496	463.7	3,577	13.87%	12.96%	1.07
46	594	573.4	4,039	14.71%	14.20%	1.04
47	639	617.5	4,246	15.05%	14.54%	1.03
48	632	640.7	4,256	14.85%	15.05%	0.99
49	658	634.6	4,093	16.08%	15.50%	1.04
50	659	598.2	3,751	17.57%	15.95%	1.10
51	548	543.8	3,317	16.52%	16.40%	1.01
52	484	473.3	2,844	17.02%	16.64%	1.02
53	433	413.0	2,461	17.59%	16.78%	1.05
54	369	351.0	2,059	17.92%	17.05%	1.05
55	328	276.3	1,612	20.35%	17.14%	1.19
56	227	212.8	1,229	18.47%	17.32%	1.07
57	165	168.9	967	17.06%	17.47%	0.98
58	119	127.1	734	16.21%	17.32%	0.94
59	123	98.7	567	21.69%	17.42%	1.25
60	67	80.6	392	17.09%	20.55%	0.83
61	52	82.8	272	19.12%	30.44%	0.63
62	103	94.0	187	55.08%	50.27%	1.10
Total	7,385	7,118.9	46,337	15.94%	15.36%	1.04

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Age



Retirement Rate - Actual, Expected, and Ratio; by Age



Tier 3

Setting retirement rates for a new benefit tier is effectively a theoretical exercise. When setting the rates for the new tier, we must consider how changes to eligibility requirements and benefit levels would impact member behavior and specifically rates of retirement, especially at certain service levels. In most situations, we can review the experience of prior membership tiers to determine how future membership tiers may act based on differences in the plan provisions.

The following items were reflected in our analysis in proposing modifications to the current assumptions:

- A police member can retire at 20 years of service under Tier 3, although the benefit is lower than Tier 1 and Tier 2 benefits. Experience has shown that a significant number of Tier 1 and Tier 2 members retire at 20 years of service (assumption is 45%). How significantly would this percentage drop due to the changes in plan provisions.
- At 22 years of service, Tier 3 members receive a benefit of 50% of final average salary which equals the percentage provided under Tier 1 and Tier 2, although the definition of final average salary is more stringent under Tier 3 than under Tier 1 and Tier 2.
- Beginning at 22 years of service, Tier 3 members can accrue credit towards full escalation of benefits. Providing a cost-of-living adjustment can be a fairly expensive benefit for police members who retire earlier than other public employee groups.
- At 25 years of service, a Tier 3 member has fully accrued the full escalation benefit. Furthermore, there are no further accruals if the member works beyond 25 years of service and all longevity compensation is included in the calculation of a member's final average salary. Under Tier 1 and Tier 2, members continue to accrue benefits under the 1/60th formula. This could incentivize Tier 3 members to retire at 25 years of service.

Based on these points, we believe that the number of police members who will retire after 25 years of service would be similar under Tier 3 as compared to those who would retire under Tier 1 and Tier 2. If there were 1,000 Tier 1 and Tier 2 members eligible to retire at 20 years of service, we have estimated approximately 750 would retire by the time they would have completed 25 years of service. Under the current assumption for Tier 3 members, we have estimated that approximately 30% fewer retirements occur during this same time period. We propose rates for the Tier 3 members that would approximate the same number of 750 that are anticipated to retire under Tier 1 and Tier 2 as we would not necessarily expect a significant reduction in the number of police members retiring after completing 25 years of service.

The following table compares the current assumption to the proposed assumption.

Tier 3, Tier 3 Revised and Tier 3 Enhanced Comparison of Current and Proposed Retirement Assumption		
Years of Service	Current Assumption	Proposed Assumption
20	5.0%	15.0%
21	2.0%	5.0%
22	5.0%	22.5%
23	2.0%	10.0%
24	2.0%	15.0%
25	45.0%	45.0%

Summary

In total, the proposed rates of retirement have increased the anticipated number of retirements for all Tiers, which we anticipate would increase plan liabilities.

Assumption Tables

The following tables show the current assumptions.

NEW YORK CITY POLICE PENSION FUND		
PROBABILITIES OF SERVICE RETIREMENT RETIREMENT WITH FULL COLA/ESCALATION FOR THOSE ELIGIBLE FOR UNREDUCED		
Age	Years of Service Since First Eligible	
	Year 1	Ultimate
39	45.00%	10.00%
40	45.00%	10.00%
41	45.00%	10.00%
42	45.00%	10.00%
43	45.00%	10.00%
44	45.00%	10.00%
45	45.00%	10.00%
46	45.00%	11.00%
47	45.00%	12.00%
48	45.00%	13.00%
49	45.00%	14.00%
50	45.00%	15.00%
51	45.00%	15.00%
52	45.00%	15.00%
53	45.00%	15.00%
54	45.00%	15.00%
55	45.00%	15.00%
56	45.00%	15.00%
57	45.00%	15.00%
58	45.00%	15.00%
59	45.00%	15.00%
60	45.00%	20.00%
61	45.00%	30.00%
62	45.00%	50.00%
63	100.00%	100.00%

*100% for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members. - Age 62

<p>NEW YORK CITY POLICE PENSION FUND</p> <p>PROBABILITIES OF EARLY SERVICE RETIREMENT FOR TIER 3, TIER 3 REVISED, AND TIER 3 ENHANCED MEMBERS</p>		
Years of Service	Reduced Service Retirement	Unreduced Before Full Escalation
20	5.00%	N/A
21	2.00%	N/A
22	N/A	5.00%
23	N/A	2.00%
24	N/A	2.00%

The following tables show the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF SERVICE RETIREMENT				
Age	Unreduced Retirement			
	20 YOS ²	25 YOS	30 YOS	Other ³
39	45.00%	17.50%	12.50%	10.00%
40	45.00%	17.50%	12.50%	10.00%
41	45.00%	18.00%	13.00%	10.50%
42	45.00%	18.50%	13.50%	11.00%
43	45.00%	19.00%	14.00%	11.50%
44	45.00%	19.50%	14.50%	12.00%
45	45.00%	20.00%	15.00%	12.50%
46	45.00%	20.50%	15.50%	13.00%
47	45.00%	21.00%	16.00%	13.50%
48	45.00%	21.50%	16.50%	14.00%
49	45.00%	22.00%	17.00%	14.50%
50	45.00%	22.50%	17.50%	15.00%
51	45.00%	23.00%	18.00%	15.50%
52	45.00%	23.50%	18.50%	16.00%
53	45.00%	24.00%	19.00%	16.50%
54	45.00%	24.50%	19.50%	17.00%
55	45.00%	25.00%	20.00%	17.50%
56	45.00%	25.50%	20.50%	18.00%
57	45.00%	26.00%	21.00%	18.50%
58	45.00%	26.50%	21.50%	19.00%
59	45.00%	27.00%	22.00%	19.50%
60	50.00%	30.00%	25.00%	20.00%
61	60.00%	40.00%	35.00%	30.00%
62 ¹	80.00%	60.00%	55.00%	50.00%
63	100.00%	100.00%	100.00%	100.00%

¹ 100% for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members

² 20 year rates apply at 25 years of service for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members

³ Applies to 21-24 and 26-29 years of service

³ Applies to 31+ years of service but multiply rates by 80% for ages less than 60

NEW YORK CITY POLICE PENSION FUND PROBABILITIES OF EARLY SERVICE RETIREMENT FOR TIER 3, TIER 3 REVISED, AND TIER 3 ENHANCED MEMBERS		
Years of Service	Reduced Service Retirement	Unreduced Before Full Escalation
20	15.00%	N/A
21	5.00%	N/A
22	N/A	22.50%
23	N/A	10.00%
24	N/A	15.00%

Disability

The current ordinary disability assumption varies by age. They apply to all service periods for Tier 1 and Tier 2 members, but do not apply before the five-year eligibility period is satisfied for Tier 3 members. Furthermore, different rates apply to accidental disability; these rates depend on age, Tier, and eligibility for World Trade Center disability benefits (WTC). We assumed that anyone with a WTC ultimate code would be eligible for the WTC benefits.

Ordinary disability benefits are as follows:

- For Tier 1 and Tier 2 members: 1/3 of final average salary (FAS) if the member has fewer than 10 years of service; 50% of FAS if the member has at least 10 years of service; 2.5% of FAS times the number of years of service if the member has completed 20 years of service.
- For Tier 3 members: the greater of 1/3 of FAS, or 2% of FAS times the number of years of credited service.

The member can elect a service retirement benefit instead of the ordinary disability benefit if eligible. Due to this fact, rates or ordinary disability were determined excluding the experience for members eligible for retirement.

The base accidental disability benefit equals 75% of final average salary plus 1/60th of total earnings after the 20th anniversary, which is greater than the service retirement benefit.

In performing the experience analysis, it is necessary to reassign disability retirement codes retroactively to reflect the eventual approval of a disability retirement. Members with a disability code in a given year had all inactive status codes in prior years changed to a disability status code. Members approved for WTC benefits had all prior inactive status codes changed to an accidental disability status code. Adjustments were made as far back as 2012.

It is difficult to determine how future years would impact the experience during the study period as we believe that this type of retroactive adjustment will be required in subsequent iterations of this study. The consequence will be a restatement of the number of disability retirements experienced during this study period, specifically 2019 – 2021.

For this purpose, our analysis reflected years from 2012 – 2019.

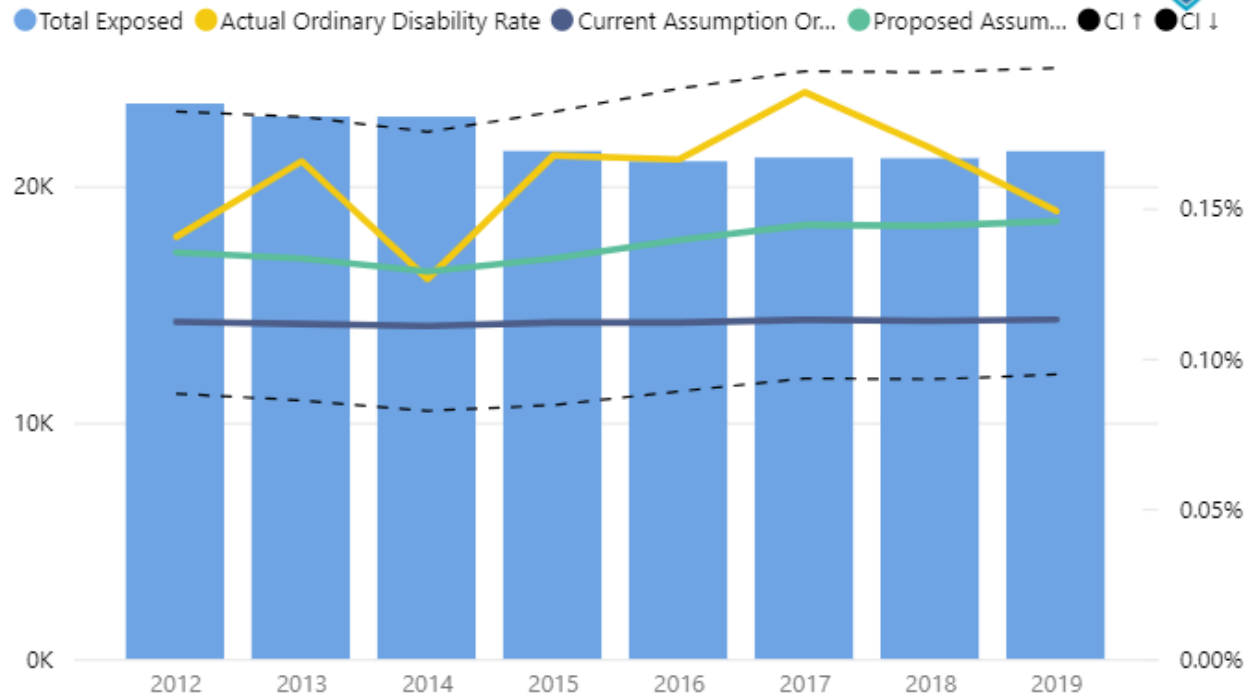
Ordinary Disability

The following charts show the experience of ordinary disability retirement by year, for the age range 25 to 54 and the service range 5 to 19 years during the period 2012 - 2019. As nearly no ordinary disability retirements occur once eligible for retirement, this analysis excludes all exposures at this point. During the selected service and age ranges, the actual rate of ordinary disability averaged 0.1587% whereas the overall expected rate of ordinary disability averaged 0.1121% based on the current assumptions and 0.1379% based on the proposed assumptions.

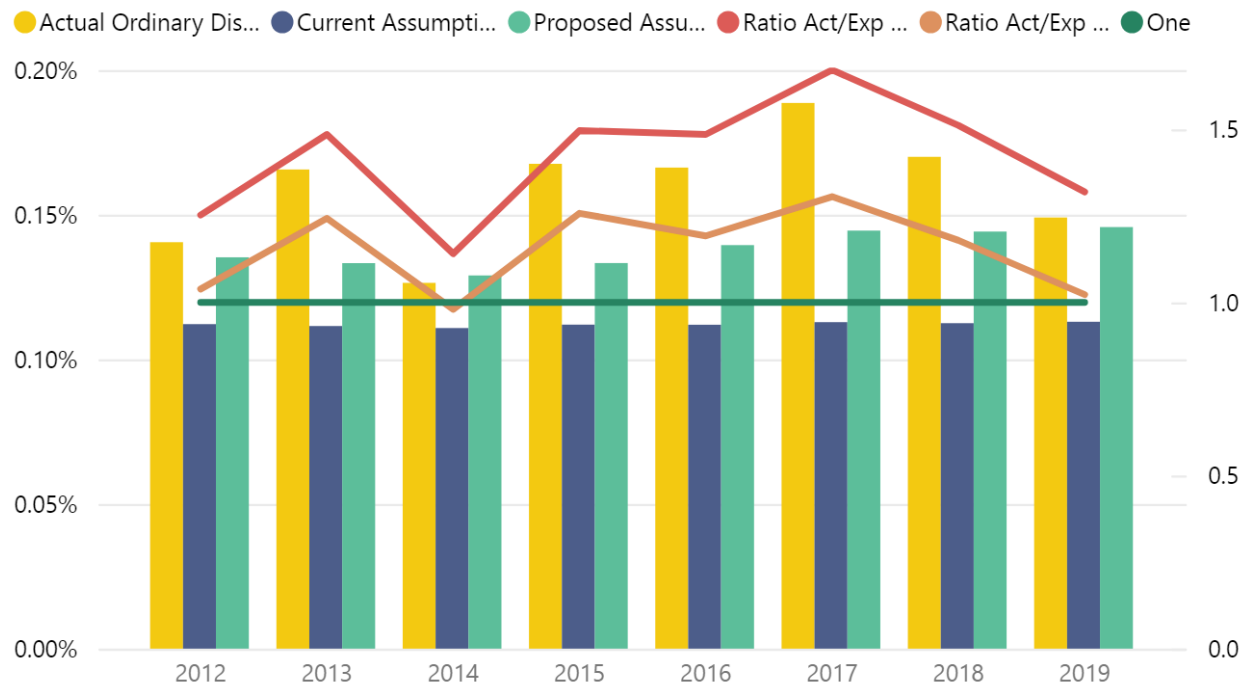
Plan Year	Actual Ordinary Disabilities	Expected Ordinary Disabilities	Total Exposed	Actual Ordinary Disability Rate	Current Assumption Ordinary Disability	Ratio Act/Exp Ordinary Disability
2012	33	26.3	23,493	0.1405%	0.1122%	▲ 1.25
2013	38	25.6	22,947	0.1656%	0.1115%	▲ 1.49
2014	29	25.4	22,941	0.1264%	0.1108%	▲ 1.14
2015	36	24.1	21,485	0.1676%	0.1120%	▲ 1.50
2016	35	23.6	21,052	0.1663%	0.1119%	▲ 1.49
2017	40	23.9	21,210	0.1886%	0.1128%	◆ 1.67
2018	36	23.8	21,180	0.1700%	0.1125%	◆ 1.51
2019	32	24.3	21,476	0.1490%	0.1130%	▲ 1.32
Total	279	197.0	175,784	0.1587%	0.1121%	▲ 1.42

Plan Year	Actual Ordinary Disabilities	Expected Ordinary Disabilities Proposed	Total Exposed	Actual Ordinary Disability Rate	Proposed Assumption Ordinary Disability	Act/Exp Proposed Ordinary Disability
2012	33	31.8	23,493	0.1405%	0.1352%	● 1.04
2013	38	30.6	22,947	0.1656%	0.1332%	▲ 1.24
2014	29	29.6	22,941	0.1264%	0.1290%	● 0.98
2015	36	28.6	21,485	0.1676%	0.1333%	▲ 1.26
2016	35	29.4	21,052	0.1663%	0.1395%	▲ 1.19
2017	40	30.6	21,210	0.1886%	0.1445%	▲ 1.31
2018	36	30.5	21,180	0.1700%	0.1441%	▲ 1.18
2019	32	31.3	21,476	0.1490%	0.1457%	● 1.02
Total	279	242.4	175,784	0.1587%	0.1379%	▲ 1.15

Exposure Distribution w/ Ordinary Disability Rate - Actual and Expected; by Year



Ordinary Disability Rate - Actual, Expected, and Ratio; by Year

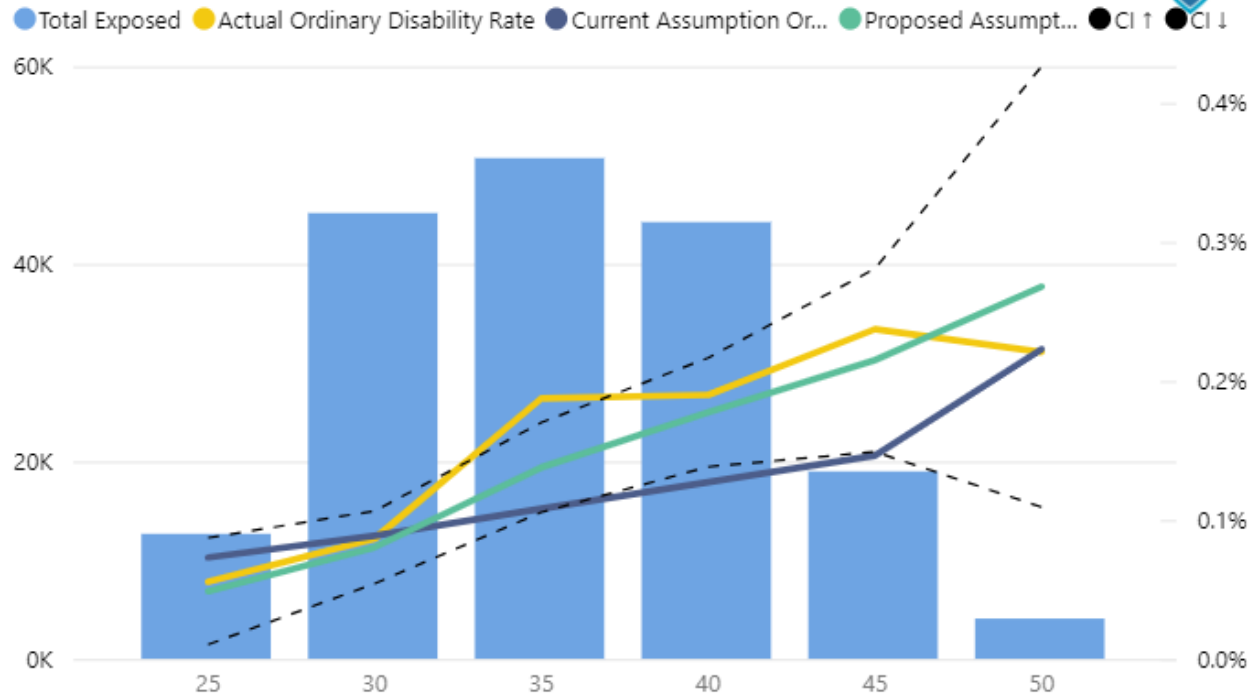


The following charts show the experience of ordinary disability retirement by age, for the age range 25 to 54 and the service range 5 to 19 years for the current and proposed assumptions. This resulted in a decrease in the A/E ratio from 1.42 to 1.15.

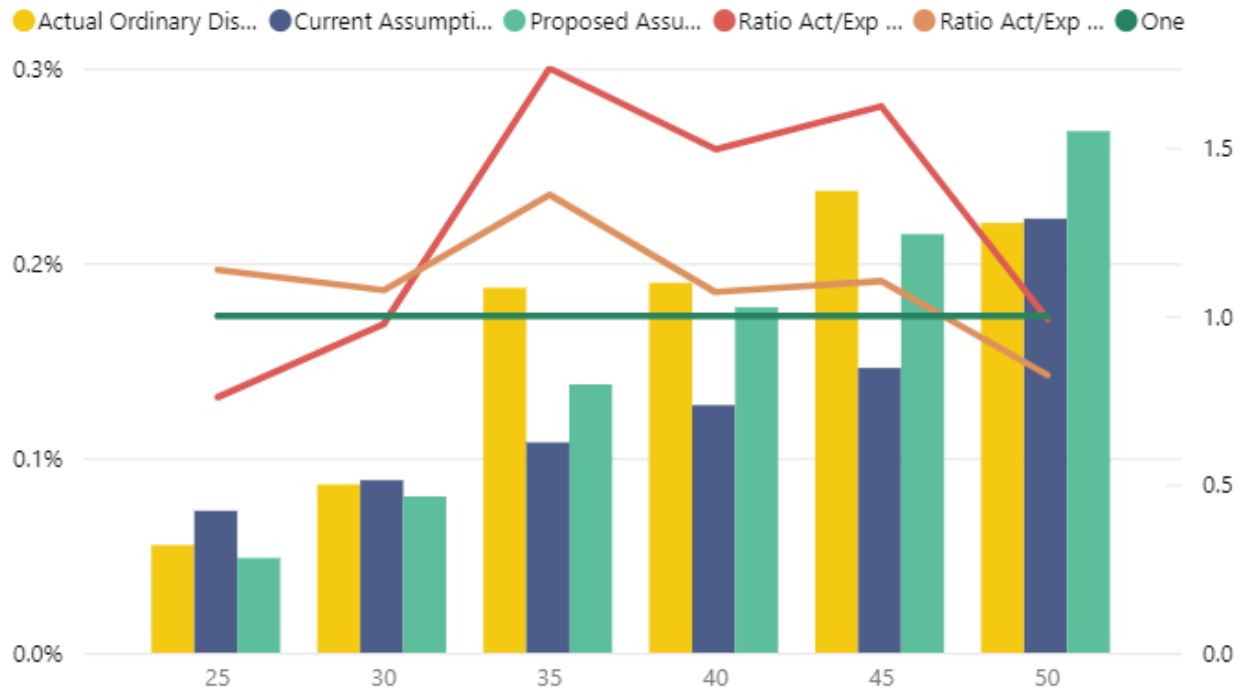
Age	Actual Ordinary Disabilities	Expected Ordinary Disabilities	Total Exposed	Actual Ordinary Disability Rate	Current Assumption Ordinary Disability	Ratio Act/Exp Ordinary Disability
25	0	0.0	11	0.0000%	0.0600%	0.00
26	0	0.3	415	0.0000%	0.0640%	0.00
27	0	1.5	2,241	0.0000%	0.0680%	0.00
28	2	3.0	4,122	0.0485%	0.0720%	0.67
29	5	4.5	5,869	0.0852%	0.0760%	1.12
30	0	6.0	7,448	0.0000%	0.0800%	0.00
31	7	7.3	8,631	0.0811%	0.0840%	0.97
32	6	8.2	9,285	0.0646%	0.0880%	0.73
33	8	8.9	9,688	0.0826%	0.0920%	0.90
34	18	9.7	10,088	0.1784%	0.0960%	1.86
35	23	10.2	10,152	0.2266%	0.1000%	2.27
36	14	10.7	10,253	0.1365%	0.1040%	1.31
37	16	11.0	10,147	0.1577%	0.1080%	1.46
38	23	11.3	10,053	0.2288%	0.1120%	2.04
39	19	11.7	10,100	0.1881%	0.1160%	1.62
40	17	12.6	10,480	0.1622%	0.1200%	1.35
41	21	12.6	10,148	0.2069%	0.1240%	1.67
42	19	11.7	9,112	0.2085%	0.1280%	1.63
43	15	10.3	7,797	0.1924%	0.1320%	1.46
44	12	9.1	6,685	0.1795%	0.1360%	1.32
45	9	7.8	5,585	0.1611%	0.1400%	1.15
46	13	6.7	4,655	0.2793%	0.1440%	1.94
47	10	5.4	3,681	0.2717%	0.1480%	1.84
48	4	4.4	2,892	0.1383%	0.1520%	0.91
49	9	3.4	2,167	0.4153%	0.1560%	2.66
50	5	2.5	1,586	0.3153%	0.1600%	1.97
51	0	2.2	1,100	0.0000%	0.2000%	0.00
52	3	1.7	690	0.4348%	0.2400%	1.81
53	1	1.4	424	0.2358%	0.3200%	0.74
54	0	1.3	279	0.0000%	0.4800%	0.00
Total	279	197.0	175,784	0.1587%	0.1121%	1.42

Age	Actual Ordinary Disabilities	Expected Ordinary Disabilities Proposed	Total Exposed	Actual Ordinary Disability Rate	Proposed Assumption Ordinary Disability	Act/Exp Proposed Ordinary Disability
25	0	0.0	11	0.0000%	0.0400%	0.00
26	0	0.2	415	0.0000%	0.0427%	0.00
27	0	1.0	2,241	0.0000%	0.0453%	0.00
28	2	2.0	4,122	0.0485%	0.0480%	1.01
29	5	3.0	5,869	0.0852%	0.0508%	1.68
30	0	4.0	7,448	0.0000%	0.0536%	0.00
31	7	5.3	8,631	0.0811%	0.0609%	1.33
32	6	7.2	9,285	0.0646%	0.0780%	0.83
33	8	9.0	9,688	0.0826%	0.0933%	0.88
34	18	10.7	10,088	0.1784%	0.1061%	1.68
35	23	12.0	10,152	0.2266%	0.1178%	1.92
36	14	13.2	10,253	0.1365%	0.1286%	1.06
37	16	14.1	10,147	0.1577%	0.1385%	1.14
38	23	14.9	10,053	0.2288%	0.1480%	1.55
39	19	15.8	10,100	0.1881%	0.1563%	1.20
40	17	17.2	10,480	0.1622%	0.1646%	0.99
41	21	17.5	10,148	0.2069%	0.1721%	1.20
42	19	16.3	9,112	0.2085%	0.1787%	1.17
43	15	14.5	7,797	0.1924%	0.1857%	1.04
44	12	13.0	6,685	0.1795%	0.1940%	0.93
45	9	11.3	5,585	0.1611%	0.2028%	0.79
46	13	9.8	4,655	0.2793%	0.2116%	1.32
47	10	8.0	3,681	0.2717%	0.2186%	1.24
48	4	6.5	2,892	0.1383%	0.2255%	0.61
49	9	5.0	2,167	0.4153%	0.2323%	1.79
50	5	3.8	1,586	0.3153%	0.2391%	1.32
51	0	2.9	1,100	0.0000%	0.2631%	0.00
52	3	2.0	690	0.4348%	0.2868%	1.52
53	1	1.3	424	0.2358%	0.3116%	0.76
54	0	0.9	279	0.0000%	0.3353%	0.00
Total	279	242.4	175,784	0.1587%	0.1379%	1.15

Exposure Distribution w/ Ordinary Disability Rate - Actual and Expected; by Age



Ordinary Disability Rate - Actual, Expected, and Ratio; by Age



The following charts show the experience of ordinary disability retirement by service, for the age range 25 to 54 and the service range 5 to 19 years for the current and proposed assumptions. Very few disabilities occurred prior to 10 years of service. As a result, we propose rates that are about 50% of the rates for members with service between 10 and 20 years. This resulted in an increase in the A/E ratio from 0.51 to 0.77 for service less than 10 years and a decrease in the A/E ratio from 1.82 to 1.23 for those with 10 or more years of service.

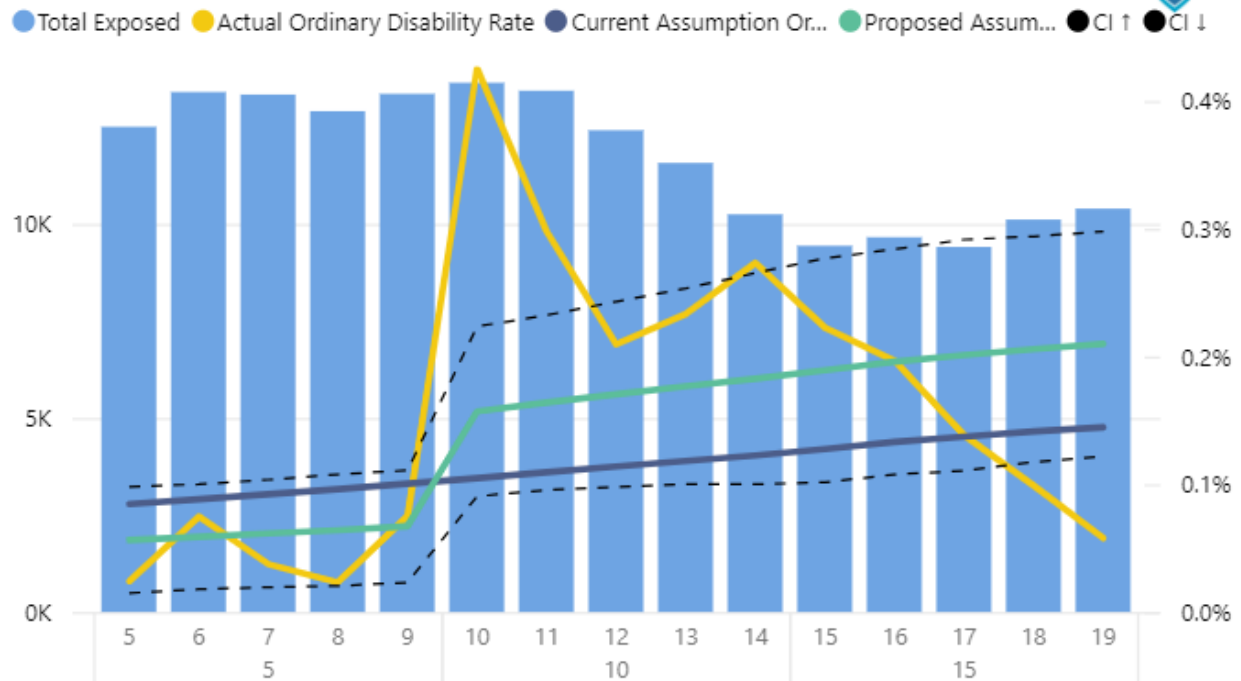
Service	Actual Ordinary Disabilities	Expected Ordinary Disabilities	Total Exposed	Actual Ordinary Disability Rate	Current Assumption Ordinary Disability	Ratio Act/Exp Ordinary Disability
5	3	10.6	12,502	0.0240%	0.0845%	0.28
6	10	11.8	13,397	0.0746%	0.0883%	0.85
7	5	12.3	13,332	0.0375%	0.0922%	0.41
8	3	12.4	12,904	0.0232%	0.0961%	0.24
9	10	13.4	13,351	0.0749%	0.1005%	0.75
Total	31	60.5	65,486	0.0473%	0.0924%	0.51

Service	Actual Ordinary Disabilities	Expected Ordinary Disabilities Proposed	Total Exposed	Actual Ordinary Disability Rate	Proposed Assumption Ordinary Disability	Act/Exp Proposed Ordinary Disability
5	3	7.0	12,502	0.0240%	0.0563%	0.43
6	10	7.9	13,397	0.0746%	0.0589%	1.27
7	5	8.2	13,332	0.0375%	0.0615%	0.61
8	3	8.3	12,904	0.0232%	0.0641%	0.36
9	10	8.9	13,351	0.0749%	0.0670%	1.12
Total	31	40.3	65,486	0.0473%	0.0616%	0.77

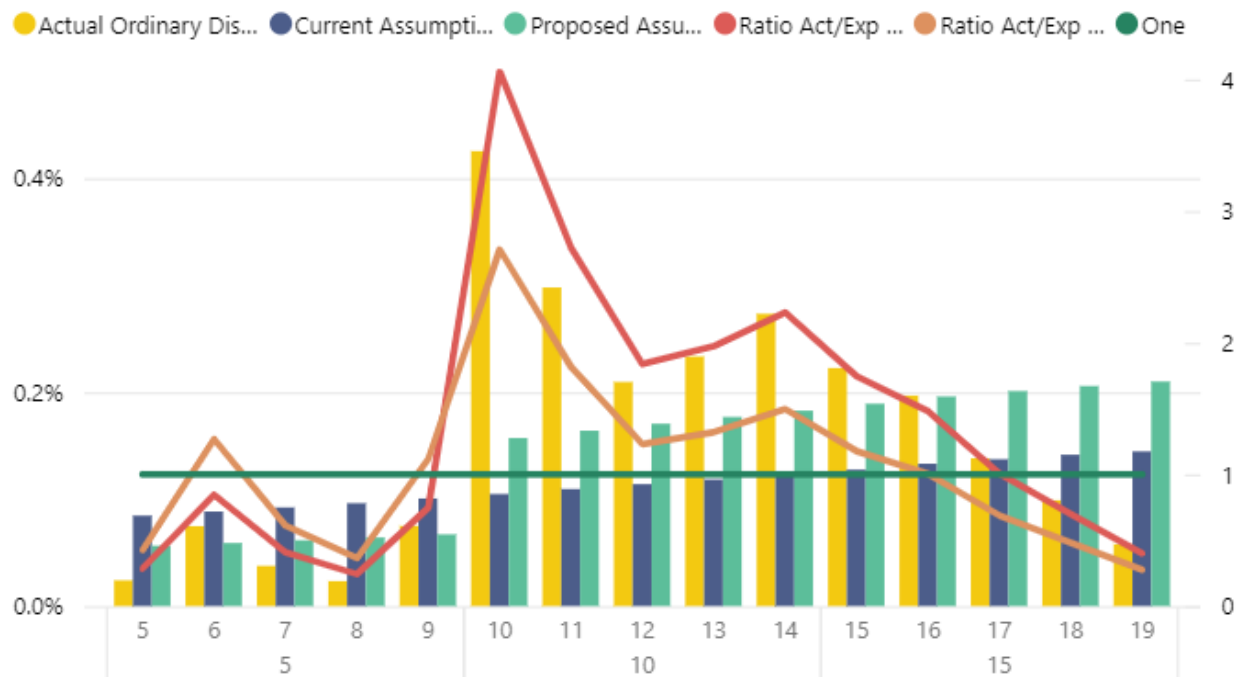
Service	Actual Ordinary Disabilities	Expected Ordinary Disabilities	Total Exposed	Actual Ordinary Disability Rate	Current Assumption Ordinary Disability	Ratio Act/Exp Ordinary Disability
10	58	14.3	13,635	0.4254%	0.1047%	◆ 4.06
11	40	14.7	13,431	0.2978%	0.1094%	◆ 2.72
12	26	14.1	12,412	0.2095%	0.1139%	◆ 1.84
13	27	13.7	11,570	0.2334%	0.1183%	◆ 1.97
14	28	12.6	10,246	0.2733%	0.1226%	◆ 2.23
15	21	12.0	9,437	0.2225%	0.1275%	◆ 1.74
16	19	12.8	9,656	0.1968%	0.1330%	▲ 1.48
17	13	12.9	9,407	0.1382%	0.1372%	● 1.01
18	10	14.3	10,111	0.0989%	0.1414%	▲ 0.70
19	6	15.0	10,393	0.0577%	0.1445%	◆ 0.40
Total	248	136.5	110,298	0.2248%	0.1237%	◆ 1.82

Service	Actual Ordinary Disabilities	Expected Ordinary Disabilities Proposed	Total Exposed	Actual Ordinary Disability Rate	Proposed Assumption Ordinary Disability	Act/Exp Proposed Ordinary Disability
10	58	21.4	13,635	0.4254%	0.1571%	◆ 2.71
11	40	22.0	13,431	0.2978%	0.1639%	◆ 1.82
12	26	21.2	12,412	0.2095%	0.1705%	▲ 1.23
13	27	20.5	11,570	0.2334%	0.1768%	▲ 1.32
14	28	18.7	10,246	0.2733%	0.1827%	▲ 1.50
15	21	17.9	9,437	0.2225%	0.1892%	▲ 1.18
16	19	18.9	9,656	0.1968%	0.1959%	● 1.00
17	13	18.9	9,407	0.1382%	0.2010%	▲ 0.69
18	10	20.8	10,111	0.0989%	0.2057%	◆ 0.48
19	6	21.8	10,393	0.0577%	0.2099%	◆ 0.28
Total	248	202.0	110,298	0.2248%	0.1832%	▲ 1.23

Exposure Distribution w/ Ordinary Disability Rate - Actual and Expected; by Service



Ordinary Disability Rate - Actual, Expected, and Ratio; by Service



Summary

Retirement eligibility has a significant impact on the number of members who apply for disability retirement. By eliminating rates of ordinary disability retirement at 20 years of service, we believe it will increase plan liabilities. Furthermore, increasing the rates of ordinary disability for other members will also result in higher plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF ORDINARY DISABILITY RETIREMENT			
Age	Rate	Age	Rate
15 - 19	0.0360%	42	0.1280%
20	0.0400%	43	0.1320%
21	0.0440%	44	0.1360%
22	0.0480%	45	0.1400%
23	0.0520%	46	0.1440%
24	0.0560%	47	0.1480%
25	0.0600%	48	0.1520%
26	0.0640%	49	0.1560%
27	0.0680%	50	0.1600%
28	0.0720%	51	0.2000%
29	0.0760%	52	0.2400%
30	0.0800%	53	0.3200%
31	0.0840%	54	0.4800%
32	0.0880%	55	0.6400%
33	0.0920%	56	0.8000%
34	0.0960%	57	1.6000%
35	0.1000%	58	2.4000%
36	0.1040%	59	3.2000%
37	0.1080%	60	4.8000%
38	0.1120%	61	6.4000%
39	0.1160%	62	8.0000%
40	0.1200%	63	N/A

*N/A for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members at age 62.

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF ORDINARY DISABILITY RETIREMENT ¹		
Age	< 10 YOS ^{2, 3}	10 - 19 YOS ⁴
20	0.0267%	0.0600%
21	0.0293%	0.0660%
22	0.0320%	0.0720%
23	0.0347%	0.0780%
24	0.0373%	0.0840%
25	0.0400%	0.0900%
26	0.0427%	0.0960%
27	0.0453%	0.1020%
28	0.0480%	0.1080%
29	0.0507%	0.1140%
30	0.0533%	0.1200%
31	0.0560%	0.1260%
32	0.0587%	0.1320%
33	0.0613%	0.1380%
34	0.0640%	0.1440%
35	0.0667%	0.1500%
36	0.0693%	0.1560%
37	0.0720%	0.1620%
38	0.0747%	0.1680%
39	0.0773%	0.1740%
40	0.0800%	0.1800%
41	0.0827%	0.1860%
42	0.0853%	0.1920%
43	0.0880%	0.1980%
44	0.0907%	0.2040%
45	0.0933%	0.2100%

- ¹ Greater of disability benefit and retirement benefit is valued if eligible for early or service retirement
- ² No rates of ordinary disability apply prior to completion of 5 years of service for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members
- ³ If less than 5 years of service, decrease rates by 50%
- ⁴ No rates of ordinary disability apply upon completion of 20 years of service

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF ORDINARY DISABILITY RETIREMENT ¹		
Age	< 10 YOS ^{2, 3}	10 - 19 YOS ⁴
46	0.0960%	0.2160%
47	0.0987%	0.2220%
48	0.1013%	0.2280%
49	0.1040%	0.2340%
50	0.1067%	0.2400%
51	0.1173%	0.2640%
52	0.1280%	0.2880%
53	0.1387%	0.3120%
54	0.1493%	0.3360%
55	0.1600%	0.3600%
56	0.1707%	0.3840%
57	0.1813%	0.4080%
58	0.1920%	0.4320%
59	0.2027%	0.4560%
60	0.2133%	0.4800%
61	0.2240%	0.5040%
62 ⁵	0.2347%	0.5280%
63	N/A	N/A

- ¹ Greater of disability benefit and retirement benefit is valued if eligible for early or service retirement
- ² No rates of ordinary disability apply prior to completion of 5 years of service for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members
- ³ If less than 5 years of service, decrease rates by 50%
- ⁴ No rates of ordinary disability apply upon completion of 20 years of service
- ⁵ N/A for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members

Accidental Disability

The rates of accidental disability retirement vary by the following characteristics:

1. Tier 1 and 2 members eligible for WTC benefits
2. Tier 1 and 2 members not eligible for WTC benefits
3. Tier 3 members.

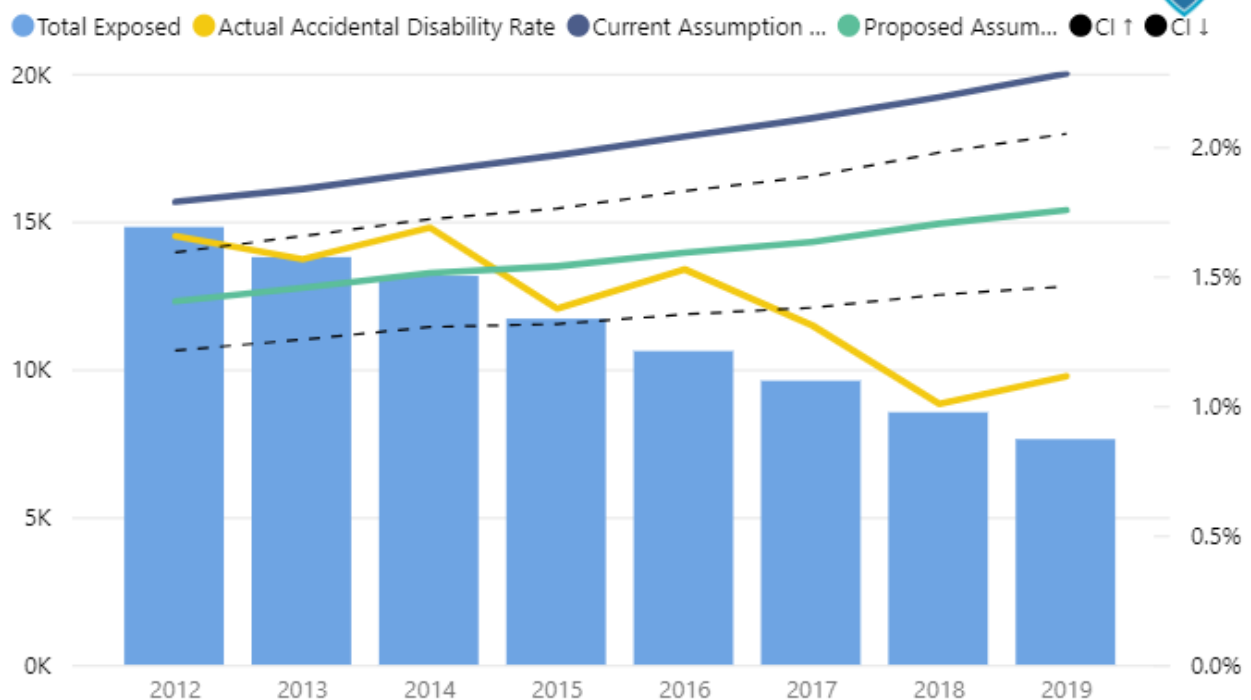
Members Who Are Eligible for WTC Benefits (Tiers 1 and 2)

The following tables show the accidental disability experience of members who are not eligible for WTC benefits by year, for the age range 35 to 59 and the service range 10 to 34 years during the period 2012 - 2019. The actual rate of accidental disability averaged 1.4498% whereas the overall expected rate of ordinary disability averaged 1.9795% based on the current assumptions and 1.5492% based on the proposed assumptions. The proposed changes include slightly lower rates at ages 40 and older and slightly higher rates at younger ages.

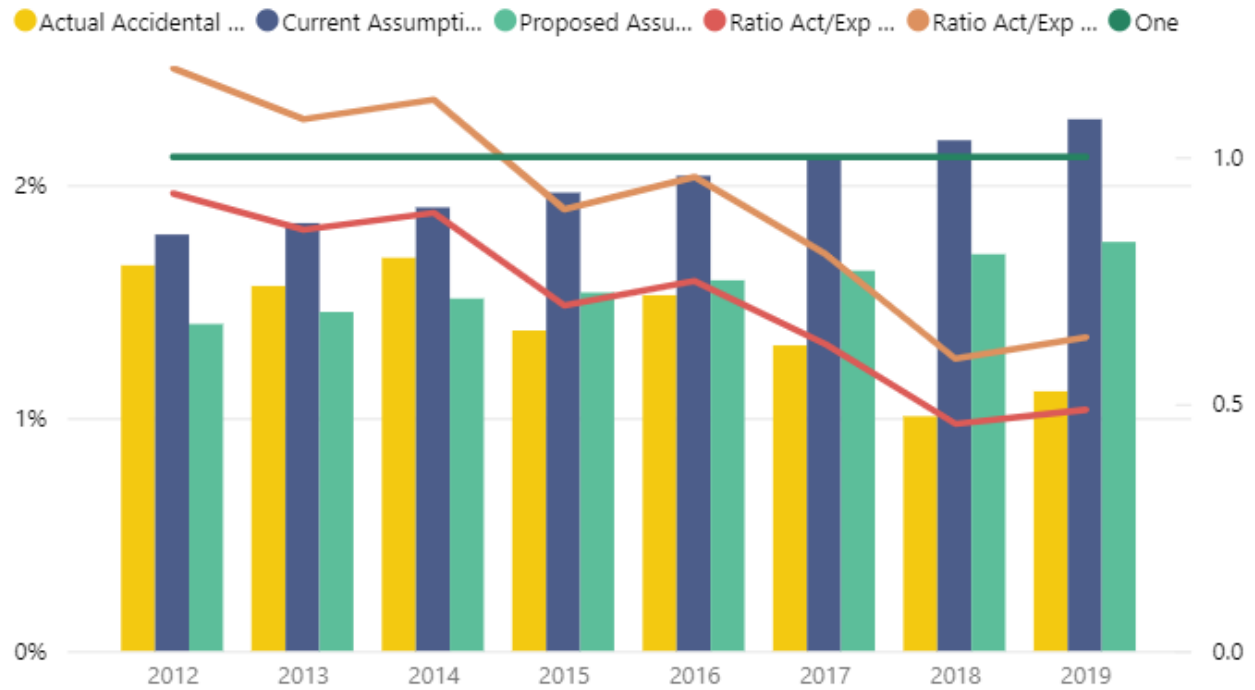
Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
2012	245	264.6	14,810	1.6543%	1.7868%	0.93
2013	216	253.2	13,794	1.5659%	1.8358%	0.85
2014	222	250.4	13,159	1.6871%	1.9033%	0.89
2015	161	230.3	11,710	1.3749%	1.9664%	0.70
2016	162	216.4	10,614	1.5263%	2.0389%	0.75
2017	126	202.7	9,611	1.3110%	2.1095%	0.62
2018	86	187.2	8,542	1.0068%	2.1912%	0.46
2019	85	174.1	7,632	1.1137%	2.2815%	0.49
Total	1,303	1,779.0	89,872	1.4498%	1.9795%	0.73

Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability
2012	245	207.7	14,810	1.6543%	1.4026%	▲ 1.18
2013	216	200.6	13,794	1.5659%	1.4544%	● 1.08
2014	222	199.0	13,159	1.6871%	1.5120%	▲ 1.12
2015	161	180.1	11,710	1.3749%	1.5378%	▲ 0.89
2016	162	168.8	10,614	1.5263%	1.5903%	● 0.96
2017	126	156.8	9,611	1.3110%	1.6314%	▲ 0.80
2018	86	145.4	8,542	1.0068%	1.7024%	▲ 0.59
2019	85	133.9	7,632	1.1137%	1.7549%	▲ 0.63
Total	1,303	1,392.3	89,872	1.4498%	1.5492%	● 0.94

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Year



Accidental Disability Rate - Actual, Expected, and Ratio; by Year

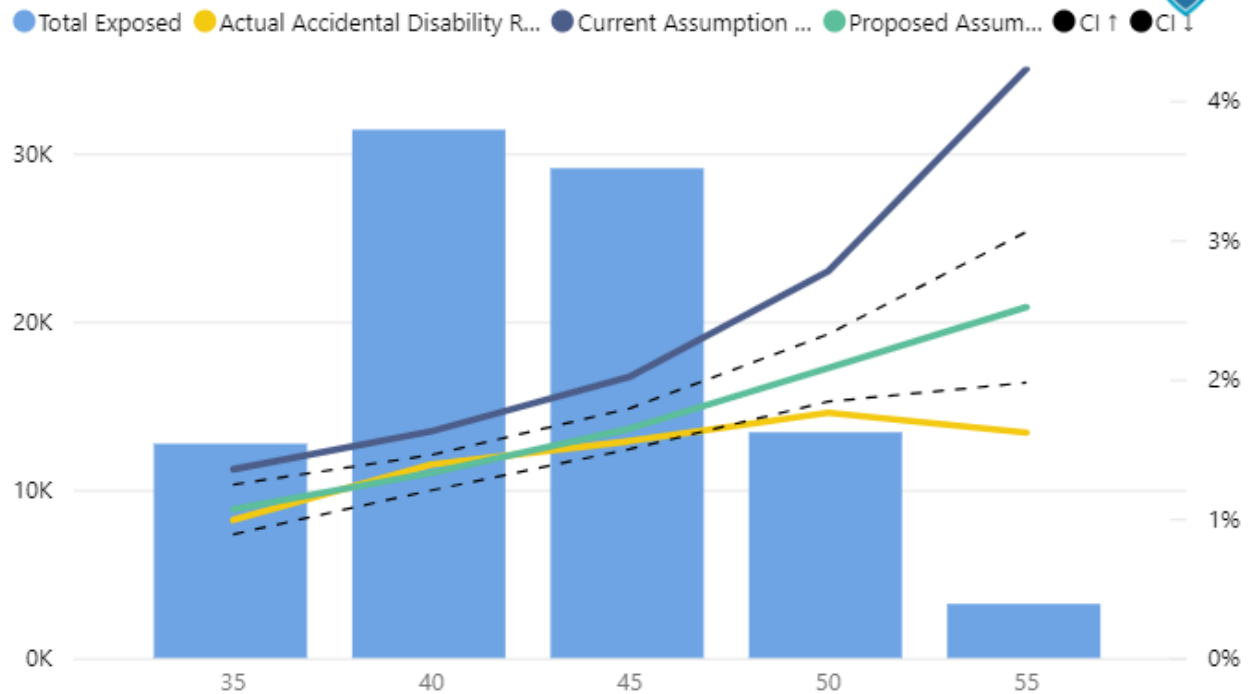


The following charts show the experience of accidental disability retirement by age, for the age range 35 to 59 and the service range 10 to 34 years for the current and proposed assumptions. This resulted in an increase in the A/E ratio from 0.73 to 0.94.

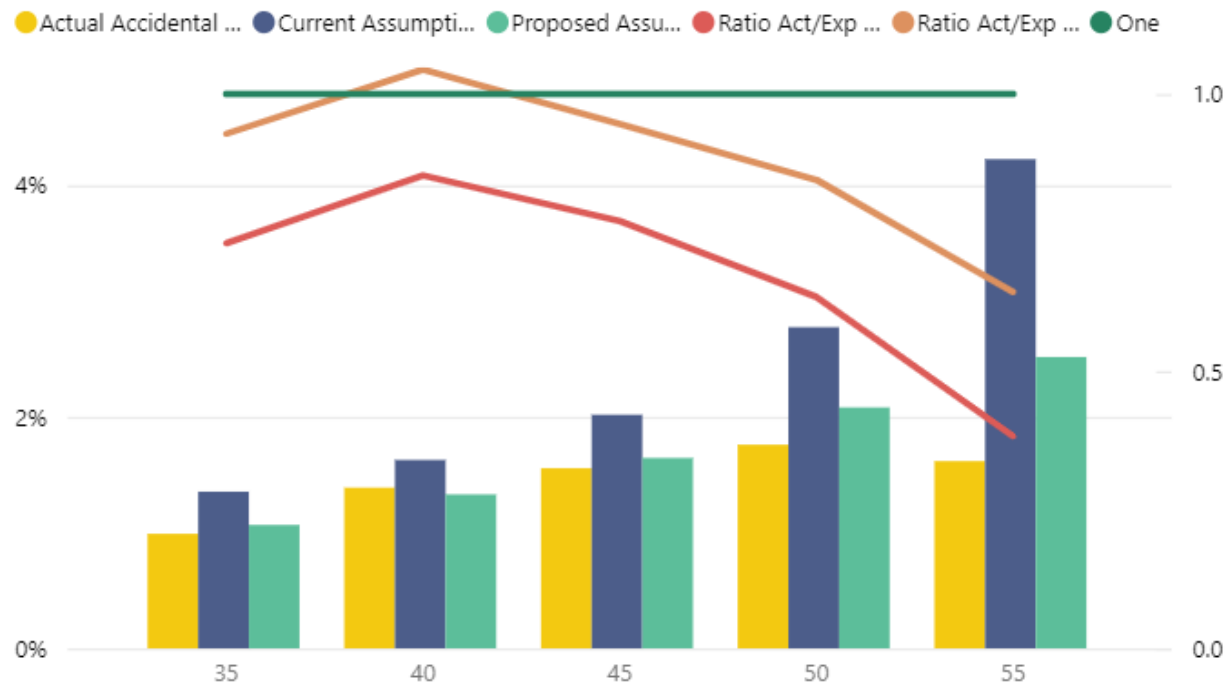
Age	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
35	7	14.4	1,202	0.5824%	1.2000%	0.49
36	17	22.8	1,810	0.9392%	1.2600%	0.75
37	23	32.5	2,463	0.9338%	1.3200%	0.71
38	41	44.3	3,211	1.2769%	1.3800%	0.93
39	38	58.3	4,050	0.9383%	1.4400%	0.65
40	54	77.0	5,134	1.0518%	1.5000%	0.70
41	90	94.7	6,072	1.4822%	1.5600%	0.95
42	83	107.0	6,608	1.2561%	1.6200%	0.78
43	116	114.2	6,795	1.7071%	1.6800%	1.02
44	93	118.1	6,790	1.3697%	1.7400%	0.79
45	120	121.1	6,725	1.7844%	1.8000%	0.99
46	86	123.6	6,438	1.3358%	1.9200%	0.70
47	77	121.5	5,955	1.2930%	2.0400%	0.63
48	76	115.1	5,331	1.4256%	2.1600%	0.66
49	94	106.2	4,658	2.0180%	2.2800%	0.89
50	68	94.1	3,920	1.7347%	2.4000%	0.72
51	64	85.9	3,254	1.9668%	2.6400%	0.75
52	42	75.3	2,615	1.6061%	2.8800%	0.56
53	35	64.1	2,055	1.7032%	3.1200%	0.55
54	27	52.8	1,571	1.7187%	3.3600%	0.51
55	13	41.9	1,165	1.1159%	3.6000%	0.31
56	10	33.5	822	1.2165%	4.0800%	0.30
57	13	26.2	575	2.2609%	4.5600%	0.50
58	8	19.7	391	2.0460%	5.0400%	0.41
59	8	14.5	262	3.0534%	5.5200%	0.55
Total	1,303	1,779.0	89,872	1.4498%	1.9795%	0.73

Age	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability
35	7	11.4	1,202	0.5824%	0.9450%	▲ 0.62
36	17	18.0	1,810	0.9392%	0.9923%	● 0.95
37	23	25.6	2,463	0.9338%	1.0395%	▲ 0.90
38	41	34.9	3,211	1.2769%	1.0867%	▲ 1.17
39	38	45.9	4,050	0.9383%	1.1343%	▲ 0.83
40	54	61.1	5,134	1.0518%	1.1901%	▲ 0.88
41	90	76.9	6,072	1.4822%	1.2667%	▲ 1.17
42	83	88.2	6,608	1.2561%	1.3345%	● 0.94
43	116	94.4	6,795	1.7071%	1.3888%	▲ 1.23
44	93	97.0	6,790	1.3697%	1.4291%	● 0.96
45	120	99.4	6,725	1.7844%	1.4775%	▲ 1.21
46	86	101.0	6,438	1.3358%	1.5681%	▲ 0.85
47	77	98.8	5,955	1.2930%	1.6596%	▲ 0.78
48	76	93.5	5,331	1.4256%	1.7544%	▲ 0.81
49	94	86.2	4,658	2.0180%	1.8501%	● 1.09
50	68	76.0	3,920	1.7347%	1.9384%	▲ 0.89
51	64	66.1	3,254	1.9668%	2.0300%	● 0.97
52	42	55.6	2,615	1.6061%	2.1256%	▲ 0.76
53	35	45.5	2,055	1.7032%	2.2130%	▲ 0.77
54	27	36.1	1,571	1.7187%	2.2983%	▲ 0.75
55	13	27.9	1,165	1.1159%	2.3916%	◆ 0.47
56	10	20.5	822	1.2165%	2.4998%	◆ 0.49
57	13	14.8	575	2.2609%	2.5811%	▲ 0.88
58	8	10.4	391	2.0460%	2.6686%	▲ 0.77
59	8	7.2	262	3.0534%	2.7614%	▲ 1.11
Total	1,303	1,392.3	89,872	1.4498%	1.5492%	● 0.94

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Age



Accidental Disability Rate - Actual, Expected, and Ratio; by Age

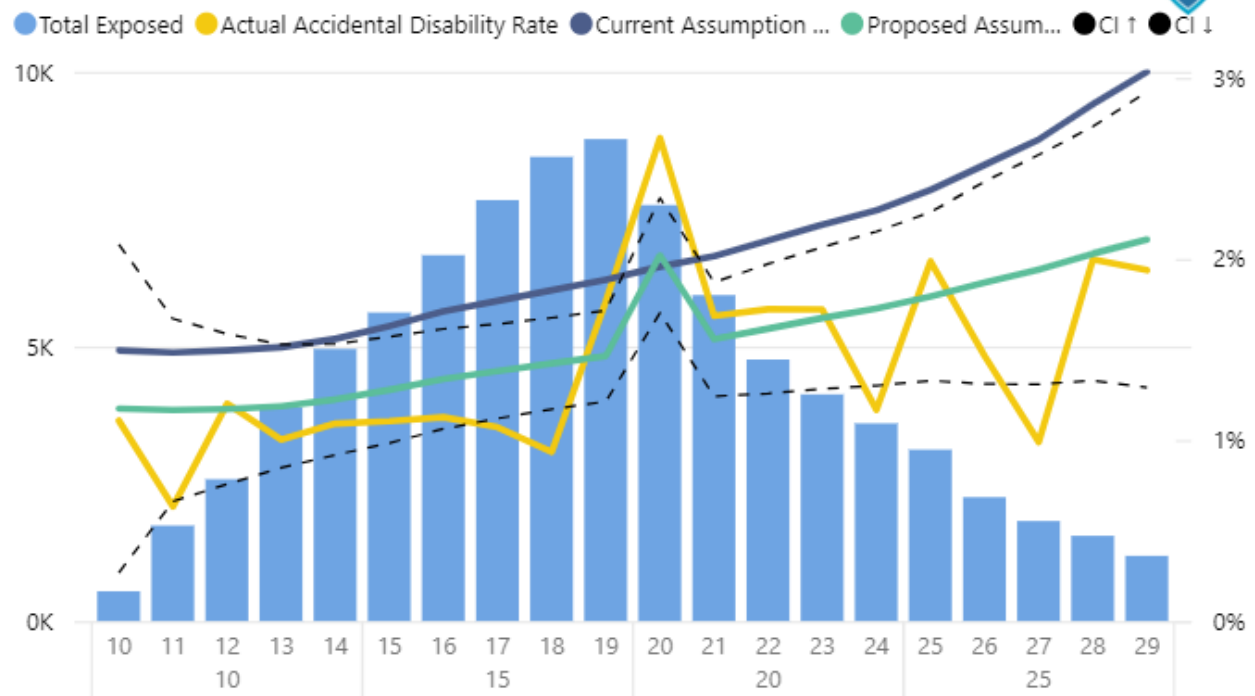


For members eligible for WTC benefits, the experience indicated a spike of retirements occurring at 20 years of service similar to retirement benefits. Therefore, we propose to increase the rates of accidental disability by 33% in the 20th year of service. The following charts show the experience of accidental disability retirement by service, for the age range 35 to 59 and the service range 10 to 29 years for the current and proposed assumptions. We reduced the service range from 34 years to 29 years for illustrative purposes.

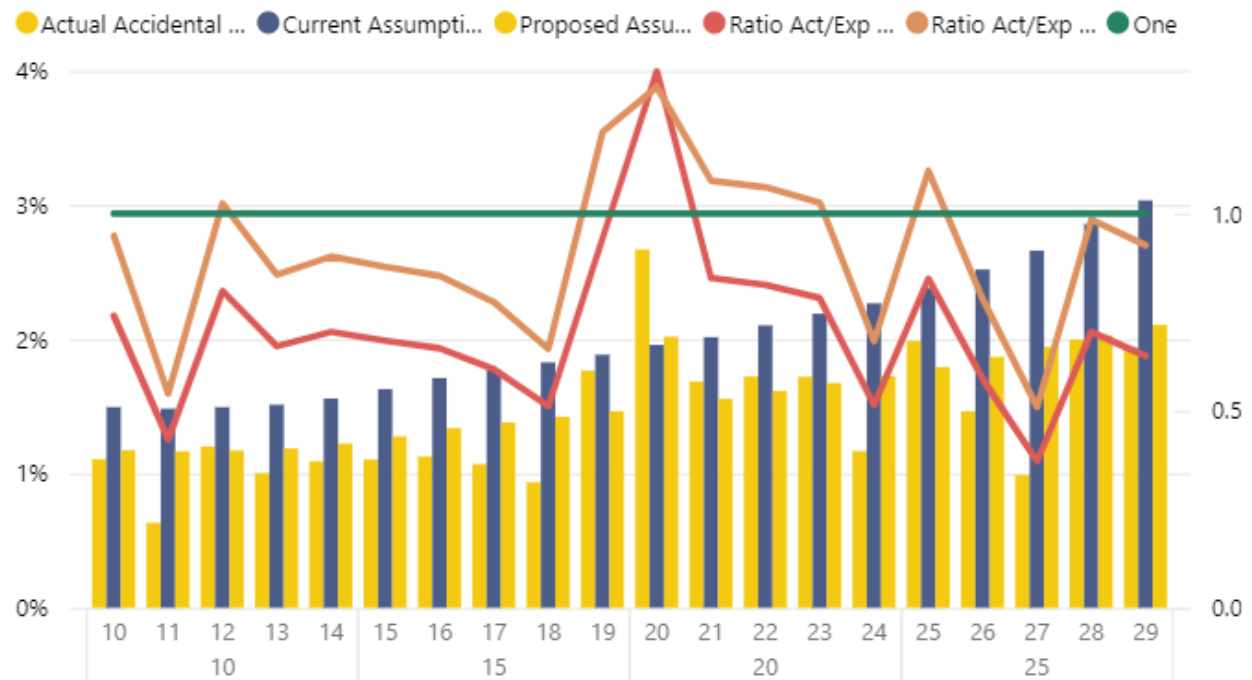
Service	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
10	6	8.1	542	1.1070%	1.4941%	▲ 0.74
11	11	25.8	1,739	0.6325%	1.4829%	◆ 0.43
12	31	38.6	2,582	1.2006%	1.4938%	▲ 0.80
13	39	58.8	3,890	1.0026%	1.5121%	▲ 0.66
14	54	77.2	4,954	1.0900%	1.5584%	▲ 0.70
15	62	91.5	5,617	1.1038%	1.6284%	▲ 0.68
16	75	113.9	6,661	1.1260%	1.7107%	▲ 0.66
17	82	135.5	7,664	1.0699%	1.7681%	▲ 0.61
18	79	154.4	8,452	0.9347%	1.8272%	▲ 0.51
19	155	165.4	8,775	1.7664%	1.8844%	● 0.94
20	202	148.2	7,573	2.6674%	1.9575%	▲ 1.36
21	100	119.6	5,934	1.6852%	2.0149%	▲ 0.84
22	82	100.1	4,761	1.7223%	2.1025%	▲ 0.82
23	71	90.4	4,127	1.7204%	2.1895%	▲ 0.79
24	42	81.6	3,599	1.1670%	2.2673%	▲ 0.51
25	62	74.3	3,121	1.9865%	2.3808%	▲ 0.83
26	33	56.8	2,255	1.4634%	2.5194%	▲ 0.58
27	18	48.4	1,821	0.9885%	2.6594%	◆ 0.37
28	31	44.3	1,552	1.9974%	2.8551%	▲ 0.70
29	23	36.0	1,187	1.9377%	3.0333%	▲ 0.64
Total	1,258	1,668.9	86,806	1.4492%	1.9226%	▲ 0.75

Service	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability	
10	6	6.4	542	1.1070%	1.1735%	●	0.94
11	11	20.3	1,739	0.6325%	1.1650%	▲	0.54
12	31	30.2	2,582	1.2006%	1.1711%	●	1.03
13	39	46.1	3,890	1.0026%	1.1863%	▲	0.85
14	54	60.6	4,954	1.0900%	1.2234%	▲	0.89
15	62	71.7	5,617	1.1038%	1.2768%	▲	0.86
16	75	89.1	6,661	1.1260%	1.3372%	▲	0.84
17	82	105.7	7,664	1.0699%	1.3796%	▲	0.78
18	79	120.2	8,452	0.9347%	1.4224%	▲	0.66
19	155	128.4	8,775	1.7664%	1.4637%	▲	1.21
20	202	152.9	7,573	2.6674%	2.0190%	▲	1.32
21	100	92.3	5,934	1.6852%	1.5561%	●	1.08
22	82	76.9	4,761	1.7223%	1.6145%	●	1.07
23	71	69.1	4,127	1.7204%	1.6737%	●	1.03
24	42	62.1	3,599	1.1670%	1.7256%	▲	0.68
25	62	55.9	3,121	1.9865%	1.7923%	▲	1.11
26	33	42.1	2,255	1.4634%	1.8685%	▲	0.78
27	18	35.3	1,821	0.9885%	1.9411%	▲	0.51
28	31	31.5	1,552	1.9974%	2.0292%	●	0.98
29	23	25.0	1,187	1.9377%	2.1068%	●	0.92
Total	1,258	1,322.0	86,806	1.4492%	1.5229%	●	0.95

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Service



Accidental Disability Rate - Actual, Expected, and Ratio; by Service



Members Who Are Not Eligible for WTC Benefits (Tiers 1 and 2)

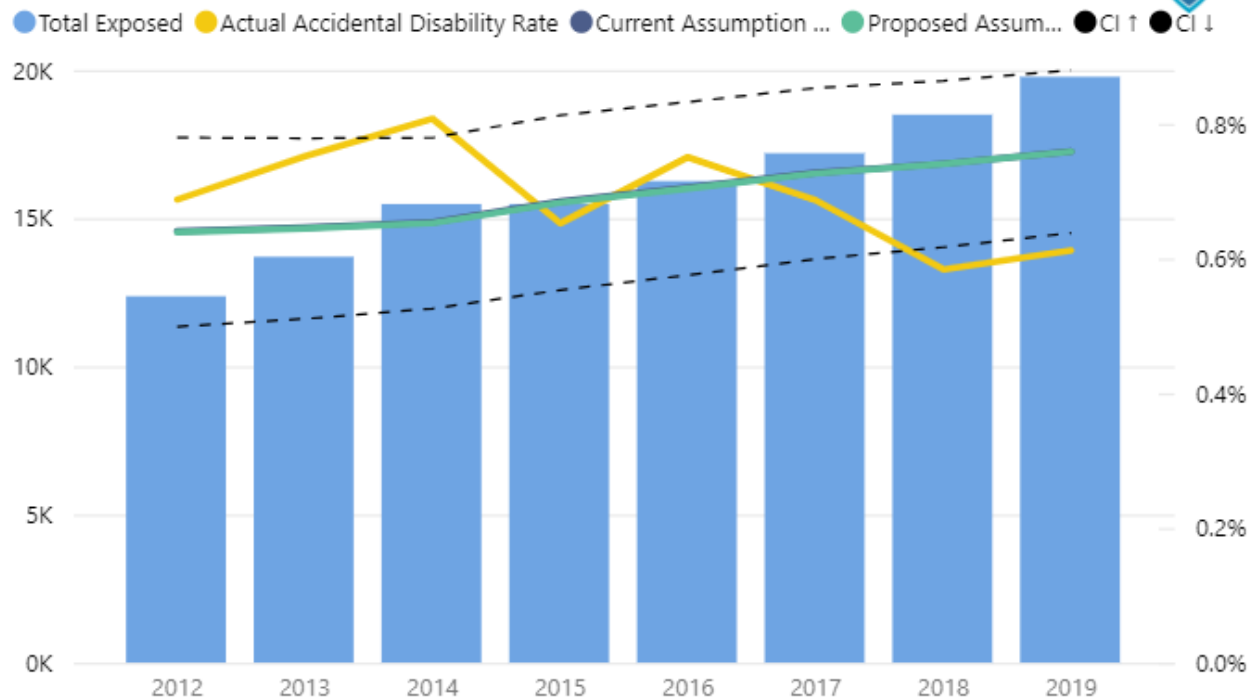
The following tables show the accidental disability experience of members who are not eligible for WTC benefits by year, for the age range 25 to 54 and the service range 5 to 29 years during the period 2012 - 2019. The actual rate of accidental disability averaged 0.6859% whereas the overall expected rate of ordinary disability averaged 0.7005% based on the current assumptions and 0.6994% based on the proposed assumptions. The proposed changes include slightly lower rates at ages 51 and older. Please note that these rates are approximately 75% of the rates proposed for those eligible for WTC benefits.

In addition, there was nearly no experience for members with less than 5 years of service. Therefore, we propose rates that are 50% lower. Since there was nearly no experience during this service period, we have excluded it from the analysis below.

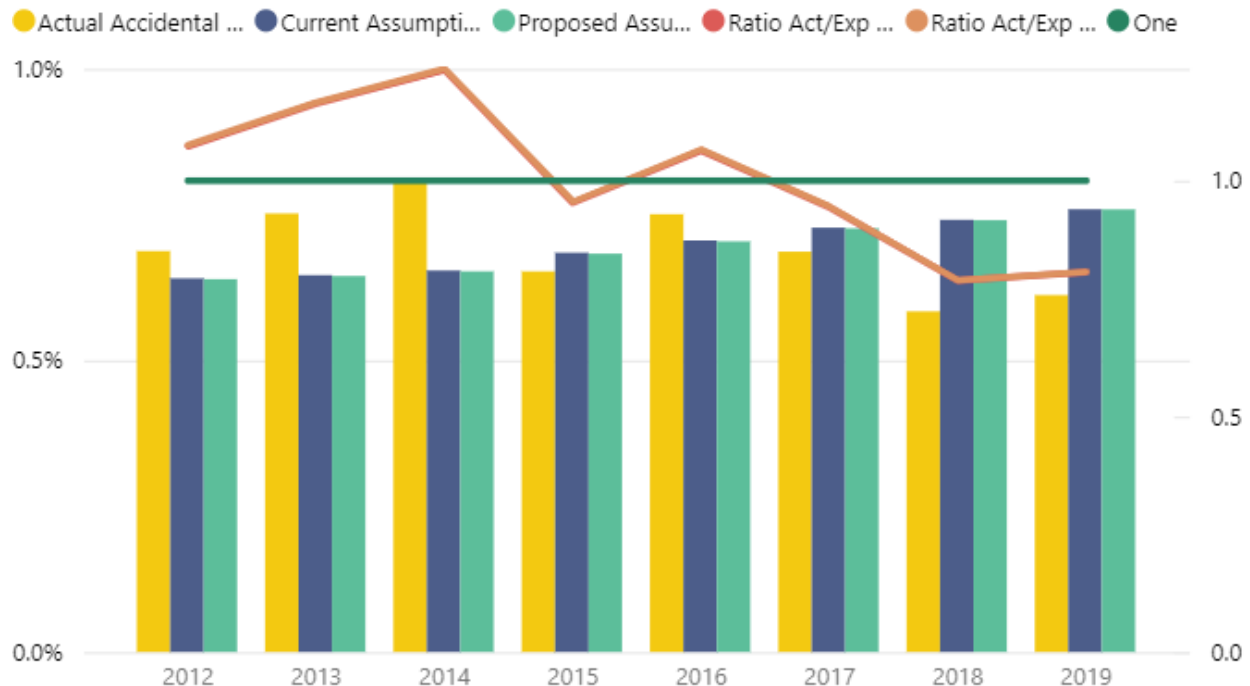
Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
2012	85	79.2	12,366	0.6874%	0.6407%	1.07
2013	103	88.5	13,700	0.7518%	0.6460%	1.16
2014	125	101.2	15,478	0.8076%	0.6540%	1.23
2015	101	106.0	15,479	0.6525%	0.6846%	0.95
2016	122	114.7	16,253	0.7506%	0.7056%	1.06
2017	118	125.1	17,193	0.6863%	0.7275%	0.94
2018	108	137.0	18,495	0.5839%	0.7410%	0.79
2019	121	150.1	19,775	0.6119%	0.7591%	0.81
Total	883	901.8	128,739	0.6859%	0.7005%	0.98

Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability
2012	85	79.0	12,366	0.6874%	0.6392%	1.08
2013	103	88.3	13,700	0.7518%	0.6446%	1.17
2014	125	101.0	15,478	0.8076%	0.6526%	1.24
2015	101	105.7	15,479	0.6525%	0.6830%	0.96
2016	122	114.4	16,253	0.7506%	0.7040%	1.07
2017	118	124.9	17,193	0.6863%	0.7263%	0.94
2018	108	136.9	18,495	0.5839%	0.7404%	0.79
2019	121	150.1	19,775	0.6119%	0.7589%	0.81
Total	883	900.4	128,739	0.6859%	0.6994%	0.98

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Year


































Accidental Disability Rate - Actual, Expected, and Ratio; by Year

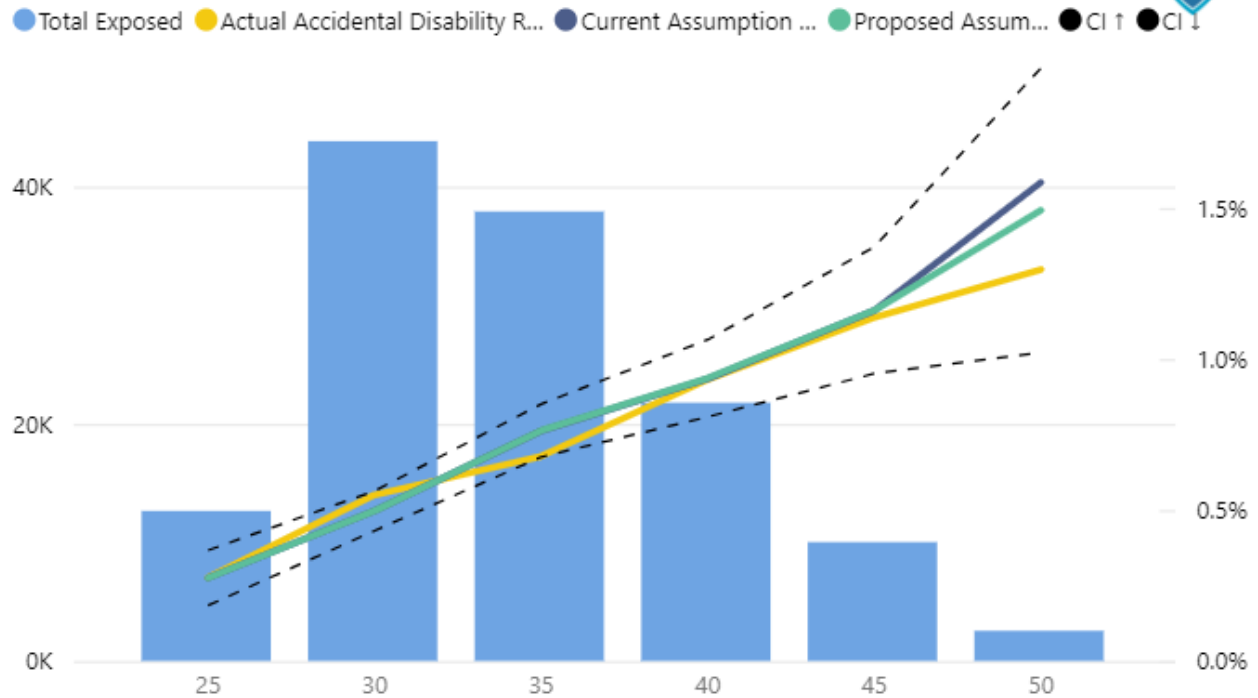


The following charts show the experience of accidental disability retirement by age, for the age range 25 to 54 and the service range 5 to 29 years for the current and proposed assumptions. This resulted in no change in the A/E ratio of 0.98.

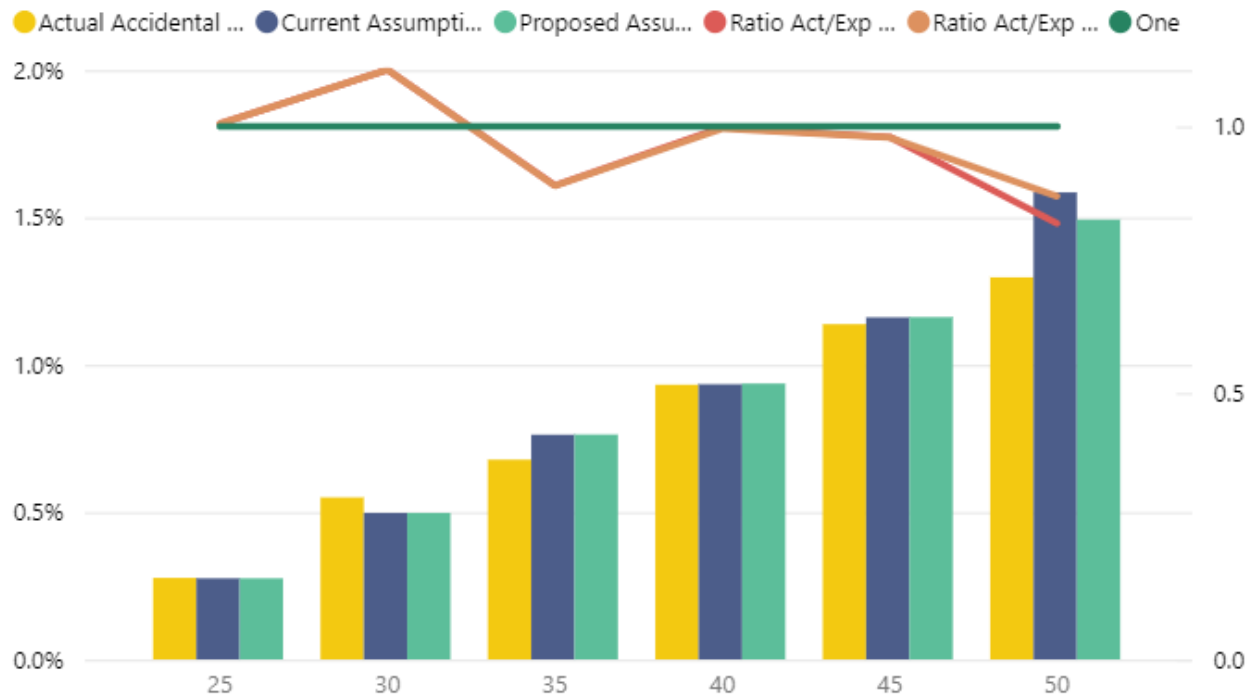
Age	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
25	0	0.0	11	0.0000%	0.1400%	0.00
26	0	0.8	415	0.0000%	0.1820%	0.00
27	5	5.0	2,240	0.2232%	0.2240%	1.00
28	10	11.0	4,121	0.2427%	0.2660%	0.91
29	20	18.1	5,866	0.3409%	0.3080%	1.11
30	29	26.0	7,441	0.3897%	0.3500%	1.11
31	47	36.1	8,595	0.5468%	0.4200%	1.30
32	46	44.8	9,146	0.5030%	0.4900%	1.03
33	55	52.2	9,320	0.5901%	0.5600%	1.05
34	64	58.8	9,335	0.6856%	0.6300%	1.09
35	46	62.5	8,934	0.5149%	0.7000%	0.74
36	65	61.9	8,432	0.7709%	0.7346%	1.05
37	58	59.0	7,670	0.7562%	0.7692%	0.98
38	42	54.9	6,829	0.6150%	0.8040%	0.76
39	46	50.7	6,040	0.7616%	0.8387%	0.91
40	42	47.8	5,470	0.7678%	0.8733%	0.88
41	36	44.3	4,884	0.7371%	0.9076%	0.81
42	49	40.7	4,326	1.1327%	0.9419%	1.20
43	46	36.8	3,771	1.2198%	0.9767%	1.25
44	30	33.7	3,328	0.9014%	1.0125%	0.89
45	31	29.6	2,826	1.0970%	1.0485%	1.05
46	40	27.1	2,418	1.6543%	1.1191%	1.48
47	20	23.5	1,972	1.0142%	1.1893%	0.85
48	12	20.0	1,587	0.7561%	1.2597%	0.60
49	11	16.2	1,217	0.9039%	1.3297%	0.68
50	10	12.7	906	1.1038%	1.4000%	0.79
51	7	10.2	665	1.0526%	1.5400%	0.68
52	6	7.5	445	1.3483%	1.6800%	0.80
53	6	5.6	310	1.9355%	1.8200%	1.06
54	4	4.3	219	1.8265%	1.9600%	0.93
Total	883	901.8	128,739	0.6859%	0.7005%	0.98

Age	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability	
25	0	0.0	11	0.0000%	0.1400%		0.00
26	0	0.8	415	0.0000%	0.1820%		0.00
27	5	5.0	2,240	0.2232%	0.2240%		1.00
28	10	11.0	4,121	0.2427%	0.2660%		0.91
29	20	18.1	5,866	0.3409%	0.3080%		1.11
30	29	26.0	7,441	0.3897%	0.3500%		1.11
31	47	36.1	8,595	0.5468%	0.4200%		1.30
32	46	44.8	9,146	0.5030%	0.4900%		1.03
33	55	52.2	9,320	0.5901%	0.5600%		1.05
34	64	58.8	9,335	0.6856%	0.6300%		1.09
35	46	62.5	8,934	0.5149%	0.7000%		0.74
36	65	62.0	8,432	0.7709%	0.7350%		1.05
37	58	59.1	7,670	0.7562%	0.7700%		0.98
38	42	55.0	6,829	0.6150%	0.8050%		0.76
39	46	50.7	6,040	0.7616%	0.8400%		0.91
40	42	47.9	5,470	0.7678%	0.8750%		0.88
41	36	44.4	4,884	0.7371%	0.9100%		0.81
42	49	40.9	4,326	1.1327%	0.9450%		1.20
43	46	37.0	3,771	1.2198%	0.9800%		1.24
44	30	33.8	3,328	0.9014%	1.0150%		0.89
45	31	29.7	2,826	1.0970%	1.0500%		1.04
46	40	27.1	2,418	1.6543%	1.1200%		1.48
47	20	23.5	1,972	1.0142%	1.1900%		0.85
48	12	20.0	1,587	0.7561%	1.2600%		0.60
49	11	16.2	1,217	0.9039%	1.3300%		0.68
50	10	12.7	906	1.1038%	1.4000%		0.79
51	7	9.8	665	1.0526%	1.4700%		0.72
52	6	6.9	445	1.3483%	1.5400%		0.88
53	6	5.0	310	1.9355%	1.6100%		1.20
54	4	3.7	219	1.8265%	1.6800%		1.09
Total	883	900.4	128,739	0.6859%	0.6994%		0.98

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Age



Accidental Disability Rate - Actual, Expected, and Ratio; by Age



Tier 3 Members

The current assumption for Tier 3 and Tier 3 Revised members is lower than the assumption used for other Tier 3 members due to the difference in the benefit. We do not believe the act of becoming accidentally disabled would vary by type of member. However, we believe that those Tier 3 members who would receive a service retirement benefit as large as an accidental disability retirement benefit would elect a service retirement benefit. Therefore, we propose the accidental disability assumption cease to apply upon completion of 22 years of service.

There is no significant experience for this group and so no charts are included.

Summary

Eligibility for WTC benefits continues to have a significant impact on the experience of the plan and accidental disability benefits. The proposed assumptions decrease the expected number to collect accidental disability benefits whether eligible for WTC benefits or not. We believe this would result in lower plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT				
Age	Tier 1 and Tier 2		Tier 3 and Tier 3 Revised	
	Not Eligible for WTC Benefits	Eligible for WTC Benefits	Enhanced Plan	Non-Enhanced Plan
15	0.098%	0.168%	0.098%	0.098%
16	0.098%	0.168%	0.098%	0.098%
17	0.098%	0.168%	0.098%	0.098%
18	0.098%	0.168%	0.098%	0.098%
19	0.098%	0.168%	0.098%	0.098%
20	0.105%	0.180%	0.105%	0.105%
21	0.112%	0.192%	0.112%	0.112%
22	0.119%	0.204%	0.119%	0.119%
23	0.126%	0.216%	0.126%	0.126%
24	0.133%	0.228%	0.133%	0.133%
25	0.140%	0.240%	0.140%	0.140%
26	0.182%	0.312%	0.182%	0.182%
27	0.224%	0.384%	0.224%	0.224%
28	0.266%	0.456%	0.266%	0.266%
29	0.308%	0.528%	0.308%	0.308%
30	0.350%	0.600%	0.350%	0.350%
31	0.420%	0.720%	0.420%	0.420%
32	0.490%	0.840%	0.490%	0.490%
33	0.560%	0.960%	0.560%	0.560%
34	0.630%	1.080%	0.630%	0.630%
35	0.700%	1.200%	0.700%	0.700%
36	0.735%	1.260%	0.735%	0.728%
37	0.770%	1.320%	0.770%	0.756%
38	0.805%	1.380%	0.805%	0.784%
39	0.840%	1.440%	0.840%	0.812%
40	0.875%	1.500%	0.875%	0.840%
41	0.910%	1.560%	0.910%	0.854%
42	0.945%	1.620%	0.945%	0.868%
43	0.980%	1.680%	0.980%	0.882%

NEW YORK CITY POLICE PENSION FUND CURRENT (continued) PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT				
Age	Tier 1 and Tier 2		Tier 3 and Tier 3 Revised	
	Not Eligible for WTC Benefits	Eligible for WTC Benefits	Enhanced Plan	Non-Enhanced Plan
44	1.015%	1.740%	1.015%	0.896%
45	1.050%	1.800%	1.050%	0.910%
46	1.120%	1.920%	1.120%	0.938%
47	1.190%	2.040%	1.190%	0.966%
48	1.260%	2.160%	1.260%	0.994%
49	1.330%	2.280%	1.330%	1.022%
50	1.400%	2.400%	1.400%	1.050%
51	1.540%	2.640%	1.540%	1.120%
52	1.680%	2.880%	1.680%	1.190%
53	1.820%	3.120%	1.820%	1.260%
54	1.960%	3.360%	1.960%	1.330%
55	2.100%	3.600%	2.100%	1.400%
56	2.380%	4.080%	2.380%	1.540%
57	2.660%	4.560%	2.660%	1.680%
58	2.940%	5.040%	2.940%	1.820%
59	3.220%	5.520%	3.220%	1.960%
60	3.500%	6.000%	3.500%	2.100%
61	4.200%	7.200%	4.200%	2.240%
62	4.900%	8.400%	4.900%	2.450%
63	N/A	N/A	N/A	N/A

*N/A for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members at age 62.

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT ¹		
Age	Not Eligible for WTC Benefits ^{2, 3}	Eligible for WTC Benefits ⁴
20	0.1050%	0.1418%
21	0.1120%	0.1512%
22	0.1190%	0.1607%
23	0.1260%	0.1701%
24	0.1330%	0.1796%
25	0.1400%	0.1890%
26	0.1820%	0.2457%
27	0.2240%	0.3024%
28	0.2660%	0.3591%
29	0.3080%	0.4158%
30	0.3500%	0.4725%
31	0.4200%	0.5670%
32	0.4900%	0.6615%
33	0.5600%	0.7560%
34	0.6300%	0.8505%
35	0.7000%	0.9450%
36	0.7350%	0.9923%
37	0.7700%	1.0395%
38	0.8050%	1.0868%
39	0.8400%	1.1340%
40	0.8750%	1.1813%
41	0.9100%	1.2285%
42	0.9450%	1.2758%
43	0.9800%	1.3230%
44	1.0150%	1.3703%
45	1.0500%	1.4175%

- ¹ Greater of disability benefit and retirement benefit is valued if eligible for early or service retirement
- ² If less than 5 years of service, decrease rates by 50%
- ³ No rates of accidental disability apply upon completion of 22 years of service for Tier 3 and Tier 3 Revised members
- ⁴ In the 20th year of service (first eligibility for retirement), increase rates by 33¹/₃%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT ¹		
Age	Not Eligible for WTC Benefits ^{2, 3}	Eligible for WTC Benefits ⁴
46	1.1200%	1.5120%
47	1.1900%	1.6065%
48	1.2600%	1.7010%
49	1.3300%	1.7955%
50	1.4000%	1.8900%
51	1.4700%	1.9845%
52	1.5400%	2.0790%
53	1.6100%	2.1735%
54	1.6800%	2.2680%
55	1.7500%	2.3625%
56	1.8200%	2.4570%
57	1.8900%	2.5515%
58	1.9600%	2.6460%
59	2.0300%	2.7405%
60	2.1000%	2.8350%
61	2.1700%	2.9295%
62 ⁵	2.2400%	3.0240%
63	N/A	N/A

- ¹ Greater of disability benefit and retirement benefit is valued if eligible for early or service retirement
- ² If less than 5 years of service, decrease rates by 50%
- ³ No rates of accidental disability apply upon completion of 22 years of service for Tier 3 and Tier 3 Revised members
In the 20th year of service (first eligibility for retirement), increase rates by
- ⁴ 33¹/₃%
- ⁵ N/A for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members.

Pre-retirement Death

Mortality assumptions involve two components: a base table and a mortality improvement scale. The mortality improvement scale adjusts the mortality rates of the base table to reflect that generally rates of mortality are anticipated to improve over time.

The Society of Actuaries (SOA) has published mortality improvement scales (MP scales) each year from 2014 to 2021. In the last several actuarial valuations, OA has used the mortality improvement scale that coincides with the valuation date. For example, OA used the MP-2020 scale in its June 30, 2020 lag actuarial valuation. In this analysis, we used the most recent improvement scale (MP-2021) published by the SOA as of the date of this analysis. Please note that the SOA has not published an updated MP scale due to the pandemic.

The SOA MP-2021 improvement scale is based on data through 2019 (before the onset of Covid) from the Social Security Administration (SSA). Even though the aggregate (for all ages) long-term trend has been towards mortality improvements, this is not always the case for each age. Therefore, there are situations where the expected mortality rate in a later year is higher than base rate.

There is much discussion in the actuarial profession and among retirement systems about the development of mortality tables and treatment of excess deaths due to the Covid pandemic, which occurred in 2020 – 2022. The analysis to develop our recommendations exclude the mortality experience of members during the pandemic and reflect the experience from 2012 - 2019.

In this study the base table of the current assumption corresponds to the year 2012; expected mortality rates in future years are obtained from the base table and the MP-2021 scale. For example, the 2017 (July 1, 2016 – June 30, 2017) mortality rates are derived from the base table (2012) adjusted with four years of improvements until 2016. This method links mortality rates across the years and, consequently, allows mortality comparisons from one year to another.

For the proposed assumption, proposed rates were initially determined as of the mid-year of the study period or fiscal year 2016. MP-2021 was then used to adjust those rates to earlier and later years. The proposed mortality rates shown in the following section have been adjusted to reflect a base year of 2019. We recommend that MP-2021 continue to be used to reflect mortality improvements both before and after the measurement date.

In reviewing the current assumption, we compared the actual experience to published tables from the SOA. The most recent tables published by the SOA reflected experience for public plan retirement systems separated into Public Safety (PubS) members, General employees (PubG) and Teachers (PubT). Adjustments were made to the standard SOA tables to match the experience of the system or the current tables, and for consistency with recommended postretirement mortality tables, to determine if the SOA tables provided a better fit.

Ordinary Death

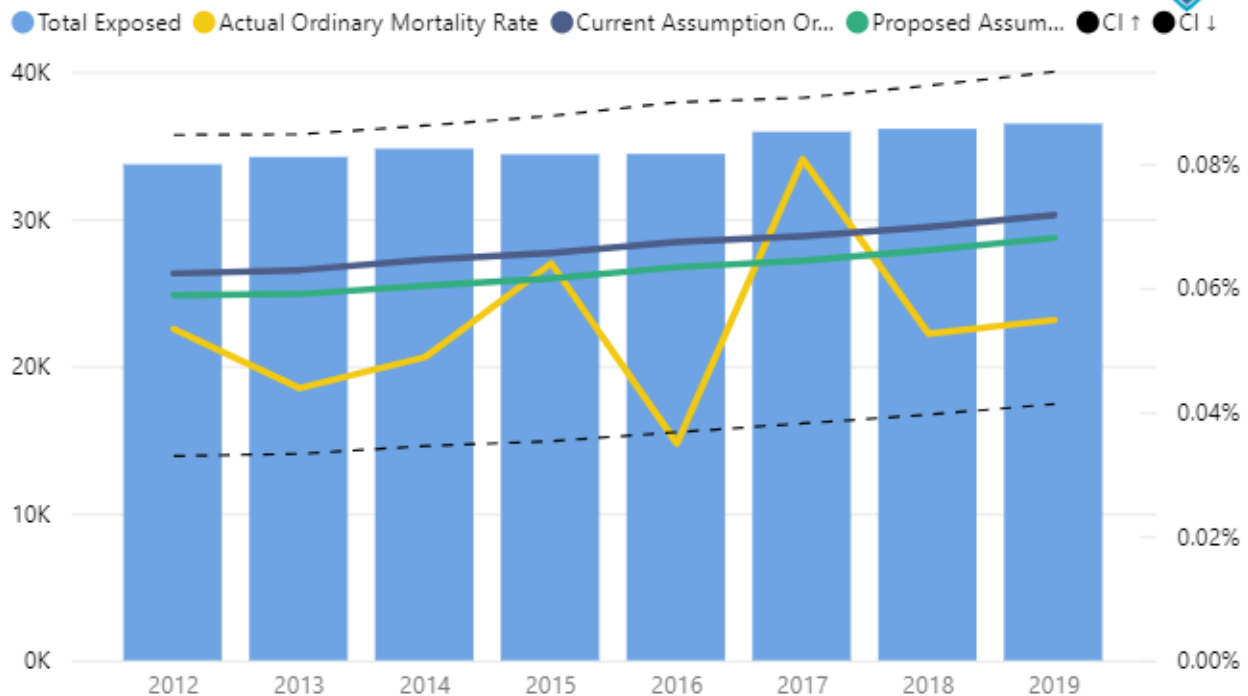
For POLICE, we compared the experience to PubS tables without further adjustments. We propose to use the PubS table, which is consistent with the proposed healthy annuitant mortality table.

The following tables show the experience of ordinary death by year, for the age range (20 to 59) during the period 2012 – 2019 based on the current and proposed assumptions for both males and females combined. The A/E ratio increased from 0.81 to 0.86.

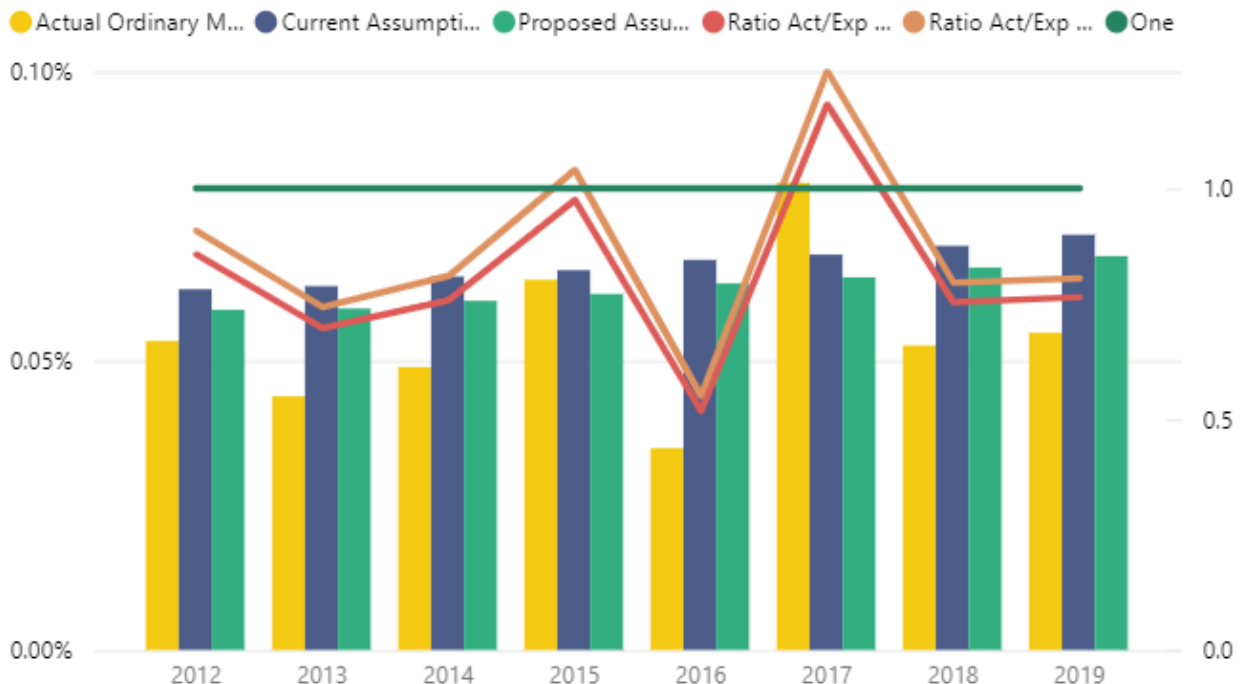
Plan Year	Actual Ordinary Deaths	Expected Ordinary Deaths	Total Exposed	Actual Ordinary Mortality Rate	Current Assumption Ordinary Mortality	Ratio Act/Exp Ordinary Mortality
2012	18	21.0	33,712	0.0534%	0.0623%	▲ 0.86
2013	15	21.5	34,214	0.0438%	0.0629%	▲ 0.70
2014	17	22.4	34,777	0.0489%	0.0645%	▲ 0.76
2015	22	22.6	34,387	0.0640%	0.0656%	● 0.97
2016	12	23.2	34,413	0.0349%	0.0674%	▲ 0.52
2017	29	24.5	35,923	0.0807%	0.0683%	▲ 1.18
2018	19	25.2	36,122	0.0526%	0.0698%	▲ 0.75
2019	20	26.2	36,476	0.0548%	0.0718%	▲ 0.76
Total	152	186.7	280,024	0.0543%	0.0667%	▲ 0.81

Plan Year	Actual Ordinary Deaths	Expected Ordinary Deaths Proposed	Total Exposed	Actual Ordinary Mortality Rate	Proposed Assumption Ordinary Mortality	Act/Exp Proposed Ordinary Mortality
2012	18	19.8	33,712	0.0534%	0.0588%	● 0.91
2013	15	20.2	34,214	0.0438%	0.0590%	▲ 0.74
2014	17	21.0	34,777	0.0489%	0.0603%	▲ 0.81
2015	22	21.2	34,387	0.0640%	0.0615%	● 1.04
2016	12	21.8	34,413	0.0349%	0.0633%	▲ 0.55
2017	29	23.1	35,923	0.0807%	0.0644%	▲ 1.25
2018	19	23.9	36,122	0.0526%	0.0661%	▲ 0.80
2019	20	24.8	36,476	0.0548%	0.0681%	▲ 0.81
Total	152	175.8	280,024	0.0543%	0.0628%	▲ 0.86

Exposure Distribution w/ Ordinary Mortality Rate - Actual and Expected; by Year

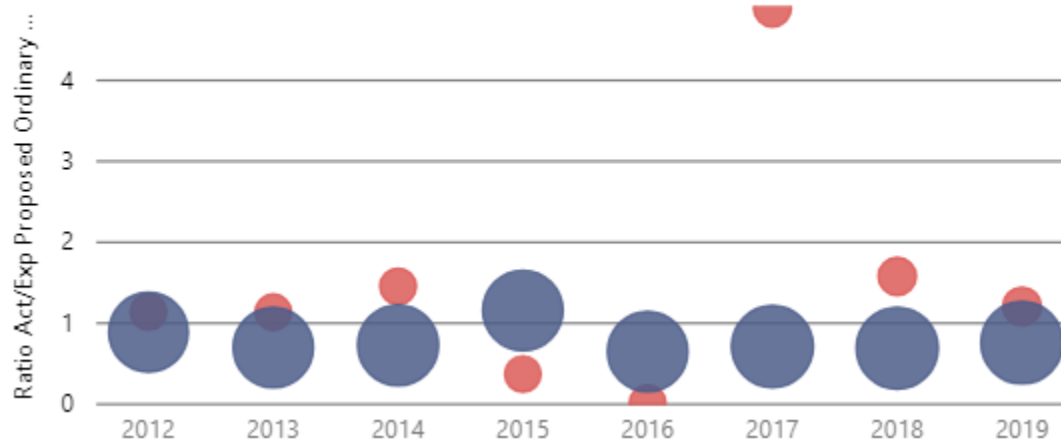


Ordinary Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Ordinary Mortality Proposed w/ Exposure Bubbles; by Year

Gender ● Female ● Male



The following section displays results by gender.

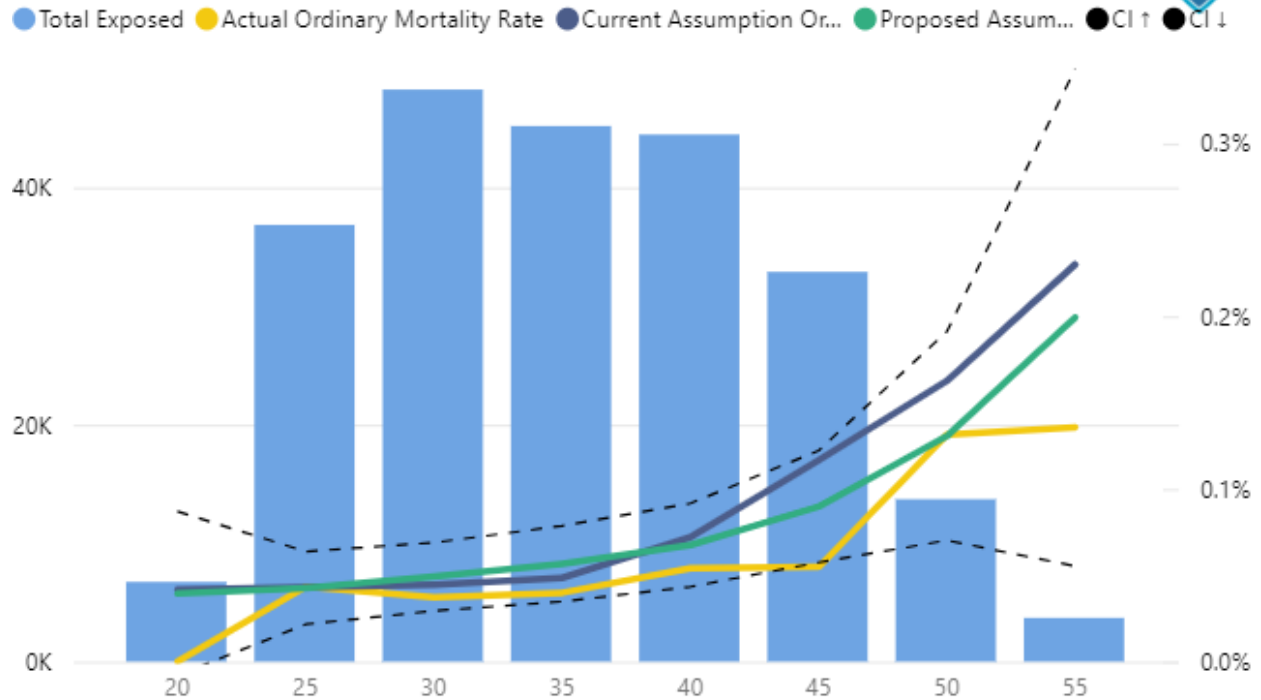
Males

The following charts show the experience of ordinary death by age band, for the age range (20 to 59) during the period 2012 – 2019 based on the current and proposed assumptions. The A/E ratio increased from 0.72 to 0.77. Please note that the charts by age are based on 5-year brackets. For example, the age bracket 45 should be interpreted as the interval 45 – 49.

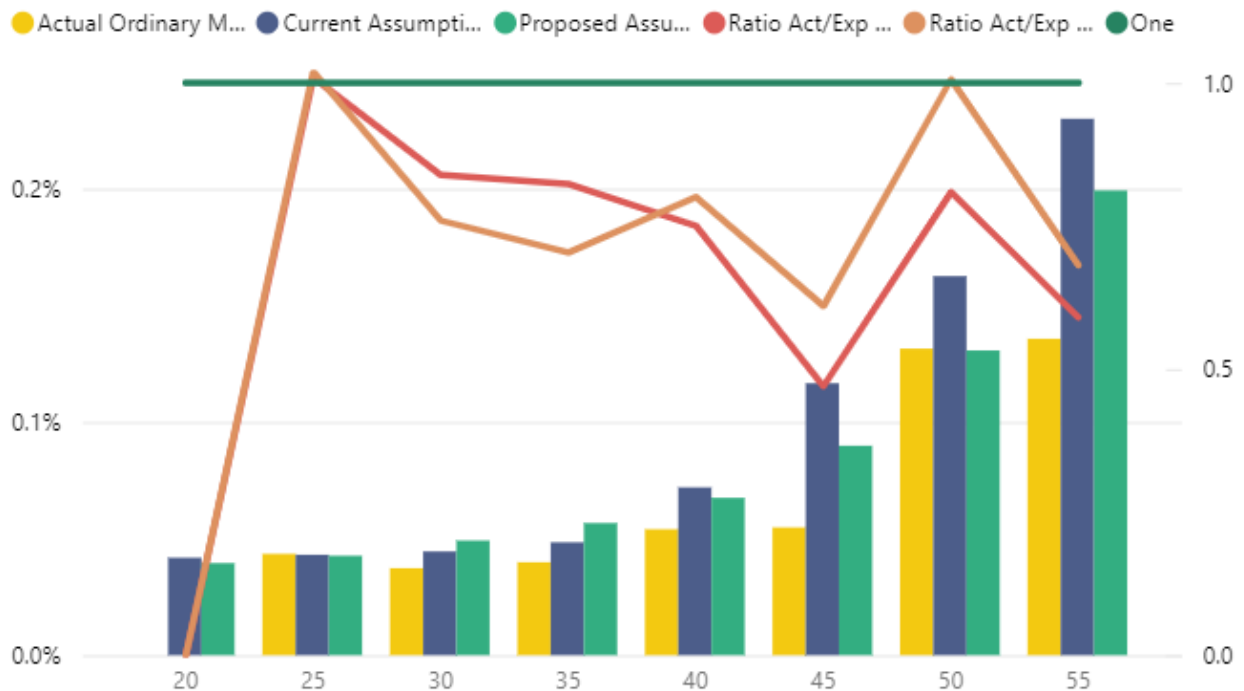
Age (bins)	Actual Ordinary Deaths	Expected Ordinary Deaths	Total Exposed	Actual Ordinary Mortality Rate	Current Assumption Ordinary Mortality	Ratio Act/Exp Ordinary Mortality
20	0	2.8	6,724	0.0000%	0.0418%	0.00
25	16	15.9	36,840	0.0434%	0.0430%	1.01
30	18	21.5	48,258	0.0373%	0.0445%	0.84
35	18	21.9	45,180	0.0398%	0.0484%	0.82
40	24	32.0	44,463	0.0540%	0.0719%	0.75
45	18	38.3	32,876	0.0548%	0.1166%	0.47
50	18	22.3	13,696	0.1314%	0.1625%	0.81
55	5	8.5	3,686	0.1356%	0.2300%	0.59
Total	117	163.0	231,723	0.0505%	0.0704%	0.72

Age (bins)	Actual Ordinary Deaths	Expected Ordinary Deaths Proposed	Total Exposed	Actual Ordinary Mortality Rate	Proposed Assumption Ordinary Mortality	Act/Exp Proposed Ordinary Mortality
20	0	2.7	6,724	0.0000%	0.0395%	0.00
25	16	15.7	36,840	0.0434%	0.0426%	1.02
30	18	23.7	48,258	0.0373%	0.0491%	0.76
35	18	25.6	45,180	0.0398%	0.0566%	0.70
40	24	30.0	44,463	0.0540%	0.0674%	0.80
45	18	29.5	32,876	0.0548%	0.0898%	0.61
50	18	17.9	13,696	0.1314%	0.1306%	1.01
55	5	7.3	3,686	0.1356%	0.1992%	0.68
Total	117	152.4	231,723	0.0505%	0.0658%	0.77

Exposure Distribution w/ Ordinary Mortality Rate - Actual and Expected; by Age



Ordinary Mortality Rate - Actual, Expected, and Ratio; by Age



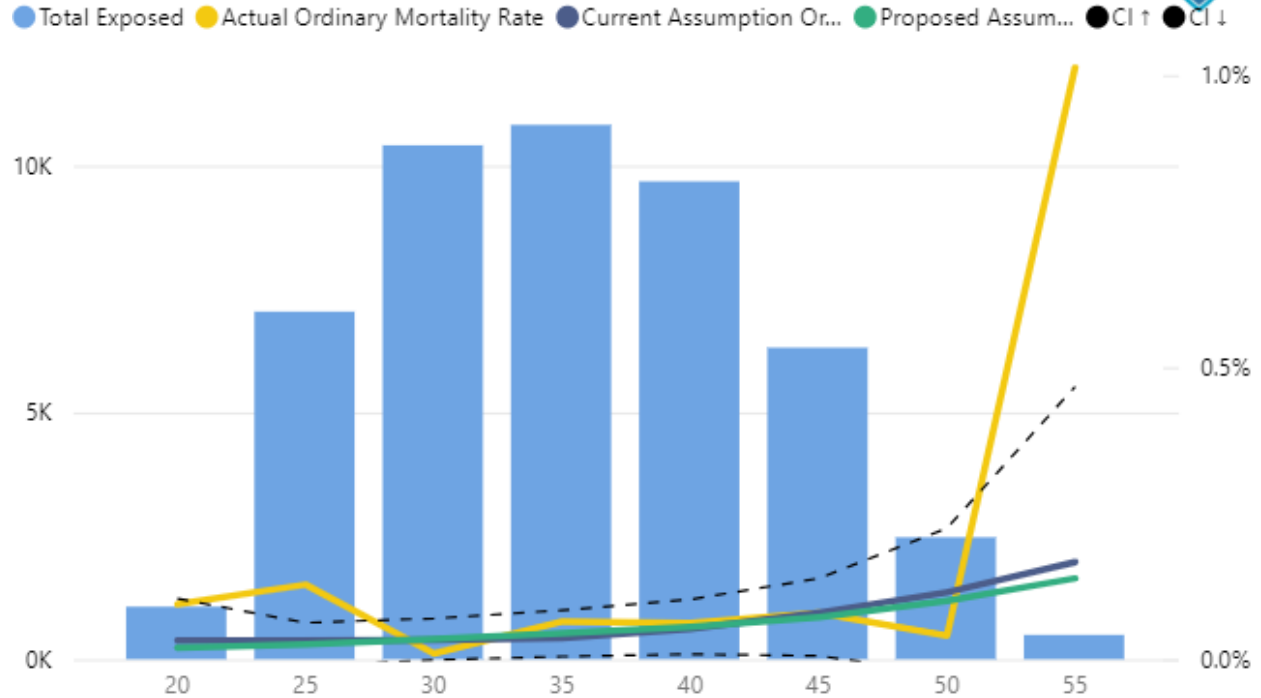
Females

The following charts show the experience of ordinary death by age band, for the age range (20 to 59) during the period 2012 – 2019 based on the current and proposed assumptions. The A/E ratio increased from 1.48 to 1.50. Please note that the charts by age are based on 5-year brackets. For example, the age bracket 45 should be interpreted as the interval 45 – 49.

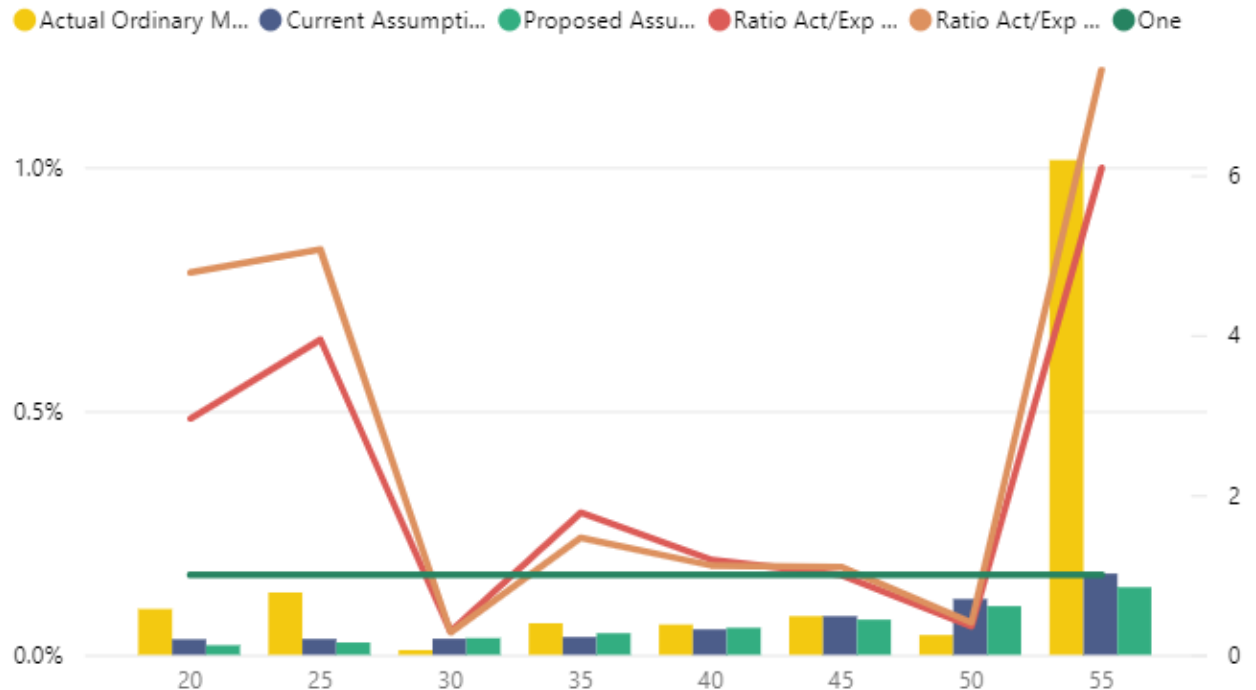
Age (bins)	Actual Ordinary Deaths	Expected Ordinary Deaths	Total Exposed	Actual Ordinary Mortality Rate	Current Assumption Ordinary Mortality	Ratio Act/Exp Ordinary Mortality
20	1	0.3	1,065	0.0939%	0.0318%	2.95
25	9	2.3	7,042	0.1278%	0.0324%	3.94
30	1	3.4	10,412	0.0096%	0.0328%	0.29
35	7	3.9	10,826	0.0647%	0.0364%	1.78
40	6	5.0	9,680	0.0620%	0.0521%	1.19
45	5	5.0	6,312	0.0792%	0.0792%	1.00
50	1	2.8	2,471	0.0405%	0.1144%	0.35
55	5	0.8	493	1.0142%	0.1665%	6.09
Total	35	23.7	48,301	0.0725%	0.0490%	1.48

Age (bins)	Actual Ordinary Deaths	Expected Ordinary Deaths Proposed	Total Exposed	Actual Ordinary Mortality Rate	Proposed Assumption Ordinary Mortality	Act/Exp Proposed Ordinary Mortality
20	1	0.2	1,065	0.0939%	0.0196%	4.78
25	9	1.8	7,042	0.1278%	0.0252%	5.07
30	1	3.6	10,412	0.0096%	0.0342%	0.28
35	7	4.8	10,826	0.0647%	0.0442%	1.46
40	6	5.4	9,680	0.0620%	0.0555%	1.12
45	5	4.5	6,312	0.0792%	0.0720%	1.10
50	1	2.5	2,471	0.0405%	0.0997%	0.41
55	5	0.7	493	1.0142%	0.1385%	7.32
Total	35	23.4	48,301	0.0725%	0.0484%	1.50

Exposure Distribution w/ Ordinary Mortality Rate - Actual and Expected; by Age



Ordinary Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

The proposed assumption decreased the anticipated number of deaths occurring prior to retirement, which will result in an increase in plan liabilities.

Accidental Death

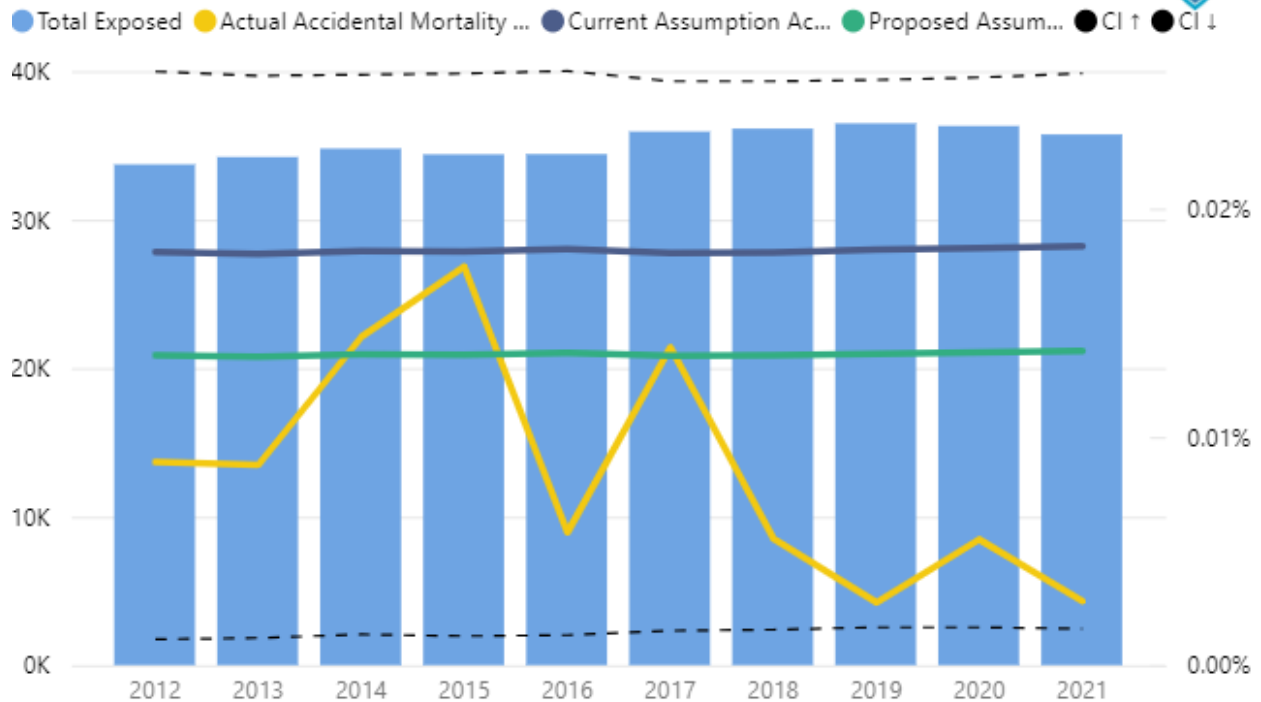
The accidental death rate assumptions are unisex, increase with age, and are not subject to mortality improvements. The actual rate was less than half of that expected. We propose to reduce the current assumption by 25%.

The following tables show the experience of accidental death by year, for the age range (20 to 59) during the period 2012 – 2021 based on the current and proposed assumptions for both males and females combined. The A/E ratio increased from 0.47 to 0.63.

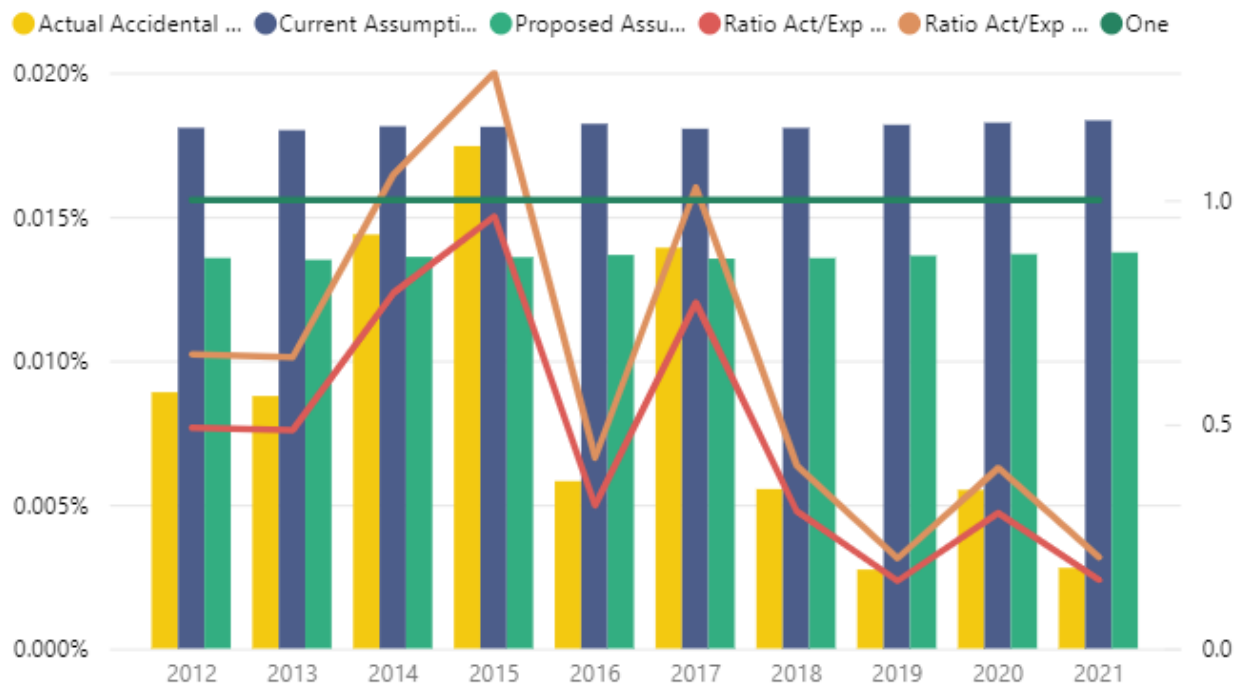
Plan Year	Actual Accidental Deaths	Expected Accidental Deaths	Total Exposed	Actual Accidental Mortality Rate	Current Assumption Accidental Mortality	Ratio Act/Exp Accidental Mortality
2012	3	6.1	33,712	0.0089%	0.0181%	0.49
2013	3	6.2	34,214	0.0088%	0.0180%	0.49
2014	5	6.3	34,777	0.0144%	0.0181%	0.79
2015	6	6.2	34,387	0.0174%	0.0181%	0.96
2016	2	6.3	34,413	0.0058%	0.0182%	0.32
2017	5	6.5	35,923	0.0139%	0.0181%	0.77
2018	2	6.5	36,122	0.0055%	0.0181%	0.31
2019	1	6.6	36,476	0.0027%	0.0182%	0.15
2020	2	6.6	36,302	0.0055%	0.0183%	0.30
2021	1	6.6	35,730	0.0028%	0.0183%	0.15
Total	30	63.9	352,056	0.0085%	0.0181%	0.47

Plan Year	Actual Accidental Deaths	Expected Accidental Deaths Proposed	Total Exposed	Actual Accidental Mortality Rate	Proposed Assumption Accidental Mortality	Act/Exp Proposed Accidental Mortality
2012	3	4.6	33,712	0.0089%	0.0136%	0.66
2013	3	4.6	34,214	0.0088%	0.0135%	0.65
2014	5	4.7	34,777	0.0144%	0.0136%	1.06
2015	6	4.7	34,387	0.0174%	0.0136%	1.28
2016	2	4.7	34,413	0.0058%	0.0137%	0.43
2017	5	4.9	35,923	0.0139%	0.0135%	1.03
2018	2	4.9	36,122	0.0055%	0.0136%	0.41
2019	1	5.0	36,476	0.0027%	0.0136%	0.20
2020	2	5.0	36,302	0.0055%	0.0137%	0.40
2021	1	4.9	35,730	0.0028%	0.0138%	0.20
Total	30	47.9	352,056	0.0085%	0.0136%	0.63

Exposure Distribution w/ Accidental Mortality Rate - Actual and Expected; by Year



Accidental Mortality Rate - Actual, Expected, and Ratio; by Year

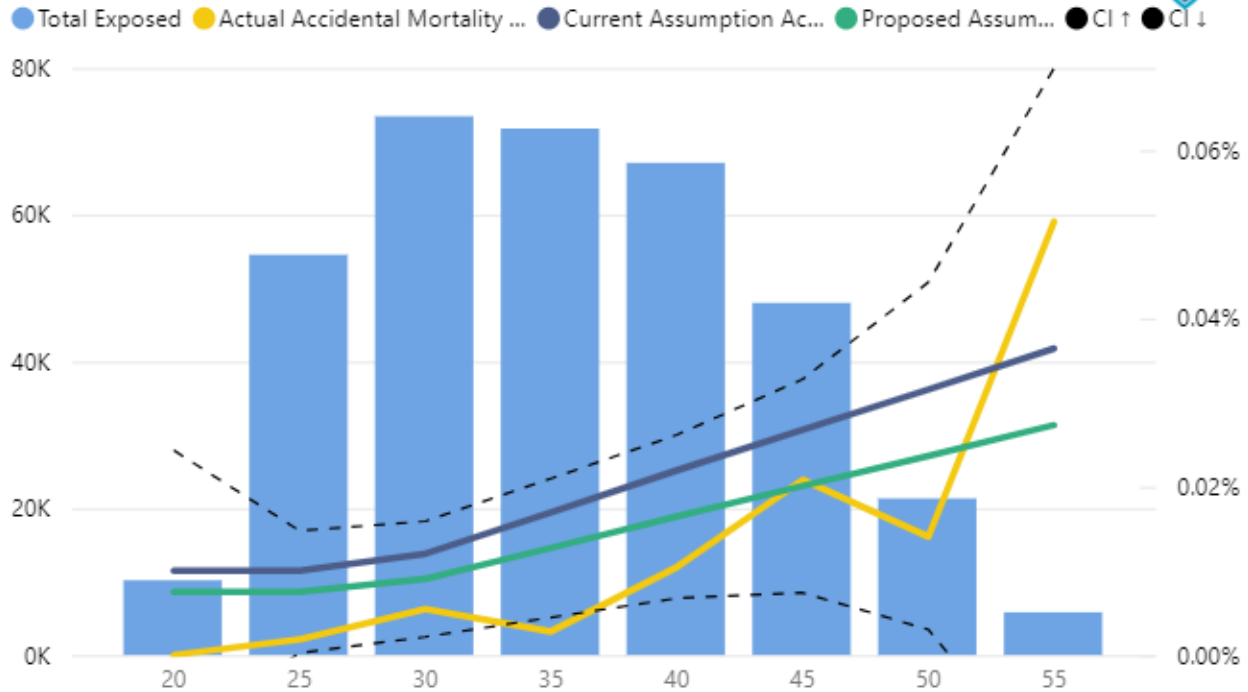


The following tables show the experience of accidental death by age band, for the age range (20 to 59) during the period 2012 – 2021 based on the current and proposed assumptions for both males and females combined. The A/E ratio increased from 0.47 to 0.63. Please note that the charts by age are based on 5-year brackets. For example, the age bracket 45 should be interpreted as the interval 45 – 49.

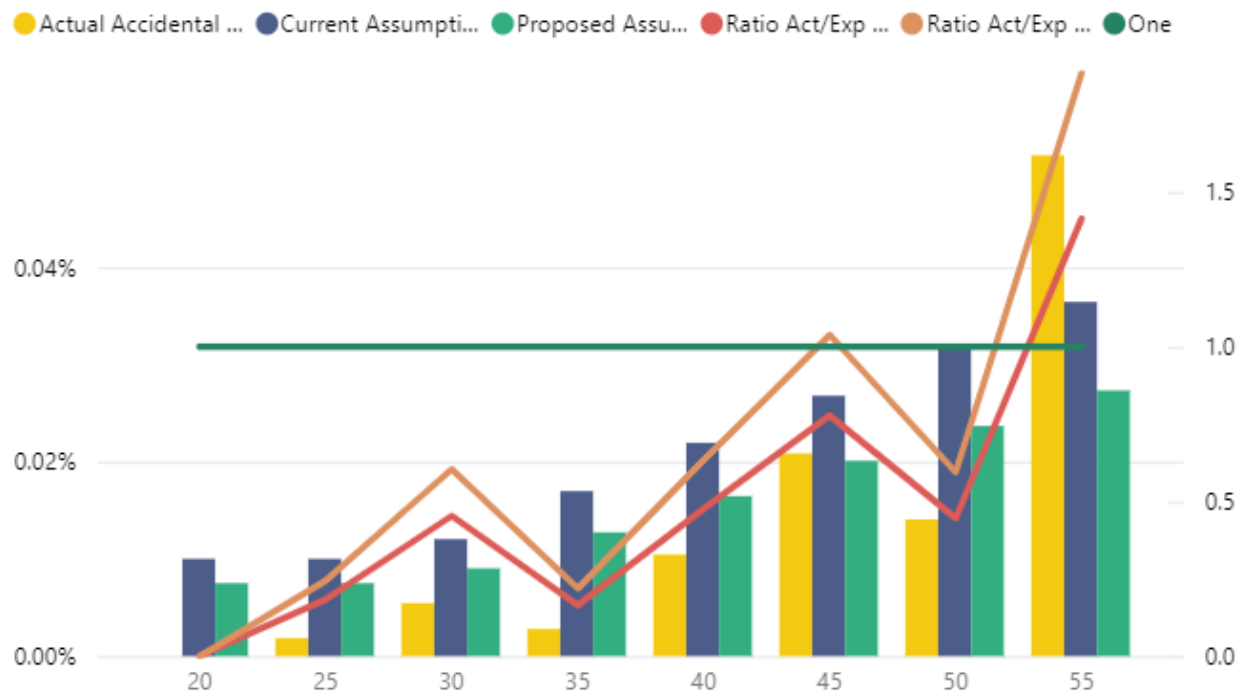
Age (bins)	Actual Accidental Deaths	Expected Accidental Deaths	Total Exposed	Actual Accidental Mortality Rate	Current Assumption Accidental Mortality	Ratio Act/Exp Accidental Mortality
20	0	1.0	10,185	0.0000%	0.0100%	0.00
25	1	5.5	54,543	0.0018%	0.0100%	0.18
30	4	8.8	73,404	0.0054%	0.0120%	0.45
35	2	12.2	71,731	0.0028%	0.0170%	0.16
40	7	14.7	67,060	0.0104%	0.0219%	0.48
45	10	12.9	47,976	0.0208%	0.0268%	0.78
50	3	6.7	21,334	0.0141%	0.0316%	0.45
55	3	2.1	5,823	0.0515%	0.0364%	1.41
Total	30	63.9	352,056	0.0085%	0.0181%	0.47

Age (bins)	Actual Accidental Deaths	Expected Accidental Deaths Proposed	Total Exposed	Actual Accidental Mortality Rate	Proposed Assumption Accidental Mortality	Act/Exp Proposed Accidental Mortality
20	0	0.8	10,185	0.0000%	0.0075%	0.00
25	1	4.1	54,543	0.0018%	0.0075%	0.24
30	4	6.6	73,404	0.0054%	0.0090%	0.60
35	2	9.1	71,731	0.0028%	0.0127%	0.22
40	7	11.0	67,060	0.0104%	0.0165%	0.63
45	10	9.6	47,976	0.0208%	0.0201%	1.04
50	3	5.0	21,334	0.0141%	0.0237%	0.59
55	3	1.6	5,823	0.0515%	0.0273%	1.89
Total	30	47.9	352,056	0.0085%	0.0136%	0.63

Exposure Distribution w/ Accidental Mortality Rate - Actual and Expected; by Age



Accidental Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

The proposed assumption decreased the anticipated number of accidental deaths occurring prior to retirement, which will result in a decrease in plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF MORTALITY FOR ACTIVE MEMBERS BASE TABLE			
Age	Ordinary Death		Accidental Death
	Males	Females	
15	0.040%	0.030%	0.010%
16	0.040%	0.030%	0.010%
17	0.040%	0.030%	0.010%
18	0.040%	0.030%	0.010%
19	0.040%	0.030%	0.010%
20	0.040%	0.030%	0.010%
21	0.040%	0.030%	0.010%
22	0.040%	0.030%	0.010%
23	0.040%	0.030%	0.010%
24	0.040%	0.030%	0.010%
25	0.040%	0.030%	0.010%
26	0.040%	0.030%	0.010%
27	0.040%	0.030%	0.010%
28	0.040%	0.030%	0.010%
29	0.040%	0.030%	0.010%
30	0.040%	0.030%	0.010%
31	0.040%	0.030%	0.011%
32	0.040%	0.030%	0.012%
33	0.040%	0.030%	0.013%
34	0.040%	0.030%	0.014%
35	0.040%	0.030%	0.015%
36	0.042%	0.032%	0.016%
37	0.044%	0.034%	0.017%
38	0.046%	0.036%	0.018%
39	0.048%	0.038%	0.019%
40	0.050%	0.040%	0.020%

NEW YORK CITY POLICE PENSION FUND CURRENT (continued) PROBABILITIES OF MORTALITY FOR ACTIVE MEMBERS BASE TABLE			
Age	Ordinary Death		Accidental Death
	Males	Females	
41	0.060%	0.046%	0.021%
42	0.070%	0.052%	0.022%
43	0.080%	0.058%	0.023%
44	0.090%	0.064%	0.024%
45	0.100%	0.070%	0.025%
46	0.110%	0.076%	0.026%
47	0.120%	0.082%	0.027%
48	0.130%	0.088%	0.028%
49	0.140%	0.094%	0.029%
50	0.150%	0.100%	0.030%
51	0.160%	0.110%	0.031%
52	0.170%	0.120%	0.032%
53	0.180%	0.130%	0.033%
54	0.190%	0.140%	0.034%
55	0.200%	0.150%	0.035%
56	0.220%	0.160%	0.036%
57	0.240%	0.170%	0.037%
58	0.260%	0.180%	0.038%
59	0.280%	0.190%	0.039%
60	0.300%	0.200%	0.040%
61	0.320%	0.220%	0.041%
62*	0.340%	0.240%	0.042%
63	N/A	N/A	N/A

*Probabilities are N/A for Tier 3 members aged 62 and over.

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF ACTIVE MEMBER MORTALITY BASE YEAR 2019			
	Ordinary Death		
Age	Males	Females	Accidental Death
15	0.017%	0.009%	0.008%
16	0.023%	0.011%	0.008%
17	0.031%	0.012%	0.008%
18	0.037%	0.014%	0.008%
19	0.040%	0.015%	0.008%
20	0.041%	0.017%	0.008%
21	0.042%	0.018%	0.008%
22	0.042%	0.019%	0.008%
23	0.042%	0.020%	0.008%
24	0.042%	0.022%	0.008%
25	0.042%	0.024%	0.008%
26	0.045%	0.025%	0.008%
27	0.047%	0.027%	0.008%
28	0.050%	0.030%	0.008%
29	0.053%	0.032%	0.008%
30	0.054%	0.035%	0.008%
31	0.056%	0.037%	0.008%
32	0.058%	0.039%	0.009%
33	0.060%	0.042%	0.010%
34	0.062%	0.044%	0.011%
35	0.064%	0.046%	0.011%
36	0.066%	0.048%	0.012%
37	0.066%	0.051%	0.013%
38	0.069%	0.051%	0.014%
39	0.071%	0.053%	0.014%
40	0.072%	0.055%	0.015%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF ACTIVE MEMBER MORTALITY BASE YEAR 2019			
	Ordinary Death		
Age	Males	Females	Accidental Death
41	0.073%	0.056%	0.016%
42	0.076%	0.058%	0.017%
43	0.077%	0.060%	0.017%
44	0.080%	0.062%	0.018%
45	0.083%	0.064%	0.019%
46	0.087%	0.067%	0.020%
47	0.092%	0.071%	0.020%
48	0.097%	0.075%	0.021%
49	0.105%	0.079%	0.022%
50	0.113%	0.086%	0.023%
51	0.121%	0.092%	0.023%
52	0.132%	0.100%	0.024%
53	0.144%	0.107%	0.025%
54	0.156%	0.117%	0.026%
55	0.171%	0.126%	0.026%
56	0.189%	0.136%	0.027%
57	0.207%	0.147%	0.028%
58	0.228%	0.156%	0.029%
59	0.251%	0.166%	0.029%
60	0.275%	0.176%	0.030%
61	0.300%	0.184%	0.031%
62 *	0.328%	0.193%	0.032%
63	N/A	N/A	N/A

*Probabilities are N/A for Tier 3 members aged 62 and over.

Postretirement Mortality

In addition to gender, the post-retirement mortality assumption depends on the type of inactive member:

- 1) Service Retirees
- 2) Disabled Retirees
- 3) Contingent Beneficiaries

The MEST contains all retirees on one page and beneficiaries on another page. On the retiree page, the experience can be examined by status to review disabled retirees versus service retirees. Service retirees include members who have commenced their pension benefit from a terminated vested status in addition to members who have retired from active status. There is a separate MEST containing the postretirement mortality experience of members across all NYCRS systems, which allowed us to review experience and develop proposed assumptions over multiple systems where it was advantageous to do so.

There is much discussion in the actuarial profession and among retirement systems about the development of mortality tables and treatment of excess deaths due to the Covid pandemic, which occurred in 2020 – 2022. The analysis to develop our recommendations excludes the mortality experience of members during the pandemic and reflects the experience from 2015 - 2019. Experience prior to 2015 was excluded as benefit amounts were not available in the historical database prior to this period.

Most mortality studies have found that higher benefits are positively correlated with smaller mortality rates and longer life expectancy. Accordingly, the OA utilizes adjustment factors to convert post-retirement mortality weighted by headcounts to post-retirement mortality weighted by benefit amounts. The current assumption adjustment factors used by the OA are:

Post-Retirement Mortality Adjustment Factor To Convert from Headcount-Weighted to Amount-Weighted		
	Males	Females
Service Retiree	0.910	0.910
Disabled Retiree	0.876	0.876
Contingent Beneficiary	0.890	0.951

Mortality assumptions involve two components: a base table and a mortality improvement scale. The mortality improvement scale adjusts the mortality rates of the base table to reflect that generally rates of mortality are anticipated to improve over time. As noted in the pre-retirement death section, we used the most recent improvement scale (MP-2021) published by the SOA as of the date of this analysis. Please note that the SOA has not published an updated MP scale due to the pandemic.

In this study the base table of the current assumption corresponds to the year 2012; expected mortality rates in future years are obtained from the base table and the MP-2021 scale. For example, the 2017 (July 1, 2016 – June 30, 2017) mortality rates are derived from the base table (2012) adjusted with four years of improvements until 2016. This method links mortality rates across the years and, consequently, allows mortality comparisons from one year to another.

For the proposed assumption, proposed rates were initially determined as of the mid-year of the study period or fiscal year 2017. MP-2021 was then used to adjust those rates to earlier and later years. The proposed mortality rates shown in the following section have been adjusted to reflect a base year of 2019. We recommend that MP-2021 continue to be used to reflect mortality improvements both before and after the measurement date.

In reviewing the current assumption, we compared the actual experience to published tables from the SOA. The most recent tables published by the SOA reflected experience for public plan retirement systems separated into Public Safety (PubS) members, General employees (PubG) and Teachers (PubT). The SOA publishes versions of each of these tables where the mortality rates are weighted by the amount of the pension benefit ("amount-weighted") or weighted by the number of members (headcount-weighted). We compared the amount-weighted experience to the amount-weighted SOA table and the headcount-weighted experience to the headcount-weighted SOA table. Adjustments were made to the applicable standard SOA tables to match the experience of the system to determine if the SOA tables provided a better statistical fit to the experience.

The SOA combined the experience of all contingent beneficiaries (teachers, general employees and public safety members) into a single table. We combined the experience of all NYCERS systems (TRS, BERS, NYCERS, POLICE and FIRE) in proposing a recommended assumption. The contingent survivor assumption would apply upon the death of the member. While both the member and contingent survivor are both alive, we propose the healthy annuitant mortality table apply.

In the actuarial valuation of pension benefits, we recommend that amount-weighted mortality rates be used. Headcount-weighted mortality rates may be used for other purposes, such as a retiree medical valuation.

Postretirement Mortality – Service Retirees

For POLICE, we propose the PubS table, multiplied by adjustment factors, which provides a better statistical fit. Separate tables exist on a headcount-weighted and amount-weighted basis. For males, the proposed adjustment factors are 104% for amount-weighted and 97% for headcount-weighted. For females, no adjustment factors are proposed due to the lack of credibility.

The following charts show postretirement mortality experience on a headcount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E increased from 0.98 to 1.00.

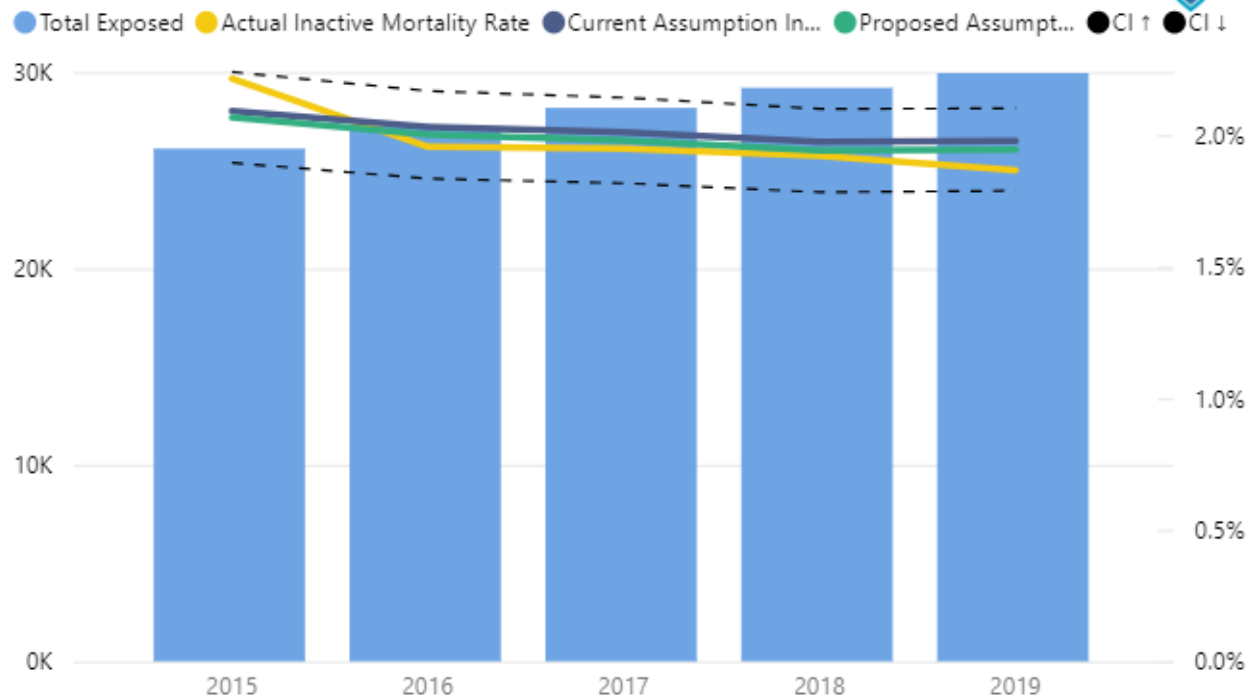
Current Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
2015	578	545.9	26,099	2.2146%	2.0917%	1.06
2016	532	552.4	27,213	1.9549%	2.0299%	0.96
2017	549	566.4	28,173	1.9487%	2.0105%	0.97
2018	561	576.3	29,194	1.9216%	1.9739%	0.97
2019	559	592.2	29,943	1.8669%	1.9778%	0.94
Total	2,779	2,833.2	140,622	1.9762%	2.0148%	0.98

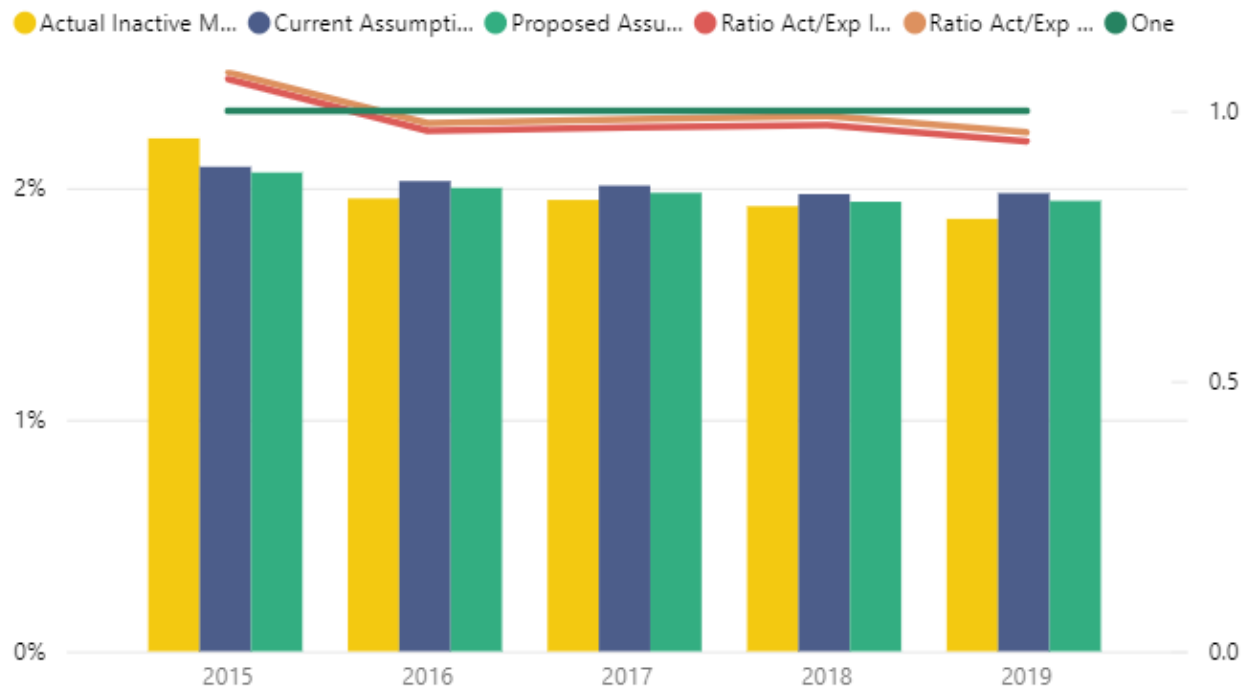
Proposed Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
2015	578	539.4	26,099	2.2146%	2.0669%	1.07
2016	532	544.4	27,213	1.9549%	2.0007%	0.98
2017	549	557.6	28,173	1.9487%	1.9793%	0.98
2018	561	566.6	29,194	1.9216%	1.9408%	0.99
2019	559	582.3	29,943	1.8669%	1.9446%	0.96
Total	2,779	2,790.4	140,622	1.9762%	1.9843%	1.00

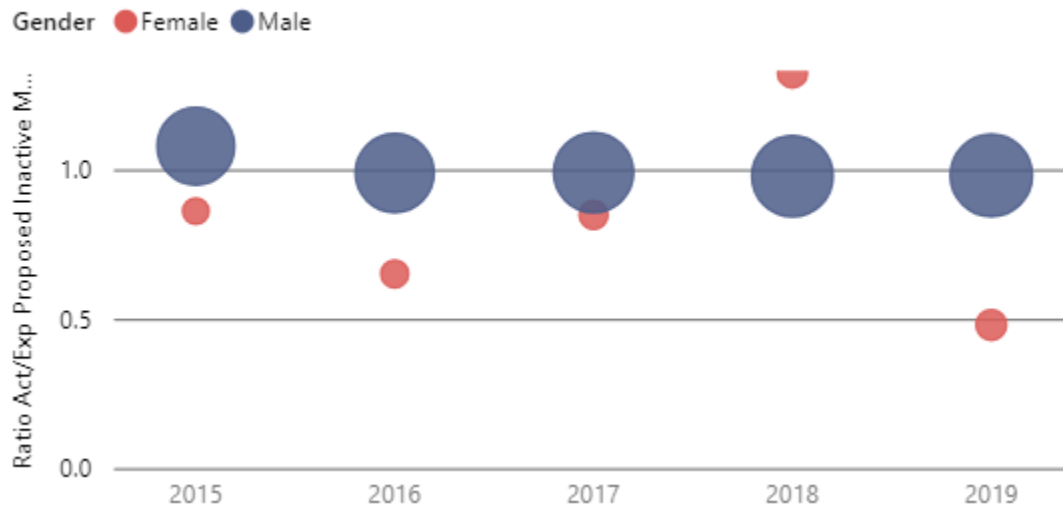
Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Exposure Bubbles; by Year



The following charts show postretirement mortality experience on an amount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E decreased from 1.01 to 1.00.

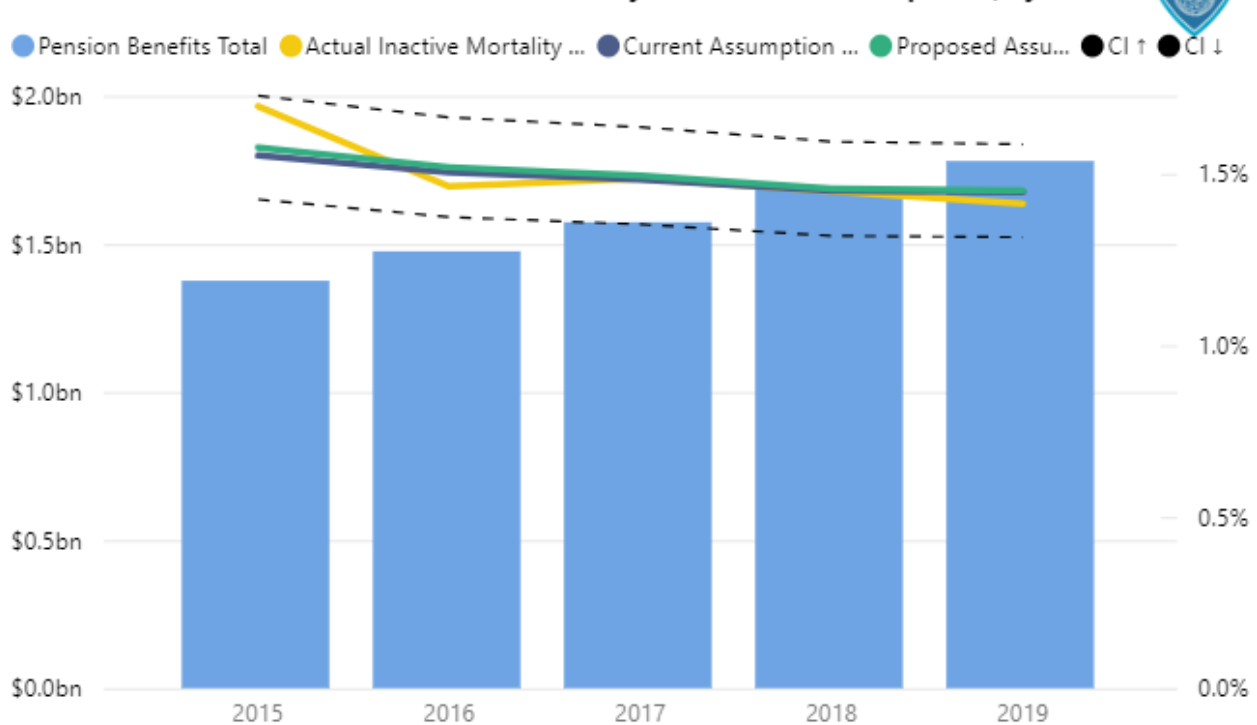
Current Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
2015	\$23.3M	\$21.4M	\$1,375.4M	1.6964%	1.5532%	1.09
2016	\$21.6M	\$22.2M	\$1,474.8M	1.4630%	1.5036%	0.97
2017	\$23.4M	\$23.3M	\$1,572.9M	1.4853%	1.4831%	1.00
2018	\$24.4M	\$24.4M	\$1,684.9M	1.4487%	1.4510%	1.00
2019	\$25.2M	\$25.8M	\$1,779.6M	1.4132%	1.4471%	0.98
Total	\$117.8M	\$117.1M	\$7,887.7M	1.4939%	1.4842%	1.01

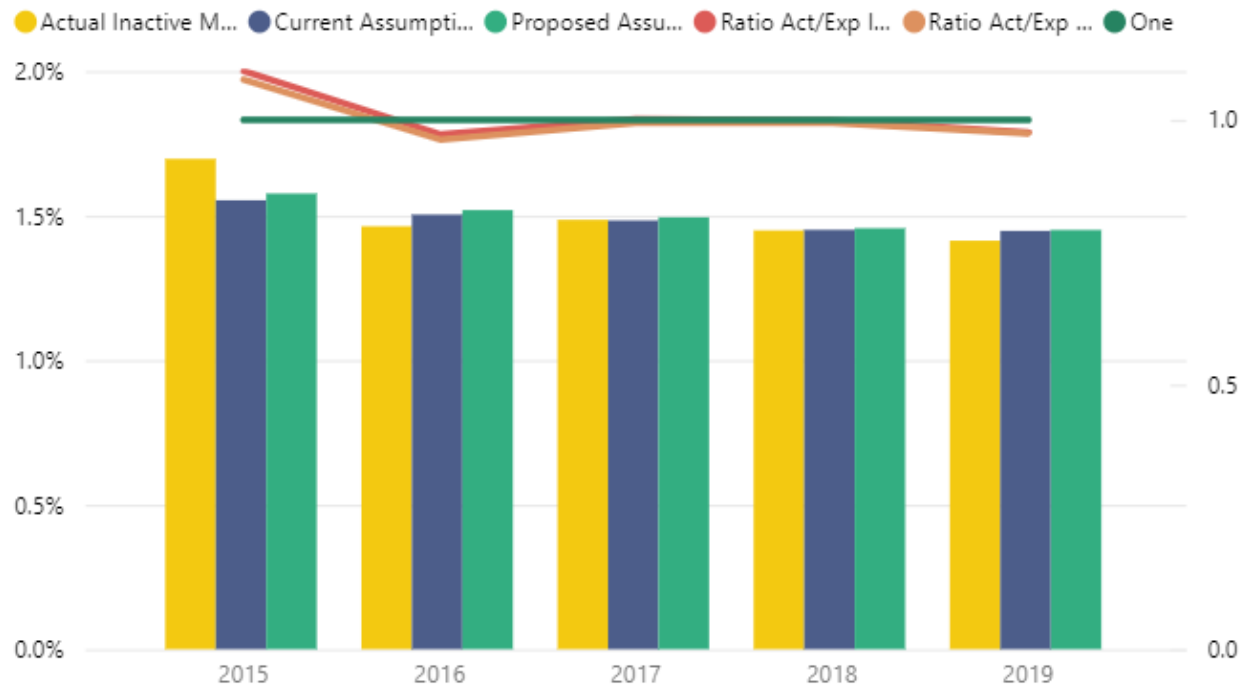
Proposed Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
2015	\$23.3M	\$21.7M	\$1,375.4M	1.6964%	1.5764%	0.96
2016	\$21.6M	\$22.4M	\$1,474.8M	1.4630%	1.5191%	0.96
2017	\$23.4M	\$23.5M	\$1,572.9M	1.4853%	1.4942%	0.99
2018	\$24.4M	\$24.5M	\$1,684.9M	1.4487%	1.4564%	0.99
2019	\$25.2M	\$25.8M	\$1,779.6M	1.4132%	1.4504%	0.97
Total	\$117.8M	\$117.9M	\$7,887.7M	1.4939%	1.4953%	1.00

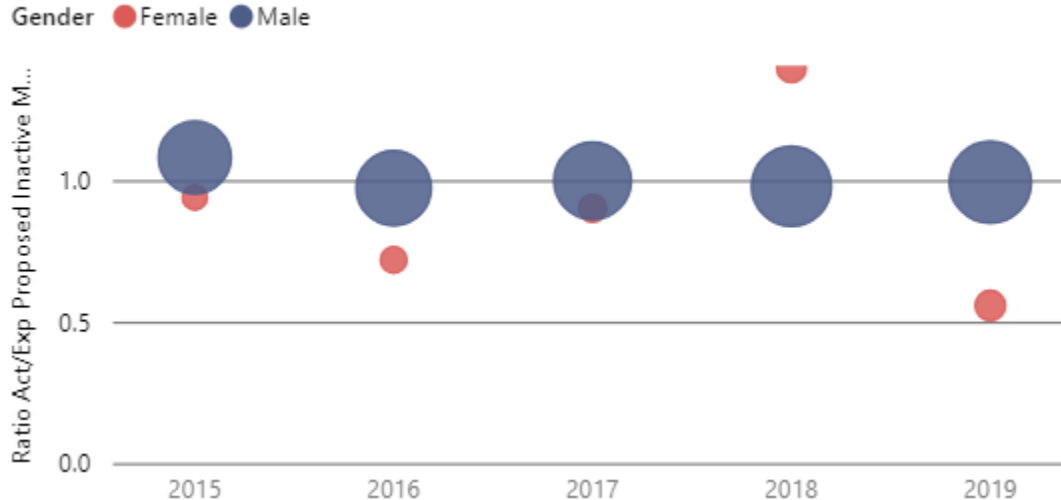
Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Benefit Bubbles; by Year



The following section displays results by gender.

Service Retirees - Males

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for males on the current and proposed assumptions. While the A/E decreased from 1.01 to 1.00, the overall fit for each group improved. For ages 50 to 69, the A/E increased from 0.70 to 0.90 and for ages 70 – 99, the A/E decreased from 1.13 to 1.03.

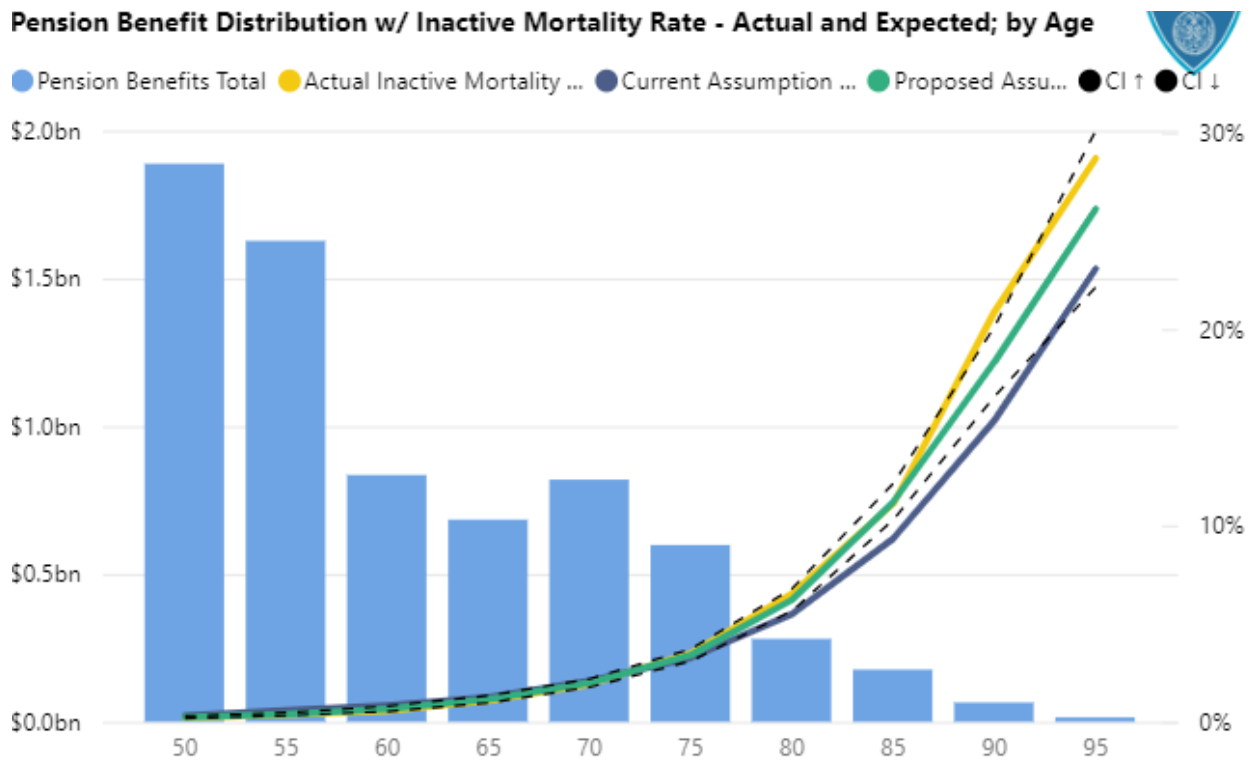
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

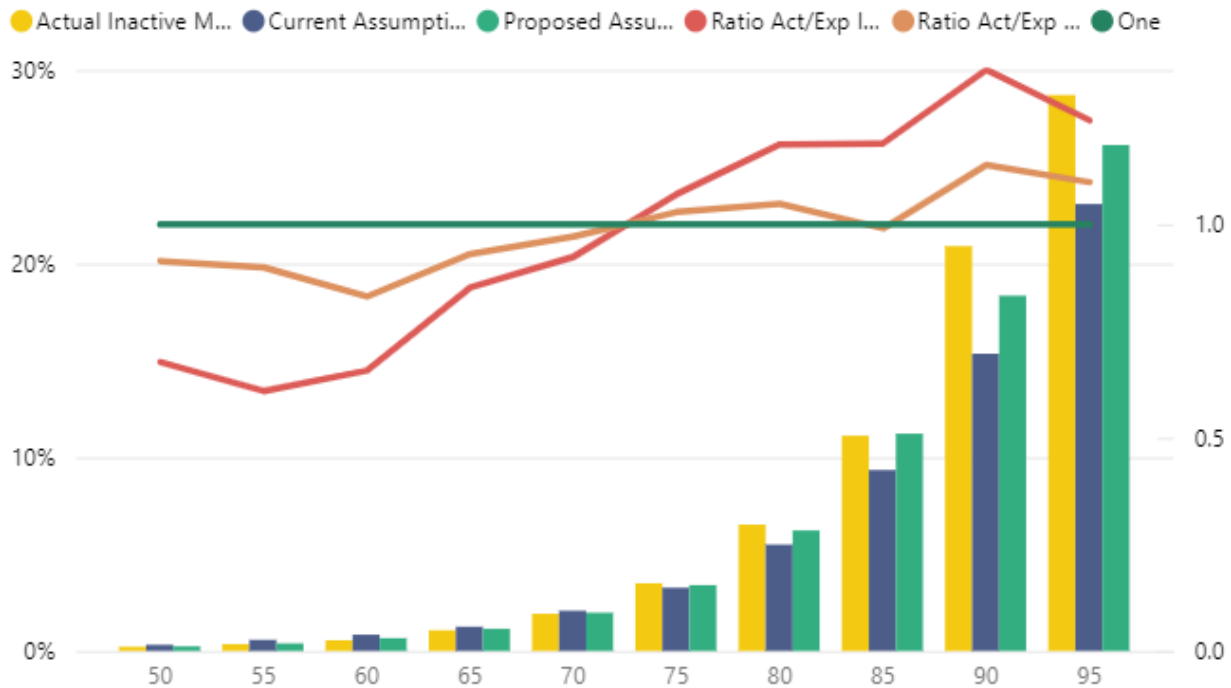
Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
50	\$4.1M	\$6.0M	\$1,887.9M	0.2147%	0.3171%	▲ 0.68
55	\$5.7M	\$9.3M	\$1,627.0M	0.3490%	0.5729%	▲ 0.61
60	\$4.6M	\$7.0M	\$834.8M	0.5501%	0.8370%	▲ 0.66
65	\$7.3M	\$8.5M	\$683.8M	1.0643%	1.2499%	▲ 0.85
70	\$15.7M	\$17.0M	\$819.2M	1.9172%	2.0760%	● 0.92
75	\$20.9M	\$19.5M	\$598.0M	3.4948%	3.2642%	● 1.07
80	\$18.3M	\$15.4M	\$280.5M	6.5189%	5.4900%	▲ 1.19
85	\$19.6M	\$16.5M	\$176.6M	11.1133%	9.3405%	▲ 1.19
90	\$13.6M	\$10.0M	\$65.1M	20.9009%	15.3454%	▲ 1.36
95	\$4.3M	\$3.4M	\$14.9M	28.7030%	23.0761%	▲ 1.24
Total	\$114.0M	\$112.7M	\$6,987.7M	1.6312%	1.6125%	● 1.01

Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
50	\$4.1M	\$4.4M	\$1,887.9M	0.2147%	0.2349%	0.91
55	\$5.7M	\$6.3M	\$1,627.0M	0.3490%	0.3882%	0.90
60	\$4.6M	\$5.5M	\$834.8M	0.5501%	0.6620%	0.83
65	\$7.3M	\$7.8M	\$683.8M	1.0643%	1.1438%	0.93
70	\$15.7M	\$16.2M	\$819.2M	1.9172%	1.9743%	0.97
75	\$20.9M	\$20.3M	\$598.0M	3.4948%	3.3973%	1.03
80	\$18.3M	\$17.4M	\$280.5M	6.5189%	6.2210%	1.05
85	\$19.6M	\$19.8M	\$176.6M	11.1133%	11.2175%	0.99
90	\$13.6M	\$11.9M	\$65.1M	20.9009%	18.3429%	1.14
95	\$4.3M	\$3.9M	\$14.9M	28.7030%	26.1228%	1.10
Total	\$114.0M	\$113.7M	\$6,987.7M	1.6312%	1.6267%	1.00

Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



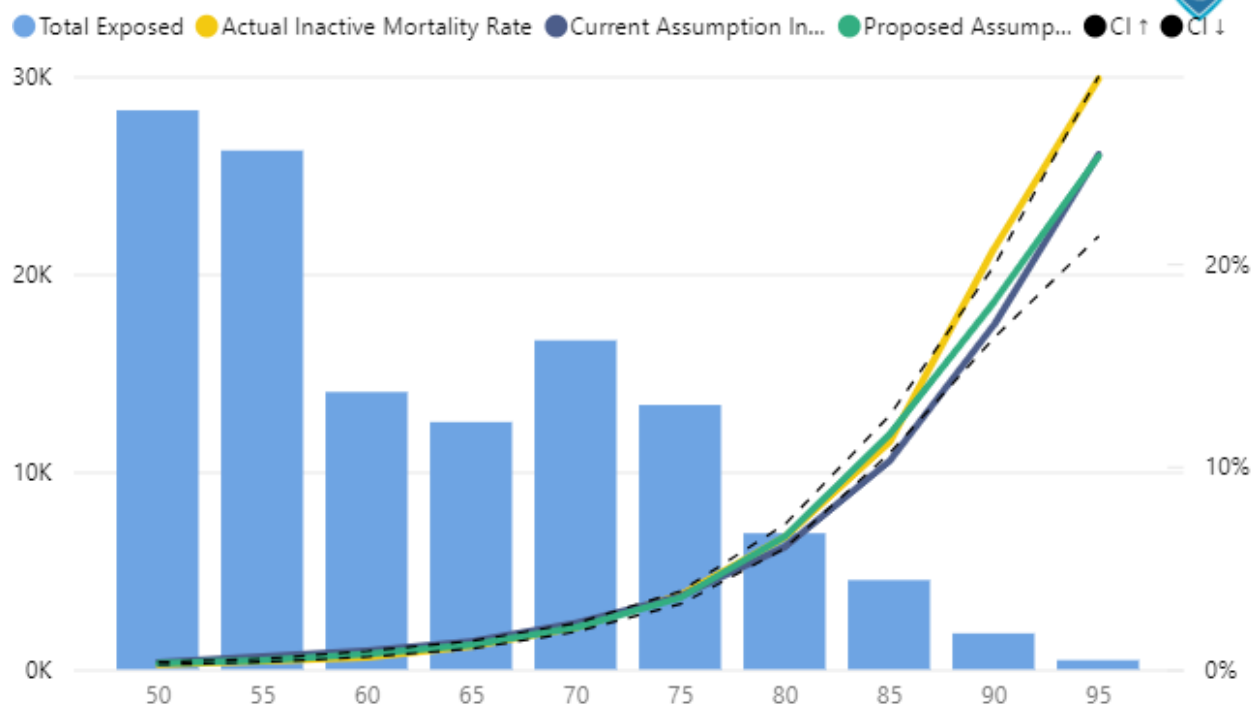
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for males on the current and proposed assumptions. The A/E increased from 0.99 to 1.00.

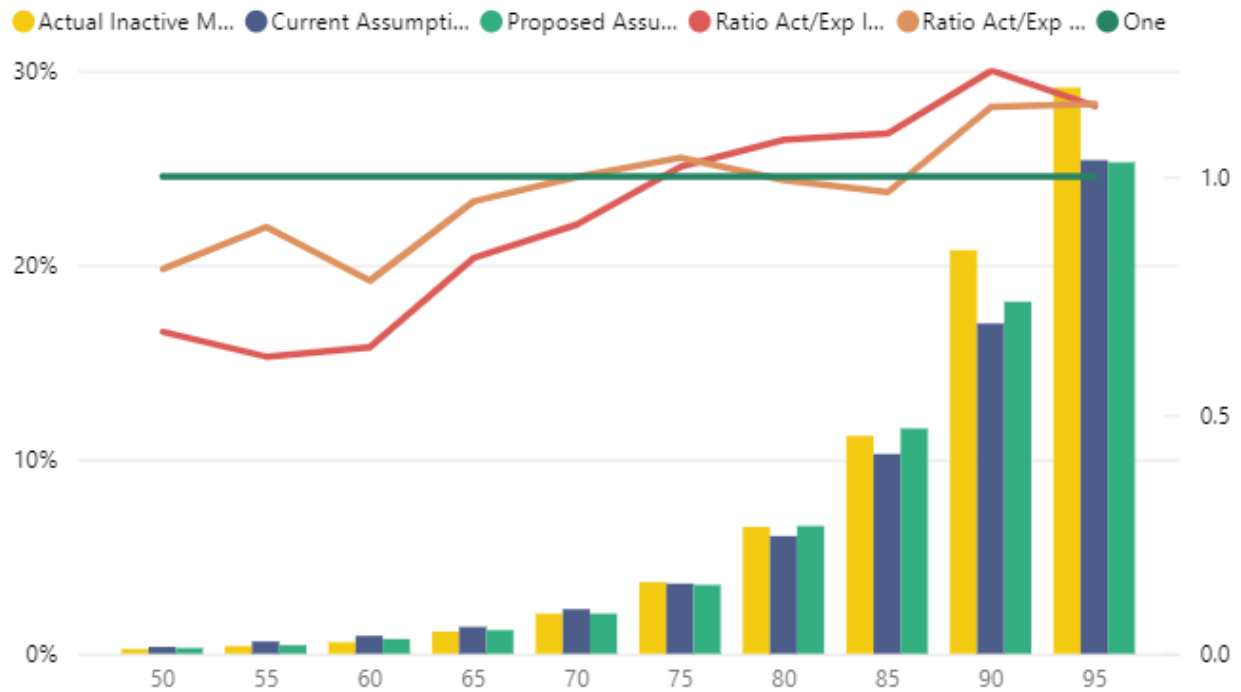
Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
50	67	99.3	28,272	0.2370%	0.3514%	0.67
55	103	165.5	26,240	0.3925%	0.6307%	0.62
60	83	129.2	14,029	0.5916%	0.9208%	0.64
65	143	172.4	12,509	1.1432%	1.3784%	0.83
70	343	381.4	16,639	2.0614%	2.2921%	0.90
75	492	482.1	13,371	3.6796%	3.6055%	1.02
80	449	416.8	6,887	6.5195%	6.0514%	1.08
85	506	464.0	4,516	11.2046%	10.2754%	1.09
90	378	309.3	1,821	20.7578%	16.9855%	1.22
95	136	118.6	467	29.1221%	25.3865%	1.15
Total	2,700	2,738.6	124,751	2.1643%	2.1952%	0.99

Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
50	67	83.2	28,272	0.2370%	0.2941%	0.81
55	103	115.2	26,240	0.3925%	0.4390%	0.89
60	83	106.2	14,029	0.5916%	0.7568%	0.78
65	143	150.8	12,509	1.1432%	1.2059%	0.95
70	343	343.2	16,639	2.0614%	2.0625%	1.00
75	492	473.5	13,371	3.6796%	3.5415%	1.04
80	449	452.3	6,887	6.5195%	6.5681%	0.99
85	506	523.1	4,516	11.2046%	11.5825%	0.97
90	378	329.8	1,821	20.7578%	18.1084%	1.15
95	136	118.1	467	29.1221%	25.2804%	1.15
Total	2,700	2,695.3	124,751	2.1643%	2.1605%	1.00

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



Service Retirees - Females

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for females on the current and proposed assumptions. The A/E increased from 0.88 to 0.90. These charts are provided for completeness although the data is not credible.

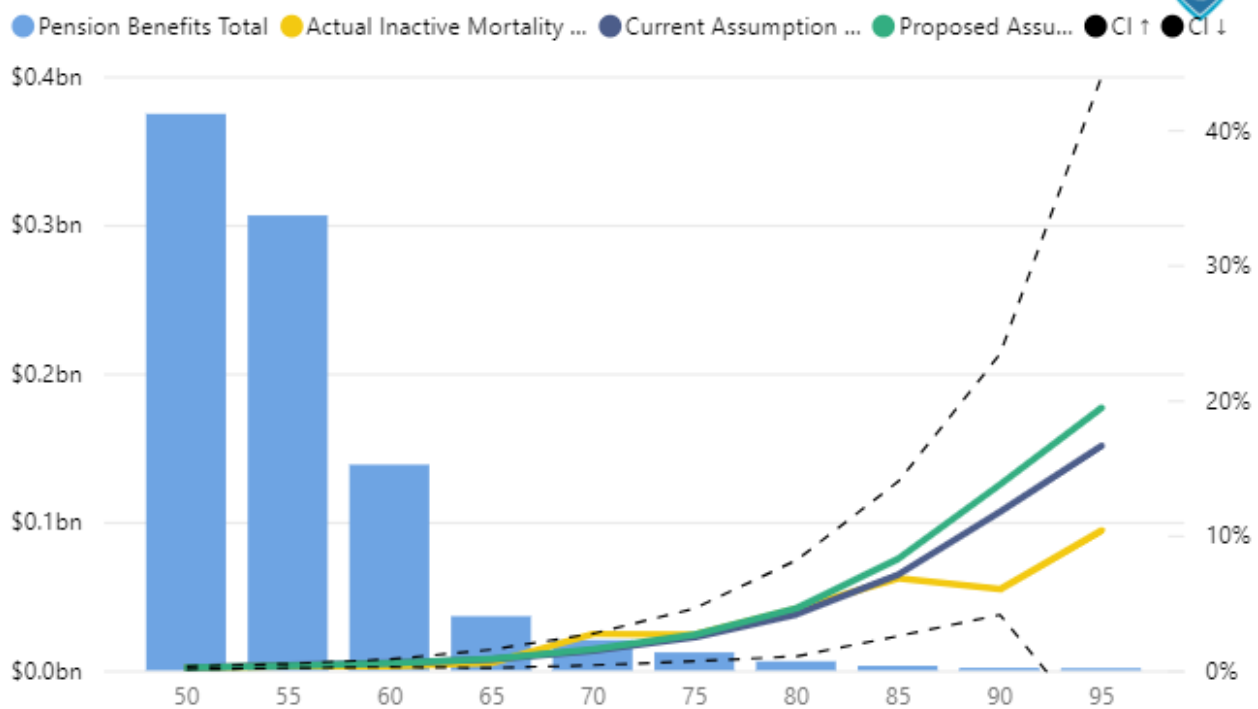
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

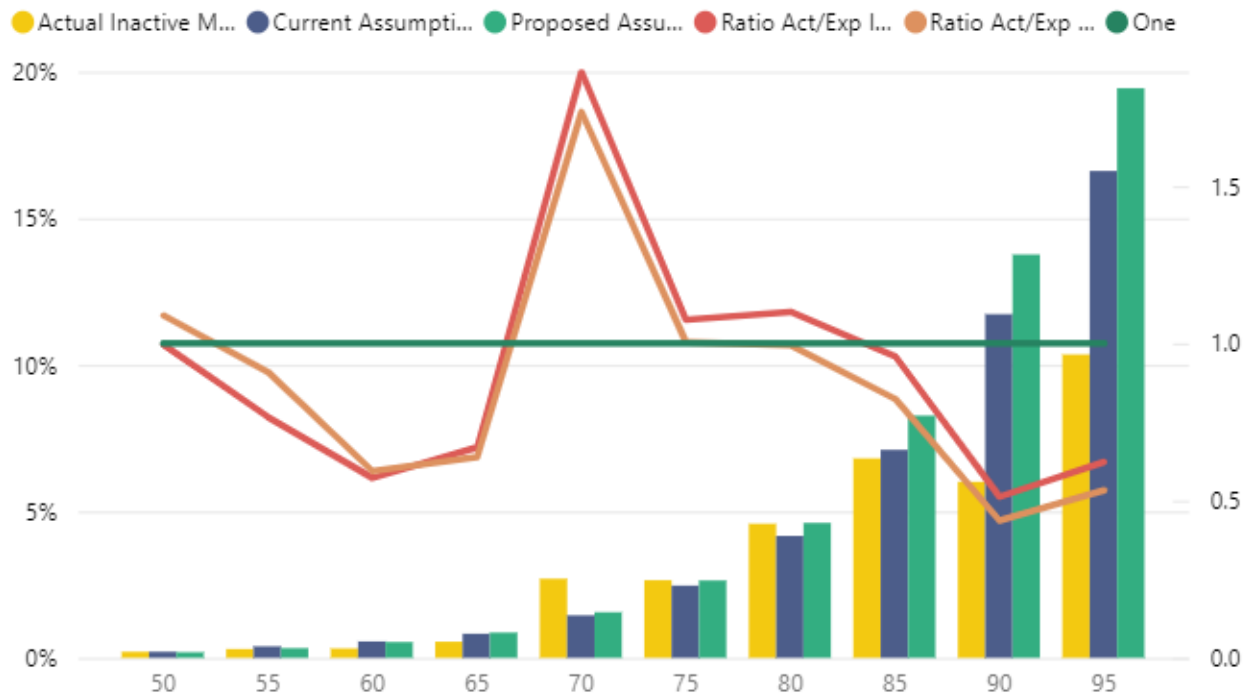
Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
50	\$0.8M	\$0.8M	\$374.7M	0.2077%	0.2085%	1.00
55	\$0.9M	\$1.2M	\$306.3M	0.2998%	0.3915%	0.77
60	\$0.4M	\$0.8M	\$138.5M	0.3194%	0.5585%	0.57
65	\$0.2M	\$0.3M	\$36.5M	0.5489%	0.8207%	0.67
70	\$0.6M	\$0.3M	\$20.5M	2.6993%	1.4481%	1.86
75	\$0.3M	\$0.3M	\$12.2M	2.6484%	2.4633%	1.08
80	\$0.3M	\$0.3M	\$6.1M	4.5749%	4.1591%	1.10
85	\$0.2M	\$0.2M	\$3.1M	6.8045%	7.0959%	0.96
90	\$0.1M	\$0.2M	\$1.7M	6.0053%	11.7237%	0.51
95	\$0.0M	\$0.1M	\$0.4M	10.3497%	16.6108%	0.62
Total	\$3.8M	\$4.4M	\$900.0M	0.4276%	0.4878%	0.88

Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
50	\$0.8M	\$0.7M	\$374.7M	0.2077%	0.1908%	1.09
55	\$0.9M	\$1.0M	\$306.3M	0.2998%	0.3300%	0.91
60	\$0.4M	\$0.7M	\$138.5M	0.3194%	0.5376%	0.59
65	\$0.2M	\$0.3M	\$36.5M	0.5489%	0.8608%	0.64
70	\$0.6M	\$0.3M	\$20.5M	2.6993%	1.5551%	1.74
75	\$0.3M	\$0.3M	\$12.2M	2.6484%	2.6395%	1.00
80	\$0.3M	\$0.3M	\$6.1M	4.5749%	4.6032%	0.99
85	\$0.2M	\$0.3M	\$3.1M	6.8045%	8.2640%	0.82
90	\$0.1M	\$0.2M	\$1.7M	6.0053%	13.7607%	0.44
95	\$0.0M	\$0.1M	\$0.4M	10.3497%	19.4333%	0.53
Total	\$3.8M	\$4.3M	\$900.0M	0.4276%	0.4749%	0.90

Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



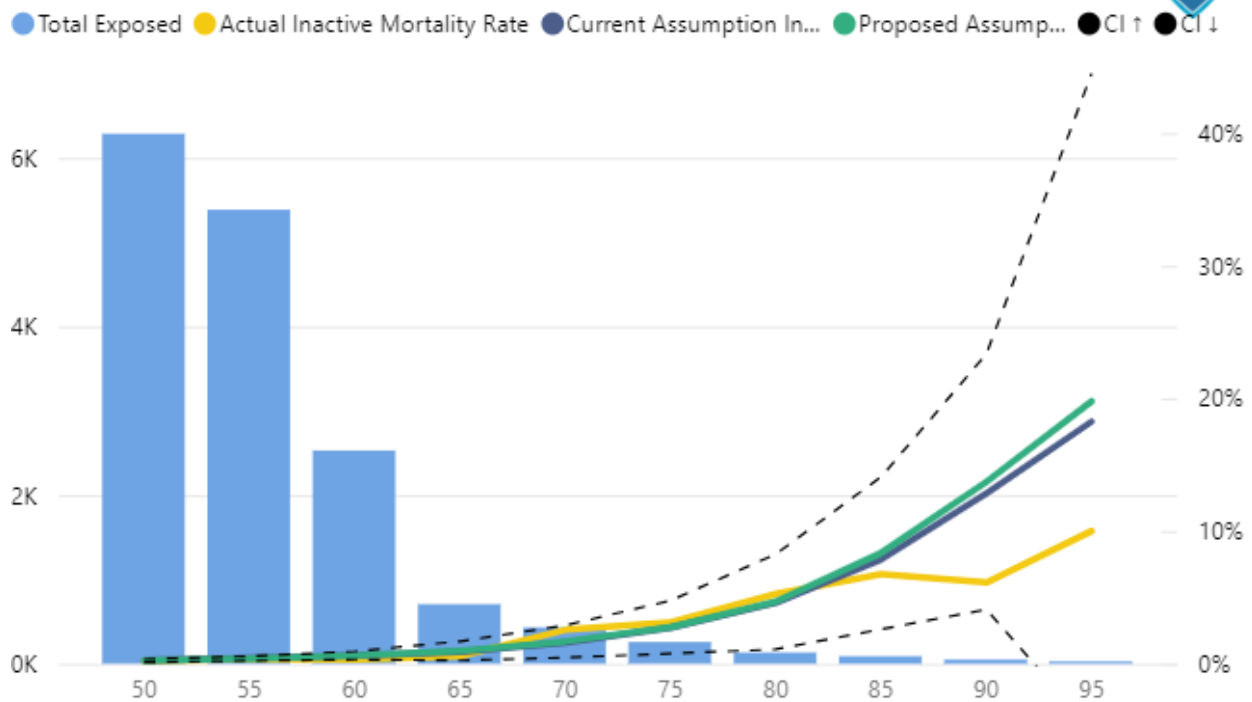
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for females on the current and proposed assumptions. The A/E remained at 0.83.

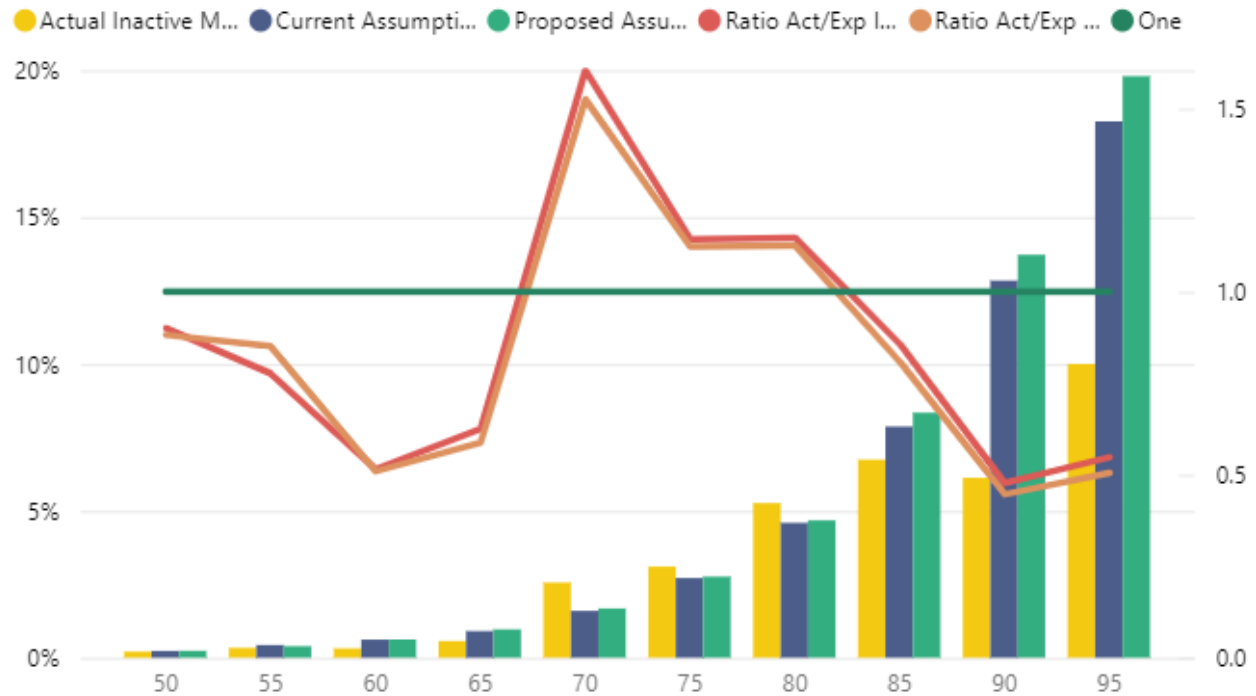
Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
50	13	14.4	6,285	0.2068%	0.2297%	0.90
55	18	23.2	5,383	0.3344%	0.4307%	0.78
60	8	15.5	2,528	0.3165%	0.6145%	0.51
65	4	6.4	706	0.5666%	0.9052%	0.63
70	11	6.9	430	2.5581%	1.5936%	1.61
75	8	7.0	258	3.1008%	2.7118%	1.14
80	7	6.1	133	5.2632%	4.5900%	1.15
85	6	7.0	89	6.7416%	7.8689%	0.86
90	3	6.3	49	6.1224%	12.8360%	0.48
95	1	1.8	10	10.0000%	18.2564%	0.55
Total	79	94.6	15,871	0.4978%	0.5962%	0.83

Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
50	13	14.7	6,285	0.2068%	0.2345%	▲ 0.88
55	18	21.2	5,383	0.3344%	0.3931%	▲ 0.85
60	8	15.7	2,528	0.3165%	0.6209%	▲ 0.51
65	4	6.8	706	0.5666%	0.9645%	▲ 0.59
70	11	7.2	430	2.5581%	1.6762%	◆ 1.53
75	8	7.1	258	3.1008%	2.7604%	▲ 1.12
80	7	6.2	133	5.2632%	4.6748%	▲ 1.13
85	6	7.4	89	6.7416%	8.3402%	▲ 0.81
90	3	6.7	49	6.1224%	13.7161%	◆ 0.45
95	1	2.0	10	10.0000%	19.7974%	▲ 0.51
Total	79	95.1	15,871	0.4978%	0.5991%	▲ 0.83

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

We have proposed new assumptions consistent with industry standards to better reflect recent non-pandemic experience. In total, the proposed mortality tables are anticipated to increase plan liabilities for younger retirement ages up to about early 60s for males, and then anticipated to decrease plan liabilities for older retirement ages. We would anticipate that this would increase plan liabilities for current active members but reduce liabilities for retirees. The actual impact will depend on the relative change for each group.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
15	0.0100%	0.0084%	68	1.4988%	1.0632%
16	0.0135%	0.0103%	69	1.6917%	1.1644%
17	0.0181%	0.0112%	70	1.8929%	1.2629%
18	0.0217%	0.0131%	71	2.1028%	1.4563%
19	0.0240%	0.0140%	72	2.3212%	1.6586%
20	0.0251%	0.0142%	73	2.5833%	1.8689%
21	0.0268%	0.0150%	74	2.8558%	2.0889%
22	0.0284%	0.0158%	75	3.1397%	2.3314%
23	0.0301%	0.0168%	76	3.4343%	2.6045%
24	0.0315%	0.0179%	77	3.7415%	2.8700%
25	0.0327%	0.0191%	78	4.2304%	3.1787%
26	0.0342%	0.0204%	79	4.7399%	3.4795%
27	0.0354%	0.0217%	80	5.2682%	3.8105%
28	0.0371%	0.0231%	81	5.7202%	4.3289%
29	0.0394%	0.0247%	82	6.1782%	4.8678%
30	0.0427%	0.0265%	83	7.0179%	5.4288%
31	0.0492%	0.0316%	84	7.8631%	5.9122%
32	0.0556%	0.0360%	85	8.7167%	6.3661%
33	0.0616%	0.0398%	86	9.5810%	7.1650%
34	0.0669%	0.0427%	87	10.4516%	8.0050%
35	0.0724%	0.0455%	88	11.8437%	8.8541%
36	0.0755%	0.0474%	89	13.2486%	9.6498%
37	0.0779%	0.0497%	90	14.6752%	10.5687%
38	0.0808%	0.0521%	91	16.3354%	12.0267%
39	0.0845%	0.0551%	92	18.0374%	13.4340%
40	0.0901%	0.0588%	93	19.7642%	14.8636%

NEW YORK CITY POLICE PENSION FUND CURRENT (continued) PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
41	0.1003%	0.0633%	94	21.5622%	16.4543%
42	0.1106%	0.0702%	95	23.4692%	17.7952%
43	0.1212%	0.0792%	96	25.3619%	19.0707%
44	0.1323%	0.0907%	97	27.1816%	20.2419%
45	0.1439%	0.1052%	98	29.0095%	21.1759%
46	0.1563%	0.1228%	99	30.6920%	21.8544%
47	0.1693%	0.1427%	100	32.1584%	22.1859%
48	0.1827%	0.1652%	101	33.7521%	23.0680%
49	0.1964%	0.1865%	102	35.1259%	24.0803%
50	0.2104%	0.1992%	103	36.3671%	25.2770%
51	0.2802%	0.2104%	104	37.3834%	26.6309%
52	0.3506%	0.2186%	105	38.1051%	28.0912%
53	0.4209%	0.2250%	106	38.4698%	29.6244%
54	0.4903%	0.2863%	107	38.6325%	31.1943%
55	0.5297%	0.3409%	108	38.8076%	32.7579%
56	0.5857%	0.3910%	109	38.9794%	34.2712%
57	0.6387%	0.4376%	110	50.0000%	50.0000%
58	0.6875%	0.4613%	111	50.0000%	50.0000%
59	0.7316%	0.5005%	112	50.0000%	50.0000%
60	0.7720%	0.5393%	113	50.0000%	50.0000%
61	0.8439%	0.5785%	114	50.0000%	50.0000%
62	0.9155%	0.6152%	115	50.0000%	50.0000%
63	0.9888%	0.6536%	116	50.0000%	50.0000%
64	1.0644%	0.7279%	117	50.0000%	50.0000%
65	1.1433%	0.8032%	118	50.0000%	50.0000%
66	1.2263%	0.8884%	119	50.0000%	50.0000%
67	1.3135%	0.9736%	120	100.0000%	100.0000%

¹ An adjustment factor of 0.91 is applied to the probabilities above to develop benefit weighted probabilities of mortality

² An adjustment factor of 0.91 is applied to the probabilities above to develop benefit weighted probabilities of mortality

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0177%	0.0090%	68	1.2404%	0.9741%
16	0.0239%	0.0110%	69	1.3734%	1.0768%
17	0.0322%	0.0120%	70	1.5246%	1.1959%
18	0.0385%	0.0140%	71	1.6983%	1.3313%
19	0.0416%	0.0150%	72	1.8959%	1.4867%
20	0.0431%	0.0169%	73	2.1224%	1.6637%
21	0.0438%	0.0183%	74	2.3824%	1.8645%
22	0.0436%	0.0187%	75	2.6778%	2.0925%
23	0.0436%	0.0203%	76	3.0150%	2.3485%
24	0.0438%	0.0219%	77	3.3979%	2.6359%
25	0.0439%	0.0236%	78	3.8331%	2.9599%
26	0.0466%	0.0253%	79	4.3261%	3.3206%
27	0.0493%	0.0271%	80	4.8849%	3.7252%
28	0.0521%	0.0302%	81	5.5159%	4.1773%
29	0.0548%	0.0320%	82	6.2271%	4.6799%
30	0.0560%	0.0350%	83	7.0206%	5.2400%
31	0.0585%	0.0367%	84	7.9092%	5.8639%
32	0.0607%	0.0395%	85	8.8993%	6.5585%
33	0.0626%	0.0421%	86	9.9973%	7.3305%
34	0.0642%	0.0444%	87	11.2110%	8.1898%
35	0.0668%	0.0464%	88	12.5533%	9.1483%
36	0.0689%	0.0480%	89	14.0364%	10.2124%
37	0.0691%	0.0505%	90	15.6654%	11.3927%
38	0.0715%	0.0514%	91	17.3339%	12.6552%
39	0.0734%	0.0533%	92	18.9678%	13.9704%
40	0.0747%	0.0548%	93	20.5471%	15.3316%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.0757%	0.0561%	94	22.0747%	16.7357%
42	0.0788%	0.0584%	95	23.5605%	18.1973%
43	0.0804%	0.0596%	96	25.1662%	19.7995%
44	0.0831%	0.0619%	97	26.8427%	21.5051%
45	0.1292%	0.0836%	98	28.6362%	23.3272%
46	0.1371%	0.0917%	99	30.5661%	25.2578%
47	0.1472%	0.1011%	100	32.6101%	27.2907%
48	0.1587%	0.1118%	101	34.7277%	29.3896%
49	0.1727%	0.1251%	102	36.8257%	31.5085%
50	0.1875%	0.1402%	103	38.9088%	33.6377%
51	0.2061%	0.1591%	104	40.9344%	35.7445%
52	0.2268%	0.1801%	105	42.9011%	37.8251%
53	0.2506%	0.2041%	106	44.8061%	39.8479%
54	0.2787%	0.2321%	107	46.6267%	41.8058%
55	0.3111%	0.2639%	108	48.3547%	43.6934%
56	0.3478%	0.2989%	109	49.9997%	45.4898%
57	0.3897%	0.3367%	110	51.3176%	47.1868%
58	0.4376%	0.3774%	111	51.4514%	48.7883%
59	0.4907%	0.4203%	112	51.5803%	49.6759%
60	0.5494%	0.4668%	113	51.7095%	49.7804%
61	0.6138%	0.5140%	114	51.8546%	49.8851%
62	0.6828%	0.5635%	115	51.9844%	49.9900%
63	0.7566%	0.6166%	116	51.9948%	49.9950%
64	0.8365%	0.6741%	117	52.0000%	50.0000%
65	0.9235%	0.7369%	118	52.0000%	50.0000%
66	1.0182%	0.8055%	119	52.0000%	50.0000%
67	1.1235%	0.8840%	120	100.0000%	100.0000%

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0165%	0.0090%	68	1.2855%	1.0772%
16	0.0223%	0.0110%	69	1.4178%	1.1835%
17	0.0301%	0.0120%	70	1.5743%	1.3057%
18	0.0359%	0.0140%	71	1.7591%	1.4445%
19	0.0398%	0.0150%	72	1.9715%	1.6027%
20	0.0421%	0.0169%	73	2.2119%	1.7819%
21	0.0429%	0.0183%	74	2.4812%	1.9833%
22	0.0438%	0.0198%	75	2.7830%	2.2110%
23	0.0449%	0.0203%	76	3.1251%	2.4660%
24	0.0462%	0.0219%	77	3.5155%	2.7494%
25	0.0476%	0.0236%	78	3.9649%	3.0677%
26	0.0503%	0.0265%	79	4.4862%	3.4197%
27	0.0531%	0.0283%	80	5.0918%	3.8117%
28	0.0558%	0.0314%	81	5.7833%	4.2453%
29	0.0586%	0.0345%	82	6.5640%	4.7255%
30	0.0612%	0.0363%	83	7.4266%	5.2572%
31	0.0636%	0.0393%	84	8.3654%	5.8639%
32	0.0658%	0.0421%	85	9.3707%	6.5585%
33	0.0677%	0.0447%	86	10.4404%	7.3305%
34	0.0705%	0.0483%	87	11.5822%	8.1898%
35	0.0716%	0.0503%	88	12.8080%	9.1483%
36	0.0734%	0.0531%	89	14.1334%	10.2124%
37	0.0748%	0.0555%	90	15.5728%	11.3927%
38	0.0768%	0.0574%	91	17.0549%	12.6552%
39	0.0782%	0.0590%	92	18.5268%	13.9704%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
40	0.0792%	0.0604%	93	19.9749%	15.3316%
41	0.0809%	0.0626%	94	21.4012%	16.7357%
42	0.0823%	0.0647%	95	22.8095%	18.3451%
43	0.0845%	0.0667%	96	24.3422%	20.2533%
44	0.0877%	0.0688%	97	25.9420%	22.2486%
45	0.1778%	0.1067%	98	27.6383%	24.3115%
46	0.1894%	0.1163%	99	29.4437%	26.4075%
47	0.2031%	0.1282%	100	31.3311%	28.5273%
48	0.2174%	0.1407%	101	33.2703%	30.6491%
49	0.2334%	0.1569%	102	35.1823%	32.7813%
50	0.2504%	0.1750%	103	37.0758%	34.9113%
51	0.2679%	0.1963%	104	38.9124%	37.0070%
52	0.2857%	0.2207%	105	40.6909%	39.0659%
53	0.3058%	0.2495%	106	42.4108%	41.0568%
54	0.3282%	0.2814%	107	44.0516%	42.9728%
55	0.3555%	0.3181%	108	45.6066%	44.8128%
56	0.3908%	0.3570%	109	47.0869%	46.5543%
57	0.4358%	0.4007%	110	47.8635%	48.1911%
58	0.4914%	0.4459%	111	47.9883%	49.5766%
59	0.5568%	0.4941%	112	48.1086%	49.6759%
60	0.6305%	0.5432%	113	48.2291%	49.7804%
61	0.7080%	0.5957%	114	48.3644%	49.8851%
62	0.7862%	0.6490%	115	48.4855%	49.9900%
63	0.8610%	0.7054%	116	48.4952%	49.9950%
64	0.9339%	0.7649%	117	48.5000%	50.0000%
65	1.0080%	0.8307%	118	48.5000%	50.0000%
66	1.0863%	0.9031%	119	48.5000%	50.0000%
67	1.1766%	0.9847%	120	100.0000%	100.0000%

Postretirement Mortality – Disability Retirees

For POLICE, we propose the PubS table without further adjustment, which is consistent with the proposed healthy annuitant mortality table. Separate tables exist on a headcount-weighted and amount-weighted basis.

The following charts show postretirement mortality experience on a headcount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E increased from 0.94 to 0.96.

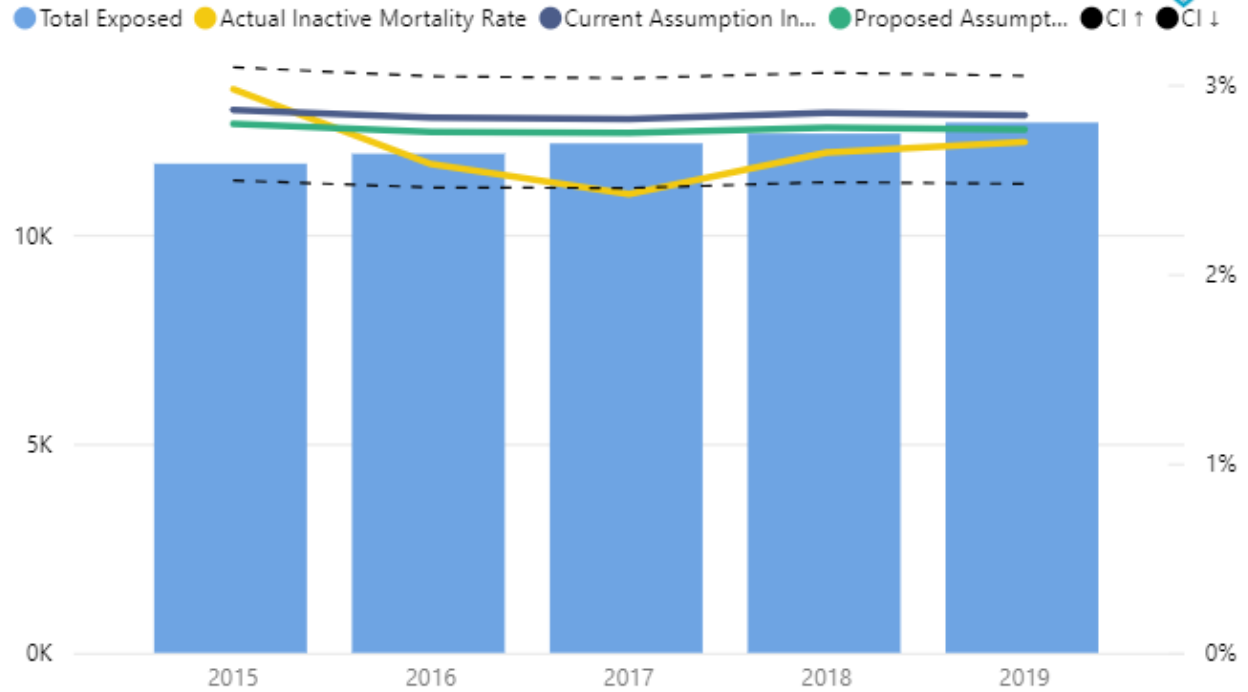
Current Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
2015	348	335.4	11,696	2.9754%	2.8676%	1.04
2016	308	337.2	11,934	2.5809%	2.8254%	0.91
2017	295	343.4	12,181	2.4218%	2.8191%	0.86
2018	328	353.9	12,413	2.6424%	2.8507%	0.93
2019	342	360.0	12,679	2.6974%	2.8394%	0.95
Total	1,621	1,729.8	60,903	2.6616%	2.8403%	0.94

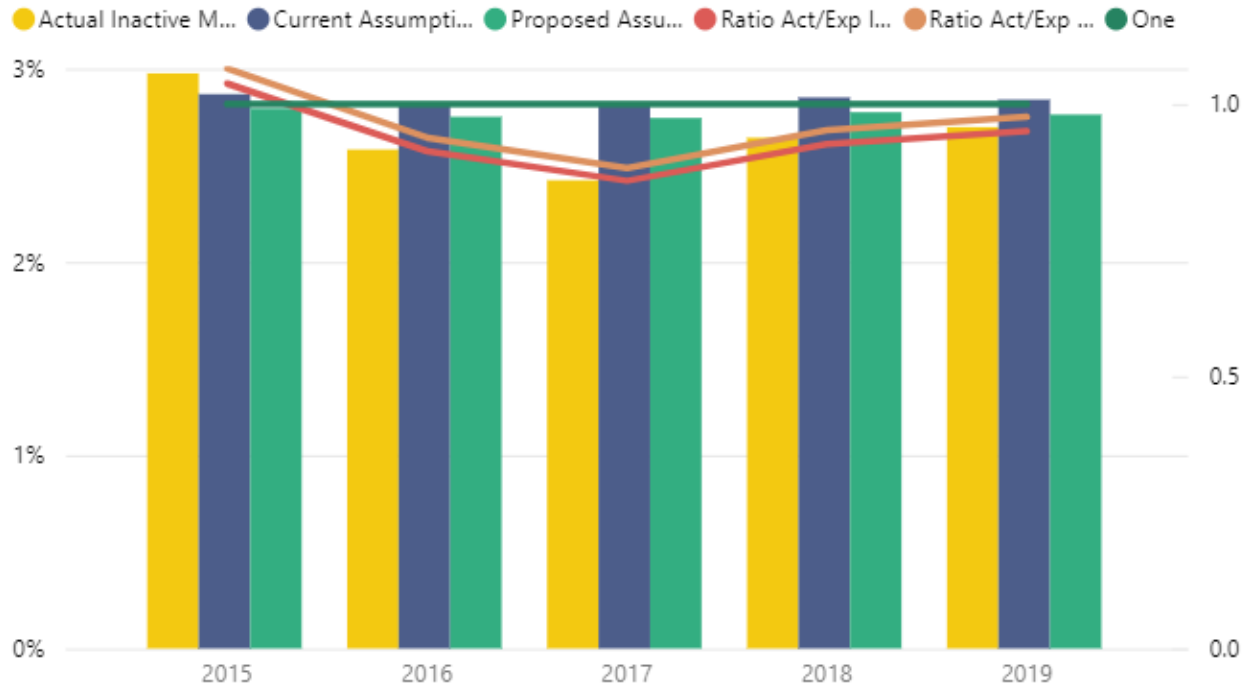
Proposed Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
2015	348	326.7	11,696	2.9754%	2.7931%	1.07
2016	308	328.3	11,934	2.5809%	2.7506%	0.94
2017	295	334.3	12,181	2.4218%	2.7441%	0.88
2018	328	344.3	12,413	2.6424%	2.7741%	0.95
2019	342	350.2	12,679	2.6974%	2.7620%	0.98
Total	1,621	1,683.7	60,903	2.6616%	2.7646%	0.96

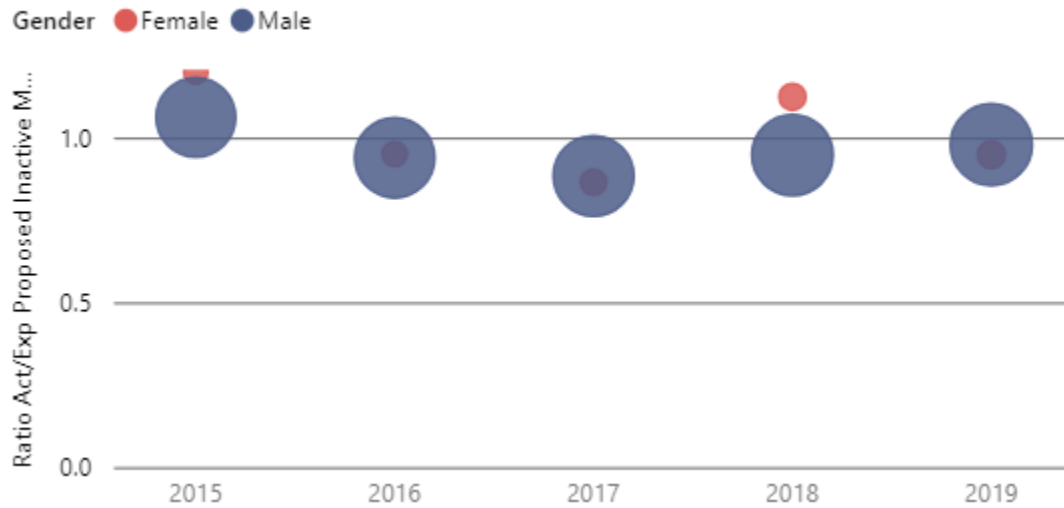
Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Exposure Bubbles; by Year



The following charts show postretirement mortality experience on an amount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E increased from 1.01 to 1.02.

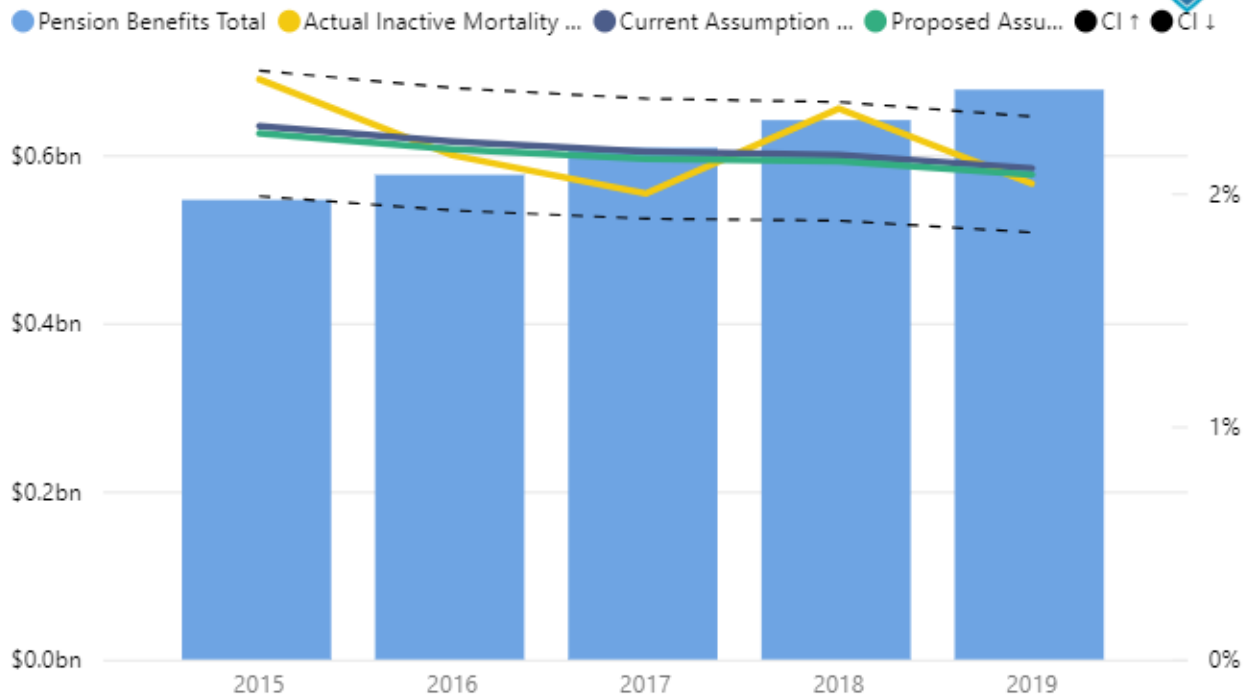
Current Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
2015	\$13.6M	\$12.5M	\$546.5M	2.4890%	2.2875%	1.09
2016	\$12.5M	\$12.8M	\$576.2M	2.1635%	2.2207%	0.97
2017	\$12.2M	\$13.3M	\$608.5M	1.9981%	2.1780%	0.92
2018	\$15.2M	\$13.9M	\$641.3M	2.3633%	2.1640%	1.09
2019	\$13.8M	\$14.3M	\$677.6M	2.0407%	2.1069%	0.97
Total	\$67.2M	\$66.7M	\$3,050.2M	2.2035%	2.1869%	1.01

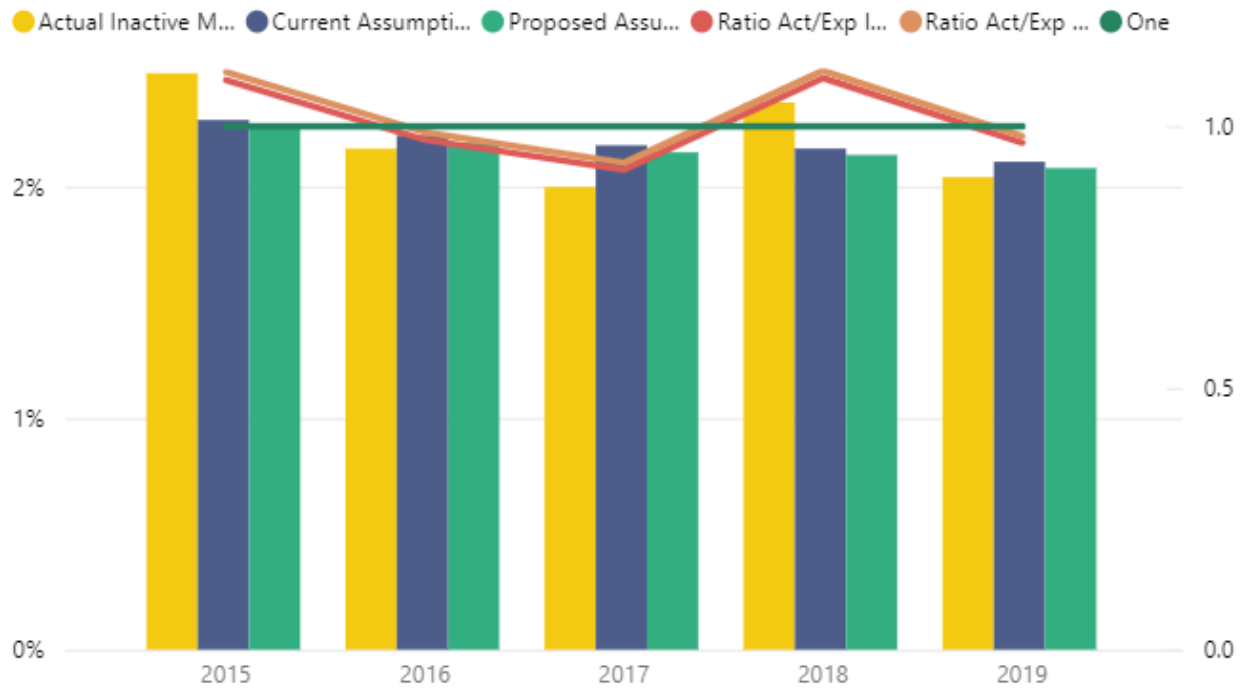
Proposed Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
2015	\$13.6M	\$12.3M	\$546.5M	2.4890%	2.2558%	▲ 1.10
2016	\$12.5M	\$12.6M	\$576.2M	2.1635%	2.1886%	● 0.99
2017	\$12.2M	\$13.1M	\$608.5M	1.9981%	2.1477%	● 0.93
2018	\$15.2M	\$13.7M	\$641.3M	2.3633%	2.1364%	▲ 1.11
2019	\$13.8M	\$14.1M	\$677.6M	2.0407%	2.0799%	● 0.98
Total	\$67.2M	\$65.8M	\$3,050.2M	2.2035%	2.1574%	● 1.02

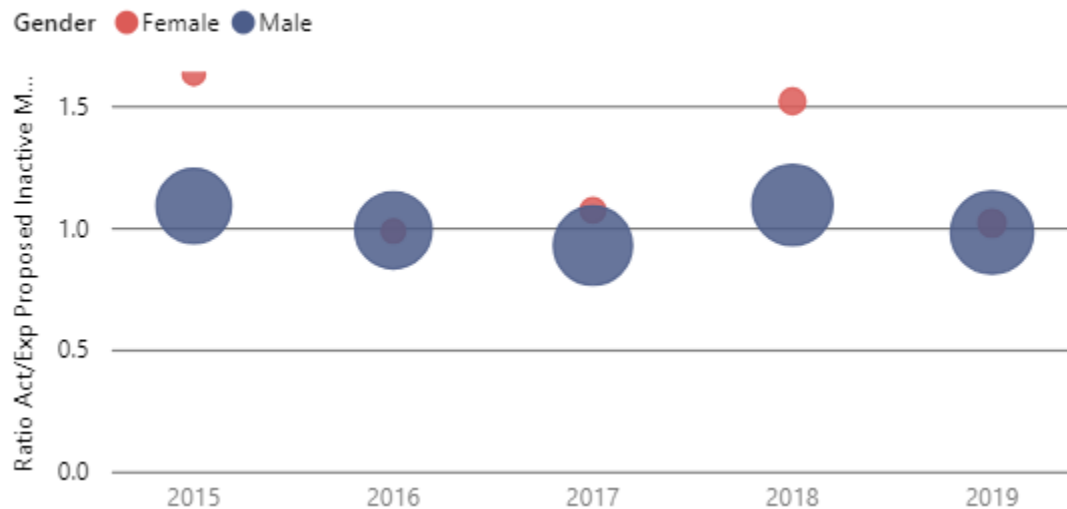
Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Benefit Bubbles; by Year



The following section displays results by gender.

Disabled Retirees - Males

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for males on the current and proposed assumptions. The A/E increased from 1.00 to 1.01.

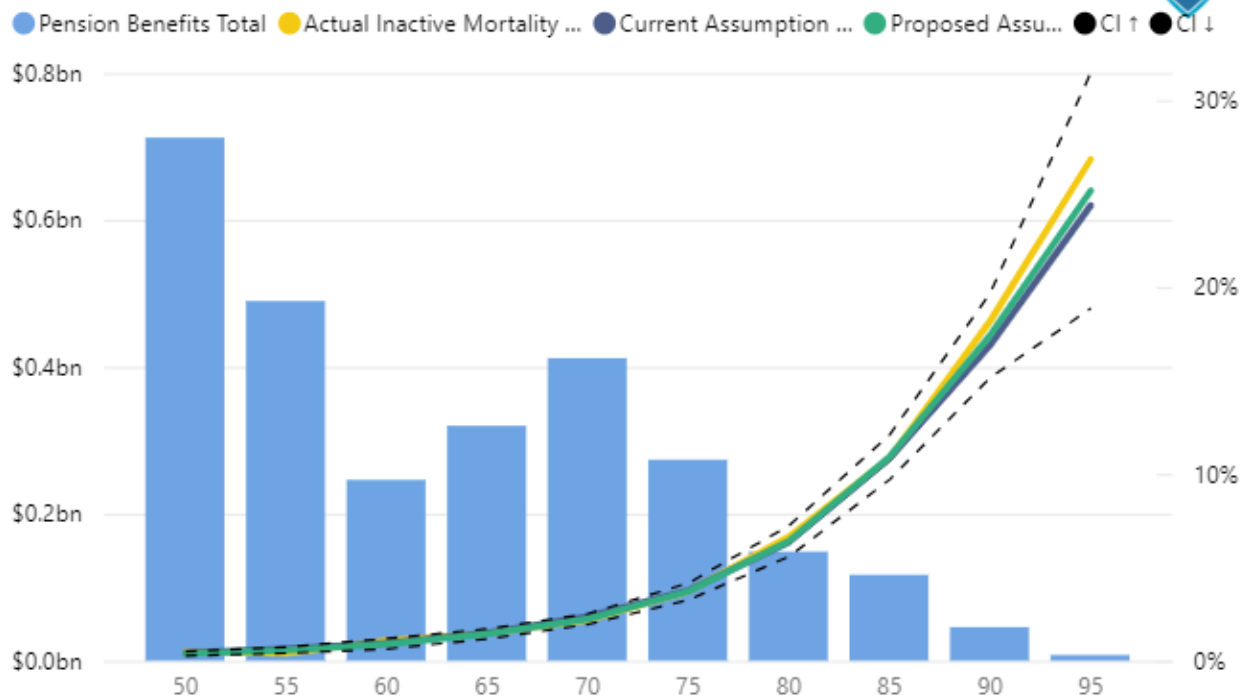
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

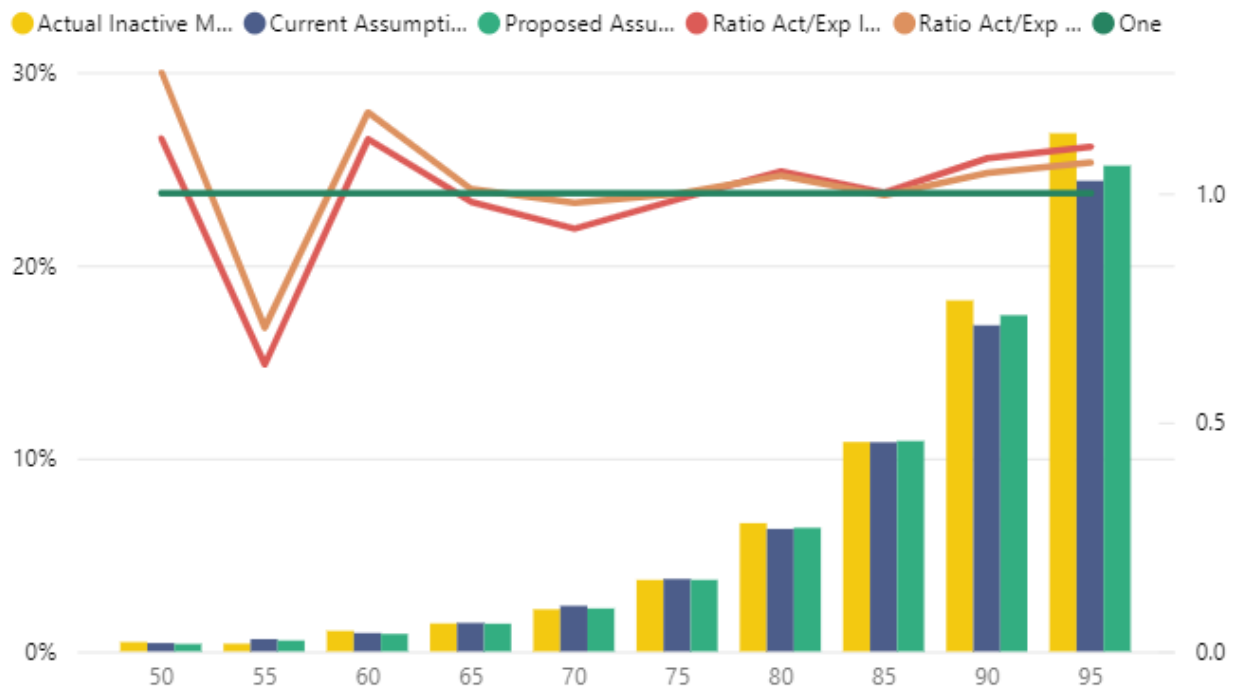
Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
50	\$3.4M	\$3.1M	\$711.8M	0.4820%	0.4306%	▲ 1.12
55	\$1.9M	\$3.1M	\$489.4M	0.3972%	0.6343%	▲ 0.63
60	\$2.6M	\$2.3M	\$246.1M	1.0618%	0.9496%	▲ 1.12
65	\$4.6M	\$4.7M	\$319.7M	1.4451%	1.4734%	● 0.98
70	\$9.0M	\$9.7M	\$411.8M	2.1757%	2.3582%	● 0.92
75	\$10.1M	\$10.3M	\$273.5M	3.7014%	3.7511%	● 0.99
80	\$9.9M	\$9.4M	\$148.4M	6.6421%	6.3415%	● 1.05
85	\$12.7M	\$12.7M	\$116.9M	10.8432%	10.8293%	● 1.00
90	\$8.3M	\$7.7M	\$45.7M	18.1766%	16.8861%	● 1.08
95	\$2.1M	\$1.9M	\$7.7M	26.8336%	24.3688%	▲ 1.10
Total	\$64.6M	\$64.8M	\$2,771.0M	2.3311%	2.3403%	● 1.00

Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
50	\$3.4M	\$2.7M	\$711.8M	0.4820%	0.3812%	▲ 1.26
55	\$1.9M	\$2.8M	\$489.4M	0.3972%	0.5622%	▲ 0.71
60	\$2.6M	\$2.2M	\$246.1M	1.0618%	0.9025%	▲ 1.18
65	\$4.6M	\$4.6M	\$319.7M	1.4451%	1.4324%	● 1.01
70	\$9.0M	\$9.2M	\$411.8M	2.1757%	2.2230%	● 0.98
75	\$10.1M	\$10.1M	\$273.5M	3.7014%	3.7052%	● 1.00
80	\$9.9M	\$9.5M	\$148.4M	6.6421%	6.3999%	● 1.04
85	\$12.7M	\$12.7M	\$116.9M	10.8432%	10.8940%	● 1.00
90	\$8.3M	\$8.0M	\$45.7M	18.1766%	17.4110%	● 1.04
95	\$2.1M	\$1.9M	\$7.7M	26.8336%	25.1552%	● 1.07
Total	\$64.6M	\$63.7M	\$2,771.0M	2.3311%	2.2981%	● 1.01

Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



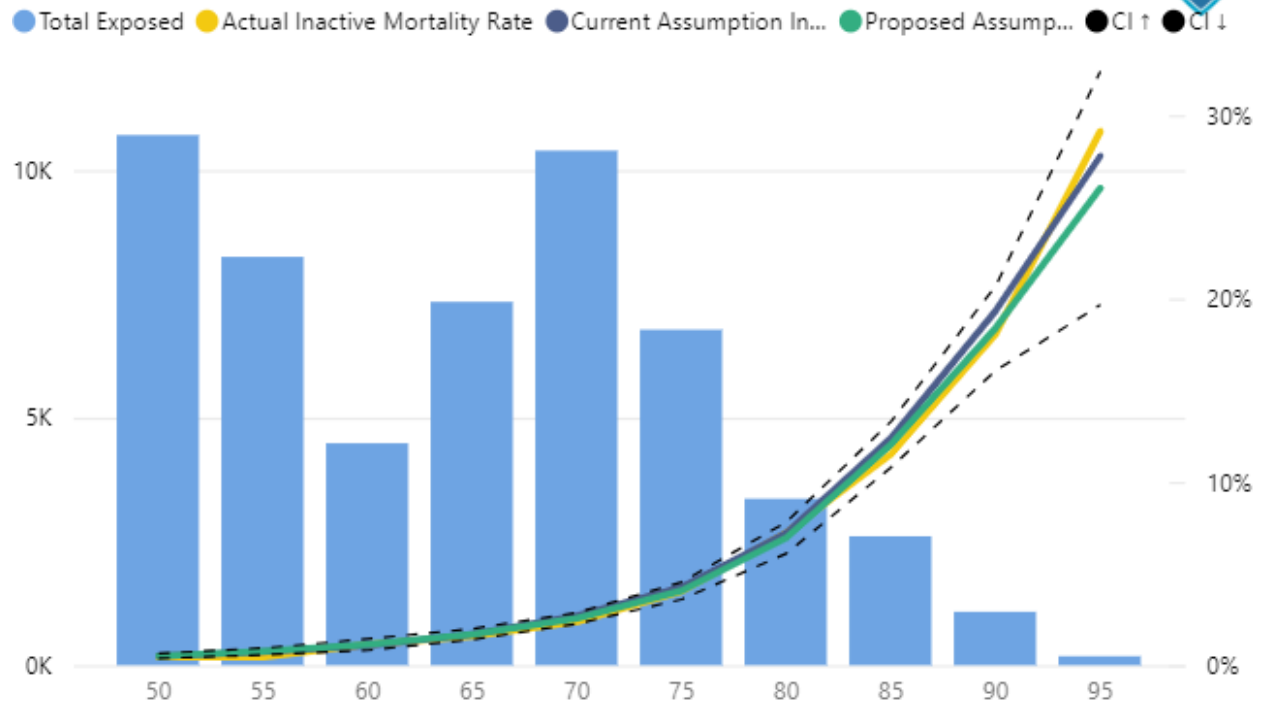
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for males on the current and proposed assumptions. The A/E increased from 0.93 to 0.96.

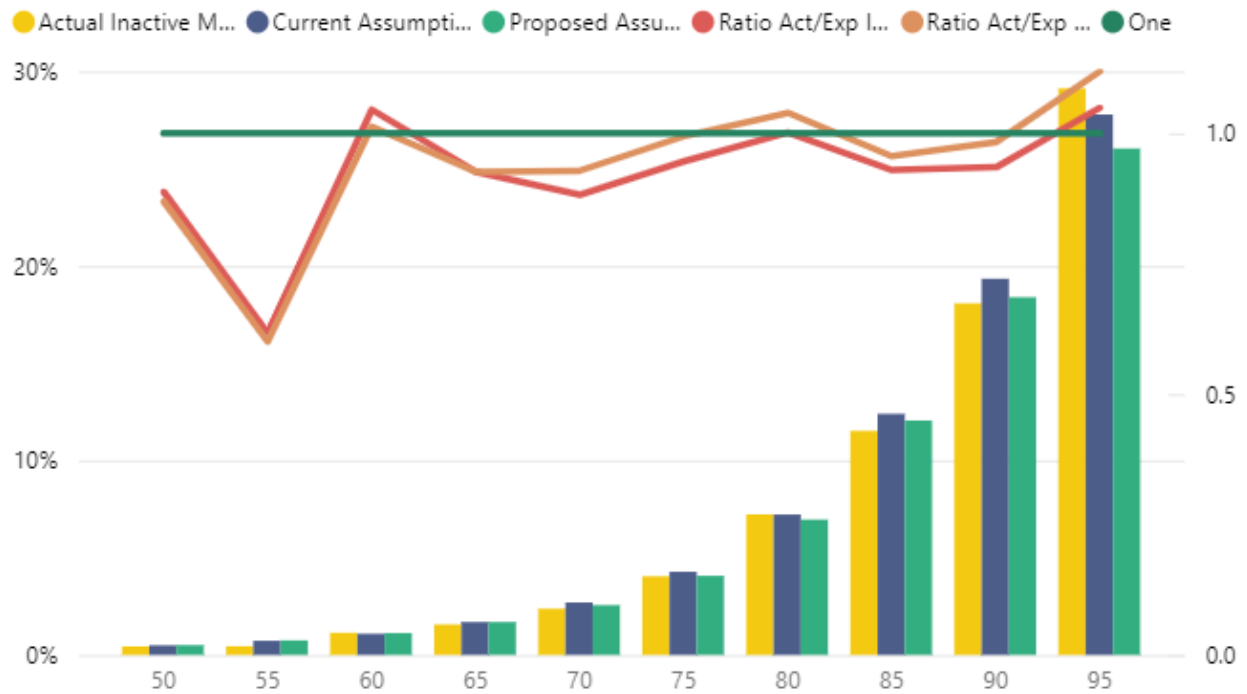
Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
50	47	52.9	10,709	0.4389%	0.4943%	0.89
55	37	59.9	8,249	0.4485%	0.7262%	0.62
60	51	48.8	4,484	1.1374%	1.0881%	1.05
65	115	124.2	7,341	1.5665%	1.6914%	0.93
70	247	280.1	10,395	2.3761%	2.6945%	0.88
75	274	289.6	6,778	4.0425%	4.2733%	0.95
80	243	242.7	3,363	7.2257%	7.2157%	1.00
85	300	322.8	2,605	11.5163%	12.3923%	0.93
90	195	208.6	1,079	18.0723%	19.3351%	0.93
95	53	50.6	182	29.1209%	27.7752%	1.05
Total	1,562	1,680.2	55,185	2.8305%	3.0446%	0.93

Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
50	47	54.1	10,709	0.4389%	0.5048%	▲ 0.87
55	37	61.6	8,249	0.4485%	0.7471%	▲ 0.60
60	51	50.4	4,484	1.1374%	1.1229%	● 1.01
65	115	124.2	7,341	1.5665%	1.6913%	● 0.93
70	247	266.1	10,395	2.3761%	2.5603%	● 0.93
75	274	275.6	6,778	4.0425%	4.0657%	● 0.99
80	243	233.9	3,363	7.2257%	6.9557%	● 1.04
85	300	313.8	2,605	11.5163%	12.0473%	● 0.96
90	195	198.4	1,079	18.0723%	18.3867%	● 0.98
95	53	47.4	182	29.1209%	26.0293%	▲ 1.12
Total	1,562	1,625.4	55,185	2.8305%	2.9454%	● 0.96

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



Disabled Retirees - Females

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for females on the current and proposed assumptions. The A/E increased from 1.41 to 1.23. These charts are provided for completeness although the data is not credible.

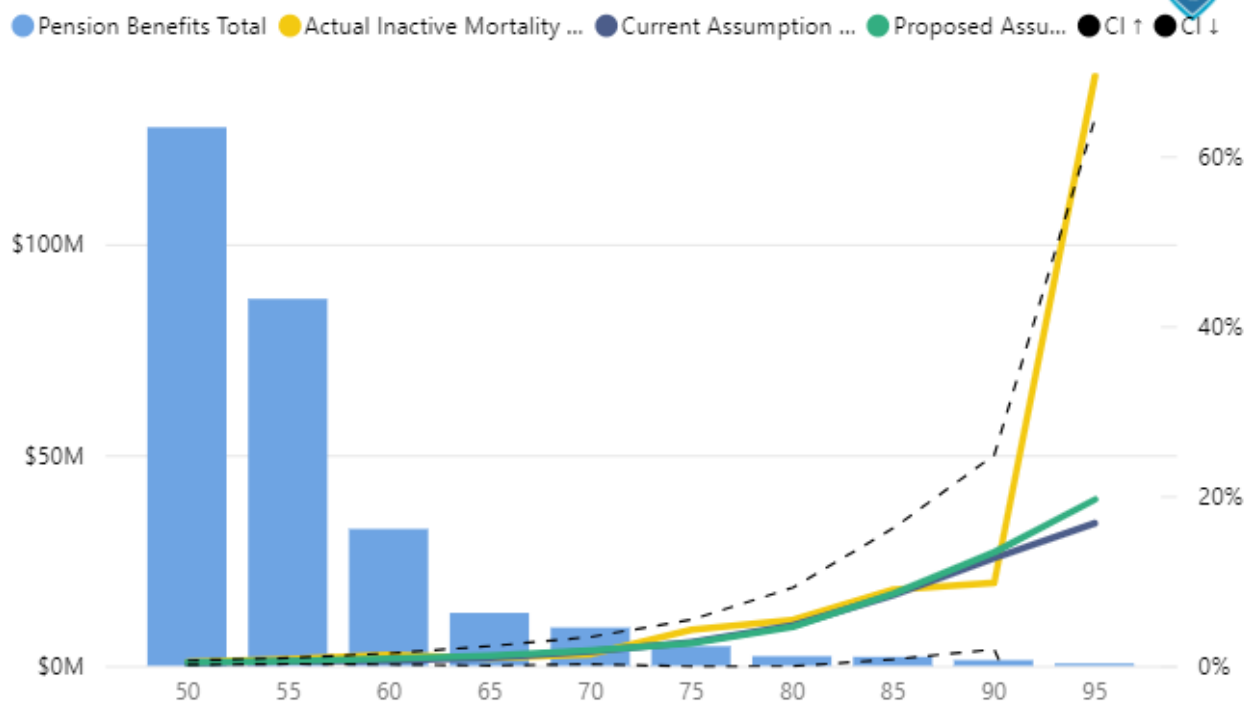
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

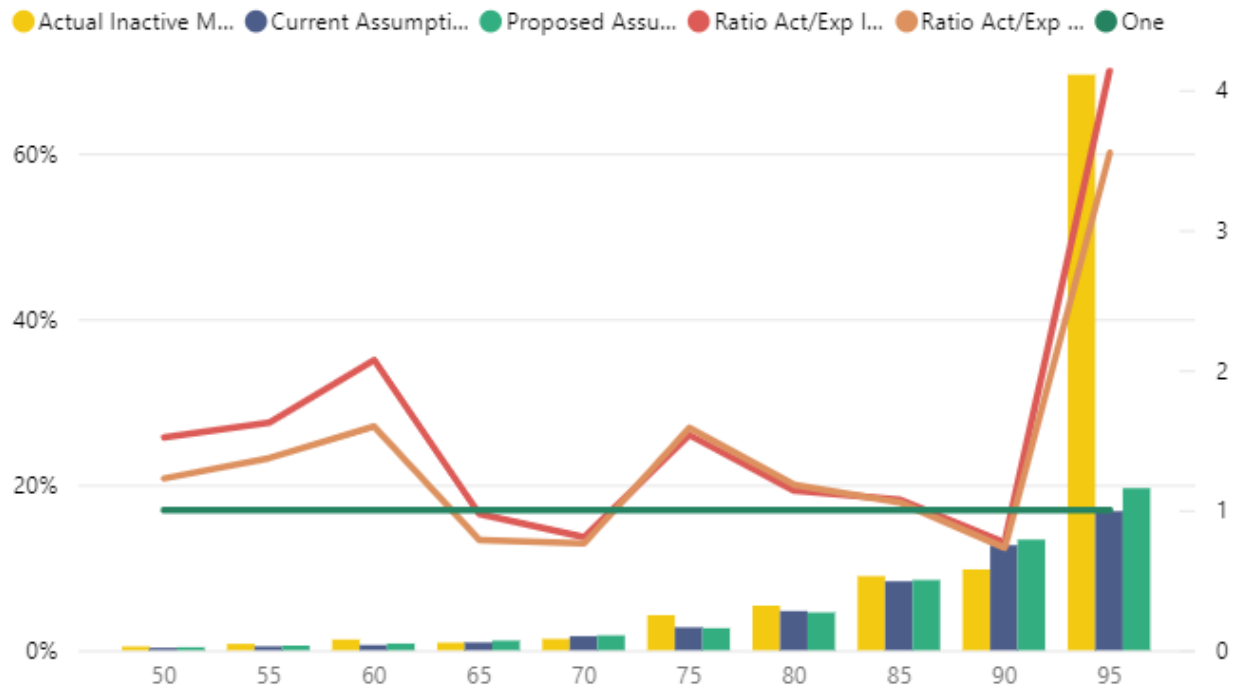
Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
50	\$0.6M	\$0.4M	\$127.7M	0.4450%	0.2931%	1.52
55	\$0.7M	\$0.4M	\$87.0M	0.7625%	0.4690%	1.63
60	\$0.4M	\$0.2M	\$32.4M	1.2887%	0.6220%	2.07
65	\$0.1M	\$0.1M	\$12.5M	0.9127%	0.9382%	0.97
70	\$0.1M	\$0.2M	\$9.1M	1.3659%	1.6942%	0.81
75	\$0.2M	\$0.1M	\$4.6M	4.2350%	2.7584%	1.54
80	\$0.1M	\$0.1M	\$2.3M	5.3814%	4.7299%	1.14
85	\$0.2M	\$0.2M	\$2.1M	8.9468%	8.3200%	1.08
90	\$0.1M	\$0.2M	\$1.3M	9.7564%	12.6790%	0.77
95	\$0.1M	\$0.0M	\$0.1M	69.4804%	16.7846%	4.14
Total	\$2.6M	\$1.9M	\$279.2M	0.9372%	0.6645%	1.41

Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
50	\$0.6M	\$0.5M	\$127.7M	0.4450%	0.3630%	▲ 1.23
55	\$0.7M	\$0.5M	\$87.0M	0.7625%	0.5561%	▲ 1.37
60	\$0.4M	\$0.3M	\$32.4M	1.2887%	0.8067%	◆ 1.60
65	\$0.1M	\$0.1M	\$12.5M	0.9127%	1.1594%	▲ 0.79
70	\$0.1M	\$0.2M	\$9.1M	1.3659%	1.7887%	▲ 0.76
75	\$0.2M	\$0.1M	\$4.6M	4.2350%	2.6684%	◆ 1.59
80	\$0.1M	\$0.1M	\$2.3M	5.3814%	4.5566%	▲ 1.18
85	\$0.2M	\$0.2M	\$2.1M	8.9468%	8.4747%	● 1.06
90	\$0.1M	\$0.2M	\$1.3M	9.7564%	13.3567%	▲ 0.73
95	\$0.1M	\$0.0M	\$0.1M	69.4804%	19.5624%	◆ 3.55
Total	\$2.6M	\$2.1M	\$279.2M	0.9372%	0.7609%	▲ 1.23

Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



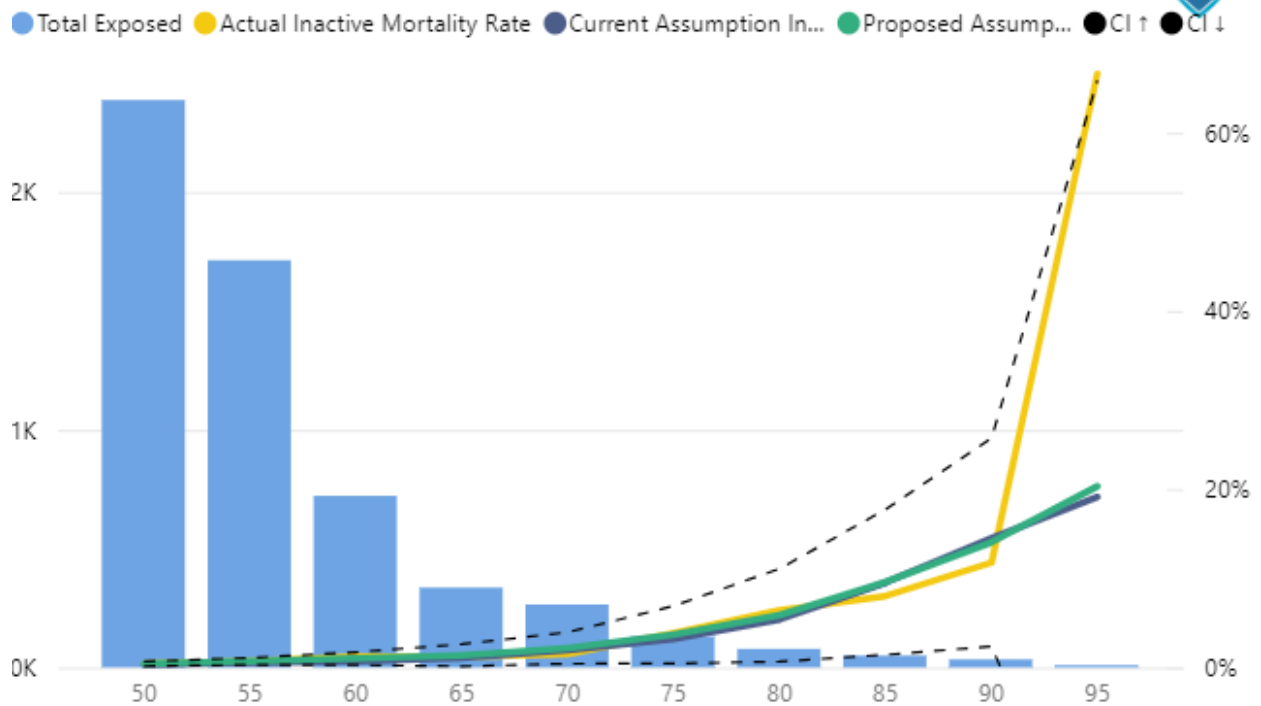
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for females on the current and proposed assumptions. The A/E decreased from 1.19 to 1.01.

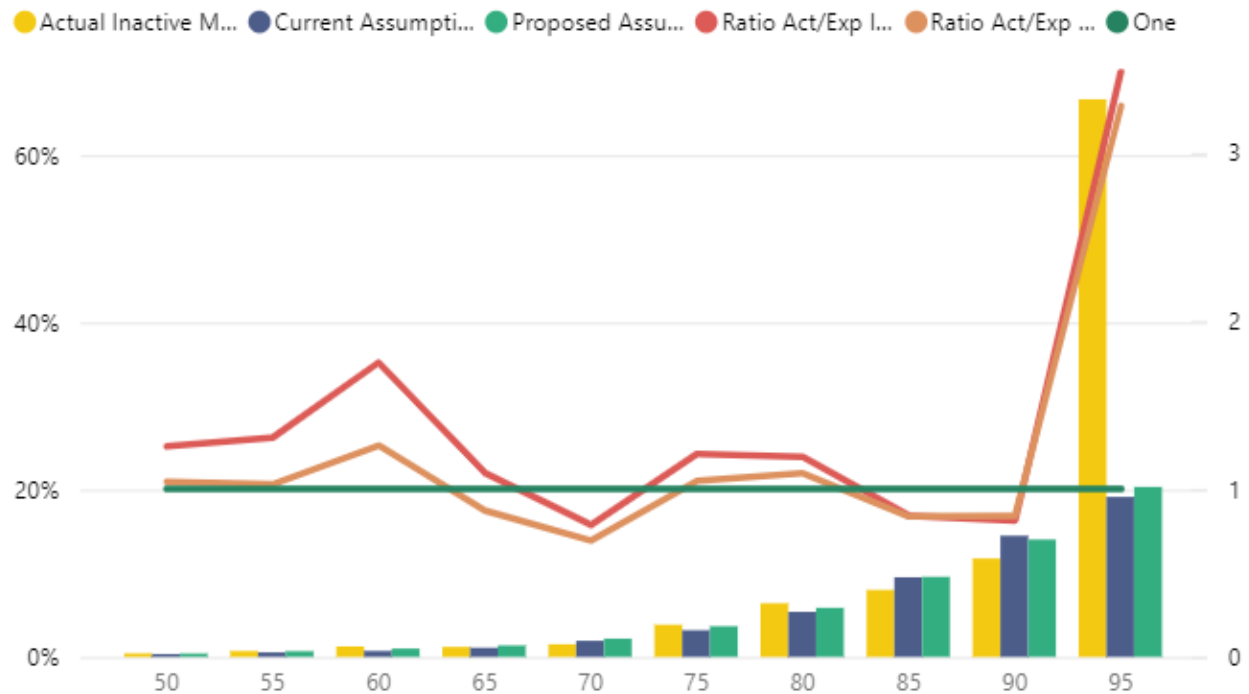
Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
50	10	8.0	2,387	0.4189%	0.3345%	▲ 1.25
55	12	9.2	1,713	0.7005%	0.5368%	▲ 1.31
60	9	5.1	722	1.2465%	0.7113%	◆ 1.75
65	4	3.7	336	1.1905%	1.0866%	● 1.10
70	4	5.1	265	1.5094%	1.9211%	▲ 0.79
75	5	4.1	130	3.8462%	3.1819%	▲ 1.21
80	5	4.2	78	6.4103%	5.3798%	▲ 1.19
85	4	4.8	50	8.0000%	9.5164%	▲ 0.84
90	4	4.9	34	11.7647%	14.4894%	▲ 0.81
95	2	0.6	3	66.6667%	19.1254%	◆ 3.49
Total	59	49.6	5,718	1.0318%	0.8682%	▲ 1.19

Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
50	10	9.6	2,387	0.4189%	0.4020%	1.04
55	12	11.7	1,713	0.7005%	0.6822%	1.03
60	9	7.2	722	1.2465%	0.9905%	1.26
65	4	4.6	336	1.1905%	1.3665%	0.87
70	4	5.8	265	1.5094%	2.1822%	0.69
75	5	4.8	130	3.8462%	3.6663%	1.05
80	5	4.6	78	6.4103%	5.8629%	1.09
85	4	4.8	50	8.0000%	9.5740%	0.84
90	4	4.8	34	11.7647%	14.0329%	0.84
95	2	0.6	3	66.6667%	20.3199%	3.28
Total	59	58.3	5,718	1.0318%	1.0198%	1.01

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

We have proposed new assumptions consistent with industry standards. In total, the proposed mortality tables are anticipated to increase plan liabilities slightly.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
15	0.0138%	0.0095%	68	1.8368%	1.2141%
16	0.0187%	0.0117%	69	2.0342%	1.3912%
17	0.0252%	0.0127%	70	2.2544%	1.5837%
18	0.0301%	0.0148%	71	2.5045%	1.7848%
19	0.0334%	0.0159%	72	2.7644%	1.9944%
20	0.0347%	0.0168%	73	3.0535%	2.2258%
21	0.0371%	0.0185%	74	3.3359%	2.4880%
22	0.0402%	0.0205%	75	3.6300%	2.7766%
23	0.0431%	0.0227%	76	4.1253%	3.0785%
24	0.0467%	0.0251%	77	4.6178%	3.3525%
25	0.0503%	0.0274%	78	5.1289%	3.6752%
26	0.0544%	0.0298%	79	5.5682%	4.1794%
27	0.0586%	0.0322%	80	6.0116%	4.7030%
28	0.0633%	0.0348%	81	6.7832%	5.2484%
29	0.0681%	0.0374%	82	7.6009%	5.7185%
30	0.0730%	0.0400%	83	8.4279%	6.1948%
31	0.0781%	0.0425%	84	9.2040%	7.0110%
32	0.0830%	0.0450%	85	10.1002%	7.8321%
33	0.0898%	0.0476%	86	11.5115%	8.6046%
34	0.0933%	0.0491%	87	12.7944%	9.3702%
35	0.0972%	0.0512%	88	14.1662%	10.2595%
36	0.1019%	0.0534%	89	15.7578%	11.5941%
37	0.1080%	0.0563%	90	17.3856%	12.9378%
38	0.1153%	0.0590%	91	19.0388%	14.3081%
39	0.1286%	0.0629%	92	20.6360%	15.3704%
40	0.1417%	0.0688%	93	22.5718%	16.4875%

NEW YORK CITY POLICE PENSION FUND CURRENT (continued) PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
41	0.1550%	0.0766%	94	24.4562%	17.6613%
42	0.1690%	0.0865%	95	26.1404%	18.7606%
43	0.1838%	0.0992%	96	28.0695%	19.7397%
44	0.1997%	0.1148%	97	29.6855%	20.6328%
45	0.2170%	0.1330%	98	30.9177%	21.2676%
46	0.2279%	0.1538%	99	32.6552%	21.8544%
47	0.2387%	0.1769%	100	33.9880%	22.1859%
48	0.2492%	0.2017%	101	34.9681%	23.0680%
49	0.3237%	0.2316%	102	35.9346%	24.0803%
50	0.3948%	0.2637%	103	36.6434%	25.2770%
51	0.4620%	0.2870%	104	37.3834%	26.6309%
52	0.5249%	0.3323%	105	38.1051%	28.0912%
53	0.5528%	0.3677%	106	38.4698%	29.6244%
54	0.5891%	0.4196%	107	38.6325%	31.1943%
55	0.6260%	0.4722%	108	38.8076%	32.7579%
56	0.6814%	0.5135%	109	38.9794%	34.2712%
57	0.7288%	0.5258%	110	50.0000%	50.0000%
58	0.7710%	0.5452%	111	50.0000%	50.0000%
59	0.8525%	0.5823%	112	50.0000%	50.0000%
60	0.9273%	0.6153%	113	50.0000%	50.0000%
61	1.0007%	0.6486%	114	50.0000%	50.0000%
62	1.0735%	0.7169%	115	50.0000%	50.0000%
63	1.1411%	0.7851%	116	50.0000%	50.0000%
64	1.2250%	0.8630%	117	50.0000%	50.0000%
65	1.3055%	0.9419%	118	50.0000%	50.0000%
66	1.4653%	1.0252%	119	50.0000%	50.0000%
67	1.6473%	1.1204%	120	100.0000%	100.0000%

¹ An adjustment factor of 0.876 is applied to the probabilities above to develop benefit weighted probabilities of mortality

² An adjustment factor of 0.876 is applied to the probabilities above to develop benefit weighted probabilities of mortality

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0170%	0.0090%	68	1.5135%	1.2432%
16	0.0230%	0.0110%	69	1.6396%	1.3390%
17	0.0310%	0.0120%	70	1.7829%	1.4488%
18	0.1080%	0.0470%	71	1.9468%	1.5720%
19	0.1170%	0.0500%	72	2.1400%	1.7107%
20	0.1223%	0.0561%	73	2.3681%	1.8658%
21	0.1243%	0.0604%	74	2.6382%	2.0377%
22	0.1238%	0.0639%	75	2.9529%	2.2274%
23	0.1226%	0.0677%	76	3.3129%	2.4384%
24	0.1229%	0.0715%	77	3.7183%	2.6737%
25	0.1256%	0.0767%	78	4.1626%	2.9599%
26	0.1332%	0.0844%	79	4.6406%	3.3206%
27	0.1398%	0.0912%	80	5.1526%	3.7252%
28	0.1464%	0.0993%	81	5.7064%	4.1773%
29	0.1542%	0.1074%	82	6.3147%	4.6799%
30	0.1603%	0.1154%	83	6.9895%	5.2400%
31	0.1673%	0.1245%	84	7.7534%	5.8639%
32	0.1737%	0.1330%	85	8.6301%	6.5585%
33	0.1792%	0.1408%	86	9.6128%	7.3305%
34	0.1838%	0.1489%	87	10.7798%	8.1898%
35	0.1886%	0.1560%	88	12.0705%	9.1483%
36	0.1933%	0.1630%	89	13.4965%	10.2124%
37	0.1980%	0.1689%	90	15.0629%	11.3927%
38	0.2024%	0.1735%	91	16.6672%	12.6552%
39	0.2067%	0.1795%	92	18.2383%	13.9704%
40	0.2120%	0.1833%	93	19.7568%	15.3316%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.2161%	0.1888%	94	21.2257%	16.7357%
42	0.2227%	0.1940%	95	22.6543%	18.1973%
43	0.2287%	0.2001%	96	24.1983%	19.7995%
44	0.2365%	0.2064%	97	25.8103%	21.5051%
45	0.2464%	0.2144%	98	27.5348%	23.3272%
46	0.2576%	0.2250%	99	29.3905%	25.2578%
47	0.2714%	0.2367%	100	31.3559%	27.2907%
48	0.2880%	0.2507%	101	33.3920%	29.3896%
49	0.3086%	0.2671%	102	35.4093%	31.5085%
50	0.3314%	0.2861%	103	37.4123%	33.6377%
51	0.3503%	0.3144%	104	39.3600%	35.7445%
52	0.3729%	0.3476%	105	41.2510%	37.8251%
53	0.4000%	0.3846%	106	43.0828%	39.8479%
54	0.4318%	0.4260%	107	44.8334%	41.8058%
55	0.4692%	0.4715%	108	46.4949%	43.6934%
56	0.5131%	0.5200%	109	48.0767%	45.4898%
57	0.5652%	0.5706%	110	49.3439%	47.1868%
58	0.6251%	0.6241%	111	49.4725%	48.7883%
59	0.6917%	0.6774%	112	49.5965%	49.6759%
60	0.7644%	0.7316%	113	49.7207%	49.7804%
61	0.8436%	0.7859%	114	49.8602%	49.8851%
62	0.9260%	0.8402%	115	49.9850%	49.9900%
63	1.0127%	0.8960%	116	49.9950%	49.9950%
64	1.1018%	0.9535%	117	50.0000%	50.0000%
65	1.1954%	1.0154%	118	50.0000%	50.0000%
66	1.2935%	1.0824%	119	50.0000%	50.0000%
67	1.3994%	1.1584%	120	100.0000%	100.0000%

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0170%	0.0090%	68	1.7718%	1.4402%
16	0.0230%	0.0110%	69	1.9141%	1.5587%
17	0.0310%	0.0120%	70	2.0755%	1.7025%
18	0.1260%	0.0470%	71	2.2597%	1.8757%
19	0.1390%	0.0500%	72	2.4717%	2.0830%
20	0.1475%	0.0561%	73	2.7146%	2.3277%
21	0.1531%	0.0604%	74	2.9939%	2.6141%
22	0.1563%	0.0639%	75	3.3109%	2.9441%
23	0.1581%	0.0677%	76	3.6703%	3.3072%
24	0.1616%	0.0715%	77	4.0735%	3.6967%
25	0.1667%	0.0767%	78	4.5223%	4.1104%
26	0.1768%	0.0844%	79	5.0168%	4.5453%
27	0.1860%	0.0912%	80	5.5631%	5.0049%
28	0.1952%	0.0993%	81	6.1653%	5.4890%
29	0.2056%	0.1074%	82	6.8329%	6.0042%
30	0.2142%	0.1154%	83	7.6563%	6.5560%
31	0.2235%	0.1245%	84	8.6241%	7.1516%
32	0.2320%	0.1330%	85	9.6605%	7.8018%
33	0.2394%	0.1408%	86	10.7633%	8.5119%
34	0.2469%	0.1489%	87	11.9404%	9.2942%
35	0.2528%	0.1560%	88	13.2041%	10.1580%
36	0.2596%	0.1630%	89	14.5705%	11.1091%
37	0.2644%	0.1689%	90	16.0544%	12.1516%
38	0.2699%	0.1735%	91	17.5823%	13.2985%
39	0.2747%	0.1795%	92	19.0998%	14.5468%
40	0.2790%	0.1855%	93	20.5927%	15.9028%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.2854%	0.1910%	94	22.0630%	17.3579%
42	0.2917%	0.1971%	95	23.5149%	18.9143%
43	0.2995%	0.2031%	96	25.0951%	20.6416%
44	0.3080%	0.2113%	97	26.7443%	22.4778%
45	0.3197%	0.2202%	98	28.4931%	24.4187%
46	0.3339%	0.2307%	99	30.3543%	26.4385%
47	0.3519%	0.2442%	100	32.3001%	28.5273%
48	0.3728%	0.2591%	101	34.2993%	30.6491%
49	0.3982%	0.2774%	102	36.2704%	32.7813%
50	0.4272%	0.2983%	103	38.2225%	34.9113%
51	0.4574%	0.3373%	104	40.1159%	37.0070%
52	0.4927%	0.3824%	105	41.9494%	39.0659%
53	0.5324%	0.4349%	106	43.7225%	41.0568%
54	0.5783%	0.4934%	107	45.4141%	42.9728%
55	0.6295%	0.5574%	108	47.0172%	44.8128%
56	0.6877%	0.6279%	109	48.5432%	46.5543%
57	0.7515%	0.7017%	110	49.3439%	48.1911%
58	0.8212%	0.7759%	111	49.4725%	49.5766%
59	0.8962%	0.8481%	112	49.5965%	49.6759%
60	0.9755%	0.9137%	113	49.7207%	49.7804%
61	1.0584%	0.9742%	114	49.8602%	49.8851%
62	1.1456%	1.0284%	115	49.9850%	49.9900%
63	1.2348%	1.0796%	116	49.9950%	49.9950%
64	1.3277%	1.1323%	117	50.0000%	50.0000%
65	1.4263%	1.1915%	118	50.0000%	50.0000%
66	1.5316%	1.2608%	119	50.0000%	50.0000%
67	1.6453%	1.3422%	120	100.0000%	100.0000%

Postretirement Mortality – Contingent Beneficiaries

The SOA combined the experience of all contingent beneficiaries of teachers, general employees and public safety members in developing contingent survivor annuity mortality tables. We combined the experience of all NYCRS systems (TRS, BERS, NYCERS, POLICE and FIRE) in proposing a recommended assumption. We propose to use the PUB contingent survivor annuitant mortality tables, multiplied by adjustment factors. Separate tables exist on a headcount-weighted and amount-weighted basis in addition to gender.

For males, the proposed adjustment factors are 125% for amount-weighted and 120% for headcount-weighted. For females, the proposed adjustment factors are 120% for amount-weighted and 108% for headcount-weighted.

The contingent survivor assumption would apply upon the death of the member. While both the member and contingent survivor are both alive, we propose the healthy annuitant mortality table apply.

The following charts show postretirement mortality experience on a headcount-weighted basis by year for the age range (60 to 104) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions for all members of NYCRS. The A/E decreased from 1.12 to 1.00 and decreased from 0.87 to 0.78 for only POLICE.

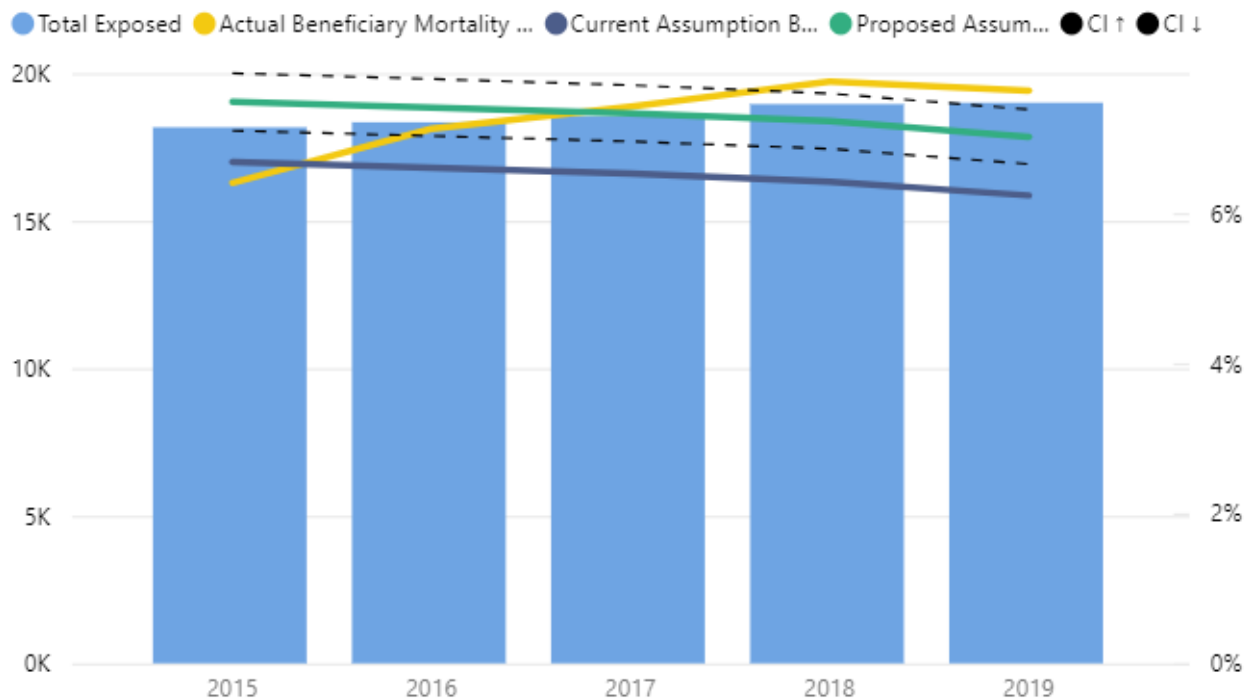
Current Assumption – Headcount-weighted

Plan Year	Actual Beneficiary Deaths	Expected Beneficiary Deaths	Total Exposed	Actual Beneficiary Mortality Rate	Current Assumption Beneficiary Mortality	Ratio Act/Exp Beneficiary Mortality
2015	1,163	1,213.4	18,168	6.4014%	6.6789%	0.96
2016	1,307	1,210.9	18,340	7.1265%	6.6027%	1.08
2017	1,376	1,210.4	18,541	7.4214%	6.5285%	1.14
2018	1,470	1,216.8	18,955	7.7552%	6.4197%	1.21
2019	1,450	1,184.7	19,001	7.6312%	6.2351%	1.22
Total	6,766	6,036.4	93,005	7.2749%	6.4904%	1.12

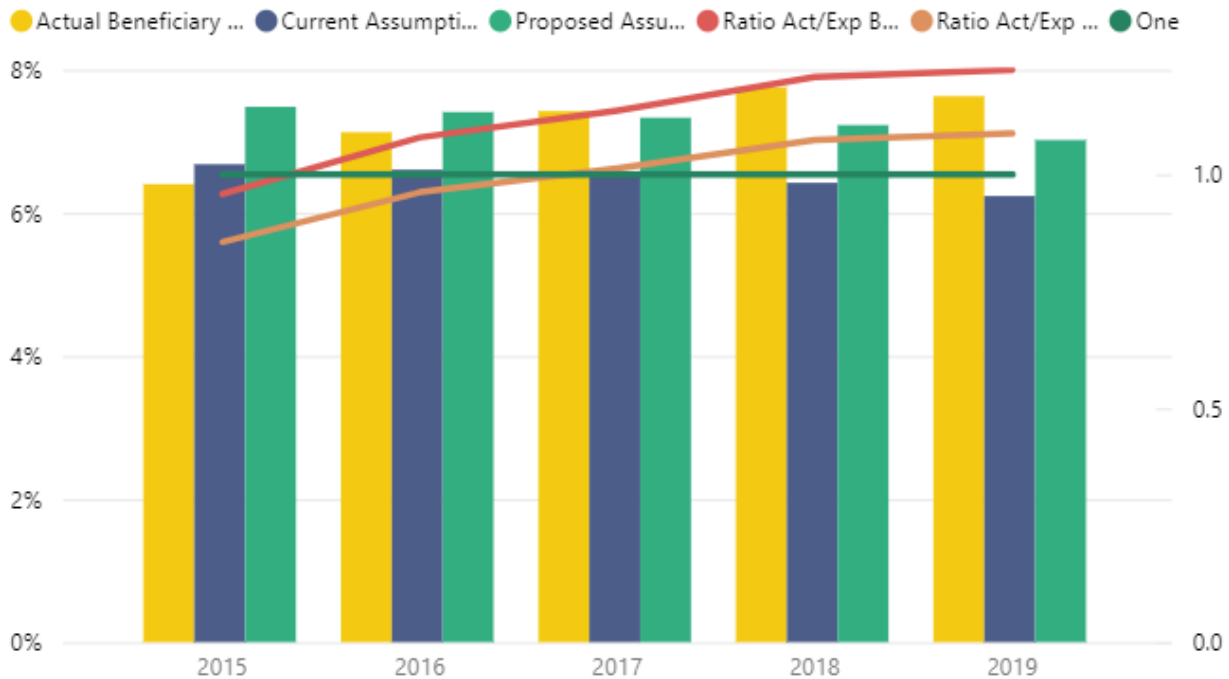
Proposed Assumption – Headcount-weighted

Plan Year	Actual Beneficiary Deaths	Expected Beneficiary Deaths Proposed	Total Exposed	Actual Beneficiary Mortality Rate	Proposed Assumption Beneficiary Mortality	Act/Exp Proposed Beneficiary Mortality
2015	1,163	1,359.3	18,168	6.4014%	7.4816%	▲ 0.86
2016	1,307	1,358.7	18,340	7.1265%	7.4084%	● 0.96
2017	1,376	1,359.0	18,541	7.4214%	7.3296%	● 1.01
2018	1,470	1,369.6	18,955	7.7552%	7.2257%	● 1.07
2019	1,450	1,333.4	19,001	7.6312%	7.0175%	● 1.09
Total	6,766	6,780.0	93,005	7.2749%	7.2899%	● 1.00

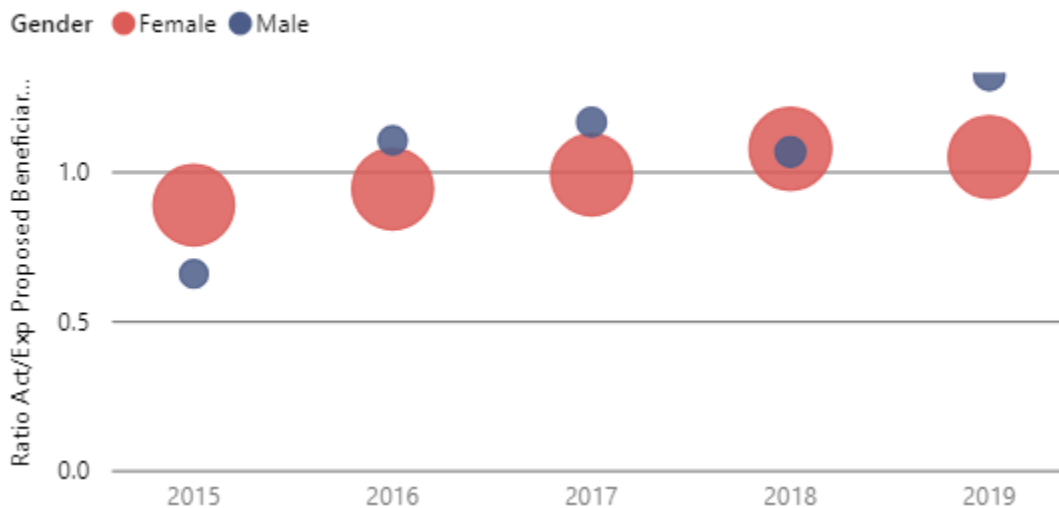
Exposure Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Year



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Beneficiary Mortality Proposed w/ Exposure Bubbles; by ...



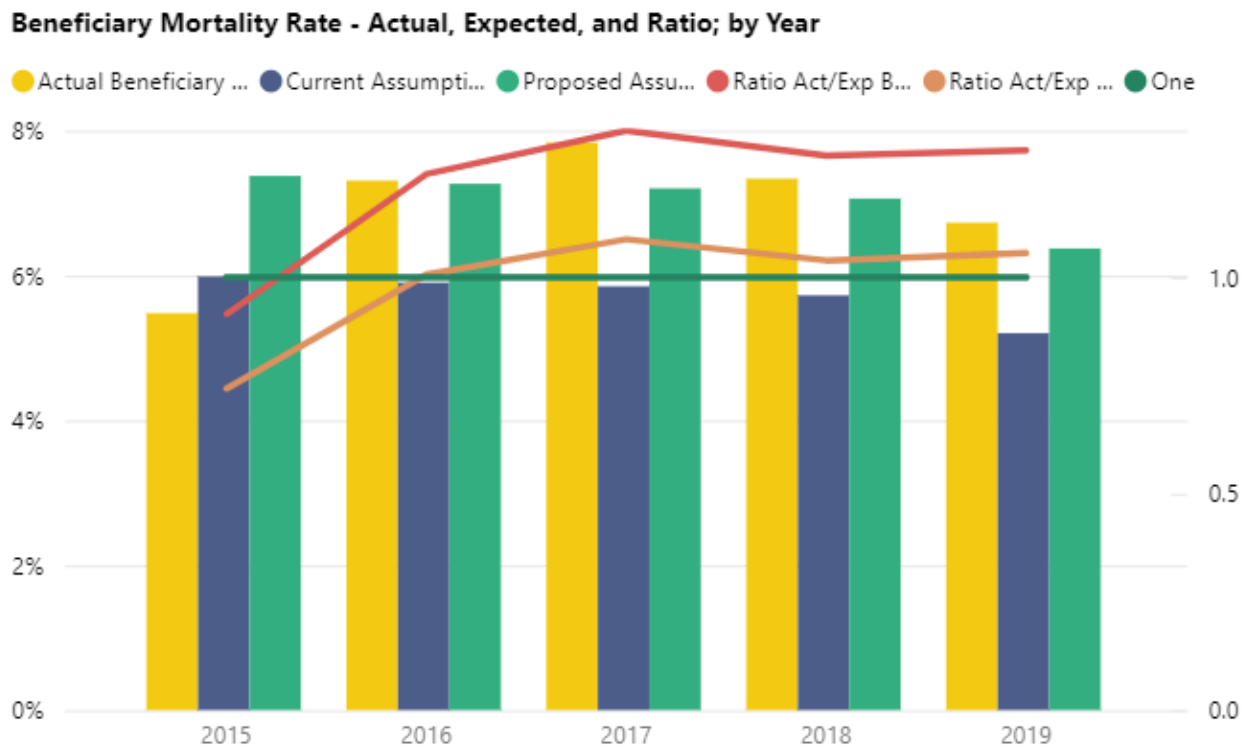
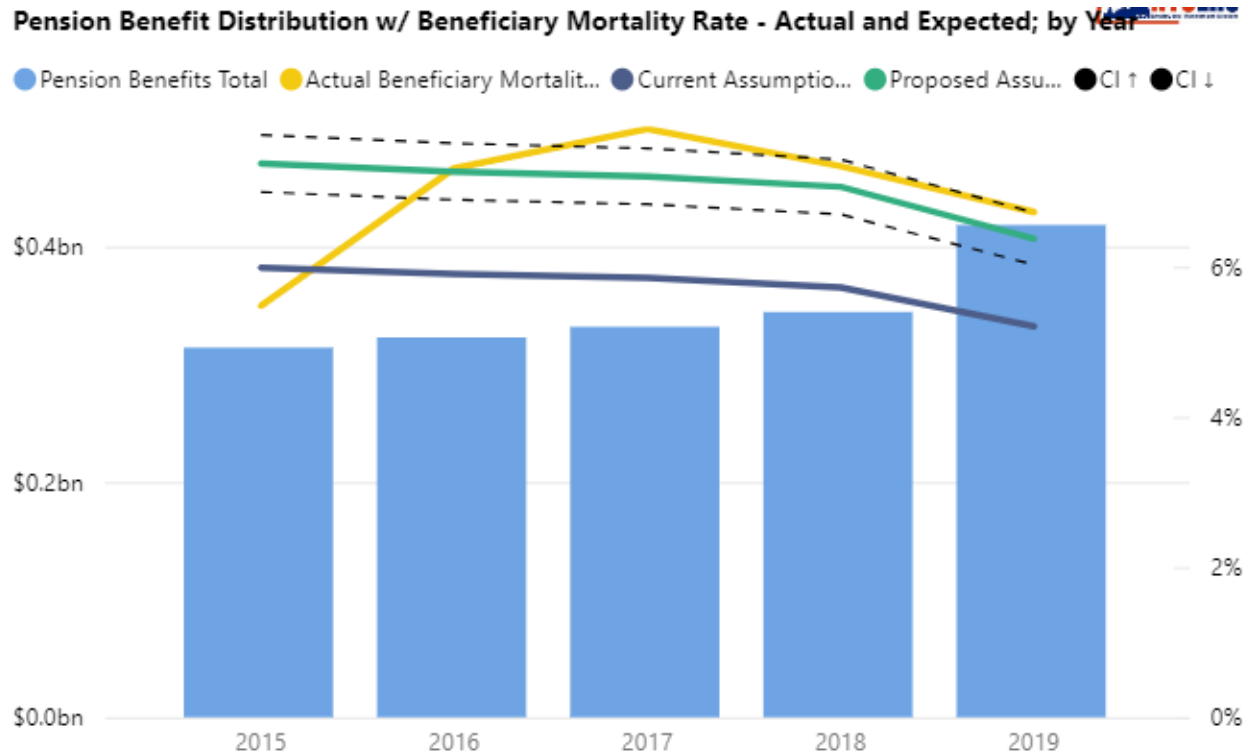
The following charts show postretirement mortality experience on an amount-weighted basis by year for the age range (60 to 104) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.22 to 0.99 and decreased from 0.95 to 0.80 for only POLICE.

Current Assumption – Amount-weighted

Plan Year	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Current Assumption Beneficiary Mortality BftWght	Ratio Act/Exp Beneficiary Mortality BftWght
2015	\$17.2M	\$18.8M	\$314.1M	5.4787%	5.9868%	0.92
2016	\$23.6M	\$19.0M	\$322.7M	7.3093%	5.9014%	1.24
2017	\$26.0M	\$19.4M	\$331.8M	7.8345%	5.8502%	1.34
2018	\$25.3M	\$19.7M	\$344.3M	7.3366%	5.7247%	1.28
2019	\$28.1M	\$21.8M	\$418.3M	6.7269%	5.2026%	1.29
Total	\$120.2M	\$98.7M	\$1,731.3M	6.9425%	5.7031%	1.22

Proposed Assumption – Amount-weighted

Plan Year	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released Proposed	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Proposed Assumption Beneficiary Mortality BftWght	Act/Exp Proposed Beneficiary Mortality BftWght
2015	\$17.2M	\$23.2M	\$314.1M	5.4787%	7.3734%	0.74
2016	\$23.6M	\$23.4M	\$322.7M	7.3093%	7.2656%	1.01
2017	\$26.0M	\$23.9M	\$331.8M	7.8345%	7.2019%	1.09
2018	\$25.3M	\$24.3M	\$344.3M	7.3366%	7.0609%	1.04
2019	\$28.1M	\$26.7M	\$418.3M	6.7269%	6.3717%	1.06
Total	\$120.2M	\$121.5M	\$1,731.3M	6.9425%	7.0162%	0.99



The following section displays results by gender.

Contingent Beneficiaries - Males

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for males on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.52 to 1.11 and decreased from 3.82 to 2.82 for only POLICE.

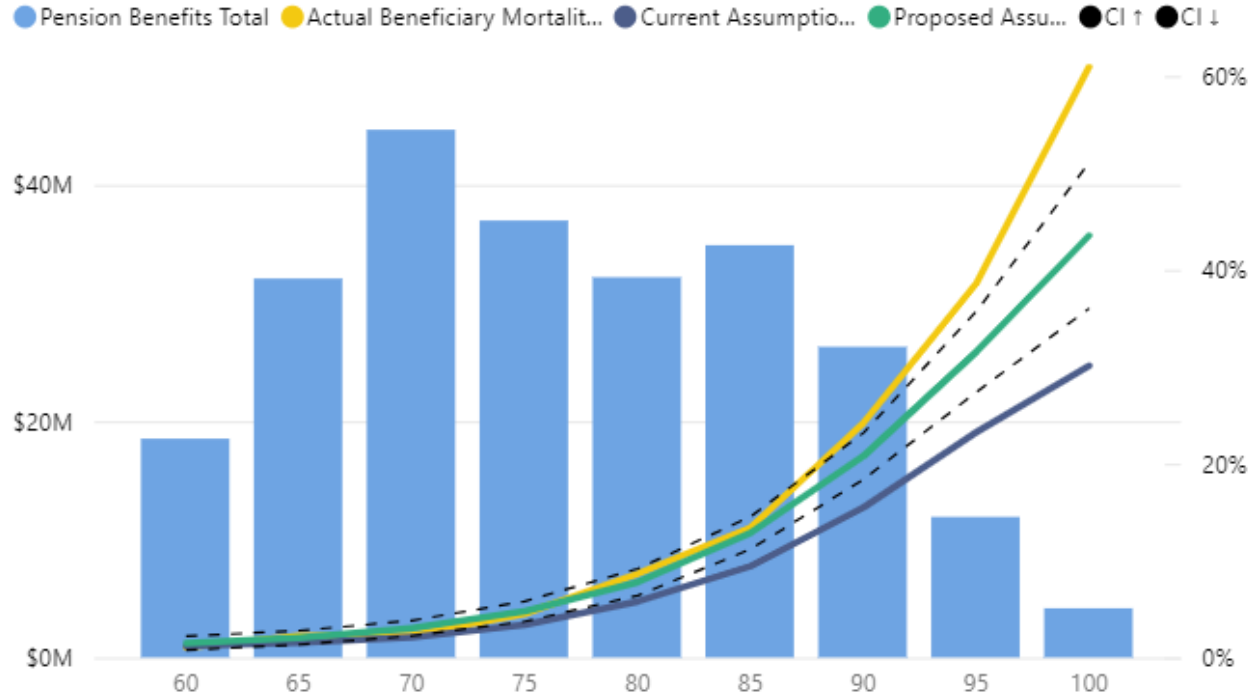
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

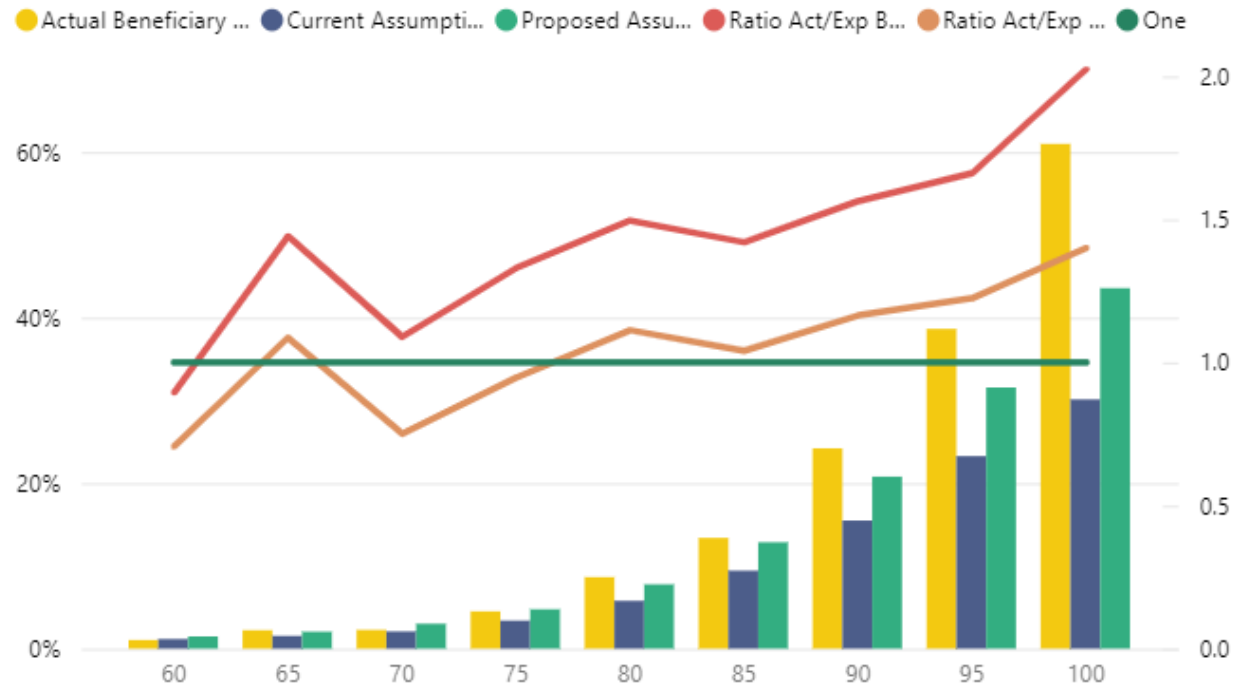
Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Current Assumption Beneficiary Mortality BftWght	Ratio Act/Exp Beneficiary Mortality BftWght
60	\$0.2M	\$0.2M	\$18.5M	1.0416%	1.1637%	▲ 0.90
65	\$0.7M	\$0.5M	\$32.1M	2.2223%	1.5421%	▲ 1.44
70	\$1.0M	\$0.9M	\$44.7M	2.2615%	2.0760%	● 1.09
75	\$1.7M	\$1.3M	\$37.0M	4.4993%	3.3836%	▲ 1.33
80	\$2.8M	\$1.9M	\$32.2M	8.6385%	5.7759%	▲ 1.50
85	\$4.7M	\$3.3M	\$34.9M	13.3692%	9.4174%	▲ 1.42
90	\$6.4M	\$4.1M	\$26.3M	24.1876%	15.4684%	◆ 1.56
95	\$4.6M	\$2.8M	\$11.9M	38.6136%	23.2507%	◆ 1.66
100	\$2.5M	\$1.3M	\$4.2M	60.9581%	30.0988%	◆ 2.03
Total	\$24.5M	\$16.1M	\$241.6M	10.1452%	6.6706%	◆ 1.52

Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released Proposed	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Proposed Assumption Beneficiary Mortality BftWght	Act/Exp Proposed Beneficiary Mortality BftWght
60	\$0.2M	\$0.3M	\$18.5M	1.0416%	1.4728%	▲ 0.71
65	\$0.7M	\$0.7M	\$32.1M	2.2223%	2.0459%	● 1.09
70	\$1.0M	\$1.3M	\$44.7M	2.2615%	3.0124%	▲ 0.75
75	\$1.7M	\$1.8M	\$37.0M	4.4993%	4.7523%	● 0.95
80	\$2.8M	\$2.5M	\$32.2M	8.6385%	7.7645%	▲ 1.11
85	\$4.7M	\$4.5M	\$34.9M	13.3692%	12.8490%	● 1.04
90	\$6.4M	\$5.5M	\$26.3M	24.1876%	20.7707%	▲ 1.16
95	\$4.6M	\$3.8M	\$11.9M	38.6136%	31.5366%	▲ 1.22
100	\$2.5M	\$1.8M	\$4.2M	60.9581%	43.5346%	▲ 1.40
Total	\$24.5M	\$22.0M	\$241.6M	10.1452%	9.1203%	▲ 1.11

Pension Benefit Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



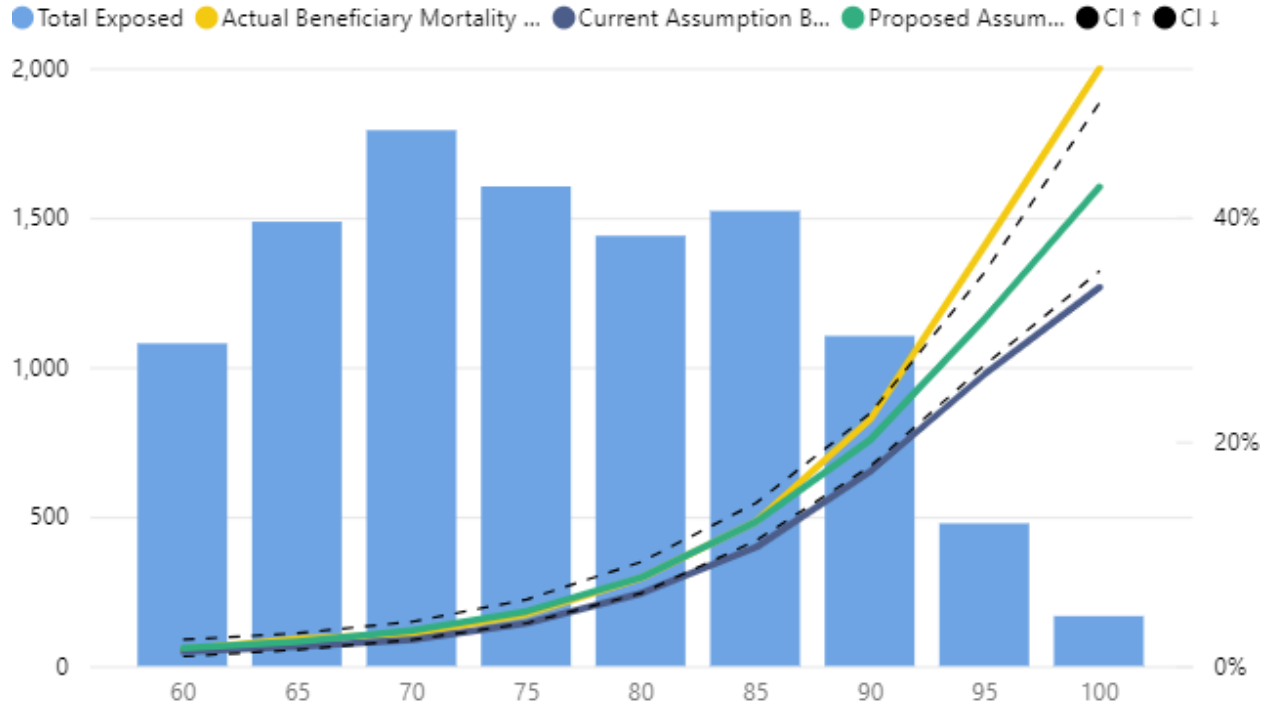
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for males on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.30 to 1.07 and decreased from 3.72 to 3.06 for only POLICE.

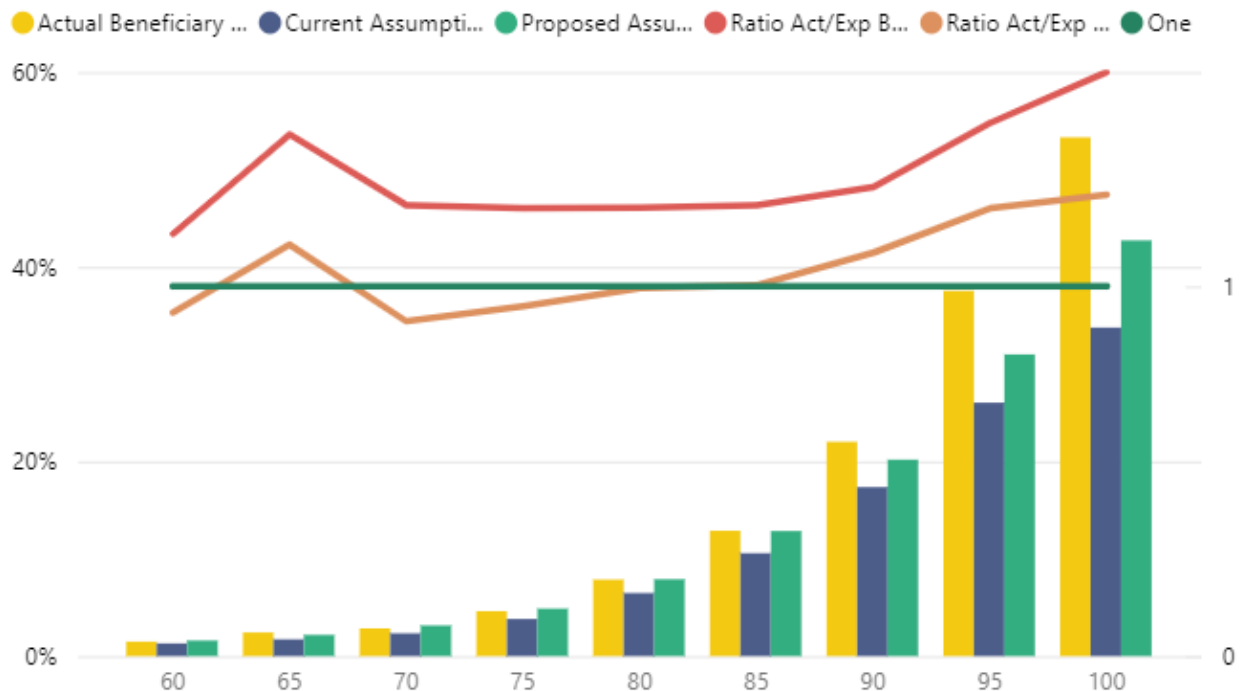
Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths	Total Exposed	Actual Beneficiary Mortality Rate	Current Assumption Beneficiary Mortality	Ratio Act/Exp Beneficiary Mortality
60	16	14.0	1,079	1.4829%	1.2992%	▲ 1.14
65	36	25.5	1,486	2.4226%	1.7181%	▲ 1.41
70	51	41.8	1,792	2.8460%	2.3340%	▲ 1.22
75	74	61.1	1,604	4.6135%	3.8106%	▲ 1.21
80	113	93.2	1,439	7.8527%	6.4733%	▲ 1.21
85	196	160.8	1,522	12.8778%	10.5664%	▲ 1.22
90	243	191.6	1,104	22.0109%	17.3553%	▲ 1.27
95	179	124.2	477	37.5262%	26.0300%	▲ 1.44
100	89	56.4	167	53.2934%	33.7478%	◆ 1.58
Total	997	768.6	10,670	9.3440%	7.2033%	▲ 1.30

Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths Proposed	Total Exposed	Actual Beneficiary Mortality Rate	Proposed Assumption Beneficiary Mortality	Act/Exp Proposed Beneficiary Mortality
60	16	17.2	1,079	1.4829%	1.5966%	● 0.93
65	36	32.3	1,486	2.4226%	2.1770%	▲ 1.11
70	51	56.3	1,792	2.8460%	3.1441%	● 0.91
75	74	78.2	1,604	4.6135%	4.8756%	● 0.95
80	113	113.6	1,439	7.8527%	7.8916%	● 1.00
85	196	195.5	1,522	12.8778%	12.8459%	● 1.00
90	243	222.8	1,104	22.0109%	20.1786%	● 1.09
95	179	147.8	477	37.5262%	30.9910%	▲ 1.21
100	89	71.3	167	53.2934%	42.7034%	▲ 1.25
Total	997	935.1	10,670	9.3440%	8.7639%	● 1.07

Exposure Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



Contingent Beneficiaries - Females

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for females on the current and proposed assumptions for all members of NYCRS. The A/E decreased from 1.16 to 0.96 and decreased from 0.80 to 0.68 for only POLICE.

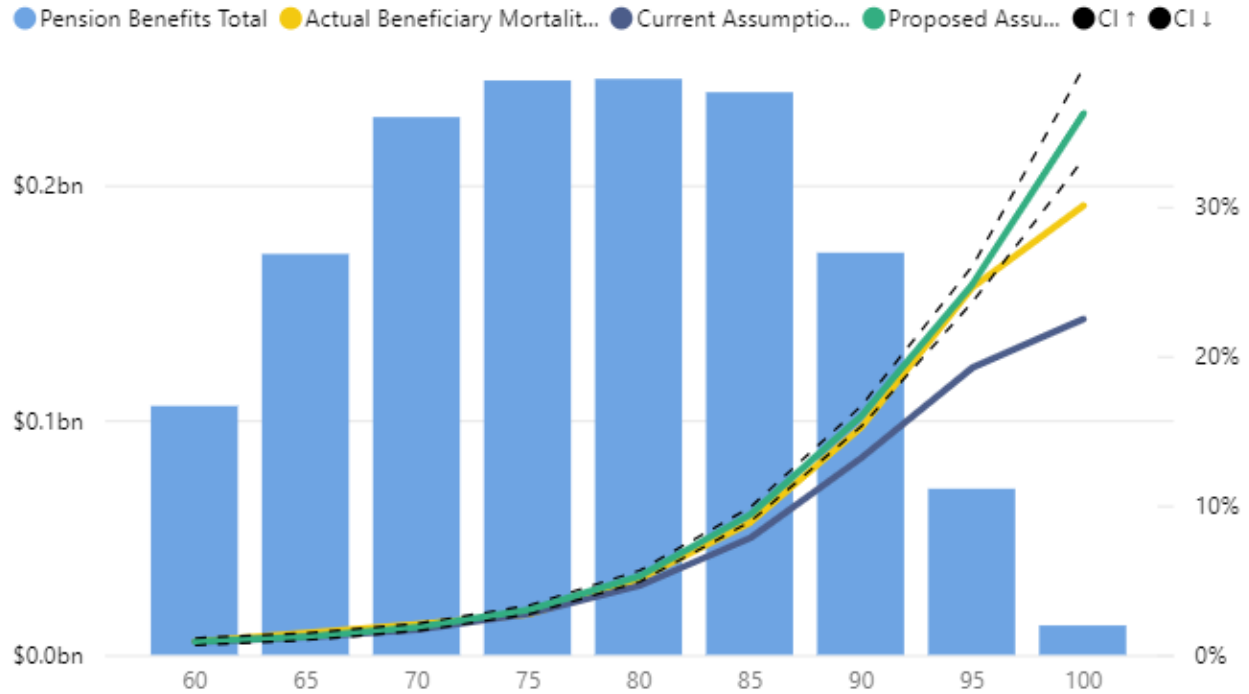
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

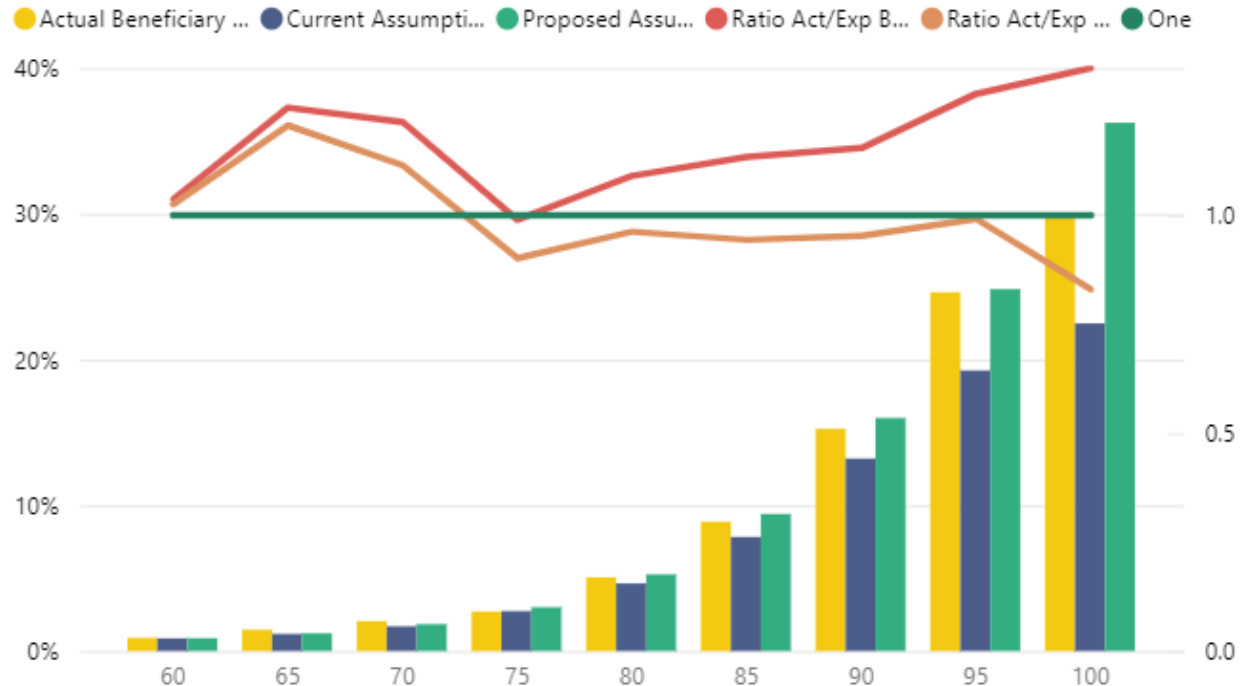
Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Current Assumption Beneficiary Mortality BftWght	Ratio Act/Exp Beneficiary Mortality BftWght
60	\$1.0M	\$0.9M	\$106.0M	0.8984%	0.8666%	1.04
65	\$2.5M	\$2.0M	\$170.7M	1.4586%	1.1698%	1.25
70	\$4.7M	\$3.9M	\$229.0M	2.0543%	1.6923%	1.21
75	\$6.6M	\$6.7M	\$244.6M	2.7071%	2.7350%	0.99
80	\$12.4M	\$11.4M	\$245.3M	5.0535%	4.6336%	1.09
85	\$21.2M	\$18.7M	\$239.6M	8.8691%	7.8227%	1.13
90	\$26.1M	\$22.6M	\$171.3M	15.2405%	13.2015%	1.15
95	\$17.4M	\$13.6M	\$70.7M	24.6092%	19.2429%	1.28
100	\$3.8M	\$2.8M	\$12.5M	30.0705%	22.4709%	1.34
Total	\$95.7M	\$82.6M	\$1,489.6M	6.4231%	5.5462%	1.16

Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released Proposed	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Proposed Assumption Beneficiary Mortality BftWght	Act/Exp Proposed Beneficiary Mortality BftWght
60	\$1.0M	\$0.9M	\$106.0M	0.8984%	0.8763%	1.03
65	\$2.5M	\$2.1M	\$170.7M	1.4586%	1.2092%	1.21
70	\$4.7M	\$4.2M	\$229.0M	2.0543%	1.8436%	1.11
75	\$6.6M	\$7.3M	\$244.6M	2.7071%	3.0029%	0.90
80	\$12.4M	\$12.9M	\$245.3M	5.0535%	5.2520%	0.96
85	\$21.2M	\$22.5M	\$239.6M	8.8691%	9.3996%	0.94
90	\$26.1M	\$27.4M	\$171.3M	15.2405%	15.9868%	0.95
95	\$17.4M	\$17.6M	\$70.7M	24.6092%	24.8248%	0.99
100	\$3.8M	\$4.5M	\$12.5M	30.0705%	36.2393%	0.83
Total	\$95.7M	\$99.4M	\$1,489.6M	6.4231%	6.6750%	0.96

Pension Benefit Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



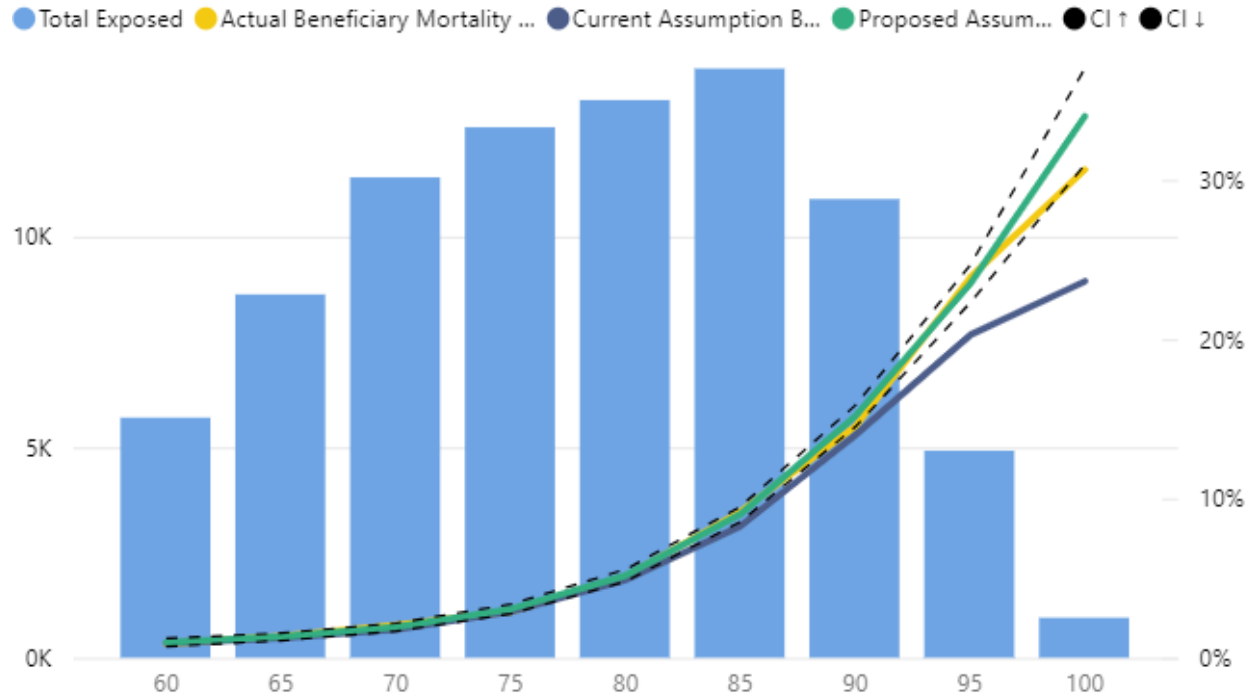
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for females on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.10 to 0.99 and decreased from 0.75 to 0.67 for only POLICE.

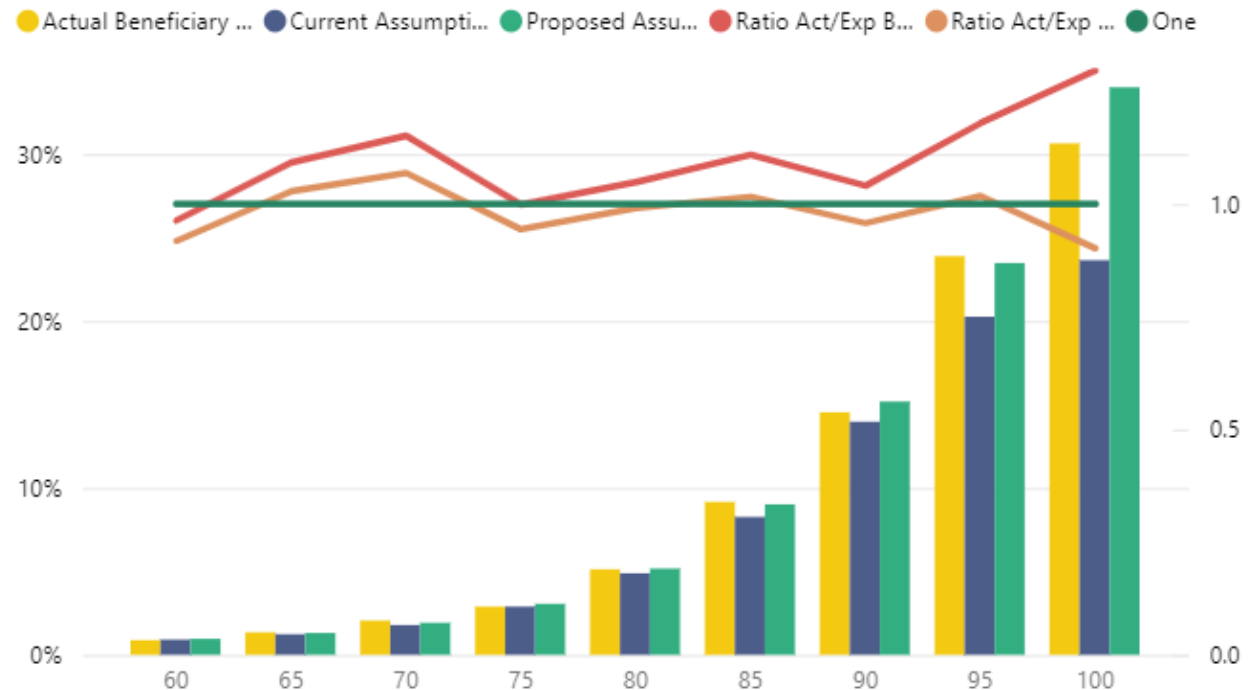
Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths	Total Exposed	Actual Beneficiary Mortality Rate	Current Assumption Beneficiary Mortality	Ratio Act/Exp Beneficiary Mortality
60	50	51.9	5,702	0.8769%	0.9101%	0.96
65	116	106.2	8,629	1.3443%	1.2311%	1.09
70	234	203.2	11,408	2.0512%	1.7814%	1.15
75	363	363.5	12,598	2.8814%	2.8857%	1.00
80	678	646.9	13,244	5.1193%	4.8841%	1.05
85	1,281	1,155.2	13,993	9.1546%	8.2556%	1.11
90	1,582	1,520.7	10,894	14.5218%	13.9588%	1.04
95	1,174	995.6	4,917	23.8763%	20.2491%	1.18
100	291	224.5	950	30.6316%	23.6325%	1.30
Total	5,769	5,267.8	82,335	7.0067%	6.3980%	1.10

Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths Proposed	Total Exposed	Actual Beneficiary Mortality Rate	Proposed Assumption Beneficiary Mortality	Act/Exp Proposed Beneficiary Mortality
60	50	54.5	5,702	0.8769%	0.9555%	0.92
65	116	112.8	8,629	1.3443%	1.3075%	1.03
70	234	219.0	11,408	2.0512%	1.9194%	1.07
75	363	384.6	12,598	2.8814%	3.0528%	0.94
80	678	684.0	13,244	5.1193%	5.1648%	0.99
85	1,281	1,260.9	13,993	9.1546%	9.0109%	1.02
90	1,582	1,652.4	10,894	14.5218%	15.1684%	0.96
95	1,174	1,153.7	4,917	23.8763%	23.4644%	1.02
100	291	322.9	950	30.6316%	33.9867%	0.90
Total	5,769	5,844.9	82,335	7.0067%	7.0989%	0.99

Exposure Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

We have proposed new assumptions consistent with industry standards. In total, the proposed mortality tables are anticipated to decrease plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY POLICE PENSION FUND CURRENT PROBABILITIES OF BENEFICIARY MORTALITY BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
15	0.0105%	0.0092%	68	1.8256%	1.3605%
16	0.0142%	0.0112%	69	1.9386%	1.4332%
17	0.0191%	0.0122%	70	2.0542%	1.5007%
18	0.0222%	0.0133%	71	2.2359%	1.6745%
19	0.0240%	0.0143%	72	2.4230%	1.8463%
20	0.0251%	0.0145%	73	2.6165%	2.0157%
21	0.0268%	0.0153%	74	2.8157%	2.1838%
22	0.0284%	0.0161%	75	3.0220%	2.3492%
23	0.0301%	0.0171%	76	3.4928%	2.6652%
24	0.0315%	0.0183%	77	3.9787%	2.9831%
25	0.0327%	0.0195%	78	4.4792%	3.3011%
26	0.0342%	0.0208%	79	4.9963%	3.6207%
27	0.0354%	0.0221%	80	5.5282%	3.9391%
28	0.0371%	0.0236%	81	6.1051%	4.4386%
29	0.0394%	0.0252%	82	6.6894%	4.9473%
30	0.0427%	0.0270%	83	7.2805%	5.4665%
31	0.0495%	0.0330%	84	7.8749%	5.9942%
32	0.0562%	0.0384%	85	8.4753%	6.5354%
33	0.0625%	0.0431%	86	9.6136%	7.4659%
34	0.0682%	0.0471%	87	10.8005%	8.3995%
35	0.0743%	0.0511%	88	12.0443%	9.3428%
36	0.0780%	0.0542%	89	13.3397%	10.2918%
37	0.0818%	0.0579%	90	14.6958%	11.2477%
38	0.0861%	0.0618%	91	16.4185%	12.8868%
39	0.0917%	0.0666%	92	18.1416%	14.4887%
40	0.0997%	0.0719%	93	19.8574%	16.0801%

NEW YORK CITY POLICE PENSION FUND CURRENT (continued) PROBABILITIES OF BENEFICIARY MORTALITY BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
41	0.1394%	0.0775%	94	21.6187%	17.5854%
42	0.1774%	0.0859%	95	23.5884%	19.0626%
43	0.2143%	0.0968%	96	25.4266%	20.2474%
44	0.2507%	0.1111%	97	27.2119%	21.2937%
45	0.2875%	0.1287%	98	29.0202%	22.0663%
46	0.3207%	0.1501%	99	30.6654%	22.5443%
47	0.3534%	0.1748%	100	32.1584%	22.6473%
48	0.3849%	0.2022%	101	33.7521%	23.5294%
49	0.4150%	0.2319%	102	35.1259%	24.5619%
50	0.4431%	0.2633%	103	36.3671%	25.7825%
51	0.5156%	0.2999%	104	37.3834%	27.1635%
52	0.5928%	0.3376%	105	38.1051%	28.6530%
53	0.6740%	0.3762%	106	38.4698%	30.2169%
54	0.7583%	0.4151%	107	38.6325%	31.8182%
55	0.8440%	0.4540%	108	38.8076%	33.4131%
56	0.9048%	0.5132%	109	38.9794%	34.9566%
57	0.9604%	0.5735%	110	50.0000%	50.0000%
58	1.0101%	0.6353%	111	50.0000%	50.0000%
59	1.0536%	0.6981%	112	50.0000%	50.0000%
60	1.0919%	0.7631%	113	50.0000%	50.0000%
61	1.1835%	0.8329%	114	50.0000%	50.0000%
62	1.2676%	0.8908%	115	50.0000%	50.0000%
63	1.3473%	0.9493%	116	50.0000%	50.0000%
64	1.4238%	1.0146%	117	50.0000%	50.0000%
65	1.4985%	1.0876%	118	50.0000%	50.0000%
66	1.6059%	1.1681%	119	50.0000%	50.0000%
67	1.7146%	1.2609%	120	100.0000%	100.0000%

¹ An adjustment factor of 0.89 is applied to the probabilities above to develop benefit weighted probabilities of mortality

² An adjustment factor of 0.951 is applied to the probabilities above to develop benefit weighted probabilities of mortality

The following table shows the proposed assumptions.

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF BENEFICIARY MORTALITY* BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0213%	0.0108%	68	2.1319%	1.2510%
16	0.0288%	0.0132%	69	2.2991%	1.3475%
17	0.0388%	0.0144%	70	2.4880%	1.4610%
18	0.0463%	0.0168%	71	2.7020%	1.5932%
19	0.0500%	0.0180%	72	2.9426%	1.7474%
20	0.0518%	0.0203%	73	3.2127%	1.9239%
21	0.0527%	0.0220%	74	3.5155%	2.1243%
22	0.0524%	0.0225%	75	3.8517%	2.3534%
23	0.0524%	0.0244%	76	4.2232%	2.6102%
24	0.0526%	0.0263%	77	4.6341%	2.9016%
25	0.0528%	0.0283%	78	5.0911%	3.2318%
26	0.0560%	0.0304%	79	5.5977%	3.6056%
27	0.0593%	0.0325%	80	6.1669%	4.0314%
28	0.0626%	0.0362%	81	6.8074%	4.5194%
29	0.0659%	0.0384%	82	7.5285%	5.0748%
30	0.0674%	0.0420%	83	8.3336%	5.7106%
31	0.0703%	0.0440%	84	9.2333%	6.4368%
32	0.0729%	0.0474%	85	10.2373%	7.2652%
33	0.0752%	0.0505%	86	11.3474%	8.2088%
34	0.0772%	0.0533%	87	12.5685%	9.2702%
35	0.0803%	0.0557%	88	13.9075%	10.4520%
36	0.0828%	0.0576%	89	15.3777%	11.7389%
37	0.0831%	0.0606%	90	17.1167%	13.1089%
38	0.0860%	0.0617%	91	18.9624%	14.5764%
39	0.0882%	0.0639%	92	20.8892%	16.1376%
40	0.0898%	0.0657%	93	22.8919%	17.7993%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF BENEFICIARY MORTALITY* BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.0910%	0.0673%	94	24.9620%	19.5555%
42	0.0947%	0.0701%	95	27.0734%	21.4140%
43	0.0967%	0.0715%	96	29.3636%	23.4560%
44	0.0999%	0.0743%	97	31.7238%	25.6189%
45	0.6986%	0.3023%	98	34.1591%	27.9023%
46	0.7085%	0.3098%	99	36.6614%	30.2827%
47	0.7222%	0.3189%	100	39.1948%	32.7488%
48	0.7402%	0.3310%	101	41.7401%	35.2675%
49	0.7619%	0.3452%	102	44.2616%	37.8102%
50	0.8227%	0.3614%	103	46.7654%	40.3653%
51	0.8500%	0.3910%	104	49.2000%	42.8934%
52	0.8814%	0.4252%	105	51.5638%	45.3902%
53	0.9178%	0.4627%	106	53.8534%	47.8174%
54	0.9603%	0.5028%	107	56.0417%	50.1669%
55	1.0067%	0.5474%	108	58.1186%	52.4321%
56	1.0594%	0.5928%	109	60.0958%	54.5877%
57	1.1170%	0.6394%	110	61.6798%	56.6242%
58	1.1797%	0.6869%	111	61.8406%	58.5460%
59	1.2454%	0.7345%	112	61.9956%	59.6111%
60	1.3156%	0.7812%	113	62.1509%	59.7365%
61	1.3908%	0.8277%	114	62.3252%	59.8621%
62	1.4697%	0.8752%	115	62.4813%	59.9880%
63	1.5526%	0.9244%	116	62.4938%	59.9940%
64	1.6430%	0.9765%	117	62.5000%	60.0000%
65	1.7438%	1.0325%	118	62.5000%	60.0000%
66	1.8562%	1.0961%	119	62.5000%	60.0000%
67	1.9859%	1.1673%	120	100.0000%	100.0000%

* This table is to be utilized for beneficiary mortality after the retiree's death. Service retirement mortality is used for the beneficiary while the retiree is alive

NEW YORK CITY POLICE PENSION FUND PROPOSED PROBABILITIES OF BENEFICIARY MORTALITY* BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0204%	0.0097%	68	2.2864%	1.3446%
16	0.0276%	0.0119%	69	2.4491%	1.4354%
17	0.0372%	0.0130%	70	2.6331%	1.5423%
18	0.0444%	0.0151%	71	2.8383%	1.6697%
19	0.0492%	0.0162%	72	3.0697%	1.8184%
20	0.0521%	0.0183%	73	3.3299%	1.9907%
21	0.0530%	0.0198%	74	3.6244%	2.1879%
22	0.0541%	0.0214%	75	3.9545%	2.4115%
23	0.0555%	0.0219%	76	4.3256%	2.6622%
24	0.0571%	0.0237%	77	4.7424%	2.9435%
25	0.0589%	0.0255%	78	5.2081%	3.2609%
26	0.0622%	0.0287%	79	5.7273%	3.6176%
27	0.0656%	0.0306%	80	6.3080%	4.0192%
28	0.0691%	0.0339%	81	6.9573%	4.4737%
29	0.0725%	0.0373%	82	7.6811%	4.9877%
30	0.0757%	0.0392%	83	8.4812%	5.5718%
31	0.0787%	0.0424%	84	9.3690%	6.2370%
32	0.0814%	0.0455%	85	10.3482%	6.9994%
33	0.0837%	0.0483%	86	11.4214%	7.8703%
34	0.0872%	0.0522%	87	12.5930%	8.8554%
35	0.0885%	0.0543%	88	13.8708%	9.9520%
36	0.0909%	0.0573%	89	15.2597%	11.1439%
37	0.0925%	0.0599%	90	16.7591%	12.4051%
38	0.0950%	0.0620%	91	18.4162%	13.7635%
39	0.0968%	0.0638%	92	20.2341%	15.2202%
40	0.0979%	0.0652%	93	22.2115%	16.7860%

NEW YORK CITY POLICE PENSION FUND PROPOSED (continued) PROBABILITIES OF BENEFICIARY MORTALITY* BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.1001%	0.0676%	94	24.3289%	18.4516%
42	0.1018%	0.0698%	95	26.5331%	20.2181%
43	0.1046%	0.0720%	96	28.9271%	22.1559%
44	0.1085%	0.0743%	97	31.3742%	24.1980%
45	0.7758%	0.3208%	98	33.8485%	26.3367%
46	0.7682%	0.3452%	99	36.3239%	28.5431%
47	0.7677%	0.3719%	100	38.7602%	30.8094%
48	0.7747%	0.4016%	101	41.1591%	33.1010%
49	0.7926%	0.4297%	102	43.5244%	35.4038%
50	0.8224%	0.4563%	103	45.8670%	37.7042%
51	0.8577%	0.4816%	104	48.1391%	39.9675%
52	0.8994%	0.5102%	105	50.3393%	42.1912%
53	0.9462%	0.5421%	106	52.4670%	44.3413%
54	0.9994%	0.5784%	107	54.4969%	46.4107%
55	1.0591%	0.6175%	108	56.4206%	48.3978%
56	1.1230%	0.6591%	109	58.2519%	50.2786%
57	1.1932%	0.7034%	110	59.2126%	52.0464%
58	1.2685%	0.7492%	111	59.3670%	53.5427%
59	1.3479%	0.7976%	112	59.5157%	53.6500%
60	1.4302%	0.8477%	113	59.6648%	53.7629%
61	1.5154%	0.9002%	114	59.8322%	53.8759%
62	1.6044%	0.9547%	115	59.9820%	53.9892%
63	1.6963%	1.0119%	116	59.9940%	53.9946%
64	1.7931%	1.0709%	117	60.0000%	54.0000%
65	1.8978%	1.1318%	118	60.0000%	54.0000%
66	2.0128%	1.1964%	119	60.0000%	54.0000%
67	2.1418%	1.2660%	120	100.0000%	100.0000%

* This table is to be utilized for beneficiary mortality after the retiree's death. Service retirement mortality is used for the beneficiary while the retiree is alive

Section V –New York City Fire Pension Fund (FIRE)

Exposures and Decrements

To set the exposures and actual decrements for FIRE, the eligibility criteria for retirement is 20 years of service. Thus, if a member has not accrued 20 years of service, the member would be considered a withdrawal exposure whereas a member with 20 or more years of service is considered a retirement exposure. Members with 19 years of service in their last active record with a status code of retirement the following year were included as retirements with 20 years of service.

Tier 3 was effective for new hires beginning no earlier than July 1, 2009. All retirement data is for Tier 2 members, except for a few exposures under Tier 1.

Using the age and service slider tools, a user can drill down to view the results that reflect a variety of conditions such as retirement at first eligibility.

OA's retirement assumptions vary based on the member's first eligibility (20 years of service) or thereafter.

We note that there was a hiring freeze for FIRE from 2007 to 2013 limiting certain age and service combinations in the study.

Rates of Salary Increase

The rates of salary increase reflect three components 1) price inflation, 2) real wage inflation and 3) merit increases. The combination of price inflation and real wage inflation is known as wage inflation. The current wage inflation is 3%, which reflects a price inflation assumption of 2.5% and 0.5% real wage inflation.

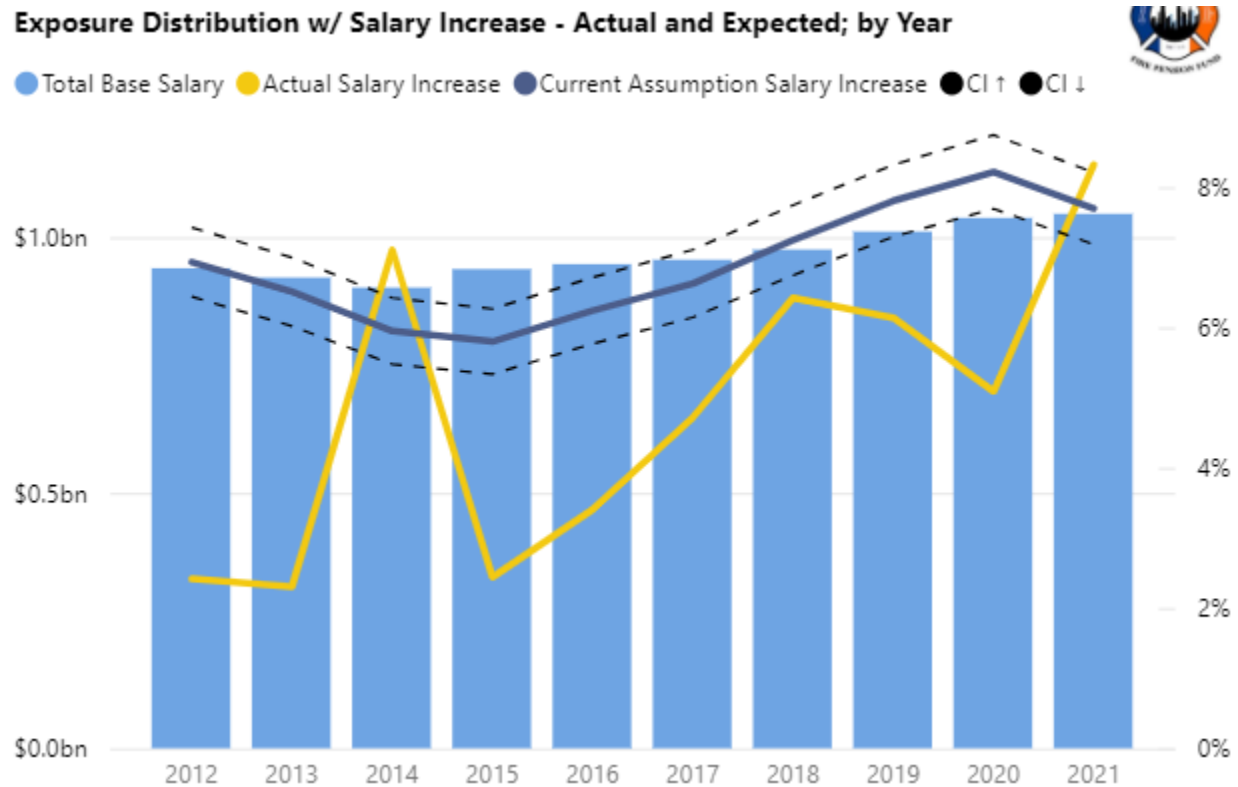
Based on the 2024 and 2023 OASDI Trustees report issued by Social Security, wage inflation from 2012 to 2020 had a cumulative compound average of 2.93%. Including the rate for 2021 of 9.04%, the average increased to 3.53%. However, in our analysis of the experience, we did not notice any large increases in wages during 2021. This is typical with government sector employees with union affiliations where salary increases are specified in contracts negotiated for a 3- to 5-year period. Thus, wage increases for these employees may not adjust as quickly as for other employment sectors included in the Social Security Trustees report.

For purposes of our analysis, we believe the 3% current wage inflation is representative of the actual experience during the study period. While inflation has been higher since 2021, we propose no changes to the inflation assumption of 2.5% and wage inflation assumptions of 3%. Therefore, we have developed proposed salary increases based on total salary increases during the indicated period. The merit portion is equal to the total less the 3% wage inflation.

For purposes of salary increases only members with a status code of A in consecutive years are included. Members with a LOA status code are excluded.

Although salary increases for government employees may respond less quickly to changes in inflation, using salary experience from many years in the past may not necessarily be indicative of future salary increases as they may not include changes negotiated in union contracts such as general increases, longevity payments, or other salary items. We reviewed the salary increases by year and determined what we believe was the most reasonable period to compare to the current assumption and develop proposed assumptions.

The following chart shows the experience by year for the age range 22 to 59 and for the service range 0 to 34.



Salary increases for FIRE varied significantly from one year to the next. There was a substantial increase in 2014 followed by a decrease in 2015 and another spike in 2021. For FIRE, we focused on the 6-year period from 2016 – 2021, which believe produced an overall reasonable average that would be representative of future salary increases.

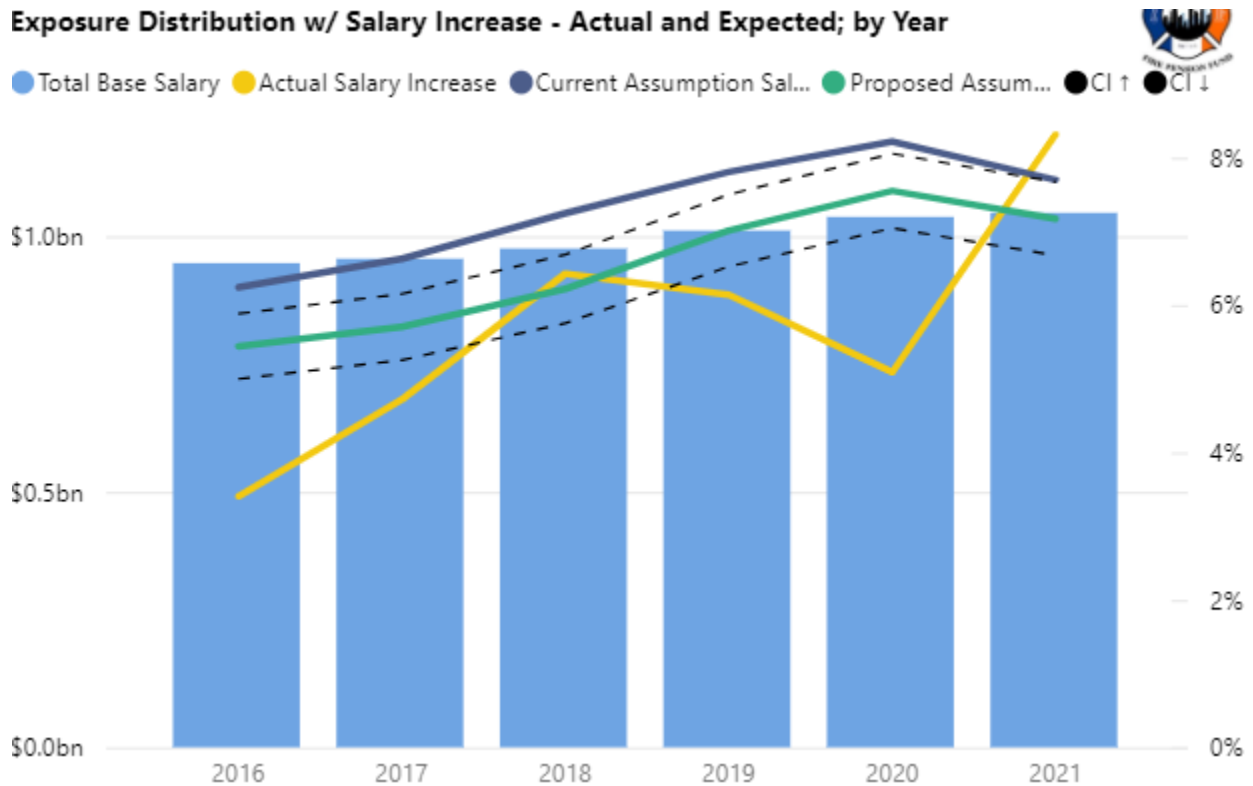
The current assumed rates of salary increases vary by service. The proposed assumption also varies by service. Overall, lower rates of salary increases are proposed.

The following charts show the experience for salary increases by year, for the age range (22 to 59), and for the service range (0 to 34) from 2016 to 2021. The actual rate of salary increases averaged 5.75% whereas the overall expected rate of increase averaged 7.33% based on the current assumptions and 6.62% based on the proposed assumptions.

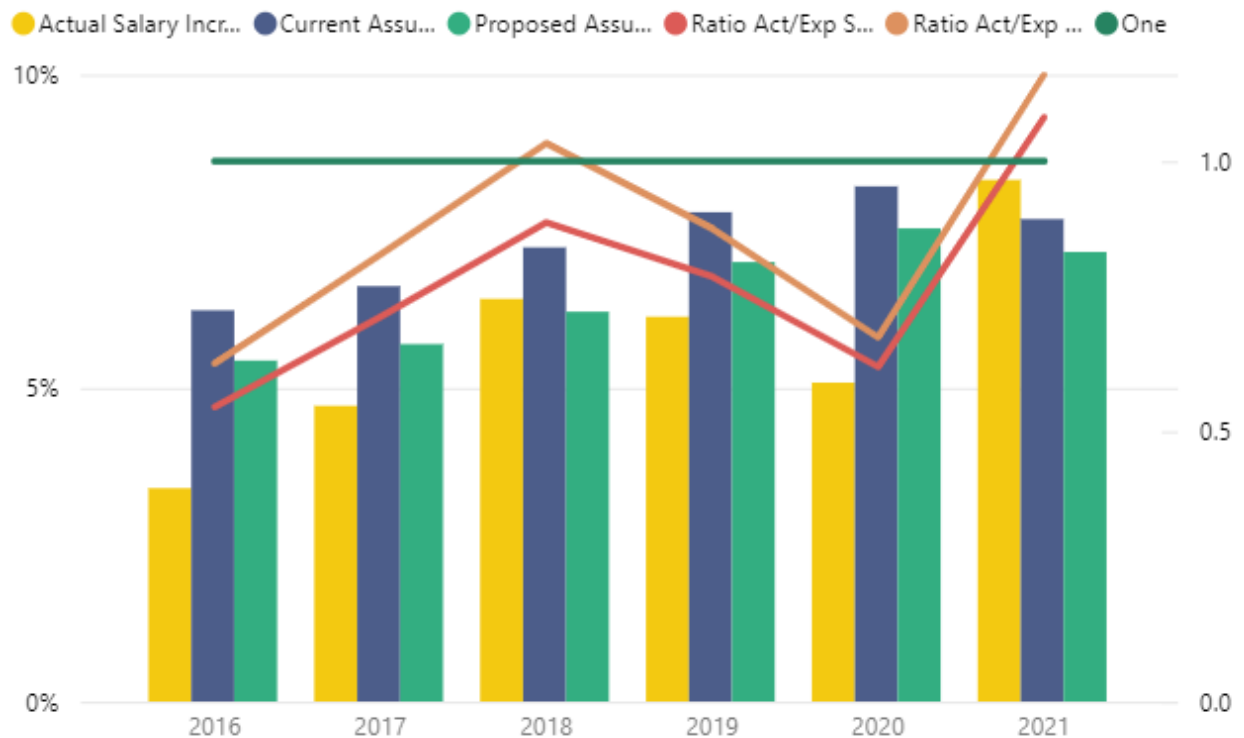
Plan Year	Exposed	Base Salary	Actual Salary	Expected Salary	Actual Salary Increase	Current Assumption Salary Increase	Ratio Act/Exp Salary Increase
2016	10,085	\$947.4M	\$979.6M	\$1,006.5M	3.40%	6.24%	▲ 0.55
2017	10,227	\$955.9M	\$1,001.0M	\$1,019.2M	4.72%	6.62%	▲ 0.71
2018	10,352	\$975.8M	\$1,038.5M	\$1,046.5M	6.42%	7.24%	▲ 0.89
2019	10,476	\$1,011.0M	\$1,073.1M	\$1,089.9M	6.14%	7.80%	▲ 0.79
2020	10,499	\$1,037.8M	\$1,090.6M	\$1,123.1M	5.09%	8.22%	▲ 0.62
2021	10,325	\$1,045.8M	\$1,132.8M	\$1,126.3M	8.32%	7.70%	● 1.08
Total	61,964	\$5,973.7M	\$6,315.5M	\$6,411.5M	5.72%	7.33%	▲ 0.78

Plan Year	Exposed	Base Salary	Actual Salary	Expected Salary Proposed	Actual Salary Increase	Proposed Assumption Salary Increase	Act/Exp Proposed Salary Increase
2016	10,085	\$947.4M	\$979.6M	\$998.9M	3.40%	5.44%	▲ 0.63
2017	10,227	\$955.9M	\$1,001.0M	\$1,010.4M	4.72%	5.70%	▲ 0.83
2018	10,352	\$975.8M	\$1,038.5M	\$1,036.5M	6.42%	6.22%	● 1.03
2019	10,476	\$1,011.0M	\$1,073.1M	\$1,081.9M	6.14%	7.01%	▲ 0.88
2020	10,499	\$1,037.8M	\$1,090.6M	\$1,116.1M	5.09%	7.55%	▲ 0.67
2021	10,325	\$1,045.8M	\$1,132.8M	\$1,120.8M	8.32%	7.17%	▲ 1.16
Total	61,964	\$5,973.7M	\$6,315.5M	\$6,364.5M	5.72%	6.54%	▲ 0.87

Exposure Distribution w/ Salary Increase - Actual and Expected; by Year



Salary Increase - Actual, Expected, and Ratio; by Year

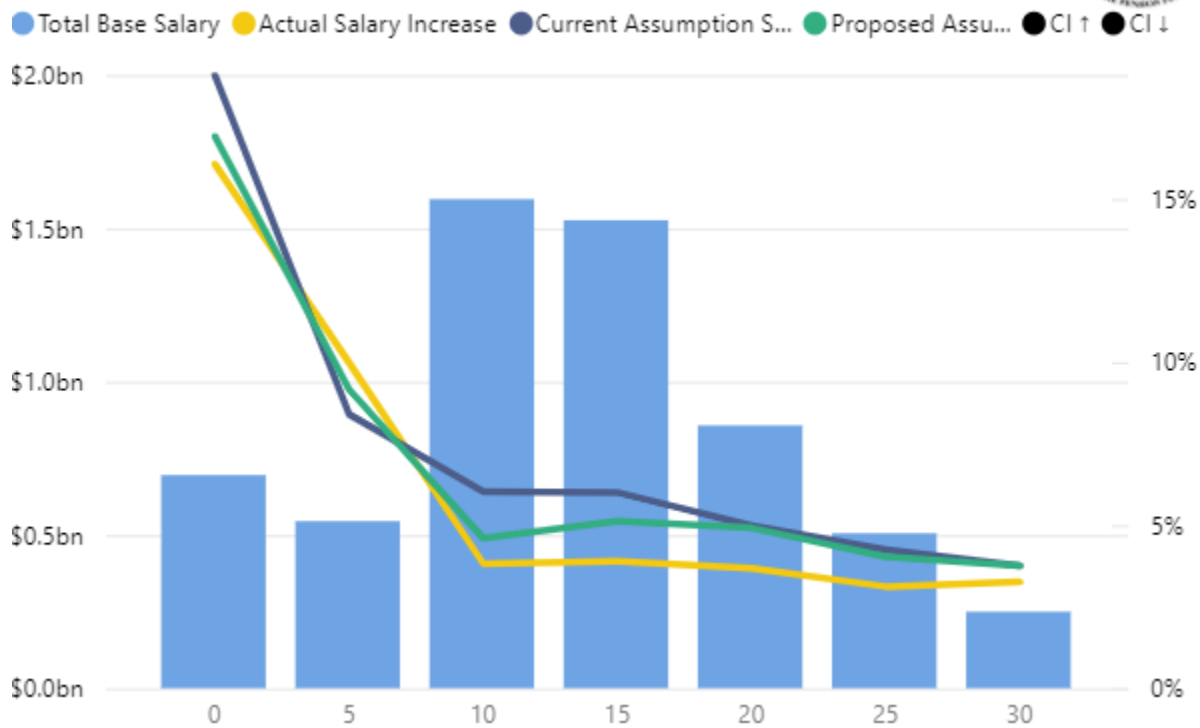


The following charts show the experience by service (0 to 34 years) from 2016 to 2021 first compared to the current assumption and then to the proposed assumption. This resulted in an increase in the A/E ratio from 0.78 to 0.87 for ages 22 to 59.

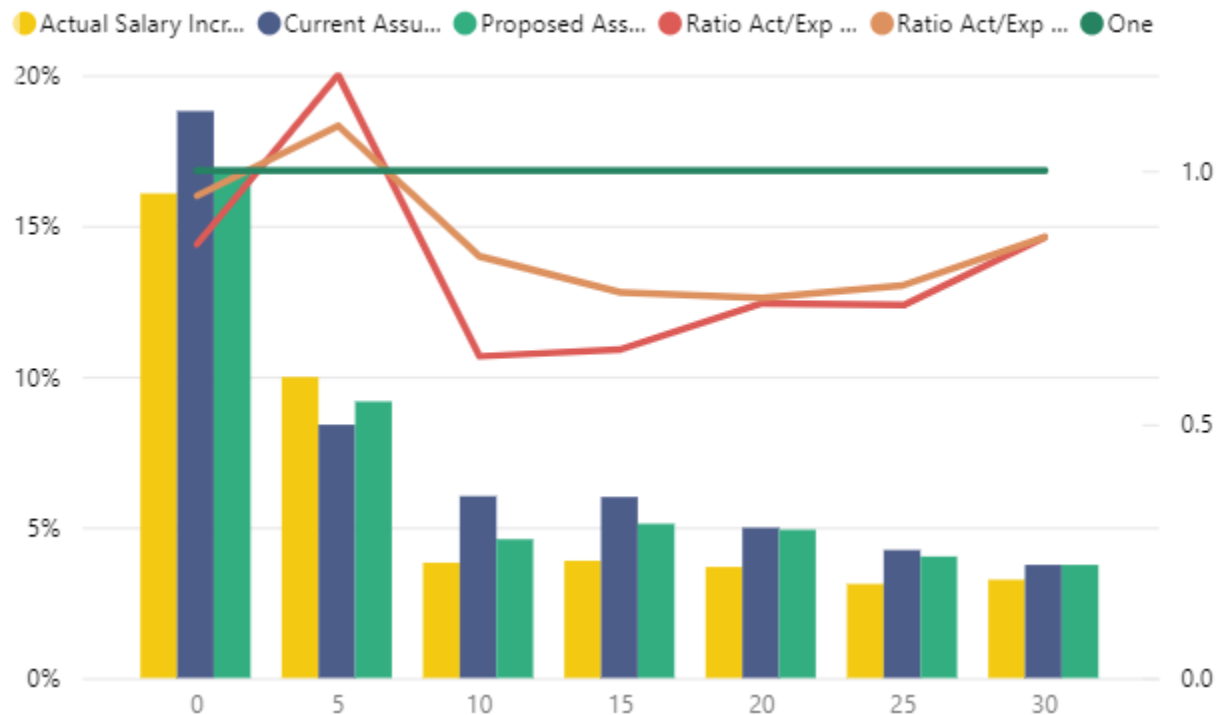
Service	Exposed	Base Salary	Actual Salary	Expected Salary	Actual Salary Increase	Current Assumption Salary Increase	Ratio Act/Exp Salary Increase
0	1,471	\$67.7M	\$71.1M	\$83.2M	5.16%	23.00%	0.22
1	3,469	\$157.8M	\$177.5M	\$181.5M	12.48%	15.00%	0.83
2	3,217	\$162.5M	\$183.2M	\$186.9M	12.73%	15.00%	0.85
3	2,961	\$167.0M	\$189.1M	\$192.0M	13.24%	15.00%	0.88
4	2,208	\$140.2M	\$185.9M	\$182.2M	32.62%	30.00%	1.09
5	1,426	\$114.3M	\$145.7M	\$136.0M	27.54%	19.00%	1.45
6	1,141	\$110.5M	\$116.6M	\$115.6M	5.55%	4.65%	1.19
7	863	\$77.1M	\$81.2M	\$80.8M	5.28%	4.80%	1.10
8	1,039	\$91.4M	\$97.1M	\$95.9M	6.22%	4.95%	1.26
9	1,635	\$151.5M	\$158.6M	\$162.2M	4.63%	7.05%	0.66
10	2,252	\$215.0M	\$225.0M	\$226.3M	4.68%	5.25%	0.89
11	2,734	\$269.5M	\$279.4M	\$284.0M	3.68%	5.40%	0.68
12	3,446	\$345.9M	\$358.7M	\$365.1M	3.72%	5.55%	0.67
13	3,688	\$376.9M	\$390.5M	\$398.4M	3.59%	5.70%	0.63
14	3,714	\$387.9M	\$402.5M	\$417.6M	3.76%	7.65%	0.49
15	3,317	\$352.2M	\$368.7M	\$373.4M	4.66%	6.00%	0.78
16	3,134	\$339.4M	\$351.3M	\$359.2M	3.51%	5.85%	0.60
17	3,015	\$331.5M	\$343.0M	\$350.4M	3.47%	5.70%	0.61
18	2,455	\$272.8M	\$282.8M	\$288.0M	3.66%	5.55%	0.66
19	2,052	\$230.5M	\$240.0M	\$247.1M	4.13%	7.20%	0.57
20	1,796	\$205.0M	\$214.1M	\$215.8M	4.43%	5.25%	0.84
21	1,674	\$196.8M	\$203.8M	\$206.9M	3.52%	5.10%	0.69
22	1,431	\$173.2M	\$179.5M	\$181.8M	3.62%	4.95%	0.73
23	1,191	\$147.4M	\$152.4M	\$154.4M	3.41%	4.80%	0.71
24	1,069	\$134.6M	\$138.9M	\$140.9M	3.16%	4.65%	0.68
25	1,062	\$135.4M	\$139.7M	\$141.5M	3.18%	4.50%	0.71
26	876	\$113.0M	\$117.1M	\$118.0M	3.61%	4.35%	0.83
27	717	\$95.1M	\$98.2M	\$99.1M	3.29%	4.20%	0.78
28	633	\$85.9M	\$88.3M	\$89.4M	2.80%	4.05%	0.69
29	546	\$76.0M	\$77.9M	\$79.0M	2.42%	3.90%	0.62
30	494	\$69.4M	\$72.3M	\$72.0M	4.11%	3.75%	1.10
31	370	\$52.2M	\$53.8M	\$54.2M	3.16%	3.75%	0.84
32	322	\$46.3M	\$47.7M	\$48.0M	3.13%	3.75%	0.84
33	298	\$43.9M	\$45.2M	\$45.5M	2.96%	3.75%	0.79
34	248	\$37.9M	\$38.7M	\$39.3M	2.34%	3.75%	0.62
Total	61,964	\$5,973.7M	\$6,315.5M	\$6,411.5M	5.72%	7.33%	0.78

Service	Exposed	Base Salary	Actual Salary	Expected Salary Proposed	Actual Salary Increase	Proposed Assumption Salary Increase	Act/Exp Proposed Salary Increase
0	1,471	\$67.7M	\$71.1M	\$79.8M	5.16%	18.00%	0.29
1	3,469	\$157.8M	\$177.5M	\$178.3M	12.48%	13.00%	0.96
2	3,217	\$162.5M	\$183.2M	\$183.6M	12.73%	13.00%	0.98
3	2,961	\$167.0M	\$189.1M	\$188.7M	13.24%	13.00%	1.02
4	2,208	\$140.2M	\$185.9M	\$182.2M	32.62%	30.00%	1.09
5	1,426	\$114.3M	\$145.7M	\$140.5M	27.54%	23.00%	1.20
6	1,141	\$110.5M	\$116.6M	\$116.5M	5.55%	5.50%	1.01
7	863	\$77.1M	\$81.2M	\$81.4M	5.28%	5.50%	0.96
8	1,039	\$91.4M	\$97.1M	\$96.4M	6.22%	5.50%	1.13
9	1,635	\$151.5M	\$158.6M	\$159.9M	4.63%	5.50%	0.84
10	2,252	\$215.0M	\$225.0M	\$226.3M	4.68%	5.25%	0.89
11	2,734	\$269.5M	\$279.4M	\$281.6M	3.68%	4.50%	0.82
12	3,446	\$345.9M	\$358.7M	\$361.4M	3.72%	4.50%	0.83
13	3,688	\$376.9M	\$390.5M	\$393.9M	3.59%	4.50%	0.80
14	3,714	\$387.9M	\$402.5M	\$405.4M	3.76%	4.50%	0.83
15	3,317	\$352.2M	\$368.7M	\$371.6M	4.66%	5.50%	0.85
16	3,134	\$339.4M	\$351.3M	\$356.3M	3.51%	5.00%	0.70
17	3,015	\$331.5M	\$343.0M	\$348.0M	3.47%	5.00%	0.69
18	2,455	\$272.8M	\$282.8M	\$286.5M	3.66%	5.00%	0.73
19	2,052	\$230.5M	\$240.0M	\$242.0M	4.13%	5.00%	0.83
20	1,796	\$205.0M	\$214.1M	\$216.3M	4.43%	5.50%	0.81
21	1,674	\$196.8M	\$203.8M	\$206.7M	3.52%	5.00%	0.70
22	1,431	\$173.2M	\$179.5M	\$181.6M	3.62%	4.80%	0.75
23	1,191	\$147.4M	\$152.4M	\$154.1M	3.41%	4.60%	0.74
24	1,069	\$134.6M	\$138.9M	\$140.6M	3.16%	4.40%	0.72
25	1,062	\$135.4M	\$139.7M	\$141.1M	3.18%	4.20%	0.76
26	876	\$113.0M	\$117.1M	\$117.7M	3.61%	4.10%	0.88
27	717	\$95.1M	\$98.2M	\$98.9M	3.29%	4.00%	0.82
28	633	\$85.9M	\$88.3M	\$89.3M	2.80%	3.90%	0.72
29	546	\$76.0M	\$77.9M	\$78.9M	2.42%	3.80%	0.64
30	494	\$69.4M	\$72.3M	\$72.0M	4.11%	3.75%	1.10
31	370	\$52.2M	\$53.8M	\$54.2M	3.16%	3.75%	0.84
32	322	\$46.3M	\$47.7M	\$48.0M	3.13%	3.75%	0.84
33	298	\$43.9M	\$45.2M	\$45.5M	2.96%	3.75%	0.79
34	248	\$37.9M	\$38.7M	\$39.3M	2.34%	3.75%	0.62
Total	61,964	\$5,973.7M	\$6,315.5M	\$6,364.5M	5.72%	6.54%	0.87

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service

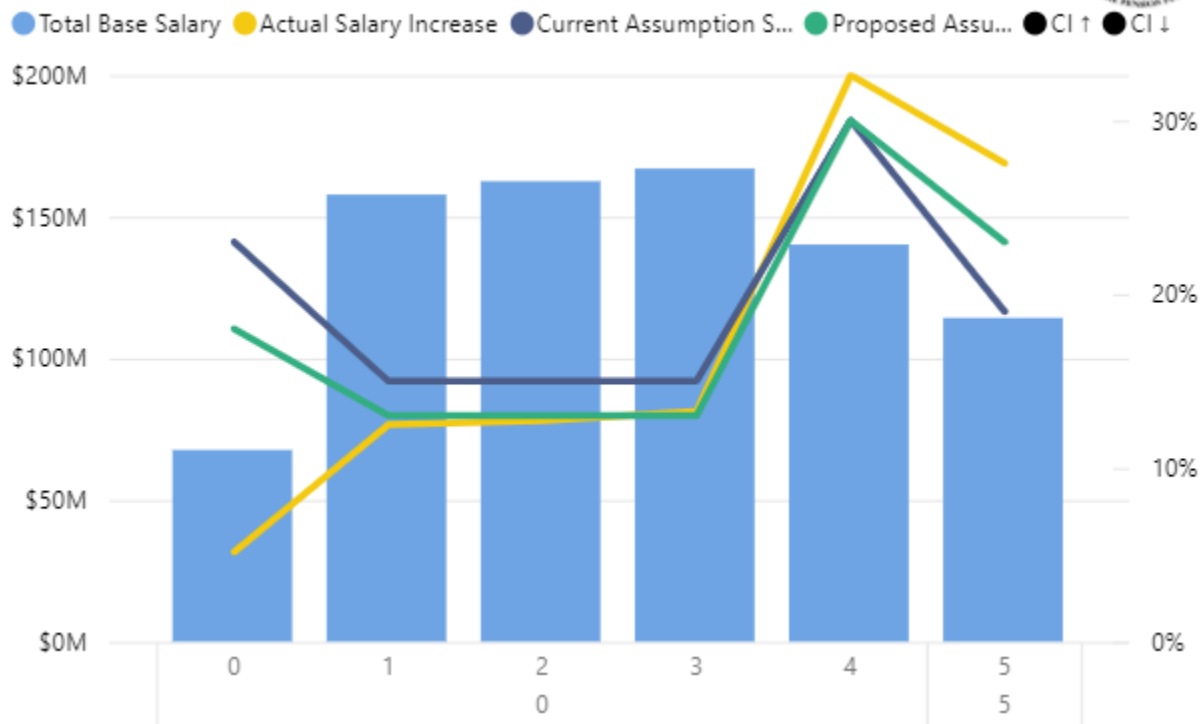


Salary Increase - Actual, Expected, and Ratio; by Service

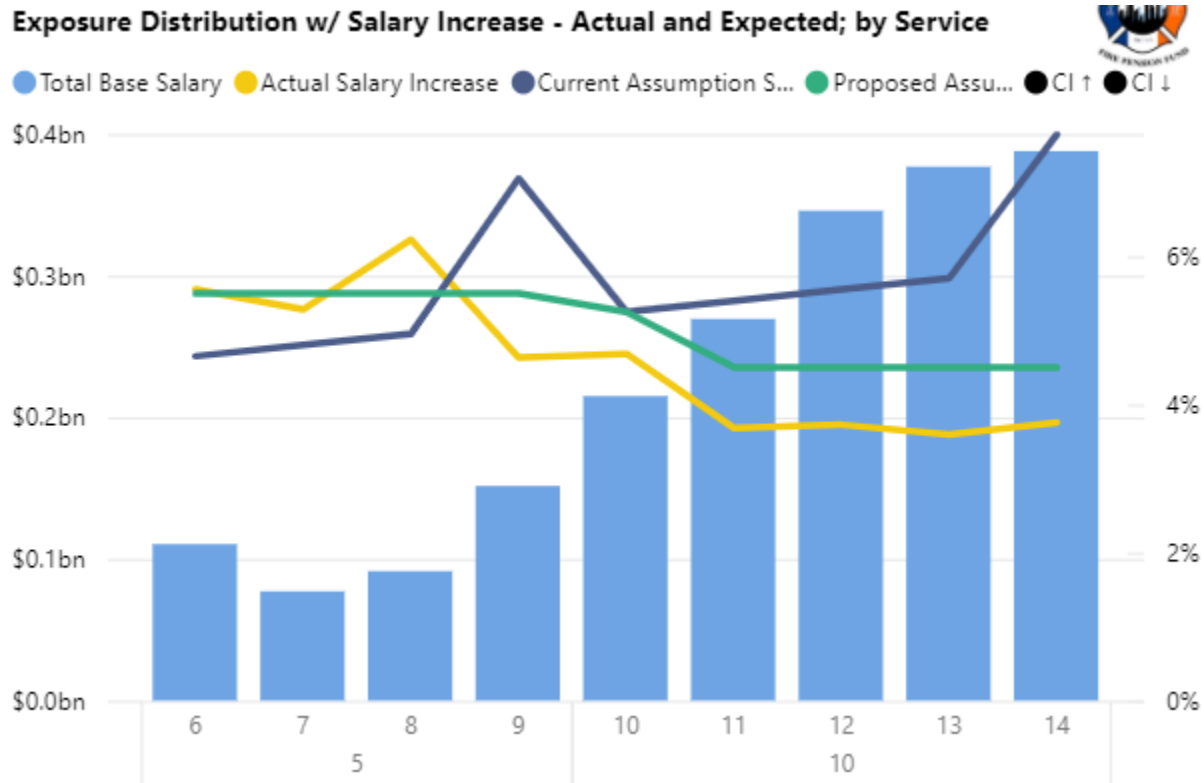


This chart shows the results by service for the service range 0 to 5 years, which decreased the assumed rate of salary increases from 18.83% to 17.77% as compared to the actual rate of 17.69%. This resulted in an increase in the A/E ratio from 0.94 to 1.00 for ages 22 to 59.

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service

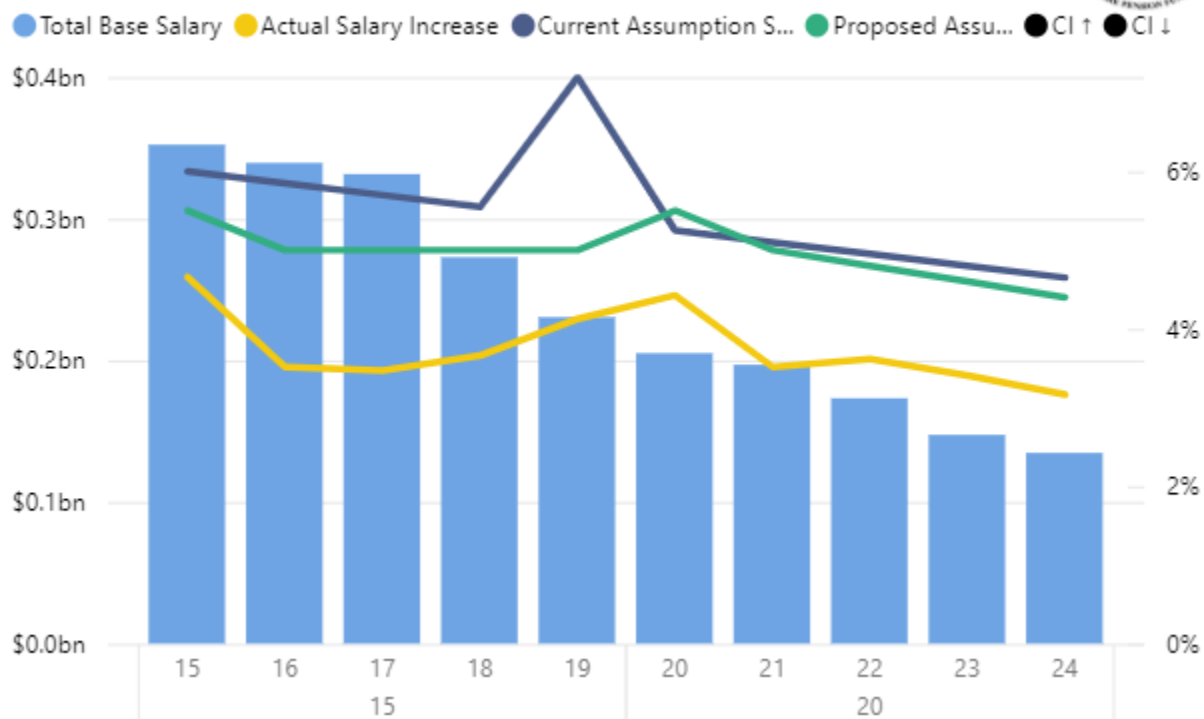


This chart shows the results by year for the service range 6 to 14 years, which decreased the assumed rate of salary increases from 5.94% to 4.79% as compared to the actual rate of 4.14%. This resulted in an increase in the A/E ratio from 0.70 to 0.86 for ages 22 to 59.



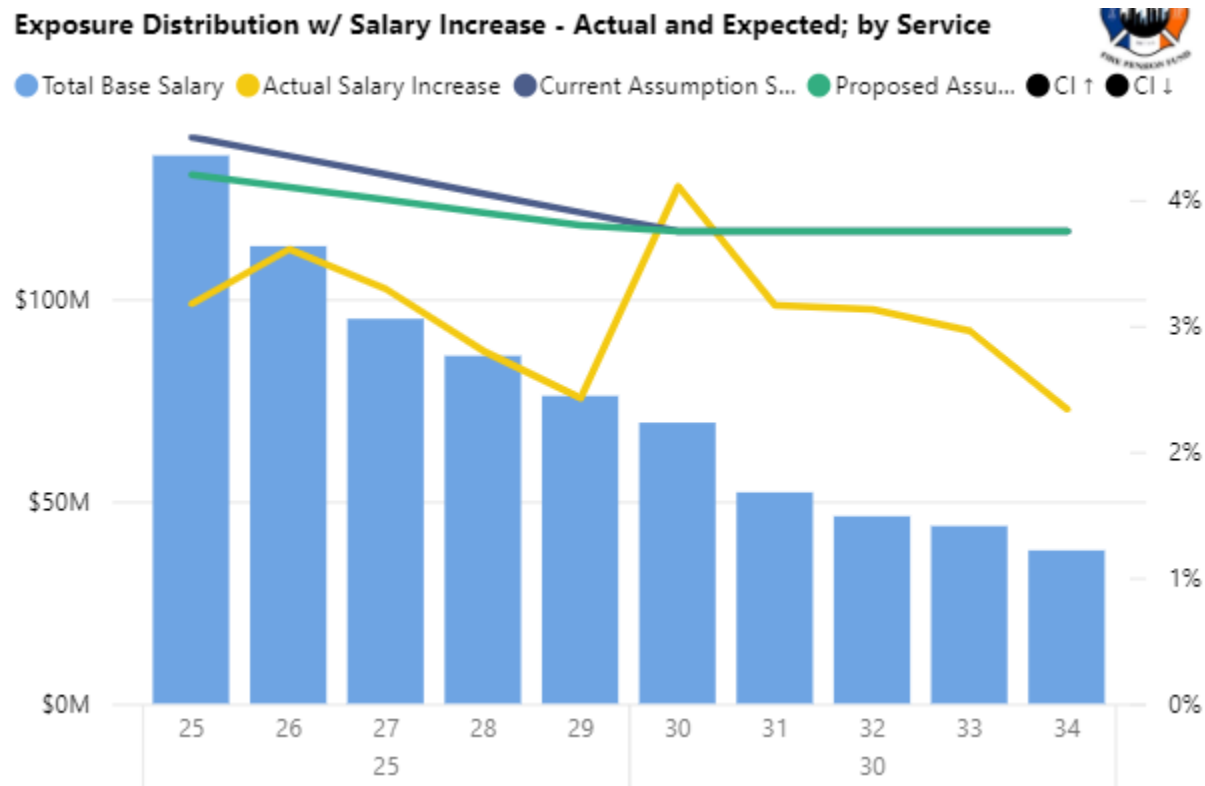
This chart shows the results by service for the service range 15 to 24 years, which decreased the assumed rate of salary increases from 5.64% to 5.04% as compared to the actual rate of 3.81%. This resulted in an increase in the A/E ratio from 0.68 to 0.76 for ages 22 to 59.

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service



This chart shows the results by service for the service range 25 to 34 years, which decreased the assumed rate of salary increases from 4.08% to 3.94% as compared to the actual rate of 3.16%. This resulted in an increase in the A/E ratio from 0.78 to 0.80 for ages 22 to 59.

Exposure Distribution w/ Salary Increase - Actual and Expected; by Service



Summary

In total, the proposed rates of salary increases are lower than the current assumptions. We would anticipate that this would decrease plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT ASSUMPTION ANNUAL RATES OF MERIT AND SALARY INCREASE		
Years of Service	Merit Increase	Salary Increase ¹
0	20.00%	23.00%
1	12.00%	15.00%
2	12.00%	15.00%
3	12.00%	15.00%
4	27.00%	30.00%
5	16.00%	19.00%
6	1.65%	4.65%
7	1.80%	4.80%
8	1.95%	4.95%
9	4.05%	7.05%
10	2.25%	5.25%
11	2.40%	5.40%
12	2.55%	5.55%
13	2.70%	5.70%
14	4.65%	7.65%
15	3.00%	6.00%
16	2.85%	5.85%
17	2.70%	5.70%
18	2.55%	5.55%
19	4.20%	7.20%
20	2.25%	5.25%
21	2.10%	5.10%
22	1.95%	4.95%
23	1.80%	4.80%
24	1.65%	4.65%
25	1.50%	4.50%
26	1.35%	4.35%
27	1.20%	4.20%
28	1.05%	4.05%
29	0.90%	3.90%
30+	0.75%	3.75%

¹ Salary increase is the general wage increase of 3% plus the merit increase

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED ASSUMPTION ANNUAL RATES OF MERIT AND SALARY INCREASE		
Years of Service	Merit Increase	Salary Increase ¹
0	15.00%	18.00%
1	10.00%	13.00%
2	10.00%	13.00%
3	10.00%	13.00%
4	27.00%	30.00%
5	20.00%	23.00%
6	2.50%	5.50%
7	2.50%	5.50%
8	2.50%	5.50%
9	2.50%	5.50%
10	2.25%	5.25%
11	1.50%	4.50%
12	1.50%	4.50%
13	1.50%	4.50%
14	1.50%	4.50%
15	2.50%	5.50%
16	2.00%	5.00%
17	2.00%	5.00%
18	2.00%	5.00%
19	2.00%	5.00%
20	2.50%	5.50%
21	2.00%	5.00%
22	1.80%	4.80%
23	1.60%	4.60%
24	1.40%	4.40%
25	1.20%	4.20%
26	1.10%	4.10%
27	1.00%	4.00%
28	0.90%	3.90%
29	0.80%	3.80%
30+	0.75%	3.75%

¹ Salary increase is the general wage increase of 3% plus the merit increase

Overtime

Overtime is considered pensionable earnings in determining a member's final average salary and benefit payable under the plan. OA applies a percentage increase to the member's base salary to account for assumed overtime. The percentage varies by years of service, tier, and whether the individual retires or becomes disabled within the next year.

The valuation data contains actual overtime earned during the prior year. For example, overtime contained in the 2019 data is for the year July 1, 2018 to June 30, 2019. We refer to this as 2019 overtime. The rate of overtime is defined as the amount of overtime for the year divided by the average of the member's base salary as of current year and the prior year. Therefore, 2019 overtime percentage is determined based on the average of the base salary as of July 1, 2018 and July 1, 2019.

The overtime percentage is only calculated for members with a status code of A in consecutive years. Members with a LOA status code are excluded.

Separate rates of overtime are applied if the member is expected to retire or become disabled in the following year. These are referred to as Dual Retirement or Dual Disability. We measured the rates of overtime in these situations for members who actually became disabled or retired the following year. For example, a dual overtime percentage applies in 2019 for a member who retired or became disabled in 2020. In the MEST, we developed codes S1 and D1 to identify these situations.

In addition, we also separately measured two years prior to a retirement or disability. For example, we reviewed whether or not the 2019 overtime percentage is higher than otherwise for members who retired in 2021 or lower than otherwise for members who became disabled in 2021. In the MEST, we developed codes S2 and D2 to identify these situations.

These measures allowed us to determine if there was a spike in the amount of overtime just at the time of retirement relative to baseline (all other years). In all situations, we did not find that overtime was higher two years prior for retirement or lower two years prior for disability. For purposes of this report, the experience for members two years prior to retirement or disability is included in the Baseline analysis.

For FIRE, we found that overtime one year prior for retirement was somewhat higher than for members of the same service who did not retire. Therefore, the proposed Dual Retirement assumption has been set to 10% higher than the proposed Baseline assumption. The Dual Retirement current assumption is approximately 25% - 30% higher than the current Baseline assumption.

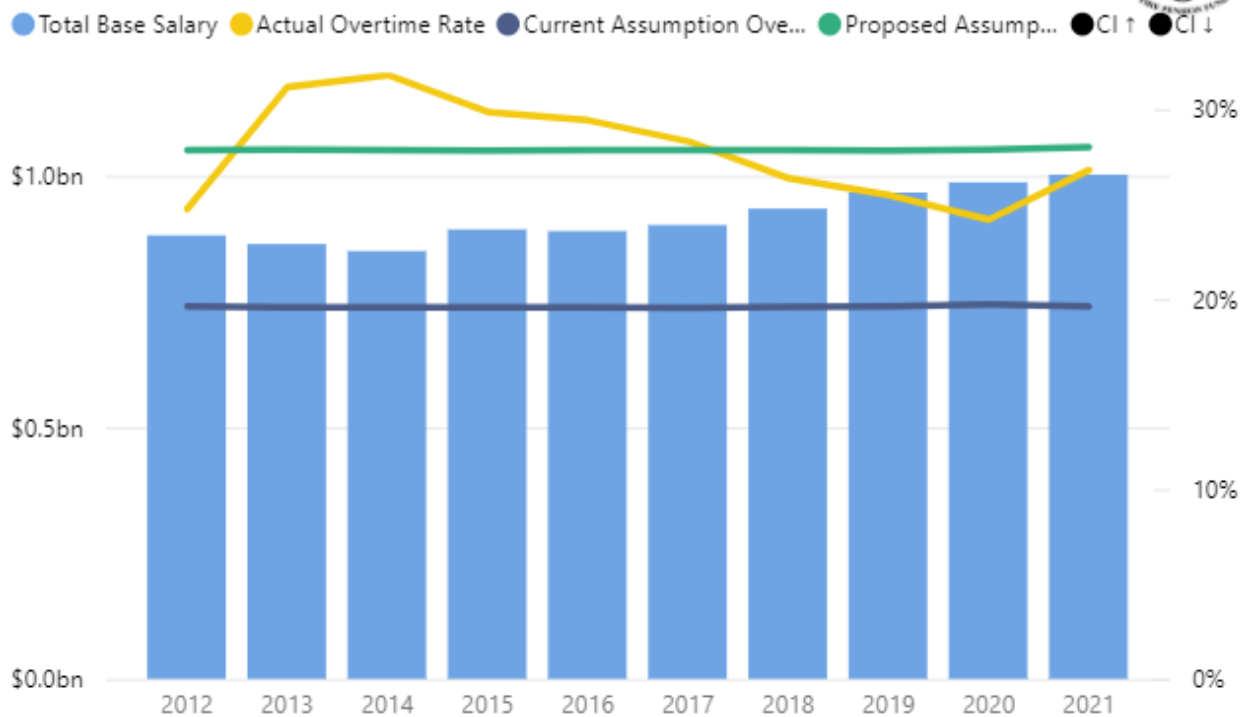
The proposed assumption varies by dual retirement and dual disability but does not vary by service. We also recommend applying the same assumptions for all tiers.

The following charts show the experience for overtime percentage by year, for the age range (20 to 64), and for the service range (0 to 39) from 2012 to 2021. The actual overtime percentage for all types of overtime averaged 27.70% whereas the overall expected overtime percentage averaged 19.60% based on the current assumptions and 27.86% based on the proposed assumptions.

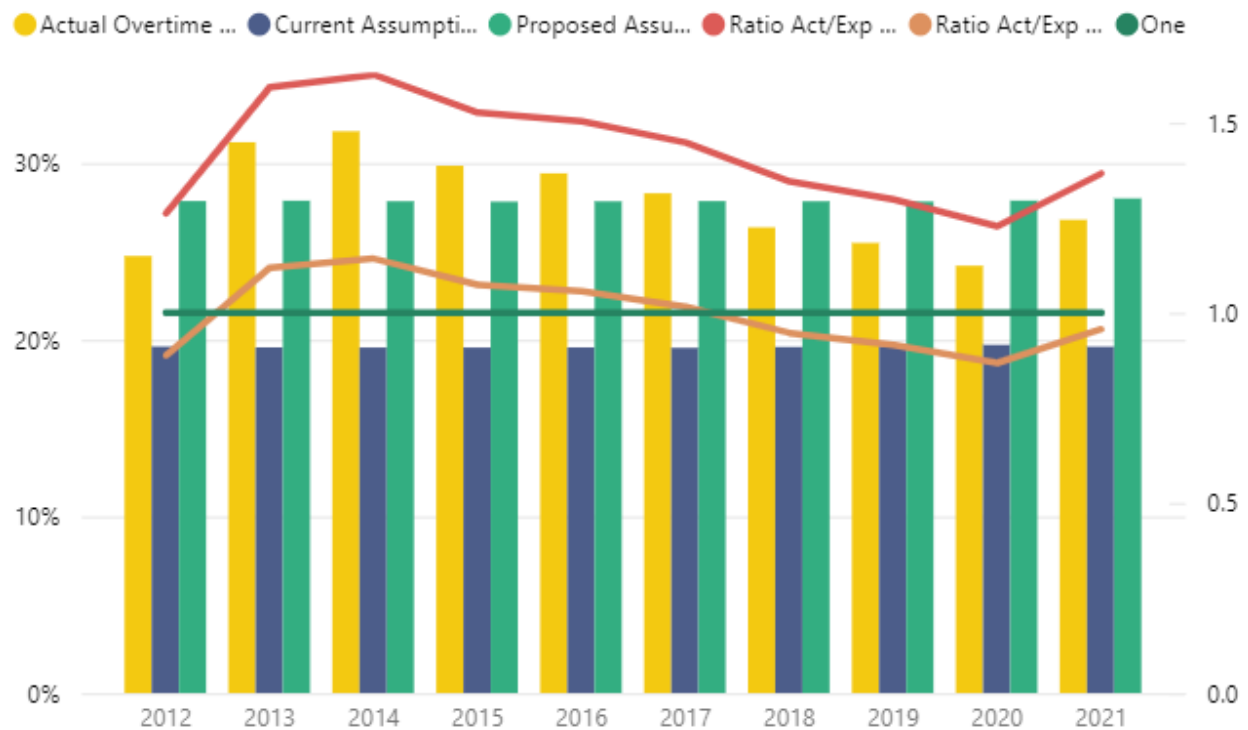
Plan Year	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
2012	9,827	\$892.2M	\$220.7M	\$175.0M	24.74%	19.61%	▲ 1.26
2013	9,449	\$874.6M	\$272.7M	\$171.1M	31.18%	19.57%	◆ 1.59
2014	9,177	\$877.1M	\$278.9M	\$171.6M	31.80%	19.56%	◆ 1.63
2015	9,446	\$903.9M	\$269.9M	\$176.8M	29.85%	19.56%	◆ 1.53
2016	9,585	\$904.8M	\$266.2M	\$177.0M	29.42%	19.56%	◆ 1.50
2017	9,751	\$923.6M	\$261.3M	\$180.5M	28.29%	19.54%	▲ 1.45
2018	10,165	\$964.6M	\$254.2M	\$189.0M	26.36%	19.59%	▲ 1.35
2019	10,285	\$996.1M	\$253.8M	\$195.5M	25.48%	19.63%	▲ 1.30
2020	10,270	\$1,013.7M	\$245.2M	\$199.8M	24.19%	19.71%	▲ 1.23
2021	10,125	\$1,043.0M	\$279.4M	\$204.5M	26.79%	19.61%	▲ 1.37
Total	98,080	\$9,393.7M	\$2,602.4M	\$1,840.8M	27.70%	19.60%	▲ 1.41

Plan Year	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
2012	9,827	\$892.2M	\$220.7M	\$248.5M	24.74%	27.85%	▲ 0.89
2013	9,449	\$874.6M	\$272.7M	\$243.8M	31.18%	27.87%	▲ 1.12
2014	9,177	\$877.1M	\$278.9M	\$244.2M	31.80%	27.84%	▲ 1.14
2015	9,446	\$903.9M	\$269.9M	\$251.5M	29.85%	27.82%	● 1.07
2016	9,585	\$904.8M	\$266.2M	\$251.9M	29.42%	27.83%	● 1.06
2017	9,751	\$923.6M	\$261.3M	\$257.2M	28.29%	27.85%	● 1.02
2018	10,165	\$964.6M	\$254.2M	\$268.5M	26.36%	27.84%	● 0.95
2019	10,285	\$996.1M	\$253.8M	\$277.2M	25.48%	27.82%	● 0.92
2020	10,270	\$1,013.7M	\$245.2M	\$282.6M	24.19%	27.88%	▲ 0.87
2021	10,125	\$1,043.0M	\$279.4M	\$292.0M	26.79%	28.00%	● 0.96
Total	98,080	\$9,393.7M	\$2,602.4M	\$2,617.3M	27.70%	27.86%	● 0.99

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Year



Overtime Assumption - Actual, Expected, and Ratio; by Year



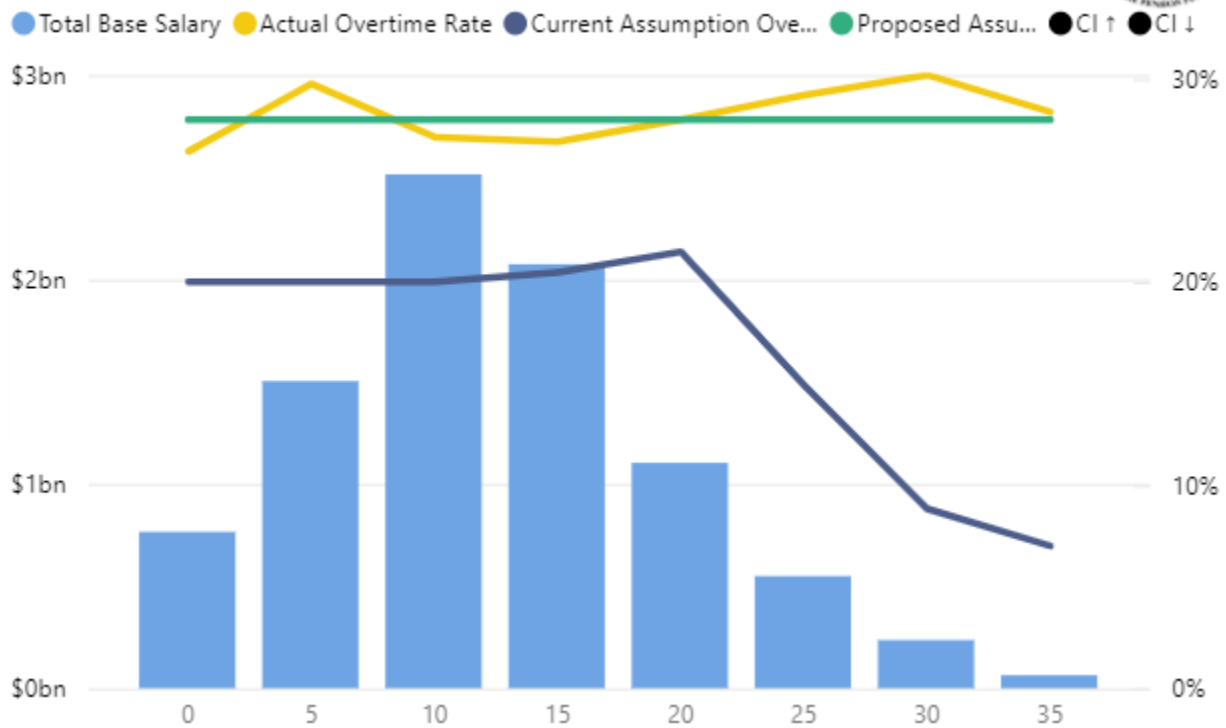
Baseline

The following charts show the experience for Baseline overtime percentage by service, for the age range (20 to 64), and for the service range (0 to 39) from 2012 to 2021. The actual Baseline overtime percentage averaged 27.79% whereas the overall expected overtime percentage averaged 19.60% based on the current assumptions and 28.00% based on the proposed assumptions. This resulted in a decrease in the A/E ratio from 1.42 to 0.99.

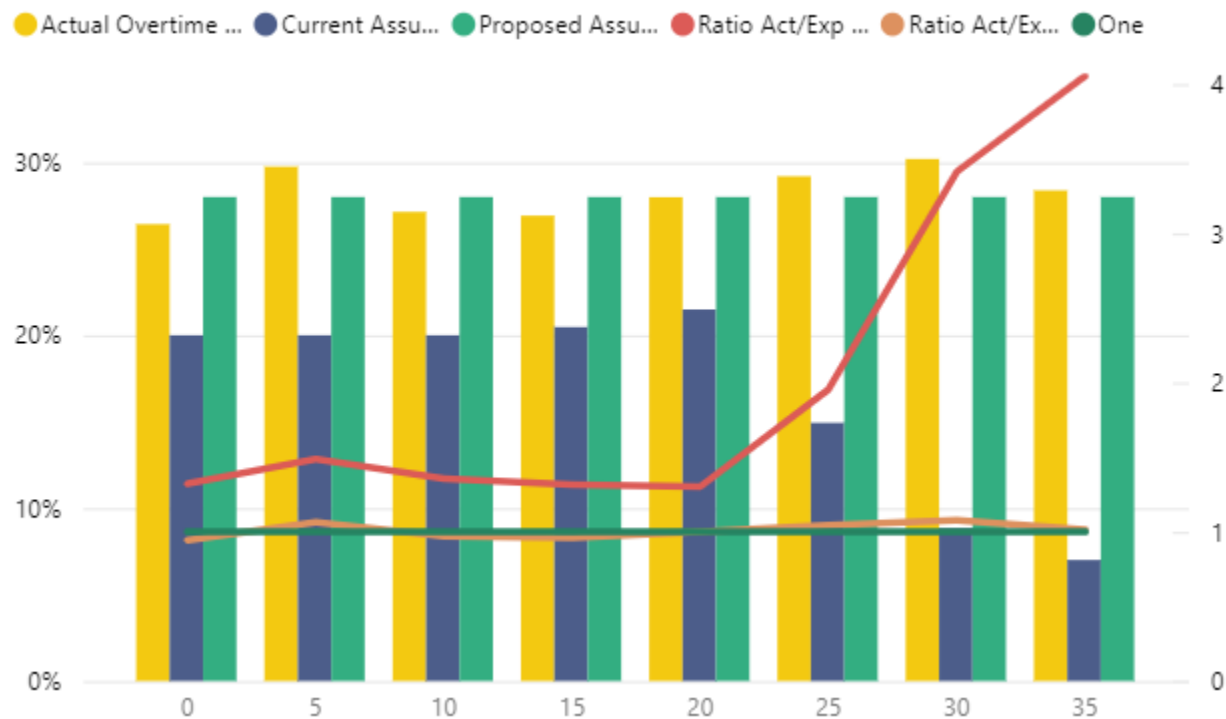
Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
0	1,287	\$58.8M	\$13.1M	\$11.8M	22.32%	20.00%	▲ 1.12
1	3,796	\$182.2M	\$51.5M	\$36.4M	28.27%	20.00%	▲ 1.41
2	3,211	\$172.0M	\$46.6M	\$34.4M	27.07%	20.00%	▲ 1.35
3	3,368	\$199.0M	\$53.3M	\$39.8M	26.78%	20.00%	▲ 1.34
4	3,091	\$218.1M	\$54.9M	\$43.6M	25.18%	20.00%	▲ 1.26
5	2,965	\$251.1M	\$76.4M	\$50.2M	30.43%	20.00%	◆ 1.52
6	3,260	\$296.7M	\$88.3M	\$59.3M	29.78%	20.00%	▲ 1.49
7	3,132	\$278.0M	\$83.0M	\$55.6M	29.86%	20.00%	▲ 1.49
8	3,718	\$331.8M	\$97.5M	\$66.4M	29.38%	20.00%	▲ 1.47
9	4,284	\$392.7M	\$116.0M	\$78.5M	29.55%	20.00%	▲ 1.48
10	4,783	\$451.0M	\$127.6M	\$90.2M	28.29%	20.00%	▲ 1.41
11	5,048	\$489.4M	\$134.7M	\$97.9M	27.53%	20.00%	▲ 1.38
12	5,373	\$533.5M	\$143.9M	\$106.7M	26.97%	20.00%	▲ 1.35
13	5,390	\$544.8M	\$144.4M	\$109.0M	26.50%	20.00%	▲ 1.33
14	5,212	\$538.0M	\$143.2M	\$107.6M	26.61%	20.00%	▲ 1.33
15	4,716	\$496.9M	\$132.4M	\$99.4M	26.64%	20.00%	▲ 1.33
16	4,441	\$474.7M	\$125.5M	\$94.9M	26.44%	20.00%	▲ 1.32
17	4,140	\$448.3M	\$120.2M	\$89.7M	26.81%	20.00%	▲ 1.34
18	3,464	\$377.6M	\$103.6M	\$79.3M	27.43%	21.00%	▲ 1.31
19	2,828	\$312.3M	\$86.4M	\$68.7M	27.66%	22.00%	▲ 1.26
20	2,406	\$269.5M	\$73.9M	\$64.7M	27.41%	24.00%	▲ 1.14
21	2,326	\$263.7M	\$72.9M	\$58.0M	27.65%	22.00%	▲ 1.26
22	2,013	\$229.8M	\$65.1M	\$48.3M	28.31%	21.00%	▲ 1.35
23	1,658	\$190.5M	\$54.4M	\$38.1M	28.54%	20.00%	▲ 1.43
24	1,438	\$166.1M	\$47.2M	\$31.6M	28.42%	19.00%	▲ 1.50
25	1,211	\$140.8M	\$41.2M	\$23.9M	29.26%	17.00%	◆ 1.72
26	1,075	\$125.4M	\$35.9M	\$20.1M	28.63%	16.00%	◆ 1.79
27	932	\$109.0M	\$31.8M	\$16.4M	29.12%	15.00%	◆ 1.94
28	831	\$97.5M	\$29.0M	\$12.7M	29.76%	13.00%	◆ 2.29
29	703	\$82.8M	\$24.3M	\$9.9M	29.42%	12.00%	◆ 2.45
30	618	\$72.9M	\$21.6M	\$8.0M	29.65%	11.00%	◆ 2.70
31	437	\$51.6M	\$15.8M	\$4.6M	30.55%	9.00%	◆ 3.39
32	384	\$45.6M	\$13.9M	\$3.6M	30.54%	8.00%	◆ 3.82
33	321	\$38.6M	\$11.8M	\$2.7M	30.61%	7.00%	◆ 4.37
34	246	\$29.8M	\$8.9M	\$2.1M	29.91%	7.00%	◆ 4.27
35	189	\$23.2M	\$7.0M	\$1.6M	30.23%	7.00%	◆ 4.32
36	131	\$16.1M	\$4.6M	\$1.1M	28.36%	7.00%	◆ 4.05
37	88	\$10.9M	\$3.0M	\$0.8M	27.24%	7.00%	◆ 3.89
38	73	\$9.2M	\$2.4M	\$0.6M	26.38%	7.00%	◆ 3.77
39	41	\$5.1M	\$1.3M	\$0.4M	26.06%	7.00%	◆ 3.72
Total	94,628	\$9,025.0M	\$2,508.4M	\$1,768.6M	27.79%	19.60%	▲ 1.42

Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
0	1,287	\$58.8M	\$13.1M	\$16.5M	22.32%	28.00%	▲ 0.80
1	3,796	\$182.2M	\$51.5M	\$51.0M	28.27%	28.00%	● 1.01
2	3,211	\$172.0M	\$46.6M	\$48.2M	27.07%	28.00%	● 0.97
3	3,368	\$199.0M	\$53.3M	\$55.7M	26.78%	28.00%	● 0.96
4	3,091	\$218.1M	\$54.9M	\$61.1M	25.18%	28.00%	▲ 0.90
5	2,965	\$251.1M	\$76.4M	\$70.3M	30.43%	28.00%	● 1.09
6	3,260	\$296.7M	\$88.3M	\$83.1M	29.78%	28.00%	● 1.06
7	3,132	\$278.0M	\$83.0M	\$77.9M	29.86%	28.00%	● 1.07
8	3,718	\$331.8M	\$97.5M	\$92.9M	29.38%	28.00%	● 1.05
9	4,284	\$392.7M	\$116.0M	\$109.9M	29.55%	28.00%	● 1.06
10	4,783	\$451.0M	\$127.6M	\$126.3M	28.29%	28.00%	● 1.01
11	5,048	\$489.4M	\$134.7M	\$137.0M	27.53%	28.00%	● 0.98
12	5,373	\$533.5M	\$143.9M	\$149.4M	26.97%	28.00%	● 0.96
13	5,390	\$544.8M	\$144.4M	\$152.5M	26.50%	28.00%	● 0.95
14	5,212	\$538.0M	\$143.2M	\$150.6M	26.61%	28.00%	● 0.95
15	4,716	\$496.9M	\$132.4M	\$139.1M	26.64%	28.00%	● 0.95
16	4,441	\$474.7M	\$125.5M	\$132.9M	26.44%	28.00%	● 0.94
17	4,140	\$448.3M	\$120.2M	\$125.5M	26.81%	28.00%	● 0.96
18	3,464	\$377.6M	\$103.6M	\$105.7M	27.43%	28.00%	● 0.98
19	2,828	\$312.3M	\$86.4M	\$87.4M	27.66%	28.00%	● 0.99
20	2,406	\$269.5M	\$73.9M	\$75.5M	27.41%	28.00%	● 0.98
21	2,326	\$263.7M	\$72.9M	\$73.8M	27.65%	28.00%	● 0.99
22	2,013	\$229.8M	\$65.1M	\$64.4M	28.31%	28.00%	● 1.01
23	1,658	\$190.5M	\$54.4M	\$53.3M	28.54%	28.00%	● 1.02
24	1,438	\$166.1M	\$47.2M	\$46.5M	28.42%	28.00%	● 1.02
25	1,211	\$140.8M	\$41.2M	\$39.4M	29.26%	28.00%	● 1.05
26	1,075	\$125.4M	\$35.9M	\$35.1M	28.63%	28.00%	● 1.02
27	932	\$109.0M	\$31.8M	\$30.5M	29.12%	28.00%	● 1.04
28	831	\$97.5M	\$29.0M	\$27.3M	29.76%	28.00%	● 1.06
29	703	\$82.8M	\$24.3M	\$23.2M	29.42%	28.00%	● 1.05
30	618	\$72.9M	\$21.6M	\$20.4M	29.65%	28.00%	● 1.06
31	437	\$51.6M	\$15.8M	\$14.4M	30.55%	28.00%	● 1.09
32	384	\$45.6M	\$13.9M	\$12.8M	30.54%	28.00%	● 1.09
33	321	\$38.6M	\$11.8M	\$10.8M	30.61%	28.00%	● 1.09
34	246	\$29.8M	\$8.9M	\$8.3M	29.91%	28.00%	● 1.07
35	189	\$23.2M	\$7.0M	\$6.5M	30.23%	28.00%	● 1.08
36	131	\$16.1M	\$4.6M	\$4.5M	28.36%	28.00%	● 1.01
37	88	\$10.9M	\$3.0M	\$3.0M	27.24%	28.00%	● 0.97
38	73	\$9.2M	\$2.4M	\$2.6M	26.38%	28.00%	● 0.94
39	41	\$5.1M	\$1.3M	\$1.4M	26.06%	28.00%	● 0.93
Total	94,628	\$9,025.0M	\$2,508.4M	\$2,527.0M	27.79%	28.00%	● 0.99

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Service

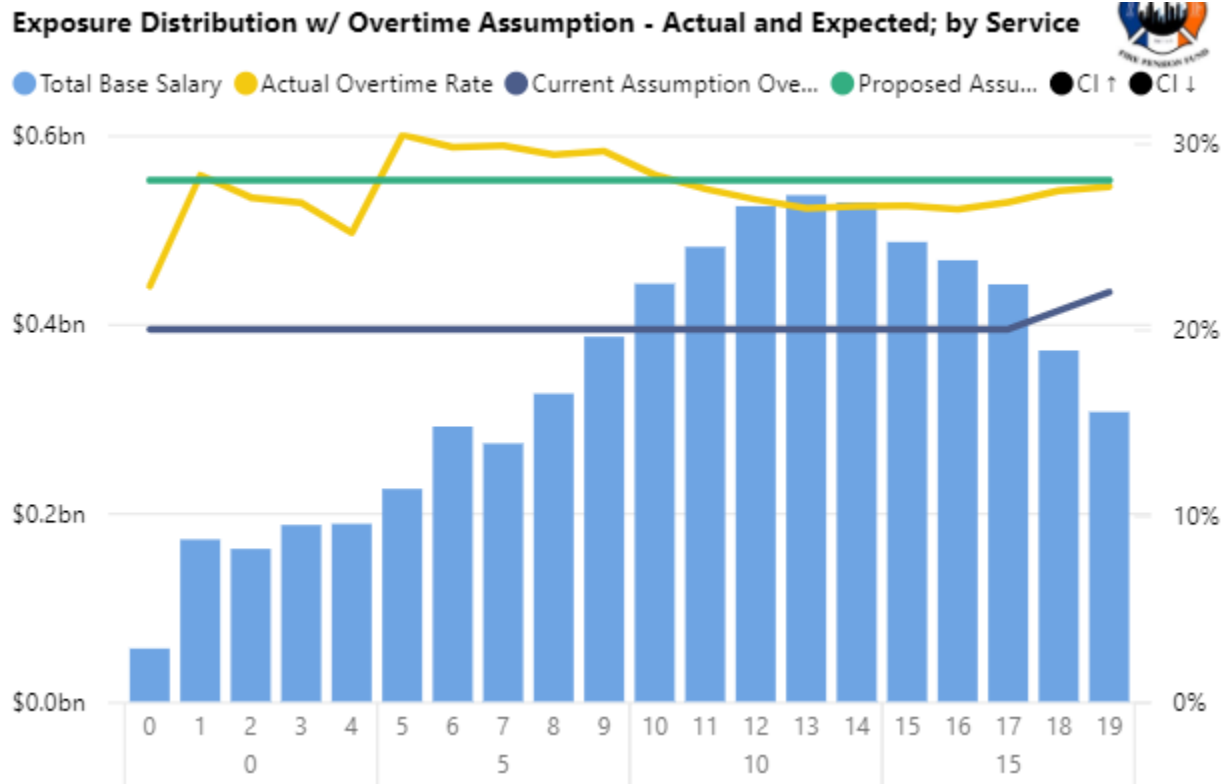


Overtime Assumption - Actual, Expected, and Ratio; by Service

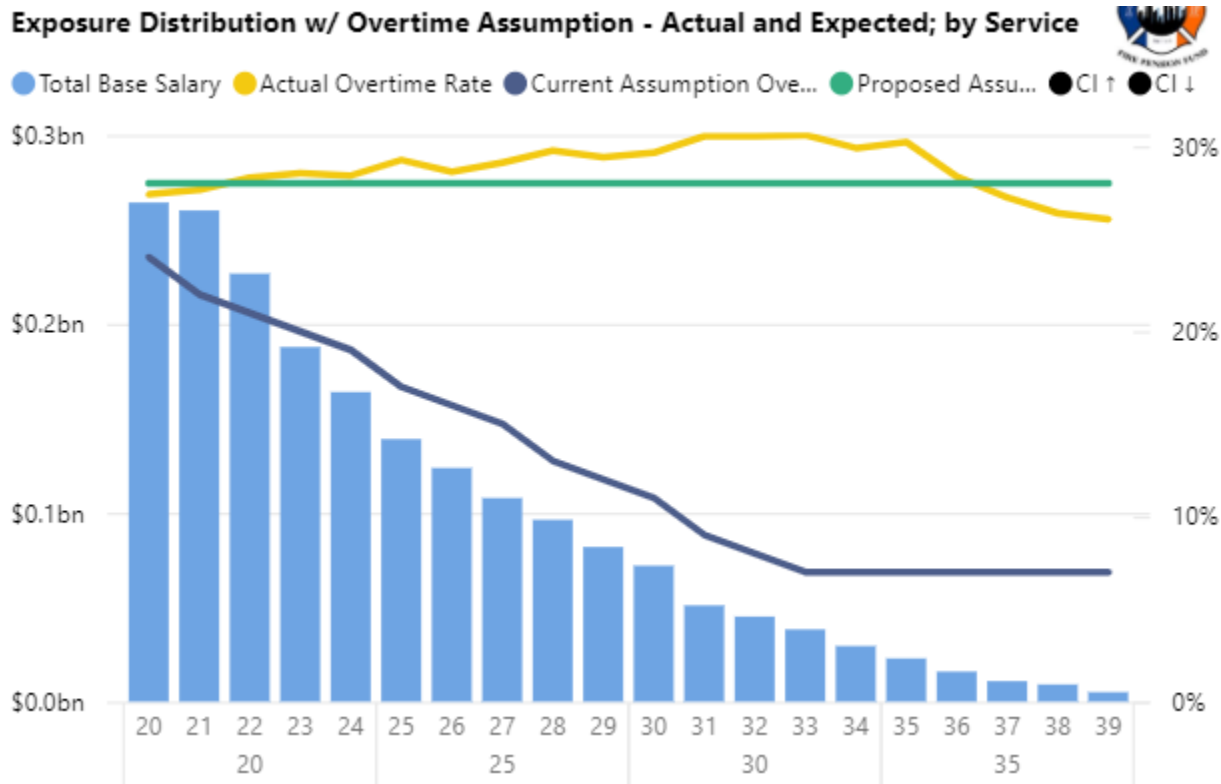


The current assumption did not vary by service until late in a member's career and then began to decrease at 22 years of service. While the actual experience showed the overtime percentage did not vary by service, it did show that it was not lower for those with more years of service. The proposed assumption of 28.00% does not vary by service.

This chart shows the experience for Baseline overtime percentage by service for the service range 0 to 19 years, where the assumed overtime percentage increased from 20.14% to 28.00% as compared to the actual rate of 27.56%. This resulted in a decrease in the A/E ratio from 1.37 to 0.98 for ages 20 to 64.



This chart shows the experience for Baseline overtime percentage by service for the service range 20 to 39 years, where the assumed overtime percentage increased from 17.65% to 28.00% as compared to the actual rate of 28.61%. This resulted in a decrease in the A/E ratio from 1.62 to 1.02 for ages 40 to 64.



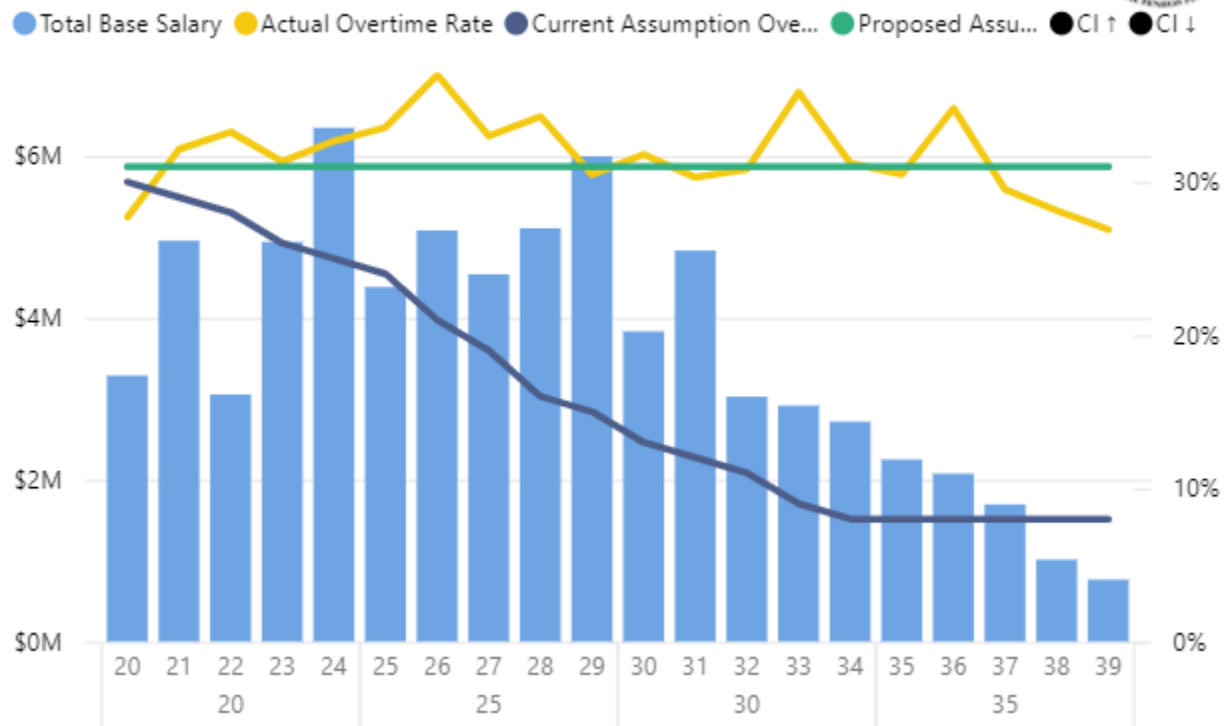
Dual Retirement

The following charts show the experience for Dual Retirement overtime percentage by service, for the age range (40 to 64), and for the service range (20 to 39) from 2012 to 2020. The actual Dual Retirement overtime percentage averaged 32.24% as compared to Baseline overtime percentage of 28.61%. This is approximately 12% higher and we propose a Dual Retirement assumption that is 10% higher than the proposed Baseline assumption. This resulted in a decrease in the A/E ratio from 1.76 to 1.04.

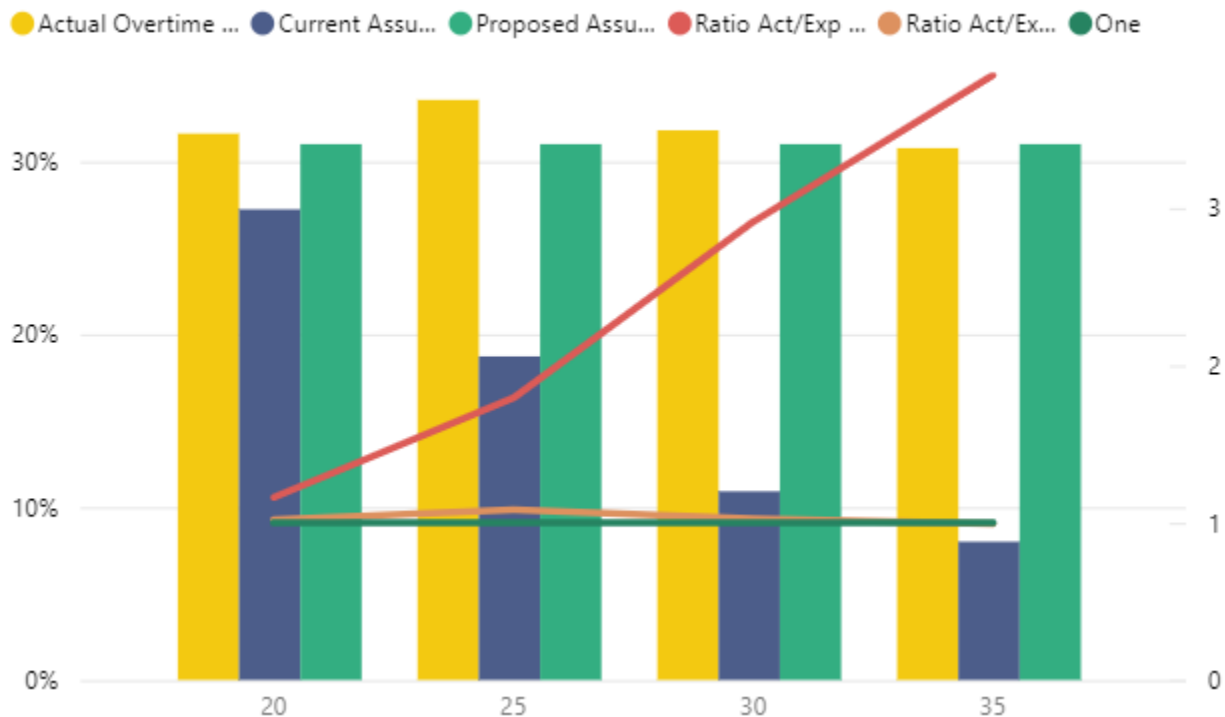
Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
20	31	\$3.3M	\$0.9M	\$1.0M	27.70%	30.00%	0.92
21	47	\$5.0M	\$1.6M	\$1.4M	32.13%	29.00%	1.11
22	29	\$3.1M	\$1.0M	\$0.9M	33.26%	28.00%	1.19
23	45	\$5.0M	\$1.6M	\$1.3M	31.32%	26.00%	1.20
24	59	\$6.4M	\$2.1M	\$1.6M	32.66%	25.00%	1.31
25	41	\$4.4M	\$1.5M	\$1.1M	33.56%	24.00%	1.40
26	46	\$5.2M	\$1.9M	\$1.1M	36.98%	21.00%	1.76
27	44	\$4.6M	\$1.5M	\$0.9M	32.99%	19.00%	1.74
28	47	\$5.1M	\$1.8M	\$0.8M	34.27%	16.00%	2.14
29	54	\$6.0M	\$1.8M	\$0.9M	30.47%	15.00%	2.03
30	35	\$3.9M	\$1.2M	\$0.5M	31.80%	13.00%	2.45
31	44	\$4.9M	\$1.5M	\$0.6M	30.30%	12.00%	2.52
32	28	\$3.1M	\$0.9M	\$0.3M	30.82%	11.00%	2.80
33	27	\$2.9M	\$1.1M	\$0.3M	35.86%	9.00%	3.98
34	23	\$2.8M	\$0.9M	\$0.2M	31.22%	8.00%	3.90
35	19	\$2.3M	\$0.7M	\$0.2M	30.51%	8.00%	3.81
36	16	\$2.1M	\$0.7M	\$0.2M	34.81%	8.00%	4.35
37	15	\$1.7M	\$0.5M	\$0.1M	29.49%	8.00%	3.69
38	9	\$1.0M	\$0.3M	\$0.1M	28.13%	8.00%	3.52
39	6	\$0.8M	\$0.2M	\$0.1M	26.89%	8.00%	3.36
Total	665	\$73.6M	\$23.7M	\$13.5M	32.24%	18.36%	1.76

Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
20	31	\$3.3M	\$0.9M	\$1.0M	27.70%	31.00%	▲ 0.89
21	47	\$5.0M	\$1.6M	\$1.5M	32.13%	31.00%	● 1.04
22	29	\$3.1M	\$1.0M	\$1.0M	33.26%	31.00%	● 1.07
23	45	\$5.0M	\$1.6M	\$1.6M	31.32%	31.00%	● 1.01
24	59	\$6.4M	\$2.1M	\$2.0M	32.66%	31.00%	● 1.05
25	41	\$4.4M	\$1.5M	\$1.4M	33.56%	31.00%	● 1.08
26	46	\$5.2M	\$1.9M	\$1.6M	36.98%	31.00%	▲ 1.19
27	44	\$4.6M	\$1.5M	\$1.4M	32.99%	31.00%	● 1.06
28	47	\$5.1M	\$1.8M	\$1.6M	34.27%	31.00%	▲ 1.11
29	54	\$6.0M	\$1.8M	\$1.9M	30.47%	31.00%	● 0.98
30	35	\$3.9M	\$1.2M	\$1.2M	31.80%	31.00%	● 1.03
31	44	\$4.9M	\$1.5M	\$1.5M	30.30%	31.00%	● 0.98
32	28	\$3.1M	\$0.9M	\$0.9M	30.82%	31.00%	● 0.99
33	27	\$2.9M	\$1.1M	\$0.9M	35.86%	31.00%	▲ 1.16
34	23	\$2.8M	\$0.9M	\$0.9M	31.22%	31.00%	● 1.01
35	19	\$2.3M	\$0.7M	\$0.7M	30.51%	31.00%	● 0.98
36	16	\$2.1M	\$0.7M	\$0.7M	34.81%	31.00%	▲ 1.12
37	15	\$1.7M	\$0.5M	\$0.5M	29.49%	31.00%	● 0.95
38	9	\$1.0M	\$0.3M	\$0.3M	28.13%	31.00%	● 0.91
39	6	\$0.8M	\$0.2M	\$0.2M	26.89%	31.00%	▲ 0.87
Total	665	\$73.6M	\$23.7M	\$22.8M	32.24%	31.00%	● 1.04

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Service



Overtime Assumption - Actual, Expected, and Ratio; by Service



Dual Disability

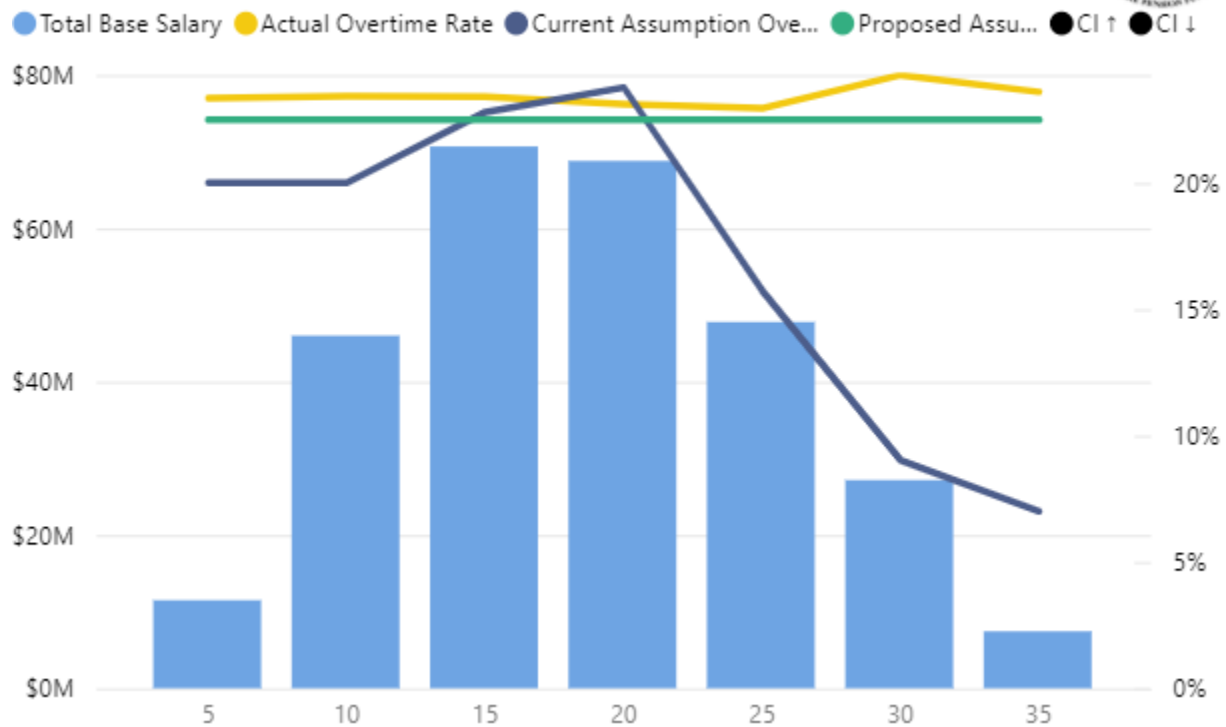
The current assumption varied by service increasing beginning at 16 years of service but then declining beginning at 21 years of service. Similar to Baseline, the actual Dual Disability experience showed the overtime percentage did not vary by service. The proposed assumption is set to 80% of the proposed Baseline percentage.

The following charts show the experience for Dual Disability overtime percentage by service, for the age range (20 to 64), and for the service range (5 to 39) from 2012 to 2020. The actual Dual Disability overtime percentage averaged 23.35% whereas the overall expected overtime percentage averaged 19.50% based on the current assumptions and 22.50% based on the proposed assumptions. This resulted in a decrease in the A/E ratio from 1.20 to 1.04.

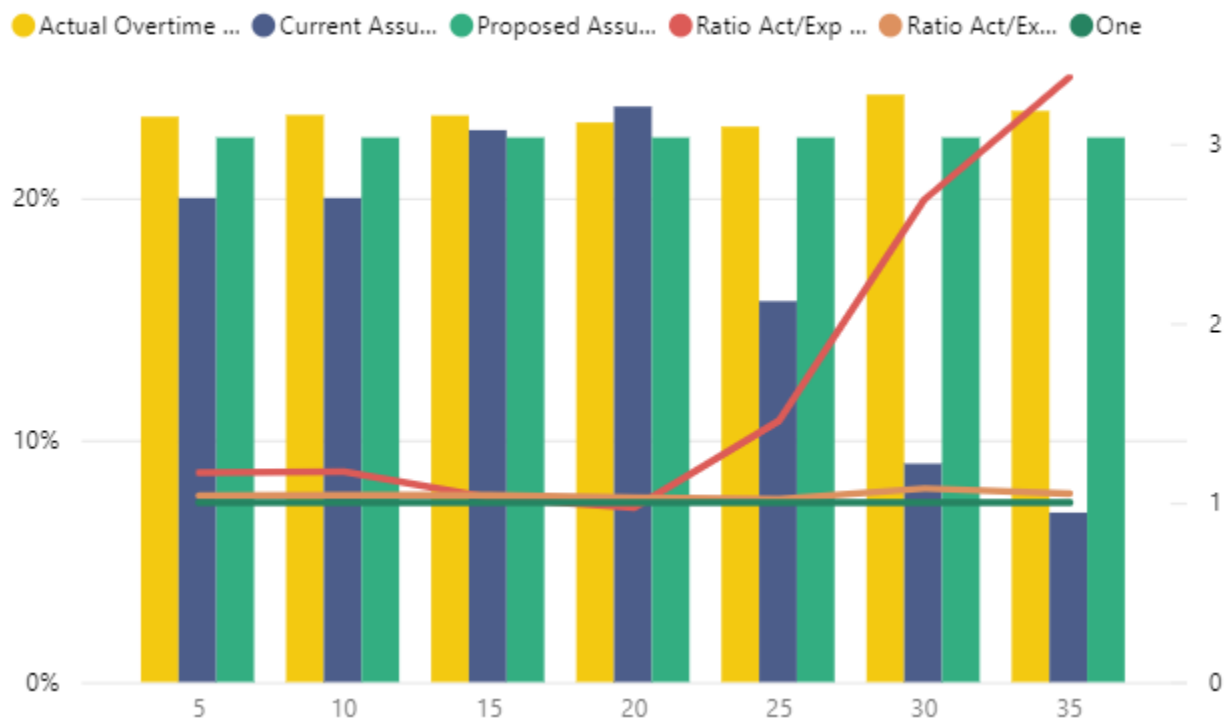
Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime	Actual Overtime Rate	Current Assumption Overtime Rate	Ratio Act/Exp Overtime Rate
5	6	\$0.5M	\$0.1M	\$0.1M	24.92%	20.00%	▲ 1.25
6	9	\$0.8M	\$0.2M	\$0.2M	22.91%	20.00%	▲ 1.15
7	16	\$1.4M	\$0.3M	\$0.3M	23.61%	20.00%	▲ 1.18
8	44	\$4.0M	\$0.8M	\$0.8M	20.57%	20.00%	● 1.03
9	54	\$4.9M	\$1.3M	\$1.0M	25.47%	20.00%	▲ 1.27
10	61	\$5.8M	\$1.3M	\$1.2M	21.77%	20.00%	● 1.09
11	76	\$7.2M	\$1.6M	\$1.4M	22.56%	20.00%	▲ 1.13
12	108	\$10.4M	\$2.4M	\$2.1M	23.16%	20.00%	▲ 1.16
13	128	\$12.5M	\$3.0M	\$2.5M	24.30%	20.00%	▲ 1.22
14	109	\$10.8M	\$2.6M	\$2.2M	24.15%	20.00%	▲ 1.21
15	122	\$12.3M	\$2.7M	\$2.5M	22.07%	20.00%	▲ 1.10
16	109	\$11.3M	\$2.7M	\$2.4M	23.64%	21.00%	▲ 1.13
17	118	\$12.3M	\$2.7M	\$2.7M	22.23%	22.00%	● 1.01
18	132	\$13.7M	\$3.2M	\$3.3M	23.51%	24.00%	● 0.98
19	213	\$22.0M	\$5.4M	\$5.5M	24.64%	25.00%	● 0.99
20	160	\$17.2M	\$3.7M	\$4.5M	21.29%	26.00%	▲ 0.82
21	142	\$15.4M	\$3.4M	\$3.8M	22.18%	25.00%	▲ 0.89
22	98	\$10.7M	\$2.5M	\$2.6M	23.54%	24.00%	● 0.98
23	124	\$13.8M	\$3.5M	\$3.0M	25.29%	22.00%	▲ 1.15
24	114	\$12.5M	\$3.0M	\$2.6M	24.03%	21.00%	▲ 1.14
25	104	\$11.9M	\$2.4M	\$2.4M	20.43%	20.00%	● 1.02
26	89	\$10.0M	\$2.7M	\$1.7M	26.96%	17.00%	◆ 1.59
27	81	\$8.9M	\$1.9M	\$1.3M	21.77%	15.00%	▲ 1.45
28	75	\$8.4M	\$1.9M	\$1.1M	22.37%	13.00%	◆ 1.72
29	81	\$9.0M	\$2.1M	\$1.1M	23.48%	12.00%	◆ 1.96
30	71	\$8.1M	\$2.0M	\$0.9M	25.01%	11.00%	◆ 2.27
31	52	\$6.1M	\$1.5M	\$0.6M	24.09%	10.00%	◆ 2.41
32	40	\$4.7M	\$1.2M	\$0.4M	25.65%	8.00%	◆ 3.21
33	32	\$3.9M	\$1.0M	\$0.3M	25.10%	7.00%	◆ 3.59
34	38	\$4.6M	\$1.0M	\$0.3M	21.12%	7.00%	◆ 3.02
35	20	\$2.5M	\$0.6M	\$0.2M	22.79%	7.00%	◆ 3.26
36	18	\$2.3M	\$0.5M	\$0.2M	20.33%	7.00%	◆ 2.90
37	12	\$1.5M	\$0.4M	\$0.1M	27.52%	7.00%	◆ 3.93
38	5	\$0.6M	\$0.2M	\$0.0M	35.02%	7.00%	◆ 5.00
39	5	\$0.7M	\$0.1M	\$0.0M	18.49%	7.00%	◆ 2.64
Total	2,666	\$282.4M	\$65.9M	\$55.1M	23.35%	19.50%	▲ 1.20

Service	Exposed	Average Base Salary	Actual Overtime	Expected Overtime Proposed	Actual Overtime Rate	Proposed Assumption Overtime Rate	Act/Exp Proposed Overtime Rate
5	6	\$0.5M	\$0.1M	\$0.1M	24.92%	22.50%	▲ 1.11
6	9	\$0.8M	\$0.2M	\$0.2M	22.91%	22.50%	● 1.02
7	16	\$1.4M	\$0.3M	\$0.3M	23.61%	22.50%	● 1.05
8	44	\$4.0M	\$0.8M	\$0.9M	20.57%	22.50%	● 0.91
9	54	\$4.9M	\$1.3M	\$1.1M	25.47%	22.50%	▲ 1.13
10	61	\$5.8M	\$1.3M	\$1.3M	21.77%	22.50%	● 0.97
11	76	\$7.2M	\$1.6M	\$1.6M	22.56%	22.50%	● 1.00
12	108	\$10.4M	\$2.4M	\$2.3M	23.16%	22.50%	● 1.03
13	128	\$12.5M	\$3.0M	\$2.8M	24.30%	22.50%	● 1.08
14	109	\$10.8M	\$2.6M	\$2.4M	24.15%	22.50%	● 1.07
15	122	\$12.3M	\$2.7M	\$2.8M	22.07%	22.50%	● 0.98
16	109	\$11.3M	\$2.7M	\$2.5M	23.64%	22.50%	● 1.05
17	118	\$12.3M	\$2.7M	\$2.8M	22.23%	22.50%	● 0.99
18	132	\$13.7M	\$3.2M	\$3.1M	23.51%	22.50%	● 1.05
19	213	\$22.0M	\$5.4M	\$4.9M	24.64%	22.50%	● 1.10
20	160	\$17.2M	\$3.7M	\$3.9M	21.29%	22.50%	● 0.95
21	142	\$15.4M	\$3.4M	\$3.5M	22.18%	22.50%	● 0.99
22	98	\$10.7M	\$2.5M	\$2.4M	23.54%	22.50%	● 1.05
23	124	\$13.8M	\$3.5M	\$3.1M	25.29%	22.50%	▲ 1.12
24	114	\$12.5M	\$3.0M	\$2.8M	24.03%	22.50%	● 1.07
25	104	\$11.9M	\$2.4M	\$2.7M	20.43%	22.50%	● 0.91
26	89	\$10.0M	\$2.7M	\$2.3M	26.96%	22.50%	▲ 1.20
27	81	\$8.9M	\$1.9M	\$2.0M	21.77%	22.50%	● 0.97
28	75	\$8.4M	\$1.9M	\$1.9M	22.37%	22.50%	● 0.99
29	81	\$9.0M	\$2.1M	\$2.0M	23.48%	22.50%	● 1.04
30	71	\$8.1M	\$2.0M	\$1.8M	25.01%	22.50%	▲ 1.11
31	52	\$6.1M	\$1.5M	\$1.4M	24.09%	22.50%	● 1.07
32	40	\$4.7M	\$1.2M	\$1.1M	25.65%	22.50%	▲ 1.14
33	32	\$3.9M	\$1.0M	\$0.9M	25.10%	22.50%	▲ 1.12
34	38	\$4.6M	\$1.0M	\$1.0M	21.12%	22.50%	● 0.94
35	20	\$2.5M	\$0.6M	\$0.6M	22.79%	22.50%	● 1.01
36	18	\$2.3M	\$0.5M	\$0.5M	20.33%	22.50%	● 0.90
37	12	\$1.5M	\$0.4M	\$0.3M	27.52%	22.50%	▲ 1.22
38	5	\$0.6M	\$0.2M	\$0.1M	35.02%	22.50%	◆ 1.56
39	5	\$0.7M	\$0.1M	\$0.1M	18.49%	22.50%	▲ 0.82
Total	2,666	\$282.4M	\$65.9M	\$63.5M	23.35%	22.50%	● 1.04

Exposure Distribution w/ Overtime Assumption - Actual and Expected; by Service



Overtime Assumption - Actual, Expected, and Ratio; by Service



Summary

In total, the proposed overtime percentages are anticipated to increase a member's anticipated pensionable earnings under the plan, which would increase plan liabilities. It would also increase the assumed amount of employee contributions received, especially for members with at least 20 years of service, which would partially offset the increase in the employer's portion of the normal cost.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT ASSUMPTION				
OVERTIME AS A PERCENTAGE OF BASE PAY				
Years of Service	All Tiers Baseline	Tier 1 and Tier 2 Dual Service	Tier 3, Tier 3 Modified, & Tier 3 Enhanced Dual Service	All Tiers Dual Disability
0	20.00%	21.00%	21.00%	20.00%
1	20.00%	21.00%	21.00%	20.00%
2	20.00%	21.00%	21.00%	20.00%
3	20.00%	21.00%	21.00%	20.00%
4	20.00%	21.00%	21.00%	20.00%
5	20.00%	21.00%	21.00%	20.00%
6	20.00%	21.00%	21.00%	20.00%
7	20.00%	21.00%	21.00%	20.00%
8	20.00%	21.00%	21.00%	20.00%
9	20.00%	21.00%	21.00%	20.00%
10	20.00%	21.00%	21.00%	20.00%
11	20.00%	21.00%	21.00%	20.00%
12	20.00%	21.00%	21.00%	20.00%
13	20.00%	21.00%	21.00%	20.00%
14	20.00%	22.00%	21.00%	20.00%
15	20.00%	24.00%	21.00%	20.00%
16	20.00%	25.00%	22.00%	21.00%
17	20.00%	26.00%	24.00%	22.00%
18	21.00%	28.00%	25.00%	24.00%
19	22.00%	29.00%	26.00%	25.00%
20	24.00%	30.00%	28.00%	26.00%
21	22.00%	29.00%	26.00%	25.00%
22	21.00%	28.00%	25.00%	24.00%
23	20.00%	26.00%	24.00%	22.00%
24	19.00%	25.00%	22.00%	21.00%
25	17.00%	24.00%	21.00%	20.00%
26	16.00%	21.00%	19.00%	16.00%
27	15.00%	19.00%	18.00%	15.00%
28	13.00%	16.00%	15.00%	13.00%
29	12.00%	15.00%	13.00%	12.00%
30	11.00%	13.00%	12.00%	12.00%
31	9.00%	12.00%	11.00%	11.00%
32	8.00%	11.00%	9.00%	8.00%
33	7.00%	9.00%	8.00%	7.00%
34+	7.00%	8.00%	8.00%	7.00%

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED ASSUMPTION			
OVERTIME AS A PERCENTAGE OF BASE PAY			
Years of Service	Baseline	Dual Retirement ¹	Dual Disability ²
0	28.00%	31.00%	22.50%
1	28.00%	31.00%	22.50%
2	28.00%	31.00%	22.50%
3	28.00%	31.00%	22.50%
4	28.00%	31.00%	22.50%
5	28.00%	31.00%	22.50%
6	28.00%	31.00%	22.50%
7	28.00%	31.00%	22.50%
8	28.00%	31.00%	22.50%
9	28.00%	31.00%	22.50%
10	28.00%	31.00%	22.50%
11	28.00%	31.00%	22.50%
12	28.00%	31.00%	22.50%
13	28.00%	31.00%	22.50%
14	28.00%	31.00%	22.50%
15	28.00%	31.00%	22.50%
16	28.00%	31.00%	22.50%
17	28.00%	31.00%	22.50%
18	28.00%	31.00%	22.50%
19	28.00%	31.00%	22.50%
20	28.00%	31.00%	22.50%
21	28.00%	31.00%	22.50%
22	28.00%	31.00%	22.50%
23	28.00%	31.00%	22.50%
24	28.00%	31.00%	22.50%
25	28.00%	31.00%	22.50%
26	28.00%	31.00%	22.50%
27	28.00%	31.00%	22.50%
28	28.00%	31.00%	22.50%
29	28.00%	31.00%	22.50%
30+	28.00%	31.00%	22.50%

¹ Dual retirement rate applies in year before assumed retirement

² Dual disability rate applies in year before assumed disability

Withdrawal

The current withdrawal assumption varies by service. The proposed assumption also varies by service. Overall, this results in an increase in the assumed rates of withdrawal, but only due to an increase in the rate at the first year of service. Small decreases are proposed for service periods 3 to 7 years of service.

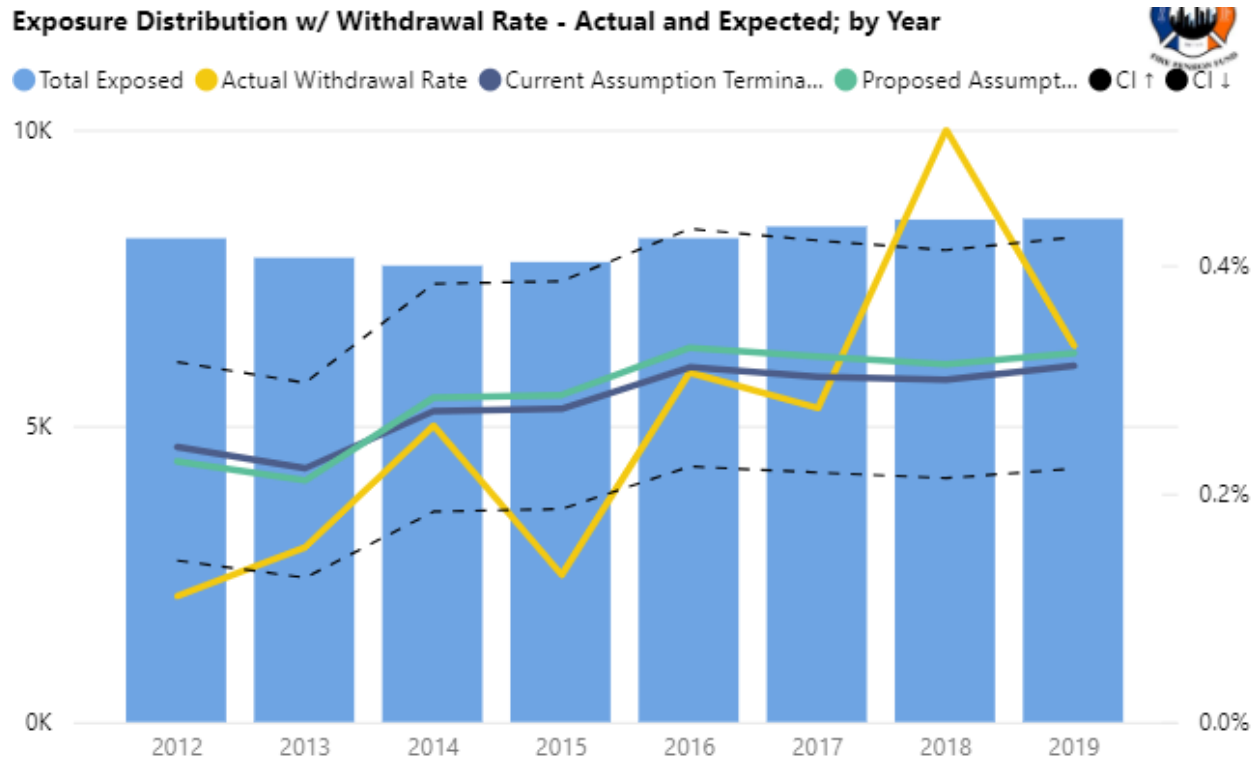
The analysis reflected years from 2012 - 2019 as the rate of termination during 2020 and 2021 may be artificially low due to members with a LOA status code. A record with a LOA status code is included as an exposure and not a decrement.

The following charts show the experience of withdrawal by year, for the age range (22 to 54) and service range (0 to 19 years). The actual rate of withdrawal averaged 0.26% whereas the overall expected rate of withdrawal averaged 0.28% based on the current assumptions and 0.29% based on the proposed assumptions.

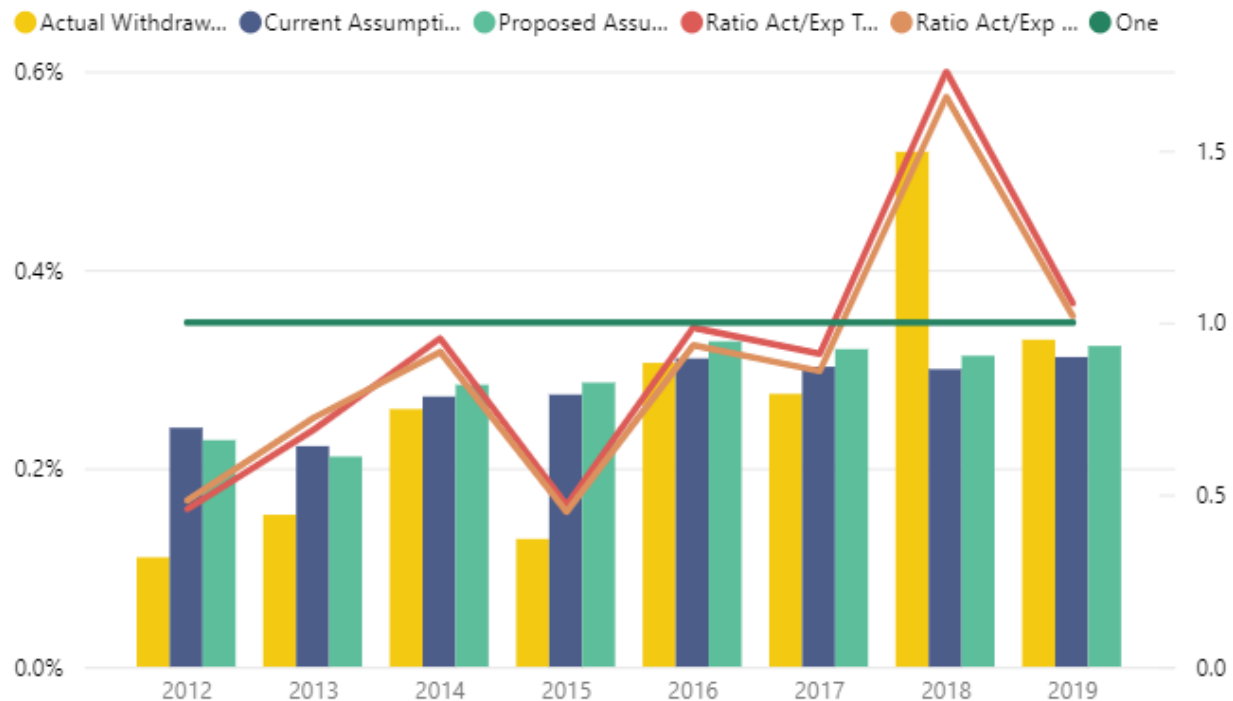
Plan Year	Actual Withdrawals	Expected Withdrawals	Total Exposed	Actual Withdrawal Rate	Current Assumption Termination	Ratio Act/Exp Term
2012	9	19.7	8,166	0.11%	0.24%	0.46
2013	12	17.4	7,838	0.15%	0.22%	0.69
2014	20	21.0	7,704	0.26%	0.27%	0.95
2015	10	21.3	7,766	0.13%	0.27%	0.47
2016	25	25.4	8,167	0.31%	0.31%	0.99
2017	23	25.3	8,366	0.27%	0.30%	0.91
2018	44	25.4	8,482	0.52%	0.30%	1.73
2019	28	26.5	8,498	0.33%	0.31%	1.06
Total	171	181.9	64,987	0.26%	0.28%	0.94

Plan Year	Actual Withdrawals	Expected Withdrawals Proposed	Total Exposed	Actual Withdrawal Rate	Proposed Assumption Termination	Act/Exp Proposed Term
2012	9	18.6	8,166	0.11%	0.23%	0.48
2013	12	16.6	7,838	0.15%	0.21%	0.72
2014	20	21.9	7,704	0.26%	0.28%	0.91
2015	10	22.2	7,766	0.13%	0.29%	0.45
2016	25	26.8	8,167	0.31%	0.33%	0.93
2017	23	26.8	8,366	0.27%	0.32%	0.86
2018	44	26.6	8,482	0.52%	0.31%	1.66
2019	28	27.5	8,498	0.33%	0.32%	1.02
Total	171	186.9	64,987	0.26%	0.29%	0.91

Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Year



Withdrawal Rate - Actual, Expected, and Ratio; by Year

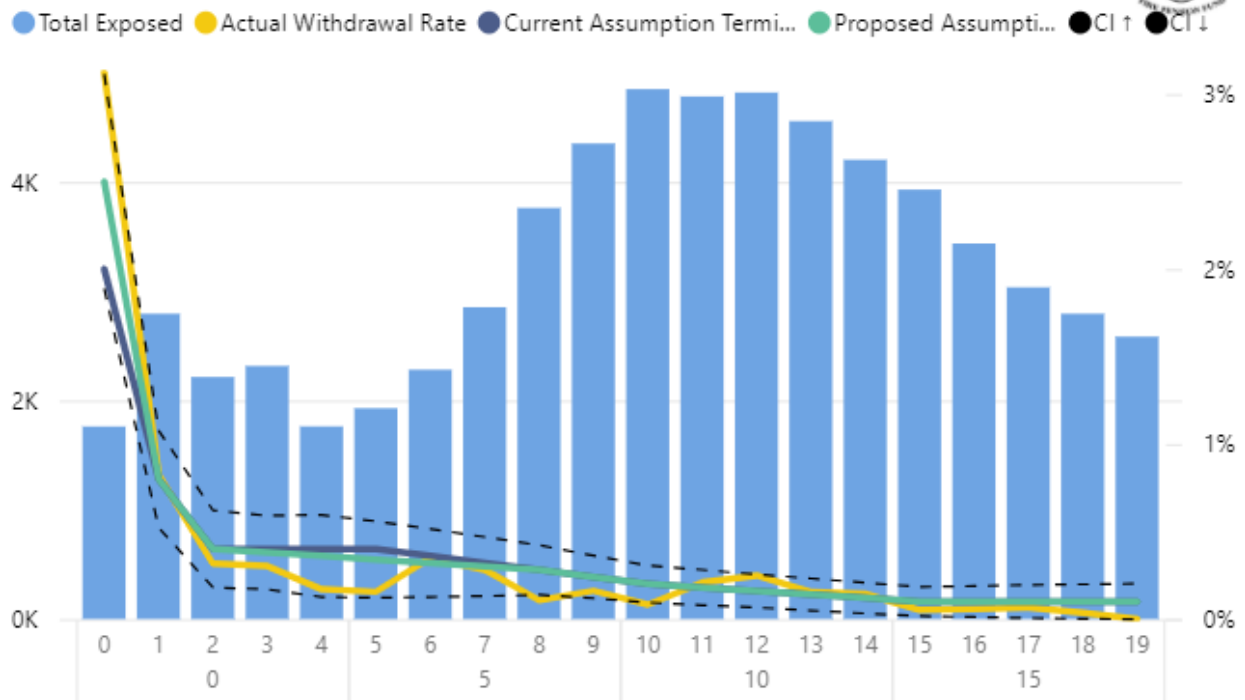


The following charts show the experience by service (0 to 19 years) in the experience study period first compared to the current assumption and then to the proposed assumption. This resulted in a decrease in the A/E ratio from 0.94 to 0.91 for ages 22 to 54.

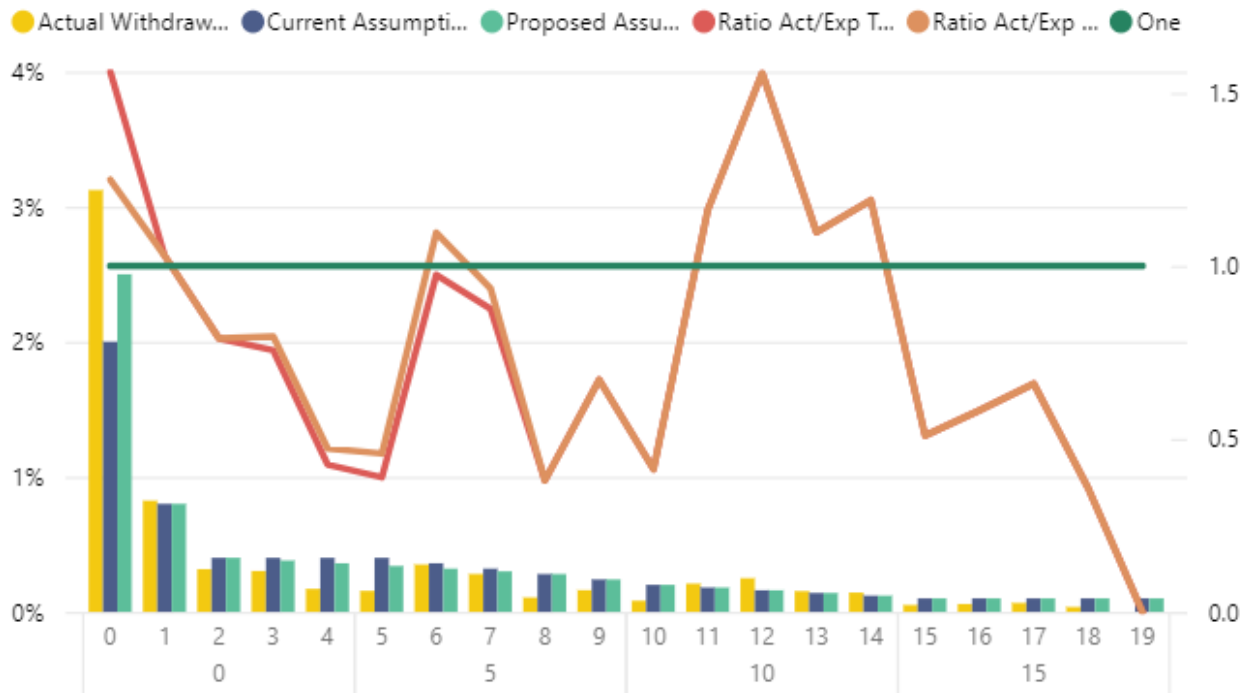
Service	Actual Withdrawals	Expected Withdrawals	Total Exposed	Actual Withdrawal Rate	Current Assumption Termination	Ratio Act/Exp Term
0	55	35.2	1,761	3.12%	2.00%	1.56
1	23	22.3	2,793	0.82%	0.80%	1.03
2	7	8.9	2,214	0.32%	0.40%	0.79
3	7	9.3	2,315	0.30%	0.40%	0.76
4	3	7.0	1,762	0.17%	0.40%	0.43
5	3	7.7	1,928	0.16%	0.40%	0.39
6	8	8.2	2,281	0.35%	0.36%	0.97
7	8	9.1	2,852	0.28%	0.32%	0.88
8	4	10.5	3,760	0.11%	0.28%	0.38
9	7	10.4	4,350	0.16%	0.24%	0.67
10	4	9.7	4,847	0.08%	0.20%	0.41
11	10	8.6	4,780	0.21%	0.18%	1.16
12	12	7.7	4,816	0.25%	0.16%	1.56
13	7	6.4	4,554	0.15%	0.14%	1.10
14	6	5.0	4,201	0.14%	0.12%	1.19
15	2	3.9	3,928	0.05%	0.10%	0.51
16	2	3.4	3,435	0.06%	0.10%	0.58
17	2	3.0	3,034	0.07%	0.10%	0.66
18	1	2.8	2,793	0.04%	0.10%	0.36
19	0	2.6	2,583	0.00%	0.10%	0.00
Total	171	181.9	64,987	0.26%	0.28%	0.94

Service	Actual Withdrawals	Expected Withdrawals Proposed	Total Exposed	Actual Withdrawal Rate	Proposed Assumption Termination	Act/Exp Proposed Term
0	55	44.0	1,761	3.12%	2.50%	▲ 1.25
1	23	22.3	2,793	0.82%	0.80%	● 1.03
2	7	8.9	2,214	0.32%	0.40%	▲ 0.79
3	7	8.8	2,315	0.30%	0.38%	▲ 0.80
4	3	6.3	1,762	0.17%	0.36%	◆ 0.47
5	3	6.6	1,928	0.16%	0.34%	◆ 0.46
6	8	7.3	2,281	0.35%	0.32%	● 1.10
7	8	8.6	2,852	0.28%	0.30%	● 0.94
8	4	10.5	3,760	0.11%	0.28%	◆ 0.38
9	7	10.4	4,350	0.16%	0.24%	▲ 0.67
10	4	9.7	4,847	0.08%	0.20%	◆ 0.41
11	10	8.6	4,780	0.21%	0.18%	▲ 1.16
12	12	7.7	4,816	0.25%	0.16%	◆ 1.56
13	7	6.4	4,554	0.15%	0.14%	● 1.10
14	6	5.0	4,201	0.14%	0.12%	▲ 1.19
15	2	3.9	3,928	0.05%	0.10%	▲ 0.51
16	2	3.4	3,435	0.06%	0.10%	▲ 0.58
17	2	3.0	3,034	0.07%	0.10%	▲ 0.66
18	1	2.8	2,793	0.04%	0.10%	◆ 0.36
19	0	2.6	2,583	0.00%	0.10%	◆ 0.00
Total	171	186.9	64,987	0.26%	0.29%	● 0.91

Exposure Distribution w/ Withdrawal Rate - Actual and Expected; by Service



Withdrawal Rate - Actual, Expected, and Ratio; by Service w/Proposed



Summary

In total, the proposed rates of withdrawal have increased the anticipated number of terminations although this is solely due to an increase in the rate in the first year of employment. We would anticipate these changes to have an insignificant impact on plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF TERMINATION	
Years Of Service	Probability of Termination
0	2.00%
1	0.80%
2	0.40%
3	0.40%
4	0.40%
5	0.40%
6	0.36%
7	0.32%
8	0.28%
9	0.24%
10	0.20%
11	0.18%
12	0.16%
13	0.14%
14	0.12%
15	0.10%
16	0.10%
17	0.10%
18	0.10%
19	0.10%
20	N/A

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF TERMINATION	
Years of Service	Rate
0	2.50%
1	0.80%
2	0.40%
3	0.38%
4	0.36%
5	0.34%
6	0.32%
7	0.30%
8	0.28%
9	0.24%
10	0.20%
11	0.18%
12	0.16%
13	0.14%
14	0.12%
15	0.10%
16	0.10%
17	0.10%
18	0.10%
19	0.10%
20	N/A

Retirement

The current retirement assumption varies by age and first eligibility for retirement. We propose no change to the retirement assumptions for Tier 1 and 2 members. First eligibility is defined as 20 years of service for Tier 1 and 2 members and as 25 years of service for Tier 3 members.

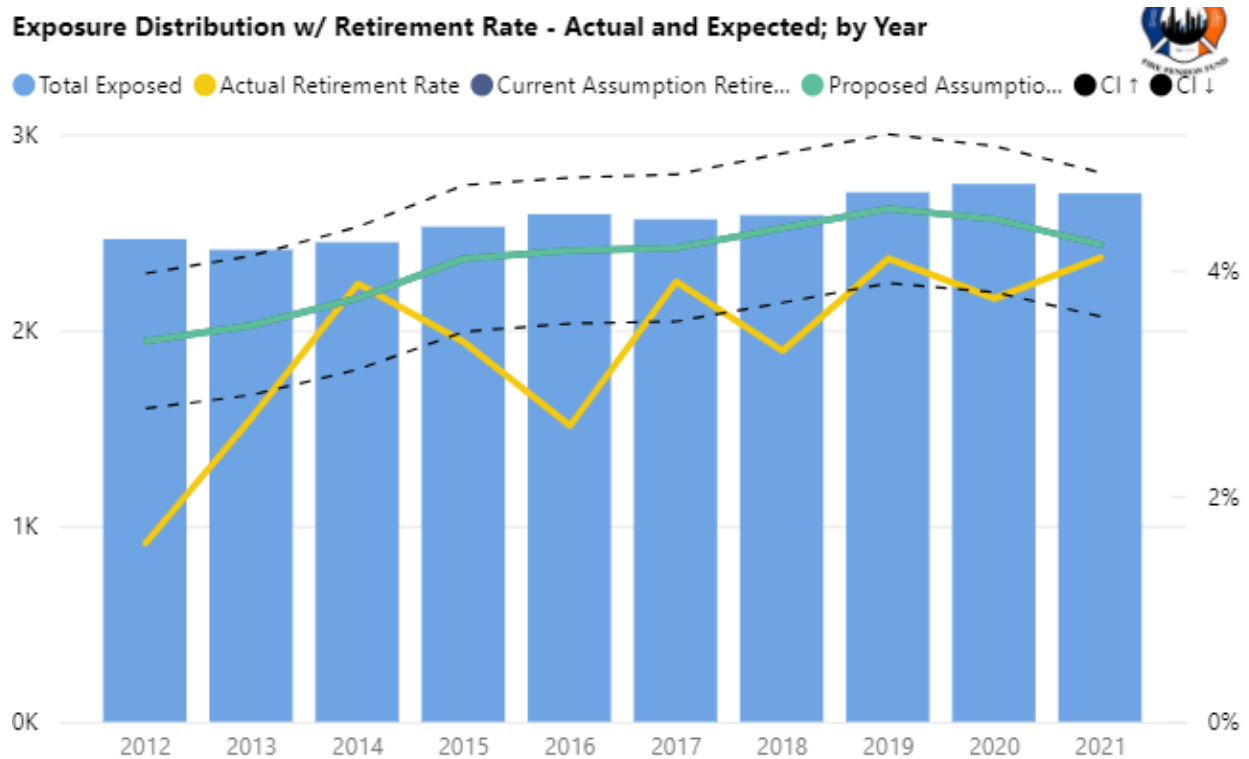
In addition, there are separate rates that apply to Tier 3 members prior to 25 years of service. Tier 3 became effective July 1, 2009, and requires 20 years of service to retire. Therefore, there is no retirement experience associated with this tier. However, using the experience for Tier 1 and Tier 2 members, we have extrapolated proposed assumptions for these members.

Please note that members who retired with World Trade Center (WTC) benefits are considered accidental disability retirements for purposes of this analysis, thus potentially reducing the number of service retirements. Our analysis reviewed the experience for members who were eligible and were not eligible for WTC benefits. We propose the same retirement rates apply to both groups.

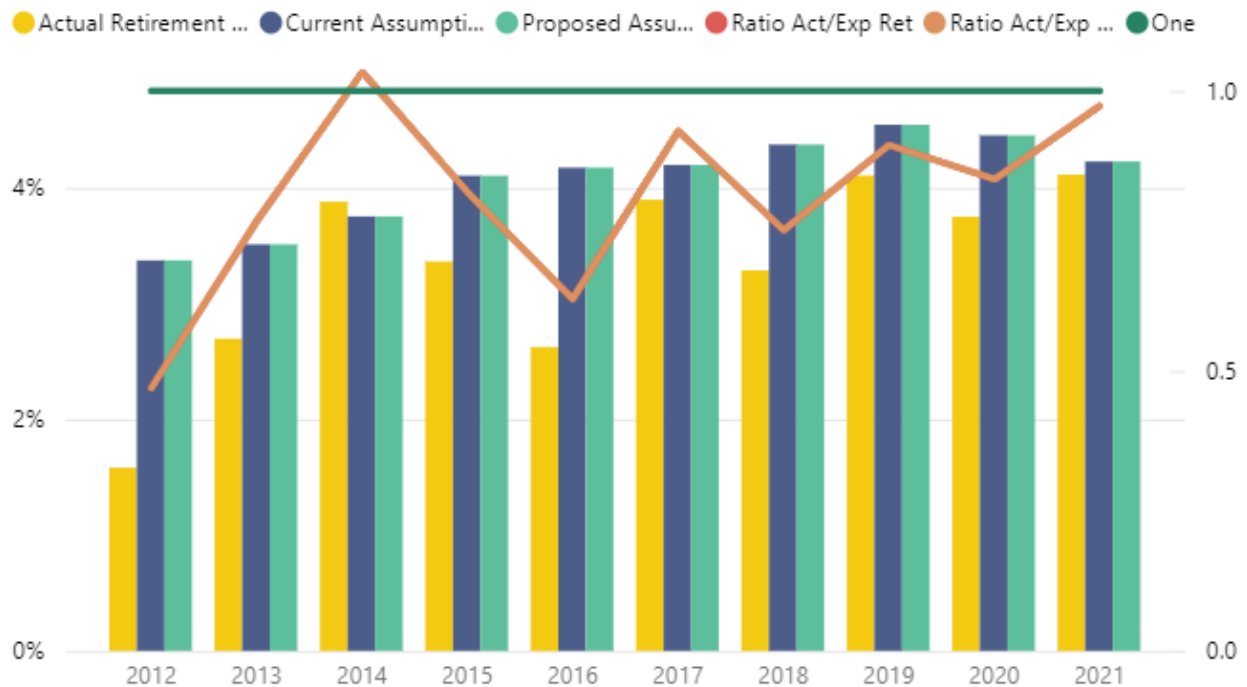
The following table shows the retirement experience by year, for the age range (40 to 64) and service range (20 to 39 years). The actual rate of retirement averaged 3.35% whereas the overall expected rate of retirement averaged 4.08% based on the current and proposed assumptions.

Plan Year	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
2012	39	83.1	2,465	1.58%	3.37%	0.47
2013	65	84.7	2,411	2.70%	3.51%	0.77
2014	95	91.9	2,449	3.88%	3.75%	1.03
2015	85	103.7	2,528	3.36%	4.10%	0.82
2016	68	108.2	2,592	2.62%	4.17%	0.63
2017	100	107.7	2,566	3.90%	4.20%	0.93
2018	85	113.1	2,587	3.29%	4.37%	0.75
2019	111	122.9	2,704	4.11%	4.54%	0.90
2020	103	122.3	2,747	3.75%	4.45%	0.84
2021	111	114.1	2,699	4.11%	4.23%	0.97
Total	862	1,051.7	25,748	3.35%	4.08%	0.82

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Year



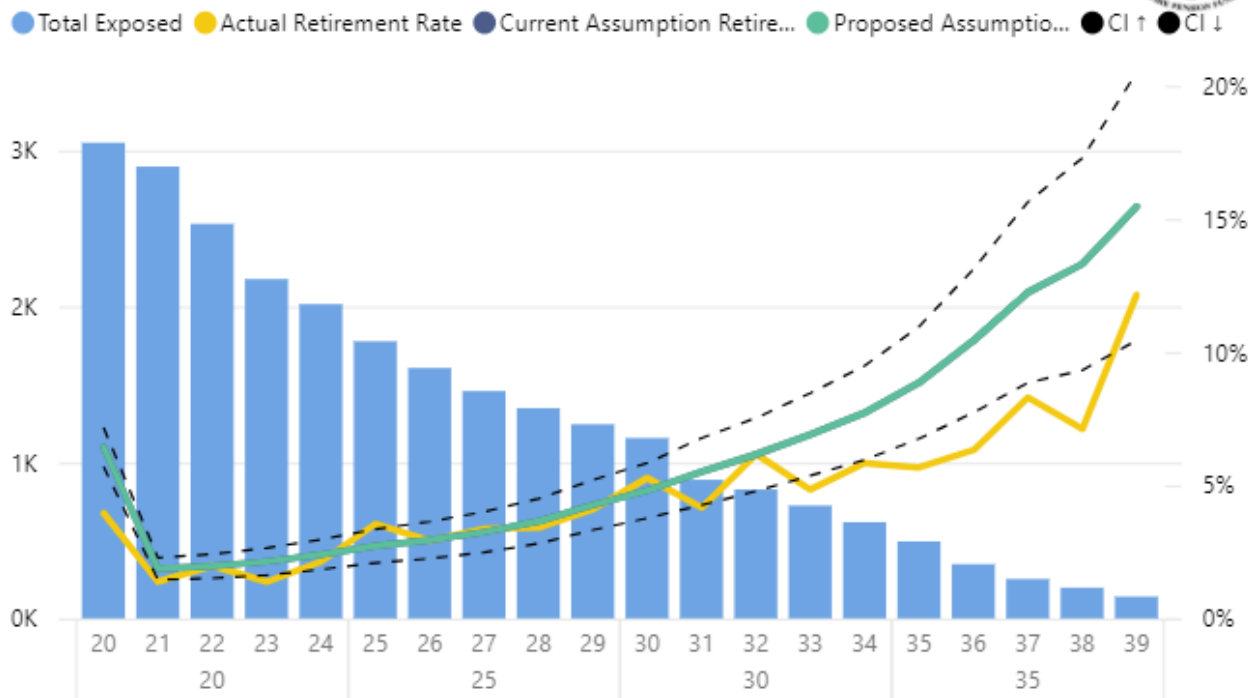
Retirement Rate - Actual, Expected, and Ratio; by Year



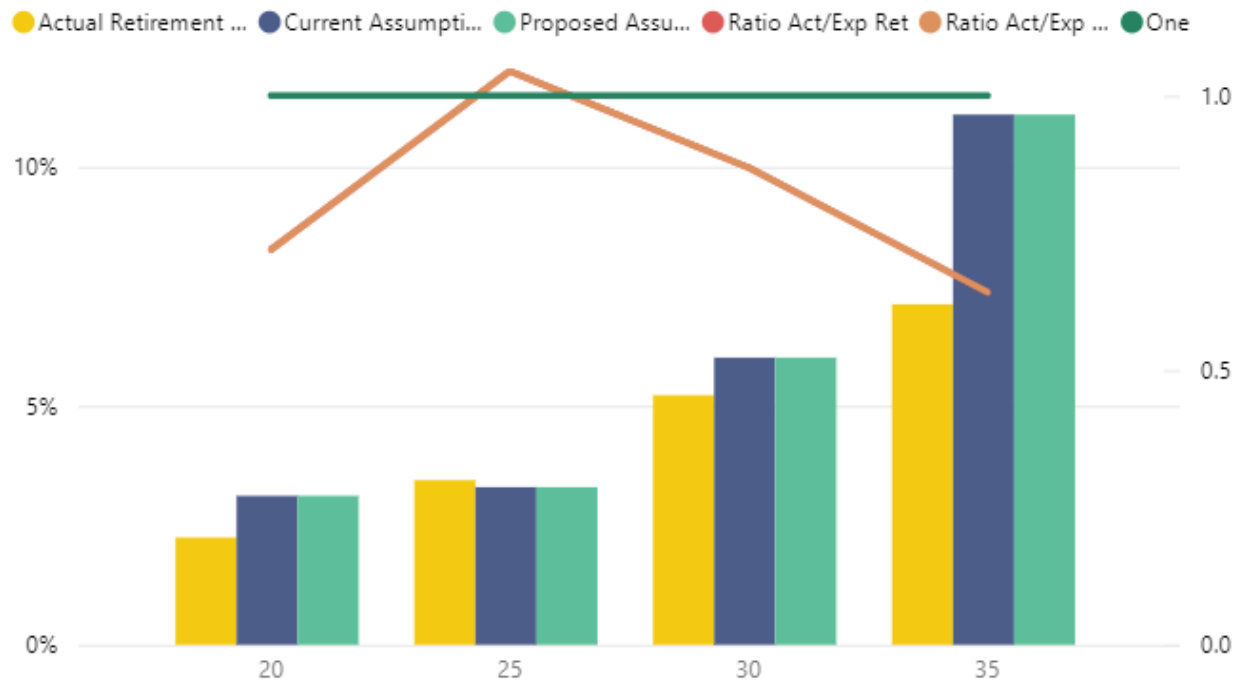
The following charts display the experience by service for the age range (40 to 64) with at least 20 years of service during the period 2012 – 2021. This resulted in no change in the A/E ratio of 0.82. At first eligibility, the A/E ratio is 0.62 and after first eligibility, the A/E ratio is 0.87.

Service	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
20	121	196.3	3,050	3.97%	6.43%	▲ 0.62
21	40	54.0	2,897	1.38%	1.86%	▲ 0.74
22	50	49.6	2,530	1.98%	1.96%	● 1.01
23	30	46.4	2,176	1.38%	2.13%	▲ 0.65
24	43	48.4	2,015	2.13%	2.40%	▲ 0.89
25	63	48.3	1,777	3.55%	2.72%	▲ 1.30
26	47	47.2	1,606	2.93%	2.94%	● 1.00
27	49	47.3	1,458	3.36%	3.24%	● 1.04
28	46	49.2	1,348	3.41%	3.65%	● 0.93
29	51	53.0	1,245	4.10%	4.26%	● 0.96
30	61	55.5	1,157	5.27%	4.80%	● 1.10
31	37	49.0	889	4.16%	5.51%	▲ 0.75
32	51	50.9	827	6.17%	6.15%	● 1.00
33	35	50.0	724	4.83%	6.91%	▲ 0.70
34	36	47.6	617	5.83%	7.72%	▲ 0.76
35	28	43.7	494	5.67%	8.85%	▲ 0.64
36	22	36.3	348	6.32%	10.42%	▲ 0.61
37	21	31.0	253	8.30%	12.24%	▲ 0.68
38	14	26.2	197	7.11%	13.30%	▲ 0.53
39	17	21.7	140	12.14%	15.47%	▲ 0.79
Total	862	1,051.7	25,748	3.35%	4.08%	▲ 0.82

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Service



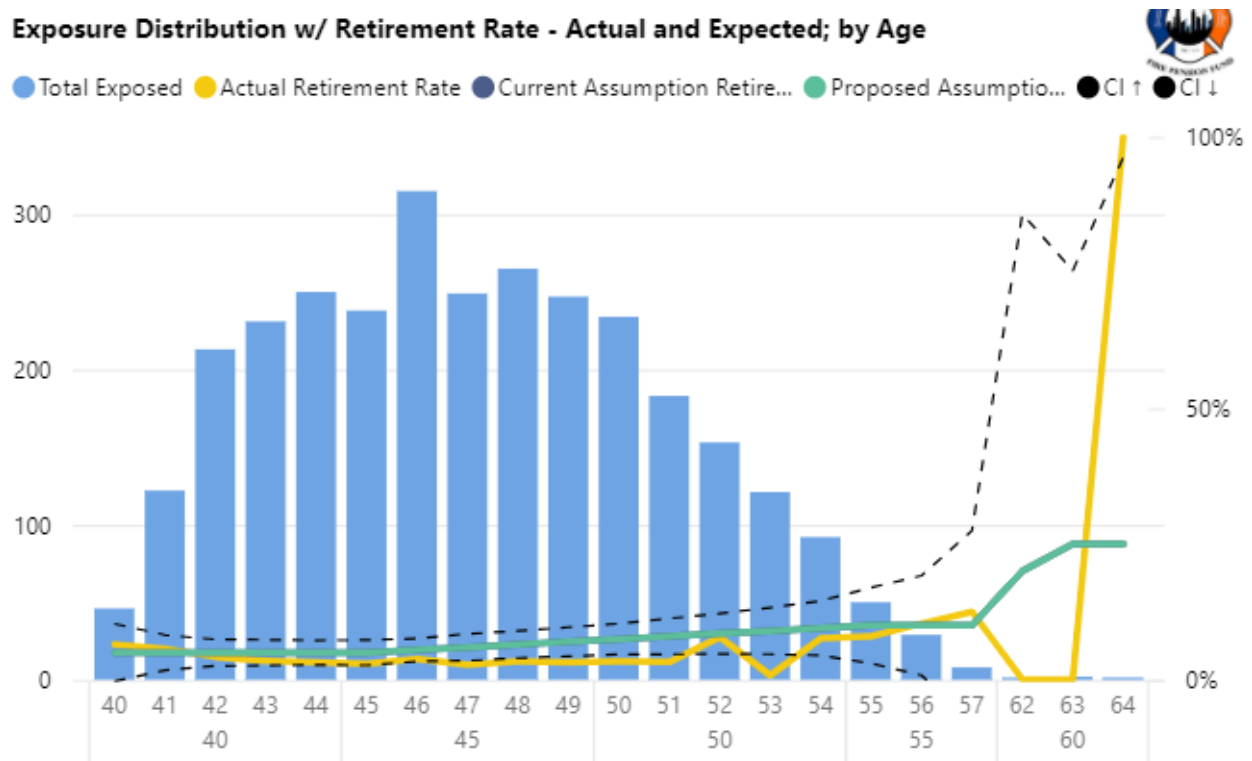
Retirement Rate - Actual, Expected, and Ratio; by Service



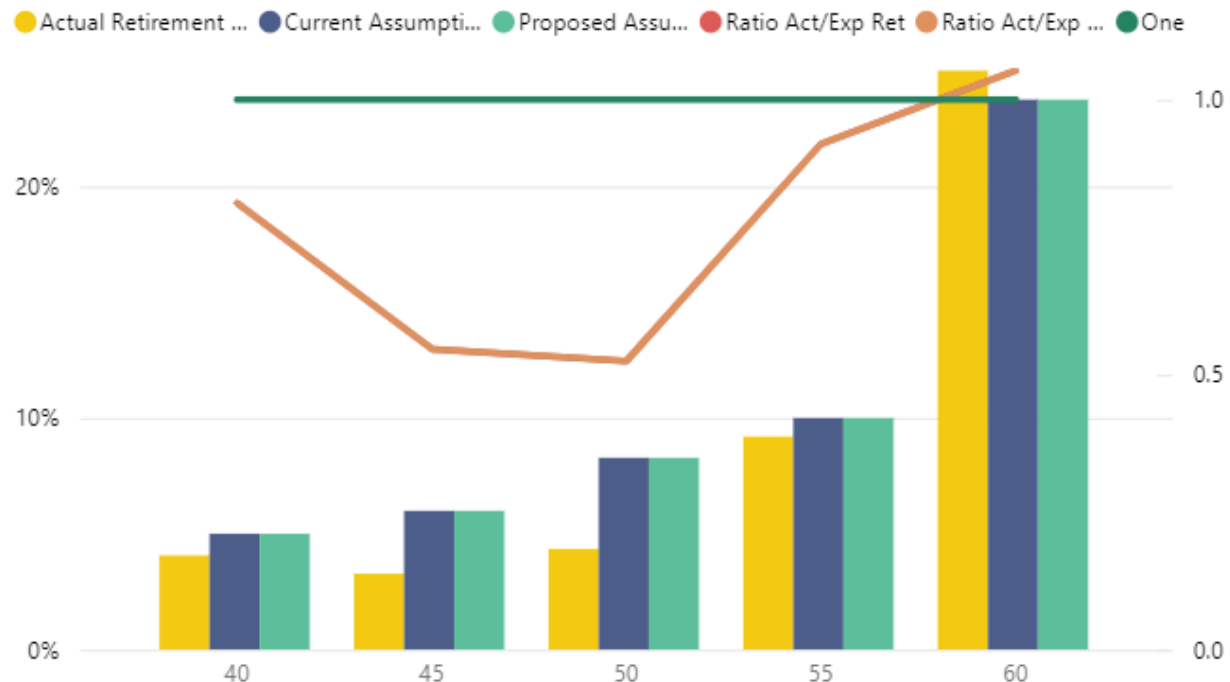
The following charts display the experience of first eligibility (20 years of service) by age based on the age range (40 to 64) for the proposed assumption. At first eligibility, the A/E ratio is 0.62. Although actual experience is less than the assumption, the number of retirements is very small and is heavily influenced by the availability of WTC benefits. Therefore, we propose no change in the assumption.

Age	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
40	3	2.3	46	6.52%	5.00%	▲ 1.30
41	7	6.1	122	5.74%	5.00%	▲ 1.15
42	9	10.7	213	4.23%	5.00%	▲ 0.85
43	8	11.6	231	3.46%	5.00%	▲ 0.69
44	8	12.5	250	3.20%	5.00%	▲ 0.64
45	7	11.9	238	2.94%	5.00%	▲ 0.59
46	12	17.3	315	3.81%	5.50%	▲ 0.69
47	7	14.9	249	2.81%	6.00%	◆ 0.47
48	9	17.2	265	3.40%	6.50%	▲ 0.52
49	8	17.3	247	3.24%	7.00%	◆ 0.46
50	8	17.5	234	3.42%	7.50%	◆ 0.46
51	6	14.6	183	3.28%	8.00%	◆ 0.41
52	12	13.0	153	7.84%	8.50%	● 0.92
53	1	10.9	121	0.83%	9.00%	◆ 0.09
54	7	8.7	92	7.61%	9.50%	▲ 0.80
55	4	5.0	50	8.00%	10.00%	▲ 0.80
56	3	2.9	29	10.34%	10.00%	● 1.03
57	1	0.8	8	12.50%	10.00%	▲ 1.25
62	0	0.2	1	0.00%	20.00%	◆ 0.00
63	0	0.5	2	0.00%	25.00%	◆ 0.00
64	1	0.3	1	100.00%	25.00%	◆ 4.00
Total	121	196.3	3,050	3.97%	6.43%	▲ 0.62

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Age



Retirement Rate - Actual, Expected, and Ratio; by Age

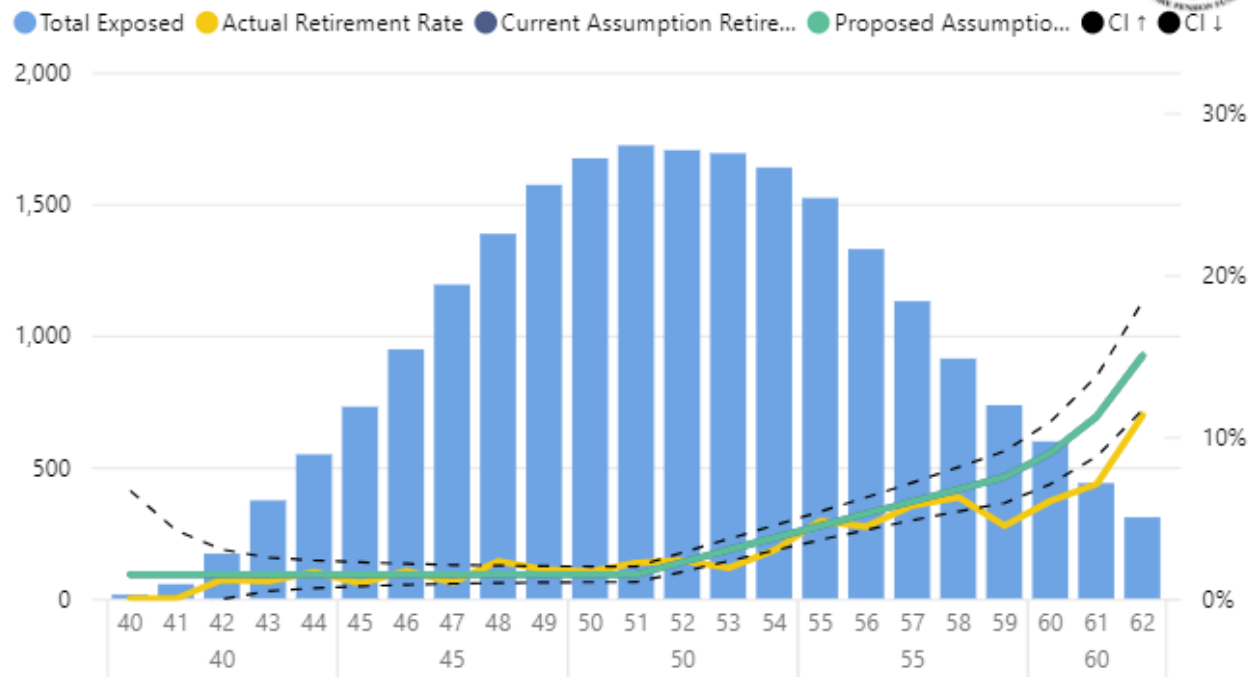


The following charts display the experience by age based on the age range (40 to 64) and service range (21 to 39) for the period 2012 – 2021 for the proposed assumption, excluding experience

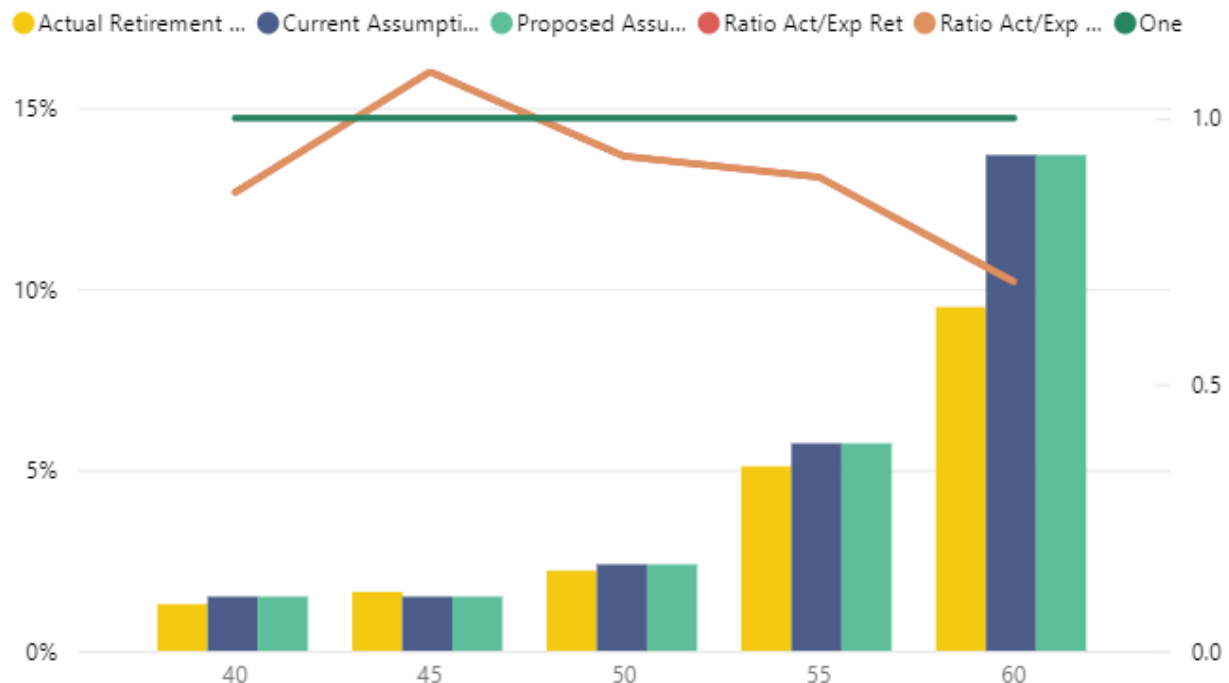
at first eligibility. After first eligibility, the A/E ratio is 0.87. We believe the current assumption is reasonable and therefore, we propose no change in the assumption.

Age	Actual Retirements	Expected Retirements	Total Exposed	Actual Retirement Rate	Current Assumption Retirement	Ratio Act/Exp Ret
40	0	0.2	15	0.00%	1.50%	0.00
41	0	0.8	55	0.00%	1.50%	0.00
42	2	2.6	171	1.17%	1.50%	0.78
43	4	5.6	373	1.07%	1.50%	0.71
44	9	8.2	548	1.64%	1.50%	1.09
45	7	10.9	729	0.96%	1.50%	0.64
46	16	14.2	947	1.69%	1.50%	1.13
47	12	17.9	1,193	1.01%	1.50%	0.67
48	32	20.8	1,386	2.31%	1.50%	1.54
49	28	23.6	1,572	1.78%	1.50%	1.19
50	28	25.1	1,673	1.67%	1.50%	1.12
51	38	25.8	1,722	2.21%	1.50%	1.47
52	40	38.3	1,704	2.35%	2.25%	1.04
53	32	50.8	1,692	1.89%	3.00%	0.63
54	49	61.4	1,638	2.99%	3.75%	0.80
55	73	68.5	1,522	4.80%	4.50%	1.07
56	59	69.7	1,328	4.44%	5.25%	0.85
57	65	67.8	1,130	5.75%	6.00%	0.96
58	57	61.6	912	6.25%	6.75%	0.93
59	33	55.1	735	4.49%	7.50%	0.60
60	36	53.7	597	6.03%	9.00%	0.67
Total	741	855.4	22,698	3.26%	3.77%	0.87

Exposure Distribution w/ Retirement Rate - Actual and Expected; by Age



Retirement Rate - Actual, Expected, and Ratio; by Age



Tier 3

Setting retirement rates for a new benefit tier is effectively a theoretical exercise. When setting the rates for the new tier, we must consider how changes to eligibility requirements and benefit levels would impact member behavior and specifically rates of retirement, especially at certain service levels. In most situations, we can review the experience of prior membership tiers to determine how future membership tiers may act based on differences in the plan provisions.

The following items were reflected in our analysis in proposing modifications to the current assumptions:

- A Fire member can retire at 20 years of service under Tier 3, although the benefit is lower than Tier 1 and Tier 2 benefits, a significant number of Tier 1 and Tier 2 members retire at 20 years of service. How significantly would this percentage drop due to the changes in plan provisions.
- At 22 years of service, Tier 3 members receive a benefit of 50% of final average salary which equals the percentage provided under Tier 1 and Tier 2, although the definition of final average salary is more stringent under Tier 3 than under Tier 1 and Tier 2.
- Beginning at 22 years of service, Tier 3 members can accrue credit towards full escalation of benefits. Providing a cost-of-living adjustment can be a fairly expensive benefit for fire members who retire earlier than other public employee groups.
- At 25 years of service, a Tier 3 member has fully accrued the full escalation benefit. Furthermore, there are no further accruals if the member works beyond 25 years of service and all longevity compensation is included in the calculation of a member's final average salary. Under Tier 1 and Tier 2, members continue to accrue benefits under the 1/60th formula. This could incentivize Tier 3 members to retire at 25 years of service.

Based on these points, we believe that the number of Fire members who will retire after 25 years of service would be similar under Tier 3 as compared to those who would retire under Tier 1 and Tier 2. If there were 1,000 Tier 1 and Tier 2 members eligible to retire at 20 years of service, we have estimated approximately 150 would retire by the time they would have completed 25 years of service. Under the current assumption for Tier 3 members, we have estimated that it approximates a similar number of retirements occurring during this same time period. Therefore, we propose no change to the rates for Tier 3 members.

The following table displays the current assumption. No change is proposed.

Tier 3, Tier 3 Modified and Tier 3 Enhanced Retirement Assumption	
Years of Service	Current Assumption
20	5.0%
21	2.0%
22	5.0%
23	2.0%
24	2.0%
25	Approximately 6.5%

Summary

The proposed rates of retirement have remained the same and no change in plan liabilities will result.

Assumption Tables

The following table shows the current rate assumptions.

NEW YORK CITY FIRE PENSION FUND PROBABILITIES OF SERVICE RETIREMENT RETIREMENT WITH FULL COLA/ESCALATION FOR THOSE ELIGIBLE FOR UNREDUCED		
Age	Years of Service Since First Eligible	
	Year 1	Ultimate
39	5.00%	1.50%
40	5.00%	1.50%
41	5.00%	1.50%
42	5.00%	1.50%
43	5.00%	1.50%
44	5.00%	1.50%
45	5.00%	1.50%
46	5.50%	1.50%
47	6.00%	1.50%
48	6.50%	1.50%
49	7.00%	1.50%
50	7.50%	1.50%
51	8.00%	1.50%
52	8.50%	2.25%
53	9.00%	3.00%
54	9.50%	3.75%
55	10.00%	4.50%
56	10.00%	5.25%
57	10.00%	6.00%
58	10.00%	6.75%
59	10.00%	7.50%
60	10.00%	9.00%
61	15.00%	11.25%
62	20.00%	15.00%
63	25.00%	25.00%
64	25.00%	25.00%
65	100.00%	100.00%

*100% for Tier 3, Tier 3 Revised, and Tier 3 Enhanced members at ages 62-64

<p>NEW YORK CITY FIRE PENSION FUND</p> <p>PROBABILITIES OF EARLY SERVICE RETIREMENT FOR TIER 3, TIER 3 MODIFIED, AND TIER 3 ENHANCED MEMBERS</p>		
Years of Service	Reduced Service Retirement	Unreduced Before Full Escalation
20	5.00%	N/A
21	2.00%	N/A
22	N/A	5.00%
23	N/A	2.00%
24	N/A	2.00%

The following table shows the proposed rate assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF SERVICE RETIREMENT		
Age	Unreduced Retirement	
	Year 1 ¹	Ultimate
39	5.00%	1.50%
40	5.00%	1.50%
41	5.00%	1.50%
42	5.00%	1.50%
43	5.00%	1.50%
44	5.00%	1.50%
45	5.00%	1.50%
46	5.50%	1.50%
47	6.00%	1.50%
48	6.50%	1.50%
49	7.00%	1.50%
50	7.50%	1.50%
51	8.00%	1.50%
52	8.50%	2.25%
53	9.00%	3.00%
54	9.50%	3.75%
55	10.00%	4.50%
56	10.00%	5.25%
57	10.00%	6.00%
58	10.00%	6.75%
59	10.00%	7.50%
60	10.00%	9.00%
61	15.00%	11.25%
62 ²	20.00%	15.00%
63 ²	25.00%	25.00%
64 ²	25.00%	25.00%
65	100.00%	100.00%

¹ Applies at 20 years for Tier 1 and Tier 2 and at 25 years of service for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members

² 100% for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF EARLY SERVICE RETIREMENT FOR TIER 3, TIER 3 MODIFIED, AND TIER 3 ENHANCED MEMBERS		
Years of Service	Reduced Service Retirement	Unreduced Before Full Escalation
20	5.00%	N/A
21	2.00%	N/A
22	N/A	5.00%
23	N/A	2.00%
24	N/A	2.00%

Disability

The current ordinary disability assumption varies by age. They apply to all service periods for Tier 1 and Tier 2 members but do not apply before the five-year eligibility period is satisfied for Tier 3 members. Furthermore, different rates apply to accidental disability; these rates depend on age, and eligibility for World Trade Center disability benefits (WTC). We assumed that anyone with a WTC ultimate code would be eligible for the WTC benefits.

Ordinary disability benefits are as follows:

- For Tier 1 and Tier 2 members: 1/3 of final average salary (FAS) if the member has fewer than 10 years of service; 50% of FAS if the member has at least 10 years of service; 2.5% of FAS times the number of years of service if the member has completed 20 years of service.
- For Tier 3 members: the greater of 1/3 of FAS, or 2% of FAS times the number of years of credited service

The member can elect a service retirement benefit instead of the ordinary disability benefit. Due to this fact, rates of ordinary disability were determined excluding the experience for members eligible for retirement.

The base accidental disability benefit equals 75% of final average salary plus 1/60th of total earnings after the 20th anniversary, which is greater than the service retirement benefit.

In performing the experience analysis, it is necessary to reassign disability retirement codes retroactively to reflect the eventual approval of a disability retirement. Members with a disability code in a given year had all inactive status codes in prior years changed to a disability status code. Members approved for WTC benefits had all prior inactive status codes changed to an accidental disability status code. Adjustments were made as far back as 2012.

It is difficult to determine how future years would impact the experience during the study period as we believe that this type of retroactive adjustment will be required in subsequent iterations of this study. The consequence will be a restatement of the number of disability retirements experienced during this study period, specifically 2019 – 2021.

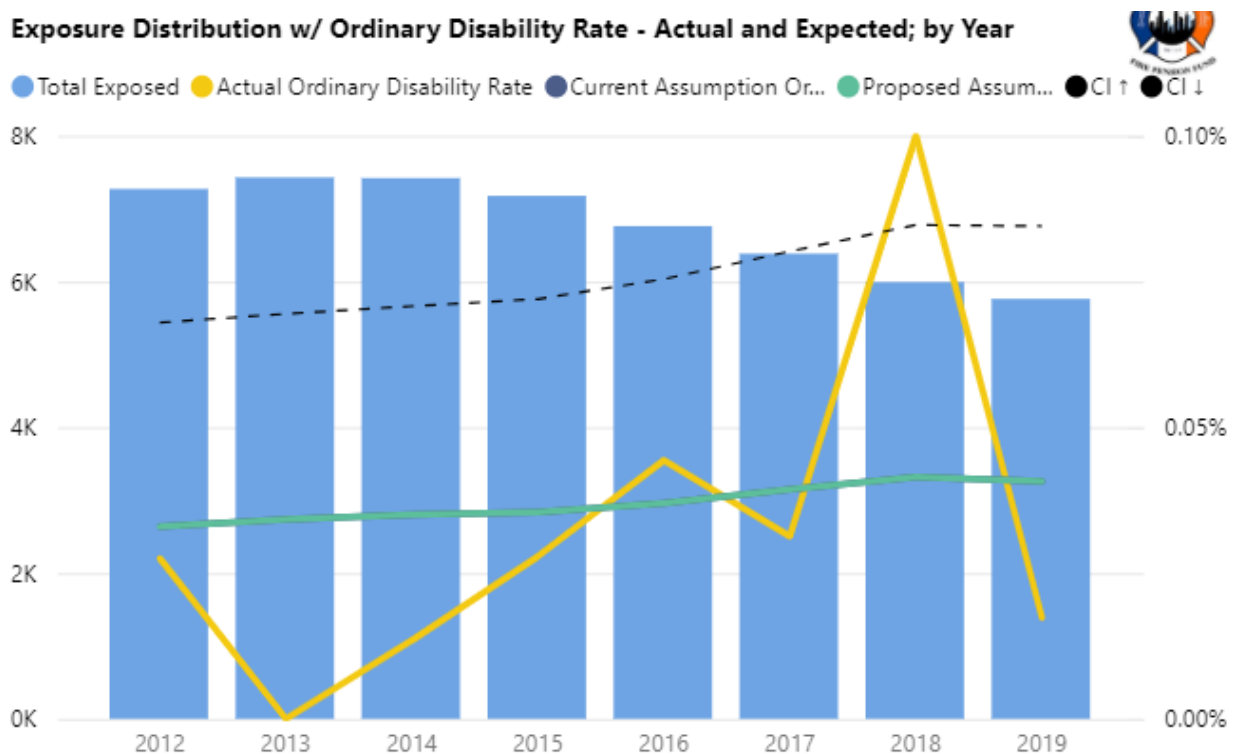
For this purpose, our analysis reflected years from 2012 – 2019.

Ordinary Disability

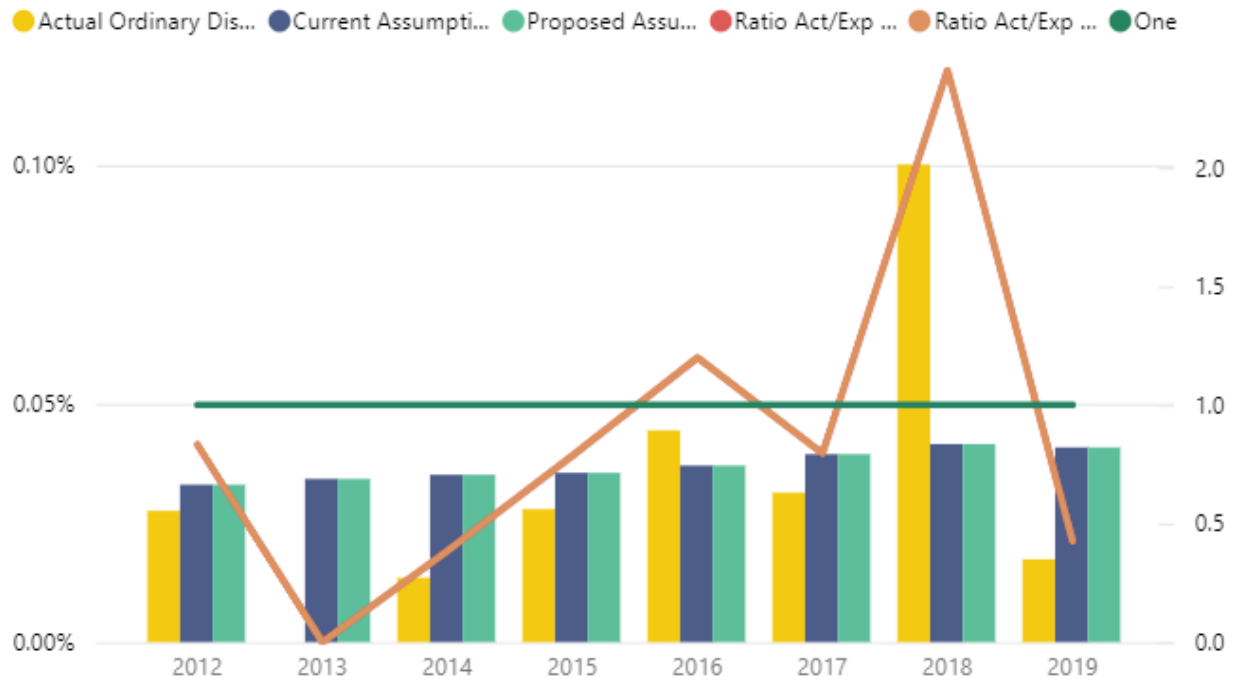
The following charts show the experience of ordinary disability retirement by year, for the age range 25 to 54 and the service range 5 to 19 years during the period 2012 - 2019. As nearly no ordinary disability retirements occur once eligible for retirement, this analysis excludes all exposures at this point. During the selected service and age ranges, the actual rate of ordinary disability averaged 0.0314% whereas the overall expected rate of ordinary disability averaged 0.0368% based on the current and proposed assumptions.

Plan Year	Actual Ordinary Disabilities	Expected Ordinary Disabilities	Total Exposed	Actual Ordinary Disability Rate	Current Assumption Ordinary Disability	Ratio Act/Exp Ordinary Disability
2012	2	2.4	7,268	0.0275%	0.0330%	0.83
2013	0	2.5	7,426	0.0000%	0.0342%	0.00
2014	1	2.6	7,417	0.0135%	0.0351%	0.38
2015	2	2.5	7,173	0.0279%	0.0355%	0.79
2016	3	2.5	6,758	0.0444%	0.0370%	1.20
2017	2	2.5	6,381	0.0313%	0.0394%	0.80
2018	6	2.5	5,991	0.1002%	0.0415%	2.41
2019	1	2.4	5,760	0.0174%	0.0408%	0.43
Total	17	19.9	54,174	0.0314%	0.0368%	0.85

Exposure Distribution w/ Ordinary Disability Rate - Actual and Expected; by Year



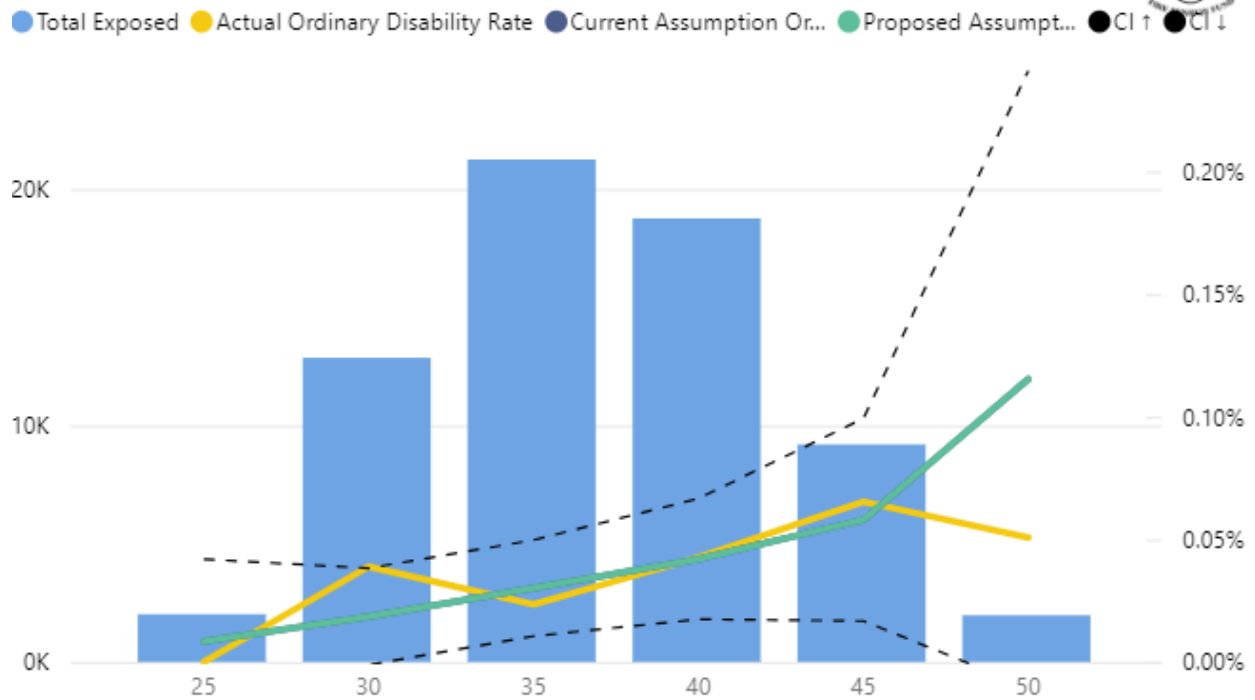
Ordinary Disability Rate - Actual, Expected, and Ratio; by Year



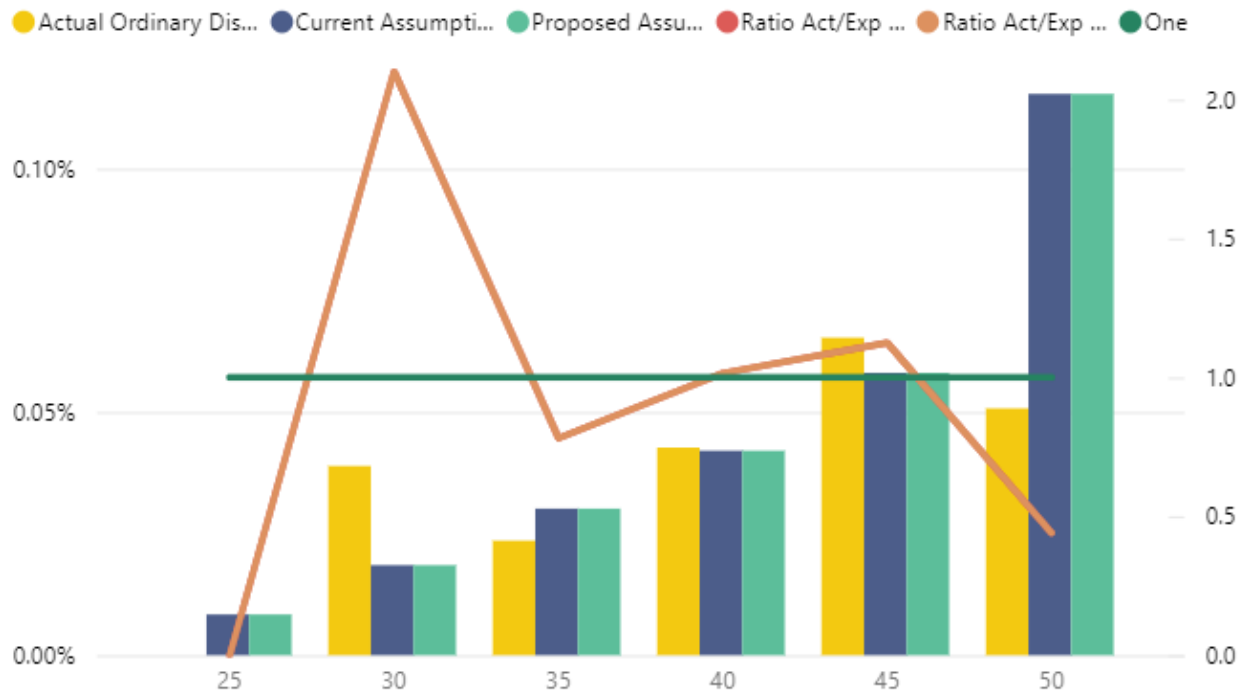
The following charts show the experience of ordinary disability retirement by age, for the age range 25 to 54 and the service range 5 to 19 years for the current and proposed assumptions. This resulted in no change in the A/E ratio of 0.85.

Age	Actual Ordinary Disabilities	Expected Ordinary Disabilities Proposed	Total Exposed	Actual Ordinary Disability Rate	Proposed Assumption Ordinary Disability	Act/Exp Proposed Ordinary Disability
25	0	0.0	4	0.0000%	0.0025%	0.00
26	0	0.0	36	0.0000%	0.0025%	0.00
27	0	0.0	217	0.0000%	0.0050%	0.00
28	0	0.0	521	0.0000%	0.0075%	0.00
29	0	0.1	898	0.0000%	0.0100%	0.00
30	0	0.2	1,300	0.0000%	0.0125%	0.00
31	0	0.3	1,773	0.0000%	0.0150%	0.00
32	0	0.4	2,226	0.0000%	0.0175%	0.00
33	1	0.5	2,706	0.0370%	0.0200%	1.85
34	3	0.7	3,137	0.0956%	0.0225%	4.25
35	0	0.8	3,374	0.0000%	0.0250%	0.00
36	0	0.9	3,444	0.0000%	0.0275%	0.00
37	0	1.1	3,530	0.0000%	0.0300%	0.00
38	1	1.2	3,609	0.0277%	0.0325%	0.85
39	2	1.3	3,600	0.0556%	0.0350%	1.59
40	1	1.3	3,537	0.0283%	0.0375%	0.75
41	2	1.3	3,336	0.0600%	0.0400%	1.50
42	0	1.3	3,011	0.0000%	0.0425%	0.00
43	1	1.2	2,637	0.0379%	0.0450%	0.84
44	1	1.1	2,345	0.0426%	0.0475%	0.90
45	0	1.0	2,004	0.0000%	0.0500%	0.00
46	1	0.9	1,709	0.0585%	0.0550%	1.06
47	1	0.9	1,461	0.0684%	0.0600%	1.14
48	1	0.8	1,181	0.0847%	0.0650%	1.30
49	1	0.6	862	0.1160%	0.0700%	1.66
50	1	0.5	619	0.1616%	0.0750%	2.15
51	0	0.5	478	0.0000%	0.1100%	0.00
52	0	0.5	328	0.0000%	0.1450%	0.00
53	0	0.4	197	0.0000%	0.1800%	0.00
54	0	0.2	94	0.0000%	0.2150%	0.00
Total	17	19.9	54,174	0.0314%	0.0368%	0.85

Exposure Distribution w/ Ordinary Disability Rate - Actual and Expected; by Age



Ordinary Disability Rate - Actual, Expected, and Ratio; by Age



Summary

Retirement eligibility has a significant impact on the number of members who apply for disability retirement. By eliminating rates of ordinary disability retirement at 20 years of service, we believe it will increase plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF ORDINARY DISABILITY RETIREMENT			
Age	Rate	Age	Rate
15 - 20	0.0025%	43	0.0450%
21	0.0025%	44	0.0475%
22	0.0025%	45	0.0500%
23	0.0025%	46	0.0550%
24	0.0025%	47	0.0600%
25	0.0025%	48	0.0650%
26	0.0025%	49	0.0700%
27	0.0050%	50	0.0750%
28	0.0075%	51	0.1100%
29	0.0100%	52	0.1450%
30	0.0125%	53	0.1800%
31	0.0150%	54	0.2150%
32	0.0175%	55	0.2500%
33	0.0200%	56	0.5000%
34	0.0225%	57	0.7500%
35	0.0250%	58	1.0000%
36	0.0275%	59	1.2500%
37	0.0300%	60	1.5000%
38	0.0325%	61	2.0000%
39	0.0350%	62	2.5000%
40	0.0375%	63	2.5000%
41	0.0400%	64	2.5000%
42	0.0425%	65	N/A

*N/A for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members at ages 62-64.

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF ORDINARY DISABILITY RETIREMENT ¹			
Age	Ordinary Disability ^{2,3}	Age	Ordinary Disability ^{2,3}
20	0.0025%	43	0.0450%
21	0.0025%	44	0.0475%
22	0.0025%	45	0.0500%
23	0.0025%	46	0.0550%
24	0.0025%	47	0.0600%
25	0.0025%	48	0.0650%
26	0.0025%	49	0.0700%
27	0.0050%	50	0.0750%
28	0.0075%	51	0.1100%
29	0.0100%	52	0.1450%
30	0.0125%	53	0.1800%
31	0.0150%	54	0.2150%
32	0.0175%	55	0.2500%
33	0.0200%	56	0.5000%
34	0.0225%	57	0.7500%
35	0.0250%	58	1.0000%
36	0.0275%	59	1.2500%
37	0.0300%	60	1.5000%
38	0.0325%	61	2.0000%
39	0.0350%	62 ⁴	2.5000%
40	0.0375%	63 ⁴	2.5000%
41	0.0400%	64 ⁴	2.5000%
42	0.0425%	65	N/A

¹ Greater of disability benefit and retirement benefit is valued if eligible for early or service retirement

² No rates of ordinary disability apply prior to completion of 5 years of service for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members

³ No rates of ordinary disability apply upon completion of 20 years of service

⁴ N/A for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members.

Accidental Disability

The rates of accidental disability retirement vary by the following characteristics:

1. Tier 1 and 2 members eligible for WTC benefits.
2. Tier 1 and 2 members not eligible for WTC benefits, including Tier 3 Enhanced members.

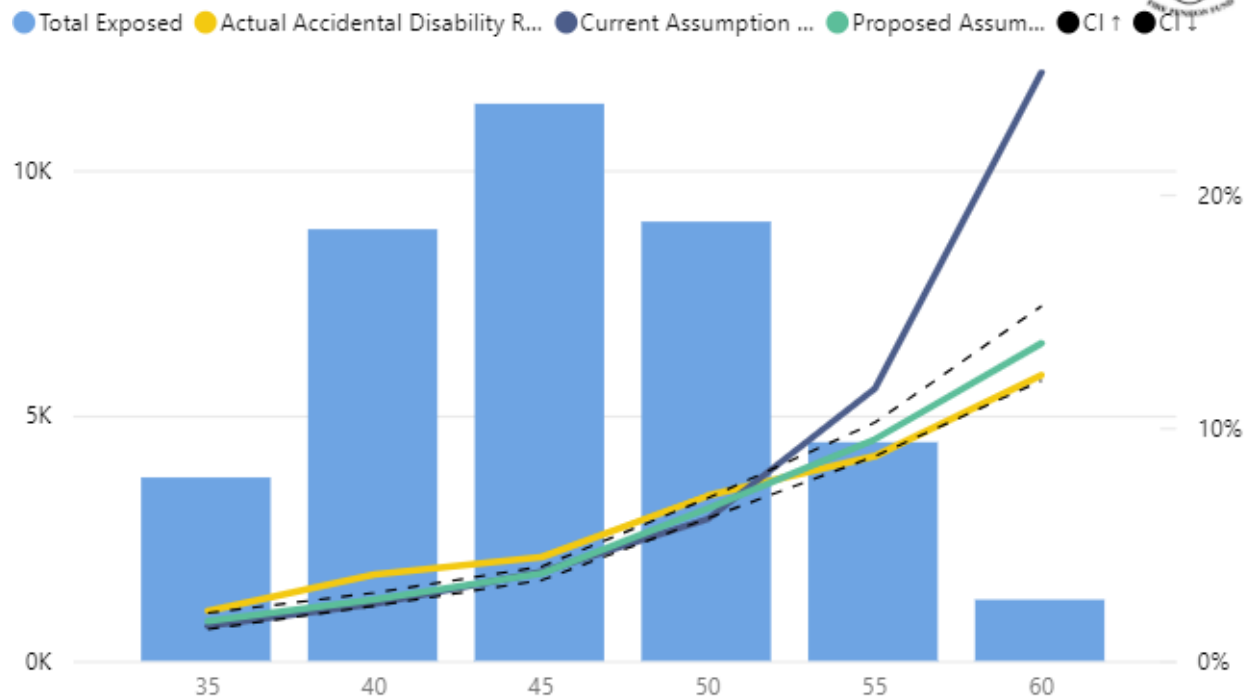
Members Who Are Eligible for WTC Benefits (Tiers 1 and 2)

The following tables show the accidental disability experience of members who are not eligible for WTC benefits by year, for the age range 35 to 64 and the service range 10 to 39 years during the period 2012 - 2019. The actual rate of accidental disability averaged 5.4196% whereas the overall expected rate of ordinary disability averaged 5.4063% based on the current assumptions and 4.9303% based on the proposed assumptions. The proposed rates include lower rates at ages 56 and older but slightly higher rates at younger ages than the current assumption.

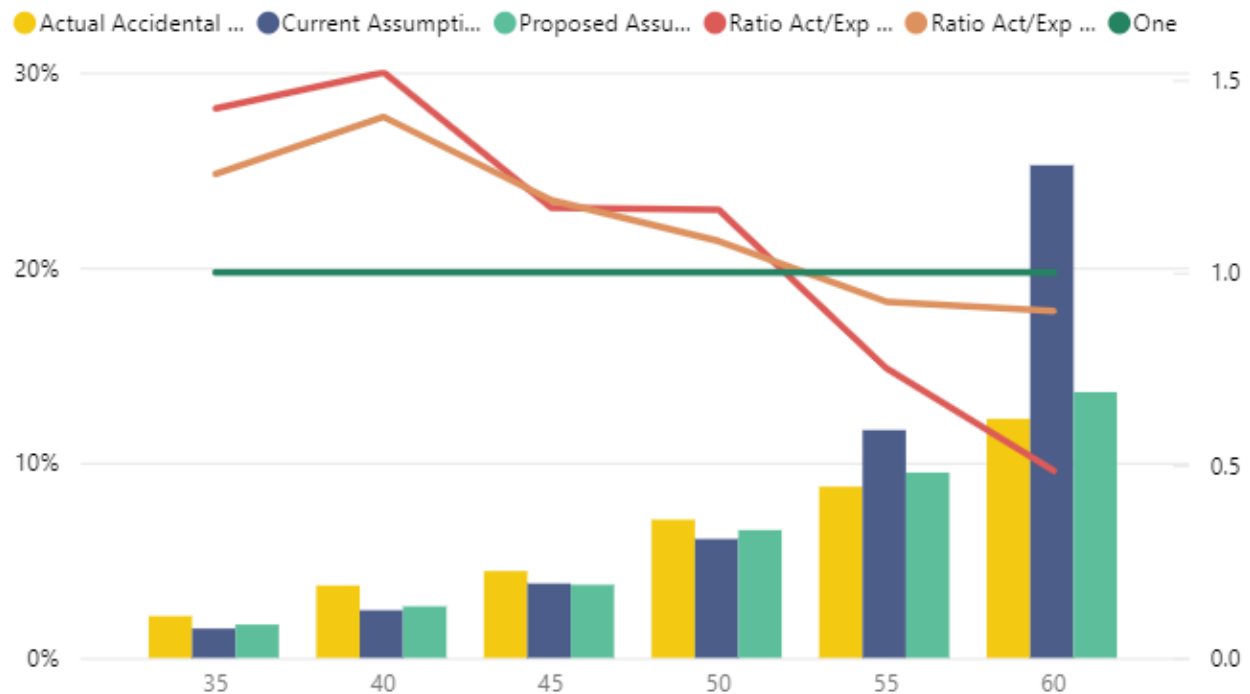
Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
2012	295	246.1	5,695	5.1800%	4.3206%	▲ 1.20
2013	249	257.3	5,596	4.4496%	4.5977%	● 0.97
2014	242	262.1	5,358	4.5166%	4.8911%	● 0.92
2015	262	267.0	5,068	5.1697%	5.2687%	● 0.98
2016	290	266.6	4,742	6.1156%	5.6221%	● 1.09
2017	256	266.0	4,382	5.8421%	6.0698%	● 0.96
2018	225	263.0	4,018	5.5998%	6.5444%	▲ 0.86
2019	270	255.9	3,686	7.3250%	6.9422%	● 1.06
Total	2,089	2,083.8	38,545	5.4196%	5.4063%	● 1.00

Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability
2012	295	238.6	5,695	5.1800%	4.1899%	▲ 1.24
2013	249	244.5	5,596	4.4496%	4.3698%	● 1.02
2014	242	245.3	5,358	4.5166%	4.5781%	● 0.99
2015	262	244.7	5,068	5.1697%	4.8283%	● 1.07
2016	290	241.2	4,742	6.1156%	5.0854%	▲ 1.20
2017	256	235.6	4,382	5.8421%	5.3761%	● 1.09
2018	225	229.1	4,018	5.5998%	5.7012%	● 0.98
2019	270	221.4	3,686	7.3250%	6.0073%	▲ 1.22
Total	2,089	1,900.4	38,545	5.4196%	4.9303%	● 1.10

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Age



Accidental Disability Rate - Actual, Expected, and Ratio; by Age

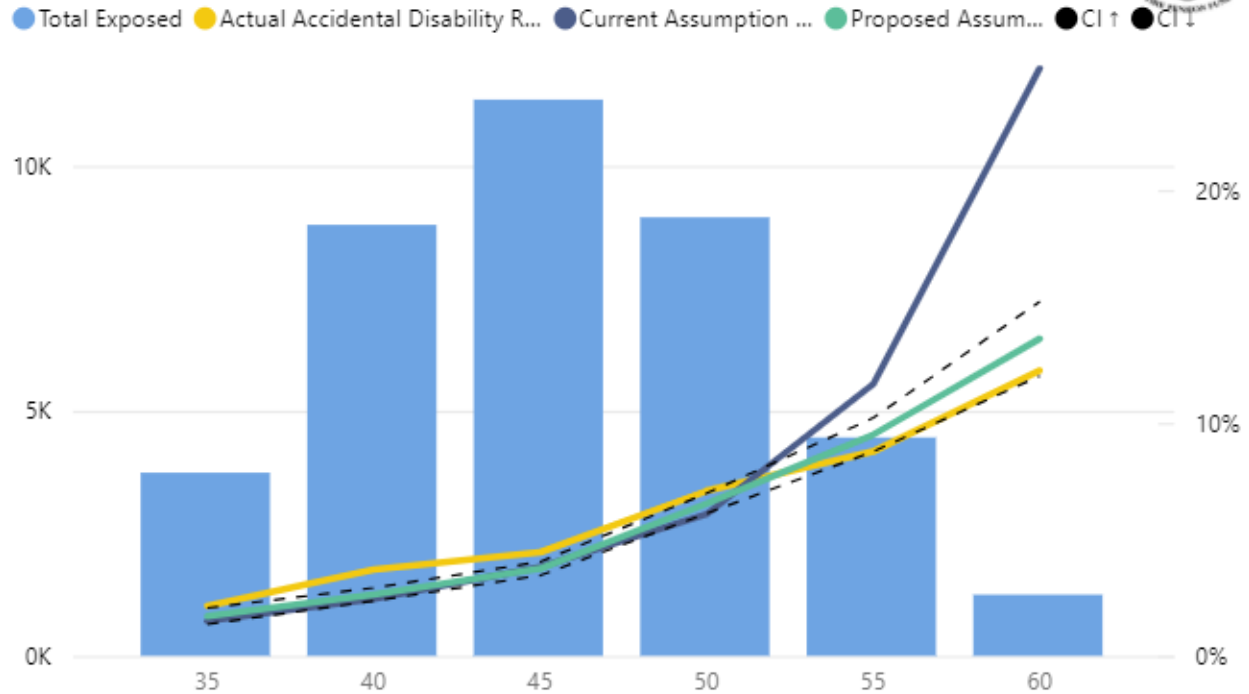


The following charts show the experience of accidental disability retirement by age, for the age range 35 to 64 and the service range 10 to 39 years for the current and proposed assumptions. This resulted in an increase in the A/E ratio from 1.00 to 1.10. For ages 35 to 54, the A/E ratio decreased from 1.24 to 1.18 and for ages 55 to 64, the A/E ratio increased from 0.64 to 0.92.

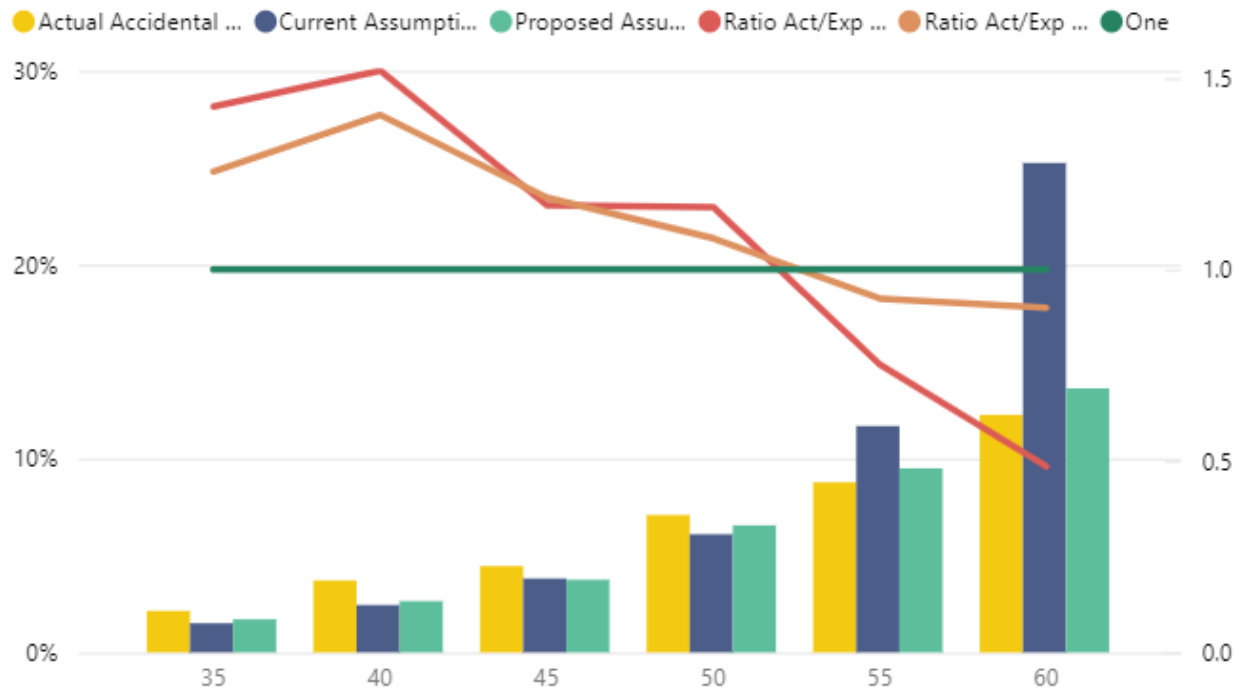
Age	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
35	5	4.0	405	1.2346%	1.0000%	▲ 1.23
36	11	6.4	537	2.0484%	1.2000%	◆ 1.71
37	13	9.9	704	1.8466%	1.4000%	▲ 1.32
38	20	15.0	937	2.1345%	1.6000%	▲ 1.33
39	31	20.8	1,155	2.6840%	1.8000%	▲ 1.49
40	35	28.0	1,399	2.5018%	2.0000%	▲ 1.25
41	50	35.1	1,595	3.1348%	2.2000%	▲ 1.42
42	64	42.7	1,778	3.5996%	2.4000%	▲ 1.50
43	75	50.2	1,929	3.8880%	2.6000%	▲ 1.50
44	102	58.7	2,096	4.8664%	2.8000%	◆ 1.74
45	68	64.8	2,160	3.1481%	3.0000%	● 1.05
46	115	77.6	2,282	5.0394%	3.4000%	▲ 1.48
47	101	88.0	2,315	4.3629%	3.8000%	▲ 1.15
48	106	98.1	2,335	4.5396%	4.2000%	● 1.08
49	115	104.0	2,261	5.0862%	4.6000%	▲ 1.11
50	135	105.6	2,113	6.3890%	5.0000%	▲ 1.28
51	131	109.8	1,961	6.6803%	5.6000%	▲ 1.19
52	136	110.5	1,783	7.6276%	6.2000%	▲ 1.23
53	121	110.8	1,629	7.4279%	6.8000%	● 1.09
54	111	108.4	1,465	7.5768%	7.4000%	● 1.02
55	108	99.8	1,248	8.6538%	8.0000%	● 1.08
56	79	103.8	1,038	7.6108%	10.0000%	▲ 0.76
57	93	105.8	882	10.5442%	12.0000%	▲ 0.88
58	57	106.4	709	8.0395%	15.0000%	▲ 0.54
59	54	104.4	580	9.3103%	18.0000%	▲ 0.52
60	49	99.1	472	10.3814%	21.0000%	◆ 0.49
61	41	84.8	339	12.0944%	25.0000%	◆ 0.48
62	30	67.5	225	13.3333%	30.0000%	◆ 0.44
63	18	40.8	136	13.2353%	30.0000%	◆ 0.44
64	15	23.1	77	19.4805%	30.0000%	▲ 0.65
Total	2,089	2,083.8	38,545	5.4196%	5.4063%	● 1.00

Age	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability	
35	5	5.0	405	1.2346%	1.2250%	●	1.01
36	11	7.5	537	2.0484%	1.4000%	▲	1.46
37	13	11.3	704	1.8466%	1.6000%	▲	1.15
38	20	16.9	937	2.1345%	1.8000%	▲	1.19
39	31	23.1	1,155	2.6840%	2.0000%	▲	1.34
40	35	30.8	1,399	2.5018%	2.2000%	▲	1.14
41	50	38.3	1,595	3.1348%	2.4000%	▲	1.31
42	64	46.2	1,778	3.5996%	2.6000%	▲	1.38
43	75	54.0	1,929	3.8880%	2.8000%	▲	1.39
44	102	62.9	2,096	4.8664%	3.0000%	◆	1.62
45	68	69.1	2,160	3.1481%	3.2000%	●	0.98
46	115	77.6	2,282	5.0394%	3.4000%	▲	1.48
47	101	83.3	2,315	4.3629%	3.6000%	▲	1.21
48	106	93.4	2,335	4.5396%	4.0000%	▲	1.13
49	115	101.7	2,261	5.0862%	4.5000%	▲	1.13
50	135	117.3	2,113	6.3890%	5.5500%	▲	1.15
51	131	117.7	1,961	6.6803%	6.0000%	▲	1.11
52	136	115.9	1,783	7.6276%	6.5000%	▲	1.17
53	121	118.1	1,629	7.4279%	7.2500%	●	1.02
54	111	117.2	1,465	7.5768%	8.0000%	●	0.95
55	108	106.1	1,248	8.6538%	8.5000%	●	1.02
56	79	96.0	1,038	7.6108%	9.2500%	▲	0.82
57	93	86.0	882	10.5442%	9.7500%	●	1.08
58	57	72.7	709	8.0395%	10.2500%	▲	0.78
59	54	62.4	580	9.3103%	10.7500%	▲	0.87
60	49	54.3	472	10.3814%	11.5000%	●	0.90
61	41	42.4	339	12.0944%	12.5000%	●	0.97
62	30	33.7	225	13.3333%	15.0000%	▲	0.89
63	18	20.4	136	13.2353%	15.0000%	▲	0.88
64	15	19.3	77	19.4805%	25.0000%	▲	0.78
Total	2,089	1,900.4	38,545	5.4196%	4.9303%	●	1.10

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Age



Accidental Disability Rate - Actual, Expected, and Ratio; by Age



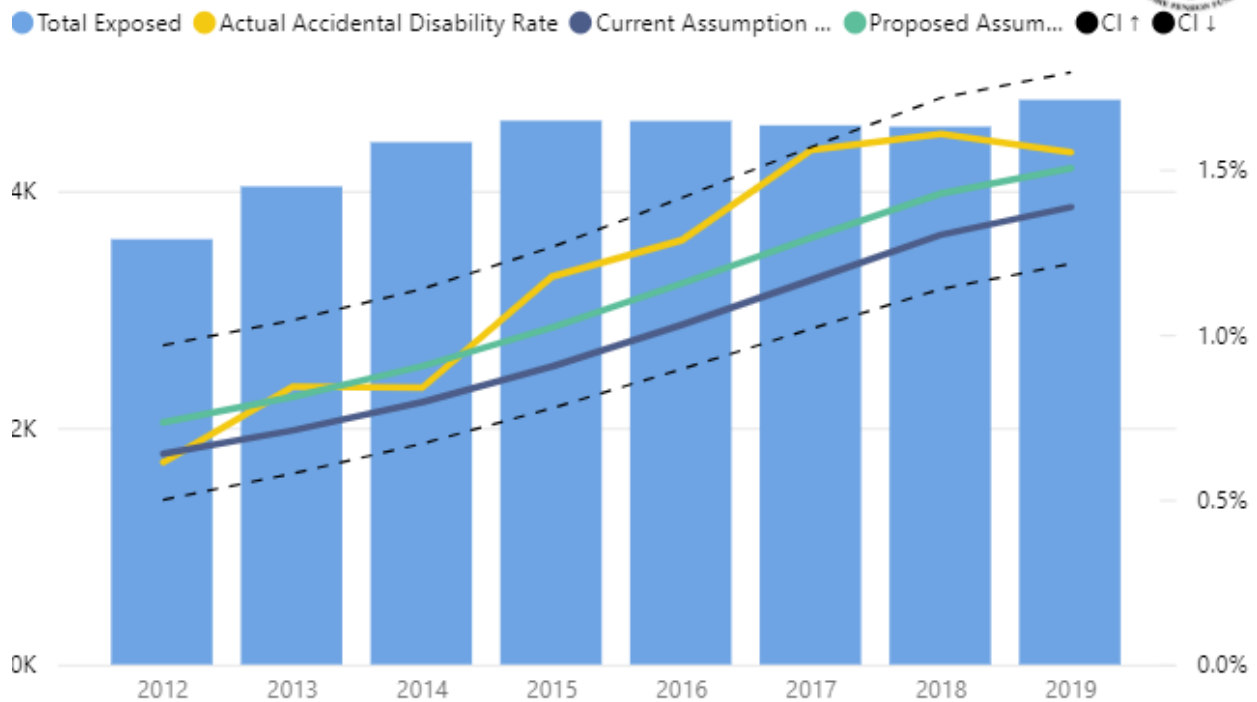
Members Who Are Not Eligible for WTC Benefits (Tiers 1 and 2 plus Tier 3 Enhanced)

The following tables show the accidental disability experience of members who are not eligible for WTC benefits by year, for the age range 25 to 49 and the service range 5 to 24 years during the period 2012 – 2019 (there was little experience for ages over 49 and service of at least 25 years). The actual rate of accidental disability averaged 1.2084% whereas the overall expected rate of ordinary disability averaged 1.0077% based on the current assumptions and 1.1234% based on the proposed assumptions. Similar to those eligible for WTC benefits, the proposed rates include lower rates at ages 56 and older but slightly higher rates at younger ages than the current assumption. Please note that these rates range from approximately 65% – 85% of the rates proposed for those eligible for WTC benefits.

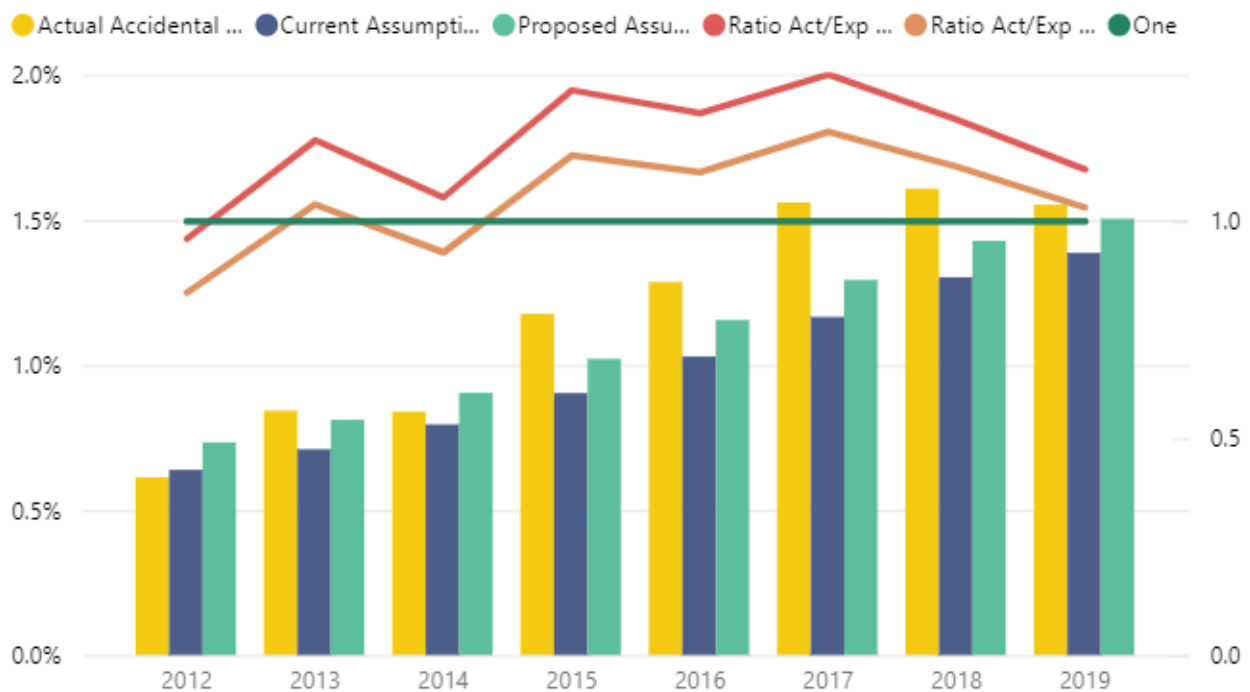
Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
2012	22	22.9	3,592	0.6125%	0.6383%	0.96
2013	34	28.6	4,037	0.8422%	0.7093%	1.19
2014	37	35.1	4,411	0.8388%	0.7946%	1.06
2015	54	41.5	4,593	1.1757%	0.9029%	1.30
2016	59	47.2	4,590	1.2854%	1.0288%	1.25
2017	71	53.0	4,553	1.5594%	1.1650%	1.34
2018	73	59.1	4,542	1.6072%	1.3020%	1.23
2019	74	66.1	4,769	1.5517%	1.3855%	1.12
Total	424	353.6	35,087	1.2084%	1.0077%	1.20

Plan Year	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability
2012	22	26.3	3,592	0.6125%	0.7329%	0.84
2013	34	32.7	4,037	0.8422%	0.8106%	1.04
2014	37	39.9	4,411	0.8388%	0.9036%	0.93
2015	54	46.9	4,593	1.1757%	1.0205%	1.15
2016	59	53.0	4,590	1.2854%	1.1544%	1.11
2017	71	58.9	4,553	1.5594%	1.2927%	1.21
2018	73	64.8	4,542	1.6072%	1.4272%	1.13
2019	74	71.7	4,769	1.5517%	1.5036%	1.03
Total	424	394.2	35,087	1.2084%	1.1234%	1.08

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Year



Accidental Disability Rate - Actual, Expected, and Ratio; by Year

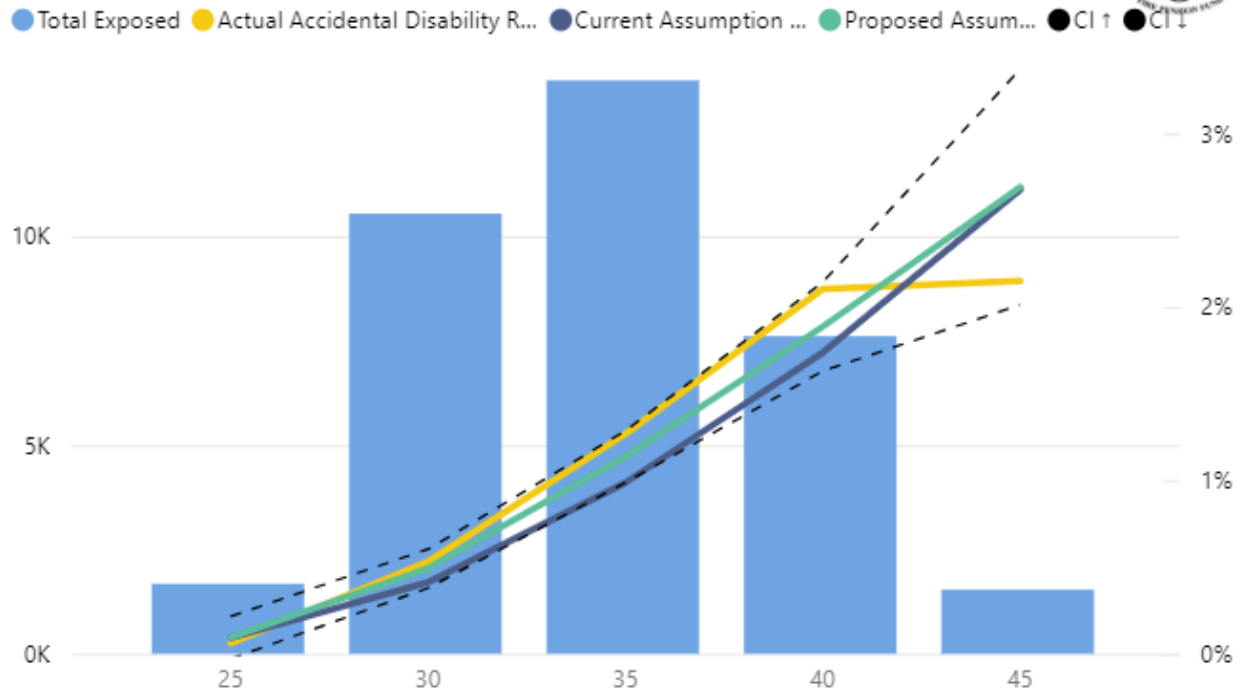


The following charts show the experience of accidental disability retirement by age, for the age range 25 to 49 and the service range 5 to 24 years for the current and proposed assumptions. This resulted in a decrease in the A/E ratio from 1.20 to 1.08.

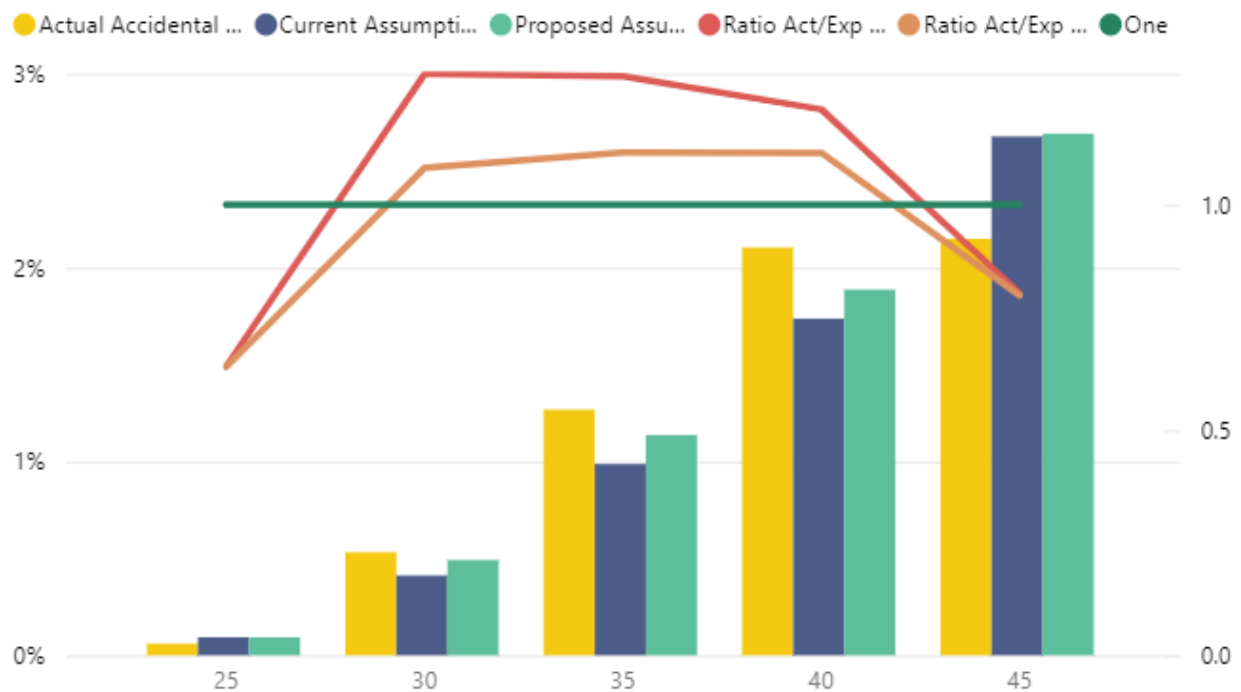
Age	Actual Accidental Disabilities	Expected Accidental Disabilities	Total Exposed	Actual Accidental Disability Rate	Current Assumption Accidental Disability	Ratio Act/Exp Accidental Disability
25	0	0.0	4	0.0000%	0.0350%	0.00
26	0	0.0	36	0.0000%	0.0450%	0.00
27	0	0.1	217	0.0000%	0.0550%	0.00
28	0	0.4	521	0.0000%	0.0750%	0.00
29	1	1.0	898	0.1114%	0.1150%	0.97
30	0	2.3	1,294	0.0000%	0.1750%	0.00
31	7	4.8	1,739	0.4025%	0.2750%	1.46
32	11	8.0	2,140	0.5140%	0.3750%	1.37
33	17	12.0	2,535	0.6706%	0.4750%	1.41
34	21	16.3	2,831	0.7418%	0.5750%	1.29
35	33	20.6	2,949	1.1190%	0.7000%	1.60
36	38	24.5	2,887	1.3162%	0.8500%	1.55
37	37	28.0	2,800	1.3214%	1.0000%	1.32
38	27	30.6	2,661	1.0147%	1.1500%	0.88
39	39	31.6	2,433	1.6030%	1.3000%	1.23
40	43	32.4	2,159	1.9917%	1.5000%	1.33
41	38	30.7	1,860	2.0430%	1.6500%	1.24
42	41	27.4	1,521	2.6956%	1.8000%	1.50
43	17	22.8	1,169	1.4542%	1.9500%	0.75
44	21	18.8	897	2.3411%	2.1000%	1.11
45	12	14.4	628	1.9108%	2.3000%	0.83
46	9	11.3	427	2.1077%	2.6500%	0.80
47	5	8.2	272	1.8382%	3.0000%	0.61
48	2	5.2	156	1.2821%	3.3500%	0.38
49	5	2.0	53	9.4340%	3.7000%	2.55
Total	424	353.6	35,087	1.2084%	1.0077%	1.20

Age	Actual Accidental Disabilities	Expected Accidental Disabilities Proposed	Total Exposed	Actual Accidental Disability Rate	Proposed Assumption Accidental Disability	Act/Exp Proposed Accidental Disability
25	0	0.0	4	0.0000%	0.0350%	0.00
26	0	0.0	36	0.0000%	0.0450%	0.00
27	0	0.1	217	0.0000%	0.0550%	0.00
28	0	0.4	521	0.0000%	0.0750%	0.00
29	1	1.0	898	0.1114%	0.1150%	0.97
30	0	2.3	1,294	0.0000%	0.1750%	0.00
31	7	5.7	1,739	0.4025%	0.3250%	1.24
32	11	10.2	2,140	0.5140%	0.4750%	1.08
33	17	14.6	2,535	0.6706%	0.5750%	1.17
34	21	19.1	2,831	0.7418%	0.6750%	1.10
35	33	25.1	2,949	1.1190%	0.8500%	1.32
36	38	28.9	2,887	1.3162%	1.0000%	1.32
37	37	32.2	2,800	1.3214%	1.1500%	1.15
38	27	34.6	2,661	1.0147%	1.3000%	0.78
39	39	35.3	2,433	1.6030%	1.4500%	1.11
40	43	35.6	2,159	1.9917%	1.6500%	1.21
41	38	33.5	1,860	2.0430%	1.8000%	1.14
42	41	29.7	1,521	2.6956%	1.9500%	1.38
43	17	24.5	1,169	1.4542%	2.1000%	0.69
44	21	20.2	897	2.3411%	2.2500%	1.04
45	12	15.4	628	1.9108%	2.4500%	0.78
46	9	11.3	427	2.1077%	2.6500%	0.80
47	5	7.8	272	1.8382%	2.8500%	0.64
48	2	5.0	156	1.2821%	3.2000%	0.40
49	5	1.9	53	9.4340%	3.5500%	2.66
Total	424	394.2	35,087	1.2084%	1.1234%	1.08

Exposure Distribution w/ Accidental Disability Rate - Actual and Expected; by Age



Accidental Disability Rate - Actual, Expected, and Ratio; by Age



Tier 3 Members

The current assumption for Tier 3 and Tier 3 Modified members is lower than the assumption used for Tier 3 Enhanced members due to the difference in the benefit. We do not believe the act of becoming accidentally disabled would vary by type of member. However, we believe that these Tier 3 members who would receive a service retirement benefit as large as an accidental disability retirement benefit would elect a service retirement benefit. Therefore, we propose the accidental disability assumption cease to apply upon completion of 22 years of service.

There is no significant experience for this group and so no charts are included.

Summary

Eligibility for WTC benefits continues to have a significant impact on the experience of the plan and accidental disability benefits. The proposed assumptions decrease the expected number to collect accidental disability benefits at ages 56 and older whether eligible for WTC benefits or not. We believe this would result in lower plan liabilities. Slightly larger rates are proposed for younger ages which would result in higher plan liabilities. The actual impact would depend on the demographics of the active membership.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT			
Age	Tier 1 & Tier 2 Eligible for WTC Benefits	Tier 1 & Tier 2 Not Eligible for WTC and Tier 3 Enhanced Plan	Tier 3 & Tier 3 Modified Non- Enhanced Plan
15	0.050%	0.035%	0.030%
16	0.050%	0.035%	0.030%
17	0.050%	0.035%	0.030%
18	0.050%	0.035%	0.030%
19	0.050%	0.035%	0.030%
20	0.050%	0.035%	0.030%
21	0.050%	0.035%	0.030%
22	0.050%	0.035%	0.030%
23	0.050%	0.035%	0.030%
24	0.050%	0.035%	0.030%
25	0.050%	0.035%	0.030%
26	0.090%	0.045%	0.040%
27	0.130%	0.055%	0.050%
28	0.170%	0.075%	0.070%
29	0.210%	0.115%	0.100%
30	0.250%	0.175%	0.150%
31	0.400%	0.275%	0.240%
32	0.550%	0.375%	0.330%
33	0.700%	0.475%	0.420%
34	0.850%	0.575%	0.510%
35	1.000%	0.700%	0.600%
36	1.200%	0.850%	0.720%
37	1.400%	1.000%	0.840%
38	1.600%	1.150%	0.960%
39	1.800%	1.300%	1.080%
40	2.000%	1.500%	1.200%
41	2.200%	1.650%	1.320%
42	2.400%	1.800%	1.440%
43	2.600%	1.950%	1.560%
44	2.800%	2.100%	1.680%
45	3.000%	2.300%	1.800%

NEW YORK CITY FIRE PENSION FUND CURRENT (continued) PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT			
Age	Tier 1 & Tier 2 Eligible for WTC Benefits	Tier 1 & Tier 2 Not Eligible for WTC and Tier 3 Enhanced Plan	Tier 3 & Tier 3 Modified Non- Enhanced Plan
46	3.400%	2.650%	1.920%
47	3.800%	3.000%	2.040%
48	4.200%	3.350%	2.160%
49	4.600%	3.700%	2.280%
50	5.000%	4.050%	2.400%
51	5.600%	4.400%	2.520%
52	6.200%	4.750%	2.640%
53	6.800%	5.100%	2.760%
54	7.400%	5.450%	2.880%
55	8.000%	5.800%	3.000%
56	10.000%	8.000%	4.000%
57	12.000%	10.000%	5.000%
58	15.000%	12.500%	6.000%
59	18.000%	15.000%	7.000%
60	21.000%	17.500%	8.000%
61	25.000%	20.000%	9.000%
62	30.000%	22.000%	N/A
63	30.000%	22.000%	N/A
64	30.000%	22.000%	N/A
65	N/A	N/A	N/A

*N/A for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members at ages 62-64.

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT ¹		
Age	Not Eligible for WTC Benefits ²	Eligible for WTC Benefits
20	0.0350%	0.0500%
21	0.0350%	0.0500%
22	0.0350%	0.0500%
23	0.0350%	0.0500%
24	0.0350%	0.0500%
25	0.0350%	0.0500%
26	0.0450%	0.1000%
27	0.0550%	0.1250%
28	0.0750%	0.1750%
29	0.1150%	0.2000%
30	0.1750%	0.2500%
31	0.3250%	0.4750%
32	0.4750%	0.7000%
33	0.5750%	0.8500%
34	0.6750%	1.0000%
35	0.8500%	1.2250%
36	1.0000%	1.4000%
37	1.1500%	1.6000%
38	1.3000%	1.8000%
39	1.4500%	2.0000%
40	1.6500%	2.2000%
41	1.8000%	2.4000%
42	1.9500%	2.6000%
43	2.1000%	2.8000%
44	2.2500%	3.0000%
45	2.4500%	3.2000%
46	2.6500%	3.4000%
47	2.8500%	3.6000%
48	3.2000%	4.0000%
49	3.5500%	4.5000%
50	4.5000%	5.5500%
51	5.0000%	6.0000%
52	5.5000%	6.5000%

NEW YORK CITY FIRE PENSION FUND PROPOSED (continued) PROBABILITIES OF ACCIDENTAL DISABILITY RETIREMENT ¹		
Age	Not Eligible for WTC Benefits ²	Eligible for WTC Benefits
53	6.0000%	7.2500%
54	6.5000%	8.0000%
55	7.0000%	8.5000%
56	7.5000%	9.2500%
57	8.0000%	9.7500%
58	8.5000%	10.2500%
59	9.0000%	10.7500%
60	9.5000%	11.5000%
61	10.0000%	12.5000%
62 ³	10.5000%	15.0000%
63 ³	11.0000%	15.0000%
64 ³	11.0000%	25.0000%
65	N/A	N/A

¹ Greater of disability benefit and retirement benefit is valued if eligible for early or service retirement

² No rates of accidental disability apply upon completion of 22 years of service for Tier 3 and Tier 3 Modified members

³ N/A for Tier 3, Tier 3 Modified, and Tier 3 Enhanced members.

Pre-retirement Death

Mortality assumptions involve two components: a base table and a mortality improvement scale. The mortality improvement scale adjusts the mortality rates of the base table to reflect that generally rates of mortality are anticipated to improve over time.

The Society of Actuaries (SOA) has published mortality improvement scales (MP scales) each year from 2014 to 2021. In the last several actuarial valuations, OA has used the mortality improvement scale that coincides with the valuation date. For example, OA used the MP-2020 scale in its June 30, 2020 lag actuarial valuation. In this analysis, we used the most recent improvement scale (MP-2021) published by the SOA as of the date of this analysis. Please note that the SOA has not published an updated MP scale due to the pandemic.

The SOA MP-2021 improvement scale is based on data through 2019 (before the onset of Covid) from the Social Security Administration (SSA). Even though the aggregate (for all ages) long-term trend has been towards mortality improvements, this is not always the case for each age. Therefore, there are situations where the expected mortality rate in a later year is higher than base rate.

There is much discussion in the actuarial profession and among retirement systems about the development of mortality tables and treatment of excess deaths due to the Covid pandemic, which occurred in 2020 – 2022. The analysis to develop our recommendations exclude the mortality experience of members during the pandemic and reflect the experience from 2012 - 2019.

In this study the base table of the current assumption corresponds to the year 2012; expected mortality rates in future years are obtained from the base table and the MP-2021 scale. For example, the 2017 (July 1, 2016 – June 30, 2017) mortality rates are derived from the base table (2012) adjusted with four years of improvements until 2016. This method links mortality rates across the years and, consequently, allows mortality comparisons from one year to another.

For the proposed assumption, proposed rates were initially determined as of the mid-year of the study period or fiscal year 2016. MP-2021 was then used to adjust those rates to earlier and later years. The proposed mortality rates shown in the following section have been adjusted to reflect a base year of 2019. We recommend that MP-2021 continue to be used to reflect mortality improvements both before and after the measurement date.

In reviewing the current assumption, we compared the actual experience to published tables from the SOA. The most recent tables published by the SOA reflected experience for public plan retirement systems separated into Public Safety (PubS) members, General employees (PubG) and Teachers (PubT). Adjustments were made to the standard SOA tables to match the experience of the system or the current tables, and for consistency with recommended postretirement mortality tables, to determine if the SOA tables provided a better fit.

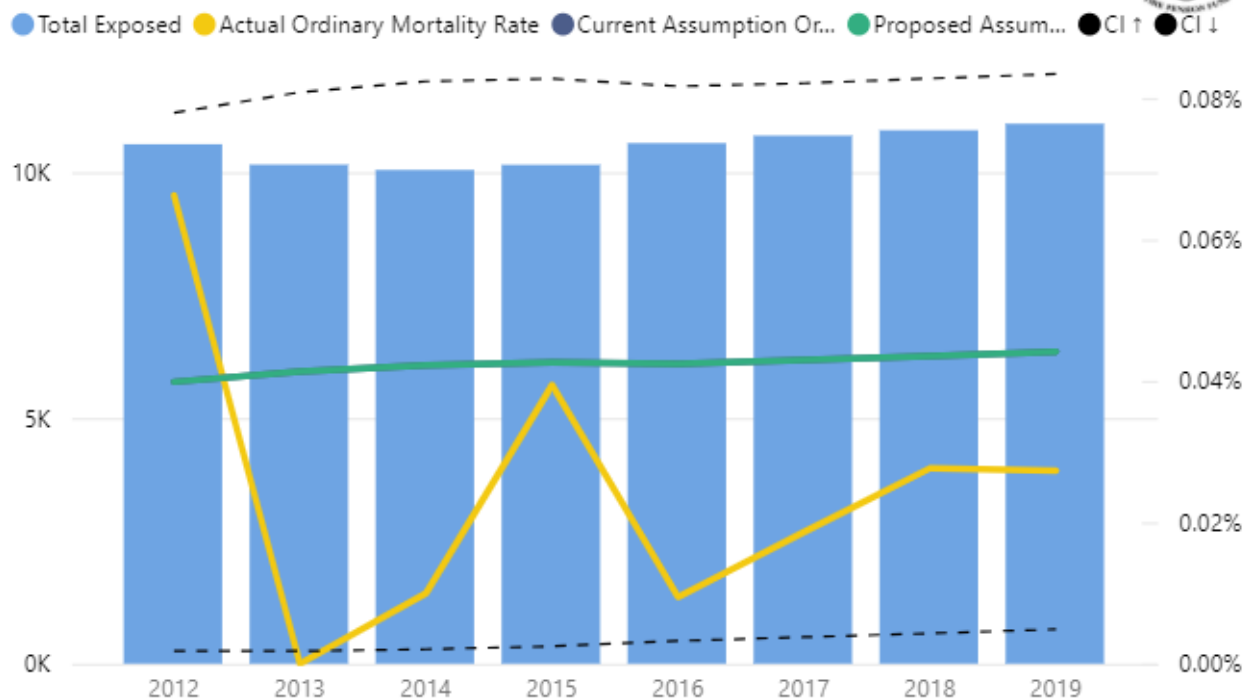
Ordinary Death

For FIRE, we compared the experience to PubS tables multiplied by an adjustment factor of 55%. As data is not credible and actual experience is much lower than published table, we propose no change to the assumption.

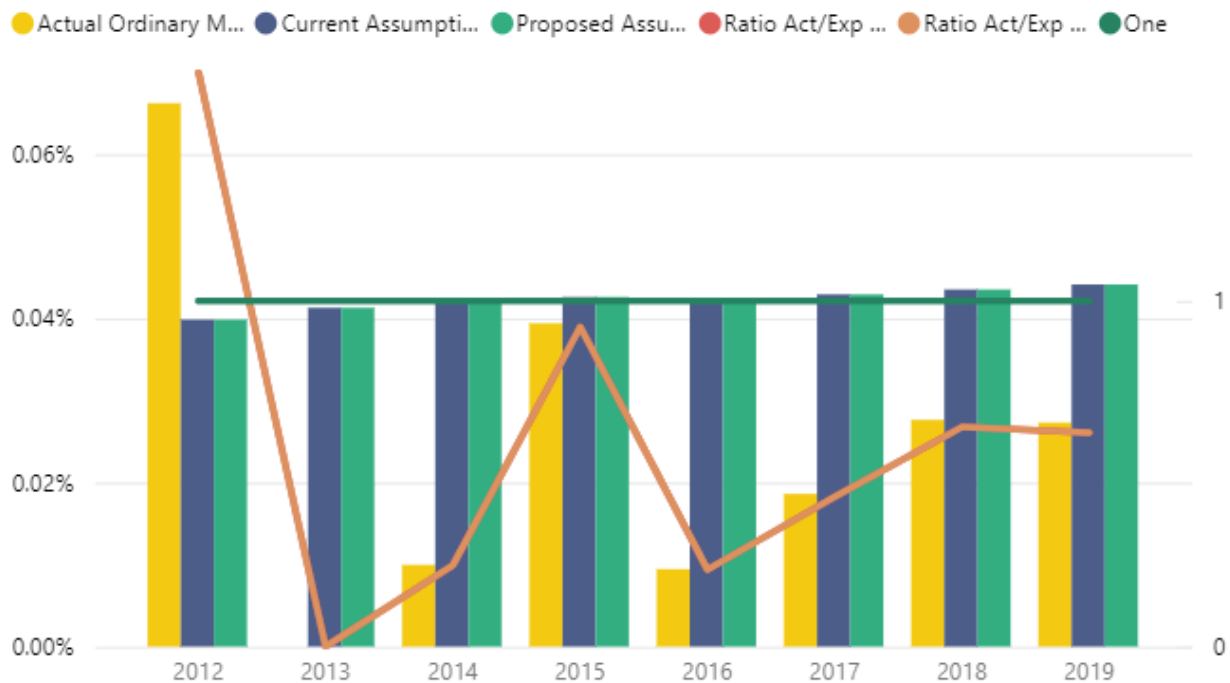
The following tables show the experience of ordinary death by year, for the age range (20 to 59) during the period 2012 – 2019 based on the proposed assumption for both males and females combined. The A/E ratio is 0.59.

Plan Year	Actual Ordinary Deaths	Expected Ordinary Deaths Proposed	Total Exposed	Actual Ordinary Mortality Rate	Proposed Assumption Ordinary Mortality	Act/Exp Proposed Ordinary Mortality
2012	7	4.2	10,570	0.0662%	0.0399%	1.66
2013	0	4.2	10,155	0.0000%	0.0413%	0.00
2014	1	4.2	10,047	0.0100%	0.0422%	0.24
2015	4	4.3	10,151	0.0394%	0.0426%	0.93
2016	1	4.5	10,593	0.0094%	0.0424%	0.22
2017	2	4.6	10,745	0.0186%	0.0429%	0.43
2018	3	4.7	10,854	0.0276%	0.0435%	0.64
2019	3	4.8	10,988	0.0273%	0.0441%	0.62
Total	21	35.7	84,103	0.0250%	0.0424%	0.59

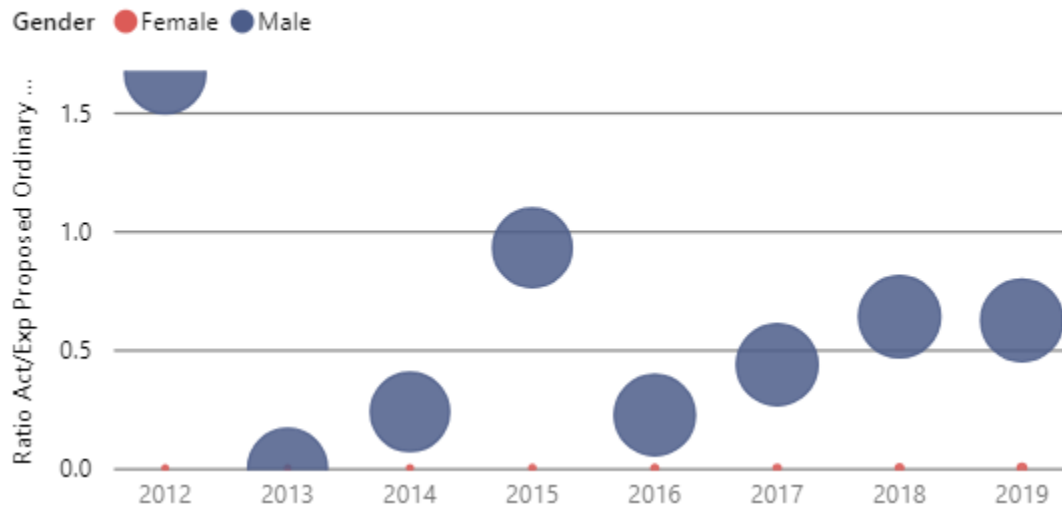
Exposure Distribution w/ Ordinary Mortality Rate - Actual and Expected; by Year



Ordinary Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Ordinary Mortality Proposed w/ Exposure Bubbles; by Year



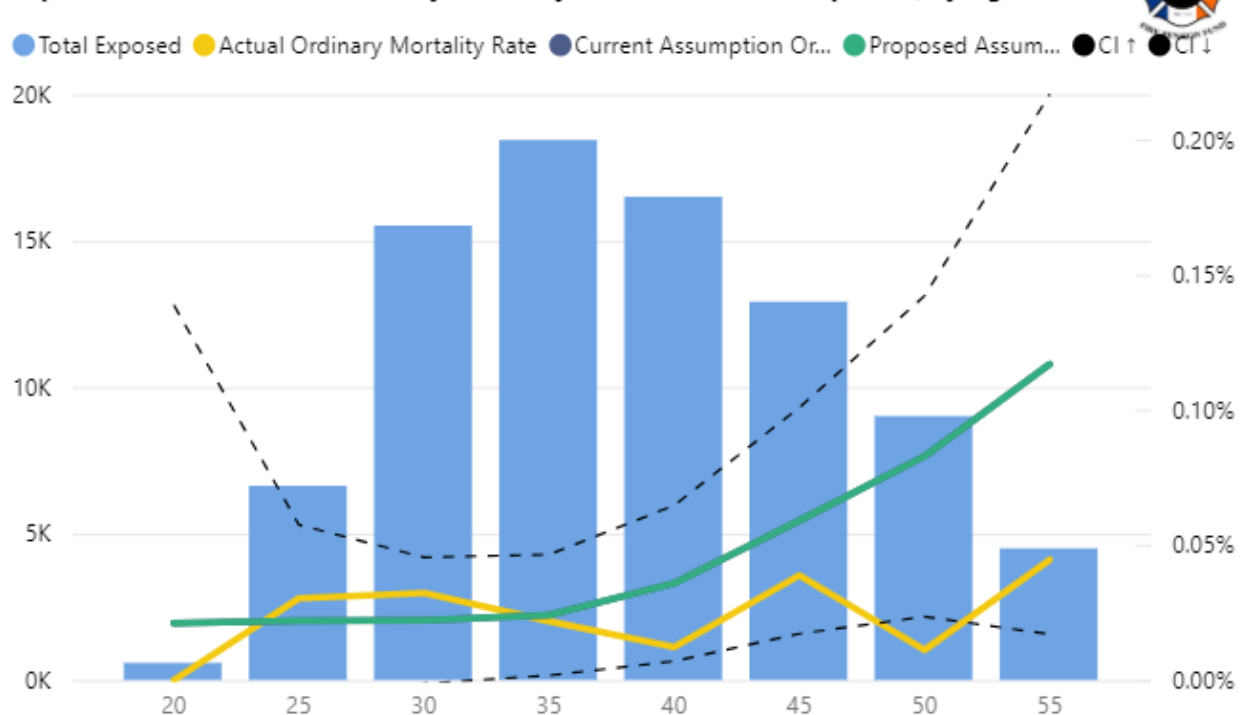
The following section displays results by age for males and females combined since there is nearly no female experience.

Males and Females

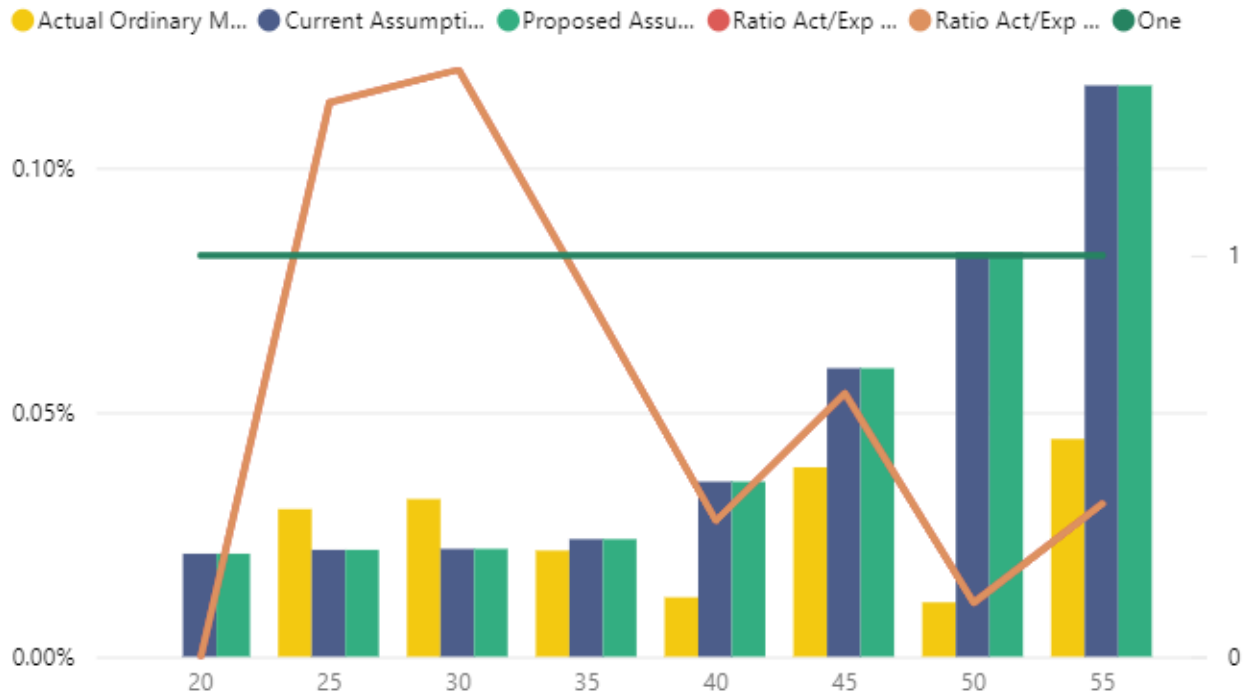
The following charts show the experience of ordinary death by age band, for the age range (20 to 59) during the period 2012 – 2019 based on the proposed assumption for both males and females combined. Although the experience is combined, separate assumptions are proposed for males and females. There is very little experience among female members. Please note that the charts by age are based on 5-year brackets. For example, the age bracket 45 should be interpreted as the interval 45 – 49.

Age (bins)	Actual Ordinary Deaths	Expected Ordinary Deaths Proposed	Total Exposed	Actual Ordinary Mortality Rate	Proposed Assumption Ordinary Mortality	Act/Exp Proposed Ordinary Mortality
20	0	0.1	584	0.0000%	0.0210%	0.00
25	2	1.4	6,631	0.0302%	0.0218%	1.38
30	5	3.4	15,518	0.0322%	0.0220%	1.46
35	4	4.4	18,442	0.0217%	0.0240%	0.90
40	2	5.9	16,504	0.0121%	0.0358%	0.34
45	5	7.6	12,918	0.0387%	0.0590%	0.66
50	1	7.5	9,013	0.0111%	0.0828%	0.13
55	2	5.2	4,493	0.0445%	0.1168%	0.38
Total	21	35.7	84,103	0.0250%	0.0424%	0.59

Exposure Distribution w/ Ordinary Mortality Rate - Actual and Expected; by Age



Ordinary Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

No change in the ordinary death assumption is proposed and thus, there is no liability impact.

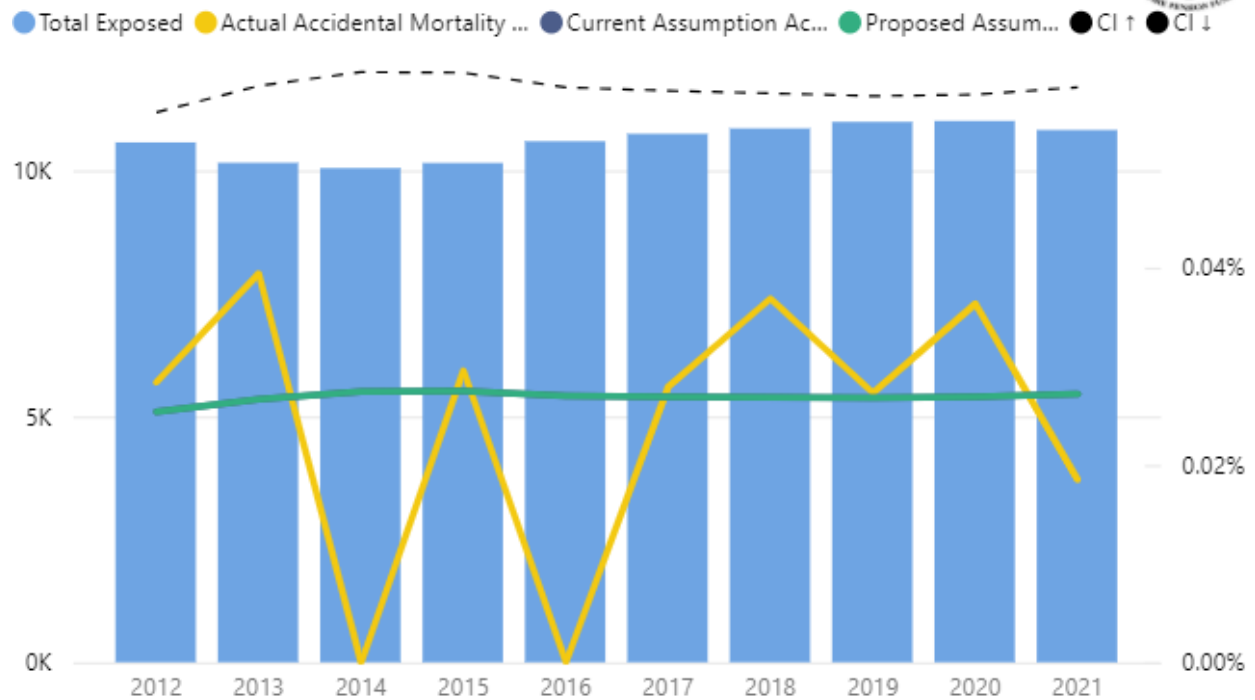
Accidental Death

The accidental death rate assumptions are unisex, increase with age, and are not subject to mortality improvements. The actual number of accidental deaths was fairly close to that anticipated. As such, we propose no change to the current assumption.

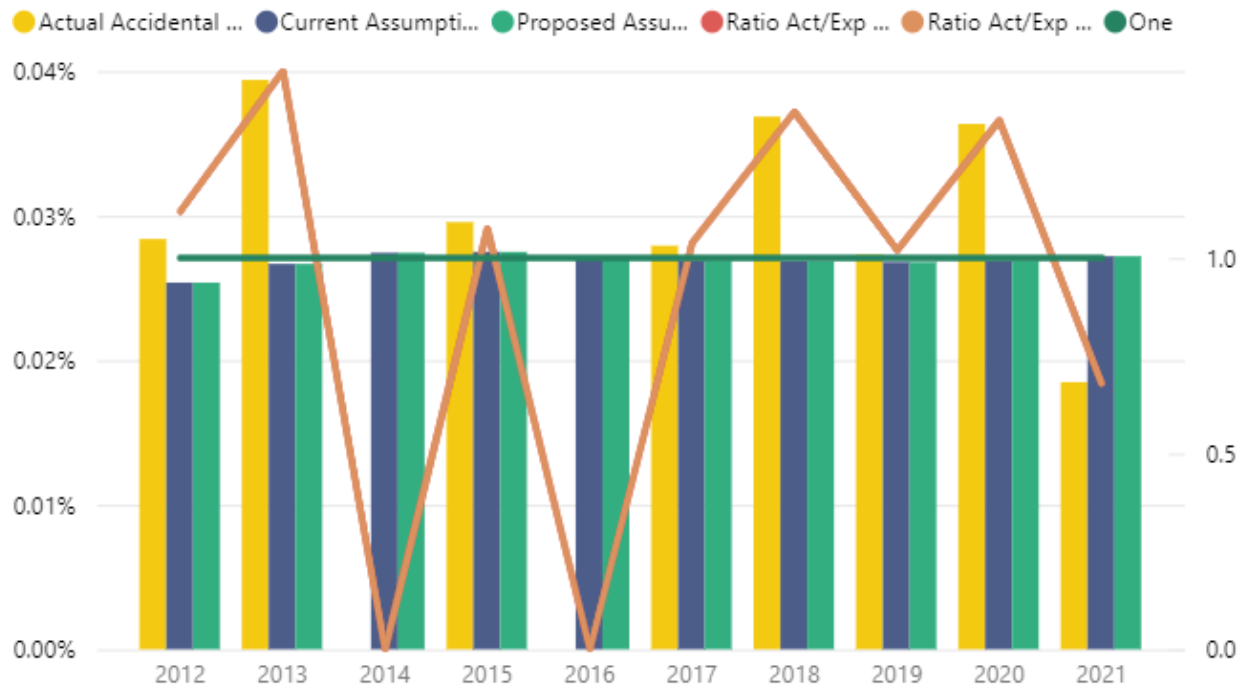
The following tables show the experience of ordinary death by year, for the age range (20 to 59) during the period 2012 – 2021 based on the proposed assumption for both males and females combined. The A/E ratio is 0.91.

Plan Year	Actual Accidental Deaths	Expected Accidental Deaths Proposed	Total Exposed	Actual Accidental Mortality Rate	Proposed Assumption Accidental Mortality	Act/Exp Proposed Accidental Mortality
2012	3	2.7	10,570	0.0284%	0.0254%	▲ 1.12
2013	4	2.7	10,155	0.0394%	0.0267%	▲ 1.48
2014	0	2.8	10,047	0.0000%	0.0274%	◆ 0.00
2015	3	2.8	10,151	0.0296%	0.0275%	● 1.07
2016	0	2.9	10,593	0.0000%	0.0270%	◆ 0.00
2017	3	2.9	10,745	0.0279%	0.0269%	● 1.04
2018	4	2.9	10,854	0.0369%	0.0268%	▲ 1.37
2019	3	2.9	10,988	0.0273%	0.0268%	● 1.02
2020	4	3.0	11,006	0.0363%	0.0269%	▲ 1.35
2021	2	2.9	10,822	0.0185%	0.0272%	▲ 0.68
Total	26	28.4	105,931	0.0245%	0.0269%	● 0.91

Exposure Distribution w/ Accidental Mortality Rate - Actual and Expected; by Year



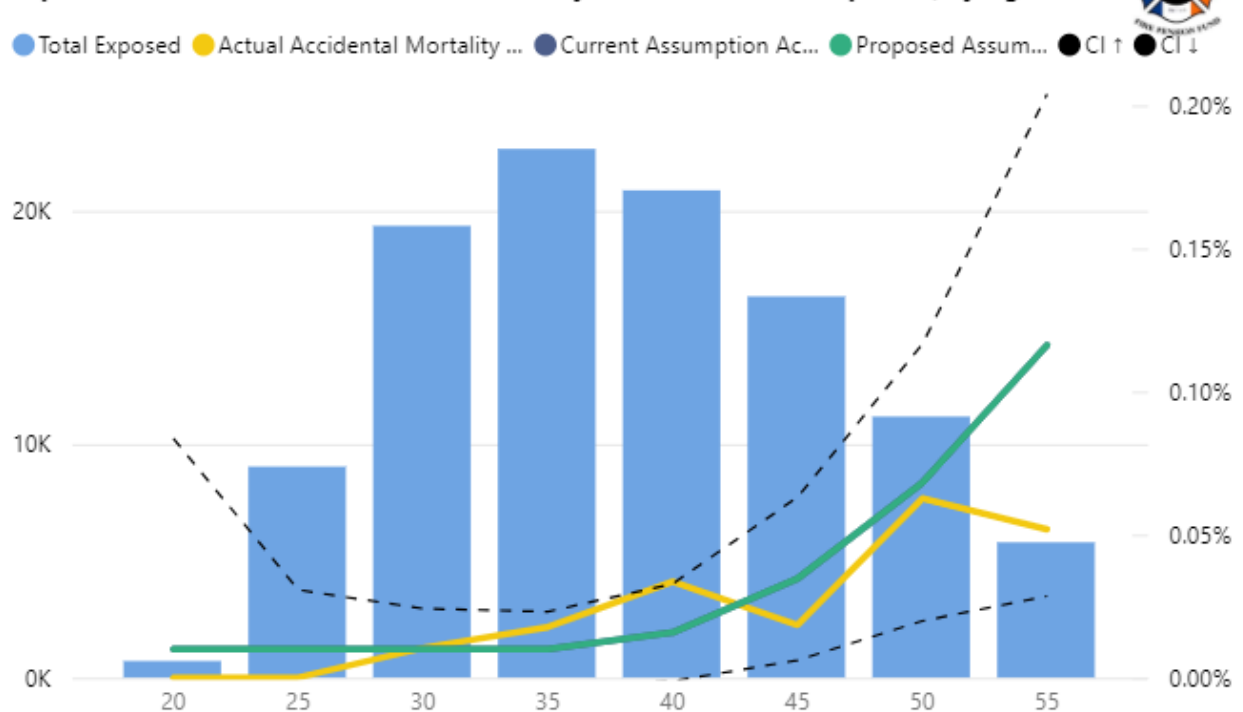
Accidental Mortality Rate - Actual, Expected, and Ratio; by Year



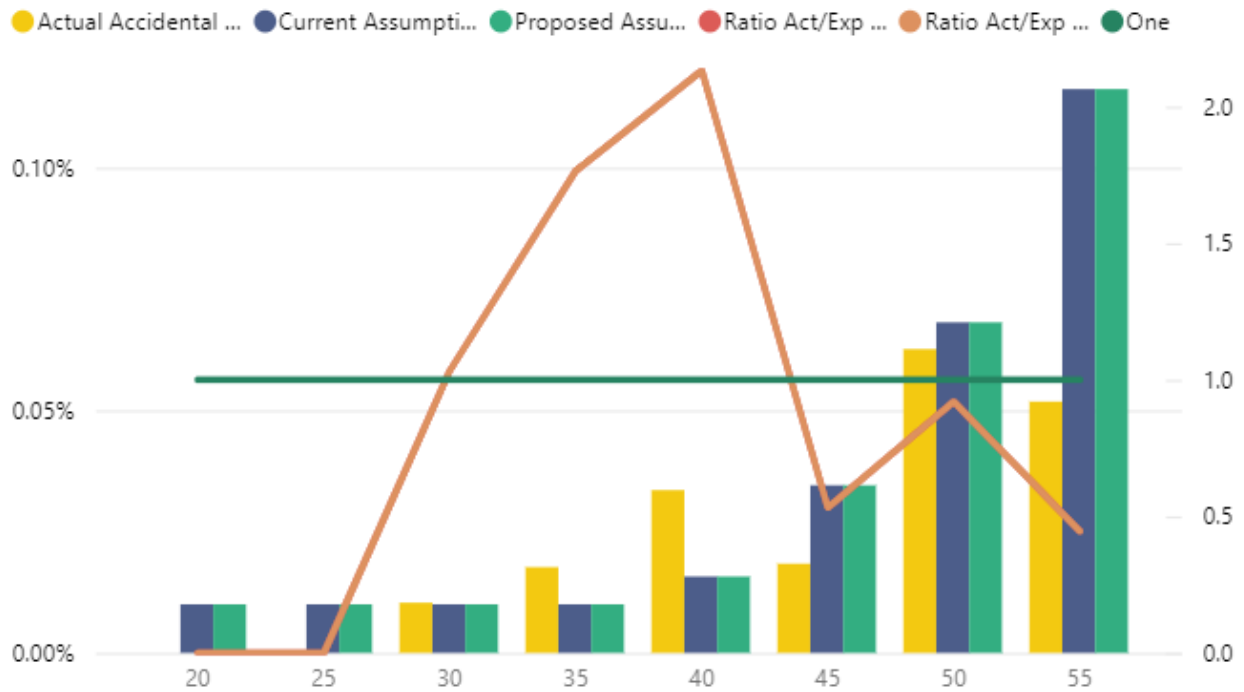
The following tables show the experience of ordinary death by age band, for the age range (20 to 59) during the period 2012 – 2021 based on the proposed assumption for both males and females combined. Please note that the charts by age are based on 5-year brackets. For example, the age bracket 45 should be interpreted as the interval 45 – 49.

Age (bins)	Actual Accidental Deaths	Expected Accidental Deaths Proposed	Total Exposed	Actual Accidental Mortality Rate	Proposed Assumption Accidental Mortality	Act/Exp Proposed Accidental Mortality
20	0	0.1	709	0.0000%	0.0100%	0.00
25	0	0.9	9,038	0.0000%	0.0100%	0.00
30	2	1.9	19,354	0.0103%	0.0100%	1.03
35	4	2.3	22,650	0.0177%	0.0100%	1.77
40	7	3.3	20,875	0.0335%	0.0157%	2.13
45	3	5.6	16,328	0.0184%	0.0345%	0.53
50	7	7.6	11,183	0.0626%	0.0681%	0.92
55	3	6.7	5,794	0.0518%	0.1162%	0.45
Total	26	28.4	105,931	0.0245%	0.0269%	0.91

Exposure Distribution w/ Accidental Mortality Rate - Actual and Expected; by Age



Accidental Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

No change in the accidental death assumption is proposed and thus, there is no liability impact.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF ACTIVE MEMBER MORTALITY			
Age	Ordinary Death		Accidental Death
	Males	Females	All
15	0.020%	0.015%	0.010%
16	0.020%	0.015%	0.010%
17	0.020%	0.015%	0.010%
18	0.020%	0.015%	0.010%
19	0.020%	0.015%	0.010%
20	0.020%	0.015%	0.010%
21	0.020%	0.015%	0.010%
22	0.020%	0.015%	0.010%
23	0.020%	0.015%	0.010%
24	0.020%	0.015%	0.010%
25	0.020%	0.015%	0.010%
26	0.020%	0.015%	0.010%
27	0.020%	0.015%	0.010%
28	0.020%	0.015%	0.010%
29	0.020%	0.015%	0.010%
30	0.020%	0.015%	0.010%
31	0.020%	0.015%	0.010%
32	0.020%	0.015%	0.010%
33	0.020%	0.015%	0.010%
34	0.020%	0.015%	0.010%
35	0.020%	0.015%	0.010%
36	0.021%	0.016%	0.010%
37	0.022%	0.017%	0.010%
38	0.023%	0.018%	0.010%
39	0.024%	0.019%	0.010%
40	0.025%	0.020%	0.010%

NEW YORK CITY FIRE PENSION FUND CURRENT (continued) PROBABILITIES OF ACTIVE MEMBER MORTALITY			
Age	Ordinary Death		Accidental Death
	Males	Females	All
41	0.030%	0.023%	0.013%
42	0.035%	0.026%	0.016%
43	0.040%	0.029%	0.019%
44	0.045%	0.032%	0.022%
45	0.050%	0.035%	0.025%
46	0.055%	0.038%	0.030%
47	0.060%	0.041%	0.035%
48	0.065%	0.044%	0.040%
49	0.070%	0.047%	0.045%
50	0.075%	0.050%	0.050%
51	0.080%	0.055%	0.060%
52	0.085%	0.060%	0.070%
53	0.090%	0.065%	0.080%
54	0.095%	0.070%	0.090%
55	0.100%	0.075%	0.100%
56	0.110%	0.080%	0.110%
57	0.120%	0.085%	0.120%
58	0.130%	0.090%	0.130%
59	0.140%	0.095%	0.140%
60	0.150%	0.100%	0.150%
61	0.160%	0.110%	0.200%
62*	0.170%	0.120%	0.250%
63	0.180%	0.130%	0.300%
64	0.190%	0.140%	0.350%
65	N/A	N/A	N/A

*Probabilities are N/A for Tier 3 and Tier 3 Modified members.

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF ACTIVE MEMBER MORTALITY BASE YEAR 2019			
Age	Ordinary Death		Accidental Death
	Males	Females	All
15	0.020%	0.015%	0.010%
16	0.020%	0.015%	0.010%
17	0.020%	0.015%	0.010%
18	0.020%	0.015%	0.010%
19	0.020%	0.015%	0.010%
20	0.021%	0.016%	0.010%
21	0.021%	0.016%	0.010%
22	0.022%	0.017%	0.010%
23	0.022%	0.017%	0.010%
24	0.022%	0.017%	0.010%
25	0.023%	0.017%	0.010%
26	0.024%	0.018%	0.010%
27	0.024%	0.018%	0.010%
28	0.025%	0.018%	0.010%
29	0.025%	0.019%	0.010%
30	0.026%	0.019%	0.010%
31	0.026%	0.019%	0.010%
32	0.026%	0.019%	0.010%
33	0.027%	0.019%	0.010%
34	0.027%	0.019%	0.010%
35	0.027%	0.019%	0.010%
36	0.028%	0.020%	0.010%
37	0.029%	0.021%	0.010%
38	0.030%	0.021%	0.010%
39	0.030%	0.022%	0.010%
40	0.031%	0.022%	0.010%

NEW YORK CITY FIRE PENSION FUND PROPOSED (continued) PROBABILITIES OF ACTIVE MEMBER MORTALITY BASE YEAR 2019			
Age	Ordinary Death		Accidental Death
	Males	Females	All
41	0.036%	0.025%	0.013%
42	0.041%	0.028%	0.016%
43	0.045%	0.030%	0.019%
44	0.049%	0.032%	0.022%
45	0.053%	0.034%	0.025%
46	0.057%	0.037%	0.030%
47	0.060%	0.039%	0.035%
48	0.064%	0.042%	0.040%
49	0.068%	0.044%	0.045%
50	0.072%	0.047%	0.050%
51	0.077%	0.052%	0.060%
52	0.082%	0.058%	0.070%
53	0.087%	0.064%	0.080%
54	0.092%	0.069%	0.090%
55	0.098%	0.076%	0.100%
56	0.109%	0.082%	0.110%
57	0.120%	0.088%	0.120%
58	0.132%	0.094%	0.130%
59	0.144%	0.100%	0.140%
60	0.155%	0.105%	0.150%
61	0.166%	0.114%	0.200%
62 *	0.177%	0.124%	0.250%
63	0.187%	0.132%	0.300%
64	0.196%	0.140%	0.350%
65	0	0	N/A

*Probabilities are N/A for Tier 3 members aged 62 and over.

Postretirement Mortality

In addition to gender, the post-retirement mortality assumption depends on the type of inactive member:

- 1) Service Retirees
- 2) Disabled Retirees
- 3) Contingent Beneficiaries

The MEST contains all retirees on one page and beneficiaries on another page. On the retiree page, the experience can be examined by status to review disabled retirees versus service retirees. Service retirees include members who have commenced their pension benefit from a terminated vested status in addition to members who have retired from active status. There is a separate MEST containing the postretirement mortality experience of members across all NYCRS systems, which allowed us to review experience and develop proposed assumptions over multiple systems where it was advantageous to do so.

There is much discussion in the actuarial profession and among retirement systems about the development of mortality tables and treatment of excess deaths due to the Covid pandemic, which occurred in 2020 – 2022. The analysis to develop our recommendations excludes the mortality experience of members during the pandemic and reflects the experience from 2015 - 2019. Experience prior to 2015 was excluded as benefit amounts were not available in the historical database prior to this period.

Most mortality studies have found that higher benefits are positively correlated with smaller mortality rates and longer life expectancy. Accordingly, the OA utilizes adjustment factors to convert post-retirement mortality weighted by headcounts to post-retirement mortality weighted by benefit amounts. The current assumption adjustment factors used by the OA are:

Post-Retirement Mortality Adjustment Factor To Convert from Headcount-Weighted to Amount-Weighted		
	Males	Females
Service Retiree	0.910	0.910
Disabled Retiree	0.830	0.830
Contingent Beneficiary	0.890	0.951

Mortality assumptions involve two components: a base table and a mortality improvement scale. The mortality improvement scale adjusts the mortality rates of the base table to reflect that generally rates of mortality are anticipated to improve over time. As noted in the pre-retirement death section, we used the most recent improvement scale (MP-2021) published by the SOA as of the date of this analysis. Please note that the SOA has not published an updated MP scale due to the pandemic.

In this study the base table of the current assumption corresponds to the year 2012; expected mortality rates in future years are obtained from the base table and the MP-2021 scale. For example, the 2017 (July 1, 2016 – June 30, 2017) mortality rates are derived from the base table (2012) adjusted with four years of improvements until 2016. This method links mortality rates across the years and, consequently, allows mortality comparisons from one year to another.

For the proposed assumption, proposed rates were initially determined as of the mid-year of the study period or fiscal year 2017. MP-2021 was then used to adjust those rates to earlier and later years. The proposed mortality rates shown in the following section have been adjusted to reflect a base year of 2019. We recommend that MP-2021 continue to be used to reflect mortality improvements both before and after the measurement date.

In reviewing the current assumption, we compared the actual experience to published tables from the SOA. The most recent tables published by the SOA reflected experience for public plan retirement systems separated into Public Safety (PubS) members, General employees (PubG) and Teachers (PubT). The SOA publishes versions of each of these tables where the mortality rates are weighted by the amount of the pension benefit (“amount-weighted”) or weighted by the number of members (headcount-weighted). We compared the amount-weighted experience to the amount-weighted SOA table and the headcount-weighted experience to the headcount-weighted SOA table. Adjustments were made to the applicable standard SOA tables to match the experience of the system to determine if the SOA tables provided a better statistical fit to the experience.

The SOA combined the experience of all contingent beneficiaries (teachers, general employees and public safety members) into a single table. We combined the experience of all NYCERS systems (TRS, BERS, NYCERS, POLICE and FIRE) in proposing a recommended assumption. The contingent survivor assumption would apply upon the death of the member. While both the member and contingent survivor are both alive, we propose the healthy annuitant mortality table apply.

In the actuarial valuation of pension benefits, we recommend that amount-weighted mortality rates be used. Headcount-weighted mortality rates may be used for other purposes, such as a retiree medical valuation.

Postretirement Mortality – Service Retirees

For FIRE, we propose the PubS table, multiplied by adjustment factors, which provides a better statistical fit. Separate tables exist on a headcount-weighted and amount-weighted basis. For males, the proposed adjustment factors vary by age and range from 85% to 100% for amount-weighted and from 80% to 100% for headcount-weighted. For females, no adjustment factors are proposed due to the lack of credibility.

The following charts show postretirement mortality experience on a headcount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E decreased from 1.02 to 1.00.

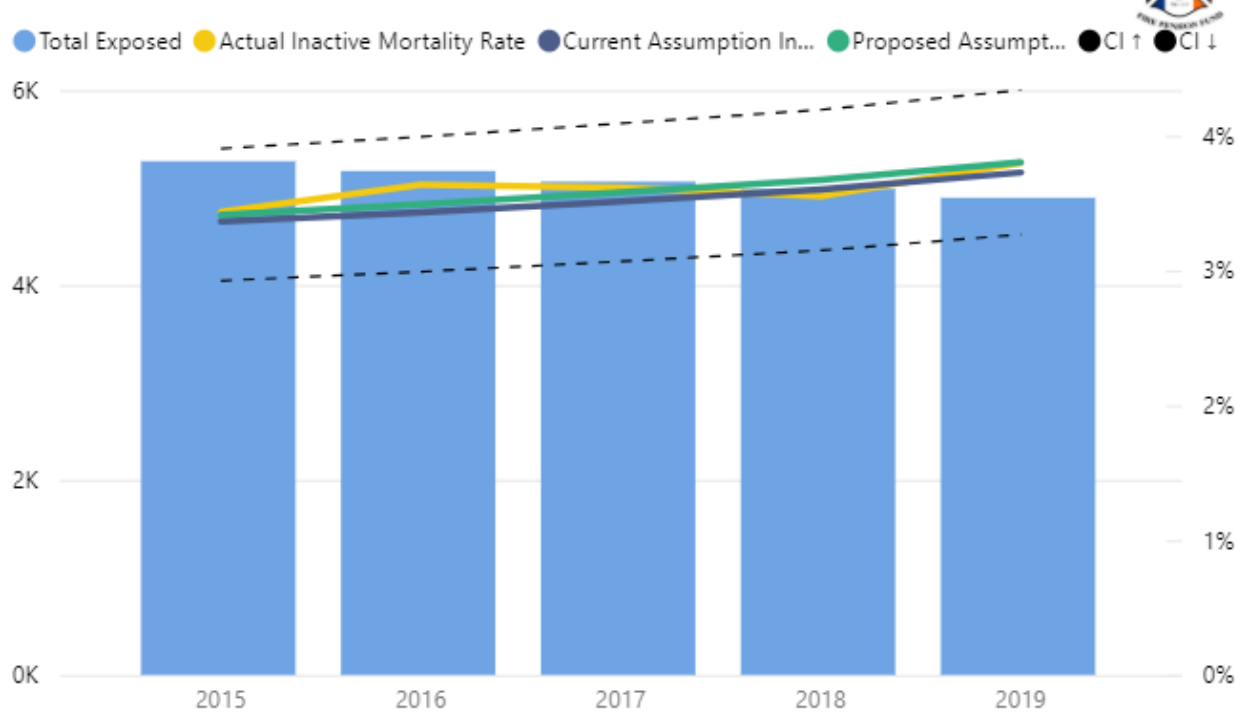
Current Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
2015	181	177.3	5,270	3.4345%	3.3634%	1.02
2016	188	177.4	5,170	3.6364%	3.4313%	1.06
2017	183	177.7	5,061	3.6159%	3.5110%	1.03
2018	177	179.5	4,986	3.5499%	3.6004%	0.99
2019	186	182.4	4,895	3.7998%	3.7267%	1.02
Total	915	894.3	25,382	3.6049%	3.5233%	1.02

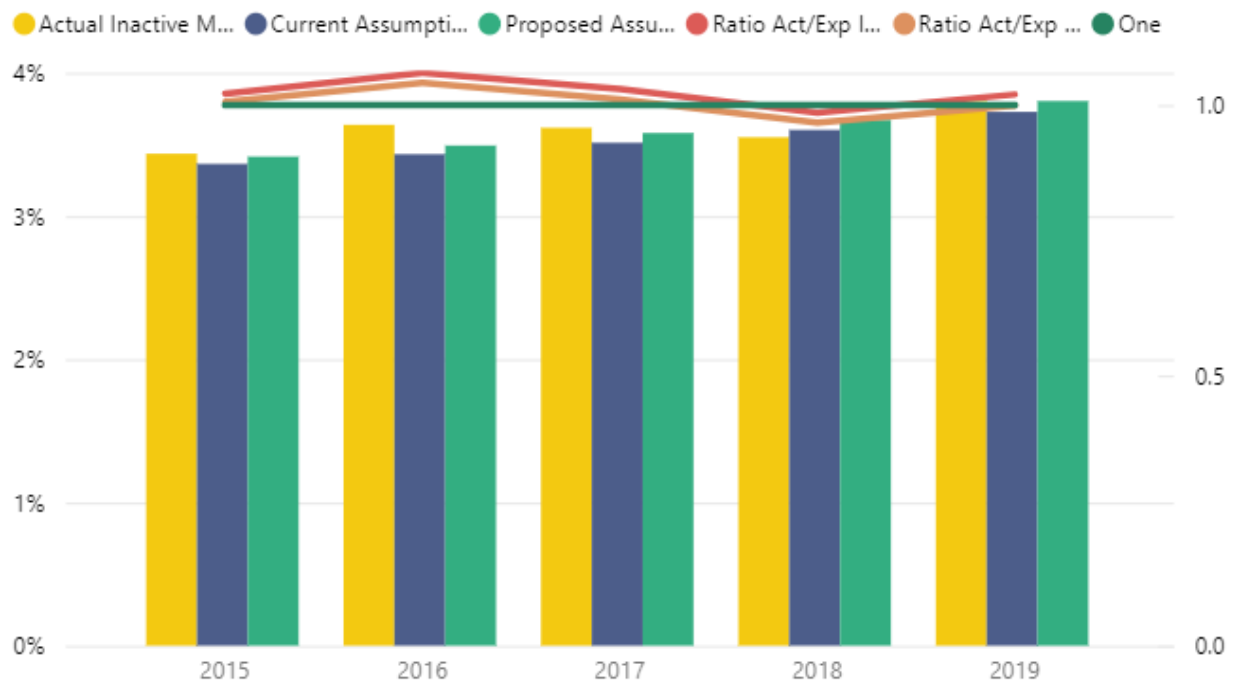
Proposed Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
2015	181	179.9	5,270	3.4345%	3.4143%	1.01
2016	188	180.5	5,170	3.6364%	3.4916%	1.04
2017	183	181.1	5,061	3.6159%	3.5790%	1.01
2018	177	183.0	4,986	3.5499%	3.6705%	0.97
2019	186	186.1	4,895	3.7998%	3.8027%	1.00
Total	915	910.7	25,382	3.6049%	3.5881%	1.00

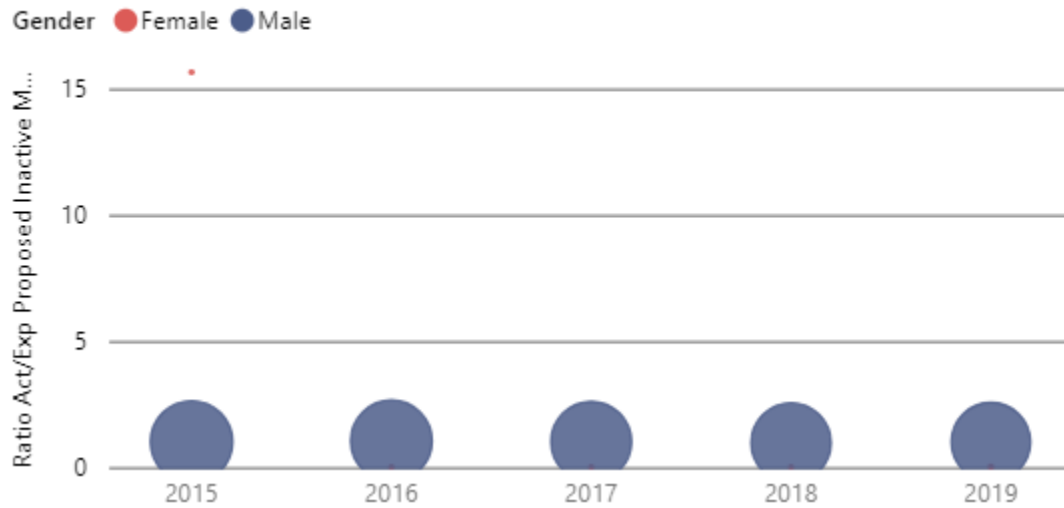
Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Exposure Bubbles; by Year



The following charts show postretirement mortality experience on an amount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E decreased from 1.05 to 0.98.

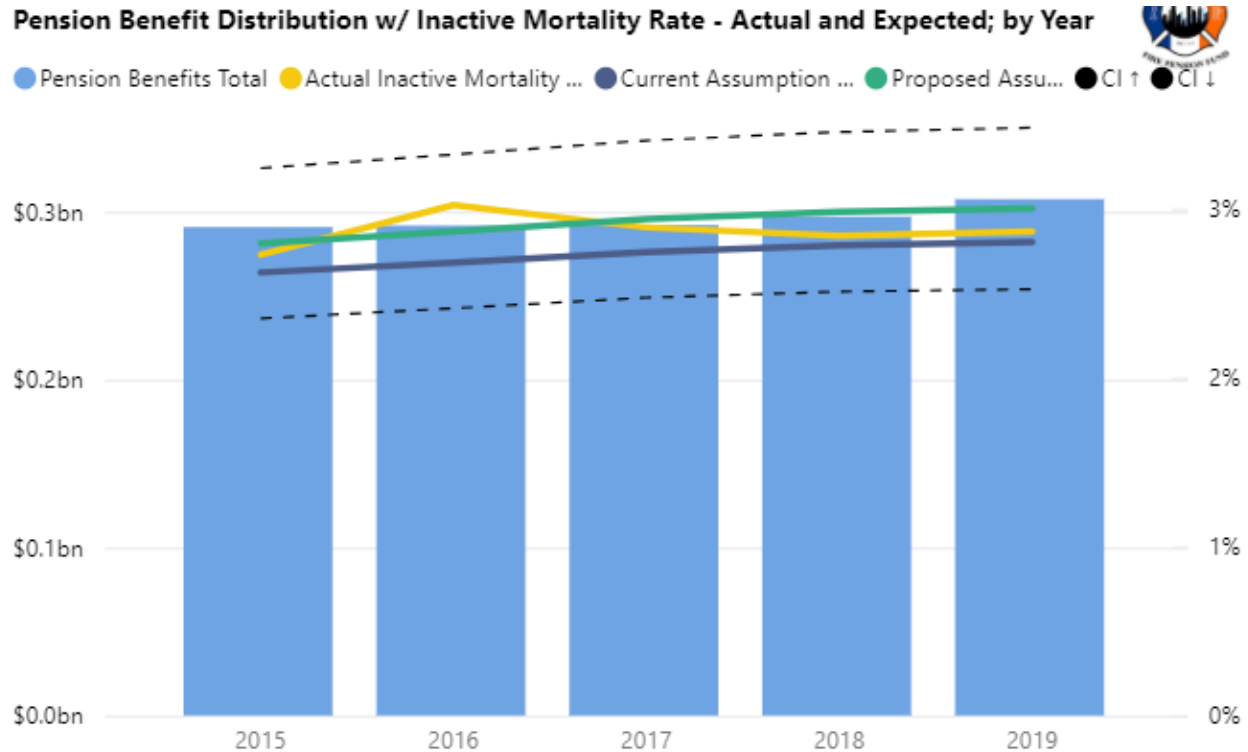
Current Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
2015	\$7.9M	\$7.6M	\$290.8M	2.7268%	2.6218%	1.04
2016	\$8.8M	\$7.8M	\$291.7M	3.0213%	2.6811%	1.13
2017	\$8.4M	\$8.0M	\$292.1M	2.8887%	2.7429%	1.05
2018	\$8.4M	\$8.3M	\$297.0M	2.8386%	2.7835%	1.02
2019	\$8.8M	\$8.6M	\$307.4M	2.8649%	2.8028%	1.02
Total	\$42.4M	\$40.3M	\$1,479.1M	2.8680%	2.7275%	1.05

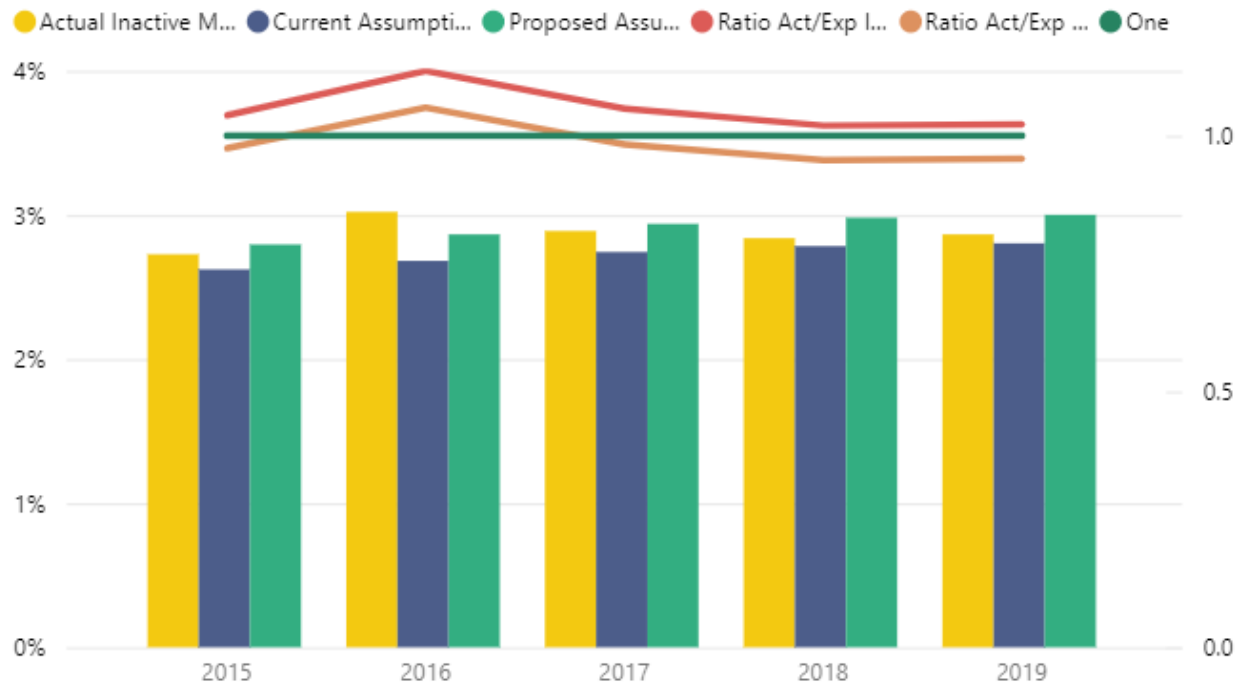
Proposed Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
2015	\$7.9M	\$8.1M	\$290.8M	2.7268%	2.7946%	0.98
2016	\$8.8M	\$8.4M	\$291.7M	3.0213%	2.8649%	1.05
2017	\$8.4M	\$8.6M	\$292.1M	2.8887%	2.9378%	0.98
2018	\$8.4M	\$8.9M	\$297.0M	2.8386%	2.9807%	0.95
2019	\$8.8M	\$9.2M	\$307.4M	2.8649%	3.0007%	0.95
Total	\$42.4M	\$43.1M	\$1,479.1M	2.8680%	2.9169%	0.98

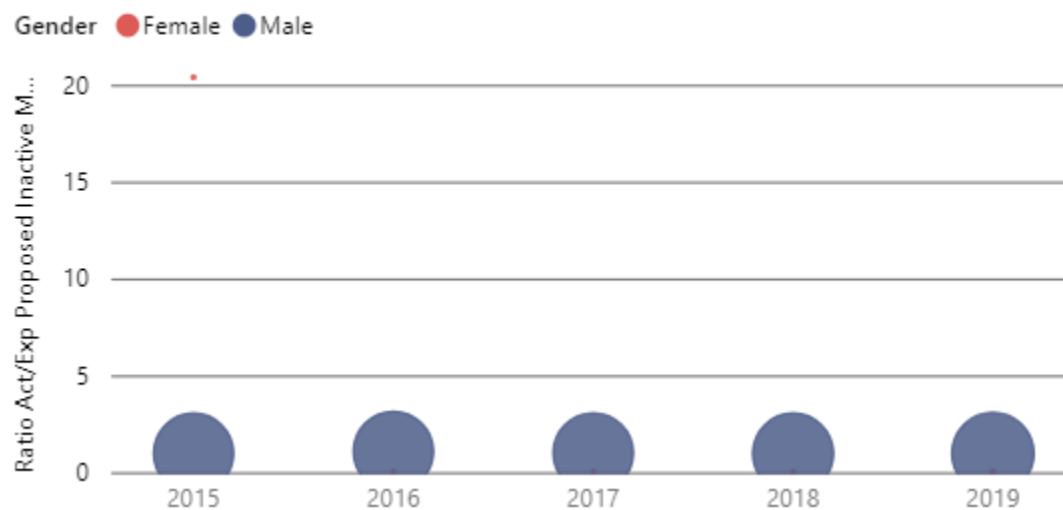
Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Benefit Bubbles; by Year



The following section displays results by age for males and females combined since there is nearly no female experience.

Service Retirees – Males and Females

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. Although the experience is combined, separate assumptions are proposed for males and females. There is very little experience among female members. While the A/E decreased from 1.05 to 0.98, the overall fit for each group improved. For ages 50 to 69, the A/E increased from 0.63 to 0.79 and for ages 70 – 99, the A/E decreased from 1.11 to 1.00.

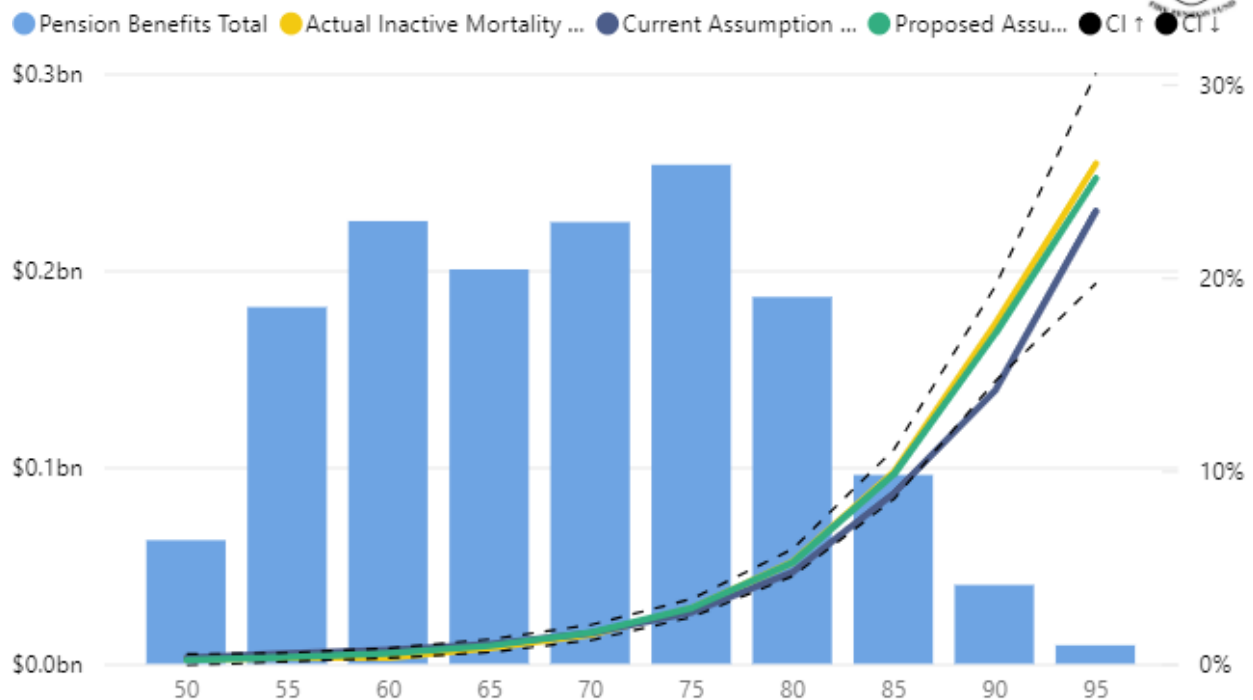
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

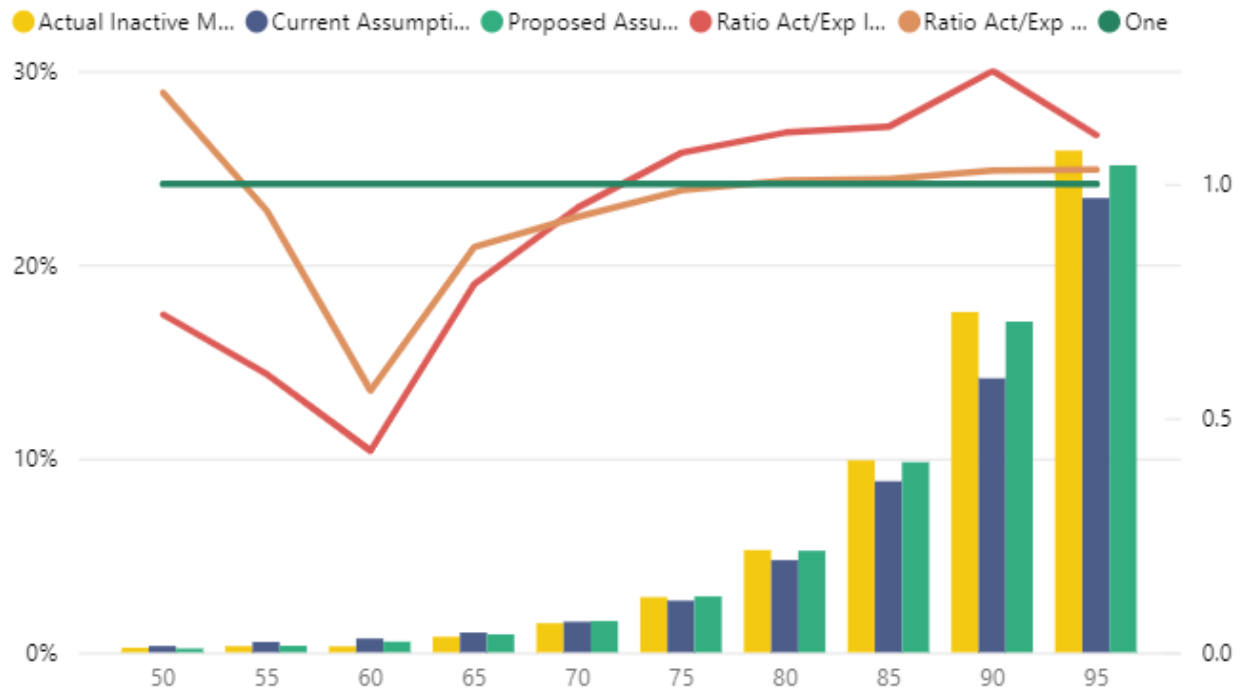
Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
50	\$0.1M	\$0.2M	\$62.8M	0.2362%	0.3275%	▲ 0.72
55	\$0.6M	\$1.0M	\$181.2M	0.3192%	0.5376%	▲ 0.59
60	\$0.7M	\$1.6M	\$224.9M	0.3077%	0.7149%	◆ 0.43
65	\$1.6M	\$2.0M	\$200.4M	0.8029%	1.0218%	▲ 0.79
70	\$3.4M	\$3.5M	\$224.4M	1.5013%	1.5806%	● 0.95
75	\$7.2M	\$6.8M	\$253.5M	2.8461%	2.6680%	● 1.07
80	\$9.8M	\$8.9M	\$186.4M	5.2785%	4.7564%	▲ 1.11
85	\$9.5M	\$8.5M	\$95.9M	9.9090%	8.8249%	▲ 1.12
90	\$7.0M	\$5.7M	\$40.0M	17.5547%	14.1367%	▲ 1.24
95	\$2.4M	\$2.2M	\$9.4M	25.8829%	23.4341%	▲ 1.10
Total	\$42.4M	\$40.3M	\$1,479.1M	2.8680%	2.7275%	● 1.05

Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
50	\$0.1M	\$0.1M	\$62.8M	0.2362%	0.1977%	▲ 1.19
55	\$0.6M	\$0.6M	\$181.2M	0.3192%	0.3385%	● 0.94
60	\$0.7M	\$1.2M	\$224.9M	0.3077%	0.5507%	▲ 0.56
65	\$1.6M	\$1.9M	\$200.4M	0.8029%	0.9277%	▲ 0.87
70	\$3.4M	\$3.6M	\$224.4M	1.5013%	1.6145%	● 0.93
75	\$7.2M	\$7.3M	\$253.5M	2.8461%	2.8846%	● 0.99
80	\$9.8M	\$9.8M	\$186.4M	5.2785%	5.2411%	● 1.01
85	\$9.5M	\$9.4M	\$95.9M	9.9090%	9.8096%	● 1.01
90	\$7.0M	\$6.8M	\$40.0M	17.5547%	17.0586%	● 1.03
95	\$2.4M	\$2.4M	\$9.4M	25.8829%	25.1209%	● 1.03
Total	\$42.4M	\$43.1M	\$1,479.1M	2.8680%	2.9169%	● 0.98

Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



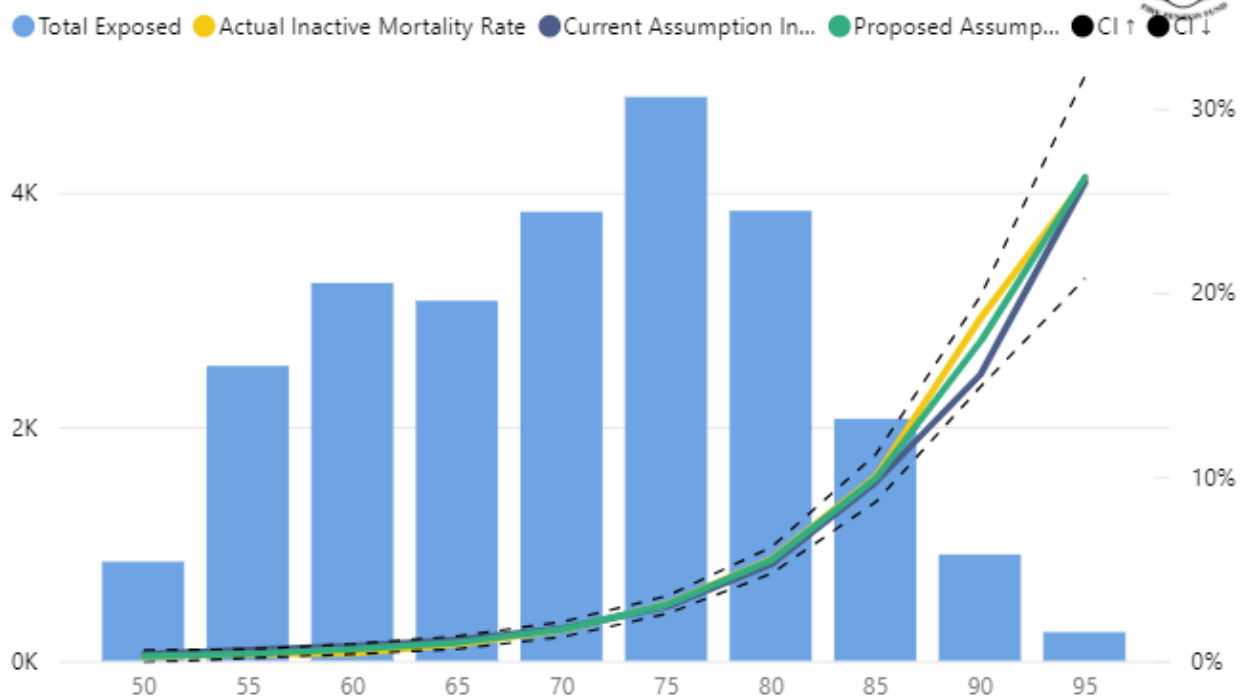
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E decreased from 1.02 to 1.00.

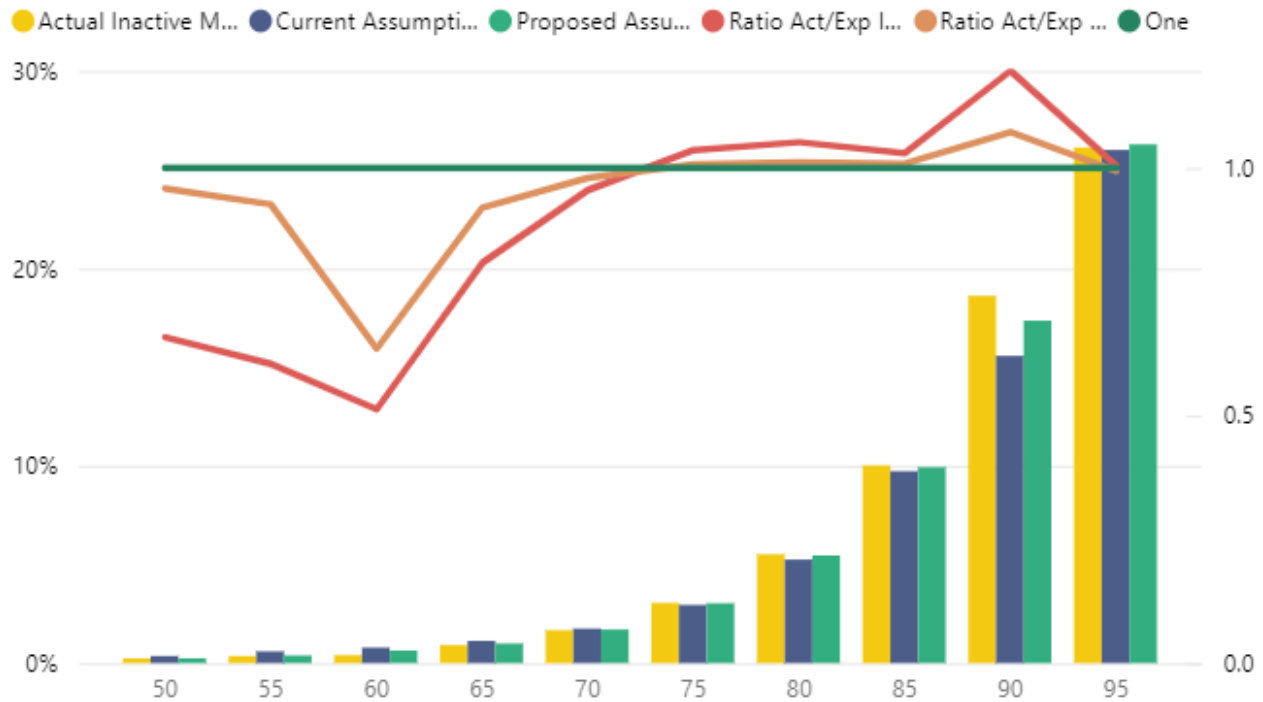
Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
50	2	3.0	847	0.2361%	0.3588%	0.66
55	9	14.9	2,519	0.3573%	0.5913%	0.60
60	13	25.4	3,227	0.4029%	0.7857%	0.51
65	28	34.6	3,075	0.9106%	1.1262%	0.81
70	64	67.0	3,835	1.6688%	1.7468%	0.96
75	147	141.9	4,816	3.0523%	2.9460%	1.04
80	212	201.5	3,843	5.5165%	5.2442%	1.05
85	207	200.9	2,067	10.0145%	9.7212%	1.03
90	169	141.3	908	18.6123%	15.5647%	1.20
95	64	63.7	245	26.1224%	25.9987%	1.00
Total	915	894.3	25,382	3.6049%	3.5233%	1.02

Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
50	2	2.1	847	0.2361%	0.2464%	0.96
55	9	9.7	2,519	0.3573%	0.3857%	0.93
60	13	20.5	3,227	0.4029%	0.6343%	0.64
65	28	30.4	3,075	0.9106%	0.9899%	0.92
70	64	65.3	3,835	1.6688%	1.7029%	0.98
75	147	146.0	4,816	3.0523%	3.0314%	1.01
80	212	209.6	3,843	5.5165%	5.4529%	1.01
85	207	205.2	2,067	10.0145%	9.9294%	1.01
90	169	157.5	908	18.6123%	17.3495%	1.07
95	64	64.4	245	26.1224%	26.2825%	0.99
Total	915	910.7	25,382	3.6049%	3.5881%	1.00

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

We have proposed new assumptions consistent with industry standards, with applicable adjustments, to better reflect recent non-pandemic experience. In total, the proposed mortality tables are anticipated to increase plan liabilities for younger retirement ages up to about early 60s for males, and then anticipated to decrease plan liabilities for older retirement ages. We would anticipate that this would increase plan liabilities for current active members but reduce liabilities for retirees. The actual impact will depend on the relative change for each group.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
15	0.0100%	0.0084%	68	1.2063%	0.7604%
16	0.0135%	0.0103%	69	1.2653%	0.8243%
17	0.0181%	0.0112%	70	1.4084%	0.9061%
18	0.0217%	0.0131%	71	1.5806%	0.9954%
19	0.0240%	0.0140%	72	1.7538%	1.0940%
20	0.0251%	0.0142%	73	1.9842%	1.2060%
21	0.0268%	0.0150%	74	2.2163%	1.3283%
22	0.0284%	0.0158%	75	2.4510%	1.4362%
23	0.0301%	0.0168%	76	2.6879%	1.6455%
24	0.0315%	0.0179%	77	2.9280%	1.8563%
25	0.0327%	0.0191%	78	3.3690%	2.0670%
26	0.0342%	0.0204%	79	3.8155%	2.3446%
27	0.0354%	0.0217%	80	4.2660%	2.6218%
28	0.0371%	0.0231%	81	4.7728%	2.8997%
29	0.0394%	0.0247%	82	5.2958%	3.1772%
30	0.0427%	0.0265%	83	6.2483%	3.4554%
31	0.0503%	0.0323%	84	7.2266%	3.9664%
32	0.0581%	0.0372%	85	8.2335%	4.4805%
33	0.0655%	0.0415%	86	9.2715%	4.9967%
34	0.0725%	0.0448%	87	10.3365%	5.5147%
35	0.0799%	0.0478%	88	11.2397%	6.0388%
36	0.0851%	0.0505%	89	12.1663%	7.0317%
37	0.0901%	0.0532%	90	13.1242%	8.0312%
38	0.0961%	0.0561%	91	14.6163%	9.4265%
39	0.1037%	0.0595%	92	16.2757%	10.8698%
40	0.1138%	0.0634%	93	18.9667%	12.3822%

NEW YORK CITY FIRE PENSION FUND CURRENT (continued) PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
41	0.1230%	0.0688%	94	21.5036%	13.7895%
42	0.1327%	0.0725%	95	23.9289%	15.2575%
43	0.1430%	0.0775%	96	25.8261%	16.7330%
44	0.1542%	0.0843%	97	27.5777%	18.2626%
45	0.1666%	0.0931%	98	29.2887%	19.6947%
46	0.1798%	0.1041%	99	30.8020%	21.1460%
47	0.1941%	0.1166%	100	32.1584%	22.1859%
48	0.2093%	0.1295%	101	33.7521%	23.0680%
49	0.2250%	0.1425%	102	35.1259%	24.0803%
50	0.2412%	0.1555%	103	36.3671%	25.2770%
51	0.2975%	0.1681%	104	37.3834%	26.6309%
52	0.3514%	0.1797%	105	38.1051%	28.0912%
53	0.4018%	0.1902%	106	38.4698%	29.6244%
54	0.4483%	0.1996%	107	38.6325%	31.1943%
55	0.4895%	0.2075%	108	38.8076%	32.7579%
56	0.5352%	0.2144%	109	38.9794%	34.2712%
57	0.5757%	0.2629%	110	50.0000%	50.0000%
58	0.6104%	0.3090%	111	50.0000%	50.0000%
59	0.6391%	0.3530%	112	50.0000%	50.0000%
60	0.6625%	0.3957%	113	50.0000%	50.0000%
61	0.7126%	0.4377%	114	50.0000%	50.0000%
62	0.7621%	0.4800%	115	50.0000%	50.0000%
63	0.8255%	0.5231%	116	50.0000%	50.0000%
64	0.9079%	0.5675%	117	50.0000%	50.0000%
65	0.9997%	0.6138%	118	50.0000%	50.0000%
66	1.0607%	0.6613%	119	50.0000%	50.0000%
67	1.1308%	0.7103%	120	100.0000%	100.0000%

¹ An adjustment factor of 0.91 is applied to the probabilities above to develop benefit weighted probabilities of mortality

² An adjustment factor of 0.91 is applied to the probabilities above to develop benefit weighted probabilities of mortality

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0145%	0.0090%	68	1.0138%	0.9741%
16	0.0196%	0.0110%	69	1.1225%	1.0768%
17	0.0264%	0.0120%	70	1.2460%	1.1959%
18	0.0314%	0.0140%	71	1.3880%	1.3313%
19	0.0340%	0.0150%	72	1.5495%	1.4867%
20	0.0353%	0.0169%	73	1.7346%	1.6637%
21	0.0358%	0.0183%	74	1.9471%	1.8645%
22	0.0357%	0.0187%	75	2.1885%	2.0925%
23	0.0356%	0.0203%	76	2.4642%	2.3485%
24	0.0358%	0.0219%	77	2.7771%	2.6359%
25	0.0359%	0.0236%	78	3.1329%	2.9599%
26	0.0381%	0.0253%	79	3.5358%	3.3206%
27	0.0403%	0.0271%	80	3.9924%	3.7252%
28	0.0426%	0.0302%	81	4.5612%	4.1773%
29	0.0447%	0.0320%	82	5.2092%	4.6799%
30	0.0458%	0.0350%	83	5.9405%	5.2400%
31	0.0478%	0.0367%	84	6.7685%	5.8639%
32	0.0496%	0.0395%	85	7.7013%	6.5585%
33	0.0512%	0.0421%	86	8.7477%	7.3305%
34	0.0525%	0.0444%	87	9.9174%	8.1898%
35	0.0546%	0.0464%	88	11.2256%	9.1483%
36	0.0563%	0.0480%	89	12.6867%	10.2124%
37	0.0565%	0.0505%	90	14.3097%	11.3927%
38	0.0585%	0.0514%	91	16.0006%	12.6552%
39	0.0599%	0.0533%	92	17.6911%	13.9704%
40	0.0611%	0.0548%	93	19.3617%	15.3316%

NEW YORK CITY FIRE PENSION FUND PROPOSED (continued) PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.0619%	0.0561%	94	21.0134%	16.7357%
42	0.0644%	0.0584%	95	22.6543%	18.1973%
43	0.0657%	0.0596%	96	24.1982%	19.7995%
44	0.0680%	0.0619%	97	25.8103%	21.5051%
45	0.1056%	0.0836%	98	27.5348%	23.3272%
46	0.1120%	0.0917%	99	29.3904%	25.2578%
47	0.1203%	0.1011%	100	31.3558%	27.2907%
48	0.1296%	0.1118%	101	33.3921%	29.3896%
49	0.1411%	0.1251%	102	35.4093%	31.5085%
50	0.1532%	0.1402%	103	37.4123%	33.6377%
51	0.1685%	0.1591%	104	39.3601%	35.7445%
52	0.1854%	0.1801%	105	41.2511%	37.8251%
53	0.2048%	0.2041%	106	43.0828%	39.8479%
54	0.2278%	0.2321%	107	44.8334%	41.8058%
55	0.2542%	0.2639%	108	46.4949%	43.6934%
56	0.2843%	0.2989%	109	48.0767%	45.4898%
57	0.3186%	0.3367%	110	49.3439%	47.1868%
58	0.3577%	0.3774%	111	49.4724%	48.7883%
59	0.4010%	0.4203%	112	49.5965%	49.6759%
60	0.4491%	0.4668%	113	49.7207%	49.7804%
61	0.5017%	0.5140%	114	49.8602%	49.8851%
62	0.5580%	0.5635%	115	49.9850%	49.9900%
63	0.6183%	0.6166%	116	49.9950%	49.9950%
64	0.6837%	0.6741%	117	50.0000%	50.0000%
65	0.7548%	0.7369%	118	50.0000%	50.0000%
66	0.8322%	0.8055%	119	50.0000%	50.0000%
67	0.9182%	0.8840%	120	100.0000%	100.0000%

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0136%	0.0090%	68	1.0602%	1.0772%
16	0.0184%	0.0110%	69	1.1693%	1.1835%
17	0.0248%	0.0120%	70	1.2984%	1.3057%
18	0.0296%	0.0140%	71	1.4508%	1.4445%
19	0.0328%	0.0150%	72	1.6260%	1.6027%
20	0.0347%	0.0169%	73	1.8242%	1.7819%
21	0.0354%	0.0183%	74	2.0464%	1.9833%
22	0.0361%	0.0198%	75	2.2952%	2.2110%
23	0.0370%	0.0203%	76	2.5774%	2.4660%
24	0.0381%	0.0219%	77	2.8994%	2.7494%
25	0.0392%	0.0236%	78	3.2700%	3.0677%
26	0.0415%	0.0265%	79	3.7000%	3.4197%
27	0.0438%	0.0283%	80	4.1994%	3.8117%
28	0.0460%	0.0314%	81	4.7697%	4.2453%
29	0.0484%	0.0345%	82	5.4136%	4.7255%
30	0.0505%	0.0363%	83	6.1251%	5.2572%
31	0.0524%	0.0393%	84	6.8993%	5.8639%
32	0.0543%	0.0421%	85	7.7284%	6.5585%
33	0.0558%	0.0447%	86	8.8259%	7.3305%
34	0.0582%	0.0483%	87	10.0299%	8.1898%
35	0.0590%	0.0503%	88	11.3555%	9.1483%
36	0.0606%	0.0531%	89	12.8221%	10.2124%
37	0.0617%	0.0555%	90	14.4490%	11.3927%
38	0.0634%	0.0574%	91	16.1757%	12.6552%
39	0.0645%	0.0590%	92	17.9538%	13.9704%
40	0.0653%	0.0604%	93	19.7689%	15.3316%

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR SERVICE RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.0667%	0.0626%	94	21.6217%	16.7357%
42	0.0679%	0.0647%	95	23.5150%	18.3451%
43	0.0697%	0.0667%	96	25.0951%	20.2533%
44	0.0723%	0.0688%	97	26.7443%	22.2486%
45	0.1466%	0.1067%	98	28.4930%	24.3115%
46	0.1562%	0.1163%	99	30.3544%	26.4075%
47	0.1675%	0.1282%	100	32.3002%	28.5273%
48	0.1792%	0.1407%	101	34.2993%	30.6491%
49	0.1925%	0.1569%	102	36.2704%	32.7813%
50	0.2066%	0.1750%	103	38.2225%	34.9113%
51	0.2209%	0.1963%	104	40.1159%	37.0070%
52	0.2356%	0.2207%	105	41.9494%	39.0659%
53	0.2522%	0.2495%	106	43.7225%	41.0568%
54	0.2706%	0.2814%	107	45.4140%	42.9728%
55	0.2933%	0.3181%	108	47.0171%	44.8128%
56	0.3224%	0.3570%	109	48.5432%	46.5543%
57	0.3594%	0.4007%	110	49.3439%	48.1911%
58	0.4053%	0.4459%	111	49.4724%	49.5766%
59	0.4592%	0.4941%	112	49.5965%	49.6759%
60	0.5200%	0.5432%	113	49.7207%	49.7804%
61	0.5840%	0.5957%	114	49.8602%	49.8851%
62	0.6484%	0.6490%	115	49.9850%	49.9900%
63	0.7101%	0.7054%	116	49.9950%	49.9950%
64	0.7702%	0.7649%	117	50.0000%	50.0000%
65	0.8313%	0.8307%	118	50.0000%	50.0000%
66	0.8960%	0.9031%	119	50.0000%	50.0000%
67	0.9704%	0.9847%	120	100.0000%	100.0000%

Postretirement Mortality – Disability Retirees

For FIRE, we propose the PubS table, multiplied by adjustment factors, which provides a better statistical fit. Separate tables exist on a headcount-weighted and amount-weighted basis. For males, the proposed adjustment factors vary by age and range from 85% to 100% for amount-weighted and from 80% to 100% for headcount-weighted, which are consistent with the proposed healthy annuitant mortality table. For females, no adjustment factors are proposed due to the lack of credibility.

The following charts show postretirement mortality experience on a headcount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E increased from 0.99 to 1.05.

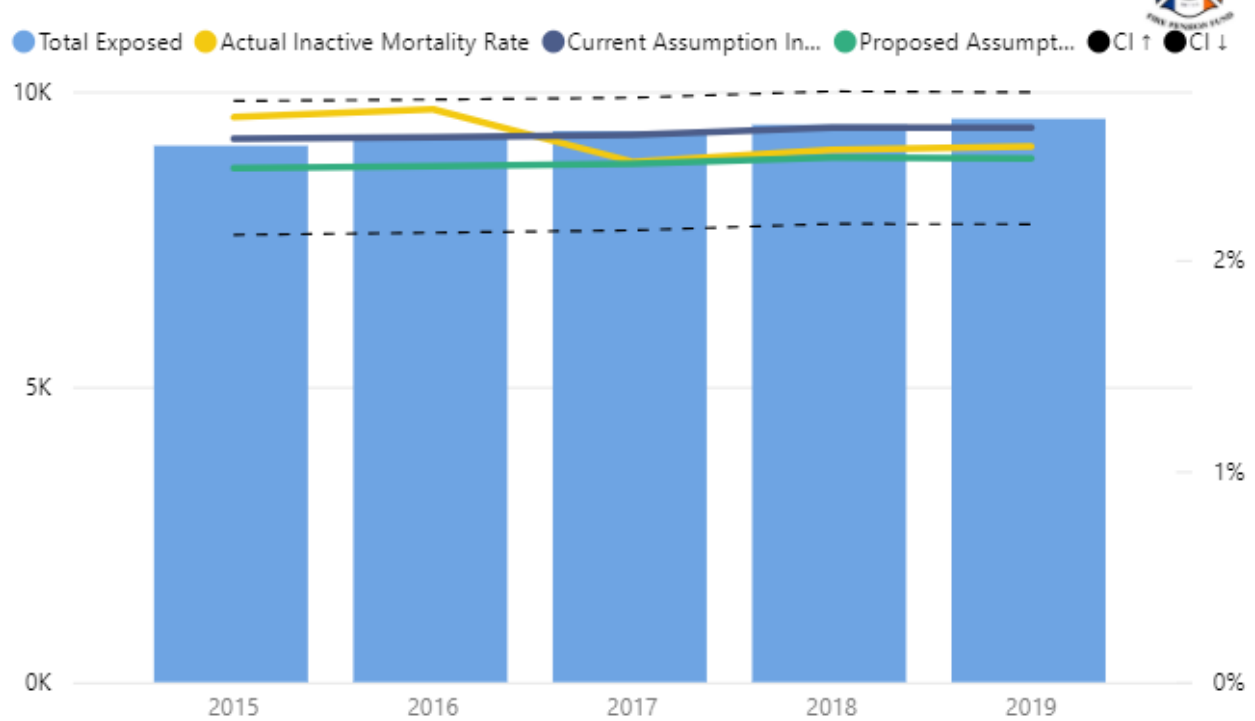
Current Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
2015	243	233.7	9,080	2.6762%	2.5734%	1.04
2016	250	237.8	9,212	2.7139%	2.5810%	1.05
2017	230	241.9	9,328	2.4657%	2.5932%	0.95
2018	238	247.8	9,436	2.5223%	2.6260%	0.96
2019	242	250.4	9,536	2.5378%	2.6263%	0.97
Total	1,203	1,211.6	46,592	2.5820%	2.6003%	0.99

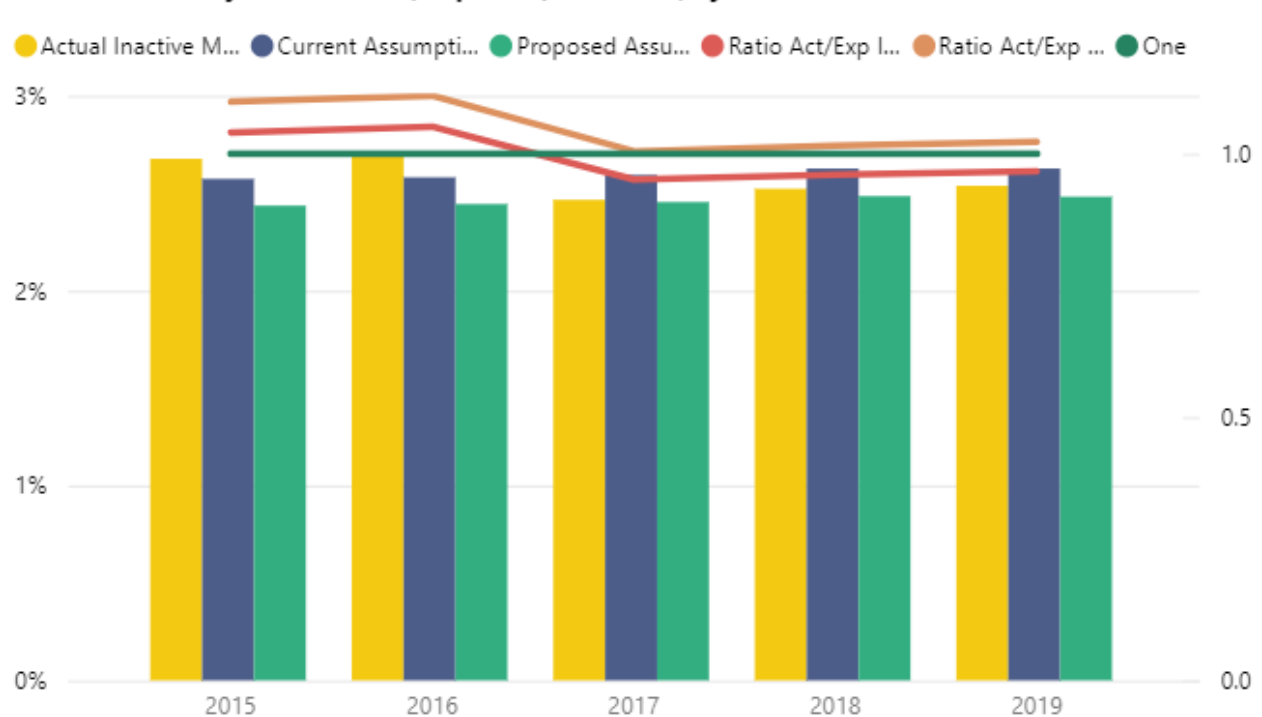
Proposed Assumption – Headcount-weighted

Plan Year	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
2015	243	221.2	9,080	2.6762%	2.4360%	1.10
2016	250	225.2	9,212	2.7139%	2.4443%	1.11
2017	230	229.0	9,328	2.4657%	2.4544%	1.00
2018	238	234.5	9,436	2.5223%	2.4847%	1.02
2019	242	236.7	9,536	2.5378%	2.4817%	1.02
Total	1,203	1,146.4	46,592	2.5820%	2.4606%	1.05

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year

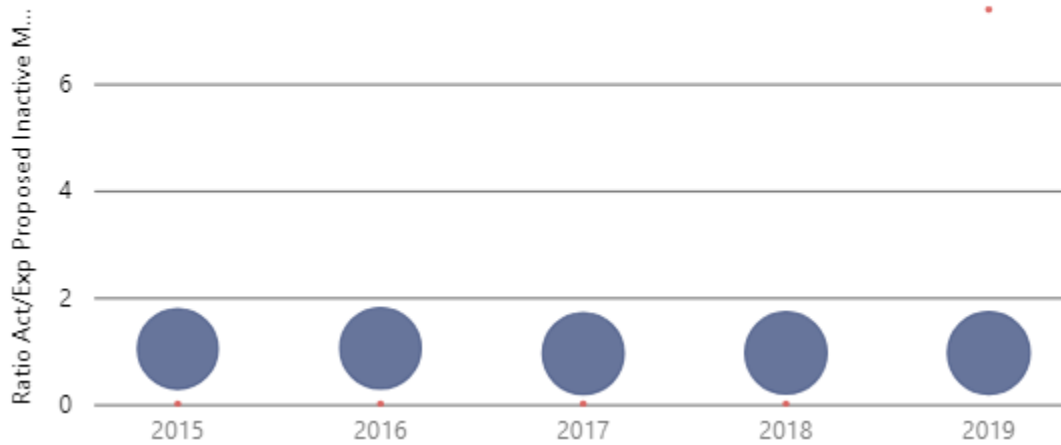


Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Exposure Bubbles; by Year

Gender ● Female ● Male



The following charts show postretirement mortality experience on an amount-weighted basis by year for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E decreased from 1.00 to 0.94.

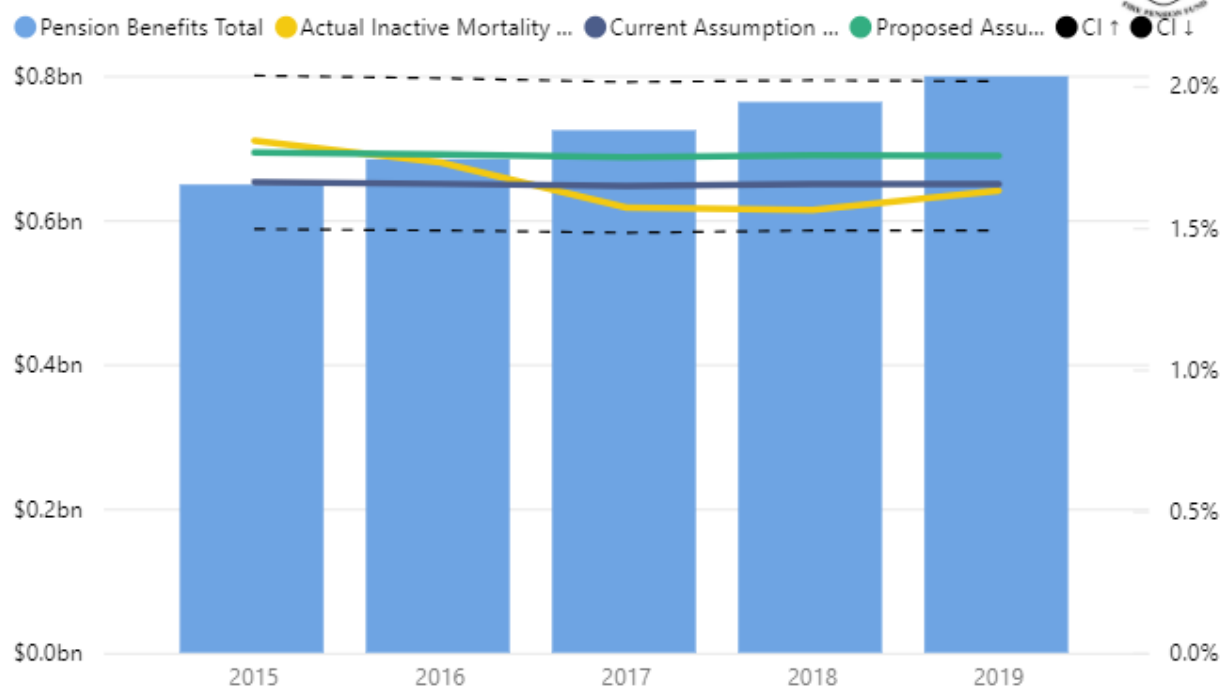
Current Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
2015	\$11.7M	\$10.8M	\$649.0M	1.8065%	1.6611%	1.09
2016	\$11.8M	\$11.3M	\$684.2M	1.7305%	1.6546%	1.05
2017	\$11.4M	\$11.9M	\$724.3M	1.5704%	1.6467%	0.95
2018	\$11.9M	\$12.6M	\$763.4M	1.5620%	1.6538%	0.94
2019	\$13.0M	\$13.2M	\$799.2M	1.6305%	1.6542%	0.99
Total	\$59.9M	\$59.9M	\$3,620.1M	1.6545%	1.6539%	1.00

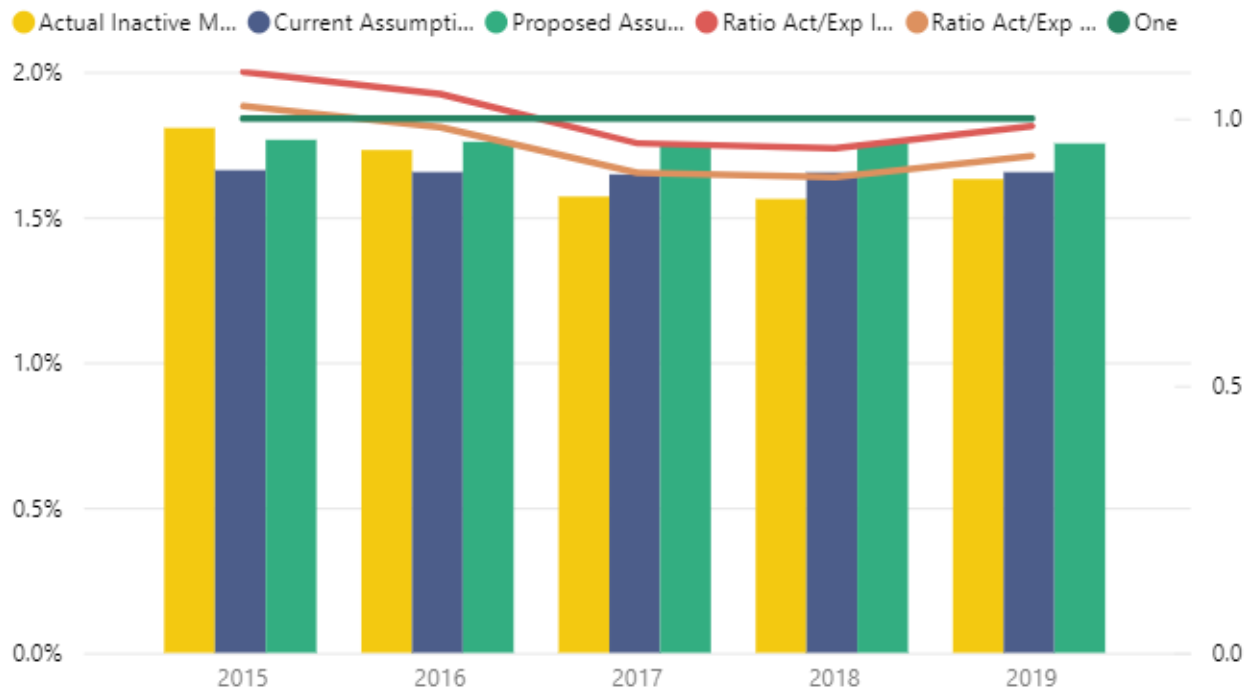
Proposed Assumption – Amount-weighted

Plan Year	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
2015	\$11.7M	\$11.5M	\$649.0M	1.8065%	1.7657%	1.02
2016	\$11.8M	\$12.0M	\$684.2M	1.7305%	1.7587%	0.98
2017	\$11.4M	\$12.7M	\$724.3M	1.5704%	1.7479%	0.90
2018	\$11.9M	\$13.4M	\$763.4M	1.5620%	1.7549%	0.89
2019	\$13.0M	\$14.0M	\$799.2M	1.6305%	1.7531%	0.93
Total	\$59.9M	\$63.6M	\$3,620.1M	1.6545%	1.7557%	0.94

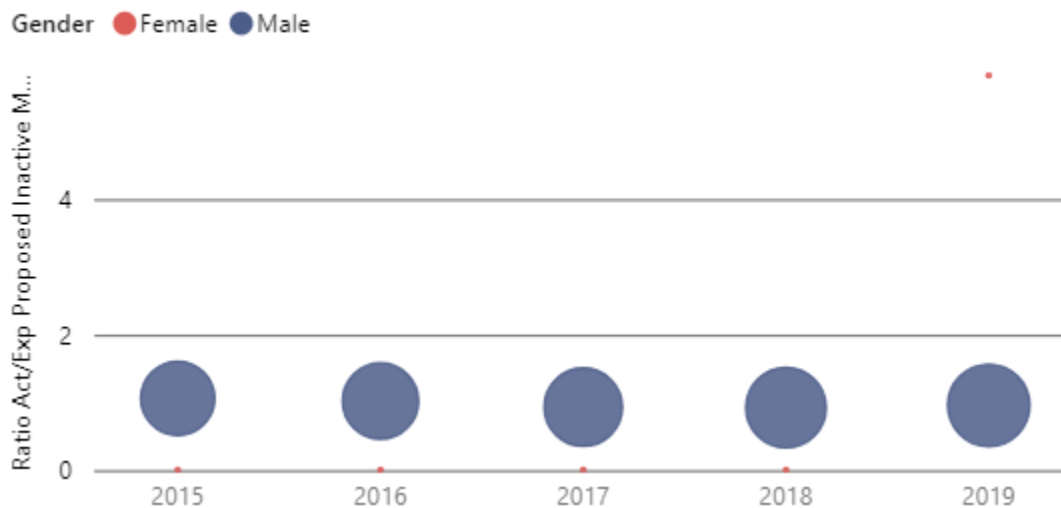
Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Year



Inactive Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Inactive Mortality Proposed w/ Benefit Bubbles; by Year



The following section displays results by age for males and females combined since there is nearly no female experience.

Disabled Retirees – Males and Females

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. Although the experience is combined, separate assumptions are proposed for males and females. There is very little experience among female members. While the A/E decreased from 1.00 to 0.94, the overall fit for each group improved. For ages 50 to 69, the A/E increased from 0.67 to 0.73 and for ages 70 – 99, the A/E decreased from 1.15 to 1.02.

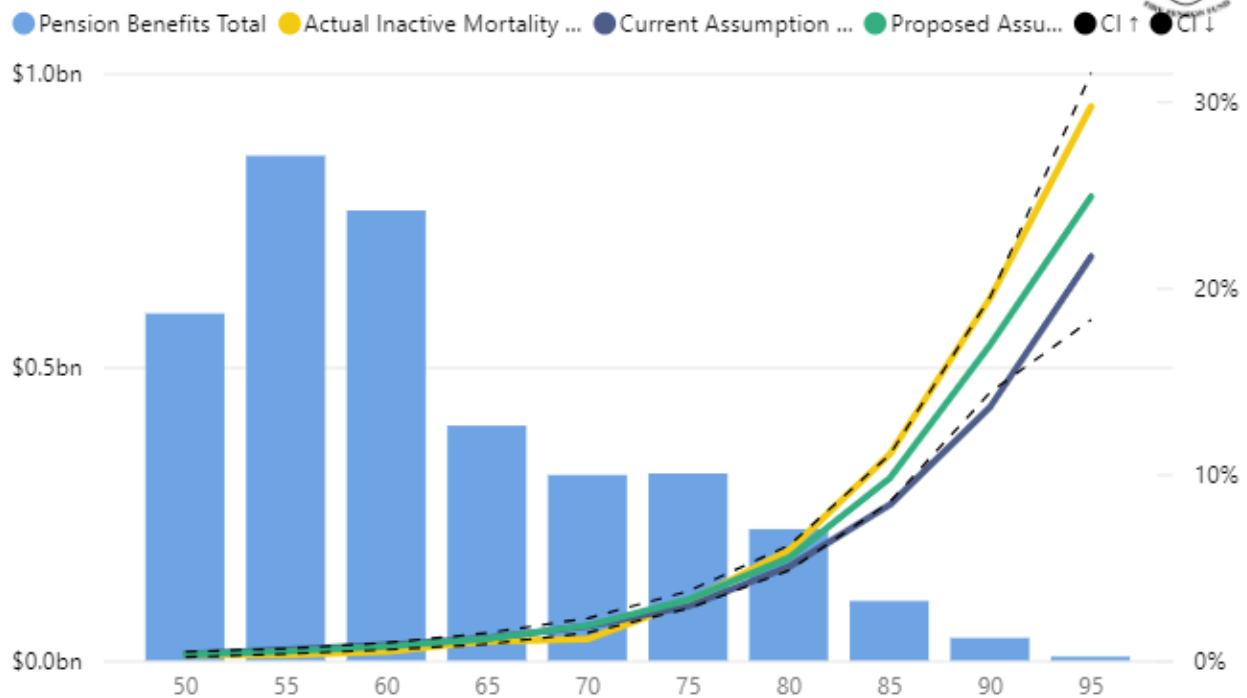
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

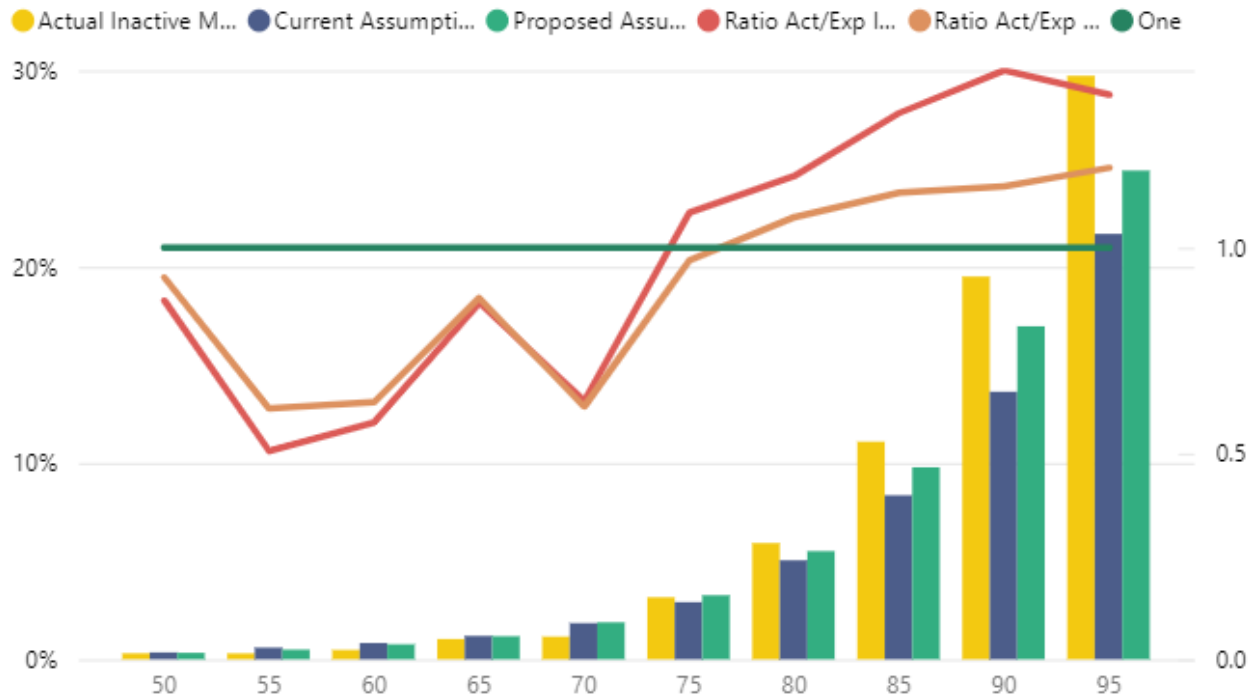
Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Current Assumption Inactive Mortality BftWght	Ratio Act/Exp Inactive Mortality BftWght
50	\$1.8M	\$2.1M	\$590.6M	0.3061%	0.3511%	▲ 0.87
55	\$2.6M	\$5.1M	\$859.1M	0.3013%	0.5954%	▲ 0.51
60	\$3.7M	\$6.4M	\$765.9M	0.4779%	0.8302%	▲ 0.58
65	\$4.1M	\$4.8M	\$399.7M	1.0332%	1.1932%	▲ 0.87
70	\$3.7M	\$5.8M	\$315.8M	1.1558%	1.8428%	▲ 0.63
75	\$10.1M	\$9.3M	\$318.4M	3.1600%	2.9130%	● 1.08
80	\$13.2M	\$11.3M	\$223.7M	5.9205%	5.0428%	▲ 1.17
85	\$11.3M	\$8.5M	\$101.5M	11.0870%	8.3544%	▲ 1.33
90	\$7.5M	\$5.2M	\$38.4M	19.4980%	13.6287%	▲ 1.43
95	\$2.0M	\$1.5M	\$6.8M	29.7250%	21.6702%	▲ 1.37
Total	\$59.9M	\$59.9M	\$3,620.1M	1.6545%	1.6539%	● 1.00

Age (bins)	Actual Inactive Benefits Released	Expected Inactive Benefits Released Proposed	Pension Benefits Total	Actual Inactive Mortality Rate BftWght	Proposed Assumption Inactive Mortality BftWght	Act/Exp Proposed Inactive Mortality BftWght
50	\$1.8M	\$1.9M	\$590.6M	0.3061%	0.3299%	0.93
55	\$2.6M	\$4.3M	\$859.1M	0.3013%	0.4947%	0.61
60	\$3.7M	\$5.9M	\$765.9M	0.4779%	0.7650%	0.62
65	\$4.1M	\$4.7M	\$399.7M	1.0332%	1.1774%	0.88
70	\$3.7M	\$5.9M	\$315.8M	1.1558%	1.8834%	0.61
75	\$10.1M	\$10.4M	\$318.4M	3.1600%	3.2627%	0.97
80	\$13.2M	\$12.3M	\$223.7M	5.9205%	5.5122%	1.07
85	\$11.3M	\$9.9M	\$101.5M	11.0870%	9.7814%	1.13
90	\$7.5M	\$6.5M	\$38.4M	19.4980%	16.9654%	1.15
95	\$2.0M	\$1.7M	\$6.8M	29.7250%	24.8965%	1.19
Total	\$59.9M	\$63.6M	\$3,620.1M	1.6545%	1.7557%	0.94

Pension Benefit Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



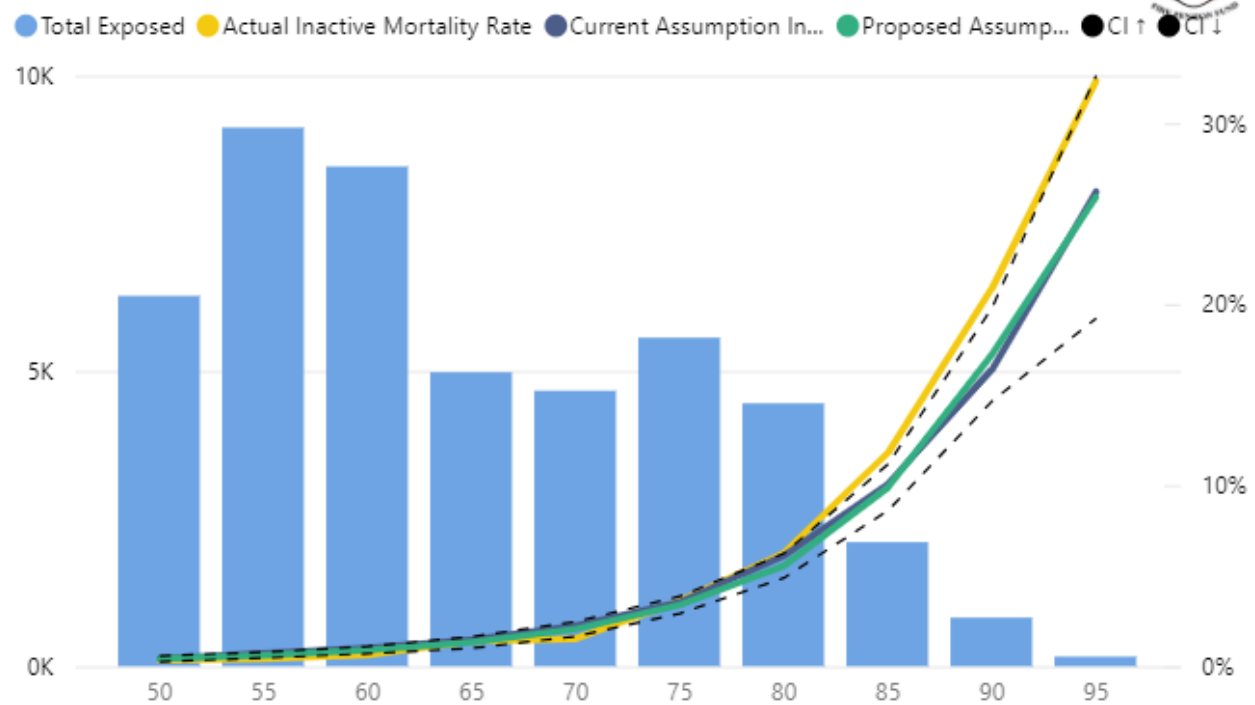
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (50 to 99) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions. The A/E increased from 0.99 to 1.05.

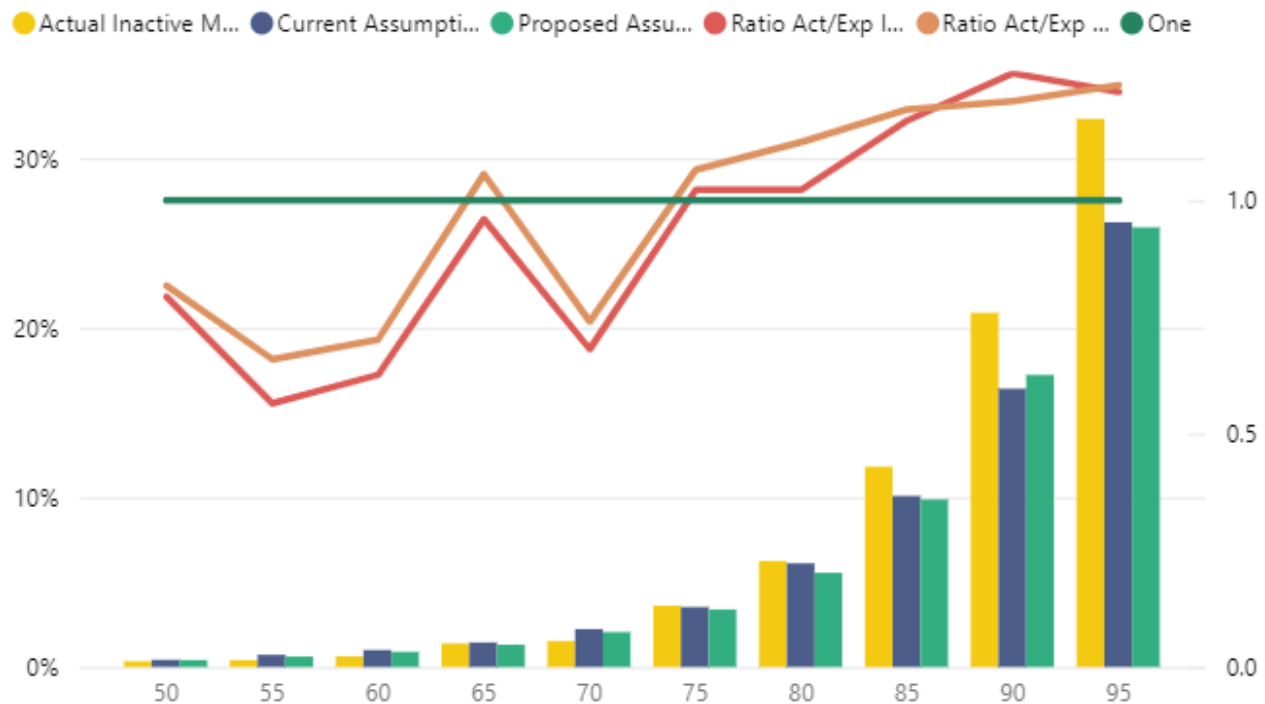
Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths	Total Exposed	Actual Inactive Mortality Rate	Current Assumption Inactive Mortality	Ratio Act/Exp Inactive Mortality
50	21	26.5	6,270	0.3349%	0.4222%	▲ 0.79
55	37	65.5	9,119	0.4057%	0.7183%	▲ 0.56
60	53	84.7	8,460	0.6265%	1.0011%	▲ 0.63
65	69	71.9	4,976	1.3867%	1.4459%	● 0.96
70	71	104.3	4,664	1.5223%	2.2356%	▲ 0.68
75	201	196.6	5,563	3.6132%	3.5348%	● 1.02
80	278	271.9	4,451	6.2458%	6.1098%	● 1.02
85	248	211.9	2,101	11.8039%	10.0841%	▲ 1.17
90	172	135.2	824	20.8738%	16.4092%	▲ 1.27
95	53	43.0	164	32.3171%	26.2217%	▲ 1.23
Total	1,203	1,211.6	46,592	2.5820%	2.6003%	● 0.99

Age (bins)	Actual Inactive Deaths	Expected Inactive Deaths Proposed	Total Exposed	Actual Inactive Mortality Rate	Proposed Assumption Inactive Mortality	Act/Exp Proposed Inactive Mortality
50	21	25.7	6,270	0.3349%	0.4098%	▲ 0.82
55	37	56.1	9,119	0.4057%	0.6157%	▲ 0.66
60	53	75.6	8,460	0.6265%	0.8935%	▲ 0.70
65	69	65.4	4,976	1.3867%	1.3134%	● 1.06
70	71	95.9	4,664	1.5223%	2.0564%	▲ 0.74
75	201	188.6	5,563	3.6132%	3.3908%	● 1.07
80	278	247.1	4,451	6.2458%	5.5525%	▲ 1.12
85	248	207.6	2,101	11.8039%	9.8792%	▲ 1.19
90	172	141.9	824	20.8738%	17.2191%	▲ 1.21
95	53	42.5	164	32.3171%	25.9192%	▲ 1.25
Total	1,203	1,146.4	46,592	2.5820%	2.4606%	● 1.05

Exposure Distribution w/ Inactive Mortality Rate - Actual and Expected; by Age



Inactive Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

We have proposed new assumptions consistent with industry standards, with applicable adjustments. In total, the proposed mortality tables are anticipated to increase plan liabilities for younger retirement ages up to about early 60s for males, and then anticipated to decrease plan liabilities for older retirement ages. We would anticipate that this would increase plan liabilities for current active members but reduce liabilities for retirees. The actual impact will depend on the relative change for each group.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
15	0.0238%	0.0098%	68	1.5909%	1.2517%
16	0.0321%	0.0120%	69	1.7622%	1.4342%
17	0.0433%	0.0131%	70	1.9120%	1.6327%
18	0.0517%	0.0153%	71	2.1153%	1.8400%
19	0.0573%	0.0164%	72	2.3101%	2.0561%
20	0.0608%	0.0173%	73	2.4968%	2.2946%
21	0.0660%	0.0191%	74	2.6752%	2.5649%
22	0.0716%	0.0211%	75	2.8786%	2.8625%
23	0.0772%	0.0234%	76	3.2717%	3.1737%
24	0.0831%	0.0259%	77	3.6597%	3.4562%
25	0.0886%	0.0282%	78	4.0420%	3.7889%
26	0.0936%	0.0307%	79	4.4200%	4.3087%
27	0.1008%	0.0332%	80	4.8490%	4.8485%
28	0.1089%	0.0359%	81	5.6563%	5.4107%
29	0.1170%	0.0386%	82	6.4729%	5.8954%
30	0.1254%	0.0412%	83	7.2988%	6.3864%
31	0.1342%	0.0438%	84	8.1300%	7.2278%
32	0.1426%	0.0464%	85	8.9696%	8.0743%
33	0.1544%	0.0491%	86	9.7646%	8.8707%
34	0.1602%	0.0506%	87	10.5803%	9.6600%
35	0.1670%	0.0528%	88	11.4245%	10.5768%
36	0.1696%	0.0551%	89	12.3269%	11.9527%
37	0.1721%	0.0580%	90	13.2834%	13.2782%
38	0.1754%	0.0608%	91	15.7515%	14.7506%
39	0.1792%	0.0648%	92	18.1410%	15.8458%
40	0.1836%	0.0709%	93	20.4240%	16.9974%

NEW YORK CITY FIRE PENSION FUND CURRENT (continued) PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
41	0.1891%	0.0790%	94	22.5700%	18.2075%
42	0.1957%	0.0892%	95	24.6643%	19.3408%
43	0.2038%	0.1023%	96	26.5127%	20.3502%
44	0.2134%	0.1184%	97	28.2029%	21.2709%
45	0.2247%	0.1371%	98	29.5441%	21.9254%
46	0.2374%	0.1586%	99	30.9728%	22.3227%
47	0.2518%	0.1824%	100	32.1584%	22.4341%
48	0.2672%	0.2079%	101	33.7521%	23.0680%
49	0.2837%	0.2388%	102	35.1259%	24.0803%
50	0.3022%	0.2719%	103	36.3671%	25.2770%
51	0.3597%	0.2959%	104	37.3834%	26.6309%
52	0.4188%	0.3426%	105	38.1051%	28.0912%
53	0.4788%	0.3791%	106	38.4698%	29.6244%
54	0.5392%	0.4326%	107	38.6325%	31.1943%
55	0.5986%	0.4868%	108	38.8076%	32.7579%
56	0.6556%	0.5294%	109	38.9794%	34.2712%
57	0.7090%	0.5421%	110	50.0000%	50.0000%
58	0.7577%	0.5621%	111	50.0000%	50.0000%
59	0.8017%	0.6003%	112	50.0000%	50.0000%
60	0.8498%	0.6343%	113	50.0000%	50.0000%
61	0.9095%	0.6687%	114	50.0000%	50.0000%
62	0.9862%	0.7391%	115	50.0000%	50.0000%
63	1.0698%	0.8094%	116	50.0000%	50.0000%
64	1.1631%	0.8897%	117	50.0000%	50.0000%
65	1.2477%	0.9710%	118	50.0000%	50.0000%
66	1.3403%	1.0569%	119	50.0000%	50.0000%
67	1.4168%	1.1551%	120	100.0000%	100.0000%

¹ An adjustment factor of 0.83 is applied to the probabilities above to develop benefit weighted probabilities of mortality

² An adjustment factor of 0.83 is applied to the probabilities above to develop benefit weighted probabilities of mortality

The following table shows the proposed assumptions.

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0145%	0.0090%	68	1.2864%	1.2432%
16	0.0196%	0.0110%	69	1.3937%	1.3390%
17	0.0264%	0.0120%	70	1.5154%	1.4488%
18	0.0918%	0.0470%	71	1.6547%	1.5720%
19	0.0994%	0.0500%	72	1.8190%	1.7107%
20	0.1039%	0.0561%	73	2.0129%	1.8658%
21	0.1056%	0.0604%	74	2.2425%	2.0377%
22	0.1052%	0.0639%	75	2.5100%	2.2274%
23	0.1042%	0.0677%	76	2.8160%	2.4384%
24	0.1044%	0.0715%	77	3.1605%	2.6737%
25	0.1068%	0.0767%	78	3.5382%	2.9599%
26	0.1132%	0.0844%	79	3.9445%	3.3206%
27	0.1189%	0.0912%	80	4.3797%	3.7252%
28	0.1245%	0.0993%	81	4.9075%	4.1773%
29	0.1311%	0.1074%	82	5.4939%	4.6799%
30	0.1363%	0.1154%	83	6.1508%	5.2400%
31	0.1422%	0.1245%	84	6.9005%	5.8639%
32	0.1476%	0.1330%	85	7.7670%	6.5585%
33	0.1523%	0.1408%	86	8.7477%	7.3305%
34	0.1562%	0.1489%	87	9.9174%	8.1898%
35	0.1603%	0.1560%	88	11.2256%	9.1483%
36	0.1643%	0.1630%	89	12.6867%	10.2124%
37	0.1683%	0.1689%	90	14.3097%	11.3927%
38	0.1720%	0.1735%	91	16.0006%	12.6552%
39	0.1756%	0.1795%	92	17.6911%	13.9704%
40	0.1801%	0.1833%	93	19.3617%	15.3316%

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.1837%	0.1888%	94	21.0134%	16.7357%
42	0.1893%	0.1940%	95	22.6543%	18.1973%
43	0.1944%	0.2001%	96	24.1982%	19.7995%
44	0.2011%	0.2064%	97	25.8103%	21.5051%
45	0.2094%	0.2144%	98	27.5348%	23.3272%
46	0.2190%	0.2250%	99	29.3904%	25.2578%
47	0.2307%	0.2367%	100	31.3558%	27.2907%
48	0.2448%	0.2507%	101	33.3921%	29.3896%
49	0.2623%	0.2671%	102	35.4093%	31.5085%
50	0.2817%	0.2861%	103	37.4123%	33.6377%
51	0.2978%	0.3144%	104	39.3601%	35.7445%
52	0.3169%	0.3476%	105	41.2511%	37.8251%
53	0.3400%	0.3846%	106	43.0828%	39.8479%
54	0.3670%	0.4260%	107	44.8334%	41.8058%
55	0.3988%	0.4715%	108	46.4949%	43.6934%
56	0.4361%	0.5200%	109	48.0767%	45.4898%
57	0.4804%	0.5706%	110	49.3439%	47.1868%
58	0.5313%	0.6241%	111	49.4724%	48.7883%
59	0.5880%	0.6774%	112	49.5965%	49.6759%
60	0.6497%	0.7316%	113	49.7207%	49.7804%
61	0.7171%	0.7859%	114	49.8602%	49.8851%
62	0.7871%	0.8402%	115	49.9850%	49.9900%
63	0.8608%	0.8960%	116	49.9950%	49.9950%
64	0.9365%	0.9535%	117	50.0000%	50.0000%
65	1.0161%	1.0154%	118	50.0000%	50.0000%
66	1.0995%	1.0824%	119	50.0000%	50.0000%
67	1.1895%	1.1584%	120	100.0000%	100.0000%

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0136%	0.0090%	68	1.4174%	1.4402%
16	0.0184%	0.0110%	69	1.5313%	1.5587%
17	0.0248%	0.0120%	70	1.6604%	1.7025%
18	0.1008%	0.0470%	71	1.8077%	1.8757%
19	0.1112%	0.0500%	72	1.9773%	2.0830%
20	0.1180%	0.0561%	73	2.1717%	2.3277%
21	0.1224%	0.0604%	74	2.3951%	2.6141%
22	0.1250%	0.0639%	75	2.6488%	2.9441%
23	0.1265%	0.0677%	76	2.9362%	3.3072%
24	0.1293%	0.0715%	77	3.2587%	3.6967%
25	0.1334%	0.0767%	78	3.6178%	4.1104%
26	0.1415%	0.0844%	79	4.0135%	4.5453%
27	0.1488%	0.0912%	80	4.4505%	5.0049%
28	0.1562%	0.0993%	81	4.9323%	5.4890%
29	0.1645%	0.1074%	82	5.4663%	6.0042%
30	0.1714%	0.1154%	83	6.1251%	6.5560%
31	0.1788%	0.1245%	84	6.8993%	7.1516%
32	0.1856%	0.1330%	85	7.7284%	7.8018%
33	0.1915%	0.1408%	86	8.8259%	8.5119%
34	0.1975%	0.1489%	87	10.0299%	9.2942%
35	0.2023%	0.1560%	88	11.3555%	10.1580%
36	0.2076%	0.1630%	89	12.8221%	11.1091%
37	0.2115%	0.1689%	90	14.4490%	12.1516%
38	0.2159%	0.1735%	91	16.1757%	13.2985%
39	0.2197%	0.1795%	92	17.9538%	14.5468%
40	0.2232%	0.1855%	93	19.7689%	15.9028%

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF MORTALITY FOR DISABLED RETIREES BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.2283%	0.1910%	94	21.6217%	17.3579%
42	0.2333%	0.1971%	95	23.5150%	18.9143%
43	0.2396%	0.2031%	96	25.0951%	20.6416%
44	0.2464%	0.2113%	97	26.7443%	22.4778%
45	0.2558%	0.2202%	98	28.4930%	24.4187%
46	0.2672%	0.2307%	99	30.3544%	26.4385%
47	0.2815%	0.2442%	100	32.3002%	28.5273%
48	0.2982%	0.2591%	101	34.2993%	30.6491%
49	0.3186%	0.2774%	102	36.2704%	32.7813%
50	0.3417%	0.2983%	103	38.2225%	34.9113%
51	0.3660%	0.3373%	104	40.1159%	37.0070%
52	0.3941%	0.3824%	105	41.9494%	39.0659%
53	0.4259%	0.4349%	106	43.7225%	41.0568%
54	0.4627%	0.4934%	107	45.4140%	42.9728%
55	0.5036%	0.5574%	108	47.0171%	44.8128%
56	0.5502%	0.6279%	109	48.5432%	46.5543%
57	0.6012%	0.7017%	110	49.3439%	48.1911%
58	0.6569%	0.7759%	111	49.4724%	49.5766%
59	0.7169%	0.8481%	112	49.5965%	49.6759%
60	0.7803%	0.9137%	113	49.7207%	49.7804%
61	0.8468%	0.9742%	114	49.8602%	49.8851%
62	0.9165%	1.0284%	115	49.9850%	49.9900%
63	0.9879%	1.0796%	116	49.9950%	49.9950%
64	1.0621%	1.1323%	117	50.0000%	50.0000%
65	1.1410%	1.1915%	118	50.0000%	50.0000%
66	1.2253%	1.2608%	119	50.0000%	50.0000%
67	1.3162%	1.3422%	120	100.0000%	100.0000%

Postretirement Mortality – Contingent Beneficiaries

The SOA combined the experience of all contingent beneficiaries of teachers, general employees and public safety members in developing contingent survivor annuity mortality tables. We combined the experience of all NYCRS systems (TRS, BERS, NYCERS, POLICE and FIRE) in proposing a recommended assumption. We propose to use the PUB contingent survivor annuitant mortality tables, multiplied by adjustment factors. Separate tables exist on a headcount-weighted and amount-weighted basis in addition to gender.

For males, the proposed adjustment factors are 125% for amount-weighted and 120% for headcount-weighted. For females, the proposed adjustment factors are 120% for amount-weighted and 108% for headcount-weighted.

The contingent survivor assumption would apply upon the death of the member. While both the member and contingent survivor are both alive, we propose the healthy annuitant mortality table apply.

The following charts show postretirement mortality experience on a headcount-weighted basis by year for the age range (60 to 104) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions for all members of NYCRS. The A/E decreased from 1.12 to 1.00 and decreased from 1.10 to 0.96 for only FIRE.

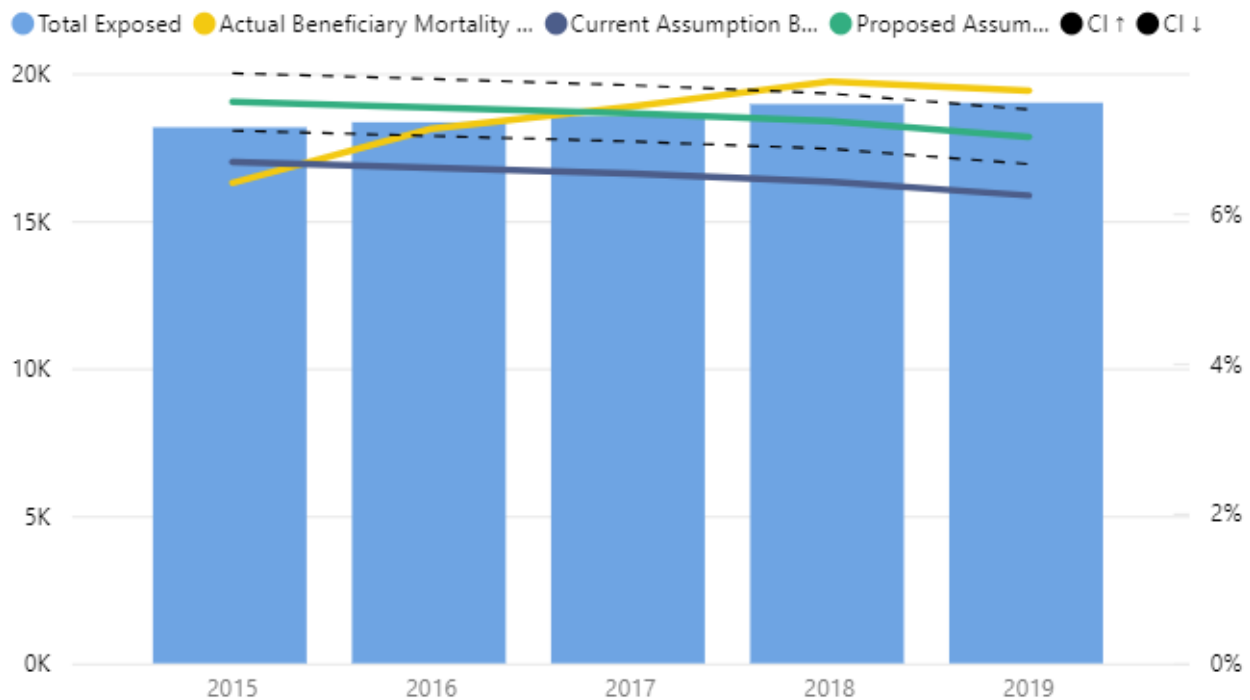
Current Assumption – Headcount-weighted

Plan Year	Actual Beneficiary Deaths	Expected Beneficiary Deaths	Total Exposed	Actual Beneficiary Mortality Rate	Current Assumption Beneficiary Mortality	Ratio Act/Exp Beneficiary Mortality
2015	1,163	1,213.4	18,168	6.4014%	6.6789%	0.96
2016	1,307	1,210.9	18,340	7.1265%	6.6027%	1.08
2017	1,376	1,210.4	18,541	7.4214%	6.5285%	1.14
2018	1,470	1,216.8	18,955	7.7552%	6.4197%	1.21
2019	1,450	1,184.7	19,001	7.6312%	6.2351%	1.22
Total	6,766	6,036.4	93,005	7.2749%	6.4904%	1.12

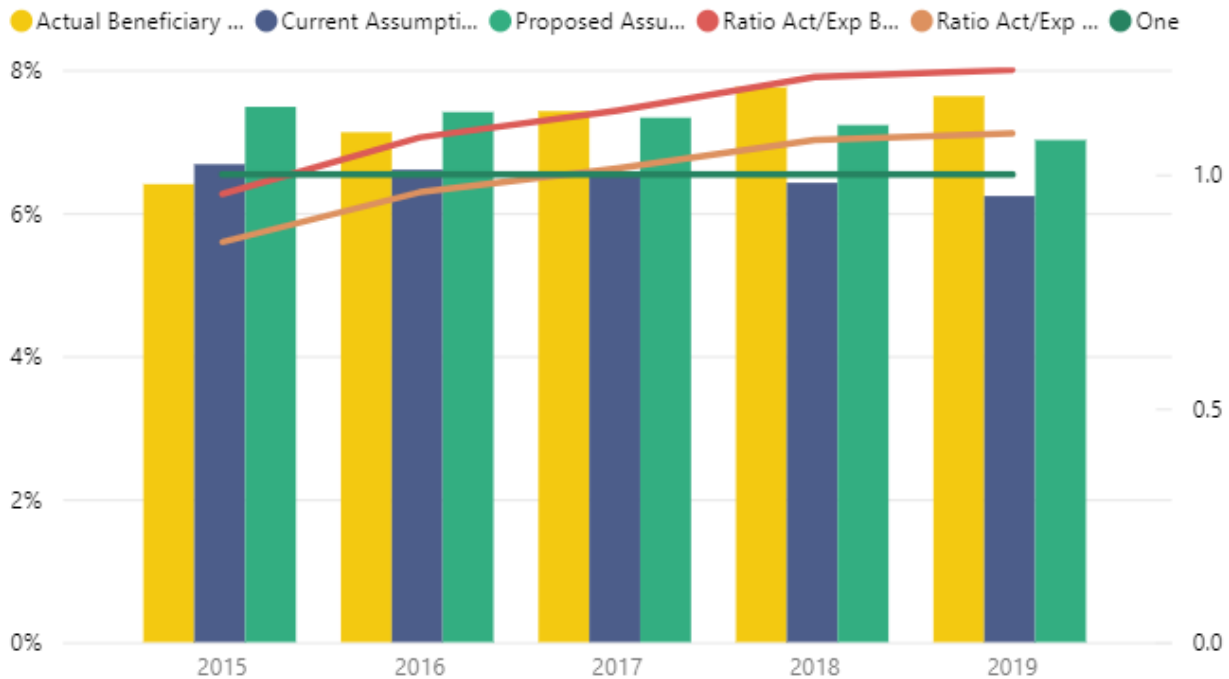
Proposed Assumption – Headcount-weighted

Plan Year	Actual Beneficiary Deaths	Expected Beneficiary Deaths Proposed	Total Exposed	Actual Beneficiary Mortality Rate	Proposed Assumption Beneficiary Mortality	Act/Exp Proposed Beneficiary Mortality
2015	1,163	1,359.3	18,168	6.4014%	7.4816%	▲ 0.86
2016	1,307	1,358.7	18,340	7.1265%	7.4084%	● 0.96
2017	1,376	1,359.0	18,541	7.4214%	7.3296%	● 1.01
2018	1,470	1,369.6	18,955	7.7552%	7.2257%	● 1.07
2019	1,450	1,333.4	19,001	7.6312%	7.0175%	● 1.09
Total	6,766	6,780.0	93,005	7.2749%	7.2899%	● 1.00

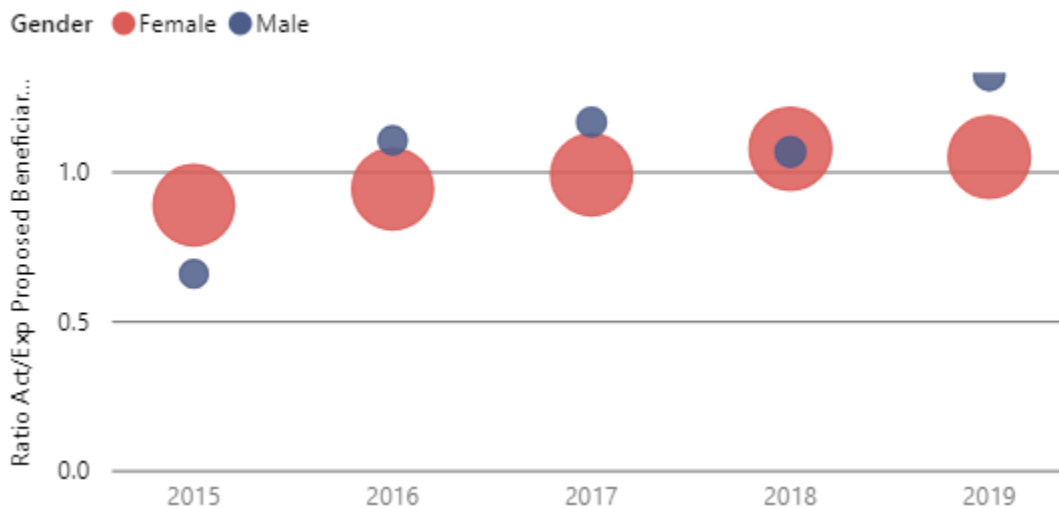
Exposure Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Year



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Year



Actual vs. Expected - Beneficiary Mortality Proposed w/ Exposure Bubbles; by ...



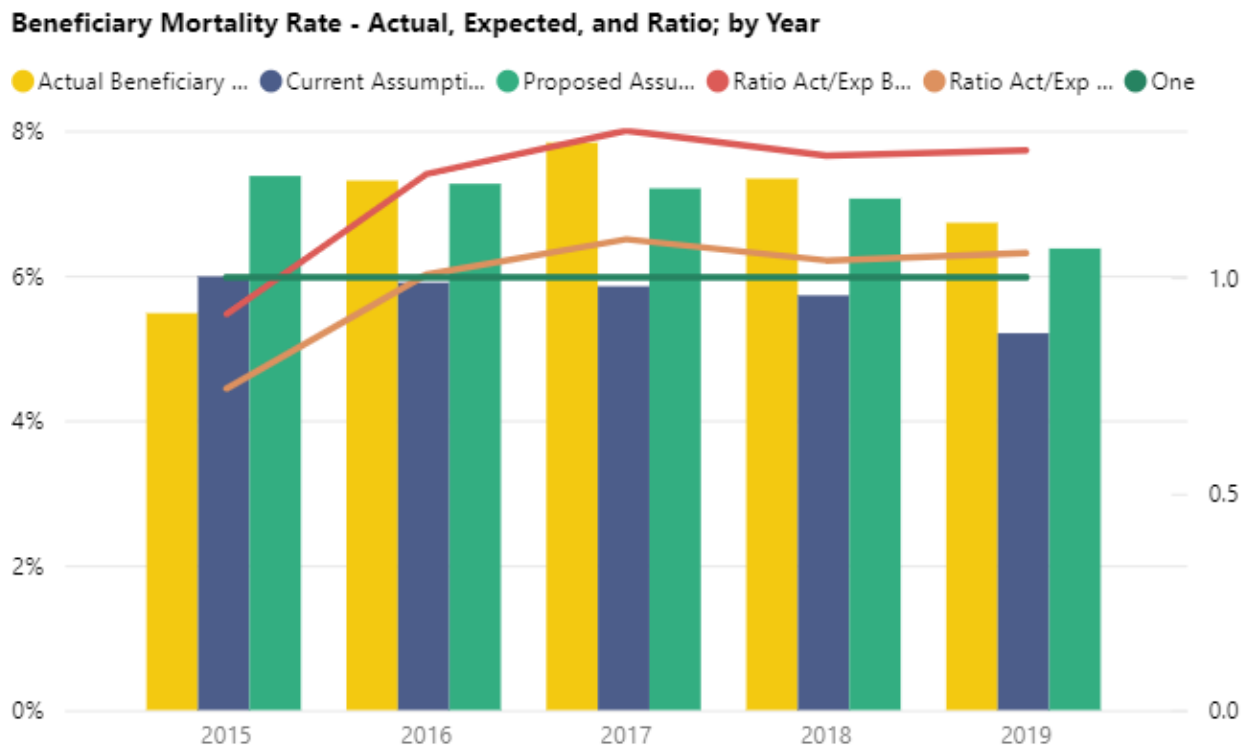
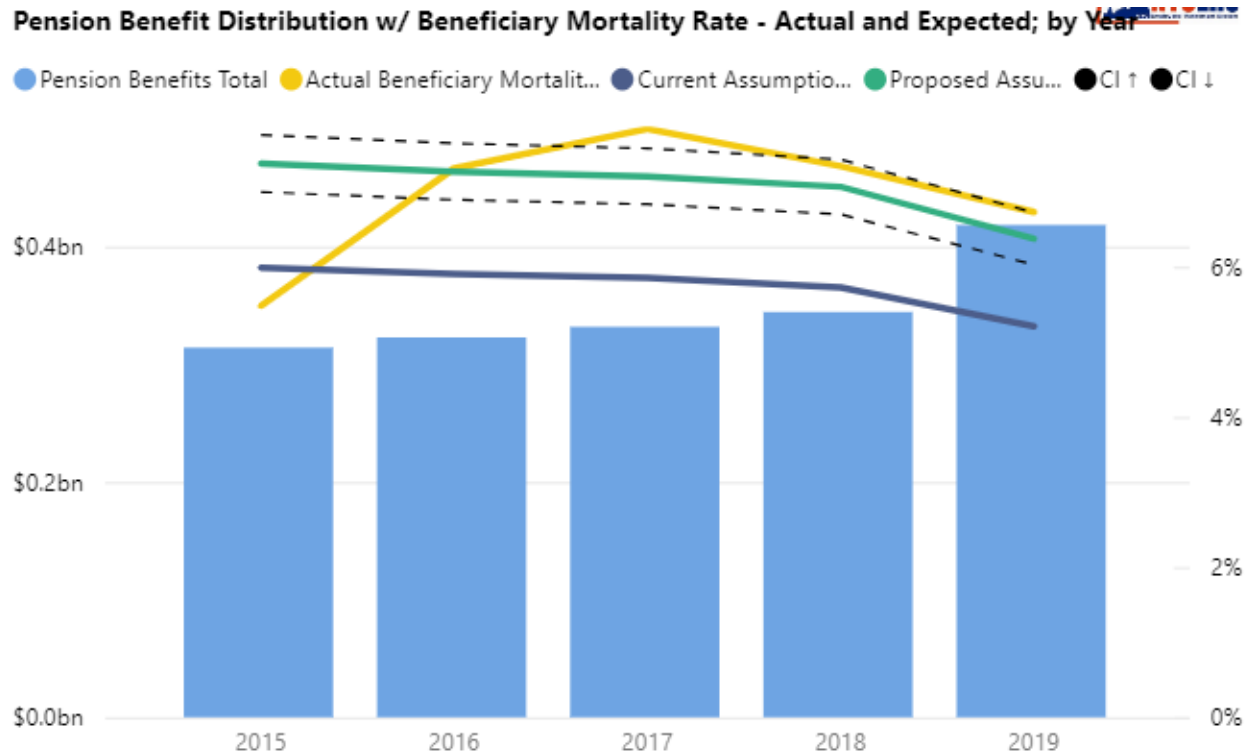
The following charts show postretirement mortality experience on an amount-weighted basis by year for the age range (60 to 104) during the period 2015 – 2019 for both males and females combined on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.22 to 0.99 and decreased from 1.00 to 0.82 for only FIRE.

Current Assumption – Amount-weighted

Plan Year	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Current Assumption Beneficiary Mortality BftWght	Ratio Act/Exp Beneficiary Mortality BftWght
2015	\$17.2M	\$18.8M	\$314.1M	5.4787%	5.9868%	0.92
2016	\$23.6M	\$19.0M	\$322.7M	7.3093%	5.9014%	1.24
2017	\$26.0M	\$19.4M	\$331.8M	7.8345%	5.8502%	1.34
2018	\$25.3M	\$19.7M	\$344.3M	7.3366%	5.7247%	1.28
2019	\$28.1M	\$21.8M	\$418.3M	6.7269%	5.2026%	1.29
Total	\$120.2M	\$98.7M	\$1,731.3M	6.9425%	5.7031%	1.22

Proposed Assumption – Amount-weighted

Plan Year	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released Proposed	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Proposed Assumption Beneficiary Mortality BftWght	Act/Exp Proposed Beneficiary Mortality BftWght
2015	\$17.2M	\$23.2M	\$314.1M	5.4787%	7.3734%	0.74
2016	\$23.6M	\$23.4M	\$322.7M	7.3093%	7.2656%	1.01
2017	\$26.0M	\$23.9M	\$331.8M	7.8345%	7.2019%	1.09
2018	\$25.3M	\$24.3M	\$344.3M	7.3366%	7.0609%	1.04
2019	\$28.1M	\$26.7M	\$418.3M	6.7269%	6.3717%	1.06
Total	\$120.2M	\$121.5M	\$1,731.3M	6.9425%	7.0162%	0.99



The following section displays results by gender.

Contingent Beneficiaries - Males

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for males on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.52 to 1.11 and there is no credible data to report for FIRE.

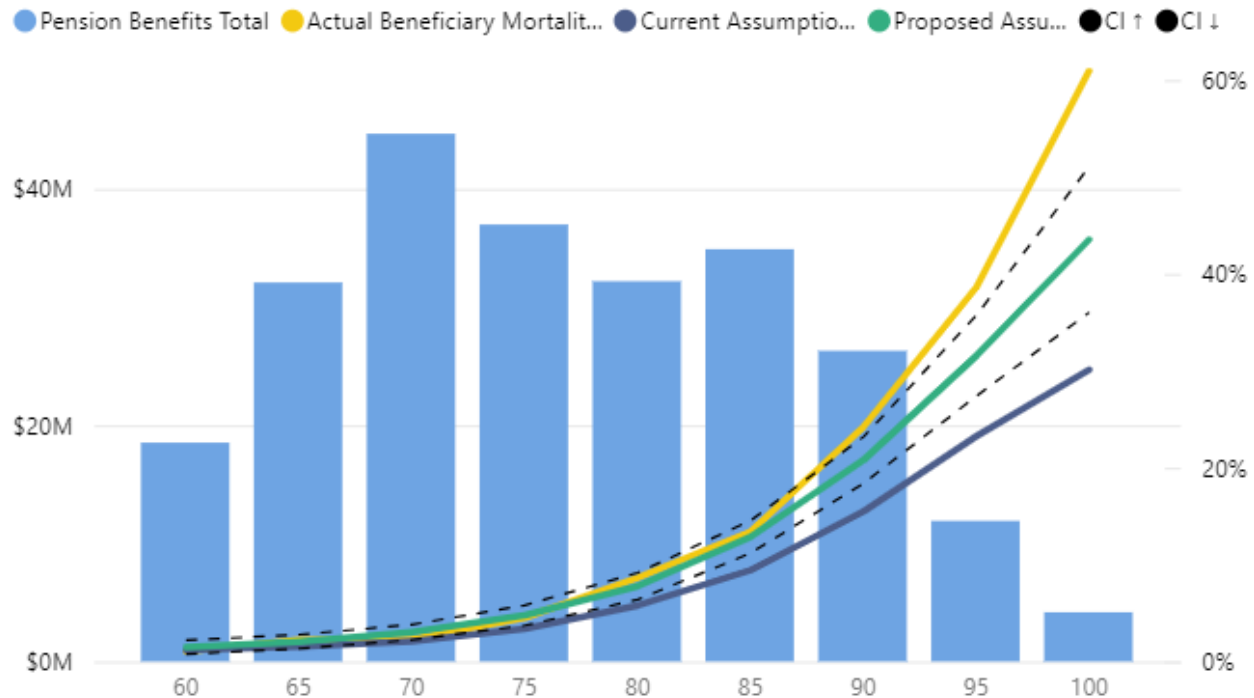
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

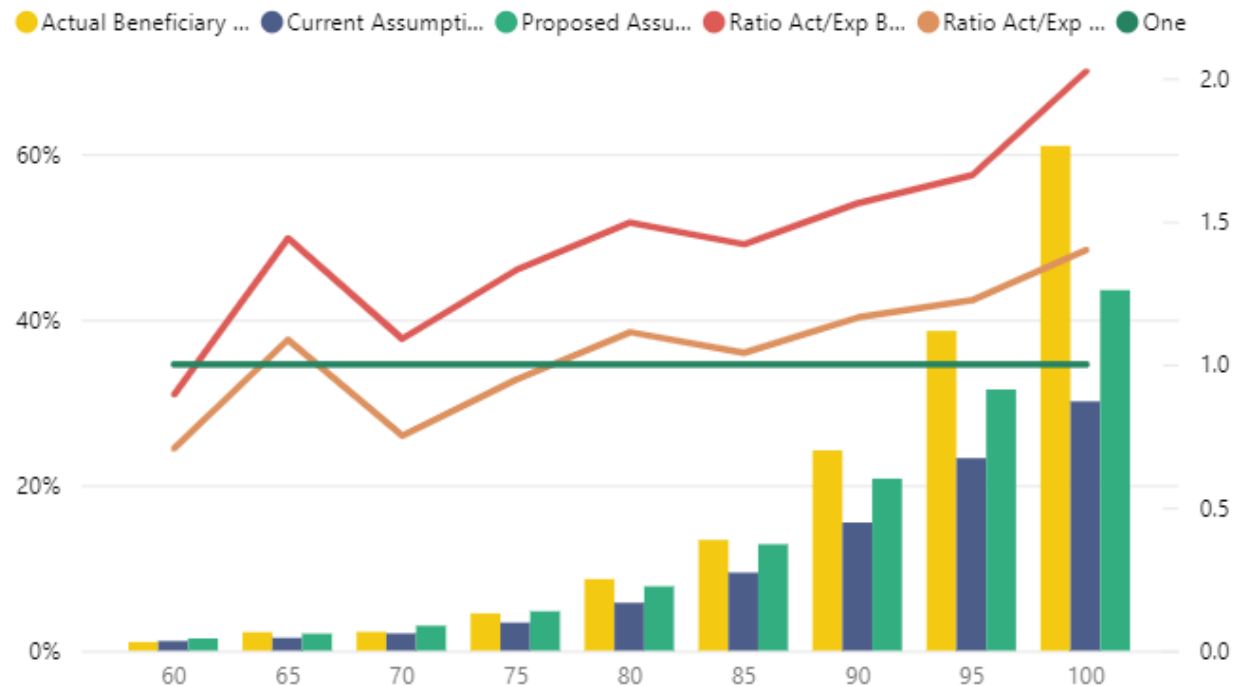
Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Current Assumption Beneficiary Mortality BftWght	Ratio Act/Exp Beneficiary Mortality BftWght
60	\$0.2M	\$0.2M	\$18.5M	1.0416%	1.1637%	▲ 0.90
65	\$0.7M	\$0.5M	\$32.1M	2.2223%	1.5421%	▲ 1.44
70	\$1.0M	\$0.9M	\$44.7M	2.2615%	2.0760%	● 1.09
75	\$1.7M	\$1.3M	\$37.0M	4.4993%	3.3836%	▲ 1.33
80	\$2.8M	\$1.9M	\$32.2M	8.6385%	5.7759%	▲ 1.50
85	\$4.7M	\$3.3M	\$34.9M	13.3692%	9.4174%	▲ 1.42
90	\$6.4M	\$4.1M	\$26.3M	24.1876%	15.4684%	◆ 1.56
95	\$4.6M	\$2.8M	\$11.9M	38.6136%	23.2507%	◆ 1.66
100	\$2.5M	\$1.3M	\$4.2M	60.9581%	30.0988%	◆ 2.03
Total	\$24.5M	\$16.1M	\$241.6M	10.1452%	6.6706%	◆ 1.52

Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released Proposed	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Proposed Assumption Beneficiary Mortality BftWght	Act/Exp Proposed Beneficiary Mortality BftWght
60	\$0.2M	\$0.3M	\$18.5M	1.0416%	1.4728%	▲ 0.71
65	\$0.7M	\$0.7M	\$32.1M	2.2223%	2.0459%	● 1.09
70	\$1.0M	\$1.3M	\$44.7M	2.2615%	3.0124%	▲ 0.75
75	\$1.7M	\$1.8M	\$37.0M	4.4993%	4.7523%	● 0.95
80	\$2.8M	\$2.5M	\$32.2M	8.6385%	7.7645%	▲ 1.11
85	\$4.7M	\$4.5M	\$34.9M	13.3692%	12.8490%	● 1.04
90	\$6.4M	\$5.5M	\$26.3M	24.1876%	20.7707%	▲ 1.16
95	\$4.6M	\$3.8M	\$11.9M	38.6136%	31.5366%	▲ 1.22
100	\$2.5M	\$1.8M	\$4.2M	60.9581%	43.5346%	▲ 1.40
Total	\$24.5M	\$22.0M	\$241.6M	10.1452%	9.1203%	▲ 1.11

Pension Benefit Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



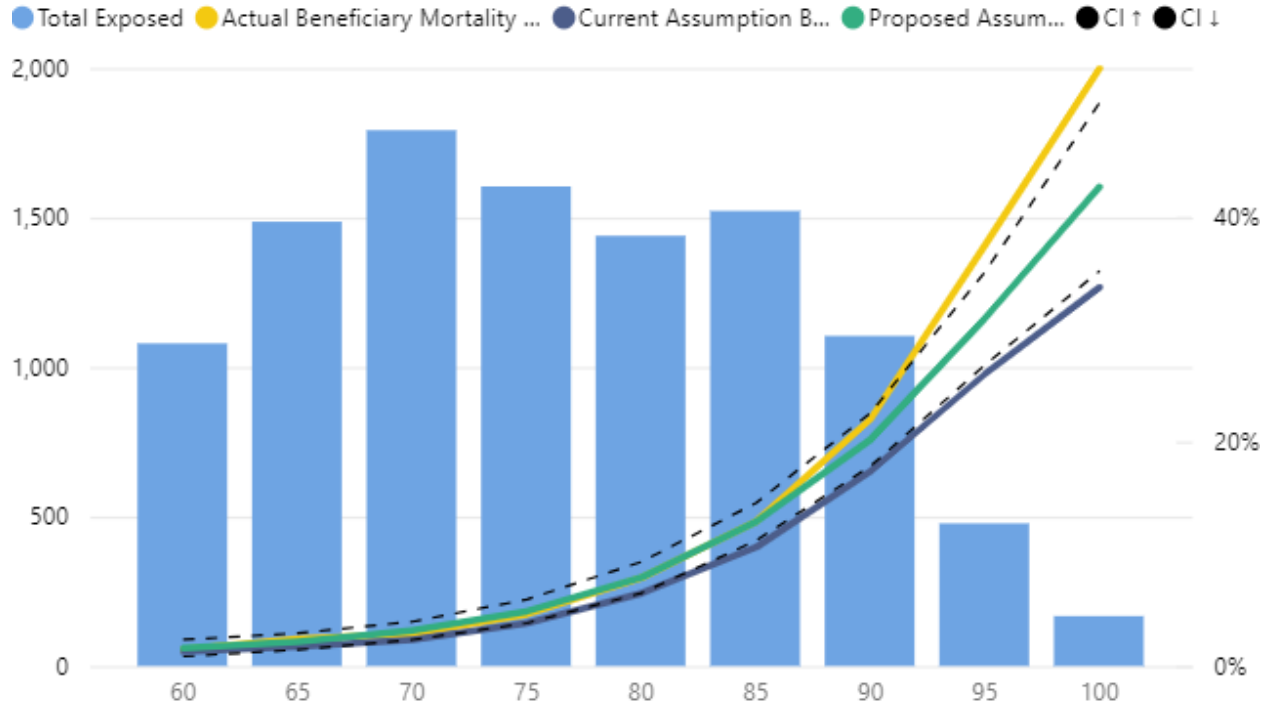
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for males on the current and proposed assumptions for all members of NYCRS. The A/E decreased from 1.30 to 1.07 and there is no credible data to report for FIRE.

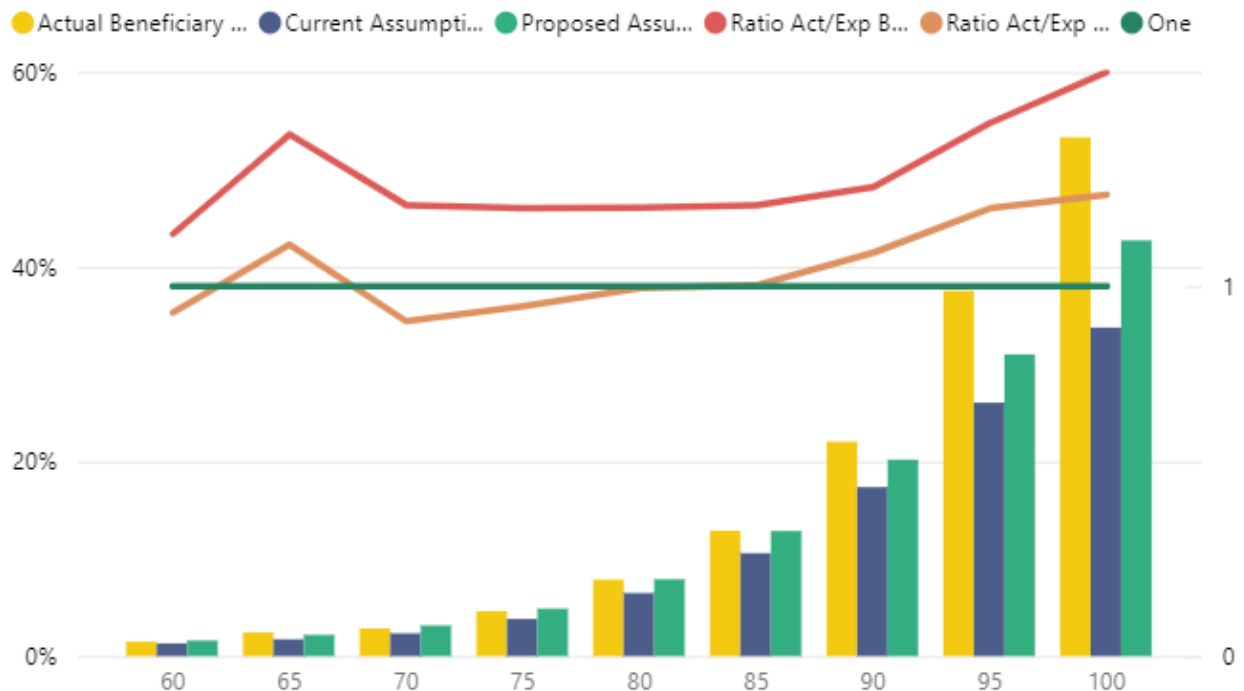
Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths	Total Exposed	Actual Beneficiary Mortality Rate	Current Assumption Beneficiary Mortality	Ratio Act/Exp Beneficiary Mortality
60	16	14.0	1,079	1.4829%	1.2992%	▲ 1.14
65	36	25.5	1,486	2.4226%	1.7181%	▲ 1.41
70	51	41.8	1,792	2.8460%	2.3340%	▲ 1.22
75	74	61.1	1,604	4.6135%	3.8106%	▲ 1.21
80	113	93.2	1,439	7.8527%	6.4733%	▲ 1.21
85	196	160.8	1,522	12.8778%	10.5664%	▲ 1.22
90	243	191.6	1,104	22.0109%	17.3553%	▲ 1.27
95	179	124.2	477	37.5262%	26.0300%	▲ 1.44
100	89	56.4	167	53.2934%	33.7478%	◆ 1.58
Total	997	768.6	10,670	9.3440%	7.2033%	▲ 1.30

Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths Proposed	Total Exposed	Actual Beneficiary Mortality Rate	Proposed Assumption Beneficiary Mortality	Act/Exp Proposed Beneficiary Mortality
60	16	17.2	1,079	1.4829%	1.5966%	● 0.93
65	36	32.3	1,486	2.4226%	2.1770%	▲ 1.11
70	51	56.3	1,792	2.8460%	3.1441%	● 0.91
75	74	78.2	1,604	4.6135%	4.8756%	● 0.95
80	113	113.6	1,439	7.8527%	7.8916%	● 1.00
85	196	195.5	1,522	12.8778%	12.8459%	● 1.00
90	243	222.8	1,104	22.0109%	20.1786%	● 1.09
95	179	147.8	477	37.5262%	30.9910%	▲ 1.21
100	89	71.3	167	53.2934%	42.7034%	▲ 1.25
Total	997	935.1	10,670	9.3440%	8.7639%	● 1.07

Exposure Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



Contingent Beneficiaries - Females

The following charts show postretirement mortality experience on an amount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for females on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.16 to 0.96 and decreased from 1.02 to 0.84 for only FIRE.

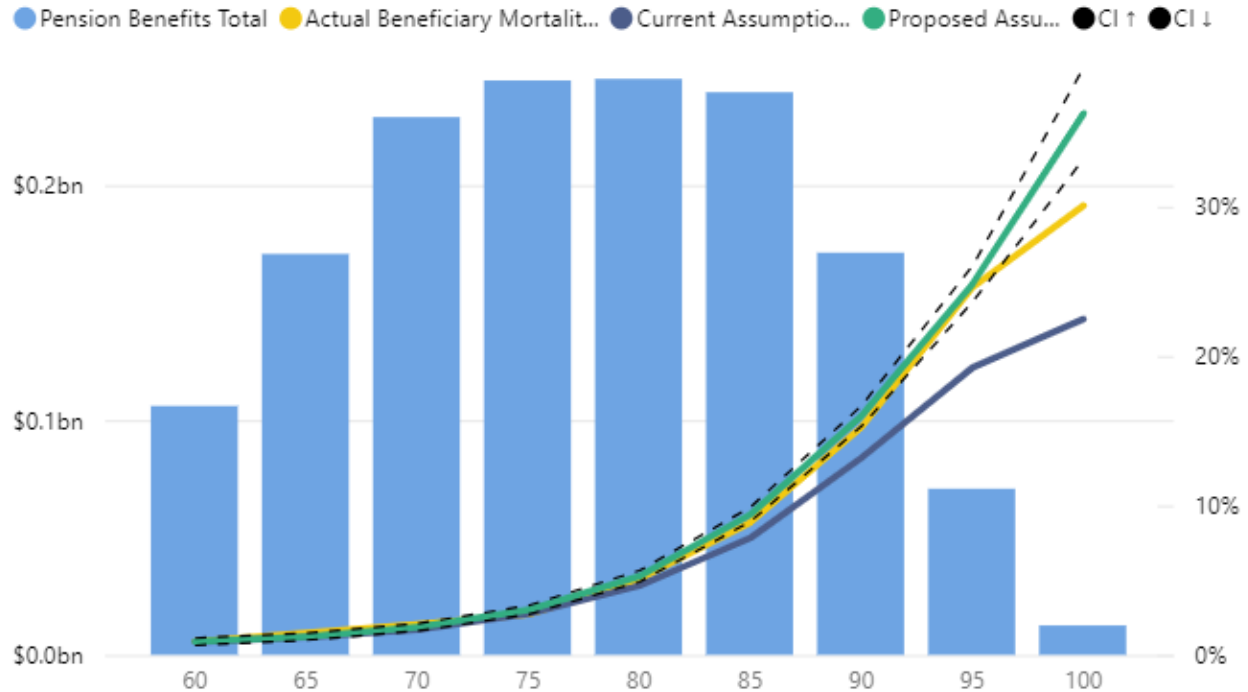
Please note that the charts by age are based on 5-year brackets. For example, the age bracket 75 should be interpreted as the interval 75 – 79.

Amount-weighted

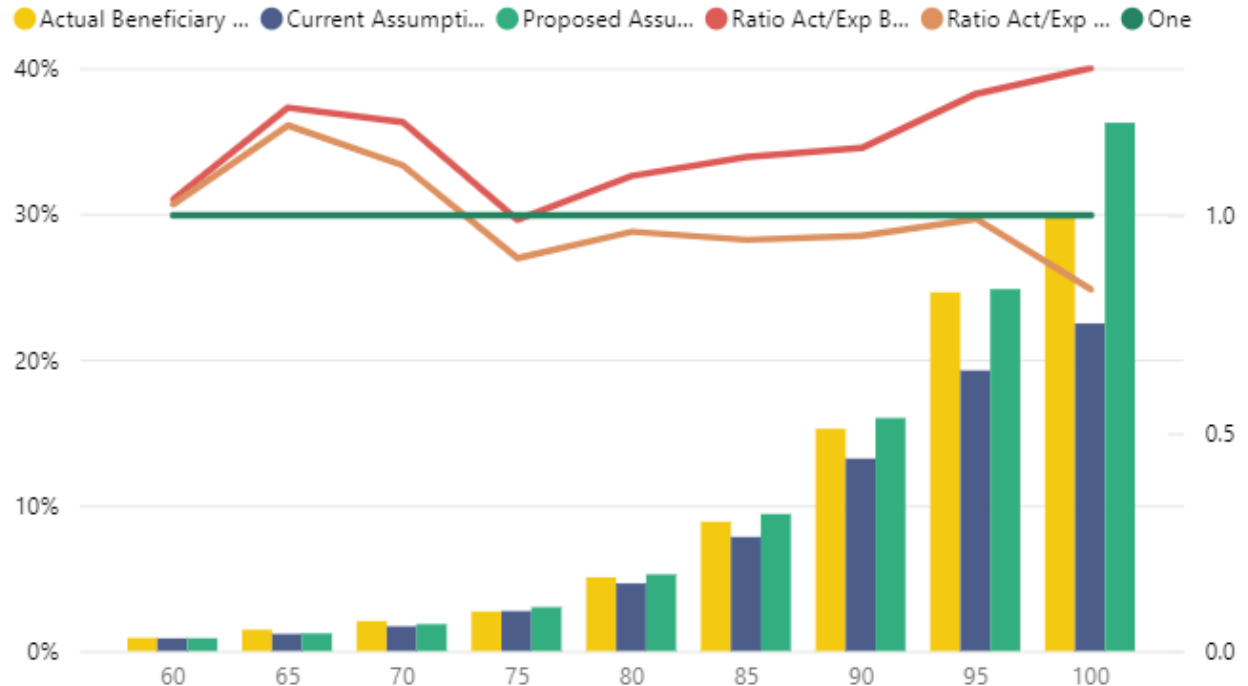
Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Current Assumption Beneficiary Mortality BftWght	Ratio Act/Exp Beneficiary Mortality BftWght
60	\$1.0M	\$0.9M	\$106.0M	0.8984%	0.8666%	1.04
65	\$2.5M	\$2.0M	\$170.7M	1.4586%	1.1698%	1.25
70	\$4.7M	\$3.9M	\$229.0M	2.0543%	1.6923%	1.21
75	\$6.6M	\$6.7M	\$244.6M	2.7071%	2.7350%	0.99
80	\$12.4M	\$11.4M	\$245.3M	5.0535%	4.6336%	1.09
85	\$21.2M	\$18.7M	\$239.6M	8.8691%	7.8227%	1.13
90	\$26.1M	\$22.6M	\$171.3M	15.2405%	13.2015%	1.15
95	\$17.4M	\$13.6M	\$70.7M	24.6092%	19.2429%	1.28
100	\$3.8M	\$2.8M	\$12.5M	30.0705%	22.4709%	1.34
Total	\$95.7M	\$82.6M	\$1,489.6M	6.4231%	5.5462%	1.16

Age Bene (bins)	Actual Beneficiary Benefits Released	Expected Beneficiary Benefits Released Proposed	Pension Benefits Total	Actual Beneficiary Mortality Rate BftWght	Proposed Assumption Beneficiary Mortality BftWght	Act/Exp Proposed Beneficiary Mortality BftWght
60	\$1.0M	\$0.9M	\$106.0M	0.8984%	0.8763%	1.03
65	\$2.5M	\$2.1M	\$170.7M	1.4586%	1.2092%	1.21
70	\$4.7M	\$4.2M	\$229.0M	2.0543%	1.8436%	1.11
75	\$6.6M	\$7.3M	\$244.6M	2.7071%	3.0029%	0.90
80	\$12.4M	\$12.9M	\$245.3M	5.0535%	5.2520%	0.96
85	\$21.2M	\$22.5M	\$239.6M	8.8691%	9.3996%	0.94
90	\$26.1M	\$27.4M	\$171.3M	15.2405%	15.9868%	0.95
95	\$17.4M	\$17.6M	\$70.7M	24.6092%	24.8248%	0.99
100	\$3.8M	\$4.5M	\$12.5M	30.0705%	36.2393%	0.83
Total	\$95.7M	\$99.4M	\$1,489.6M	6.4231%	6.6750%	0.96

Pension Benefit Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



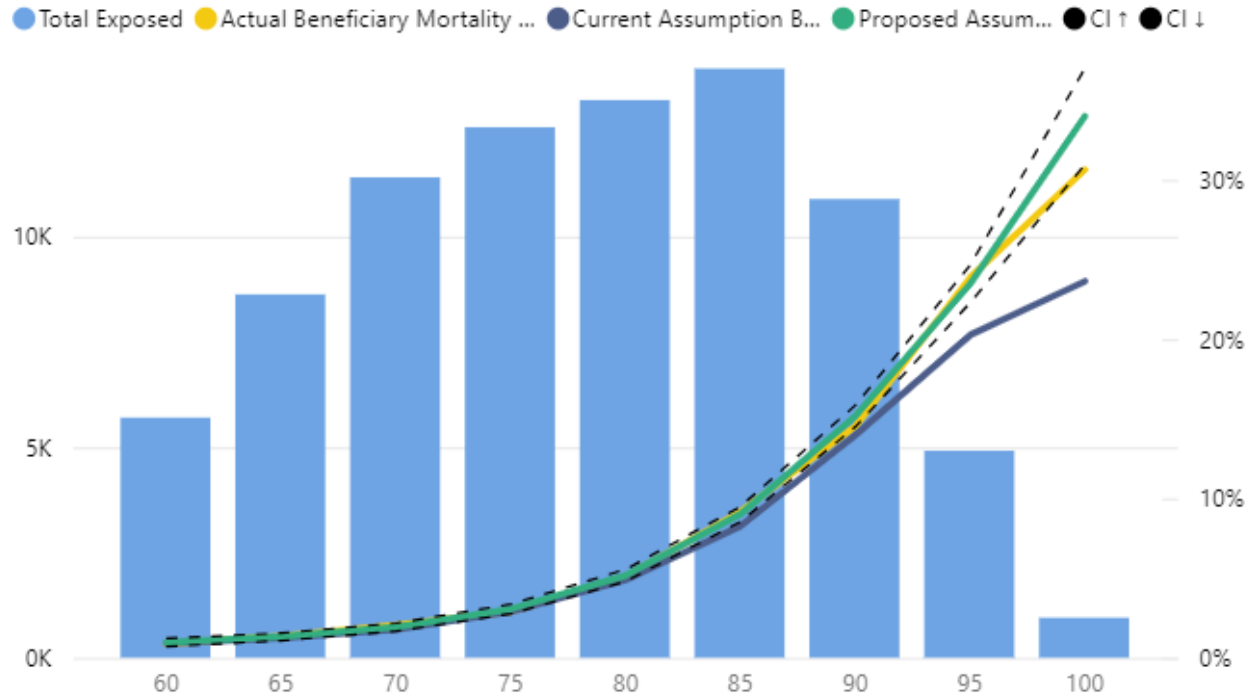
Headcount-weighted

The following charts show postretirement mortality experience on a headcount-weighted basis by age band for the age range (60 to 104) during the period 2015 – 2019 for females on the current and proposed assumptions for all members of NYCERS. The A/E decreased from 1.10 to 0.99 and decreased from 1.11 to 0.96 for only FIRE.

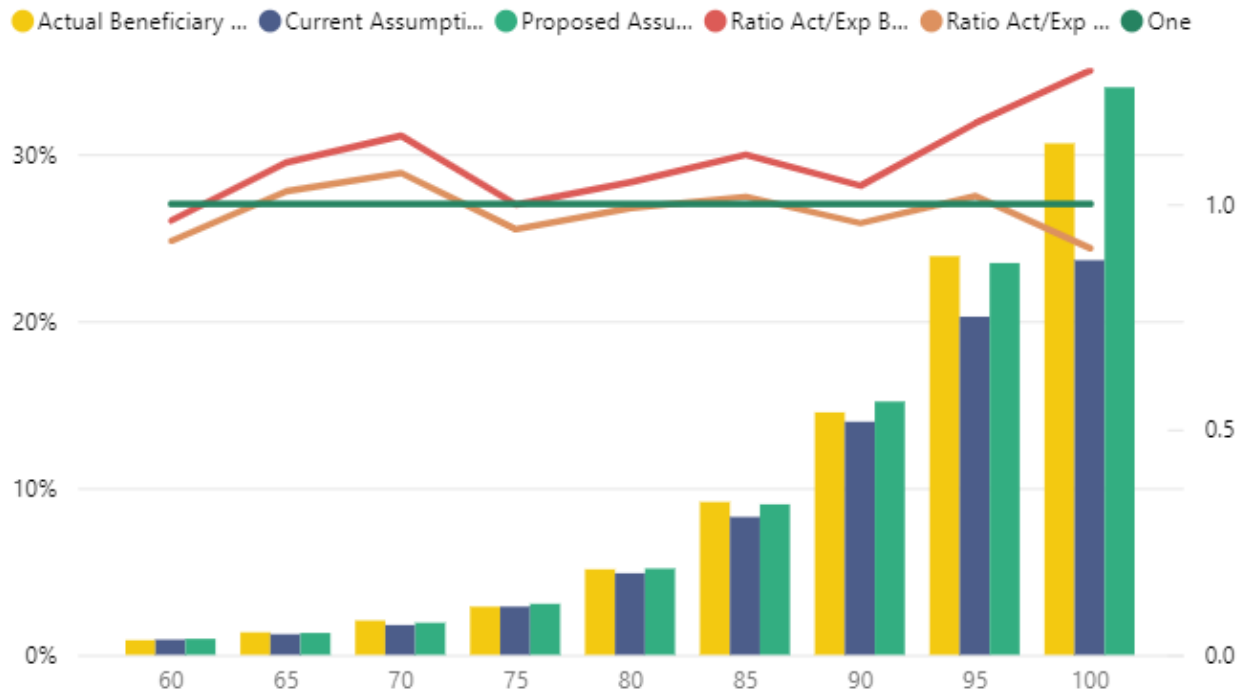
Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths	Total Exposed	Actual Beneficiary Mortality Rate	Current Assumption Beneficiary Mortality	Ratio Act/Exp Beneficiary Mortality
60	50	51.9	5,702	0.8769%	0.9101%	0.96
65	116	106.2	8,629	1.3443%	1.2311%	1.09
70	234	203.2	11,408	2.0512%	1.7814%	1.15
75	363	363.5	12,598	2.8814%	2.8857%	1.00
80	678	646.9	13,244	5.1193%	4.8841%	1.05
85	1,281	1,155.2	13,993	9.1546%	8.2556%	1.11
90	1,582	1,520.7	10,894	14.5218%	13.9588%	1.04
95	1,174	995.6	4,917	23.8763%	20.2491%	1.18
100	291	224.5	950	30.6316%	23.6325%	1.30
Total	5,769	5,267.8	82,335	7.0067%	6.3980%	1.10

Age Bene (bins)	Actual Beneficiary Deaths	Expected Beneficiary Deaths Proposed	Total Exposed	Actual Beneficiary Mortality Rate	Proposed Assumption Beneficiary Mortality	Act/Exp Proposed Beneficiary Mortality
60	50	54.5	5,702	0.8769%	0.9555%	0.92
65	116	112.8	8,629	1.3443%	1.3075%	1.03
70	234	219.0	11,408	2.0512%	1.9194%	1.07
75	363	384.6	12,598	2.8814%	3.0528%	0.94
80	678	684.0	13,244	5.1193%	5.1648%	0.99
85	1,281	1,260.9	13,993	9.1546%	9.0109%	1.02
90	1,582	1,652.4	10,894	14.5218%	15.1684%	0.96
95	1,174	1,153.7	4,917	23.8763%	23.4644%	1.02
100	291	322.9	950	30.6316%	33.9867%	0.90
Total	5,769	5,844.9	82,335	7.0067%	7.0989%	0.99

Exposure Distribution w/ Beneficiary Mortality Rate - Actual and Expected; by Age



Beneficiary Mortality Rate - Actual, Expected, and Ratio; by Age



Summary

We have proposed new assumptions consistent with industry standards. In total, the proposed mortality tables are anticipated to decrease plan liabilities.

Assumption Tables

The following table shows the current assumptions.

NEW YORK CITY FIRE PENSION FUND CURRENT PROBABILITIES OF BENEFICIARY MORTALITY BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
15	0.0105%	0.0092%	68	1.8256%	1.3605%
16	0.0142%	0.0112%	69	1.9386%	1.4332%
17	0.0191%	0.0122%	70	2.0542%	1.5007%
18	0.0222%	0.0133%	71	2.2359%	1.6745%
19	0.0240%	0.0143%	72	2.4230%	1.8463%
20	0.0251%	0.0145%	73	2.6165%	2.0157%
21	0.0268%	0.0153%	74	2.8157%	2.1838%
22	0.0284%	0.0161%	75	3.0220%	2.3492%
23	0.0301%	0.0171%	76	3.4928%	2.6652%
24	0.0315%	0.0183%	77	3.9787%	2.9831%
25	0.0327%	0.0195%	78	4.4792%	3.3011%
26	0.0342%	0.0208%	79	4.9963%	3.6207%
27	0.0354%	0.0221%	80	5.5282%	3.9391%
28	0.0371%	0.0236%	81	6.1051%	4.4386%
29	0.0394%	0.0252%	82	6.6894%	4.9473%
30	0.0427%	0.0270%	83	7.2805%	5.4665%
31	0.0495%	0.0330%	84	7.8749%	5.9942%
32	0.0562%	0.0384%	85	8.4753%	6.5354%
33	0.0625%	0.0431%	86	9.6136%	7.4659%
34	0.0682%	0.0471%	87	10.8005%	8.3995%
35	0.0743%	0.0511%	88	12.0443%	9.3428%
36	0.0780%	0.0542%	89	13.3397%	10.2918%
37	0.0818%	0.0579%	90	14.6958%	11.2477%
38	0.0861%	0.0618%	91	16.4185%	12.8868%
39	0.0917%	0.0666%	92	18.1416%	14.4887%
40	0.0997%	0.0719%	93	19.8574%	16.0801%

NEW YORK CITY FIRE PENSION FUND CURRENT (continued) PROBABILITIES OF BENEFICIARY MORTALITY BASE TABLE					
Age	Males ¹	Females ²	Age	Males ¹	Females ²
41	0.1394%	0.0775%	94	21.6187%	17.5854%
42	0.1774%	0.0859%	95	23.5884%	19.0626%
43	0.2143%	0.0968%	96	25.4266%	20.2474%
44	0.2507%	0.1111%	97	27.2119%	21.2937%
45	0.2875%	0.1287%	98	29.0202%	22.0663%
46	0.3207%	0.1501%	99	30.6654%	22.5443%
47	0.3534%	0.1748%	100	32.1584%	22.6473%
48	0.3849%	0.2022%	101	33.7521%	23.5294%
49	0.4150%	0.2319%	102	35.1259%	24.5619%
50	0.4431%	0.2633%	103	36.3671%	25.7825%
51	0.5156%	0.2999%	104	37.3834%	27.1635%
52	0.5928%	0.3376%	105	38.1051%	28.6530%
53	0.6740%	0.3762%	106	38.4698%	30.2169%
54	0.7583%	0.4151%	107	38.6325%	31.8182%
55	0.8440%	0.4540%	108	38.8076%	33.4131%
56	0.9048%	0.5132%	109	38.9794%	34.9566%
57	0.9604%	0.5735%	110	50.0000%	50.0000%
58	1.0101%	0.6353%	111	50.0000%	50.0000%
59	1.0536%	0.6981%	112	50.0000%	50.0000%
60	1.0919%	0.7631%	113	50.0000%	50.0000%
61	1.1835%	0.8329%	114	50.0000%	50.0000%
62	1.2676%	0.8908%	115	50.0000%	50.0000%
63	1.3473%	0.9493%	116	50.0000%	50.0000%
64	1.4238%	1.0146%	117	50.0000%	50.0000%
65	1.4985%	1.0876%	118	50.0000%	50.0000%
66	1.6059%	1.1681%	119	50.0000%	50.0000%
67	1.7146%	1.2609%	120	100.0000%	100.0000%

¹ An adjustment factor of 0.89 is applied to the probabilities above to develop benefit weighted probabilities of mortality

² An adjustment factor of 0.951 is applied to the probabilities above to develop benefit weighted probabilities of mortality

The following table shows the proposed assumptions.

Part II Experience Study Report – POLICE and FIRE
 New York City Retirement Systems

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF BENEFICIARY MORTALITY * BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0213%	0.0108%	68	2.1319%	1.2510%
16	0.0288%	0.0132%	69	2.2991%	1.3475%
17	0.0388%	0.0144%	70	2.4880%	1.4610%
18	0.0463%	0.0168%	71	2.7020%	1.5932%
19	0.0500%	0.0180%	72	2.9426%	1.7474%
20	0.0518%	0.0203%	73	3.2127%	1.9239%
21	0.0527%	0.0220%	74	3.5155%	2.1243%
22	0.0524%	0.0225%	75	3.8517%	2.3534%
23	0.0524%	0.0244%	76	4.2232%	2.6102%
24	0.0526%	0.0263%	77	4.6341%	2.9016%
25	0.0528%	0.0283%	78	5.0911%	3.2318%
26	0.0560%	0.0304%	79	5.5977%	3.6056%
27	0.0593%	0.0325%	80	6.1669%	4.0314%
28	0.0626%	0.0362%	81	6.8074%	4.5194%
29	0.0659%	0.0384%	82	7.5285%	5.0748%
30	0.0674%	0.0420%	83	8.3336%	5.7106%
31	0.0703%	0.0440%	84	9.2333%	6.4368%
32	0.0729%	0.0474%	85	10.2373%	7.2652%
33	0.0752%	0.0505%	86	11.3474%	8.2088%
34	0.0772%	0.0533%	87	12.5685%	9.2702%
35	0.0803%	0.0557%	88	13.9075%	10.4520%
36	0.0828%	0.0576%	89	15.3777%	11.7389%
37	0.0831%	0.0606%	90	17.1167%	13.1089%
38	0.0860%	0.0617%	91	18.9624%	14.5764%
39	0.0882%	0.0639%	92	20.8892%	16.1376%
40	0.0898%	0.0657%	93	22.8919%	17.7993%

NEW YORK CITY FIRE PENSION FUND PROPOSED (continued) PROBABILITIES OF BENEFICIARY MORTALITY * BASE YEAR 2019 BENEFIT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.0910%	0.0673%	94	24.9620%	19.5555%
42	0.0947%	0.0701%	95	27.0734%	21.4140%
43	0.0967%	0.0715%	96	29.3636%	23.4560%
44	0.0999%	0.0743%	97	31.7238%	25.6189%
45	0.6986%	0.3023%	98	34.1591%	27.9023%
46	0.7085%	0.3098%	99	36.6614%	30.2827%
47	0.7222%	0.3189%	100	39.1948%	32.7488%
48	0.7402%	0.3310%	101	41.7401%	35.2675%
49	0.7619%	0.3452%	102	44.2616%	37.8102%
50	0.8227%	0.3614%	103	46.7654%	40.3653%
51	0.8500%	0.3910%	104	49.2000%	42.8934%
52	0.8814%	0.4252%	105	51.5638%	45.3902%
53	0.9178%	0.4627%	106	53.8534%	47.8174%
54	0.9603%	0.5028%	107	56.0417%	50.1669%
55	1.0067%	0.5474%	108	58.1186%	52.4321%
56	1.0594%	0.5928%	109	60.0958%	54.5877%
57	1.1170%	0.6394%	110	61.6798%	56.6242%
58	1.1797%	0.6869%	111	61.8406%	58.5460%
59	1.2454%	0.7345%	112	61.9956%	59.6111%
60	1.3156%	0.7812%	113	62.1509%	59.7365%
61	1.3908%	0.8277%	114	62.3252%	59.8621%
62	1.4697%	0.8752%	115	62.4813%	59.9880%
63	1.5526%	0.9244%	116	62.4938%	59.9940%
64	1.6430%	0.9765%	117	62.5000%	60.0000%
65	1.7438%	1.0325%	118	62.5000%	60.0000%
66	1.8562%	1.0961%	119	62.5000%	60.0000%
67	1.9859%	1.1673%	120	100.0000%	100.0000%

* This table is to be utilized for beneficiary mortality after the retiree's death. Service retirement mortality is used for the beneficiary while the retiree is alive

NEW YORK CITY FIRE PENSION FUND PROPOSED PROBABILITIES OF BENEFICIARY MORTALITY * BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
15	0.0204%	0.0097%	68	2.2864%	1.3446%
16	0.0276%	0.0119%	69	2.4491%	1.4354%
17	0.0372%	0.0130%	70	2.6331%	1.5423%
18	0.0444%	0.0151%	71	2.8383%	1.6697%
19	0.0492%	0.0162%	72	3.0697%	1.8184%
20	0.0521%	0.0183%	73	3.3299%	1.9907%
21	0.0530%	0.0198%	74	3.6244%	2.1879%
22	0.0541%	0.0214%	75	3.9545%	2.4115%
23	0.0555%	0.0219%	76	4.3256%	2.6622%
24	0.0571%	0.0237%	77	4.7424%	2.9435%
25	0.0589%	0.0255%	78	5.2081%	3.2609%
26	0.0622%	0.0287%	79	5.7273%	3.6176%
27	0.0656%	0.0306%	80	6.3080%	4.0192%
28	0.0691%	0.0339%	81	6.9573%	4.4737%
29	0.0725%	0.0373%	82	7.6811%	4.9877%
30	0.0757%	0.0392%	83	8.4812%	5.5718%
31	0.0787%	0.0424%	84	9.3690%	6.2370%
32	0.0814%	0.0455%	85	10.3482%	6.9994%
33	0.0837%	0.0483%	86	11.4214%	7.8703%
34	0.0872%	0.0522%	87	12.5930%	8.8554%
35	0.0885%	0.0543%	88	13.8708%	9.9520%
36	0.0909%	0.0573%	89	15.2597%	11.1439%
37	0.0925%	0.0599%	90	16.7591%	12.4051%
38	0.0950%	0.0620%	91	18.4162%	13.7635%
39	0.0968%	0.0638%	92	20.2341%	15.2202%
40	0.0979%	0.0652%	93	22.2115%	16.7860%

NEW YORK CITY FIRE PENSION FUND PROPOSED (continued) PROBABILITIES OF BENEFICIARY MORTALITY * BASE YEAR 2019 COUNT WEIGHTED					
Age	Males	Females	Age	Males	Females
41	0.1001%	0.0676%	94	24.3289%	18.4516%
42	0.1018%	0.0698%	95	26.5331%	20.2181%
43	0.1046%	0.0720%	96	28.9271%	22.1559%
44	0.1085%	0.0743%	97	31.3742%	24.1980%
45	0.7758%	0.3208%	98	33.8485%	26.3367%
46	0.7682%	0.3452%	99	36.3239%	28.5431%
47	0.7677%	0.3719%	100	38.7602%	30.8094%
48	0.7747%	0.4016%	101	41.1591%	33.1010%
49	0.7926%	0.4297%	102	43.5244%	35.4038%
50	0.8224%	0.4563%	103	45.8670%	37.7042%
51	0.8577%	0.4816%	104	48.1391%	39.9675%
52	0.8994%	0.5102%	105	50.3393%	42.1912%
53	0.9462%	0.5421%	106	52.4670%	44.3413%
54	0.9994%	0.5784%	107	54.4969%	46.4107%
55	1.0591%	0.6175%	108	56.4206%	48.3978%
56	1.1230%	0.6591%	109	58.2519%	50.2786%
57	1.1932%	0.7034%	110	59.2126%	52.0464%
58	1.2685%	0.7492%	111	59.3670%	53.5427%
59	1.3479%	0.7976%	112	59.5157%	53.6500%
60	1.4302%	0.8477%	113	59.6648%	53.7629%
61	1.5154%	0.9002%	114	59.8322%	53.8759%
62	1.6044%	0.9547%	115	59.9820%	53.9892%
63	1.6963%	1.0119%	116	59.9940%	53.9946%
64	1.7931%	1.0709%	117	60.0000%	54.0000%
65	1.8978%	1.1318%	118	60.0000%	54.0000%
66	2.0128%	1.1964%	119	60.0000%	54.0000%
67	2.1418%	1.2660%	120	100.0000%	100.0000%

* This table is to be utilized for beneficiary mortality after the retiree's death. Service retirement mortality is used for the beneficiary while the retiree is alive