Segal Consulting

Mendocino County Employees' Retirement Association

ACTUARIAL EXPERIENCE STUDY

Analysis of Actuarial Experience
During the Period
July 1, 2013 through June 30, 2016

April 14, 2017

Board of Retirement
Mendocino County Employees' Retirement Association
625-B Kings Court
Ukiah, CA 95482-5027

Re: Review of Actuarial Assumptions for the June 30, 2017 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience of the Mendocino County Employees' Retirement Association. This study utilizes the census data for the three-year period from July 1, 2013 through June 30, 2016 and includes the proposed actuarial assumptions, both demographic and economic, to be used in the June 30, 2017 and later actuarial valuations.

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 herein.

We look forward to reviewing this report with you and answering any questions you may have.

Sincerely,

Paul Angelo, FSA, MAAA, EA, FCA
Senior Vice President and Actuary

Andy Yeung, ASA, MAAA, EA, FCA
Vice President and Actuary

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Table of Contents

Actuarial Experience Study
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I. Introduction, Summary, and Recommendations

To project the cost and liabilities of the Pension Fund, assumptions are made about all future events that could affect the amount and timing of the benefits to be paid and the assets to be accumulated. Each year actual experience is compared against the projected experience, and to the extent there are differences, the future contribution requirement is adjusted.

If assumptions are changed, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions in effect assumes that experience was temporary and that, over the long run, experience will return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and it has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important in maintaining adequate funding, while paying promised benefit amounts to participants already retired and to those near retirement. The actuarial assumptions used do not determine the "actual cost" of the plan. The actual cost is determined solely by the benefits and administrative expenses paid out, offset by investment income received. However, it is desirable to estimate as closely as possible what the actual cost will be so as to permit an orderly method for setting aside contributions today to provide benefits in the future, and to maintain equity among generations of participants and taxpayers.

This study was undertaken in order to develop assumptions for use in the June 30, 2017 and later actuarial valuations. It compares the actual experience during one three-year experience period, from July 1, 2013 through June 30, 2016, with that expected under the current assumptions. Note that, under the prior schedule for these studies, the demographic experience study would have been based on experience from the three-year period from July 1, 2014 through June 30, 2017. However, we provided MCERA with a proposed alternative schedule in our letter dated December 2, 2016 that would allow presentation of this report to the Board in the first half of 2017, and the subsequent June 30, 2017 valuation report (which will use the assumptions adopted from this experience study) in early November 2017. Transitioning to this schedule results in using the July 1, 2013 through June 30, 2014 demographic data in two different experience studies (i.e., it was also used in the July 1, 2011 through June 30, 2014 demographic experience study); however, in future experience studies, each year of demographic experience would be used only once. The proposed alternative schedule was adopted by the Board at its December 14, 2016 meeting.

The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27, "Selection of Economic Assumptions for Measuring Pension Obligations" and ASOP No. 35, "Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations". These Standards of Practice put forth guidelines for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected near-term experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for: inflation, investment return, merit and promotional salary increases, retirement from active employment, spouse age difference, pre-retirement mortality, healthy life mortality, disabled life mortality, termination from active employment, disability incidence, and sick leave.

Our recommendations for the major actuarial assumption categories are as follows:

Actuarial Assumption Categories	Recommendation
Inflation: Future increases in the cost-of-living index, which drives investment returns and active member salary increases, as well as COLA increases to retired employees.	Reduce the rate from 3.25% to 3.00% per annum.
Investment Return: The estimated average net rate of return on current and future assets of the Association as of the valuation date. This rate is used to discount liabilities.	Reduce the investment return assumption from 7.25% to 7.00%.
Individual Salary Increases: Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary salary increases. • Real "across the board" salary increases. • Merit and promotional increases.	Reduce the current inflationary salary increase assumption from 3.25% to 3.00% per annum, consistent with our recommended general inflation assumption, and maintain the real "across the board" salary increase assumption of 0.50%. This means that the combined inflationary and real "across the board" salary increases will decrease from 3.75% to 3.50% per annum. Increase the current merit and promotional assumptions for the 5-10 years of service categories.
Retirement Rates: The probability of retirement at each age at which participants are eligible to retire. **Other Retirement Related Assumptions including:** • Percent married and spousal age differences for members not yet retired • Retirement age for inactive vested members • Future reciprocal members and reciprocal salary increases	For active members, adjust the current retirement rates to those developed in Section (IV)(A). Overall, the recommended assumptions will anticipate (1) slightly earlier retirements overall for active members in General Tiers 1, 2, and 3, and (2) slightly later retirements for active members in Probation Tiers 1, 2, and 3. No adjustments have been made to the General Tier 4 or Safety Tiers 1, 2, and 3 rates. For active and inactive vested members, maintain the percent married at retirement assumption at 75% for males and at 50% for females. Reduce the female and male spouse age difference assumption from three years to two years (female spouses are assumed to be younger than their male spouses). For inactive vested members, maintain the assumed retirement age at 60 for General members and at 55 for Safety and Probation members. Maintain the current assumption for percent of future deferred vested members working for a reciprocal employer. Decrease the reciprocal pay increase assumption from 4.25% to 4.00%.

Actuarial Assumption Categories	Recommendation
Mortality Rates: The probability of dying at each age. Mortality rates are used to project life expectancies.	For healthy pensioners and all beneficiaries, change from the current RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females, to the RPH-2014 (Headcount Weighted) Healthy Annuitant Mortality Tables, projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females.
	For disabled pensioners, change from the current RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set forward four years for General, Safety, and Probation members, to the RPH-2014 (Headcount Weighted) Healthy Annuitant Mortality Tables, projected 20 years with the two-dimensional improvement Scale MP-2016, set forward four years for males and set forward six years for females.
	For pre-retirement mortality, change from the current RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females, to the RPH-2014 (Headcount Weighted) Employee Mortality Tables, projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females. In addition, change the assumption for pre-retirement deaths for General members from 90% non-service connected (and 10% service connected) to 100% non-service connected. Similarly, change the assumption for pre-retirement deaths for Safety and Probation members from 50% service connected (and 50% non-service connected) to 100% service connected
	For determining member contribution rates, change the mortality rates to those developed in Section (IV)(B).
	The recommended mortality assumptions will anticipate longer life expectancy both pre- and post-retirement.
Termination Rates: The probability of leaving employment at each age or service category and receiving either a refund of contributions or a deferred vested retirement benefit.	Adjust the current termination rates to those developed in Section (IV)(D). The recommended assumptions will anticipate more terminations. Maintain the percentage of terminated members assumed to choose a refund of contributions or a deferred vested benefit.
Disability Incidence Rates: The probability of becoming disabled at each age.	Adjust the current disability rates to those developed in Section (IV)(E). The recommended assumptions will anticipate slightly fewer disability retirements for General members and more disability retirements for Safety and Probation members.
Unused Sick Leave: Unused sick leave hours can be converted into service credit at retirement.	Reduce the assumption to anticipate years of sick leave conversion at service retirement for each year of employment from 0.019 to 0.018.
Vacation Cash Outs: Vacation cash outs during employment and final salary averaging period.	Continue to work with the employer to collect such data to determine whether an assumption should be included in the actuarial valuation to anticipate conversion of relatively higher amounts of vacation cash outs immediately before retirement.

Section II provides some background on basic principles and the methodology used for the experience study. A detailed discussion of the experience and reasons for the proposed changes are found in Section III for the economic assumptions and Section IV for the demographic assumptions. The cost impact of the proposed changes is detailed in Section V.

II. Background and Methodology

In this report, we analyzed both economic and demographic ("non-economic") assumptions. The primary economic assumptions reviewed are inflation, investment return, and salary increases. Demographic assumptions include the probabilities of certain events occurring in the population of members, referred to as "decrements," e.g., termination from service, disability retirement, service retirement, and death before and after retirement.

Economic Assumptions

Economic assumptions consist of:

> **Inflation:** Increases in the price of goods and services. The inflation assumption reflects the basic return that investors expect from securities markets. It also reflects the expected basic salary increase for active employees and drives increases in the allowances of retired members.

> **Investment Return:** Expected long-term rate of return on the Association's investments after expenses. This assumption has a significant impact on contribution rates.

> **Salary Increases:** In addition to inflationary increases, it is assumed that salaries will also grow by "across the board" real pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers. These are commonly referred to as merit and promotional increases. Payments to amortize any unfunded actuarial accrued liability (UAAL) are assumed to increase each year by the price inflation rate plus any "across the board" pay increases that are assumed.

The setting of these economic assumptions is described in Section III.

Demographic Assumptions

In order to determine the probability of an event occurring, we examine the "decrements" and "exposures" of that event. For example, taking termination from service, we compare the number of employees who actually terminate in a certain age and/or service category (i.e., the number of "decrements") with those who could have terminated (i.e., the number of "exposures"). For example, if there were 500 active employees in the 20-24 age group at the beginning of the year and 50 of them terminate during the year, we would say the probability of termination in that age group is $50 \div 500$ or 10%.

The reliability of the resulting probability is highly dependent on both the number of decrements and the number of exposures. For example, if there are only a few people in a high age category at the beginning of the year (number of exposures), we would not lend as much credibility to the probability of termination developed for that age category, especially if it is out of line with the pattern shown for the other age groups. Similarly, if we are considering the death decrement, there may be a large number of exposures in, say, the age 20-24 category, but very few

decrements (actual deaths); therefore, we would not be able to rely heavily on the probability developed for that category.

One reason we use several years of experience for such a study is to have more exposures and decrements, and therefore more statistical reliability. Another reason for using several years of data is to smooth out fluctuations that may occur from one year to the next. However, we also calculate the rates on a year-to-year basis to check for any trend that may be developing in the later years.

III. Economic Assumptions

A. Inflation

Unless an investment grows at least as fast as prices increase, investors will experience a reduction in the inflation-adjusted value of their investment. There may be times when "riskless" investments return more or less than inflation, but over the long term, investment market forces will generally require an issuer of fixed income securities to maintain a minimum return which protects investors from inflation.

The inflation assumption is long term in nature, so it is set using primarily historical information. Following is an analysis of 15 and 30-year moving averages of historical inflation rates:

HISTORICAL CONSUMER PRICE INDEX – 1930 TO 2016
(U.S. City Average - All Urban Consumers)

	25th Percentile	Median	75th Percentile
15-year moving averages	2.5%	3.4%	4.5%
30-year moving averages	3.1%	3.9%	4.8%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary period over the past two decades. Also, the later of the 15-year averages during the period are lower as they do not include the high inflation years of the mid-1970s and early 1980s.

Based on information found in the Public Plans Data website, which is produced in partnership with the National Association of State Retirement Administrators (NASRA), the median inflation assumption used by 142 large public retirement funds in their 2015 fiscal year valuations was 3.00%. In California, CalPERS, CalSTRS, Contra Costa County, LACERA, and two other 1937 Act CERL systems use an inflation assumption of 2.75%, while OCERS and seven other 1937 Act CERL systems use an inflation assumption of 3.00%.

MCERA's investment consultant, Callan, anticipates an annual inflation rate of 2.25%, while the average inflation assumption provided by Callan and by seven other investment advisory firms retained by Segal's California public sector clients was 2.30%. Note that, in general, investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.

To find a forecast of inflation based on a longer time horizon, we referred to the 2016 report on the financial status of the Social Security program. The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.60%. We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds. As of February 2017, the difference in yields is about 2.10%, which provides a measure of market expectations of inflation.

Based on all of the above information, we recommend that the current 3.25% annual inflation assumption be lowered to 3.00% for the June 30, 2017 valuation.

Retiree Cost-of-Living Adjustments

In our last review of the economic assumptions as of June 30, 2014, consistent with the 3.00% maximum cost-of-living benefit provision adopted by the employer for the non-CalPEPRA tiers,[1] the Board adopted a 3.00% retiree cost-of-living adjustment (COLA) for retirees in those tiers. Note that no COLAs are provided for members in General Tier 4, Safety Tier 3, and Probation Tier 3.

We are recommending that the same 3.00% cost-of-living assumption be used in the June 30, 2017 valuation for General Tiers 1, 2, and 3, Safety Tiers 1 and 2, and Probation Tiers 1 and 2.

Note that in developing the COLA assumption, we also considered the results of a stochastic approach that would attempt to account for the possible impact of low inflation that could occur before COLA banks are able to be established for the member. Although the results of this type of analysis might justify the use of a lower COLA assumption, we are not recommending that at this time. The reasons for this conclusion include the following:

➢ The results of the stochastic modeling are significantly dependent on assuming that lower levels of inflation will persist in the early years of the projections. If this is not assumed, then the stochastic modeling will produce results similar to our proposed COLA assumption.

➢ Using a lower long-term COLA assumption based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 3.00% is met in a year. We question the reasonableness of this result.

We do not see the stochastic possibility of COLAs averaging less than those predicted by the assumed rate of inflation as a reliable source of cost savings that should be anticipated in our COLA assumption. Therefore, we continue to recommend setting the COLA assumption based on the long-term annual inflation assumption, as we have in prior years.

B. Investment Return

The investment return assumption is comprised of two primary components, inflation and real rate of investment return, with adjustments for expenses and risk.

Real Rate of Investment Return

This component represents the portfolio's incremental investment market returns over inflation. Theory has it that as an investor takes a greater investment risk, the return on the investment is expected to also be greater, at least in the long run. This additional return is expected to vary by asset class and empirical data supports that expectation. For that reason, the real rate of return

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[1] The non-CalPEPRA tiers are General Tiers 1, 2, and 3, Safety Tiers 1 and 2, and Probation Tiers 1 and 2.

assumptions are developed by asset class. Therefore, the real rate of return assumption for a retirement system's portfolio will vary with the Board's asset allocation among asset classes.

The following is the Association's current target asset allocation and assumed real rate of return assumptions by asset class. The first column of real rate of return assumptions are determined by reducing Callan's total or "nominal" return assumptions by their assumed 2.25% inflation rate. The second column of returns (except for Global ex-US Equity) represents the average of a sample of real rate of return expectations, where each firm's nominal returns have been reduced by that firm's assumed inflation rate. The sample includes the expected annual real rate of returns provided to us by Callan and by seven other investment advisory firms retained by Segal's California public retirement system clients. We believe these averages are a reasonable consensus forecast of long-term future market returns in excess of inflation.[2]

MCERA'S TARGET ASSET ALLOCATION AND ASSUMED ARITHMETIC REAL RATE OF RETURN ASSUMPTIONS BY ASSET CLASS AND FOR THE PORTFOLIO

Asset Class	Percentage of Portfolio	Callan's Assumed Real Rate of Return[3]	Average Assumed Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[4]
U.S. Large Cap Equity	25.3%[5]	6.05%[6]	5.64%
U.S. Small Cap Equity	12.7%[5]	6.05%[6]	6.24%
Global ex-US Equity	29.0%	6.70%	6.70%[7]
Broad US Fixed Income	22.0%	0.80%	1.06%
Real Estate	11.0%	4.65%	4.37%
Total	**100.0%**	**4.93%**	**4.88%**

The above are representative of "indexed" returns and do not include any additional returns ("alpha") from active management. This is consistent with the Actuarial Standard of Practice No. 27, Section 3.6.3.d, which states:

> "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). The actuary should not assume that superior or inferior returns will be achieved, net of investment expenses,

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[2] Note that, just as for the inflation assumption, in general the time horizon used by the investment consultants in determining the real rate of return assumption is shorter than the time horizon we used for the actuarial valuation.

[3] Derived by reducing Callan's 1-year arithmetic rate of return assumptions for 2017 by their 2.25% inflation assumption.

[4] These are based on the projected arithmetic returns provided by Callan and seven other investment advisory firms serving Mendocino and 16 other city and county retirement systems in California. These returns are gross of any applicable investment expenses.

[5] "Broad US equity" represents 38% of the target allocation. We understand that the domestic equity target breakdown is about 2/3 for US large cap equities and 1/3 for US small/mid cap equities.

[6] Note that MCERA's target allocation for domestic equity is based on the "Broad US Equity" asset class, and, accordingly, we have displayed Callan's real rate of return assumption for that asset class here. The averages shown in the next column represent the averages of the US large cap equity and US small cap equity, respectively, for the seven other investment advisory firms, and the broad US equity for MCERA.

[7] For this asset class, the Callan assumption is applied in lieu of the average because the global equity asset class for the other investment advisory firms includes investments from the United States, whereas the Global ex-US Equity asset class for MCERA specifically excludes US investments.

from an active investment management strategy compared to a passive investment management strategy unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period."

The following are some observations about the returns provided above:

1. The investment consultants to our California public clients have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods shorter than the duration of a retirement plan's liabilities.

2. Using an average of expected real rate of returns allows the Association's investment return assumption to include a broader range of capital market information and should help reduce year-to-year volatility in the Association's investment return assumption.

3. Therefore, we recommend that the 4.88% portfolio real rate of return be used to determine the Association's investment return assumption. This is 0.23% higher than the real rate of return that was used three years ago to prepare the recommended investment return assumption for the June 30, 2014 valuation. The difference is primarily due to changes in asset allocation and to some degree the increase in the real rate of return for broad US fixed income provided to us by the investment advisory firms.

Association Expenses

For funding purposes, the real rate of return assumption for the portfolio needs to be adjusted for investment expenses expected to be paid from investment income. As further discussed later in this repot, current practice for MCERA also adjusts for expected administrative expenses.

Based on information provided by the Association, we have shown in the following table the expenses in relation to the market value of assets for the last five years ending June 30, 2016.

<p style="text-align:center; color:red; font-weight:bold">ADMINISTRATIVE AND INVESTMENT EXPENSES
AS A PERCENTAGE OF MARKET VALUE OF ASSETS (DOLLARS IN 000'S)</p>

Year Ending June 30	Market Value of Assets at Beginning of Plan Year	Investment Expenses	Administrative Expenses	Investment %	Administrative %	Total %
2012	$355,043	$316	$698	0.09%	0.20%	0.29%
2013	342,737	632	830	0.18%	0.24%	0.42%
2014	383,197	503	930	0.13%	0.24%	0.37%
2015	442,308	565	1,059	0.13%	0.24%	0.37%
2016	444,217	490	1,142	0.11%	0.26%	0.37%
Five-year average as of June 30, 2016, used in setting this assumption in the June 30, 2016 experience study				**0.13%**	**0.24%**	**0.37%**
Recommendation				**0.15%**	**0.25%**	**0.40%**

Based on this experience, we recommend that the Association's future expense component of the investment return assumption be increased from 0.35% to 0.40%.

Note related to investment expenses paid for active asset management: As cited above under Section 3.8.3.d of ASOP No. 27, the effect of an active investment management strategy should be considered "net of investment expenses…unless the actuary believes, based on relevant data, that such superior or inferior returns represent a reasonable expectation over the measurement period."

For MCERA, of the $490 thousand in investment expenses paid in fiscal year 2015/2016, only about $176 thousand (or one-third) was for expenses paid to active managers. We have not performed a detailed analysis to measure how much of the investment expenses paid to active managers might have been offset by additional returns ("alpha") earned by that active management. We do not believe that such a review would have a significant impact on the recommended investment return assumption using the above expense assumption. Recently, Callan indicated that they do not have any data or studies that can be used to demonstrate future alpha for MCERA's active investment managers. For now, we will continue to use the current approach of treating any "alpha" that may be identified as an implicit increase in the risk adjustment and corresponding confidence level in developing the investment return assumption rather than as an explicit offset to any related active management expenses.[8]

Risk Adjustment

The real rate of return assumption for the portfolio generally is adjusted to reflect the potential risk of shortfalls in the return assumptions. The Association's asset allocation also determines this portfolio risk, since risk levels are driven by the variability of returns for the various asset classes and the correlation of returns among those asset classes. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

The purpose of the risk adjustment (as measured by the corresponding confidence level) is to increase the likelihood of achieving the actuarial investment return assumption in the long term.[9] The 4.88% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. This means there is a 50% chance of the actual return in each year being at least as great as the expected return (assuming a symmetrical distribution of future returns). The risk adjustment is intended to increase that probability somewhat above the 50% level. This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not. Note that, based on the investment return assumptions recently adopted by systems that have been analyzed under this model, we observe a confidence level generally in the range of 50% to 60%.

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[8] As noted earlier, Actuarial Standard of Practice (ASOP) No. 27, Section 3.8.3.d states "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). The actuary should not assume that superior or inferior returns will be achieved, **net of investment expenses**, from an active investment management strategy compared to a passive investment management strategy unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period." (emphasis added). We believe this means that assuming only enough superior return to cover related investment expenses would not require the relevant supporting data referenced in ASOP No. 27.

[9] This type of risk adjustment is sometimes referred to as a "margin for adverse deviation."

Note that, in our model, the confidence level associated with a particular risk adjustment represents the likelihood that the actual average return would equal or exceed the assumed value over a 15-year period. For example, if we set our real rate of return assumption using a risk adjustment that produces a confidence level of 60%, then there would be a 60% chance (6 out of 10) that the average return over 15 years will be equal to or greater than the assumed value. The 15-year time horizon represents an approximation of the "duration" of the fund's liabilities, where the duration of a liability represents the sensitivity of that liability to interest rate variations.

Three years ago, the Board opted to lower the investment return assumption from 7.75% to 7.25%, which implied a risk adjustment of 0.30%. Together with an annual portfolio standard deviation of 13.38% (provided by Callan in 2014), this reflected a confidence level of about 53% that the actual return over 15 years would not be less than the assumed return, assuming that the distribution of returns over that period follows the normal statistical distribution.[10]

If we use the same 53% confidence level from the return assumption adopted for the June 30, 2014 valuation to set this year's risk adjustment, based on the current long-term portfolio standard deviation of 14.10% (provided by Callan in 2017), the corresponding risk adjustment would be 0.31%. Together with the other investment return components, this would result in a preliminary investment return assumption of 7.17%, which is slightly lower than the current assumption of 7.25%. Because a 53% confidence level is currently on the lower end of the range we have observed for the other public retirement systems we serve, we evaluated the effect on the confidence level of a reduction in the investment return assumption. In particular, a net investment return assumption of 7.00%, together with the other investment return components, would produce a risk adjustment of 0.48%, which corresponds to a confidence level of 55%.

As we have discussed in prior years, the risk adjustment model and associated confidence level is most useful as a means for comparing how the Association has positioned itself relative to risk over periods of time. The use of a 55% confidence level should be considered in context with other factors, including:

1. As noted above, the confidence level is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons.

2. The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by Callan. The standard deviation is a statistical measure of the future volatility of the portfolio and so is itself based on assumptions about future portfolio volatility and can be considered somewhat of a "soft" number.

3. A confidence level of 55% (which is associated with a 7.00% investment return assumption) is about the average level that corresponds to the risk adjustments used by most of Segal's other California public retirement system clients. Again, most public retirement systems that have recently reviewed their investment return assumptions have considered adopting more conservative investment return assumptions for their valuations,

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[10] Strictly speaking, future compound long-term investment returns will tend to follow a log-normal distribution. However, we believe the normal distribution assumption is reasonable for purposes of setting this type of risk adjustment.

mainly to maintain the likelihood that future actual market return will meet or exceed the investment return assumption.

4. A lower level of inflation should reduce the overall risk of failing to meet the investment return assumption.

5. As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. One measure of reasonableness is discussed below in the section that presents a comparison with assumptions adopted by similarly situated public sector retirement sections.

Other Considerations

During the deliberations when we presented the results of the last several annual valuations, there were some discussions regarding the potential to need to liquidate investments periodically so that cash proceeds from the sale together with employer and employee contributions would be sufficient to meet monthly benefit cash flow needs for retirees and beneficiaries. In particular, concerns were raised regarding the impact such periodic disposition of assets might have on the Association's ability to achieve the expected investment return assumption.

Based on a recent discussion we had with the Association's staff, we understand that the types of assets involved in such sales are chosen after consultation with Callan in a manner so that, after the sales, the Association's asset portfolio would be brought back into closer alignment with its target asset allocation. Furthermore, there is a constant effort by the Association to stay fully invested until shortly before cash is needed to make monthly benefit payments. As the Association's assets are heavily invested in mutual funds, there is very little transaction cost incurred from buying and selling such investments.

Based on all of the above, we have continued to make no specific reduction to the investment return assumption to account for the cash flow needs of the Association.

Recommended Investment Return Assumption

Taking into account the factors above, our recommendation is to reduce the net investment return assumption from 7.25% to 7.00%. As noted above, this return implies a risk adjustment of 0.48%, reflecting a confidence level 55% that the actual average return over 15 years would not fall below the assumed return. The reduction in the net investment return assumption from 7.25% to 7.00% could be viewed as reflecting the lower inflation expectation while applying the 0.23% increased real return expectation between the 2014 and 2017 reviews (primarily due to changes in asset allocation and to some degree the increase in real rate of return for broad US fixed income provided to us by the investment advisory firms) to increase the confidence level rather than increase the nominal expected return.

The following table provides the components of the investment return assumption developed in the previous discussion. For comparison purposes, we have included similar values from the prior three studies during our term as appointed actuary for the Association.

Assumption Component	Recommended Value	Adopted Value	
	June 30, 2017	June 30, 2014	June 30, 2011
Inflation	3.00%	3.25%	3.50%
Plus Average Real Rate of Return	4.88%	4.65%	4.87%
Minus Expense Adjustment	(0.40)%	(0.35)%	(0.30)%
Minus Risk Adjustment	(0.48)%	(0.30)%	(0.32)%
Total	**7.00%**	**7.25%**	**7.75%**
Confidence Level	**55%**	**53%**	**54%**

Based on this analysis, we recommend that the net investment return assumption be reduced from 7.25% to 7.00% per annum.

Comparing with Other Public Retirement Systems

One final consideration related to the recommended investment return assumption is to compare it against those used by other public retirement systems, both in California and nationwide.

We note that a 7.00% investment return assumption is becoming more common among California public sector retirement systems. In particular, three County employees' retirement systems (Contra Costa, Fresno and Santa Barbara) use a 7.00% earnings assumption. The CalPERS Board has approved a reduction in the earnings assumption from 7.50% to 7.00% over the next three years. In addition, CalSTRS recently adopted a 7.25% earnings assumption for the 2016 valuation (down from 7.50%) and a 7.00% earnings assumption for the 2017 valuation.

The following table compares the Association's recommended net investment return assumption against those of the nationwide public retirement systems that participated in the National Association of State Retirement Administrators (NASRA) 2016 Public Fund Survey for 142 large public retirement funds in their 2015 fiscal year valuations:

Assumption	MCERA (recommended)	NASRA 2016 Public Fund Survey		
		Low	Median	High
Net Investment Return	7.00%	4.29%	7.50%	8.50%

The detailed survey results show that more than one-half of the systems have an investment return assumption in the range of 6.75% to 7.75%, and over half of those systems have used an assumption of 7.50%. The survey also notes that several plans have reduced their investment return assumption during the last year. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

In summary, we believe that both the risk adjustment model and other considerations indicate a lower earnings assumption. The recommended assumption of 7.00% provides for an increase in risk margin within the risk adjustment model, and it is consistent with the Association's current practice relative to other public systems.

C. Salary Increase

Salary increases impact plan costs in two ways: (i) by increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and (ii) by increasing total active member payroll which in turn generates lower UAAL contribution rates. The components of the salary increase assumptions are discussed below.

As an employee progresses through his or her career, increases in pay are expected to come from three sources:

1.   **Inflation:** Unless pay grows at least as fast as consumer prices grow, employees will experience a reduction in their standard of living. There may be times when pay increases lag or exceed inflation, but over the long term, labor market forces may require an employer to maintain its employees' standards of living.

    As discussed earlier in this report, we are recommending a reduction in the inflation rate from 3.25% to 3.00% per annum. This inflation component is used as part of the salary increase assumption.

2.   **Real "Across the Board" Pay Increases:** These increases are typically termed productivity increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across the board". The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across the board" pay increases have averaged about 0.6% - 0.9% annually during the last ten to twenty years.

    We also referred to the annual report on the financial status of the Social Security program published in June 2016. In that report, real "across the board" pay increases are forecast to be 1.2% per year under the intermediate assumptions.

    The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not based on individual plan experience. However, recent salary experience with public systems in California as well as anecdotal discussions with plans and plan sponsors indicate lower future real wage growth expectations for public sector employees. We note that MCERA's salary increase experience indicates that actual increases were lower than the actual changes in CPI for the latest three-year period:

Valuation Date	Actual Average Increase[11]	Actual Change in CPI[12]
June 30, 2014	(1.83)%	1.75%
June 30, 2015	1.45%	1.27%
June 30, 2016	3.84%	1.81%
Three-year average as of June 30, 2016, used in the June 30, 2016 experience study	**1.15%**	**1.61%**

Even though the actual average salary increase was lower than the average change in the CPI over the three-year period ending June 30, 2016, the gap has been significantly reduced since the prior review of this assumption in 2014.[13] We would recommend maintaining the real "across the board" salary increase assumption at 0.50%. This means that the combined inflation and "across the board" salary increase will decrease from 3.75% to 3.50% per annum.

3. **Merit and Promotional Increases:** As the name implies, these increases come from an employee's career advances. This form of pay increase differs from the previous two, since it is specific to the individual. For MCERA, there are service-specific merit and promotional increases.

   The annual merit and promotional increases are determined by measuring the actual increases received by members over the experience period, net of inflationary and "across the board" components. Increases are measured separately for General members and for Safety and Probation members. This is accomplished by:

   a. Measuring each continuing member's actual salary increase over each year of the experience period;

   b. Categorizing these increases according to member demographics;

   c. Removing the wage inflation component from these increases (estimated as the increase in the members' average salary during the year for all members);

   d. Averaging these annual increases over the three-year experience period; and

   e. Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility."

   The following table compares the actual average merit and promotional increases by years of service over the three-year experience period from July 1, 2013 through June 30, 2016. The actual increases were reduced by 1.15%, the actual average inflation plus across the board increase over the three-year experience period.

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[11] Reflects the increase in average salary for members at the beginning of the year compared to all members at the end of the year. It does not reflect the average salary increases received by individual members who worked the full year.

[12] Based on the change in the December CPI for the West Region compared to the prior year. For comparison purposes, the three-year average for the San Francisco-Oakland-San Jose Area is 2.81%.

[13] At the time of the last experience study (i.e., during the three-year period ended June 30, 2014), the actual average salary increase was (3.09)% while the average change in the CPI based on the San Francisco-Oakland-San Jose Area was 2.58%.

MERIT AND PROMOTIONAL INCREASES
(Actual vs. Proposed Assumption)

Years of Service	Rate (%)					
	General Members			Safety and Probation Members		
	Current Assumption	Actual Average Increase (Last 3 Years)	Proposed Assumption	Current Assumption	Actual Average Increase (Last 3 Years)	Proposed Assumption
0-1	5.00	8.89	5.00	5.00	6.87	5.00
1-2	3.75	6.94	3.75	3.75	5.11	3.75
2-3	3.50	6.19	3.50	3.00	5.78	3.00
3-4	2.75	7.75	2.75	2.25	5.88	2.25
4-5	2.25	6.40	2.25	1.00	3.33	1.00
5-6	0.50	4.57	1.75	0.50	2.89	0.75
6-7	0.50	3.96	1.50	0.50	0.15	0.75
7-8	0.50	2.63	1.25	0.50	2.03	0.75
8-9	0.50	3.67	1.00	0.50	1.62	0.75
9-10	0.50	3.04	0.75	0.50	3.08	0.75
10+	0.50	2.35	0.50	0.50	0.96	0.50

Actual experience for the merit and promotional increases from the last three years was higher than expected for almost all service categories. However, these increases have been observed during a period of lower than expected "inflationary" salary increases, and follow a period of one-time pay reductions ranging from 2.5% to 12.5% beginning with fiscal year 2010/2011, as noted in our 2014 experience study report. In conjunction with the recommended decrease in the inflation component of the salary increase assumption, we are recommending no changes in the merit and promotional increases component at the lower (i.e., less than five years) and higher (i.e., ten or more years) service categories, but increases in the assumptions for the 5-10 years of service categories.

Chart 1 provides a graphical comparison of the actual merit and promotional increases, compared to the proposed assumptions for General members. Chart 2 provides a similar comparison for Safety and Probation members.

All three of the above components are incorporated into a salary increase assumption that is applied in the actuarial valuation to project future benefits and future normal cost contribution collections.

Active Member Payroll

Projected active member payrolls are used to develop the UAAL contribution rate. Future values are determined as a product of the number of employees in the workforce and the average pay for all employees. The average pay for all employees increases only by inflation and real "across

the board" pay increases. The promotional and merit increases are not an influence, because this average pay is not specific to an individual.

For the June 30, 2017 valuation, we recommend that the active member payroll increase assumption be reduced from 3.75% to 3.50% annually, consistent with the combined inflation and "across the board" salary increase assumptions.

CHART 1: MERIT AND PROMOTIONAL SALARY INCREASE RATES GENERAL MEMBERS
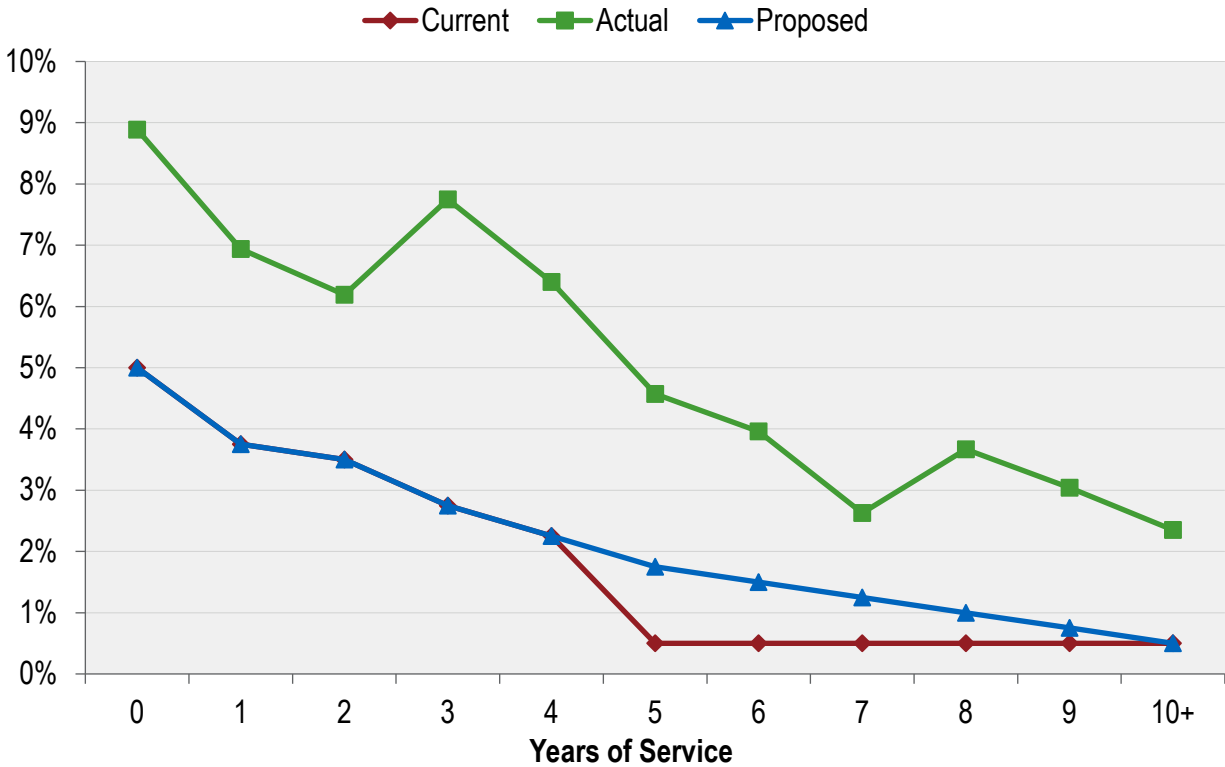
CHART 2: MERIT AND PROMOTIONAL SALARY INCREASE RATES SAFETY AND PROBATION MEMBERS
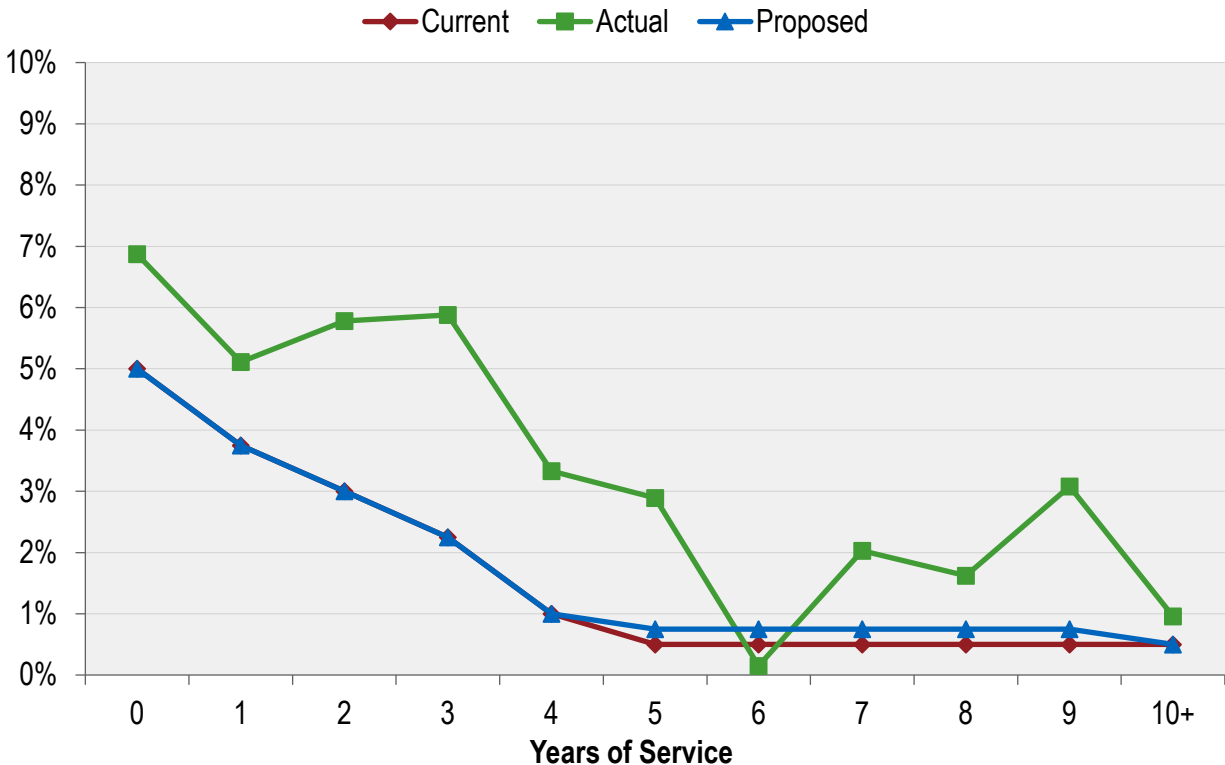
IV. Demographic Assumptions

A. Retirement Rates

The age at which a member retires will affect both the amount of the benefits that will be paid to that member as well as the period over which funding must take place.

Currently, there are separate retirement rates for members in General Tiers 1, 2, and 3 combined, General Tier 4, Safety Tiers 1 and 2 combined, Safety Tier 3, Probation Tiers 1 and 2 combined, and Probation Tier 3.

General Members – Tiers 1, 2, and 3

For General members in Tiers 1, 2 and 3, the actual rates of retirement compared to the expected rates for the last three years, and the proposed rates, are as follows:

	Rate of Retirement (%)		
Age	Current Assumption	Actual Rate of Retirement	Proposed Assumption
50	6.00	2.38	6.00
51	6.00	2.63	6.00
52	6.00	6.98	6.00
53	6.00	11.11	6.00
54	6.00	11.90	6.00
55	10.00	12.24	11.00
56	10.00	10.64	11.00
57	10.00	14.81	11.00
58	10.00	12.50	11.00
59	10.00	14.00	11.00
60	12.00	4.17	12.00
61	20.00	12.50	16.00
62	26.00	35.19	30.00
63	20.00	15.38	20.00
64	20.00	27.27	20.00
65	45.00	44.83	45.00
66	45.00	38.10	45.00
67	45.00	66.67	45.00
68	45.00	25.00	45.00
69	45.00	0.00	45.00
70 and over	100.00	20.00	100.00

General Members – Tier 4

No adjustments have been made to the rates for the General CalPEPRA tier (i.e., General Tier 4), since the rates for that tier were initially developed based, in part, on the benefit level comparisons to General Tier 3, and the General Tier 3 retirement rates have not been changed significantly in this report.

Safety Members – Tiers 1 and 2

For Safety members in Tiers 1 and 2, the actual rates of retirement compared to the expected rates for the last three years, and the proposed rates, are as follows:

Age	Rate of Retirement (%)		
	Current Assumption	Actual Rate of Retirement	Proposed Assumption
50	8.00	0.00	8.00
51	8.00	0.00	8.00
52	8.00	15.38	8.00
53	8.00	22.22	8.00
54	8.00	0.00	8.00
55	9.00	0.00	9.00
56	9.00	20.00	9.00
57	10.00	0.00	10.00
58	20.00	25.00	20.00
59	30.00	0.00	30.00
60 and over	100.00	21.05	100.00

Safety Members – Tier 3

No adjustments have been made to the rates for the Safety CalPEPRA tier (i.e., Safety Tier 3), since the rates for that tier were initially developed based, in part, on the benefit level comparisons to Safety Tier 2, and the Safety Tier 2 retirement rates have not been changed in this report.

Probation Members – Tiers 1 and 2

For Probation members in Tiers 1 and 2, the actual rates of retirement compared to the expected rates for the last three years, and the proposed rates, are as follows:

	Rate of Retirement (%)		
Age	Current Assumption	Actual Rate of Retirement	Proposed Assumption
50	5.00	0.00	5.00
51	5.00	0.00	5.00
52	5.00	0.00	5.00
53	5.00	0.00	5.00
54	5.00	0.00	5.00
55	24.00	0.00	20.00
56	24.00	50.00	20.00
57	24.00	0.00	20.00
58	24.00	0.00	20.00
59	24.00	0.00	20.00
60 and over	100.00	33.33	100.00

Probation Members – Tier 3

Adjustments have been made to the rates for the Probation CalPEPRA tier (i.e., Probation Tier 3). The rates for that tier were initially developed based, in part, on the benefit level comparisons to Probation Tier 2, and the Probation Tier 2 retirement rates have been changed significantly enough in this report to warrant a change to the Probation Tier 3 rates. The proposed rates are as follows:

	Rate of Retirement (%)	
Age	Current Assumption	Proposed Assumption
50	4.00	4.00
51	4.00	4.00
52	4.00	4.00
53	4.00	4.00
54	4.00	4.00
55	14.00	11.00
56	25.00	21.00
57	25.00	21.00
58	25.00	21.00
59	25.00	21.00
60 and over	100.00	100.00

Chart 3 compares actual experience with the current and proposed rates of retirement for General members in Tiers 1, 2 and 3. Chart 4 displays the same data for Safety members in Tiers 1 and 2, and Chart 5 is for Probation members in Tiers 1 and 2.

In prior valuations, inactive vested members were assumed to retire at age 60 for General members and age 55 for Safety and Probation members. The average age at retirement over the prior three-year period was about 59.3 for General members and about age 53.3 for Safety and Probation members. We recommend maintaining the assumed retirement ages of 60 for General inactive vested participants and 55 for Safety and Probation inactive vested participants.

Currently, 60% of members who terminate and are entitled to a deferred vested benefit are assumed to establish reciprocity with another employer. As of June 30, 2016, the proportion of all inactive vested members entitled to future benefits who are working for a reciprocal employer was observed to be about 65%. However, the incidence of reciprocity for new inactive vested members over the experience study period was 39%. Based on this experience, we recommend maintaining the reciprocity assumption of 60% for the June 30, 2017 valuation.

In prior retirement plan valuations, it was assumed that 75% of all active and inactive vested male members and 50% of all active and inactive vested female members would be married or have a domestic partner eligible for the 60% automatic retirement continuance benefit when they retired. According to the experience of members who retired during the last three years, about 69% of all male members and 54% of all female members were married at retirement. (Note that these percentages increased to 74% for males and 55% for females, based on the experience over the last five years.) Based on this experience, we recommend maintaining the current marriage assumption for male and female members.

For prior valuations, it was assumed that female spouses were three years younger than their male-member spouses, and male spouses were three years older than their female-member spouses. Observed experience for members who retired during the last three years indicates that female spouses were about 1.8 years younger than their male-member spouses on average, and male spouses were about 2.0 years older than their female-member spouses, on average. Based on this experience, we recommend lowering the female and male spouse age difference assumption from three years to two years (female spouses are assumed to be younger than their male spouses). All spouses are assumed to be of the opposite sex to the member.
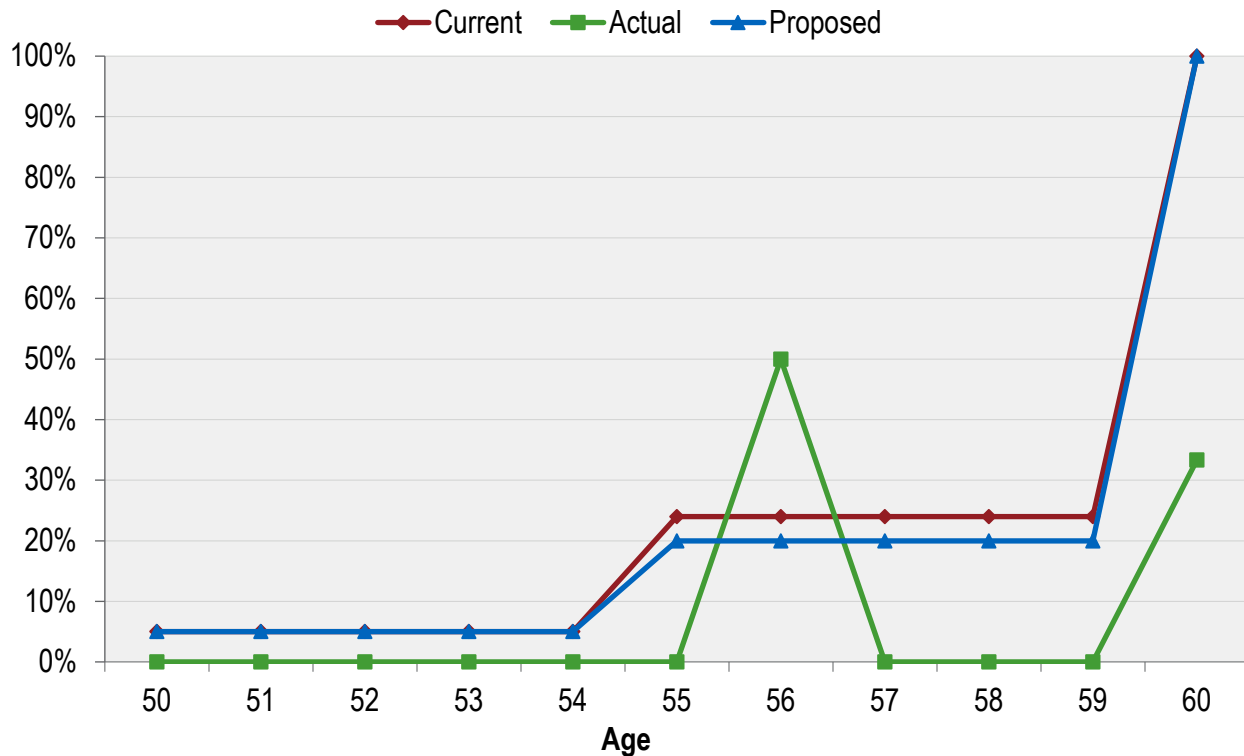
CHART 3: RETIREMENT RATES
GENERAL MEMBERS – TIERS 1, 2 AND 3
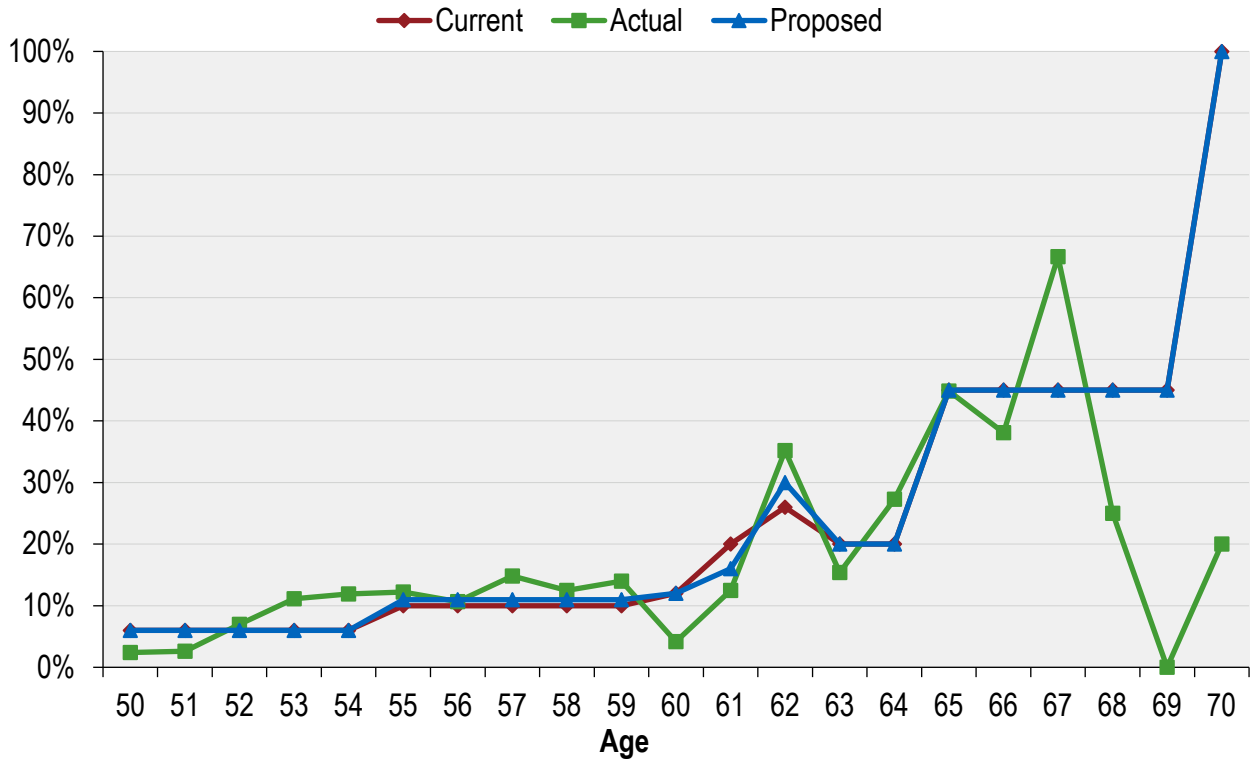
CHART 4: RETIREMENT RATES
SAFETY MEMBERS – TIERS 1 AND 2
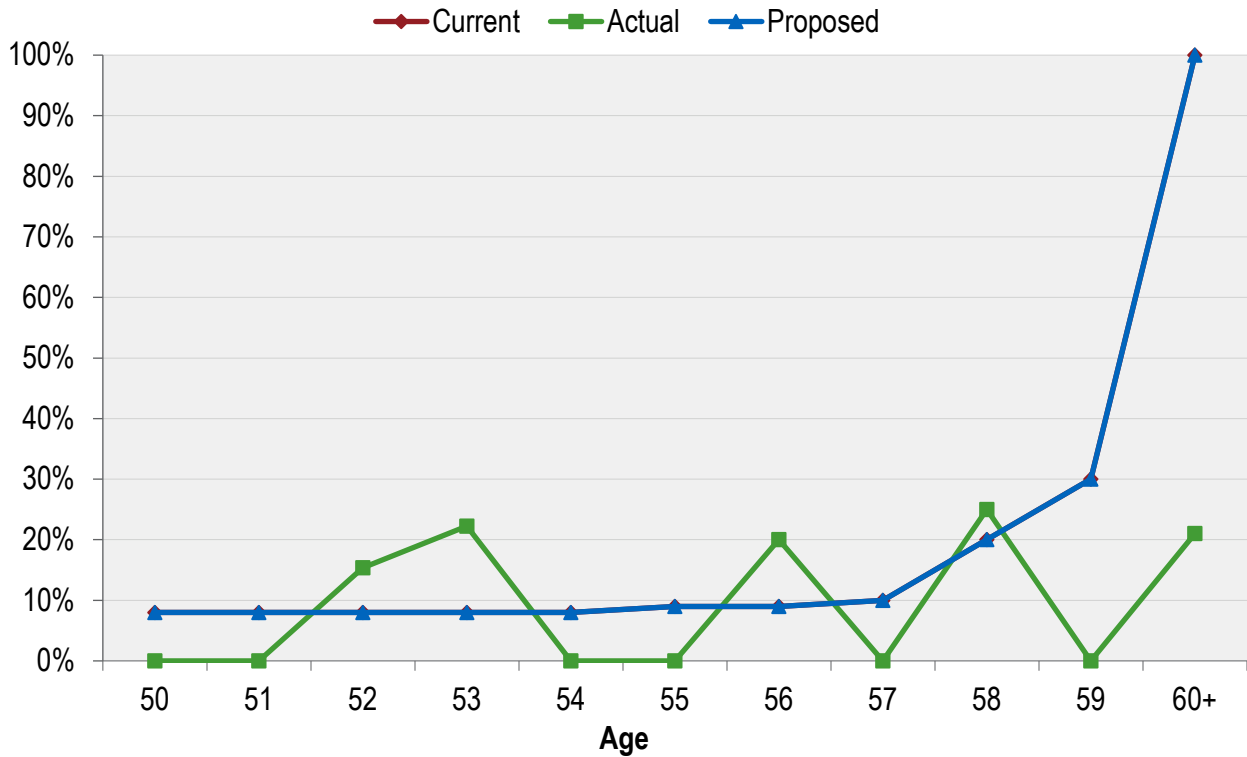
CHART 5: RETIREMENT RATES
PROBATION MEMBERS – TIERS 1 AND 2

B. Mortality Rates - Healthy

The "healthy" mortality rates project what proportion of members will die before retirement as well as the life expectancy of a member who retires for service (i.e., who did not retire on a disability pension). For retirees, the tables currently being used for post-service retirement mortality rates are the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females. Beneficiary mortality is based on the tables used for General members.

The Society of Actuaries (SOA) has recently published the RP-2014 family of mortality tables and associated life expectancy improvement scales. Within that family of mortality tables, there are mortality rates developed for annuitants on a "headcount" weighted basis that weight all retirees at the same age the same way without regard to the level of benefits those annuitants are receiving from a retirement plan. Mortality rates are also developed for annuitants on a "benefit" weighted basis, with higher credibility assigned to experience from annuitants receiving larger benefits. The headcount-weighted basis is the more common practice and is the approach used by Segal in the past for its California public system clients (including MCERA) and by other public sector actuaries in California.

As for the life expectancy improvement scales, they can be applied in one of two ways. Historically, the more common application is to use a "static" approach to anticipate a fixed level of mortality improvement for all annuitants receiving benefits from a retirement plan. This is in contrast to a "generational" approach where each future year has its own mortality table that

reflects the forecasted improvements, using the published improvement scales. The static approach, however, is still used by many California public retirement systems, including CalPERS.

The SOA is in the process of collecting data from public sector plans so that they can develop mortality tables based on public sector experience comparable to the RP-2014 mortality tables developed using data collected from private and multi-employer plans. Furthermore, after publishing the two-dimensional MP-2014 life expectancy improvement scale, the SOA replaced it with the two-dimensional MP-2015 life expectancy improvement scale to remove some of the conservatism built into the MP-2014 scale and to better reflect the most recent data of mortality improvement from the Social Security Administration. We understand that the Retirement Plans Experience Committee of the Society of Actuaries (RPEC) intends to publish annual updates to the "RPEC_2014" mortality table model and corresponding mortality improvement scales. Improvement scale MP-2016 is based on the 2016 version of the RPEC_2014 model including the RPEC-selected assumption set for 2016, and is the latest improvement scale available.

Segal believes that given the continuing trend towards longer life expectancies, it would be prudent for the Board of Retirement to adopt the Headcount-Weighted RP-2014 mortality table, adjusted for MCERA experience. However, given that there is a large difference between the generational MP-2014 and MP-2016 improvement scales, Segal recommends that MCERA continue to use a static mortality improvement but with an adjustment that would nearly double the 10% margin we have recommended in the past to anticipate the move towards a "generational" approach in a future experience study. Once the SOA has included data from public sector plans in developing the new tables, we will also include a discussion with the Board of Retirement on whether to consider the benefit weighted mortality rates in the experience study.

Note that in order to use more actual MCERA experience in our analysis, we have used experience for a five-year period from both the current (from July 1, 2013 to June 30, 2016) and the last (from July 1, 2011 to June 30, 2014) experience study periods to study this assumption. In addition, we have continued to examine the mortality experience with all beneficiaries included since combining healthy retirees and beneficiaries would provide more exposures and would lend more credence to the results.

In the table below, we have provided the approximate change in the total employer and member contribution rates based on the different approaches to build in margin for future mortality improvements.

	Employer and Member Contribution Rate Impact combined
Headcount Weighted RP-2014 Family of Tables – Static Approach with Increased Margin	**1.8% of payroll**
Benefit Weighted RP-2014 Family of Tables – Static Approach without Increased Margin	0.9% of payroll
Headcount Weighted RP-2014 Family of Tables – Generational Approach	1.9% of payroll

Note that when we use a mortality table with a set forward in a valuation for a group of retirees, we anticipate that the group has a shorter life expectancy when compared to the unadjusted table.

The opposite is true when we use a mortality table with a set back. For example, a 50-year old member under the age adjusted table, assuming a one year set forward, is anticipated to have the same life expectancy as a 51-year old under the unadjusted table.

For retirees, we are recommending a change to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females. Beneficiary mortality will again be based on the tables used for General members. Under the recommended mortality assumptions, we continue to maintain our approach to not make a distinction in mortality experience among General, Safety, and Probation members due to the relatively small Safety and Probation retiree population.

Post-Service Retirement Mortality

Among healthy service retired members and all beneficiaries, the actual deaths compared to the expected deaths under the current and proposed assumptions for the last five years are as follows:

Year Ending June 30,	Healthy General Pensioners and All Beneficiaries			Healthy Safety & Probation Pensioners Only		
	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
2012	22	16	21	0	0	0
2013	23	33	22	1	3	1
2014	23	31	22	1	1	1
2015	26	23	24	1	0	1
2016	27	35	25	2	3	2
Total	121	138	114	5	7	5
Actual / Expected	114%		121%	140%		140%

Year Ending June 30,	All Healthy Pensioners and Beneficiaries Combined		
	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
2012 - 2016	126	145	119
Actual / Expected	115%		122%

Charts 6 and 7 summarize the above information.

Charts 8 and 9 show the life expectancies under both the current and proposed tables.

Pre-Retirement Mortality

In prior experience studies, the pre-retirement rates for active members were set equal to the post-retirement mortality rates for retirees since the actual number of deaths among active members was not large enough to provide a statistically credible analysis. However, this approach is not compatible with our current proposal because the post-retirement RP-2014 Healthy Annuitant mortality table does not include mortality rates for ages below 50.

From the RP-2014 family of tables, we recommend that pre-retirement mortality follow the RPH-2014 (Headcount-Weighted) Employee Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females.
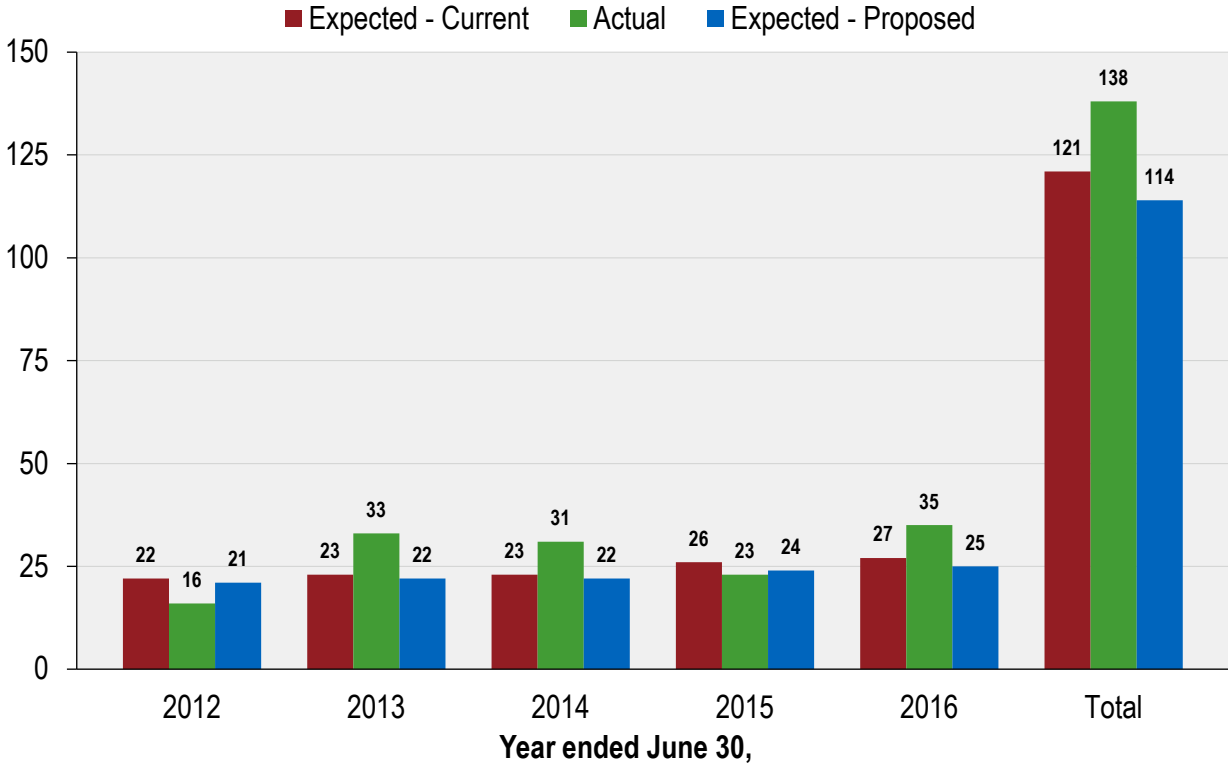
Currently, our assumption is that 10% of General member pre-retirement deaths are service connected and the other 90% are non-service connected. For Safety and Probation members, 50% are assumed to be service connected deaths and the other 50% are non-service connected. Observed experience over the past five years for active member deaths is small, however, each of the active General member deaths reported by MCERA over this period has been classified as non-service connected. Similarly, each of the Safety and Probation member deaths reported by MCERA over the past five years has been classified as service connected. Based on this experience, we recommend changing the assumption for pre-retirement mortality to 100% non-service connected for General members and 100% service connected for Safety and Probation members.
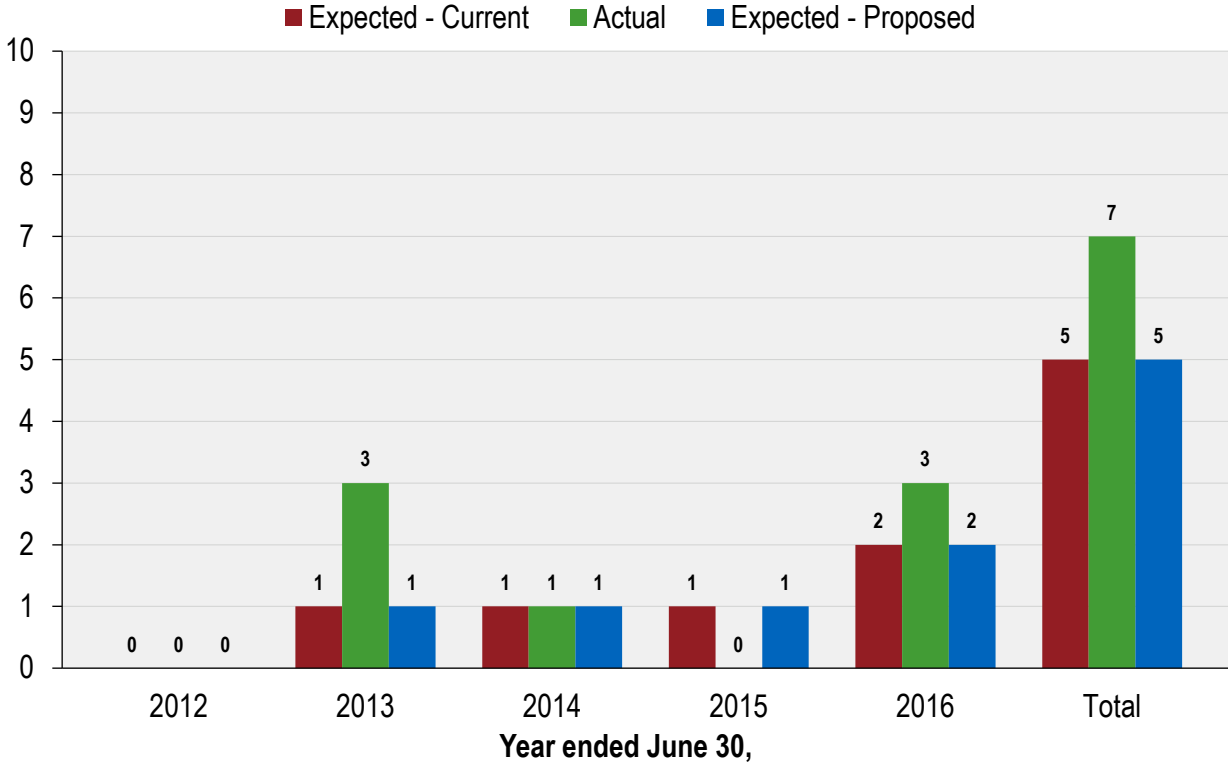
Mortality Table for Member Contributions

We recommend that the mortality table used for determining contributions for General members be changed from the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females, weighted 30% male and 70% female, to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females, weighted 30% male and 70% female. This is based on the proposed mortality tables for General members and the actual sex distribution for the current active General members.

For Safety and Probation members, we recommend the mortality table be changed from the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females weighted 80% male and 20% female, to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females, weighted 80% male and 20% female. This is based on the proposed mortality tables for Safety and Probation members and the actual sex distribution for the current active Safety and Probation members.

CHART 6: POST-RETIREMENT DEATHS
GENERAL HEALTHY (NON-DISABLED) PENSIONERS AND ALL BENEFICIARIES

Legend: Expected - Current | Actual | Expected - Proposed

Year ended June 30,	Expected - Current	Actual	Expected - Proposed
2012	22	16	21
2013	23	33	22
2014	23	31	22
2015	26	23	24
2016	27	35	25
Total	121	138	114

CHART 7: POST-RETIREMENT DEATHS
SAFETY AND PROBATION HEALTHY (NON-DISABLED) PENSIONERS

Legend: Expected - Current | Actual | Expected - Proposed

Year ended June 30,	Expected - Current	Actual	Expected - Proposed
2012	0	0	0
2013	1	3	1
2014	1	1	1
2015	1	0	1
2016	2	3	2
Total	5	7	5

CHART 8: LIFE EXPECTANCIES
GENERAL HEALTHY (NON-DISABLED) PENSIONERS AND ALL BENEFICIARIES
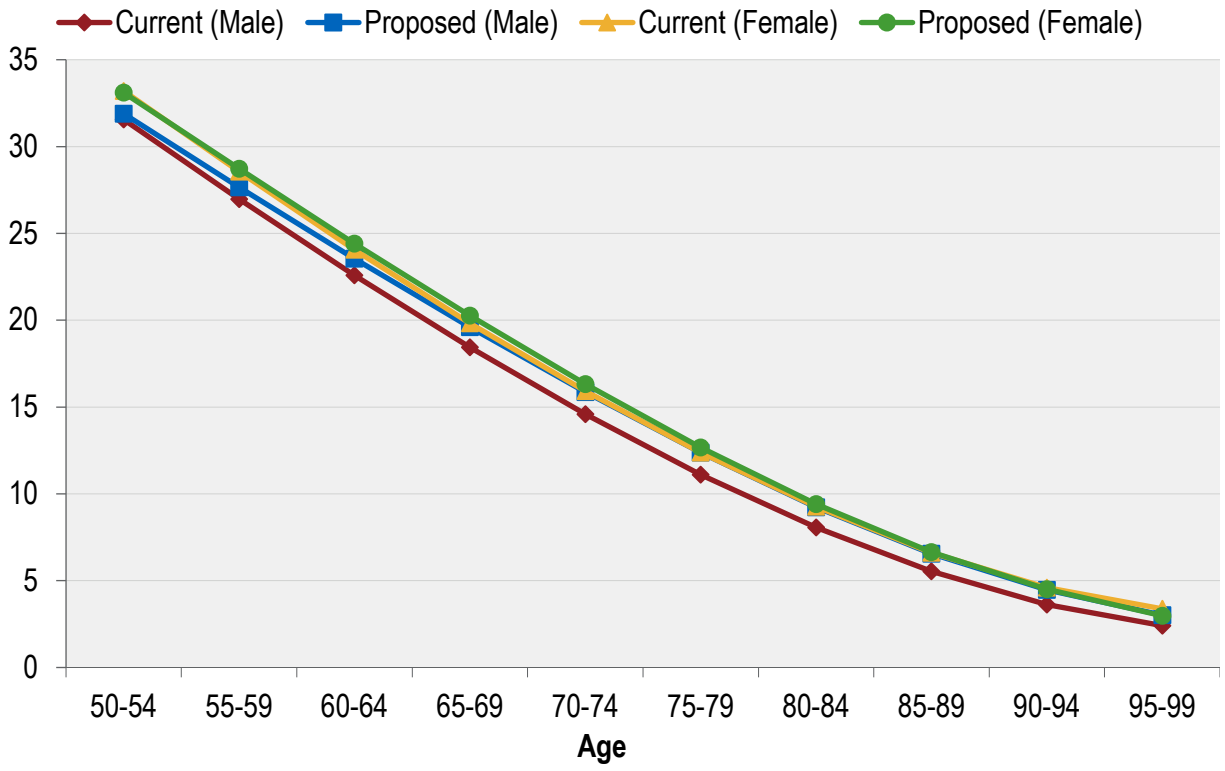
CHART 9: LIFE EXPECTANCIES
SAFETY AND PROBATION HEALTHY (NON-DISABLED) PENSIONERS

✶ Segal Consulting 30
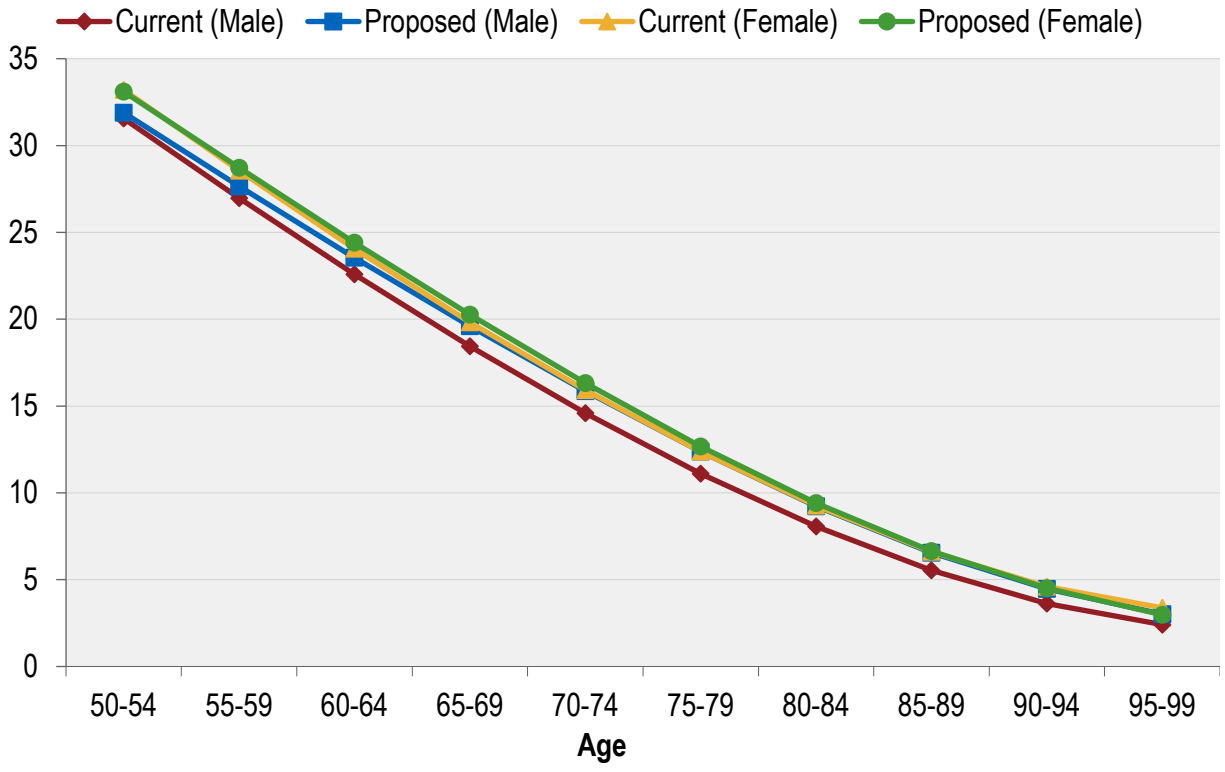
C. Mortality Rates - Disabled

Since death rates for disabled members can be higher than for healthy members, a different mortality assumption is often used. The tables currently being used are the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set forward four years for General, Safety, and Probation males and females.

We are recommending a change to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two dimensional improvement Scale MP-2016, set forward four years for males and set forward six years for females.

The number of actual deaths compared to the number expected for the last five years under the current and the proposed assumptions are as follows:

Year Ending June 30,	Disabled General Pensioners			Disabled Safety & Probation Pensioners		
	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
2012	2	3	2	1	0	1
2013	3	3	3	2	2	2
2014	2	5	2	2	2	2
2015	2	3	2	1	2	1
2016	3	2	3	2	2	1
Total	12	16	12	8	8	7
Actual / Expected	133%		133%	100%		114%

Year Ending June 30,	All Disabled Pensioners Combined		
	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
2012 - 2016	20	24	19
Actual / Expected	120%		126%

Based on the combined experience for all disabled retirees, the tables recommended for healthy mortality, and the margin for mortality improvement discussed earlier, we are recommending a change to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set forward four years for males and set forward six years for females for the General, Safety, and Probation membership groups. Note that the proposed disability mortality tables for all members combined will provide our preferred margin of at least 20% based on the experience over the latest five-year period.

Charts 10 and 11 compare actual to expected deaths under both the current and proposed assumptions for disabled members over the last five years. Chart 12 shows the life expectancies under both the current and proposed tables.
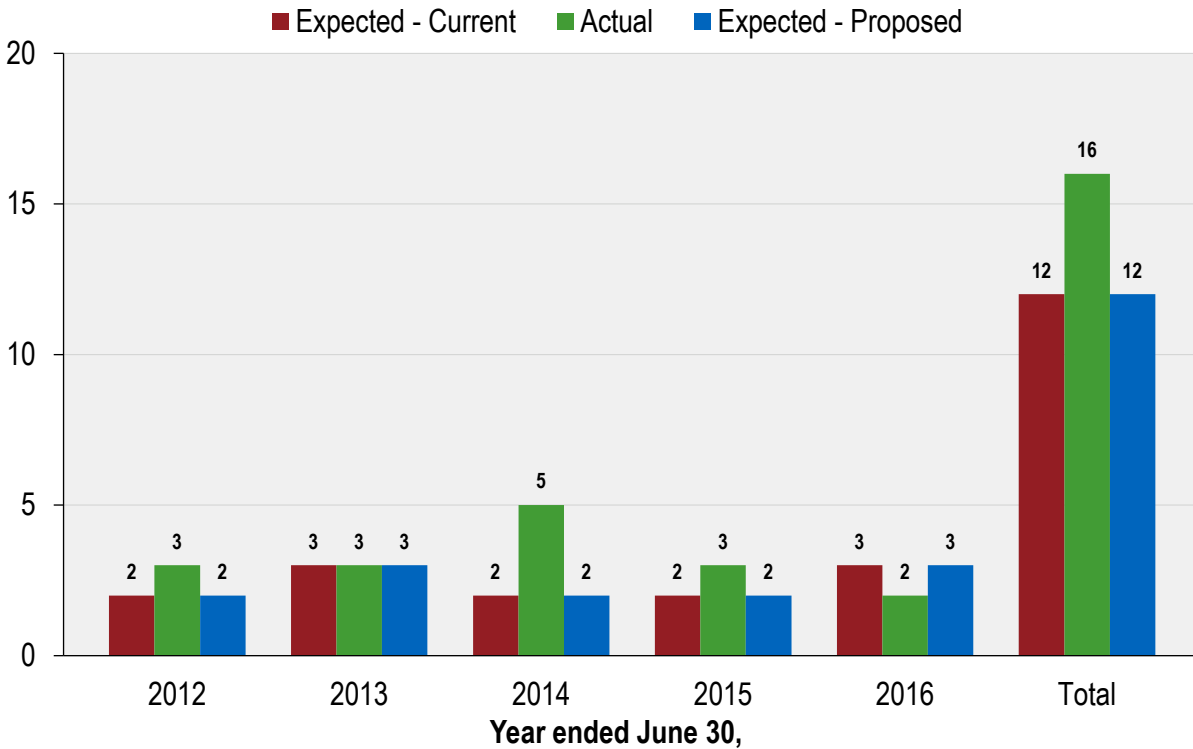
**CHART 10: POST-RETIREMENT DEATHS
DISABLED GENERAL PENSIONERS**

**CHART 11: POST-RETIREMENT DEATHS
DISABLED SAFETY AND PROBATION PENSIONERS**
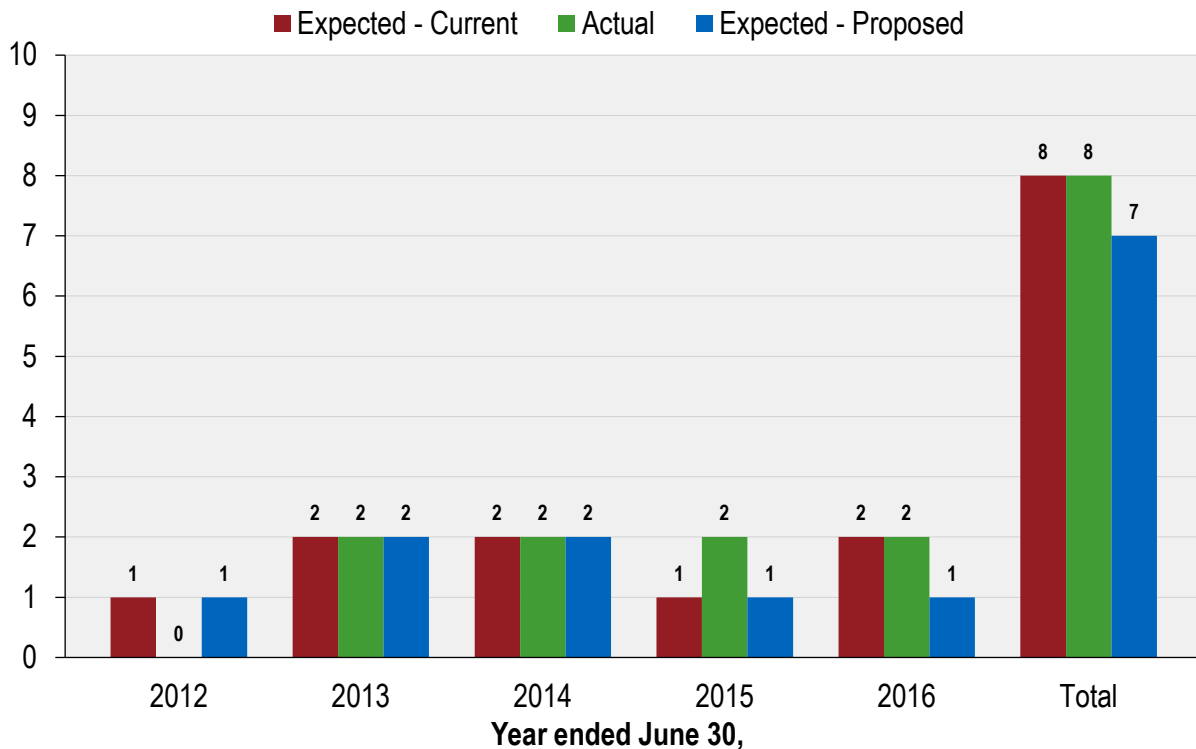
CHART 12: LIFE EXPECTANCIES
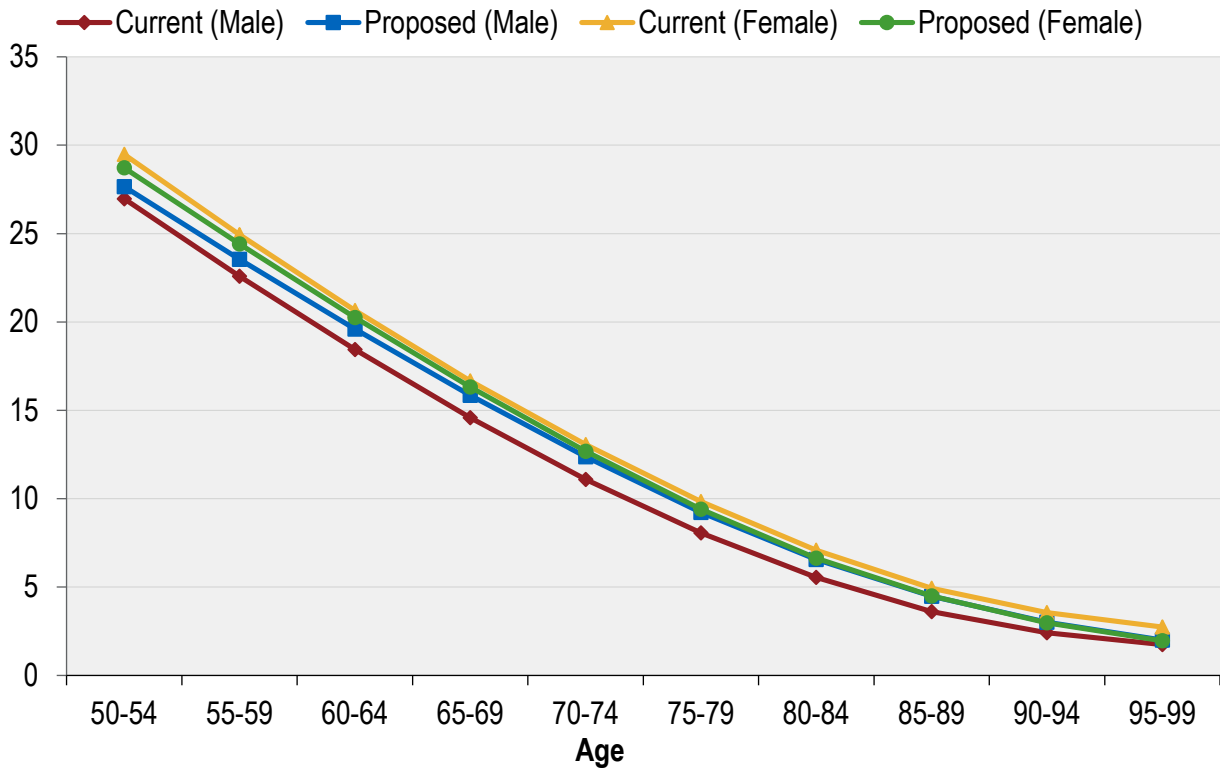## DISABLED PENSIONERS

Legend: Current (Male) · Proposed (Male) · Current (Female) · Proposed (Female)

Age: 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85-89, 90-94, 95-99

D. Termination Rates

Termination rates include all terminations for reasons other than death, disability, or retirement. Under the current assumptions, there is a separate set of assumptions for members with less than five years of service and for members with five or more years of service (which is an age-based assumption). There is also another set of assumptions to anticipate the percentage of members who will withdraw their contributions or who will leave their contributions on deposit and receive a deferred vested benefit.

The termination experience over the last three years split between those members with under five years of service and those with five or more years of service is shown below:

General Members – Less Than Five Years of Service

Years of Service	Rate of Termination (%)		
	Current Assumption	Actual Rate of Termination	Proposed Assumption
0	18.00	25.79	22.00
1	16.00	16.60	16.00
2	14.00	14.88	14.00
3	12.00	11.86	13.00
4	10.00	17.74	12.00

Safety and Probation Members – Less Than Five Years of Service

Years of Service	Rate of Termination (%)		
	Current Assumption	Actual Rate of Termination	Proposed Assumption
0	13.50	18.18	16.00
1	11.50	13.89	13.00
2	9.50	10.00	10.00
3	7.50	14.29	9.00
4	5.50	20.00	8.00

General Members – Five or More Years of Service

Age	Rate of Termination (%)*		
	Current Assumption	Actual Rate of Termination	Proposed Assumption
20 – 24	6.50	0.00**	7.50
25 – 29	6.50	0.00	7.50
30 – 34	6.50	5.80	7.50
35 – 39	6.50	9.72	7.50
40 – 44	6.50	5.94	7.50
45 – 49	6.50	6.77	7.50
50 – 54	6.50	15.60	7.50
55 – 59	5.50	6.42	6.50
60 – 64	4.50	7.96	5.50
65 – 69	3.50	12.77	4.50

Safety and Probation Members – Five or More Years of Service

Age	Rate of Termination (%)*		
	Current Assumption	Actual Rate of Termination	Proposed Assumption
20 – 24	5.00	0.00**	7.00
25 – 29	4.50	0.00	6.00
30 – 34	4.00	5.88	5.00
35 – 39	3.50	4.69	4.00
40 – 44	3.00	2.90	3.00
45 – 49	2.50	4.17	2.50
50 – 54	0.50	12.50	2.00
55 – 59	0.00	0.00	0.00

* *At central age in age range shown.*
** *There were no eligible members in this age category.*

Chart 13 compares actual to expected terminations of the past three years for both the current and proposed assumptions.

Chart 14 shows the current and proposed termination rates for General members with less than five years of service. Chart 15 shows the same information as Chart 14, but for Safety and Probation members combined.

Chart 16 shows the current and proposed termination rates for General members with five or more years of service. Chart 17 shows the same information as Chart 16, but for Safety and Probation members combined.

Based upon the recent experience, the proposed termination rates have mainly been increased. We continue to assume that all termination rates are zero for all members eligible to retire, that is, members eligible to retire at termination will retire rather than elect a refund or defer their benefit.

The following table shows the recommended percentages for members who are anticipated to withdraw their contributions and members who will leave their contributions on deposit and receive a deferred vested benefit. The current assumption is that 85% of all members who terminate with less than five years of service would withdraw and receive a refund and the other 15% would choose a deferred vested benefit. For the members with five or more years of service, the current assumption is that 25% of all members who terminate would withdraw and receive a refund and the other 75% would choose a deferred vested benefit. We recommend that these assumptions be maintained for the June 30, 2017 valuation.

Less Than Five Years of Service

	Withdrawal (%)			Vested Termination (%)		
Group	Current Assumption	Observed Withdrawal	Proposed Assumption	Current Assumption	Observed Vested Termination	Proposed Assumption
All Combined	85	82	85	15	18	15

Five or More Years of Service

	Withdrawal (%)			Vested Termination (%)		
Group	Current Assumption	Observed Withdrawal	Proposed Assumption	Current Assumption	Observed Vested Termination	Proposed Assumption
All Combined	25	24	25	75	76	75

CHART 13: ACTUAL NUMBER OF TERMINATIONS COMPARED TO EXPECTED
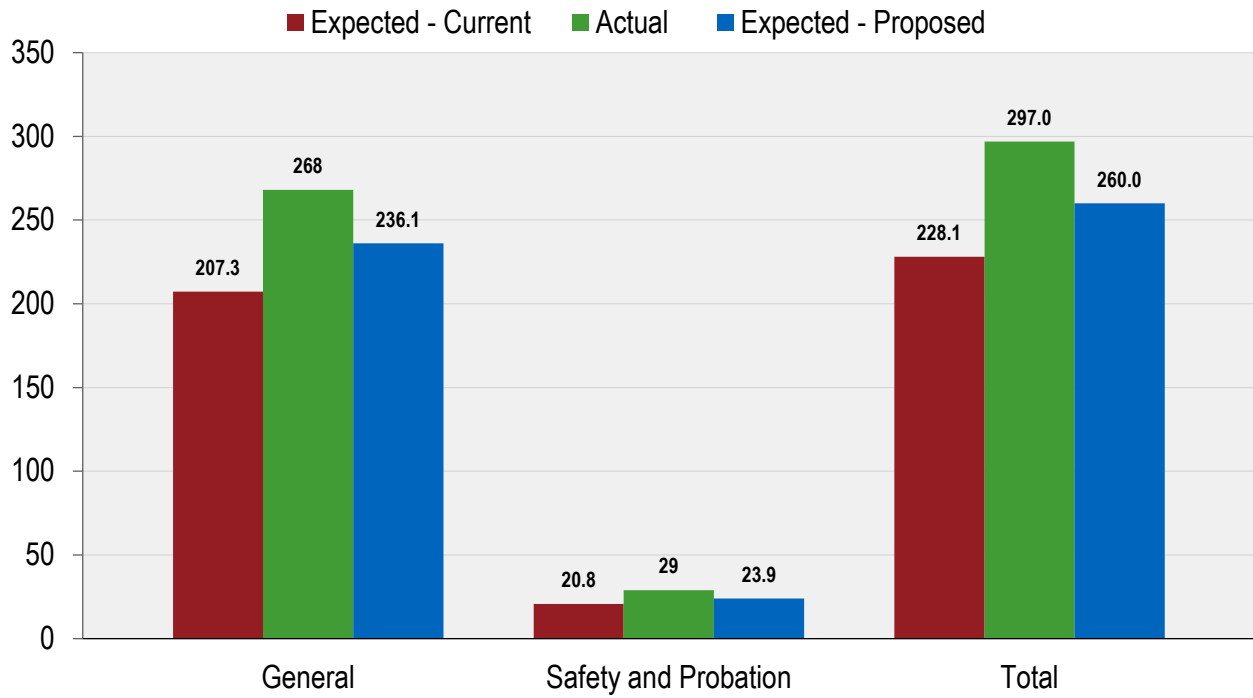
CHART 14: TERMINATION RATES – GENERAL MEMBERS LESS THAN FIVE YEARS OF SERVICE
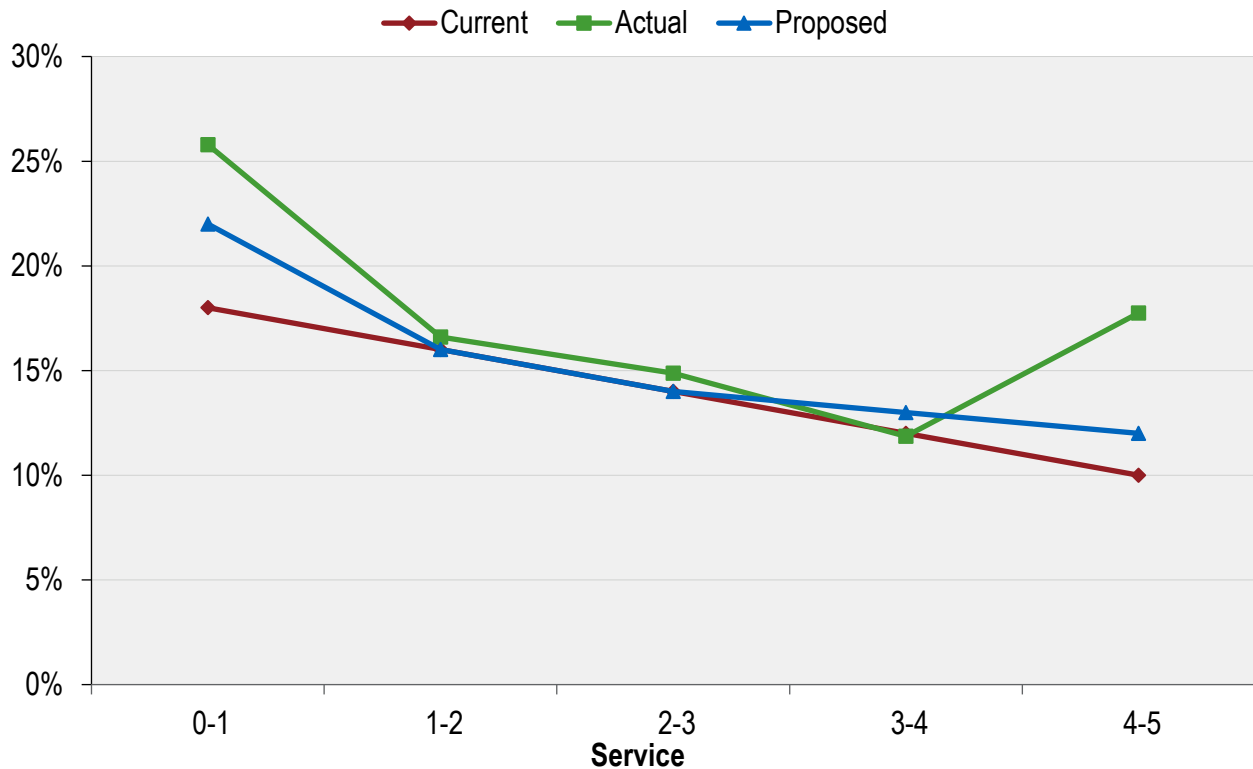
CHART 15: TERMINATION RATES – SAFETY AND PROBATION MEMBERS LESS THAN FIVE YEARS OF SERVICE
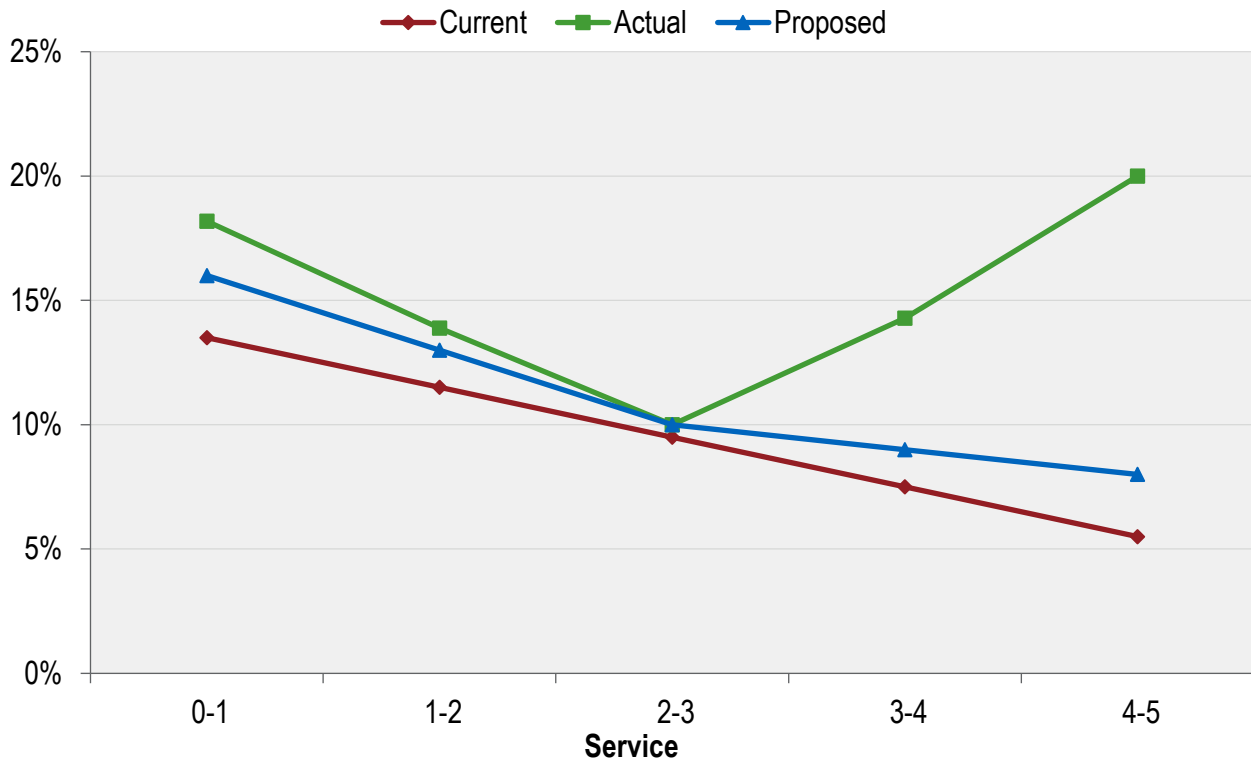
CHART 16: TERMINATION RATES – GENERAL MEMBERS FIVE OR MORE YEARS OF SERVICE
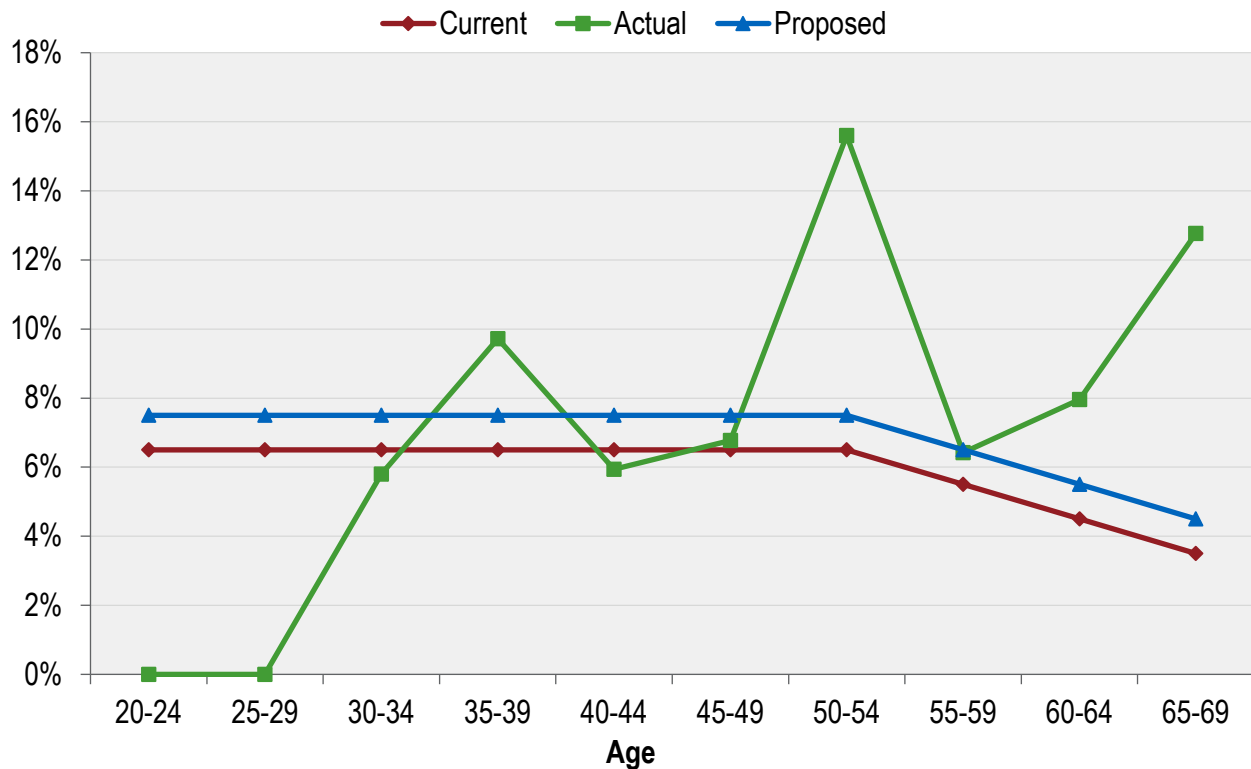
CHART 17: TERMINATION RATES – SAFETY AND PROBATION MEMBERS FIVE OR MORE YEARS OF SERVICE
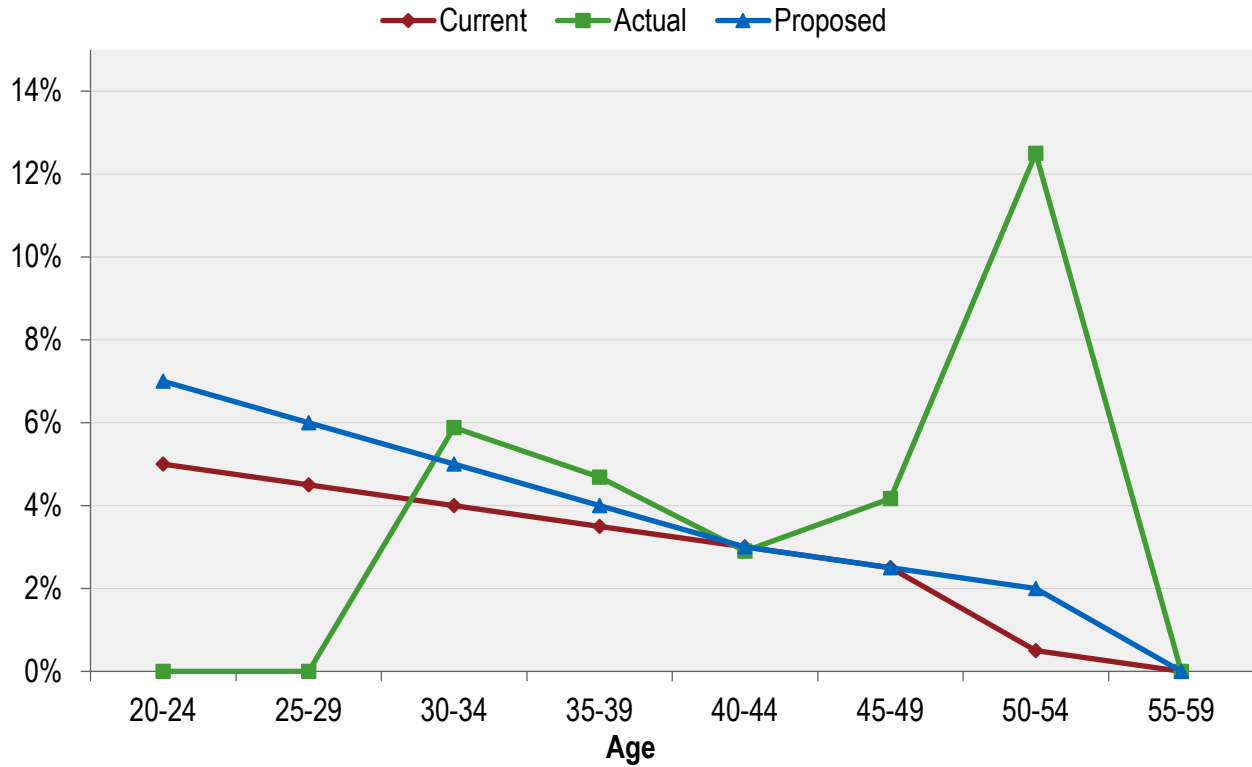
E. Disability Incidence Rates

When a member becomes disabled, he or she may be entitled to either a 50% of final average compensation pension (service connected disability), or a pension that depends upon the member's years of service (non-service connected disability). The following summarizes the actual incidence of combined service and non-service connected disabilities over the past three years compared to the current and proposed assumptions for combined service and non-service connected disability incidence:

General Members

	Rate of Disability Incidence* (%)		
Age	Current Assumption	Actual Rate of Disability	Proposed Assumption
20 – 24	0.01	0.00	0.01
25 – 29	0.01	0.00	0.01
30 – 34	0.01	0.00	0.01
35 – 39	0.02	0.00	0.02
40 – 44	0.20	0.00[1]	0.20
45 – 49	0.50	0.00[2]	0.45
50 – 54	0.55	0.24	0.55
55 – 59	0.60	1.33	0.60
60 – 64	0.65	0.51	0.60
65 – 69	0.60	0.83	0.65

[1] *0.08% in the prior experience study*
[2] *0.50% in the prior experience study*

Safety and Probation Members

	Rate of Disability Incidence* (%)		
Age	Current Assumption	Actual Rate of Disability	Proposed Assumption
20 – 24	0.10	0.00	0.10
25 – 29	0.15	0.00	0.15
30 – 34	0.20	0.00	0.20
35 – 39	0.75	2.74	1.50
40 – 44	1.25	1.30	1.75
45 – 49	1.50	1.90	1.75
50 – 54	2.75	2.50	2.75
55 – 59	2.75	2.63	2.75

* At central age in age range shown. Note that the actual rates of disability include new disabled retirees from prior inactive and service retired statuses, since we understand that, in some circumstances, MCERA classifies members in these statuses prior to the disability being granted.

Chart 18 compares the actual number of service and non-service connected disabilities over the past three years to that expected under both the current and proposed assumptions. The proposed

disability rates were adjusted to reflect the past three years' experience. Chart 19 shows actual disablement rates, compared to the assumed and proposed rates for General members. Chart 20 shows the same information for Safety and Probation members.

Since 33% of all new disabled General members in the prior three-year period have received a service connected disability, we recommend that 35% of the proposed rates be used to anticipate service connected disability retirement (reduced from the current assumption of 40%). The remaining 65% of the rates will be used to anticipate non-service connected disability.

Since 100% of all new disabled Safety and Probation members in the prior three-year period have received a service connected disability (observed experience for the prior three-year period was also 100%), we recommend that 95% of the proposed rates be used to anticipate service connected disability retirement (increased from the current assumption of 90%). The remaining 5% of the rates will be used to anticipate non-service connected disability.

CHART 18: ACTUAL NUMBER OF DISABILITIES COMPARED TO EXPECTED
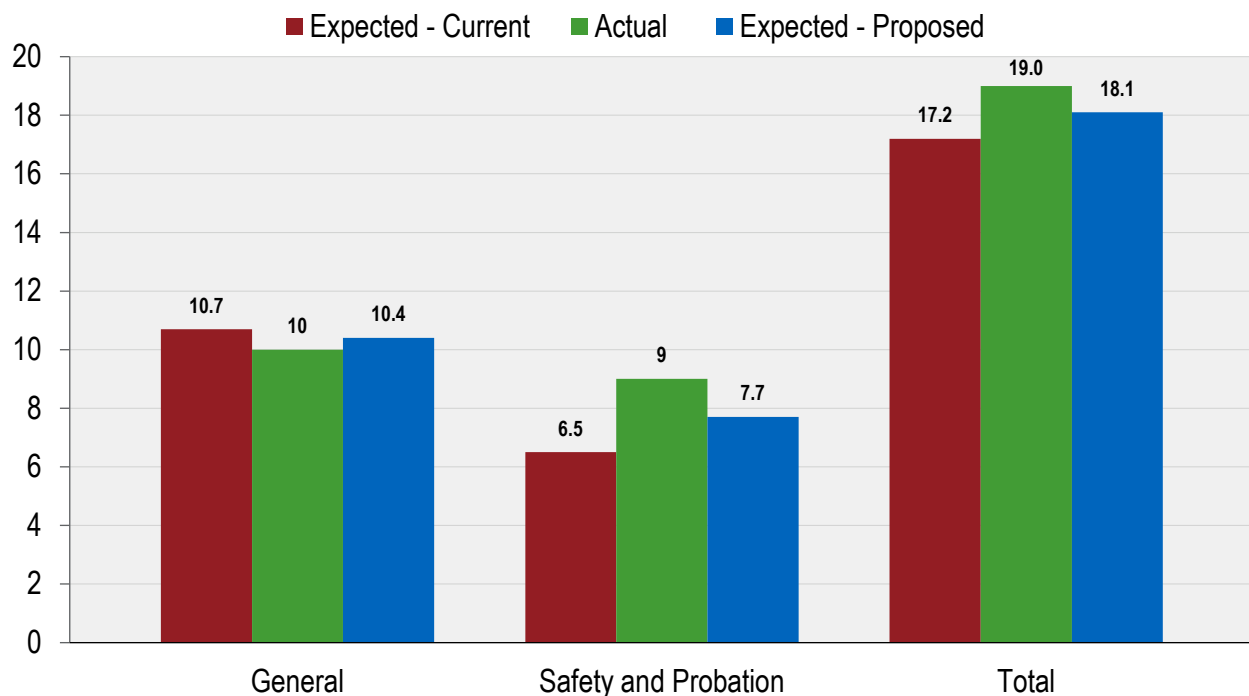
CHART 19: DISABLEMENT RATES
GENERAL MEMBERS
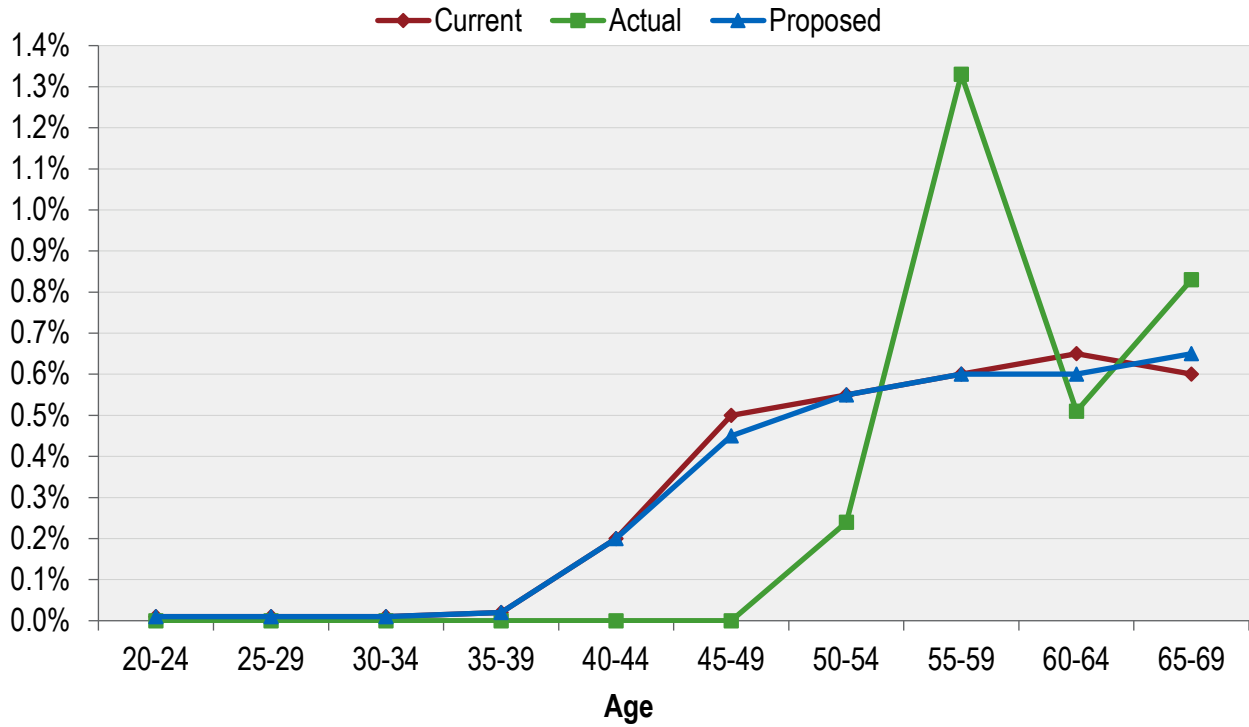
0.08% for ages 40-44 and 0.50% for ages 45-49 in the prior experience study

CHART 20: DISABLEMENT RATES
SAFETY AND PROBATION MEMBERS

F. Sick Leave

The current assumption for converting unused sick leave into additional service credit at retirement is that for each year of employment, an employee will convert approximately 0.019 years of sick leave into additional service credit at retirement. We have observed that the conversion of sick leave for new service retirees over each of the last three years has averaged about 0.017 years for each year of employment. Based on this observed experience, we recommend that th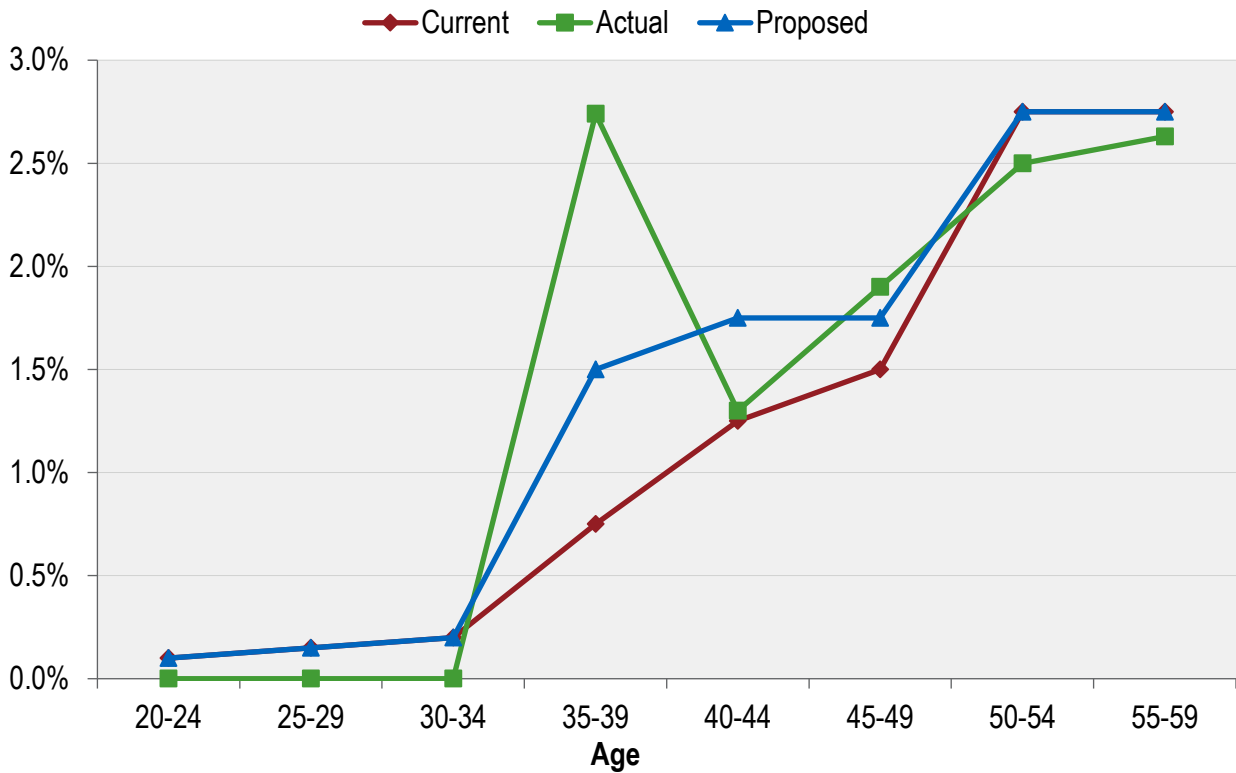e sick leave conversion assumption be lowered to 0.018 years of additional service credit at retirement, for each year of employment.

G. Vacation Cash Outs

As previously discussed with the Board in our letter dated November 28, 2012, we understand that for non-CalPEPRA member's payments received from vacation cash outs are generally considered compensation earnable. Prior to the June 30, 2016 valuation, these amounts have been reported in the aggregate to the actuary, together with other elements of compensation earnable outside of base pay. However, if an active member were to have relatively lower vacation cash outs during employment compared to the final salary averaging period, the Association would experience an increase in the UAAL when such higher cash outs are ultimately used in determining the retirement benefit.

We have been exploring with the employer the feasibility of collecting historical vacation cash out data in order to determinate whether an assumption to anticipate conversion of relatively higher amounts of vacation cash outs immediately before retirement is warranted for inclusion in future actuarial valuations. For the June 30, 2016 valuation, we received for the first time separate identification of the vacation cash out amounts for active members, along with a file of historical vacation cash out amounts for new retirees during 2015/2016. Based on a recent conversation with the Association's staff, we will work with them to refine the vacation cash out information we receive for future valuations so that we can reconcile any discrepancies we have observed in the vacation cash out data for new retirees compared to the past information we have received for these members as active employees. In addition, we anticipate that we would have more than one year of experience available at the time of the next experience study in order to study the feasibility of developing a vacation cash out assumption.

V. Cost Impact

The table below shows the changes in the total normal cost and actuarial accrued liability due to the proposed assumption changes, as if they were applied in the June 30, 2016 actuarial valuation. If all of the proposed assumption changes were implemented, the total normal cost would have increased by about $0.52 million and the actuarial accrued liability would have increased by about $27.2 million.

	Change in Plan Liabilities, as of June 30, 2016 ($ in Thousands)		
	Current Assumptions	Proposed Assumptions	Increase / (Decrease)
Total Employer and Employee Normal Cost	$12,797	$13,317	$520
Actuarial Accrued Liability			
Active Members	$189,735	$197,216	$7,481
Inactive Vested Members	33,545	34,461	916
Retired Members and Beneficiaries	408,777	427,564	18,787
Total	**$632,057**	**$659,241**	**$27,184**

The table below details the change in the employer contributions due to the proposed assumption changes. The contributions are shown with the increase in the actuarial accrued liability being amortized as a level percentage of pay over 18 years. The cost increase was mostly due to the recommended change in the investment return and mortality assumptions.

As shown in the table below, the total percent of pay cost increase for the employer based on the 18-year amortization period is approximately 4.12%. The total percent of pay cost increase for the employee is approximately 0.42%. The expected payroll for Plan Year beginning June 30, 2016 is approximately $61.1 million.

	Change in Employer Contributions, 18-Year Amortization
	% of Pay, End of Each Pay Period
Increase in Employer Normal Cost	0.47%
Increase in UAAL Contributions	3.65%
Total Increase in Costs for the Employer	**4.12%**

Appendix A: Current Actuarial Assumptions

Post-Retirement Mortality Rates:

Healthy Members and All Beneficiaries:

➤ **All members and all beneficiaries:** RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females.

Disabled Members:

➤ **All members:** RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set forward four years for both males and females.

Employee Contribution Rates:

➤ **General members:** RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females, weighted 30% male and 70% female.

➤ **Safety and Probation members:** RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and with no setback for females, weighted 80% male and 20% female.

Mortality Rates Before Retirement

	Rate (%)			
	General[1]		**Safety and Probation**[2]	
Age	**Male**	**Female**	**Male**	**Female**
25	0.04	0.02	0.04	0.02
30	0.04	0.02	0.04	0.02
35	0.07	0.04	0.07	0.04
40	0.10	0.07	0.10	0.07
45	0.13	0.11	0.13	0.11
50	0.19	0.16	0.19	0.16
55	0.30	0.25	0.30	0.25
60	0.53	0.41	0.53	0.41
65	0.90	0.76	0.90	0.76

1 *10% of General deaths are assumed to be service connected deaths. The other 90% are assumed to be non-service connected deaths.*

2 *50% of Safety and Probation deaths are assumed to be service connected deaths. The other 50% are assumed to be non-service connected deaths.*

Disability Rates

	Rate (%)		
Age	General[1]	Safety[2]	Probation[2]
20	0.01	0.10	0.10
25	0.01	0.13	0.13
30	0.01	0.18	0.18
35	0.02	0.53	0.53
40	0.13	1.05	1.05
45	0.38	1.40	1.40
50	0.53	2.25	2.25
55	0.58	2.75	2.75
60	0.63	0.00	0.00

1   *40% of General disabilities are assumed to be service connected disabilities. The other 60% are assumed to be non-service connected disabilities.*

2   *90% of Safety and Probation disabilities are assumed to be service connected disabilities. The other 10% are assumed to be non-service connected disabilities.*

Termination Rates

Years of Service	Rate (%) Termination Less than 5 Years of Service[1]		
	General	Safety	Probation
0	18.00	13.50	13.50
1	16.00	11.50	11.50
2	14.00	9.50	9.50
3	12.00	7.50	7.50
4	10.00	5.50	5.50

Age	Rate (%) Termination 5 or More Years of Service[2]		
	General	Safety	Probation
20	6.50	5.00	5.00
25	6.50	4.70	4.70
30	6.50	4.20	4.20
35	6.50	3.70	3.70
40	6.50	3.20	3.20
45	6.50	2.70	2.70
50	6.50	1.30	1.30
55	5.90	0.20	0.20
60	4.90	0.00	0.00
65	3.90	0.00	0.00

1 *85% of all terminated members will choose a refund of contributions and 15% will choose a deferred vested benefit. No termination is assumed after a member is eligible for retirement.*

2 *25% of all terminated members will choose a refund of contributions and 75% will choose a deferred vested benefit. No termination is assumed after a member is eligible for retirement.*

Retirement Rates

Age	Rate (%)					
	General Tiers 1, 2, & 3	General Tier 4	Safety Tiers 1 & 2	Safety Tier 3	Probation Tiers 1 & 2	Probation Tier 3
50	6.00	0.00	8.00	3.00	5.00	4.00
51	6.00	0.00	8.00	3.00	5.00	4.00
52	6.00	6.00	8.00	3.00	5.00	4.00
53	6.00	3.00	8.00	3.00	5.00	4.00
54	6.00	3.00	8.00	3.00	5.00	4.00
55	10.00	5.00	9.00	4.00	24.00	14.00
56	10.00	5.00	9.00	6.00	24.00	25.00
57	10.00	5.00	10.00	7.00	24.00	25.00
58	10.00	5.00	20.00	9.00	24.00	25.00
59	10.00	5.00	30.00	30.00	24.00	25.00
60	12.00	6.00	100.00	100.00	100.00	100.00
61	20.00	9.00	100.00	100.00	100.00	100.00
62	26.00	12.00	100.00	100.00	100.00	100.00
63	20.00	14.00	100.00	100.00	100.00	100.00
64	20.00	12.00	100.00	100.00	100.00	100.00
65	45.00	32.00	100.00	100.00	100.00	100.00
66	45.00	32.00	100.00	100.00	100.00	100.00
67	45.00	32.00	100.00	100.00	100.00	100.00
68	45.00	32.00	100.00	100.00	100.00	100.00
69	45.00	32.00	100.00	100.00	100.00	100.00
70	100.00	100.00	100.00	100.00	100.00	100.00

Retirement Age and Benefit for Deferred Vested Members:	For deferred vested members, retirement age assumptions are as follows:
	
	    General Age: 60
	    Safety and Probation Age: 55
	
	For future deferred vested members who terminate with less than five years of service and are not vested, it is assumed they will retire at age 70 if they decide to leave their contributions on deposit.
	
	It is assumed that 60% of future deferred vested members will continue to work for a reciprocal employer. For reciprocals, 4.25% compensation increases per annum are assumed.

Future Benefit Accruals:	1.0 year of service per year of employment plus 0.019 years of additional service to anticipate conversion of unused sick leave for each year of employment, for members expected to retire directly from active employment and to receive a service retirement benefit.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Inclusion of Deferred Vested Members:	All deferred vested members are included in the valuation.
Percent Married:	75% of male members; 50% of female members.
Age of Spouse:	Female (or male) spouses are 3 years younger (or older) than their spouses.
Net Investment Return:	7.25% per annum
Employee Contribution Crediting Rate:	7.25% per annum
Consumer Price Index:	Increase of 3.25% per year, retiree COLA increases due to CPI for General Tiers 1, 2, and 3, Safety Tiers 1 and 2, and Probation Tiers 1 and 2 subject to a 3% maximum change per year (no COLA increases for General Tier 4, Safety Tier 3, or Probation Tier 3).

Salary Increases

Annual Rate of Compensation Increase (%)		
Inflation: 3.25%; plus an additional 0.50% "across the board" salary increases (other than inflation); plus the following Merit and Promotional increases based on years of service.		
Years of Service	**General**	**Safety and Probation**
0 - 1	5.00	5.00
1 – 2	3.75	3.75
2 - 3	3.50	3.00
3 – 4	2.75	2.25
4 – 5	2.25	1.00
5+	0.50	0.50

Appendix B: Proposed Actuarial Assumptions

Post-Retirement Mortality Rates:

Healthy Members and All Beneficiaries:

➤ **All members and all beneficiaries:** RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females.

Disabled Members:

➤ **All members:** RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set forward four years for males and set forward six years for females.

Employee Contribution Rates:

➤ **General members:** RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females, weighted 30% male and 70% female.

➤ **Safety and Probation members:** RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables projected 20 years with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females, weighted 80% male and 20% female.

Mortality Rates Before Retirement[1]

	Rate (%)			
	General[2]		Safety[3]	
Age	Male	Female	Male	Female
25	0.05	0.02	0.05	0.02
30	0.05	0.02	0.05	0.02
35	0.05	0.03	0.05	0.03
40	0.07	0.05	0.07	0.05
45	0.09	0.08	0.09	0.08
50	0.15	0.13	0.15	0.13
55	0.25	0.19	0.25	0.19
60	0.42	0.28	0.42	0.28
65	0.75	0.42	0.75	0.42

1   *Based on the RPH-2014 (Headcount-Weighted) Employee Mortality Tables projected 20 year with the two-dimensional improvement Scale MP-2016, set back one year for males and set forward one year for females.*

2   *100% of General deaths are assumed to be non-service connected deaths.*

3   *100% of Safety and Probation deaths are assumed to be service connected deaths.*

Disability Rates

	Rate (%)		
Age	General[1]	Safety[2]	Probation[2]
20	0.01	0.10	0.10
25	0.01	0.13	0.13
30	0.01	0.18	0.18
35	0.02	0.98	0.98
40	0.13	1.65	1.65
45	0.35	1.75	1.75
50	0.51	2.35	2.35
55	0.58	2.75	2.75
60	0.60	0.00	0.00
65	0.63	0.00	0.00

1   *35% of General disabilities are assumed to be service connected disabilities. The other 65% are assumed to be non-service connected disabilities.*

2   *95% of Safety and Probation disabilities are assumed to be service connected disabilities. The other 5% are assumed to be non-service connected disabilities.*

Termination Rates

Years of Service	Rate (%) Termination Less than 5 Years of Service[1]		
	General	Safety	Probation
0	22.00	16.00	16.00
1	16.00	13.00	13.00
2	14.00	10.00	10.00
3	13.00	9.00	9.00
4	12.00	8.00	8.00

Age	Rate (%) Termination 5+ Years of Service[2]		
	General	Safety	Probation
20	7.50	7.40	7.40
25	7.50	6.40	6.40
30	7.50	5.40	5.40
35	7.50	4.40	4.40
40	7.50	3.40	3.40
45	7.50	2.70	2.70
50	7.50	2.20	2.20
55	6.90	0.80	0.80
60	5.90	0.00	0.00
65	4.90	0.00	0.00

1   *85% of all terminated members will choose a refund of contributions and 15% will choose a deferred vested benefit. No termination is assumed after a member is eligible for retirement.*

2   *25% of all terminated members will choose a refund of contributions and 75% will choose a deferred vested benefit. No termination is assumed after a member is eligible for retirement.*

Retirement Rates

Age	Rate (%)					
	General Tiers 1, 2, & 3	General Tier 4	Safety Tiers 1 & 2	Safety Tier 3	Probation Tiers 1 & 2	Probation Tier 3
50	6.00	0.00	8.00	3.00	5.00	4.00
51	6.00	0.00	8.00	3.00	5.00	4.00
52	6.00	6.00	8.00	3.00	5.00	4.00
53	6.00	3.00	8.00	3.00	5.00	4.00
54	6.00	3.00	8.00	3.00	5.00	4.00
55	11.00	5.00	9.00	4.00	20.00	11.00
56	11.00	5.00	9.00	6.00	20.00	21.00
57	11.00	5.00	10.00	7.00	20.00	21.00
58	11.00	5.00	20.00	9.00	20.00	21.00
59	11.00	5.00	30.00	30.00	20.00	21.00
60	12.00	6.00	100.00	100.00	100.00	100.00
61	16.00	9.00	100.00	100.00	100.00	100.00
62	30.00	12.00	100.00	100.00	100.00	100.00
63	20.00	14.00	100.00	100.00	100.00	100.00
64	20.00	12.00	100.00	100.00	100.00	100.00
65	45.00	32.00	100.00	100.00	100.00	100.00
66	45.00	32.00	100.00	100.00	100.00	100.00
67	45.00	32.00	100.00	100.00	100.00	100.00
68	45.00	32.00	100.00	100.00	100.00	100.00
69	45.00	32.00	100.00	100.00	100.00	100.00
70	100.00	100.00	100.00	100.00	100.00	100.00

Retirement Age and Benefit for Deferred Vested Members:	For deferred vested members, retirement age assumptions are as follows: General Age: 60 Safety and Probation Age: 55 For future deferred vested members who terminate with less than five years of service and are not vested, it is assumed they will retire at age 70 if they decide to leave their contributions on deposit. It is assumed that 60% of future deferred vested members will continue to work for a reciprocal employer. For reciprocals, 4.00% compensation increases per annum are assumed.
Future Benefit Accruals:	1.0 year of service per year of employment plus 0.018 years of additional service to anticipate conversion of unused sick leave for each year of employment, for members expected to retire directly from active employment and to receive a service retirement benefit.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Inclusion of Deferred Vested Members:	All deferred vested members are included in the valuation.
Percent Married:	75% of male members; 50% of female members.
Age of Spouse:	Female (or male) spouses are 2 years younger (or older) than their spouses.
Net Investment Return:	7.00% per annum
Employee Contribution Crediting Rate:	7.00% per annum
Consumer Price Index:	Increase of 3.00% per year, retiree COLA increases due to CPI for General Tiers 1, 2, and 3, Safety Tiers 1 and 2, and Probation Tiers 1 and 2 subject to a 3% maximum change per year (no COLA increases for General Tier 4, Safety Tier 3, or Probation Tier 3).

Salary Increases

Annual Rate of Compensation Increase (%)		
Inflation: 3.00%; plus an additional 0.50% "across the board" salary increases (other than inflation); plus the following Merit and Promotional increases based on years of service.		
Years of Service	**General**	**Safety and Probation**
0 – 1	5.00	5.00
1 – 2	3.75	3.75
2 – 3	3.50	3.00
3 – 4	2.75	2.25
4 – 5	2.25	1.00
5 – 6	1.75	0.75
6 – 7	1.50	0.75
7 – 8	1.25	0.75
8 – 9	1.00	0.75
9 – 10	0.75	0.75
10+	0.50	0.50

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